

Service
Service
Service

Interactive
Media
Systems

CDI



Service Manual



/20/25 are PAL players

These sets are equipped with Compact Disc Mechanism type CDM9; service code 4822 691 30275. This CDM is also used in CDI200 CDI205, CDI220 and CDI910. Service information is included in this manual.

SURVEY OF MAINPANELS

Version	Mainpanel	LCD-display
/00	4822 214 60019	4822 130 91194
/05	4822 214 60021	4822 130 91194
/20	4822 214 52135	4822 214 52133
/25	4822 214 52136	4822 214 52133

The mainpanels must be repaired via the central repair procedure. If the defective item is on the circuitry of the μ P part, digital audio or the digital video part, see chapter 3.6.

(SF) Varoitus!
Laitte sisältää laseriodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilyä.

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

(DK) Advarsel!
Usynlig laserstråling 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. Safety components are marked by the symbol



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2. PRODUCT INFORMATION

2.1 TECHNICAL SPECIFICATION

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

Usable discs • Disques utilisables • Discos utilizables • Discos Utilizable • 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 UK: 240 V/50 Hz

Power consumption • Consommation • Consumo de corriente • Opgenomen vermogen • Leistungsaufnahme • Consumo di corrente • Consumo de Corriente
 Europe: 35 W with, 22 W without extension (22ER9141)
 Europe: 35 W avec, 22 W sans extension (22ER9141)
 UK: 34 W with, 21 W without extension (22ER9141)
 UK: 34 W avec, 21 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

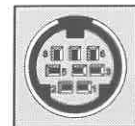
Relative humidity • Humidité relative • Humedad relative • Relatieve vochtigheid • Relative Feuchtigheit • Umidità relativa • Humedad relativa
 5% to 95% (no condensation)
 5% à 95% (sans condensation)

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 • Eingang • Eingang • Ingresso • Entradas
 remote in 2 V_{pp} at 2.2 kOhm cinch socket
 Prise cinch 2 V_{c-c} à 2,2 kOhm

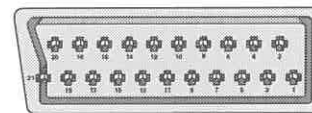
input (2 ports) 8-pin mini-DIN
 (2 entrées) mini DIN 8 broches



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.)	

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

AV/Euroconnector
 Péri-télévision A/V

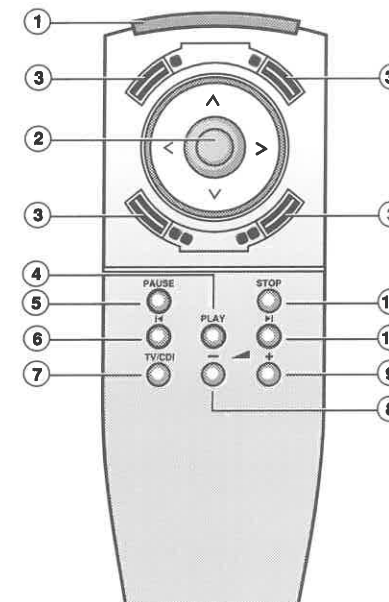
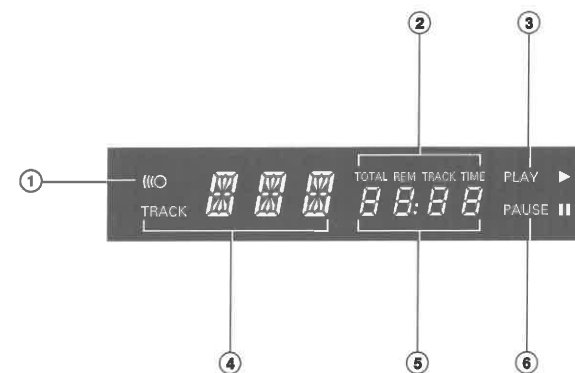
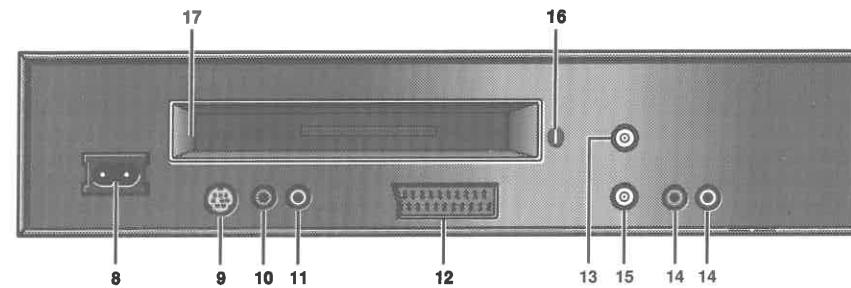
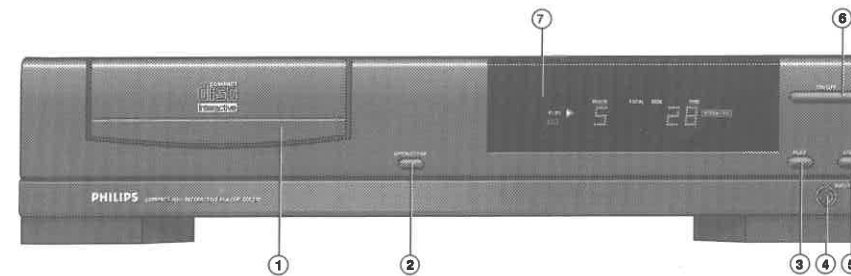


pin Broche	signal Signal
1	audio R / audio R (droite)
2	nc / non connecté
3	audio L / audio L (gauche)
4	audio ground / masse audio
5	blue ground / masse bleu
6	nc / non connecté
7	blue / bleu
8	slow switching (0=TV 1=AV/Euroconnector) commutation lente (0=TV 1=Péri-télévision A/V)
9	green ground / masse 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

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

2.2 CONNECTION AND CONTROLS

CDI 210



DESCRIPTION OF CONTROLS AND CONNECTIONS

FRONT

1. Disc loading tray
2. Open/close button
3. Play button
4. Input port for CD-I pointing devices
5. Stop button
6. AC power on/off button
7. Soft tone multifunction display with infra-red remote control receiver

REAR

8. Mains AC (alternating current) input jack
9. Input2 port for CD-I pointing devices, keyboard or serial port
10. REMOTE (RC6) IN
11. Video output (CVBS)
12. A/V Euroconnector*
13. OUT TO TV*
14. Audio output R
15. Audio output L
16. IN FROM ANTENNA*
17. Channel selector* (for 22ER9141)*

DISPLAY PANEL

- 1 Remote control active (flashing indicator).
- 2 Time indicators
- 3 Disc playing (stepping indicator).
- 4 Track number (CD-Audio).
- 5 Elapsed or remaining time (CD-Audio).
- 6 CD pause active.

REMOTE CONTROL

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

*Available on some player versions only.

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.

Designs and specifications are subject to change without notice. * La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable. * Los diseños y las especificaciones están sujetos a cambios sin previo aviso. * Concepten en specificaties kunnen gewijzigd worden zonder voorafgaande verwittiging. * Änderungen 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.

2.3 BEFORE USING YOUR CD-I PLAYER

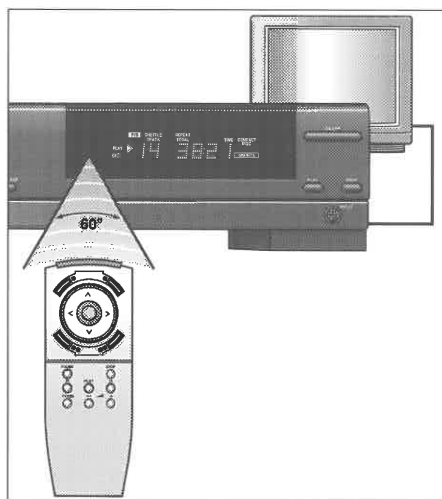
REMOVING THE TRANSIT PAD

- Press the on/off button on the player.
- Press the open/close button on the player to open the disc tray.
- Take the transit pad from the disc tray.
- Press the open/close button on the player to close the tray.
- To avoid damages to the CD-I player when transporting, keep the transit pad and reuse it whenever you are transporting the player.

REMOTE CONTROL INTERACTIVE OPERATION

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

- Aim the remote control at the player.
- Move the thumbstick to point the cursor arrow on the screen to the required function. The cursor arrow movement corresponds to the direction in which the stick is moved. The arrow moves faster if the stick is moved further.
- Click on one of the action buttons.



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

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

WIRED POINTING DEVICE OPERATION

Place the pointing device in front of the display screen, with the back (the cable end) pointed towards the screen. Now, as you roll the mouse, the trackerball or use the graphic tablet, the cursor moves in the corresponding direction on the screen.

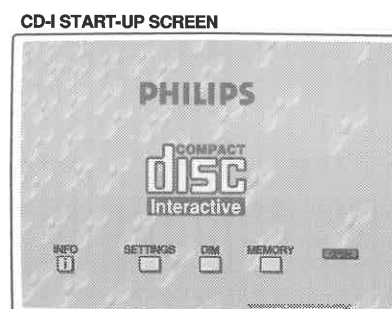
When the cursor is positioned on the required function click on one of the action buttons.

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

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

START-UP

- Press the power on/off button on the CD-I player, and check that the player display lights.
- Switch on the TV (and HiFi system if used).
- Select the CD-I input on the TV (and HiFi system if used).
- On the TV, the player start-up screen appears.

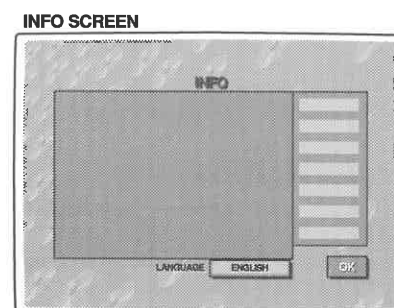


This screen has the following system function icons to guide and assist you. Select:

1. Info if you need help during start-up, or when playing CD-Audio discs. (available on some player versions only)
2. Settings to preselect your preferred start-up conditions.
3. Dim to reduce the screen brightness while the system is at rest.
4. Memory to refer to the intermediate results of CD-I titles and of FTS programs created for your CD-Audio discs.
5. Open/close to open or close the disc tray.

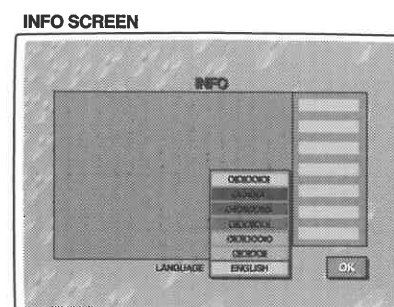
INFO

(available on some player versions only)



The info screens offer help related to the operating mode. Point-and-click on the function for which you need help.

If your player offers the feature to change languages, point-and-click on the language shown at the foot of the screen to get the full list, then point-and-click on your choice.

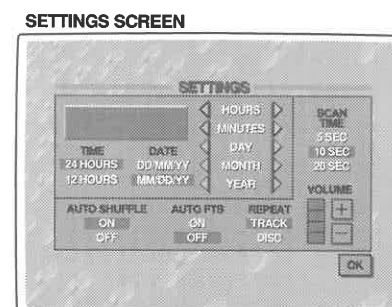


When finished, point-and-click on OK.

2.4 SETTING UP

SETTINGS

This screen allows you to change the player's settings. You can change the player's time and date and the way they are presented. For CD-Audio discs you can set repeat to repeat the whole disc or just the current track, set the scan time to 5, 10 or 20 seconds per track, and set the player to automatically select shuffle and/or FTS.



Time

Select 24 hour or 12 hour clock.

Date

Select dd/mm/yy to present the date in day-month-year sequence. Select mm/dd/yy to present the date in month-day-year sequence.

Time/date set

If the time or date shown on the screen is wrong, select the appropriate < and > arrows to set hours, minutes, day, month and year in turn, as required.

Scan time*

Select the time you want the beginning of each audio track to play for when the scan function is activated.

Auto shuffle* and auto FTS*

For each of these functions, select "on" if you want the function to be activated automatically when a disc is loaded.

Repeat*

Select to repeat a complete audio disc or a single track when the repeat function is activated.

Default Volume setting

Select + or - to increase resp. decrease the default volume, (-3dB per step).

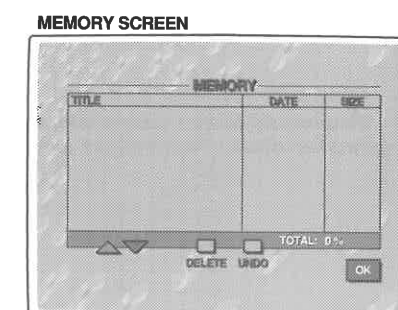
Note: Functions marked * are CD-Audio functions. When finished, point-and-click on OK

DIM

Selecting dim greatly reduces the brightness of the displayed picture. To restore the normal brightness simply deflect the thumbstick.

On all screens shown in this manual except CD Graphics screen, dim occurs automatically if the player is not used for a while.

MEMORY



The memory screen shows the information held in memory: titles, dates and percentage of memory used. Use the scroll arrows to move up and down the list. To delete an item, click on its title and then click on delete. If you change your mind after deleting, click on undo.

When finished, point-and-click on OK.

OPEN/CLOSE

This icon shows the command you can select; open when the disc loading tray is closed, close when it is open.

CHANGING OVER TO TV

Select the desired channel or input of your TV using the controls of your TV set. When the player is switched on, its antenna signal is fed through to the TV and depending on the player-TV connection, TV reception might be interrupted automatically.

To change over to TV reception at any time in such case, press the TV/CDI button on the remote control (available with some player versions only). To return to CD-I play, press the TV/CDI button again.

SOUND LEVEL

When playing any disc adjust the sound level as required, preferably on the TV or HiFi amplifier. The volume up/down buttons on the remote control may also be used, but for each disc these controls always start at level set in the setting menu.

A suitable level must therefore first be set on the TV or HiFi amplifier.

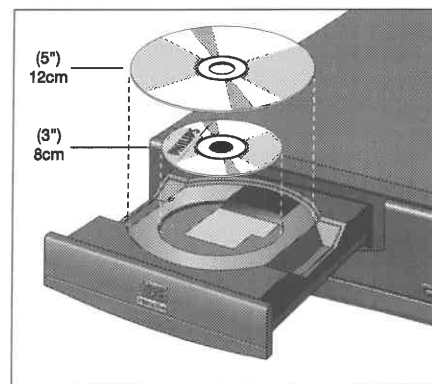
SWITCHING OFF

- Press the on/off button on the player, and check that the player display goes off.
- Switch off the TV (and HiFi system if used).

2.5 DISC PLAY

LOADING

Point and click on open (you may also press the open/close button on the player) to open the disc loading tray.



Take the disc from its holder and place it on the tray with the label up.

Point and click on close (you may also press the open/close button on the player, or gently push the front of the tray) to close the tray.

The TV screen changes according to the type of disc.

Caution: never put more than one disc at a time into the CD-I player

UNLOADING

Point and click on open (you may also press the open/close button on the player) to open the disc loading tray. The player start-up screen reappears on the TV. Take the disc from the tray and replace it in its holder.

Point and click on close (you may also press the open/close button on the player, or gently press the front of the tray) to close the tray with or without a new disc.

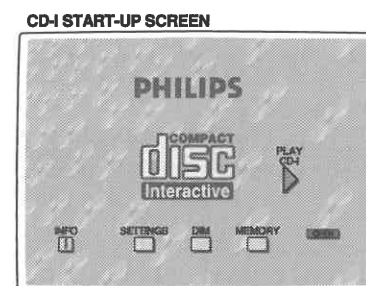
Note: you may unload the disc at any time by pressing the open/close button. Unloading a CD-I disc while the CD-I program is running, will terminate the CD-I program abruptly. "Bookmarks" or intermediate results, if used by the CD-I program, might not be updated to the latest situation.

PLAYING A CD-I DISC

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

Warning: When a title consist of more than one consecutive disc, a so-called "Multi-disc" title, follow the instructions for opening and closing of the tray as shown on the screen. When you use the "OPEN" button on the player the title is considered to be played wholly and any intermediate scores, settings or "Bookmarks" will not be updated. Any additional disc of the multi-disc title will not be recognised as part of it. The tray may also be closed by gently pressing the front of it.

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

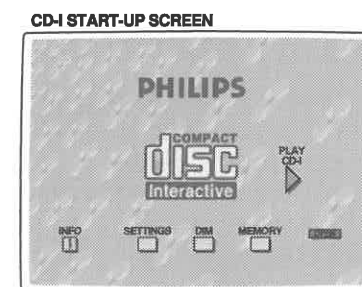


To start the CD-I program, select the play icon on the screen (you may also press the play button on the player or remote control). Using a play button will also automatically close the tray when open. (*) The opening screen of the CD-I program now appears on the TV. From this point, all interaction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

DISC PLAY

PLAYING A PHOTO CD

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



To start the Photo CD program, select the 'PLAY CD-I' icon on the screen (you may also press the play button on the player or remote control). The opening screen of the Photo CD program now appears on the TV. At the bottom of this screen a menu bar with icons is shown (fig.1). Select the -icon and the "SETTINGS" screen appears.

To select a language click on the box, the flag or the name of a country (the previous setting is replaced automatically).

Select the -icon (Return) of this screen to go back to the Photo CD opening screen.

Select the -icon (Information) (fig.2) and the "INFORMATION" screen, explaining the control buttons of the menu bar in the selected language, appears. From this point, all interaction is between you and the program.

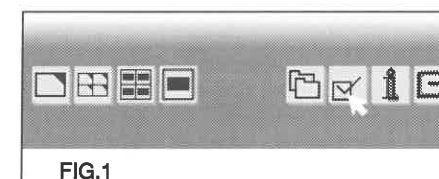


FIG.1

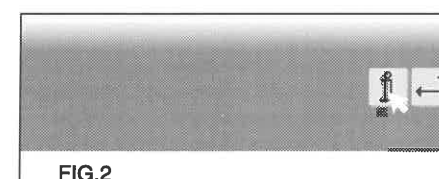
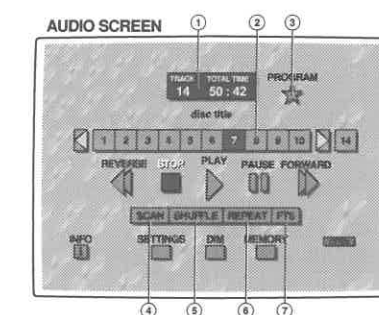


FIG.2

PLAYING A CD-AUDIO DISC

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



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

1. Track/time window: after loading, and in stop mode, this shows the total number of tracks and the total playing time. In play and pause modes, the window shows the track number and either the elapsed or the remaining track playing time. To change between elapsed and remaining time, "point-and-click" at the time shown in the window.
2. Play track bar: shows up to 10 tracknumbers and the total number of tracks. You can "point-and-click" to select any track. For discs with more than 10 tracks, the forward > and reverse < scroll arrows at the right and left of the track bar are used to move through the track list. The total number of tracks is shown in the box to the right of the bar; you can "point-and-click" on it to display the total playing time in the track/time window.
3. Program star: allows you to program a list of special tracks called a favorite track selection. When you select this star, the cursor arrow changes to a star, the FTS track bar appears above the play track bar and the save diamond appears beside the program star.
4. Scan: allows you to listen to the beginning of every track listed in the play track bar. You can set the scan time to 5, 10 or 20 seconds in the settings screen.
5. Shuffle: allows you to play the tracks in the play track bar in a random order.
6. Repeat: allows you to repeat either a track or the entire disc. You can change the repeat mode in the settings screen.
7. FTS: allows you to play favorite track selections. This icon only appears if a favorite track selection has been created for the disc that is loaded in the player.

(*) The default Volume is than Automatically set to the level selected in the SETTINGS Screen.

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

Note: if auto shuffle or auto FTS has been selected on the settings screen, this function will be activated automatically.

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 ⚠.



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.

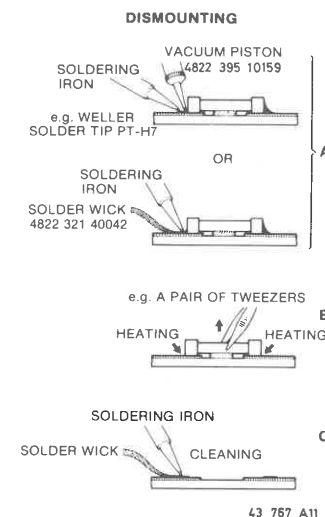


Fig. 1

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).

