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# Compact disc interactive player

# CDI 210/40/41/45

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CDI



# ServiceManual

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COMPACT disc Interactive

## SURVEY OF PLAYERS

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

These sets are equiped with Compact Disc Mechanism type CDM12.4; service code 4822 691 30354.
This CDM is also used in CDI220/60/61/65/77.
Service information is included in this manual.

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PHILIPS MEDIA©

## SURVEY OF MAINPANELS

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

The mainpanels must be repaired via the central repair procedure, if the defective item is on the circuitry of the µP part, digital audio or the digital video part.
All above mentioned players are equiped with CDM9.

| Version | Mainpanel |
|---|---|
| /40<br>/41<br>/45 | These mainpanels must be repaired down to component level in a local central re-pairshop ,see chapter 3.6. |

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

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

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

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

CLASS 1
LASER PRODUCT
3122 110 03420

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# 2. PRODUCT INFORMATION
## 2.1 TECHNICAL SPECIFICATION

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

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

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

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

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

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

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

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

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

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

**REAR**
input (1 ports) 8-pin mini-DIN
*(1 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 (100 mA max) | |

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

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

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



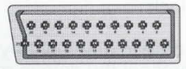
| pin *Broche* | signal *Signal* | I/O *E/S* |
|---|---|---|
| 1 | rxd1 | I / *E* |
| 2 | rxd2 | I / *E* |
| 3 | tx2 | O / *S* |
| 4 | rts1 | O / *S* |
| 5 | ground / Masse | - |
| 6 | nc | - |
| 7 | rts2 | O / *S* |
| 8 | +5V (100 mA max) | |

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

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

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

AV/Euroconnector
*Péritélévision A/V*



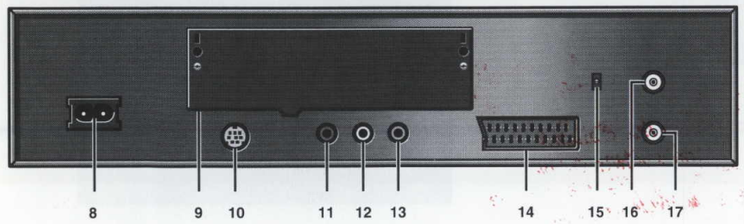
| pin *Broche* | signal *Signal* |
|---|---|
| 1 | audio R / *audio R (droite)* |
| 2 | nc / *non connecté* |
| 3 | audio L / *audio L (gauche)* |
| 4 | audio ground / *masse audio* |
| 5 | blue ground / *masse bleu* |
| 6 | nc / *non connecté* |
| 7 | blue / *bleu* |
| 8 | function switching (0=Antenna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

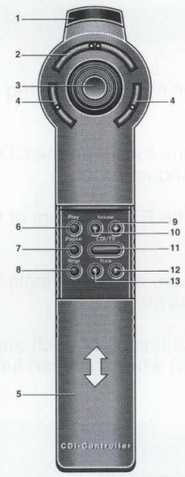
Designs and specifications are subject to change without notice. • *La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable.* • *Los diseños y las especificaciones están sujetos a cambios sin previo aviso.* • *Concepten en specificaties kunnen gewijzigd worden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

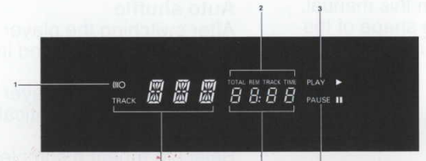
# 2.2 CONNECTION AND CONTROLS

CDI 210




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## DESCRIPTION OF CONTROLS AND CONNECTIONS

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

**REAR**
8. Mains AC (alternating current) input socket.
9. Extension socket (22ER9956).
10. Input port for CD-I serial connections.
11. Audio output R.
12. Audio output L.
13. Video output (CVBS).
14. A/V Euroconnector*.
15. Channel selector*.
16. OUT TO TV*.
17. IN FROM ANTENNA*.

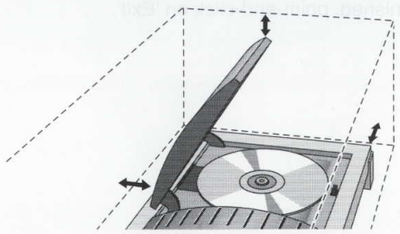
**DISPLAY PANEL**
1 Remote control active (flashing indicator).
2 Time indicators.
3 Disc playing.
4 Track number (CD-Audio).
5 Elapsed or remaining time (CD-Audio).
6 CD pause active.

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

*Available on some player versions only.

## PLACEMENT

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



## POWER CONNECTION

- Connect the female end of the AC (alternating current) cord supplied into the AC socket (8).
- Insert the male end of the cord into an AC outlet.
- **CAUTION: NEVER MAKE OR CHANGE CONNECTIONS WITH THE POWER SWITCHED ON.**

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



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# 2.3 BEFORE USING YOUR CD-I PLAYER

## REMOTE CONTROL INTERACTIVE OPERATION

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

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




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

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

## WIRED POINTING DEVICE OPERATION

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

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

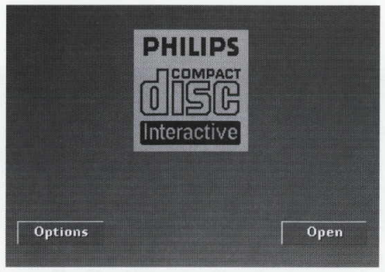
**Note**: To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used. The shape of the cursor is different according to the program you are playing, but it is always controlled in the same way.

## SETTINGS

- Press the ON/OFF button (7) to switch the player on.
- Switch on the TV (and HiFi system if used).
- Select the CD-I input on the TV (and HiFi system if used).

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

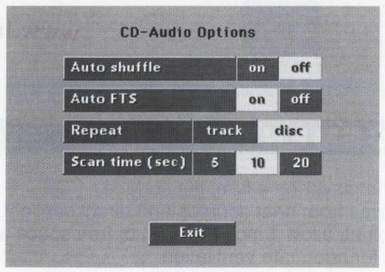
**Open/Close:** To open or close the disc tray.
**Options:** See: 'OPTIONS SCREEN'.




- Press the ON/OFF button (7) to switch the player off.
- Switch off the TV (and HiFi system, if used).

## OPTIONS SCREEN

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

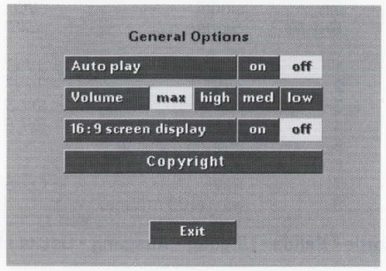



- When finished, point-and-click on 'Exit'.

# 2.4 SETTING UP

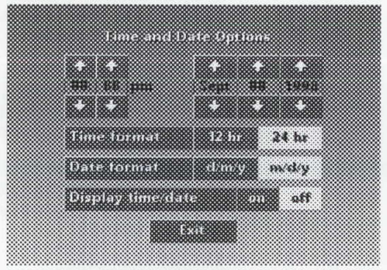
## OPTIONS SCREEN CONTINUATION

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




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

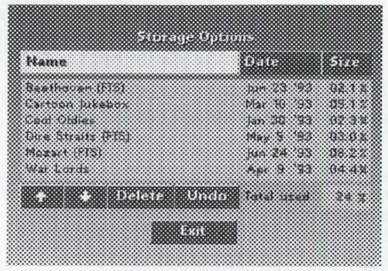
**3. Time and Date**
To change the player time/date settings:
**Time/Date set**
If the time or date shown on the screen is wrong, select the appropriate 3 and 4 arrows to set hours, minutes, day, month and year in turn, as required.
**Time format**
Select 24 hour or 12 hour clock.
**Date format**
Select d/m/y to present the date in day-month-year sequence. Select m/d/y to present the date in month-day year sequence.
**Display time/date**
Select whether time and date will displayed on the TV screen or not.




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

**4. Storage**
To refer to the intermediate results of CD-I titles and of programs created for your audio and Photo CDs.
The 'Storage' screen shows the information held in memory: titles, dates and percentage of memory used.
Clicking on 'Name', 'Date', or 'Size' sorts the information accordingly.

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



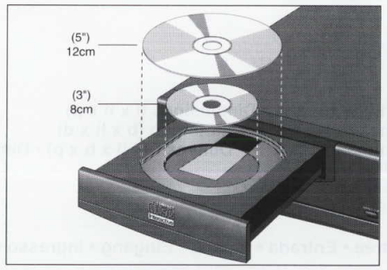

- When finished, point-and-click on 'Exit'.

## LOADING AND UNLOADING

**Loading:**

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

The TV screen changes according to the type of disc.




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

**Unloading:**

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

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



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# 2.5 DISC PLAY

## PLAYING A CD-I DISC

**NOTE**

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

**CAUTION**

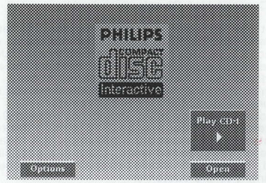
**– NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.**

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

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

2. When autoplay is "ON":
   After loading the disc, the CD-I program will start up automatically.
   The opening screen of the CD-I program now appears on the TV.

From this point, all interaction is between you and the program.
To stop at any time, select the STOP or EXIT function provided by the CD-I program.




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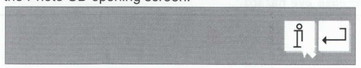
## PLAYING A PHOTO CD

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

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



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



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

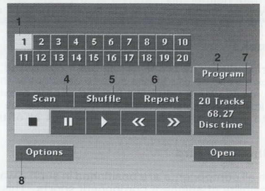
**CAUTION**

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

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

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

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




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

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

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

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

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

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

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

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

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

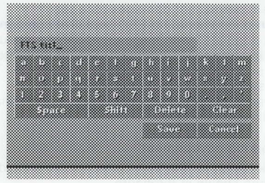
# DISC PLAY

**NOTE**

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

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

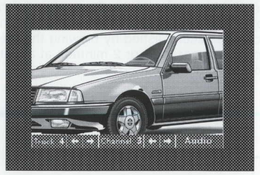
- After creating a Favorite Track Selection for a disc, you can compose a title of up to 30 characters (depending on the character width) for the selection using the keyboard screen.
  The title then appears on the CD-Audio screen whenever the disc is loaded.
- At the CD-Audio screen, 'point-and-click'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




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

## PLAYING A CD-AUDIO DISC 3. CD graphics

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




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

**CAUTION**

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

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

# 2.6 ACCESSORIES • ACCESSOIRES

## SUPPLIED ACCESSORIES • ACCESSOIRES FOURNIS

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


AC Cord


Three Batteries


Euroconnector *


Antenna Cable * (RF coaxial cable)


"Thumbpad" Remote Control Handset

** available on some player versions only*

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

## OPTIONAL ACCESSORIES • ACCESSOIRES EN OPTION

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

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


CD-I Mouse 22ER9011


Roller Controller 22ER9012


CD-I Trackball 22ER9013


Touchpad 22ER9017


Audio L-R Cable


Video (CVBS) Cable


Audio Stereo Splitter 22ER9209


Splitter 22ER9208


Digital Video Cartridge 22ER9956

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

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### 3.1 SAFETY INSTRUCTIONS

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

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

### 3.2 SERVICING OF SMDs (Surface Mounted Devices)

#### 3.2.1 General cautions on handling and storage

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

#### 3.2.2 Removal of SMDs

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

#### 3.2.2.1 Caution on removal:

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

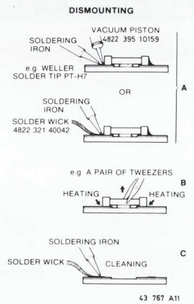



Fig. 1

#### 3.2.3 Attachment of SMDs

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

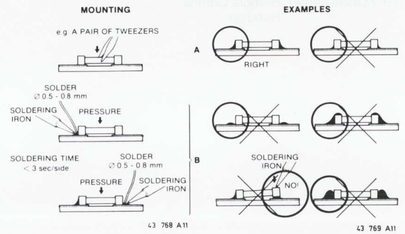



Fig. 2




Fig. 3

#### 3.2.3.1 Caution on attachment:

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

### 3.3 HANDLING ESD-SENSITIVE COMPONENTS

#### 3.3.1 Personal safety

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

#### 3.3.2 Storage and transport

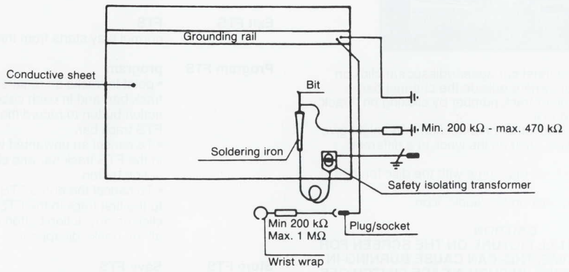
Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

#### 3.3.3 Testing or handling

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

#### 3.3.4 Mounting ESD-sensitive components

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




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

#### 3.3.5 Soldering

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

#### 3.3.6 Electrostatic charges

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

#### 3.3.7 Transients (switch-on phenomena)

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

#### 3.3.8 Working environment

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

#### 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.

## SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

### Important

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

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

### Safety Checks

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

### Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those units which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed according to the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematic diagrams and/or exploded views.
   Replacement parts without the same safety characteristics may create shock, fire, or other hazards.
7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.

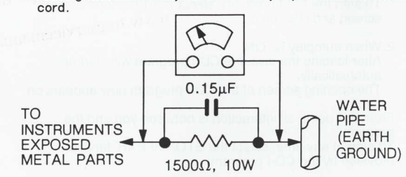
### Fire and Shock Hazard (Continued)

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

* Broken line: ▬ · ▬ · ▬ · ▬ · ▬

### Leakage Current Cold Check

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




### Leakage Current Hot Check

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

### Parts Replacement

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

**LASER NOTE:**

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

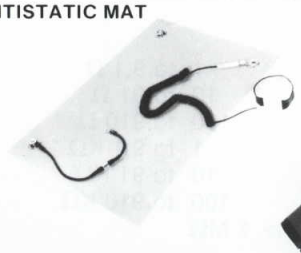


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## TOOLS TO BE USED


ANTISTATIC MAT


MAGNIFYING GLASS



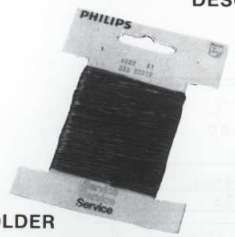

METAL BRUSH


HAIR DRYER

4822 390 50025
FLUX



BRUSH



SOLDER
ø0,5-0,8 MM

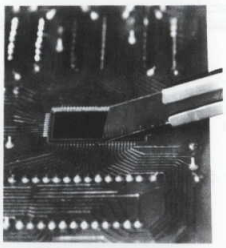
4822 321 40042
DESOLDER BRAID

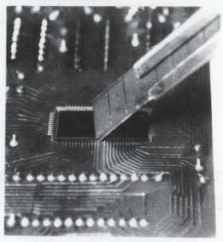

SOLDERING IRON
WELLER TCP 50


SOLDER TIP
WELLER PT-CC7
4822 310 50081

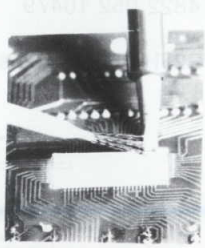

KNIFE

## DISMOUNTING

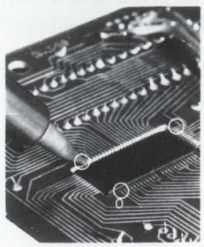

CUTTING
THE LEADS

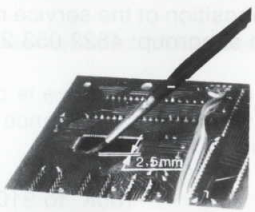

WRONG
TRACKS WILL
BE DAMAGED




CLEANING
THE TRACKS

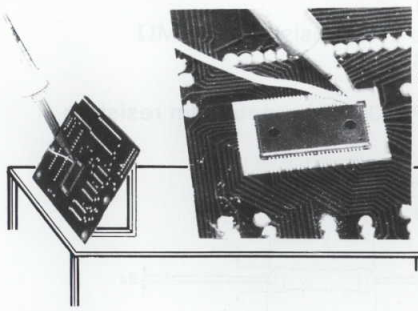
## MOUNTING



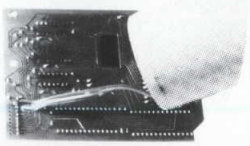


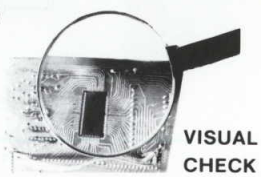
APPLYING FLUX

FIXING IC
AT THE CORNERS

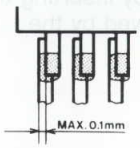

SOLDERING:
SPEED
1 CM IN 5 SEC.

