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Compact disc interactive player CDI 210/00/05

Service
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Service Manual

COMPACT disc Interactive

/00/05 are PAL players

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

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

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

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

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

CLASS 1
LASER PRODUCT
3122 110 03420

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PHILIPS

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2. PRODUCT INFORMATION
2.1 TECHNICAL SPECIFICATION

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

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

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

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

Power consumption • Consommation • Consume de corriente • Opgenomen vermogen • Leistungsaufname • Consumo di corrente • Consomo 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 fonzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

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

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

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

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

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

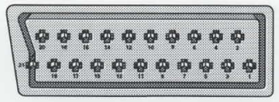


pin *Broche*	signal *Signal*	I/O *E/S*
1	nc	
2	rxd	I / *E*
3	txd	O / *S*
4	nc	
5	ground / *Masse*	
6	cts	I / *E*
7	rts	O / *S*
8	+5V (200 mA maxi.)	

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

Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas
video (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
Péritélévision A/V



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

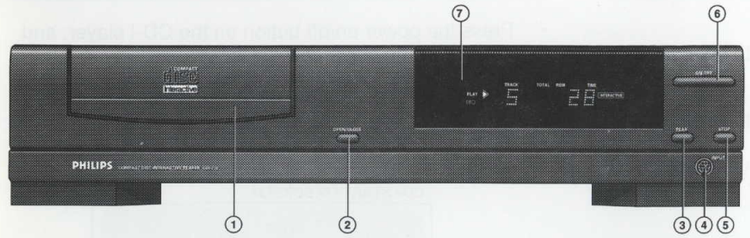
Audio 2 V_{rms}
2 channel individual RCA pin cinch sockets
2 V_{eff}
2 prises cinch (une par canal)

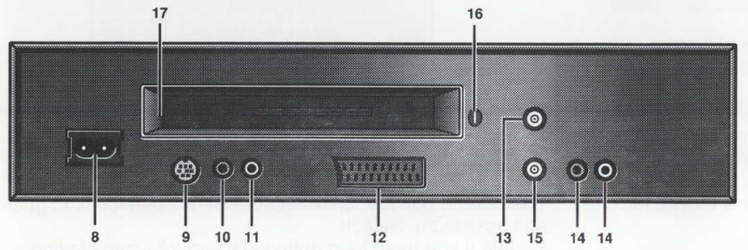
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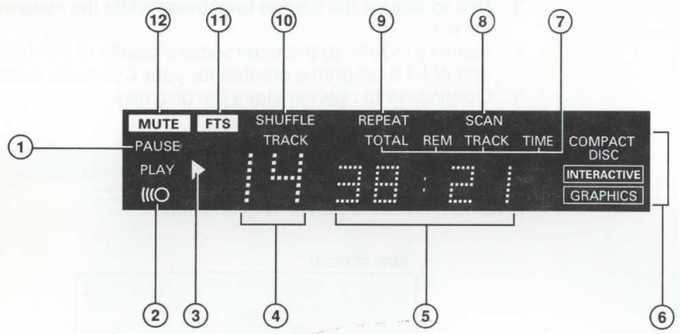
Designs and specifications are subject to change without notice. • *La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable. • Los diseños y las especificaciones están sujetos a cambios sin previo aviso. • Concepten en specificaties kunnen gewijzigd worden zonder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

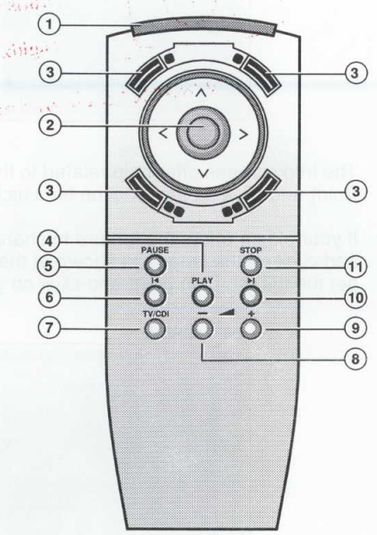
2.2 CONNECTION AND CONTROLS

CDI 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 seriel port
10. REMOTE (RC6) IN
11. Video output (CVBS)
12. A/V Euroconnector*
13. OUT TO TV*
14. Audio output R
    Audio output L
15. IN FROM ANTENNA*
16. Channel selector*
17. Extension socket (for 22ER9141)*

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

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

*Available on some player versions only.

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2.3 BEFORE USING YOUR CD-I PLAYER

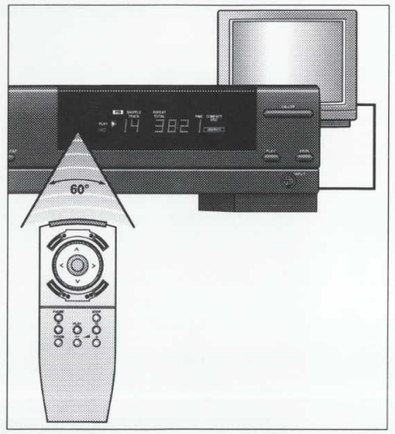
REMOVING THE TRANSIT PAD

- 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.

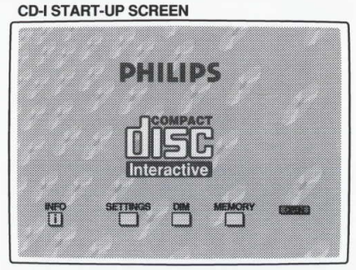
The function selected by this "point-and-click" technique is highlighted to confirm the selection.

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.

CD-I START-UP SCREEN



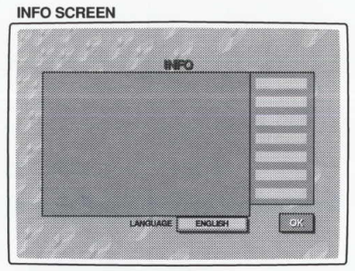
This screen has the following system function icons to guide and assist you. Select:

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)

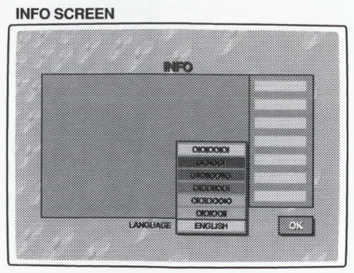
INFO SCREEN



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.

INFO SCREEN



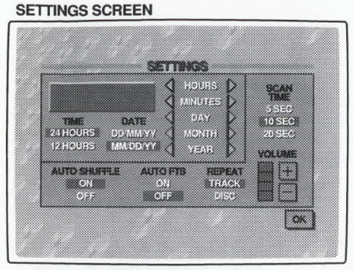
When finished, point-and-click on OK.

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.

SETTINGS SCREEN



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).

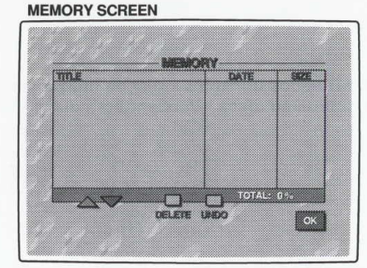
Note: Functions marked * are CD-Audio functions.
When finished, point-and-click on OK

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

MEMORY SCREEN



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).

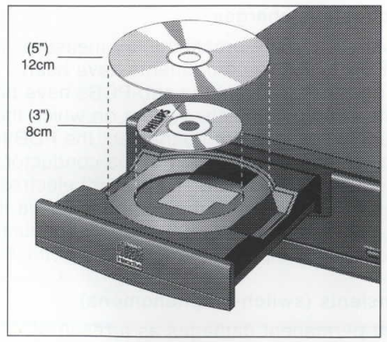
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2.5 DISC PLAY

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.

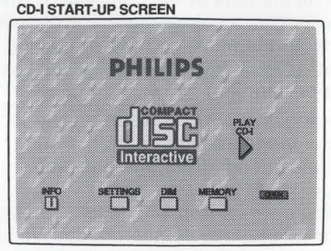
PLAYING A CD-I DISC

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.

CD-I START-UP SCREEN



To start the CD-I program, select the play icon on the screen (you may also press the play but-ton 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.

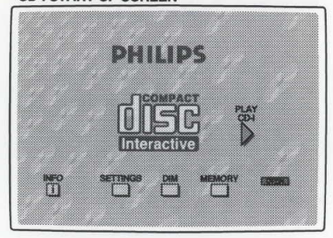
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DISC PLAY

PLAYING A PHOTO CD

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

CD-I START-UP SCREEN



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.

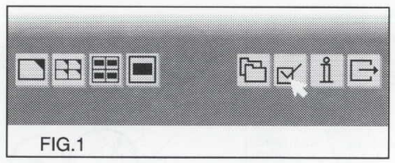


FIG.1

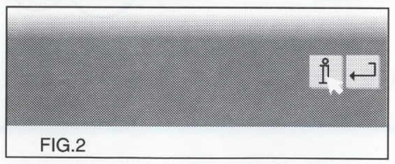
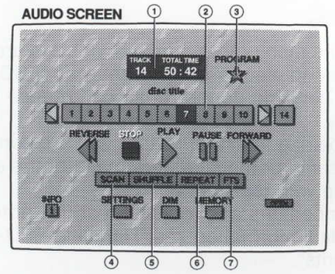


FIG.2

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.

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3.1 SAFETY INSTRUCTIONS

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

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

3.2 SERVICING OF SMDs (Surface Mounted Devices)

3.2.1 General cautions on handling and storage

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

3.2.2 Removal of SMDs

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

3.2.2.1 Caution on removal:

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

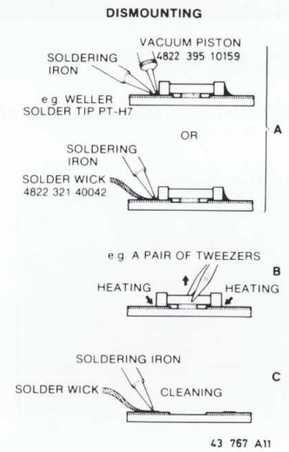


Fig. 1

3.2.3 Attachment of SMDs

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

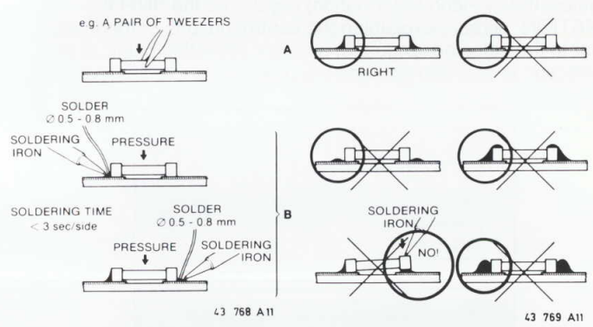


Fig. 2 Fig. 3

3.2.3.1 Caution on attachment:

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

3.3 HANDLING ESD-SENSITIVE COMPONENTS

3.3.1 Personal safety

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

3.3.2 Storage and transport

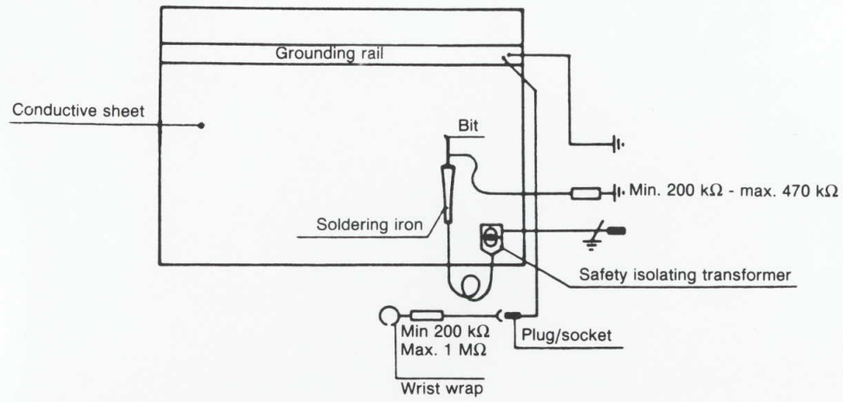
Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

3.3.3 Testing or handling

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

3.3.4 Mounting ESD-sensitive components

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



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

3.3.5 Soldering

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

3.3.6 Electrostatic charges

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

3.3.7 Transients (switch-on phenomena)

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

3.3.8 Working environment

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

3.3.9 Replacement of the Flat Pack IC's

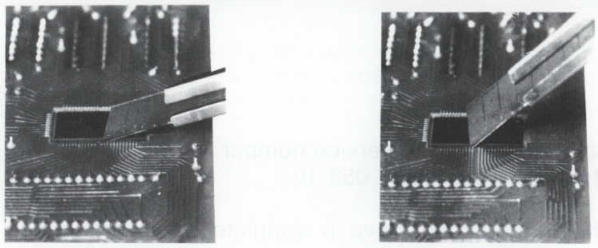
For replacing a component see Fig. 6 Dismounting and Mounting. Also a number of precautions and examples is given.
When replacing a flat pack, rosin flux applied to the device leads will ensure a good soldered joint.
Since rosin flux, when not properly heated by the soldering process, is sticky, it will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

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TOOLS TO BE USED



DISMOUNTING



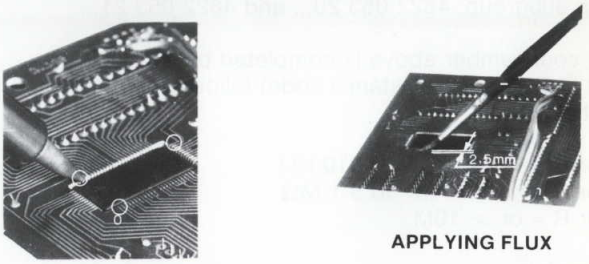
CUTTING THE LEADS

WRONG TRACKS WILL BE DAMAGED



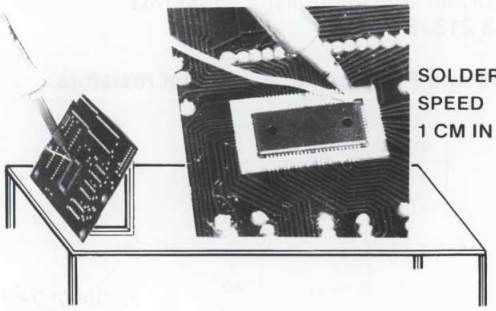
CLEANING THE TRACKS

MOUNTING



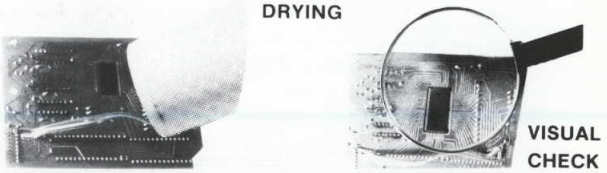
FIXING IC AT THE CORNERS

APPLYING FLUX



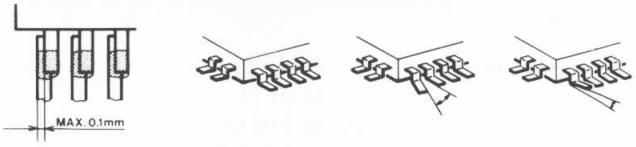
SOLDERING: SPEED 1 CM IN 5 SEC.

DRYING



VISUAL CHECK

ALIGNING THE LEADS



RIGHT WRONG WRONG

SOLDERING



RIGHT WRONG WRONG

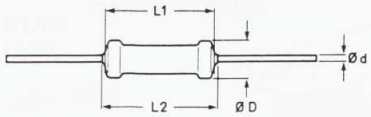
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CODENUMBERS FOR STANDARDIZED RESISTORS

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

VR25, VR37 high-ohmic/high -voltage resistors



type	D_{max}	$L_{1\,max}$	$L_{2\,max}$	d
VR25	2,5	6,5	7,5	0,6

type	D_{max}	$L_{1\,max}$	$L_{2\,max}$	d
VR37	3.7	9.0	10.0	0.7

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

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

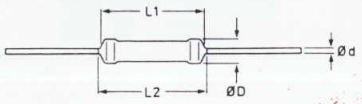
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

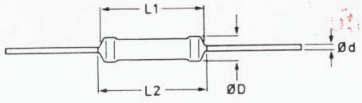
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

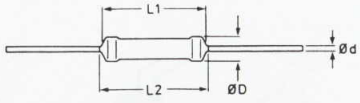
ϕD_{max}	L1	$L2_{max}$	ϕd
2.5	6.5	8.0	0.6



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



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



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

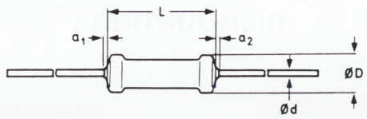
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

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

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

NFR25 fusible resistors ⚠



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

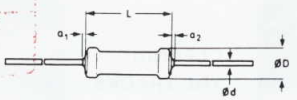
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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

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

NFR25H fusible resistors ⚠



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

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

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

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

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

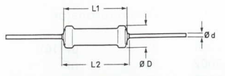
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3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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



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VR25	2,5	6,5	7,5	0,6

type	D_{max}	$L_{1\,max}$	$L_{2\,max}$	d
VR37	3.7	9.0	10.0	0.7

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

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

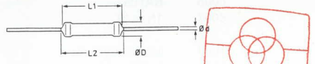
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

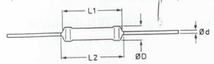
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

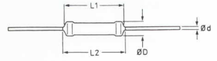
ϕD_{max}	L1	L_{2max}	ød
2.5	6.5	8.0	0.6



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



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



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

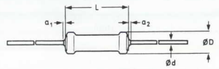
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

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

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

NFR25 fusible resistors ⚠



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

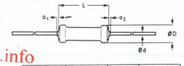
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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

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

NFR25H fusible resistors ⚠



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

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

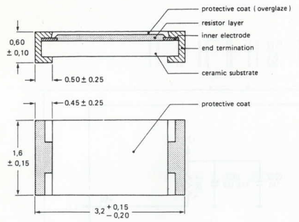
The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

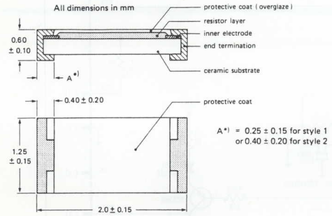
8 for R= 1 to 9,1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
3 for R= 10 to 91 KΩ

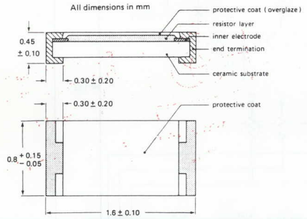
Example:
The service number of a resistor of 47 Ω is: 4822 052 11479

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







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

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

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

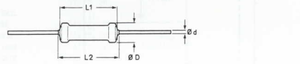
8 for R= 0 to 9.1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9.1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= 1 to 9.1 MΩ
6 for R= or > 10 MΩ

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

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

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

MRS16T metal film resistors with low-inductance



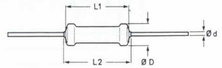
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 – 0,04

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

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

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

MRS25 metal film resistors (0,5%)



D	L1	L2 max	d
2,5	6,5	7,0	0,6 ± 0,03

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

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

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

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

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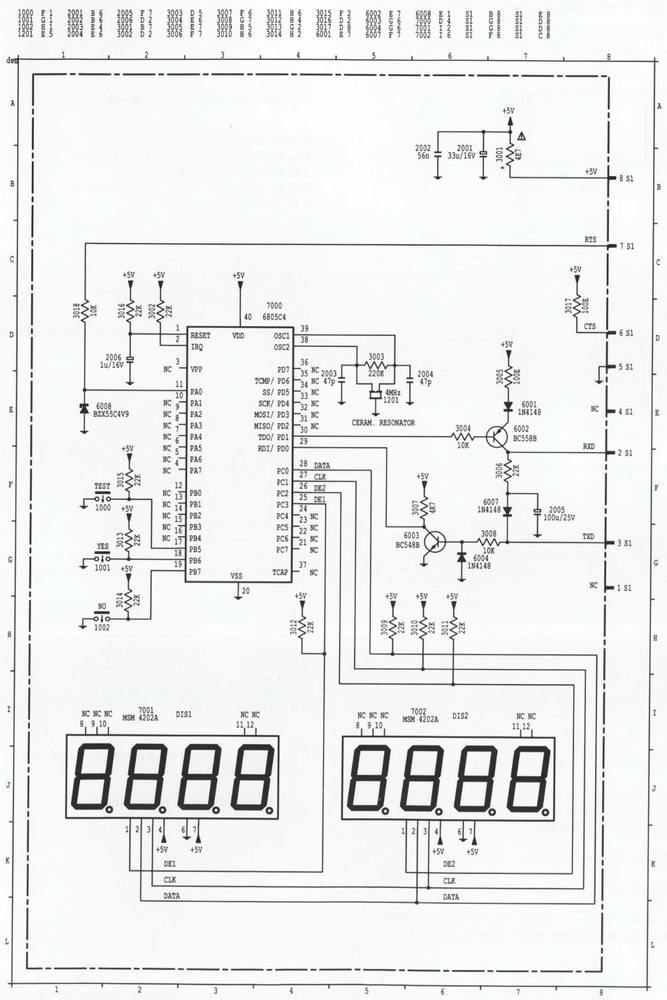
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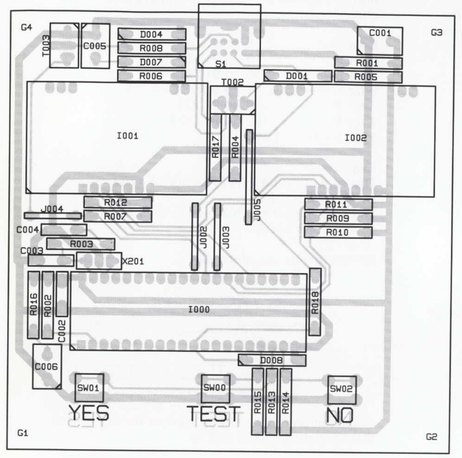
3.5 SERVICE TOOLS

3.5.1 Service PCB

3.5.1.1 Circuit diagram



3.5.1.2 Layout



3.5.1.3 Parts list

ITEM	DESCRIPTION		CODENUMBER
1000	Tact switch		4822 276 10974
1001	Tact switch		4822 276 10974
1002	Tact switch		4822 276 10974
1201	Ceram.resonator		4822 242 72527
2001	33	µF/16V	4822 124 20688
2002	56	nF	4822 121 41154
2003	47	pF	4822 122 31072
2004	47	pF	4822 122 31072
2005	100	µF/25V	4822 124 20701
2006	1	µF/63V	4822 124 20722
3001	4,7	Ω	4822 052 10478
3002	22	KΩ	4822 050 22203
3003	220	KΩ	4822 050 22204
3004	10	KΩ	4822 050 21003
3005	100	Ω	4822 050 21001
3006	22	KΩ	4822 050 22203
3007	4,7	KΩ	4822 050 24702
3008	10	KΩ	4822 050 21003
3009	22	KΩ	4822 050 22203
3010	22	KΩ	4822 050 22203
3011	22	KΩ	4822 050 22203
3012	22	KΩ	4822 050 22203
3013	22	KΩ	4822 050 22203
014	22	KΩ	4822 050 22203
3015	22	KΩ	4822 050 22203
3016	22	KΩ	4822 050 22203
3017	100	Ω	4822 050 21003
6001	1N4148		4822 130 30621
6002	BC558B		4822 130 44197
6003	BC548B		4822 130 40937
6004	1N1448		4822 130 30621
6005	BZX55 C4V7		4822 130 34174
6006	BAT85		4822 130 31983
6007	1N1448		4822 130 30621
7000	MC68HC705C4		4822 900 10272
7001	MSM 4202A		4822 130 90474
7002	MSM 4202A		4822 130 90474
S1	miniDIN 8pins(male)		4822 267 31289
Plug	8 a mini DIN (Female)		4822 264 50262

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3.5.2 LIST OF ACCESSORIES AND SERVICE TOOLS

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

3.5.2.1 PARTSLIST FOR ROLLERCONTROLLER

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

3.6 THE MONOBOARD CENTRAL REPAIR PROCEDURE

In case of a defect on the Multi Media Controller (see 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	Codenumber
/00	4822 214 60019
/05	4822 214 60021

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

REPAIR PROCEDURE CONDITIONS :

* HANDLE WITH CARE IN AN ESD PROTETECTED ENVIRONMENT.