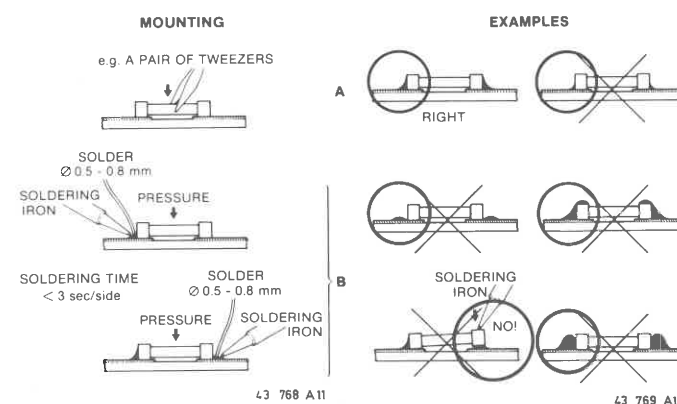


Fig. 2

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

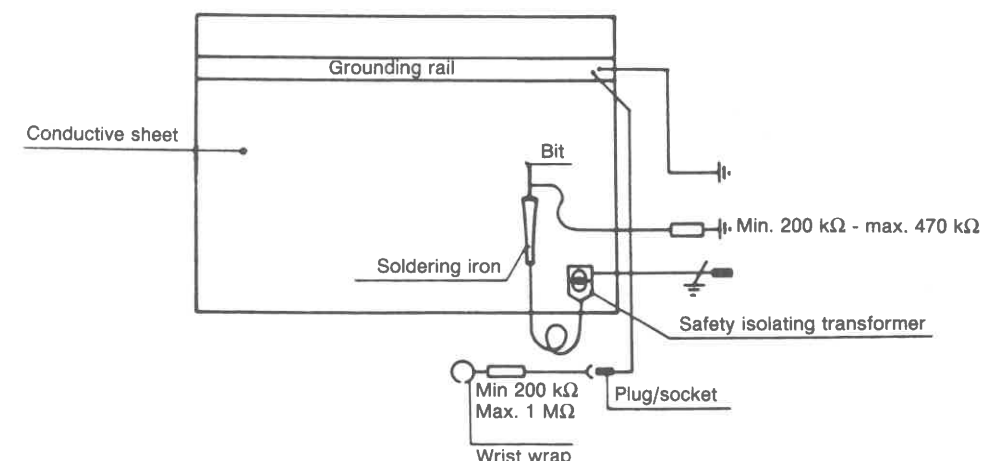
Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

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)

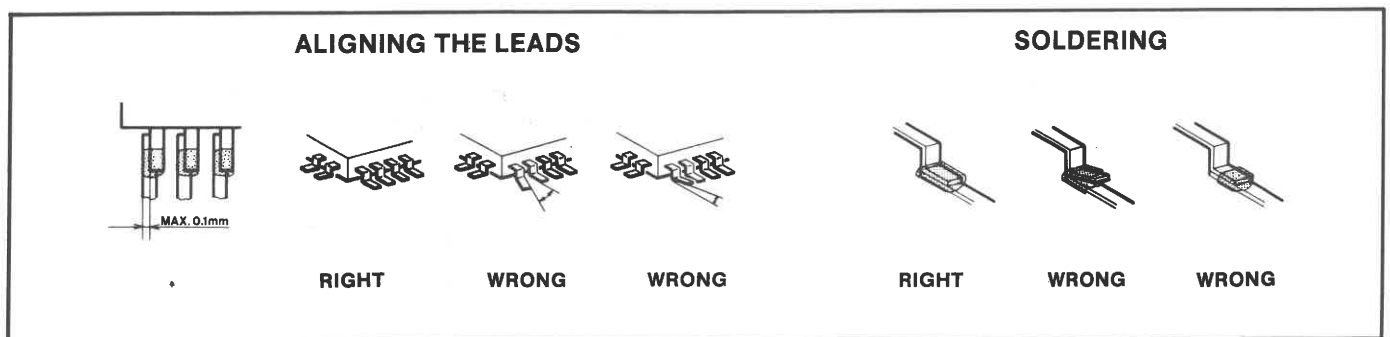
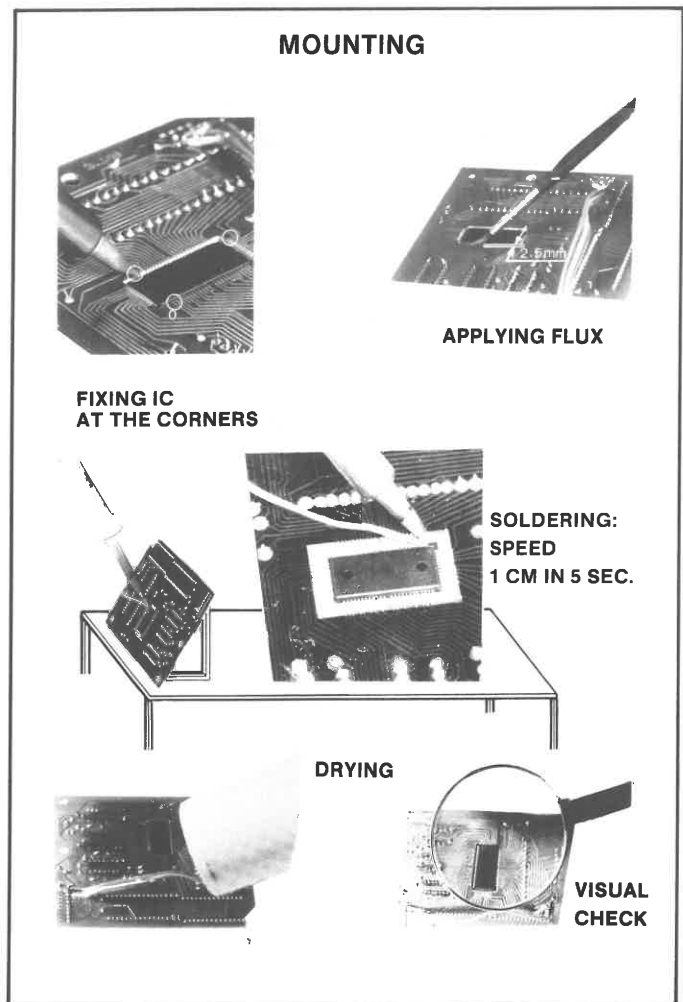
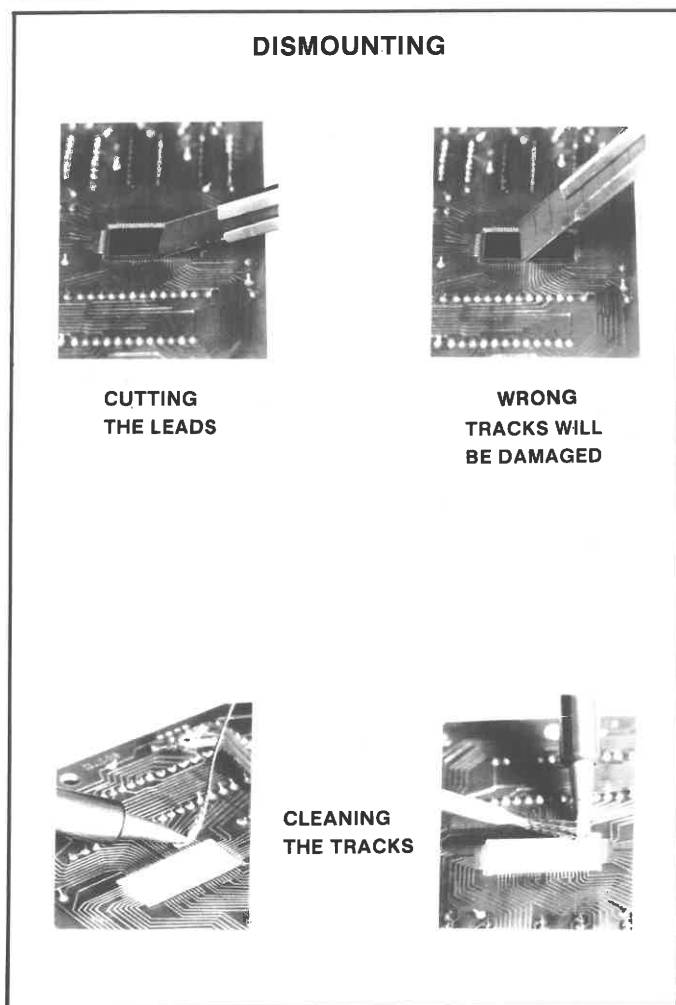
To prevent permanent damages as a result of switch-on phenomena, no ESD-sensitive components, or PCBs populated with these components, should be inserted in or removed from test-sockets or systems with the supply voltage on.
Prevent switching peaks on the mains as a consequence of switching electric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

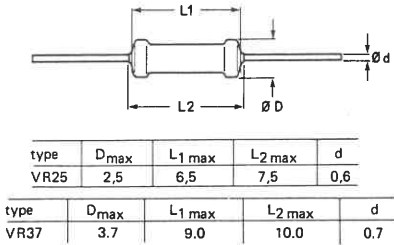
For replacing a component see Fig. 6 Dismounting and Mounting. Also a number of precautions and examples is given.
When replacing a flat pack, rosin flux applied to the device leads will ensure a good soldered joint. Since rosin flux, when not properly heated by the soldering process, is sticky, it will 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.



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

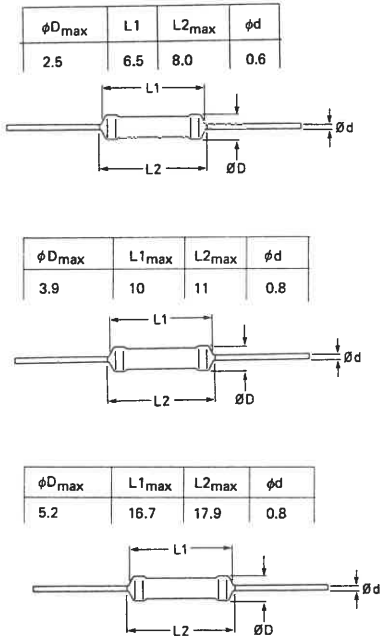
Composition of the service number for the VR25 and VR37
Main subgroup: 4822 053 20... and 4822 053 21...

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

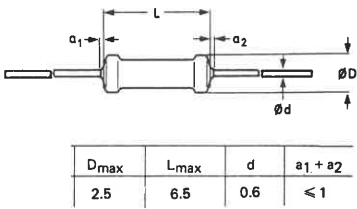
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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



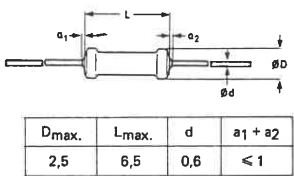
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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



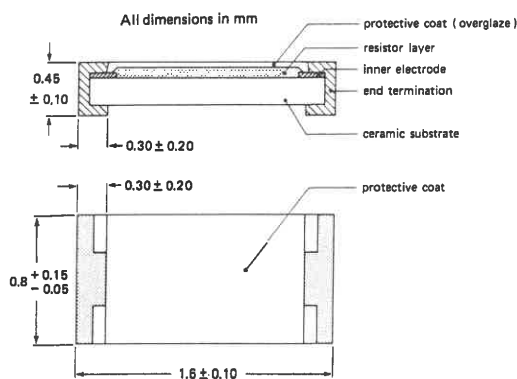
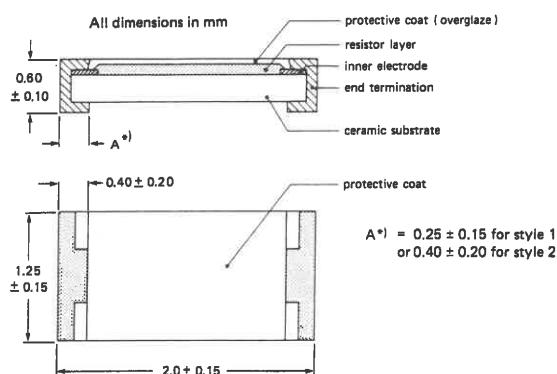
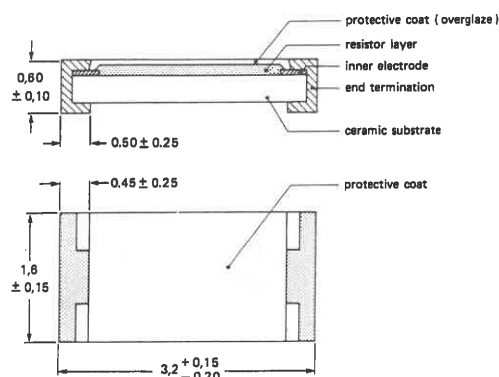
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

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 M Ω
RC-11 0 Ω TO 10 M Ω
RC-21 0 Ω TO 6,8 M Ω

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.

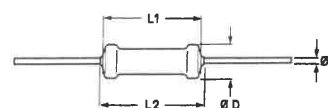
8 for R=	0 to 9.1 Ω
9 for R=	10 to 91 Ω
1 for R=	100 to 910 Ω
2 for R=	1 to 9.1 K Ω
3 for R=	10 to 91 K Ω
4 for R=	100 to 910 K Ω
5 for R=	1 to 9.1 M Ω
6 for R= or >	10 M Ω

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

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

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

MRS16T metal film resistors with low-inductance



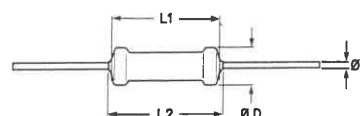
D	L	L2 max.	d
1,7 +0,2/-0,1	3,5 +0,2/-0,15	3,7	0,5 -0,04

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

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

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

MRS25 metal film resistors (0,5%)



D	L1	L2 max	d
2,5	6,5	7,0	0,6 ± 0,03

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

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

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

Example:

The service number of a resistor of 976 Ω is:

4822 050 29761

3.5 SERVICE TOOLS

3.5.1 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 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
/00	4822 214 60019
/05	4822 214 60021
/20	4822 214 52135
/25	4822 214 52136

- 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 :

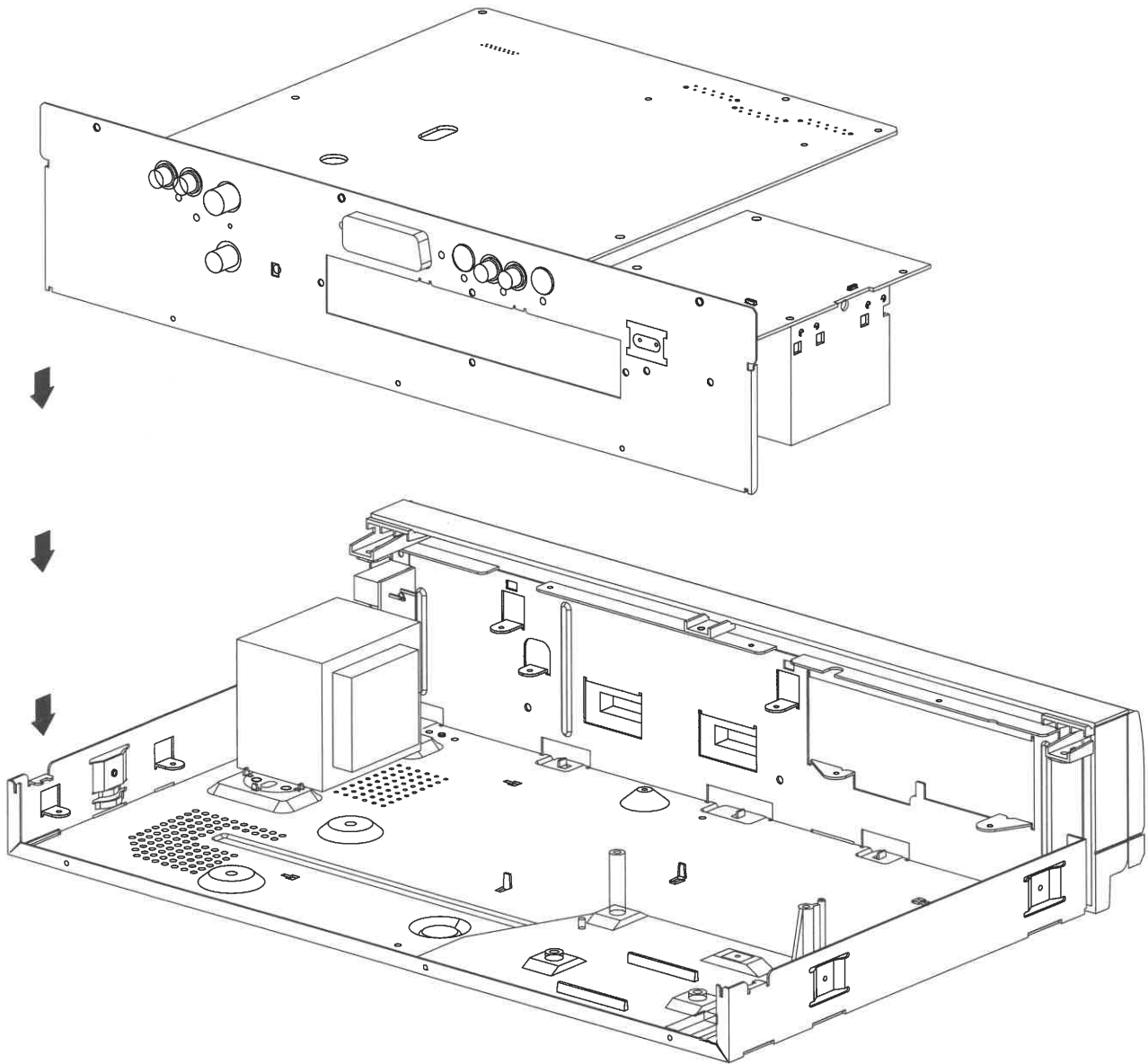
- * HANDLE WITH CARE IN AN ESD PROTECTED ENVIRONMENT.
- * Defective items must be sent back to PHILIPS CONSUMER SERVICE for repair forwarded by Address sticker.
- * Put the address sticker properly on a free area of the box.
- * Boards must not be reworked or damaged.
- * Re-use original package order 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 !!!