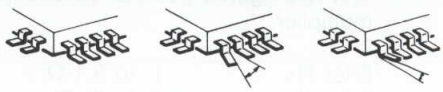
DRYING




VISUAL
CHECK

## ALIGNING THE LEADS





RIGHT WRONG WRONG

## SOLDERING


RIGHT WRONG WRONG

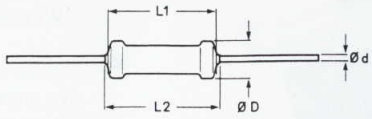
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## 3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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

### VR25, VR37 high-ohmic/high -voltage resistors




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

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

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

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

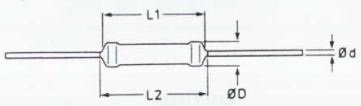
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

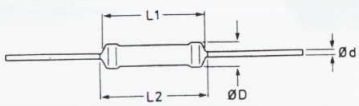
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

### PR01, PR02 and PR03 power metal film resistors

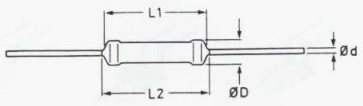
| $\phi D_{max}$ | L1 | $L2_{max}$ | $\phi$d |
|---|---|---|---|
| 2.5 | 6.5 | 8.0 | 0.6 |




| $\phi D_{max}$ | $L1_{max}$ | $L2_{max}$ | $\phi$d |
|---|---|---|---|
| 3.9 | 10 | 11 | 0.8 |




| $\phi D_{max}$ | $L1_{max}$ | $L2_{max}$ | $\phi$d |
|---|---|---|---|
| 5.2 | 16.7 | 17.9 | 0.8 |




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

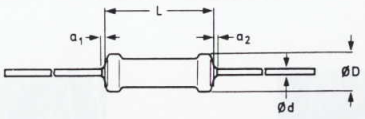
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

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

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

### NFR25 fusible resistors ⚠




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

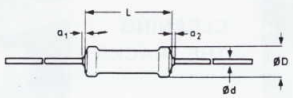
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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

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

### NFR25H fusible resistors ⚠




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

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

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

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

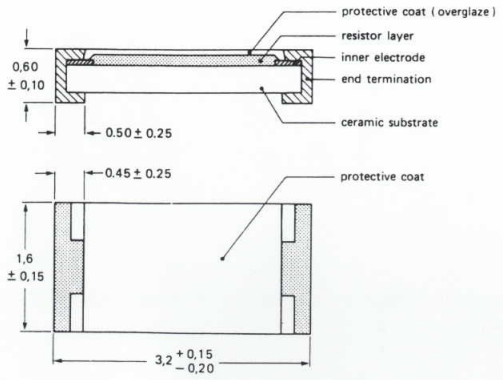
Example:
The service number of a resistor of 47 Ω is: 4822 052 11479

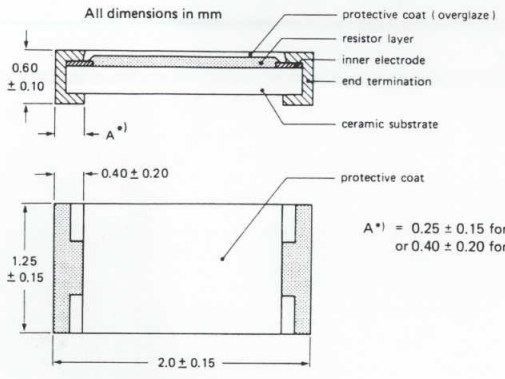


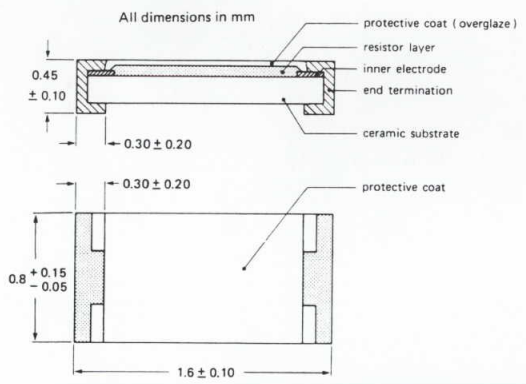
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## RC-01, RC-11 AND RC-21 chip resistors




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

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

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

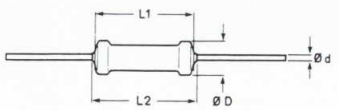
| | | |
|---|---|---|
| 8 for R= | 0 | to 9.1 Ω |
| 9 for R= | 10 | to 91 Ω |
| 1 for R= | 100 | to 910 Ω |
| 2 for R= | 1 | to 9.1 KΩ |
| 3 for R= | 10 | to 91 KΩ |
| 4 for R= | 100 | to 910 KΩ |
| 5 for R= | 1 | to 9.1 MΩ |
| 6 for R= or > | 10 MΩ | |

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

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

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

## MRS16T metal film resistors with low-inductance



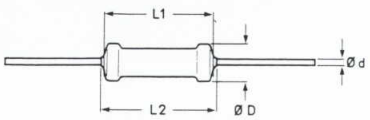

| D | L | L2 max. | d |
|---|---|---|---|
| 1,7 +0,2 −0,1 | 3,5 +0,2 −0,15 | 3,7 | 0,5 −0,04 |

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

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

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

## MRS25 metal film resistors (0,5%)




| D | L1 | L2 max | d |
|---|---|---|---|
| 2,5 | 6,5 | 7,0 | 0,6 ± 0,03 |

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



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

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

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



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## 3.5 CENTRAL REPAIR PROCEDURE OF THE MAINBOARD

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

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

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

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

## 3.6 REPAIR PROCEDURE OF THE MAINBOARD IN YOUR COUNTRY

### 3.6.1 Repair procedure for NORTH AMERICA Customers

- Return defective Main boards to the following address :

**PHILIPS SERVICE COMPANY**
**907 SNAPP FERRY ROAD**
**GREENEVILLE, TN 37743**

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

### 3.6.2 Procedura di Riparazione ITALIA

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

**SERVIZIO CONSUMATORI PHILIPS**
**PIAZZA IV NOVEMBRE 3**
**20124 MILANO**

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

### 3.6.3 Reparatur Prozedur OSTERREICH

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

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

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

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

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

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

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

### 3.6.5 Proceso de Reparación ESPAÑA

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

**EUROSERVICE (SERVICE SPAIN)**
**BRUCH 147 - 149**
**08037 BARCELONA**

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

### 3.6.6 Reparaturabwicklung DEUTSCHLAND

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

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

### 3.6.7 Procédure de réparation FRANCE

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

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

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

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

### 3.6.8 Other countries

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

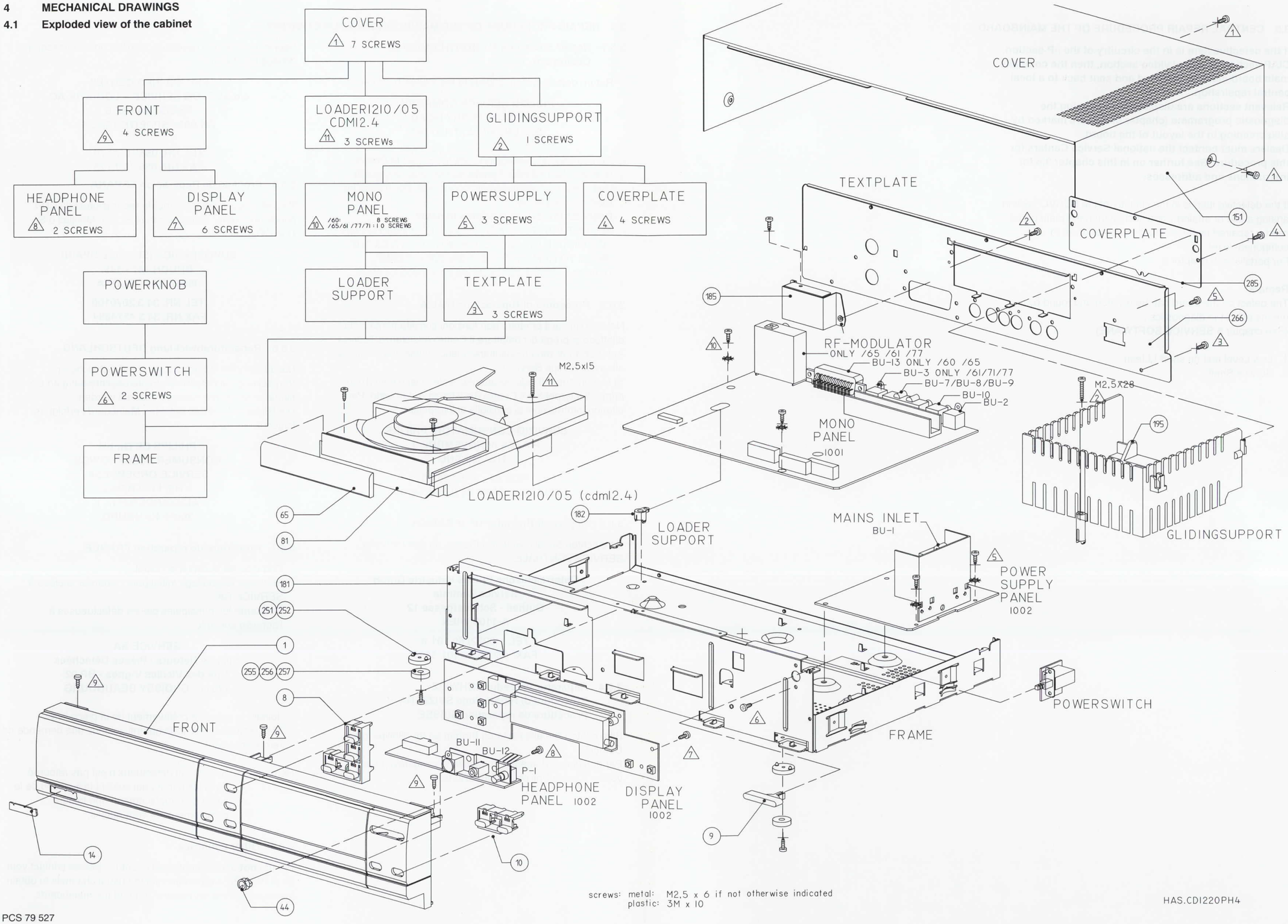


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# 4 MECHANICAL DRAWINGS

## 4.1 Exploded view of the cabinet

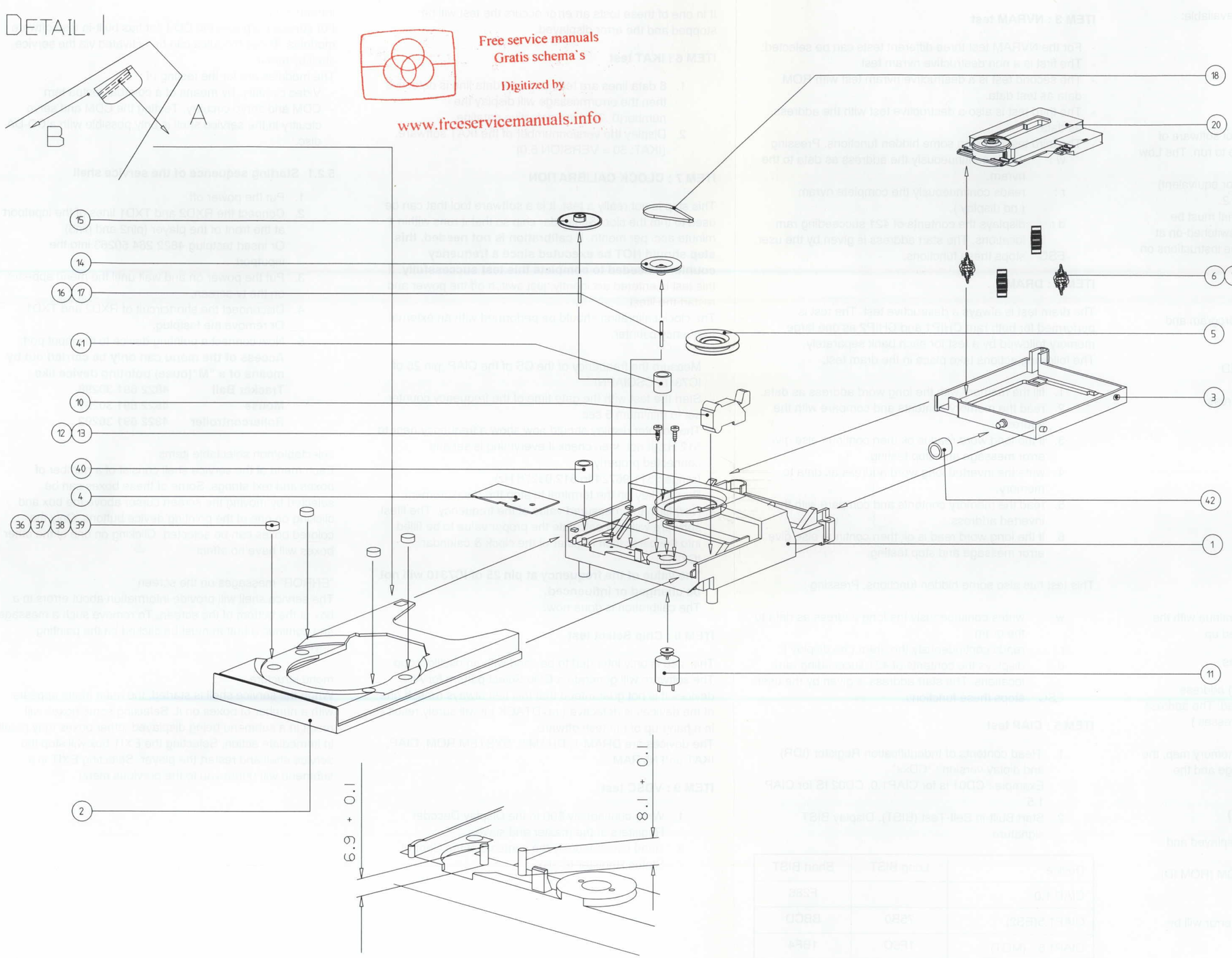



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## 4.2 Exploded view of the loader




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## 5 SERVICE SOFTWARE

In the set there are 2 different testsoftware available:

1. Low Level test
2. Service Shell

### 5.1 THE LOW LEVEL TEST

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

#### 5.1.1 Testsequence

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

| STEP | ACTION/TEST PERFORMED |
|---|---|
| 0 | Exit Low Level test |
| 1 | Writing to a default RAM address |
| 2 | ROM parity check |
| 3 | NVRAM test (8K) |
| 4 | DRAM test |
| 5 | CIAP test |
| 6 | IKAT-CD60-DSIC2 test |
| 7 | Clock Calibration |
| 8 | Chip Select test |
| 9 | VDSC test |

Display LLtest header and release number

**ITEM 0 : Exit Low Level test**

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

**ITEM 1 : Writing to a default RAM address**

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

**ITEM 2: ROM parity check (System ROM)**

For the ROM the following information is displayed and checked:
- Display the identification code for this ROM (ROM ID)
- Display the release number of this ROM
- Display the checksum of this ROM.
  If the checksum is not ok then a specific error will be displayed.

**ITEM 3 : NVRAM test**

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

**ITEM 4 : DRAM**

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

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

This test has also some hidden functions. Pressing :

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

**ITEM 5 : CIAP test**

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

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

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

**ITEM 6 : IKAT test**

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

**ITEM 7 : CLOCK CALIBRATION**

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

- Measure the frequency of the CS of the CIAP :pin 25 of IC7310, CSCIAPN!
- Start the test with the gate time of the frequency counter set to minimum 5 sec.
- The counter display should now show a frequency near to 512 Hz. If not, then check if everything is set and connected properly.
  (range : 511,96724 to 512,03276 Hz)
- Press a key on the terminal to stop the measurement.
- Now fill in the measured value of the frequency. The lltest software will now calculate the proper value to be filled into the calibration register of the clock & calendar IC7241.
  **The value of the frequency at pin 25 of IC7310 will not be changed or influenced.**
- The calibration is done now.

**ITEM 8 : Chip Select test**

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

**ITEM 9 : VDSC test**

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

### 5.2 THE SERVICE SHELL

Introduction.
For service purposes the CD-I set has built-in testsoftware modules. These modules can be activated via the service shell by menu.
The modules are for the testing of :
- Video circuitry, by means of a colorbar testpa tern
- CDM and servo circuitry. Testing the CDM and servo cicuitry in the service shell is only possible with a CD-DA disc.

#### 5.2.1 Starting sequence of the service shell

1. Put the power off
2. Connect the RXD2 and TXD1 lines of the inputport at the front of the player (pin2 and pin3).
   Or insert testplug 4822 264 50263 into the inputport.
3. Put the power on and wait until the menu appears on the tv-screen.
4. Disconnect the shortcircuit of RXD2 and TXD1.
   Or remove the testplug.
5. Now connect a pointing device to the input port:
   **Access of the menu can only be carried out by means of a "M"(ouse) pointing device like :**
   **Tracker Ball 4822 691 30298**
   **Mouse 4822 691 30297**
   **Rollercontroller 4822 691 30293**

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

"ERROR" messages on the screen
The service shell will provide information about errors in a box at the bottom of the screen. To remove such a message and continue a button must be clicked on the pointing device.

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



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### 5.2.2 Subject dependent information

Main menu
The main menu contains three item boxes.

1. TEST IMAGE
2. CD DRIVE
3. EXIT

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

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

CD drive test

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

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

MODE 1
In mode 1 the IKAT processor will try to focus. If it manages to do so (a disc must be present!), the message IN FOCUS will appear in the left box. Otherwise, the message NO FOCUS will appear after the processor has tried to focus 3 times. In that case (no focus found) the test will return to mode 0.
Selecting NEXT STEP will bring the player in mode 2.

MODE 2
The turntablemotor is rotating and controlled by the rough HF. The message MOTOR OK will appear. If an error occurs, the message MOTOR ERROR APEARS and the test will return to mode 0.
Selecting NEXT STEP in mode 2 will bring the player in mode 3.

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

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

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



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## 6 ELECTRICAL DRAWINGS

### 6.1 BLOCKDIAGRAM with FUNCTIONAL SURVEY

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

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

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

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

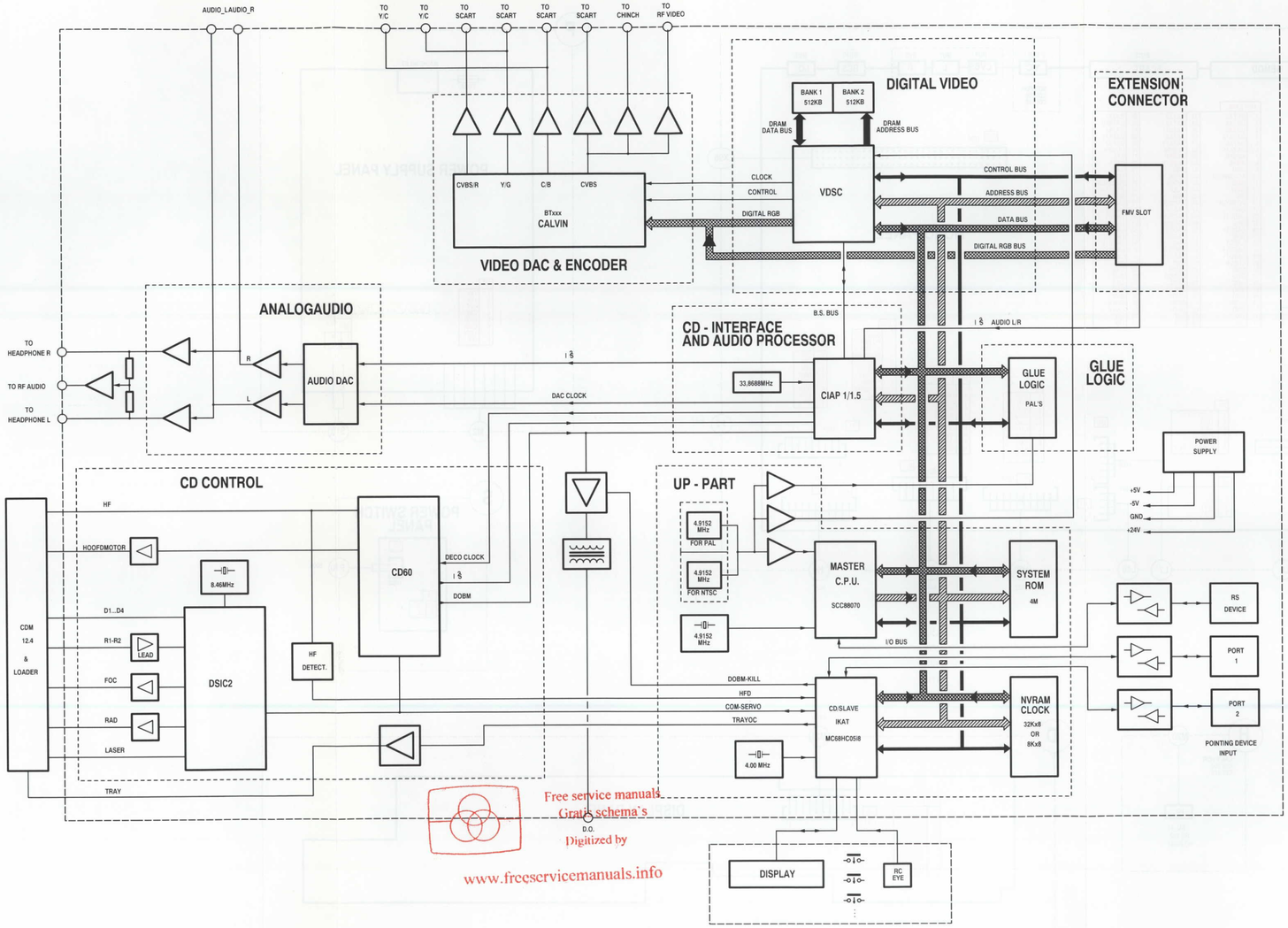
**Chip Select and DTACKN generating glue logic**
- PAL 16L8-10
- PAL 16R4-10