* Defective items must be sent back to PHILPS CONSUMER SERVICE for repair forwarded by Address sticker.

* Put the address sticker properly on a free area of the box.

* Boards must not be reworked or damaged.

* Re-use original package order new package in case of damages.

* Remove additional stickers and labeling if re-using the original box. Service codenumber on sticker must be equal to codenumber on repairable item.

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

• Dealers have to contact the local PHILIPS sales-organization.

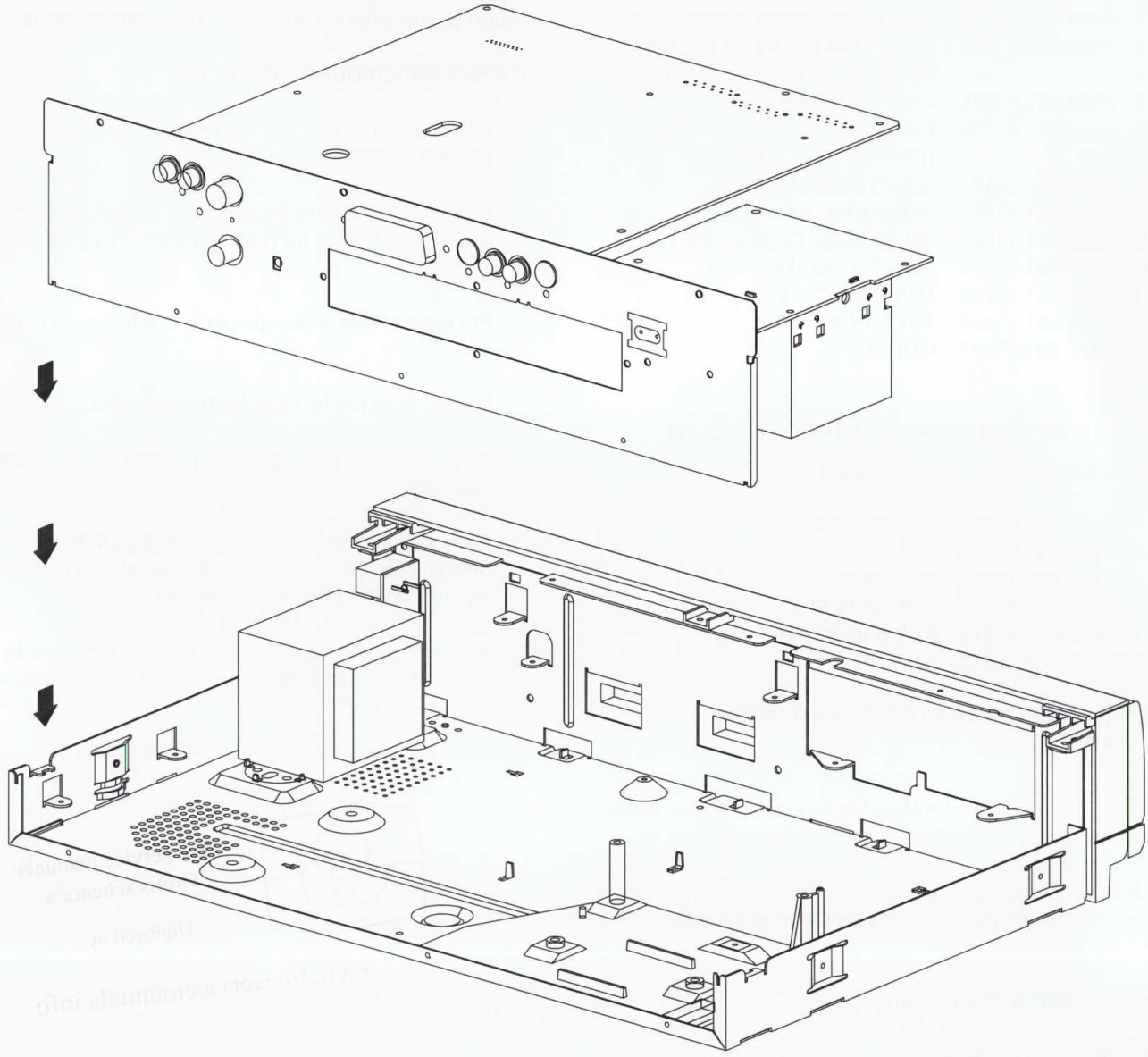
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4 MECHANICAL DRAWINGS AND PARTS LIST

4.1 SERVICE POSITIONS



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4.2 EXPLODED VIEW OF THE CABINET

COVER
△1 7 SCREWS

FRONT
△9 3 SCREWS

CDM9 LOADER
△11 4 SCREWs

DVC-BOX
△2 6 SCREWS

BRACKET
△8 2 SCREWS

DISPLAY PANEL
△7 6 SCREWS

MONO PANEL
△10 /00/17: 7 SCREWS
/05: 9 SCREWS

POWERSUPPLY
△5 3 SCREWS

DVC-EXPANSION
△4 2 SCREWS

MOUSE CON.

POWERKNOB

LOADER SUPPORT

TEXTPLATE
△3 3 SCREWS

POWERSWITCH
△6 2 SCREWS

FRAME

M3x36

65

81

CDM9 + LOADER

182

MONO PANEL
1001

COVER

TEXTPLATE

151

281
ONLY /17

266

185

BU-7/BU-8

△10

RF-MODULATOR
ONLY /05 /17

BU-13 ONLY /00 /05

BU-9/BU-10
BU-2

189

DVC-BOX

LOADER SUPPORT

MAINS INLET
BU-1

POWER SUPPLY PANEL
1002

DVC-EXPANSION PANEL
1003

3Mx5

181

251 252

1

255 256 257

FRONT

8

BU-11

△8 3Mx6

BRACKET

63

10

DISPLAY PANEL
1002

FRAME

POWERSWITCH
1002

M3X6 WASHER

5802

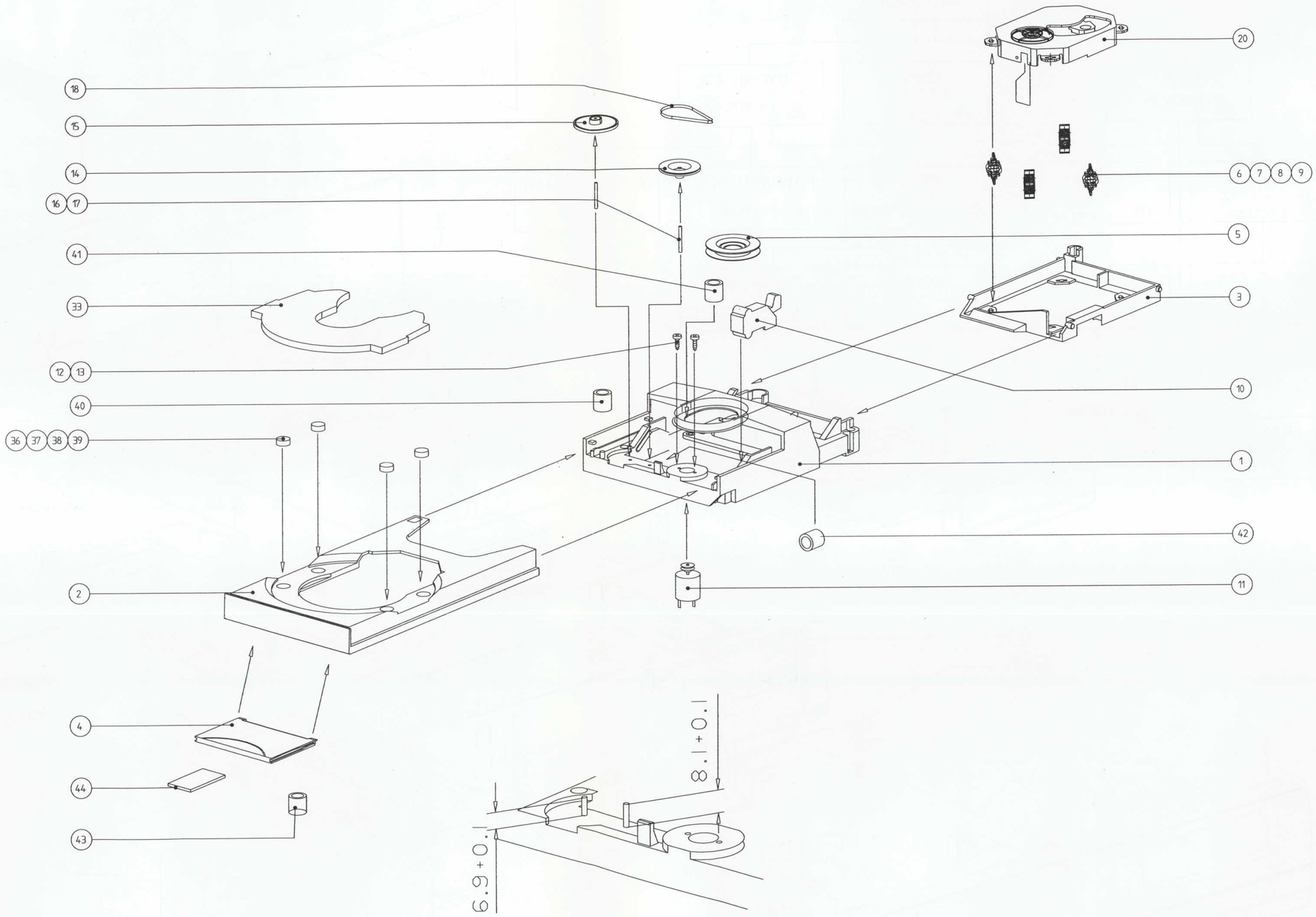
MAINS TRANSFORMER

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

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4.3 EXPLODED VIEW OF LOADER



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5 SERVICE SOFTWARE

In the set there are 3 different testsoftware available:

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

5.1 THE FTD-DISPLAY/KEYBOARD TEST

Scope (not for CDI200 and CDI210).
This testfeature includes following tests:

- FTD filament test
- Player keyboard test
- NVDS signal test
  (The NVDS signal is to switch on/off to the FMV mode)

5.1.1 Test sequence

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

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

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

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

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

5.2 THE LOW LEVEL MMC TEST

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

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

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

5.2.1 Tools

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

The three keys available are :

TEST ; test all display leds.
Yes ; Send an ASCII 'Y'.
No ; Send an ASCII 'N'.

The communication parameters are fixed at :

9600 baud
8 data bits
1 stopbit
no parity

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

5.2.2 Testsquence

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

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

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

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5.2.3 Low level test implementation

The low level test (short: lltest) is implemented in the boot part of the CD-RTOS software. The whole test occupies about 15k of ROM memory and is written in assembler. The test runs without the use of any external RAM. It only uses internal CPU registers. As communication channel the 68070's UART is used. Before starting the normal player boot the following sequence is executed :

1. Initialize the 68070's UART : 9600 baud
   1 startbit
   8 databits
   1 stopbit
   no parity
   no handshake !
2. Clear the RXD buffer.
3. Wait 5 ms.
4. Read the RXD buffer.
   If the character receved was a space ($20) the start the terminal lltest.
   If the character received was an ACK ($06) the start the pcb lltest.
5. Else start the normal player boot.

The UART is connected to I/O port 2

5.2.4 How to start up the low level test

With service pcb
To startup **the pcb low level testsoftware** the next sequence should be followed:

- Switch off the player.
- Connect service pcb to port 2 at the rear of the player.
- Switch on the player.
- The service pcb display should now show 'CDI RLxx'. (with xx the release number)
- The pcb lltest is now ready to go.

With VT100 terminal

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

5.2.5 PCB low level test

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

Display lltest release number:

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

CDI RLxx

(RL stands for RELEASE, xx stands for release x.x).

The lltest is now waiting for an action from the user.
The user should now press either the'Y' or 'N' button to continue the test.

STEP 0 : VDSC

STEP 0A0B : VDSC channel 1&2 registers

display: 0A0B

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

STEP 1 : ROM

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

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

STEP 1 : ROM

STEP 1A : ID AND RELEASE NUMBER DISPLAY

display: 1A IDxxRLyy

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

STEP 1C : CHECKSUM

display: 1C

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

display: 1C Er05

STEP 5 : NVRAM

The nvram test is a non destructive test. This means that the original nvram contents is restored again.
Address range : Full nvram address range

display: 5

The following actions take place in the nvram test:

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

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If error,

display: 5 Er09

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

   If error,
   display: 5 Er10

8. repeat this for every possible nvram address.

STEP 6-8 : DRAM

The dram test is always a destructive test. The test is performed for both ram chip1 and chip2 as one large memory followed by a test for each bank separately.
On the displays following, the 'x' is a memory counter. The counter is incremented every 256k. So for the full range it counts from 1 to 4.

STEP 6A : TEST THE FULL DRAM MEMORY

The following actions take place in this test:

1. fill the memory with the long word address as data.

   display: 6AFx

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

   display: 6ARx

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

   If error,
   display: 6ArxEr11

STEP 6B : TEST THE FULL DRAM MEMORY WITH INVERTED DATA

The following actions take place in this test:

1. fill the memory with the inverted long word address as data.

   display: 6BFx

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

   display: 6BRx

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

   If error,
   display: 6BrxEr12

STEP 7A : TEST DRAM CHIP1

The following actions take place in this test:

1. fill the memory with the long word address as data.

   display: 7AFx

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

   display: 7ARx

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

   If error,
   display: 7ARxEr13

STEP 7B : TEST DRAM CHIP1 WITH INVERTED DATA

The following actions take place in this test:

1. fill the memory with the inverted long word address as data.

   display: 7BFx

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

   display: 7BRx

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

   If error,
   display: 7BRxEr14

STEP 8A : TEST DRAM CHIP2

The following actions take place in this test:

1. fill the memory with the long word address as data.

   display: 8AFx

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

   display: 8ARx

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

   If error,
   display: 8ARxEr15

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STEP 8B : TEST DRAM CHIP2 WITH INVERTED DATA

The following actions take place in this test:

1. fill the memory with the inverted long word address as data.

   display: 8BFx

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

   display: 8BRx

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

   If error,
   display: 8BRxEr16

STEP 9 : CDIC

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

STEP 9A : CDIC RAM TEST WITH ADDRESS AS DATA

display: 9A

The following actions take place in the CDIC RAM test:

1. Fill the memory with long word address as data.
2. Read and compare the data with the address.
3. If the long word read is ok then continue
   else give an error and stop testing.

   If error,
   display: 9A Er17

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

display: 9B

The following actions take place in the CDIC RAM test:

1. Fill the memory with inverted long word address as data.
2. Read and compare the data with the inver ted address.
3. If the long word read is ok then continue
   else give an error and stop testing.

   If error,
   display: 9A Er18

STEP 9C : CDIC REGISTER 2 TEST

display: 9C

The following actions take place in the CDIC REGISTER test:

1. Read register 2 and compare with fixed pattern. Register 2 has a defined pattern after reset.
2. If the register is ok then continue with next step else give an error and stop testing.

   If error,
   display: 9C Er19

STEP 10 SLAVE processor (68HC05)

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

Address range : Slave base address + 6

STEP 10A : WRITE REQUEST BYTE TO THE SLAVE

display: 10A

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

STEP 10B : READ ACKNOWLEDGE FROM THE SLAVE

display: 10B

In this step the following actions take place:

1. wait about 2 sec to give the slave the time to acknowledge.
2. read the acknowledge.
3. if the acknowledge is $F0 then continue
   else give an error and stop testing.

   if error,
   display: 10B Er20

STEP 10C : READ AND DISPLAY SLAVE RELEASE NUMBER

display: 10C RLxx

For a moment the slave release number is displayed

STEP 10D : READ AND DISPLAY CD RELEASE NUMBER

display: 10D RLxx

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

STEP 11 : X-BUS TEST

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

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STEP 11A : XBUS TRANSPARENT COMMAND TO CIDIC

display : 11A

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

STEP 11B : READ ACKNOWLEDGE FROM THE SLAVE

display : 11B

In this step the following actions take place :

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

   If error,
   display : 11b Er21

STEP	DESCRIPTION
0a	VDSC channel 1 initialization
0b	VDSC channel 2 initialization
1a	ROM identification release number
1c	ROM checksum check
5	NVRAM test with rom data as data
6af	DRAM fill chip1&chip2 with address as data
6ar	DRAM read and compare data
6bf	DRAM fill chip1&chip2 with inverted add. as data
6br	DRAM read and compare data
7af	DRAM fill chip1 with address as data
7ar	DRAM read and compare
7bf	DRAM fill chip1 with inverted address as data
7br	DRAM read and compare data
8af	DRAM fill chip2 with address as data
8ar	DRAM read and compare
8bf	DRAM fill chip2 with inverted address as data
8br	DRAM read and compare data
9a	CDIC RAM test with address as data
9b	CDIC RAM test with inverted address as data
9c	CDIC register test
10a	SLAVE test :write request to slave
10b	SLAVE test :read echo from slave
10c	SLAVE test :read SLAVE release number from slave
10d	SLAVE test :read CD release number from slave
11a	Xbus test write command to CIDIC
11b	Xbus test read response from servo in Slave µP

Table 1 : PCB LLTEST steps overview

5.2.6 TERMINAL LOW LEVEL TEST

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

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

ITEM 0 : EXIT LOW LEVEL TEST

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

ITEM 1 : Writing to a default RAM address

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

ITEM 2 : ROM parity check

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

ITEM 3 : NVRAM test

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

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

See error table for more information.

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ITEM 4 : DRAM

The dram test is always a destructive test. The test is performed for both ram CHIP1 and CHIP2 as one large memory followed by a test for each bank separately.
The following actions take place in the dram test:

1. fill the memory with the long word address as data.
2. read the memory contents and compare with the address.
3. if the long word read is ok then continue else give error message and stop testing.
4. write the inverted long word address as data to memory.
5. read the memory contents and compare with the inverted address.
6. if the long word read is ok then continue else give error message and stop testing.

This test has also some hidden functions. Pressing :

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

Remark : The error message is different from the pcb lltest. See error table for more information.

ITEM 5 : CDIC

The cdic test consists out of three main parts:

1. test cdic ram with long word address as pattern
2. test cdic ram with inverted long word address as pattern
3. display cdic register and compare If in one of these tests an error occurs the test will be stopped and the error displayed.

