Service
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Service Manual

CLASS 1
LASER PRODUCT

DVD+ReWritable

DIGITAL VIDEO

DIGITAL AUDIO

For repair information on the Basic Engine, refer to Service Manual DVD+RW VAD8041, 12NC: 3122 785 14850.

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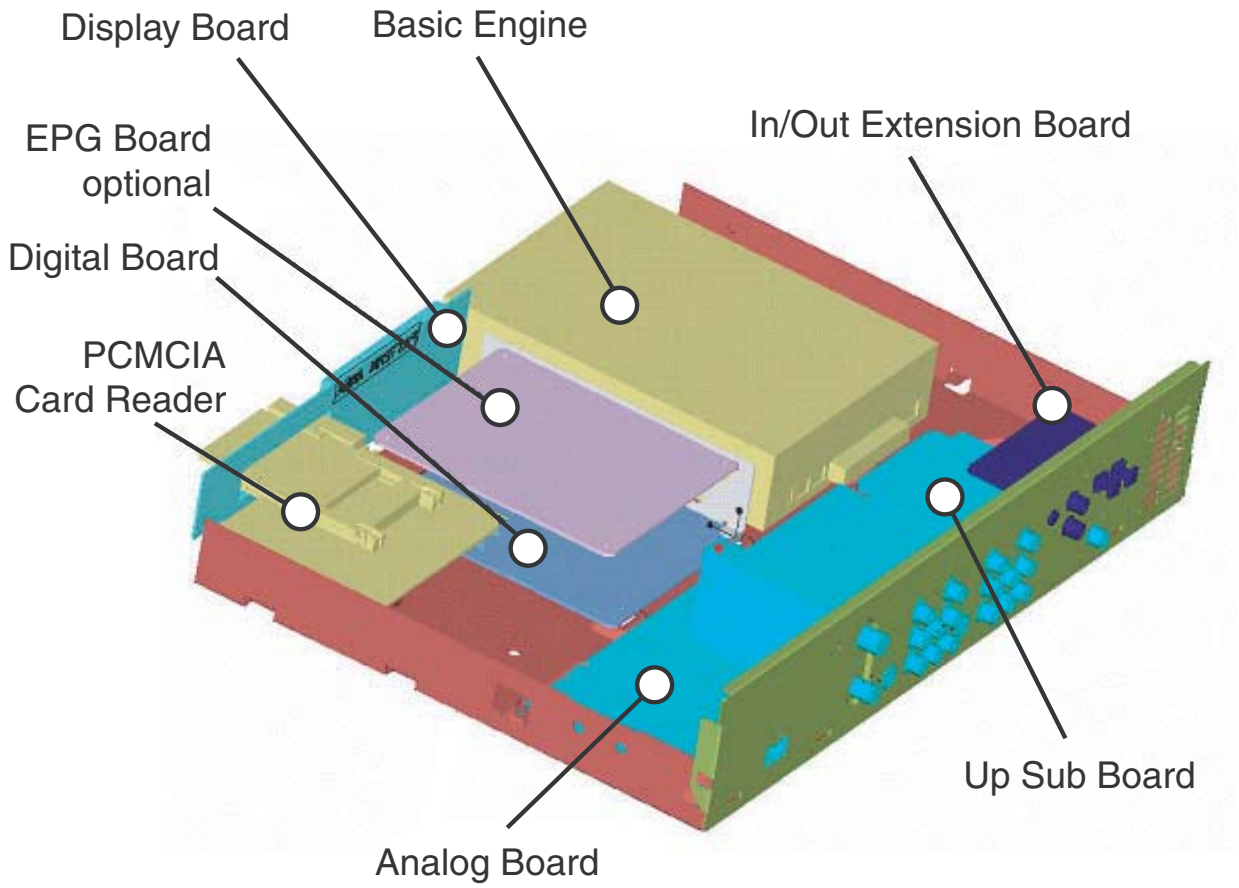
PHILIPS

1. Technical Specifications and Connection Facilities

1.1 PCB Locations



Remarks:
The EPG Board is not present in the DVDR730.

1.2 Diversity Matrix

Type	DVDR730/00/02
Digital Board Chrysalis PAL Progressive	PBAS CHRY PPS_E5_AV3 _PLUS
Basic Engine AV3.5	VAD8041/01
I/O Extension Board	PBAS IOE IST E2
UP Sub Board	PBAS UP SUB IST PLUS E1 NG
Analog-Board	PBAS AB IST PLUS E1 NG
Display Board	PCB ASSY PB DC1 IST

1.3 General:

Mains voltage	:	198V-276V
Mains frequency	:	43 Hz - 63Hz
Power consumption mains	:	28 W
Power consumption standby	:	< 7 W
Power consumption low power stand-by	:	< 3 W

1.4 RF Tuner

Test equipment:Fluke 54200 TV Signal generator

Test streams:PAL BG Philips Standard test pattern

1.4.1 System:

PAL B/G, PAL D/K, SECAM L/L', PAL I

1.4.2 RF - Loop Through:

Frequency range	:	45 MHz - 860 MHz
Gain: (ANT IN - ANT OUT)	:	-6 dB to 0dB

1.4.3 Radio Interference:

input voltage /3 tone method (+40 dB min)	:	no limit

1.4.4 Receiver:

PLL tuning with AFC for optimum reception

Frequency range:	:	45.25 MHz - 857 MHz
Sensitivity at 40 dB S/N	:	≥ 60dBµV at 75Ω (video unweighted)

1.4.5 Video Performance:

Channel 25 / 503,25 MHz,
Test pattern: PAL BG PHILIPS standard test pattern,
RF Level 74 dBV

Measured on SCART 1
Frequency response: : 0 - 4.00 MHz +0-4dB
Group delay (0.1 MHz - 4.4 MHz) : 0 nsec ± 150nsec

1.4.6 Audio Performance:

Audio Performance Analogue - HiFi:
Frequency response at SCART 1 (L+R) output: : 100 Hz - 12 kHz / 0± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal: : FM: ≥ 50dB; AM ≥ 45dB, unweighted
Harmonic distortion (1 kHz, ± 25 kHz deviation): : FM ≤ 1.5%; AM ≤ 2%

Audio Performance NICAM:
Frequency response at SCART 1(L+R) output: : 40 Hz - 15 kHz 0 ± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal: : ≥ 60 dB unweighted
Harmonic distortion (1 kHz): : ≤ 0.5 %

1.4.7 Tuning

Automatic Search Tuning
scanning time without antenna : typ. 3 min. PAL
stop level (vision carrier) : ≥ 37dBµV
Maximum tuning error of a recalled program : ± 62.5 kHz
Maximum tuning error during operation : ± 100 kHz

Tuning Principle
automatic B,G, I, DK and L/L'detection
manual selection in "STORE" mode

1.5 Analogue Inputs

1.5.1 SCART 1 (Connected to TV)

Pin Signals:
1 - Audio R 1.8V RMS
2 - Audio R
3 - Audio L 1.8V RMS
4 - Audio GND
5 - Blue/Chroma GND
6 - Audio L
7 - Blue out/ Chroma in 0.7Vpp ± 0.1V into 75 Ohm (*)
8 - Function switch <2V = TV
>4.5V / <7V = asp. ratio 16:9 DVD
>9.5V / <12V = asp. ratio 4:3 DVD
9 - Green GND
10 - P50 control
11 - Green 0.7Vpp ± 0.1V into 75 Ohm (*)
12 - Nc
13 - Red/Chroma GND
14 - fast switch GND
15 - Red out/ Chroma out 0.7Vpp ± 0.1V into 75 Ohm (*)
± 3dB 0.3Vpp Chroma (burst)
16 - fast switch RGB/ CVBS or Y <0.4V into 75 Ohm = CVBS
>1V / <3V into 75 Ohm = RGB
17 - Y/CVBS GND OUT
18 - Y/CVBS GND IN
19 - CVBS/Y 1Vpp ± 0.1V into 75 Ohm (*)
20 - CVBS/Y
21 - Shield

1.5.2 SCART 2 (Connected to AUX)

Pin Signals:
1 - Audio R 1.8V RMS
2 - Audio R
3 - Audio L 1.8V RMS
4 - Audio GND
5 - Blue/Chroma GND
6 - Audio L
7 - Blue in/Chroma out ± 3dB 0.3Vpp Chroma (burst)
8 - Function switch
9 - Green GND
10 - P50 control
11 - Green
12 - Nc
13 - Red/Chroma GND
14 - fast switch GND
15 - Red in/Chroma in
16 - fast switch RGB/ CVBS or Y
17 - CVBS GND OUT
18 - CVBS GND IN
19 - CVBS/Y/RGB sync 1Vpp ± 0.1V into 75 Ohm (*)
20 - CVBS/Y
21 - Shield

(*) for 100% white

1.5.3 Audio/Video Front Input Connectors

Audio
Input voltage : 2 Vrms
Input impedance : >10kΩ

Video - Cinch
Input voltage : 1 Vpp ± 3dB
Input impedance : 75 Ω

Video - YC (Hosiden)
Input voltage Y : 1Vpp ± 3dB
Input impedance Y : 75 Ω
Input voltage C : burst 300 mVpp ± 3 dB
Input impedance C : 75 Ω

1.6 Video Performance

All outputs loaded with 75 Ohm
SNR measurements over full bandwidth without weighting.

1.6.1 SCART (RGB)

SNR : > -65 dB on all output
Bandwidth : 4.8 MHz ± 2dB

1.7 Audio Performance CD

1.7.1 Cinch Output Rear

Output voltage 2 channel mode	:	2Vrms ± 2dB
Channel unbalance (1kHz)	:	<1dB
Crosstalk 1kHz	:	>95dB
Crosstalk 20Hz-20kHz	:	>85dB
Frequency response 20Hz- 20kHz	:	±0.2dB max
Signal to noise ratio	:	>95 dB
Dynamic range 1kHz	:	>85dB
Dynamic range 20Hz-20kHz	:	>80dB
Distortion and noise 1kHz	:	>85dB
Distortion and noise 20Hz-20kHz	:	>75dB
Intermodulation distortion	:	>77dB
Mute	:	>95dB
Outband attenuation:	:	>40dB above 30kHz

1.7.2 Scart Audio

Output voltage 2 channel mode	:	1.6Vrms ± 2dB
Channel unbalance (1kHz)	:	<1dB
Crosstalk 1kHz	:	>85dB
Crosstalk 20Hz-20kHz	:	>70dB
Frequency response 20Hz- 20kHz	:	± 0.2dB max
Signal to noise ratio	:	>85 dB
Dynamic range 1kHz	:	>75dB
Dynamic range 20Hz-20kHz	:	>70dB
Distortion and noise 1kHz	:	>75dB
Distortion and noise 20Hz-20kHz	:	>65dB
Intermodulation distortion	:	>70dB
Mute (spin-up, pause, access)	:	>85dB
Outband attenuation:	:	>40dB above 25kHz

1.8 Digital Output

1.8.1 Coaxial

CDDA/ LPCM (incl MPEG1)	:	according IEC958
MPEG2, AC3 audio	:	according IEC1937
DTS	:	according IEC1937, amendment 1

1.9 Card Reader

IDE Interface ATA Card Reader
PC Card Standard Rev 8.0 Type I & II PCMCIA ATA Flash Memory Card Standard
Data transfer: 16.6MB/s max.
Support of all types of IDE Hard Disk Drives, Compact Flash Cards, Smart Media Cards / Smart Media ROM Cards, MMC Cards, SD Cards,

1.10 Digital Video Input (IEEE 1394)

1.10.1 Applicable Standards

Implementation according:
IEEE Std 1394-1995
IEC 61883 - Part 1
IEC 61883 - Part 2 SD-DVCR (02-01-1997)
Specification of consumer use digital VCR's using 6.3 mm magnetic tape - dec.1994
Mechanical connection according:
Annex A of 61883-1

1.11 P50 System Control

Via SCART pin nr 10

1.12 Dimensions and Weight

Height of feet	:	10mm
Apparatus tray closed	:	WxDxH :435 x 324.5 x 88cm
Apparatus tray open	:	WxDxH :435 x 366 x 88cm
Weight without packaging	:	app. 4 kg ± 0.5 kg
Weight in packaging	:	app. 6.5 kg

1.13 Laser Output Power & Wavelength

1.13.1 DVD

Output power during reading	:	0.8mW
Output power during writing	:	20mW
Wavelength	:	660nm

1.13.2 CD

Output power	:	0.3mW
Wavelength	:	780nm

2. Safety Information, General Notes

2.1 Description of the Production Number on the type plate

The type plate of the set contains a production number that consists of the following:

x	x													Site Code (Production center)
		x												BOM (Bill of Material) code
			x											Service version change code
				x	x	x	x							Production year/week code
								x	x	x	x	x		Serial number (6 digits)
V	N	1	A	0	3	4	2	1	2	3	4	5	6	Example code

2.1.1 The Site Code (Production center)

The site code consists of 2 letters and relates to the factory assembling and/or equipping the products. The site code letters valid for Consumer Electronics are stated in UAT-0477. The code is used to trace the production site of the model number,
e.g. VN...Szekesfehervar
KB...Hasselt
KT...SBI Electronics Shenzhen

2.1.2 BOM Code

The BOM code is used to link the model to the actual Bill Of Material used for assembly during set production. One set model can be made up of different standard designs / modules. This depends on the material availability in the production or the development progress of the successor modules. Different modules may be used during the same production period or changed back and forth from one week to the other.
BOM version 1 gets BOM code 1, BOM version 2 gets BOM code 2, etc. Allowed codes are 1-9, A-Z.

2.1.3 Service Version Change Code

The service version change code, which has to be recognizable for service and production departments, is used to indicate a production change that is considered as a major change affecting the “serviceability” of the product. A major change is occurring when a safety component is changed or when the servicer needs additional information to repair the set. E.g. when the software is changed or when an IC and its peripheral circuit are changed. Allowed characters are (A-Z, 0-9) to be used in the following sequence: A-Z followed by 0-9.

2.1.4 Production year/week code

Indicates the actual week of set assembly. Made up of the last two digits of year plus production week.

2.1.5 Serial number

The six digit serial numbers.

2.2 Safety Instructions

2.2.1 General Safety

Safety regulations require that during a repair:
- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:
- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
  1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
  2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
  3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
  4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
  5. Verify this, before you return the unit to the customer/ user (ref. UL-standard no. 1492).
  6. Switch the unit ‘off’, and remove the wire between the two pins of the mains plug.

2.2.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type	:	Semiconductor laser GaAlAs
Wavelength	:	650 nm (DVD)
	:	780 nm (VCD/CD)
Output Power	:	20 mW (DVD+RW writing)
	:	0.8 mW (DVD reading)
	:	0.3 mW (VCD/CD reading)
Beam divergence	:	60 degree

Figure 2-1

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.3 Warnings

2.3.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential. Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.

– Wristband tester 4822 344 13999.

- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off'!). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

2.3.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
VARNING SYNLIG OCH OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD BETRAKTA EJ STRÅLEN
VARO! AVATT AESSA OLET ALTTIINA NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASER SÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN
VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETSEN
DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM
ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2

2.3.3 Notes

Dolby

Manufactered under licence from Dolby Laboratories. “Dolby”, “Pro Logic” and the double-D symbol are trademarks of Dolby Laboratories. Confidential Unpublished Works. ©1992-1997 Dolby Laboratories, Inc. All rights reserved.

DOLBY SURROUND
PRO • LOGIC

Figure 2-3

Trusurround

TRUSURROUND, **SRS** and symbol (fig 2-4) are trademarks of SRS Labs, Inc. TRUSURROUND technology is manufactured under licence frm SRS labs, Inc.

Figure 2-4

Video Plus

“Video Plus+” and “PlusCode” are registered trademarks of the Gemstar Development Corporation. The “Video Plus+” system is manufactored under licence from the Gemstar Development Corporation.

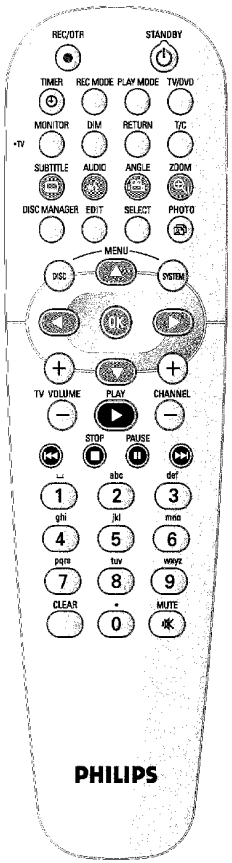
VIDEO Plus+

Figure 2-5

Macrovision

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners.
Use of this copyright protection technology must be autorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

The remote control



REC/OTR ● Record the current TV channel

STANDBY ⏻ To switch set on or off, interrupt menu function, interrupt a programmed recording (TIMER)

TIMER To make a TIMER programming with/without ShowView® system or to alter/clear programmed recordings.

REC MODE To select the picture quality/ maximum possible record time/

PLAY MODE Choose between repeat, shuffle play and intro-scan

TV/DVD Switches the scart socket **EXT2 AUX-I/O** of the DVD recorder directly to the TV set. This lets you watch the picture from any unit connected to this scart socket (set-top box', video recorder or satellite receiver) and at the same time record from another source.
If you have not connected a device to the **EXT2 AUX-I/O** socket or the device is switched off, you can use this button to switch between TV reception and the signal of the DVD recorder.
But this only works if you use a scart cable to connect the TV set to your DVD recorder (**EXT1 TO TV-I/O** socket) and your TV set responds to this switch-over.

MONITOR This button lets you switch between disc playback or the picture of the internal tuner (TV channel).

DIM This button lets you change the brightness of the display to one of two levels or switch it off.

RETURN Return to previous menu on a video CD (VCD). This also works with some DVDs.

T/C Choose the 'T'(Title)/'C'(Chapter) directly from the menu bar using ▼, ▲.
If 'INFO' appears in the display, the index menu from a recorded disc or an introductory film will be shown. In this case, this function is not available.

SUBTITLE Select the subtitle language

AUDIO Selecting the audio language. For recording or during playback using the internal tuner (**MONITOR** key), select language 1 or 2.

ANGLE Select the camera angle

ZOOM Enlarge the picture

EDIT For displaying the edit menu for DVD+RW/+R discs, for setting chapter markers, for editing the photos in the 'Digital Photo Manager'

SELECT Select function/value/photos

PHOTO Open the 'Digital Photo Manager'

DISC MENU To show the DVD menu or the index screen, to leave the 'Digital Photo Mamger'

SYSTEM MENU Call up/cancel the main menu (menu bar at the top of the screen)

▲ ▼ In den Menüs Cursortasten nach oben, unten.

◄ ► Cursor buttons left, right in the menus.

OK Confirming of functions

PLAY► Play back a recorded disc.

CHANNEL + Next programme number

ENGLISH

CHANNEL − Previous programme number

⏮ Briefly press the button during playback: Previous chapter or previous title
Hold down the button: Search backwards
Hold down the button during the still picture: slow motion backwards

STOP ■ Stop playback/recording, except with programmed recordings (TIMER)
Hold down button, opens and closes the disc tray.

PAUSE II If this button is pressed during playback, the DVD recorder switches to pause. You will see a still picture.
If this button is pressed during recording, the DVD recorder will also switch to pause.

⏭ Briefly press the button during playback: Next chapter or next title
Hold down the button: Search forwards
Hold down button during still picture, slow motion forwards

0..9 For entering numbers or characters at the corresponding entry fields.

CLEAR To delete last entry or clear programmed recording (TIMER)

TV/MUTE 🔇 Switch TV sound on/off

Additional TV functions

This will only work with TV sets with the same remote control code *RC5) (e.g. Philips TV sets)

TV VOLUME + Increase TV volume

TV VOLUME − Reduce TV volume

TV/MUTE 🔇 Switch TV sound on/off

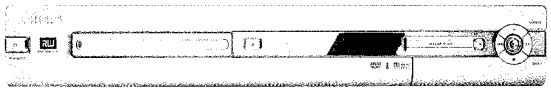
For the following functions you need to hold down the **• TV** button (on the left side) and then select the function you need with the appropriate button.

STANDBY ⏻ Switch on/off TV set

0..9 Number buttons 0 - 9

CHANNEL + To select a higher programme number

CHANNEL − To select a lower programme number



Front of the device

STANDBY-ON ⏻ : To switch device off / on, interrupt a function, interrupt a programmed recording (TIMER).

: Red light around the disc tray indicates recording on a DVD+RW/+R.

OPEN/CLOSE ⏏ : Open/close disc tray.

MEDIA SLOT : Media Slot for PC (PCMCIA)-cards (adapters)

EJECT Eject PC-(PCMCIA) card

RECORD : Record the current TV channel

▶ : : Play back a recorded disc.

⏮ : select previous title/search backwards

⏭ : select next title/search forwards

■ : Interrupt playback/recording

Behind the flap at the right-hand corner on the front

S-VIDEO (CAM1) : Connection of SVHS/Hi8 camcorders or SVHS/Hi8 video recorders (programme number 'CAM 1')

Yellow socket

VIDEO (CAM1) : **Video input socket**: Connection of camcorders or video recorders (programme number 'CAM 1')

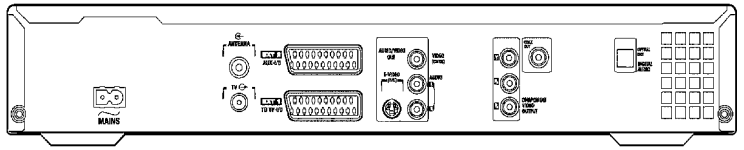
White/red socket

AUDIO L/R (CAM1) : **Audio input socket left/right** : Connection of camcorders or video recorders (programme number 'CAM 1')

DV IN (CAM2) : digital video input (DV format only), IEEE 1394, FireWire to connecting a digital camcorder or other suitable device (programme number 'CAM2').

Switching between the sockets **VIDEO (CAM1)** , **S-VIDEO (CAM1)** *is done automatically. If a signal is available at both sockets at the same time, the signal at the* **S-VIDEO (CAM1)** *socket has priority.*
If you change the socket (unplug), you must re-select the socket. (Button **CHANNEL −** *and then* **CHANNEL +** *)*

ENGLISH



Back of the device

~ **MAINS** Connection to the mains supply (230V/50Hz)

ANTENNA IN Connection of the aerial

TV OUT Connection of the aerial cable to the TV set

EXT2 AUX-I/O Connection of an additional device (satellite receiver, set-top box, video recorder, camcorder, ...). Input for RGB, S-video signals, input/output for CVBS (video) signals

EXT1 TO TV-I/O Connection of a TV set. Input for RGB, S-video signals, input/output for CVBS (video) signals

Output sockets (AUDIO/VIDEO OUT)

S-VIDEO OUT (Y/C) Connection of an S-Video compatible TV set

VIDEO OUT (CVBS) Yellow cinch socket for the connection of a TV set with video input (CVBS, Composite Video).

AUDIO OUT L/R White/red cinch socket for the connection of a TV set with audio input sockets or an additional device.

COMPONENT VIDEO OUT **Component Video output (red/blue/green socket)**: Connection of an additional device with Component Video input (Interlaced/Progressive Scan)

Output sockets (DIGITAL AUDIO OUT)

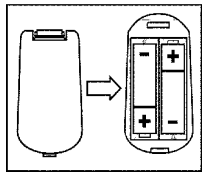
COAX OUT
For the connection of a digital audio device using a coaxial cable(cinch cable).

OPTICAL OUT
For the connection of a digital audio device using an optical cable (Toslink).

Preparing the remote control for operation

The remote control and its batteries are packed separately in the original DVD recorder packaging. You must install the batteries in the remote control before use - described in the following section.

1. Take the remote control and the enclosed batteries (2 batteries).



2. Open the battery compartment, insert the batteries as shown and then close the battery compartment. Match the polarities (+ and -) on the batteries with the diagram on the remote.

The remote control is now ready to use.
Its range is approximately 5 to 10 meters.

'Aim' correctly

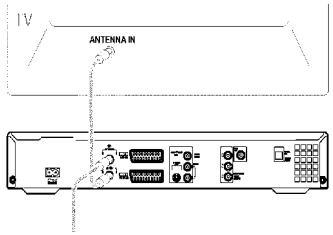
Aim the remote control at the DVD recorder and not at the TV set.

Connecting to the aerial

To receive TV programmes you have to connect the DVD-recorder to the aerial or the cable network.

1. Switch off your TV set.
2. Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA IN** socket at the back of the DVD recorder.
3. Insert one end of the supplied aerial cable into the **TV OUT** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.

   The aerial input socket of the TV set may be labeled ANT IN, RF IN, 75 ohm, etc. Check your TV instructions for details.



Connection with 'Easy Link'

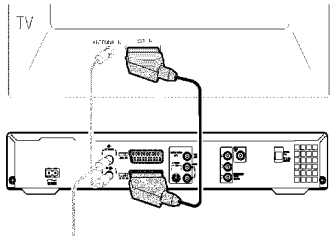
easyLINK

Use this connection method if your TV set is equipped with 'Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link, Megalogic, Datalogic, ...'.
Please see your TV's operating instructions.

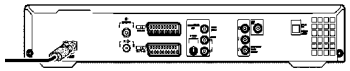
What is Easy-Link?

With the Easy Link function your DVD recorder can exchange information with your TV set. Your TV channels can also be transferred in the same order from your TV set to your DVD recorder.

1. Switch off your TV set.
2. Plug in a full-pin scart cable (all 21 contacts wired) into the scart socket **EXT1 TO TV-I/O** at the back of the DVD recorder and the corresponding scart socket - suitable for Easylink - at the back of the TV set (see TV set operating instructions).



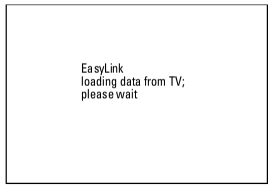
   - Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.
3. Switch on the TV set.
4. Use the supplied mains cable to connect the mains socket ~**MAINS** at the back of the DVD recorder with the wall outlet.



   → The most important features of the DVD recorder will appear in scrolling text on the display.
   After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.

5. Switch on the DVD recorder using **STANDBY-ON** ⏻.

   → A message appears on the screen announcing that the transfer has started.



   → 'EASYL INK' appears on the display during transfer.

   → The TV set transfers all saved TV channels, in the same order, to the DVD recorder
   This may take several minutes.

   - If more installation menus appears on your TV set
     - select the line with ▼, ▲.
     - confirm with ▶
     - change the data with ▼, ▲ or the number buttons **0..9**
     - confirm with **OK**.

     For more information on the various functions see 'Initial installation' in 'Installing your DVD recorder'.

Initial installation is now complete.

Connecting to the TV

If the function Easy Link is not supported from your TV set, choose from the following connection methods:

Connection with scart cable

Connection with S-videocable

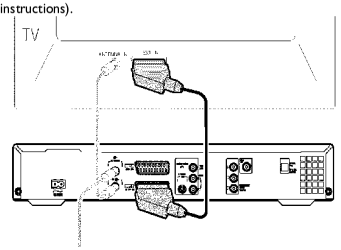
Connection with Video (CVBS) cable

Connection with the aerial cable only

Connection with scart cable

The scart or Euro AV cable serves as the universal connector for picture, sound and control signals. With this type of connection, there is practically no loss of quality in picture or sound transmission.

1. Plug a scart cable into the scart socket **EXT1 TO TV-I/O** at the back of the DVD recorder and the scart socket for the DVD recorder at the back of the TV set (see TV set operating instructions).



Several scart sockets on the TV?

Select the scart socket that is suitable for both video output and for video input.

Selection menu for the scart socket?

On some TV sets select 'VCR' as the source for this scart socket. Read your instruction manual for your TV set for further information.

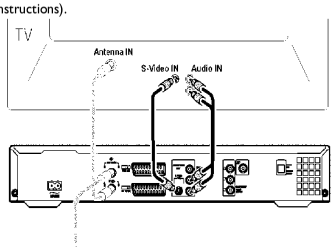
- Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

Then, read the chapter on 'Connecting to the mains'.

Connection with an S-Video(Y/C)cable

This connecting cable, also known as the SVHS cable, is used to transmit the brightness signal (Y signal) and colour signal (C signal) separately. This mini DIN socket/plug is also called a Hosiden socket/plug.

1. Insert one end of an S-Video(SVHS) cable into the **S-VIDEO OUT (Y/C)** socket at the back of the DVD recorder and the other end into the S-Video (SVHS) input socket on the TV set (usually labelled 'S-Video in' or 'SVHS in'. See TV operating instructions).
2. Insert one end of an audio (Cinch) cable into the red/white Cinch socket **AUDIO OUT L/R** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).



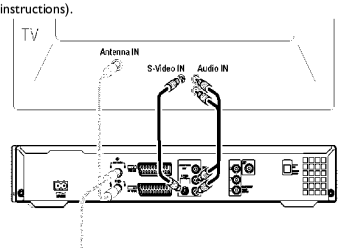
- Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

Then, read the chapter on 'Connecting to the mains'.

Connection with video (CVBS) cable

This cable, usually with yellow Cinch connectors, is used for transmitting the Composite Video signal (FBAS, CVBS). In this method of transmission the colour signal and the brightness signal are transmitted on the same cable. In certain circumstances, this can lead to slight problems with the picture, such as 'Moiré' patterns.

1. Insert one end of a video (CVBS) cable into the yellow Cinch socket **VIDEO OUT (CVBS)** at the back of the DVD recorder and the other end into the video input socket (usually yellow) on the TV set (usually labelled 'Video in' or 'AV in'. See TV operating instructions).
2. Insert one end of an audio (Cinch) cable into the red/white Cinch socket **AUDIO OUT L/R** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).



- Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

Then, read the chapter on 'Connecting to the mains'.

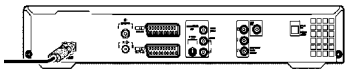
Connection with the aerial cable only

To connect this DVD-Recorder to a TV set without external Audio/Video input sockets, you need a modulator. With the modulator the audio/video signal is converted in an UHF-channel. This signal can be received and stored on the TV as a TV-station.

Connecting to the mains

Always check if the local mains voltage matches the voltage range printed on the type plate at the back or bottom of the DVD-recorder. If not consult your dealer or the customer support from your country.

1. Switch on the TV set.
2. Insert one end of the supplied mains cable into the mains socket ~ **MAINS** at the back of the DVD recorder and the other end into the wall socket.

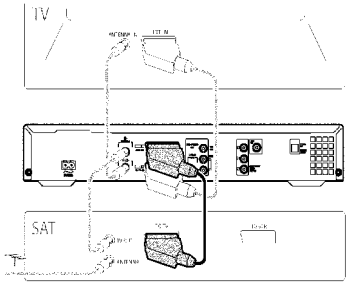


→ The most important features of the DVD recorder will appear in scrolling text on the display.

After the first installation is completed this function will be switched off.

Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting additional devices to the second scart socket



You can connect additional devices such as decoders, satellite receivers, camcorders, etc. to the **EXT2 AUX-I/O** socket.

When playback is started on this additional device the DVD recorder automatically connects the **EXT2 AUX-I/O** scart socket with the **EXT1 TO TV-I/O** scart socket. You will then see the picture from the additional device on your TV set, even if the DVD recorder is switched off.

- The **TV/DVD** button on the remote control allows you to switch between playback through the **EXT2 AUX-I/O** scart socket and playback from the DVD recorder.

Connecting a video recorder, DVD player.

You can also connect a video recorder or a DVD player to the **EXT2 AUX-I/O** input socket.
The DVD recorder must be connected **directly** to the TV set (**EXT1 TO TV-I/O** socket directly to the TV set). If there is a video recorder in between the picture quality may be poor because of the copy protection system built into the DVD recorder.

- If you already have an external receiver (satellite receiver, set-top box, cable TV box) connected to this socket, you can connect the video recorder to the 'VCR', 'TO VCR', ...socket of the external receiver.

- You can also use the front sockets **S-VIDEO (CAM1)** , **VIDEO (CAM1)** and the **AUDIO L/R (CAM1)** audio sockets.

Connecting an external receiver

1. Connect the **scart socket** of the receiver (satellite receiver, set-top box, cable TV box,...) provided for the TV set (usually labelled 'TV', 'TO TV',...) with the **EXT2 AUX-I/O** socket of the DVD recorder.
   - If your external receiver offers several options for the signal available at the 'TV', 'TO TV',... socket, choose the 'RGB' setting.

Why can't I use the 'VCR', 'TO VCR',... socket?

In order to achieve the best possible picture quality, you must use the RGB (red-green-blue) signal of the receiver. As a rule, this signal is available at the 'TV', 'TO TV',... socket. The DVD recorder transfers the signal to the **EXT1 TO TV-I/O** *socket.*

Some receivers only provide a 'Video (CVBS/FBAS)' signal at the 'VCR', 'TO VCR'...socket.
If you are satisfied with the picture quality of the 'VCR', 'TO VCR',... socket, you can also use this socket.
Read the instruction manual of the receiver which signals are available at the sockets.

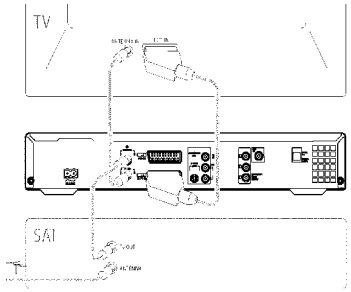
Connecting additional receivers

For additional receivers, you can also use the **EXT1 TO TV-I/O** *socket (if the TV set is connected to the* **COMPONENT VIDEO OUT** *sockets), and* **VIDEO (CAM1)** , **S-VIDEO (CAM1)** *sockets at the front. Please observe that you also have to connect an audio cable to the* **AUDIO L/R (CAM1)** *socket.*

Connecting additional devices only via aerial cable

If you want to connect additional devices (e.g. satellite receiver...) only via aerial cable, please observe the following:

The DVD-Recorder must be connected directly to the TV set. If there is a video recorder or an additional device in between, the picture quality may be poor because of the copy protection system built into the DVD-Recorder.



The additional device (satellite receiver) must be connected **before** the DVD recorder (additional device - DVD recorder - TV set). Only the TV set must be connected to the **TV OUT** socket.

If there is interference in the picture when the additional device is switched on, a TV broadcaster may be transmitting on the same channel or a channel very close to that of the additional device. (e.g.: TV broadcaster on channel 45, additional device (satellite receiver) also on channel 45). In this case, change the channel of the additional device (satellite receiver). Consult the instruction manual of the additional device.
You must also store this channel on the DVD recorder to be able to record TV programmes from the additional device (satellite receiver).

Switch on the additional device during the installation of the DVD recorder. During the automatic channel search, the channel on which the additional device is transmitting will be stored as a TV channel.

Connecting a camcorder to the front sockets

To copy camcorder recordings, you can use the front sockets. These sockets are located behind the flap on the right hand side.

Digital (DV) input socket

If you have a DV or Digital 8 camcorder, connect the **DV IN (CAM2)** input of the DVD recorder to the appropriate DV output on the camcorder.
Choose 'CAM2' as a programme number for this input.

During recording on a DVD+RW/+R the original recording date and time are stored as DVD subtitles.
On playback, this data can be displayed on the TV screen by using the '....' function (Subtitle).

S-video input socket

If you have a Hi8 or S-VHS(C) camcorder, connect the **S-VIDEO (CAM1)** input of the DVD recorder to the appropriate S-VHS output on the camcorder.
You must also connect the audio input **AUDIO L/R (CAM1)** on the DVD recorder to the audio output on the camcorder.

Choose 'CAM1' as a programme number for this input.

Video (CVBS) input socket

If you have a camcorder that only has a single video output (Composite Video, CVBS), connect the **VIDEO (CAM1)** input on the DVD recorder to the appropriate output on the camcorder.
You must also connect the audio input **AUDIO L/R (CAM1)** on the DVD recorder to the audio output on the camcorder.

Choose 'CAM1' as a programme number for this input.

Connecting audio devices to the analogue audio sockets

Two analogue audio sockets **AUDIO OUT L/R** (audio signal output left/right) are located at the back of the DVD recorder.

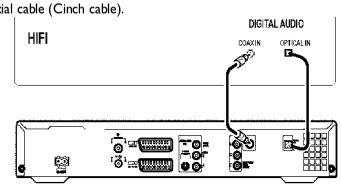
These can be used to connect the following:
•) a receiver with Dolby Surround Pro Logic
•) a receiver with two-channel analogue stereo

Can I use the 'Phono' input on my amplifier?

This socket (input) on the amplifier is designed only for a record player without preamplifiers. Do ***not*** *use this input for connecting the DVD recorder.*
The DVD recorder or the amplifier may be damaged as a result.

Connecting audio devices to the digital audio sockets

At the back of the DVD recorder there are two digital audio output sockets **OPTICAL OUT** for an optical cable and **COAX OUT** for a coaxial cable (Cinch cable).



These can be used to connect the following:
•) an A/V receiver or an A/V amplifier with a digital multi-channel sound decoder
•) a receiver with two-channel digital stereo (PCM)

Digital multi-channel sound

Digital multi-channel sound offers the best possible sound quality. You will need a multi-channel A/V receiver or amplifier that supports at least one of the audio formats of the DVD recorder (MPEG2 and Dolby Digital).
Consult the operating instructions for your receiver to find out which audio formats it supports.

× ***All I can hear from my loudspeakers is a loud distorted noise***
✓ *The receiver is not compatible with the digital audio format of the DVD recorder. The audio format of the DVD disc is displayed in the status window when you switch to another language. Playback in six-channel digital surround sound is only possible if the receiver has a digital multi-channel sound decoder.*

Initial installation

After successfully connecting your DVD recorder to the TV set and other additional devices as described in the previous chapters, this chapter will show you how to start the initial installation. The DVD recorder automatically seeks and stores all available TV channels.

Switching on additional devices

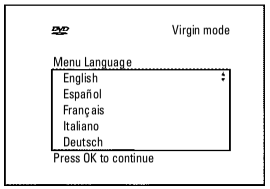
If you have connected additional devices such as a satellite receiver to the aerial cable, switch them on. The automatic channel search will recognise it and save it. Please observe that you must switch on a "test signal" for some additional devices.

No aerial connected

Even if you only want to use the DVD recorder to play back or have only connected a satellite receiver, you must still complete the initial installation. This is necessary so that the basic settings are stored correctly. Once initial installation is complete you can use the DVD recorder as normal.

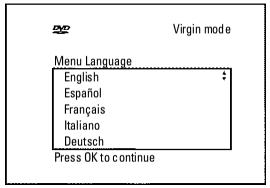
1 Press **STANDBY-ON** ⏻ on the front of the DVD-recorder
→ 'PHILIPS' and then 'IS TV ON?' will appear on the display.

→ If the connection was properly made and your TV was **automatically switched** to the programme number for the input socket, e.g. 'EXT', '0', 'AV', you will see the following picture:



× ***My screen is empty.***
✓ *Depending on the initialisation procedure it can take some time before the picture appears. Please press **no button** in the meantime.*
✓ *If the TV set does not automatically switch to the programme number of the input socket, select the corresponding programme number on your TV set manually (see your TV's operating instructions).*
✓ *Check that the scart cable is connected from the TV set to the **EXT1 TO TV-I/O** socket on the DVD recorder. The **EXT2 AUX-I/O** socket is intended only for additional devices.*

2 Select the desired language for the on-screen menu by pressing ▼ or ▲ .

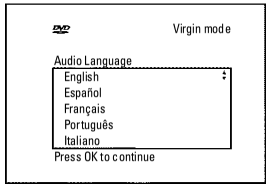


What is an on-screen menu?

All settings and/or functions are displayed on your TV screen in the relevant language.

3 Confirm with **OK** .

4 Select the desired audio language using ▼ or ▲ .

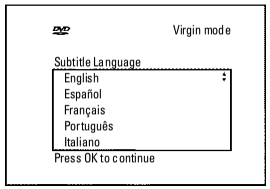


What is an audio language?

The DVD will play the sound in the language you select, provided this language is available on the disc. If it is not available on the disc the first language on the DVD will be used instead. The DVD Video Disc menu, if available, will also be displayed in the language you select.

5 Confirm with **OK** .

6 Select the desired language for the subtitles by pressing ▼ or ▲ .

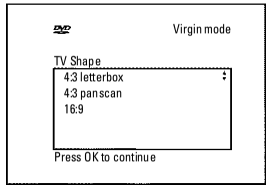


What is the subtitle language?

The subtitles will be displayed in the language you select, provided this language is available on the disc. If it is not available on the disc the fist language on the DVD will be used instead.

7 Confirm with **OK** .

8 Select the desired screen format position using ▼ or ▲ .

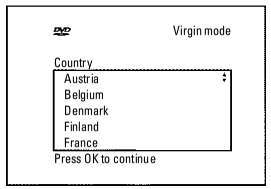


- '***4:3 letterbox***'
  for a 'wide-screen' (cinema format) picture with black bars at the top and bottom.
- '***4:3 panscan***'
  for a full-height picture with the sides trimmed.
- '***16:9***'
  for a wide-screen TV set (screen edge ratio 16:9)

9 Confirm with **OK** .

10 Select the country of your residence with ▼ or ▲ .

- If your country does not appear, select '***Other***'.



Why do I have to set the country?

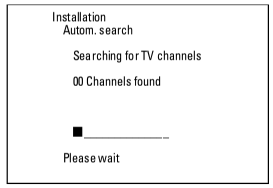
To call up the specific settings for the respective country, you must first install the country.

11 Confirm with **OK** .

→ A screen appers with a message about the connection of the aerial.
It can take some time before this screen appears. Please press **no button** in the meantime.

12 After you connect the aerial (or cable TV, satellite receiver, etc.) to the DVD recorder, press **OK** .

→ The automatic TV channel search starts.

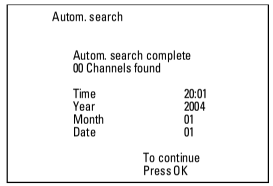


→ '*WAIT*' will appear on the display.
Wait until all available TV channels have been found. This can take several minutes.

× ***No TV-Stations found yet?***
✓ *Select channel 1 on the TV set. Can you see the stored TV channel on the TV set?*
If not, check the cable connection from the aerial (aerial socket) to the DVD recorder and to the TV set.
✓ *Please have patience.*
The DVD recorder searches the entire frequency range in order to find and save the largest possible number of TV channels.
✓ *If you have not connected an aerial, go through all the basic settings right to the end and then, if you wish, start the automatic search (see 'Automatic TV channel search').*

→ When the automatic TV channel search is complete, '***Autom. search complete***' will appear on the TV screen along with the number of TV channels found.

→ '***Time***', '***Year***', '***Month***', '***Date***' will then appear on the TV screen. It can take some time before this screen appears. Please press **no button** in the meantime.



13 Check the displayed settings for '***Time***', '***Year***', '***Month***' and '***Date***' .

- If required, change the data with the number buttons **0..9** on your remote control.
- Select the line with ▲ or ▼ .

14 If all informations are correct, save by pressing **OK** .

The initial installation is now complete.
How to modify the channel settings or the time/date settings you will red on the following chapter.

× ***Sound may be distorted on some TV channels.***
✓ *If the sound is distorted on any of the stored TV channels or if there is no sound at all, the wrong TV system may have been stored for the TV channel. Read 'Manual TV channel search' for information on how to change the TV system.*

Using a satellite receiver

TV channels from a satellite receiver (connected to scart socket **EXT2 AUX-I/O**) are received on the DVD recorder on programme number '***EXT2***'

If necessary, use the **MONITOR** button to switch to the internal tuner.
Select programme number '***EXT1***' with **0** on the remote control and then select programme number '***EXT2***' with **CHANNEL −** .
You should select the TV channels to be received by the satellite receiver directly on the receiver itself.

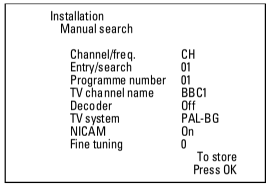
Allocating a decoder

Some TV channels send coded TV signals that can only be viewed properly with a purchased or rented decoder. You can connect such a decoder (descrambler) to your DVD recorder. The following function automatically activates the connected decoder for the TV channel you want to watch.

If your TV set supports 'Easy Link' the decoder must be assigned to the relevant TV channel on the TV set (see the operating instructions for your TV set). Settings cannot then be made in this menu.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Use the **CHANNEL +** and **CHANNEL –** buttons or the number buttons **0..9** on the remote control to select the TV channel for which you want to use the decoder.
   - If necessary, use the **MONITOR** button to switch to the internal tuner.
2. Press the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.
3. Select '⚙' symbol with ◄ or ► .
4. Select '***Installation***' using ▼ or ▲ and confirm with ► .
5. Select '***Manual search***' using ▼ or ▲ and confirm with ► .



6. Select '***Decoder***' using ▼ or ▲ .
7. Select '***On***' with ► .
   - To switch off the decoder use ► to select '***Off***' (Decoder switched off).
8. Confirm with **OK** .
9. To end, press **SYSTEM MENU** .

Your decoder has now been allocated to this TV channel.

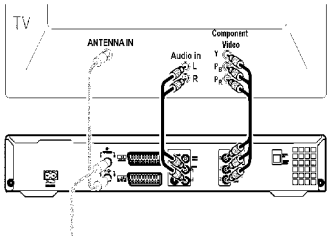
Connection using a component video (Y Pb Pr/YUV) cable

Component video (Y Pb Pr) is the highest quality picture transmission option. This is achieved by dividing the video signal into a luminance signal (Y) and two colour difference signals - red minus luminance (V) and blue minus luminance (U). As a rule, "Cr, Pr" or "R-Y" is used to describe the red difference signal and "Cb, Pb" or "B-Y" the blue difference signal.
These signals are transmitted through separate lines. The connectors of this cable and the corresponding sockets are usually green (luminance, Y), blue (U, Pb, Cb, B-Y), and red (V, Pr, Cr, R-Y).

Attention!
If you choose this type of connection, the DVD recorder must already be connected and completely installed (initial installation complete). Switching of the signal to the **COMPONENT VIDEO OUT** sockets is carried out in a menu that is not yet available during the initial installation.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select the '👤' symbol using ▼ or ▲ and confirm with ► .
4. Select the line '***Component video output***' using ▼ and confirm with ► .
5. Select the setting you need with **SELECT** . Choose '***Progressive Scan***' only if your TV has Progressive Scan.
6. Confirm with **OK** .

   For more information on the other settings, read section 'Picture settings' ('***Video output***') in chapter 'User preferences'.



7. Use a component video (Y Pb Pr) cable, connect the three cinch sockets (red, blue, green) **COMPONENT VIDEO OUT** at the back of the DVD recorder with the corresponding three component video (progressive scan) input sockets of your TV set, usually labelled 'Component Video Input', 'YUV Input', 'YPbPr', 'YCbCr' or simply 'YUV'.

Warning!
Do not confuse these sockets with the five-component RGB sockets (if available) or the yellow video (CVBS/FBAS) socket and the two audio sockets (red/white). The five-component RGB sockets are only provided for the R-G-B-H-V signals (red, green, blue with horizontal and vertical synchronisation impulse).

Please observe the colour sequence
The colours of the sockets at the DVD recorder and the connectors must match those of the socket colours at the TV set (red-red/blue-blue/green-green). If they don't, the colours of the picture may get mixed up or the picture may not be visible.

8. Use an audio (cinch) cable, connect the red/white cinch socket **AUDIO OUT L/R** at the back of the DVD recorder with the most coloured red/white audio input socket of your TV set (usually labelled 'Audio in' or 'AV in'. See the instruction manual of your TV set.)
9. If necessary, switch the TV set to the component video (Progressive Scan) input sockets. If there is a switch or selection on your TV-set between 'Interlaced' and 'Progressive scan' select 'Progressive scan'.
   You may need to refer to your TV operating instructions.
   → The menu of the DVD recorder should now appear on the TV screen. If not, check the cable connections and the settings on your TV set.
   - If necessary store this setting on your TV set.
10. End with **SYSTEM MENU** .

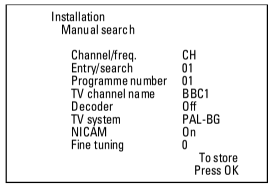
Manual TV channel search

In some cases, not all of the available TV channels may have been found and stored during initial installation. In this case, you will need to search for and store the missing or coded TV channels manually.

With 'Easy Link', the DVD recorder will automatically download the TV channels stored on the TV set. This is why some lines have no function. To store new TV channels, they must first be stored on the TV set. The information will then be transferred to the DVD recorder automatically.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select '***Installation***' using ▼ or ▲ and confirm with ► .
4. Select '***Manual search***' using ▼ or ▲ and confirm with ► .



5. In '***Channel/freq.***', select the desired display using ► . '***Freq.***'(Frequency), '***CH***'(Channel), '***S-CH***'(Special/hyperband channel)
6. In '***Entry/search***', enter the frequency or channel of the TV station using the number buttons **0..9** .
   - Press ► in the line '***Entry/search***' to start the automatic search.
   → A changing channel number/frequency number will appear on the TV screen.
   Continue the automatic search until you have found the TV channel you are looking for.
7. Using ◄ or ► in '***Programme number***', select the programme number you want to use for the TV channel, e.g. '***01***'.
8. Press **OK** to store the TV channel.
9. To search for other TV channels, begin again at 6 .
   - **Change the name of a TV channel:**
     - In '***TV channel name***', press ► .
     - Select the desired character position using ◄ or ► .
     - hange the character at the desired position with ▼ or ▲ .
     - Select the next character position in the same way.
     - Confirm with **OK** .
   - **Change the TV system of the TV channel:**
     - In '***TV system***', use ◄ or ► to select the TV system that produces the least distortion of picture and sound.
   - **NICAM**
     - If reception is poor and the sound distorted you can turn off NICAM.
       In '***NICAM***', select '***Off*** using ► .
   - **Fine tuning**
     - You can try fine tune the TV channel manually with ◄ , ► in the line '***Fine tuning***'.
10. To end, press **SYSTEM MENU** .

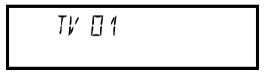
Sorting TV channels automatically (Follow TV)

This function changes the order of the TV channels stored in your DVD recorder to match the order on the TV set.
This only works if the DVD recorder (**EXT1 TO TV-I/O** socket) and the TV set **are connected with a scart cable**.

If your TV set supports 'Easylink...', TV channels will be stored during initial installation in the same order as they appear on the TV set. To store the TV channels in a different order, you'll need to change the order on the TV set. When you start the Follow TV function the information is transferred again from the TV set.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select '***Installation***' using ▼ or ▲ and confirm with ► .
4. Select line '***Follow TV*** with ▼ or ▲ . and confirm with the ► button.
5. Confirm the message on the screen with **OK** .
   → 'TV 01' will appear in the DVD recorder display.



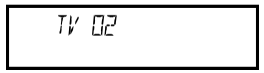
6. Select programme number '1' **on the TV set**.

× ***I cannot switch my TV set to programme number '1'***
✓ *If you have connected additional devices to the* **EXT2 AUX-I/O** *socket, please disconnect these devices. Other connected devices may have switched the TV set to the programme number of the scart socket.*

7. Confirm with **OK** on the DVD recorder remote control.
   → 'WAIT' will appear in the display.
   → The DVD recorder compares the TV channels on the TV set and the DVD recorder.
   If the DVD recorder finds the same TV channel as on the TV set it stores it at 'P01'.

× ***'NOTV' will appear in the display.***
The DVD recorder is not receiving a video signal from the TV set.
✓ *Chech the connectors at both ends of the scart cable.*
✓ *Check your TV's operating instructions to see which scart socket is used for video signals.*
✓ *If the problem persists, you won't be able to use this feature. Please read 'Sorting and deleting TV channels manually'.*

8. Wait until for example 'TV 02' appears in the display.



9. Select the next programme number **on the TV set**, e.g. '2'.
10. Confirm with **OK** on the DVD recorder remote control.
    - If you confirmed the wrong TV channel, you can delete the last allocation with ◄ .
11. Repeat steps 8 to 10 until you have assigned all the TV channels from your TV set.
12. To end, press **SYSTEM MENU** .

Automatic TV channel search

If the channel assignments of your cable or satellite TV provider change or if you are reinstalling the DVD recorder, e.g. after moving house, you can start this procedure again. This will replace the stored TV channels with the new ones.

My TV set has Easylink
With Easylink, you can search for and store TV channels only on the TV set. These settings are accepted by the DVD recorder. Use this function to start the transfer of TV channels from the TV set.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears on the screen.
2. Select the '⚙' icon using ◄ or ► .
3. Select '***Installation***' using ▼ or ▲ and confirm with ► .
4. To end, press **SYSTEM MENU** .

You can read about how to search for a TV channel manually in 'Manual TV channel search'.

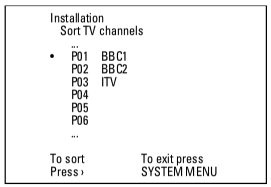
Sorting and deleting TV channels manually

With this function you can rearrange the TV channels already stored or to delete TV channels you don't want or those with poor reception.

EasyLink
With Easylink, you can search for and store TV channels only on the TV set. These settings are then transferred to the DVD recorder. That is why you cannot select this function manually.

Preparation:
•) The TV set is switched on, and if necessary, the programme number for the DVD recorder has been selected.
•) the DVD recorder is switched on.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears on the screen.
2. Select the '⚙' icon using ◄ or ► .
3. Wählen Sie mit der Taste ▼ oder ▲ die Zeile '***Installation***' und bestätigen Sie mit der Taste ► .
4. Select '***Sort TV channels***' using ▼ or ▲ and confirm with ► .



5. Using ▼ or ▲ select the TV channel that you want to delete or whose order you want to change.
6. Confirm with ► .
   - **Deleting TV channels**
     Unwanted channels or those with poor reception can be deleted using **CLEAR** .
7. Using ▼ or ▲ , shift the TV channel to the desired position and press the ◄ button.
   → The DVD recorder will insert the TV channel.
8. Repeat steps 5 to 7 until you have resorted/deleted all the TV channels you want.
9. To store, press **OK** .
10. To end, press **SYSTEM MENU** .

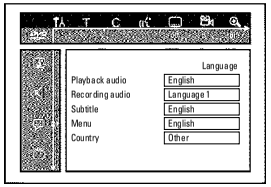
Setting the language/country

You can select the country and, for the basic setting of DVD playback, the language for the subtitles and the audio language.