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

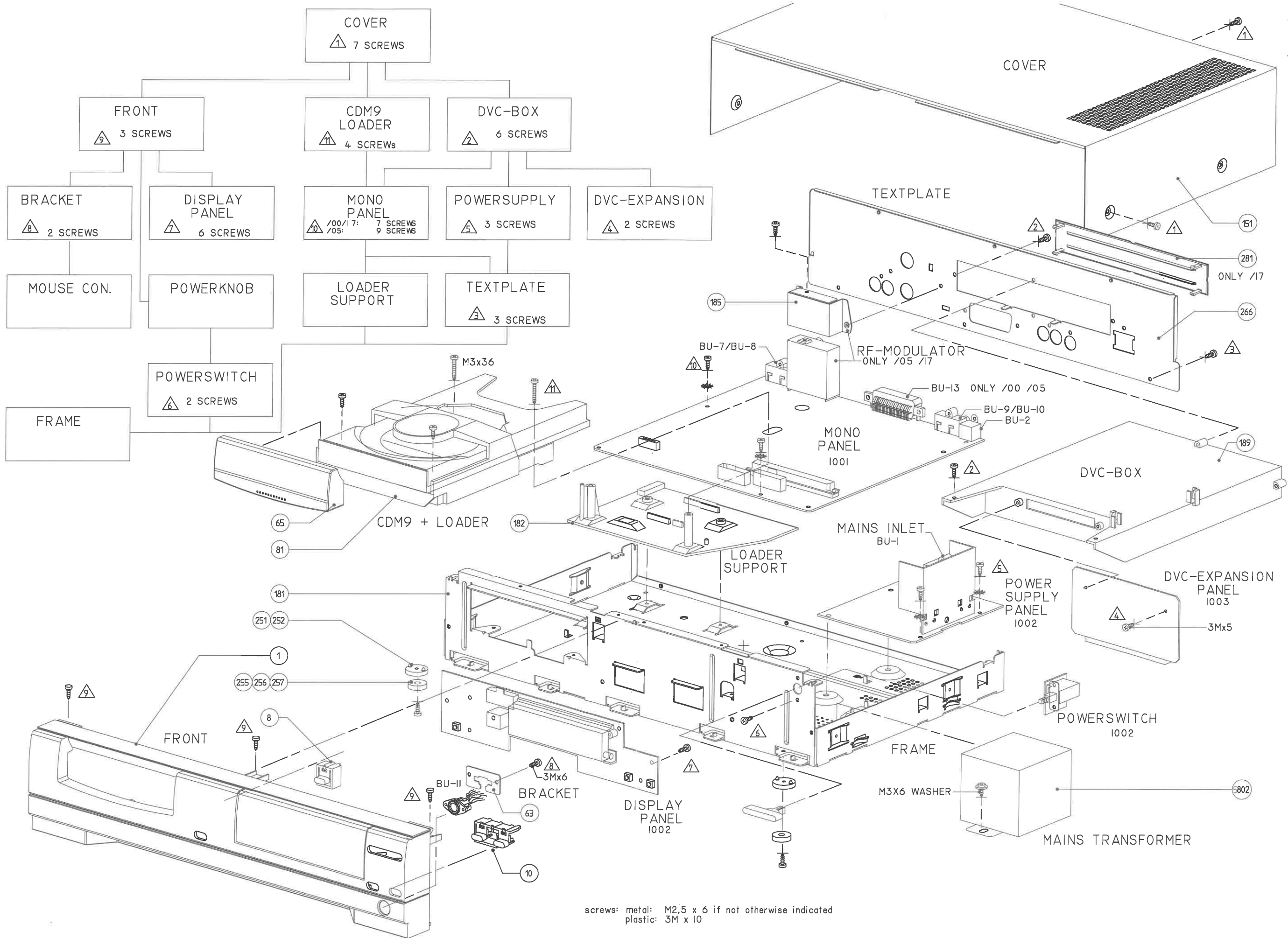
4 MECHANICAL DRAWINGS AND PARTS LIST

4.1 SERVICE POSITIONS

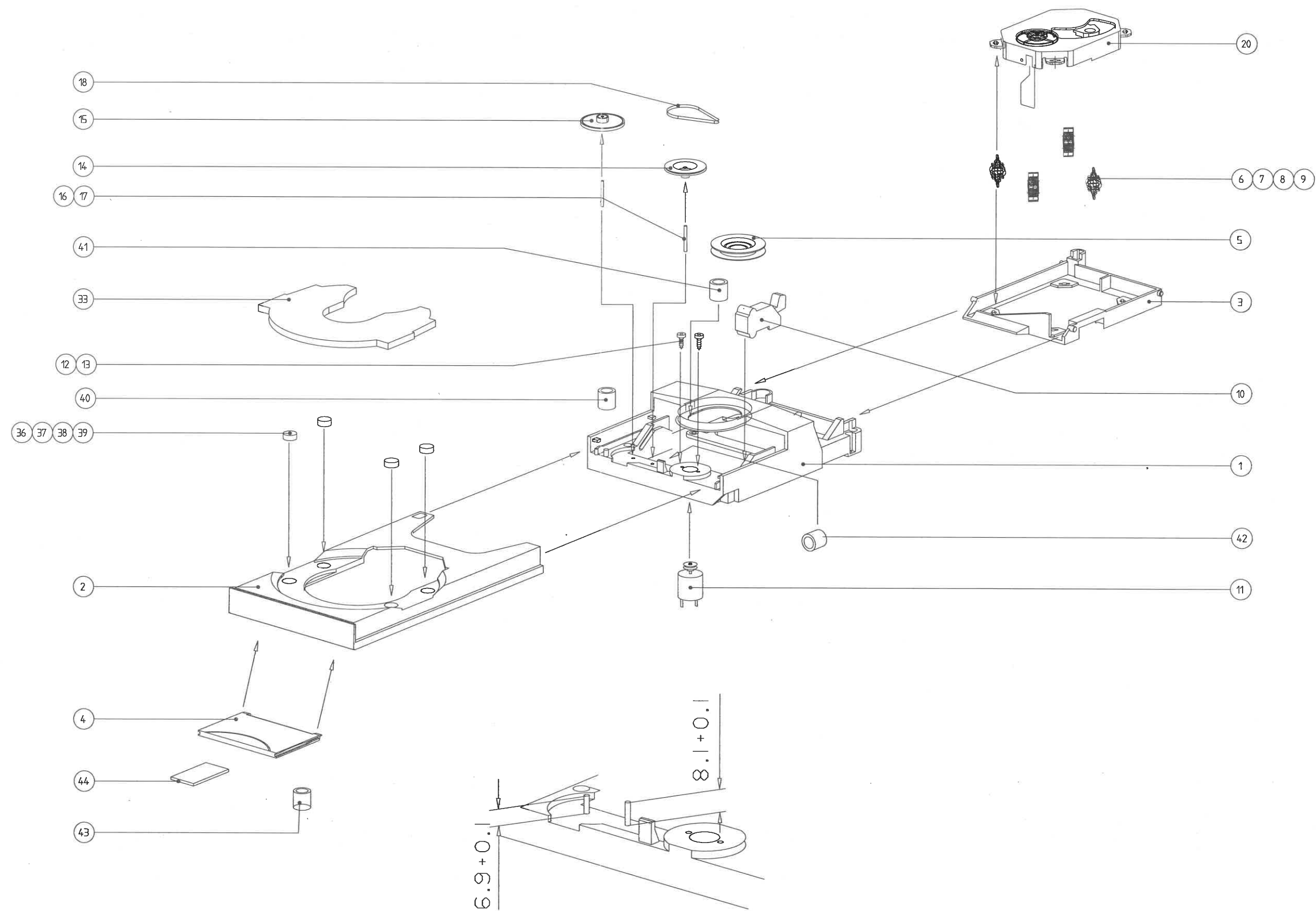


HAS.CDI220

4.2 EXPLODED VIEW OF THE CABINET



4.3 EXPLODED VIEW OF LOADER



5 SERVICE SOFTWARE

In the set there are 2 different testsoftware available:

1. Low Level test
2. Service Shell

5.1 THE LOW LEVEL MMC TEST

Scope

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

5.1.1 Testsequence

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

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

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

5.1.2 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 tries 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.

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 : DSP

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

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

ITEM 6 : SLAVE processor

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 pin20 of IC7320 CSDSPN
- 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 : Chip Select test

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

The devices are DRAM 1, DRAM 2, SYSTEM ROM, DSP, SLAVE, NVRAM and KILLME & DMAEN

ITEM 9 : VDSC test

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

5.2 THE SERVICE SHELL

Introduction.

For service purposes the CD-I set has built-in software modules. These modules can be activated via the service shell by menu.

The modules are for the testing of :

- Video circuitry, by means of a colorbar testpattern
- CDM and servo circuitry

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

5.2.1 Starting the service shell

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

5.2.2 Layout info

selectable/non selectable items

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

(error) messages on the screen

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

menu structure

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

5.3.3 Subject dependent information

Main menu

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

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.

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 lens inwards and outwards. Selecting NEXT STEP will bring the player in mode 1.

Mode 1

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

Mode 2

The turntablemotor is rotating and controlled by the rough HF, moving the cd lens 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 normal playing mode.

Mode 3

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

Normal playing mode

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

ERROR MESSAGES

display : A5 xx0000

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

Video test image

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

What could be wrong if...

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

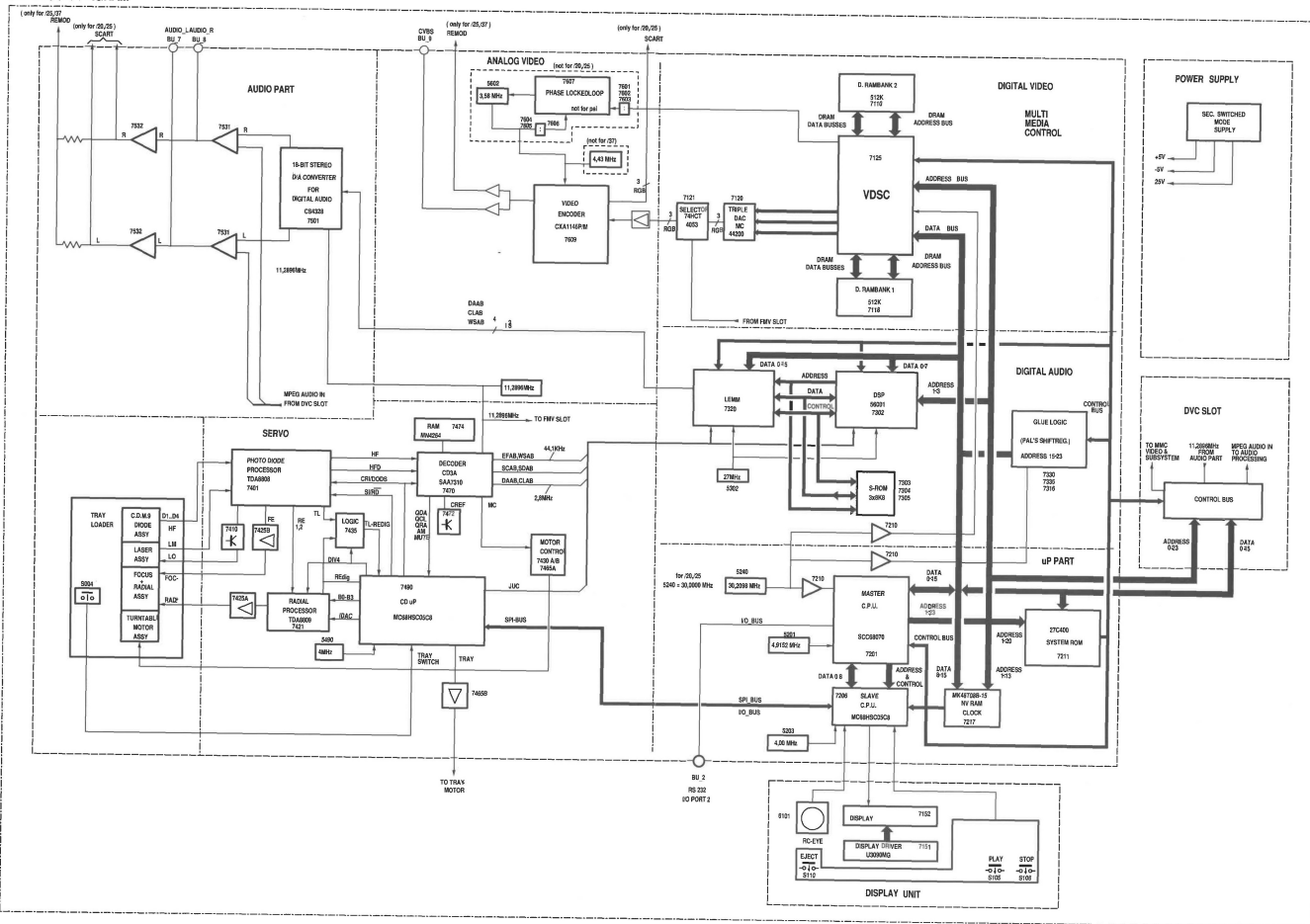
Service shell cannot be started with the testplug. Connections between port 1 and slave may be bad. Testplug could be wrong. Maybe the slave processor is defect. If the playershell cannot be started either, try the low level test first.

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

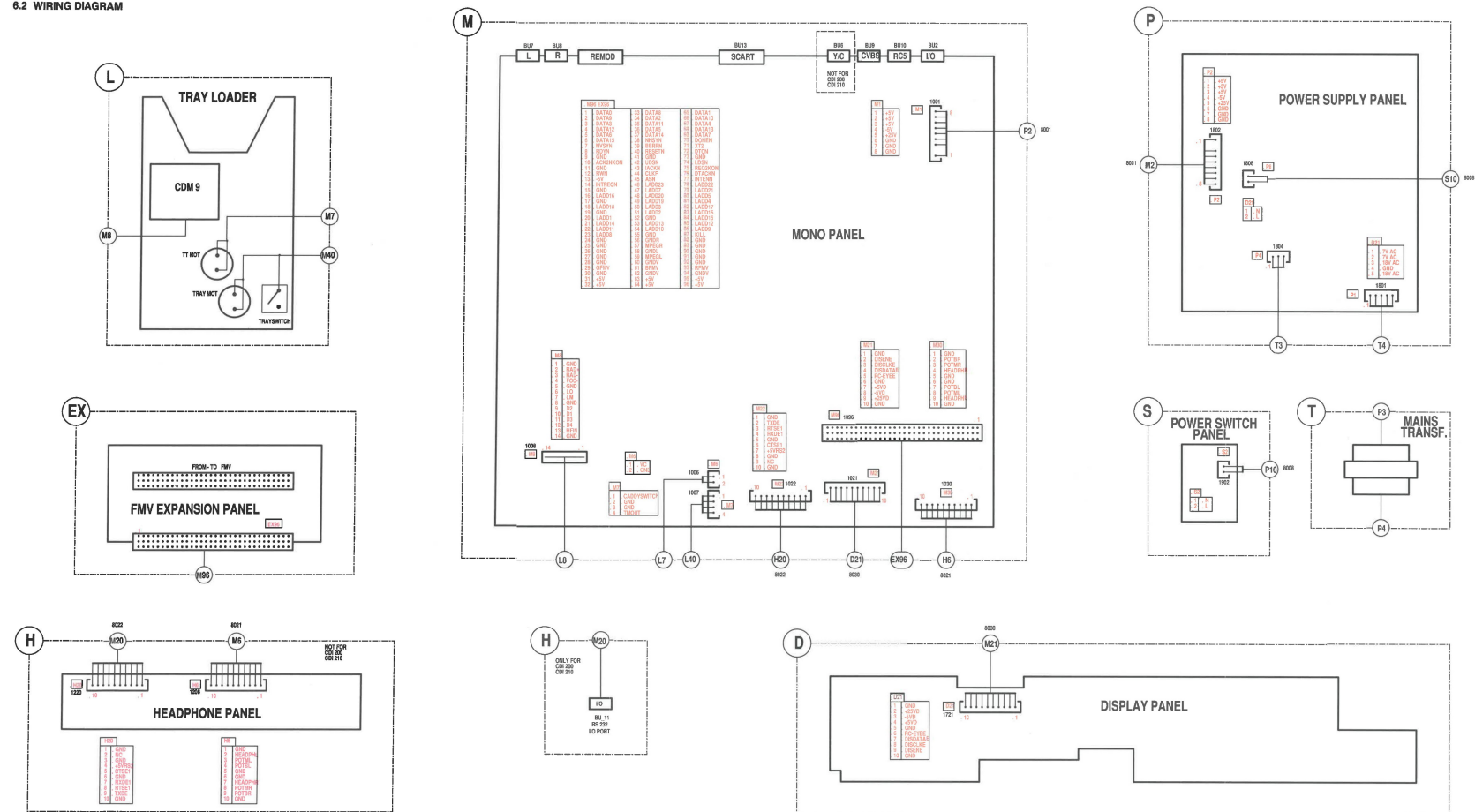
Disconnecting the clock from MMC to CD processor will make the CD player turn as fast as it can.

6 ELECTRICAL DRAWINGS

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
ACK2NKON	DMA REQUEST ACKNOWLEDGE (95-pins connector, channel 2: FMV)
ADEN	(= ADENA) ADDRESS ENABLE NOT. When low, the address ADENA coming from the bus (6807

CLK1	: the clock on which the DSP operates (7,5264 MHz)	DIV4	: DIVIDE BY 4 signal
CRI	: COUNTER RESET INHIBIT (low during a real trackloss or during execution of a jump command)	DMAEN	: DMA enable for the FMV extension
COC	: COMMAND COMPLETED signal	DTCNC	: data transfer completed corrected (CDIC)
COXN	: serial output clock for the X-bus	DO	: DIGITAL OUT
COXNDSP	: clock DSP, the clock used to send serial data on the X-bus	DODS	: DROP-OUT DETECTOR SUPPRESSION
CPUASN	: the address strobe of the 68070 microprocessor	DONEN	: DONE (active low). open drain, operates in the DMA-mode
CPULDSN	: the lower data strobe of the 68070 microprocessor	DOXN	: serial data output of the X-bus
CPUUDSN	: the upper data strobe of the 68070 microprocessor	DPSRWN	: read (high) or write (low) from or to the DSP
CRI-DODS	: counter reset inhibit of the 7310 chip	DSN2N	: DATA STROBE (active low) of the DSP
CS	: CHIP SELECT	DATAACK ROM	: DATA TRANSFER ACKNOWLEDGE of the ROM
CSCDICN	: CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC	DTACKSLAVEN	: DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
CSKILL-MEMM	: chip select for kill and DMA circuit.	DTCN	: DATA TRANSFER COMPLETE (active low, open drain) operates in the DMA-mode
CSKILL-MEMMS	: >> synchronized	DUARTCSN	: DUART CHIP SELECT, when low bus info is coming from or going to the DUART
CSDAC1N	: (= CSDAC2N) (if selected, low) it means that data will be adjusted on that channel	EFAB	: ERROR FLAG
CSNVRAMN	: CHIP SELECT NVRAM (active low) bus information is intended for or coming from the NVRAM	FILTERN	: filter select when high: level C, when low: level A
CSROMN	: >>	FOC-	: >>focus out to CDM
CSROM0N	: CHIP SELECT ROM (active low) bus information is coming from the ROM'S	FOC+	: >>
CSSLAVEN	: CHIP SELECT SLAVES (active low)	GFMV	: green color coming from from the FMV-extension
CSN	: CHIP SELECT (active low) for the 8kx8 SRAM'S	GIN	: green color input for the CXA1145 encoder
CSVDSN	: CHIP SELECT for the VDSC	GN	: when low: the outputs and inputs of the transceivers are enabled
CSYN	: COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)	GSC	: green color (SCART)
CTS1..4	: CLEAR TO SEND (active low) it indicates that the remote receiving device is ready	GSW	: green color coming from the switch CDI/external (FMV) video
CTS#2	: >>	G0..7	: digital video (green) from VDSC > DRAM HALTN
CTSE1..2	: CLEAR TO SEND input		: active low, open drain, bidirectional. If low together with the resetn it causes the 68070 to enter the reset state.
CTS1..2	: >>	HEADPHL	: (HPL) headphone audio left
CVBS	: CVBS output	HEADPHR	: (HPR) headphone audio right
CVBS-OUT	: >>	HFIN	: HF current input
CVBS-REM	: CVBS input signal for the remodulator	HSYN	: (active low) horizontal synchronisation input from the VSC
CVBS-SYNC	: composite sync input for the SCART connector	HSYNCOU	: (active low) horizontal synchronisation output for monitor or TV
D0..7	: input data bus for the two DAC'S of the APU part	HVID0..7S	: 8 bit pixel bus for channel 1 VSD from VSC
DAAB	: (DAAB2, DAABCD) serial data output of the X-bus I ² S standard	IACKN	: interrupt acknowledge for the FMV-extension
DATA0..15	: DATA LINES	IACKIN2N	: >>
DATADAC	: data which will be send to the DAC('S) for volume adjustment	IACKIN4N	: >> decoded interrupt acknowledge (active low).
DDTACKN	: DATA TRANSFER ACKNOWLEDGE (active low) from CDIC	IACKIN5N	: >> asserted during an interrupt acknowledge
DEEMP	: DEEMPHASIS	IACKOUT2N	: >> sequence to indicate to a peripheral that
DIG OUT	: DIGITAL OUTPUT		
DIRN	: DIRECTION CONTROL. indicates the direction of data transfer through the transievers	IACKOUT4N	: >> this interrupt request is being serviced
DISCLK	: (DISCLKE) DISPLAY CLOCK >>	IACKOUT5N	: >>
DISDAT	: (DISDATAE) DISPLAY DATA >>	IACKOUT2	: >>
DISEN	: (DISENE) DISPLAY ENABLE >>	IACKOUT4	: >>
		IACKOUT5	: >>

IACKOUT22	: >>	MSMA0..8	: ADDRESS-BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER
IACKOUT23	: >>		
IACKOUT42	: >>		
IACKOUT52	: >>	MSMD0..15	: DATA-BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER
IDAC	: 1/2 bit DAC		
IFDN2	: main channel word-flag to the DSP	NCSYNV	: composite sync for the VDSC
INTENN1	: interrupt enable for the FMV-extension	NHSYN	: active low horizontal sync input for the FMV-extension
INTENN	: >> when low, no extensions use the interrupts, when high interrupt devices are daisy chained	NRESET	: when low the video synthesizer is in reset
INTENN2	: >>	NVDS	: digital output to control an external switch for TV overlays (active low)
INTENN3	: >>		
INTENN4	: >>	NVDSI	: >> synchronized with NXT2
INTREQN	: interrupt request from the FMV-extension	NVSYN	: (active low) vertical sync input for the FMV-extension
IN2IN	: (= IN2OUT) >>	PCLK1IN	: PIXEL CLOCK for channel 1
IN4IN	: (= IN4OUT) >> decoder interrupt priority inputs	PCLK2IN	: PIXEL CLOCK for channel 2
IN5IN	: (= IN5OUT) >> (active low) IN2IN has the lower	PLOIN1	: input clock for CDIC (22,5792 MHz)
IN2OUT	: >> and IN5IN has the higher priority	PLOIN2	: input clock for CDIC (19,3536 MHz)
IN4OUT	: >> IN2IN = SLAVEPROCESSOR (6805), IN4IN =	PLOIN	: clock signals for emulator panel
IN5OUT	: >> CDIC (IMS66490), IN5IN = DUART	PLOINE	: >>
IN4OUT2	: >>	POTBL	: headphone left volume control
IN5OUT2	: >>	POTBR	: headphone right volume control
IN2OUT3	: >>	POTML	: headphone left volume control
KILL	: to mute audio outputs by power on and off	POTMR	: headphone right volume control
KILLME	: (KILL-ME) dot killer enable signal (active for NTSC)	QCL	: Q-channel CLOCK
LA1	: >> control signals for brushless DC-motor	QDA	: Q-channel DATA
LB1	: >>	QRA	: Q-channel REQUEST INPUT/ACKNOWLEDGE OUTPUT
LC1	: >>	Q22	: output to PLL (22,5792 MHz) divided by 14
LADD1..23	: ADDRESS-BUS (active high, tristate) for direct addressing of 16 Mbyte of memory	Q21	: output to PLL (19,3536 MHz) divided by 12
LBOT	: for HPL volume control	RAD+	: >> RADIAL OUT to CDM
LDSN	: LOWER DATA STROBE of the bus	RAD-	: >>
LM	: LASER MONITOR diode input	RBOT	: for HPR volume control
LO	: laser amplifier current OUTPUT	RC5	: wired RC input (cinch)
LRDN	: when low select, the ROM'S or NVRAM read the lower data byte	RCEYE	: (RCEYEE) REMOTE CONTROL EYE
LTAP	: >> for HPL volume control	RCLED	: REMOTE CONTROL LED
LTOP	: >>	RDN	: READY signal, starting up procedure finished
LVID0IN..7IN	: >> 8 bit pixel-bus for channel 2 (VSC-SLAVE)	RDYN	: READY (active low) of the DMA channel
LVID0OUT..7OUT	: >>	REDIG	: RADIAL ERROR DIGITAL
LWN	: read/write enable (for the lower part of the data: MD0..7) for the DRAM (VDSC)	REM	: power supply remodulator
LWRSN	: R/W lower memory data to DRAM from VSC slave	RESETCD	: when low resetsequence starts
LWRMN	: R/W lower memory data to DRAM from VSC master	RESETINN	: when low VSC is in reset
MC	: MOTOR CONTROL signal	RESETN	: this is the reset for all other ic's on MMC
MISO	: MASTER IN SLAVE OUT	RESETSYS	: system reset (controlled by the slave-processor)
MOSI	: MASTER OUT SLAVE IN	REQ2N	: DMA-request of channel 2
MPEGL	: left audio signal color coming from the FMV-extension > goes the adder CDI/FMV audio	REQ2NKON	: DMA-request (96-pins connector, channel 2 : FMV
MPEGR	: right audio signal color coming from the FMV-extension > goes the adder CDI/FMV AUDIO	REQ2KON	: DMA-request of channel 2 via DMA 2 on/off circuit
MSM	: master slave selection input	RFMV	: red color coming from the FMV-extension
		RIN	: red color input for the CXA1145 encoder
		RSC	: red color (scart)
		RSTOUT	: RESET OUT of the slave processor when high resetsequence starts
		RTAP	: >> for HPR volume control
		RTOP	: >>
		RTSE1..2	: REQUEST TO SEND
		RTSI1..2	: REQUEST TO SEND