ITEM 6 : SLAVE processor (68HC05)

This lltest for the slave performs following actions:

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

ITEM 7 : CLOCK CALIBRATION

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

- Connect the probe of the counter to pin34 of IC7304 (CSCDICN).
- Start the test with the gate time of the frequency counter set to minimum 5 sec.
- The counter display should now show a frequency near to 512 Hz.
  If not, the chek if everything is set and connected properly. (range : 511,96724 to 512,03276)
- Press a key on the terminal to stop the measurement.
- Now fill in the measured value of the frequency. The lltest software will now calculate the proper value to be filled into the calibration register of the clock&calendar IC. The value of the frequency at pin34 of IC7304 will not be changed or influenced.
- The calibration is done now.

ITEM 8 : ATTEX test

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

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

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

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

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

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

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

ITEM 9 : X-BUS test

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

5.2.7 ERROR CODES

When during a test an error occurs the user should be aware of following conventions:

- For the pcb low level test the error is displayed on the outermost righthand side of the display.

  Example: 1 Er11

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

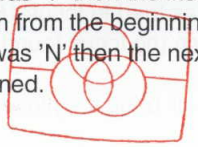
- For the terminal low level test the error is displayed on the outermost lefthand side of the terminal. In some cases (memory tests) the error code is replaced by a more meaningful error output.

  Example: ADDRESS DATA READ EXPECTED

  ERROR : 00080000 F0080000 00080000
  RETURN to continue, ESC to STOP

  Meaning: (assuming long word data is used);
  On address $80000 the data was $F0080000 and not $80000 as it should be.

- If RETURN button is pressed, the next address will be read and checked. With this output it will be easier to debug the MONOboard
- When an error has occurred the program will wait for a user intervention with following question:
  RESTART the test Yes or No ?
  If the answer was 'Y' then the lltest software is executed again from the beginning.
  If the answer was 'N' then the next test is executed as if nothing happened.



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

Table 2. Error codes overview

5.2.8 RELEASE NUMBER, ID AND CHECKSUM STORAGE

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

Where are these bytes stored in the ROM's, where in the memory?

ROM address range for the 4Mb :
$00000-$7FFFF)
MONO address range for the 1Mb :
$400000-$47FFFF)

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

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

5.2.9 HOW IS THE CHECKSUM CALCULATED ?

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

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

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5.3 THE SERVICE SHELL

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

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

5.3.1 Starting the service shell

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

5.3.2 Layout info

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

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

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

5.3.3 Subject dependent information

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

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

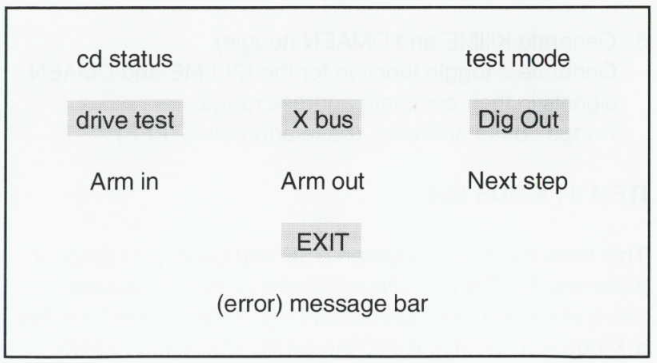


Fig 3.2 CD test menu

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

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

Mode 0

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

Mode 1

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

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Mode 2

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

Mode 3

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

Normal playing mode

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

ERROR MESSAGES

display : A5 xx0000

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

Duart test
This test is not relevant for the consumer players

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

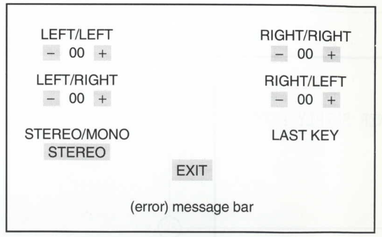


Fig 3.4 APU test menu

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

What could be wrong if...

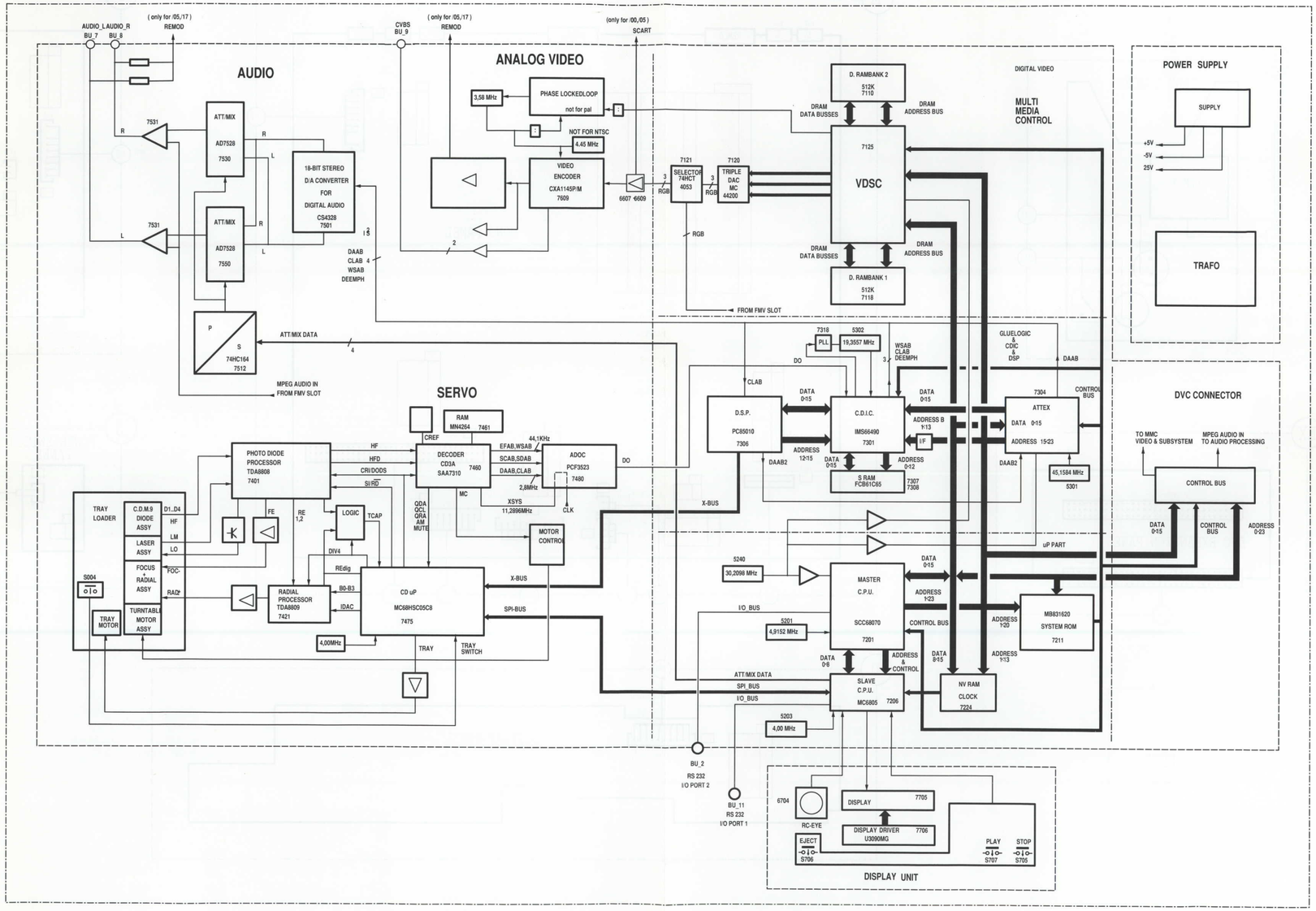
This paragraph will describe the meaning of the error messages given by the service shell and contains suggestions about possible errors. This paragraph must be updated with new information from testing and debugging players.

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

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

6 ELECTRICAL DRAWINGS

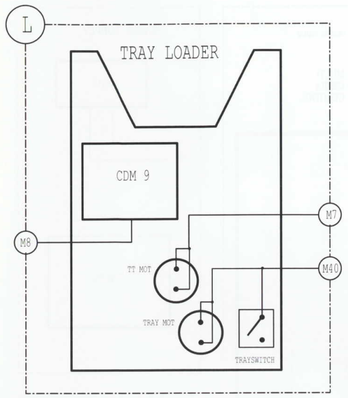
6.1 BLOCK DIAGRAM

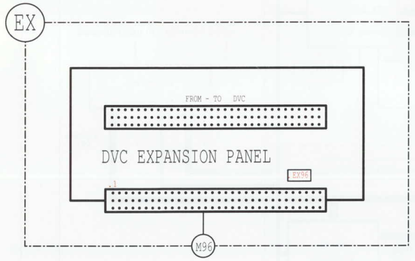


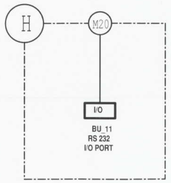
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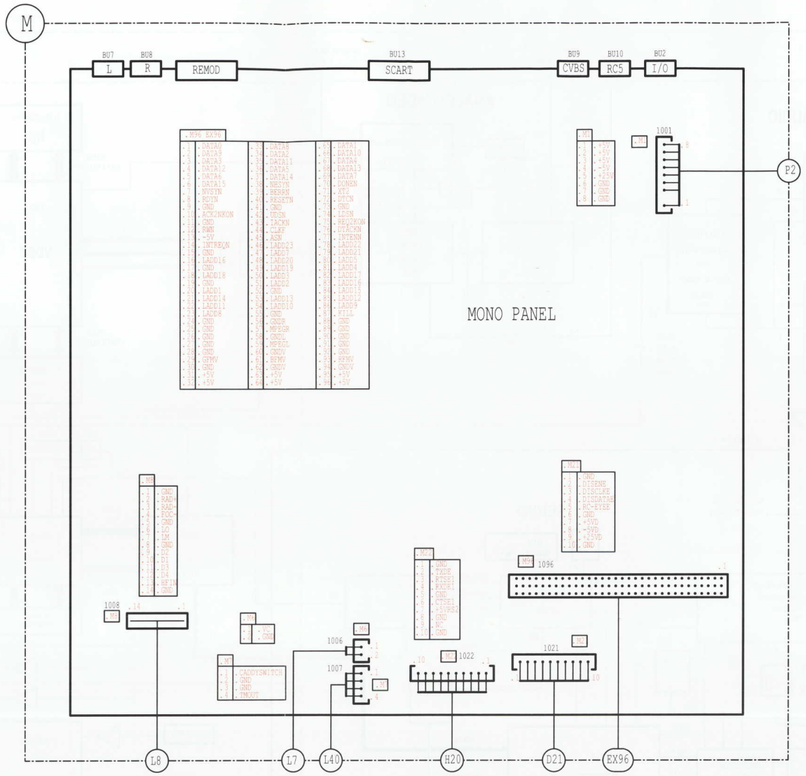
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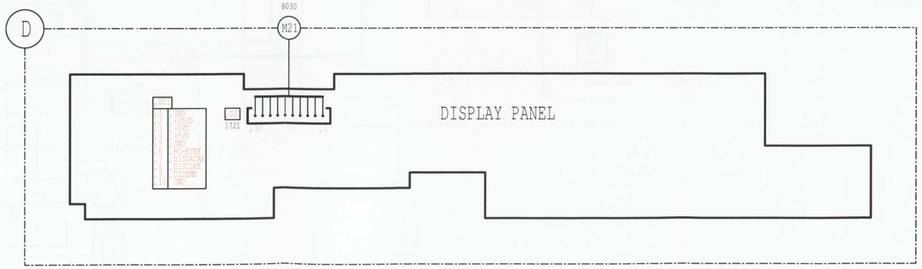
6.2 WIRING DIAGRAM

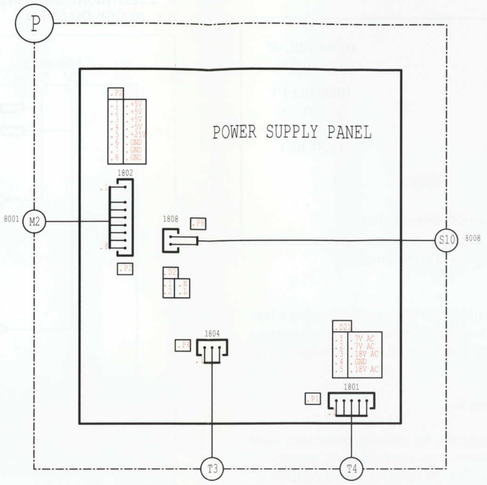


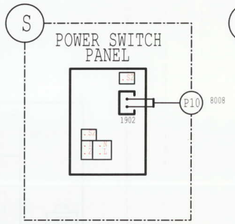


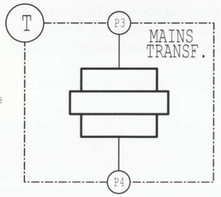












6.2.1 Alphabetical signal listing

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 (96-pins connector, channel 2: FMV)
ADEN	:	(= ADENA) ADDRESS ENABLE NOT. When low, the address ADENA coming from the bus (68070)
ADOCLK	:	output clock from the ADOC (11.2896 MHz)
AM	:	ADDITIONAL MUTE
ASN	:	ADDRESS STROBE (active low, tristate) indicates when an address is valid on the bus for the system
AUDL	:	>> AUDIO LEFT
AUDIOL	:	>>
AUDIOLSC	:	>> (scart)
AUDR	:	>> AUDIO RIGHT
AUDIOR	:	>>
AUDIORSC	:	>> (scart)
AVN	:	AUTOVECTORED INTERRUPTS (active low), can be used by an extension
B0..7	:	digital video (blue) from VDSC > DRAM
B0CD..B3CD	:	input control bits for off, catch-, play status and DAC output current for radial motor
B,G,R	:	output colours of the VSD
BERRN	:	>> BUS ERROR (active low, open drain)
BFMV	:	blue color coming from the FMV-extension
BIN	:	blue color input for the CXA1145 encoder
BLANI	:	(= BLAN1M) BLANKING OUTPUT (active low, tristate) of the VSC
BSC	:	blue color (scart)
BSW	:	blue color coming from the switch CDI/external (FMV) video
CADDYIN	:	high when reading data
CADDYSWITCH	:	control signal for position tray
CAS1N	:	column address strobe 1 (VDSC)
CAS2N	:	column address strobe 2 (VDSC)
CBA	:	68070 bus transiever latch (rising edge)
CDICDACKN	:	(= ACK1N) DMA REQUEST ACKNOWLEDGE (active low)
CDICREQN	:	(= REQ1N) DMA REQUEST (active low)
CDTV	:	to change by remote control between TV or CDI (only used by CDI 2XX)
CLAB=CLAB2	:	bitclock for the SAA 7220 chip
CLABCD	:	bitclock from the 7310 chip
CLK=2BLCK	:	CLOCK (11,2896 Mhz)
CLKDAC	:	CLOCK DAC, the clock used to send serial data to the volume adjustment
CLKF	:	2B-clock (11,2896 MHz) for the FMV extension

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CLK1 : the clock on which the DSP operates (7,5264 MHz)
CRI : COUNTER RESET INHIBIT (low during a real trackloss or during excention of a jump command
COC : COMMAND COMPLETED signal
COXN : serial output clock for the X-bus
COXNDSP : clock DSP, the clock used to send serial data on the X-bus
CPUASN : the address strobe of the 68070 microprocessor
CPULDSN : the lower data strobe of the 68070 microprocessor
CPUUDSN : the upper data strobe of the 68070 microprocessor
CRI-DODS : counter reset inhibit of the 7310 chip
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSKILL-MEMM : chip select for kill and DMA circuit.
CSKILL-MEMMS : >> syncronized
CSDAC1N : (= CSDAC2N) (if selected, low) it means that data will be adjusted on that channel
CSNVRAMN : CHIP SELECT NVRAM (active low) bus information is intended for or coming from the NVRAM
CSROMN : >>
CSROM0N : CHIP SELECT ROM (active low) bus information is coming from the ROM'S
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : CHIP SELECT (active low) for the 8kx8 SRAM'S
CSVDSCN : CHIP SELECT for the VDSC
CSYN : COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)
CTS1..4 : CLEAR TO SEND (active low) it indicates that the remote reciving device is ready
CTS#2 : >>
CTSE1..2 : CLEAR TO SEND input
CTSI1..2 : >>
CVBS : CVBS output
CVBS-OUT : >>
CVBS-REM : CVBS input signal for the remodulator
CVBS-SYNC : composite sync input for the SCART connector
D0..7 : input data bus for the two DAC'S of the APU part
DAAB : (DAAB2, DAABCD) serial data output of the X-bus I^2S standard
DATA0..15 : DATA LINES
DATADAC : data which will be send to the DAC('S) for volume adjustment
DDTACKN : DATA TRANSFER ACKNOWLEDGE (active low) from CDIC
DEEMP : DEEMPHASIS
DIG OUT : DIGITAL OUTPUT
DIRN : DIRECTION CONTROL. indecates the direction of data transfer through the transievers
DISCLK : (DISCLKE) DISPLAY CLOCK >>
DISDAT : (DISDATAE) DISPLAY DATA >>
DISEN : (DISENE) DISPLAY ENABLE >>
DIV4 : DIVIDE BY 4 signal
DMAEN : DMA enable for the FMV extension
DTCNC : data transfer completed corrected (CDIC)
DO : DIGITAL OUT
DODS : DROP-OUT DETECTOR SUPPRESSION
DONEN : DONE (active low). open drain), operates in the DMA-mode
DOXN : serial data output of the X-bus
DPSRWN : read (high) or write (low) from or to the DSP
DSN2N : DATA STROBE (active low) of the DSP
DATACK ROM : DATA TRANSFER ACKNOWLEDGE of the ROM
DTACKSLAVEN : DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
DTCN : DATA TRANSFER COMPLETE (active low, open drain) operates in the DMA-mode
DUARTCSN : DUART CHIP SELECT, when low bus info is coming from or going to the DUART
EFAB : ERROR FLAG
FILTERN : filter select when high: level C, when low: level A
FOC- : >>focus out to CDM
FOC+ : >>
GFMV : green color coming from from the FMV-extension
GIN : green color input for the CXA1145 encoder
GN : when low: the outputs and inputs of the trancievers are enabled
GSC : green color (SCART)
GSW : green color coming from the switch CDI/external (FMV) video
G0..7 : digital video (green) from VDSC > DRAM HALTN
: active low, open drain, biderectional. If low together with the resetn it couses the 68070 to enter the reset state.
HEADPHL : (HPL) headphone audio left
HEADPHR : (HPR) headphone audio right
HFIN : HF current input
HSYN : (active low) horizontal synchronisation input from the VSC
HSYNCOUT : (active low) horizontal synchronisation output for monitor or TV
HVID0..7S : 8 bit pixel bus for channel 1 VSD from VSC
IACKN : interrupt acknowledge for the FMV-extension
IACKIN2N : >>
IACKIN4N : >> decoded interrupt acknowledge (active low).
IACKIN5N : >> asserted during an interrupt acknowledge
IACKOUT2N : >> sequence to indicate to a peripheral that
IACKOUT4N : >> this interupt request is being serviced
IACKOUT5N : >>
IACKOUT2 : >>
IACKOUT4 : >>
IACKOUT5 : >>

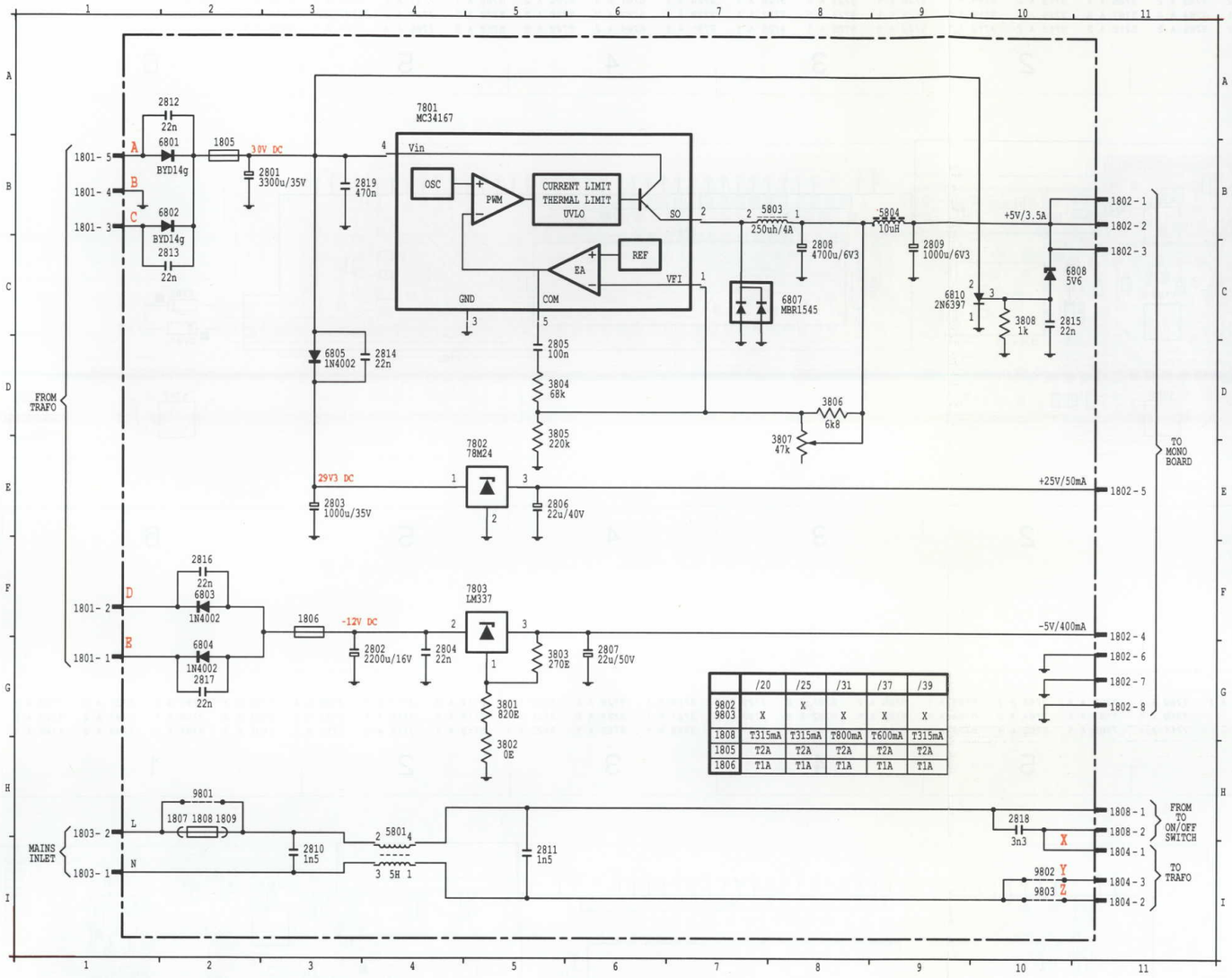
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IACKOUT22 : >>
IACKOUT23 : >>
IACKOUT42 : >>
IACKOUT52 : >>
IDAC : 1/2 bit DAC
IFDN2 : main channel word-flag to the DSP
INTENN1 : interrupt enable for the FMV-extension
INTENN : >> when low, no extensions use the interupts, when high interupt devices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