Please note that with some DVDs the audio language and/or subtitle language can be changed only via the DVD menu.
For bilingual shows, you can also select the sound channel of the TV station via the internal tuner (**MONITOR** button) for recording or playback.

Preparation:
•) The TV set is switched on, and if necessary, the programme number for the DVD recorder has been selected.
•) the DVD recorder is switched on.

1. Press **SYSTEM MENU** on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select '💬' with ▼ or ▲ and confirm with the ► button.



4. Select the appropriate line and confirm with ► .
   - ***Playback audio***
     The DVD will play back in the language you have chosen.
   - ***'Subtitle'***
     Subtitle language
   - ***'Menu'***
     You have the option of setting one of the displayed languages for the on-screen menu (OSD). However, the DVD recorder display will only display English text regardless of this setting.
5. Select the appropriate setting using ▼ or ▲ and confirm with **OK** .
6. To end, press **SYSTEM MENU** .

Additional installation features

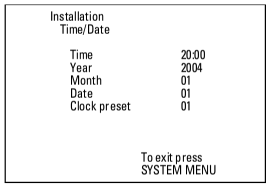
Setting the time and date

If the display shows an incorrect time or '**--:--**', the time and date must be reset manually.

SMART CLOCK

*'SMART CLOCK' automatically sets the time and date using the information transmitted by the TV channel. Normally the TV channel stored at programme number 'P01' is used. In the '**Clock preset**' line you can select the programme number (channel name) whose TV channel transmits this information.*
*If the time/date is not displayed correctly you need to choose the '**Off**' setting in the '**Clock preset**' line and set the date and time manually.*

1. Press **SYSTEM MENU** on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select '***Installation***' using ▼ or ▲ and confirm with ► .
4. Select '***Time/Date***' using ▼ or ▲ and confirm with ► .



5. Change the time in '***Time***' using the number buttons **0..9** on your remote control.
6. Check '***Year***', '***Month***' and '***Date***' in the same way. Select the entry field with the ▼ or ▲ button.

   × ***Time/date is displayed incorrectly despite manual setting***
   ✓ *With 'SMART CLOCK', time/date is transferred from the TV channel saved on 'P01' and automatically corrected.*
   You can either enter another TV channel for transferring the data or disable the function.
   *In the line '**Clock preset**' select the relevant TV channel with ◄ or ► . To disable, select '**Off**'.*

7. Check the displayed settings and confirm with **OK** .
   → '***Stored***' will appear briefly on the screen.
8. To end, press **SYSTEM MENU** .

Information on the screen of your TV

You can check or change many of the functions and settings of your DVD recorder via the system menu bar. The menu bar cannot be displayed during recording.

Symbols in the menu bar

Press **SYSTEM MENU** to open and close the menu bar (main menu).
Use ◄ and ► to select the relevant function.
Use ▼ to confirm the function and go either to another menu or execute the function directly.
Some functions may not be available, depending on the disc inserted.

Menu bar 1

⚙ User preferences

T Title/track

C Chapter/index

Audio language

Subtitle language

Camera angle

Zoom

Menu bar 2

While menu bar 1 is being displayed you can go to menu bar 2 by pressing ► again.

Sound

Frame advance

Slow motion

Fast motion

Search by time

Field for temporary messages

The top left corner of the menu line contains a field for temporary messages relating to the various operating modes. This information appears briefly on the screen when certain disc functions have been activated:

Shuffle

Scan

Repeat entire disc

Repeat title

Repeat track

Repeat chapter

Repeat from A to the end

Repeat from A to B

Camera angle

Child lock enabled

Resume playback

Illegal action

Status field

The status field shows the current operating mode (status) of the DVD recorder and the type of disc inserted. This display can be switched off.

Disc type symbols

DVD+RW

DVD+R

DVD-Video

Video-CD

No disc

Error

Operating mode symbols

Recording

Stop

Playback

Playback-Pause

Record-Pause

Search forwards (8x speed)

Search backwards (8x speed)

Slow motion

Tuner information box

This field is located in the bottom left-hand corner of the screen. The aerial signal, the TV channel and the TV channel name for the selected programme are displayed.

Current channel/selected input socket

No signal
The TV channel is not available/the additional device is not connected or it is switched off

Copy-protected signal

'Live picture' in the 'Tuner information box'

Instead of the information about the aerial signal or the TV channel, you can watch the picture of the selected TV channel or the signal on the input socket.

1. In the system menu (button **SYSTEM MENU**) select the symbol '' and confirm with ▶
2. In the line '***Live source view***' select '***On***' to view this picture or '***Off***to switch this picture off.
3. End with **OK** and then **SYSTEM MENU** .

Timer information box

This box appears above the tuner information box. When a timer recording is set, it shows the timer icon and the start time or date of the first programme to be recorded.
If no timer recording is scheduled, the current time is displayed.
This box disappears during playback of a disc or after a recording starts. However, you can access it during an OTR recording by pressing **SYSTEM MENU** .

! Timer starts on the day/time shown

OTR recording runs until the stop time displayed

Current time
No timer event programmed

General notes on playback

With this DVD recorder you can play back the following systems:
•) DVD Video
•) (Super)Video CD Disc
•) DVD+RW Disc
•) DVD+R Disc
•) DVD-RW (video mode, finalised)
•) DVD-R
•) CD-R
•) CD-RW
•) Audio CD
•) MP3-CD
•) Picture -CD (JPEG-data)
You can operate the video recorder using the remote control or the buttons on the front of the DVD recorder.

× ***The display will read 'PIN'***
✓ *The child lock has been activated for the inserted disc. Read the sections on 'Child lock' and 'Releasing a disc' in the chapter on 'Access control (child lock).*

× ***The menu on the screen is showing an 'X'***
✓ *Some DVD discs can be manufactured so that certain steps are required before the disc can be played, or so that only limited operation is possible during playback. When an 'X' appears on the screen the selected feature is not possible.*

× ***The screen is showing regional code information***
✓ *Since DVD films are not normally released in all parts of the world at the same time, all DVD players have a specific regional code. Discs can be given a regional code. If the regional codes differ between the player and the disc, playback is not possible.*
✓ *The regional code is shown on the label on the back of the machine.*
✓ *The regional code does not apply to recordable DVDs.*

× ***I can see the message 'EMPTY DISC'***
✓ *The disc does not contain any recordings.*

× ***'DISC ERR' will appear on the display***
✓ *Recording could not be completed correctly because of a disc error. Check the disc and clean it if necessary.*

× ***A dialog box appears asking you whether you want to delete the contents or eject the disc***
✓ *The disc inserted is a DVD+RW but its contents are not DVD video-compatible (e.g. a data disc). Recordings on this disc can only be made if the entire disc is first deleted with the* **REC/OTR** ● *button.*

Inserting a disc

1. Press the **OPEN/CLOSE** ▲ button on the front.

→ The disc tray will open. While the disc tray is opening, the display shows '*OPENING*' and then '*TRAY OPEN*' when the tray is fully open.

2. Carefully place the disc in the tray with the label facing up and press **PLAY** ► or **OPEN/CLOSE** ▲ .
→ '*CLOSING*' and then '*READING*' will appear in the display. The information on the disc will be read.

How do I insert a double-sided DVD?
Double-sided discs do not have labelling over the whole surface. The labelling for each side is in the centre of the disc. To play a side its label must be facing up.

Opening/closing the tray using the remote control
You can open and close the disc tray using the remote control.
Press and hold the **STOP** ■ *button on the remote control until the dialog box shows '*OPENING*' or '*CLOSING*'.*

Playing a DVD video disc

A menu may appear when a DVD is played back. If the titles and chapters are numbered, press a number button on the remote control.

- You can also use the ◄ , ► , ▲ , ▼ buttons or number buttons **0..9** to select a menu item and confirm with **OK** .
- You can also access the menu using **DISC MENU** on the remote control.

1. If playback does not start automatically, press **PLAY** ► .
→ title/chapter number, elapsed time will appear on the display.

2. To stop playback, press **STOP** ■ on the remote control or ■ on the DVD recorder.
3. To remove the disc, press **OPEN/CLOSE** ▲ on the front of the DVD recorder.

Playing a DVD+RW/ +R disc

DVD+ReWritable

1. If the disc is write-protected or a finalised DVD+R disc, playback starts automatically.

2. If playback does not start automatically, use the ▼ or ▲ button to select the title you want to play on the index screen.
   You can also use the or button on the front.

   With ⏮ , ⏭ you can jump to the begin or the end of the index screen.

3. Press the **PLAY ►** button.
   → title/chapter number, elapsed time will appear on the display.

   × ***I can see the message*** *'EMPTY DISC'*
   ✓ *The disc does not contain any recordings.*

4. To stop playback, press **STOP ■** on the remote control or ■ on the DVD recorder.

5. To remove the disc, press **OPEN/CLOSE ≜** on the front of the DVD recorder.

Playing an audio CD

COMPACT DISC DIGITAL AUDIO

You can also use the DVD recorder to play audio CDs

If the TV is on, the audio CD screen appears automatically.
During playback, the current track number and its elapsed playing time will show on the TV screen and on the recorder display.

1. Insert an audio CD.
   → Playback starts automatically.

2. Stop playback using **STOP ■** .
   → The number of tracks and the total time are displayed.

Playing an MP3 CD

MP3 (MPEG1 Audio Layer-3) files are highly compressed music files. Using this technology the data volume can be compressed by a factor of 10. This means it is possible to record 10 hours of music in CD quality on a single CD-ROM.

When creating MP3 CDs please note the following:
File system: ISO9660
Directory structure: maximum of 8 levels
Formats: *.mp3
Filenames: maximum of 12 characters (8+3)
Maximum of 32 albums, 999 titles
Supported sampling frequencies: 32, 44.1, 48 (kHz). Music with sampling frequencies other than these will be skipped.
Supported bit rates: 32, 64, 96, 128, 192, 256 (kbit/s)
ID3 Tag: Version 1, 1.1. In later versions the directory name is displayed as the album and the filename as the title.

Important notes for playback:
Only the first session of a multi-session CD will play back.

1. Insert an MP3 CD.
   → Playback starts automatically.

MP3 CD display

If the TV is on, the MP3 CD screen appears automatically.

During playback, the current track number and its elapsed playing time will be shown on the TV screen and on the recorder display.
During stopped playback (**STOP ■** *button) the numbers of the albums will be shown on the TV screen and on the display.*

Further information on the album, track and artist will also be displayed if included in the ID tag.

2. Stop playback using **STOP ■** .
   → The number of albums is displayed in the display.
   - Using ⏮ or ⏭ select the next or previous title.
   - You can also use the **T/C** button to select titles and albums.
     - Press the **T/C** button and use the ► or ◄ button to select the 'T' symbol for title or 'C' for chapter. Use the ▼ or ▲ buttons or the number buttons **0..9** on the remote control to select the number of the title/chapter.
   - You can also use the repeat functions (**PLAY MODE** button).

Playing a (Super) Video CD

COMPACT DISC DIGITAL VIDEO

(Super) Video CDs may be equipped with PBC (Play Back Control). This means that special playback functions (menus) can be directly selected. The video CD must be PBC compatible (see CD case). 'PBC' is active in the default settings.

1. Insert a (Super) Video CD.
   → If the '■' symbol appears in the display, start playback by pressing **PLAY ►** .
   - If a menu appears on the screen, use the remote control buttons indicated on the screen to select the menu option you want (PREV=⏮ , NEXT= ⏭) or with the number buttons **0..9** .
   - If a PBC menu consists of a list of titles, you can select a title directly.
   - Use **RETURN** to go back to the previous menu
2. Stop playback using **STOP ■** .

General

DVD's are divided in titles and chapters.

- During playback, press ▶▶| to go to the next title. If there are several chapters within a title, the next chapter.
- Press |◀◀ to return to the start of the current title/chapter.
- Press |◀◀ twice to return to the start of the previous title/chapter.

Use the T/C (title/chapter) button

- Press **T/C** *(title/chapter) and then use* ▲ *or* ▼ *to select the appropriate title.*
Make sure the symbol 'T' (title) is selected in the menu bar.
- Use **T/C** *to select chapters within a title. Press* **T/C** *and use* ▶ *to select the 'C' symbol (chapter).*
Now select the appropriate chapter with ▲ *or* ▼ *.*

Searching a disc

You can search the disc for a recording at 4x, 8x or 32x playback speed. Other speeds can only be selected via the menu bar ('▶▶').

1. During playback, press and hold |◀◀ (reverse) or ▶▶| (forwards) to switch to the search feature.
   - You can switch between the playback speeds using |◀◀ / ▶▶| .
2. To continue playback, press **PLAY** ► at your chosen location.

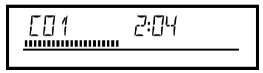
× ***No sound***
✓ *The sound is switched off in search mode. This is not a fault in your machine.*

Search feature via menu bar

- During playback press **SYSTEM MENU** *on the remote control. The menu bar will appear at the top of the screen.*
- Select the '▶▶' symbol using ▶ *or* ◀ *and confirm with* ▼ *.*
- You can now use the ◀ *or* ▶ *button to select different forward and backward search speeds.*
- If necessary, switch the menu bar off with the **SYSTEM MENU** *button.*
- To continue playback, press **PLAY** ► *.*

Still picture

1. During playback, press **PAUSE II** to stop playback and display a still picture.



Frame advance via menu bar

- During a still picture press **SYSTEM MENU** *on the remote control. The menu bar will appear at the top of the screen.*
- Select the '◖▯▸' symbol using ▶ *or* ◀ *and confirm with* ▼ *.*
- You can now use the ◀ *or* ▶ *button to go forwards or backwards one frame at a time.*
- If necessary, switch the menu bar off with the **SYSTEM MENU** *button.*

2. To continue playback, press **PLAY** ► .

Slow motion

1. During playback press **PAUSE II** on the remote control. Now hold down |◀◀ or ▶▶| to switch to slow motion.
   - You can switch between different speeds using |◀◀ or ▶▶| .

Slow motion via menu bar

- During playback press **PAUSE II** *and then* **SYSTEM MENU** *on the remote control. The menu bar will appear at the top of the screen.*
- Select the '▷' symbol using ▶ *or* ◀ *and confirm with* ▼ *.*
- You can now use the ◀ *or* ▶ *button to select different forward and backward slow motion speeds.*
- If necessary, switch the menu bar off with the **SYSTEM MENU** *button.*

2. To continue playback, press **PLAY** ► twice.

Search by time

Using this feature you can select where playback should start (select elapsed time).

1. During playback press **SYSTEM MENU** on the remote control.
   → The menu bar will appear at the top of the screen.
2. Select the '⏲' symbol using ▶ or ◀ and confirm with ▼ .
   → Playback is stopped and a box appears on the screen showing the elapsed time.
3. Enter the start time with the digit keys **0..9** from where playback should start.
4. Confirm with **OK** .

× ***The time entered will flash on the screen***
✓ *The selected title is shorter than the time entered. Enter a new time or cancel the function by pressing* **SYSTEM MENU** *.*

5. Playback starts at the time you entered.

Repeat/Shuffle play

You can mark entire sections or the whole disc for endless playback. Depending on the type of disc (DVD video, DVD+RW, video CD) you can select a chapter, title or the entire disc.

1. Select the desired chapter, title or the entire disc and start playback.
2. During playback, press **PLAY MODE** . By pressing **PLAY MODE** again you can chose from the following options:
   - •) '⟲ chapter': repeat chapter (DVD only)
   - •) '⟲ title': repeat track/title
   - •) '⟲ repeat': repeat entire disc (Video CD, Audio CD only)
   - •) '⤮ shuffle': Shuffle
   - •) Display disappears: no repeat
3. To end the repeat, press the **STOP** ■ button.
   - You can also keep pressing the **PLAY MODE** button until the displays disappear.

Repeating a passage (A-B)

You can repeat a particular passage within a title/chapter. You need to indicate the start and end of the passage.

1. During playback press **PAUSE II** at the start point.
   → You will see a still picture.
2. Keep pressing **PLAY MODE** until '⟲ A-B' appears on the screen.
   → The start point is now saved.
3. Press **PLAY** ► to start playback.
4. When the end point is reached press **OK** .
   → '⟲ A-B' appears on the TV screen.
   Playback now takes place within these points.
5. To end the repeat, press the **STOP** ■ button.
   - You can also keep pressing the **PLAY MODE** button until the displays disappear.

Scan feature

This feature plays back the first 10 seconds of each chapter (DVD) or track (CD).

1. During playback, press **PLAY MODE** . Select '⟲ scan' using **PLAY MODE** .
   → After 10 seconds the DVD recorder switches to the next chapter/index.
   - To start playback at the relevant chapter/index press **STOP** ■ and then **PLAY** ► .

Camera angle

If a DVD contains scenes that have been shot from different camera angles you can select these camera angles for playback.

1. During playback, press **PAUSE II** .
   → You will see a still picture.
2. Press **SYSTEM MENU** and select the '📷' icon using ▶ .

× ***The '📷' symbol will be hidden***
✓ *The selected scene has been shot from only one camera angle. This feature is therefore not available. For more information please read the cover of your DVD disc.*

3. Select the required camera angle with ▼ or ▲ .
   - You can also directly enter the number with the number buttons **0..9** .

   → After a short time, playback will resume from the new camera angle.
   The '📷' symbol will remain visible until a scene starts for which there is only one camera angle.

Zoom feature

The Zoom feature allows you to enlarge the video image and pan through the enlarged image.

1. During playback, press **ZOOM** .
   → The DVD recorder switches to 'PAUSE'. You will see a still picture.
2. Select the required zoom factor using ▼ or ▲ .
   → When '***press OK to pan***' appears on the screen, the zoom process is complete.
3. Press **OK** . Using ▲ , ▼ , ▶ , ◀ select the part of the image you wish to view.
4. Confirm with **OK** .
5. To stop the feature, press **PLAY** ► and then **SYSTEM MENU** .

Additonal playback features

Select the audio language

Many pre-recorded DVD discs have more than one audio language. The language initially selected for playback will be the one you selected when you first set up the DVD recorder. However you can change the audio language of the inserted disc at any time.
You can change the audio language either using the menu of the inserted disc (**DISC MENU** button) or the **AUDIO** button. The audio languages for DVD playback in the two menus may be different. Please note that with some DVDs the audio language and/or subtitle language can be changed only via the DVD menu.

1. During playback press **AUDIO** .
2. Select the required audio language using ▼ or ▲ .
   - O You can also enter the number directly using the number buttons **0..9** .
   - → Play continues in the new audio language.

Subtitles

Many pre-recorded DVD discs have more than one subtitle language. The language initially selected for playback will be the one you selected when you first set up the DVD recorder. However you can change the subtitle language of the inserted disc at any time.
You can change the subtitle language either using the menu of the inserted disc (**DISC MENU** button) or the **SUBTITLE** button. The subtitle languages in the menus may differ.

1. During playback press **SUBTITLE** .
   Select the required subtitle language using ▼ or ▲ .
   - O You can also enter the number directly using the number buttons **0..9** .
   - O You can switch off subtitles again with **0** or by pressing '***off***'.
   - → Playback continues in the new subtitle language.

Disc Manager (DM)

General information

The 'Disc Manager' is an integrated database in the DVD recorder that remembers all recordings on DVD+RW/+R discs made by this DVD recorder. This gives you a complete overview of your entire video collection at the touch of a button. The Disc Manager gives you quick and easy access to every recording **made on with this DVD recorder**. The Disc Manager also tells you which film was recorded on which disc and how many unrecorded minutes remain on the discs.
And: You can go automatically to the beginning of the selected recording and start playback.

How many discs can I save in the Disc Manager?
You can store up to 999 discs on this DVD recorder. The maximum number of titles is more than 9,000. The maximum number of titles per disc is 49.

Caution when recording with other DVD recorders
Don't use a disc stored in the Disc Manager for recording on other DVD recorders. If you use a disc to record on another DVD recorder, then this disc will no longer be recognised by the Disc Manager. In this case, delete the disc from the Disc Manager's memory and then add it after it has been recorded.

Adding 'child-proof discs'
If you want to add child-proof discs you need to enter the PIN code.

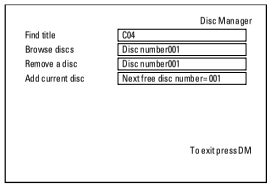
Adding a disc to the Disc Manager

You can only add DVD+RW or DVD+R discs to the Disc Manager since other discs do not hold any information on the titles or lengths of the recordings. These discs have to be at least once recorded in the DVD-Recorder. A table of content have to be available.
DVD+R discs can also be finalised. Other discs cannot be added to the Disc Manager.

Recordings are saved automatically
On a disc that has been added to the Disc Manager, you can make new recordings as often as you like using this DVD recorder. The titles of these recordings will be stored in the Disc Manager automatically.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Insert the DVD+RW/+R disc that you want to add in the DVD recorder.



× ***When I insert a disc I see a number on the screen in the index picture screen in the top left-hand corner***
✓ *You have inserted a disc that has already been registered by the Disc Manager.*

2. Press the **DISC MANAGER** button on the remote control.
3. Select '***Add current disc***' using ▲ or ▼ and confirm with ▶ .
4. Confirm with **OK** .
   - → The disc number will be added to the Disc Manager.
   - → The disc number is then displayed and the disc tray opens automatically.
     The disc is now stored in the Disc Manager under the displayed disc number.
     Please write this number on the disc and on the cover.

Why do I need to label the discs?
When searching for unrecorded free space or available recordings, you will asked to insert the appropriate discs (disc numbers).

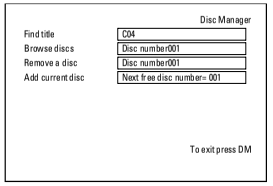
5. To end, press **DISC MANAGER** .

The DVD recorder will immediately recognise that this disc is saved in the Disc Manager. When this disc is inserted the disc number will appear in the title overview in the top left-hand corner.

Removing discs from the Disc Manager

Every DVD+RW/+R is stored with a number in the Disc Manager (DM). You can remove this disc number from the Disc Manager to use the Disc Manager's memory for new discs or to remove damaged discs from memory.

1. Press **DISC MANAGER** on the remote control.
2. Select '***Remove a disc***' using ▲ or ▼ and confirm with ▶ .



3. Select the disc number with ▲ or ▼ and confirm with **OK** .

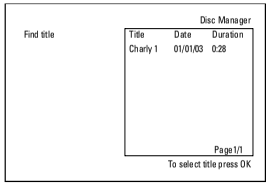
Disc contents are not deleted.
The disc is only removed from the Disc Manager's memory. Its contents remain unchanged.

4. To end, press **DISC MANAGER** .

Searching for a title in the Disc Manager

This function can be used to quickly and easily find and play back a recording saved in the Disc Manager.

1. Press **DISC MANAGER** on the remote control.
2. Select '***Find title***' using ▼ or ▲ and confirm with ▶ .
   → A list of the titles of all recordings stored in the Disc Manager (DM) will appear on the TV screen.



What do the displays on the screen mean?
'***Title***' = *Title*
'***Date***' = *Date of the recording*
'***Duration***' = *Length of the recording*

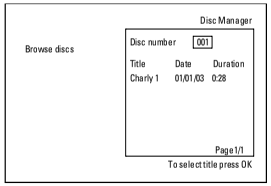
3. Select the title that you want to play back with ▼ or ▲ .
4. Confirm with **OK** .
   → The DVD recorder will jump to the start of the selected recording.

× ***I see the message 'Insert disc number' on my screen***
✓ *The selected recording is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc. After a brief check, the DVD recorder will jump to the start of the selected recording.*

Searching discs

You can easily search for the title of a recording stored in the Disc Manager. To do this, the appropriate disc does not have to be in the DVD recorder.

1. Press **DISC MANAGER** on the remote control.
2. Select '***Browse discs***' using ▼ or ▲ .
3. Confirm with ▶ .
   → The screen will show the contents of the last Disc Manager disc used.



4. Use ▲ or ▼ to select a different disc number if necessary and confirm with ▶ .

What do the displays on the screen mean?
'***Title***' = *Title*
'***Date***' = *Date of the recording*
'***Duration***' = *Length of the recording*

5. Press ▲ or ▼ to select the desired title.
6. Confirm with **OK** .
   → The DVD recorder searches for the start of the appropriate recording.

× ***I see the message 'Insert disc number' on my screen***
✓ *The selected recording is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc.*

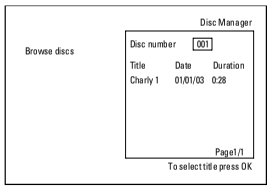
Searching for a blank section

You can search for space for a new recording on the disc (at least 1 minute of blank space), for example at the end of existing recordings. This only works with discs which have already been stored in the Disc Manager.

1. Press **DISC MANAGER** on the remote control.
2. Select '***Browse discs***' using ▲ or ▼ .
3. Confirm with **OK** .
   → A list of the recordings on the disc you have selected will appear on the TV screen.
4. Use ▲ or ▼ to select a disc (disc number) on which there is enough space for the recording.

How can I see how much space is available for the recording?
*The space available is designated as '**Empty**'. The time is displayed next to the title '**Empty**'. You can use the* **REC MODE** *button to change the recording mode (recording time).*

How can I choose the titlel 'Empty' if there were many recordings on the disc?
*In this case press ▶ and then select with ▼ , ▲ the title '**Empty**'.*



5. Select the title '***Empty***' with ▲ or ▼ .
6. Confirm with **OK** .

× ***I see the message 'Insert disc number' on the screen.***
✓ *The blank space is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc.*

→ The DVD recorder rewinds to the beginning of that particular part and automatically switches to Stop.

General

Using the 'Digital Photo Manager', you can view and modify JPEG pictures from a memory card, Picture CD, DVD, or a CD ROM. You can store them on a DVD+RW/+R or on the memory card.
In addition, you can store the pictures in a so-called album in a specific order, yet without changing the order in which the pictures are stored on the memory card.
Moreover, you can view the pictures in a slide show at adjustable intervals.
Store the slide show on a DVD+RW/+R so you can view them on a DVD player.

How many pictures can be organized from the DVD-Recorder?

Since the storage size of a JPEG picture depends on different parameters (quality, picture information, JPEG compression, resolution of the camera,...) the limitation is only the available storage capacity.
You can store up to a maximum of 999 photos in one album on a DVD+RW/+R or memory card.
In case you want to store pictures on a medium that cannot be recorded by the DVD recorder (Picture CD, CD-ROM, finalised DVD+R, DVD), you can store up to a maximum of 100 pictures per album in 20 albums. These albums will be stored in the internal memory with the appropriate disc ID-number. With this number the allocation to the different disc is possible.

Select from the following chapters:

'The PC (PCMCIA) card',
to install or remove the memory card.

'Showing JPEG pictures from a roll' ,
in order to view and modify the pictures and create slide shows from the roll.

'Advanced editing of JPEG-pictures,
for advanced editing options such as color, sharpness...

'Creating an album ',
to arrange pictures from different rolls in a definite order and to create a slideshow from the album.

'Making a 'DVD compatible' slide show',
Make a slide show from the roll/album for viewing on a DVD-player.

'Storing rolls/albums on a DVD+RW/+R' ,
Store your JPEG pictures for archiving on a DVD+RW/+R.

'Changing roll settings' ,
to modify the rolls to your personal preferences.

'Changing album settings' ,
to modify the albums to your personal preferences.

'Changing the media settings',
to modify the storage media (DVD+RW/+R, memory cards) to your personal preferences.

What is the difference between a 'Roll' and 'Albums'?

'Roll'

A folder containing JPEG pictures. It is comparable with a conventional 35mm film for cameras. Rolls will be created automatically from the digital cameras.

'Albums'

A binary file containing references to the pictures on the rolls. It is comparable with a conventional photo album that may contain the pictures of different films (rolls).
You can delete an album without deleting the pictures of the rolls.

The PC (PCMCIA) Card

In this DVD-Recorder you can use the following types of memory cards with an adapter:
•) SD memory cards
•) Multimedia Card
•) CompactFlash
•) SmartMedia
•) Memory Stick/Memory Stick pro
•) Micro Drive
•) xD Picture Card

The DVD-Recorder can read/write files, which were stored on memory cards using the file systems FAT 8, FAT 12, FAT16 and FAT 32. This means that it can handle memory cards larger than 2 GB.

Inserting the PC Card

1. If necessary, insert the memory card into the PC Card adapter first.
   The label must be facing up.
   The contacts must be facing the device.
2. Insert the PC Card into the media slot in the front of the recorder until the EJECT button sticks out of the device front completely.
   Press this button only if you want to remove the PC Card.

Removing the PC Card

1. Press the EJECT button next to the PC Card.
2. This will push the card out of its slot.
   If the card remains in the slot, insert the PC Card once again and press the EJECT button again.

Warning !
Insert/Remove the PC Card only when there is no access to the memory card. This could damage the memory card.

You can recognise the access by:
•) A moving disc symbol lights up on the top left corner of the screen

If you were not sure, press in the 'Digital Photo Manager' the button **PHOTO** . This will take you directly into the '***Media menu***' screen.
You can also switch the DVD-Recorder off with the **STANDBY** ⏻ button.

Showing JPEG pictures from a roll

The DVD recorder can read JPEG pictures stored on a CD-ROM, Picture CD, memory card, or a DVD and write them on a DVD+RW/+R or memory card.

Please observe the following:
- The file extension has to be '*.JPG' and not '*.JPEG'.
- These pictures must be stored in the root directories or in a subfolder called 'DCIM' in folders. These will be recognized by the DVD recorder as rolls (comparable with a 35mm roll for cameras). You can select the directories (folders) as rolls in the '***Media menu***'.
- This device is compatible with still pictures (JPEG)
- It can only display DCF-standard still pictures or JPEG pictures e.g. TIFF. It cannot play back moving pictures, Motion JPEG, and other formats, or pictures in formats other than JPEG, or pictures associated with sound e.g. AVI-files.

1. Insert the medium you want to use (CD, DVD+RW/+R, memory card).
2. Press **PHOTO** on the remote control.
   → The '***Media menu***' will appear.
3. Use ▼ or ▲ to select the medium you want to process (disc or memory card).
   → If you did not insert the corresponding medium (disc or memory card), a warning sign will appear above the symbol on the left hand side of the screen.
4. Confirm with ► .
5. Select '***Roll***' using ▼ or ▲ and confirm with ► .
   → You will see an overview with the first picture of each roll that contains pictures. The display and the description of the roll will depend on the camera or the computer program used to create this roll.
6. Select the desired roll using ▼ or ▲ and confirm with **OK** .
   → The data will be read and then an overview of the stored pictures will be displayed.
   - You can select a picture for viewing or editing with ◄ , ► , ▼ , ▲ .

Fast browsing trough the pictures

With ▶▶| or |◀◀ you can switch one page forward or backward.
You can also select a picture with the number buttons **0..9** *on the remote.*

7. Press **OK** to select the desired picture.
   → The picture will be displayed as a full picture on the screen.

Editing JPEG pictures

1. On the corresponding pictures press **SELECT** to select them for editing.
   → The picture frame appears in a different color.
   If you want to deselect the pictures, press **SELECT** on the selected pictures again.
2. Keep pressing ▲ until the menu bar is selected. Select one of the displayed functions with the ► or ◄ button.
   - '***Menu***' leave the menu
   - '***Play***' starts the slide show
   - '***Erase***' erases the selected pictures
   - '***Rotate***' rotates the selected pictures by 90
   - '***Copy***' copies the selected pictures on the other loaded media (from memory card to DVD+RW/+R or vice versa)
   - '***Select all***' selects all pictures
   - '***Cancel***' cancels the changes

Using the buttons on the remote

- '***Play***' *Button* **PLAY ►**
- '***Erase***' *Button* **CLEAR** *and then* **OK**
- '***Rotate***' *Button* **ANGLE**

Slide show

You can display JPEG pictures in the selected roll automatically one after the other at adjustable intervals.

- **Starting the slide show**
  Press **PLAY ►** to start the slide show.
- **Interrupting the slide show**
  - Press **PAUSE II** . This will stop the automatic display of the pictures.
  - Press **PLAY ►** to resume the slide show.
- **End the slide show**
  Press **STOP ■** . The picture overview will appear.

Changing the slide show settings

1. Press **SYSTEM MENU** during playback of the slide show.
2. Select one of the displayed functions with the ◄ or ► button.
   - '***Overview***'
     Returns to the picture overview. Has the same function as **STOP ■**
   - '***Play***'
     Resumes the slide show. Has the same function as **PLAY ►**
   - '***Timer***'
     Select one of various speeds by pressing ▼
     Confirm with ► .
     Start the slide show with **PLAY ►** .
   - '***Repeat***':
     Switches repeat playback of the slide show on and off

Using the buttons on the remote
- *Repeat playback:Button* **PLAY MODE**
- *Enlarge pictures:Button* **ZOOM**
- *Edit pictures:Button* **EDIT**

Advanced editing of the JPEG pictures

You can edit the pictures in the DVD recorder and then store them back on the memory card or a DVD+RW/+R. The original picture remains unchanged, and the modified one is additionally stored on the medium.
Please make sure the memory card or DVD+RW/+R is not write-protected and has enough storage space.

1. Press at the required picture the button **EDIT** .
2. Select one of the displayed functions with the ◄ or ► button.

Using the buttons on the remote
- **ANGLE** : *Rotates the picture*
- **ZOOM** : *Enlarge the picture*
- **STOP ■** : *Returns to the picture overview*
- **CLEAR** : *Discard the changes. The picture will be reloaded.*

'*Overview*'

Returns to the picture overview.

'*Rotate*'

Rotates the picture by 90 each time you press **OK** .

'*Flip*'

Mirrors the picture along its vertical axis when you press **OK** .

'*Zoom*'

Using this function, you can enlarge the picture and pan through the enlarged picture.

1. Press **OK** to activate the zoom function.
2. Select the area to be enlarged with ◄ , ► , ▼ , ▲ .
3. You can press **ZOOM** to enlarge the selected area at several steps.
4. Press **OK** to return to the normal picture size.

'*Filters*'

Using this function, you can modify the picture properties.

1. Press ▼ and select one of the displayed functions using ▼ or ▲ . Confirm with ► .
   - '***Sepia***': **Displays the entire picture in brown colors. It gives the picture an 'antique' appearance.**
   - '***Negative***':
     Converts the picture into a black-and-white negative.
   - '***Colour negative***':
     Converts the picture into a color negative. Comparable to a color negative film.
   - '***Black & white***':
     Converts the picture into a black-and-white picture.
   - '***Soften***':
     Use this function to reduce picture sharpness in three steps, from edge blurring to a visible blur.
2. To end, keep pressing ▲ until the menu bar is selected.

'*Colour*'

Using this function, you can change the red, green, and blue color components of the picture.

1. Press ▼ .
2. Use ▼ or ▲ to select the corresponding color control.
3. Change the color using ◄ or ► .
4. To end, keep pressing ▲ until the menu bar is selected.

'*Reset*'

This setting will appear only if changes have already been made to the picture. If you want to discard the changes, confirm with **OK** .

'*Save*'

This setting will appear only if changes have already been made to the picture. If you want to save the changes, confirm with **OK** .

Creating an album

You can store pictures contained in a memory card or DVD+RW/+R in a so-called '***Albums***' in a different order. Albums are binary files containing information on the orientation and storage location of the pictures.
Albums from a medium that cannot be recorded by the DVD recorder (Picture CD, CD-ROM, finalised DVD+R), will be stored in the internal memory of the DVD recorder. You can store up to a maximum of 100 pictures per album in 20 albums.

Adding pictures to an album

1. Select '***Albums***' in the '***Media menu***' using ▼ or ▲ and confirm with ► .
2. An overview of the albums you already created will appear. Select '***New album***' with ▼ to create a new album.
3. Press ► . The menu '***Album Settings***' will appear.
   In a new album, the line '***Add photos***' is already highlighted.
4. Confirm with **OK** .
5. The roll overview will appear.
6. Use ▼ or ▲ to select the roll from which you want to add pictures to the album.
7. Confirm with ► .
   The picture overview will appear.
8. Use ◄ , ► , ▼ , ▲ to select the pictures you want to add to the album.
9. Confirm each selected picture with **SELECT** . Do not pay attention to the order of the pictures. You can change it later in the album.

Select all pictures
*If you want to store many pictures in the album, select '**Select all**'. Then use* **SELECT** *to select the pictures you don't want to add to the album.*
These pictures will be deselected.

10. Keep pressing ▲ until the menu bar is highlighted.
11. Select '***Done***' with ◄ or ► to add all selected pictures to the album.
12. Confirm with **OK** .
    The album will be created. 'SAVING' will appear in the display while the album is created.
    Do not remove the medium from the device!
13. The menu '***Album Settings***' will then automatically appear.
14. To add additional pictures, use ▼ to select '***Add photos***' and confirm with **OK** .
15. Repeat steps 5 to 14 until the album contains all the desired pictures.

Changing the picture order within an album

You can change the order of the pictures within an album as you wish. The order of the pictures of the rolls remains unchanged.

1. Select '***Albums***' in the '***Media menu***' using ▼ or ▲ and confirm with ► .
   An overview of the albums you already created will appear.
2. Press ► to select the desired album. The '***Album Settings***' menu will appear.
3. Select '***Overview***' by pressing ▼ . The '***Overview***' option can be found on the second menu page
4. Confirm with **OK** .
5. Use ▼ , ▲ , ◄ , ► to select the picture you want to move to a different position.
6. Press **SELECT** . The picture frame appears in a different color.
7. Keep pressing ▲ until the menu bar is highlighted.
8. Select '***Move***' using ◄ or ► and confirm with **OK** .
9. Use ▼ , ▲ , ◄ , ► to select the position **before** which the desired picture is to be moved.
10. Confirm with **OK** . The picture will be inserted.

Editing pictures in an album

You can also erase, rotate, or hide pictures in an album. These changes will only affect the album. The pictures on the disc or the memory card will remain unchanged.

1. Select the pictures you want to change in the '***Album overview***' using **SELECT** .
2. Keep pressing ▲ until the menu bar is highlighted.
3. Select one of the displayed functions with the ◄ or ► button.
   - '***Menu***': **Closes the current menu**
   - '***Play***':
     Starts the slide show of the album
   - '***Move***':
     Changes the order of pictures within an album.
   - '***Erase***':
     Erases the pictures from an album. The picture on the media remains unchanged.
   - '***Rotate***:
     Rotates pictures by 90
   - '***Hide***':
     Hides pictures for the slide show
   - '***Select all***':
     Selects all pictures
   - '***Cancel***':
     Discards all changes

Using of the buttons on the remote
- '***Play***':
  Button **PLAY MODE**
- '***Erase***':
  Button **CLEAR**
- '***Rotate***':
  Button **ANGLE**

Making a 'DVD compatible' slide show

Using this function, you can record the pictures in such a way, that you can view the slide show from a roll or an album on a DVD player.
The slide show will be stored on the DVD+RW/+R as a video title. If you want to store the photos in the JPEG format in addition to the video title, you must prepare the DVD+RW so that you can store both pictures and videos. See section 'Preparing a DVD+RW/+R'.
On a DVD+R you can only store either photos or videos. A combination of JPEG photos and video is not possible.

Making a slide show from an album

1. Select the disc (top symbol) in the '***Media menu***' and confirm with ► .
2. Add pictures to the album as described in chapter 'Adding pictures to the album'.
3. You can change the order of the pictures, erase unwanted pictures, enter a new name for an album, or change the cover picture of the album, until the album corresponds to your personal preferences.
4. Select '***Make video title***' in the menu '***Album Settings***' using ▼ , ▲ .
5. Confirm with **OK** .
   → 'SAVING' will appear in the display and the screen will show the time left until completion.
   The new album will be stored on the DVD+RW/+R as a video title (movie). It will appear in the index picture screen as a separate title.

   This video title will be recorded automatically after the last recording. No existing titles will be overwritten.
   Ensure that there is enough space on the disc.
6. To end, press **DISC MENU** .

Making a slide show from a roll

Each roll will be stored as one video title on the DVD+RW/+R.
If you want to make a video title from different rolls, you have to create an album first. Then you can store the album as a video title on the DVD+RW/+R.

1. In the '***Media menu***' screen select the memory card (symbol in the middle) and confirm with ► .
2. Select the line '***Rolls***' and confirm with ► .
3. Select with ▼ , ▲ , the roll from which you want to make a video title.
4. Press ► the '***Roll Settings***' menu will appear.
5. Select the line '***Make video title***' using ▼ , ▲ an confirm with **OK** .
   → 'SAVING' will appear in the display and the screen will show the time left until completion.
   → The new roll will be stored on the DVD+RW/+R as a video title (movie). It will appear in the index picture screen as a separate title.

   This video title will be recorded automatically after the last recording. No existing titles will be overwritten.
   Ensure that there is enough space on the disc.
6. To end, press **DISC MENU** .

Storing rolls/albums on a DVD+RW/+R

If you want to store the JPEG pictures from the rolls/albums on a DVD+RW/+R, you must first prepare the disc.

Preparing a DVD+RW/+R

1. Press **PHOTO** on the remote control. The media menu will appear.
2. Use ▼ or ▲ to select the disc alone as a medium. If you did not insert a disc, a warning sign will appear above the symbol on the left hand side of the screen.
3. Press ► .
4. Select '***Media settings***' using ▼ and confirm with **OK** .
5. Use ▼ or ▲ to select whether you want to store '***Photo only***'or '***Video & photo***' together on this disc.
   Please note, that DVD+R's or memory cards can only be prepared for '***Photo only***'.

   What is the difference?
   '*Photo only*'
   The DVD+RW/+R will be prepared so that only pictures can be stored on the entire disc (4,4 GB).
   '*Video & photo*'
   On the DVD+RW/+R a space (650 MB) will be reserved for storing pictures additionally to movies. So you can store the appropriate photos after the movie.
   *A DVD+R can not be prepared for '**Video & photo**'*

   How long does this process last?
   *To prepare a disc for '**Video & photo**', a new DVD+RW has to be formattet first. This can take up to 25 minutes. You can speed up the process, if you use a prerecorded disc.*
6. Confirm with **OK** .

   WARNING!
   All data on the disc will be erased.
   - If you want to continue, press **OK** .
   - To cancel the process, press ▼ or ▲ .

   → 'PREPARING' will appear in the display until the preparation is complete.

   → If the disc has been successfully prepared, the '***Media settings***' menu will appear, indicating the available storage space. (4.4 GB for '***Photo only***'/650MB for '***Video & photo***')

General

With this DVD recorder, you can record on two types of DVD:

DVD+RW (Digital Versatile Disc + wiederbeschreibbar)
This disc can be written to and then the contents deleted.

DVD+R (Digital Versatile Disc + einmalbeschreibbar)
This type of disc can only be recorded once.

If you want to play this DVD in a DVD player it must be finalised using the '***Finalise disc***' function. It is not possible to make further recordings using this disc.

If this disc is to be played in a DVD recorder it must not be finalised. Recordings can be added and deleted. The disc space (playback time) from the deleted recording cannot be recovered for further recordings

- To add a new recording at the end of the last recording on the disc, hold down the **REC/OTR ●** button until the message 'SAFE REC' appears on the display.
- For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.
- If the end of a disc is reached during recording, recording will stop and the Recorder will turn itself off automatically.

Recording without automatic switch-off

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Insert a disc on which the recording is to be made.
   → This disc is then checked for content and system. 'READING' will appear on the display.

2. Wählen Sie mit der Taste ▼ oder ▲ jenen Titel der überschrieben werden soll, oder '***Empty title***'.
   - Sollte eine neue DVD+RW/+R eingelegt sein, erscheint im Anzeigefeld 'EMPTY DISC'. Da noch keine Indexbild-Anzeige verfügbar ist, können Sie sofort mit der Aufnahme beginnen.
   - Sollten Sie Aufnahmen zwischen bereits vorhandenen Aufnahmen einfügen, beachten Sie die Länge der alten und der neuen Aufnahme. Sollte die neue Aufnahme zu lang sein, wird die nachfolgende Aufnahme (Titel/Kapitel) überschrieben.

× ***A dialog box appears asking you whether you want to delete the contents or eject the disc***
✓ *The disc inserted is a DVD+RW but its contents are not DVD video-compatible (e.g. a data disc). Recordings on this disc can only be made if the entire disc is first deleted with the* **REC/OTR ●** *button.*

× ***The message 'Title limit' appears on the screen if a recording is to be made***
✓ *A disc may contain a maximum of 48 titles (including blank titles). Delete titles or change the disc.*

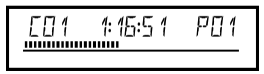
3. If necessary, use the **MONITOR** button on the remote control to switch to the internal tuner in the DVD recorder.

4. Use **CHANNEL +** or **CHANNEL −** to select the programme number (station name) you want to record.
   → This will appear on the display:

Programme numbers of the external inputs:
'EXT1'
Scart socket at the back **EXT1 TO TV-I/O**
'EXT2'
Scart socket at the back **EXT2 AUX-I/O**
'CAM1'
Front SVHS/audio sockets **S-VIDEO (CAM1) / AUDIO L/R (CAM1)**
'CAM1'
Front video/audio sockets A/V **S-VIDEO (CAM1) / AUDIO L/R (CAM1)**
Switching between the **S-VIDEO (CAM1)** *and* **VIDEO (CAM1)** *sockets takes place automatically. If a signal is available at both sockets at the same time, the signal at the* **S-VIDEO (CAM1)** *socket has priority.*
'CAM2'
Digital Video (i Link) front socket **DV IN (CAM2)**

5. To start recording, press **REC/OTR ●** on the remote control or **RECORD** on the DVD recorder.
   - If you want to start the recording at the end of the existing recordings, hold down the **REC/OTR ●** button until the message 'SAFE REC' appears on the display. For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.

   → This will, for example, appear in the display:



Insert chapter markers
During recording you can mark scenes so you can find them or hide them later.
During recording, press **EDIT** *at the start point.* ***'Inserting marker'*** *appears on the TV screen. In the display, the number of the 'CHAPTER' increases by one.*
For further information on titles and chapters, see the section on 'Changing to another title/chapter' in 'Playback'.

6. Use the **STOP ■** button on the remote control or **■** on the machine to stop the recording.
   → 'MENU UPDT' will appear on the display.
   The DVD recorder is writing the list of contents. Wait until the message disappears from the display. The recording is then complete.

   → The display will read 'DISC ERR'.
   Recording could not be completed correctly because of a disc error. Check the disc and clean it if necessary.

Making recordings on DVD+R discs compatible
*If you want to play back the recording on a DVD player, you need to finalise the disc in the DVD recorder. You can prepare your DVD for use in a DVD player using the '****Finalising****' feature. See 'Finalising DVD+R discs' in 'Managing the disc contents'.*

Interrupt recording (Pause)

With this function you can interrupt and continue recordings without creating a new title

1. During recording press **PAUSE II** , for example to avoid recording the commercials.

2. To continue recording, press **REC/OTR ●** .

End recording
To end the recording, press the **STOP ■** *button. Wait until 'MENU UPDT' disappears from the display.*

Recording with automatic switch-off (OTR one-touch-recording)

With this function you can start a recording manually but end automatically within a certain time. Thus avoid recordings till the end of the disc.

1. Insert a disc.

2. If necessary, use the **MONITOR** button on the remote control to switch to the internal tuner in the DVD recorder.

3. Use **CHANNEL +** or **CHANNEL −** to select the programme number (channel name) you want to record.

4. Press **REC/OTR ●** on the remote control.
   - Each time you press **REC/OTR ●** you will add 30 minutes to the recording time..

How can I cancel the recording time I have just entered?
To delete an entry, press **CLEAR** *while the display shows the recording time.*

How can I check the remaining recording time?
Press **SYSTEM MENU** *while an OTR is in progress. The time at which the recording will end will appear on the TV screen in the timer info box.*

Preventing accidental erasing of discs

To ensure you don't accidentally delete a recording you can protect the entire disc. You can only ever protect the entire disc. You cannot protect individual recordings.

What happens with DVD+R discs?

As long as these discs are not finalised, they can be protected against accidental erasure in the same way as DVD+RW discs.

1. Insert the disc to be protected.
2. While the index screen is displayed press **STOP ■** on the remote control.
   → The first title is highlighted.
3. Press ▲ .
   → This takes you to the disc info screen.
4. Press the ▶ button.
   Select the '***Protection***' line.
   Confirm with ▶ .
5. Select '***Protected***' with the ▼ button and confirm with **OK** .
6. Press ◀ and then **DISC MENU** to terminate.
   → The entire disc is now protected.
   If an attempt is made to record on a protected disc, 'DISC LOCK' will appear on the display and '***Disc locked***' will appear on the screen.

*If you later decide to record on the disc, follow these steps but select '**Unprotected**' at step 5 .*

Lining up recordings within a title (assemble cut)

On a recorded DVD+RW disc you can add another recording to an existing title. This recording is added to the title as a 'chapter'. The existing information will be overwritten starting from this point. Titles will also be overwritten that follow the current title depending on the length of the new recording. The recording type (Quality) will be taken from the current title.
To play back this recording, press **SYSTEM MENU** and use the ▶ button to select the 'C' (Chapter) symbol. You can also use the **T/C** key.

For further information, see 'Changing to another title/chapter' in 'Playback'.

What happens with DVD+R discs?

New recordings on 'DVD+R' discs can only be added after existing recordings. It is not possible to overwrite existing recordings on 'DVD+R' discs.

1. In the index display, find the title to which the new recording is to be added.
2. Look at the last minute of the old recording (playback)
3. Press **PAUSE II** on the remote control at the position where the new recording is to go.
   → '**II** ' will appear on the screen.
   - To monitor the recording you can press **MONITOR** to switch to the internal tuner.
4. Now start recording as usual by pressing **REC/OTR ●** on the remote control.
   → The new recording will be added.
5. Stop recording with **STOP ■** .

Selecting the recording mode (picture quality)

You can select the picture quality of the recording using the recording quality feature and hence the maximum recording time per disc.
To check the quality of a recording mode you can make a 'test recording' with the desired recording mode. Check during playback the quality of this 'test recording'.
During playback, the correct picture quality will automatically be selected.

1. Select the record mode with the button **REC MODE** on the remote control before you start the recording.
   → Please observe, that you can not switch the recording type during recording. You have to interrupt the recording with the **STOP ■** button.
   - '***M1***': High Quality offers the best picture quality and a recording time of 1 hour.
   - '***M2***': Standard Play (pre-recorded DVD quality) offers standard picture quality and a recording time of 2 hours.
   - '***M2x***': Standard Play plus (better than S-VHS quality) offers standard picture quality and a recording time of 2.5 hours.
   - '***M3***': Long Play (S-VHS picture quality).
   - '***M4***': Extended Play (better than VHS picture quality). Recording time of 4 hours.
   - '***M6***': Super Long Play (VHS picture quality). Recording time of 6 hours.
   - '***M8***': Super Extended Play (VHS-LP picture quality). Recording time of 8 hours.

You can also set a record mode as a basic setting

1. Press the **SYSTEM MENU** button.
2. Select '⚙' symbol with ◀ or ▶ .
3. Select '***Record settings***' using ▼ or ▲ and confirm with ▶ .
4. In the line '***Record mode***' select the recording type with ◀ or ▶ .
5. Confirm using **OK** and **SYSTEM MENU** .
6. If you have selected the recording mode '***M3***', '***M4***', '***M6***' or '***M8***', you can select the '***Stndrd***' (Standard) or '***Sport***' setting (for rapid movements) in the '***Filter mode***' line.

Automatic recording from a satellite receiver (Sat recording)

You can use this function if your own a satellite receiver that can control other devices via a scart cable and a programming function (timer). For more information, please see the operating instructions for the satellite receiver.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **SYSTEM MENU** on the remote control.
   → The menu bar appears.
3. Select '⚙' symbol with ◀ or ▶ .
4. Select '***Record settings***' using ▼ or ▲ and confirm with ▶ .
5. Select '***EXT2***' in line '***Sat record***' with ◀ or ▶ .

Switching off 'Sat Recording'

*To switch off the function, select '**Off**' using ▶ or ◀ .*

6. Confirm with **OK** .
7. Use a scart cable to connect scart socket **EXT2 AUX-I/O** on the DVD recorder to the corresponding scart socket on the satellite receiver.
8. To end, press **SYSTEM MENU** .
9. Insert a disc you want to use for recording.
10. Programme the satellite receiver with the required information (programme number of the TV channel, start time, finish time). If necessary, please see the operating instructions for your satellite receiver.
11. Switch off the DVD recorder using **STANDBY** ⏻ .
    → 'SAT' also appears in the display to indicate that the function is active.

The DVD recorder is now ready to record.
→ The start and end of the recording is controlled via scart cable **EXT2 AUX-I/O** .

Direct Record

Can you record the right TV channel in seconds when the DVD recorder is switched off? No problem. If recording is started manually, the **switched-off** DVD recorder takes the current TV channel from the TV set via the scart cable.
You will find more information on how to switch 'Direct record' on or off in the next section 'Direct record'.

How does Direct Record work?

The DVD recorder compares the TV channel selected on the TV set with its stored TV channels via the scart cable. If the same TV channel is found, it switches the DVD recorder to the corresponding programme number and starts recording.

Please do not change channel on the TV during the search. This could affect the tuning of the DVD recorder.

1. On the TV set, select the programme number you want make the recording from.
2. Press **REC/OTR ●** with the DVD recorder **switched off**.
   → The display will read '*WAIT*'
   The DVD recorder is comparing its saved TV channels with those of the TV set. Please do not change the TV channel on the TV set while '*WAIT*' is shown in the display.
   → '*NOTV*' appears in the display
   This TV channel could not be found in the DVD recorder's memory.
   Check that all TV channels saved on the TV set are available on the DVD recorder. If required, save any missing channels. Please read 'Manual TV channel search' in 'Installing your DVD recorder'.
   Check the connectors at both ends of the scart cable.
   Check your TV's operating instructions to see which scart socket is used for video signals.
   If the problem persists, you won't be able to use this feature.
3. Stop recording with **STOP ■** .

Switching 'Direct Record' on or off

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **SYSTEM MENU** on the remote control. The menu bar appears.
3. Select '⚙' symbol with ◄ or ► .
4. Select '***Record settings***' using ▼ or ▲ and confirm with ► .
5. Select '***Direct Record***' using ▼ or ▲ .
6. Select '***On***' (Direct Record on) or '***Off***' (Direct Record off) using ► .
7. Confirm with **OK** .
8. To end, press **SYSTEM MENU** .