RTSUART	: REQUEST TO SEND from the slave processor to the UART of the 68070 processor	TXDE1..2	: transmit data
RST1..4	: >> REQUEST TO SEND (active low)	TXDI1..2	: transmit data
RST#1..2	: >>	TXD1..4	: >> TRANSMIT DATA TXD is data output
RWN	: READ - WRITE (low is write) signal	TXD#1..2	: >>
RWN2	: READ - WRITE (low is write) signal from CDIC to the DSP	UDSN	: UPPER DATA STROBE (active when low)
RWRAM	: READ - WRITE signal from the CDIC to the S RAM'S	URDN	: READ UPPER DATA BYTE (active when low)
RXDE1..2	: RECIEVE DATA	UWN	: read/write enable (for the upper part of the data: MD8..15) fir the DRAM (VDSC)
RXDI1..2	: RECIEVE DATA	UWRSN	: read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE
R0..7	: digital video (red) from VDSC > DRAM	VC	: output DC-motor (VOLTAGE CONTROL)
RXD1..4	: >> RECIEVE DATA RXD is data input	VDSC-INTN	: interrupt request of the VDSC
XD#1..2	: >>	V-FLAG	: output to the DSP
SCAB	: subcode data clock (2,8224 MHz) from the 7310	VSCM-INTN	: when low, interrupt from VSC master to 68070 processor
SDAB	: subcode data from the 7310	VSCS-INTN	: when low, interrupt from VSC slave to 68070 processor
SI	: on - off control for laser supply and focus circuit	VSYN	: (active when low) VERTICAL SYNCHRO-NISATION INPUT from the VSC
SI-RD	: on - off control for laser supply and focus circuit/ready signal, starting up procedure finished	WIREDRC	: see RC5
SLMA0..8	: VSC-slave memory address bus to the DRAM'S	WRMN	: read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER
SLMD0..15	: VSC-slave memory data bus to the DRAM'S	WRN	: WRITE UPPER DATA BYTE (active when low)
SOXENN	: Serial output enable for the XBUS (enabled when low)	WRPN1M..S	: control input for channel 1 or 2 (active low) of the VSD
SOXRQN	: SERIAL OUTPUT REQUEST FOR THE X-BUS (when low)	WSAB	: >> WORD SELECT from A to B CHIP
SOYENN2	: SERIAL OUTPUT ENABLE FOR THE Y-BUS (when low)	WSAB2	: >>
SPICKL	: SERIAL PERIPHERAL INTERFACE CLOCK	WSABCD	: 11.2896 MHz bitclock (I ² S)
SPISS	: (SPISSN) SERIAL PERIPHERAL INTERFACE SLAVE SELECT	XINB	: delayed clock XIN from CDIC > goes back to CDIC
STAND	: NTSC or PAL selection signal	XIN	: >> 11,2896/9,6768/4,8384 symmetrical clock
STANDARDOUT	: software choise between PAL and NTSC	XIN2	: >>
STANDARDSW	: hardware choise between PAL and NTSC	X-TAL2	: the same as the system clock, coming out of the VSC'S
STANDEM	: status from emulator, input for DUART	XT2	: (XT2N) the system clock devided by two
STANDEMEN	: enable signal for switch signal on emulator	XT4	: >> the system clock devided by four
STATUS	: RF/external video selection signal	XT41N	: >>
STATUSF	: CVBS/RGB video selection signal	0AD..12AD	: >> ADDRESS BUS, between CDIC-SRAM'S and SYSTEM ADDRESS BUS BUFFERS
SSM	: START STOP MOTOR	10ADA..12ADA	: >>
SWAB	: SUBCODING WORD CLOCK INPUT	0D..15D	: DATA BUS between CDIC and DSP
SWAB-SSM	: subcoding word clock output and start/stop input of the 7310	0DA..15DA	: DATA BUS between CDIC-SRAM'S and SYSTEM DATA BUS TRANCIEVERS
SWEM	: software dat to switch on the emulator	2BCLK	: CLOCK for the 2 B-chip
SYSCLK	: >>SYSTEM CLOCK	12A..15A	: ADDRESS BUS between CDIC and DSP
SYSCLKA	: >>		
SYSCLK1	: >>		
SYSCLK2	: >>		
TCAP	: input capture feature for the on-chip timer		
TCMP	: output for the output compare feature of the on chip timer		
TL	: TRACK LOSS of the TDA8808 combined with the radial error signal of the TDA8809		
TMOUT	: TRAY MOTOR OUT		
TRAY	: tray open/close signal		

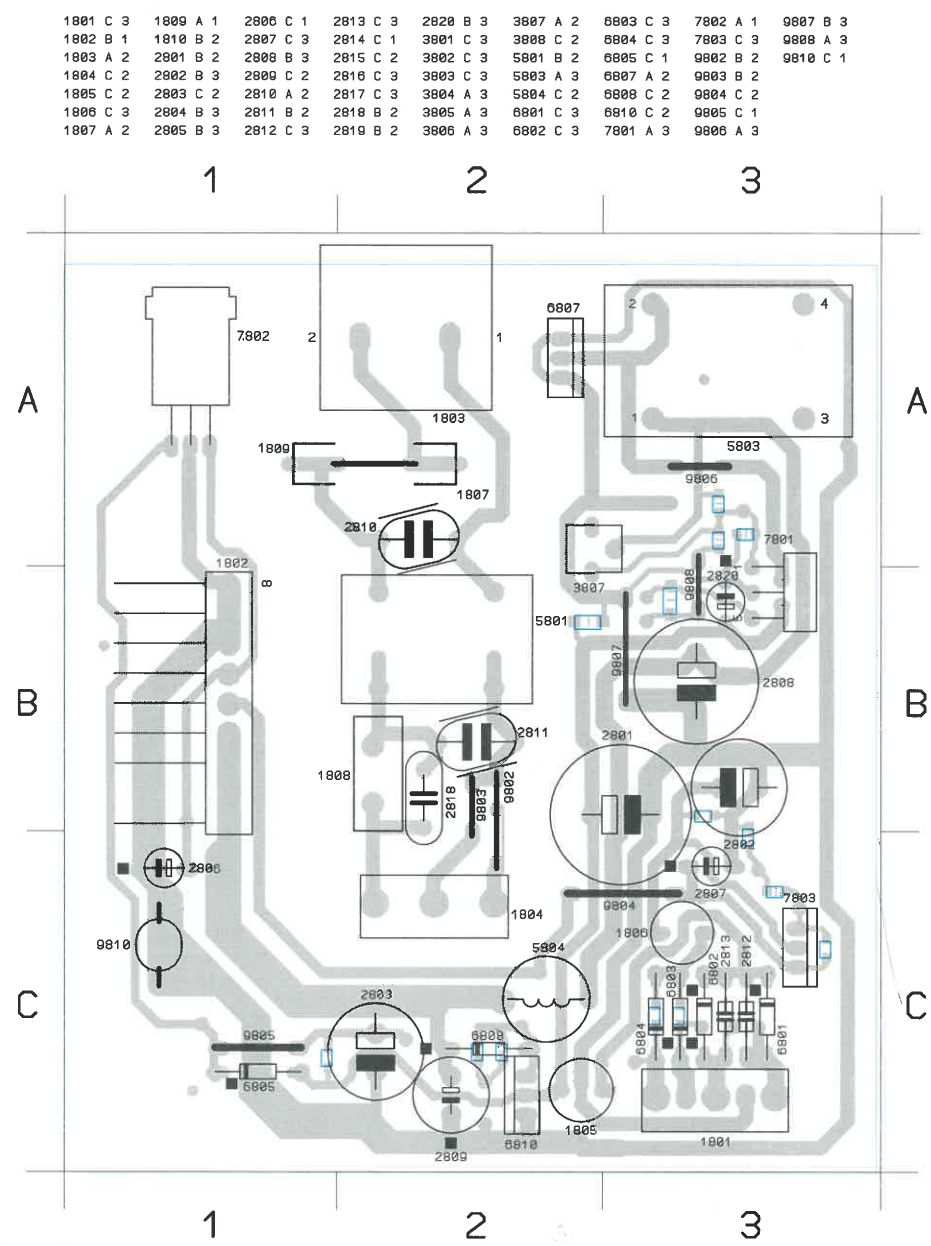
Additional signal names

A0...A15	: Local adressbus of the audio DSP-processor	IACK2	: Interrupt acknowldge from 68070 (active low) → AVN line of the 68070 (auto-vector interrupt) → The 68070 generates this signal (IACK2) when the slave proc. asserts IN2
ASPRAT	: Aspect ratio switch signal (16:9 or 4:3)	IN2	: Interrupt request from slave proc. → 68070 (active low)
AUDGND	: Audio ground (SCART)	IN5	: Interrupt request input 5 of the 68070 (not used)
AUDIOREM	: Audio signal to remodulator	INTREQN	: Interrupt request from the FMV-extension → CDI (96-pins connector) (active low)
AUDL	: Audio left (CINCH)	IRQA	: Interrupt request from LEMM → DSP (active low) and mode A pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
AUDR	: Audio right (CINCH)	IRQABN	: logical AND of the IRQA and the IRQB line (LEMM output pin → DSP)
BGND	: Blue color ground (SCART)	IRQB	: Interrupt request from LEMM → DSP (active low) and mode B pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
C	: Chrominance signal (Y/C)	JUC	: jump completed signal from servo proc. → LEMM
CLK3A	: 11.2896 MHz clock for the SAA7310 decoder	KIP	: Host enable input pin of the DSP-processor : this signal enables a transfer on the DSP host bus DATA0..7 (active low)
CLK11	: not used (connected to ground)	LM	: Laser monitor signal from laser (CDM) → TDA8808
CLOCK_27	: 27 Mhz clock : used as system clock by the DSP and the LEMM	MA0..8	: VDSC DRAM adress bus
CSDMAKILL	: generates killme : Dot killer enable signal (active for NTSC) and functions as DMA enable for the FMV extension	MD0..15	: VDSC DRAM data bus
CSDSPN	: signal used by LEMM to generate the DSP chip select signal (KIP) (active low)	Q_DATA	: I ² S data from LEMM → audio DAC
CST	: combined chipselect signal for NVRAM/system ROM	Q_CLK	: I ² S bit clock from LEMM → audio DAC
CVBS-GND	: CVBS ground (SCART)	Q_WCLK	: I ² S word clock from LEMM → audio DAC
D0...D23	: Local data bus of the audio DSP-processor	RASN	: Row address valid (active low) for the VDSC DRAM's
D8NVR	: data bit 8 (least significant bit) signal for the NVRAM	RC-EYEDIS	: RC-eye disable signal (not used)
DISSEL	: software selection signal (CDI210/220)	RD	: Read signal DSP : this signal is asserted to read external memory (three SRAM's FCB61C65) on the data bus D0..23 (active low)
DS	: Data memory select output of the DSP-processor (active low)	RESETSYS	: system reset coming from the slave-processor
DSPACKN	: DMA acknowledge (Channel 1) : 68070 → LEMM (active low)	RGBS_GND	: Incoming video SCART (not used) ground
DSPREQN	: DMA request (Channel 1) : LEMM → 68070 (active low)	RGND	: Red color ground (SCART)
DSP-INTN	: interrupt request DSP → 68070 (active low)	RSW	: Red color coming from the switch CDI/external (FMV) video
DTACKN	: data transfer acknowledge (68070) (active low)	RTSI1	: Request to send signal (internally) from slave to device 1 port
DTRAM	: DTACKN generation signal for NVRAM acces	RTSI2	: Request to send signal (internally) from UART interface (68070) to device 2 port
DTROM	: DTACKN geberation signal for system ROM acces		
DTCN	: Data transfer completed (active low; 68070)		
FSB	: Frame select line output of the LEMM → DSP : this line is asserted for every WSAB (pin 66 of the LEMM) transition		
GGND	: Green color ground (SCART)		
GND C	: Ground for the color signal (Y/C)		
GND L	: Ground for MPEG audio left (96-pins connector)		
GND R	: Ground for MPEG audio right (96-pins connector)		
GND V	: Ground for MPEG video (96-pins connector)		
GND Y	: Ground for the luminance		

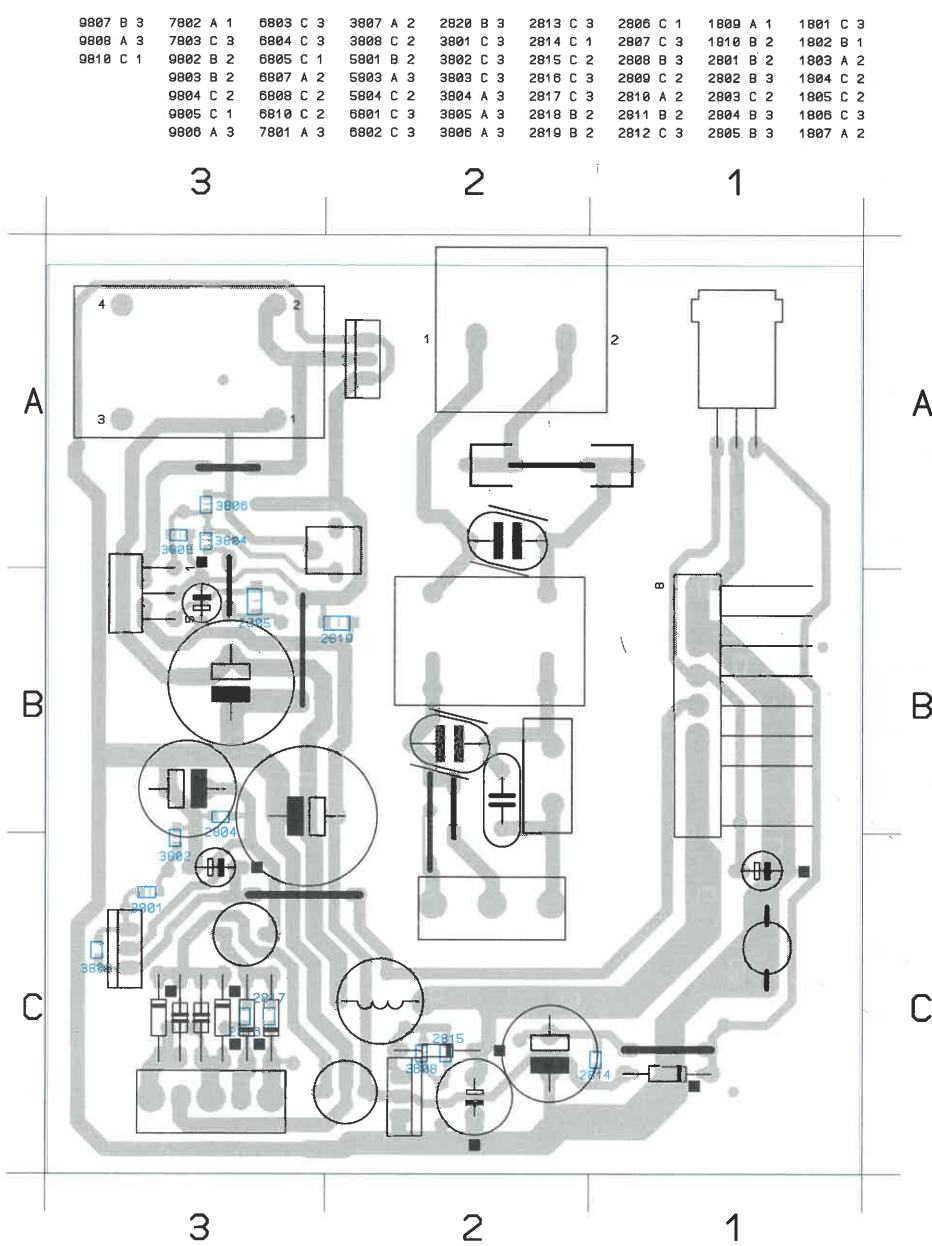
RTSUART	: Request to send signal from the slave processor to the RTS2 generation logic
RXD11	: Receive data (internally) from device 1 port → slave
RXD12	: Receive data (internally) from device 2 port → UART interface (68070)
SCK	: serial clock output from the LEMM → DSP : the data and frame select for the DSP is clocked out on the rising edge of this clock
SOCKGND	: socket ground (SCART)
SRD	: Serial data from LEMM → DSP
STANDIN	: NTSC or PAL selection signal (input for slave)
STD	: serial data from DSP → LEMM
TXD11	: Transmit data (internally) from slave → device 1 port
TXD12	: Transmit data (internally) from UART interface (68070) → device 2 port
WR	: Write enable output of the DSP : this signal is asserted to write external memory (three SRAM's FCB61C65) on the data bus D0..23 (active low)
XY	: this DSP output signal selects which external memory space (X or Y) is selected
Y	: luminance signal (Y/C)

6.3 POWER SUPPLY PANEL

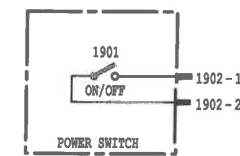
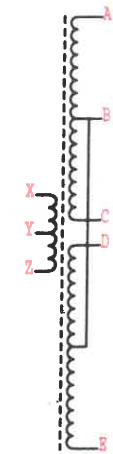
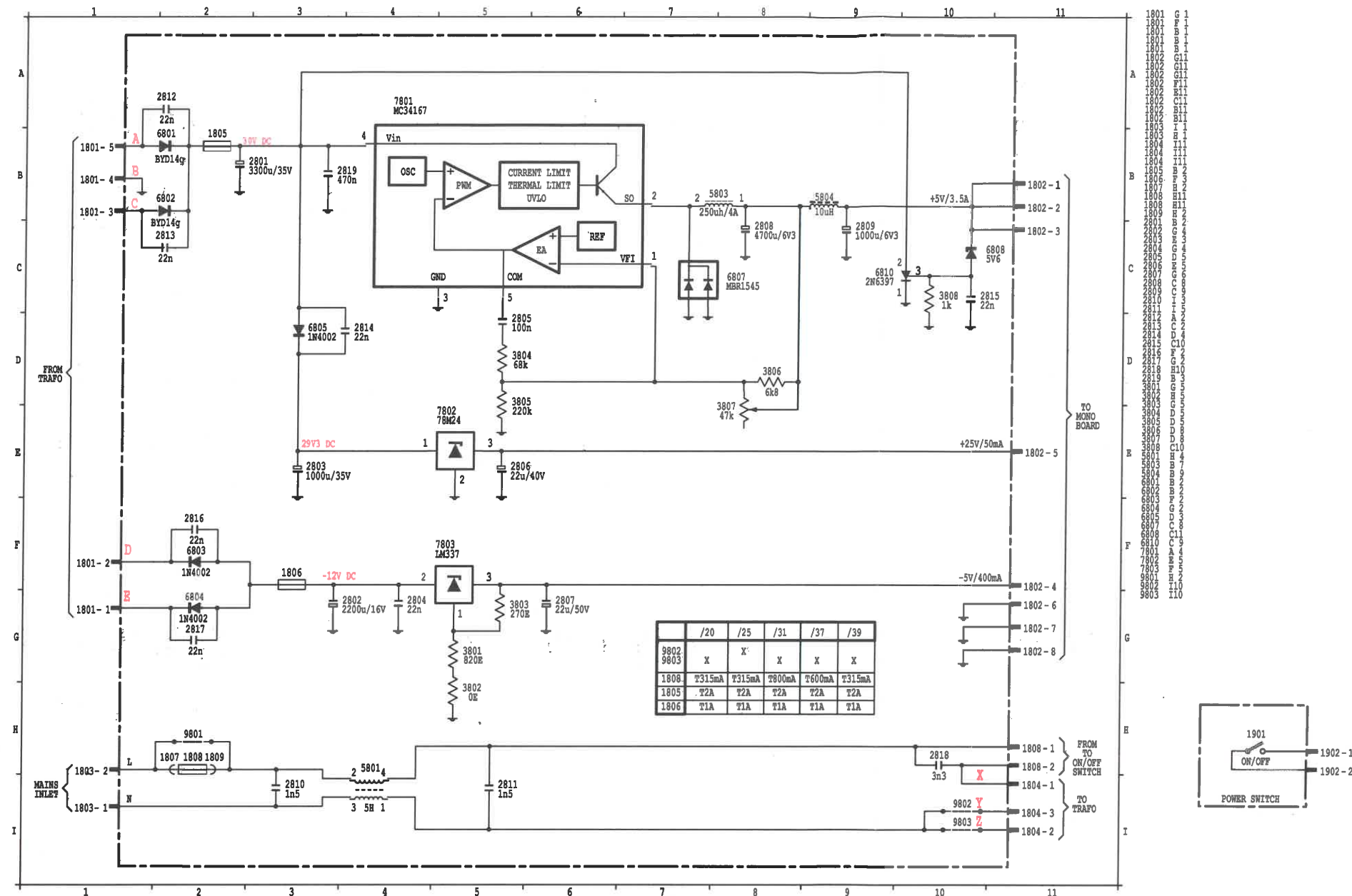
6.3.1 Power supply PCB
Component side view