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

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

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

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




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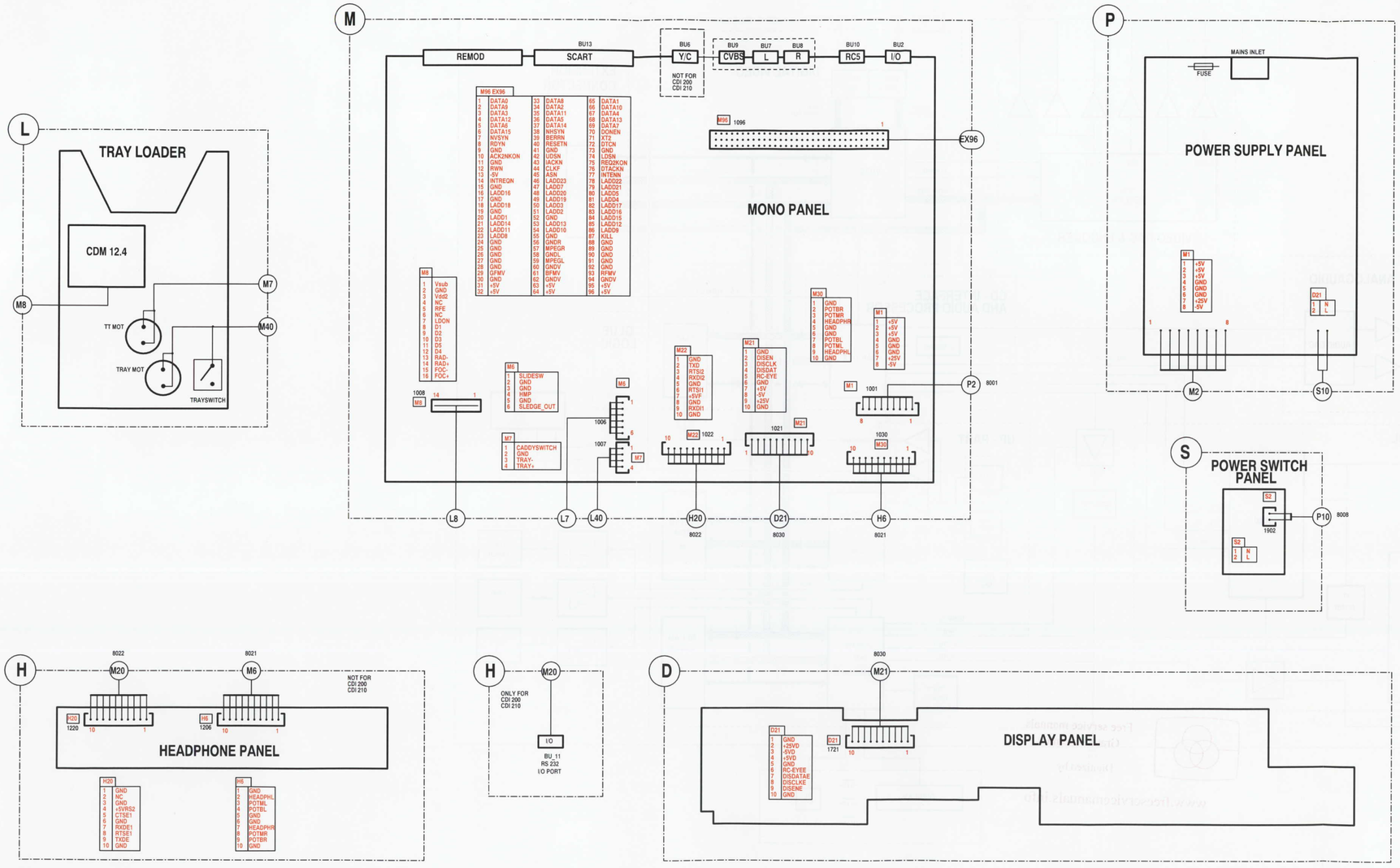


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## 6.2 WIRING DIAGRAM






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### 6.3 Alphabetical list of abbreviations

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

A,B,C + : >>control signals for brushless DC-motor
A,B,C, - : >>
ACK2N : DMA REQUEST ACKNOWLEDGE (active low)(of channel 2)
ACM : output AC-motor
ACK2NKON : DMA REQUEST ACKNOWLEDGE (96-pins connector, channel2 :FMV)
ADEN : (=ADENA)ADDRESS ENABLE NOT. When low,the address ADENA coming from the bus (68070)
ADOCLK : output clock from the ADOC (11.2896 MHz)
AM : ADDITIONAL MUTE
ASN : ADDRESS STROBE (active low, tristate) indicates whwn an address is valid on the bus for the system
ASNP : ADDRESS STROBE from processor (active low)
ASPRAT : Aspect ratio switch signal (16:9 or 4:3)
AUDGND : Audio ground (SCART)
AUDL : >>AUDIO LEFT
AUDIOL : >>
AUDIOLSC : >> (scart)
AUDIOREM : Audio signal to remodulator
AUDR : >>AUDIO RIGHT
AUDIOR : >>
AUDIORSC : >> (scart)
AUDIO_CLK : 16.93MHz clock (33.86MHz:2) from CIAP to CD60 and audio DAC
AVN : AUTOVECTORED INTERRUPTS (active low),can be used by an extension
A0..15 : Local addressbus of the audio DSP-processor
B0..7 : digital video (blue) from VDSC DRAM
B0CD..B3CD : input control bits for off-,catch-,play status and DAC output current for radial motor
B,G,R : output colours of the VSD
BERRN : >>BUS ERROR (active low,open drain)
BFMV : blue color coming from the FMV-extension
BGACKN : Bus Grant Acknowledge (active low)
BGN : Bus Grant (active low) access from the cartridge to the base system via bus-mastership
BGND : Blue color ground (SCART)
BIN : blue color input for the CXA1145 encoder
BLANI : (=BLAN1M) BLANKING OUTPUT (active low,tristate) of the VSC
BRN : Bus Request (active low) access from the cartridge to the basecase system via bus- mastership
BSC : blue color (scart)
BSW : blue color coming from the switch CDI/external (FMV) video
BUGCD60 : CD60 anti - hangup line
BUSYLED : signal to control green busy LED - driver
C : Chrominance singnal (Y/C)
CADDYIN : high when reading data
CADDYSWITCH : control signal for position tray
CAS1N : column address strobe 1 (VDSC)
CAS2N : column address strobe 2 (VDSC)
CBA : 68070 bus tranceiver latch (rising edge)
CBSC : CHROMA for S-VHS (Y/C) or BLUE for SCART
CDICDACKN : (=ACK1N) DMA REQUEST ACKNOWLEDGE (active low)
CDICREQN : (=REQ1N) DMA REQUEST (active low)
CDTV : to change by remote control between TV or CDI (only used by CDI 2XX)
CD60_V2 : CD60 -status information line from CD60 to IKAT
CIAPACKN : DMA channel 1;CIAP acknowledge (active low)
CIAPJUC : CIAP Jump Complete
CIAPREQN : DMA channel 2;CIAP request (active low)
CIAP_INTN : CIAP interrupt request (active low)
CL : serial communication clock to DSIC2 and CD60
CLAB=CLAB2 : bitclock for the SAA 7220 chip
CLABCD : bitclock from the 7310 chip
CLK=2BLCK : CLOCK (11,2896 Mhz)
CLKDAC : CLOCK DAC,the clock used to send serial data to the volume adjustment
CLKF : 2B-clock (11,2896 MHz) for the FMV-extension
CLK1 : the clock on which the DSP operates (7,5264 MHz)
CLK11 : not used (connected to ground)
CLK3A : 11.2896 MHz clock for the SAA7310 decoder
CLOCK_27 : 27 MHz clock :used as system clock by the DSP and the LEMM
CRI : COUNTER RESET INHIBIT (low during a real trackloss or during excention of a jump command
COC : COMMAND COMPLETED signal
COXN : serial output clock for the X-bus
COXNDSP : clock DSP, the clock used to send serial data on the X-bus
CSDMAKILL : generates killme :Dot killer enable signal (active for NTSC) and functions as DMA enable for the FMV extension
CSDSPN : signal used by LEMM to generate the DSP chip select signal (KIP) (active low)
CST : combined chipselect signal for NVRAM/system ROM
CPUASN : the address strobe of the 68070 microprocessor
CPULDSN : the lower data strobe of the 68070 microprocessor
CPUUDSN : the upper data strobe of the 68070 microprocessor
CRI-DODS : counter reset inhibit of the 7310 chip
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSCIAPN : CHIP SELECT CIAP NOT
CSIKATN : chip selekt for IKAT (active low)
CSIKATP : modified chip select for IKAT for testing purposes
CSKILL-MEMM : chip select for kill and DMA circuit.
CSKILL-MEMMS : >> syncronized
CSDAC1N : (=CSDAC2N)(if selected,low)it means that data will be adjusted on that channel
CSNVRAMN : CHIP SELECT NVRAM (active low) information is intended for or coming from the NVRAM
CSROMN : >>
CSROM0N : CHIP SELECT ROM (active low) information is coming from the ROM'S
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : CHIP SELECT (active low) for the 8Kx8 SRAM'S
CSVDSCN : CHIP SELECT for the VDSC (active low)
CSYN : COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)
CTS1..4 : CLEAR TO SEND (active low) it indicates that the remote receiving device is ready
CTS#2 : >>
CTSE1..2 : CLEAR TO SEND input
CTSI1..2 : >>
CVBS : CVBS output
CVBS-OUT : >>
CVBS-GND : CVBS ground (SCART)
CVBS-REM : CVBS input signal for the remodulator
CVBS-SYNC : composite sync input for the SCART connector
D0..D23 : Local data bus of the audio DSP-processor
D8NVR : data bit 8 (least significant bit) signal for the NVRAM
DA : serial communication data to DSIC2 and CD60
DAAB : (DAAB2,DAABCD) serial data output of the X-bus $I^2S$ standard
DATA0..15 : DATA LINES
DATADAC : data which will be send to the DAC('S) for volume adjustment
DDTACKN : DATA TRANSFER ACKNOWLEDGE (active low) from CDIC
DEEMP : DEEMPHASIS
DIG OUT : DIGITAL OUTPUT
DIRN : DIRECTION CONTROL. indicates the direction of data transfer through the transievers
DISCL : DISPLAY CLOCK
DISCLK : (DISCLKE) DISPLAY CLOCK >>
DISDAT : (DISDATAE) DISPLAY DATA >>
DISEN : (DISENE) DISPLAY ENABLE >>
DISSEL : software selection signal (CDI210/220)
DIV4 : DIVIDE BY 4 signal
DMAEN : DMA enable for the FMV extension
DOBM : Digital Out from CD60
DOBM_KILL : DIGITAL OUT KILL signal
DS : Data memory select output of the DSP-processor (active low)
DSPACKN : DMA acknowledge (Channel 1) : 68070 -- LEMM (active low)
DSPREQN : DMA request (Channel 1) : LEMM -- 68070 (active low)
DSP-INTN : interrupt request DSP -- 68070 (active low)
DTACKN : data transfer acknowledge (68070) (active low)
DTCNC : data transfer completed corrected (CDIC)
DTRAM : DTACKN generation signal for NVRAM acces
DTROM : DTACKN generation signal for system ROM acces
DTCN : Data transfer completed (active low; 68070)
DO : DIGITAL OUT
DODS : DROP-OUT DETECTOR SUPPRESSION
DONEN : DONE (active low).open drain),operates in the DMA-mode
DOXN : serial data output of the X-bus
DPSRWN : read (high) or write (low) from or to the DSP
DSN2N : DATA STROBE (active low) of the DSP
DATACK ROM : DATA TRANSFER ACKNOWLEDGE of the ROM
DTACKSLAVEN : DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
DTCN : DATA TRANSFER COMPLETE (active low,open drain) operates in the DMA-mode
DUARTCSN : DUART CHIP SELECT,when low businfo is coming from or going to the DUART
DZF : DATA ZERO FLAG
D1...5 : CDM photo diodes inputs
D8NVR : DATA 8 to NVRAM
EFAB : ERROR FLAG
EFLAG : ERROR FLAG input to CIAP
EFLAGCD60 : ERROR FLAG output from CD60
FILTERN : filter select when high:levelC,when low:level A
FOC- : >>focus out to CDM
FOC+ : >>
FSB : Frame select line output of the LEMM -- DSP :this line is asserted for every WSAB (pin 66 of the LEMM) transition
GFMV : green color coming from from the FMV-extension
GGND : Green color ground (SCART)
GIN : green color input for the CXA1145 encoder
GN : when low:the outputs and inputs of the trancievers are enabled
GNDC : Ground for the color signal (Y/C)



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GNDL : Ground for MPEG audio left (96-pins connector)
GNDR : Ground for MPEG audio right (96-pins connector)
GNDV : Ground for MPEG video (96-pins connector)
GNDY : Ground for the luminance
GSC : green color (SCART)
GSW : green color coming from the switch CDI/external (FMV) video
G0..7 : digital video (green) from VDSC DRAM
HALTN : active low,open drain,biderectional.if low together whit the resetn it couses the 68070 to enter the reset state.
HEADPHL : (HPL)headphone audio left
HEADPHR : (HPR)headphone audio right
HFD : High Frequency Detect signal
HFDDEF : signal that indicates when the last session of a multisession-disc has ended
HFIN : HF current input
HMP : Spindle Motor Plus
HSYN : (active low) horizontal synchronisation input from the VSC
HSYNCOUT : (active low) horizontal synchronisation output for monitor or tv
HVID0..7S : 8bit pixel bus for channel 1 VSD from VSC
IACK2 : Interrupt acknowledge from 68070 (active low) -- AVN line of the 68070 (auto-vector interrupt) -- the 68070 generates this signal (IACK2) when the slave proc. as- serts IN2
IACKN : interrupt acknowledge for the FMV-extension
IACKIN2N : >>
IACKIN4N : >>decoded interrupt acknowledge (active low).
IACKIN5N : >>asserted during an interrupt acknowledge
IACKOUT2N : >>sequence to indicate to a peripheral that
IACKOUT4N : >>this interupt request is being serviced
IACKOUT5N : >>
IACKOUT2 : >>
IACKOUT4 : >>
IACKOUT5 : >>
IACKOUT22 : >>
IACKOUT23 : >>
IACKOUT42 : >>
IACKOUT52 : >>
IDAC : 1/2 bit DAC
IFDN2 : main channel word-flag to the DSP
IN2 : interrupt request from slave proc. --68070 (active low)
IN5 : interrupt request input 5 of the 68070 (not used)
INTENN1 : interrupt enable for the FMV-extension
INTENN : >>when low,no extensions use the interupts,when high interupt devices are daisy chained
INTENN2 : >>
INTENN3 : >>
INTENN4 : >>
INTIKATN : INTERRUPT from IKAT (from IKAT to UP)
INTREQN : interrupt request from the FMV-extension
IN2IN : (=IN2OUT)>>
IN4IN : (=IN4OUT)>> decoder interrupt priority inputs
IN5IN : (=IN5OUT)>> (active low) IN2IN has the lower
IN2OUT : >>and IN5IN has the higher priority
IN4OUT : >>IN2IN = SLAVEPROCESSOR (6805),IN4IN =
IN5OUT : >>CDIC (IMS66490),IN5IN = DUART
IN4OUT2 : >>
IN5OUT2 : >>
IN2OUT3 : >>
IRQA : interrupt request from LEMM -- DSP (active low) and mode A pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
IRQABN : logical AND of the IRQA and the IRQB line (lemm output pin -- DSP)
IRQB : interrupt request from LEMM -- DSP (active low) and mode B pin of the DSP (after the DSP reset, the DSP read the level on this pin to define the mode of operation)
IRQIN : interrupt request for IKAT (not used)
ISELIN : pin of CIAP (always pulled up)
JUC : jump completed signal from servo proc. --LEMM
KILL : to mute audio outputs by power on and off
KILLME : (KILL-ME)dot killer enable signal (active for NTSC)
KIP : host enable input pin of the DSP-processor :this signal enables a transfer on the DSP host bus DATA0..7 (active low)
LA1 : >>control signals for brushless DC-motor
LB1 : >>
LC1 : >>
LADD1..23 : ADDRESS-BUS (active high,tristate)for direct addressing of 16 Mbyte of memory
LBOT : for HPL volume control
LDON : switches laser on (5V) & off (0V) (LASER DRIVE ON)
LDSN : LOWER DATA STROBE of the bus
LIDSWITCH : Lid detection switch
LM : LASER MONITOR diode input
LO : laser amplifier current OUTPUT
LRDN : when low select,the ROM'S or NVRAM read the lower data byte
LS : switches between DOUBLE (0V) & SINGLE (5V) SPEED
LTAP : >>for HPL volume control
LTOP : >>
LVID0IN..7IN : >>8 bit pixel-bus for channel 2 (VSC-SLAVE)
LVID0OUT..7OUT : >>
LWN : read/write enable (for the lower part of the data: MD0..7) for the DRAM (VDSC)
LWRSN : R/W lower memory data to DRAM from VSC slave
LWRMN : R/W lower memory data to DRAM from VSC master
MA0..8 : VDSC DRAM address bus
MC : MOTOR CONTROL signal
MD0..15 : VDSC DRAM data bus
MISO : MASTER IN SLAVE OUT
MOSI : MASTER OUT SLAVE IN
MPEGL : left audio signal color coming from the FMV-extension goes the adder CDI/FMV audio
MPEGR : right audio signal color coming from the FMV-extension goes the adder CDI/FMV AUDIO
MSM : master slave selection input
MSMA0..8 : ADDRESS-BUS between the DRAM'S of the VSC'MASTER and the VSC MASTER
MSMD0..15 : DATA-BUS between the DRAM'S of the VSC'MASTER and the VSC MASTER
NCSYNV : composite sync for the VDSC
NHSYN : active low horizontal sync input for the FMV-extension
NPORE : Power on Reset for CD60 (active low)
NRESET : when low the video synthesizer is in reset
NVDS : digital output to control an external switch for TV overlays (active low)
NVDSI : >>synchronized with NXT2
NVDSN : Digital video switch - line (active low)
NVSYN : (active low) vertical sync input for the FMV-extesion
OTD : Off Track Detection from DSIC2
PCLK1IN : PIXEL CLOCK for channel 1
PCLK2IN : PIXEL CLOCK for channel 2
PLAYSEL : SELECTION of PLAYER type
PLOIN1 : input clock for CDIC (22,5792 MHz)
PLOIN2 : input clock for CDIC (19,3536 MHz)
PLOIN : clock signals for emulator panel
PLOINE : >>
POTBL : headphone left volume control
POTBR : headphone right volume control
POTML : headphone left volume control
POTMR : headphone right volume control
PRTS11 : request to send from main processor
QCL : Q-channel CLOCK
QDA : Q-channel DATA
QRA : Q-channel REQUEST INPUT/ACKNOWLEDGE OUTPUT
Q22 : output to PLL (22,5792 MHz) devided by 14
Q21 : output to PLL (19,3536 MHz) devided by 12
Q_DATA : $I^2S$ data from LEMM -- audio DAC
Q_CLK : $I^2S$ bit clock from LEMM -- audio DAC
Q_WCLK : $I^2S$ word clock from LEMM -- audio DAC
RAB : hand shake protocol signal for CD60
RAD+ : >>RADIAL OUT to CDM
RAD- : >>
RASN : row address valid (active low) for the VDSC DRAM'S
RBOT : for HPR volume control
RC5 : wired RC input (cinch)
RC-EYEDIS : RC-EYE DISABLE signal (not used)
RCEYE : (RCEYEE)REMOTE CONTROL EYE
RCLED : REMOTE CONTROL LED
RD : READ signal DSP : this signal is asserted to read external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
RDN : READY signal, starting up procedure finished
RDYN : READY (active low) of the DMA channel
REDIG : RADIAL ERROR DIGITAL
REFHCA : reference voltage pin of CD60
REFLCA : reference voltage pin of CD60
REM : power supply remodulator
RESETCD : when low resetsequence starts
RESETINN : when low VSC is in reset
RESETN : this is the rest for all other ic's on MMC
RESETSYS : system reset (controlled by the slave-processor)
REQ2N : DMA-request of channel 2
REQ2NKON : DMA-request (96-pins connector, channel 2 : FMV
REQ2KON : DMA-request of channel 2 via DMA 2 on/off circuit
RFE : high-frequent signal coming from CDM (disc)
RFMV : red color coming from the FMV-extension
RGBS_GND : incoming video SCART (not used) ground
RGND : red color ground (SCART)
RIN : red color input for the CXA1145 encoder
RSC : red color (scart)
RSTOUT : RESET OUT of the slave processor when high resetsequence starts
RSW : red color coming from the switch CDI/external (FMV) video
RTAP : >>for HPR volume control
RTOP : >>
RTS12 : REQUEST TO SEND 2 from IKAT
RTSE1..2 : REQUEST TO SEND
RTSI1..2 : REQUEST TO SEND
RTSUART : REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RST1..4 : >>REQUEST TO SEND (active low)
RST#1..2 : >>
RWN : READ - WRITE (low is write) signal