Recording from a video recorder/DVD player

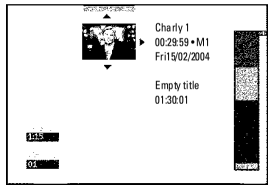
Please observe:
Most pre-recorded video cassettes or DVDs are copy-protected. If you try to copy these, the message '*COPY PROT*' will appear in the display of the DVD recorder.

1. Schalten Sie das Fernsehgerät. Wählen Sie falls erforderlich die Programmnummer für den DVD-Recorder.
2. Switch on the DVD recorder.
3. Insert a DVD+RW/+R ready for recording.
4.
5. Locate on the DVD+RW/+R the position where you want to start the recording.
6. If necessary press **STOP ■** to stop playback.
7. Select recording mode picture quality) using **REC MODE** .
8. Press **MONITOR** to display the picture of the Video recorder/DVD player on the screen.
9. Use ▼ , ▲ to select the programme number of the input socket to which the Video recorder/DVD player is connected. ('***EXT1***' for **EXT1 TO TV-I/O** , '***EXT2***' for **EXT2 AUX-I/O**)
10. Switch on the video recorder/DVD player.
    O In case playback has started automatically, interrupt it with **STOP ■** or **PAUSE II** .
11. Start recording by pressing **REC/OTR ●** on the DVD recorder and playback by pressing **PLAY ►** on the video recorder/DVD player.

× ***When copying video cassettes, 'NO SIGNAL' appears in the display of the DVD recorder***
✓ *Check whether the cable connectors are properly inserted.*
✓ *If the recording is made from a video recorder, change the 'tracking' setting on the video recorder.*
✓ *In case of bad or non-standard video input signals, the DVD recorder may be unable to detect the signal.*

× ***When copying DVD video discs or pre-recorded video cassettes, the picture is fuzzy and brightness varies***
✓ *This happens when you try to copy DVDs or video cassettes that are copy-protected. Although the complete cassette/disc is recorded, only parts without copy protected signal can be played back. This interference is unavoidable with copy-protected DVDs or video cassettes.*

General



When a recording is made to disc, the following additional information is also stored at the beginning of the recording:
•) Name of the recording
If the TV station does not transmit a name, only the channel number and time will be stored as the name
•) Length of the recording
•) Record type (Quality)
•) Date of the recording
•) Index picture of the recording

A marker will be set every 5-6 minutes if the '***Auto chapters***' function is activated in the '***Record settings***' menu. This marker is known as a 'chapter'.
These markers can be changed when the recording has finished.

Can markers be set on a DVD+R disc?

Markers can be set on these discs if they have not been finalised.

It is also possible to add 'chapters' later. This means that scenes you do not want to see during playback can be hidden or skipped. During playback you can watch your recording as a continuous sequence without the hidden chapters.

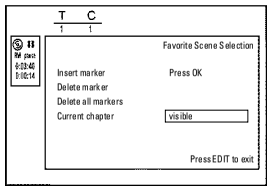
Favorite Scene Selection

In this menu you can adapt a title to suit your particular needs.
You can insert/delete chapter markers, hide chapters, select a new index, or split up a title. Press **EDIT** on the remote control during recording to open this menu.

Insert chapter markers

During recording, you can set or delete chapter markers within a title. The maximum number of chapters per disc is 255 and 99 per title. If one of these limits is reached the following message will appear on the screen: '***Chapter limit***'. You need to delete some markers before you can insert new ones or make recordings.

1. During playback, press **EDIT** on the remote control at the appropriate point.
   → The '***Favorite Scene Selection***' menu appears on the TV screen.



2. Confirm '***Insert marker***' by pressing **OK** .
   → '***Inserting marker***' appears on the TV screen.

'X' will appear on the screen:

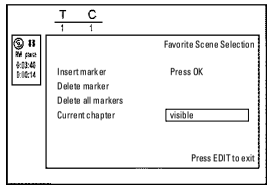
This DVD is write-protected or the disc is a finalised DVD-R. Subsequent changes cannot be made.

3. To stop this function, press **EDIT** .

Hiding chapters

Initially, all the chapters are visible. You can hide chapters for playback (e.g. unwanted scenes) or make them visible again. In editing mode, hidden chapters are shown darker.
A chapter always consists of a start marker and an end marker.
To hide a certain scene, proceed as follows:

1. Search the beginning of the scene you want to hide. Press **PAUSE II** .



2. Press **EDIT** on the remote control to call the '***Favorite Scene Selection***' editing menu.
3. Set the start marker using **OK** .
   → The number of chapters ('C') in the menu line will increase by one.
4. Search for the end of the scene.
   - You can also use ▶▶| or |◀◀ to search faster for the end of the scene.
     Make sure that you do not jump into the next title (title number 'T' must not change).
   - Only chapters within a title can be hidden.
5. Press **PAUSE II** at the corresponding position.
6. Set the end marker with **OK** . This will also be the start marker of the next chapter.
   → The number of chapters ('C') in the menu line increases by one.

> × ***The number of chapters ('C') has increased by two or more numbers***
> ✓ *This is the case when you want to hide a chapter that, due to automatic chapter numbering (if switched on), stretches over two or more chapters. In this case, you must delete the start of the automatically generated chapter:*
> - *Press* **T/C** *twice while the editing menu is displayed to change the chapter number.*
> - *Select the chapter between the new markers using* ▼ *or* ▲ *. Press* **PAUSE II** .
> - *Select '**Delete marker**' with* ▼ *to delete the current chapter marker. Confirm with* **OK** *. The current chapter number decreases by one.*

7. Press **T/C** twice to change the chapter number 'C'.
8. Select the previous chapter with ▼ , since you are already in the next chapter (end of the chapter is also the beginning of the next chapter).
9. Wait until the chapter has been played and press **PAUSE II** to stop playback.
10. Select '***Current chapter***' using ▼ or ▲ .
11. Using ▶ select '***hidden***'.
    → The picture is shown darker.

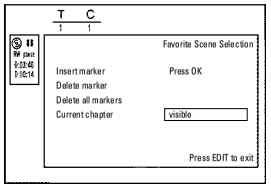
> ***Switching quickly***
> *You can switch between show chapters ('**visible**') and hide chapters ('**hidden**') quickly and easily using* **SELECT** .
> *This function is independent from the selected line.*

12. To end, press **EDIT** .

During playback this chapter will be skipped.
If the chapter is not visible, select '***visible***' in step 11 with ▶ .

Deleting chapter markers

Within a title you can delete either all markers or individual markers.



1. While the relevant chapter is playing, press **EDIT** on the remote control.
   → The '***Favorite Scene Selection***' menu appears on the TV screen.

> ***How can I select different chapters?***
> - *Press the* **T/C** *button on the remote control. Titles and chapters are displayed at the top of the screen.*
> - *Select title (T) or chapter (C) with* ▶ *or* ◀ *.*
> - *Use* ▲ *or* ▼ *to select the title/chapter channel you want to edit.*

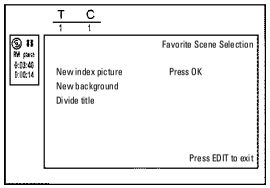
2. Use ▼ to select:
   - line '***Delete marker***' for this chapter
   - line '***Delete all markers***' for all chapters within the selected title.

3. Confirm with **OK** .
   - You will be prompted to press **OK** again to make sure you really want to delete all markers.
   - If you do not want to, press the ◀ button.
4. To end the menu , press **EDIT** .

Changing the index picture

Normally the picture from the beginning of a recording is used as the index picture. You can however choose any picture from the recording as the index picture.

1. During playback, search for location of the new index picture. Press the **PAUSE II** button.
2. Press the **EDIT** button.
   → The '***Favorite Scene Selection***' menu appears on the TV screen.



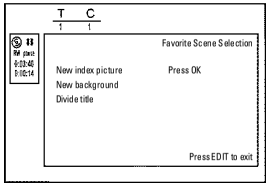
3. Select line '***New index picture***' and confirm with **OK** .
4. Start the change with **OK** .
   → '***Updating menu***' appears on the TV screen.

Once the revision has been completed successfully the DVD recorder reverts to the index overview.

Changing the menu background

You can choose any frame from the recording as the menu background. This setting is stored on the inserted DVD. Please note that after the modification the 'original background' will be lost.
If you erase the complete disc (close the disc tray with **CLEAR** and make a recording) the 'original background' will be restored.

1. During playback, search for the location that is to be used as the new menu background. Press **PAUSE II** .
2. Press **EDIT** .
   → The '***Favorite Scene Selection***' menu appears on the TV screen.



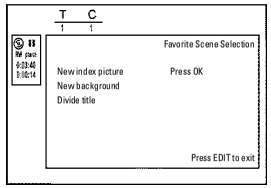
3. Select line '***New background***' and confirm with **OK** .
4. Start the change with **OK** .
   → '***Updating menu***' appears on the TV screen.
   → Once the revision has been completed successfully the DVD recorder reverts to the index overview.

Dividing titles

You can divide a title into several sections (titles) of any size. Each of these sections (titles) is identified by its own index.
Note: This division cannot be undone.

Can I divide titles on DVD+R discs?
As recordings on DVD+R discs cannot be overwritten, it is not possible to divide titles on DVD+R discs.

1. While the relevant title is playing, press **EDIT** on the remote control.
   → The '***Favorite Scene Selection***' menu appears on the TV screen.



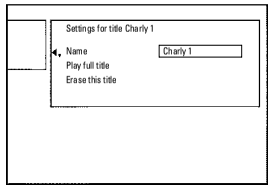
2. Select '***Divide title***' and confirm with the **OK** button.
3. If you are sure, press **OK** to start the process.
   → '***Dividing title***' appears on the TV screen.
4. Wait until the new title is displayed with an index picture in the index picture overview.

The process of splitting the title is now complete.

Editing recording titles (name)

Some TV stations transmit the title (name) of a programme. In this case, the name will be included automatically (e.g. 'ROCKY'). Otherwise, the only the programme number (programme name) and the time are stored as the name of the recording. The name of the recording can only be changed after the recording has been completed.

1. If required, press the **STOP** ■ button to interrupt playback.
2. Using ▲ or ▼ select the title whose name you want to edit and confirm with ▶ .
   → The menu for editing names appears.



3. Select '***Name***' using ▲ or ▼ and confirm with ▶ .
4. Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.
5. Change the icon using ▲ or ▼ .
   - You can switch between upper and lowercase using **SELECT** .
   - You can delete the character using **CLEAR** .

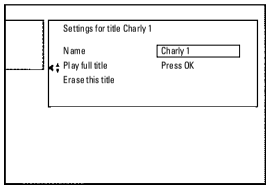
How can I enter the characters with the buttons 0..9 ?
*Press a number button as often as the required character or the number appears. You can enter language dependent characters with the buttons ⏮ or ⏭ on the corresponding character e.g.: ä, button **2** for 'a' and then with ⏭ as often as 'ä' appears.*
*For special characters press the button **1** repeatedly.*
The position for the following character will be selected automatically.
*To enter a space press the button **1** .*
*To erase a character press **CLEAR** .*

6. Repeat 4 and 5 until you have made the changes you want.
7. Save the new name with **OK** .
   → '***Storing name***' appears on the TV screen for confirmation.
8. To end, press ◀ .

Playing the entire title

If you have hidden certain sections (chapters) of a title, this setting lets you watch the entire title including the hidden sections. To do this, proceed as follows:

1. Press the **STOP** ■ button or during playback press **DISC MENU** .

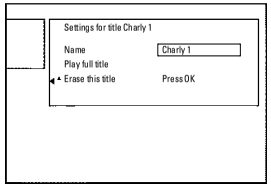


2. Using ▲ or ▼ select the title you want to play all of and confirm with ▶ .
   → The title editing menu will appear.
3. Select '***Play full title***' using ▲ or ▼ and confirm with **OK** .
   → Playback starts automatically. The title is played in its entirety - including the hidden chapters.

Erasing recordings/titles

You can erase specific recordings from a disc. To do this, proceed as follows:

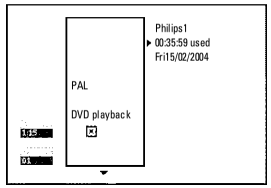
1. Press the **STOP** ■ button or during playback press **DISC MENU** .
2. Using ▲ or ▼ select the title you want to delete and confirm with ▶ .
   → The title editing menu will appear.



3. Select '***Erase this title***' using ▲ or ▼ and confirm with **OK** .
   → '***This will completely erase this title***'. '***Press OK to confirm***' appears on the TV screen.
   - If you want to delete this title, press **OK** to confirm.
   - Otherwise press ◀ .
4. '***Erasing title***' appears on the TV screen.
5. At this point '***Empty title***' appears in the 'index picture display'. A new recording can now be made here.
   If the deleted title was very short (less than 1 minute) '***Empty title***' will not appear at this point.

Can titles be deleted from a DVD+R disc?
*Titles on DVD+R discs are only marked as deleted. '**Deleted title**' will appear in the display instead of '**Empty title**'. During playback the 'deleted' title is skipped. The space used for this title cannot be used again as the title has not been physically deleted. Once the disc has been finalised no further changes can be made.*

Disc settings



This screen appears **before** the first title and contains general information about the current disc.

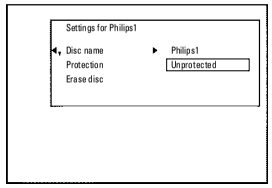
You can:
•) change the name of the disc
•) activate or deactivate write protection on the disc
•) Finish editing (make the disc DVD compatible)
•) finalise a DVD+R
•) delete a DVD+RW

To get to this display, proceed as follows:

1. Press the **STOP ■** button or during playback press **DISC MENU** .
2. Select the first title with ▲ or press **STOP ■** . **STOP ■** .
3. Press ▲ .
   → The disc info display will appear.

Changing the disc name

1. In the 'Disc info display' press ▶ .
   → The '***Settings for***' menu appears on the TV screen.



2. Select '***Disc name***' using ▲ or ▼ and confirm with ▶ .
3. Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.
4. Change the icon using ▲ or ▼ .
   - You can switch between upper and lowercase using **SELECT** .
   - You can delete the character using **CLEAR** .
5. Repeat 3 and 4 until you have made the changes you want.
6. Save the new title with **OK** .
   → '***Storing name***' appears on the TV screen for confirmation.
7. To end, press ◀ .

Finishing editing

If one or more titles have been edited a DVD player may still display the original titles. You can prepare your DVD+RW disc in such a way that a DVD player will be able to play the edited version.

1. In the 'Disc info display' press ▶ .
   → The '***Settings for***' menu appears on the TV screen.
2. Select '***Make edits compatible***' using ▲ or ▼ and confirm with **OK** .

   × ***'Make edits compatible' does not appear***
   ✓ *Your disc is already compatible. There is no need for conversion. To end, press* **SYSTEM MENU** .

3. The screen displays '***This will take***' to show how long the process will last.
4. To confirm press **OK** .
   → '***Working***...' appears on the TV screen.
   → bar will move from left to right indicating progress.

Finalising DVD+R discs

This feature is required to play back a DVD+R disc in a DVD player. Once the disc has been finalised no further recordings or changes can be made.

1. In the 'Disc info display' press ▶ .
   → The '***Settings for***' menu appears on the TV screen.
2. Select '***Finalise disc***' using ▲ or ▼ and confirm with **OK** .

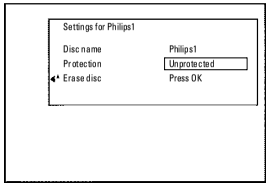
   × ***'Finalise disc' does not appear***
   ✓ *Either there is no DVD+R disc inserted or the disc is already finalised. To end, press* **SYSTEM MENU** .

   × ***The 'Settings for' menu does not appear***
   ✓ *The menu may not appear if the disc has been recorded on another DVD recorder. In this case, use the '**Finalise disc**' feature in the '🔧' menu, under '**Features**'.*

3. The screen displays '***This will take***...' to show how long the process will take.
4. To confirm press **OK** .
   → '***Working***...' appears on the TV screen.
   → A bar will move from left to right indicating progress.

Erasing DVD+RW Disc's

1. In the 'Disc info display' press ▶ .
   → The '***Settings for***' menu appears on the TV screen.



2. Select '***Erase disc***' using ▲ or ▼ and confirm with **OK** .
   → '***This will erase all titles Press OK to confirm***' appears on the TV screen..
3. If you want to delete all the titles, press **OK** to confirm. Otherwise press ◀ .
   → '***Erasing disc***' appears on the TV screen.
   After deletion, the index picture display shows the free space on the disc.

*If the disc is empty already, you cannot select '**Erase disc**'.*

General

Use 'Programming a recording (TIMER)', to automatically start and stop a recording at a later date.

The DVD recorder will switch to the right programme number and begin recording at the correct time.
With this DVD recorder, you can pre-programme up to six recordings within a period of one month.

To make a programmed recording, your DVD recorder needs to know:
* the date you want to make the recording
* the programme number of the TV channel
* the start and stop time of the recording
* VPS or PDC on or off
* the recording mode (picture quality) (***M1***/***M2***/***M2x***/***M3***/***M4***/***M6***/***M8***)

Fit to space Recording
*You can select also the recording mode '**FR**'.*
*With these setting the recording mode (bit rate) will be automatically calculated to use the complete empty space (title '**Empty**').*
If the empty space is too small the recording will be stopped to prevent the following titles from being overwritten.

This information is saved in a 'TIMER block'.
Before you begin, make sure the clock is set. If the clock is not set, the '***Time/Date***' menu will appear when you press the **TIMER** button.

What is 'VPS/PDC'?
- 'VPS' (Video Programming System)/'PDC' (Programme Delivery Control) are used to control the start and duration of TV channel recordings. If a TV programme starts earlier or ends later than was scheduled, the DVD recorder will then turn on and off at the correct time.

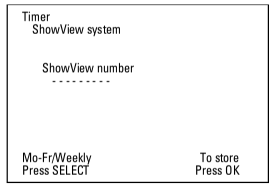
What do I need to know about 'VPS/PDC'?
*- Usually the start time is the **same** as the VPS or PDC time. If a different 'VPS/PDC time' is indicated, e.g.: '20.15 (VPS/PDC 20.14)', the **VPS/PDC time** '20.14' must be entered **exactly to the minute** during programming.*
If you want to programme a time that is different from the VPS or PDC time, you must switch off VPS or PDC.
- Only one TV program of a TV channel can be controlled using 'VPS/PDC' at a time. If you want to record two or more TV programmes on a TV channel using 'VPS/PDC', you will need to programme these as two separate recordings.
- Since the DVD recorder requires a certain lead time (for getting the disc up to speed and positioning the laser) before recording can start, it is possible that the recorder will miss the first few seconds of a TV show recorded with VPS/PDC.
In this case, disable VPS/PDC and enter a start time one minute earlier.

Programming recordings with the ShowView® System

SHOWVIEW®

Thanks to this programming system, you no longer need to tediously enter the date, programme number, start and finish times. All the information needed by the DVD recorder for programming is contained in the ShowView® programming number. This 9-digit ShowView® number is found in most TV listings magazine.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **TIMER** on the remote control.
   The programming method selected last is marked.
3. Select '***ShowView system***' using ▼ or ▲ and confirm with ▶ .
4. Enter the entire ShowView number. This number is up to 9 digits long and can be found next to the start time of the TV programme in your TV listings magazine.
   e.g.: 5-312-4 or 5,312 4
   Enter 53124 for the ShowView-number.
   If you make a mistake, you can clear your instructions with **CLEAR** .



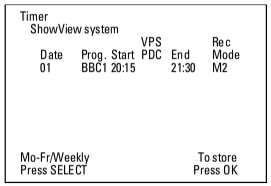
Selecting daily/weekly recordings
*Using **SELECT**, select from the following options:*
***'Mo-Fr'**: Repeated daily recordings (Monday to Friday).*
***'Weekly'**: Repeated weekly recordings (every week on the same day).*

5. Confirm with **OK** .

× ***The following message appears on the screen: 'Please enter programme number'***
✓ *The programme number of the TV channel has not yet been assigned to the ShowView number. Use ▶ , ◀ or the number buttons **0..9** on the remote control to select the appropriate programme number (name) of the TV channel and confirm with **OK** .*

× ***The following message appears on the screen: 'ShowView number wrong'***
✓ *The entered ShowView number is incorrect. Repeat the entry or cancel using the **SYSTEM MENU** button.*
✓ *Check the time/date (see 'Setting the time & date' in 'Installing your DVD recorder').*

× ***The following message appears on the screen: 'Weekend programming not possible'***
✓ *A daily recording was entered for the wrong day. Daily programming can only be used for recordings to be made from Monday to Friday.*



→ The decoded data appears after confirmation. You can go back and change the data. Select the appropriate input field with ▶ or ◀ . If required, make changes using ▲ , ▼ or the number buttons **0..9** .

'Switching on 'VPS/PDC' in the 'Start' input field
*Select the '**Start**' input field using ▶ . Using **SELECT** switch on 'VPS/PDC' ('*' lights up). If you press **SELECT** again, you will switch 'VPS/PDC' off ('*' goes out).*

Changing the recording mode in input field 'End'
*Select the '**End**' input field using ▶ .*
*Use **REC MODE** to select the recording mode '**M1**, **M2**, **M2x**, **M3**, **M4**, **M6**, **M8**'.*

Fit to space Recording
*You can select also the recording mode '**FR**'.*
*With these setting the recording mode (bit rate) will be automatically calculated to use the complete empty space (title '**Empty**').*
If the empty space is too small the recording will be stopped to prevent the following titles from being overwritten.

Do not use this function under the following conditions:
•) more then one programmed recording
•) daily/weekly repeated recordings
•) recordings with VPS/PDC
May be the calculation of the recording mode can not function properly.

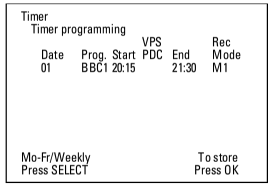
6. If all information is correct, press the **OK** button. The programming information is stored in a TIMER block.
7. To end, press **TIMER** .
8. Insert a recordable disc (one without write protection).
   The inserted disk is checked.
9. Search the position on the disc where the recording should begin. Press **STOP** ■ .
10. Switch off the DVD recorder using **STANDBY** ⏻ .
    The programmed recording functions only if the DVD recorder has been **switched off** using **STANDBY** ⏻ .

If one or more recordings have been programmed '***TIMER***' will light up on the display.

Programming recordings without the ShowView® System

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press **TIMER** on the remote control.
   → The programming method selected last is marked.



2. Select line '***Timer programming***' with ▼ or ▲ . and confirm with the ▶ button.
   → The information will appear on the screen.
3. Select the input field with ◀ or ▶ .
4. Enter information with ▼ or ▲ or with the number buttons **0..9** .

Selecting daily/weekly recordings

*In '**Date**' use* **SELECT** *to select from the following options:*
***'Mo-Fr'**: Repeated daily recordings from Monday to Friday*
***'Mon'**: Repeated weekly recordings (every week on the same day, e.g. Monday).*

Programme numbers of the 'EXT1' and 'EXT2' scart socket

You can also programme recordings from external sources via scart socket **EXT1 TO TV-I/O** *('**EXT1**') or* **EXT2 AUX-I/O** *('**EXT2**').*

'Switching on 'VPS/PDC' in the 'Start' input field

*Select the '**Start**' input field using* **TIMER** *. Using* **SELECT** *switch on 'VPS/PDC' ('*' lights up). If you press* **SELECT** *again, you will switch 'VPS/PDC' off ('*' goes out).*

Changing the recording quality in input field 'End'

*Select the '**End**' input field using ▶ .*
Use **SELECT** *to select the recording mode.*

5 If all information is correct, press the **OK** button.
→ The programming information is stored in a TIMER block.

6 To end, press **TIMER** .

→ The disc you have inserted will be checked.

7 Search the position on the disc where the recording should begin.

8 Switch off with **STANDBY** .
The programmed recording will only function properly if the DVD recorder has been **switched off** using the **STANDBY** button.

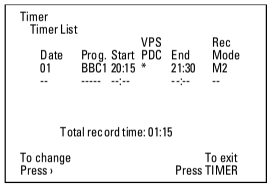
If any of the TIMER blocks are in use, '***TIMER***' will light up on the recorder display.

How to change or delete a programmed recording (TIMER)

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1 Press **TIMER** on the remote control.
→ The programming mode selected last is marked.

2 Select '***Timer List***' using ▼ or ▲ and confirm with ▶ .



3 Select the programmed recording (TIMER) you want to check, change or delete with ▼ or ▲ .

Delete programmed recording

4 Press the **CLEAR** button.

5 Confirm with **OK** . '***Timer Cleared***' will briefly appear on the TV screen.
'-- ---' appears rather than the displayed values

6 Press ▶ .
Select the input field with ◀ or ▶ .
If required, change the information with ▲ , ▼ or the number buttons **0..9** .

7 Confirm with **OK** .

8 To end, press **TIMER** .
9 Switch off with **STANDBY** .

'NexTView Link'

This DVD recorder is equipped with the 'NexTView Link' feature. If your television is also equipped with 'NexTView', you can mark TV programmes on the television for programming. These TV programmes will automatically be transmitted to a TIMER block on the DVD recorder.
If you clear the marking of the TV programme on the television, the corresponding TIMER block on the DVD recorder will also be cleared. For more information, read the instruction manual of your TV set.

Problem solving for programmed recordings

PROBLEM	SOLUTION
The DVD recorder is not responding	✓*While a programmed recording is being made, you cannot operate your DVD recorder manually. If you want to cancel the programmed recording, press* **STANDBY** .
'*Switch off, timer recording*' flashes on the TV screen.	✓*The DVD recorder was switched on a few minutes before the start of a programmed recording. Switch off the DVD recorder using* **STANDBY** . *A programmed recording (timer) will only function if the DVD recorder is switched off (* **STANDBY** *button).*
Error message: '*Insert recordable disc*'	✓*Either a disc has not been inserted or the disc cannot be used for recording. Insert a disc on which recordings can be made. Search the position on the disc where you want the recording to begin. Switch off the DVD recorder using* **STANDBY** .
The error message '*Disc locked*' appears briefly on the screen.	✓*A write-protected disc has been inserted. Undo the write protection (see 'Preventing accidental erasing of discs' in 'Manual recording') or insert a different disc.*
Error message: '*Memory full*'	✓*If this error message appears after pressing* **TIMER** , *then all TIMER blocks are already programmed. No more recordings can be programmed. Press the ▶ button. If you want to clear or check a programmed recording (TIMER block), select it with ▲ or ▼ .*
The '*Data error*' message appears on the screen.	✓*The data for the recording could not be transferred. Please check date, start time and finish time of the programmed recording.*
The '*Collision*' message appears on the screen.	✓*Two programmed recordings overlap.* ✓*If you ignore this error message the show with the earlier start time will be recorded first. The start of the second show will not be recorded.* ✓*Change the setting for either of the two recordings.* ✓*Clear either of the two recordings*

General

This section describes how you can make additional personal settings. The symbols have the following meaning:

Picture settings

Sound settings

Language settings

Additional settings

Disc settings

Record settings

Installation

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

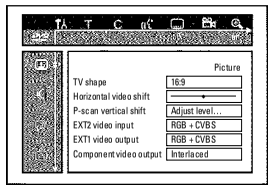
1. Press the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.

If this menubar is not complete visible on your wide screen TV-set, change the picture settings on your TV.

2. Select ' ' using ◄ oder ► and confirm with
3. Select the corresponding function using ▼ or ▲ and confirm with ► .
4. Select the corresponding line using ▼ or ▲ and confirm with ► . For more information on each function, read the following pages.
5. Select the corresponding function using ▼ or ▲ , or the setting with ◄ or ► . Select the functions you want to change as described in the following pages.
6. Confirm the new setting with **OK** .
7. Close the menu item with ◄ .

Picture settings

In this menu you can adapt the picture from the DVD-Recorder to your TV set.
Additionally you can adjust the Colour, the Brightness, the Contrast, for playback from the internal tuner or input sockets seperately



'*TV shape*'

The picture signal from your DVD recorder can be set to match your TV set:

- '***4:3 letterbox***'
  for a widescreen picture with black bars at the top and bottom
- '***4:3 panscan***'
  for a full-height picture with the sides trimmed.
- '***16:9***'
  for a widescreen TV set (16:9 screen ratio)

'*Horizontal video shift*'

Use this feature to adjust the position of the picture on your TV left or right using ◄ , ► to suit the screen of your TV set.

'*P-scan vertical shift*'

Use this feature to adjust the position of the picture on your TV down or up using ▼ , ▲ to suit the screen of your TV set.

'*EXT1 video output*', '*EXT2 video input*'

Since RGB and S-VIDEO signals sometimes use the same connections on a scart cable, the two signals cannot be transmitted simultaneously. With these settings, you can decide whether RGB or S-VIDEO signals are to be transmitted. This setting affects only the scart sockets of the DVD recorder ('***EXT1 video output***': Output socket **EXT1 TO TV-I/O** and '***EXT2 video input***': Input socket **EXT2 AUX-I/O**)
Please also observe which signals are available at which scart socket of the TV set or how the scart sockets need to be switched.
If necessary, consult the instruction manual of your TV set.

'*EXT2 video input*'

- '***RGB + CVBS***'
  Depending on the TV set you are using, switching between the 'RGB' and the 'Video(CVBS/FBAS)' signal is done automatically.
- '***S-video only***'
  On the scart socket **EXT2 AUX-I/O** only the S-Video signal will be processed.
  Please observe that when making recordings from a video recorder that transmits only video (CVBS/FBAS) signals through the scart cable, recordings may be made in black and white.
  Therefore, use this setting with caution.

'*EXT1 video output*'

- '***RGB + CVBS***'
  Depending on the TV set you are using, switching between the 'RGB' and the 'Video(CVBS/FBAS)' signal is done automatically. If the picture scrolls to the side or colour quality problems appear on some TV sets when the setting is '***RGB + CVBS***', you must select '***CVBS only***'.
- '***S-video only***'
  On the scart socket **EXT1 TO TV-I/O** only the S-Video signal will be processed.
  In case the scart socket of the TV set is not suitable for S-VIDEO (Y/C) signals, you will only see a black&white picture,
- '***CVBS only***'
  Only the video (CVBS/FBAS) signal is transmitted, regardless of the video signals (RGB, Y/C) at the scart sockets. This setting is selected automatically when no 'RGB' or 'S-VIDEO' signal is detected at the scart socket. USe this setting if picture disturbance occurs on your TV set with the setting '***RGB + CVBS***'.

When selecting the settings '***S-video only***' or '***CVBS only***', the RGB signal is switched off.

'*Component video output*'

This allows you to switch the Component Video signal between 'Interlaced' and 'Progressive Scan.'
Warning If your TV has separate connections for 'Interlaced' and 'Progressive Scan' or it does not switch automatically between the two, it is possible that no picture will appear on the TV after it is switched from one to the other.

1. Select the setting you need with **SELECT** . Choose Progressive Scan only if your TV has Progressive Scan.
2. Confirm with **OK** .

× ***No picture appears on the TV after switching***
Überprüfen Sie die Anzeige im Anzeigefeld des DVD-Recorders:
Check the display of your DVD recorder.
'PRO': 'Progressive Scan' is on
No display: 'Interlaced' is on. Switch your TV to the corresponding input jack or select the corresponding connection. You can also switch the Component video output signal as follows:

- *Disconnect the recorder's power cord.*
- *Hold down ⏮ on the DVD Recorder while reconnecting the power cord. 'PRO' (progressive scan) appears on the display.*
- *If you want to switch back, hold down ⏮ until 'PRO' disappears from the display. The DVD Recorder is switched to 'Interlaced.'*

'*Black level shift*'

Adapts the colour dynamics for NTSC playback when switched to '***On***'

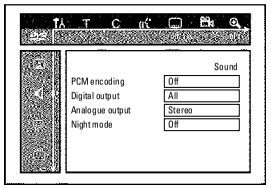
Colour and Contrast settings

This menu appears if you select the line '***Black level shift***' and press ▼ once.
Here you can set different settings for the signals at the input sockets **EXT1 TO TV-I/O** , **EXT2 AUX-I/O** , **S VIDEO/VIDEO in** , **DV IN** or at the internal tuner.

1. Select the programm numbers of the input socket or the internal tuner.using **CHANNEL +** , **CHANNEL −** .
2. Select the appropriate line and confirm using ► .
3. Change the settings with ◄ , or ► .
4. Store the settings using **OK** .
5. Select another line or end using **SYSTEM MENU** .

Sound settings

You can select the settings in this menu depending on which audio outputs are used.
If you only use the analogue audio output (red and white socket **AUDIO OUT L/R**), select the setting '***Off***' in the '***Digital output***' menu.



'*PCM encoding*'

- '***On***'
  The audio recording will be done in PCM-sound
- '***Off***'
  The audio recording will be done in Dolby Digital

'*Digital output*'

You can select one of the following settings for devices that are connected to the **COAX OUT** or **OPTICAL OUT** sockets:

- '*All*'
  Dolby Digital and DTS signals are fed unaltered to the digital output. MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation).
  For receivers/amplifiers **with digital multi-channel decoders**.
- '*PCM only*'
  Digital and MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation). For receivers/amplifiers **without digital multi-channel decoders**.
- '*Off*'
  Digital output switched off.
  For devices **with analogue audio input**.

'*Analogue output*'

You can select one of the following settings for devices that are connected to the analogue audio output ():

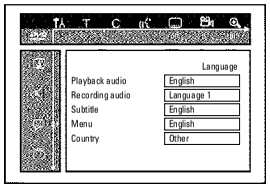
- '*Stereo*'
  For devices without DolbySurround or TruSurround. Use this setting if the DVD recorder is only connected to a stereo TV set.
- '*Surround*'
  Dolby Digital and MPEG-2 multi-channel are mixed down to a Dolby Surround-compatible two-channel output signal.
  For devices **with Dolby Surround / Pro Logic Decoder** .

'*Night mode*'

Night mode optimises the sound for playback at low volume. You are therefore less likely to disturb your neighbours. This only works with Dolby Digital audio on DVD video discs.

Language settings

You can select the following settings in this menu:



'*Playback audio*'

Playback audio language.

'*Recording audio*'

Wahl der Audio-Aufnahme bei zweisprachigen Sendungen

'*Subtitle*'

Subtitle language

'*Menu*'

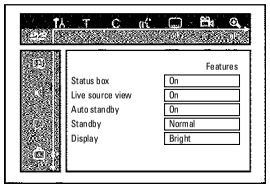
Screen menu language

'*Country*'

Selection of the location

Additional settings

You can select the following functions in this menu:



'*Status box*'

Along with the on-screen menus, the OSD (On Screen Display) also displays information on the current operating status (counter, playback, recording, TV channel, ...) on the TV screen.
You can switch off the information about the operating status so that the on-screen display is not recorded when making recordings on additional devices.

- '*On*'
  The OSD information appears for a few seconds in each selected mode and then disappears.
- '*Off*'
  The OSD information is switched off. It is **no longer** displayed on the screen.

'*Live source view*'

With this function you can switch between the live picture or the information of the selected TV channel/input socket in the 'Tuner information box' (left-hand corner of the screen).

'*On*'
The live picture of the selected TV channel or signal on the input sockets is visible.

- '*Off*'
  The information about the selected TV channel or signal on the input sockets is visible.

'*Auto standby*'

If you haven't used the DVD-recorder for a few minutes in certain modes (e.g.: STOP), it will switch to standby automatically. You can cancel this function to use the DVD-recorder as a television receiver.

- '*On*'
  The DVD-Recorder leave switched on.
- '*Off*'
  The DVD-Recorder will be switched to standby after few minutes.

'*Standby*'

You can switch off the clock display on your DVD recorder to save energy. Programmed recordings will be carried out despite of this.
Zusätzlich können Sie die wichtigsten Funktionen des DVD-Recorders im Anzeigefeld in Laufschrift darstellen (Demo).

- '*Low power*':
  When the DVD recorder was switched off using **STANDBY** ⏻ , the clock display is also switched off.
- '*Normal*':
  When the DVD recorder was switched off using **STANDBY** ⏻ , the clock display remains visible.
- '*Demo mode*':
  When the DVD recorder is switched off using **STANDBY** ⏻ , a list of the most important features appears in the display.

'*Display*'

You can change the brightness of the display on the DVD recorder. This setting only affects the DVD recorder when it is switched on.
You can also adjust this setting using the **DIM** button on the remote control.

- '*Bright*':
  The display appears with normal brightness. The disc tray light is switched on.
- '*Dimmed*':
  The display appears less bright. The disc tray light is switched off.
- '*Off*':
  The display and the disc tray light are switched off.

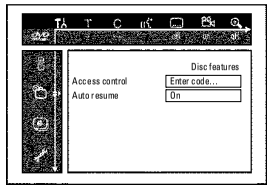
Fernbedienungseinstellung

In diesem Menü können Sie die Art der Fernbedienung einstellen, auf die Ihr DVD-Recorder reagieren soll

- '*DVD player*'
  Der DVD-Recorder reagiert auf die mitgelieferte Fernbedienung und auf die Fernbedienung eines DVD-Players (Fernbedienungscode RC-6).
  Wählen Sie diese Einstellung, wenn die Fernbedienung Ihres Philips-Fernsehgerätes DVD-Funktionen unterstützt.
- '*DVD recorder*'
  Der DVD-Recorder reagiert nur auf die mitgelieferte Fernbedienung.

Disk feature menu

In this menu, you can make changes that relate to the disc:



'*Access control*'

Please read the next chapter 'Access control (child lock)'.

Auto resume

If playback of a pre-recorded DVD video disc or video CD is interrupted (using **STOP** ■ or **OPEN/CLOSE** ▲), playback will resume where it stopped after you reinsert the disc. This applies not only to the current disc but also to the last 20 discs you played.

You can switch off this feature if you do not want it.

'*PBC*'

This line appears only if you insert a VCD.
Using this function, you can activate or deactivate the PBC menu (Playback Control) of a Video CD. For more information, read section 'Playing a (Super) Video CD' in chapter 'Playback'.

'*Finalise disc*'

This function allows you to finalise DVD+R discs. If the disc has already been finalised, this line will appear darker.

'*Adapt disc format*'

If a DVD+RW has been recorded in a PC drive or a different DVD recorder, the index screen may not be displayed properly.
This feature allows you to adjust the format of the disc.
Therefore, this feature is only visible if the disc format is different.

Child lock (DVD and VCD)

This feature enables discs to be locked for children.
When Child Lock is on, a 4-digit code (PIN) needs to be entered before a disc can be played.
You can also decide whether the inserted disc should always be played or should be played only once, despite the child lock

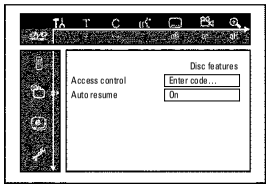
•)'***Play always***':
This disc is stored in a memory with space for 50 child-safe discs. If more than 50 discs are stored, the last disc in the list is removed and the new disc is added. The screen shows 'Child safe' at the start of playback.

•)'***Play once***':
This disc is only authorised for single playback. If the recorder is switched off, the PIN code must be re-entered.

Activating/deactivating child lock

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears on the screen.
2. Select the '⚒' icon using ◄ or ► .
3. Select '(***Disc features***)' using ▼ or ▲ and confirm with ► .



4. Confirm '***Access control*** using ► .
5. Enter a 4-digit code of your choice.
   → If the code is new, you may have to enter the code a second time as confirmation.
6. Select '***Child lock***' using ▲ or ▼ and confirm with ► .
7. Select the '🔒' icon using ▼ or ▲ .
8. Confirm with **OK** .
9. Quit the feature using ◄ and **SYSTEM MENU** .

Unauthorised discs can only be played by entering the four-digit PIN code.
To deactivate the child lock, select the '🔒' icon in 7 .

Authorising a disc

1. Insert a disc. The access control box will appear after a short delay.
2. Using ▲ or ▼ select '***Play once***' or '***Play always***'.
3. Enter your PIN code using the number buttons **0..9** .

Double-sided DVDs may have a different ID for each side. For these discs, each side must be authorised. Video CDs may have a different ID for each disc. For these CDs, each disc must be authorised.

Locking unlocked discs

To lock a disc that was formerly authorised follow the instructions below

1. Insert a disc. Playback starts automatically. If the playback does not start automatically, press **PLAY►** .
2. Press the **STOP** ■ button while the '—safe—' icon is visible. The icon changes to '—locked—'. The disc is now locked.

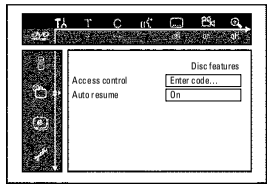
Parental level control (DVD video only)

Films on pre-recorded DVD discs may contain scenes not suitable for children. Therefore, some discs may contain 'Parental Control' rating information that applies to the entire disc or to certain scenes on the disc.
The appropriate scenes have filter values that reach from 1-8. If such a scene is detected during playback, the filter value set on the DVD recorder is compared to the scene. If the filter value is higher than the setting, an alternative scene will be played (if available).
Most DVDs apply the rating to an entire DVD. Therefore, if certain scenes exceed the rating you select, the entire disc will be blocked from viewing.

Activating/deactivating parental level control

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears.
2. Select the '⚙' icon using ◄ or ► .
3. Press the **SYSTEM MENU** button on the remote control.
4. Select the '⚙' icon using ◄ or ► .
5. Select '(***Disc features***)' using ▼ or ▲ and confirm with ► .



6. Confirm '***Access control***' using ► .
7. Enter a 4-digit code of your choice. If the code is new, you may have to enter the code a second time as confirmation.
8. Select the '***Parental level***' using ▲ or ▼ and confirm with ► .
   A bar appears to select the parental level.
9. Select the appropriate rating using ▼ , ▲ or the number buttons **0..9** .

What do the ratings mean?
Rating 0 (displayed as '--') parental control not active.
Rating 1 (suitable for children)
Rating 8 (only suitable for adults)

What happens if a DVD scene contains a higher level than the rating set?
If the recorder does not find a suitable alternative, playback will stop and you must enter the four-digit code.

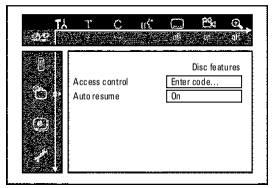
10. Confirm with **OK** . Quit using ◄ and **SYSTEM MENU** .

Changing the country

The set filter values depend on the respective country. It is therefore necessary to enter the country to which these filter values apply.

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears on the screen.
2. Select the '⚙' icon using ◄ or ► .
3. Select line '(***Disc features***)' using ▼ or ▲ and confirm with ► .

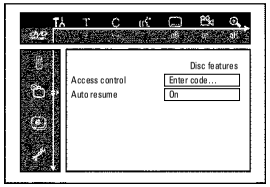


4. Confirm the line '***Access control***' using ► .
5. Enter your four-digit code. If the code is new, you may have to enter the code a second time as confirmation.
6. Select '***Change country***' using ▼ or ▲ and confirm with ► .
7. Select the corresponding country using ▲ or ▼ and confirm with **OK** .
8. To end, press ◄ and then **SYSTEM MENU** .

Changing the PIN code

Preparation:
•) Switch on the TV set, and if necessary, select the programme number for the DVD recorder.
•) Switch on the DVD recorder.

1. Press the **SYSTEM MENU** button on the remote control.
   → The menubar appears.
2. Select the '⚙' icon using ◄ or ► .
3. Select '(***Disc features***)' using ▼ or ▲ and confirm with ► .



4. Confirm '***Access control*** using ► .
5. Enter your four-digit PIN code. If the code is new, you may have to enter the code a second time as confirmation.
6. Select '***Change code***' using ▲ or ▼ and confirm with ► .
7. Enter the new code using the number buttons **0..9** . Enter the same code again as confirmation.
8. Quit using ◄ and **SYSTEM MENU** .

I have forgotten my code
Press **STOP** ■ *four times (step* **5** *), then press* **OK** *. Access control is now switched off. You can now enter a new code as described above.*

The symbols on your DVD recorder display

These symbols can light up on your DVD recorder display:

Multi-function display/text line
- •) Clock
- •) Disc/title playing time
- •) OTR switch-off time
- •) Title name
- •) Display of the programme number of the TV channel/playing time/channel name/function.
- •) Display of information and alerts

IIIIIIIIIIIIII Disc bar : Displays the current position on the disc (disc pointer).
Play/Record: Single flashing segment at the current position.
Pause: Flashing segment on both sides of the current position.
Stop: Illuminated segment at the current position.

SAT An automatic recording from a satellite receiver (SAT recording) has been programmed.

TIMER A recording (timer) has been programmed
Die Anzeige blinkt, wenn eine programmierte Aufnahme nicht durchgeführt werden kann. Der DVD-Recorder ist entweder eingeschaltet, oder es ist eine gesperrte DVD+RW/+R eingelegt.

PRO Component Video output switched to 'progressive scan'. If this display does not appear, the Component Video output is switched to 'interlaced'.

o(((A remote control signal has been received

VPS/PDC Video programming system / programme delivery control: A VPS or PDC code is transmitted for the selected TV program

LANG II During playback a 2-channel tone was detected or a 2-channel tone was received. 'I' or 'II' lights up depending on which sound channel has been selected

Messages in the DVD recorder display

The following messages may appear in your DVD recorder display

IS TV ON? The DVD recorder is in initial installation mode. Switch the TV on, then read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

NO SIGNAL No input signal available (signal inadequate or unstable)

MENU The menu on the screen is active

OPENING Disc tray opening

TRAY OPEN Disc tray open

CLOSING Disc tray closing

READING Disc being read

MENU UPDT Once recording has been successfully completed on a DVD+RW/+R the table of contents is created.

INIT MENU The menu structure is created after the first recording has been made on a new disc

COPY PROT You received a copy-protected signal. This may come from a copy-protected DVD/videotape of a DVD/video player or from a TV channel.
During the display *COPY PROT* no recording will be made. A running recording will be interrupted.

WAIT Please wait until this message disappears. The DVD recorder is busy performing a task.

NO DISC A disc has not been inserted for recording. If a disc has been inserted, it cannot be read.

INFO Information about the inserted DVD is displayed on the screen

BUSY The DVD recorder is processing the changes to make the disc DVD compatible

ERASING The entire DVD+RW is being erased

EMPTY DISC The DVD+RW/+R inserted is either new or has been completely erased (no recordings).

PROTECTED The DVD+RW/+R inserted is protected against recording.

MAX TITLE The maximum number of titles per disc has been reached. The maximum number of titles on a disc is 48.

MAX CHAP The maximum number of chapters within a title/or the disc has been reached. The maximum number of chapters within a title is 99, on a disc 255. (spreaded over the whole disc).

DISC FULL The disc is full. There is no space for new recordings

PAL DISC A disc with PAL recordings has been inserted. The machine is trying to record an NTSC signal. Insert a new disc or one that contains NTSC recordings.

NTSC DISC A disc with NTSC recordings has been inserted. The machine is trying to record a PAL signal. Insert a new disc or one that contains PAL recordings.

RECORDING An illegal action (e.g. **OPEN/CLOSE** ⏏ button) was attempted during recording.

FREE TITLE An empty title is selected.

DISC LOCK An attempt has been made to record during playback of a protected disc. This message appears if an attempt is made to insert a chapter marker (**EDIT** button).

DISC ERR An error occurred when reading the title. If this error keeps occurring, please clean the disc or use a new one. For instructions on how to clean a disc see the section on 'Cleaning the discs' in the next chapter.

DISC WARN An error occurred when writing the title. Recording was continued; the error was skipped

SETUP After the automatic search the menu for setting the date/time will appear on the screen.

WAIT 01 During the automatic channel search the TV channels found will be counted.

BLOCKED The disc tray cannot be closed/opened.

SAFE REC The new recording will be added at the end of all the other recordings (SAFE RECORD).

EASYLINK Data transfer 'EasyLink' from the TV is in progress

POST-FORMAT After the creation of the menu structure the disc is prepared. As long as *'POST-FORMAT'* is visible on the display you can not operate the DVD-Recorder.

PHILIPS The DVD-Recorder has been switched on

STANDBY The DVD-Recorder has been switched off

PHOTO The 'Digital Photo Manager' is switched on

VIDEO The 'Digital Photo Manager' will be switched off

SAVING Data will be written on the inserted memory card or on a DVD+RW/+R

4. Mechanical Instructions

4.1 Dismantling and Assembly of the Set

Remark: Exploded views can be found in chapter 10.