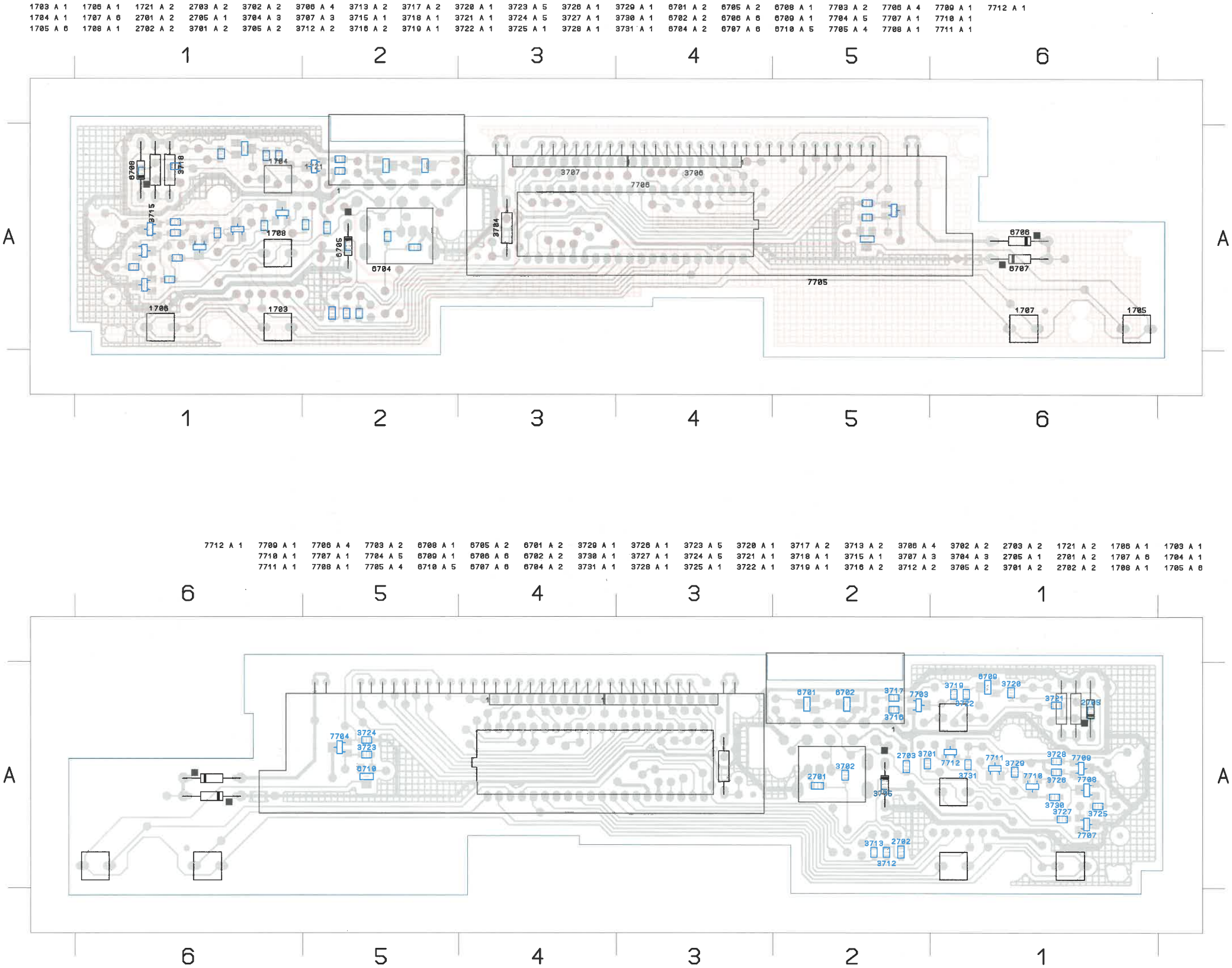
Power supply PCB
Coppertrack side view



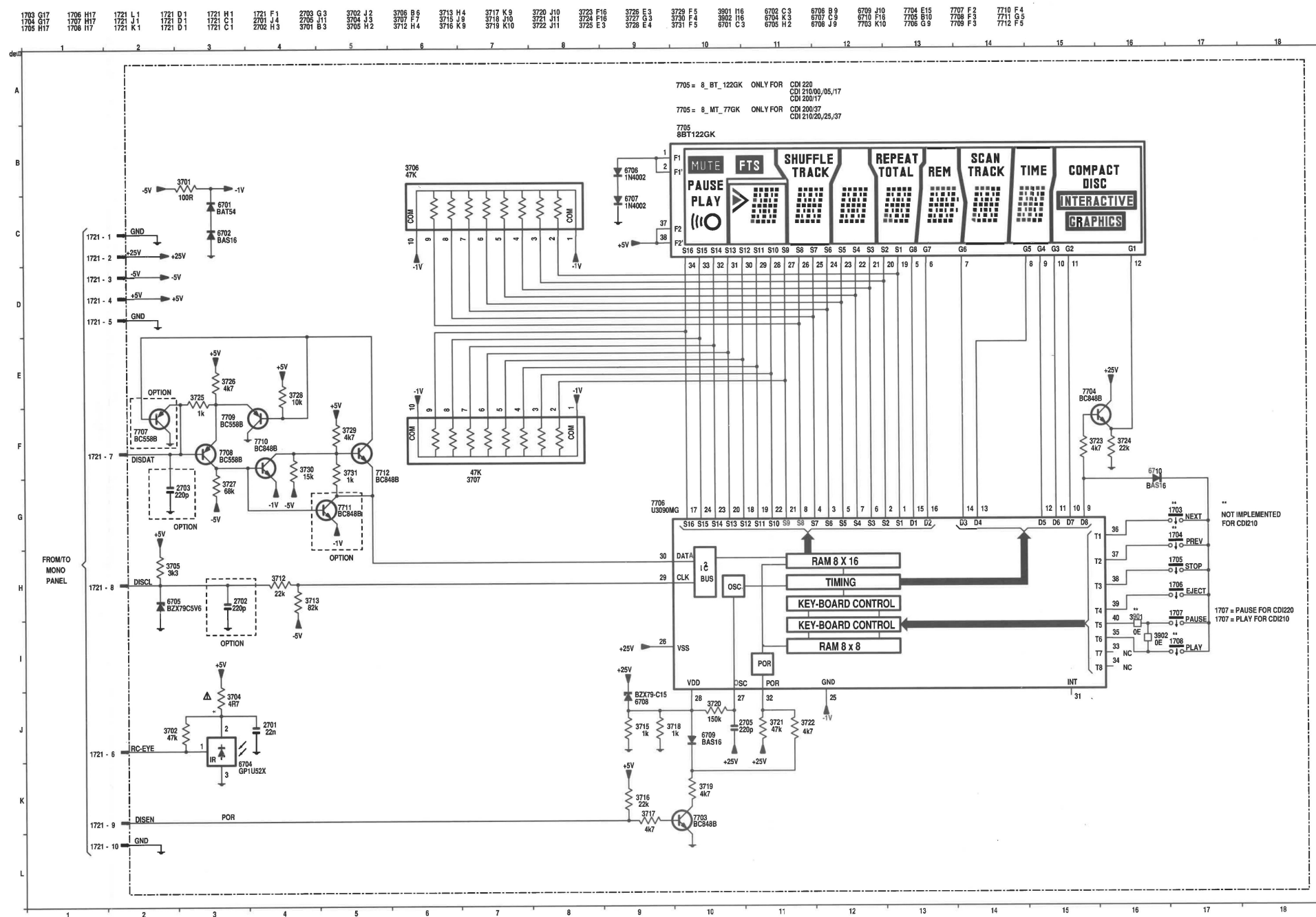
6.3.2 Power supply Circuit diagram



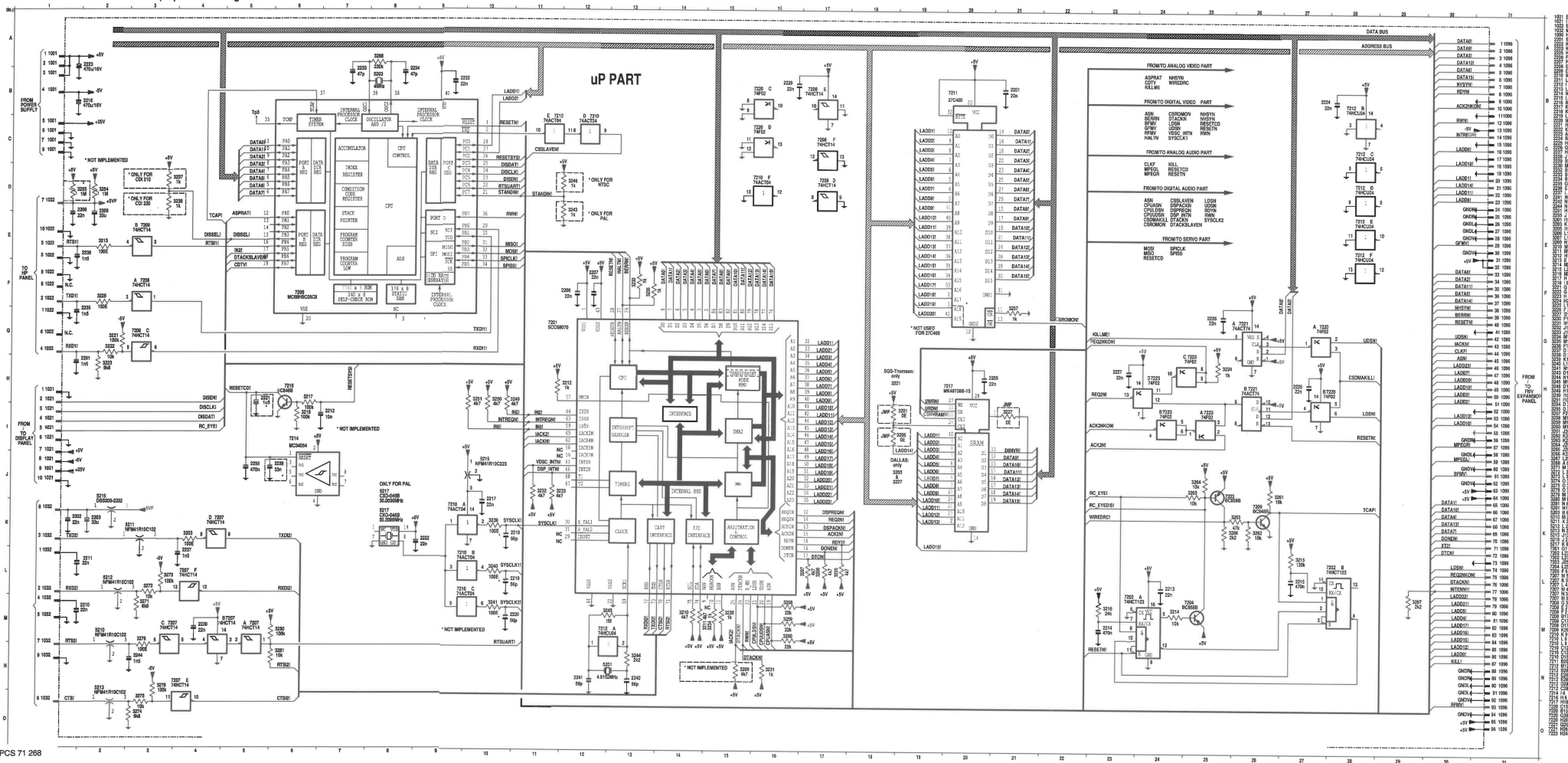
6.4 CONTROL & DISPLAY PANEL
6.4.1 Control & Display PCB



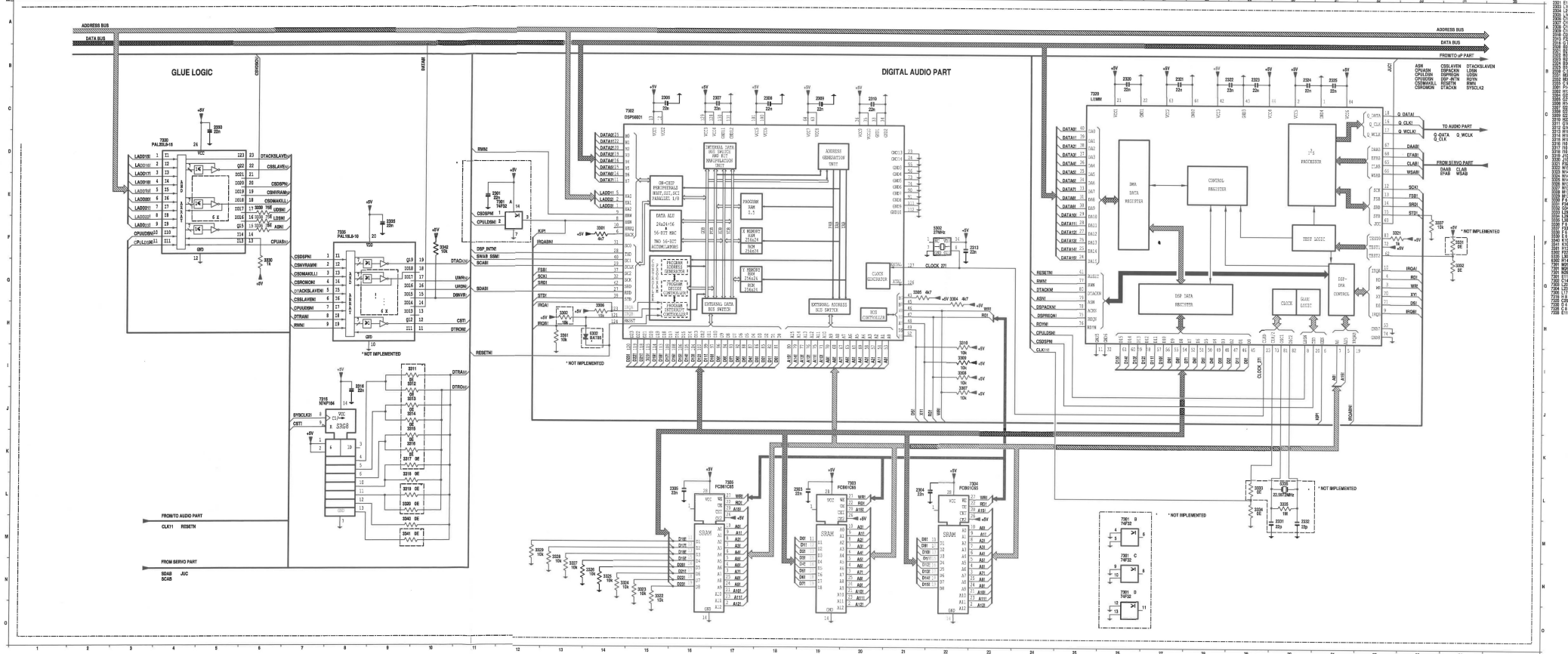
6.4.2 Control & Display Circuit diagram



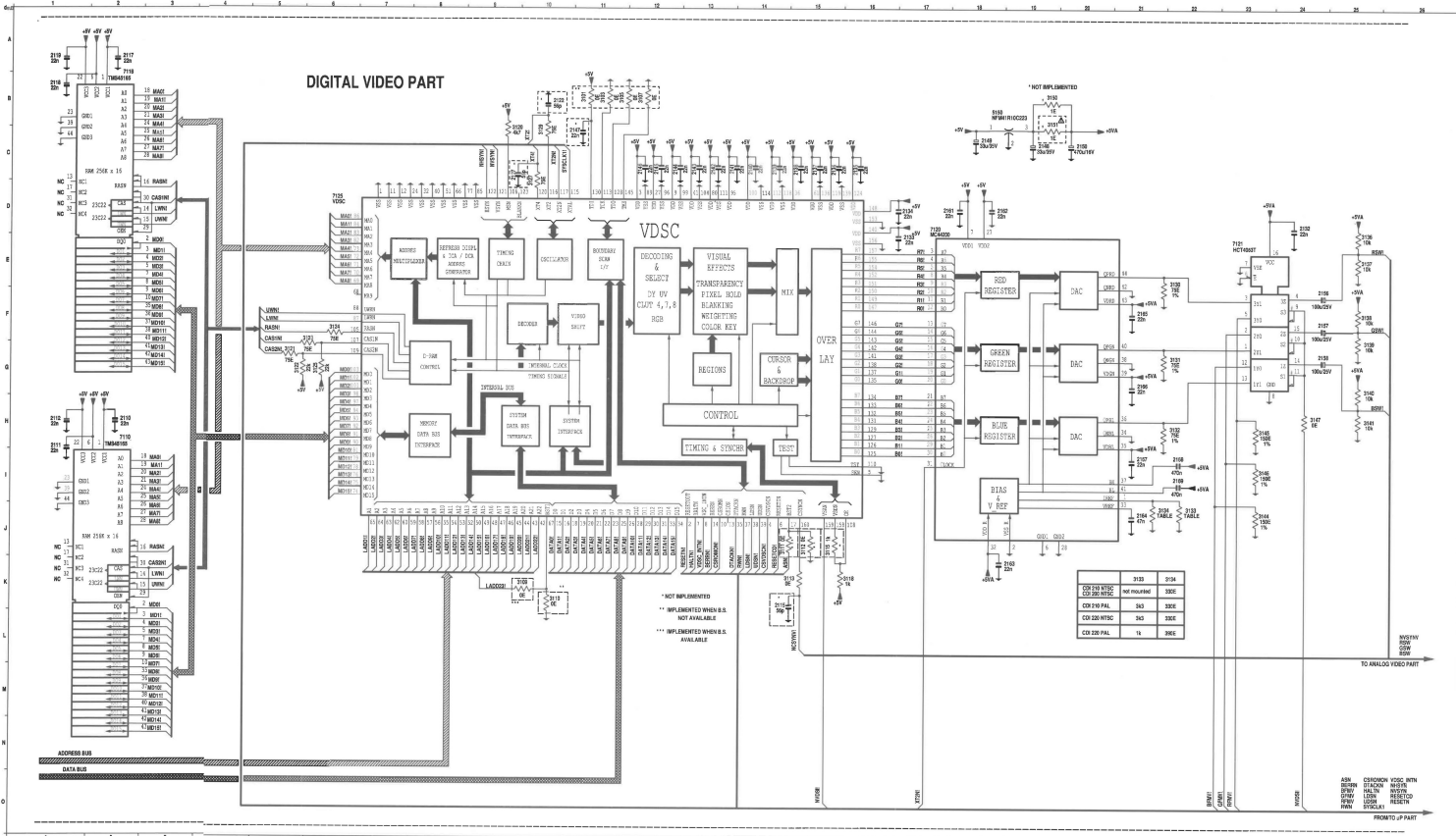
6.6 MONOBOARD PANEL 6.6.1 μ P part circuit diagram