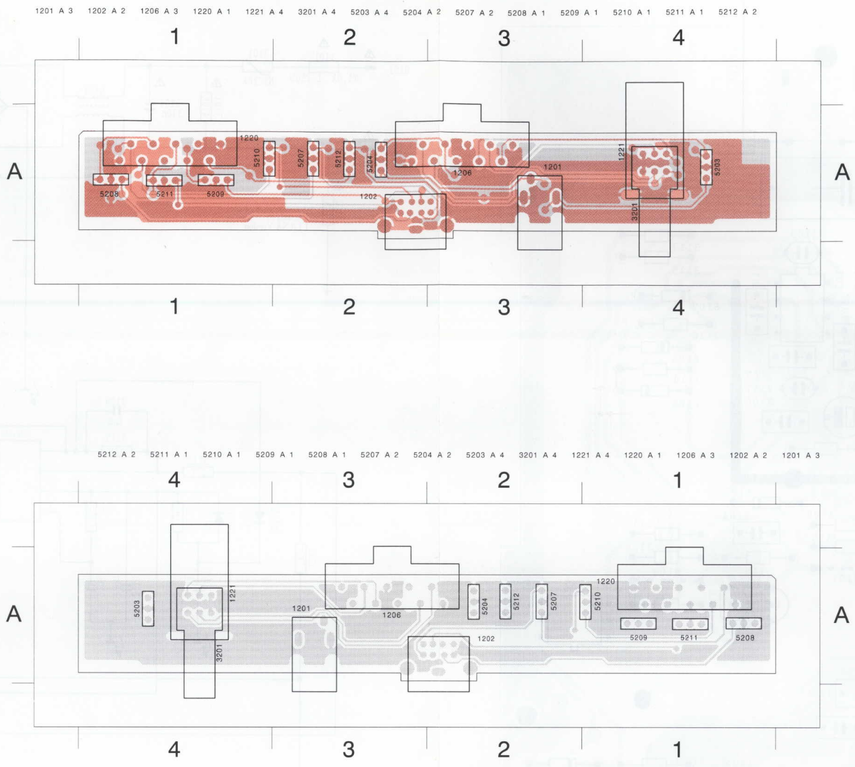


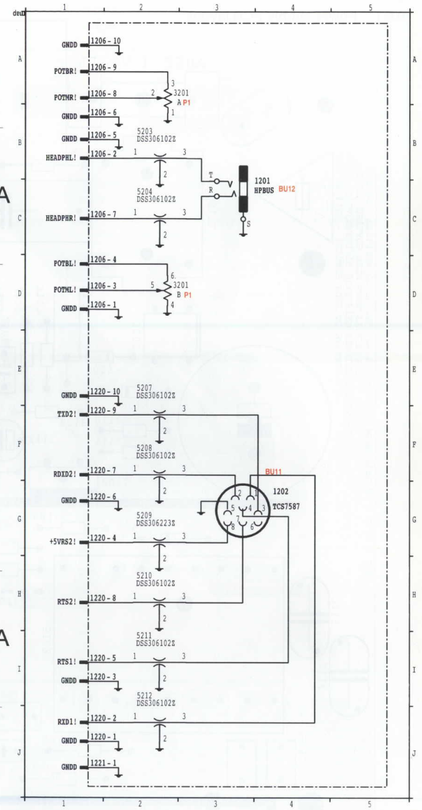
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| | | |
|---|---|---|
| RWN2 | : | READ - WRITE (low is write) signal from CDIC to the DSP |
| RWRAM | : | READ - WRITE signal from the CDIC to the S RAM'S |
| RXDE1..2 | : | RECIEVE DATA |
| RXDI1..2 | : | RECIEVE DATA |
| R0..7 | : | digital video (red) from VDSC DRAM |
| RXD1..4 | : | >>RECIEVE DATA RXD is data input |
| XD#1..2 | : | >> |
| SCAB | : | subcode data clock (2,8224 MHz) from the 7310 |
| SCK | : | serial clock output from the LEMM -- DSP :the data and frame select for the DSP is clocked out on the rising edge of this clock |
| SCL | : | $I^2C$ clock to HOBBES |
| SCLK | : | $I^2S$ clock out from CD60 |
| SDA | : | $I^2C$ data to HOBBES |
| SDAB | : | subcode data from the 7310 |
| SDATA | : | signal from CD60 data |
| SDAT | : | $I^2S$ data out from CD60 |
| SERVORESETN | : | Reset for DSIC2 from IKAT |
| SI | : | on - off control for laser supply and focus circuit |
| SI-RD | : | on - off control for laser supply and focus circuit/ready signal,starting up procedure finished |
| SILD | : | Serial communication Load to DSIC2 |
| SLEDGE | : | sledge motor control |
| SLEDGE_OUT | : | power signal for activating the sledge motor |
| SLEEPAUDN | : | Audio kill line (active low) |
| SLEEPVID | : | Video kill line (active low) |
| SLIDESW | : | SLIDE SWITCH ;detection of sledge - endposition |
| SLMA0..8 | : | VSC-slave memory address bus to the DRAM'S |
| SLMD0..15 | : | VSC-slave memory data bus to the DRAM'S |
| SOCKGND | : | socket ground (SCART) |
| SOXENN | : | SERIAL OUTPUT ENABLE FOR THE X-BUS (enabled when low) |
| SOXRQN | : | SERIAL OUTPUT REQUEST FOR THE X-BUS (when low) |
| SOYENN2 | : | SERIAL OUTPUT ENABLE FOR THE Y-BUS (when low) |
| SPICLK | : | SERIAL PERIPHERAL INTERFACE CLOCK |
| SPISS | : | (SPISSN) SERIAL PERIPHERAL INTERFACE SLAVE SELECT |
| SRD | : | serial data from LEMM -- DSP |
| SRTS1 | : | request to send 1 from IKAT |
| STAND | : | NTSC or PAL selection signal |
| STANDARDOUT | : | software choise between PAL and NTSC |
| STANDARDSW | : | handware choise between PAL and NTSC |
| STANDEM | : | status from emulator,input for DUART |
| STANDEMEN | : | enable signal for switch signal on emulator |
| STANDIN | : | NTSC or PAL selection signal (input for slave) |
| STATUS | : | RF/external video selection signal |
| STATUSF | : | CVBS/RGB video selection signal |
| STD | : | serial data from DSP -- LEMM |
| SSCLKIN | : | pin of CIAP (always pulled up) |
| SSM | : | START STOP MOTOR |
| SWAB | : | SUBCODING WORD CLOCK INPUT |
| SWAB-SSM | : | subcoding word clock output and start/stop input of the 7310 |
| SWCLK | : | $I^2S$ Word Select Clock out from CD60 |
| SWEM | : | software dat to switch on the emulator |
| SYSCLK | : | >>SYSTEM CLOCK |
| SYSCLKA | : | >> |
| SYSCLK1 | : | >> |
| SYSCLK2 | : | >> |
| SYSCLK3 | : | 33.86MHz system clock to CIAP |
| TCAP | : | input capture feature for the on-chip timer |
| TCMP | : | output for the output compare feature of the on chip timer |
| TCK | : | scan clock boundary |
| TDI | : | boundary scan input |
| TDOCIAP | : | boundary scan output of CIAP |
| TDOVDSC | : | boundary scan output of VDSC |
| TL | : | TRACK LOSS of the TDA8808 combined with the radial error signal of the TDA8809 |
| TMOUT | : | TRAY MOTOR OUT |
| TMS | : | boundary scan control line |
| TRAY | : | tray open/close signal |
| TRAYOC | : | TRAY open/close |
| TRAYSWITCH | : | tray open/close detection signal |
| TX2 | : | transmit data from IKAT |
| TXDE1..2 | : | transmit data |
| TXDI1..2 | : | transmit data |
| TXD1..4 | : | >>TRANSMIT DATA TXD is data output |
| TXD#1..2 | : | >> |
| UDSN | : | UPPER DATA STROBE (active when low) |
| URDN | : | READ UPPER DATA BYTE (active when low) |
| UWN | : | read/write enable (for the upper part of the data: MD8..15) fir the DRAM (VDSC) |
| UWRN | : | Upper Write Read Not for NVRAM |
| UWRSN | : | read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE |
| VC | : | output DC-motor (VOLTAGE CONTROL) |
| VDSC-INTN | : | interrupt request of the VDSC |
| V-FLAG | : | output to the DSP |
| VREFA | : | Reference Voltage on audio DAC |
| Vsub | : | substrate voltage |
| VSCM-INTN | : | when low,interrupt from VSC master to 68070 processor |
| VSCS-INTN | : | when low,interrupt from VSC slave to 68070 processor |
| VSYN | : | (active when low) VERTICAL SYNCHRONISATION INPUT from the VSC |
| V1 | : | off track detection from DSIC2 to CD60 |
| WIREDRC | : | see RC5 |
| WR | : | write enable output of the DSP :this signal is asserted to write external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low) |
| WRMN | : | read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER |
| WRN | : | WRITE UPPER DATA BYTE (active when low) |
| WRPN1M..S | : | control input for channel 1 or 2 (active low) of the VSD |
| WSAB | : | >>WORD SELECT from A to B CHIP |
| WSAB2 | : | >> |
| WSABCD | : | 11.2896 MHz bitclock ($I^2S$) |
| XINB | : | delayed clock XIN from CDIC goes back to CDIC |
| XIN | : | >>11,2896/9,6768/4,8384 symmetrical clock |
| XIN2 | : | >> |
| X-TAL2 | : | the same as the system clock,coming out of the VSC'S |
| XT2 | : | (XT2N) the system clock devided by two |
| XT4 | : | >>the system clock devided by four |
| XT41N | : | >> |
| XY | : | this DSP output signal selects which external memory space (X or Y) is selected |
| X_CLK | : | external audio $I^2S$ -clock |
| X_DATA | : | external audio $I^2S$ -data |
| X_WSIN | : | external audio $I^2S$ -word select |
| Y | : | luminance signal (Y/C) |
| Y_GSC | : | Y (luminance) S-VHS (Y/C) or G for SCART |
| 0AD..12AD | : | >>ADDRESS BUS,between CDIC-SRAM'S and SYSTEM ADDRESS BUS BUFFERS |
| 10ADA..12ADA | : | >> |
| 0D..15D | : | DATA BUS between CDIC and DSP |
| 0DA..15DA | : | DATA BUS between CDIC-SRAM'S and SYSTEM DATA BUS TRANCIEVERS |
| 2BCLK | : | CLOCK for the 2 B-chip |
| 12A..15A | : | ADDRESS BUS between CDIC and DSP |

## 6.4 HEADPHONE PANEL




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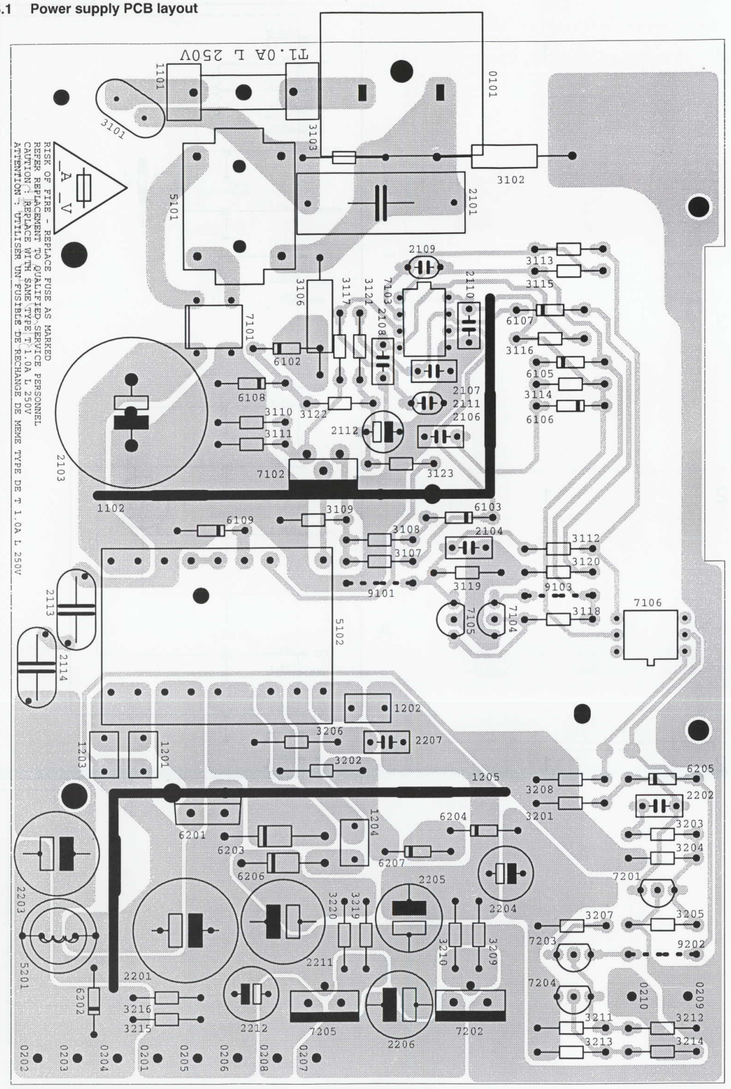
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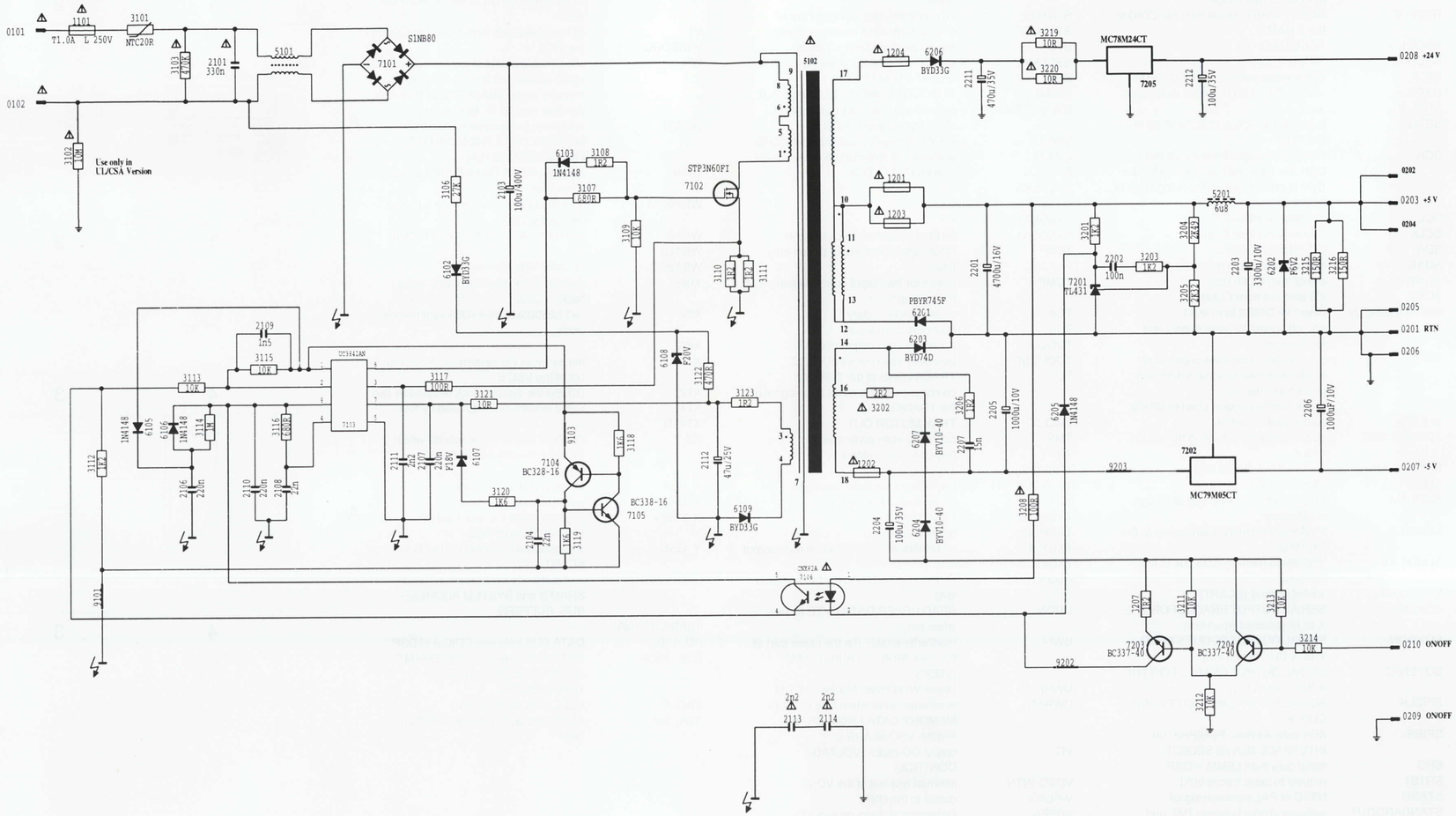
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## 6.5 POWER SUPPLY UNIT