4.1.1 Manually opening the tray

- In case the loader is defective or cannot be opened electrically you can open the tray manually.
- Through a slot at the underside of the cabinet a slider that unlocks the tray can be accessed.
  However the slot is covered by an adhesive tape on the cabinet of the drive to prevent dust coming into the drive. Push through this adhesive tape by means of a thin screwdriver and move the slider to the left, see picture 4-1.
- **Make sure that an adhesive tape has been reapplied to the drive when repair is finished!**

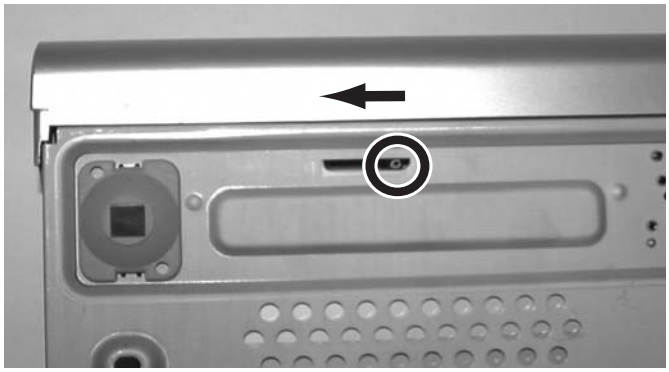


Figure 4-1

4.1.2 Front

- Before removing the front panel the tray has to be in the opened position.
- Remove the top cover
- Remove tray front by pulling it upwards (1), see picture 4-2
- Unplug the IDE cable that connects to the card reader (2), see picture 4-3
- Remove the 2 screws (3) that fix the card reader
- Remove the card reader PCB (4)
- Remove the screw (5) that fixes the bracket of the card reader to the front plate, see picture 4-4
- Remove the three screws (6) fixing the front panel
- Release the cables from the clamps (7)
- Release the two snap hooks at the sides (8) and remove the front (9), see picture 4-5
- Remove the 9 screws (10) to remove the front plate (11), see picture 4-6, 4-7

Figure 4-2

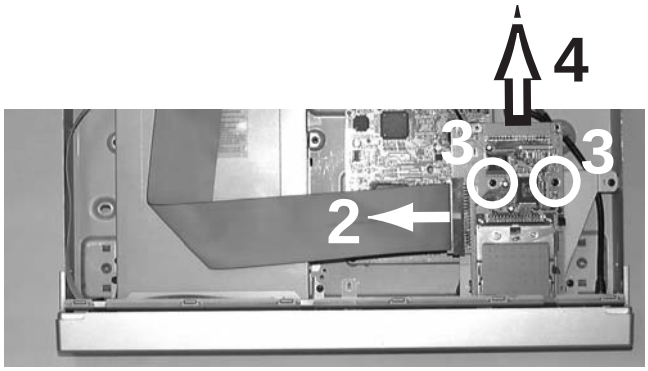


Figure 4-3

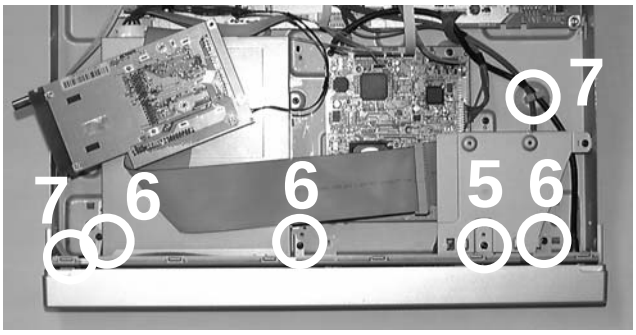


Figure 4-4

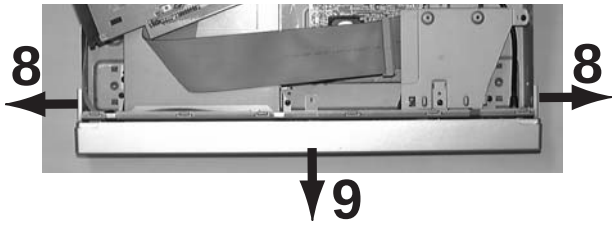


Figure 4-5

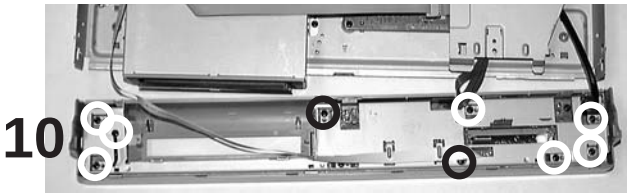


Figure 4-6

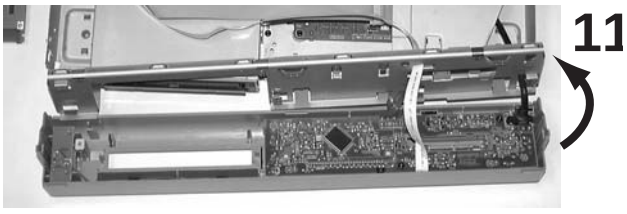


Figure 4-7

4.1.3 Digital Board

- Unplug the IDE cable that connects to the card reader (1), see picture 4-8
- Remove the 2 screws (2) that fix the card reader
- Remove the card reader PCB (3)
- Remove the 3 screws (4) that fix the bracket of the card reader, see picture 4-9.
- Remove the 4 screws (5) that fix the Digital Board, see picture 4-10, and turn the Digital Board to the required service position, see picture 4-11

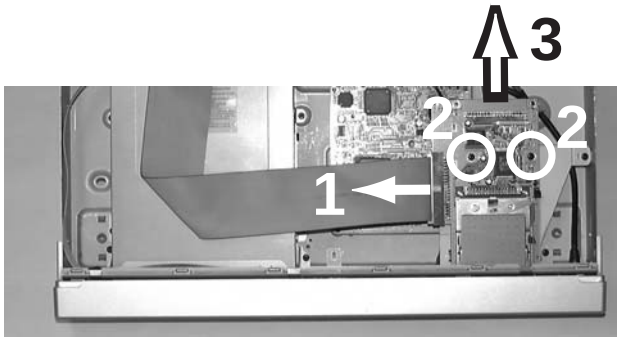


Figure 4-8

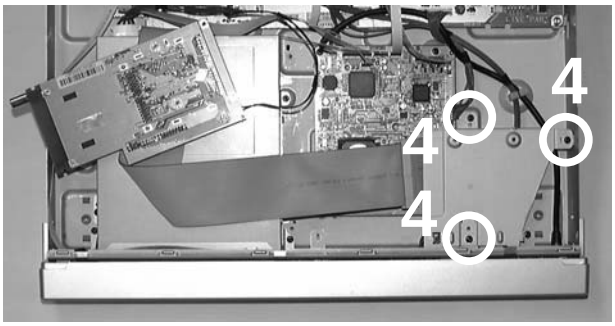


Figure 4-9

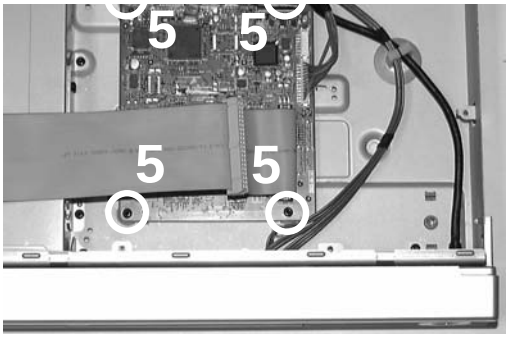


Figure 4-10

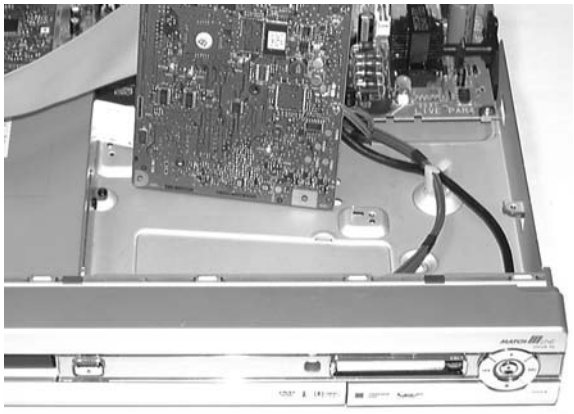


Figure 4-11

4.1.4 Basic Engine

- Remove the tray, see picture 4-2
- Remove the 4 screws that fix the drive, see picture 4-12

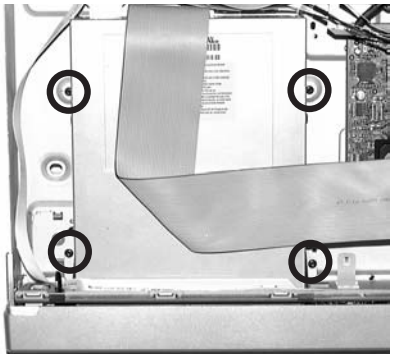


Figure 4-12

4.1.5 Analog Board

- Remove the 3 screws (1) that fix the back plate to the bottom plate, see picture 4-13
- Remove the 4 screws (2) that fix the Analog Board to the bottom plate
- Remove the Fan assy by releasing the fixing screw (3)
- Remove screw safety holder (4)
- Unlock the two snaps hooks at the left and right (5), see picture 4-14, and pull the board and backplate out gently (6)
- Turn the PCB in the service position (7), see picture 4-15

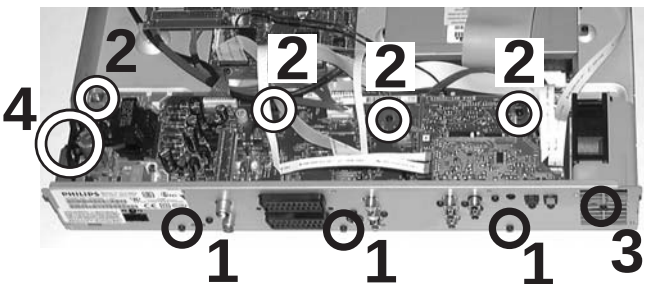


Figure 4-13

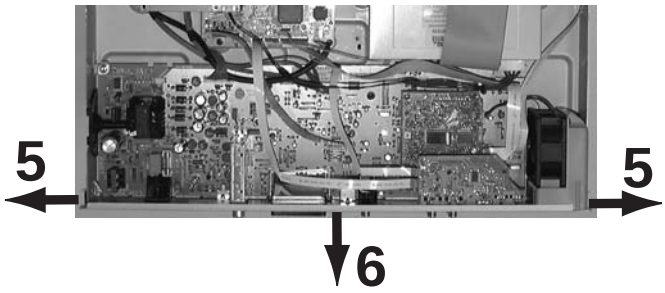


Figure 4-14

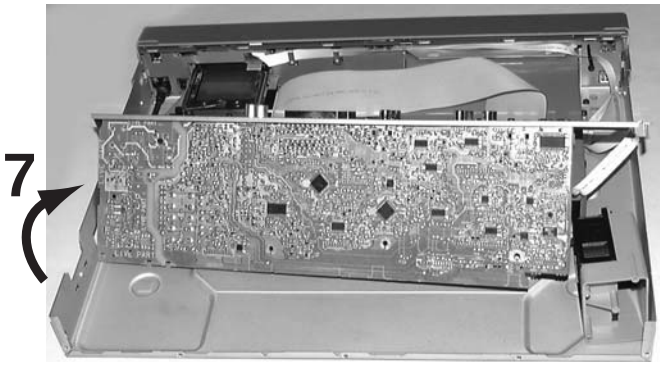


Figure 4-15

5. Diagnostic Software

Due to the complexity of the DVD recorder, the time to find a defect in the recorder can become long. To reduce this time, the recorder has been equipped with Diagnostic and Service software (DS). The DS offers functionality to diagnose the DVDR hardware and tests the following:

- Interconnections between components
- Accessibility of components
- Functionality of the audio and video paths

This functionality can be accessed via several interfaces:

1. End user/Dealer script interface
2. Command Interface

5.1 End User/Dealer Script Interface

5.1.1 Description

The End user/Dealer script interface gives a diagnosis on a stand alone DVD recorder. During this mode, a number of hardware tests (nuclei) are automatically executed to check if the recorder is faulty. The diagnosis is simply a "fail" or "pass" message. If the message "FAIL" appears on the display, there is apparently a failure in the recorder. If the message "PASS" appears, the nuclei in this mode have been executed successfully. There can be still a failure in the recorder because the nuclei in this mode don't cover the complete functionality of the recorder.

5.1.2 Structure

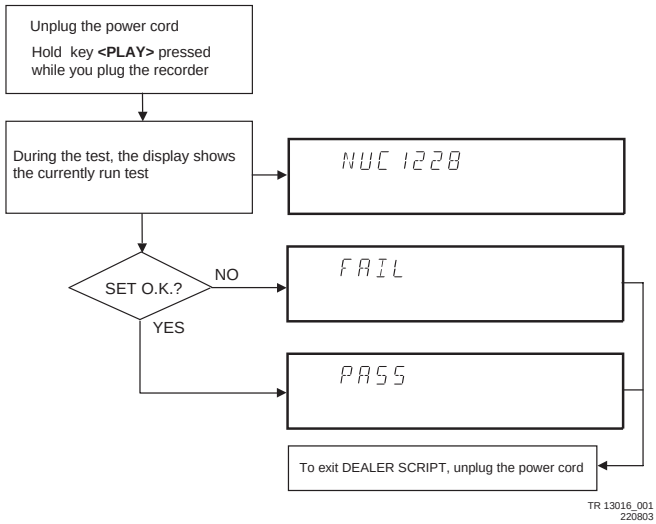


Figure 5-1

The End use/Dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD recorder.

5.1.3 Contents

Included tests:	1.DS_ANAB_COMMUNICATIONECHO_NUC 2.DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC6. DS_CHR_INT_PIC_NUC7. DS_CHR_DMA_NUC8. DS_BROM_WRITEREAD_NUC9. DS_NVRAM_COMMUNICATION_NUC10. DS_NVRAM_WRITEREAD_NUC11. DS_SDRAM_WRITEREADFAST_NUC12. DS_FLASH_WRITEREAD_NUC13.DS_FLASH_CHECKSUMPROGRAM_ NUC14.DS_SYS_HARDWAREVERSIONGET_NUC15. DS_VIP_DEVTYPEGET_NUC16. DS_VIP_COMMUNICATION_NUC17. DS_DVIO_LINKDEVTYPEGET_NUC18. DS_DVIO_PHYDEVTYPEGET_NUC19. DS_DVIO_LINKCOMMUNICATION_NUC20. DS_DVIO_PHYCOMMUNICATION_NUC21.DS_PSCAN_COMMUNICATI ONDENC_NUC22.DS_PSCAN_COMMUNICATIONDEINTERLACER_NU C23. DS_BE_COMMUNICATIONECHO_NUC24.DS_ANAB_COMMUNICATIO NIICNVRAM_NUC25.DS_ANAB_COMMUNICATIONIICTUNER_NUC26.D S_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC27.DS_ANA B_COMMUNICATIONIICAVSELECTOR_NUC28. DS_ANAB_CHECKSUMPROGRAM_NUC

5.2 Trade Mode

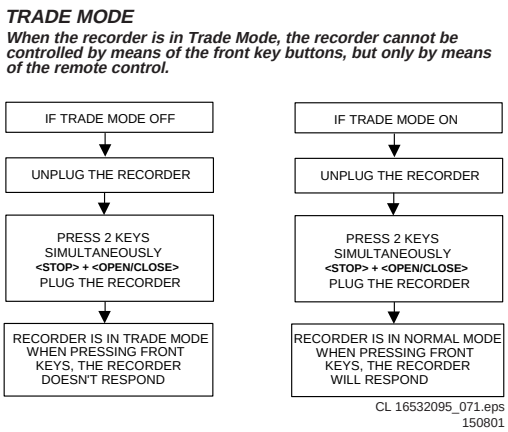


Figure 5-2

5.3 Virgin mode

If you want that the recorder starts up in Virgin mode, follow this procedure:

- Unplug the recorder
- plug the recorder again while you keep the STAND BY/ON key pressed
- the set starts up in Virgin mode.

5.4 Command Mode Interface

5.4.1 Nuclei Numeration

Each nucleus has a unique number of four digits. This number is the input of the command mode.

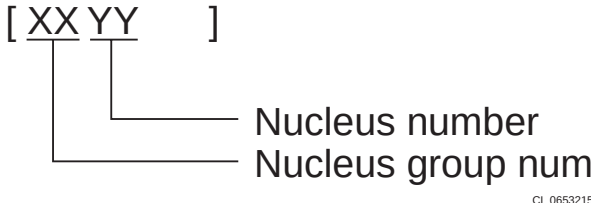


Figure 5-3

The following groups are defined for Digital Board Chrysalis:

Group number	Group name
0	Basic / Scripts
1	Chrysalis
2	Boot EEPROM
3	NVRAM
4	SDRAM
5	Flash
6	Video Input Processor
7	DVIO
8	Progressive Scan
9	Basic Engine
10	Display and Control Board
11	Analogue Board
12	System

5.4.2 Error Handling

Each nucleus returns an error code. This code contains six numerals, which means:

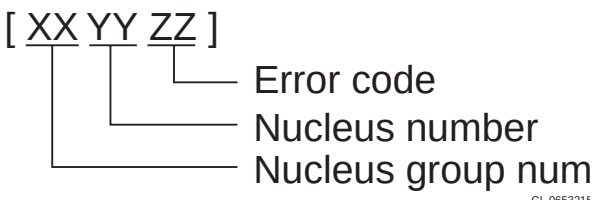


Figure 5-4

The nucleus group numbers and nucleus numbers are the same as above.

5.4.3 Command Mode Interface

Set-Up Physical Interface Components

Hardware required:

- Service PC
- one free COM port on the Service PC
- special cable to connect DVD recorder to Service PC

The service PC must have a terminal emulation program (e.g. Hyperterminal) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD recorder. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).

Code number of PC interface cable: 3122 785 90017

Activation Digital Board Chrysalis

1. Pull the mains cord from the recorder and reconnect it again (reboot).
2. The next welcome message will appear on the PC:

Startup screen

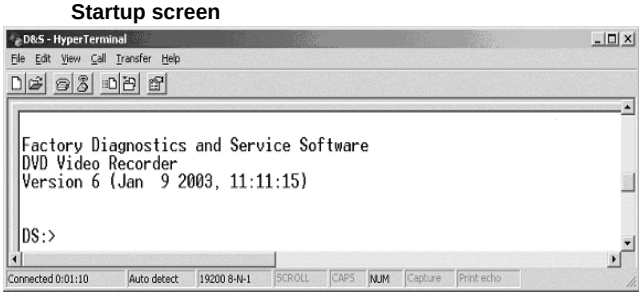


Figure 5-5

Now, the prompt 'DS:>' will appear. The diagnostic software is now ready to receive commands. The commands that can be given are the numbers of the nuclei. If you see above shown screen, continue with paragraph 'Nuclei Codes'.

1. It is possible that the next messages will appear when starting the DVD+RW for the first time

Error messages startup

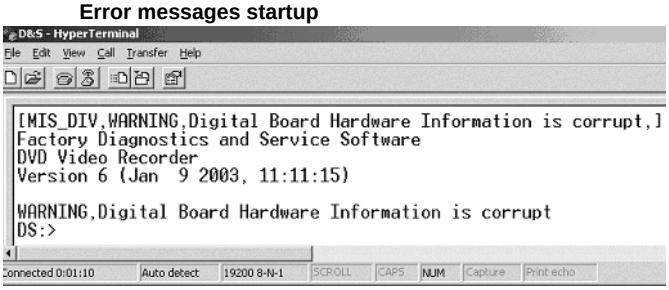


Figure 5-6

Error messages D&S program

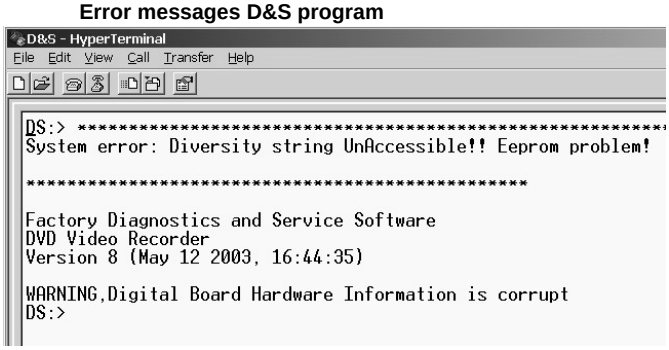


Figure 5-7

In these cases, the boot EEPROM of the Chrysalis Digital Board does not contain the required string with the hardware information. To update the Digital Board with the correct string, nucleus 1226 must be executed. See next section 'Diversity String Input'.

There can also be the next error message.

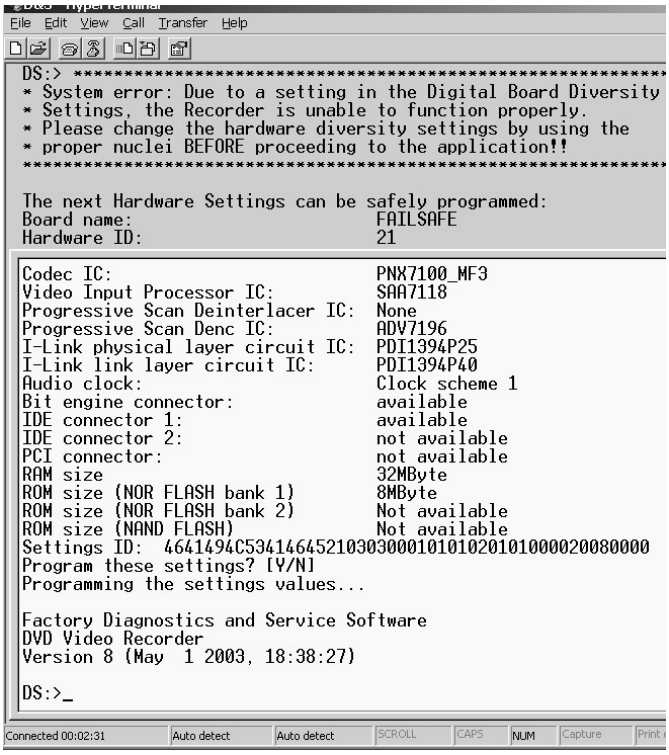


Figure 5-8

Enter "Y" to program a safe string. With this automatically generated string the board will work in principle but it has to be checked if all board settings were detected correctly.

Diversity String Input

1. Execute nucleus 1226 to enter the string. Please see adjustment instructions in chapter 8 for details

Nucleus 1226 execution with string

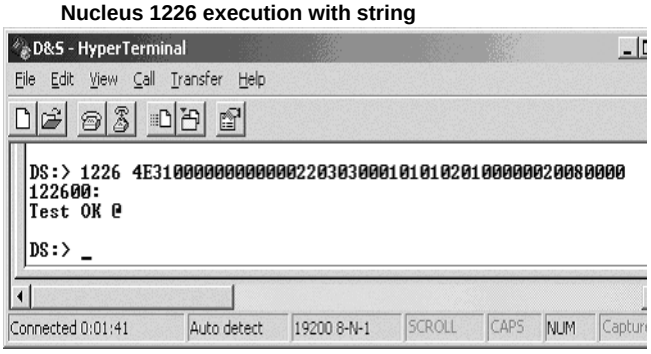


Figure 5-9

1. To check if the hardware info is filled correctly, you can execute nucleus 1228.

Nucleus 1228 info example

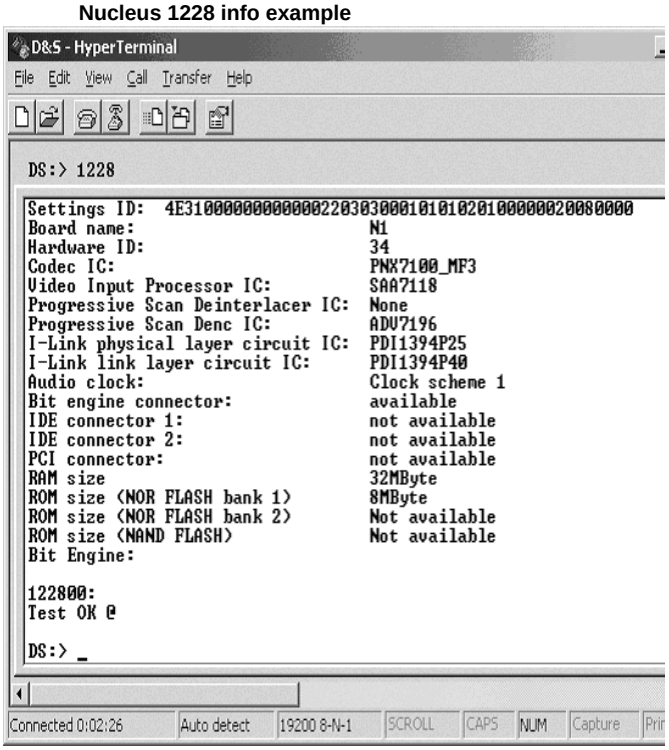


Figure 5-10

1. Exit the 'Terminal' program.
1. Reboot the DVD recorder to allow the software to start.

Command overview Digital Board Chrysalis

Below you will find an overview of the nuclei, their numbers, and their error codes. This overview is preliminary and subject to modifications.

Chrysalis (CHR)

Nucleus Name	**DS_CHR_DevTypeGet**
Nucleus Number	100
Description	Sends the device ID and the module ids and revisions of the PNX7100 (Chrysalis) to the stdout port.
User Input	None
Example	DS:> 100 Device ID 7100 Codec ID PNX7100_MF2 F-BCU (0x0102) 1.0 INTC (0x011d) 1.0 PCI-XIO(0x0113) 1.0 SIF(0x013b) 1.0 EJTAG (0x0104) 0.0 S-BCU (0x0102) 1.0 BOOT (0x010a) 1.0 CONFIG (0x013f) 1.0 RESET (0x0123) 1.0 DEBUG (0x0116) 0.0 UART0 (0x0107) 0.1 UART1 (0x0107) 0.1 UART2 (0x0107) 0.1 UART3 (0x0107) 0.1 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1 GPIO (0x013c) 1.0 SYNC (0x013a) 1.0 DISP0 (0xa015) 0.1 DISP1 (0xa00f) 0.0 OSD (0x0136) 0.1 SPU (0xa00e) 0.0 MIXER (0x0137) 1.0 DENC (0x0138) 0.1 CCIR (0x0139) 1.0 VDEC (0x0133) 0.1 PARSER (0xa00d) 0.0 DV (0xa00c) 0.0 BEI (0xa00a) 0.0 IDE (0xa009) 0.0 SGDX (0xa008)0.0 BYTE (0xa00b) 0.0 OUTPUT (0xa003) 0.0 ACOMP (0xa000) 0.0 VFE (0xa001) 0.0 VCOMP (0xa002) 0.0 SCR (0x0000) 0.0 SIFF (0xa011) 0.0 WMD (0xa010) 0.0 AUDIO0 (0xa015) 0.1 AUDIO1 (0xa00f) 0.0 PSCAN (0xa018) 0.0 010000: Test OK @

Nucleus Name	**DS_CHR_TestImageOn**
Nucleus Number	101
Description	Generates a test-image of a selected video standard on selected video output on the digital board. When no input is given, the default values will be used. Use nucleus **DS_ANAB_VideoRouting** to route the video signal on the analogue board output
User Input	The user has to decide which test image, video standard and video output must be used: **Test image id:** 0 VERTICAL_COLOURBAR (default) 1 HORIZONTAL_COLOURBAR 2 WHITE 3 YELLOW 4 CYAN 5 GREEN 6 MAGENTA 7 RED 8 BLUE 9 BLACK 10 GRAY **Video standard:** PAL (default) NTSC **Video output:** ALL CVBS and YC and RGB (default) CVBS YC RGB YUV PSCAN progressive scan
Example	DS:> 101 010100: Test OK @ DS:> 101 0 pal cvbs 010100: Test OK @ DS:> 101 4 ntsc yc 010100: Test OK @

Nucleus Name	**DS_CHR_TestImageOff**
Nucleus Number	102
Description	Switches the test-image off.
User Input	None

Example	DS:> 102 010200: Test OK @

Nucleus Name	**DS_CHR_SineOn**
Nucleus Number	103
Description	Generate an audio sine signal on the audio output of the digital board. Note: Left channel 6kHz, right channel 12 kHz sine. Make sure to route the signal first.
User Input	None
Example	DS:> 103 010300: Test OK @

Nucleus Name	**DS_CHR_SineOff**
Nucleus Number	104
Description	Stop generating the audio sine signal
User Input	None
Example	DS:> 104 010400: Test OK @

Nucleus Name	**DS_CHR_SineBurst**
Nucleus Number	105
Description	Generate an audio sine signal on the audio output of the digital board for 4 seconds.
	Note: Left channel 6kHz, right channel 12 kHz sine with some known hick-ups
User Input	None
Example	DS:> 105 010500: Test OK @

Nucleus Name	**DS_CHR_MuteOn**
Nucleus Number	106
Description	Mute the audio outputs of the digital board
User Input	None
Example	DS:> 106 010600: Test OK @

Nucleus Name	**DS_CHR_MuteOff**
Nucleus Number	107
Description	De-mute the audio outputs of the digital board
User Input	None
Example	DS:> 107 010700: Test OK @

Nucleus Name	**DS_CHR_DvLedOn**
Nucleus Number	108
Description	Check the connection to the DV-LED on the digital board by switching it on
User Input	None
Example	DS:> 108 010800: Test OK @

Nucleus Name	**DS_CHR_DvLedOff**
Nucleus Number	109
Description	Switch off the DV-LED on the digital board
User Input	None
Example	DS:> 109 010900: Test OK @

Nucleus Name	**DS_CHR_MacroVisionOn**
Nucleus Number	110
Description	Turn on MacroVision.
User Input	None
Example	DS:> 110 011000: Test OK @

Nucleus Name	**DS_CHR_MacroVisionOff**
Nucleus Number	111
Description	Turn off MacroVision.
User Input	None
Example	DS:> 111 011100: Test OK @

Nucleus Name	**DS_CHR_Peek**
Nucleus Number	112
Description	Peek a value on a specified address
User Input	The address to peek on
Example	DS:> 112 0xa0700000 011200: Value read = 0x000001BD Test OK @

Nucleus Name	**DS_CHR_Poke**
Nucleus Number	113
Description	Poke a value on a specified address
User Input	The address to poke and the value: <address><value>
Example	DS:> 113 0xa0700000 0xaabbccdd 011300: Test OK @

Nucleus Name	**DS_CHR_INT_PICInterrupts**
Nucleus Number	114
Description	Test all interrupts of the priority interrupt controller
User Input	-
Example	DS:> 114 011400: Test OK @

Nucleus Name	**DS_CHR_DMA_TestDMA**
Nucleus Number	115
Description	Test the memory to memory DMA transfer
User Input	-
Example	DS:> 115 011500: Test OK @

Boot EEPROM (BROM)

Nucleus Name	**DS_BROM_Communication**
Nucleus Number	200
Description	Check the communication between the IIC controller of the Chrysalis and the boot EEPROM
User Input	None
Example	DS:> 200 020000: Test OK @

Nucleus Name	**DS_BROM_WriteRead**
Nucleus Number	201
Description	Check whether the Boot EEPROM can be written to and read from
User Input	None

Example	DS:> 201 020100: Test OK @

NVRAM

Nucleus Name	**DS_NVRAM_Communication**
Nucleus Number	300
Description	Check the communication between the IIC controller of the Chrysalis and the EEPROM
User Input	None
Example	DS:> 300 030000: Test OK @

Nucleus Name	**DS_NVRAM_WriteRead**
Nucleus Number	301
Description	Check whether the EEPROM can be written to and read from
User Input	None
Example	DS:> 301 030100: Test OK @

Nucleus Name	**DS_NVRAM_Clear**
Nucleus Number	302
Description	Make the EEPROM empty, containing all zeroes.
User Input	None
Example	DS:> 302 030200: Test OK @

Nucleus Name	**DS_NVRAM_Modify**
Nucleus Number	303
Description	Modifies one or more locations in NVRAM and updates the checksum of the section modified
User Input	1. The location that must be modified i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWNLOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and data which to put on the selected location <offset> <length> <data>
Example	DS:> 303 DIAGNOSTICS 5 1 0x5a 030300:Section is modified successfully Test OK @

Nucleus Name	**DS_NVRAM_Read**
Nucleus Number	304
Description	Read out one or more locations in the NVRAM
User Input	1. The location which must be read i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWN LOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and number of bytes to read <offset> <length>
Example	304 DIAGNOSTICS 0 6 030400: Value read = 0x00 0x00 0x00 0x00 0x00 0x5A Test OK @

SDRAM

Nucleus Name	**DS_SDRAM_WriteRead**
Nucleus Number	400
Description	Check all data lines, address lines and memory locations of the SDRAM
User Input	None
Example	DS:> 400 040000: Test OK @

Nucleus Name	**DS_SDRAM_WriteReadFast**
Nucleus Number	401

Description	Check all data lines and address lines of the SDRAM
User Input	None
Example	DS:> 401 040100: Test OK @

Nucleus Name	**DS_SDRAM_Write**
Nucleus Number	402
Description	Write to a specific memory address
User Input	1. The location that must be modified (SDRAM starts at address 0xA0000000) 2. The value to put on the selected location
Example	DS:> 402 0xa1000010 0xad112222 040200: Test OK @

Nucleus Name	**DS_SDRAM_Read**
Nucleus Number	403
Description	Read from a specific memory address
User Input	The location from which the data must be read (SDRAM starts at address 0xA0000000)
Example	DS:> 403 0xa1000010 040300: Value read = 0xAD112222 Test OK @

FLASH

Nucleus Name	**DS_FLASH_DevTypeGet**
Nucleus Number	500
Description	Get the device (revision) type information of the FLASH IC. (manufacturer and device ID)
User Input	None
Example	DS:> 500 050000: Found FLASH memory: Manufacturer ID: 0x01 Device ID : 0x01 Test OK @

Nucleus Name	**DS_FLASH_WriteRead**
Nucleus Number	501
Description	Check whether the FLASH can be written to and read from
User Input	None
Example	DS:> 501 050100: Test OK @

Nucleus Name	**DS_FLASH_Read**
Nucleus Number	502
Description	Read from a specific memory address in FLASH
User Input	The location from which data must be read (FLASH starts at address 0xB8000000)
Example	DS:> 502 0xb8000000 050200: Value read = 0x3C08A000 Test OK @

Nucleus Name	**DS_FLASH_ChecksumProgram**
Nucleus Number	503
Description	Check the checksum of the application partitions by recalculating and comparing partition checksums
User Input	None
Example	DS:> 503 050300: BootCode checksum is: 0xBABE5B6F, which is correct Diagnostics checksum is : 0xBABEBAFF, which is correct Download checksum is: 0xBABEEDBF, which is correct Application checksum is : 0xBABE8EEC, which is correct Test OK @

Nucleus Name	**DS_FLASH_CalculateChecksum**
Nucleus Number	504
Description	Calculate the checksum over all memory addresses. Used to check entire FLASH contents
User Input	None
Example	DS:> 504 050400: The Checksum = 0xBABE30A4 Test OK @

Nucleus Name	**DS_FLASH_CalculateChecksumFast**
Nucleus Number	505
Description	Calculate a checksum over a selected number of address locations
User Input	None
Example	DS:> 505 050500: The Checksum = 0xBABEB064 Test OK @

Video Input Processor (VIP)

Nucleus Name	**DS_VIP_DevTypeGet**
Nucleus Number	600
Description	Get the device (revision) type information of the VIP IC
User Input	None
Example	DS:> 600 060000: Found SAA7118 Test OK @

Nucleus Name	**DS_VIP_Communication**
Nucleus Number	601
Description	Check the communication between the IIC controller of the chrysalis and the VIP IC
User Input	None
Example	DS:> 601 060100: Test OK @

Nucleus Name	**DS_VIP_ClockOutputOn**
Nucleus Number	602
Description	Switch the clock output on
User Input	None
Example	DS:> 602 060200: Test OK @

Nucleus Name	**DS_VIP_ClockOutputOff**
Nucleus Number	603
Description	Switch the clock output off
User Input	None
Example	DS:> 603 060300: Test OK @

Nucleus Name	**DS_VIP_SelectInput**
Nucleus Number	604
Description	Select an input video path to be switched to the analogue output pin (AOUT) of the VIP
User Input	The input to select, see table below. 1 CVBS_Y_IN_A 2 CVBS_OUT_B 3 CVBS_Y_IN_B 4 CVBS_Y_IN_C 6 C_IN 8 G_IN 9 Y_IN 13 B_IN 14 U_IN 18 R_IN 19 V_IN

Example	DS:> 604 1 060400: Test OK @

Digital Video Input Output (DVIO)

Nucleus Name	**DS_DVIO_LinkDevTypeGet**
Nucleus Number	700
Description	Get the device (revision) type information of the 1394 Link layer IC
User Input	None
Example	DS:> 700 070000: Device type of the link layer IC: ffc00301 Test OK @

Nucleus Name	**DS_DVIO_PhyDevTypeGet**
Nucleus Number	701
Description	Get the device (revision) type information of the 1394 Physical layer IC
User Input	None
Example	DS:> 701 070100: Device type of the phy layer IC: 0 Test OK @

Nucleus Name	**DS_DVIO_LinkCommunication**
Nucleus Number	702
Description	Check the accessibility of the 1394 Link layer IC by writing to and reading from a specific address
User Input	None
Example	DS:> 702 070200: Test OK @

Nucleus Name	**DS_DVIO_PhyCommunication**
Nucleus Number	703
Description	Check the accessibility of the 1394 Physical layer IC by writing to and reading from a specific address
User Input	None
Example	DS:> 703 070300: Test OK @

Nucleus Name	**DS_DVIO_Routing**
Nucleus Number	704
Description	Route a DV stream containing an audio and video signal through the physical and link layer ICs to the Chrysalis
User Input	None, test works for both NTSC and PAL
Example	DS:> 704 070400: Test OK @

Nucleus Name	**DS_DVIO_DetectNode**
Nucleus Number	705
Description	Check whether a DV node can be detected by the hardware
User Input	None, test works for both NTSC and PAL
Example	DS:> 705 070500: Test OK @

Nucleus Name	**DS_DVIO_DetectStream**
Nucleus Number	706
Description	Check whether a DV stream can be detected by the hardware
User Input	None, test works for both NTSC and PAL
Example	DS:> 706 070600: Test OK @

Progressive Scan (PSCAN)

Nucleus Name	**DS_PSCAN_CommunicationDenc**
Nucleus Number	801
Description	Check the communication between the IIC controller of the chrysalis and the progressive scan DENC-IC
User Input	None
Example	DS:> 801 080100: Test OK @

Nucleus Name	**DS_PSCAN_TestImageOn**
Nucleus Number	802
Description	Generate the test images that are present on the progressive scan IC.
User Input	In case of ADV7196: When no input is given “HATCH” is the default -“HATCH” -“FRAME” Remark: “HATCH” is a crosshatch test pattern (horizontal and vertical white lines are displayed against a black background) “FRAME” is a uniform coloured frame/field test pattern (default white). In case of FLI2300: Nothing.
Example	DS:> 802 HATCH 080200: Test OK @

Nucleus Name	**DS_PSCAN_TestImageOff**
Nucleus Number	803
Description	Switch off the generated test image
User Input	None
Example	DS:> 803 080300: Test OK @

Nucleus Name	**DS_PSCAN_TestImageColourSettingsSet**
Nucleus Number	804
Description	Set the colour of the hatch- or the frame- field to a different value than the default white
User Input	A colour string of one of the next non-case sensitive strings (WHITE, BLACK, RED, GREEN, BLUE, YELLOW, CYAN, MAGENTA) or Y Cr Cb (hexa-) decimal values.
Example	DS:> 804 yellow 080400: Test OK @ DS:> 804 0x6a 0xde 0xca 080400: Test OK @

Nucleus Name	**DS_PSCAN_TestImageColourSettingsGet**
Nucleus Number	805
Description	Get the colour settings of the hatch- or the frame- field.
User Input	None
Example	DS:> 805 080500: Colour Y Cr Cb values: 0xD2 0x92 0x10 Test OK @

Nucleus Name	**DS_PSCAN_Routing**
Nucleus Number	806
Description	Route a video signal from the host processor through the progressive scan ICs to the progressive scan output of the set. Note: to route the progressive scan to the output of the set, first call nucleus 1112 with parameter 0 (video routing on analogue board).
User Input	None
Example	DS:> 806 080600: Test OK @

Nucleus Name	**DS_PSCAN_DevTypeGetDeinterlacer**
Nucleus Number	807
Description	Get the device (revision) type information of the progressive scan deinterlacer.
User Input	None
Example	DS:> 807 080700: Chip name : 2300 Chip version : 1 Test OK @

Nucleus Name	**DS_PSCAN_CommunicationDeinterlacer**
Nucleus Number	808
Description	Check the communication between the IIC controller of the chrysalis and the progressive scan Deinterlacer-IC
User Input	None
Example	DS:> 808 080800: Test OK @

Basic Engine (BE)

Nucleus Name	**DS_BE_CommunicationEcho**
Nucleus Number	900
Description	Check the communication between the digital board and the basic engine by issuing an echo command over the S2B interface
User Input	None
Example	DS:> 900 090000: Test OK @

Nucleus Name	**DS_BE_Reset**
Nucleus Number	901
Description	Reset the basic engine
User Input	None
Example	DS:> 901 090100: Test OK @

Nucleus Name	**DS_BE_VersionGet**
Nucleus Number	903
Description	Get the version of the basic engine and that of the optical unit
User Input	None
Example	DS:> 903 090300: BE version = 20.09.18 Optical unit version = 3C.00.09.41.08 Test OK @

Nucleus Name	**DS_BE_GetSelftestResult**
Nucleus Number	902
Description	Return the self-test results through the service port
User Input	None
Example	DS:> 902 090200: Test OK @

Nucleus Name	**DS_BE_TrayOut**
Nucleus Number	904
Description	Open the tray of the basic engine
User Input	None
Example	DS:> 904 090400: Test OK @

Nucleus Name	**DS_BE_TrayIn**
Nucleus Number	905
Description	Close the tray of the basic engine

User Input	None
Example	DS:> 905 090500: Test OK @

Nucleus Name	**DS_BE_WriteReadDvdRw**
Nucleus Number	906
Description	Write data to and read data from a DVD+RW disc through the basic engine for verification of the writing
User Input	None
Example	DS:> 906 090600: Testing on sector 0x5dbe0: OK Test OK @

Nucleus Name	**DS_BE_WriteReadDvdR**
Nucleus Number	907
Description	Write data to and read data from a DVD+R disc through the basic engine for verification of the writing
User Input	None
Example	DS:> 907 090700: Testing on sector 0x36210: OK Test OK @

Nucleus Name	**DS_BE_StatisticalInformationGet**
Nucleus Number	908
Description	Retrieve the statistical information from the basic engine
User Input	None
Example	DS:> 908 Total time the power power on (HR:MIN) 0: 0h Total time of reading CDROM discs (HR:MIN) 0: 0h Total time of reading high DVD SL discs (HR:MIN) 0: 0h Total time of reading other DVD SL discs (HR:MIN) 0: 0h Total time of reading high DVD DL siscs (HR:MIN) 0: 0h Total time of reading other DVD DL discs (HR:MIN) 0: 0h Total time of reading high DVD+R discs (HR:MIN) 0: 0h Total time of reading other DVD+R discs (HR:MIN) 0: 0h Total time of reading high DVD+RW discs (HR:MIN) 0: 0h Total time of reading other DVD+RW discs (HR:MIN) 1: 0h Total time of writing DVD+R discs in 2HRS mode (HR:MIN) 0: 0h Total time of writing DVD+R discs in 4HRS mode (HR:MIN) 0: 0h Total time of writing DVD+R discs in 6HRS mode (HR:MIN) 0: 2h Total time of writing DVD+RW discs in 2HRS mode (HR:MIN) 0: 0h Total time of writing DVD+RW discs in 4HRS mode (HR:MIN) 0: 3h Total time of writing DVD+RW discs in 6HRS mode (HR:MIN) 0: 0h 090800: Test OK @

Nucleus Name	**DS_BE_StatisticalInformationReSet**
Nucleus Number	909
Description	Reset the statistical information in the basic engine
User Input	None
Example	DS:> 909 090900: Test OK @

Nucleus Name	**DS_BE_ErrorLogGet**
Nucleus Number	910
Description	Get the error log from the basic engine
User Input	None
Example	DS:> 910 Momentary errors (0-9): 0x21 0x00 0x00 0x20 0x00 0x00 0x00 0x00 0x00 0x00 Cumulative errors (1-9): 0x00 0x80 0x20 0x00 0x00 0x00 0x00 0x00 0x00 Software fatal assert : 256 cpowermanager.cpp 091000: Test OK @

Nucleus Name	**DS_BE_ErrorLogReset**
Nucleus Number	911
Description	Reset the error log in the basic engine
User Input	None
Example	DS:> 911 091100: Test OK @

Nucleus Name	DS_BE_JitterOptimise
Nucleus Number	912
Description	Perform jitter optimisation:A formatted DVD must be loaded into the engine before executing this nucleus
User Input	none
Example	DS:> 912 Test OK @

Nucleus Name	**DS_BE_FocusOn**
Nucleus Number	913
Description	Put the laser of the BE into focus
User Input	None
Example	DS:> 913 091300: Test OK @

Nucleus Name	**DS_BE_FocusOff**
Nucleus Number	914
Description	Turn off putting the laser of the BE into focus
User Input	None
Example	DS:> 914 091400: Test OK @

Nucleus Name	**DS_BE_MotorOn**
Nucleus Number	915
Description	Turn on the turntable motor
User Input	None
Example	DS:> 915 091500: Test OK @

Nucleus Name	**DS_BE_MotorOff**
Nucleus Number	916
Description	Turn off the turntable motor
User Input	None
Example	DS:> 916 091600: Test OK @

Nucleus Name	**DS_BE_RadialOn**
Nucleus Number	917
Description	Close the radial loop
User Input	A formatted DVD must be loaded into the engine before executing this nucleus
Example	DS:> 917 091700: Test OK @

Nucleus Name	**DS_BE_RadialOff**
Nucleus Number	918
Description	Open the radial loop
User Input	None
Example	DS:> 918 091800: Test OK @

Nucleus Name	**DS_BE_RadialCalibration**
Nucleus Number	919
Description	Calibrate the radial loop
User Input	A formatted DVD must be loaded into the engine before executing this nucleus
Example	DS:> 919 091900: Test OK @

Nucleus Name	**DS_BE_Tilt**
Nucleus Number	920
Description	Test the tilt mechanism control loop, or allow its proper functioning to be measured.Before executing this nucleus a disc must be loaded into the recorder
User Input	None
Example	DS:> 920 092000: Tilt sensor bathtub: (71,-12,145)(68,-12,135)(62,-10,120)(56,-92,97)(50,-75,86) (44,-59,80)(41,-52,80)(35,-37,86)(29,-22,86) (23,-7,92)(17,8,111)(11,23,135)(8,31,138)(5,39,158) Test OK @

Nucleus Name	**DS_BE_CheckDisc**
Nucleus Number	921
Description	Check whether there is a disc inside the BE
User Input	None
Example	DS:> 921 092100: A DVD+Rewritable is loaded (disc is empty or partially recorded) Test OK @ DS:> 921 092100: No Disc is loaded Test OK @

Nucleus Name	**DS_BE_SledgeMotor**
Nucleus Number	922
Description	Send the sledge to its home position, then to the middle of the disc, and then to the end.
User Input	None
Example	DS:> 922 092200: Test OK @

Nucleus Name	**DS_BE_ReadTocInfo**
Nucleus Number	924
Description	Read the TOC from the disc. This gives a good indication if the BE works properly..
User Input	None
Example	DS:> 924 092400: TOC info [hex] = 91 3A 0C Test OK@ DS:> 924 092403: The BE returned: 0x10 #{no_disc_error} No disc is detected Error@ DS:> 924 092403: The BE returned: 0x1e #{illegal_medium_error} Engine unable to handle current disc. Probably illegal medium. Error @

Nucleus Name	**DS_BE_DiscErase**
Nucleus Number	925
Description	Perform a DC-erase on a DVD+RW disc.
User Input	None

Example	DS:> 925 The entirely disc will be erased. Are you sure you want this?[y/n] 092500: Test OK @

Nucleus Name	**DS_BE_RegionCodeSet**
Nucleus Number	928
Description	Set the region code in the AV3.
User Input	Region code
Example	DS:> 928 1 092800: Test OK @ DS:> 928 This nucleus is not supported by the engine 092800: Test OK @

Nucleus Name	**DS_BE_RegionCodeGet**
Nucleus Number	929
Description	Read the region code from the AV3.
User Input	None
Example	DS:> 929 092900: DVD region 1 Test OK @ DS:> 929This nucleus is not supported by the engine 092900: Test OK @

Nucleus Name	**DS_BE_RegionCounterReset**
Nucleus Number	930
Description	Reset the region counter in the AV3.
User Input	None
Example	DS:> 930 093000: Test OK @ DS:> 930 This nucleus is not supported by the engine 093000: Test OK @

Nucleus Name	**DS_BE_AdjustLaserControl**
Nucleus Number	931
Description	Adjust the DVD-M (with the OPU) with PCBA. (So adjusts the two PCBS to each other)
User Input	None
Execution Time	30 seconds
Example	DS:> 931 093100: Test OK @

Display and Control Board (DCB)

Nucleus Name	**DS_DCB_CommunicationEcho**
Nucleus Number	1000
Description	Check the communication between the digital board and the DCB by issuing an echo command
User Input	None
Example	DS:> 1000 100000: Test OK @

Nucleus Name	**DS_DCB_VersionGet**
Nucleus Number	1001
Description	Get the version of the DCB

User Input	None
Example	DS:> 1001100100: DCB version: 13Test OK @

Nucleus Name	**DS_DCB_LightDisplay**
Nucleus Number	1002
Description	Light the entire display of the DCB, and clear the display after confirmation.User confirmation is necessary.
User Input	None
Example	DS:> 1002 100200: Test OK @

Nucleus Name	**DS_DCB_Keyboard**
Nucleus Number	1004
Description	Check all keys of the keyboard by confirming the key-code displayed of each key.
User Input	None
Example	DS:> 1004 100400: Test OK @

Nucleus Name	**DS_DCB_RemoteControl**
Nucleus Number	1005
Description	Check the interface between the remote control and the DCB by checking the key-code displayed
User Input	None
Example	DS:> 1005 100500: Test OK @

Nucleus Name	**DS_DCB_Led**
Nucleus Number	1006
Description	Switch the record LED on, and after confirmation off. The user confirms by pressing the REC key, STOP key, or the PLAY key on the local keyboard. The PLAY key confirms that the LED is on and the REC key
User Input	None
Example	DS:> 1006 100600: Test OK @

Analogue Board (ANAB)

Nucleus Name	**DS_ANAB_CommunicationEcho**
Nucleus Number	1100
Description	Check the communication between the digital board and the analogue board by issuing some echo string.
User Input	None
Example	DS:> 1100 110000: Hello Analogue Board Test OK @

Nucleus Name	**DS_ANAB_CommunicationlicNvram**
Nucleus Number	1101
Description	Check the communication between the digital board and the NVRAM on the analogue board.
User Input	None
Example	DS:> 1101 110100: Test OK @

Nucleus Name	**DS_ANAB_CommunicationlicTuner**
Nucleus Number	1102
Description	Check the communication between the digital board and the tuner on the analogue board
User Input	None

Example	DS:> 1102 110200: Test OK @

Nucleus Name	**DS_ANAB_CommunicationlicDataSlicer**
Nucleus Number	1103
Description	Check the communication between the digital board and the data slicer on the analogue board
User Input	None
Example	DS:> 1103 110300: Test OK @

Nucleus Name	**DS_ANAB_CommunicationlicSoundProcessor**
Nucleus Number	1104
Description	Check the communication between the digital board and the sound processor on the analogue board
User Input	None
Example	DS:> 1104 110400: Test OK @

Nucleus Name	**DS_ANAB_CommunicationlicAVSelector**
Nucleus Number	1105
Description	Check the communication between the digital board and the A/V-selector on the analogue board
User Input	None
Example	DS:> 1105 110500: Test OK @

Nucleus Name	**DS_ANAB_HardwareVersionGet**
Nucleus Number	1106
Description	Get the hardware version of the analogue board
User Input	None
Example	DS:> 1106 110600: Analogue hardware version : 11 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionBootGet**
Nucleus Number	1107
Description	Get the software version of the boot software of the analogue board
User Input	None
Example	DS:> 1107 110700: Bootcode application version : 11.00.11 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionDownloadGet**
Nucleus Number	1108
Description	Get the software version of the download software of the analogue board
User Input	None
Example	DS:> 1108 110800: Download application version : 11.00.06 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionApplGet**
Nucleus Number	1109
Description	Get the software version of the application software of the analogue board
User Input	None
Example	DS:> 1109 110900: Recorder application version : 11.00.23 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionDiagnosticsGet**
Nucleus Number	1110
Description	Get the software version of the diagnostic software of the analogue board
User Input	None
Example	DS:> 1110 111000: Diagnostics application version : 11.00.13 Test OK @

Nucleus Name	**DS_ANAB_ChecksumProgram**
Nucleus Number	1111
Description	Check the checksum of the several partitions by recalculating and comparing partition checksums
User Input	None
Example	DS:> 1111 BootCode checksum is: 0xBABE6240, which is correct Diagnostics checksum is : 0xBABEBEAD, which is correct Download checksum is: 0xBABEA6B7, which is correct Application checksum is : 0xBABEB277, which is correct 111100: Test OK @

Nucleus Name	**DS_ANAB_VideoRouting**
Nucleus Number	1112
Description	Perform the routing of the video paths on the analogue board
User Input	The user has to input the correct parameter for the routing (see table 'video routing' below).
Example	DS:> 1112 00111200: Test OK @

Video routing paths (Europe)

Path ID	Description
0	Input signal is VIDEO(CVBS) from digital board and will be re-routed back to the digital board.
1	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.
2	No Routing.
3	Input signal is from FRONT S-VIDEO(Y/C) and will be routed to the digital board.
4	No Routing.
5	Input signal is CVBS from SCART1 and will be routed to the digital board.
6	Input signal is CVBS from SCART2 and will be routed to the digital board.
7	Input Signal is CVBS from Digital Board and it will be routed to Scart1 and Scart2.
8	Input signal is VIDEO(CVBS) from ANTENNA IN and will be routed to SCART2.
9	Input signal is VIDEO(CVBS) from SCART1 and will be routed to SCART2.
10	Input signal is VIDEO(CVBS) from SCART2 and will be routed to SCART1.
11	Signal path is routed Fast Blank from Scart2 pin16 and will be routed SCART1 pin16
12	Input Signal is YC from Digital Board and it will be routed to SCART1.
13	
14	No Routing.
15	Input Signal is CVBS from TUNER and it will be routed to Digital .
16	No Routing.
17	Input Signal is routed from digital board YC to REAR S-VIDEO(YC) OUT
18	Signal path is routed from digital board RGB to RGB SCART1 and from digital board CVBS to digital board CVBS.
19	No Routing.
20	Input RGB Signal is routed from Digital Board to SCART1(RGB),Input CVBS Signal from Digital Board to Digital Board and Fast Blanking Signal from SCART2 to SCART1.
21	Input Y/C Signal from Digital Board is routed to Rear Y/C Connector and Input Y/C Signal from Front Y/C connector is routed to Digital Board.

Video routing paths (NAFTA)

Path ID	Description
0	No Routing.
1	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.This routing is same as the above path id.

2	Input signal is from REAR VIDEO(CVBS) IN and will be routed to the digital board.
3	Input signal is from FRONT S-VIDEO(Y/C) IN and the signal received will be routed to the digital board.
4	Input signal is from REAR S-VIDEO(Y/C) IN and will be routed to the digital board.
5	No Routing.
6	No routing.
7	No routing.
8	Input signal is VIDEO(CVBS) from TUNER and will be routed to Y Pin of Rear Y/C Connector.This will give only black/White Picture .
9	Input signal is from YUV IN and will be routed to YUV OUT.This is possible only if Digital Board routes back YUV signal received back to the Analogue board(DENC)
10	No routing.
11	No routing.
12	No Routing.
13	No Routing.
14	No Routing.
15	Input CVBS Signal from Tuner is routed to Digital Board..
16	No Routing.
17	No Routing.
18	Input Signal from CVBS Rear In is routed to Digital Board. This is the same as path ID 02.
19	Input Y/C signal from Digital Board is routed to Y/C Rear Out Connector and Input signal from Y/C Front In Connector is routed to Y/C Digital Board.
20	Y/C signal from Digital Board is routed to Y/C Rear Out Connector and Input signal from Y/C Rear In Connector is routed to Y/C Digital Board.
23	The Video signal received from the Digital board will be output on Modulator channel 3.
24	The Video signal received from the Digital board will be output on Modulator channel 4.

Nucleus Name	**DS_ANAB_AudioRouting**
Nucleus Number	1113
Description	Perform the routing of the audio paths on the analogue board
User Input	The user has to input the correct parameter for the routing (see table 'audio routing' below)
Example	DS:> 1113 00111300: Test OK @

Audio routing paths (Europe)

Path ID	Description
0	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
1	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
2	No Routing.
3	Input signal is AUDIO from SCART1 and will be routed to the digital board.
4	Input signal is AUDIO from SCART2 and will be routed to the digital board.
5	No routing.
6	No routing.
7	Input Audio signal is from the digital Board and it will be routed to the SCART1 and SCART2
8	Input AUDIO signal from TUNER and will be routed to SCART2.
9	Input signal is AUDIO from SCART1 and will be routed to SCART2.
10	Input audio signal from SCART2 is routed to SCART1.
11	Input Audio signal is routed from DVIO to SCART2.
12	
13	No Routing.
14	Input is Audio Signal from DVIO and it will be routed to Digital Board.
15	Input is Audio Signal from TUNER and it will be routed to Digital Board..
16	No routing.
17	No Routing.
18	Input signal is from FRONT AUDIO IN and will be routed to SCART2.
21	Input signal is from FRONT AUDIO IN and will be routed to the digital board.

Audio routing paths (NAFTA)

Path ID	Description
0	No Routing.
1	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
2	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.

3	Input Audio Signal is routed from FRONT Cinch In to Digital Board.(This is same as path ID 01)
4	Input Signal is from Rear Cinch In1 and it will be routed to Digital Board..
5	No routing.
6	No routing.
7	No routing.
8	No Routing.
9	No routing.
10	No Routing.
11	No Routing.
12	No Routing.
13	Input Signal is from Digital Board and it will be routed to the digital board.
14	No routing.
15	Input is Audio Signal from TUNER and it will be routed to Digital Board.
16	Input signal is AUDIO from dvio board and will be routed to Digital Board.
17	No routing.
18	No routing.
19	No routing.
20	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.
21	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
22	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
23	The Audio signal received from the Digital board will be outputted on Modulator channel 3.
24	The Audio signal received from the Digital board will be outputted on Modulator channel 4.