6.6.2 GlueLogic, digital audio part circuit diagram



6.6.3 Digital video part circuit diagram



2 3 4 5 6

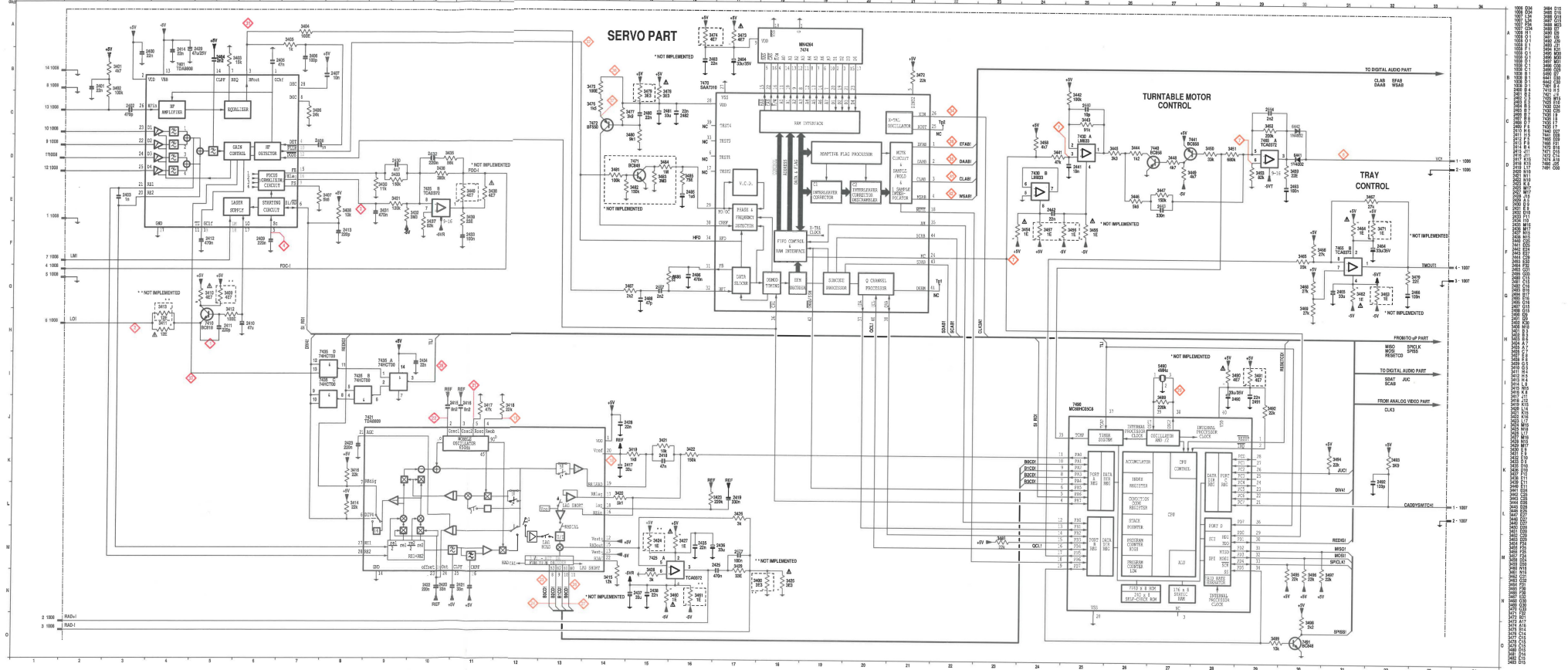


A	
B	
C	
D	
E	
F	

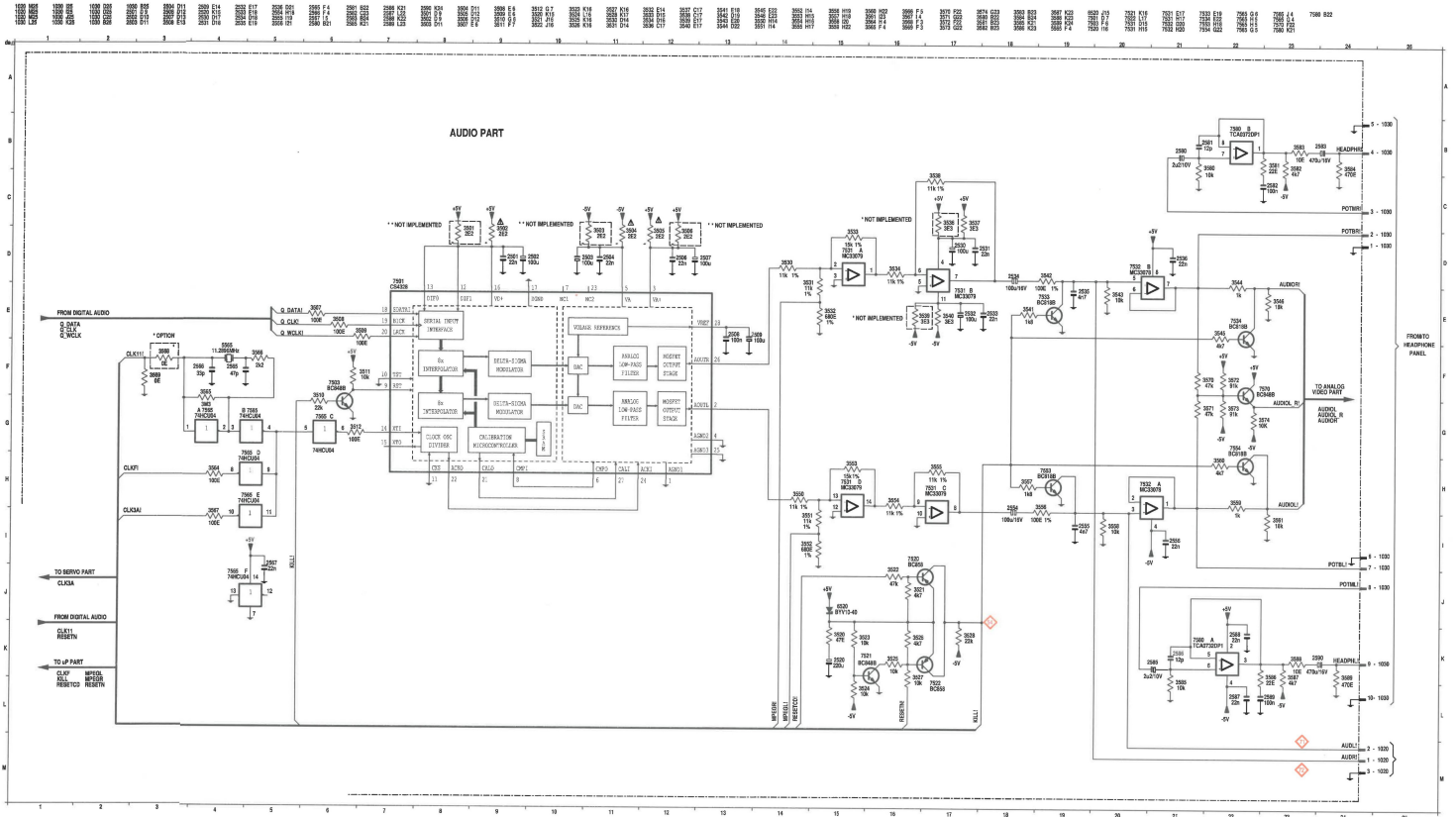
6.6.5 F.M.V. interface panel



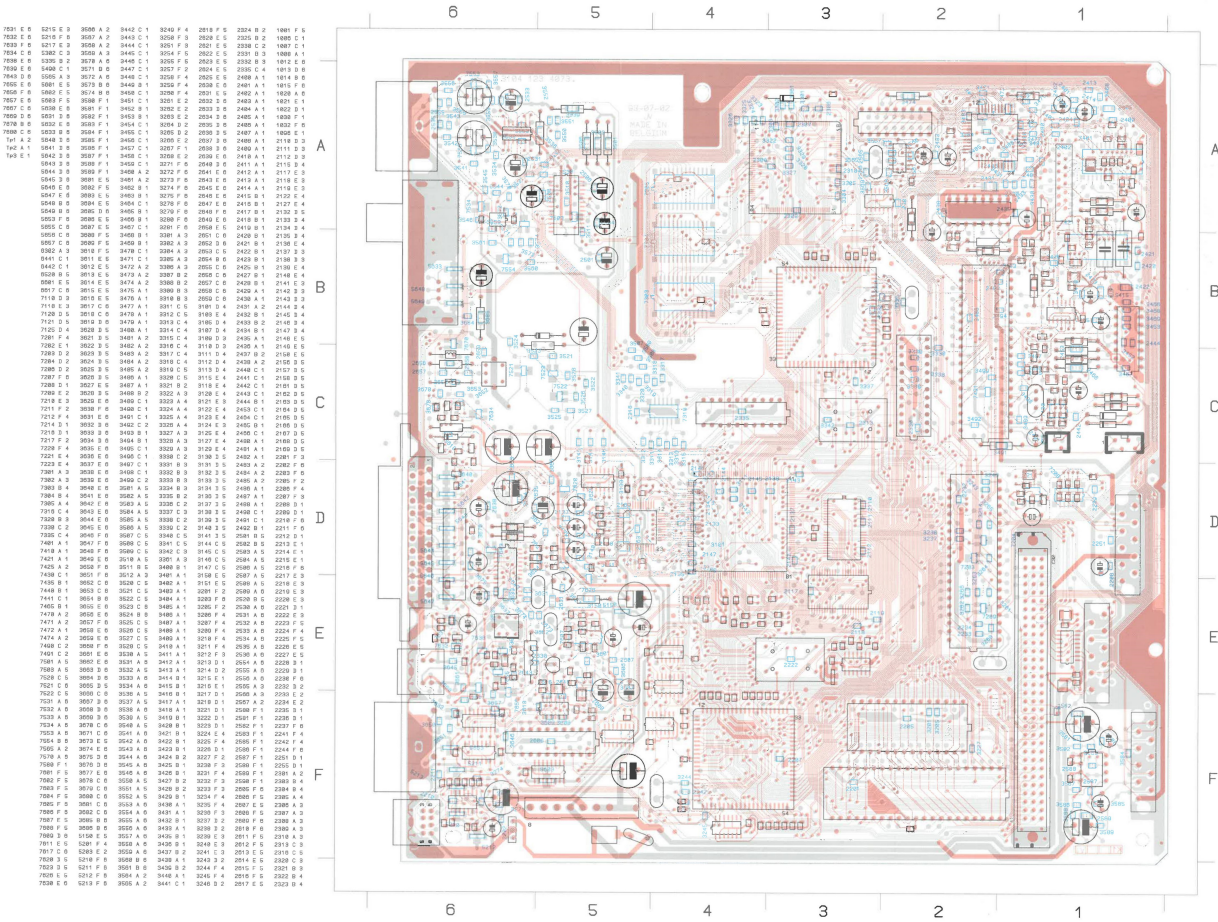
6.6.6 Servo part circuit diagram



6.6.7 Analog audio part circuit diagram



6.6.9 Mono board PCB layout



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 DigitalVideo part or by the Analog Video circuit. A few voltage and signal measurements can quickly isolate the problem. Hint, also check all the video outputs: S-video, RF, and CVBS. If video is not present from any output, check the RGB, composite sync, and power source inputs. If these signals are present, the Digital Video circuits are functional. Further checks of the Analog Video circuit can isolate the problem further. Check the Video Encoder IC. Also check Vcc1 and Vcc2 to the Video Encoder IC.

Symptom 3: no color. This symptom is most likely caused by a problem in the ENCODER circuit. Check the subcarrier oscillator at Pin 6 of the Video Encoder IC. If this signal is present (correct frequency), check the chroma output signal at Pin 15. If there is no chroma output, IC7609 may be the fault. Also check for short circuits between pins of the IC. If the chroma is present, check the chroma input at Pin 17. If the chroma is not present here, check the coupling components between Pins 15 and 17. If there is chroma at this point, check the composite output at Pin 20. If the chroma is missing, suspect the Video Encoder IC (IC7609).

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 %.

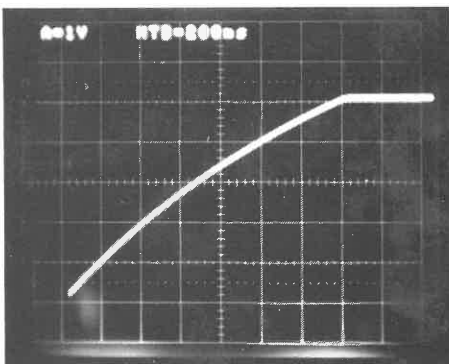
7.2.2.2 Focus signal.

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 :

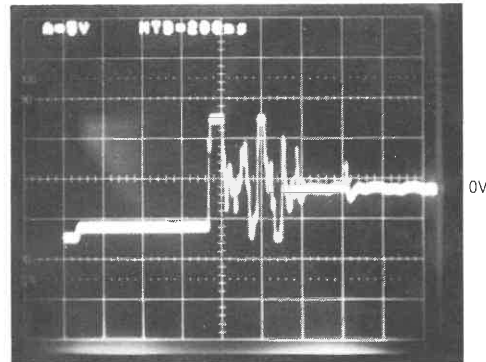


The signal is triggered by the Si/RD signal on IC7401pin6.

7.2.2.4 Motorcontrol signals.

Insert testdisc 5.

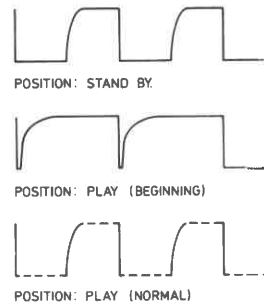
Measure accross IC7445A pin3 and GND, after pushing the play button the next picture should appear on the oscilloscope.



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 :



38 849 A12

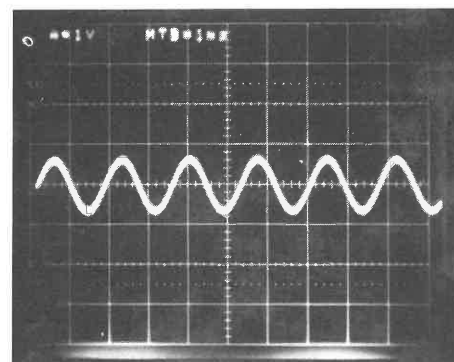
7.2.2.5 Radial error circuit signals.

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.

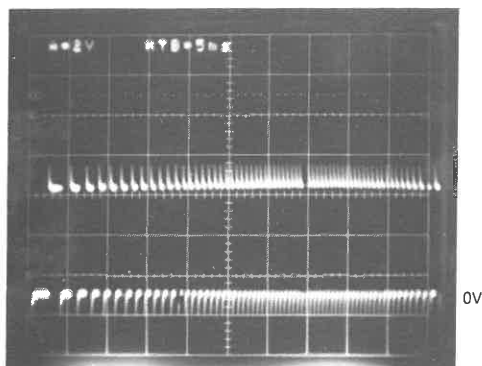
Voltage accross measuring point 21 and GND : 1,2 V / DC $\pm$ 10% in PLAY mode.

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 :



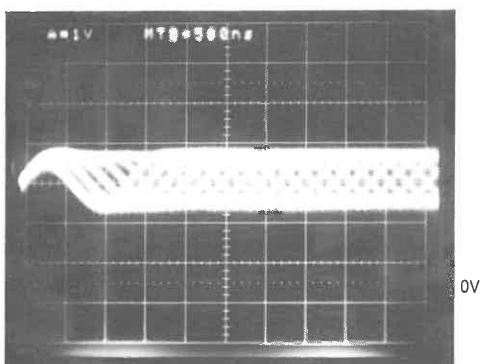
7.2.2.6 Clock signal μ P IC7475

Measuring point 29 : clock signal $f = 4\text{MHz}$.

7.2.2.7 Decoder signals

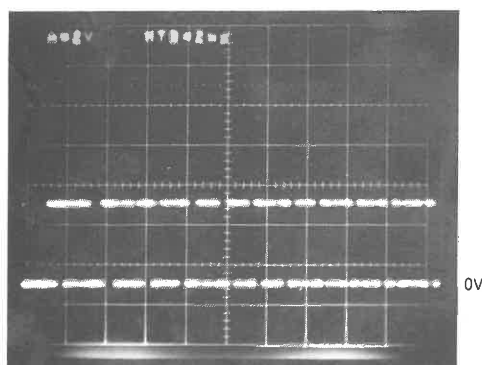
Play track 1 of testdisc 5.

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.

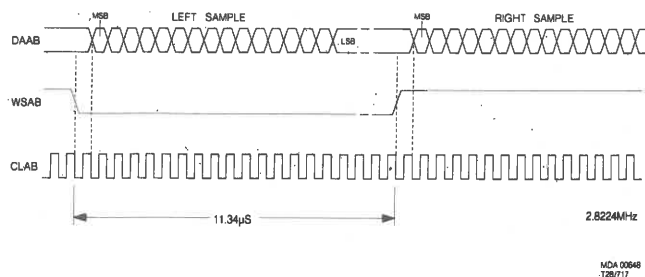
The signal accross measuring point 32 should be :



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 ($2 + 8$).

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

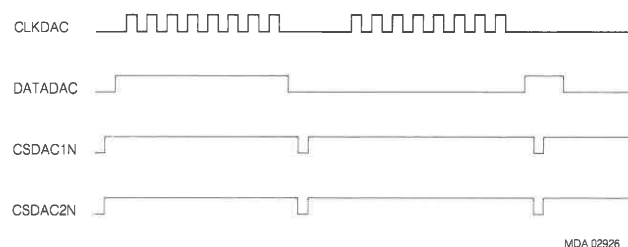
Check whether the signals appear on test/measurements points 66 + 69 (connector A11 pin 1 + 4) from the slave processor.

66 - CLKDAC

67 - DATADAC

68 - CSDAC1N Pin15 of IC7550

69 - CSDAC2N Pin15 of IC7530

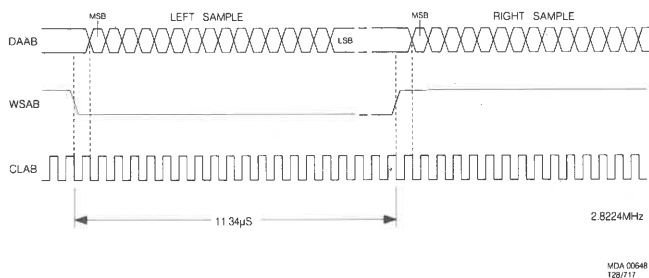


These signals are very hard to recognize on an oscilloscope during the normal application. Only in the **service shell** and controlling the attenuators you can observe activity .
If there is any activity on one of the lines 66 + 69 one can suppose that the information of this signals are oke.
This is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

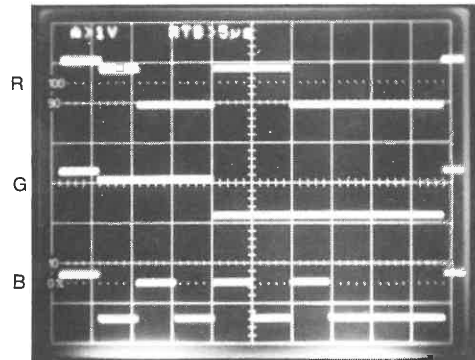
7.2.4 Video section

Required test equipment.

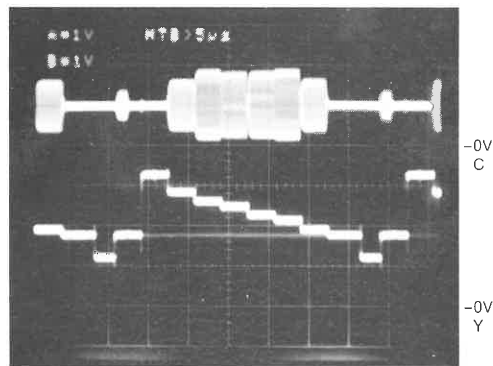
- Electronic voltmeter
- Oscilloscope
- Frequency counter

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

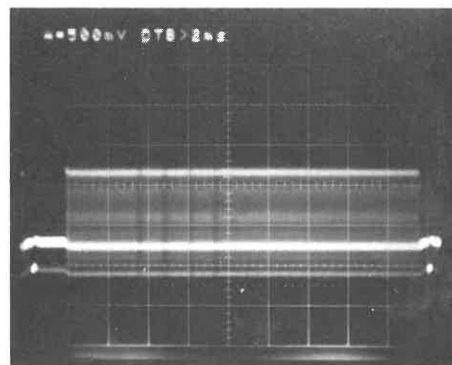
Measuring point 86, 87 and 88:



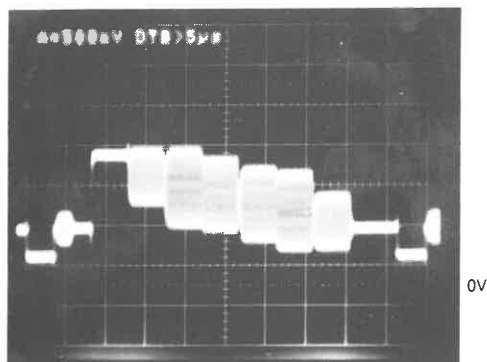
Measuring point 91:



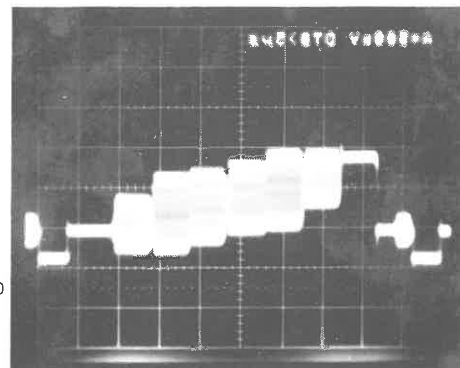
Measuring point 92:



Measuring point 89:



Check of Output signals for CVBS - Y / C.