### 6.5.1 Power supply PCB layout




### 6.5.2 Powersupply circuit diagram






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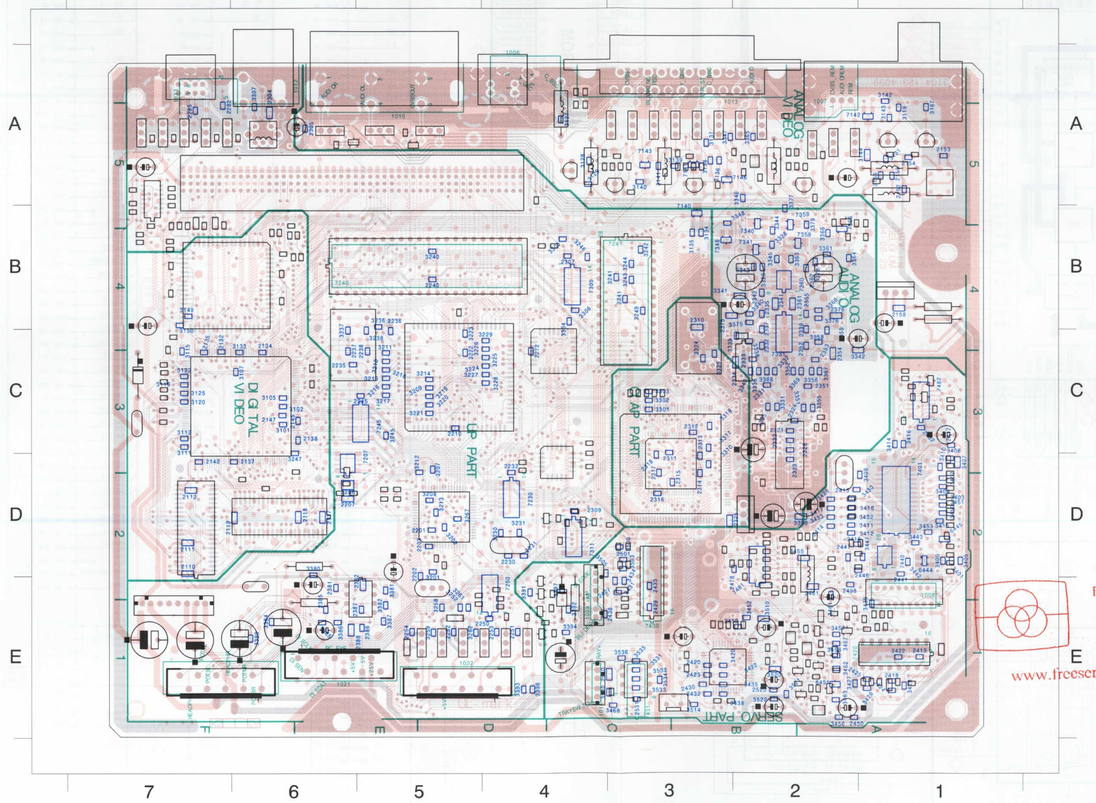
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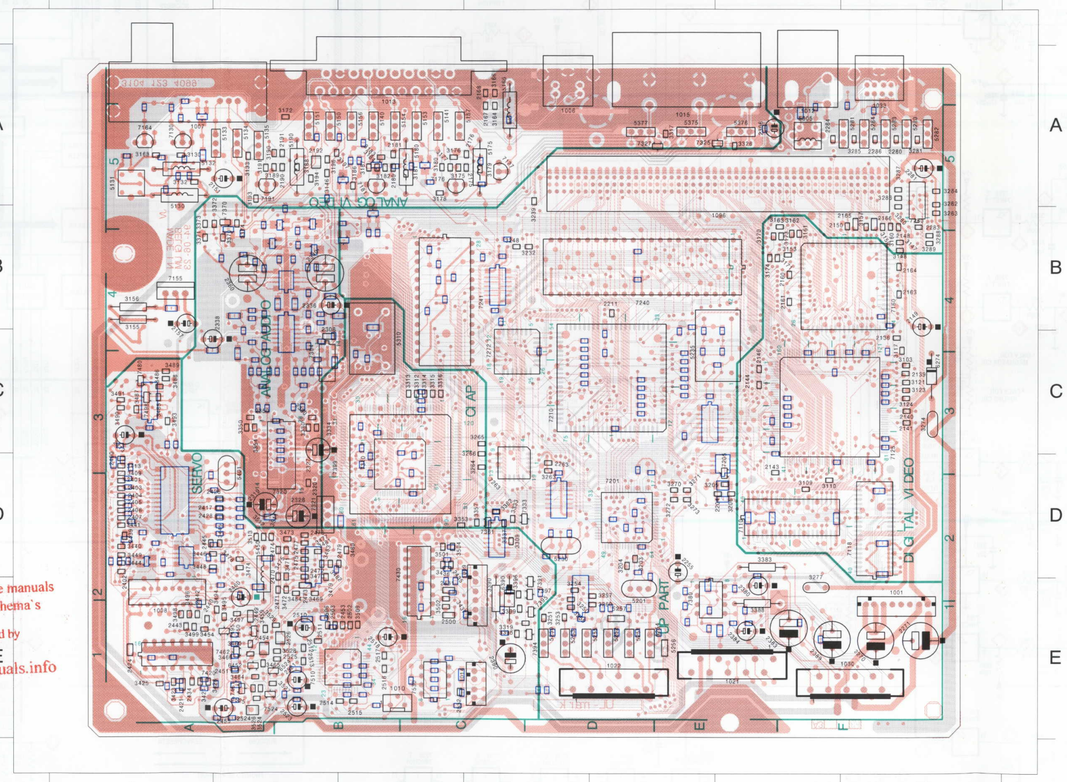
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## 6.6 MAINPANEL

### 6.6.1 Mainpanel PCB layout, Tracks side

### 6.6.2 Mainpanel PCB layout, Component side




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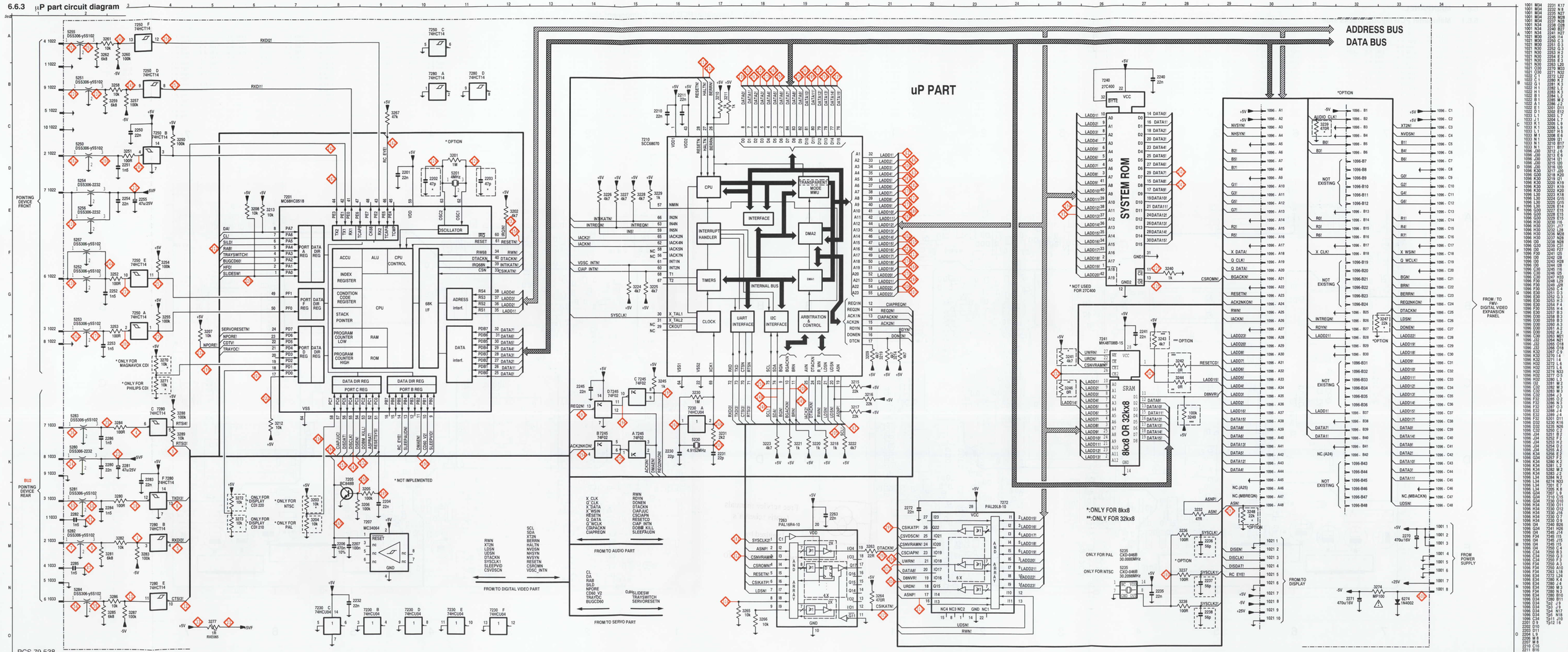


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## 6.6.3 µP part circuit diagram

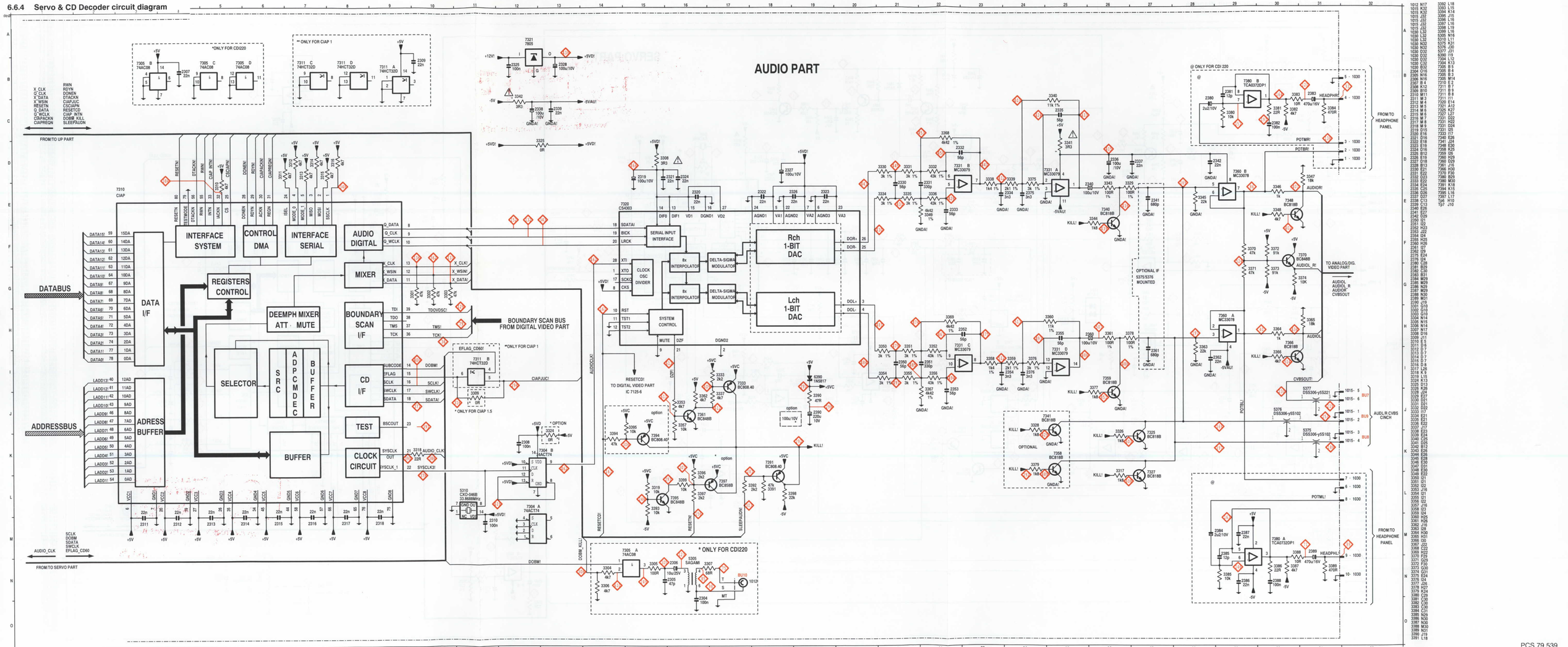



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## 6.6.4 Servo & CD Decoder circuit diagram



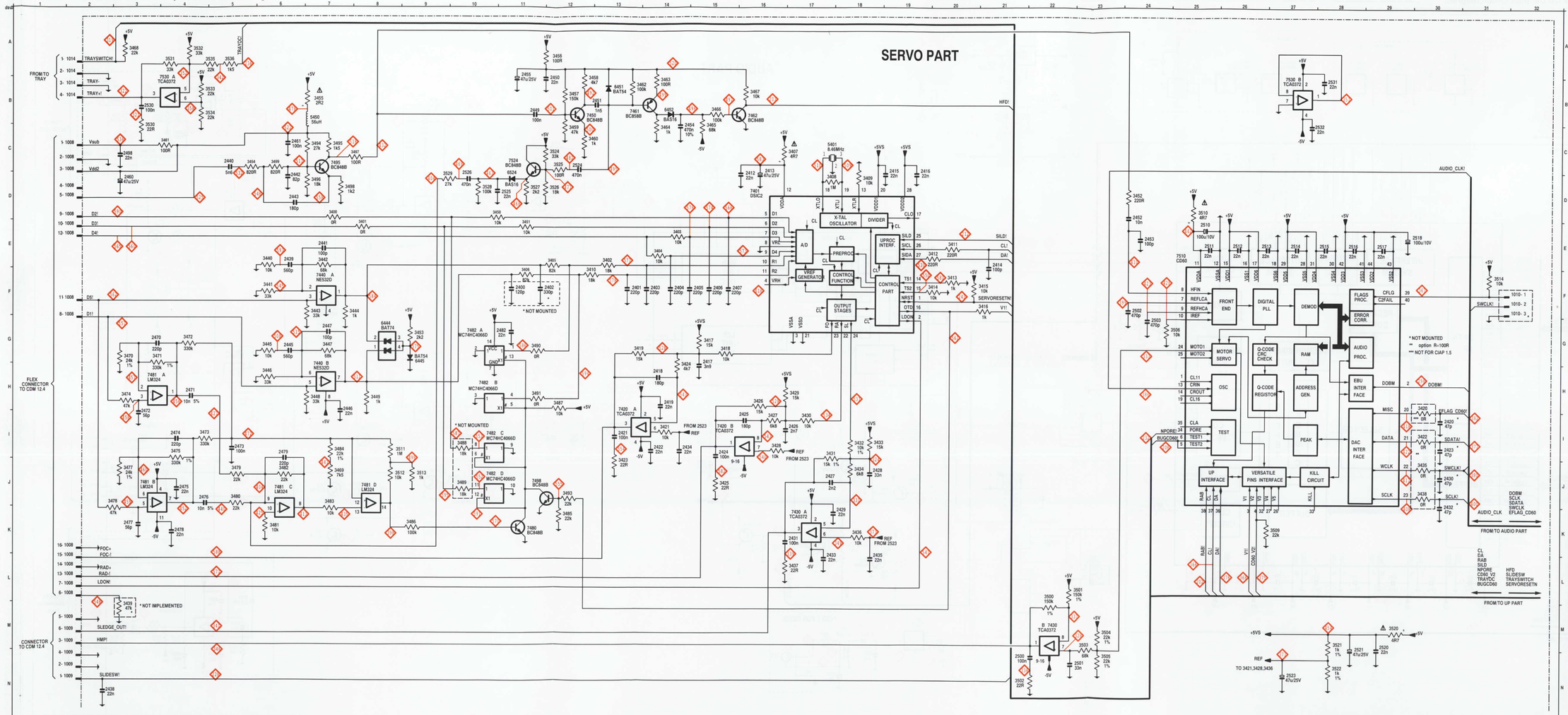



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## 6.6.5 CD interface and Audioprocessor circuit diagram