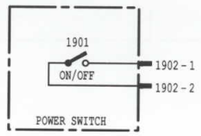
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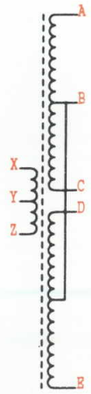
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6.3.2 Power supply Circuit diagram



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



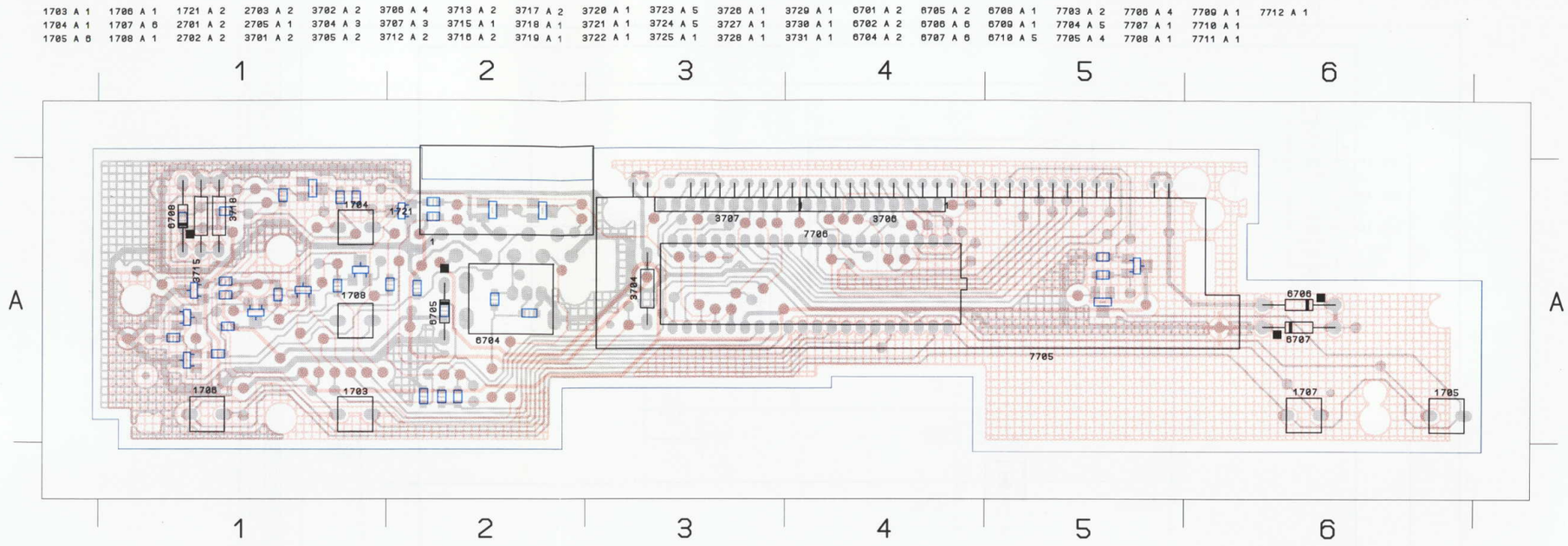


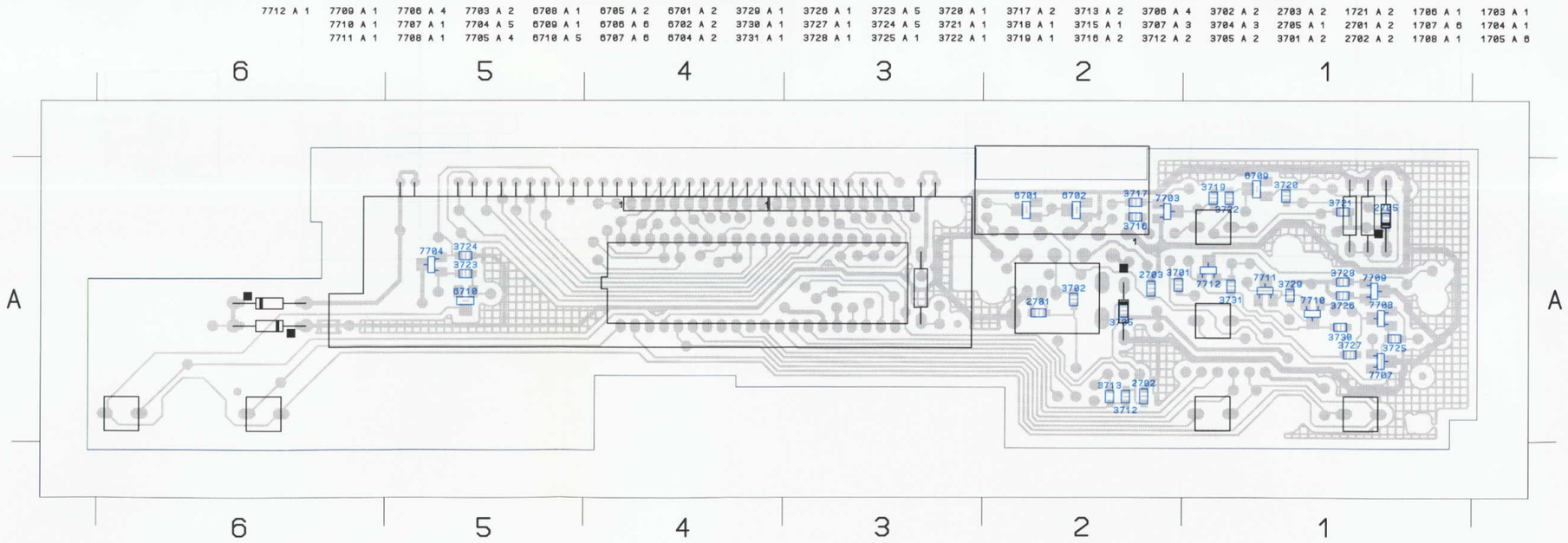
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6.4 CONTROL & DISPLAY PANEL

6.4.1 Control & Display PCB





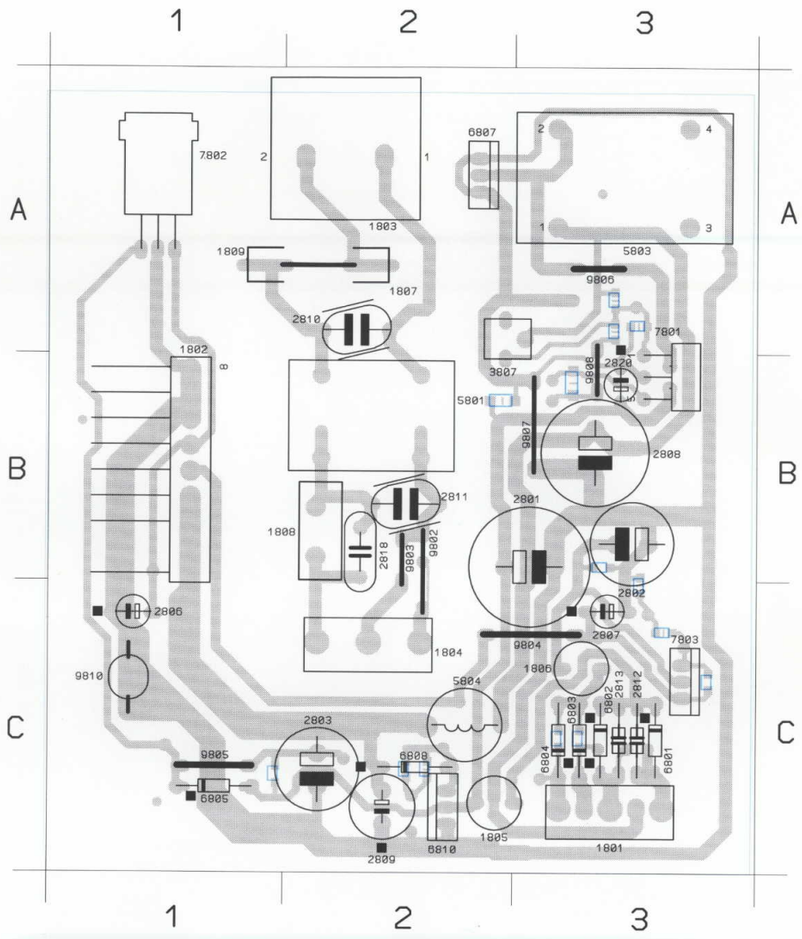
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6.3 POWER SUPPLY PANEL

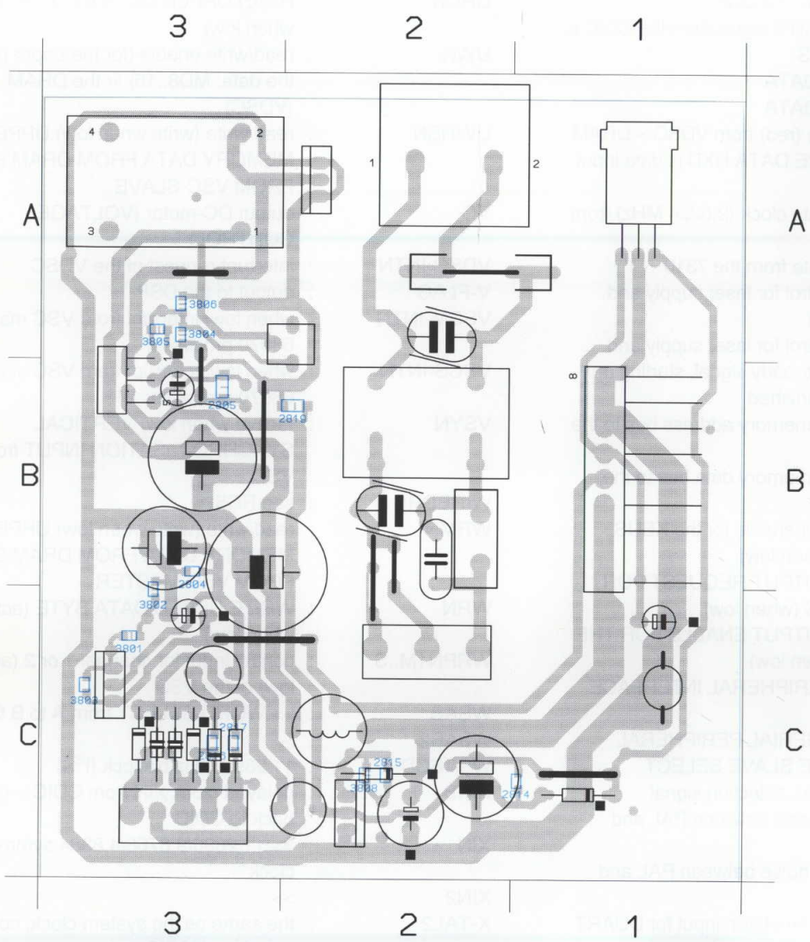
6.3.1 Power supply PCB
Component side view

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



Power supply PCB
Coppertrack side view

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



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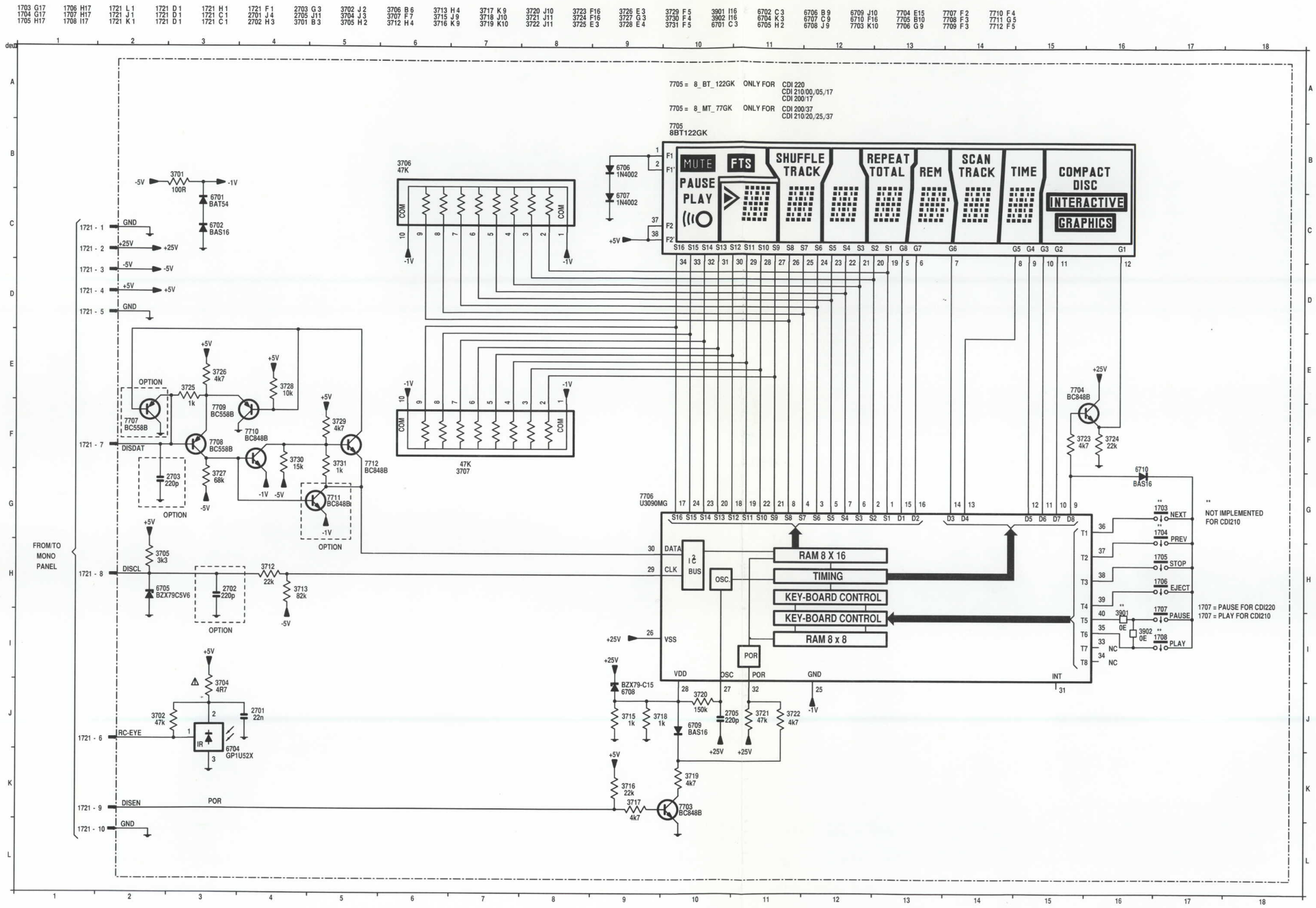
RTSUART	:	REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RST1..4	:	>> REQUEST TO SEND (active low)
RST#1..2	:	>>
RWN	:	READ - WRITE (low is write) signal
RWN2	:	READ - WRITE (low is write) signal from CDIC to the DSP
RWRAM	:	READ - WRITE signal from the CDIC to the S RAM'S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

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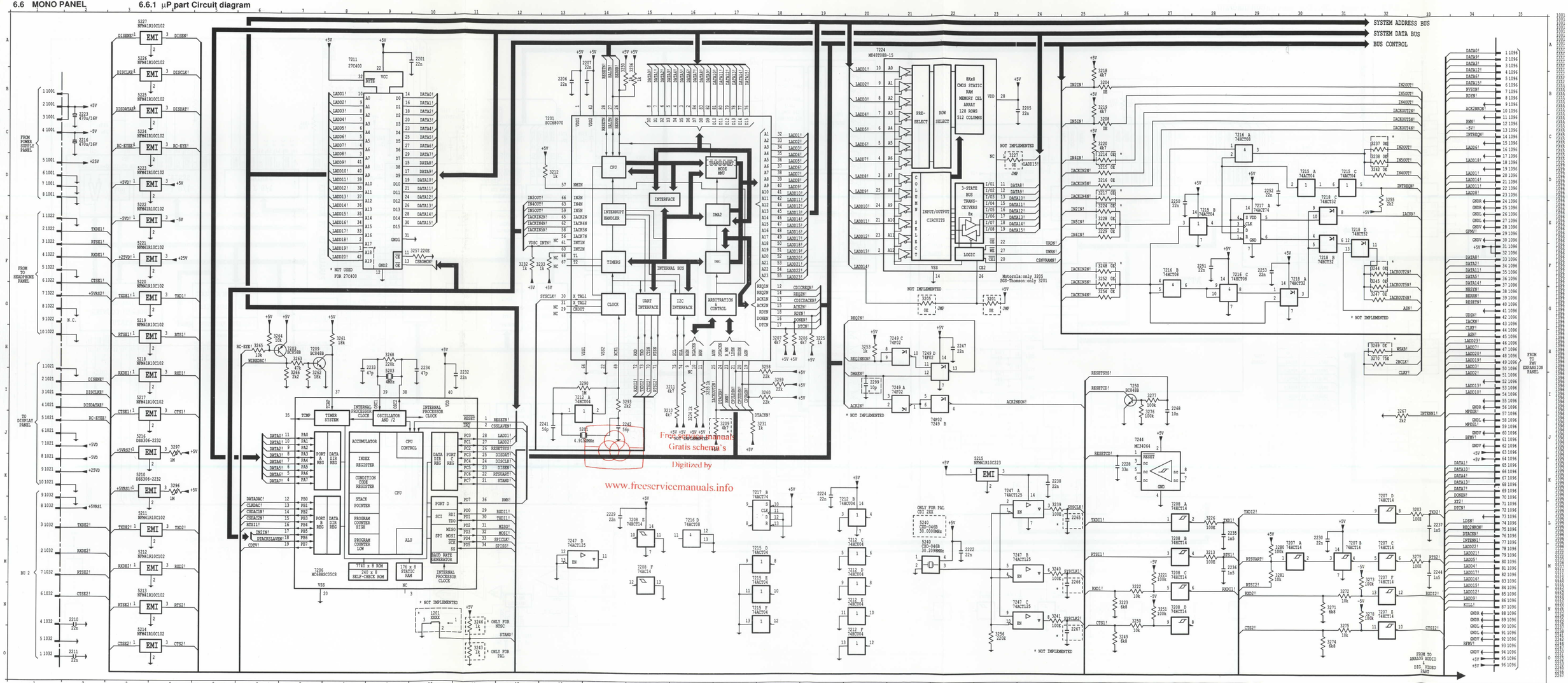
6.4.2 Control & Display Circuit diagram



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6.6 MONO PANEL 6.6.1 µP part Circuit diagram