7.2.4.1 Check of subcarrier .

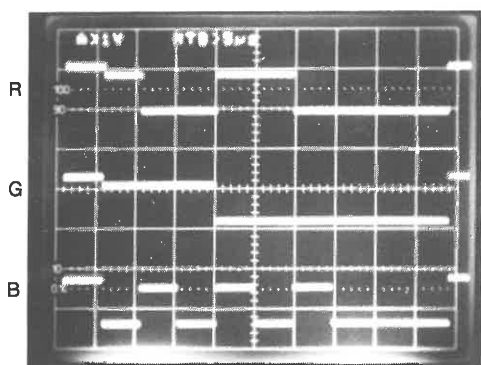
- Player switched off.
- Connect frequency counter to testpoint 83 ,(Pin 6 IC 7609) and turn on the player.
- The frequency on testpoint 83 should be;
PAL = 4 433 618 Hz. $\pm$ 50 Hz.
NTSC = 3 579 545 Hz. $\pm$ 7 Hz.
- The amplitude on testpoint 83 should be in between;
400 mV and 1000 mV_{pp}
- If for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

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.

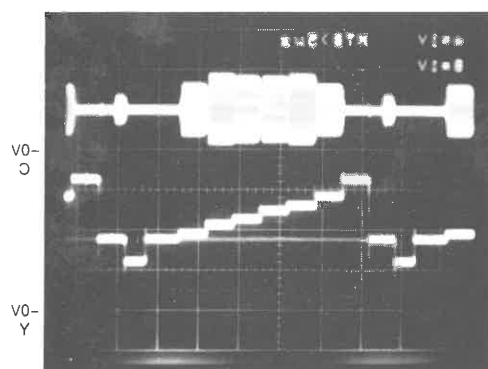
7.2.4.3 Check of RGB input signals

On the given photo below the signals are given for R - G - B.
On Testpoints 86, 87 and 88.



CVBS signals Testpoint 89

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



Y/C Sign. Testpoint 91/92

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

7.2.5 Multi Media Controller section

Required equipment:

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

7.2.5.1 Supply voltages

Check if the following voltages are present at connector 1001

pin1,2,3 : +5 V $\pm$ 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 bists : 8
stop bits : 0
no parity/ no handshake

8 PARTSLIST

8.1 Partslist of the cabinet

Item	Codenummer	Description	Item	Codenummer	Description
1	4822 444 40684	Front assy /00/05	256	4822 462 40409	Plate for foot
9	4822 410 62821	Powerknob assy	257	4822 462 40409	Plate for foot
22	4822 502 30408	PL3X10PAN<STZNBK	259	4822 502 12795	M2,5X5PAN<STZNBK
23	4822 502 30408	PL3X10PAN<STZNBK	260	4822 502 12795	M2,5X5PAN<STZNBK
24	4822 502 30408	PL3X10PAN<STZNBK	268	4822 502 12795	M2,5X5PAN<STZNBK
25	4822 502 30408	PL3X10PAN<STZNBK	269	4822 502 12795	M2,5X5PAN<STZNBK
26	4822 502 30408	PL3X10PAN<STZNBK	270	4822 502 12795	M2,5X5PAN<STZNBK
27	4822 502 30408	PL3X10PAN<STZNBK	271	4822 502 11667	M3X6PAN<STZNBK
30	4822 502 30408	PL3X10PAN<STZNBK	272	4822 502 11667	M3X6PAN<STZNBK
31	4822 502 30408	PL3X10PAN<STZNBK	273		M3X4PAN<STZNBK
44	4822 413 51434	Volume knob	274	4822 502 11667	M3X6PAN<STZNBK
65	4822 444 40683	Tray front	275	4822 502 11667	M3X6PAN<STZNBK
75	4822 502 12795	M2,5X5PAN<STZNBK	278	4822 502 30408	PL3X10PAN<STZNBK
76	4822 502 12795	M2,5X5PAN<STZNBK	279	4822 502 30408	PL3X10PAN<STZNBK
77	4822 502 12795	M2,5X5PAN<STZNBK	281		Cap
78	4822 502 12795	M2,5X5PAN<STZNBK	301	4822 321 10249	Mainscord /00/20
81	Tray loader	SEE SEPARATE LIST	301	4822 321 10886	Mainscord /05/25
151	4822 444 60936	Cover	302	4822 321 20308	Audio cord set
171	4822 502 12795	M2,5X5PAN<STZNBK	309	4822 736 21839	Dir.for use
172	4822 502 12795	M2,5X5PAN<STZNBK	315	4822 321 61579	Video cord set
173	4822 502 12795	M2,5X5PAN<STZNBK	316	4822 321 61849	TPX 3500 cord
174	4822 502 12795	M2,5X5PAN<STZNBK	318	4822 218 10401	IR-remote Control
175	4822 502 12795	M2,5X5PAN<STZNBK			
178	4822 502 12795	M2,5X5PAN<STZNBK	1001	4822 214 60019	Monopanel assy /00
181		Frame assy	1001	4822 214 60021	Monopanel assy /05
182		Trafo support	1001	4822 214 52135	Monopanel assy /20
183		Spacer locking	1001	4822 214 52136	Monopanel assy /25
184		Spacer locking			These monoboards to be repaired via PCS-repair procedure !
185		Remod. bracket			For separate parts see partslist Monoboard
186	4822 402 61422	Spacer			
187	4822 402 61422	Spacer			
188	4822 402 61422	Spacer			
189		FMV box			
200		Taptide M3X36	1002		Display/powersupply panel.
201		Taptide M3X36			See separate partslist
202	4822 502 12795	M2,5X5PAN<STZNBK	1003	4822 214 52048	FMV expansion panel
203	4822 502 12795	M2,5X5PAN<STZNBK	1808	4822 070 33151	Fuse T315mA
207		ZN 3X6 TORX			
208		ZN 3X6 TORX	5802	4822 146 31208	Transformer 220V/240V
209	4822 502 12795	M2,5X5PAN<STZNBK			
210	4822 502 12795	M2,5X5PAN<STZNBK			
211	4822 502 30408	PL3X10PAN<STZNBK			
212	4822 502 30408	PL3X10PAN<STZNBK			
213	4822 502 30408	PL3X10PAN<STZNBK			
214	4822 502 30408	PL3X10PAN<STZNBK			
215	4822 530 80522	2,8X5,5			
216	4822 530 80522	2,8X5,5			
217	4822 502 12795	M2,5X5PAN<STZNBK			
218	4822 502 12795	M2,5X5PAN<STZNBK			
219	4822 502 12795	M2,5X5PAN<STZNBK			
220	4822 502 12795	M2,5X5PAN<STZNBK			
221	4822 530 80522	2,8X5,5			
222	4822 530 80522	2,8X5,5			
223	4822 502 30438	PL3X6PAN<STZNBK			
224	4822 502 30438	PL3X6PAN<STZNBK			
225		M3X4PAN<STZNBK			
226		M3X4PAN<STZNBK			
251	4822 462 41992	Foot			
252	4822 462 41992	Foot			
255	4822 462 40409	Plate for foot			

8.2 PARTS LIST OF THE TRAY LOADER

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

8.3 PARTSLIST OF THE DISPLAY AND POWERSUPPLY PANEL

Item	Codenumber	Description
2		Heat sink
4		Bracket for conn.
6		FTD-holder
7		Insulating plate
8		Factory plate
10		Shielding cap
101	4822 492 63076	Spring clip
103	4822 492 63076	Spring clip
107	4822 492 63076	Spring clip
201	4822 325 20188	Mica isulator
202	4822 325 20188	Mica isulator
1201	4822 267 31572	socket 3p hor. fem.
1202	4822 267 51216	minidin socket 8p FEM TCS
1206	4822 267 50994	Conn. 10p grey
1220	4822 267 50994	Conn. 10p grey
1221		Earth spring
1703	4822 276 13114	Switch tact H=4,3
1704	4822 276 13114	Switch tact H=4,3
1705	4822 276 13114	Switch tact H=4,3
1706	4822 276 13114	Switch tact H=4,3
1707	4822 276 13114	Switch tact H=4,3
1708	4822 276 13114	Switch tact H=4,3
1721		Conn. 10p hor male
1801		Conn. 5p ver male
1802		Conn. 8p ver male
1803	4822 265 31015	AC socket /00/05/20/25
1804		Conn. 3p top entry
1805	4822 253 10128	Fuse T2A Rad
1806	4822 253 10138	Fuse T1A Rad
1807	4822 256 30495	Fuseholder
1809	4822 256 30495	Fuseholder
1810	4822 265 40596	Conn. 2p male
1901	4822 276 11309	Powerswitch
1902	4822 265 40596	Conn. 2p male
2701	5322 122 32654	22nF 10% X7R 63V
2705	4822 122 33575	220pF 5% NPO 50V
2802	4822 124 80148	220µF 20% 16V
2803	4822 124 80047	1000µF 20% 35V
2804	5322 122 32654	22nF 10% X7R 63V
2805	4822 122 33496	100nF 10% X7R 63V
2806	4822 124 41596	22µF 20% 50V
2807	4822 124 41596	22µF 20% 50V
2808		4700µF 20% 6V3
2809		1000µF 20% 6V3
2810	4822 126 12522	1,5nF 20% 400V
2811	4822 126 12522	1,5nF 20% 400V
2812	4822 122 10289	22nF 100V
2813	4822 122 10289	22nF 100V
2814	5322 122 32654	22nF 10% X7R 63V
2815	5322 122 32654	22nF 10% X7R 63V
2816	5322 122 32654	22nF 10% X7R 63V
2817	5322 122 32654	22nF 10% X7R 63V
2818	4822 126 10454	3,3nF 20% 400V
2820	4822 124 41598	33µF 20% 35V

Item	Codenumber	Description
3201	4822 101 21199	2X10k POTM. CARBON
3701	4822 051 20101	100R00 5% 0,1W
3702	4822 051 20473	47k00 5% 0,1W
3704	4822 052 10478	4R70 5% 0,33W
3705	4822 051 20332	3k30 5% 0,1W
3706	4822 116 90857	4R7X8
3707	4822 116 90857	4R7X8
3712	4822 051 20223	22k00 5% 0,1W
3713	4822 051 20823	82k00 5% 0,1W
3715	4822 050 21002	1k00 1% 0,6W
3716	4822 051 20223	22k00 5% 0,1W
3717	4822 051 20472	4k70 5% 0,1W
3718	4822 050 21002	1k00 1% 0,6W
3719	4822 051 20472	4k70 5% 0,1W
3720	4822 051 20154	150k00 5% 0,1W
3721	4822 051 20473	47k00 5% 0,1W
3722	4822 051 20472	4k70 5% 0,1W
3723	4822 051 20472	4k70 5% 0,1W
3724	4822 051 20223	22k00 5% 0,1W
3725	4822 050 21002	1k00 1% 0,6W
3726	4822 051 20472	4k70 5% 0,1W
3727	4822 051 20683	68k00 5% 0,1W
3728	4822 051 20103	10k00 5% 0,1W
3729	4822 051 20472	4k70 5% 0,1W
3730	4822 051 20153	15k00 5% 0,1W
3731	4822 050 21002	1k00 1% 0,6W
3801	4822 051 20821	820R00 5% 0,1W
3802	4822 051 20008	0R00 5% 0,1W
3803	4822 051 20271	270R00 5% 0,1W
3804	4822 051 20683	68k00 5% 0,1W
3805	4822 116 83776	220k 1% 0,1W
3806	4822 051 20123	12k00 5% 0,1W
3807	4822 100 11633	47k TRIM CARBON
3808	4822 051 10102	1k00 2% 0,25W
5203		EMI FILTER 1nF 100V
5204		EMI FILTER 1nF 100V
5207		EMI FILTER 1nF 100V
5208		EMI FILTER 1nF 100V
5209		EMI FILTER 22nF 16V
5210		EMI FILTER 1nF 100V
5211		EMI FILTER 1nF 100V
5801	4822 338 33030	MAINS FILTER
5803		FXC INDUCTOR
5804	5322 157 52513	10μH 20%
6701	4822 130 80622	BAT54
6702	5322 130 31928	BAS16
6704	4822 214 52009	IR RECEIVER GP1U58XP
6705	4822 130 34173	BZX79-C5V6
6706	5322 130 30684	1N4002
6707	5322 130 30684	1N4002
6708	4822 130 34281	BZX79-C15
6709	5322 130 31928	BAS16
6801	4822 130 82985	BYD14G
6802	4822 130 82985	BYD14G
6803	5322 130 30684	1N4002
6804	5322 130 30684	1N4002
6805	5322 130 30684	1N4002
6807	4822 209 81758	MBR1545CT
6808	4822 130 34173	BZX79-C5V6
6810	4822 130 20279	2N6397PH

Item	Codenumber	Description
7703	5322 130 41982	BC848B
7704	5322 130 41982	BC848B
7705	4822 130 91194	FTD DISPLAY/00/05
7705	4822 214 52133	FTD DISPLAY/20/25
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 for /20/25

Item	Codenumber	Description	Item	Codenumber	Description
PCB	4822 214 52135	PANEL ASSY /20	2209	5322 122 32654	22nF 10% 63V
PCB	4822 214 52136	PANEL ASSY /25	2210	5322 122 32654	22nF 10% 63V
1001		conn. 8p hor.male	2211	5322 122 32654	22nF 10% 63V
1006	4822 265 30525	conn. 2p vert. male	2212	4822 017 01031	10nF 20% 50V
1007	4822 265 40474	conn. 4p vert. male	2216	4822 124 41989	470µF 20% 16V
1008	4822 267 51152	conn. 14p zif straight	2217	5322 122 32654	22nF 10% 63V
1013	4822 267 60326	EUROCONN SCART BLUE	2222	5322 122 32654	22nF 10% 63V
1014	4822 214 52071	RF modulator /05	2223	4822 124 41989	470µF 20% 16V
1015		socket 2p female YKC21-550	2224	5322 122 32654	22nF 10% 63V
1020		socket 2p female YKC21-528	2225	5322 122 32654	22nF 10% 63V
1021	4822 265 40442	conn. 10p vert. male	2226	5322 122 32654	22nF 10% 63V
1022	4822 265 40442	conn. 10p vert. male	2227	5322 122 32654	22nF 10% 63V
1032	4822 267 51216	minidin socket 8p FEM TCS	2229	5322 122 32654	22nF 10% 63V
1096	4822 267 70325	conn. 96p hor. female	2230	5322 122 32654	22nF 10% 63V
1206	4822 255 40129	IC socket 40p	2232	5322 122 32654	22nF 10% 63V
1211	4822 255 40129	IC socket 40p	2233	5322 122 32452	47pF 5% NPO 63V
1490	4822 255 40129	IC socket 40p	2234	5322 122 32452	47pF 5% NPO 63V
2110	5322 122 32654	22nF 10% 63V	2235	5322 122 31865	1,5nF 10% 63V
2111	5322 122 32654	22nF 10% 63V	2236	5322 122 31865	1,5nF 10% 63V
2112	5322 122 32654	22nF 10% 63V	2237	5322 122 31865	1,5nF 10% 63V
2117	5322 122 32654	22nF 10% 63V	2241	5322 122 32661	56pF 5% 50V
2118	5322 122 32654	22nF 10% 63V	2242	5322 122 32661	56pF 5% 50V
2119	5322 122 32654	22nF 10% 63V	2244	5322 122 31865	1,5nF 10% 63V
2132	5322 122 32654	22nF 10% 63V	2251	5322 122 31865	1,5nF 10% 63V
2133	5322 122 32654	22nF 10% 63V	2255	4822 126 12549	470nF 10% 25V
2134	5322 122 32654	22nF 10% 63V	2303	5322 122 32654	22nF 10% 63V
2135	5322 122 32654	22nF 10% 63V	2304	5322 122 32654	22nF 10% 63V
2136	5322 122 32654	22nF 10% 63V	2305	5322 122 32654	22nF 10% 63V
2137	5322 122 32654	22nF 10% 63V	2307	5322 122 32654	22nF 10% 63V
2138	5322 122 32654	22nF 10% 63V	2308	5322 122 32654	22nF 10% 63V
2139	5322 122 32654	22nF 10% 63V	2309	5322 122 32654	22nF 10% 63V
2140	5322 122 32654	22nF 10% 63V	2310	5322 122 32654	22nF 10% 63V
2141	5322 122 32654	22nF 10% 63V	2313	5322 122 32654	22nF 10% 63V
2142	5322 122 32654	22nF 10% 63V	2316	5322 122 32654	22nF 10% 63V
2143	5322 122 32654	22nF 10% 63V	2317	5322 122 32452	47pF 5% NPO 63V
2144	5322 122 32654	22nF 10% 63V	2320	5322 122 32654	22nF 10% 63V
2145	5322 122 32654	22nF 10% 63V	2321	5322 122 32654	22nF 10% 63V
2146	5322 122 32654	22nF 10% 63V	2322	5322 122 32654	22nF 10% 63V
2147	5322 122 32654	22nF 10% 63V	2323	5322 122 32654	22nF 10% 63V
2148	4822 124 41598	33µF 20% 35V	2324	5322 122 32654	22nF 10% 63V
2149	4822 124 41598	33µF 20% 35V	2325	5322 122 32654	22nF 10% 63V
2150	4822 124 41989	470µF 20% 16V	2330	5322 122 32654	22nF 10% 63V
2156	4822 124 41528	100µF 25V	2335	5322 122 32654	22nF 10% 63
2157	4822 124 41528	100µF 25V	2400	5322 122 32654	22nF 10% 63V
2158	4822 124 41528	100µF 25V	2401	5322 122 32654	22nF 10% 63V
2161	5322 122 32654	22nF 10% 63V	2402	5322 122 32268	470pF 10% 50V
2162	5322 122 32654	22nF 10% 63V	2403	5322 122 34123	1nF 10% 50V
2163	5322 122 32654	22nF 10% 63V	2404	4822 122 33175	2,2nF 20% 50V
2164	4822 122 32542	47nF 10% 63V	2405	4822 122 32542	47nF 10% 63V
2165	5322 122 32654	22nF 10% 63V	2406	5322 122 32531	100pF 5% 50V
2166	5322 122 32654	22nF 10% 63V	2407	4822 122 33177	10nF 20% 50V
2167	5322 122 32654	22nF 10% 63V	2408	5322 122 34123	1nF 10% 50V
2168	4822 126 12549	470nF 10% 25V	2409	5322 122 31865	1,5nF 10% 63V
2169	4822 126 12549	470nF 10% 25V	2411	4822 122 32575	220pF 10% 500V
2201	5322 122 32654	22nF 10% 63V	2412	4822 126 12549	470nF 10%
2202	5322 122 32654	22nF 10% 63V	2413	4822 122 32575	220pF 10% 500V
2203	4822 124 41598	33µF 20% 35V	2414	5322 122 32654	22nF 10% 63V
2205	5322 122 32654	22nF 10% 63V	2415	4822 121 51321	8,2nF 1% 63V
2206	5322 122 32654	22nF 10% 63V	2416	4822 121 51321	8,2nF 1% 63V
2207	5322 122 32654	22nF 10% 63V	2417	4822 124 41598	33µF 20% 35V
2208	5322 122 32654	22nF 10% 63V	2418	4822 122 32542	47nF 10% 63V