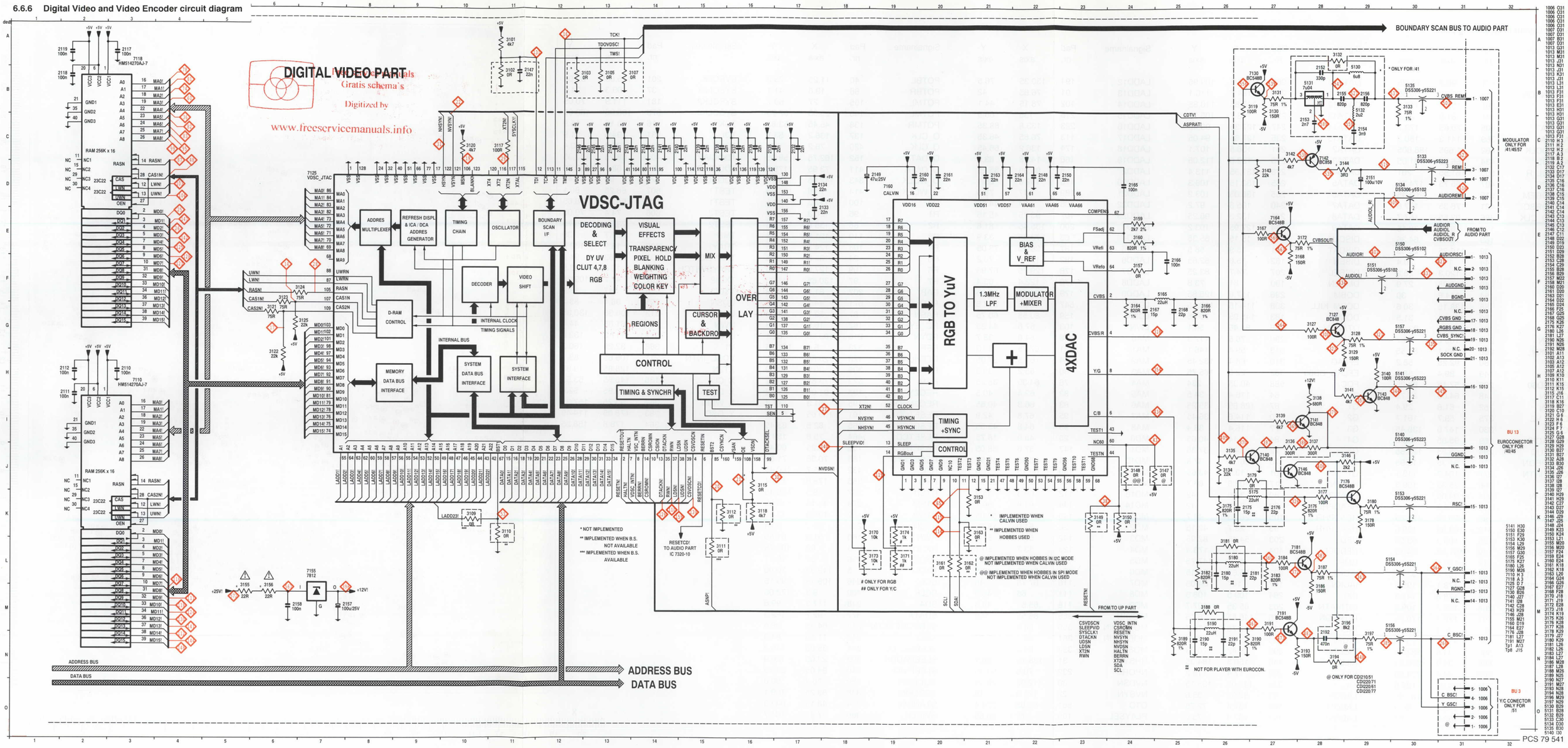



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## 6.6.6 Digital Video and Video Encoder circuit diagram




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### 6.6.7 Layout of Measuring pads

| Signalname | Pad nr. | X-axis | Y-axis |
|---|---|---|---|
| ACK2N | 171 | 96.3 | 65.25 |
| ACK2NKON | 154 | 86.85 | 59.55 |
| ASN | 291 | 157.8 | 117.6 |
| ASNP | 41 | 81.9 | 25.2 |
| ASPRAT | 405 | 70.65 | 173.7 |
| ASPRAT | 369 | 141.3 | 160.2 |
| AUDIOCLK | 462 | 91.695 | 188.805 |
| AUDIOL | 434 | 166.05 | 181.05 |
| AUDIOL_R | 505 | 161.55 | 201 |
| AUDIOR | 407 | 165.75 | 174.75 |
| AUDIOREM | 516 | 173.85 | 204.45 |
| AUDIORSC | 421 | 178.35 | 177.6 |
| AUDIO_CLK | 386 | 92.55 | 167.7 |
| AUDL | 197 | 167.7 | 78.15 |
| AUDR | 169 | 167.1 | 64.35 |
| B0 | 39 | 116.25 | 25.05 |
| B1 | 44 | 114 | 26.4 |
| B2 | 50 | 120.3 | 28.2 |
| B3 | 49 | 116.25 | 27.9 |
| B4 | 54 | 114.6 | 30 |
| B5 | 58 | 138.15 | 30.6 |
| B6 | 59 | 116.85 | 31.5 |
| B7 | 61 | 145.05 | 33.45 |
| BERRN | 210 | 103.2 | 83.7 |
| BGACKN | 208 | 89.1 | 83.55 |
| BGN | 150 | 92.25 | 58.2 |
| BRN | 149 | 89.4 | 58.2 |
| BUGCD60 | 206 | 57.15 | 83.25 |
| CAS1N | 48 | 64.05 | 27.75 |
| CAS2N | 52 | 61.8 | 29.4 |
| CD60_V2 | 375 | 59.7 | 161.7 |
| CDTV | 330 | 147.6 | 138.45 |
| CIAPACKN | 259 | 95.85 | 106.2 |
| CIAPJUC | 294 | 65.25 | 125.85 |
| CIAPREQN | 276 | 94.35 | 112.95 |
| CIAP_INTN | 277 | 104.7 | 113.1 |
| CL | 366 | 25.35 | 159.3 |
| CSCIAPN | 394 | 94.05 | 170.4 |
| CSIKATN | 315 | 72.9 | 131.7 |
| CSIKATP | 295 | 80.25 | 125.85 |
| CSNVRAMN | 312 | 109.35 | 129.6 |
| CSROMN | 135 | 105.3 | 53.55 |
| CSVDSCN | 139 | 101.55 | 54.15 |
| CTSI3 | 12 | 150.9 | 14.1 |
| CVBSOUT | 230 | 167.4 | 92.25 |
| CVBS_REM | 503 | 173.1 | 199.5 |
| CVBS_SYNC | 335 | 178.8 | 141.3 |
| C_BSC | 268 | 179.7 | 109.8 |
| C_BSC | 393 | 178.8 | 170.25 |
| D1 | 557 | 34.8 | 221.25 |
| D2 | 590 | 45.75 | 234.6 |
| D3 | 560 | 34.8 | 223.95 |
| D4 | 565 | 34.8 | 226.65 |
| D5 | 562 | 44.4 | 224.55 |
| D8NVR | 304 | 104.25 | 127.5 |
| DA | 376 | 24.45 | 161.85 |
| DATA0 | 239 | 143.4 | 96.9 |
| DATA1 | 251 | 133.2 | 102 |
| DATA10 | 269 | 135.3 | 109.95 |
| DATA11 | 285 | 134.7 | 116.1 |
| DATA12 | 271 | 143.85 | 110.85 |
| DATA13 | 258 | 143.7 | 105.75 |
| DATA14 | 247 | 127.35 | 99.45 |
| DATA15 | 235 | 127.35 | 94.05 |
| DATA2 | 261 | 136.5 | 107.1 |
| DATA3 | 275 | 132.6 | 112.05 |
| DATA4 | 278 | 137.55 | 113.4 |
| DATA5 | 265 | 132.15 | 108.3 |
| DATA6 | 255 | 136.05 | 103.2 |
| DATA7 | 240 | 135.3 | 97.2 |
| DATA8 | 241 | 132.3 | 98.25 |
| DATA9 | 254 | 127.95 | 103.2 |
| DISCLK | 143 | 15.15 | 55.35 |
| DISDAT | 151 | 15.9 | 58.5 |
| DISEN | 132 | 15.6 | 52.65 |
| DISSEL | 207 | 74.7 | 83.25 |
| DMAEN | 190 | 81 | 73.8 |
| DOBM | 296 | 117.6 | 125.85 |
| DOBM_KILL | 308 | 114.15 | 129.15 |
| DONEN | 183 | 145.95 | 70.95 |
| DTACKN | 126 | 84.45 | 50.1 |
| DTACKP | 290 | 76.5 | 117.3 |
| DZF | 613 | 59.4 | 146.1 |
| EFLAG | 316 | 68.4 | 132.45 |
| EFLAG_CD60 | 382 | 22.8 | 165.75 |
| FOC- | 588 | 40.35 | 234 |
| G0 | 64 | 116.4 | 34.5 |
| G1 | 67 | 128.85 | 35.25 |
| G2 | 70 | 114.6 | 36.45 |
| G3 | 77 | 116.4 | 38.4 |
| G4 | 84 | 114 | 40.65 |
| G5 | 72 | 123.45 | 37.35 |
| G6 | 73 | 126.15 | 37.8 |
| G7 | 101 | 113.7 | 43.65 |
| HALTN | 217 | 108.6 | 86.7 |
| HEADPHL | 89 | 30.6 | 42 |
| HEADPHL | 90 | 33.6 | 42 |
| HEADPHR | 105 | 26.25 | 44.7 |
| HEADPHR | 93 | 23.7 | 42.15 |
| HFD | 203 | 54.45 | 82.95 |
| HFDDEF | 404 | 51 | 173.4 |
| HMP | 346 | 32.1 | 147.75 |
| IACK2 | 227 | 106.65 | 90.15 |
| IACKN | 167 | 147 | 64.05 |
| IN5 | 264 | 109.5 | 108.3 |
| INTIKATN | 263 | 85.35 | 107.7 |
| INTREQN | 176 | 146.85 | 67.5 |
| IREF | 428 | 27.75 | 179.7 |
| IRQIN | 233 | 55.65 | 93.6 |
| ISELIN | 395 | 78.42 | 170.63 |
| KILL | 446 | 150.3 | 184.35 |
| KILL | 292 | 17.4 | 118.2 |
| KILL | 325 | 142.05 | 135.15 |
| LADD1 | 62 | 82.95 | 33.6 |
| LADD10 | 186 | 137.4 | 72.75 |
| LADD11 | 192 | 137.4 | 75.6 |
| LADD12 | 194 | 130.35 | 76.5 |
| LADD13 | 91 | 76.65 | 42 |
| LADD14 | 102 | 78.15 | 44.1 |
| LADD15 | 215 | 135 | 85.5 |
| LADD16 | 223 | 133.8 | 88.35 |
| LADD17 | 113 | 76.65 | 46.35 |
| LADD18 | 174 | 136.2 | 66.45 |
| LADD19 | 166 | 142.8 | 63.6 |
| LADD2 | 66 | 85.35 | 35.25 |
| LADD20 | 170 | 132.9 | 65.1 |
| LADD21 | 189 | 147 | 73.5 |
| LADD22 | 106 | 84 | 44.85 |
| LADD23 | 107 | 93.75 | 45.15 |
| LADD3 | 200 | 135.45 | 81.6 |
| LADD4 | 63 | 73.35 | 33.9 |
| LADD5 | 187 | 128.25 | 73.05 |
| LADD6 | 182 | 127.8 | 70.2 |
| LADD7 | 178 | 129.75 | 67.95 |
| LADD8 | 172 | 122.4 | 65.4 |
| LADD9 | 179 | 132.75 | 68.85 |
| LDON | 547 | 43.95 | 217.8 |
| LDSN | 159 | 80.55 | 60.75 |
| LWN | 103 | 57.6 | 44.25 |
| MA0 | 78 | 54.6 | 38.7 |
| MA1 | 81 | 57.75 | 39.3 |
| MA2 | 74 | 61.5 | 37.95 |
| MA3 | 60 | 55.2 | 33.3 |
| MA4 | 76 | 64.35 | 38.25 |
| MA5 | 82 | 62.4 | 40.5 |
| MA6 | 83 | 66.3 | 40.65 |
| MA7 | 95 | 67.8 | 42.9 |
| MA8 | 99 | 64.8 | 43.35 |
| MD0 | 25 | 48.9 | 18.75 |
| MD1 | 147 | 57.6 | 58.05 |
| MD10 | 124 | 68.25 | 49.95 |
| MD11 | 130 | 66.15 | 51.6 |
| MD12 | 141 | 67.05 | 55.05 |
| MD13 | 112 | 69.3 | 45.9 |
| MD14 | 144 | 64.8 | 56.7 |
| MD15 | 148 | 67.35 | 58.05 |
| MD2 | 26 | 51.9 | 18.75 |
| MD3 | 142 | 57.9 | 55.2 |
| MD4 | 125 | 53.7 | 50.1 |
| MD5 | 128 | 57.45 | 50.85 |
| MD6 | 121 | 61.65 | 49.5 |
| MD7 | 116 | 57.75 | 48 |
| MD8 | 111 | 66 | 45.9 |
| MD9 | 118 | 65.55 | 48.6 |
| MISOIN | 356 | 86.55 | 153 |
| MODE_0IN | 359 | 84.9 | 155.1 |
| MODE_1IN | 361 | 86.4 | 157.35 |
| MOSIIN | 353 | 84.3 | 151.5 |
| NHSYN | 31 | 138.75 | 20.7 |
| NPORE | 232 | 70.5 | 93.45 |
| NVDSN | 30 | 112.95 | 20.55 |
| NVSYN | 22 | 121.5 | 18 |
| OTD | 561 | 82.05 | 224.4 |
| PLAYSEL | 199 | 72 | 80.85 |
| POTBL | 40 | 11.25 | 25.2 |
| POTBR | 86 | 19.8 | 41.1 |
| POTML | 155 | 27 | 59.7 |
| POTML | 145 | 25.05 | 57.75 |
| POTMR | 138 | 45.45 | 53.85 |
| Q_CLK | 137 | 136.2 | 53.7 |
| Q_CLK | 420 | 76.2 | 177 |
| Q_DATA | 152 | 162.75 | 58.95 |
| Q_DATA | 411 | 73.95 | 175.2 |
| Q_WCLK | 343 | 142.95 | 146.1 |
| Q_WCLK | 414 | 78.6 | 175.65 |
| R0 | 100 | 117.3 | 43.5 |
| R1 | 96 | 120.3 | 43.05 |
| R2 | 88 | 138.9 | 41.85 |
| R3 | 110 | 121.8 | 45.45 |
| R4 | 108 | 124.5 | 45.15 |
| R5 | 94 | 135.6 | 42.75 |
| R6 | 109 | 127.2 | 45.15 |
| R7 | 97 | 130.65 | 43.05 |
| RAB | 202 | 61.2 | 82.8 |
| RAD- | 571 | 44.7 | 228.3 |
| RASN | 87 | 59.7 | 41.25 |
| RC_EYE | 162 | 16.5 | 63 |
| RDYN | 216 | 100.95 | 86.1 |
| REF | 373 | 5.4 | 161.25 |
| REFHCA | 423 | 25.65 | 177.75 |
| REFLCA | 399 | 30.3 | 171.9 |
| REM | 523 | 173.85 | 208.2 |
| REQ2N | 193 | 91.05 | 76.2 |
| REQ2NKON | 195 | 81.3 | 77.4 |
| RESETCD | 161 | 109.65 | 61.95 |
| RESETCD | 165 | 82.5 | 63.45 |
| RESETCD | 464 | 75.6 | 189.6 |
| RESETN | 156 | 77.25 | 60.45 |
| RESETSYS | 185 | 70.35 | 71.55 |
| RFE | 432 | 35.7 | 180.45 |
| RSC | 355 | 178.8 | 152.4 |
| RTSI1 | 257 | 48.3 | 105.45 |
| RTSI2 | 279 | 45.15 | 113.85 |
| RTSI3 | 9 | 138.3 | 13.65 |
| RTSI4 | 242 | 55.2 | 98.4 |
| RWN | 160 | 91.5 | 61.65 |
| RXDI1 | 253 | 60 | 102.75 |
| RXDI2 | 256 | 57 | 104.7 |
| RXDI3 | 5 | 149.85 | 10.95 |
| SCL | 246 | 105.15 | 99.15 |
| SCLK | 400 | 9.3 | 172.05 |
| SDA | 248 | 117.3 | 99.6 |
| SDATA | 377 | 92.7 | 162.3 |
| SERVORESETN | 243 | 64.35 | 98.4 |
| SILD | 212 | 11.55 | 84.3 |
| SLEDGE_OUT | 341 | 38.85 | 145.2 |
| SLEEPAUDN | 303 | 22.05 | 126.9 |
| SLEEPVID | 140 | 94.05 | 54.75 |
| SLIDESW | 228 | 70.2 | 90.6 |
| SSCLKIN | 348 | 83.25 | 149.1 |
| STANDIN | 234 | 48.15 | 94.05 |
| SWCLK | 380 | 57.45 | 164.7 |
| SYSCLK | 201 | 115.65 | 82.05 |
| SYSCLK1 | 37 | 99.3 | 24.6 |
| SYSCLK2 | 181 | 111.9 | 70.05 |
| SYSCLK3 | 378 | 106.95 | 163.05 |
| TCK | 16 | 105.15 | 15.9 |
| TDI | 131 | 94.5 | 51.9 |
| TDI | 134 | 96.9 | 53.4 |
| TDOCIAP | 401 | 68.25 | 172.35 |
| TDOCIAP | 389 | 68.1 | 169.65 |
| TDOVDSC | 129 | 99 | 51.45 |
| TEST1 | 607 | 68.25 | 80.1 |
| TEST1 | 605 | 68.85 | 76.65 |
| TEST2 | 606 | 74.4 | 79.05 |
| TEST2 | 604 | 73.35 | 75.75 |
| TMS | 79 | 101.7 | 39 |
| TRAY+ | 322 | 18.9 | 133.5 |
| TRAYOC | 236 | 63 | 94.2 |
| TRAYSWITCH | 319 | 10.8 | 133.5 |
| TXDI2 | 267 | 47.7 | 109.35 |
| TXDI3 | 8 | 147 | 13.2 |
| UDSN | 205 | 98.1 | 83.1 |
| URDN | 313 | 106.35 | 130.35 |
| UWN | 104 | 61.65 | 44.4 |
| UWRN | 317 | 117.3 | 132.9 |
| V1 | 368 | 32.25 | 160.2 |
| VDSC_INTN | 211 | 106.65 | 83.7 |
| XT2N | 27 | 128.85 | 19.65 |
| X_CLK | 136 | 146.55 | 53.55 |
| X_DATA | 133 | 140.85 | 52.8 |
| X_WSIN | 362 | 93.75 | 157.35 |
| Y_GSC | 283 | 178.05 | 114.45 |
| Y_GSC | 364 | 178.8 | 158.25 |