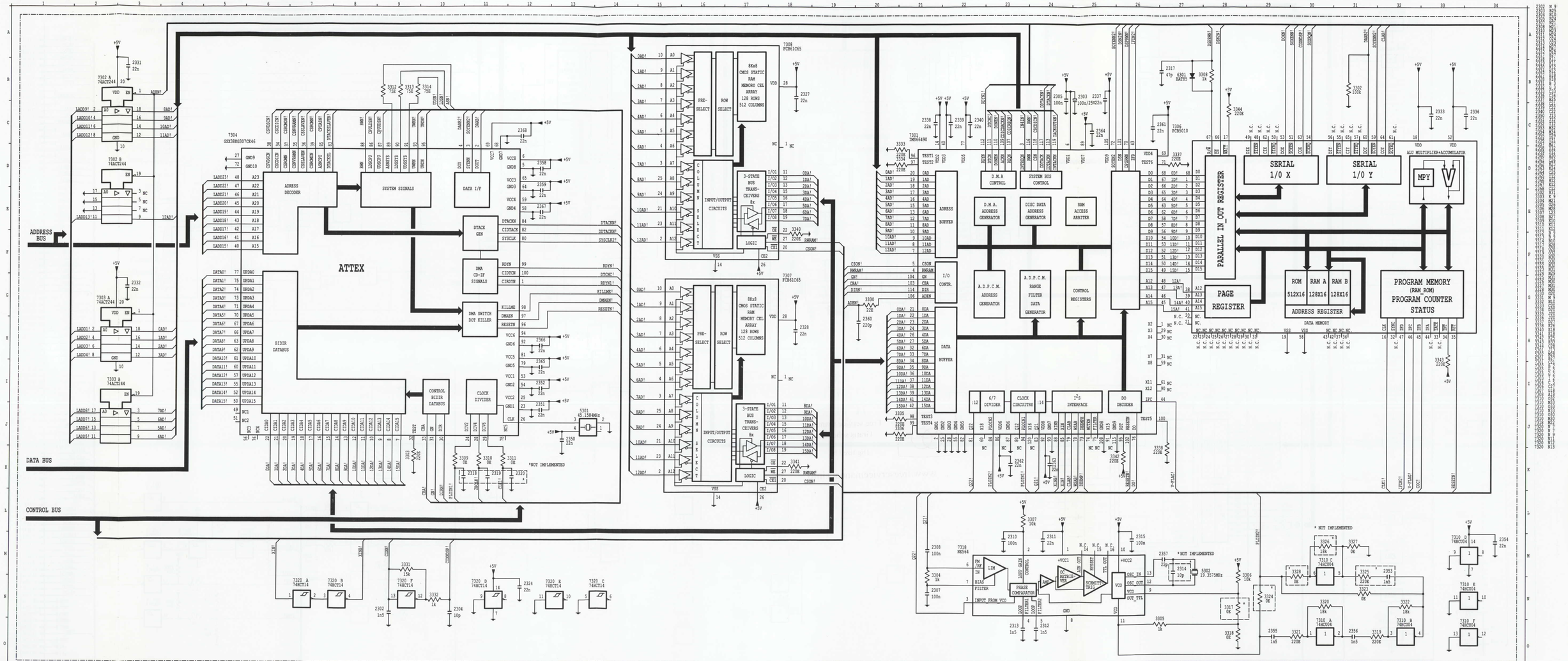
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6.6.2 Gluelogic, CDIC, DSP part Circuit diagram

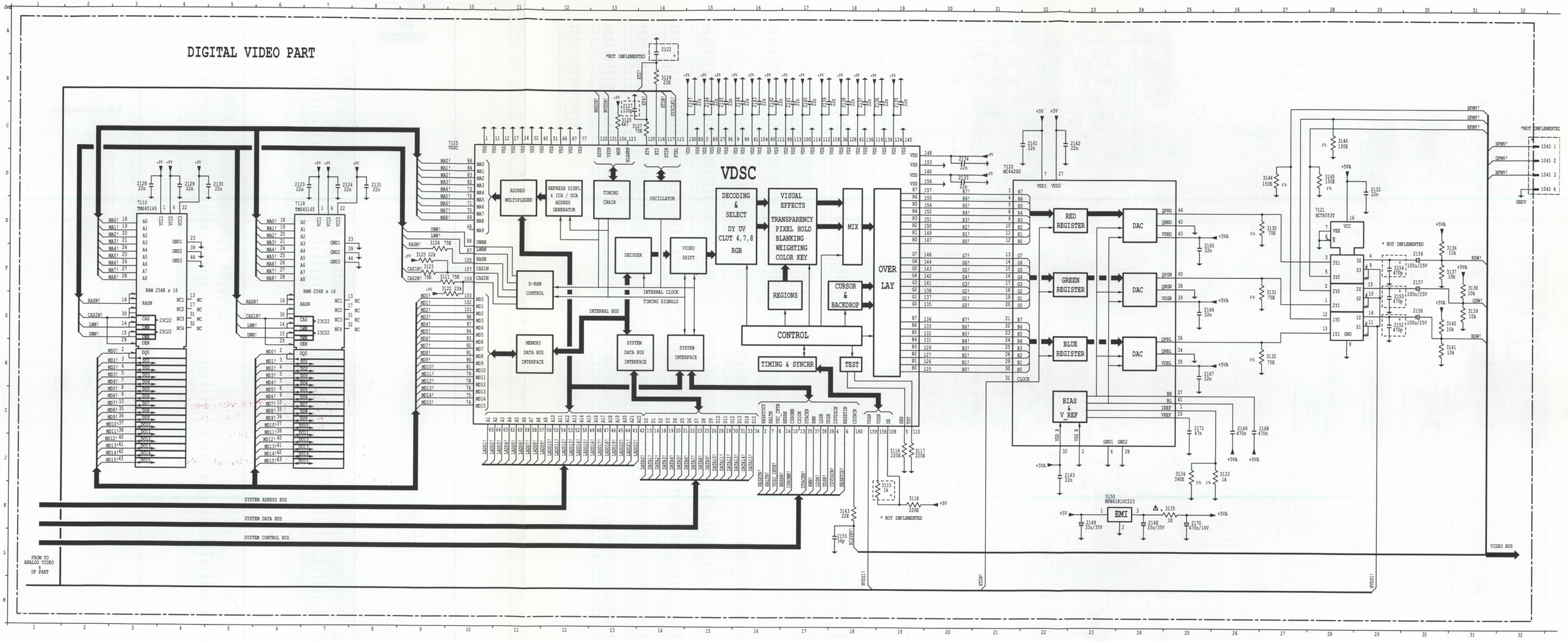


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6.6.3 Digital video part Circuit diagram

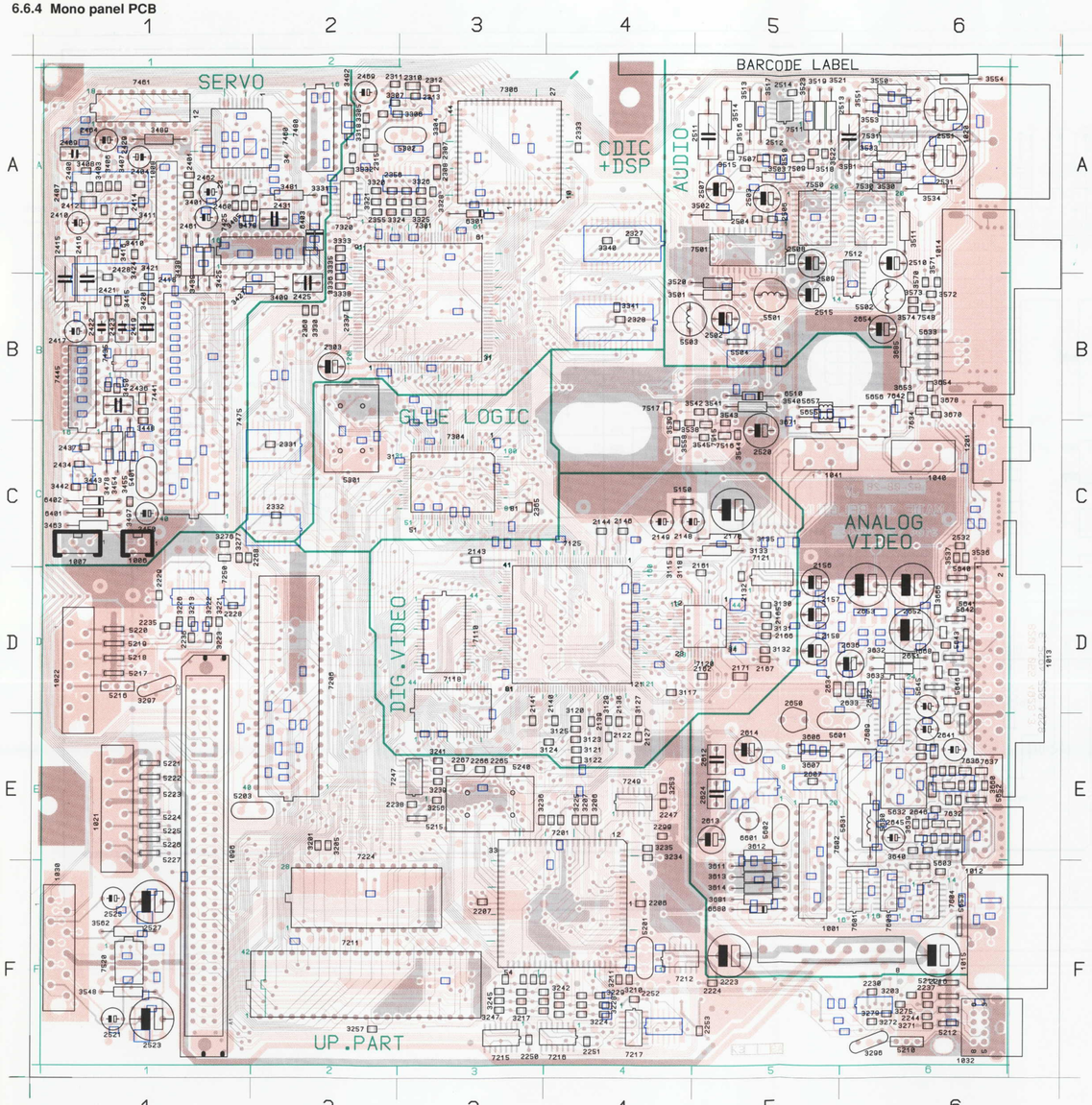


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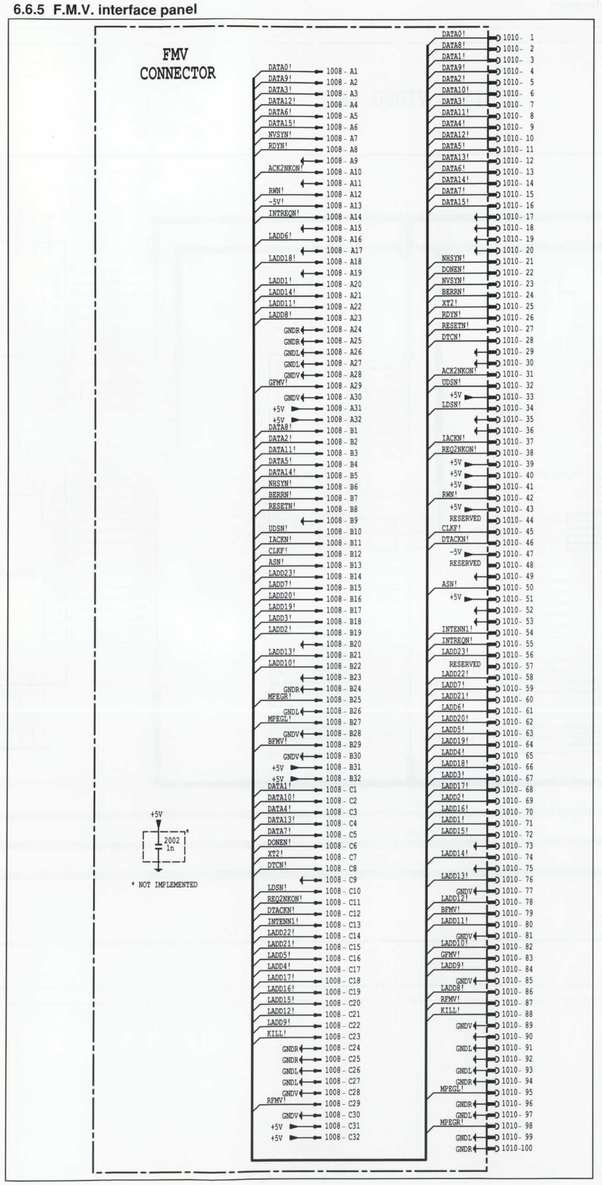
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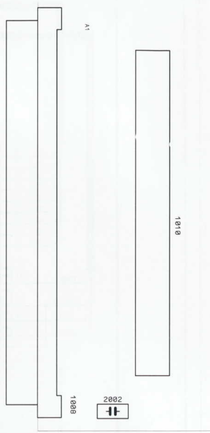
6.6.4 Mono panel PCB



6.6.5 F.M.V. interface panel



F.M.V. expansion

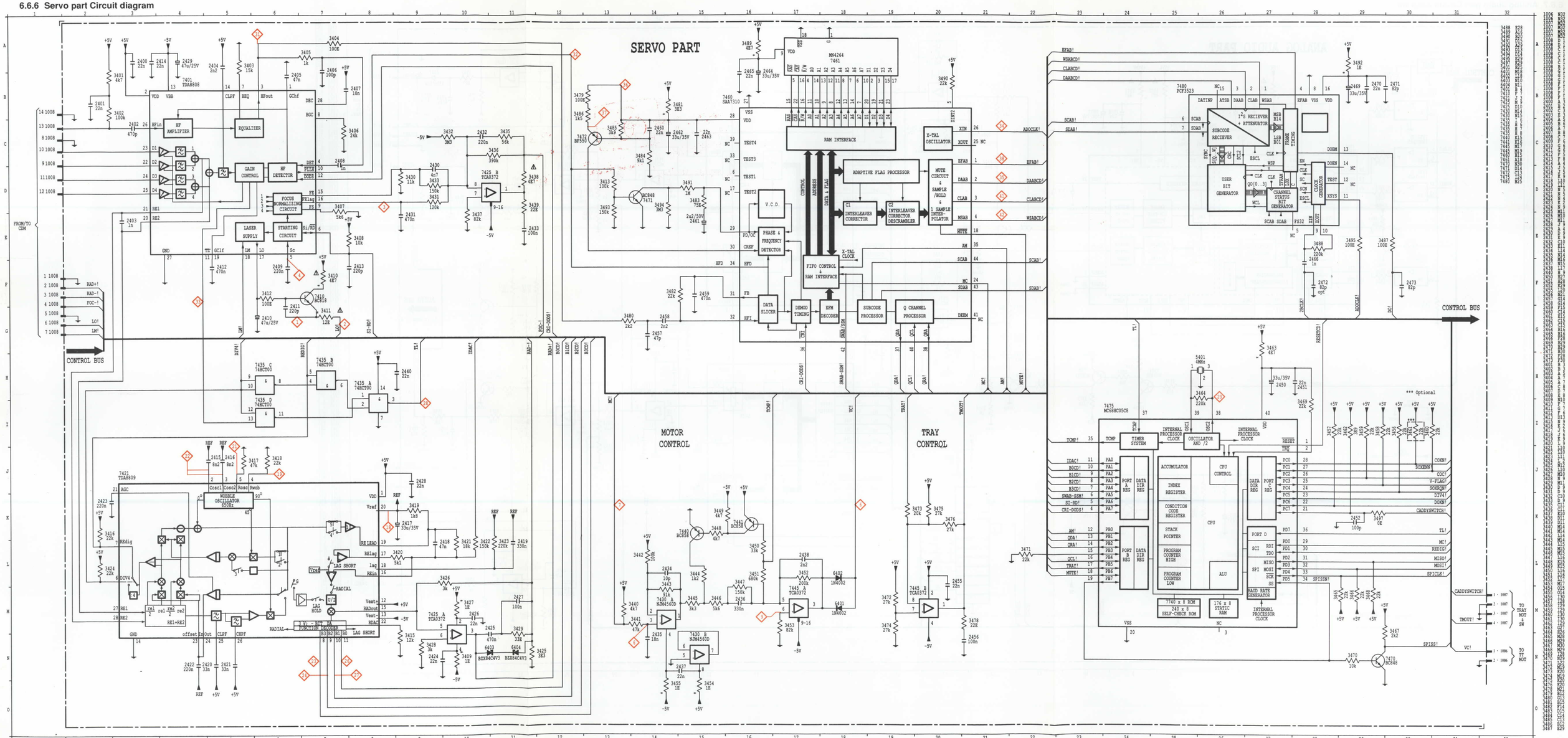


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6.6.6 Servo part Circuit diagram

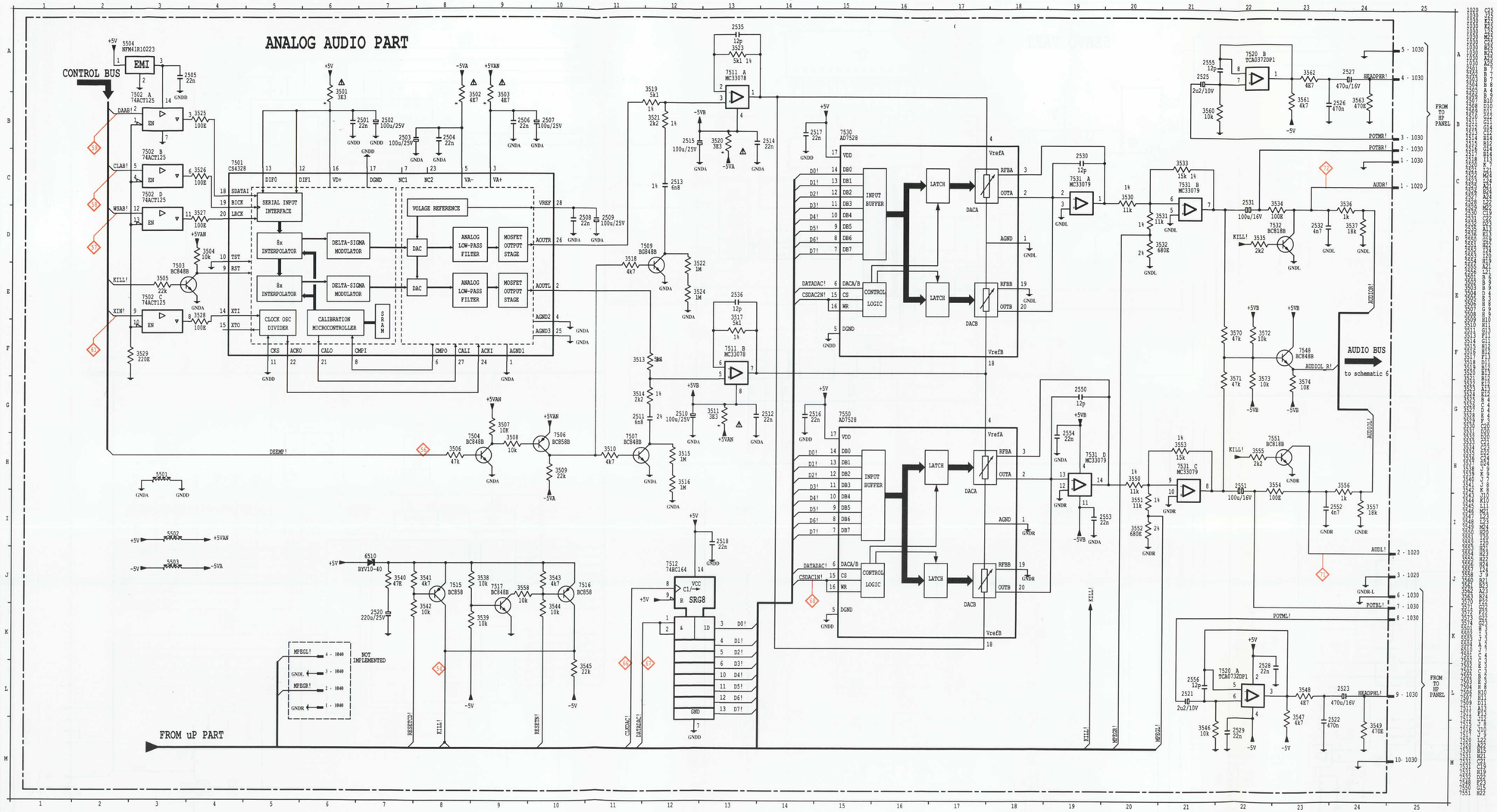


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6.6.7 Analog audio part Circuit diagram

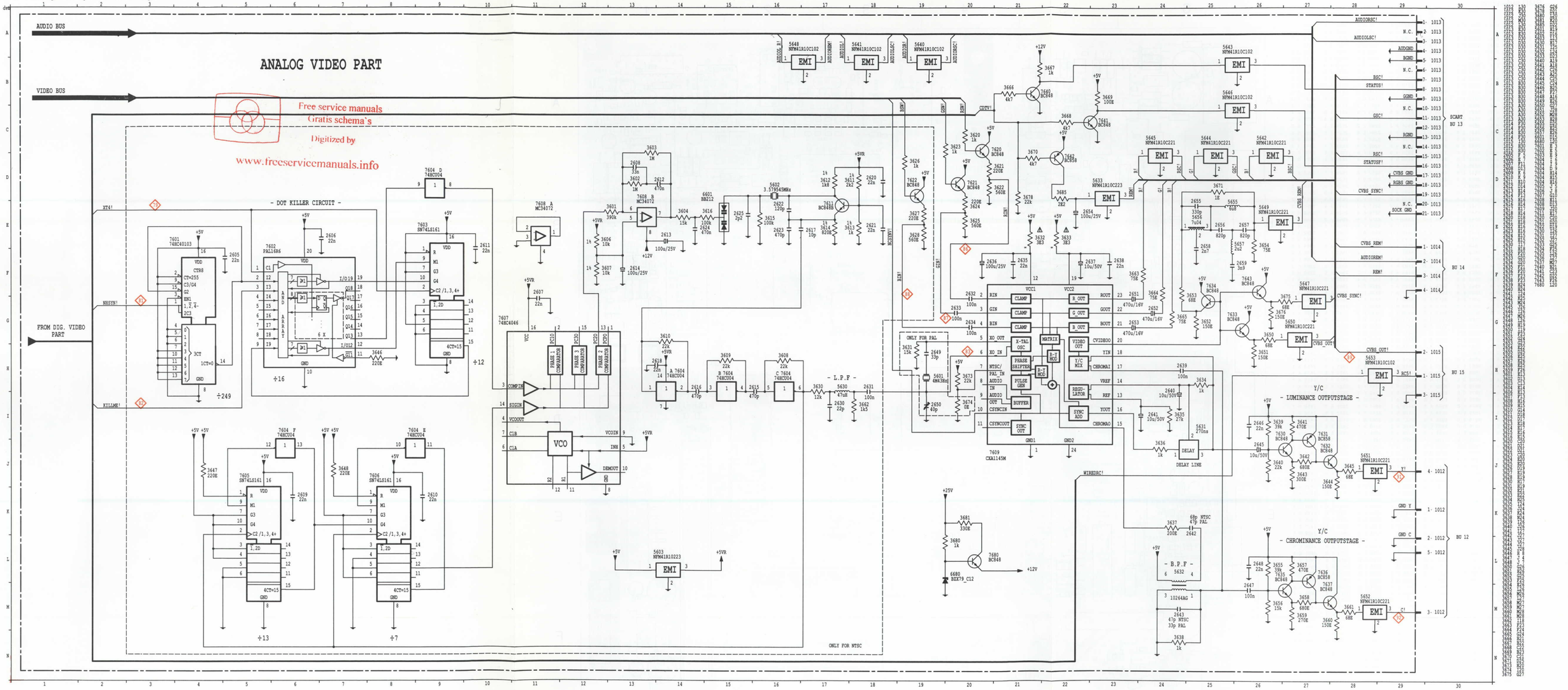


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6.6.8 Analog video part Circuit diagram