Item	Codenummer	Description	Item	Codenummer	Description
2419	5322 121 42661	330nF 5%	2635	5322 122 32654	22nF 10% 63V
2420	4822 122 33342	33nF 10% 63V	2636	4822 124 41528	100µF 25V
2421	4822 122 33342	33nF 10% 63V	2637	4822 124 41579	10µF 20% 50V
2422	4822 121 42408	220nF 5% 63V	2638	5322 122 32654	22nF 10% 63V
2423	4822 121 42408	220nF 5% 63V	2639	4822 122 33496	100nF 10% 63V
2425	4822 121 51252	470nF 5% 63V	2640	4822 124 41579	10µF 20% 50V
2427	4822 122 33496	100nF 10% 63V	2641	4822 124 41579	10µF 20% 50V
2428	5322 122 32654	22nF 10% 63V	2643	5322 122 32448	10pF 5% 50V
2429	4822 124 41527	47µF 25V	2647	4822 122 33496	100nF 10% 63V
2430	5322 126 10223	4,7nF 10% 63V	2648	5322 122 32654	22nF 10% 63V
2431	4822 121 51252	470nF 5% 63V	2649	5322 122 32659	33pF 5% 50V
2432	4822 122 32927	220nF Y5V 50V	2650		9,8pF-60pF 100V
2433	4822 122 33496	100nF 10% 63V	2651	4822 124 41989	470µF 16V
2434	5322 122 32654	22nF 10% 63V	2652	4822 124 41989	470µF 16V
2435	5322 122 32654	22nF 10% 63V	2653	4822 124 41989	470µF 16V
2436	4822 124 41598	33µF 20% 35V	2654	4822 124 41528	100µF 25V
2437	4822 124 41598	33µF 20% 35V			
2438	5322 122 32654	22nF 10% 63V	3101	4822 051 20008	0R00 jumper
2440	5322 122 32448	10pF 5% 50V	3103	4822 051 20008	0R00 jumper
2441	4822 122 33893	18nF 10% 63V	3105	4822 051 20008	0R00 jumper
2442	5322 122 32654	22nF 10% 63V	3107	4822 051 20008	0R00 jumper
2443	4822 126 12719	330nF 10% 25V	3110	4822 051 20008	0R00 jumper
2444	4822 122 33175	2,2nF 20% 50V	3112	4822 051 20008	0R00 jumper
2453	4822 122 33496	100nF 10% 63V	3113	4822 051 20008	0R00 jumper
2464	4822 124 41598	33µF 20% 35V	3118	4822 051 10102	1k00 2% 0,25W
2465	4822 124 41598	33µF 20% 35V	3120	4822 051 20472	4k70 5% 0,1W
2466	4822 122 33496	100nF 10% 63V	3121		75R00 1%
2480	5322 122 32654	22nF 10% 63V	3122	4822 051 20223	22k00 5% 0,1W
2481	4822 124 41598	33µF 20% 35V	3123		75R00 1%
2482	5322 122 32654	22nF 10% 63V	3124		75R00 1%
2483	5322 122 32654	22nF 10% 63V	3125	4822 051 20223	22k00 5% 0,1W
2484	4822 124 41598	33µF 20% 35V	3127		75R00 1% 0,1W
2485	4822 124 40243	1,5µF 20% 63V	3129		75R00 1%
2486	4822 126 12549	470nF 10% 25V	3130		75R00 1% 0,1W
2487	4822 122 33175	2,2nF 20% 50V	3131		75R00 1% 0,1W
2488	5322 122 32452	47pF 5% 63V	3132		75R00 1% 0,1W
2490	4822 124 41598	33µF 20% 35V	3133	4822 051 20332	3k30 5% 0,1W
2491	5322 122 32654	22nF 10% 63V	3134		330R00 1%
2492	5322 122 32531	100pF 5% 50V	3136	4822 051 20103	10k00 5% 0,1W
2501	5322 122 32654	22nF 10% 63V	3137	4822 051 20103	10k00 5% 0,1W
2502	4822 124 41528	100µF 25V	3138	4822 051 20103	10k00 5% 0,1W
2503	4822 124 41528	100µF 25V	3139	4822 051 20103	10k00 5% 0,1W
2504	5322 122 32654	22nF 10% 63V	3140	4822 051 20103	10k00 5% 0,1W
2506	5322 122 32654	22nF 10% 63V	3141	4822 051 20103	10k00 5% 0,1W
2507	4822 124 41528	100µF 25V	3144		150R00 1%
2508	4822 122 33496	100nF 10% 63V	3145		150R00 1%
2509	4822 124 41528	100µF 25V	3146		150R00 1%
2520	4822 124 80144	220µF 20% 25V	3201	4822 051 20008	0R00 5% 0,1W
2530	4822 124 41528	100µF 25V	3203	4822 051 20101	100R00 5% 0,1W
2531	5322 122 32654	22nF 10% 63V	3206	4822 051 20472	4k70 5% 0,1W
2532	4822 124 41528	100µF 25V	3207	4822 051 20472	4k70 5% 0,1W
2533	5322 122 32654	22nF 10% 63V	3210	4822 051 20472	4k70 5% 0,1W
2535	5322 126 10223	4,7nF 10% 63V	3211	4822 051 20472	4k70 5% 0,1W
2536	5322 122 32654	22nF 10% 63V	3212	4822 050 21002	1k00 1% 0,1W
2554	4822 124 22339	100µF 16V	3213	4822 051 20101	100R00 5% 0,1W
2555	5322 126 10223	4,7nF 10% 63V	3218	4822 051 20472	4k70 5% 0,1W
2556	5322 122 32654	22nF 10% 63V	3221	4822 051 20104	100k00 5% 0,1W
2565	5322 122 32452	47pF 5% 63V	3222	4822 051 20103	10k00 5% 0,1W
2566	5322 122 32659	33pF 5% 50V	3223	4822 051 20682	6k80 5% 0,1W
2567	5322 122 32654	22nF 10% 63V	3224	4822 050 21002	1k00 1% 0,1W
2632	4822 122 33496	100nF 10% 63V	3225	4822 051 20472	4k70 5% 0,1W
2633	4822 122 33496	100nF 10% 63V	3226	4822 051 20101	100R00 5% 0,1W
2634	4822 122 33496	100nF 10% 63V	3230	4822 050 21002	1k00 1% 0,1W

Item	Codenummer	Description			Item	Codenummer	Description		
3231	4822 050 21002	1k00	1%	0,1W	3340	4822 051 20008	0R00	5%	0,1W
3232	4822 051 20472	4k70	5%	0,1W	3342	4822 051 20103	10k00	5%	0,1W
3233	4822 051 20472	4k70	5%	0,1W	3361	4822 051 20103	10k00	5%	0,1W
3234	4822 050 21002	1k00	1%	0,1W	3400		3R3		
3235	4822 050 21002	1k00	1%	0,1W	3401	4822 051 20472	4k70	5%	0,1W
3236	4822 050 21002	1k00	1%	0,1W	3402	4822 051 20104	100k00	5%	0,1W
3237	4822 051 10102	1k00	2%	0,25W	3403	4822 116 83933	15k	1%	0,1W
3239	4822 051 20101	100R00	5%	0,1W	3404	4822 051 20101	100R00	5%	0,1W
3240	4822 051 20101	100R00	5%	0,1W	3405	4822 050 21002	1k00	1%	0,1W
3241	4822 051 20101	100R00	5%	0,1W	3406	4822 116 83705	24k	2%	0,2W
3243	4822 051 10102	1k00	2%	0,25W	3407	4822 051 20562	5k60	5%	0,1W
3244	4822 051 20222	2k20	5%	0,1W	3408	4822 051 20103	10k00	5%	0,1W
3245	4822 051 20105	1M00	5%	0,1W	3409	4822 052 10478	4R70	5%	0,33W
3249	4822 051 20472	4k70	5%	0,1W	3412	4822 051 20101	100R00	5%	0,1W
3250	4822 051 20472	4k70	5%	0,1W	3413		12R		
3251	4822 051 20472	4k70	5%	0,1W	3414	4822 051 20223	22k00	5%	0,1W
3254	4822 051 20008	0R00	5%	0,1W	3415	4822 051 20123	12k00	5%	0,1W
3257	4822 050 21002	1k00	1%	0,1W	3416	4822 051 20223	22k00	5%	0,1W
3258	4822 051 20223	22k00	5%	0,1W	3417	4822 051 20473	47k00	5%	0,1W
3259	4822 051 20223	22k00	5%	0,1W	3418	4822 051 20223	22k00	5%	0,1W
3260	4822 051 20223	22k00	5%	0,1W	3419	4822 051 20182	1k80	5%	0,1W
3261	4822 051 20183	18k00	5%	0,1W	3420	4822 116 83706	5k1	2%	0,2W
3262	4822 051 20183	18k00	5%	0,1W	3421	4822 051 20183	18k00	5%	0,1W
3263	4822 051 20473	47k00	5%	0,1W	3422	4822 051 20154	150k00	5%	0,1W
3264	4822 051 20103	10k00	5%	0,1W	3423	4822 051 20224	220k00	5%	0,1W
3265	4822 051 20103	10k00	5%	0,1W	3424		1R		
3266	4822 051 20222	2k20	5%	0,1W	3426	4822 051 20302	3k00	5%	0,1W
3267	4822 051 20222	2k20	5%	0,1W	3428	4822 051 20302	3k00	5%	0,1W
3268	4822 051 20224	220k00	5%	0,1W	3429	4822 051 20339	33R00	5%	0,1W
3271	4822 051 20682	6k80	5%	0,1W	3430	4822 051 20113	11k00	5%	0,1W
3272	4822 051 20103	10k00	5%	0,1W	3431	4822 051 20124	120k00	5%	0,1W
3273	4822 051 20104	100k00	5%	0,1W	3432		3M3	5%	0,1W
3274	4822 051 20682	6k80	5%	0,1W	3433	4822 051 20154	150k00	5%	0,1W
3275	4822 051 20103	10k00	5%	0,1W	3435	4822 051 20563	56k00	5%	0,1W
3278	4822 051 20104	100k00	5%	0,1W	3436	4822 051 20394	390k00	5%	0,1W
3279	4822 051 20101	100R00	5%	0,1W	3437	4822 051 20823	82k00	5%	0,1W
3280	4822 051 20104	100k00	5%	0,1W	3439	4822 116 52186	22E	5%	0,5W
3281	4822 051 20103	10k00	5%	0,1W	3440		4R7		
3301	4822 051 20472	4k70	5%	0,1W	3441	4822 051 20473	47k00	5%	0,1W
3304	4822 051 20472	4k70	5%	0,1W	3442	4822 051 20104	100k00	5%	0,1W
3305	4822 051 20472	4k70	5%	0,1W	3443	4822 051 20913	91k00	5%	0,1W
3306	4822 051 20103	10k00	5%	0,1W	3444	4822 051 20122	1k20	5%	0,1W
3307	4822 051 20103	10k00	5%	0,1W	3445	4822 051 20332	3k30	5%	0,1W
3308	4822 051 20103	10k00	5%	0,1W	3446	4822 051 20562	5k60	5%	0,1W
3309	4822 051 20103	10k00	5%	0,1W	3447	4822 051 20154	150k00	5%	0,1W
3310	4822 051 20103	10k00	5%	0,1W	3448	4822 051 20472	4k70	5%	0,1W
3318	4822 051 20008	0R00	5%	0,1W	3449	4822 051 20472	4k70	5%	0,1W
3321	4822 050 21002	1k00	1%	0,1W	3450	4822 051 20333	33k00	5%	0,1W
3322	4822 051 20103	10k00	5%	0,1W	3451	4822 051 20684	680k00	5%	0,1W
3323	4822 051 20103	10k00	5%	0,1W	3452	4822 051 20204	200k00	5%	0,1W
3324	4822 051 20103	10k00	5%	0,1W	3453	4822 051 20823	82k00	5%	0,1W
3325	4822 051 20103	10k00	5%	0,1W	3456		1R00		
3326	4822 051 20103	10k00	5%	0,1W	3457		1R00		
3327	4822 051 20103	10k00	5%	0,1W	3458	4822 051 20472	4k70	5%	0,1W
3328	4822 051 20103	10k00	5%	0,1W	3459	4822 116 52186	22E	5%	0,5W
3329	4822 051 20103	10k00	5%	0,1W	3461		1R00		
3330	4822 050 21002	1k00	1%	0,1W	3463		1R00		
3332	4822 051 20008	0R00	5%	0,1W	3465	4822 051 20203	20k00	5%	0,1W
3334	4822 051 20008	0R00	5%	0,1W	3466	4822 116 83084	27k	2%	0,2W
3336		75R00	1%		3467	4822 116 83084	27k	2%	0,2W
3337	4822 051 20103	10k00	5%	0,1W	3468	4822 116 83084	27k	2%	0,2W
3338		75R00	1%		3469	4822 116 83084	27k	2%	0,2W
3339		75R00	1%		3470	4822 116 52186	22E	5%	0,5W

Item	Codenummer	Description				Item	Codenummer	Description			
3471		1R00				3560	4822 051 20472	4k70	5%	0,1W	
3472	4822 051 20223	22k00	5%	0,1W		3561	4822 051 20183	18k00	5%	0,1W	
3474		4R7				3570	4822 051 20473	47k00	5%	0,1W	
3475	4822 051 20101	100R00	5%	0,1W		3571	4822 051 20473	47k00	5%	0,1W	
3476	4822 051 20152	1k50	5%	0,1W		3572	4822 051 20913	91k00	5%	0,1W	
3477	4822 051 20392	3k90	5%	0,1W		3573	4822 051 20913	91k00	5%	0,1W	
3479		3R3				3574	4822 051 20103	10k00	5%	0,1W	
3480	4822 051 20912	9k10	5%	0,1W		3605		3R3			
3485		75R	1%			3617	4822 050 23301	330R00	1%	0,6W	
3486	4822 051 20223	22k00	5%	0,1W		3618	4822 051 10102	1k00	2%	0,25W	
3487	4822 051 20222	2k20	5%	0,1W		3619		3R3			
3488	4822 051 20223	22k00	5%	0,1W		3620	4822 051 10102	1k00	2%	0,25W	
3489	4822 051 20224	220k00	5%	0,1W		3621	4822 051 20221	220R00	5%	0,1W	
3491		4R7				3622	4822 051 20561	560R00	5%	0,1W	
3492	4822 051 20223	22k00	5%	0,1W		3623	4822 051 10102	1k00	2%	0,25W	
3493	4822 051 20392	3k90	5%	0,1W		3624	4822 051 20221	220R00	5%	0,1W	
3494	4822 051 20223	22k00	5%	0,1W		3625	4822 051 20561	560R00	5%	0,1W	
3495	4822 051 20223	22k00	5%	0,1W		3626	4822 051 10102	1k00	2%	0,25W	
3496	4822 051 20223	22k00	5%	0,1W		3627	4822 051 20221	220R00	5%	0,1W	
3497	4822 051 20223	22k00	5%	0,1W		3628	4822 051 20561	560R00	5%	0,1W	
3498	4822 051 20222	2k20	5%	0,1W		3629	4822 051 20223	22k00	5%	0,1W	
3499	4822 051 20103	10k00	5%	0,1W		3631	4822 116 83933	15k	1%	0,1W	
3501		2R2				3634	4822 051 10102	1k00	2%	0,25W	
3503		2R2				3635	4822 051 20273	27k00	5%	0,1W	
3506		2R2				3636	4822 051 10102	1k00	2%	0,25W	
3507	4822 051 20101	100R00	5%	0,1W		3637	4822 051 10102	1k00	2%	0,25W	
3508	4822 051 20101	100R00	5%	0,1W		3638	4822 051 20223	22k00	5%	0,1W	
3509	4822 051 20101	100R00	5%	0,1W		3649	4822 051 10102	1k00	2%	0,25W	
3510	4822 051 20223	22k00	5%	0,1W		3650		75R00	1%		
3511	4822 051 20103	10k00	5%	0,1W		3651	4822 051 20151	150R00	5%	0,1W	
3520	4822 052 10479	47R	5%	0,33W		3652	4822 051 20151	150R00	5%	0,1W	
3521	4822 051 20472	4k70	5%	0,1W		3653		75R00	1%		
3522	4822 051 20473	47k00	5%	0,1W		3654		75R00	1%		
3523	4822 051 20103	10k00	5%	0,1W		3655	4822 051 54730	47k00	5%	0,1W	
3524	4822 051 20103	10k00	5%	0,1W		3656	4822 051 20223	22k00	5%	0,1W	
3525	4822 051 20103	10k00	5%	0,1W		3657	4822 051 20471	470R00	5%	0,1W	
3526	4822 051 20472	4k70	5%	0,1W		3658	4822 051 20511	510R00	5%	0,1W	
3527	4822 051 20103	10k00	5%	0,1W		3659	4822 051 20181	180R00	5%	0,1W	
3528	4822 051 20223	22k00	5%	0,1W		3663		75R00	1%		
3530	4822 050 21103	11k00	1%	0,6W		3664		75R00	1%		
3531	4822 050 21103	11k00	1%	0,6W		3665		75R00	1%		
3532	4822 051 20681	680R00	5%	0,1W		3666	4822 051 20472	4k70	5%	0,1W	
3533	4822 050 21503	15k00	1%	0,6W		3667	4822 117 10361	680R	1%	0,1W	
3534	4822 050 21103	11k00	1%	0,6W		3668	4822 051 20472	4k70	5%	0,1W	
3536		3R3				3669	4822 051 20101	100R00	5%	0,1W	
3538	4822 050 21103	11k00	1%	0,6W		3670	4822 051 20472	4k70	5%	0,1W	
3539		3R3				3674	4822 051 20008	0R00 JUMPER			
3541		1k80	1%	0,1W		3675		75R00	1%		
3542	4822 051 20101	100R00	5%	0,1W		3677	4822 051 20689	68R00	5%	0,1W	
3543	4822 051 20103	10k00	5%	0,1W		3678	4822 051 20223	22k00	5%	0,1W	
3544	4822 050 21002	1k00	1%	0,1W		3679	4822 051 20301	300R00	5%	0,1W	
3545	4822 051 20472	4k70	5%	0,1W		3680	4822 051 20301	300R00	5%	0,1W	
3546	4822 051 20183	18k00	5%	0,1W		3681	4822 051 20472	4k70	5%	0,1W	
3550	4822 050 21103	11k00	1%	0,6W		3682	4822 051 20223	22k00	5%	0,1W	
3551	4822 050 21103	11k00	1%	0,6W		3685		3R3			
3552	4822 051 20681	680R00	5%	0,1W							
3553	4822 050 21503	15k00	1%	0,6W		5150	4822 157 90252	EMI FILTER	22nF	100V	
3554	4822 050 21103	11k00	1%	0,6W		5201	4822 242 81398	4.915 000 MC			
3555	4822 050 21103	11k00	1%	0,6W		5203	4822 242 81396	4.000 000 MC			
3556	4822 051 20101	100R00	5%	0,1W		5210		EMI FILTER	1nF	100V	
3557		1k80	1%	0,1W		5211		EMI FILTER	1nF	100V	
3558	4822 051 20103	10k00	5%	0,1W		5212		EMI FILTER	1nF	100V	
3559	4822 050 21002	1k00	1%	0,1W		5213		EMI FILTER	1nF	100V	

Item	Codenummer	Description
5215	4822 157 90252	EMI FILTER 22nF 100V
5216	4822 157 70378	EMI FILTER 22nF 16V
5217	4822 242 81419	30 MC
5302		27 MC
5490	4822 242 72527	CST 4,00MGW-TF01
5631	4822 320 40247	DELAY LINE 275nSEC
5632		FILTER 3M5814M43
5640		EMI FILTER 1nF 100V
5641		EMI FILTER 1nF 100V
5642		EMI FILTER 220p 100V
5643		EMI FILTER 1nF 100V
5644		EMI FILTER 220pF 100V
5645		EMI FILTER 220pF 100V
5646		EMI FILTER 1nF 100V
5647		EMI FILTER 220pF 100V
5648		EMI FILTER 1nF 100V
5649		EMI FILTER 220pF 100V
5653		EMI FILTER 1nF 100V

6441	5322 756 20683	1N4002
6442	5322 756 20683	1N4002
6520	5322 130 34885	1N5817
6617	4822 130 34197	BZX79-C12

7110		HM514270ATT-7
7118		HM514270ATT-7
7120	4822 209 31292	MC44200
7121	5322 209 60189	PC74HCT4053T
7125		GXCT38307CI15
7201		SCC68070CCA84
7203	5322 130 41983	BC858B
7206		SLAVE PROC µP
7207	5322 209 71568	PC74HCT14T
7208	5322 209 71568	PC74HCT14T
7209	5322 130 41982	BC848B
7210	4822 209 30704	MC74HCU04D
7211		SYSTEM E-PROM
7212	4822 209 30704	MC74HCU04D
7216	5322 130 41982	BC848B
7217	4822 209 30554	MK48T08B15
7220	5322 209 61434	N74F02D
7221	4822 209 30696	MC74ACT74DR2
7223	5322 209 61434	N74F02D
7302		DSP56001FC27
7303	4822 209 32036	UM6264BM-10L
7304	4822 209 32036	UM6264BM-10L
7305	4822 209 32036	UM6264BM-10L
7316		N74F164D
7320		GSC38LG307P156
7330		IC SELECT PAL
7335		IC DTACK PAL
7401	4822 209 73234	TDA8808T/C3
7410	4822 130 42696	BC818-25
7421	4822 209 31973	TDA8809T/C2/S1/13
7425	4822 209 72587	TCA0372D2
7430	4822 209 30095	LM833D
7435	5322 209 60299	PC74HCT00T
7440	5322 130 41983	BC858B
7441	5322 130 41983	BC858B
7465	4822 209 72587	TCA0372D2
7470	4822 209 61759	SAA7310GP/H5
7472	4822 130 42131	BF550
7474	4822 209 70422	MN4264-15

Item	Codenummer	Description
7490		IC SERVO-CD µP
7491	5322 130 41982	BC848B
7501	4822 209 32072	CS4328KS
7503	4822 130 41982	BC848B
7520	5322 130 41983	BC858B
7521	5322 130 41982	BC848B
7522	5322 130 41983	BC858B
7531	4822 209 32071	MC33079D
7532	4822 209 62312	MC33078P
7533	4822 130 42696	BC818-25
7534	4822 130 42696	BC818-25
7553	4822 130 42696	BC818-25
7554	4822 130 42696	BC818-25
7565	4822 209 30704	MC74HCU04D
7570	5322 130 41982	BC848B
7609	4822 209 31908	CXA1145M
7617	5322 130 41982	BC848B
7620	5322 130 41982	BC848B
7623	5322 130 41982	BC848B
7626	5322 130 41982	BC848B
7633	5322 130 41982	BC848B
7634	5322 130 41982	BC848B
7638	5322 130 41982	BC848B
7639	5322 130 41982	BC848B
7643	5322 130 41982	BC848B
7655	5322 130 41982	BC848B
7656	5322 130 41983	BC858B
7667	5322 130 41982	BC848B
7669	5322 130 41982	BC848B
7670	5322 130 41983	BC858B
7680	4822 130 41982	BC848B

8.5 LIST OF ACCESSORIES AND SERVICE TOOLS

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

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