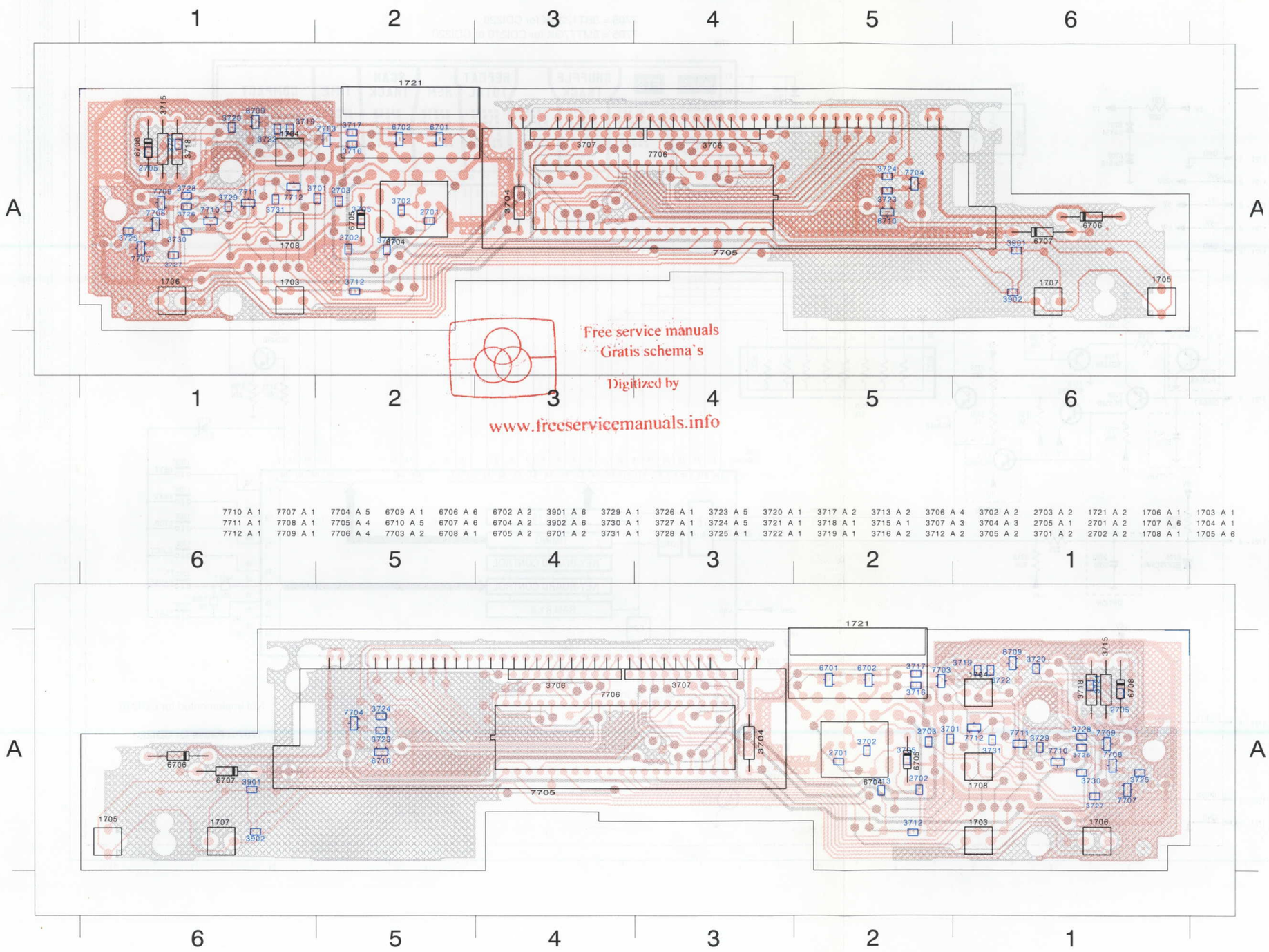

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## 6.7 CONTROL & DISPLAY PANEL

### 6.7.1. Control & Display PCB

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




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



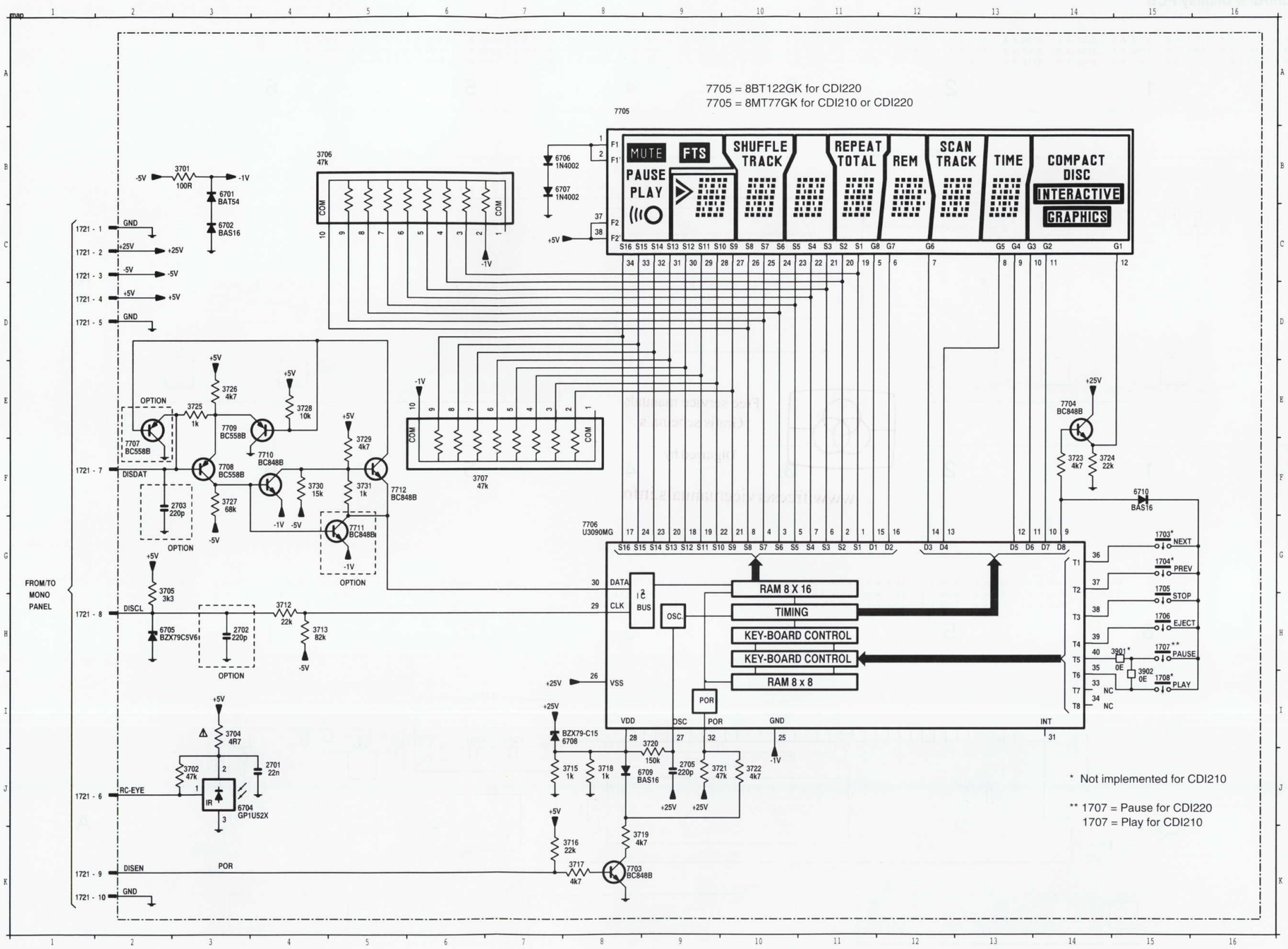

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### 6.7.2. Control & Display circuit diagram






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# 7 DIAGNOSTICS AND SHORT DESCRIPTIONS

## 7.1 SHORT DESCRIPTION OF THE KEYCOMPNENTS

### 7.1.1 CPU SCC68070

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

### 7.1.2 VDSC : Video Decoder and System Controller

**System Interface**

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

**DRAM Interface**

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

**Video Interface**

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

**General**

- CMOS technology
- 160-pin QFP package

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

### 7.1.3 SYSTEMROM 27C400

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

### 7.1.4 IKAT MC68HC05I8

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

### 7.1.5 CIAP : CD-Interface and Audio Processor

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

### 7.1.6 NVRAM + CLOCK

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

### 7.1.7 CALVIN

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

### 7.1.8 PAL's

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



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### 7.1.9 DSIC2 Digital Servo IC

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

### 7.1.10 CD60 CD-decoder

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

## 7.2 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Analog Audio section are similar to any CD player. Thus, the same techniques for troubles hooting a CD player may be used. Added features in servicing the CDI player is the Low Level Test and the Service Shell, see section 5." Service Software". The Low Level Test needs a VT100 terminal(or equivalent) to run and test the functioning of the µP section, CIAP section or digital video section.
The Service Shell provides tests for the Video and Servo and Decoder circuits. Section 5.3 covers all the Service Shell test procedures.
The analog video/audio and servo & CD decoder circuitry can be serviced to the component level, the CD Mechanism (CDM12) is also replaced as an assembly. Disassembly instructions are provided on the exploded views.
**If the defective item is in the circuitry of the µP section, CIAP section or digital video section, then the complete main board must be replaced and sent back to a local central repairshop. See section 3.5 and 3.6.**

**Troubleshooting hints:**

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

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

The mainboard is replaced as a module when parts of the µP section, CIAP section or digital video section are defective. The technician must know the functioning of those sections to diagnose a CDI player. The CDI player contains some built-in diagnostics to aid in troubleshooting. One diagnostic tool is the Service Shell (see section 5.2) and the other is the Low Level Test or LL Test (see section 5.1). The LL Test should be performed if there is access to neither the Player Shell nor the Service Shell. If the Low Level test indicates a fault, replace the complete mainboard. If the test cannot be initiated, check the power sources and main clock signals on the µP section. If all supplies and clock signals are present, replace the mainpanel.

### 7.2.3 Servo & CD Decoder and Audio Section Troubleshooting

A problem in the CD-I player can be isolated to a particular circuit by carefully observing the symptoms. For example, if there is no audio, but a picture from a CD-I disc is displayed, it is obvious that the CD Servo and decoding circuits are functional. Therefore the fault can be isolated to the audio decoding circuits only. Or the symptom may be opposite, the audio circuits may be working, but not the video. Again, the servo circuits must be functioning. Troubleshooting of the video decoding should then be followed.
Also if a disc is inserted and the disc type is recognized it is obvious that the Servo and CD decoder circuit is functioning When there is a symptom indicating a fault in the Servo circuitry, troubleshooting techniques used in CD players can be followed since the CD Unit portion of the CD-I player is basically a CD player (refer to the Servo & CD decoder schematic diagrams). If the CDM does not start, check for Vdd, clock, and reset on the IKAT, DSIC2 and CD60.
If these signals are present, perform the CD drive test in the Service Shell or Low Level test. If there is a communication failure, proceed with the Low Level Test to determine if there is a failure in the system control circuitry. If the communication buses are functional, check the CD servo circuits using the Service Shell CD drive test modes. These modes are the standard CD servo test modes to test the Focus, radial and turntable control functions. If there is a failure in the servo test modes, further checks with measurements should reveal the fault If the servo circuits are functioning, check the decoder circuits. Activity should be seen on the (SDATA, SWCLK and SCLK) and DOBM. If there is no activity, check the supply (Vdd) and input signals (HF, AUDIO_CLK).
When the servo and decoder circuits are functioning properly, there may be a problem in the CD interface & Audio Processor circuitry (CIAP)



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### 7.2.4 Video Section Troubleshooting

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

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

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

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

## 7.3 MEASUREMENTS

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

### 7.3.1 A general check of the main panel

**Test of the DC power supply voltages**

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

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



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### 7.3.2 Test of the clocksignals

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

System clock

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

This system clock must be present at the following points:

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

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

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

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

4.9152 MHz ± 50 ppm

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

4.000 MHz ± 55 ppm

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

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

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

33.8688 MHz ± 50 ppm

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

8.4672 MHz ± 50 ppm

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

16.9344 MHz ± 50 ppm

### 7.3.3 Test of the I2S Interface

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

### 7.3.4 Test of the microcontroller 68070

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

### 7.3.5 Test of the hardware with the Low Level Test

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

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

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



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# 8 PARTSLIST

## 8.1 Partslist of the cabinet

| Item | Codenumber | Description |
|---|---|---|
| 1 | 4822 444 40684 | Front assy |
| 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 | 2511 076 50011 | PL3X6PAN<STZNBK |
| 31 | 2511 076 50011 | PL3X6PAN<STZNBK |
| 63 | | Bracket |
| 65 | 4822 444 40799 | Tray front |
| 70 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 75 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 76 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 77 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 81 | Tray loader | SEE SEPARATE LIST |
| 100 | | Sticker |
| 151 | 4822 444 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 |
| 177 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 178 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 181 | | Frame assy |
| 182 | | Loader support |
| 183 | | Spacer locking |
| 184 | | Spacer locking |
| 185 | | Remod. bracket |
| 186 | 4822 402 61422 | Spacer |
| 187 | 4822 402 61422 | Spacer |
| 188 | 4822 402 61422 | Spacer |
| 190 | | Saddle edging |
| 191 | | ZN 3X6 TORX |
| 192 | | ZN 3X6 TORX |
| 195 | | Gliding support |
| 196 | 2511 077 00031 | ZN M2,5X28 TORX |
| 200 | 2511 077 00031 | ZN M2,5X28 TORX |
| 202 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 203 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 207 | | ZN 3X6 TORX |
| 208 | | ZN 3X6 TORX |
| 209 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 210 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 211 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 212 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 213 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 214 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 217 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 218 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 219 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 220 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 223 | 4822 502 30438 | PL3X6PAN<STZNBK |
| 224 | 4822 502 30438 | PL3X6PAN<STZNBK |
| 225 | | M3X4PAN<STZNBK |
| 226 | | M3X4PAN<STZNBK |

| Item | Codenumber | Description |
|---|---|---|
| 251 | 4822 462 41992 | Foot |
| 252 | 4822 462 41992 | Foot |
| 255 | 4822 462 40409 | Plate for foot |
| 256 | 4822 462 40409 | Plate for foot |
| 259 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 260 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 266 | | Textplate |
| 268 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 269 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 270 | 4822 502 12795 | M2,5X5PAN<STZNBK |
| 275 | 4822 502 11667 | M3X6PAN<STZNBK |
| 276 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 277 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 278 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 279 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 280 | 4822 502 30408 | PL3X10PAN<STZNBK |
| 282 | | Earth plate |
| 285 | | Cover plate assy |
| 286 | 3104 128 91091 | M2,5X6 TRX SLT |
| 287 | 3104 128 91091 | M2,5X6 TRX SLT |
| 301 | 4822 321 10249 | Mainscord /40 |
| 301 | 4822 321 10886 | Mainscord /45 |
| 302 | 4822 321 20308 | Audio cord set |
| 309 | 4822 736 22232 | Dir. for use |
| 315 | 4822 321 61579 | Video cord set |
| 318 | 4822 218 10523 | IR-remote Control |
| 1005 | 4822 214 52229 | Power supply unit |
| BU11 | 4822 321 62714 | MINIDINN assy |



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## 8.2 Parts list of the tray loader

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

## 8.3 Partslist of the display and powersupply panel

| Item | Codenumber | Description | | |
|---|---|---|---|---|
| 1705 | 4822 276 13114 | TACT SWITCH | | |
| 1706 | 4822 276 13114 | TACT SWITCH | | |
| 1707 | 4822 276 13114 | TACT SWITCH | | |
| 1721 | | CONN 10P M RFK1 | | |
| 2701 | 5322 122 32654 | 22n | X7R | PM10 |
| 2705 | 4822 122 33575 | 220P | 50V | |
| 3701 | 4822 122 33575 | 100R | | PM5 |
| 3702 | 4822 051 20473 | 47k | | PM5 |
| 3704 | 4822 052 10478 | 4R7 | | PM5 |
| 3705 | 4822 051 20332 | 3k3 | | PM5 |
| 3706 | 4822 116 90857 | 8x 47k | | PM5 |
| 3707 | 4822 116 90857 | 8x 47k | | PM5 |
| 3712 | 4822 051 20223 | 22k | | PM5 |
| 3713 | 4822 051 20823 | 82k | | PM5 |
| 3715 | 4822 050 21002 | 1k0 | 1/8W | PM5 |
| 3716 | 4822 051 20223 | 22k | | PM5 |
| 3717 | 4822 051 20472 | 4k7 | | PM5 |
| 3718 | 4822 050 21002 | 1k0 | 1/8W | PM5 |
| 3719 | 4822 051 20472 | 4k7 | | PM5 |
| 3720 | 4822 051 20154 | 150k | | PM5 |
| 3721 | 4822 051 20473 | 47k | | PM5 |
| 3722 | 4822 051 20472 | 4k7 | | PM5 |
| 3723 | 4822 051 20472 | 4k7 | | PM5 |
| 3724 | 4822 051 20223 | 22k | | PM5 |
| 3725 | 4822 051 10102 | 1k | | PM5 |
| 3726 | 4822 051 20472 | 4k7 | | PM5 |
| 3727 | 4822 051 20333 | 33k | | PM5 |
| 3728 | 4822 051 20103 | 10k | | PM5 |
| 3729 | 4822 051 20472 | 4k7 | | PM5 |
| 3730 | 4822 051 20153 | 15k | | PM5 |
| 3731 | 4822 051 10102 | 1k | | PM5 |
| 3902 | 4822 051 20008 | 0R05 | | |
| 3999 | | PROCESS CHIP RP | | |
| 6701 | 4822 130 80622 | BAT54 | | |
| 6702 | 5322 130 31928 | BAS16 | | |
| 6704 | 4822 214 52009 | GP1U58XP | | |
| 6705 | 4822 130 34173 | BZX79-C5V6 | | |
| 6706 | 5322 130 30684 | 1N4002GP | | |
| 6707 | 5322 130 30684 | 1N4002GP | | |
| 6708 | 4822 130 34281 | BZX79-C15 | | |
| 6709 | 5322 130 31928 | BAS16 | | |
| 6710 | 5322 130 31928 | BAS16 | | |
| 7703 | 5322 130 41982 | BC848B | | |
| 7704 | 5322 130 41982 | BC848B | | |
| 7705 | 4822 214 52133 | DISPLAY FTD | | |
| 7706 | 4822 209 72226 | U3090MG-40P | | |
| 7708 | 5322 130 41983 | BC858B | | |
| 7709 | 5322 130 41983 | BC858B | | |
| 7710 | 5322 130 41982 | BC848B | | |
| 7712 | 5322 130 41982 | BC848B | | |