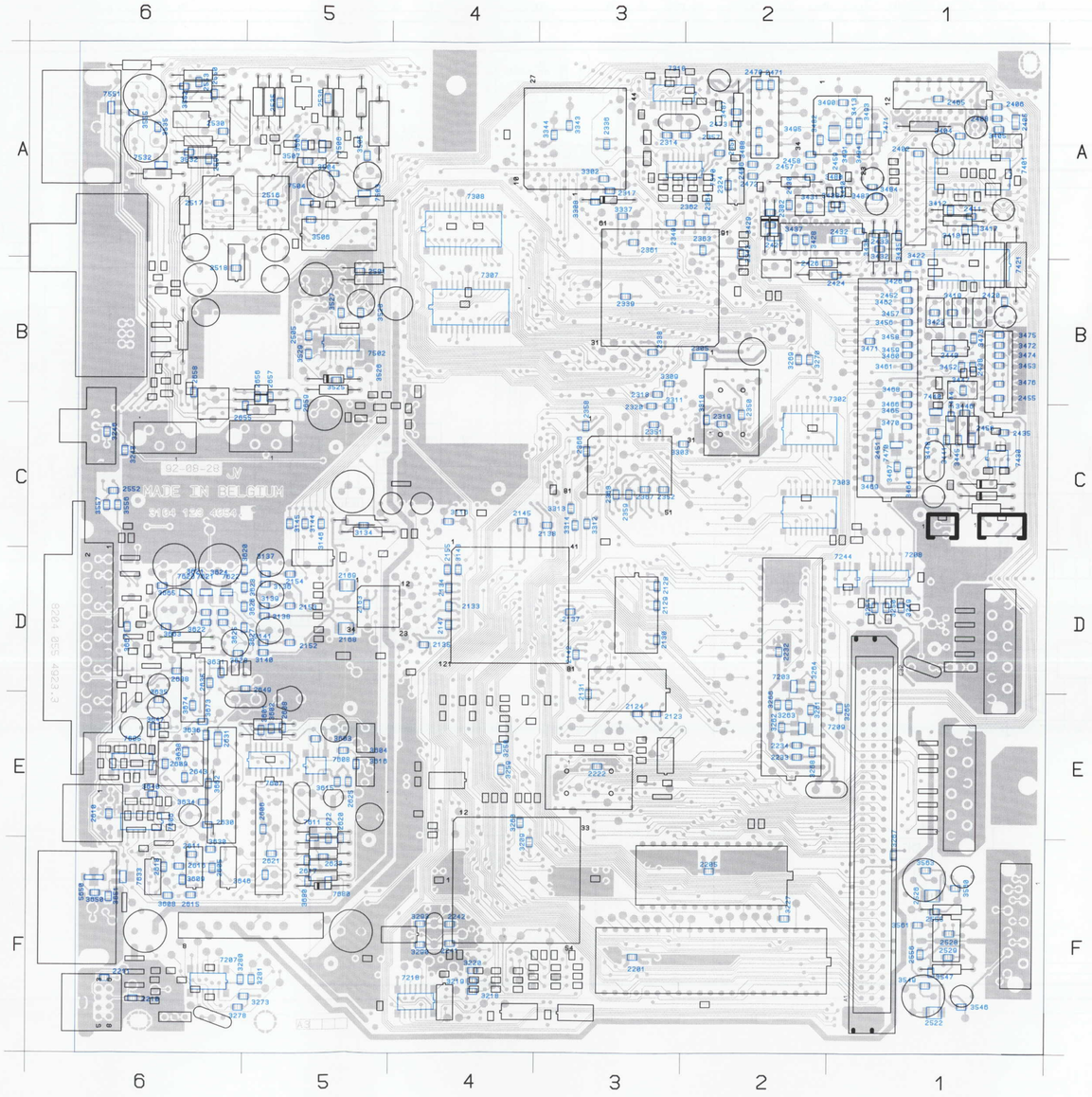


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6.6.9 Mono panel PCB
SMD side view



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7 DIAGNOSTICS

7.1 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Analog Audio section are similar to any CD player. Thus, the same techniques for troubleshooting a CD player may be used. Added features in servicing the CDI player is the Low Level Test and the Service Shell, see section 5." Service Software". The Low Level Test needs a VT100 terminal(or equivalent) or a Service PCB as an extra tool to run and test the functioning of the MMC section .
The Service Shell provides tests for the Analog Video, CD Servo, and Analog Audio circuits. Section 5.3 covers all the Service Shell test procedures.

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

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

7.1.2 Troubleshooting and Service the MMC parts

The monoboard is replaced as a module when parts of the Multi Media Controller are defective. The technician must know the functions of the MMC parts to diagnose a CDI player. The CDI player contains some built-in diagnostics to aid in troubleshooting. One diagnostic tool is the Service Shell (see section 5.3) and the other is the Low Level Test or LL Test (see section 5.2). The LL Test should be performed if there is access to neither the Player Shell nor the Service Shell. If the Low Level MMC test indicates a fault, replace the complete monoboard. If the test Cannot be initiated, check the power sources and main clock signals on the MMC section. If all supplies and clock signals are present, replace the MMC Unit.

7.1.3 Servo part and Audio Section Troubleshooting

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

When there is a symptom indicating a fault in the Servo circuitry, troubleshooting techniques used in CD players can be followed since the CD Unit portion of the CD-I player is basically a CD player (refer to the CD Unit schematic diagrams in the service manual).

If the CDM does not start, check for Vdd, clock, and reset on the CD Drive Microprocessor. If these signals are present, perform the X-bus test in the Service Shell or Low Level test. Also check for activity on the X-bus and SPI-bus.
If there is a communication failure, proceed with the MMC Low Level Test to determine if there is a failure in the system control circuitry. If the communication buses are functional, check the CD servo circuits using the Service Shell test modes. These modes are the standard CD servo test modes to test the OPU, turntable and swing arm. If there is a failure in the servo test modes, further checks with measurements on the CD panel (see section 7.2.2) should reveal the fault .
If the servo circuits are functioning, check the decoder circuits. Activity should be seen on the I^2S (DAAB, CLAB, and WSAB) and subcode (SCAB and SDAB) lines from the SAA7310 Decoder IC. If there is no activity, check the supply (Vdd) and input signals (HF, XIN).
If there is activity, check the ADOC circuitry.

When the servo and decoder circuits are functioning properly, there may be a problem in the Analog Audio circuit.

7.1.4 Video Section Troubleshooting

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

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

Symptom 2: no video. This symptom may be caused by either the DigitalVideo part or by the Analog Video circuit. A few voltage and signal measurements can quickly isolate the problem. Hint, also check all the video outputs: S-video, RF, and CVBS. If video is not present from any output, check the RGB, composite sync, and power source inputs. If these signals are present, the Digital Video circuits are functional. Further checks of the Analog Video circuit can isolate the problem further. Check the Video Encoder IC. Also check Vcc1 and Vcc2 to the Video Encoder IC.

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

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7.2 MEASUREMENTS & ADJUSTMENTS

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

7.2.1 Powersupply section

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

7.2.2 Servo section

7.2.2.1 Lasercurrent.

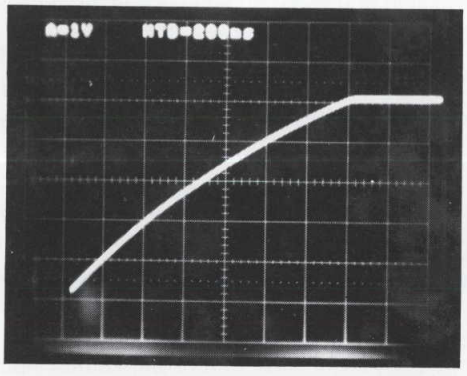
The lasercurrent is adjusted in the CDM9 and is a factory adjustment. After replacing a defective CDM the laser current does not need to be adjusted.
Play track 1 of testdisc 5, the voltage accross item 3411(measuring point 1 and point 2) on the CD panel should be : 0,7 V / DC ± 10 %.

7.2.2.2 Focus signal.

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

7.2.2.3 Starting signal.

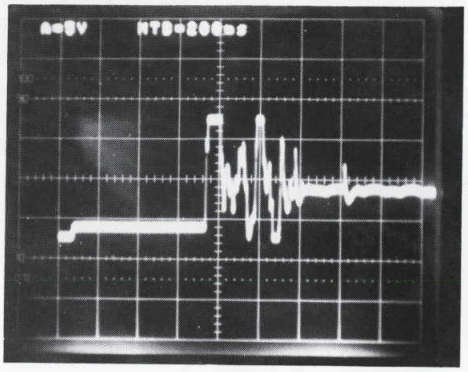
Insert a disc and measure accross item 2409 (measuring point 4 and GND).
After pushing the play button the next picture appears on the oscilloscoop :



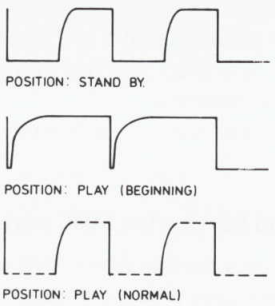
The signal is triggered by the Si/RD signal on IC7401pin6.

7.2.2.4 Motorcontrol signals.

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

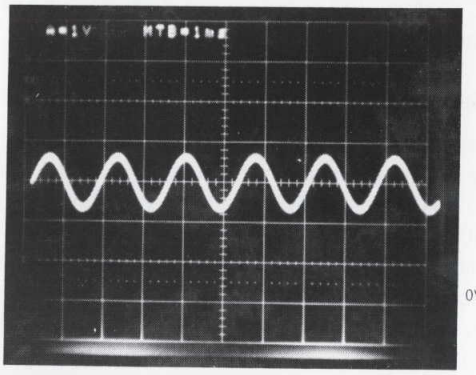


After a while, when playing track 1, the voltage should be: - 1.7 V DC ± 10%
Play track 1 of testdisc 5, the voltage across measuring point 6 and ground should be: 3.2 Volt DC ± 10%
Signal accross measuring point 7 and GND should be :



7.2.2.5 Radial error circuit signals.

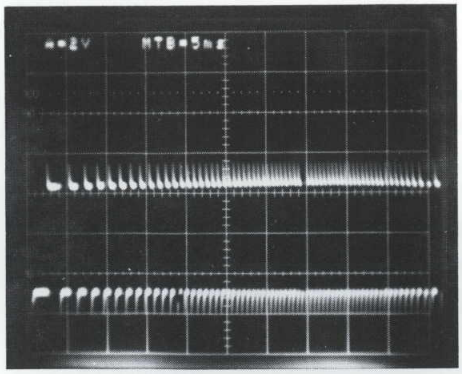
Voltage accross measuring point 18 and GND : 2,6 V / DC ± 10%.
Voltage accross measuring point 19 and GND : 110 mV / DC ± 10% in PLAY mode.
Voltage accross measuring point 21 and GND : 1,2 V / DC ± 10% in PLAY mode.
Voltage accross measuring point 22 and GND :



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

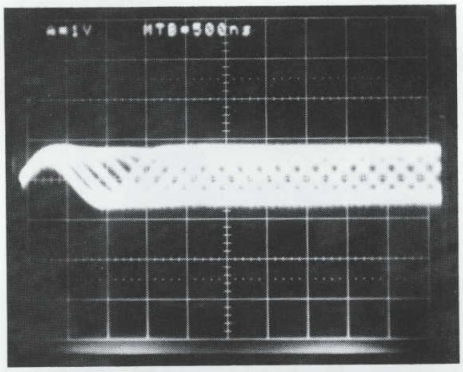
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For measuring point 28 and 33 put the player in the service shell on CD drive test mode 2. The voltage accross point 28 and GND should be :

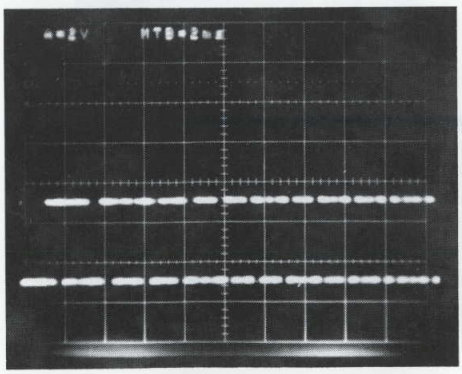


7.2.2.6 Clock signal µP IC7475
Measuring point 29 : clock signal f = 4MHz.

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



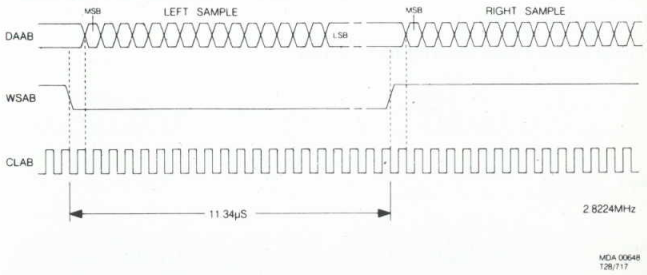
Insert testdisc 5 and put the player in the service shell on CD drive test mode 2.
The signal accross measuring point 32 should be :



Measuring point 34 : clock signal f = 11.289.600 Hz.
Voltage accross measuring point 36 and 37 :
775 mV /DC ± 10%

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

Measuring point 39, 41 and 42 :



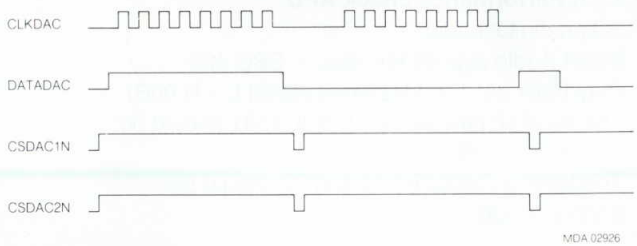
7.2.3 Audio section

Select the submenu "**APU/KEY**" of the Service Shell, see section 5.3. With this menu we can check besides the remote control functions also the audio functions **L-R** and **mono/stereo.**This audio function can only be checked when an audio-disc is inserted. When any disturbances occur, the following checks/measurements can be performed (2 ÷ 8).

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

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

66 - CLKDAC
67 - DATADAC
68 - CSDAC1N Pin15 of IC7550
69 - CSDAC2N Pin15 of IC7530

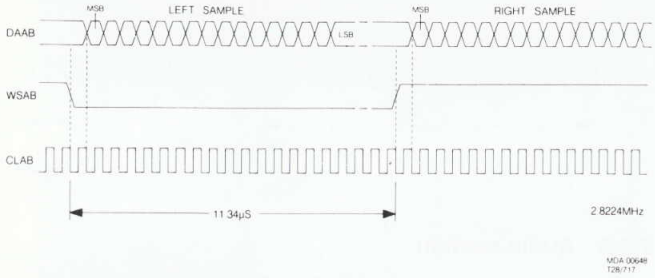


These signals are very hard to recognize on an oscilloscope during the normal application. Only in the **service shell** and controlling the attenuators you can observe activity .
If there is any activity on one of the lines 66 ÷ 69 one can suppose that the information of this signals are oke.
This is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

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7.2.3.2 I^2S signals

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



7.2.3.3 Xin clock signal

testpoint 61

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

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

7.2.3.4 DEEMP signal

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

7.2.3.5 KILL signal

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

7.2.3.6 Performance check APU

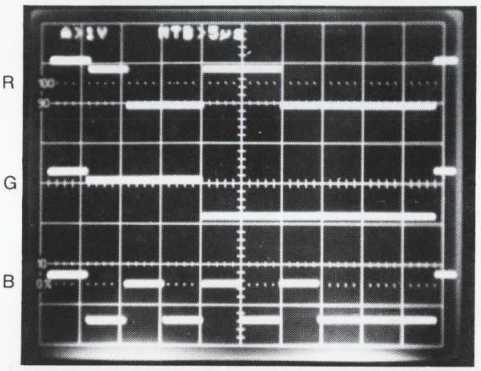
Position digital audio
- Insert Audio signals test disc 1, SBC 429
- Play track no. 1. (1kHz sinus signal L + R 0dB)
- The level on pin7 and pin8 of IC7531 should be: 0.9 Vrms ± 2dB
- The level on testpoint 71 and 72 should be: 2 Vrms ± 3dB.

7.2.4 Video section

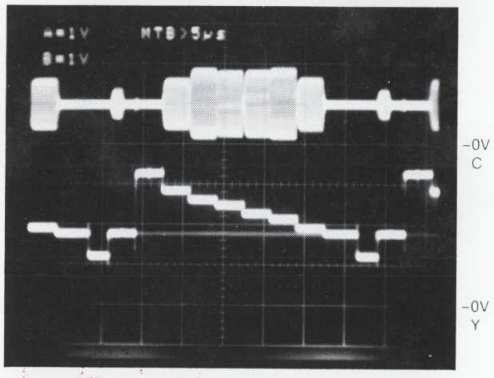
Required test equipment.
- Electronic voltmeter
- Oscilloscope
- Frequency counter

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

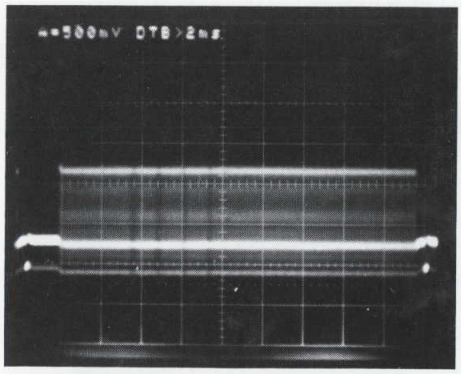
Measuring point 86, 87 and 88:



Measuring point 91:

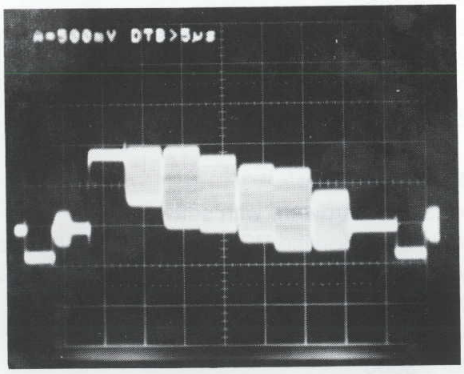


Measuring point 92:



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Measuring point 89:



7.2.4.1 Check of subcarrier .

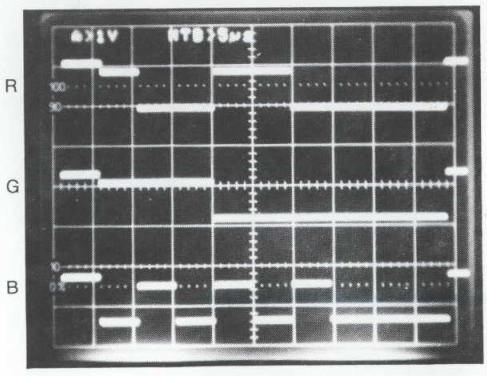
- Player switched off.
- Connect frequency counter to testpoint 83 ,(Pin 6 IC 7609) and turn on the player.
- The frequency on testpoint 83 should be;
  PAL = 4 433 618 Hz. ± 50 Hz.
  NTSC = 3 579 545 Hz. ± 7 Hz.
- The amplitude on testpoint 83 should be in between;
  400 mV and 1000 mV_{pp}
- If for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

7.2.4.2 Check of standard control signal SW

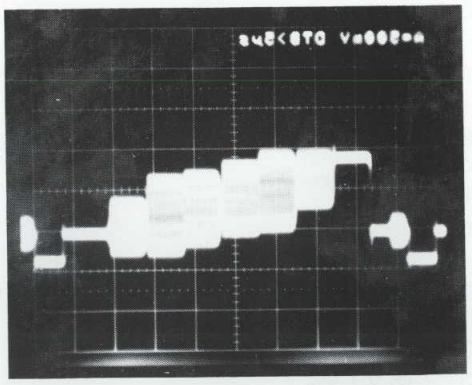
The control signal SW on testpoint 78, should be low (0 V) for PAL and high (5 V) for NTSC.