Nucleus Name	**DS_ANAB_SelectTunerChannel**		
Nucleus Number	1114		
Description	Set the tuner to receive a valid audio and video signal		
User Input	<Frequency*16> <video standard id>Tuner frequency: to tune the tuner to e.g. 216 MHz, this parameter must be 3456. (Since 216*16 = 3456. This is to avoid the decimal points to the parameter list.)Video standard id: The table below shows which video standards are possible		
	Video standard id	Europe	NAFTA
	163248648096112	PAL_BG	NTSC
		PAL_I	Invalid
		PAL_DK	Invalid
		SEC_L	Invalid
		SEC_LS	Invalid
		SEC_BG	Invalid
		SEC_DK	Invalid
Example	DS:> 1114 3456 16 111400: Test OK @		

Nucleus Name	**DS_ANAB_IICWriteRead**
Nucleus Number	1115
Description	Perform an IIC write and read action on the analogue board
User Input	Writing: [<W>|<w>] [I2C address] [number of data bytes to write] with <data[0]...data[n]> Max 16 data bytes (n < 16). Reading: [<R>|<r>] [I2C address] [number of data bytes to read] Max 16 data bytes (n < 16).
Example	DS:> 1115 w 0x94 2 0x06 0x02 111500: Test OK @

Nucleus Name	**DS_ANAB_ClockAdjust**
Nucleus Number	1116
Description	Set the clock to the value passed through in the YYYY MM DD HH MM SS format
User Input	<YYYY> <MM> <DD> <HH> <MM> <SS>
Example	DS:> 1116 2002 11 11 11 11 11 111600: Test OK @

Nucleus Name	**DS_ANAB_ClockReference**
Nucleus Number	1117
Description	Generate a 1 kHz signal on pin 7 (INT) of the clock IC
User Input	None
Example	DS:> 1117 111700: Test OK @

Nucleus Name	**DS_ANAB_ClockCorrection**
Nucleus Number	1118
Description	Store the clock IC correction value in NVRAM
User Input	The correction value for the clock
Example	DS:> 1118 1000023 111800: Test OK @

Nucleus Name	**DS_ANAB_TunerAFCReferenceVoltage**
Nucleus Number	1119
Description	Store the reference voltage for the tuner in NVRAM
User Input	The reference voltage, between 0 and 255
Example	DS:> 1119 5111900: Test OK @

Nucleus Name	**DS_ANAB_TunerFrequencyDownload**
Nucleus Number	1120
Description	Store the frequency table in NVRAM. The frequency table is passed through the error-string provided to the nucleus.
User Input	See frequency table
Example	DS:> 1120 2233 00 02 4E45442031 112000: Test OK @

Nucleus Name	**DS_ANAB_StoreExternalPresets**
Nucleus Number	1121
Description	Store the external presets in NVRAM
User Input	None
Example	DS:> 1121 112100: Test OK @

Nucleus Name	**DS_ANAB_BargraphLevelAdjust**
Nucleus Number	1122
Description	Measure the audio signal corresponding to 0dB per channel and store it as correction value in NVRAM
User Input	none
Example	DS:> 1122 112200: Test OK @

Frequency download string format

Format	description	remarks
X(XXX)	Preset number	
VVWW	VV: Channel numberWW : Channel offset	

ZZ	Byte containing 8 bit fields for TRUE/FALSE : BIT 0: Decoder BIT 1: Modulation BIT 2: NICAM SAP BIT 3: Satpreset BIT 4: Presetdefined Channelpreferred BIT 5: ExtPreset BIT 6: NameManuallyChanged BIT 7: ChannelPreset	 NICAM/stereo bit for Europe SAP/stereo bit for NAFTA Preset defined bit is only used for Europe. For NAFTA, renamed as channelpreferred to indicate if a channel is preferred or not. TRUE if preset is defined from P50 as extern [TGA]
HH	HfSystemFineTuning	HfS: 4 bit, FT: -4,...,4
IIJJKKLLMM	Netname	Range: A,..,Z,0,..,9,_,.. Netname length exists for Europe only. 'II' is the HEX-value for the first character, 'JJ' for the second, Ö
The message string of (DS_MessageDef *msgString) should be in the format: "X(XXX)_VVWW_ZZ_HH_IIJJKKLLMM". Here will be 'X(XXX)' a decimal value in the range of 0 to 255. V, W, Z, H, I, J, K, L, M are hex values with out the prefix '0x' (in the range 0... 9,A ... F) " _" Denotes a space character. Remarks: CHANNEL_SYSTEM is for NAFTA. PRESET_SYSTEM is for Europe.		

System (SYS)

Nucleus Name	**DS_SYS_HardwareVersionGet**	
Nucleus Number	1200	
Description	Get the hardware version and type of the digital board	
User Input	None	
Example	DS:> 1200 120000: Hardware ID = 00 The (PIO-pins) Digital Board ID = 2 Test OK @ DS:>	

Nucleus Name	**DS_SYS_SoftwareVersionBootGet**
Nucleus Number	1201
Description	Get the version of the boot software on the digital board
User Input	None
Example	DS:> 1201 120100: Software Boot Version = 0001T est OK @

Nucleus Name	**DS_SYS_SoftwareVersionDownloadGet**
Nucleus Number	1202
Description	Get the version of the download software on the digital board
User Input	None
Example	DS:> 1202 120200: Software Download Version = 0001 Test OK @

Nucleus Name	**DS_SYS_SoftwareVersionApplGet**
Nucleus Number	1203
Description	Get the version of the application software on the digital board
User Input	None
Example	DS:> 1203 120300: Software Application Version = 0001 Test OK @

Nucleus Name	**DS_SYS_SoftwareVersionDiagnosticsGet**
Nucleus Number	1204
Description	Get the version of the diagnostics software on the digital board
User Input	None

Example	DS:> 1204 120400: Software Diagnostics Version = 0001 Test OK @

Nucleus Name	**DS_SYS_EepromUpload**	
Nucleus Number	1205	
Description	Upload the contents of the NVRAM on the analogue board or the digital board to the service PC, by using the X-modem protocol	
User Input	Choose one of the following parameters for the nucleus:1. Upload the contents of the NVRAM of the digital board2. Upload the contents of the NVRAM of the analogue boardChoose in the terminal on the control PC -> transfer -> receive file. Select X-modem protocol. Then click receive in the dialogue and fill in the file name in which you want to store the data.	
	120503	Something went wrong while transferring the data.
	120504	User cancelled the upload.
Example	DS:> 1205 1120500: Test OK @	

Nucleus Name	**DS_SYS_EepromDownload**
Nucleus Number	1206
Description	Download a file with the contents of the NVRAM for the analogue board or the digital board from the service PC to the recorder, by using the X-modem protocol
User Input	Choose one of the following parameters for the nucleus:1. Download the contents of the NVRAM of the digital board2. Download the contents of the NVRAM of the analogue boardChoose in the terminal of the control PC -> transfer -> send file. Select X-modem protocol. Then choose a file with the Browse button in the dialogue and click on send.
Example	DS:> 1206 1120600: Test OK @

Nucleus Name	**DS_SYS_DvIdNumberSet**
Nucleus Number	1207
Description	Set the IEEE 1394 unique IDThe unique ID to be set.
User Input	None
Example	DS:> 1207 1234567890 120700: Test OK @

Nucleus Name	**DS_SYS_DvIdNumberGet**
Nucleus Number	1208
Description	Get the IEEE1394 ID
User Input	None
Example	DS:> 1208 120800: The DvIdNumber is: 0x0C22384E5A Test OK @

Nucleus Name	**DS_SYS_IicWrite**
Nucleus Number	1209
Description	Perform an IIC write action on the digital board
User Input	The user input the number of bytes to write followed by these bytes: <BusID><Slave address to write to><number of bytes to write><d1><d2><..><dx> Where the bus ID is either 0 (normally used) or 1
Example	DS:> 1209 0 0xa0 1 0x6 120900: 1 Bytes written Test OK @

Nucleus Name	**DS_SYS_IicRead**
Nucleus Number	1210
Description	Perform an IIC read action on the digital board
User Input	The user inputs the number of bytes to read and the address to read them from: <BusID><Slave address to read from><Number of bytes to read>Where the bus ID is either 0 (normally used) or 1

Example	DS:> 1210 0 0xa0 1 121000: Value read =0x06T est OK @

Nucleus Name	**DS_SYS_UartWrite**
Nucleus Number	1211
Description	Perform an UART write action on the digital board on a specified UART
User Input	The user inputs the UART to write to, the number of bytes and the bytes to be written to the UART. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr><Number of bytes to write><d1><d2><..><dx>
Example	DS:> 1211 2 2 0xd1 0x01 121100: Test OK @

Nucleus Name	**DS_SYS_UartRead**
Nucleus Number	1212
Description	Perform an UART read action on the digital board on a specified UART
User Input	The user inputs the UART to read from. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr >
Example	DS:> 1212 2 121200: The value that was read is: 0x50 0xD1 0x00 Test OK @

Nucleus Name	**DS_SYS_VideoLoopThroughStart**
Nucleus Number	1213
Description	The video signal, which is confirm the user input, is routed from the input to the output. Input is set with the routing nucleus 1112. All outputs are enabled.
User Input	<vipInput> <VideoOutput> <VideoStandard> 1. vipInput (CVBS, YC, YUV, RGB). 2. VideoOutput (YUV, RGB). 3. VideoStandard (PAL, NTSC).
Example	DS:> 1213 CVBS RGB PAL 121300: Test OK @

Nucleus Name	**DS_SYS_VideoLoopThroughStop**
Nucleus Number	1214
Description	Stop routing the video input to all the outputs.
User Input	-
Example	DS:> 1214 121400: Test OK @

Nucleus Name	**DS_SYS_VideoLoop**
Nucleus Number	1215
Description	Note: Before executing this nucleus the user must route the video signal on the analog board with nucleus DS_ANAB_VideoRouting(1112).
User Input	Video input of the digital board: - CVBS - YC - YUV - RGB - TEST (The video output will be routed to the video input on the digital board.) Video standard: - PAL - NTSC When no input is given, the nucleus will take TEST for video input and PAL for video standard.

Example	DS:> 1215 cvbs ntsc 121500: Test OK @ DS:> 1215 cvbs pal 121508: The VideoInputProcessor cannot detect a sync-signal. Error @ DS:> 1215 yuv ntsc 121511: Error in luminance signal(Y) Error in chrominance signal(U) Error in chrominance signal(V) Error @

Nucleus Name	**DS_SYS_AudioLoop**
Nucleus Number	1216
Description	The user first needs to select how the audio path must be routed on the analogue board (FRS_DS_ANAB_AUDIO_VIDEO_ROUTING) and/or digital board before calling this nucleus. The user also has to route the audio outputs back to the inputs by means of cables. In this nucleus the Chrysalis generates an audio sine signal with a specific signature and sends it to the output of the digital board (FRS_DS_CHR_SINE). The Chrysalis encodes the audio signal to MPEG I layer II and after this the signature of the signal will be checked.
User Input	None
Example	DS:> 1216 121600: Test OK @

Nucleus Name	**DS_SYS_SlashVersionSet**
Nucleus Number	1217
Description	Set the slash version of the system
User Input	The slash version
Example	DS:> 1217 82121700: Test OK @

Nucleus Name	**DS_SYS_SlashVersionGet**
Nucleus Number	1218
Description	Get the slash version of the system
User Input	None
Example	DS:> 1218 121800: The slash version is: 82 Test OK @

Nucleus Name	**DS_SYS_Virginize**
Nucleus Number	1219
Description	(Re-) Virginize the recorder. User data in the NVRAM of the analogue board is cleared
Example	DS:> 1219 121900: Test OK @

Nucleus Name	**DS_SYS_VirginModeOn**
Nucleus Number	1220
Description	Turn on the virgin mode functionality (e.g. the auto channel search upon start-up)
User Input	None
Example	DS:> 1220 122000: Test OK @

Nucleus Name	**DS_SYS_VirginModeOff**
Nucleus Number	1221
Description	Turn off the virgin mode functionality (e.g. the auto channel search upon start-up)
User Input	None
Example	DS:> 1221 122100: Test OK @

Nucleus Name	**DS_SYS_DisplayFatalOn**
Nucleus Number	1223
Description	Turn on the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically
User Input	None
Example	DS:> 1223 122300: Test OK @

Nucleus Name	**DS_SYS_DisplayFatalOff**
Nucleus Number	1224
Description	Turn off the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically
User Input	None
Example	DS:> 1224122400:Test OK @

Nucleus Name	**DS_SYS_DisplayFatalGet**
Nucleus Number	1225
Description	Get the display-fatal flag of the recorder
User Input	None
Example	DS:> 1225 122500: Test OK @

Nucleus Name	**DS_SYS_SettingsSet**
Nucleus Number	1226
Description	Programs the digital board settings into the boot EEPROM on the digital board.
User Input	A large hexadecimal value that represents the digital board settings obtained from the DbString.exe program or from a reference set.
Example	DS:> 1226 6469616774737462010102000101010101010000020080000 122600: Test OK @

Nucleus Name	**DS_SYS_SettingsDisplay**
Nucleus Number	1228
Description	Show the settings that are programmed in the BROM on the digital board.
User Input	None.
Example	DS:> 1228 Settings ID: 6D7920626F617264000203000101010201010000020080000 Board name: my board Hardware ID: 0 Codec IC: PNX7100_MF2 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available Bit Engine: AV 2.0 122800: Test OK @

Nucleus Name	**DS_SYS_SettingsGet**
Nucleus Number	1229
Description	Get the digital board diversity settings string that is programmed in the BROM on the digital board.
User Input	None.

Example	DS:> 1229 122900: 6D7920626F617264000203000101010201010000020080000 Test OK @

Nucleus Name	**DS_SYS_AudioLoopThroughStart**
Nucleus Number	1230
Description	Description: The audio input is routed from the an input to all outputs. Input is set with the routing nucleus 1113. All outputs are enabled.
User Input	None.
Example	DS:> 1230 123000: Test OK @

Nucleus Name	**DS_SYS_AudioLoopThroughStop**
Nucleus Number	1231
Description	Stop routing the audio input to all the outputs
User Input	-
Example	DS:> 1231 123100: Test OK @

Nucleus Name	**DS_SYS_SettingsHwIdSet**
Nucleus Number	1232
Description	Double check whether stored HW-string equals actual HW as far as we can automatically detect this. An automatic and a manual mode is supported.
User Input	- 'manual' or 'MANUAL' to enter manual mode - default is automatic mode where the nucleus stops upon and reports the first encountered error
Example	DS:> 1233 123300: Test OK @ DS:> 1233 manual 123300: Test OK @ DS:> 1233 123301:Hardware ID mismatch: in HW-Diversity string:99, actual in FLASH:0 Error @ DS:> 1233 manual Hardware ID mismatch! in HW-Diversity string:99, actual in FLASH:0 Enter the correct HW ID of the digital board. > 0 The HW-diversity string has been modified by you. Settings: Board name: DIAG Hardware ID: 0 Codec IC: PNX7100_MF3 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available Is it OK to program this inthe new HW-diversity string? ([y]es/[n]o):y Diversity HW-string programmed successfully. 123300: Test OK @ DS:>

Nucleus Name	**DS_SYS_SettingsDoubleCheck**
Nucleus Number	1233
Description	This nucleus sets the HW-Id in the HW-diversity string
User Input	- <HW-ID> - The hardware ID to set -No input - The user will be asked for the ID
Example	DS:> 1232 Enter the new HW ID of the digital board (Currently equals 21) Enter a value between 0 and 99: > 22 The HW ID will be set to: 22. Is that correct? ([Y/N]):y 123200: Test OK @ DS:> 1232 Enter the new HW ID of the digital board (Currently equals 22) Enter a value between 0 and 99: > The HW ID will be set to: 0. Is that correct? ([Y/N]):N 123202: Setting the HW ID was aborted by the user. Error @ DS:> 1232 99 123200: Test OK @

Electronic Program Guide Board (EPGB)

Nucleus Name	**DS_EPGB_VersionGet**
Nucleus Number	1300
Description	Returns the version of the EPG board.
User Input	None
Example	DS:> 1300 130000: Version : 6.1.9 Test OK @

PCMCIA INTERFACE (PCMCIA)

Nucleus Name	**DS_PCMCIA_Reset**
Nucleus Number	1400
Description	Reset the PCMCIA device by sending a reset command through IDE
Example	DS:> 1400 140000: Test OK @

Nucleus Name	**DS_PCMCIA_Inquiry**
Nucleus Number	1401
Description	Get the vendor- and product identification and the product revision level of the media in the slot.
Example	DS:> 1401 140100: Test OK @

Nucleus Name	**DS_PCMCIA_WriteRead**
Nucleus Number	1402
Description	Perform a Write Read test to a random sector on the inserted medium in the PCMCIA device and check if the data read is equal to the data written.
Example	DS:> 1402 140200: Test OK @

Nucleus Name	**DS_PCMCIA_Diagnostics**
Nucleus Number	1403
Description	Shall perform the internal diagnostic tests implemented by the PCMCIA slot. The electronics of the PCMCIA slot are tested here, not the inserted medium.
Example	DS:> 1403 140300: Test OK @

HARD DISK DRIVE (HDD)

Nucleus Name	**DS_HDD_SpinOff**	
Nucleus Number	2110	
Description	Put the HDD in parking position by sending the sleep command so it can be moved without endangering the mechanical parts	
User Input	None	
Error	Number	Description
	210500	The spin off of the hard disk drive device succeeded
	210501	The initialisation of IDE failed
	210501	The initialisation of IDE failed
	210501	The sleep ATA command failed
Example	DS:> 2105 210500: Test OK @	

Script

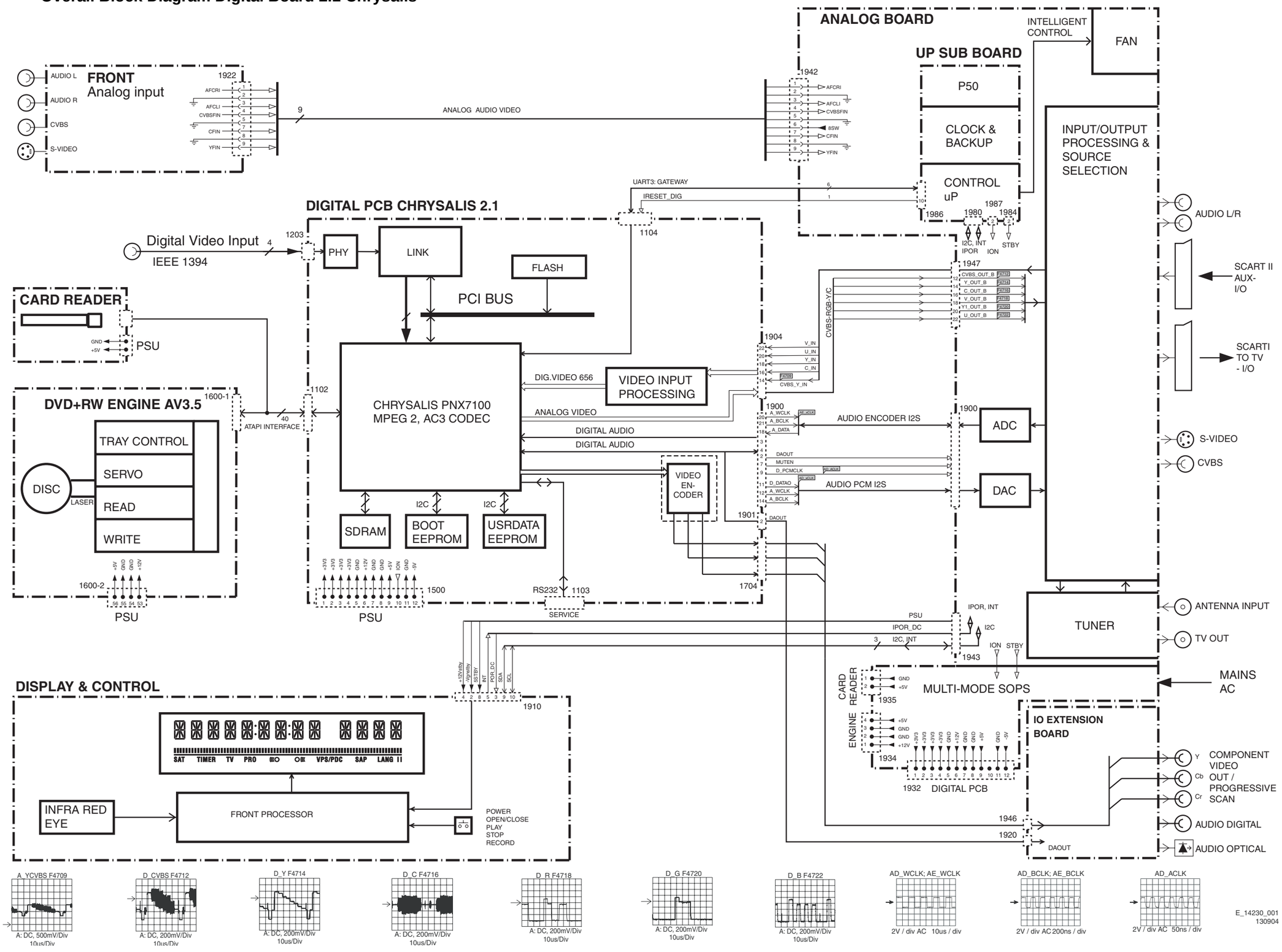
Nucleus Name	**DS_IH_ScriptHandler**
Nucleus Number	Script
Description	
Included tests:	1. DS_ANAB_COMMUNICATIONECHO_NUC 2. DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC 6. DS_CHR_INT_PIC_NUC 7. DS_CHR_DMA_NUC 8. DS_BROM_WRITEREAD_NUC 9. DS_NVRAM_COMMUNICATION_NUC 10. DS_NVRAM_WRITEREAD_NUC 11. DS_SDRAM_WRITEREADFAST_NUC 12. DS_FLASH_WRITEREAD_NUC 13. DS_FLASH_CHECKSUMPROGRAM_NUC 14. DS_SYS_HARDWAREVERSIONGET_NUC 15. DS_VIP_DEVTYPEGET_NUC 16. DS_VIP_COMMUNICATION_NUC 17. DS_DVIO_LINKDEVTYPEGET_NUC 18. DS_DVIO_PHYDEVTYPEGET_NUC 19. DS_DVIO_LINKCOMMUNICATION_NUC 20. DS_DVIO_PHYCOMMUNICATION_NUC 21. DS_PSCAN_COMMUNICATIONDENC_NUC 22. DS_PSCAN_COMMUNICATIONDEINTERLACER_NUC 23. DS_BE_COMMUNICATIONECHO_NUC 24. DS_ANAB_COMMUNICATIONIICNVRAM_NUC 25. DS_ANAB_COMMUNICATIONIICTUNER_NUC 26. DS_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC 27. DS_ANAB_COMMUNICATIONIICAVSELECTOR_NUC 28. DS_ANAB_CHECKSUMPROGRAM_NUC
User Input	None

Example	DS:> script Executing User/Dealer script. Busy executing NUC1100 1-28 Hello Analogue Board Busy executing NUC1000 2-28 Busy executing NUC200 3-28 Busy executing NUC1228 4-28 Settings ID: 4C4541440D0000000003030001010102010100002008000 0 Board name: LEAD Hardware ID: 0 Codec IC: PNX7100_MF3 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available Bit Engine: AV 2.0 Busy executing NUC100 5-28 Device ID 7100 Codec ID PNX7100_MF3 F-BCU (0x0102) 1.0 INTC (0x011d) 1.0 PCI-XIO(0x0113) 1.0 SIF (0x013b) 1.0 EJTAG (0x0104) 0.0 S-BCU (0x0102) 1.0 BOOT (0x010a) 1.0 CONFIG (0x013f) 1.0 RESET (0x0123) 1.0 DEBUG (0x0116) 0.0 UART0 (0x0107) 0.1 UART1 (0x0107) 0.1 UART2 (0x0107) 0.1 UART3 (0x0107) 0.1 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1 GPIO (0x013c) 1.0 SYNC (0x013a) 1.0 DISP0 (0xa015) 0.2 DISP1 (0xa00f) 0.0 OSD (0x0136) 0.1 SPU (0xa00e) 0.0 MIXER (0x0137) 1.0 DENC (0x0138) 0.1 CCIR (0x0139) 1.0 VDEC (0x0133) 0.1 PARSER (0xa00d) 0.0 DV (0xa00c) 0.0 BEI (0xa00a) 0.0 IDE (0xa009) 0.0 SGDX (0xa008) 0.0 BYTE (0xa00b) 0.0 OUTPUT (0xa003) 0.0 ACOMP (0xa000) 0.0 VFE (0xa001) 0.0 VCOMP (0xa002) 0.0 SCR (0x0000) 0.0 SIFF (0xa011) 0.0 WMD (0xa010) 0.0 AUDIO0 (0xa015) 0.2 AUDIO1 (0xa00f) 0.0 PSCAN (0xa018) 0.0 Busy executing NUC114 6-28 Busy executing NUC115 7-28 Busy executing NUC201 8-28 Busy executing NUC300 9-28 Busy executing NUC301 10-28 Busy executing NUC401 11-28 Busy executing NUC501 12-28 Busy executing NUC503 13-28 BootCode checksum is: 0xBABEB432, which is correct Diagnostics checksum is: 0xBABED22B, which is correct Download checksum is: 0xBABE025F, which is correct Application checksum is: 0xBABE2825, which is correct Busy executing NUC1200 14-28 Hardware ID = 00 Busy executing NUC600 15-28 Found SAA7118

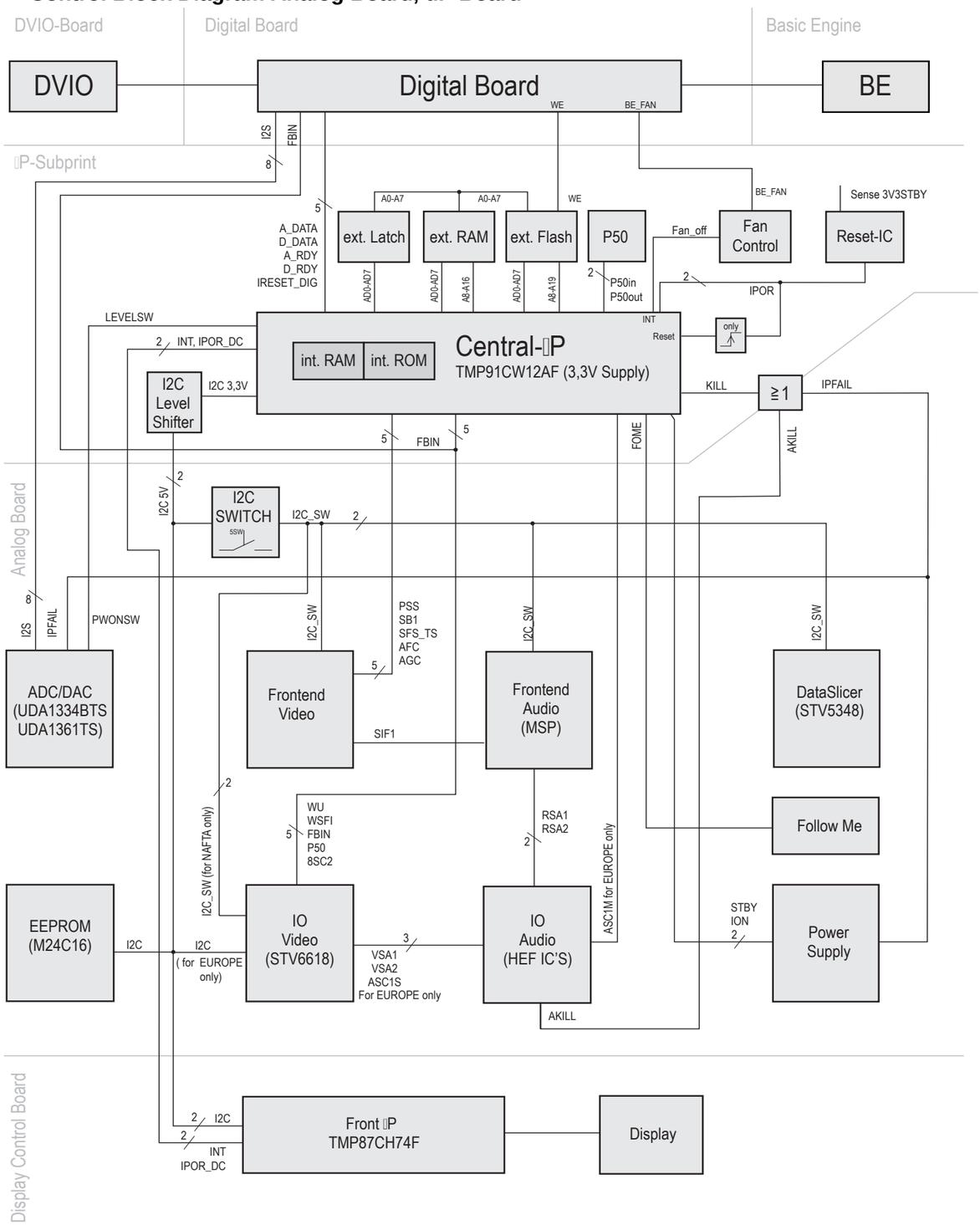
Example	Busy executing NUC601 16-28 Busy executing NUC700 17-28 Device type of the link layer IC: ffc00301 Busy executing NUC701 18-28 Device type of the phy layer IC: 0 Busy executing NUC702 19-28 Busy executing NUC703 20-28 Busy executing NUC801 21-28 Busy executing NUC808 22-28 The IIC acknowledge was not received, which is correct Busy executing NUC900 23-28 Busy executing NUC1101 24-28 Busy executing NUC1102 25-28 Busy executing NUC1104 26-28 Busy executing NUC1105 27-28 Busy executing NUC1111 28-28 BootCode checksum is: 0xBABE6240, which is correct Diagnostics checksum is: 0xBABEDC9A, which is correct Download checksum is: 0xBABEA6B7, which is correct Application checksum is: 0xBABE5968, which is correct PASS DS:>

6. Block Diagrams, Waveforms, Wiring Diagram.

Overall Block Diagram Digital Board 2.1 Chrysalis



Control Block Diagram Analog Board, uP Board



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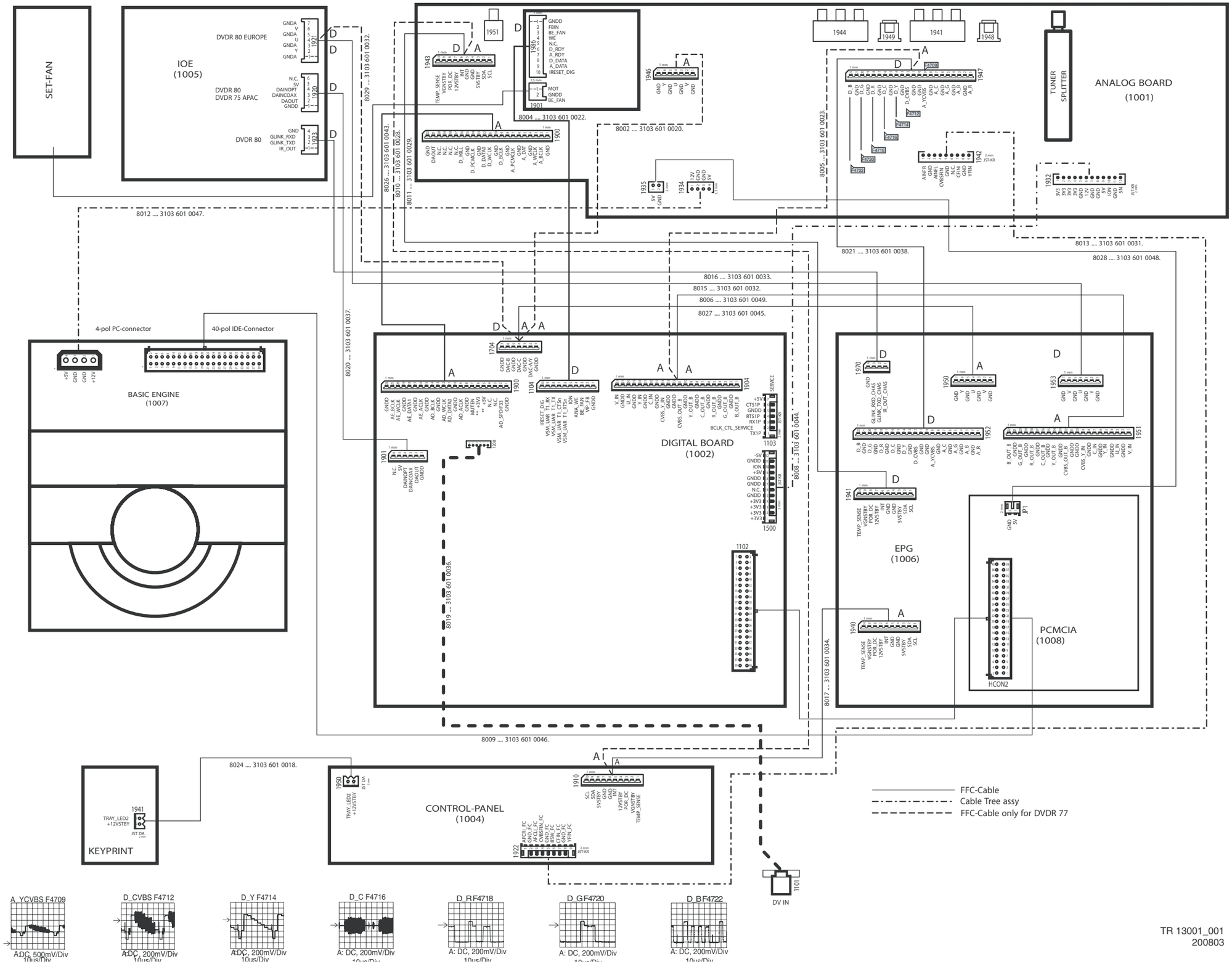
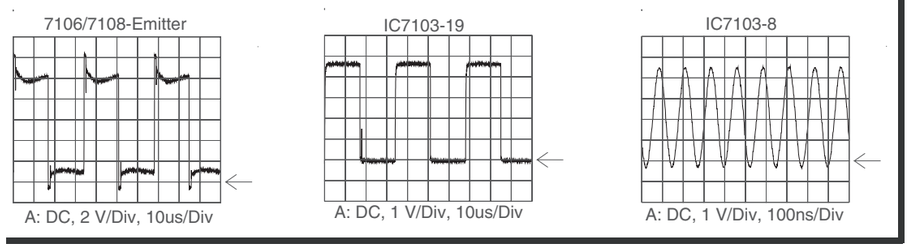
130502

Wiring Diagram

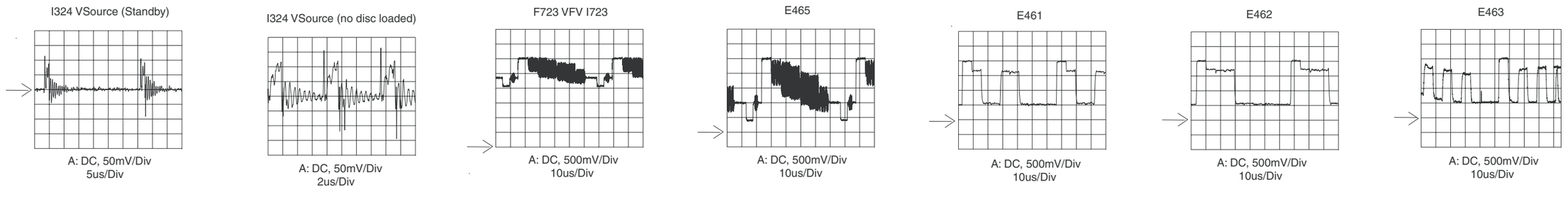


Waveforms

Waveforms Display Board



Waveforms Analog Board



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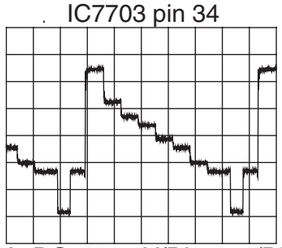
200303

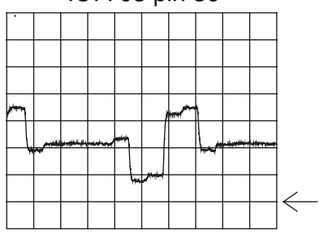
Waveforms Digital Board Chrysalis 2.1

IC7703 pin 34



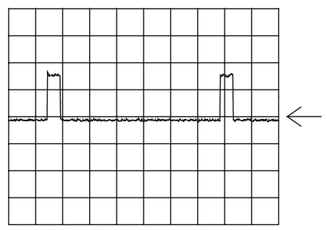
A: DC, 200mV/Div, 5us/Div

IC7703 pin 36



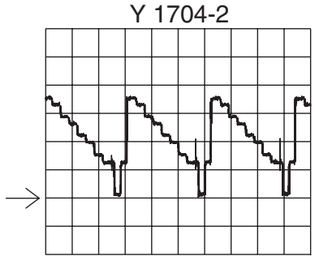
A: DC, 200mV/Div, 5us/Div

HS_IN



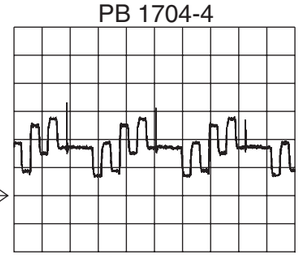
A: DC, 2 V/Div, 10us/Div

Y 1704-2



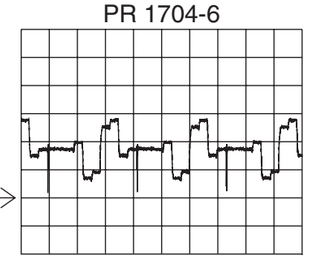
A: DC, 500mV/Div
10us/Div

PB 1704-4



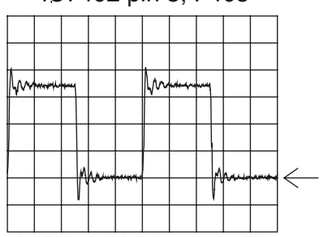
A: DC, 500mV/Div
10us/Div

PR 1704-6



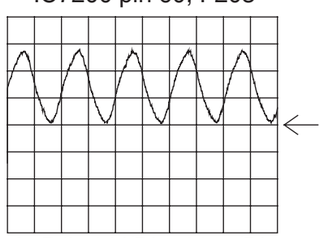
A: DC, 500mV/Div
10us/Div

IC7402 pin 3, F405



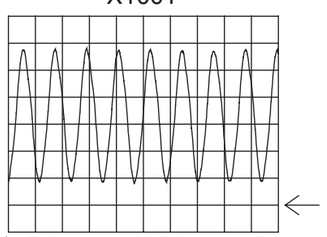
A: DC, 1 V/Div, 50ns/Div

IC7200 pin 60, F203



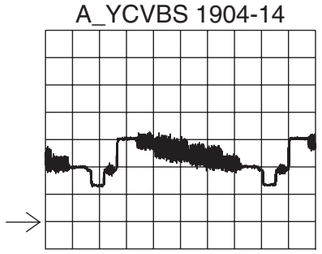
A: DC, 1 V/Div, 20ns/Div

X1001



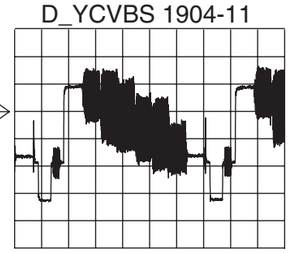
A: DC, 500mV/Div, 2us/Div

A_YCVBS 1904-14



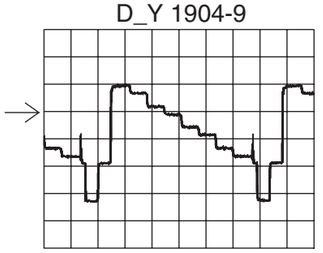
A: DC, 500mV/Div
10us/Div

D_YCVBS 1904-11



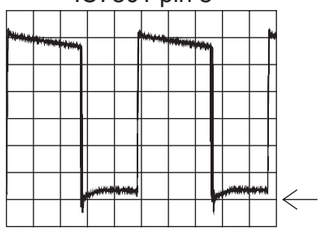
A: DC, 200mV/Div
10us/Div

D_Y 1904-9



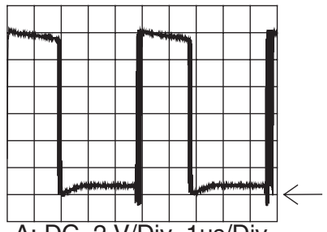
A: DC, 200mV/Div
10us/Div

IC7501 pin 5



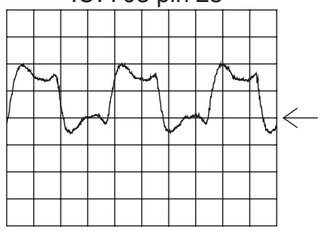
A: DC, 2 V/Div, 1us/Div

IC7501 pin 6



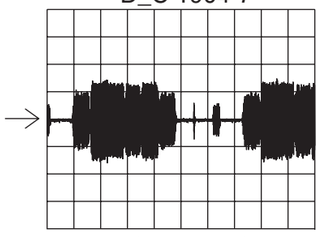
A: DC, 2 V/Div, 1us/Div

IC7703 pin 25



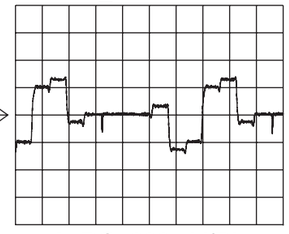
A: DC, 2 V/Div, 10ns/Div

D_C 1904-7



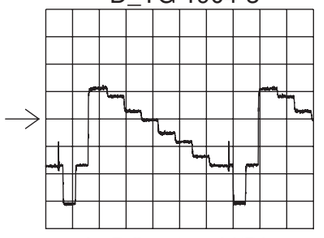
A: DC, 200mV/Div
10us/Div

D_VR 1904-5



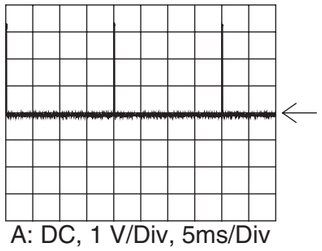
A: DC, 200mV/Div
10us/Div

D_YG 1904-3



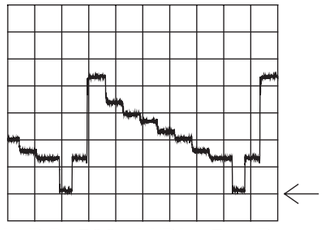
A: DC, 200mV/Div
10us/Div

VS_IN



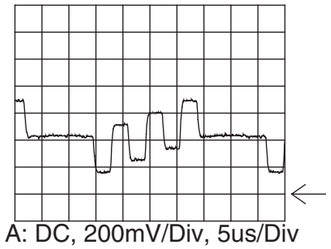
A: DC, 1 V/Div, 5ms/Div

1704-2, F1702



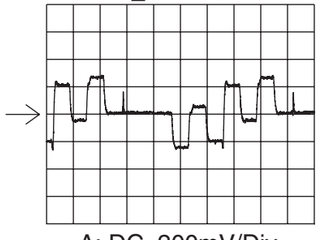
A: DC, 500mV/Div, 5us/Div

IC7703 pin 32



A: DC, 200mV/Div, 5us/Div

D_UB 1904-1



A: DC, 200mV/Div
10us/Div

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220403

Test points overview Analog Board

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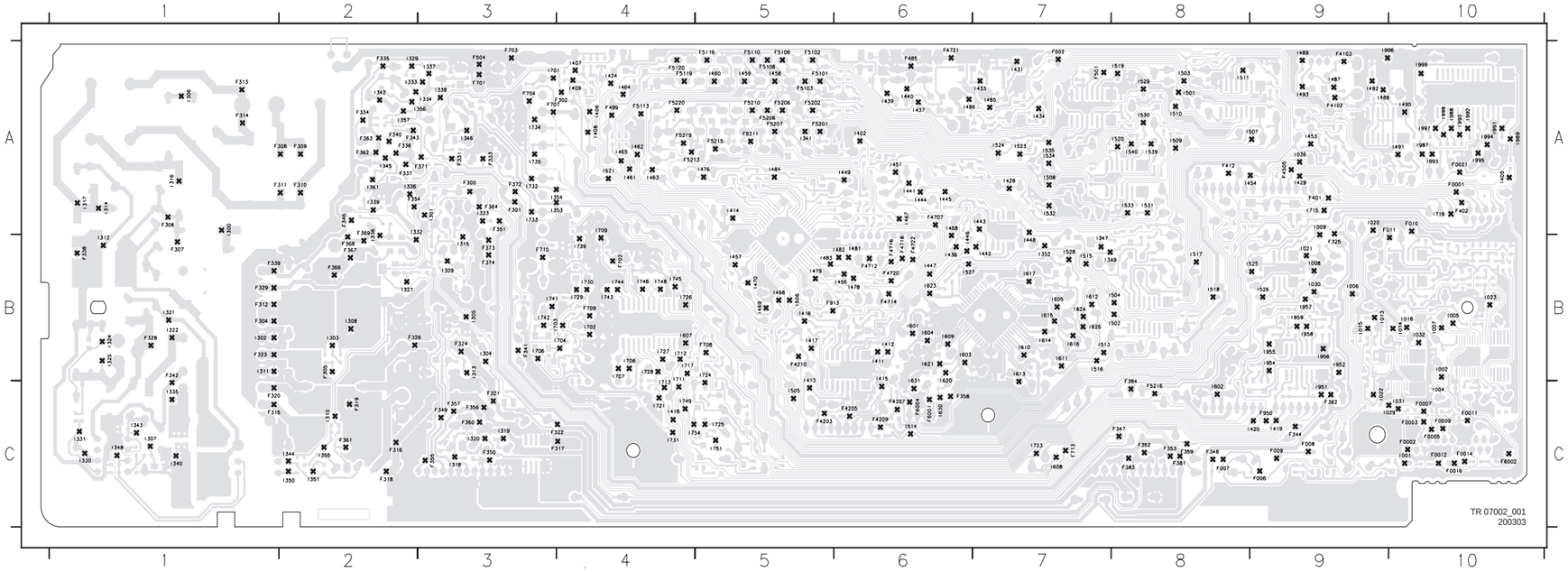
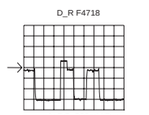
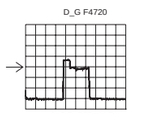
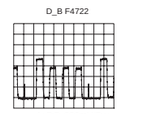
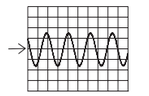
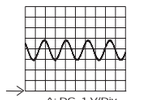


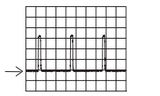


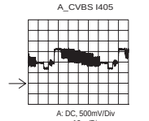


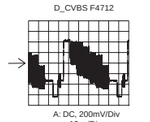


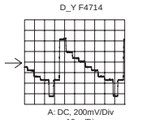


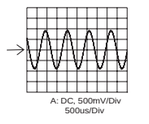


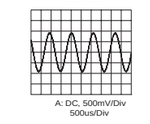


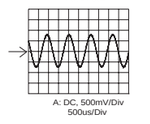


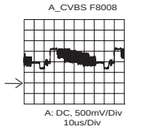


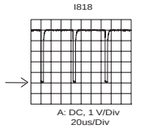


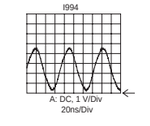


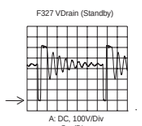


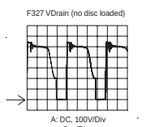


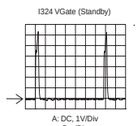


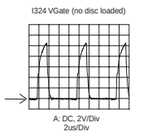


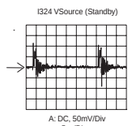


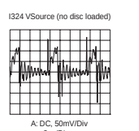


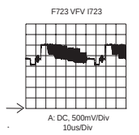


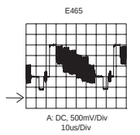


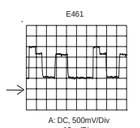


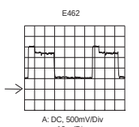


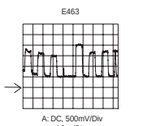


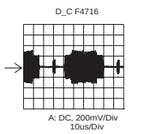


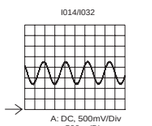


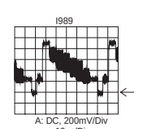




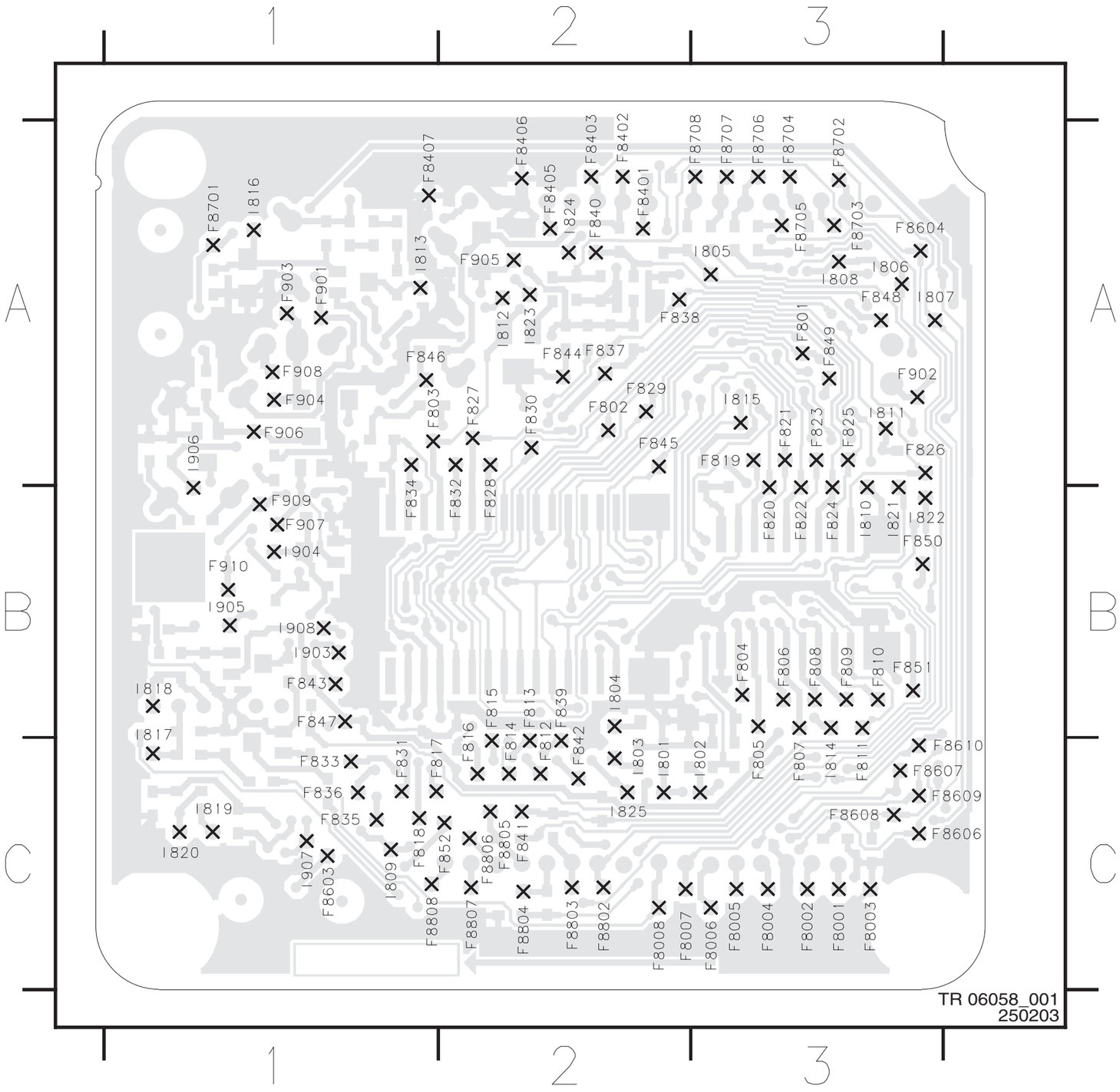








Test points overview UP Sub Board



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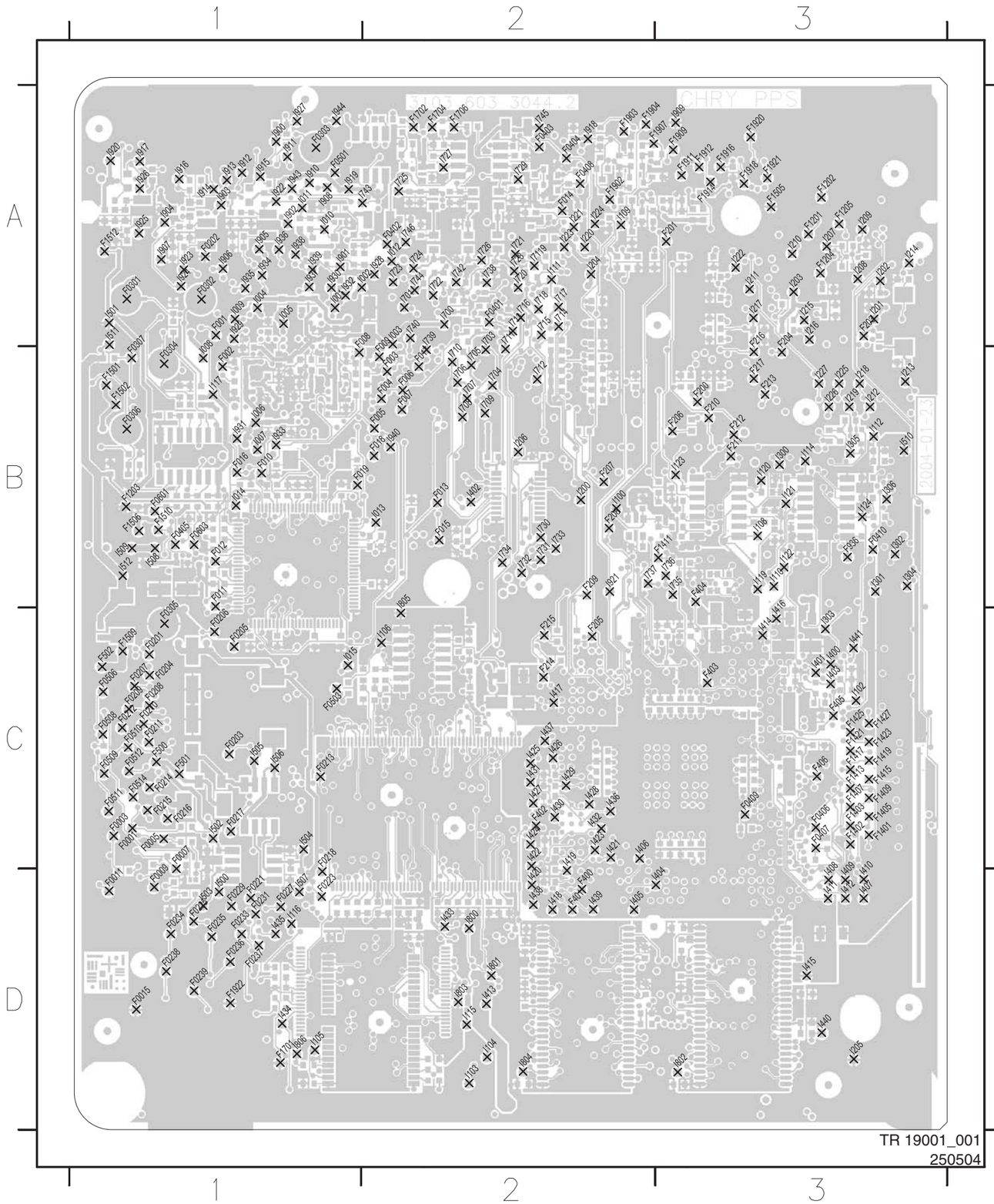
Test points overview Digital Board