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| Item | Codenumber | Description | | |
|---|---|---|---|---|
| 1 | 4822 265 31015 | SOC SUPP | | |
| 1011 | | HEATSINK | | |
| 1112 | 4822 492 70143 | SPRING1 | | |
| 1213 | | HEATSINK | | |
| 1314 | 4822 492 70143 | SPRING1 | | |
| 1101 | 4822 256 30517 | FUSE HOLDER | | |
| 1201 | 4822 252 51179 | PROT DEV 65V 4A | | |
| 1202 | 4822 252 51179 | PROT DEV 65V 4A | | |
| 1203 | 4822 252 51179 | PROT DEV 65V 4A | | |
| 1204 | 4822 252 51179 | PROT DEV 65V 4A | | |
| 2101 | 5322 121 44222 | 330n | 250V | PM20 |
| 2103 | 4822 124 42191 | 100µ | 400V | PM20 |
| 2104 | 4822 121 41856 | 22n | 100V | PM5 |
| 2106 | 4822 121 42408 | 220n | 50V | PM10 |
| 2107 | 4822 121 42408 | 220n | 50V | PM10 |
| 2108 | 4822 121 41856 | 22n | 100V | PM5 |
| 2109 | | 1n5 | 50V | PM10 |
| 2110 | 4822 121 42408 | 220n | 50V | PM10 |
| 2111 | 5322 122 32818 | 2n2 | 63V | P80M20 |
| 2112 | | 47µ | 25V | PM20 |
| 2113 | 4822 122 32576 | 2n2 | 400V | PM20 |
| 2114 | 4822 122 32576 | 2n2 | 400V | PM20 |
| 2201 | 4822 124 23183 | 4700µ | 16V | PM20 |
| 2202 | 5322 121 42386 | 100n | 50V | PM10 |
| 2203 | | 3300µ | 10V | PM20 |
| 2205 | | 1000µ | 10V | PM20 |
| 2206 | | 1000µ | 10V | PM20 |
| 2207 | | 15n | 100V | P50M20 |
| 2211 | 4822 124 41334 | 470µ | 35V | PM20 |
| 2212 | | 100µ | 35V | PM20 |
| 3101 | | 20R | NTC | PM20 |
| 3103 | 4822 053 20474 | 470k | | PM5 |
| 3106 | 4822 053 11273 | 27k | | PM5 |
| 3107 | 4822 116 52228 | 680R | | PM5 |
| 3108 | | 1R2 | | PM5 |
| 3109 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3110 | | 1R2 | | PM5 |
| 3111 | | 1R2 | | PM5 |
| 3112 | 4822 116 52207 | 1k2 | 1/6W | PM5 |
| 3113 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3114 | 4822 116 52235 | 1M0 | 1/6W | PM5 |
| 3115 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3116 | 4822 116 52228 | 680R | 1/6W | PM5 |
| 3117 | 4822 116 52175 | 100R | 1/6W | PM5 |
| 3118 | 4822 116 52246 | 1k6 | 1/6W | PM5 |
| 3119 | 4822 116 52246 | 1k6 | 1/6W | PM5 |
| 3120 | 4822 116 52246 | 1k6 | 1/6W | PM5 |
| 3121 | 4822 116 52176 | 10R | 1/6W | PM5 |
| 3122 | 4822 116 83883 | 470R | | PM5 |
| 3123 | | 1R2 | | PM5 |
| 3201 | | 1k2 | | PM5 |
| 3202 | 4822 052 10228 | 2R2 | | PM5 |
| 3203 | | 1k2 | | PM5 |
| 3204 | | 2k49 | | PM1 |
| 3205 | | 2k32 | | PM1 |
| 3206 | | 1R2 | | PM5 |

| Item | Codenumber | Description | | |
|---|---|---|---|---|
| 3207 | | 1R2 | | PM5 |
| 3208 | 4822 052 10101 | 100R | | PM5 |
| 3211 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3212 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3213 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3214 | 4822 116 52233 | 10k | 1/6W | PM5 |
| 3215 | 4822 116 83868 | 150R | | PM5 |
| 3216 | 4822 116 83868 | 150R | | PM5 |
| 3219 | 4822 052 10229 | 22R | | PM5 |
| 3220 | 4822 052 10229 | 22R | | PM5 |
| 5101 | 4822 157 71268 | FILTER CHOKE | | |
| 5102 | | TRANSFORMER | | |
| 5201 | | 6µ8 PM20 | | |
| 6102 | 4822 130 42489 | BYD33G | | |
| 6103 | 4822 130 30621 | 1N4148 | | |
| 6105 | 4822 130 30621 | 1N4148 | | |
| 6106 | 4822 130 30621 | 1N4148 | | |
| 6107 | 4822 130 31024 | BZX79-F18 | | |
| 6108 | 4822 130 34499 | BZX79-F20 | | |
| 6109 | 4822 130 42489 | BYD33G | | |
| 6201 | 4822 130 83073 | PBYR745F | | |
| 6202 | 4822 130 34167 | BZX79-F6V2 | | |
| 6203 | 4822 130 82035 | BYD74D | | |
| 6204 | 4822 130 32245 | BYV10-40 | | |
| 6205 | 4822 130 30621 | 1N4148 | | |
| 6206 | 4822 130 42489 | BYD33G | | |
| 6207 | 4822 130 32245 | BYV10-40 | | |
| 7101 | 4822 130 83707 | S1NB80 | | |
| 7102 | 4822 130 63689 | STP3N60FI | | |
| 7103 | 4822 209 83909 | UC3842AN | | |
| 7104 | 4822 130 41023 | BC328-16 | | |
| 7105 | 4822 130 40892 | BC338-16 | | |
| 7106 | 4822 130 10025 | CNX82A | | |
| 7201 | 4822 209 81397 | TL431CLPRM | | |
| 7202 | 4822 209 11079 | MC79M05CT | | |
| 7203 | 4822 130 41344 | BC337-40 | | |
| 7204 | 4822 130 41344 | BC337-40 | | |
| 7205 | 5322 209 60027 | MC78M24CT | | |



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## 8.4 Parts list of the mainboard

| Item | Codenumber | Description |
|---|---|---|
| 1001 | 4822 265 41119 | CON V 08P M |
| 1007 | 4822 214 52064 | RF modulator /41 |
| 1007 | 4822 214 52071 | RF modulator /45 |
| 1007 | 4822 214 52046 | RF modulator /57 |
| 1008 | | CON H 16P F |
| 1009 | | CON V 06P M |
| 1012 | | CINCH H 1P |
| 1013 | | CON EURO H 21P |
| 1014 | | CON V 04P M |
| 1015 | | CINCH H 3P F |
| 1021 | | CON V 10P M |
| 1022 | | CON V 10P M |
| 1030 | | CON V 10P M |
| 1033 | 4822 267 51216 | MDIN V FEM 8P |
| 1096 | | CON V 120PM |
| 2110 | 4822 122 33496 | 100n X7R PM10 |
| 2111 | 4822 122 33496 | 100n X7R PM10 |
| 2112 | 4822 122 33496 | 100n X7R PM10 |
| 2117 | 4822 122 33496 | 100n X7R PM10 |
| 2118 | 4822 122 33496 | 100n X7R PM10 |
| 2119 | 4822 122 33496 | 100n X7R PM10 |
| 2132 | 5322 122 32654 | 22n X7R PM10 |
| 2133 | 5322 122 32654 | 22n X7R PM10 |
| 2134 | 5322 122 32654 | 22n X7R PM10 |
| 2135 | 5322 122 32654 | 22n X7R PM10 |
| 2136 | 5322 122 32654 | 22n X7R PM10 |
| 2137 | 5322 122 32654 | 22n X7R PM10 |
| 2138 | 5322 122 32654 | 22n X7R PM10 |
| 2139 | 5322 122 32654 | 22n X7R PM10 |
| 2140 | 5322 122 32654 | 22n X7R PM10 |
| 2141 | 5322 122 32654 | 22n X7R PM10 |
| 2142 | 5322 122 32654 | 22n X7R PM10 |
| 2143 | 5322 122 32654 | 22n X7R PM10 |
| 2144 | 5322 122 32654 | 22n X7R PM10 |
| 2145 | 5322 122 32654 | 22n X7R PM10 |
| 2146 | 5322 122 32654 | 22n X7R PM10 |
| 2148 | 5322 122 32654 | 22n X7R PM10 |
| 2149 | 4822 124 80483 | 47µ 6V3 PM20 |
| 2150 | 5322 122 32654 | 22n X7R PM10 |
| 2157 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2158 | 4822 122 33496 | 100n X7R PM10 |
| 2160 | 5322 122 32654 | 22n X7R PM10 |
| 2161 | 5322 122 32654 | 22n X7R PM10 |
| 2163 | 5322 122 32654 | 22n X7R PM10 |
| 2164 | 5322 122 32654 | 22n X7R PM10 |
| 2166 | 4822 122 33496 | 100n X7R PM10 |
| 2201 | 5322 122 32654 | 22n X7R PM10 |
| 2204 | 5322 122 32654 | 22n X7R PM10 |
| 2206 | 4822 126 12549 | 470n 25V PM10 |
| 2207 | 4822 122 33496 | 100n X7R PM10 |
| 2210 | 5322 122 32654 | 22n X7R PM10 |
| 2211 | 5322 122 32654 | 22n X7R PM10 |
| 2230 | 5322 122 32658 | 22p 50V COL |
| 2231 | 5322 122 32658 | 22p 50V COL |
| 2232 | 5322 122 32654 | 22n X7R PM10 |
| 2235 | 5322 122 32654 | 22n X7R PM10 |
| 2240 | 5322 122 32654 | 22n X7R PM10 |
| 2241 | 5322 122 32654 | 22n X7R PM10 |
| 2245 | 5322 122 32654 | 22n X7R PM10 |
| 2250 | 5322 122 32654 | 22n X7R PM10 |
| 2251 | 5322 122 31865 | 1n5 X7R PM10 |
| 2252 | 5322 122 31865 | 1n5 X7R PM10 |
| 2253 | 5322 122 31865 | 1n5 X7R PM10 |
| 2254 | 5322 122 32654 | 22n X7R PM10 |
| 2255 | 4822 124 40433 | 47µ 25V PM20 COL |
| 2263 | 5322 122 32654 | 22n X7R PM10 |
| 2270 | 4822 124 41989 | 470µ 16V PM20 |
| 2271 | 4822 124 41989 | 470µ 16V PM20 |
| 2272 | 5322 122 32654 | 22n X7R PM10 |
| 2280 | 5322 122 32654 | 22n X7R PM10 |
| 2281 | 4822 124 80483 | 47µ 6V3 PM20 |
| 2282 | 5322 122 31865 | 1n5 X7R PM10 |
| 2283 | 5322 122 32654 | 22n X7R PM10 |
| 2284 | 5322 122 31865 | 1n5 X7R PM10 |
| 2285 | 5322 122 31865 | 1n5 X7R PM10 |
| 2286 | 5322 122 31865 | 1n5 X7R PM10 |
| 2304 | 4822 122 33496 | 100n X7R PM10 |
| 2305 | | 47p 50V COL |
| 2306 | | 10µ 50V PM20 COL |
| 2307 | 5322 122 32654 | 22n X7R PM10 |
| 2308 | 4822 122 33496 | 100n X7R PM10 |
| 2310 | 4822 122 33496 | 100n X7R PM10 |
| 2311 | 5322 122 32654 | 22n X7R PM10 |
| 2312 | 5322 122 32654 | 22n X7R PM10 |
| 2313 | 5322 122 32654 | 22n X7R PM10 |
| 2314 | 5322 122 32654 | 22n X7R PM10 |
| 2315 | 5322 122 32654 | 22n X7R PM10 |
| 2316 | 5322 122 32654 | 22n X7R PM10 |
| 2317 | 5322 122 32654 | 22n X7R PM10 |
| 2318 | 5322 122 32654 | 22n X7R PM10 |
| 2319 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2320 | 5322 122 32654 | 22n X7R PM10 |
| 2321 | 5322 122 32654 | 22n X7R PM10 |
| 2322 | 5322 122 32654 | 22n X7R PM10 |
| 2323 | 5322 122 32654 | 22n X7R PM10 |
| 2324 | 5322 122 32654 | 22n X7R PM10 |
| 2325 | 4822 122 33496 | 100n X7R PM10 |
| 2326 | 5322 122 32654 | 22n X7R PM10 |
| 2327 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2328 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2330 | 5322 122 32661 | 56p 50V COL |
| 2331 | 5322 122 31863 | 330p 50V COL |
| 2332 | 5322 122 32661 | 56p 50V COL |
| 2333 | 5322 122 32661 | 56p 50V COL |
| 2334 | 5322 122 33897 | 3n3 63V PM5 |
| 2335 | 5322 122 32661 | 56p 50V COL |
| 2336 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2337 | 5322 122 32654 | 22n X7R PM10 |
| 2338 | 4822 124 41584 | 100µ 10V PM20 COL |
| 2339 | 5322 122 32654 | 22n X7R PM10 |
| 2340 | 4822 124 22339 | 100µ BIP 16V PM20 |
| 2342 | 5322 122 32654 | 22n X7R PM10 |
| 2350 | 5322 122 32661 | 56p 50V COL |
| 2351 | 5322 122 31863 | 330p 50V COL |
| 2352 | 5322 122 32661 | 56p 50V COL |
| 2353 | 5322 122 32661 | 56p 50V COL |
| 2354 | 5322 122 33897 | 3n3 63V PM5 |
| 2355 | 5322 122 32661 | 56p 50V COL |
| 2360 | 4822 124 22339 | 100µ BIP 16V PM20 |



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

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



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

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



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

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



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| Item | Codenumber | Description | | |
|---|---|---|---|---|
| 3311 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3312 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3313 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3314 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3315 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3316 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3317 | 4822 051 20182 | 1k8 | 0,1W | 5% |
| 3318 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3319 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3324 | 4822 051 20008 | 0R05 | | |
| 3326 | 4822 051 20182 | 1k8 | 0,1W | 5% |
| 3329 | 4822 117 11373 | 100R | | 1% |
| 3330 | 4822 117 11143 | 3k | | 1% |
| 3331 | 4822 117 11143 | 3k | | 1% |
| 3332 | | 43k | | 1% |
| 3333 | 4822 051 20222 | 2k2 | 0,1W | 5% |
| 3334 | 4822 117 11143 | 3k | | 1% |
| 3335 | 4822 117 11143 | 3k | | 1% |
| 3336 | | 43k | | 1% |
| 3337 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3338 | | 1k4 | | 1% |
| 3339 | | 2k1 | | 1% |
| 3340 | | 11k | | 1% |
| 3341 | | 3R3 | 0,1W | 5% |
| 3342 | | 3R3 | 0,1W | 5% |
| 3343 | 4822 117 11373 | 100R | | 1% |
| 3344 | 4822 051 20182 | 1k8 | 0,1W | 5% |
| 3345 | 4822 051 20223 | 22k | 0,1W | 5% |
| 3346 | 4822 051 10102 | 1k | 0,1W | 5% |
| 3347 | 4822 051 20183 | 18k | 0,1W | 5% |
| 3348 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3349 | | 4k42 | | 1% |
| 3350 | 4822 117 11143 | 3k | | 1% |
| 3351 | 4822 117 11143 | 3k | | 1% |
| 3352 | | 43k | | 1% |
| 3353 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3354 | 4822 117 11143 | 3k | | 1% |
| 3355 | 4822 117 11143 | 3k | | 1% |
| 3356 | | 43k | | 1% |
| 3357 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3358 | | 1k4 | | 1% |
| 3359 | | 2k1 | | 1% |
| 3360 | | 11k | | 1% |
| 3361 | 4822 117 11373 | 100R | | 1% |
| 3362 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3363 | 4822 051 20223 | 22k | 0,1W | 5% |
| 3364 | 4822 051 10102 | 1k | 0,1W | 5% |
| 3365 | 4822 051 20183 | 18k | 0,1W | 5% |
| 3366 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3367 | | 4k42 | | 1% |
| 3368 | | 4k42 | | 1% |
| 3369 | | 4k42 | | 1% |
| 3375 | 4822 117 11143 | 3k | | 1% |
| 3376 | 4822 117 11143 | 3k | | 1% |
| 3377 | 4822 051 20182 | 1k8 | 0,1W | 5% |
| 3378 | 4822 117 11373 | 100R | | 1% |
| 3380 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3381 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3382 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3383 | 4822 052 10109 | 10R | 0,1W | 5% |
| 3384 | 4822 051 20471 | 470R | 0,1W | 5% |
| 3385 | 4822 051 20103 | 10k | 0,1W | 5% |

| Item | Codenumber | Description | | |
|---|---|---|---|---|
| 3386 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3387 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3388 | 4822 052 10109 | 10R | 0,1W | 5% |
| 3389 | 4822 051 20471 | 470R | 0,1W | 5% |
| 3390 | 4822 050 14709 | 47R | 0,4W | 1% |
| 3391 | 4822 051 20473 | 47k | 0,1W | 5% |
| 3392 | 4822 051 20222 | 2k2 | 0,1W | 5% |
| 3393 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3394 | 4822 051 20473 | 47k | 0,1W | 5% |
| 3395 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3396 | 4822 051 20222 | 2k2 | 0,1W | 5% |
| 3397 | 4822 051 20222 | 2k2 | 0,1W | 5% |
| 3398 | 4822 051 20223 | 22k | 0,1W | 5% |
| 3399 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3400 | 4822 051 20008 | 0R05 | | |
| 3401 | 4822 051 20008 | 0R05 | | |
| 3402 | 4822 051 20183 | 18k | 0,1W | 5% |
| 3403 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3404 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3405 | 4822 051 20823 | 82k | 0,1W | 5% |
| 3406 | 4822 051 20823 | 82k | 0,1W | 5% |
| 3407 | 4822 117 11152 | 4R7 | 0,1W | 5% |
| 3408 | 4822 051 20105 | 1M | 0,1W | 5% |
| 3409 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3410 | 4822 051 20183 | 18k | 0,1W | 5% |
| 3411 | 4822 051 20221 | 220R | 0,1W | 5% |
| 3412 | 4822 051 20221 | 220R | 0,1W | 5% |
| 3413 | 4822 051 10102 | 1k | 0,1W | 5% |
| 3414 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3415 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3416 | 4822 051 10102 | 1k | 0,1W | 5% |
| 3417 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3418 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3419 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3421 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3422 | 4822 051 20008 | 0R05 | | |
| 3423 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3424 | 4822 051 20472 | 4k7 | 0,1W | 5% |
| 3425 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3426 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3427 | 4822 051 20682 | 6k8 | 0,1W | 5% |
| 3428 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3429 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3430 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3431 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3432 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3433 | 4822 051 20153 | 15k | 0,1W | 5% |
| 3434 | 4822 051 20682 | 6k8 | 0,1W | 5% |
| 3435 | 4822 051 20008 | 0R05 | | |
| 3436 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3437 | 4822 051 20229 | 22R | 0,1W | 5% |
| 3438 | 4822 051 20008 | 0R05 | | |
| 3440 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3441 | 4822 051 20333 | 33k | 0,1W | 5% |
| 3442 | 4822 051 20683 | 68k | 0,1W | 5% |
| 3443 | 4822 051 20333 | 33k | 0,1W | 5% |
| 3444 | 4822 051 10102 | 1k | 0,1W | 5% |
| 3445 | 4822 051 20103 | 10k | 0,1W | 5% |
| 3446 | 4822 051 20333 | 33k | 0,1W | 5% |
| 3447 | 4822 051 20683 | 68k | 0,1W | 5% |
| 3448 | 4822 051 20333 | 33k | 0,1W | 5% |
| 3449 | 4822 051 10102 | 1k | 0,1W | 5% |



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

## 8.5 List of accessories and service tools

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

### Partslist for rollercontroller

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

### Partslist for the touch pad

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



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