7.2.4.3 Check of RGB input signals

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

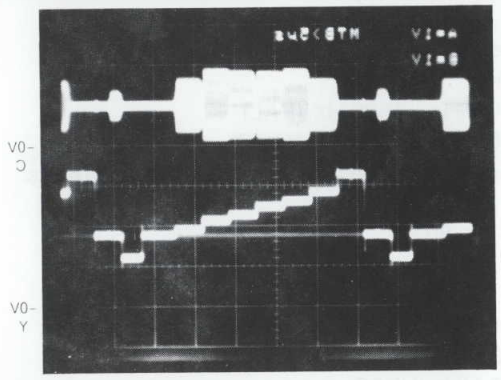


Check of Output signals for CVBS - Y / C.



CVBS signals Testpoint 89

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



Y/C Sign. Testpoint 91/92

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

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7.2.5 Multi Media Controller section

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

7.2.5.1 Supply voltages

Check if the following voltages are present at connector 1001

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

7.2.5.2 Clock signals:

Carry out measurements just after hardware reset.
This is done each time after pressing the OPEN/CLOSE button or after power-on.
System clock

30.0000 MHz ± 1500 Hz (PAL)
30.2098 MHz ± 600 Hz NTSC)

This system clock must be present at the following points:

IC7201 pin 30
IC7304 pin 80
IC7125 pin 115

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

15.0000 MHz (=30.000 : 2).
15.1049 MHz (NTSC)

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

Frequency 4.9152 MHz ± 250 Hz

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

Frequency 4.000 MHz ± 100 Hz

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

Frequency 22.5792 MHz ± 1100 Hz.

At IC7306 pin 16 the DSP clock must be present :

Frequency 7.5264MHz ± 380 Hz

7.2.5.3 I^2S interface:

FILTERN : 0V
DAAB
CLAB : frequency 2.8224 MHz(only for CD-DA)
WSAB : frequency 44.1 KHz (only for CD-DA)
DEEM : 0V (only for CD-DA and only if de-emphasis track is played)

7.2.5.4 Reset circuitry:

Press the OPEN/CLOSE button at front panel and measure the 'RESETCD' time (low!). This 'low' time must be 140 ms ± 20 ms. Also measure the RESETCD time(low!) if the button is released. The signal RESETCD must be low for 140 ms ± 20 ms.
IC7201 pin 28 RESETN; low time = 250 ms ± 20 ms

7.2.5.5 Check of microprocessor 68070.

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

7.2.5.6 Low level test

Purpose is to test the hardware with software.
Connect a terminal, or Service PCB to the UART of 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

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8 PARTSLIST

8.1 PARTSLIST OF THE CABINET

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

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8.2 PARTS LIST OF THE TRAY LOADER

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

8.3 PARTSLIST OF THE DISPLAY AND POWER SUPPLY PANEL

Item	Codenumber	Description
2		Heat sink
4		Bracket for conn.
6		FTD-holder
7		Insulating plate
8		Factory plate
10		Shielding cap
101	4822 492 63076	Spring clip
103	4822 492 63076	Spring clip
107	4822 492 63076	Spring clip
201	4822 325 20188	Mica isulator
202	4822 325 20188	Mica isulator
1201	4822 267 31572	socket 3p hor. fem.
1202	4822 267 51216	minidin socket 8p FEM TCS
1206	4822 267 50994	Conn. 10p grey
1220	4822 267 50994	Conn. 10p grey
1221		Earth spring
1703	4822 276 13114	Switch tact H=4,3
1704	4822 276 13114	Switch tact H=4,3
1705	4822 276 13114	Switch tact H=4,3
1706	4822 276 13114	Switch tact H=4,3
1707	4822 276 13114	Switch tact H=4,3
1708	4822 276 13114	Switch tact H=4,3
1721		Conn. 10p hor male
1801		Conn. 5p ver male
1802		Conn. 8p ver male
1803	4822 265 31015	AC socket /20/25/31/39
1803	4822 265 31016	AC socket /37
1804		Conn. 3p top entry
1805	4822 253 10128	Fuse T2A Rad
1806	4822 253 10138	Fuse T1A Rad
1807	4822 256 30495	Fuseholder
1809	4822 256 30495	Fuseholder
1810	4822 265 40596	Conn. 2p male
1901	4822 276 11309	Powerswitch
1902	4822 265 40596	Conn. 2p male

2701	5322 122 32654	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

3201	4822 101 21199	2X10k POTM. CARB0N		
3701	4822 051 20101	100R00	5%	0,1W
3702	4822 051 20473	47k00	5%	0,1W
3704	4822 052 10478	4R70	5%	0,33W
3705	4822 051 20332	3k30	5%	0,1W
3706	4822 116 90857	4R7X8		
3707	4822 116 90857	4R7X8		
3712	4822 051 20223	22k00	5%	0,1W
3713	4822 051 20823	82k00	5%	0,1W
3715	4822 050 21002	1k00	1%	0,6W
3716	4822 051 20223	22k00	5%	0,1W
3717	4822 051 20472	4k70	5%	0,1W
3718	4822 050 21002	1k00	1%	0,6W
3719	4822 051 20472	4k70	5%	0,1W
3720	4822 051 20154	150k00	5%	0,1W
3721	4822 051 20473	47k00	5%	0,1W
3722	4822 051 20472	4k70	5%	0,1W
3723	4822 051 20472	4k70	5%	0,1W
3724	4822 051 20223	22k00	5%	0,1W
3725	4822 050 21002	1k00	1%	0,6W
3726	4822 051 20472	4k70	5%	0,1W
3727	4822 051 20683	68k00	5%	0,1W
3728	4822 051 20103	10k00	5%	0,1W
3729	4822 051 20472	4k70	5%	0,1W
3730	4822 051 20153	15k00	5%	0,1W
3731	4822 050 21002	1k00	1%	0,6W
3801	4822 051 20821	820R00	5%	0,1W
3802	4822 051 20008	0R00	5%	0,1W
3803	4822 051 20271	270R00	5%	0,1W
3804	4822 051 20683	68k00	5%	0,1W

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Item	Codenumber	Description
3805	4822 116 83776	220k 1% 0,1W
3806	4822 051 20123	12k00 5% 0,1W
3807	4822 100 11633	47k TRIM CARBON
3808	4822 051 10102	1k00 2% 0,25W
5203		EMI FILTER 1nF 100V
5204		EMI FILTER 1nF 100V
5207		EMI FILTER 1nF 100V
5208		EMI FILTER 1nF 100V
5209		EMI FILTER 22nF 16V
5210		EMI FILTER 1nF 100V
5211		EMI FILTER 1nF 100V
5801	4822 338 33030	MAINS FILTER
5803		FXC INDUCTOR
5804	5322 157 52513	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
7703	5322 130 41982	BC848B
7704	5322 130 41982	BC848B
7705	4822 130 91194	FTD DISPLAY
7706	4822 209 72226	U3090M-40P
7708	5322 130 41983	BC858B
7709	5322 130 41983	BC858B
7710	5322 130 41982	BC848B
7712	5322 130 41982	BC848B

8.4 PARTS LIST MONOBOARD

Item	Codenumber	Description
PCB	4822 214 52065	PANEL ASSY /20
PCB	4822 214 52068	PANEL ASSY /25
PCB	4822 214 52069	PANEL ASSY /31
PCB	4822 214 52056	PANEL ASSY /37
PCB	4822 214 52066	PANEL ASSY /39
1001		conn. 8p hor.male
1006	4822 265 30525	conn. 2p vert. male
1007	4822 265 40474	conn. 4p vert. male
1008	4822 267 51152	conn. 14p zif straight
1012	4822 267 41079	minidin socket 4p FEM 9217A
1013	4822 267 60326	EUROCONN SCART BLUE
1014	4822 214 52071	RF modulator /05
1015		socket 2p female YKC21-550
1020		socket 2p female YKC21-528
1021	4822 265 40442	conn. 10p vert. male
1022	4822 265 40442	conn. 10p vert. male
1030	4822 265 40442	conn. 10p vert. male
1032	4822 267 51216	minidin socket 8p FEM TCS
1096	4822 267 70325	conn. 96p hor. female
1202	4822 255 40129	IC socket 40p
1203	4822 255 40129	IC socket 40p
2123	5322 122 32654	22nF 10% 63V
2124	5322 122 32654	22nF 10% 63V
2128	5322 122 32654	22nF 10% 63V
2129	5322 122 32654	22nF 10% 63V
2130	5322 122 32654	22nF 10% 63V
2131	5322 122 32654	22nF 10% 63V
2132	5322 122 32654	22nF 10% 63V
2133	5322 122 32654	22nF 10% 63V
2134	5322 122 32654	22nF 10% 63V
2135	5322 122 32654	22nF 10% 63V
2136	5322 122 32654	22nF 10% 63V
2137	5322 122 32654	22nF 10% 63V
2138	5322 122 32654	22nF 10% 63V
2139	5322 122 32654	22nF 10% 63V
2140	5322 122 32654	22nF 10% 63V
2141	5322 122 32654	22nF 10% 63V
2142	5322 122 32654	22nF 10% 63V
2143	5322 122 32654	22nF 10% 63V
2144	5322 122 32654	22nF 10% 63V
2145	5322 122 32654	22nF 10% 63V
2146	5322 122 32654	22nF 10% 63V
2147	5322 122 32654	22nF 10% 63V
2148	4822 124 41598	33µF 20% 35V
2149	4822 124 41598	33µF 20% 35V
2155	5322 122 32661	56pF 5% 50V
2156	4822 124 41528	100µF 25V
2157	4822 124 41528	100µF 25V
2158	4822 124 41528	100µF 25V
2161	5322 122 32654	22nF 10% 63V
2162	5322 122 32654	22nF 10% 63V
2163	5322 122 32654	22nF 10% 63V
2165	5322 122 32654	22nF 10% 63V
2166	5322 122 32654	22nF 10% 63V
2167	5322 122 32654	22nF 10% 63V
2168		470nF 10% 63V
2169		470nF 10% 63V
2170	4822 124 41989	470µF 20% 16V
2171	4822 122 32542	47nF 10% 63V
2201	5322 122 32654	22nF 10% 63V

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Item	Codenumber	Description			
2205	5322 122 32654	22nF	10%		63V
2206	5322 122 32654	22nF	10%		63V
2207	5322 122 32654	22nF	10%		63V
2210	5322 122 32654	22nF	10%		63V
2211	5322 122 32654	22nF	10%		63V
2216	4822 124 41989	470µF	20%		16V
2222	5322 122 32654	22nF	10%		63V
2223	4822 124 41989	470µF	20%		16V
2224	5322 122 32654	22nF	10%		63V
2228	4822 122 03330	33nF	10%		63V
2229	5322 122 32654	22nF	10%		63V
2230	5322 122 32654	22nF	10%		63V
2232	5322 122 32654	22nF	10%		63V
2233	5322 122 32452	47pF	5%	NPO	63V
2234	5322 122 32452	47pF	5%	NPO	63V
2235	5322 122 31865	1,5nF	10%		63V
2236	5322 122 31865	1,5nF	10%		63V
2237	5322 122 31865	1,5nF	10%		63V
2238	5322 122 32654	22nF	10%		63V
2241	5322 122 32661	56pF	5%		50V
2242	5322 122 32661	56pF	5%		50V
2244	5322 122 31865	1,5nF	10%		63V
2247	5322 122 32654	22nF	10%		63V
2250	5322 122 32654	22nF	10%		63V
2251	5322 122 32654	22nF	10%		63V
2252	5322 122 32654	22nF	10%		63V
2253	5322 122 32654	22nF	10%		63V
2268	4822 122 33177	10nF	20%		50V
2302	5322 122 31865	1,5nF	10%		63V
2303	4822 124 41528	100µF			25V
2304	5322 122 32448	10pF	5%		50V
2305	4822 122 33496	100nF	10%		63V
2307	4822 122 33496	100nF	10%		63V
2308	4822 122 33496	100nF	10%		63V
2310	4822 122 33496	100nF	10%		63V
2311	5322 122 32654	22nF	10%		63V
2312	5322 122 31865	1,5nF	10%		63V
2313	5322 122 31865	1,5nF	10%		63V
2315	4822 122 33496	100nF	10%		63V
2317	5322 122 32452	47pF	5%	NPO	63V
2324	5322 122 32654	22nF	10%		63V
2327	5322 122 32654	22nF	10%		63V
2328	5322 122 32654	22nF	10%		63V
2331	5322 122 32654	22nF	10%		63V
2332	5322 122 32654	22nF	10%		63V
2333	5322 122 32654	22nF	10%		63V
2336	5322 122 32654	22nF	10%		63V
2337	5322 122 32654	22nF	10%		63V
2338	5322 122 32654	22nF	10%		63V
2339	5322 122 32654	22nF	10%		63V
2340	5322 122 32654	22nF	10%		63V
2350	5322 122 32654	22nF	10%		63V
2351	5322 122 32654	22nF	10%		63V
2351	5322 122 32654	22nF	10%		63V
2354	5322 122 32654	22nF	10%		63V
2355	5322 122 31865	1,5nF	10%		63V
2356	5322 122 31865	1,5nF	10%		63V
2357	5322 122 32658	22pF	5%		50V
2358	5322 122 32654	22nF	10%		63V
2359	5322 122 32654	22nF	10%		63V
2360	4822 122 32575	220pF	10%		500V
2361	5322 122 32654	22nF	10%		63V
2362	5322 122 32654	22nF	10%		63V

Item	Codenumber	Description			
2363	5322 122 32654	22nF	10%		63V
2364	5322 122 32654	22nF	10%		63V
2365	5322 122 32654	22nF	10%		63V
2366	5322 122 32654	22nF	10%		63V
2367	5322 122 32654	22nF	10%		63V
2368	5322 122 32654	22nF	10%		63V
2400	5322 122 32654	22nF	10%		63V
2401	5322 122 32654	22nF	10%		63V
2402	5322 122 32268	470pF	10%		50V
2403	5322 122 34123	1nF	10%		50V
2404	4822 122 33175	2,2nF	20%		50V
2405	4822 122 32542	47nF	10%		63V
2406	5322 122 32531	100pF	5%		50V
2407	4822 122 33177	10nF	20%		50V
2408	5322 122 34123	1nF	10%		50V
2409	4822 121 42408	220nF	5%		63V
2410	4822 124 41527	47µF			25V
2411	4822 122 32575	220pF	10%		500V
2412		470nF	10%		
2413	4822 122 32575	220pF	10%		500V
2414	5322 122 32654	22nF	10%		63V
2415	4822 121 51321	8,2nF	1%		63V
2416	4822 121 51321	8,2nF	1%		63V
2417	4822 124 41598	33µF	20%		35V
2418	4822 122 32542	47nF	10%		63V
2419	5322 121 42661	330nF	5%		63V
2420	4822 122 33342	33nF	10%		63V
2421	4822 122 33342	33nF	10%		63V
2422	4822 121 42408	220nF	5%		63V
2423	4822 121 42408	220nF	5%		63V
2424	5322 122 32654	22nF	10%		63V
2425	4822 121 51252	470nF	5%		63V
2426	5322 122 32654	22nF	10%		63V
2427	4822 122 33496	100nF	10%		63V
2428	5322 122 32654	22nF	10%		63V
2429	4822 124 41527	47µF			25V
2430	5322 126 10223	4,7nF	10%		63V
2431	4822 121 51252	470nF	5%		63V
2432	4822 122 32927	220nF		Y5V	50V
2433	4822 122 33496	100nF	10%		63V
2434	5322 122 32448	10pF	5%		50V
2435	4822 122 33893	18nF	10%		63V
2436	5322 121 42661	330nF	5%		63V
2437	5322 122 32654	22nF	10%		63V
2438	4822 122 33175	2,2nF	20%		50V
2440	5322 122 32654	22nF	10%		63V
2450	4822 124 41598	33µF	20%		35V
2451	5322 122 32654	22nF	10%		63V
2452	5322 122 32531	100pF	5%		50V
2455	5322 122 32654	22nF	10%		63V
2456	4822 122 33496	100nF	10%		63V
2457	5322 122 32452	47pF	5%		63V
2458	4822 122 33175	2,2nF	20%		50V
2459		470nF	10%		50V
2460	5322 122 32654	22nF	10%		63V
2461	4822 124 41576	2,2µF	20%		50V
2462	4822 124 41598	33µF	20%		35V
2463	5322 122 32654	22nF	10%		63V
2464	4822 124 41598	33µF	20%		35V
2465	5322 122 32654	22nF	10%		63V
2466	5322 122 34123	1nF	10%		50V
2469	4822 124 41598	33µF	20%		35V
2470	5322 122 32654	22nF	10%		63V

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

Item	Codenumber	Description		
2635	5322 122 32654	22nF	10%	63V
2636	4822 124 41528	100µF		25V
2637	4822 124 41579	10µF	20%	50V
2638	5322 122 32654	22nF	10%	63V
2639	4822 122 33496	100nF	10%	63V
2640	4822 124 41579	10µF	20%	50V
2641	4822 124 41579	10µF	20%	50V
2642	5322 122 32269	68pF	5%	50V
2643	5322 122 32452	47pF	5%	63V
2645	4822 124 41579	10µF	20%	50V
2646	5322 122 32654	22nF	10%	63V
2647	4822 122 33496	100nF	10%	63V
2648	5322 122 32654	22nF	10%	63V
2654	4822 124 41528	100µF		25V
3116	4822 051 20221	220R00	5%	0,1W
3117	4822 051 20221	220R00	5%	0,1W
3118	4822 051 20221	220R00	5%	0,1W
3120	4822 051 20472	4k70	5%	0,1W
3121		75R00	1%	
3122	4822 051 20223	22k00	5%	0,1W
3123		75R00	1%	
3124		75R00	1%	
3125	4822 051 20223	22k00	5%	0,1W
3127		75R00	1%	0,1W
3129	4822 051 20229	22R00	5%	0,1W
3130		75R00	1%	0,1W
3130		75R00	1%	0,1W
3131		75R00	1%	0,1W
3132		75R00	1%	0,1W
3133	4822 050 21002	1k00	1%	0,1W
3134		390R00	1%	
3135	4822 052 10108	1R00	5%	0,33W
3136	4822 051 20103	10k00	5%	0,1W
3137	4822 051 20103	10k00	5%	0,1W
3138	4822 051 20103	10k00	5%	0,1W
3139	4822 051 20103	10k00	5%	0,1W
3140	4822 051 20103	10k00	5%	0,1W
3141	4822 051 20103	10k00	5%	0,1W
3143	4822 051 20229	22R00	5%	0,1W
3144		150R00	1%	
3145		150R00	1%	
3146		150R00	1%	
3201	4822 051 20008	0R00	5%	0,1W
3203	4822 051 20101	100R00	5%	0,1W
3204	4822 051 20008	0R00	5%	0,1W
3206	4822 051 20472	4k70	5%	0,1W
3207	4822 051 20472	4k70	5%	0,1W
3208	4822 051 20008	0R00	5%	0,1W
3210	4822 051 20472	4k70	5%	0,1W
3211	4822 051 20472	4k70	5%	0,1W
3212	4822 050 21002	1k00	1%	0,1W
3213	4822 051 20101	100R00	5%	0,1W
3215	4822 051 20008	0R00	5%	0,1W
3216	4822 051 20008	0R00	5%	0,1W
3218	4822 051 20472	4k70	5%	0,1W
3219	4822 051 20472	4k70	5%	0,1W
3220	4822 051 20472	4k70	5%	0,1W
3221	4822 051 20104	100k00	5%	0,1W
3222	4822 051 20103	10k00	5%	0,1W
3223	4822 051 20682	6k80	5%	0,1W
3225	4822 050 21002	1k00	1%	0,1W
3226	4822 051 20101	100R00	5%	0,1W