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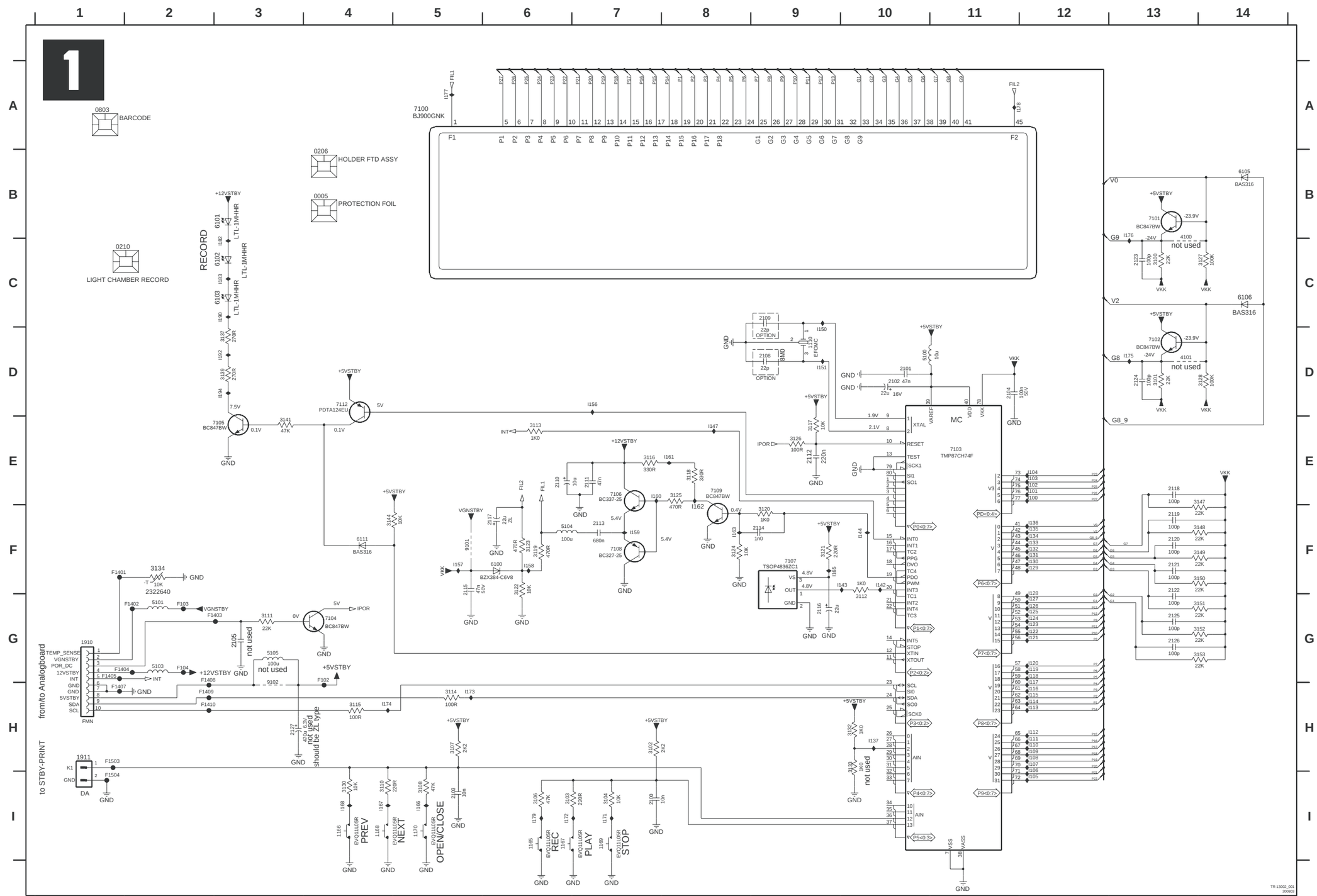
I433 D2
I434 D1
I435 D1
I436 C2
I437 C2
I438 D2
I439 D2
I440 D3
I441 C3
I441 C4
I500 D1
I501 A1
I502 C1
I503 D1

I504 C1
I505 C1
I506 C1
I507 D1
I508 B1
I509 B1
I510 B3
I511 B1
I512 B1
I700 A2
I701 A2
I703 B2
I704 B2
I705 B2
I706 B2
I707 B2
I708 B2
I709 B2
I710 B2
I711 B2
I7119 A2
I712 B2
I713 A2
I714 A2
I715 A2
I716 A2
I717 A2
I718 A2
I720 A2
I721 A2
I722 A2
I723 A2
I724 A2
I725 A2
I726 A2
I729 A2
I730 B2
I731 B2
I732 B2
I733 B2
I734 B2
I735 B3
I736 B3
I737 B2
I738 A2
I739 B2
I740 B2
I742 A2
I743 A2
I743 A5
I744 A2
I744 A5
I745 A2

I745 A5
I746 A2
I746 A5
I800 D2
I801 D2
I802 D3
I803 D2
I804 D2
I805 C2
I806 D1
I900 A1
I901 A1
I902 A1
I903 A1
I904 A1
I905 A1
I906 A1
I907 A1
I908 A1
I909 A3
I910 A1
I911 A1
I912 A1
I913 A1
I914 A1
I915 A1
I916 A1
I917 A1
I918 A2
I919 A1
I920 A1
I921 B2
I922 A1
I923 A1
I924 A1
I925 A1
I926 A1
I927 A1
I928 A2
I929 B1
I930 A1
I931 B1
I932 A1
I933 B1
I934 A1
I935 A1
I936 A1
I937 A1
I938 A1
I939 A1
I940 B2
I940 B5
I943 A1
I943 A6
I944 A1
I944 A6

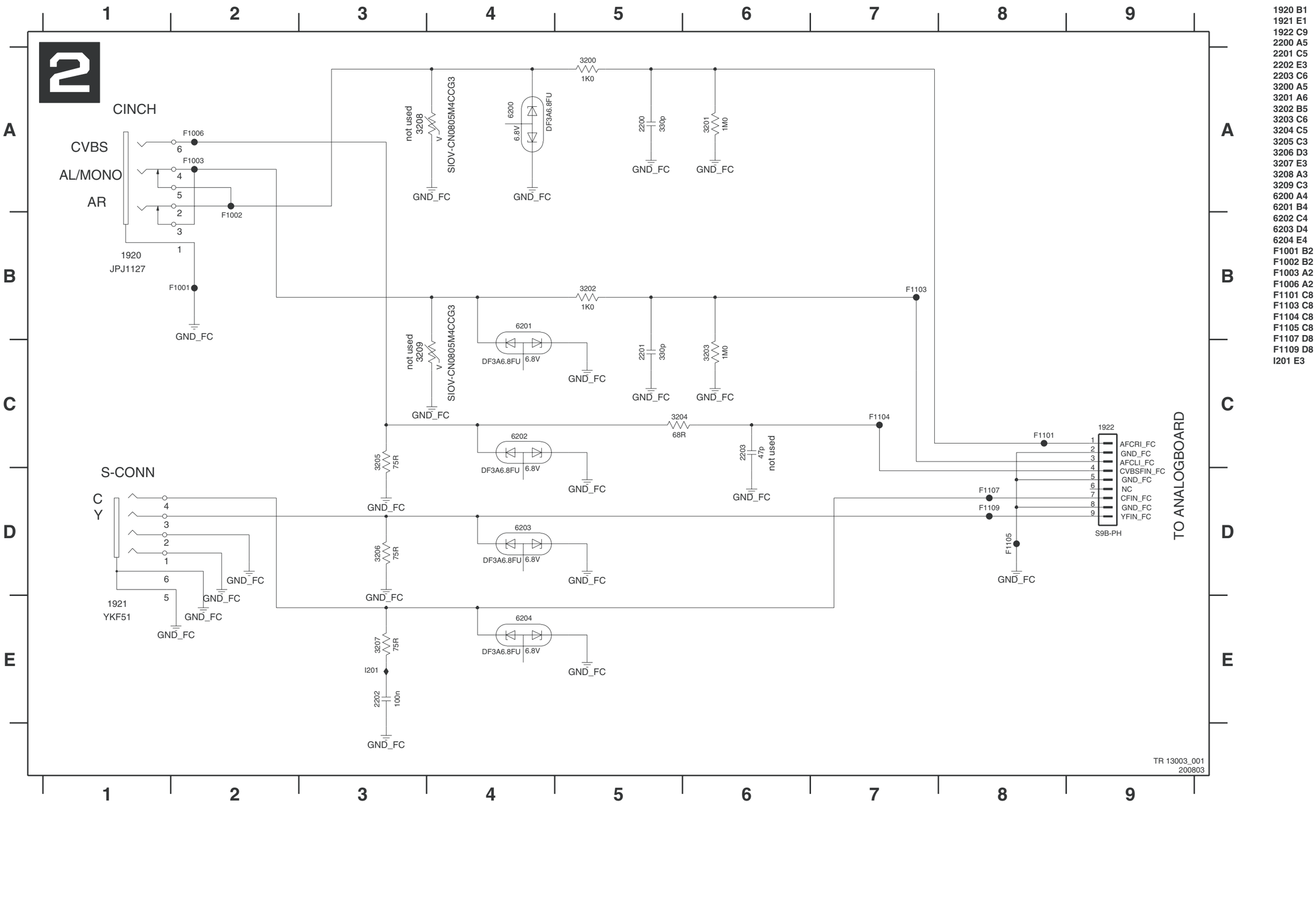
7. Circuit Diagrams and PWB Layouts

Display Panel



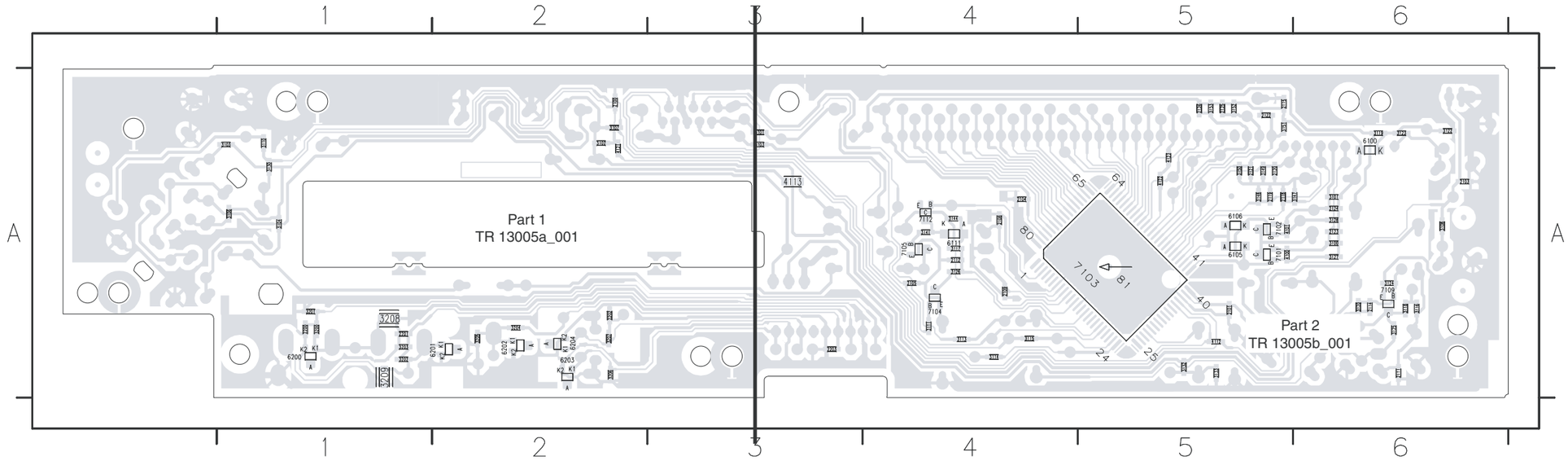
0005	B4	F1408	G2
0206	B4	F1409	H2
0210	C1	F1410	H2
0803	A1	F1503	H1
1110	D9	F1504	I1
1165	I6	I100	E12
1166	I4	I101	E12
1167	I6	I102	E12
1168	I4	I103	E12
1169	I7	I104	E12
1170	I5	I105	I12
1910	G1	I106	H12
1911	H1	I107	H12
2100	I7	I108	H12
2101	D10	I109	H12
2102	D10	I110	H12
2103	I5	I111	H12
2104	D11	I112	H12
2105	G3	I113	H12
2108	D9	I114	H12
2109	C9	I115	H12
2110	E6	I116	H12
2111	E7	I117	G12
2112	E9	I118	G12
2113	F7	I119	G12
2114	F9	I120	G12
2115	F5	I121	G12
2116	G9	I122	G12
2117	F6	I123	G12
2118	E13	I124	G12
2119	F13	I125	G12
2120	F13	I126	G12
2121	F13	I127	G12
2122	F13	I128	F12
2123	C13	I129	F12
2124	D13	I130	F12
2125	G13	I131	F12
2126	G13	I132	F12
2127	H3	I133	F12
3100	C13	I134	F12
3101	D13	I135	F12
3102	H7	I136	F12
3103	I6	I137	H10
3104	I7	I142	F10
3106	I6	I143	F10
3107	H5	I144	F10
3108	I5	I147	E8
3110	I4	I150	D9
3111	G3	I151	D9
3112	G10	I156	D7
3113	E6	I157	F5
3114	H5	I158	F6
3115	H4	I159	F7
3116	E7	I160	E7
3117	E9	I161	E8
3118	E8	I162	F8
3119	F6	I163	F8
3120	F9	I165	F9
3121	F9	I166	I5
3122	F6	I167	I4
3123	F6	I168	I4
3124	F8	I171	I7
3125	E8	I172	I6
3126	E9	I173	H5
3127	C14	I174	H4
3128	D14	I175	D13
3130	I4	I176	B13
3132	H10	I177	A5
3133	H10	I178	A11
3134	F2	I179	I6
3137	D3	I182	C3
3139	D3	I183	C3
3141	E3	I190	C3
3144	F4	I192	D3
3147	E14	I194	D3
3148	F14		
3149	F14		
3150	F14		
3151	G14		
3152	G14		
3153	G14		
4100	C13		
4101	D13		
5100	D10		
5101	G2		
5103	G2		
5104	F6		
6100	F6		
6101	B3		
6102	C3		
6103	C3		
6105	B14		
6106	C14		
6111	F4		
7100	A5		
7101	B13		
7102	D13		
7103	E11		
7104	G4		
7105	E3		
7106	E7		
7107	F9		
7108	F7		
7109	E8		
7112	D4		
9101	F5		
F102	G4		
F103	G2		
F104	G2		
F1401	F1		
F1402	G2		
F1403	G3		
F1404	G1		
F1405	G1		
F1407	H1		

Front Connector (FC)

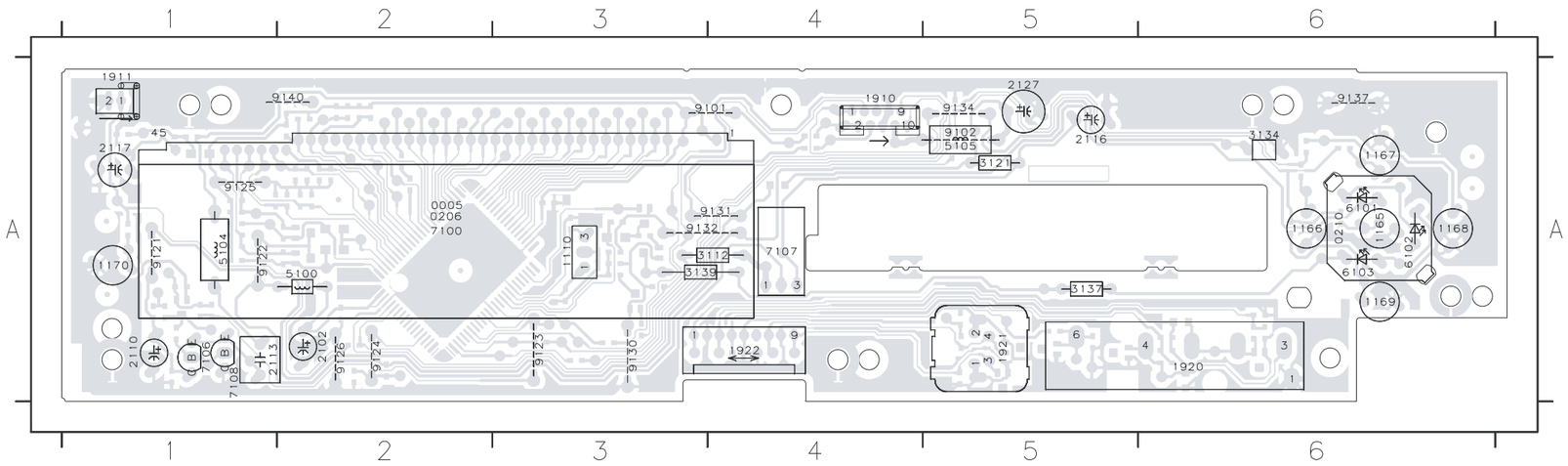


1920 B1
1921 E1
1922 C9
2200 A5
2201 C5
2202 E3
2203 C6
3200 A5
3201 A6
3202 B5
3203 C6
3204 C5
3205 C3
3206 D3
3207 E3
3208 A3
3209 C3
6200 A4
6201 B4
6202 C4
6203 D4
6204 E4
F1001 B2
F1002 B2
F1003 A2
F1006 A2
F1101 C8
F1103 C8
F1104 C8
F1105 C8
F1107 D8
F1109 D8
I201 E3

Layouts Display Panel



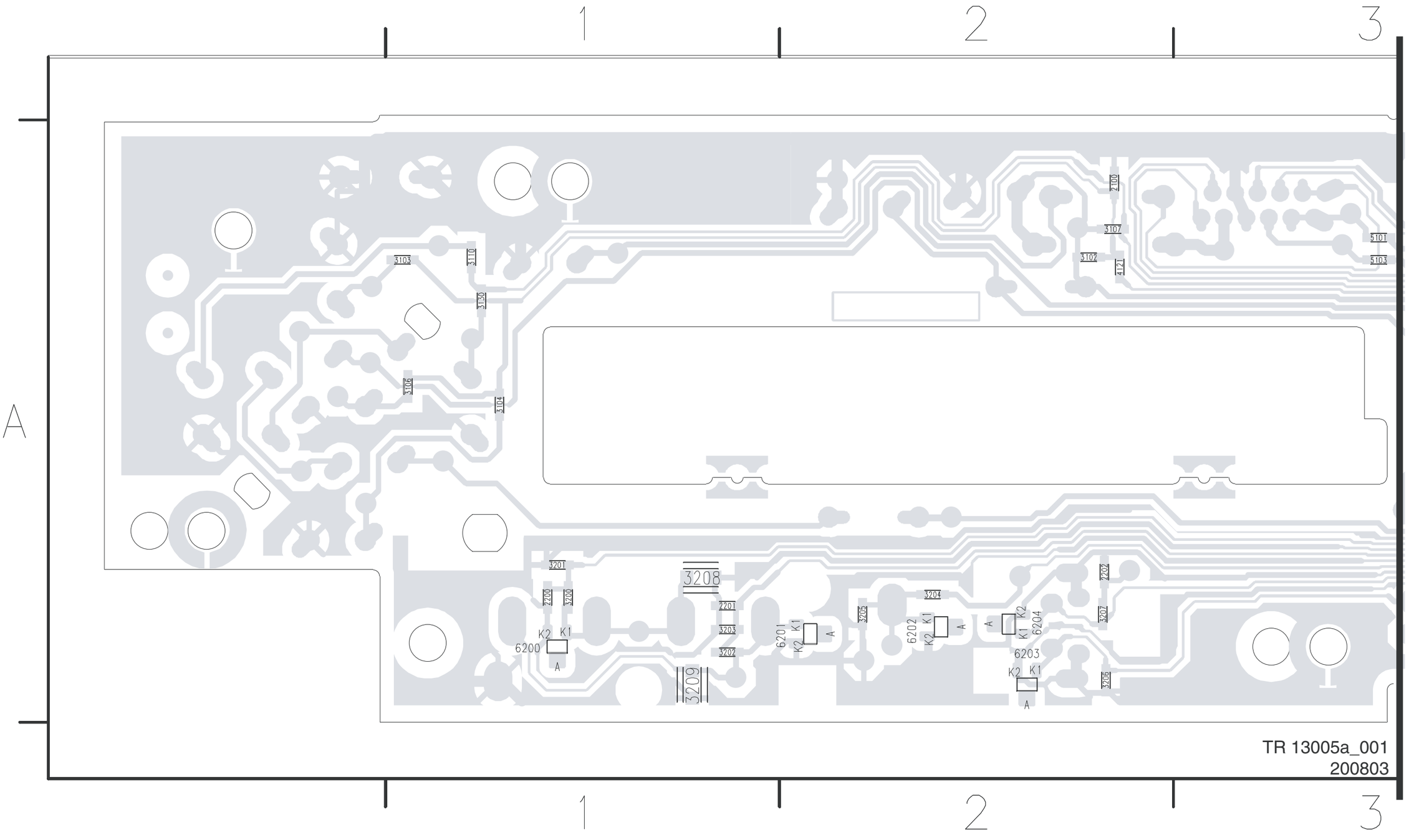
2100 A2
2101 A5
2103 A6
2104 A4
2105 A4
2108 A4
2109 A4
2111 A6
2112 A4
2114 A6
2115 A5
2118 A5
2119 A5
2120 A5
2121 A5
2122 A5
2123 A6
2124 A6
2125 A5
2126 A5
2200 A1
2201 A1
2202 A2
2203 A3
3100 A6
3101 A6
3102 A2
3103 A1
3104 A1
3106 A1
3107 A2
3108 A6
3110 A1
3111 A4
3113 A4
3114 A4
3115 A4
3116 A6
3117 A4
3118 A6
3119 A6
3120 A6
3122 A6
3123 A6
3124 A6
3125 A6
3126 A4
3127 A6
3128 A6
3130 A1
3132 A5
3133 A5
3141 A4
3144 A4
3147 A6
3148 A5
3149 A5
3150 A5
3151 A5
3152 A5
3153 A5
3200 A1
3201 A1
3202 A1
3203 A1
3204 A2
3205 A2
3206 A2
3207 A2
3208 A1
3209 A1
4100 A5
4101 A5
4112 A5
4113 A3
4121 A2
4122 A5
4123 A5
5101 A3
5103 A3
6100 A6
6105 A5
6106 A5
6111 A4
6200 A1
6201 A2
6202 A2
6203 A2
6204 A2
7101 A5
7102 A5
7103 A5
7104 A4
7105 A4
7109 A6
7112 A4



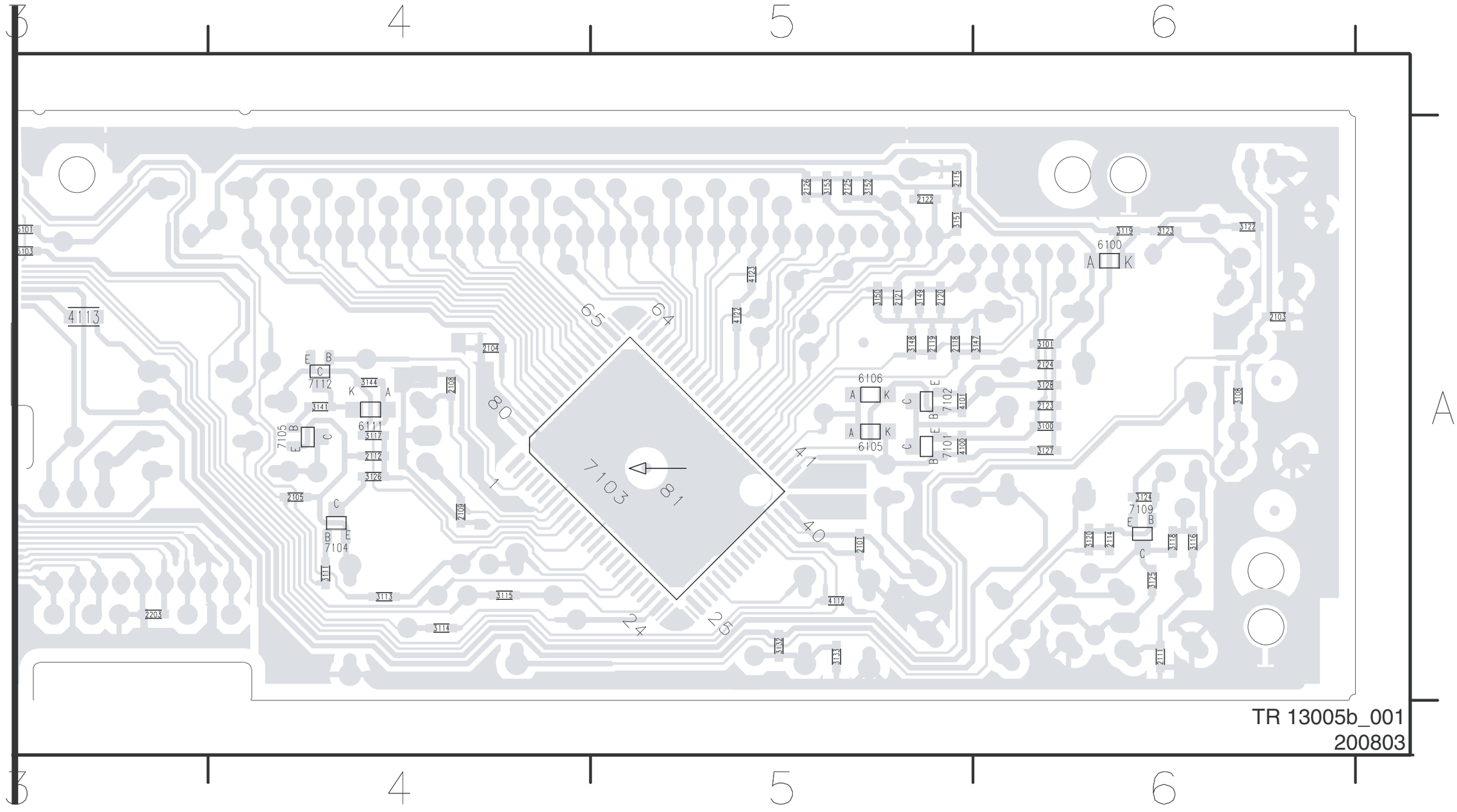
0005 A2
0206 A2
0210 A6
1110 A3
1165 A6
1166 A6
1167 A6
1168 A6
1169 A6
1170 A1
1910 A4
1911 A1
1920 A6
1921 A5
1922 A4
2102 A2
2110 A1
2113 A1
2116 A5
2117 A1
2127 A5
3112 A4
3121 A5
3134 A6
3137 A3
3139 A3
5100 A2
5104 A1
5105 A5
6101 A6
6102 A6
6103 A6
7100 A2
7106 A1
7107 A4
7108 A1
9101 A4
9102 A5
9121 A1
9122 A1
9123 A3
9124 A2
9125 A1
9126 A2
9130 A3
9131 A4
9132 A5
9134 A5
9137 A6
9140 A2

TR 13005_001
200803

Layout Display Panel (Part 1 Bottom View)

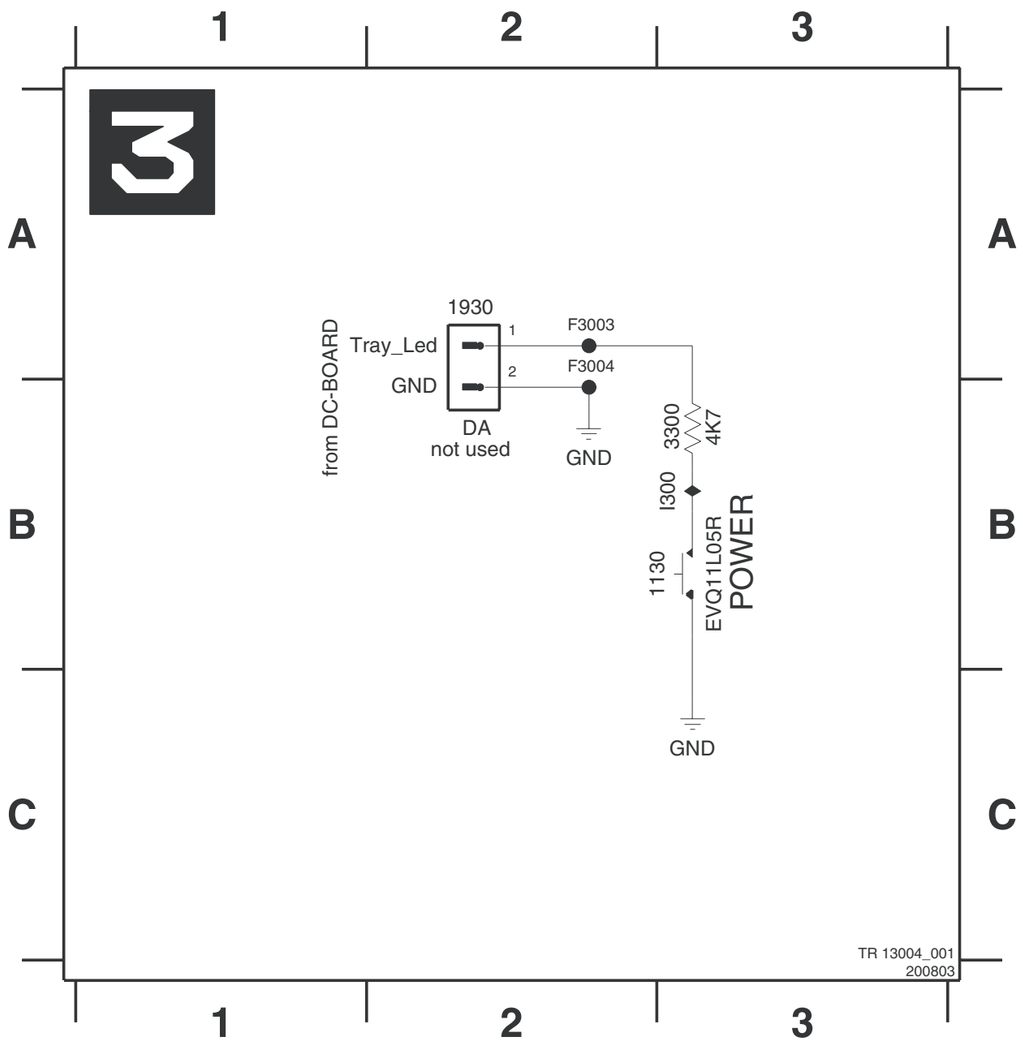


Layout Display Panel (Part 2 Bottom View)

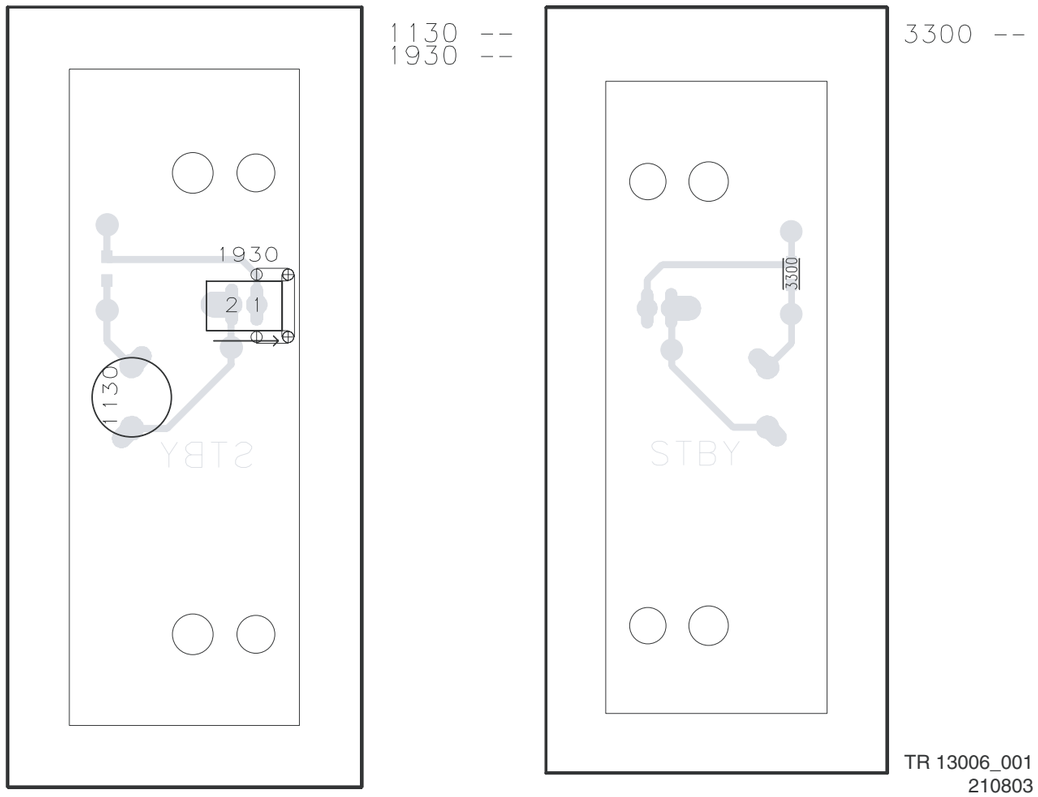


Standby Panel (STBY)

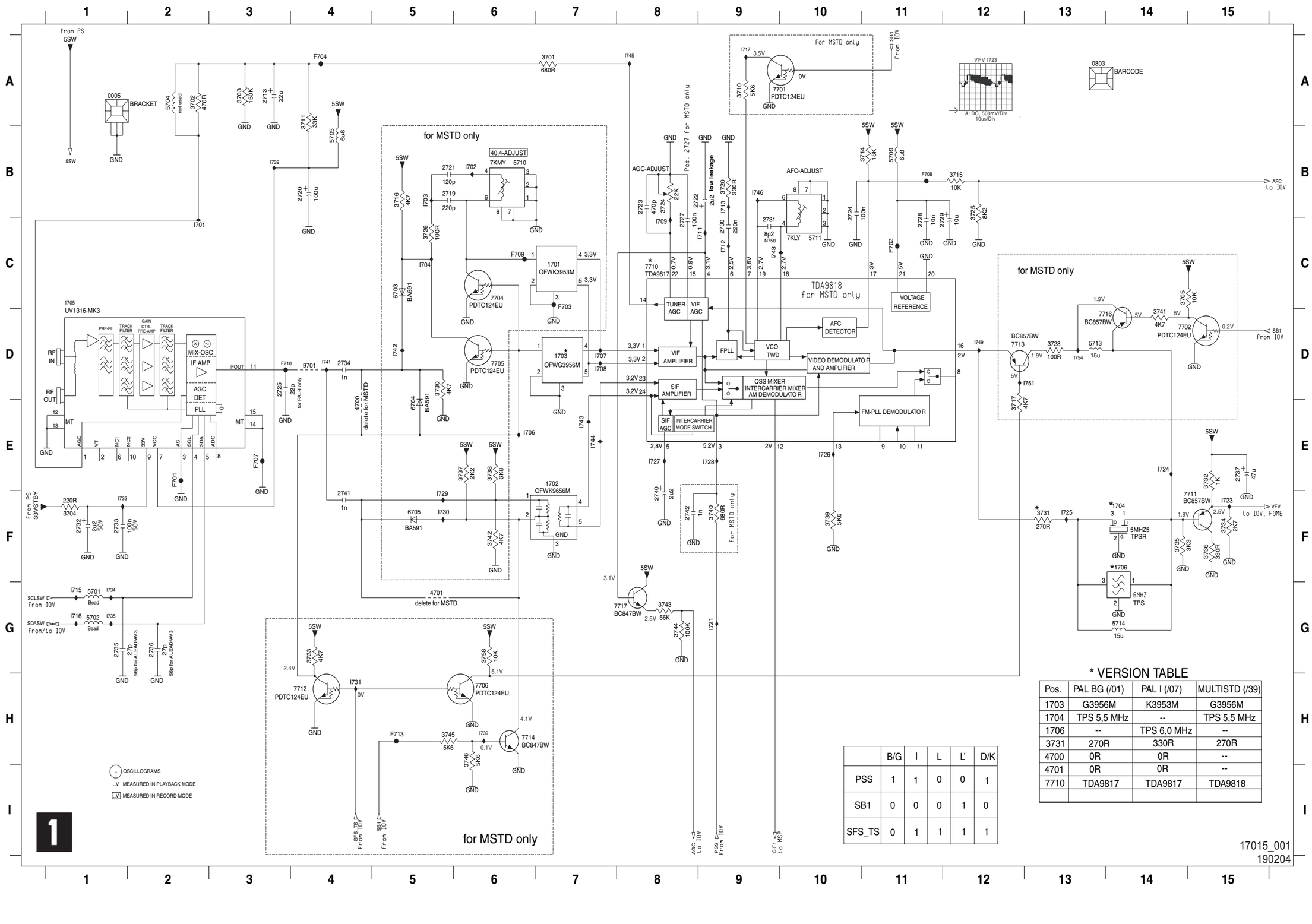
1130 B3 1930 A2 3300 B3 F3003 A2 F3004 A2 I300 B3



Layout Standby Panel



Analog Board: Frontend Video (FV)

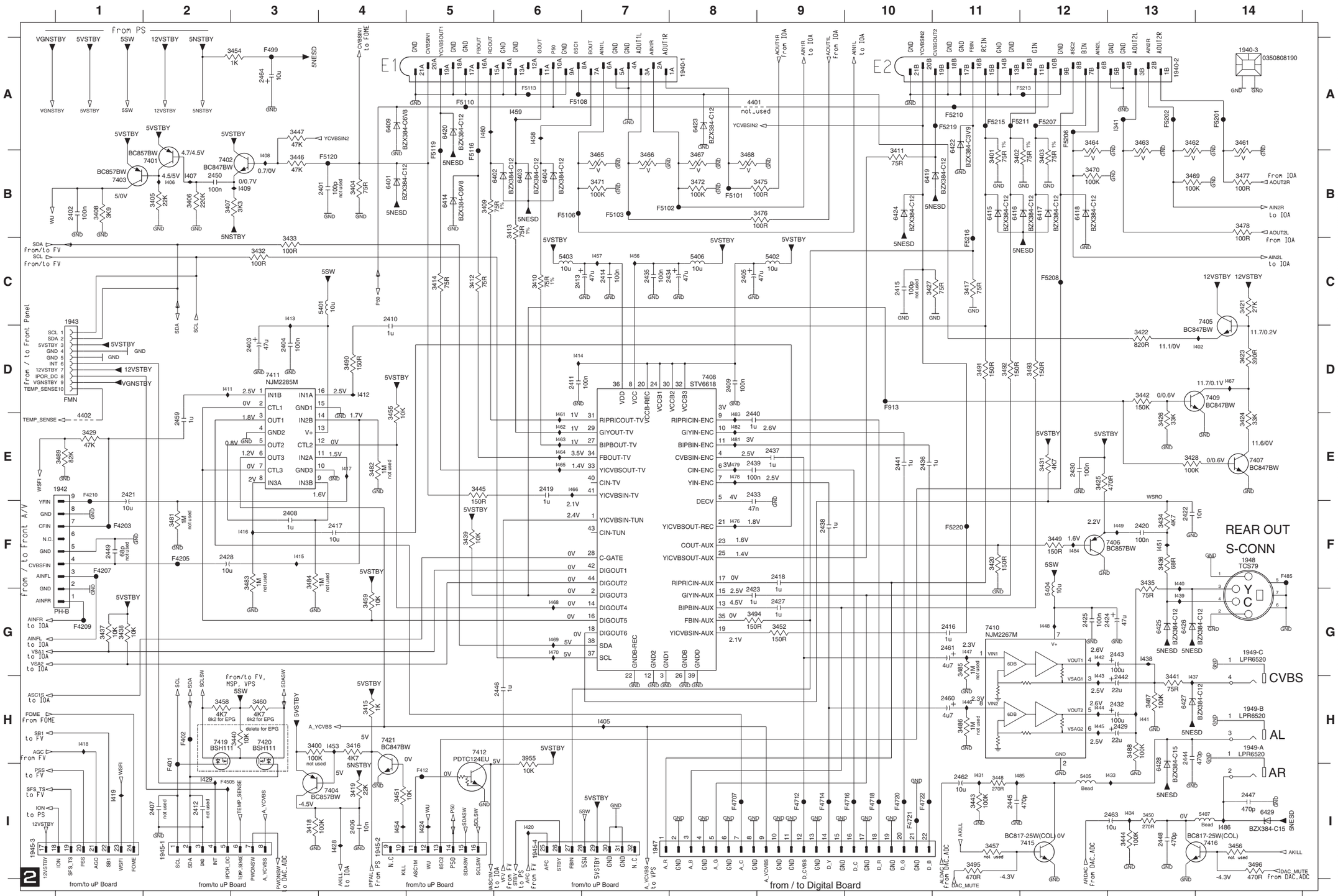


* VERSION TABLE

Pos.	PAL BG (/01)	PAL I (/07)	MULTISTD (/39)
1703	G3956M	K3953M	G3956M
1704	TPS 5,5 MHz	--	TPS 5,5 MHz
1706	--	TPS 6,0 MHz	--
3731	270R	330R	270R
4700	0R	0R	--
4701	0R	0R	--
7710	TDA9817	TDA9817	TDA9818

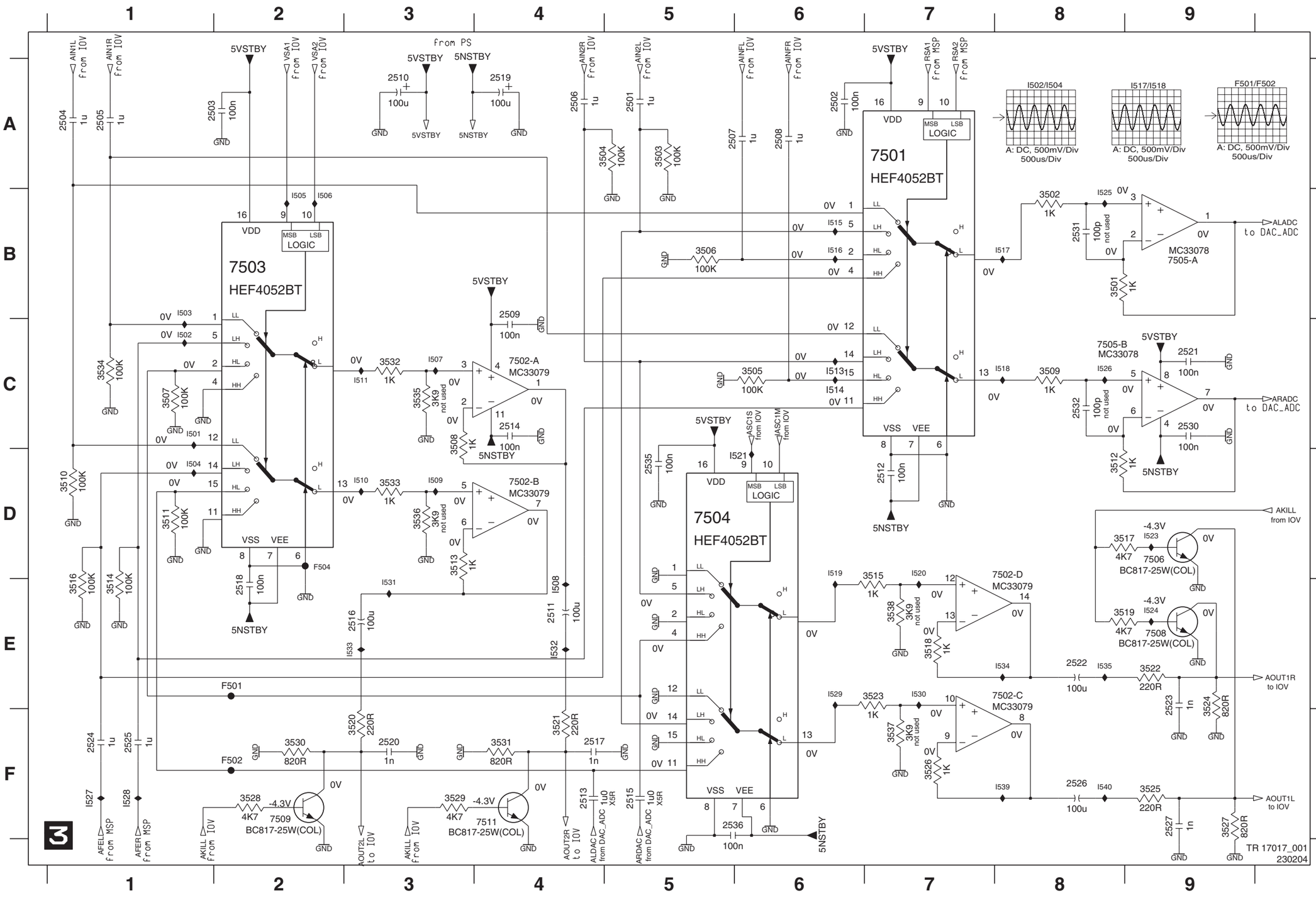
	B/G	I	L	L'	D/K
PSS	1	1	0	0	1
SB1	0	0	0	1	0
SFS_TS	0	1	1	1	1

Analog Board: In/Out Video (IOV)



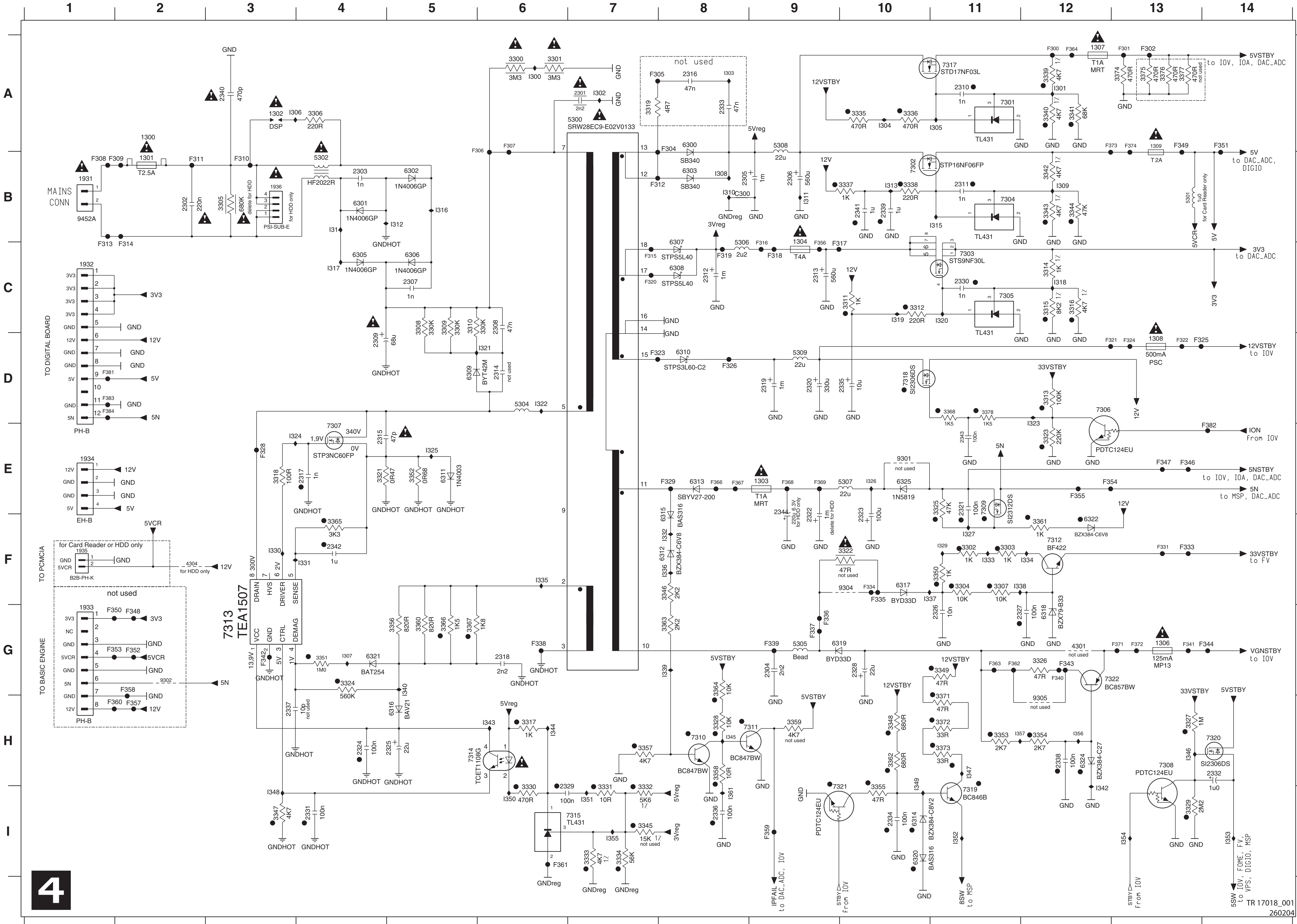
17016_001
190204

Analog Board: IN/Out Audio (IOA)



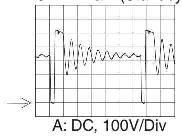
2501 A5	I503 B1
2502 A6	I504 D1
2503 A2	I505 B2
2504 A1	I506 B2
2505 A1	I507 C3
2506 A4	I508 E4
2507 A6	I509 D3
2508 A6	I510 D3
2509 B4	I511 C3
2510 A3	I513 C6
2511 E4	I514 C6
2512 D7	I515 B6
2513 F4	I516 B6
2514 C4	I517 B8
2515 F5	I518 C8
2516 E3	I519 D6
2517 F4	I520 D7
2518 E2	I521 D6
2519 A4	
2520 F3	I523 D9
2521 C9	I524 E9
2522 E8	I525 B8
2523 E9	I526 C8
2524 F1	I527 F1
2525 F1	I528 F1
2526 F8	I529 E6
2527 F9	I530 E7
2530 C9	I531 E3
2531 B8	I532 E4
2532 C8	I533 E3
2535 D5	I534 E8
2536 F5	I535 E8
3501 B8	I539 F8
3502 B8	I540 F8
3503 A5	
3504 A5	
3505 C6	
3506 B5	
3507 C1	
3508 C3	
3509 C8	
3510 D1	
3511 D1	
3512 D8	
3513 D3	
3514 E1	
3515 D7	
3516 E1	
3517 D8	
3518 E7	
3519 E8	
3520 F3	
3521 F4	
3522 E9	
3523 E7	
3524 E9	
3525 F9	
3526 F7	
3527 F9	
3528 F2	
3529 F3	
3530 F2	
3531 F4	
3532 C3	
3533 D3	
3534 C1	
3535 C3	
3536 D3	
3537 F7	
3538 E7	
7501 A7	
7502-A C4	
7502-B D4	
7502-C E7	
7502-D D7	
7503 B2	
7504 D5	
7505-A B9	
7505-B C8	
7506 D9	
7508 E9	
7509 F2	
7511 F4	
F501 E2	
F502 F2	
F504 D2	
I501 C1	
I502 C1	

Analog Board: Power Supply (PS)



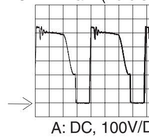
1300 A2	3360 G5	F344 G14
1301 B2	3361 F12	F346 E13
1302 A3	3362 H10	F347 E13
1303 E9	3363 G8	F348 G2
1304 C9	3364 G8	F349 A13
1306 G13	3365 F4	F350 G1
1307 A12	3366 G5	F351 A14
1308 D13	3367 G5	F352 G2
1309 A13	3368 D11	F353 G1
1931 B1	3371 H11	F354 E12
1932 C1	3372 H11	F355 E12
1933 G1	3373 H11	F356 C9
1934 E1	3374 A13	F357 H2
1935 F1	3375 A13	F358 G2
1936 B3	3376 A13	F359 I9
2301 A7	3377 A13	F360 H1
2302 B2	3378 D11	F361 I6
2303 B4	4301 G12	F362 G11
2304 G9	4304 F2	F363 G11
2305 B8	5300 A6	F364 A12
2306 B9	5301 B13	F366 E8
2307 C5	5302 B4	F367 E8
2308 C6	5304 D6	F368 E9
2309 D4	5305 G9	F369 E9
2310 A11	5306 C8	F371 G13
2311 B11	5307 E10	F372 G13
2312 C8	5308 A9	F373 A12
2313 C9	5309 D9	F374 A13
2314 D6	6300 A8	F381 D1
2315 E4	6301 B4	F382 E14
2316 A8	6302 B5	F383 D1
2317 E4	6303 B8	F384 D1
2318 G6	6305 C4	I300 A6
2319 D9	6306 C5	I301 A12
2320 D9	6307 C8	I302 A7
2321 E11	6308 C8	I303 A8
2322 F9	6309 D5	I304 A10
2323 F10	6310 D8	I305 A11
2324 H4	6311 E5	I306 A3
2325 H5	6312 F8	I307 G4
2326 G11	6313 E8	I308 B8
2327 G12	6314 I10	I309 B12
2328 G10	6315 F8	I310 B8
2329 I6	6316 H5	I311 B9
2330 C11	6317 F10	I312 B5
2331 I4	6318 G12	I313 B10
2332 H14	6319 G9	I314 B4
2333 A8	6320 I10	I315 B11
2334 I10	6321 G4	I316 B5
2335 D10	6322 F12	I317 C4
2336 I8	6324 H12	I318 C12
2337 H3	6325 E10	I319 C10
2338 H12	7301 A11	I320 C11
2339 B10	7302 B10	I321 D6
2340 A3	7303 C11	I322 D6
2341 B10	7304 B11	I323 D12
2342 F4	7305 C11	I324 E3
2343 E11	7306 D12	I325 E5
2344 F9	7307 E4	I326 E10
3300 A6	7308 H13	I327 F11
3301 A6	7309 E11	I329 F11
3302 F11	7310 H8	I330 F3
3303 F11	7311 H8	I331 F4
3304 F11	7312 F12	I332 F8
3305 B3	7313 G3	I333 F11
3306 A4	7314 H5	I334 F12
3307 F11	7315 I6	I335 F6
3308 C5	7317 A11	I336 F8
3309 C5	7318 D10	I337 F10
3310 C5	7319 I11	I338 F11
3311 C10	7320 H14	I339 G8
3312 C10	7321 I10	I340 G5
3313 D12	7322 G12	I342 I12
3314 C12	9301 E10	I343 H6
3315 C12	9302 G2	I344 H6
3316 C12	9304 F10	I345 H8
3317 H6	9305 H12	I346 H13
3318 E3	C300 B8	I347 H11
3319 A7	F300 A12	I348 I3
3321 E4	F301 A13	I349 H10
3322 F10	F302 A13	I350 I6
3323 E12	F304 A8	I351 I7
3324 G4	F305 A7	I352 I11
3325 E11	F306 B6	I353 I14
3326 G12	F307 A6	I354 I13
3327 H13	F308 B1	I355 I7
3328 H8	F309 B2	I356 H12
3329 I13	F310 B3	I357 H11
3330 I6	F311 B2	I361 I8
3331 I7	F312 B7	
3332 I7	F313 C1	
3333 I7	F314 C2	
3334 I7	F315 C7	
3335 A10	F316 C9	
3336 A10	F317 C9	
3337 B10	F318 C9	
3338 B10	F319 C8	
3339 A12	F320 C7	
3340 A12	F321 D12	
3341 A12	F322 D13	
3342 B12	F323 D7	
3343 B12	F324 D13	
3344 B12	F325 D13	
3345 I7	F326 D8	
3346 F8	F328 E3	
3347 I3	F329 E8	
3348 H10	F331 F13	
3349 G11	F333 F13	
3350 F11	F334 F10	
3351 G4	F335 F10	
3352 E5	F336 G9	
3353 H11	F337 G9	
3354 H12	F338 G6	
3355 I10	F339 G9	
3356 G5	F340 G12	
3357 H7	F341 G13	
3358 H8	F342 G3	
3359 H9	F343 G12	