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Item	Codenumber	Description		
3229	4822 051 20008	0R00	5%	0,1W
3230	4822 050 21002	1k00	1%	0,1W
3231	4822 050 21002	1k00	1%	0,1W
3232	4822 050 21002	1k00	1%	0,1W
3233	4822 050 21002	1k00	1%	0,1W
3234	4822 050 21002	1k00	1%	0,1W
3235	4822 050 21002	1k00	1%	0,1W
3236	4822 050 21002	1k00	1%	0,1W
3239	4822 051 20101	100R00	5%	0,1W
3240	4822 051 20101	100R00	5%	0,1W
3241	4822 051 20101	100R00	5%	0,1W
3242	4822 051 20008	0R00	5%	0,1W
3246	4822 050 21002	1k00	1%	0,1W
3247	4822 051 20008	0R00	5%	0,1W
3249	4822 051 20682	6k80	5%	0,1W
3250	4822 051 20103	10k00	5%	0,1W
3251	4822 051 20104	100k00	5%	0,1W
3253	4822 050 21002	1k00	1%	0,1W
3254	4822 051 20008	0R00	5%	0,1W
3255	4822 051 20222	2k20	5%	0,1W
3256	4822 051 20221	220R00	5%	0,1W
3257	4822 051 20221	220R00	5%	0,1W
3258	4822 051 20223	22k00	5%	0,1W
3259	4822 051 20223	22k00	5%	0,1W
3260	4822 051 20223	22k00	5%	0,1W
3260	4822 051 20223	22k00	5%	0,1W
3261	4822 051 20183	18k00	5%	0,1W
3262	4822 051 20183	18k00	5%	0,1W
3263	4822 051 20473	47k00	5%	0,1W
3264	4822 051 20103	10k00	5%	0,1W
3265	4822 051 20103	10k00	5%	0,1W
3266	4822 051 20222	2k20	5%	0,1W
3267	4822 051 20222	2k20	5%	0,1W
3268	4822 051 20224	220k00	5%	0,1W
3270		75R00	1%	
3271	4822 051 20682	6k80	5%	0,1W
3272	4822 051 20103	10k00	5%	0,1W
3273	4822 051 20104	100k00	5%	0,1W
3274	4822 051 20682	6k80	5%	0,1W
3275	4822 051 20103	10k00	5%	0,1W
3276	4822 051 20104	100k00	5%	0,1W
3277	4822 051 20104	100k00	5%	0,1W
3278	4822 051 20104	100k00	5%	0,1W
3279	4822 051 20101	100R00	5%	0,1W
3280	4822 051 20104	100k00	5%	0,1W
3281	4822 051 20103	10k00	5%	0,1W
3290	4822 051 20105	1M00	5%	0,1W
3293	4822 051 20222	2k20	5%	0,1W
3296	4822 116 40238	0R46 - 60V		
3297	4822 116 40238	0R46 - 60V		
3302	4822 051 20104	100k00	5%	0,1W
3303	4822 051 20221	220R00	5%	0,1W
3304	4822 050 21002	1k00	1%	0,1W
3305	4822 050 21002	1k00	1%	0,1W
3306	4822 051 20103	10k00	5%	0,1W
3307	4822 051 20103	10k00	5%	0,1W
3308	4822 050 21002	1k00	1%	0,1W
3309	4822 051 20008	0R00	5%	0,1W
3310	4822 051 20008	0R00	5%	0,1W
3311	4822 051 20008	0R00	5%	0,1W
3312		75R00	1%	
3313		75R00	1%	
3314		75R00	1%	

Item	Codenumber	Description		
3318	4822 051 20008	0R00	5%	0,1W
3319	4822 051 20221	220R00	5%	0,1W
3320	4822 051 20183	18k00	5%	0,1W
3321	4822 051 20221	220R00	5%	0,1W
3322	4822 051 20183	18k00	5%	0,1W
3323	4822 051 20008	0R00	5%	0,1W
3327	4822 051 20008	0R00	5%	0,1W
3330	4822 051 20229	22R00	5%	0,1W
3331	4822 051 20153	15k00	5%	0,1W
3332	4822 050 21002	1k00	1%	0,1W
3333	4822 051 20221	220R00	5%	0,1W
3334	4822 051 20221	220R00	5%	0,1W
3335	4822 051 20221	220R00	5%	0,1W
3336	4822 051 20221	220R00	5%	0,1W
3337	4822 051 20221	220R00	5%	0,1W
3338	4822 051 20221	220R00	5%	0,1W
3340	4822 051 20221	220R00	5%	0,1W
3341	4822 051 20221	220R00	5%	0,1W
3342	4822 051 20221	220R00	5%	0,1W
3343	4822 051 20221	220R00	5%	0,1W
3344	4822 051 20221	220R00	5%	0,1W
3401	4822 051 20472	4k70	5%	0,1W
3402	4822 051 20104	100k00	5%	0,1W
3403	4822 051 20123	12k00	5%	0,1W
3404	4822 051 20101	100R00	5%	0,1W
3405	4822 050 21002	1k00	1%	0,1W
3406	4822 116 83705	24k	2%	0,2W
3407	4822 051 20562	5k60	5%	0,1W
3408	4822 051 20103	10k00	5%	0,1W
3409	4822 052 10108	1R00	5%	0,33W
3410	4822 052 10478	4R70	5%	0,33W
3411	4822 052 10129	12R00	5%	0,33W
3412	4822 051 20101	100R00	5%	0,1W
3413	4822 051 20104	100k00	5%	0,1W
3415	4822 051 20123	12k00	5%	0,1W
3416	4822 051 20223	22k00	5%	0,1W
3417	4822 051 20473	47k00	5%	0,1W
3418	4822 051 20223	22k00	5%	0,1W
3419	4822 051 20182	1k80	5%	0,1W
3420	4822 116 83706	5k1	2%	0,2W
3421	4822 051 20183	18k00	5%	0,1W
3422	4822 051 20154	150k00	5%	0,1W
3422	4822 051 20224	220k00	5%	0,1W
3424	4822 051 20223	22k00	5%	0,1W
3425	4822 050 23308	3R30	1%	0,6W
3426	4822 051 20302	3k00	5%	0,1W
3427	4822 052 10108	1R00	5%	0,33W
3428	4822 051 20302	3k00	5%	0,1W
3429	4822 051 20339	33R00	5%	0,1W
3430	4822 051 20113	11k00	5%	0,1W
3431	4822 051 20124	120k00	5%	0,1W
3432		3M3	5%	0,1W
3433	4822 051 20154	150k00	5%	0,1W
3435	4822 051 20563	56k00	5%	0,1W
3436	4822 051 20394	390k00	5%	0,1W
3437	4822 051 20823	82k00	5%	0,1W
3438	4822 052 10478	4R70	5%	0,33W
3439	4822 116 52186	22E	5%	0,5W
3440	4822 051 20472	4k70	5%	0,1W
3441	4822 051 20473	47k00	5%	0,1W
3442	4822 051 20104	100k00	5%	0,1W
3443	4822 051 20913	91k00	5%	0,1W
3444	4822 051 20122	1k20	5%	0,1W

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Item	Codenumber	Description		
3445	4822 051 20332	3k30	5%	0,1W
3446	4822 051 20562	5k60	5%	0,1W
3447	4822 051 20154	150k00	5%	0,1W
3448	4822 051 20472	4k70	5%	0,1W
3449	4822 051 20472	4k70	5%	0,1W
3450	4822 051 20333	33k00	5%	0,1W
3451	4822 051 20684	680k00	5%	0,1W
3452	4822 051 20204	200k00	5%	0,1W
3454	4822 052 10108	1R00	5%	0,33W
3455	4822 052 10108	1R00	5%	0,33W
3456	4822 051 20223	22k00	5%	0,1W
3457	4822 051 20223	22k00	5%	0,1W
3458	4822 051 20223	22k00	5%	0,1W
3459	4822 051 20223	22k00	5%	0,1W
3460	4822 051 20223	22k00	5%	0,1W
3462	4822 051 20223	22k00	5%	0,1W
3463	4822 052 10478	4R70	5%	0,33W
3464	4822 051 20224	220k00	5%	0,1W
3465	4822 051 20223	22k00	5%	0,1W
3466	4822 051 20223	22k00	5%	0,1W
3467	4822 051 20222	2k20	5%	0,1W
3468	4822 051 20223	22k00	5%	0,1W
3469	4822 051 20223	22k00	5%	0,1W
3470	4822 051 20103	10k00	5%	0,1W
3471	4822 051 20223	22k00	5%	0,1W
3472	4822 116 83084	27k	2%	0,2W
3473	4822 051 20203	20k00	5%	0,1W
3474	4822 116 83084	27k	2%	0,2W
3475	4822 116 83084	27k	2%	0,2W
3476	4822 116 83084	27k	2%	0,2W
3478	4822 116 52186	22E	5%	0,5W
3479	4822 051 20104	100k00	5%	0,1W
3480	4822 051 20222	2k20	5%	0,1W
3481	4822 052 10338	3R3	5%	0,33W
3482	4822 051 20223	22k00	5%	0,1W
3483		75R00	1%	
3484	4822 051 20912	9k10	5%	0,1W
3485	4822 051 20392	3K90	5%	0,1W
3486	4822 051 20152	1k50	5%	0,1W
3487	4822 051 20101	100R00	5%	0,1W
3488	4822 051 20224	220k00	5%	0,1W
3489	4822 052 10478	4R70	5%	0,33W
3490	4822 051 20223	22k00	5%	0,1W
3491	4822 051 20105	1M00	5%	0,1W
3492	4822 052 10108	1R00	5%	0,33W
3493	4822 051 20154	150K00	5%	0,1W
3494		3M3	5%	0,1W
3495	4822 051 20101	100R00	5%	0,1W
3497	4822 051 20008	0R00	5%	0,1W
3501	4822 052 10338	3R3	5%	0,33W
3502	4822 052 10478	4R70	5%	0,33W
3503	4822 052 10478	4R70	5%	0,33W
3504	4822 051 20103	10k00	5%	0,1W
3505	4822 051 20223	22k00	5%	0,1W
3506	4822 051 20473	47k00	5%	0,1W
3507	4822 051 20103	10k00	5%	0,1W
3508	4822 051 20103	10k00	5%	0,1W
3509	4822 051 20223	22k00	5%	0,1W
3510	4822 051 20472	4k70	5%	0,1W
3511	4822 052 10338	3R3	5%	0,33W
3513	4822 050 25102	5k10	1%	0,6W
3514	4822 050 22202	2k20	1%	0,6W
3515	4822 051 20105	1M00	5%	0,1W

Item	Codenumber	Description		
3516	4822 051 20105	1M00	5%	0,1W
3517	4822 050 25102	5k10	1%	0,6W
3518	4822 051 20472	4k70	5%	0,1W
3519	4822 050 25102	5k10	1%	0,6W
3520	4822 052 10338	3R3	5%	0,33W
3521	4822 050 22202	2k20	1%	0,6W
3522	4822 051 20105	1M00	5%	0,1W
3523	4822 050 25102	5k10	1%	0,6W
3524	4822 051 20105	1M00	5%	0,1W
3525	4822 051 20101	100R00	5%	0,1W
3526	4822 051 20101	100R00	5%	0,1W
3527	4822 051 20101	100R00	5%	0,1W
3528	4822 051 20101	100R00	5%	0,1W
3529	4822 051 20221	220R00	5%	0,1W
3530	4822 050 21103	11k00	1%	0,6W
3531	4822 050 21103	11k00	1%	0,6W
3532	4822 051 20681	680R00	5%	0,1W
3533	4822 050 21503	15k00	1%	0,6W
3534	4822 051 20101	100R00	5%	0,1W
3535	4822 050 22202	2k20	1%	0,6W
3538	4822 051 20103	10k00	5%	0,1W
3539	4822 051 20103	10k00	5%	0,1W
3540	4822 050 14709	47R00	1%	0,4W
3541	4822 051 20472	4k70	5%	0,1W
3542	4822 051 20103	10k00	5%	0,1W
3543	4822 051 20472	4k70	5%	0,1W
3544	4822 051 20103	10k00	5%	0,1W
3545	4822 051 20223	22k00	5%	0,1W
3546	4822 051 20103	10k00	5%	0,1W
3547	4822 051 20472	4k70	5%	0,1W
3548	4822 050 24708	4R70	1%	0,6W
3549	4822 051 20471	470R00	5%	0,1W
3550	4822 050 21103	11k00	1%	0,6W
3551	4822 050 21103	11k00	1%	0,6W
3552	4822 051 20681	680R00	5%	0,1W
3553	4822 050 21503	15k00	1%	0,6W
3554	4822 050 21001	100R00	1%	0,6W
3555	4822 050 22202	2k20	1%	0,6W
3558	4822 051 20103	10k00	5%	0,1W
3560	4822 051 20103	10k00	5%	0,1W
3561	4822 051 20472	4k70	5%	0,1W
3562	4822 050 24708	4k7	1%	0,6W
3563	4822 051 20471	470R00	5%	0,1W
3570	4822 051 20473	47k00	5%	0,1W
3571	4822 051 20473	47k00	5%	0,1W
3572	4822 051 20103	10k00	5%	0,1W
3573	4822 051 20103	10k00	5%	0,1W
3574	4822 051 20103	10k00	5%	0,1W
3601	4822 051 20394	390k00	5%	0,1W
3602	4822 051 20105	1M00	5%	0,1W
3603	4822 051 20105	1M00	5%	0,1W
3604	4822 051 20153	15k00	5%	0,1W
3606	4822 050 21003	10k00	1%	0,6W
3607	4822 050 21003	10k00	1%	0,6W
3608	4822 051 20223	22k00	5%	0,1W
3609	4822 051 20223	22k00	5%	0,1W
3610	4822 051 20223	22k00	5%	0,1W
3611	4822 050 22202	2k20	1%	0,6W
3612	4822 050 21802	1k80	1%	0,6W
3613	4822 050 21002	1k00	1%	0,6W
3614	4822 050 28201	820R00	1%	0,6W
3615	4822 051 20104	100k00	5%	0,1W
3616	4822 051 20104	100k00	5%	0,1W

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Item	Codenumber	Description		
3620	4822 051 10102	1k00	2%	0,25W
3621	4822 051 20221	220R00	5%	0,1W
3622	4822 051 20561	560R00	5%	0,1W
3623	4822 051 10102	1k00	2%	0,25W
3624	4822 051 20221	220R00	5%	0,1W
3625	4822 051 20561	560R00	5%	0,1W
3626	4822 051 10102	1k00	2%	0,25W
3627	4822 051 20221	220R00	5%	0,1W
3628	4822 051 20561	560R00	5%	0,1W
3630	4822 051 20123	12k00	5%	0,1W
3632	4822 052 10338	3R3	5%	0,33W
3633	4822 052 10338	3R3	5%	0,33W
3634	4822 051 10102	1k00	2%	0,25W
3635	4822 051 20273	27k00	5%	0,1W
3636	4822 051 10102	1k00	2%	0,25W
3537		200R00	5%	0,1W
3638	4822 051 10102	1k00	2%	0,25W
3639	4822 051 20393	39k00	5%	0,1W
3640	4822 051 20223	22k00	5%	0,1W
3641	4822 051 20471	470R00	5%	0,1W
3642	4822 051 20681	680R00	5%	0,1W
3643		300R00	5%	0,1W
3644	4822 051 20151	150R00	5%	0,1W
3645	4822 051 20689	68R00	5%	0,1W
3646	4822 051 20221	220R00	5%	0,1W
3647	4822 051 20221	220R00	5%	0,1W
3648	4822 051 20221	220R00	5%	0,1W
3650	4822 051 20689	68R00	5%	0,1W
3651	4822 051 20151	150R00	5%	0,1W
3652	4822 051 20151	150R00	5%	0,1W
3653	4822 051 20689	68R00	5%	0,1W
3654		75R00	1%	
3655	4822 051 20393	39k00	5%	0,1W
3656	4822 051 20153	15k00	5%	0,1W
3657	4822 051 20471	470R00	5%	0,1W
3658	4822 051 20681	680R00	5%	0,1W
3659	4822 051 20271	270R00	5%	0,1W
3660	4822 051 20151	150R00	5%	0,1W
3661	4822 051 20689	68R00	5%	0,1W
3662	4822 051 20152	1k50	5%	0,1W
3670	4822 051 20472	4k70	5%	0,1W
3671	4822 052 10108	1R00	5%	0,33W
3673	4822 051 20223	22k00	5%	0,1W
3678	4822 051 20223	22k00	5%	0,1W
3680	4822 051 10102	1k00	2%	0,25W
3681	4822 050 23301	330R00	1%	0,6W
3685	4822 052 10228	2R20	5%	0,33W

5150		EMI FILTER	22nF	100V
5201	4822 242 81398	4.915 000 MC		
5203	4822 242 81396	4.000 000 MC		
5210	4822 157 70378	EMI FILTER	22nF	16V
5211		EMI FILTER	1nF	100V
5212		EMI FILTER	1nF	100V
5213		EMI FILTER	1nF	100V
5214		EMI FILTER	1nF	100V
5215		EMI FILTER	22nF	100V
5216	4822 157 70378	EMI FILTER	22nF	16V
5217		EMI FILTER	1nF	100V
5218		EMI FILTER	1nF	100V
5219		EMI FILTER	1nF	100V
5220		EMI FILTER	1nF	100V
5221		EMI FILTER	1nF	100V
5222		EMI FILTER	1nF	100V

Item	Codenumber	Description
5223		EMI FILTER 1nF 100V
5224		EMI FILTER 1nF 100V
5225		EMI FILTER 220pF 100V
5226		EMI FILTER 220pF 100V
5227		EMI FILTER 1nF 100V
5240	4822 242 81394	30.209 800 MC
5240	4822 242 81419	30.0000 MC
5301	4822 242 81395	45.158 400 MC
5302	4822 242 81393	19.357 000 MC
5401	4822 242 72527	CST 4,00MGW-TF01
5501		CHOKE
5502		CHOKE
5503		CHOKE
5504		EMI FILTER 22nF 100V
5602	4822 242 81397	3.579 000 MC
5603		EMI FILTER 22nF 100V
5630	4822 157 53906	47uH
5631	4822 320 40247	DELAY LINE 275 nSEC
5632	4822 157 53259	COIL 166NNF10264AG
5633		EMI FILTER 22nF 100V
5648		EMI FILTER 1nF 100V
5649		EMI FILTER 220pF 100V
5650		EMI FILTER 220pF 100V
5651		EMI FILTER 220pF 100V
5652		EMI FILTER 220pF 100V
5653		EMI FILTER 1nF 100V

6301	4822 130 31983	BAT85
6401	5322 130 30684	1N4002
6402	5322 130 30684	1N4002
6403	4822 130 31981	BZX79-B3V9
6404	4822 130 31981	BZX79-B3V9
6510	5322 130 34885	1N5817
6601	4822 130 31129	BB212
6680	4822 130 34197	BZX79-C12

7110	4822 209 32148	TMS45165-70-DGE
7118	4822 209 32148	TMS45165-70-DGE
7120	4822 209 31292	MC44200
7121	5322 209 60189	PC74HCT4053T
7125		MCDI460-VDSC
7201		SCC68070CCA84
7203	5322 130 41983	BC858B
7206	4822 209 32101	MC68H05/ZC405170R3.2
7207	5322 209 71568	PC74HCT14T
7208	5322 209 71568	PC74HCT14T
7209	5322 130 41982	BC848B
7211	4822 209 32098	SYST.SOFTW. 3.0R1.2
7212	4822 209 30704	MC74HCU04D
7215	4822 209 32147	MC74ACT04DC
7216	5322 209 11596	PC74HCT08T
7217	4822 209 30696	MC74ACT74DR2
7218	5322 209 11599	PC74HCT32T
7224	4822 209 30554	MK48T08B15
7225	4822 209 72587	TCA0372D2
7244	4822 209 61547	MC34064D
7245	4822 209 72587	TCA0372D2
7247	4822 209 32068	MC74ACT125D
7249	5322 209 61434	N74F02D
7250	4822 130 41982	BC848B
7301		IMS66490/1 CDIC'
7302	4822 209 32146	MC74ACT244DWR2
7303	4822 209 32146	MC74ACT244DWR2
7304		ATTEX CGL00010

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Item	Codenumber	Description
7306		PCB5010WP/M023
7307	4822 209 63925	FCB61C65L-70T
7308	4822 209 63925	FCB61C65L-70T
7310	4822 209 30704	MC74HCU04D
7318	4822 209 31963	NE564D
7320	5322 209 71568	PC74HCT14T
7401	4822 209 73234	TDA8808T/C3
7410	4822 130 42696	BC818-25
7421	4822 209 31973	TDA8809T/C2/S1/13
7430	4822 209 30095	LM833D
7435	5322 209 60299	PC74HCT00T
7440	5322 130 41983	BC858B
7441	5322 130 41983	BC858B
7460	4822 209 61759	SAA7310GP/H5
7461	4822 209 70422	MN4264-15
7470	4822 130 41982	BC848B
7471	4822 130 41982	BC848B
7472	4822 130 42131	BF550
7475	4822 209 32099	MC68HC05C8/ZC405171 R3.1
7480	4822 209 62588	PCF2705P
7501	4822 209 32072	CS4328KS
7502	4822 209 32068	MC74ACT125D
7503	4822 130 41982	BC848B
7504	4822 130 41982	BC848B
7506	5322 130 41983	BC858B
7507	4822 130 41982	BC848B
7509	4822 130 41982	BC848B
7511	4822 209 62312	MC33078D
7512	5322 209 12099	MC74HC164D
7515	5322 130 41983	BC858B
7516	5322 130 41983	BC858B
7517	4822 130 41982	BC848B
7520	4822 209 62059	TCA0372DP1
7530	4822 209 32067	AD7528JR
7531	4822 209 32071	MC33079D
7532	4822 130 42696	BC818-25
7548	4822 130 41982	BC848B
7550	4822 209 32067	AD7528JR
7551	4822 130 42696	BC818-25
7601	4822 209 32069	PC74HCT40103T
7602	4822 209 32097	TIBPAL16R6-7602N 2E
7603	4822 209 32074	MC74HC161D
7604	4822 209 30704	MC74HCU04D
7605	4822 209 32074	MC74HC161D
7606	4822 209 32074	MC74HC161D
7607	4822 209 30726	MC74HC4046AD
7608	4822 209 32073	MC34072D
7609	4822 209 31908	CXA1145M
7620	4822 130 41982	BC848B
7621	4822 130 41982	BC848B
7622	4822 130 41982	BC848B
7630	4822 130 41982	BC848B
7631	5322 130 41983	BC858B
7632	4822 130 41982	BC848B
7633	4822 130 41982	BC848B
7634	4822 130 41982	BC848B
7635	4822 130 41982	BC848B
7636	5322 130 41983	BC858B
7637	4822 130 41982	BC848B
7642	5322 130 41983	BC858B
7680	4822 130 41982	BC848B

8.5 LIST OF ACCESSORIES AND SERVICE TOOLS

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

PARTSLIST FOR ROLLER CONTROLLER

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

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