F327 VDrain (Standby)



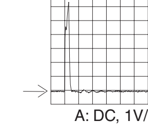
A: DC, 100V/Div
5us/Div

F327 VDrain (no disc loaded)



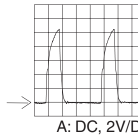
A: DC, 100V/Div
2us/Div

I324 VDrain (Standby)



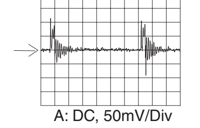
A: DC, 1V/Div
5us/Div

I324 VGate (no disc loaded)



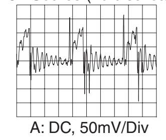
A: DC, 2V/Div
2us/Div

I325 VSource (Standby)



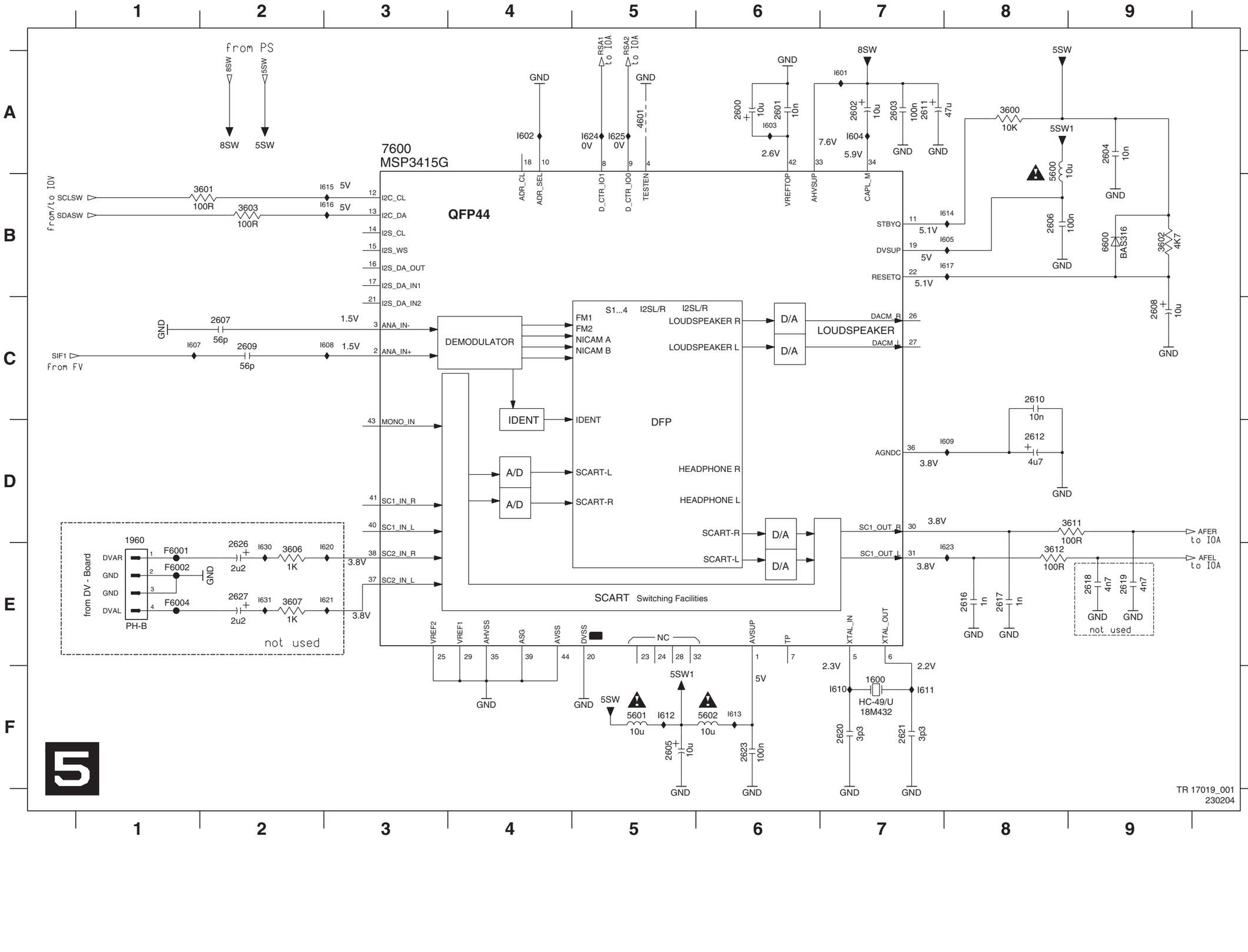
A: DC, 50mV/Div
5us/Div

I325 VSource (no disc loaded)



A: DC, 50mV/Div
2us/Div

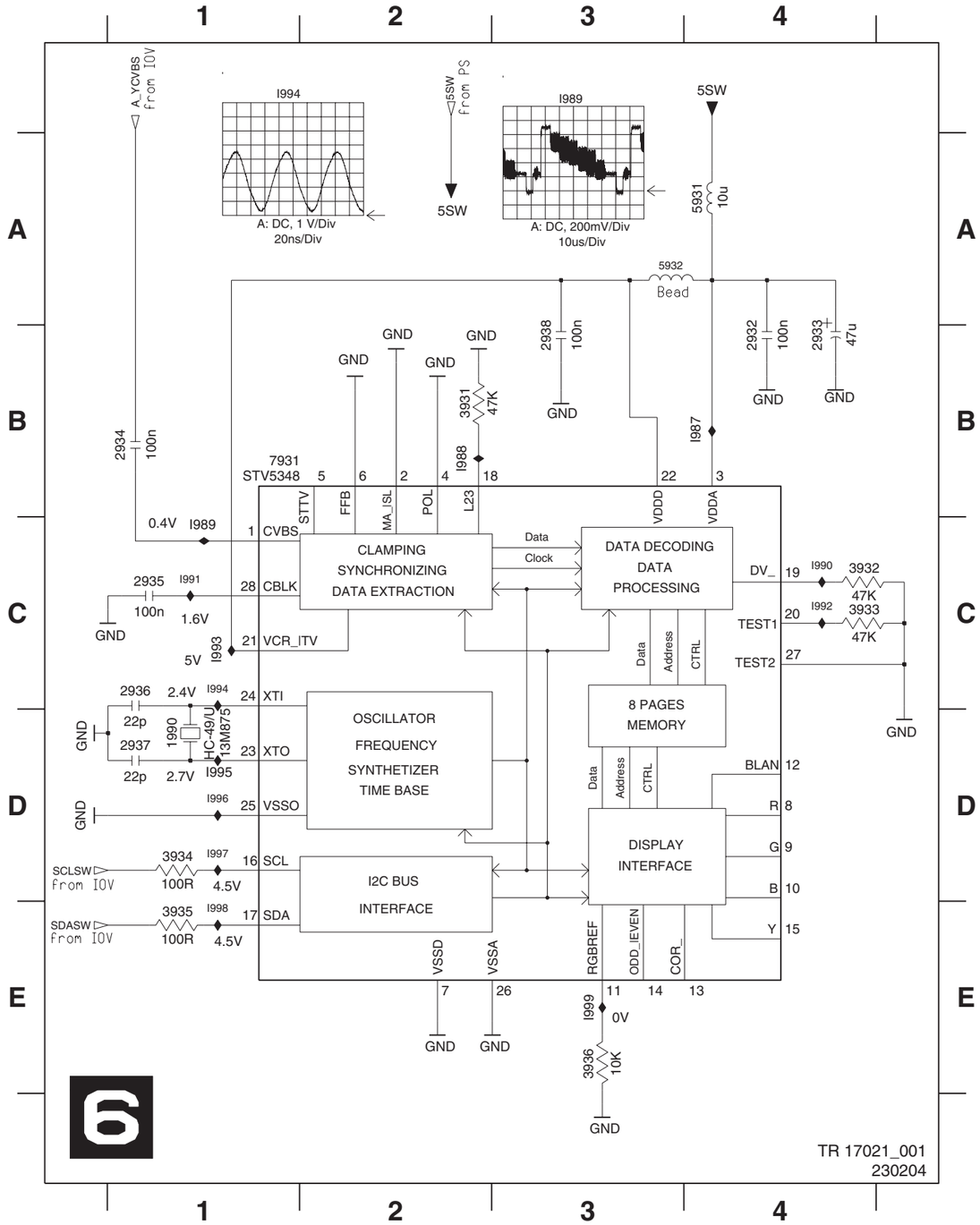
Analog Board: Multi Sound Processing (MSP)



1600 F7
1960 E1
2600 A6
2601 A6
2602 A7
2603 A7
2604 A9
2605 F5
2606 B8
2607 C2
2608 C9
2609 C2
2610 C8
2611 A7
2612 D8
2616 E8
2617 E8
2618 E9
2619 E9
2620 F7
2621 F7
2623 F6
2626 E2
2627 E2
3600 A8
3601 B2
3602 B9
3603 B2
3606 E2
3607 E2
3611 D9
3612 E8
4601 A5
5600 A8
5601 F5
5602 F6
6600 B9
7600 A3
F6001 E1
F6002 E1
F6004 E1
I601 A7
I602 A4
I603 A6
I604 A7
I605 B8
I607 C1
I608 C3
I609 D8
I610 F7
I611 F7
I612 F5
I613 F6
I614 B8
I615 B3
I616 B3
I617 B8
I620 E3
I621 E3
I623 E8
I624 A5
I625 A5
I630 E2
I631 E2

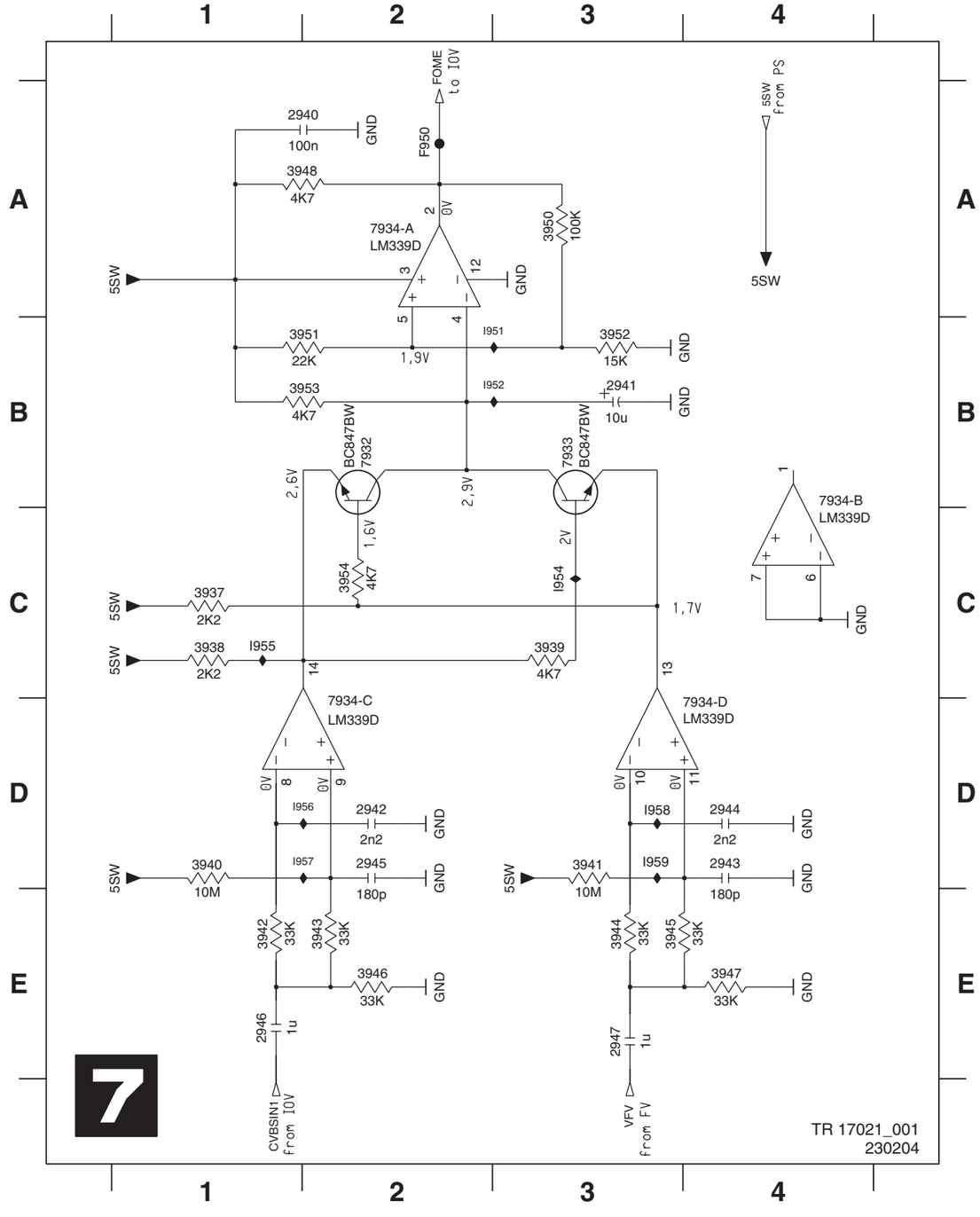
Analog Board: VPS

1990 D1 2934 B1 2937 D1 3932 C4 3935 E1 5932 A3 I988 B2 I991 C1 I994 C1 I997 D1
2932 B4 2935 C1 2938 B3 3933 C4 3936 E3 7931 B2 I989 C1 I992 C4 I995 D1 I998 E1
2933 B4 2936 C1 3931 B2 3934 D1 5931 A4 I987 B4 I990 C4 I993 C1 I996 D1 I999 E3



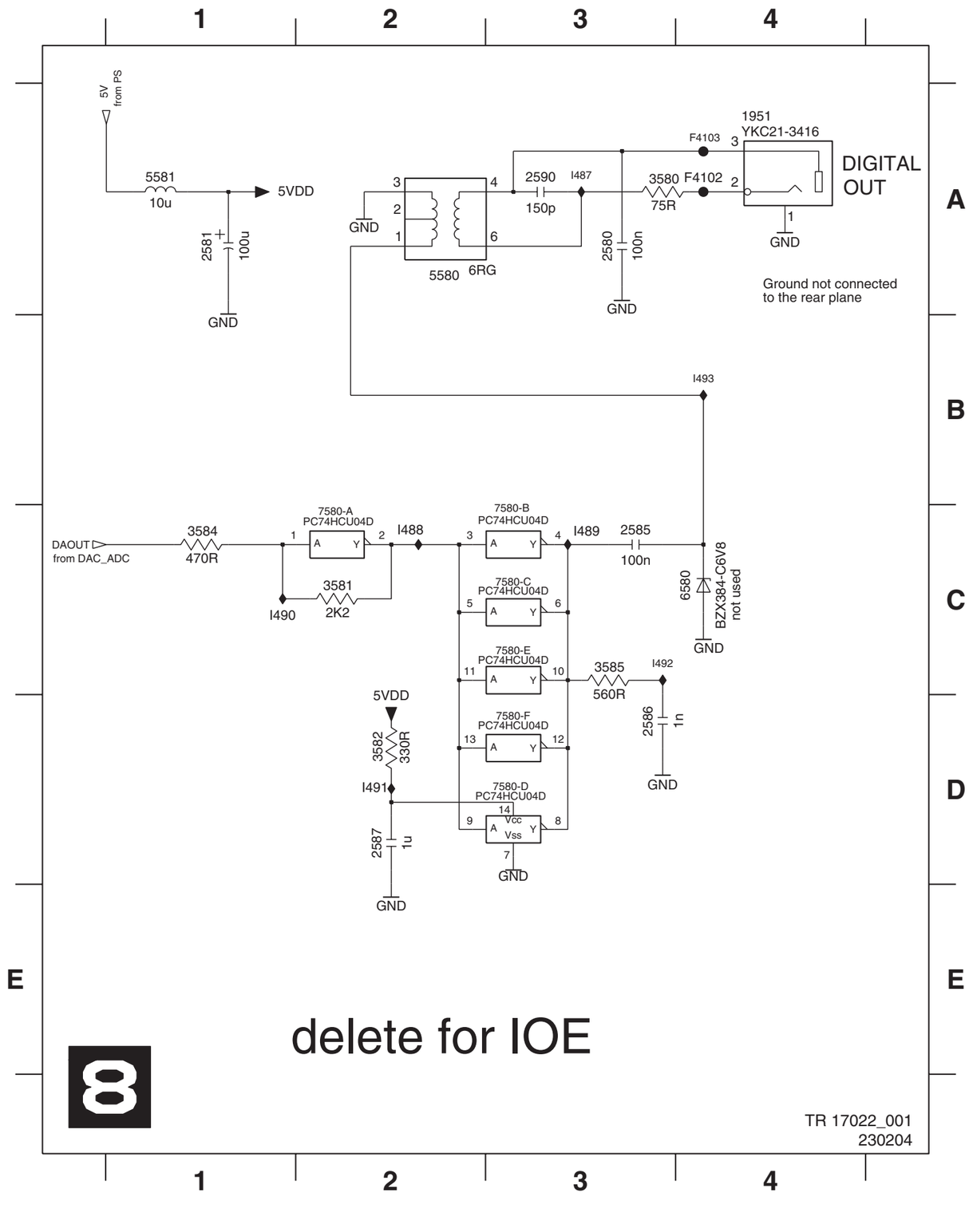
Analog Board: Follow Me (FOME)

2940 A2 2944 D4 3937 C1 3941 D3 3945 E3 3950 A3 3954 C2 7934-B B4 I951 B3 I956 D2
2941 B3 2945 D2 3938 C1 3942 E1 3946 E2 3951 B2 7932 B2 7934-C C2 I952 B3 I957 D2
2942 D2 2946 E1 3939 C3 3943 E2 3947 E4 3952 B3 7933 B3 7934-D C3 I954 C3 I958 D3
2943 D4 2947 E3 3940 D1 3944 E3 3948 A2 3953 B2 7934-A A2 F950 A2 I955 C1 I959 D3

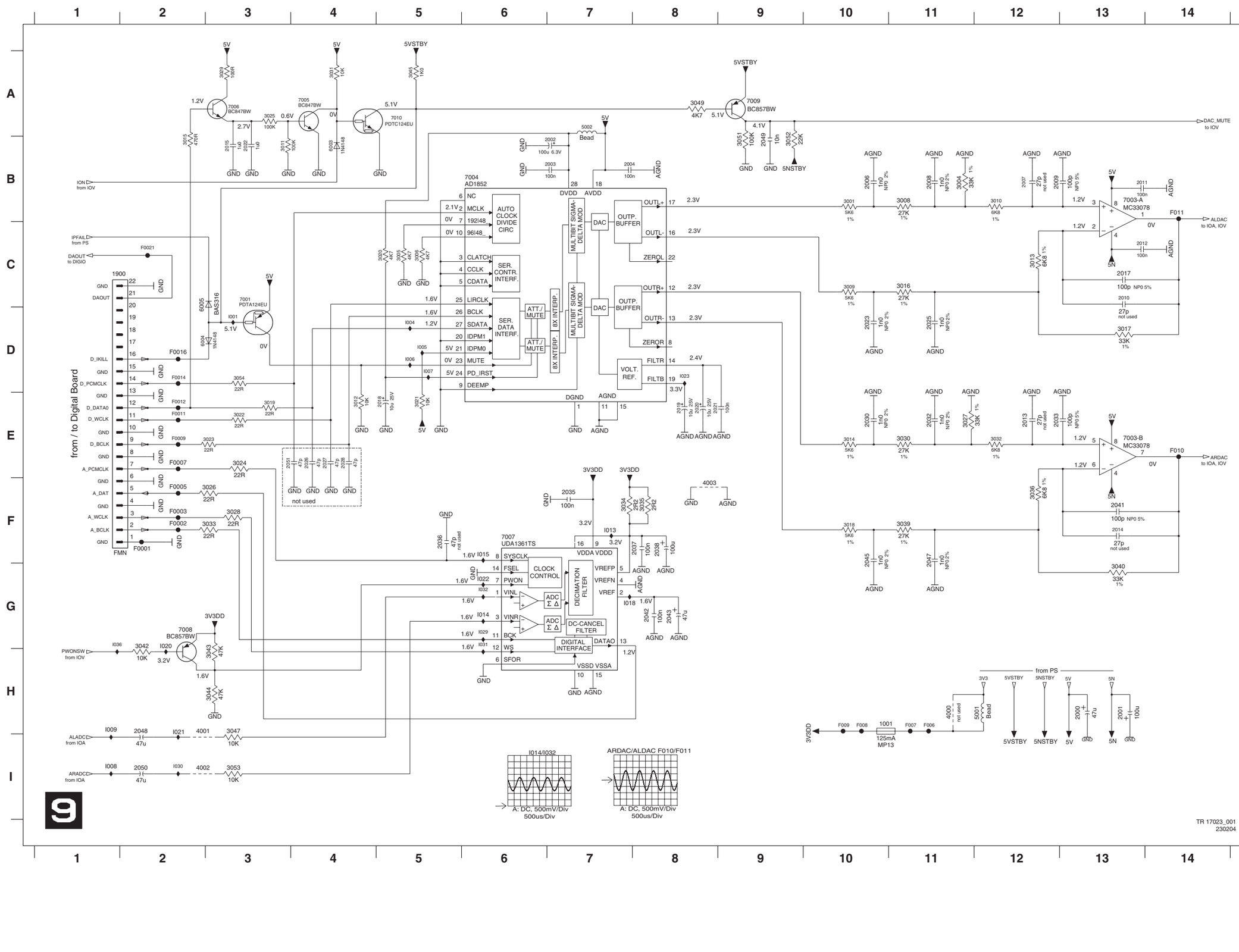


Analog Board: Digital In / Out (DIGIO)

1951 A4	2585 C3	2590 A3	3582 D2	5580 A2	7580-A C2	7580-D D3	F4102 A4	I488 C2	I491 D2
2580 A3	2586 D3	3580 A3	3584 C1	5581 A1	7580-B C3	7580-E C3	F4103 A4	I489 C3	I492 C3
2581 A1	2587 D2	3581 C2	3585 C3	6580 C4	7580-C C3	7580-F D3	I487 A3	I490 C1	I493 B4



Analog Board: Audio Converter (DAC_ADC)



1001 H10
1900 C2
2000 H13
2001 H13
2002 B7
2003 B7
2004 B7
2006 B10
2007 B12
2008 B11
2009 B12
2010 C13
2011 B13
2012 C13
2013 E12
2014 F13
2015 B3
2017 C13
2018 E5
2019 E8
2020 E8
2021 E8
2022 B3
2023 D10
2025 D11
2026 E4
2027 E4
2028 E4
2030 E10
2032 E11
2033 E12
2035 F7
2036 F5
2037 F7
2038 F8
2041 F13
2042 G8
2043 G8
2045 F10
2047 F11
2048 H2
2049 B9
2050 I2
2051 E3
3001 B10
3004 B11
3005 C5
3006 C5
3008 B11
3009 C10
3010 B12
3011 B3
3012 E4
3013 C12
3014 E10
3015 B2
3016 C11
3017 D13
3018 F10
3019 E3
3020 C5
3021 E5
3022 E3
3023 E3
3024 E3
3025 A3
3026 F3
3027 E11
3028 F3
3029 A3
3030 E11
3031 A4
3032 E12
3033 F3
3034 F7
3035 F8
3036 F12
3039 F11
3040 G13
3042 G2
3043 H3
3044 H3
3045 A5
3047 H3
3049 A8
3051 B9
3052 B9
3053 I3
3054 D3
4000 H11
4001 H2
4002 I2
4003 F8
5001 H12
5002 A7
6003 B4
6004 D2
6005 C2
7001 C3
7003-A B13
7003-B E13
7004 B6
7005 A4
7006 A3
7007 F6
7008 G2
7009 A9
7010 A5
F0001 F2
F0002 F2
F0003 F2
F0005 F2
F0007 E2
F0009 E2
F0011 E2
F0012 E2
F0014 D2
F0016 D2
F0021 C2
F006 H11
F007 H11
F008 H10
F009 H10
F010 E14
F011 B14
I001 D3
I004 D5
I005 D5
I006 D5
I007 D5
I008 I1
I009 H1
I013 F7
I014 G6
I015 F6
I018 G7
I020 G2
I021 H2
I022 G6
I023 D8
I029 G6
I030 I2
I031 G6
I032 G6
I036 G1

Layout Analog Board (Top View)

0005 A8
0803 C5
1001 C2
1300 A9
1301 A9
1302 A10
1303 B9
1304 C8
1306B8
1307 A8
1308 C8
1309 A8
1600 B4
1701 B7
1702 B7
1703 B7
1704 C6
1705 A8
1706 C6
1900 C1
1931 A10
1932 C8
1933 C3
1934 C4
1935 C3
1936 A10
1940 A6
1942 C5
1943 A1
1945 C2
1947 B5
1948 A5
1949 A4
1951 A2
1960 C5
1990 A1
2000 B3
2001 B3
2002 B1
2018 B1
2019B1
2020 C1
2038 B2
2043 B1
2048 B2
2050 B2
2301 C10
2302 A10
2303 A10
2304 B9
2305 B9
2306 B8
2307 A10
2308 B10
2309 A10
2312 C9
2313 C8
2314 B10
2315 C10
2318 C10
2319 B9
2320 B8
2322 B9
2323 A8
2325 C10
2326 A9
2328 A9
2332 A8
2335 C8
2340 A9
2344 B9
2403 C6
2405 B6
2413 B6
2417 B6
2421 B6
2424 A4
2428 C5
2429 A5
2432 A5
2434 B6
2442 A5
2443 B5
2460 B5
2461 B5
2462 A4
2463 A4
2464 A7
2510 A2
2511 A4
2516 A3
2519 B3
2522 A4
2526 A3
2581 A1
2600 B5
2602 B5
2605 B4
2608 B4
2611 B5
2612 B5
2626 B5
2627 B5
2713 B7
2720 A8
2722 C7
2729 B7
2732 A8
2737 C6
2740 B7
2933 A1
2941 B2
3019 C1
3042 A2
3047 B2
3053 B2
3300 A10
3301 B10
3305 A10
3306 A10
3308 C10
3309 C10
3310 C10
3313 A8
3318 C10
3321 B10
3322 A9
3326 A9
3342 B8
3352 B10
3356 C10
3360 C10
3412 A7
3422 A5
3432 B6
3433 B6
3434 A5
3435 A5
3436 A5
3441 A5
3447 A7
3451 A2
3454 A7
3502 B3
3509 B3
3515 A3
3517 A4
3519 A4
3523 A3
3532 A2
3533 A3
3601 B4
3603 B4
3701 B7
3703 B7
3724 A7
5300 B10
5301 C3
5302 A10
5304 B10
5305 A9
5306 C9
5307 B9
5308 B8
5309 B8
5401 C6
5402 A6
5403 B6
5404 B4
5406 B5
5580 A2
5581 A1
5600 B4
5601 B4
5602 C4
5705 A8
5709 A7
5710 B7
5711 B7
5713 C7
5714 C6
5931 A1
6003 C3
6004 C1
6300 B9
6302 A10
6303 B9
6305 A10
6306 A10
6307 C9
6308 C9
6309 B9
6310 B9
6311 B10
6313 B9
6316 C10
6317 A8
6318 A9
6319 A9
6325 A9
7301 A8
7302 B8
7304 B8
7305 C8
7307 B10
7312 A8
7313 C10
7314 C10
7315 C9
7317 A8
9001 B9
9002 C9
9003 C9
9004 C8
9005 B8
9006 B8
9008 A9
9009 A9
9010 A8
9011 A7
9012 A8
9013 B8
9014 B8
9015 C7
9016 C6
9017 A7
9018 A6
9019 A6
9020 A6
9021 A5
9022 B6
9023 C5
9024 A5
9026 A2
9027 B3
9029 C3
9030 A2
9031 A1
9032 A1
9034 C2
9035 C1
9037 B4
9038 B2
9039 A3
9040 C3
9301 A9
9302 C7
9303 A9
9304 A9
9305 A9
9401 C3
9421 A5
9422 A8
9423 C6
9424 A7
9425 B10
9426 A7
9427 A8
9428 A7
9429 A5
9430 A7
9431 B6
9432 C4
9433 A5
9434 A5
9435 C4
9436 B5
9437 B5
9438 B5
9439 B4
9440 B8
9441 A6
9442 A4
9443 B3
9444 B3
9445 C3
9446 C6
9447 A2
9448 A1
9449 C3
9450 A1
9451 C6
9452 A3
9453 A4
9454 C2
9455 A3
9456 C2
9457 A3
9458 B1
9459 B3
9460 B5
9461 B3
9462 C4
9463 B4
9464 C1
9465 B2
9466 B3
9467 A3
9468 A3
9469 A2
9470 A3
9471 B3
9472 B2
9473 B3
9474 A3
9475 B4
9476 A3
9477 B3
9478 B3
9480 A3
9481 A2
9482 A3
9483 A4
9484 A1
9485 B6
9486 A4
9487 C3
9488 A2
9489 C3
9490 A4
9491 A2
9492 A2
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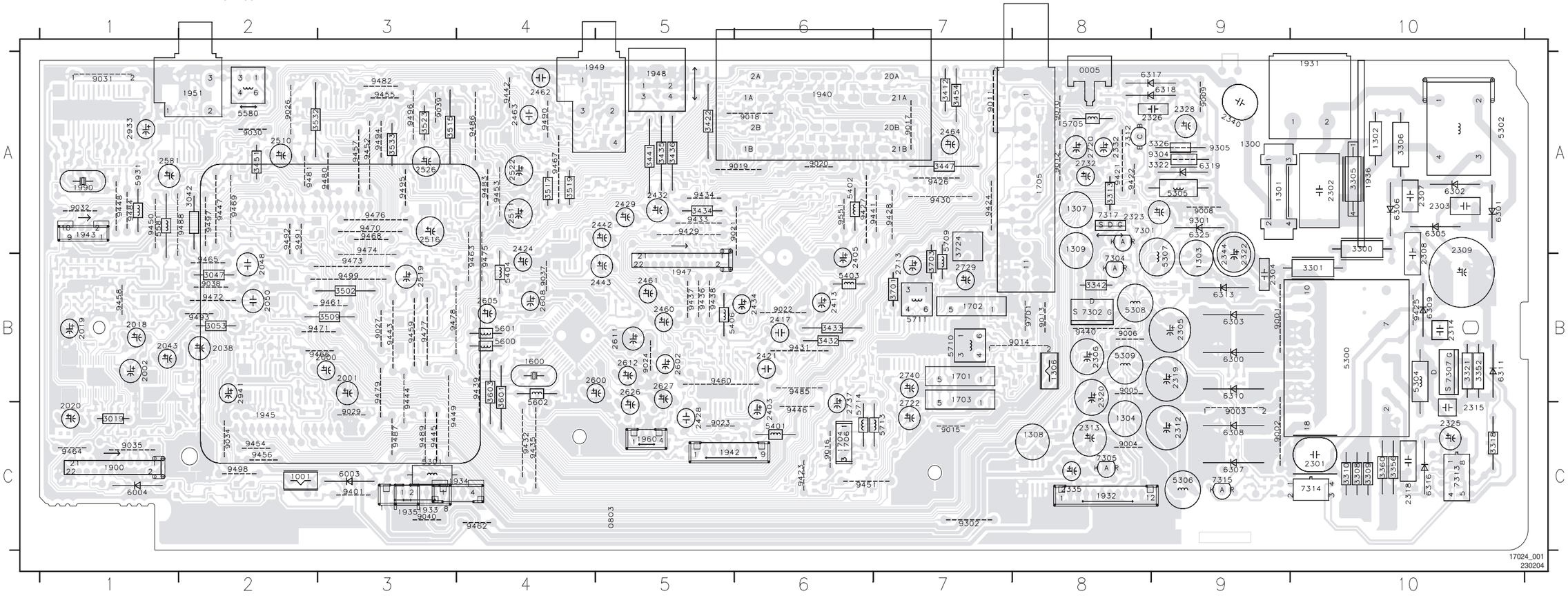
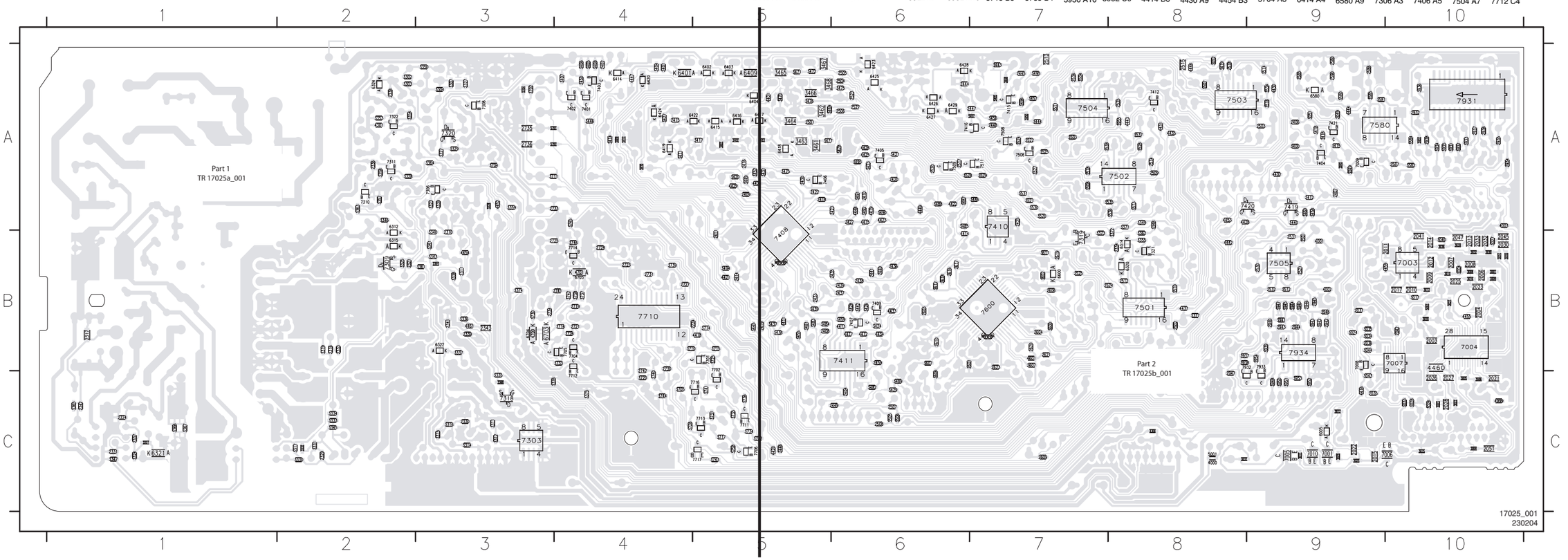
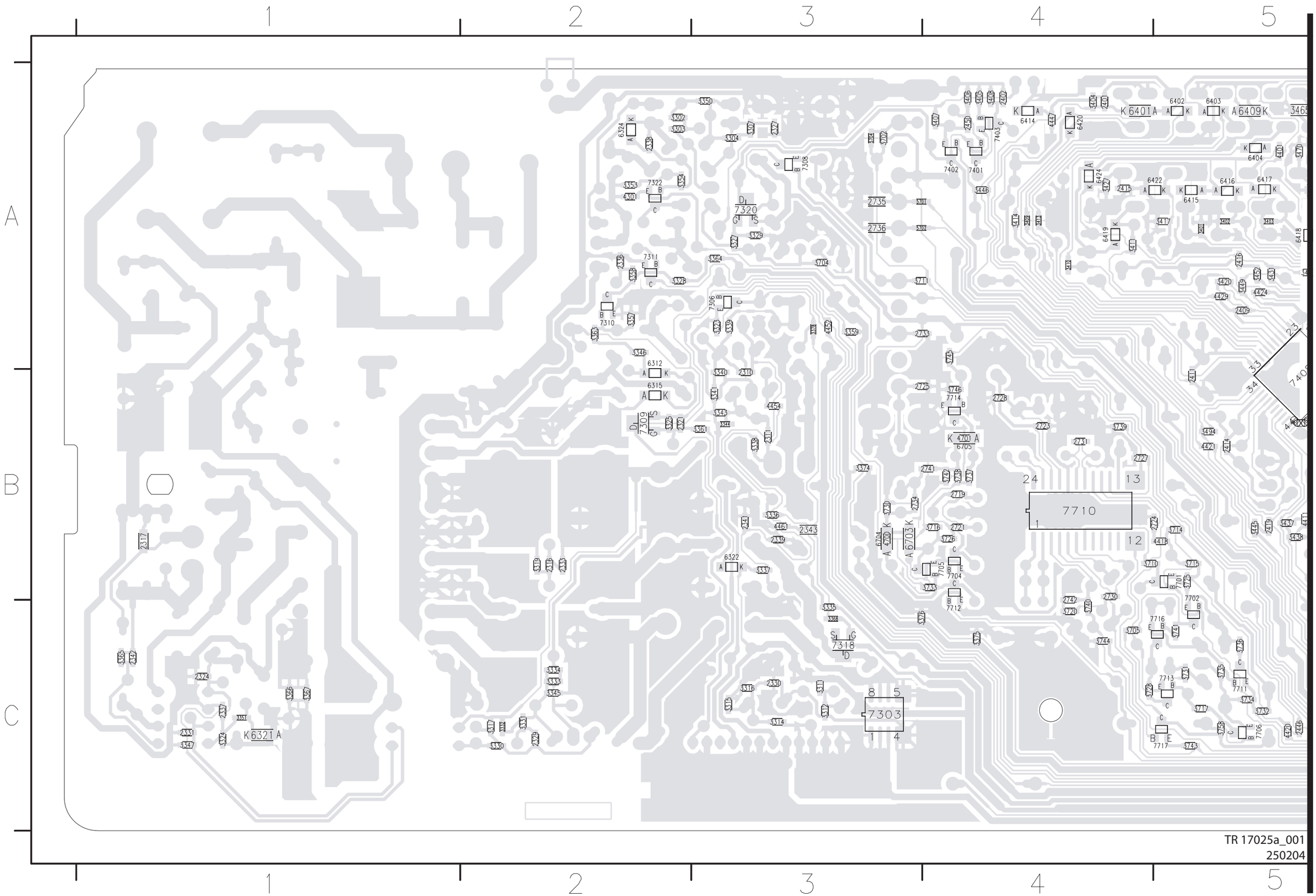
9496 A3
9497 A2
9498 C2
9499 B3
9551 A6
9701 B8



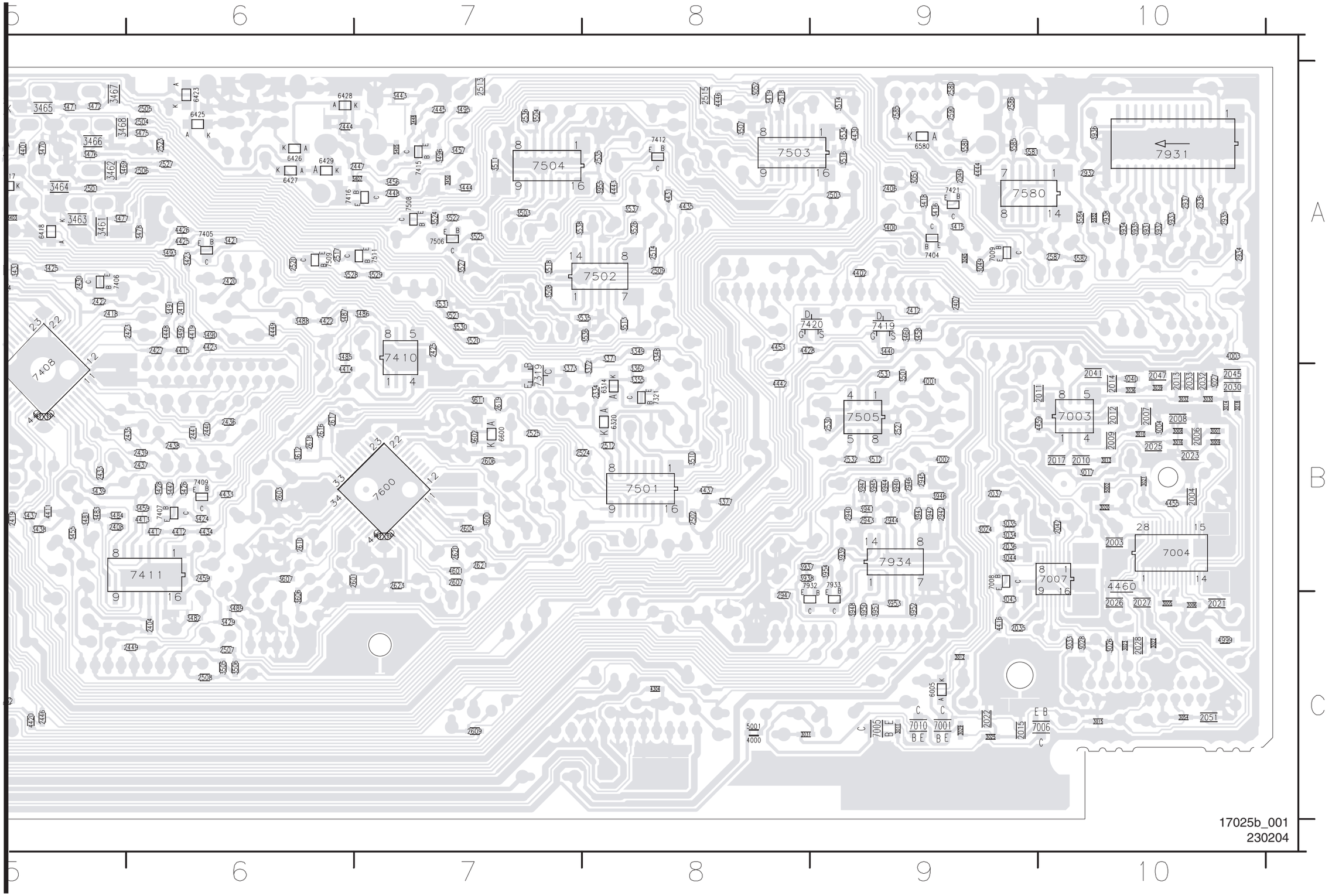
Layout Analog Board (Overview Bottom View)



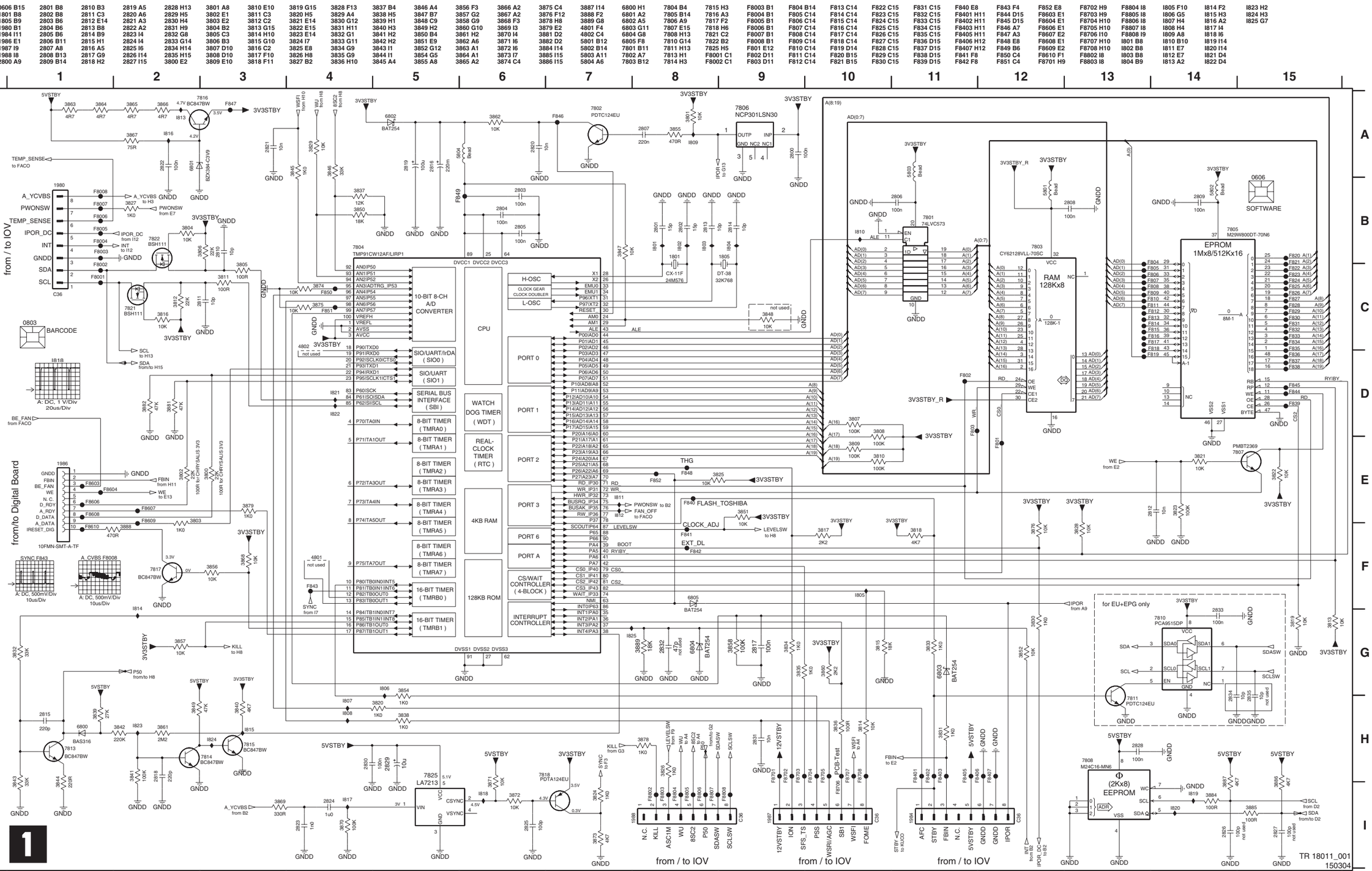
Layout Analog Board (Part 1 Bottom View)



Layout Analog Board (Part 2 Bottom View)

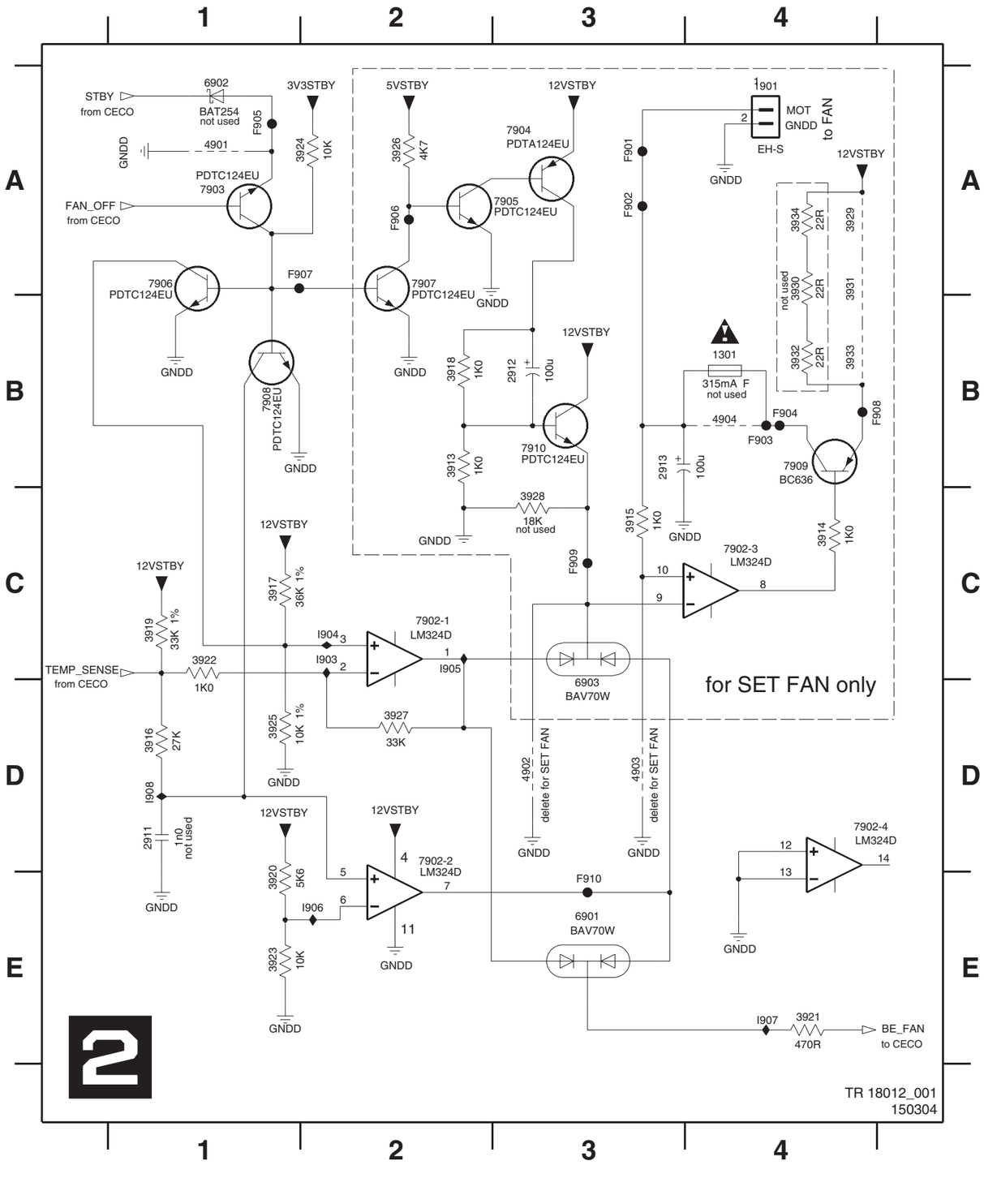


UP Sub Board: Central Controller (CECO)

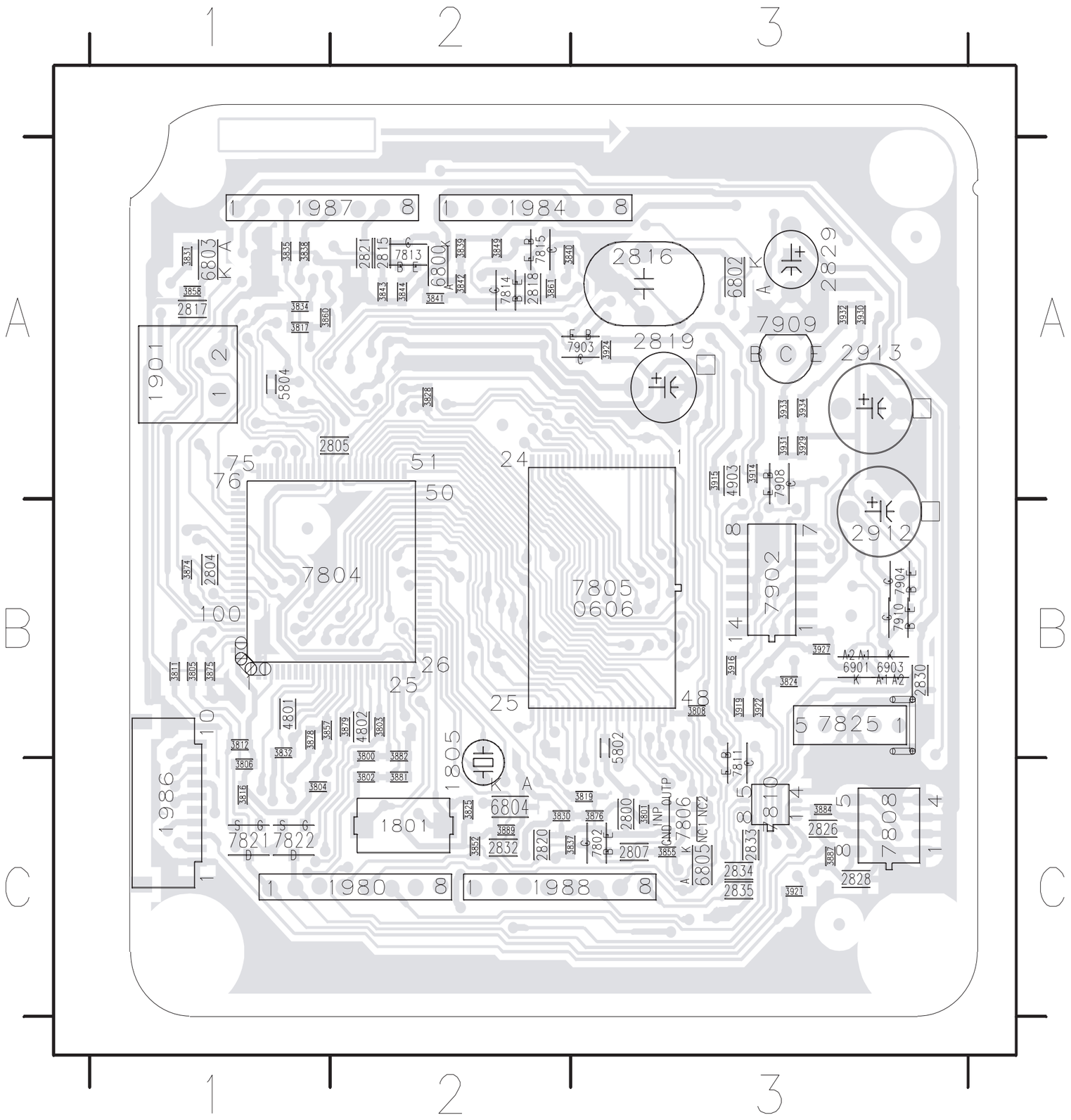


UP Sub Board: Fan Control (FACO)

1301 B4	3915 C3	3922 C1	3929 A4	4902 D3	7902-2 D2	7907 A2	F904 B4	I903 C2
1901 A4	3916 D1	3923 E1	3930 A4	4903 D3	7902-3 C4	7908 B1	F905 A1	I904 C2
2911 D1	3917 C1	3924 A2	3931 A4	4904 B4	7902-4 D4	7909 B4	F906 A2	I905 C2
2912 B3	3918 B2	3925 D1	3932 B4	6901 E3	7903 A1	7910 B3	F907 A1	I906 E2
2913 B3	3919 C1	3926 A2	3933 B4	6902 A1	7904 A3	F901 A3	F908 B4	I907 E4
3913 B2	3920 E1	3927 D2	3934 A4	6903 C3	7905 A3	F902 A3	F909 C3	I908 D1
3914 C4	3921 E4	3928 C3	4901 A1	7902-1 C2	7906 A1	F903 B4	F910 E3	



Layout UP Sub Board (Top View)



0606	B3	3819	C3	3929	A3
1801	C2	3824	B3	3930	A3
1805	C2	3825	C2	3931	A3
1901	A1	3828	A2	3932	A3
1980	C2	3830	C2	3933	A3
1984	A2	3831	A1	3934	A3
1986	C1	3832	B1	4801	B1
1987	A1	3834	A1	4802	B2
1988	C2	3835	A1	4903	A3
2800	C3	3837	C2	5802	B3
2804	B1	3838	A1	5804	A1
2805	A2	3839	A2	6800	A2
2807	C3	3840	A2	6802	A3
2815	A2	3841	A2	6803	A1
2816	A3	3842	A2	6804	C2
2817	A1	3843	A2	6805	C3
2818	A2	3844	A2	6901	B3
2819	A3	3849	A2	6903	B3
2820	C2	3852	C2	7802	C3
2821	A2	3855	C3	7804	B2
2826	C3	3857	B1	7805	B3
2828	C3	3858	A1	7806	C3
2829	A3	3860	A1	7808	C3
2830	B3	3861	A2	7810	C3
2832	C2	3874	B1	7811	C3
2833	C3	3875	B1	7813	A2
2834	C3	3876	C3	7814	A2
2835	C3	3878	B1	7815	A2
2912	B3	3879	B2	7821	C1
2913	A3	3881	C2	7822	C1
3800	B2	3882	B2	7825	B3
3801	C3	3884	C3	7902	B3
3802	C2	3887	C3	7903	A3
3803	B2	3889	C2	7904	B3
3804	C1	3914	A3	7908	A3
3805	B1	3915	A3	7909	A3
3806	C1	3916	A3	7910	B3
3808	B3	3919	A3		
3811	B1	3921	A3		
3812	B1	3922	A3		
3816	C1	3924	A3		
3817	A1	3927	B3		

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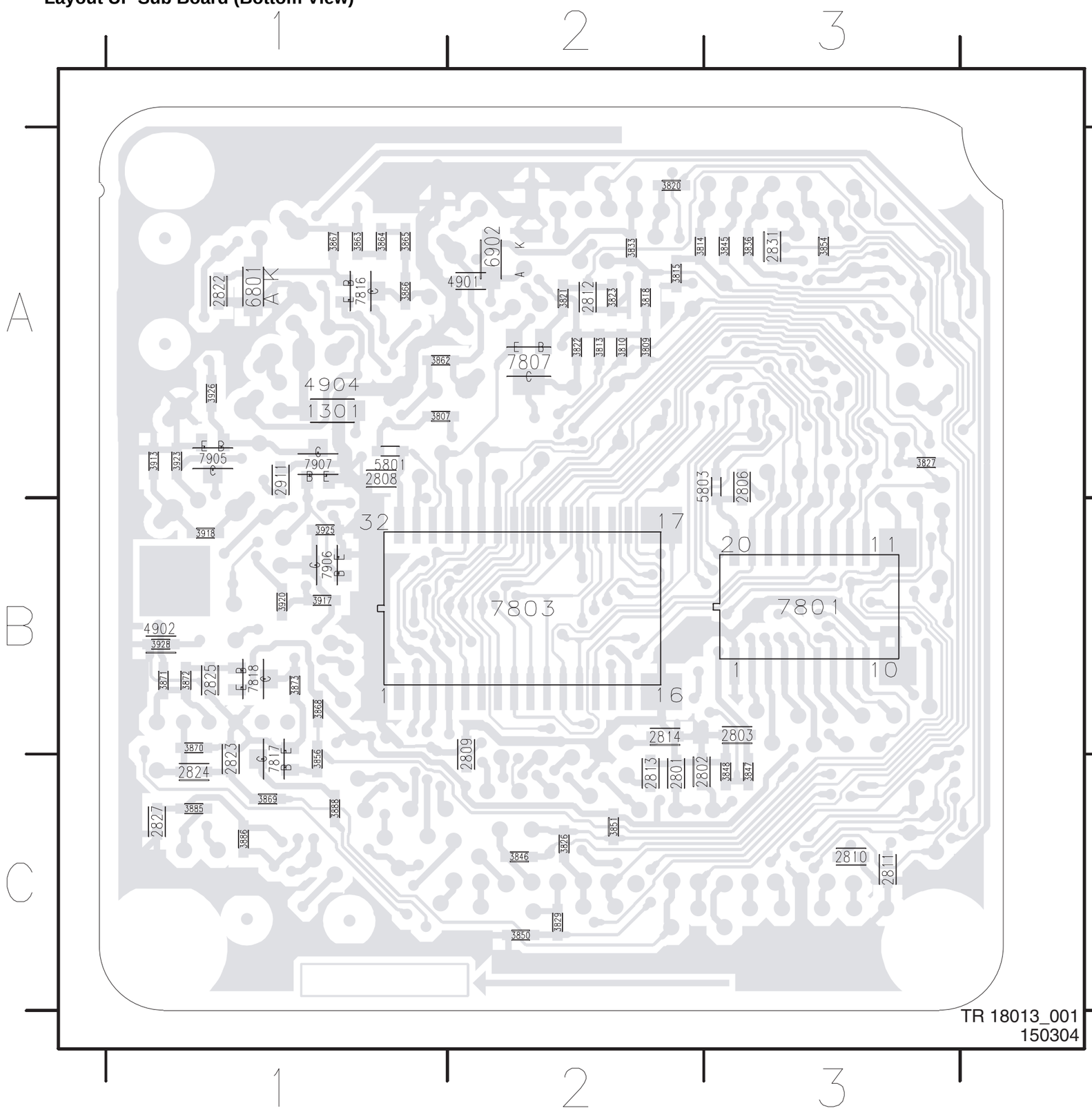
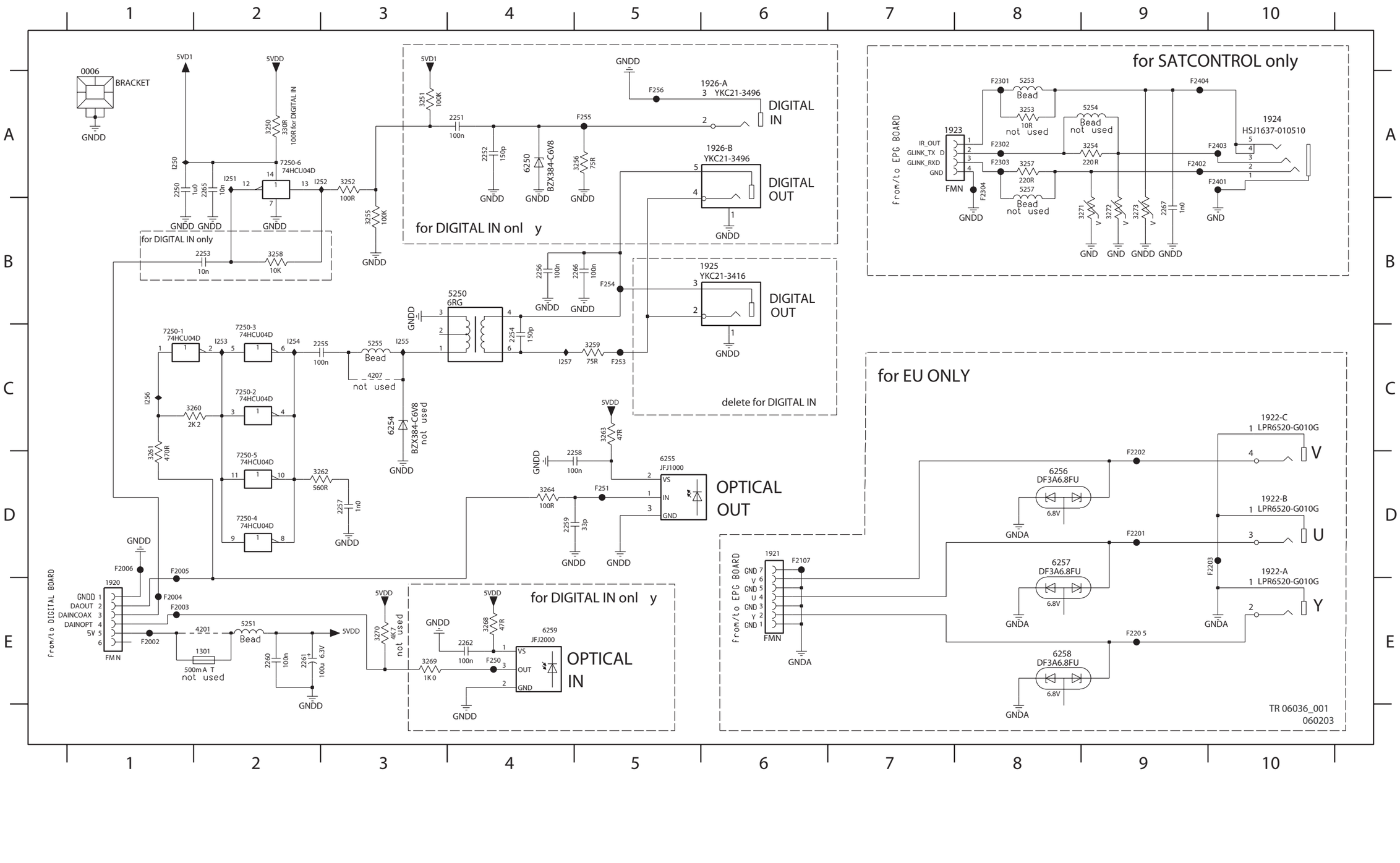
Layout UP Sub Board (Bottom View)



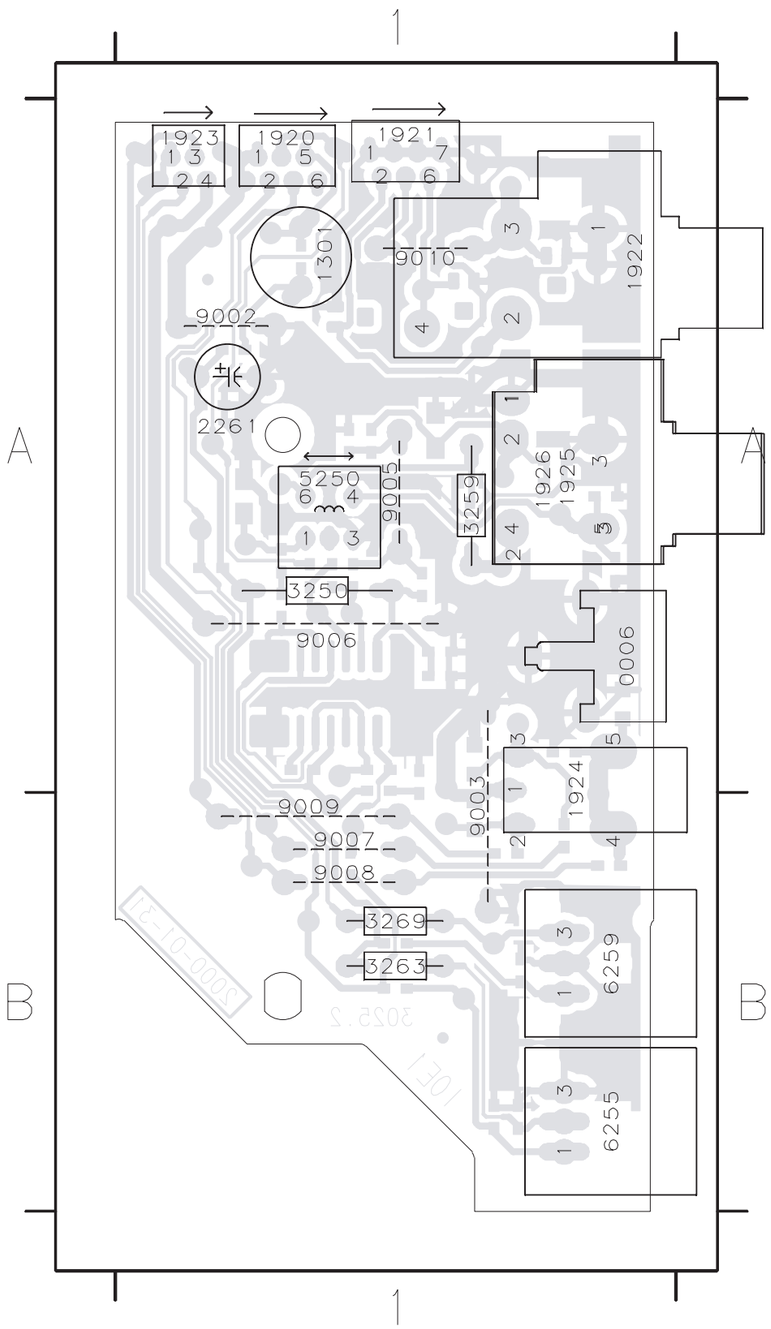
1301 A1	3826 C2	3918 B1
2801 C2	3827 A3	3920 B1
2802 C2	3829 C2	3923 A1
2803 B3	3833 A2	3925 B1
2806 A3	3836 A3	3926 A1
2808 A1	3845 A3	3928 B1
2809 B2	3846 C2	4901 A2
2810 C3	3847 C3	4902 B1
2811 C3	3848 C3	4904 A1
2812 A2	3850 C2	5801 A1
2813 C2	3851 C2	5803 A2
2814 B2	3854 A3	6801 A1
2822 A1	3856 C1	6902 A2
2823 C1	3862 A1	7801 B3
2824 C1	3863 AI	7803 B2
2825 B1	3864 A1	7807 A2
2827 C1	3865 A1	7816 A1
2831 A3	3866 A1	7817 C1
2911 A1	3867 A1	7818 B1
3807 A1	3868 B1	7905 A1
3809 A2	3869 C1	7906 B1
3810 A2	3870 B1	7907 A1
3813 A2	3871 B1	
3814 A2	3872 B1	
3815 A2	3873 B1	
3818 A2	3885 C1	
3820 A2	3886 C1	
3821 A2	3888 C1	
3822 A2	3913 A1	
3823 A2	3917 B1	

In/Out Extension Board IOE

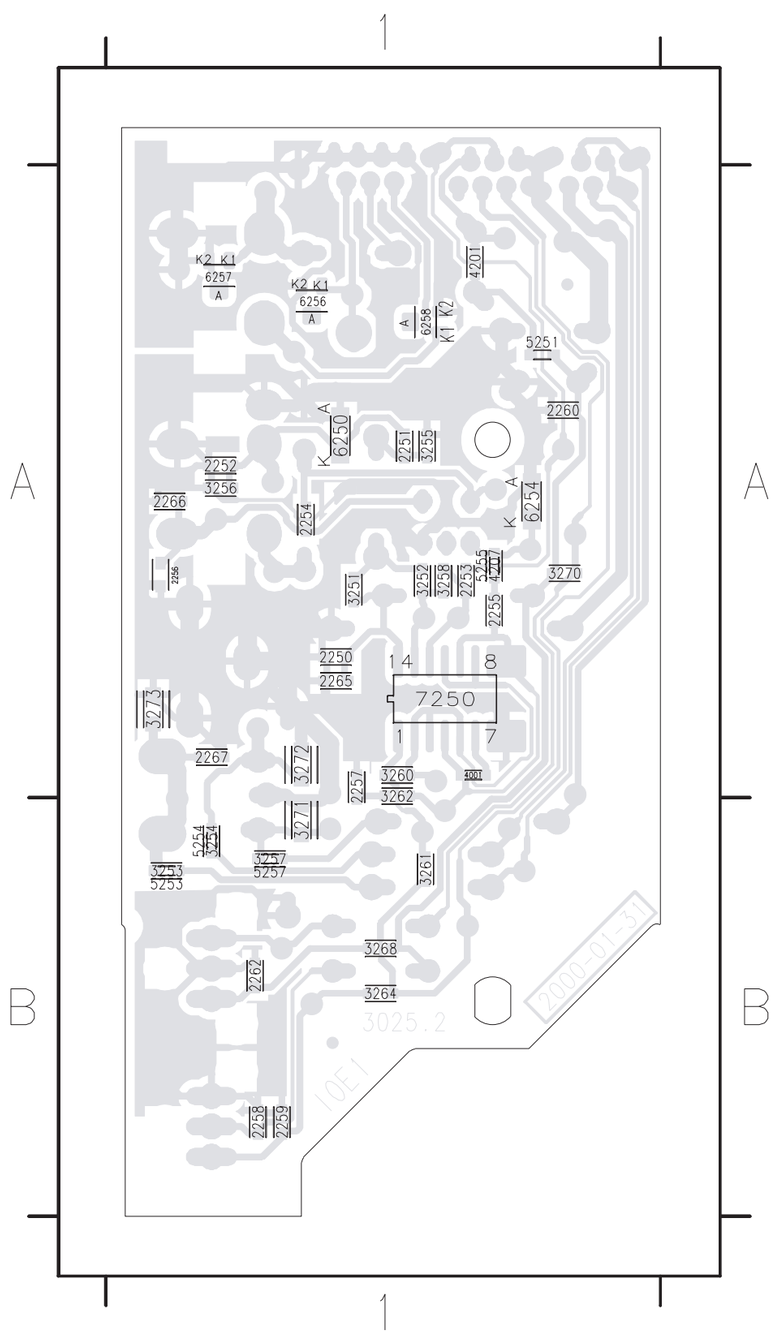
0006 A1
1301 E2
1920 E1
1921 D6
1922-A D10
1922-B D10
1922-C C10
1923 A8
1924 A10
1925 B5
1926-A A6
1926-B A6
2250 A1
2251 A4
2252 A4
2253 B2
2254 C4
2255 C3
2256 B4
2257 D3
2258 D5
2259 D4
2260 E2
2261 E2
2262 E4
2265 A2
2266 B5
2267 B9
3250 A2
3251 A3
3252 A3
3253 A8
3254 A9
3255 B3
3256 A5
3257 A8
3258 B2
3259 C5
3260 C2
3261 D1
3262 D3
3263 C5
3264 D4
3268 E4
3269 E3
3270 E3
3271 B9
3272 B9
3273 B9
4201 E2
4207 C3
5250 B4
5251 E2
5253 A8
5254 A9
5255 C3
5257 A8
6250 A4
6254 C3
6255 D5
6256 D8
6257 D8
6258 E8
6259 E4
7250-1 C1
7250-2 C2
7250-3 C2
7250-4 D2
7250-5 D2
7250-6 A2
F2003 E1
F2004 E1
F2005 D1
F2006 D1
F2107 D6
F2201 D9
F2202 D9
F2203 D10
F2205 E9
F2301 A8
F2302 A8
F2303 A8
F2304 A8
F2401 A10
F2402 A9
F2403 A10
F2404 A9
F250 E4
F251 D5
F253 C5
F254 B5
F255 A5
F256 A5
I250 A1
I251 A2
I252 A3
I253 C2
I254 C2
I255 C3
I256 C1
I257 C4



Layout In / Out Extension Board



0006 A1
1301 A1
1920 A1
1921 A1
1922 A1
1923 A1
1924 A1
1925 A1
1926 A1
2261 A1
3250 A1
3259 A1
3263 B1
3269 B1
5250 A1
6255 B1
6259 B1
9002 A1
9003 B1
9005 A1
9006 A1
9007 B1
9008 B1
9009 B1
9010 A1



2250 A1
2251 A1
2252 A1
2253 A1
2254 A1
2255 A1
2256 A1
2257 A1
2258 B1
2259 B1
2260 A1
2262 B1
2265 A1
2266 A1
2267 A1
3251 A1
3252 A1
3253 B1
3254 B1
3255 A1
3256 A1
3257 B1
3258 A1
3260 A1
3261 B1
3262 A1
3264 B1
3268 B1
3270 A1
3271 B1
3272 A1
3273 A1
4001 A1
4201 A1
4207 A1
5251 A1
5253 B1
5254 B1
5255 A1
5257 B1
6250 A1
6254 A1
6256 A1
6257 A1
6258 A1
7250 A1

Digital Board Chrysalis 2.1: IDE, UARTS, RESET, BE

TRUTH TABLE
NAND / NOR FLASH

XIO_SEL0	MPIO24	NANDFLASH	NORFLASH
0	0	1	0
0	1	0	1
1	0	1	1
1	1	1	1

for AV2 only

IDE1 Only

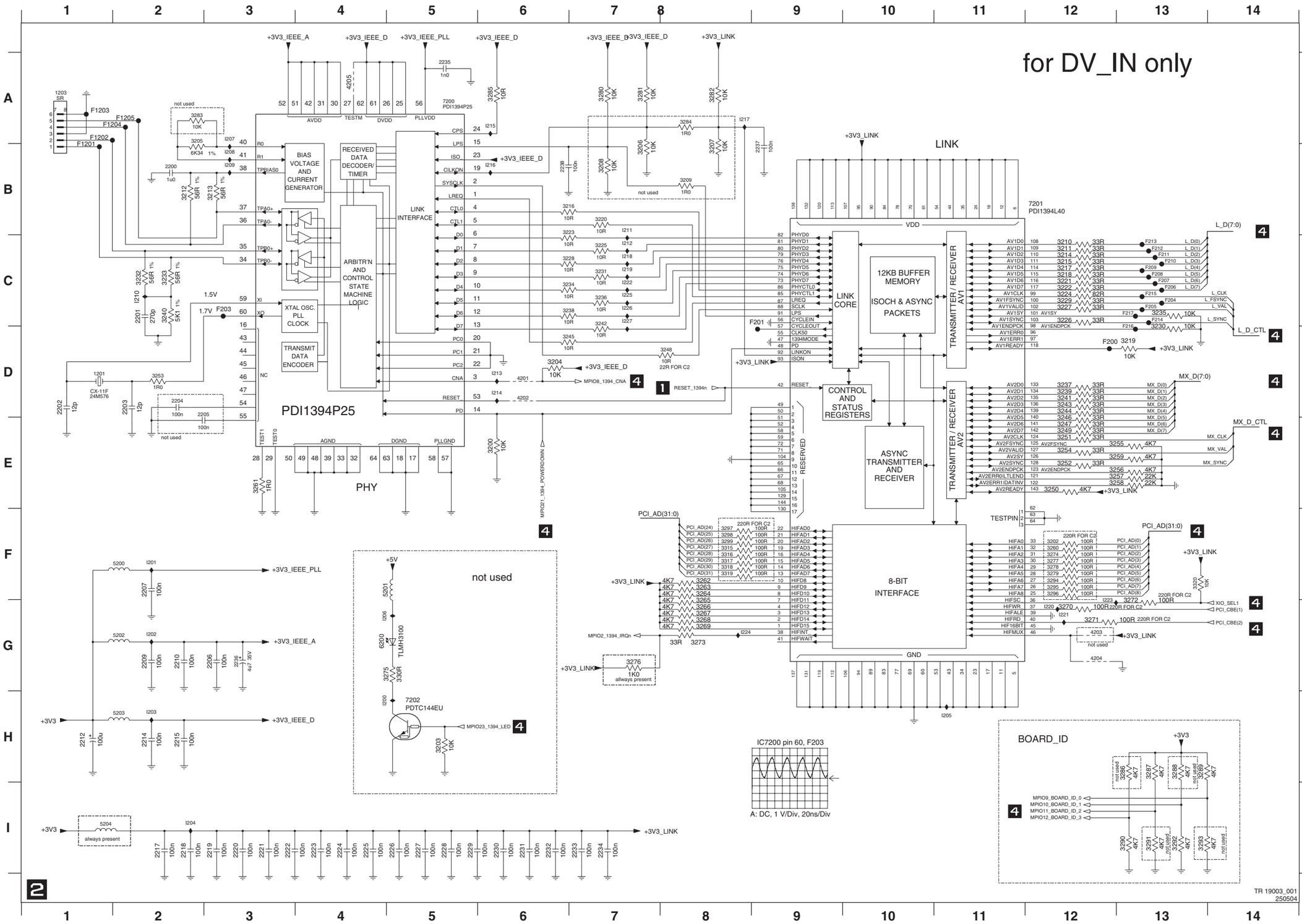
Service

ANALOG BOARD

TR 19002_001
250504

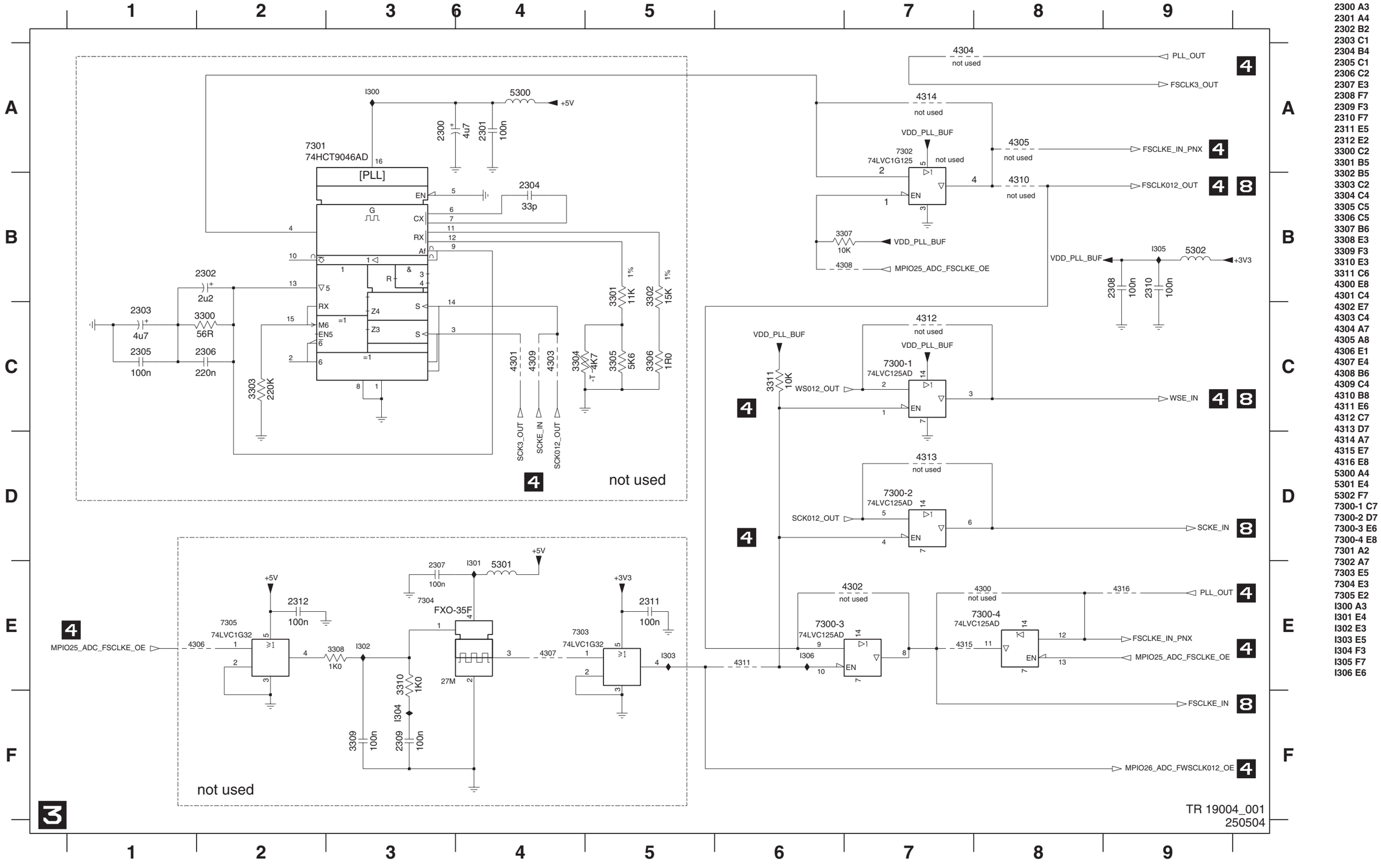
1100 A10	4117 E6	F0227 D14	
1102 B14	4118 F8	F0229 D13	
1103 H14	4119 F8	F0231 D14	
1104 G9	4121 H6	F0233 D13	
1105 B10	4122 B5	F0234 D13	
1106 I5	4123 B5	F0235 D13	
2100 A8	4124 D11	F0236 E13	
2101 E4	4125 D11	F0237 E14	
2102 D7	5100 C4	F0238 E14	
2103 D3	5102 E11	F0239 D12	
2104 D8	5103 I13	F0301 H13	
2105 D8	5104 H8	F0302 H13	
2106 D8	5108 A5	F0303 H13	
2107 D8	6100 E5	F0304 H13	
2108 A7	6101 E6	F0305 H13	
2109 E9	6103 E11	F0306 H13	
2110 E9	7100 F5	F0307 I13	
2111 E9	7101 F6	F0401 H9	
2112 H11	7102-1 A4	F0402 H9	
2113 E6	7102-2 A5	F0403 H9	
2114 E12	7102-3 B4	F0404 H9	
2116 E11	7102-4 B5	F0405 G9	
2119 I12	7103 A8	F0406 G9	
2120 I8	7104-1 H2	F0407 G9	
2124 I5	7104-2 I3	F0408 G9	
2125 D3	7104-3 D2	F0409 G9	
2127 A3	7104-4 E2	F0410 G9	
2128 D11	7105 G5	F0501 C10	
2129 A13	7106 E5	F0503 D9	
3080 H7	7107-1 F2	F0506 D9	
3081 H7	7107-2 F2	F0508 B9	
3082 G10	7107-3 G2	F0509 C9	
3085 C7	7107-4 H5	F0510 C9	
3086 C7	7108 G6	F0511 C9	
3088 I6	7109 E12	F0512 C9	
3090 G2	7111-1 G11	F0514 C9	
3091 H2	7111-2 I11	F0601 I5	
3092 I12	7111-3 H11	F0603 I5	
3093 I12	7111-4 I11	F936 G3	
3094 E8	7111-5 I6	I100 E6	
3095 C2	7111-6 I7	I102 E6	
3096 H5	F0001 B9	I103 A3	
3097 I8	F0003 B9	I104 A3	
3098 I7	F0005 B9	I105 A5	
3099 I8	F0007 B9	I106 B5	
3100 A12	F0009 B9	I108 D3	
3101 A13	F0011 B9	I109 E3	
3102 B9	F0015 A10	I110 F3	
3103 A12	F0201 A14	I111 G3	
3104 B8	F0202 B14	I112 C3	
3105 B8	F0203 A13	I114 C1	
3106 A12	F0204 A12	I115 A4	
3107 B9	F0205 A13	I116 E11	
3108 A12	F0206 A12	I117 H8	
3109 B8	F0207 A13	I119 E2	
3110 A12	F0208 A12	I120 E2	
3111 B9	F0209 B13	I121 F2	
3112 A12	F0210 B12	I122 G2	
3113 B6	F0211 B13	I123 I2	
3114 D5	F0212 B12	I124 H2	
3115 B8	F0213 B13		
3116 A12	F0214 B12		
3117 I2	F0215 B13		
3118 B12	F0216 C12		
3119 A9	F0217 C13		
3120 B12	F0218 C12		
3121 F6	F0221 C13		
3122 B12	F0223 C14		
3123 F7	F0225 C13		
3124 B12	F0227 D14		
3125 G6	F0229 D13		
3126 B12	F0231 D14		
3127 G7	F0233 D13		
3128 B12	F0234 D13		
3129 G4	F0235 D13		
3130 B12	F0236 E13		
3131 C7	F0237 E14		
3132 F5	F0238 E14		
3133 C12	F0239 D12		
3134 G4	F0301 H13		
3135 C12	F0302 H13		
3136 C7	F0303 H13		
3137 G6	F0304 H13		
3138 C12	F0305 H13		
3139 C7	F0306 H13		
3140 C7	F0307 I13		
3141 C7	F0401 H9		
3142 G7	F0402 H9		
3143 C12	F0403 H9		
3144 G7	F0404 H9		
3145 C12	F0405 G9		
3146 F11	F0406 G9		
3147 E13	F0407 G9		
3149 F13	F0408 G9		
3150 I6	F0409 G9		
3152 D8	F0410 G9		
3154 D12	F0501 C10		
3156 D12	F0503 D9		
3157 D8	F0506 D9		
3159 E13	F0508 B9		
3161 D12	F0509 C9		
3162 E2	F0510 C9		
3163 D2	F0511 C9		
3164 D12	F0512 C9		
3165 D2	F0514 C9		
3167 F13	F0601 I5		
3168 D12	F0603 I5		
3170 E13	F936 G3		
3172 F13	I100 E6		
3173 E2	I102 E6		
3175 E14	I103 A3		
3176 B3	I104 A3		
3178 F14	I105 A5		
3180 D12	I106 B5		
3184 F2	I108 D3		
3185 G11	I109 E3		
3186 H12	I110 F3		
3187 G2	I111 G3		
3189 H12	I112 C3		
3191 H11	I114 C1		
3192 H12	I115 A4		
3195 I10	I116 E11		
3197 I12	I117 H8		
3199 I12	I119 E2		
4101 A8	I120 E2		
4110 F8	I121 F2		
4111 H7	I122 G2		
4113 F8	I123 I2		
4115 D1	I124 H2		
4116 G5			

Digital Board Chrysalis 2.1: 1394



1201 D1	3289 H13
1203 A1	3290 I13
2200 B2	3291 I13
2201 C2	3292 I13
2202 D1	3293 I13
2203 D2	3294 F12
2204 D2	3295 F12
2205 D2	3296 F12
2206 G3	3297 F8
2207 F2	3298 F8
2209 G2	3299 F8
2210 G2	3315 F8
2212 H1	3316 F8
2214 H2	3317 F8
2215 H2	3318 F8
2217 I2	3319 F8
2218 I2	3320 F13
2219 I3	4201 D6
2220 I3	4202 D6
2221 I3	4203 G12
2222 I3	4204 G12
2223 I4	4205 A4
2224 I4	5200 F2
2225 I4	5201 F5
2226 I5	5202 G2
2227 I5	5203 H2
2228 I5	5204 I1
2229 I5	6200 G4
2230 I6	7200 A5
2231 I6	7201 B12
2232 I6	7202 H5
2233 I7	F1201 B1
2234 I7	F1202 A1
2235 A5	F1203 A1
2236 G3	F1204 A2
2237 B9	F1205 A2
2238 B6	F200 D12
3200 E6	F201 C9
3202 F12	F203 C3
3203 H5	F204 C13
3204 D6	F205 C13
3205 A2	F206 C13
3206 B7	F207 C13
3207 B8	F208 C13
3208 B7	F209 C13
3209 B8	F210 C13
3210 C12	F211 C13
3211 C12	F212 C13
3212 B2	F213 C13
3213 B3	F214 C13
3214 C12	F215 C13
3215 C12	F216 D13
3216 B6	F217 C13
3217 C12	I200 H4
3218 C12	I201 F2
3219 D13	I202 G2
3220 B7	I203 H2
3221 C12	I204 I2
3222 C12	I205 H11
3223 B6	I206 G4
3224 C12	I207 A3
3225 C7	I208 B3
3226 C12	I209 B3
3227 C12	I210 C2
3228 C6	I211 B7
3229 C12	I212 C7
3230 D13	I213 D6
3231 C7	I214 D6
3232 C2	I215 A6
3233 C2	I216 B6
3234 C6	I217 A8
3235 C13	I218 C7
3236 C7	I219 C7
3237 D12	I220 G12
3238 C6	I221 G12
3239 D12	I222 C7
3240 C2	I223 G12
3241 D12	I224 G8
3242 C7	I225 C7
3243 D12	I226 C7
3244 D12	I227 C7
3245 D6	
3246 E12	
3247 E12	
3248 D8	
3249 E12	
3250 E12	
3251 E12	
3252 E12	
3253 D2	
3254 E12	
3255 E13	
3256 E13	
3257 E13	
3258 E13	
3259 E13	
3260 F12	
3261 E3	
3262 F8	
3263 F8	
3264 F8	
3265 G8	
3266 G8	
3267 G8	
3268 G8	
3269 G8	
3270 G12	
3271 G12	
3272 G13	
3273 G8	
3274 F12	
3275 G5	
3276 G7	
3277 F12	
3278 F12	
3279 F12	
3280 A7	
3281 A7	
3282 A8	
3283 A2	
3284 A8	
3285 A6	
3286 H13	
3287 H13	
3288 H13	

Digital Board Chrysalis 2.1: Audio PLL



Digital Board Chrysalis 2.1: Chrysalis

SDRAM

	3831	3823
32 MB	-	X
64 MB	X	-

1394 OUT

1394 IN

PCI/XIO

I²C

DIGITAL VIDEO INTERFACE

ANALOG VIDEO

PROG SCAN

PIOS

TEST

GENERAL

DIGITAL AUDIO INTERFACE

UARTS

IDE

SDRAM

EJTAG pitch 1.27 mm

UART0: DEBUG / SERVICE

UART1: DEV ONLY

UART2: S2B (BASIC ENGINE)

UART3: GATEWAY (ANALOG BOARD)

TR 19005_001
250504

HS_IN
A: DC, 2 V/Div, 10us/Div

VS_IN
A: DC, 1 V/Div, 5ms/Div

IC7402 pin 3, F405
A: DC, 1 V/Div, 50ns/Div

Digital Board Chrysalis 2.1: 1.8V Power

1506 1000mA F
F500 F501
5501 I505
+12V
5502 I502 100n 2514
7501 NCP1571D
12.3V
VCC GATE-H GATE-L PGDELAY PWRGD GND
1V I500 1.5V
VFB COMP
2515 470n
I503 3.8V
2527 10n
I501
2518 100p
I504
3504 1K3 1% 1K5 1% FOR C3
3503 1K5 1%
7500-1 STS5DNF20V
7500-2 STS5DNF20V
2512 100u
I506 5503 10u SLF 10145
I507 +1V8
2516 100u

1500
F1502 F1501
1505 1000mA F
I508 I509 I510 +3V3
2519 100n
F1505 F1506 +12V
2521 100n
F1509
not used 4500
F502
2524 100n
1507 1000mA F
I511 I512 +5V
F1510 ION
2525 100n
F1512 -5V
2526 100n
ANALOG BOARD
B12B-PH-SM3-TBT

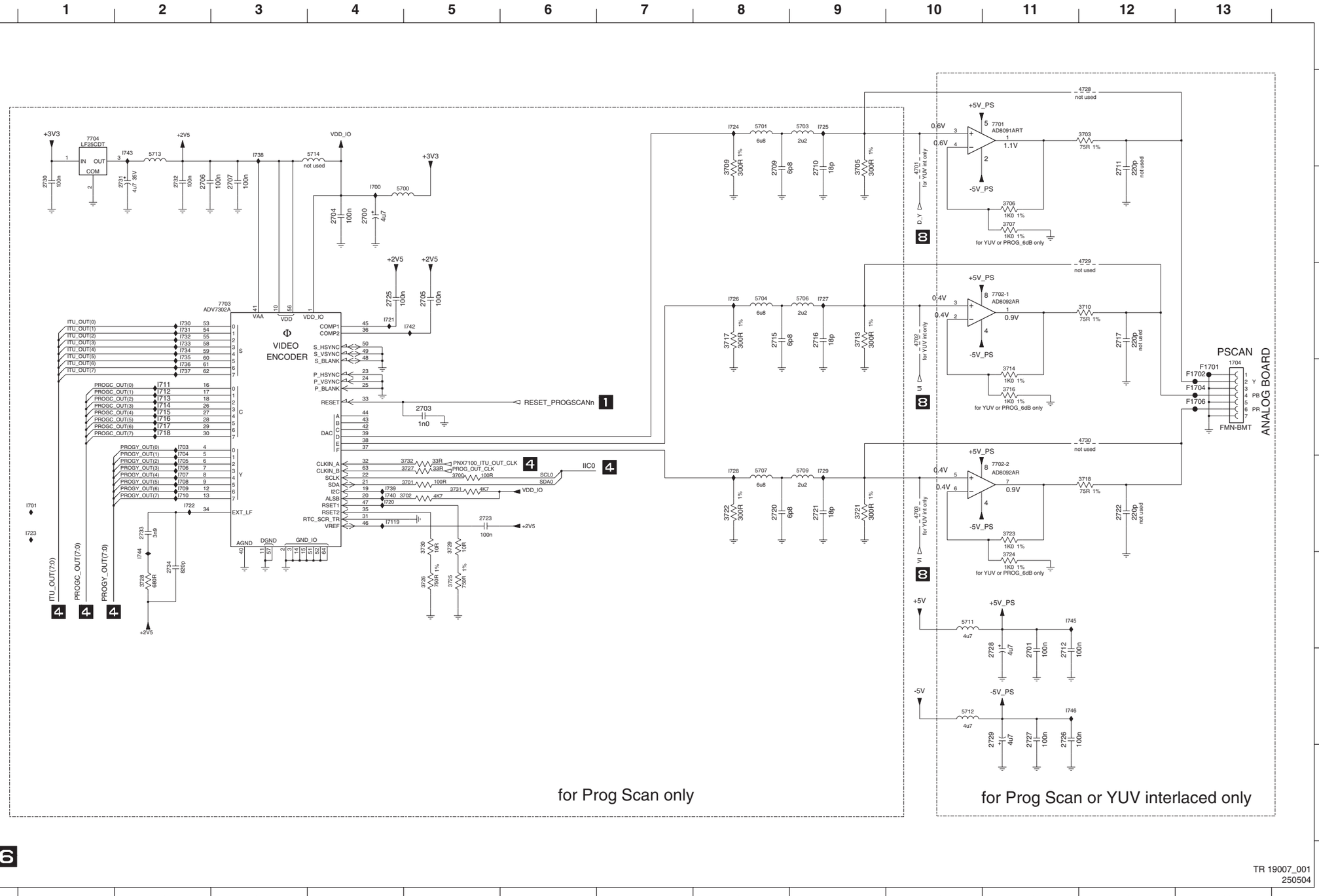
IC7501 pin 5
A: DC, 2 V/Div, 1us/Div
IC7501 pin 6
A: DC, 2 V/Div, 1us/Div

1501 1502 1503 1504

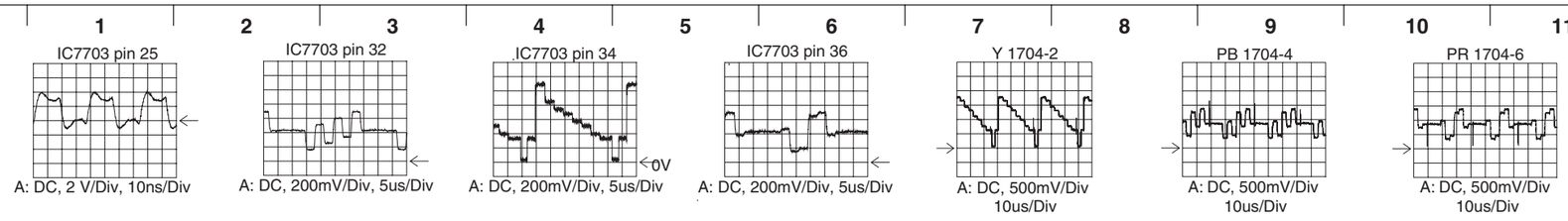
TR 19006_001
250504

1500 C1
1501 E4
1502 E4
1503 E4
1504 E5
1505 C2
1506 A4
1507 D2
2512 A5
2514 A3
2515 B2
2516 B6
2518 C3
2519 C3
2521 D3
2524 D3
2525 E3
2526 E3
2527 B4
3503 C4
3504 C5
4500 D2
5501 A5
5502 A3
5503 B5
7500-1 A5
7500-2 B5
7501 A3
F1501 C2
F1502 C1
F1505 D2
F1506 D2
F1509 D2
F1510 D2
F1512 E2
F500 A4
F501 A4
F502 D2
I500 B3
I501 B3
I502 A3
I503 B4
I504 C4
I505 A5
I506 B5
I507 B6
I508 C2
I509 C2
I510 C3
I511 D2
I512 D3

Digital Board Chrysalis 2.1: Prog. scan DAC

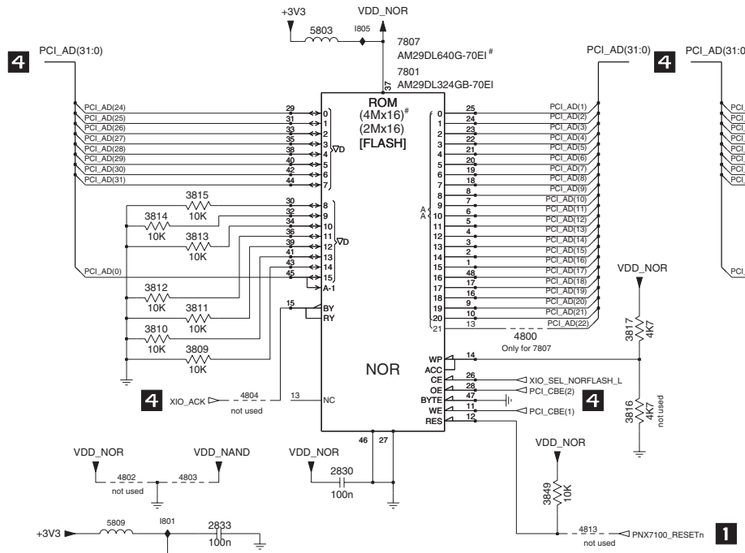


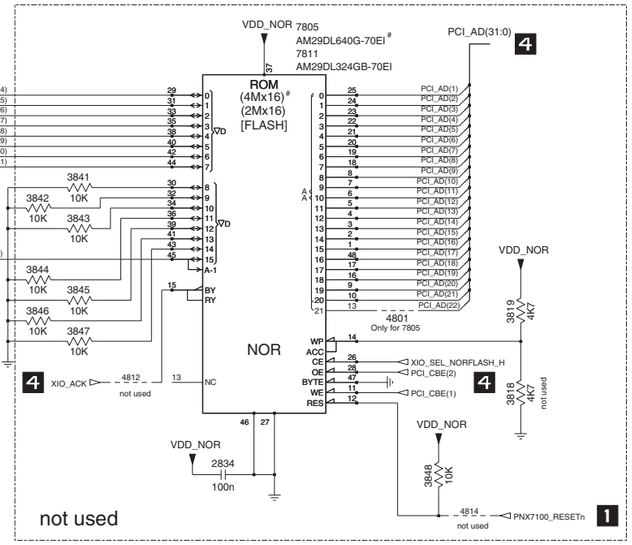
TR 19007_001
250504

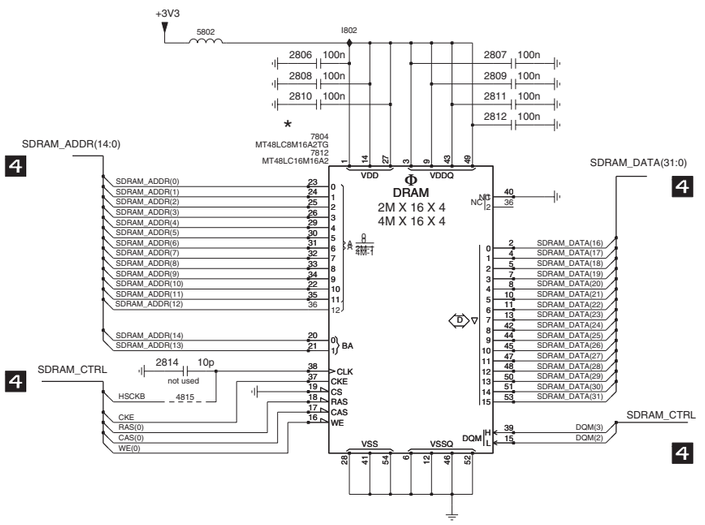


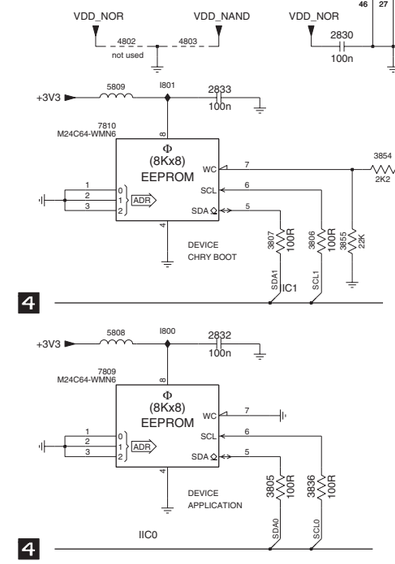
1704 D13
2700 B4
2701 G11
2703 D5
2704 B4
2705 C5
2706 B2
2707 B3
2709 B8
2710 B9
2711 B12
2712 G11
2715 C8
2716 C9
2717 C12
2720 E8
2721 E9
2722 E12
2723 E5
2725 C4
2726 G11
2727 G11
2728 G11
2729 G11
2730 B1
2731 B2
2732 B2
2733 E2
2734 F2
3700 E5
3701 E5
3702 E5
3703 A12
3705 B9
3706 B11
3707 B11
3709 B8
3710 C12
3713 C9
3714 D11
3716 D11
3717 C8
3718 E12
3721 E9
3722 E8
3723 E11
3724 F11
3725 F5
3726 F5
3727 E5
3728 F2
3729 E5
3730 E5
3731 E5
3732 E5
4701 B10
4702 C10
4703 E10
4728 A12
4729 C12
4730 D12
5700 B4
5701 A8
5703 A9
5704 C8
5706 C9
5707 E8
5709 E9
5711 F10
5712 G10
5713 A2
5714 A4
7701 A11
7702-1 C11
7702-2 E11
7703 C3
7704 A1
F1701 D13
F1702 D13
F1704 D13
F1706 D13
I700 B4
I701 E1
I703 D2
I704 D2
I705 E2
I706 E2
I707 E2
I708 E2
I709 E2
I710 E2
I711 D2
I7119 E4
I712 D2
I713 D2
I714 D2
I715 D2
I716 D2
I717 D2
I718 D2
I720 E4
I721 C4
I722 E2
I723 E1
I724 A8
I725 A9
I726 C8
I727 C9
I728 E8
I729 E9
I730 C2
I731 C2
I732 C2
I733 C2
I734 C2
I735 C2
I736 D2
I737 D2
I738 A3
I739 E4
I740 E4
I742 C5
I743 A2
I744 F2
I745 F11
I746 G11

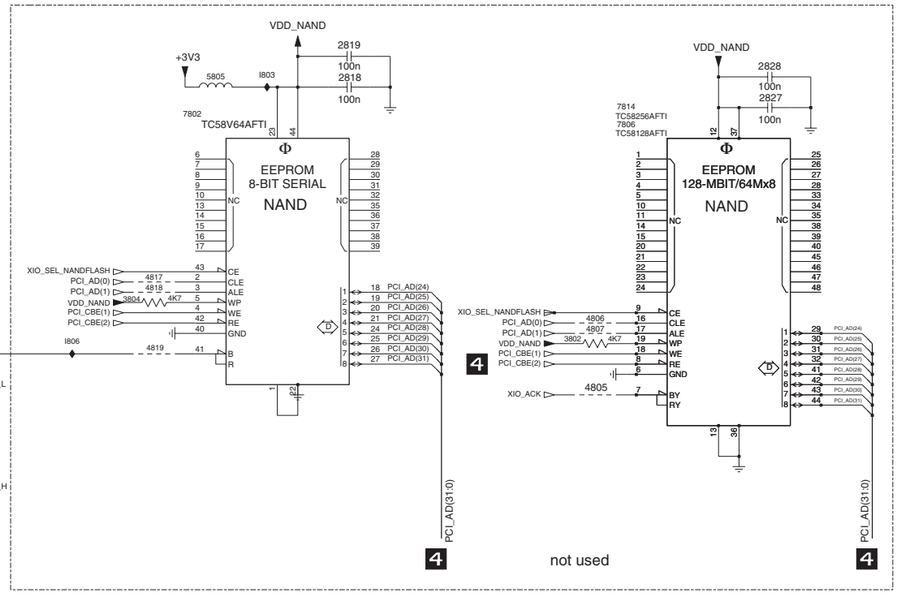
Digital Board Chrysalis 2.1: Flash SDRAM EEPROM

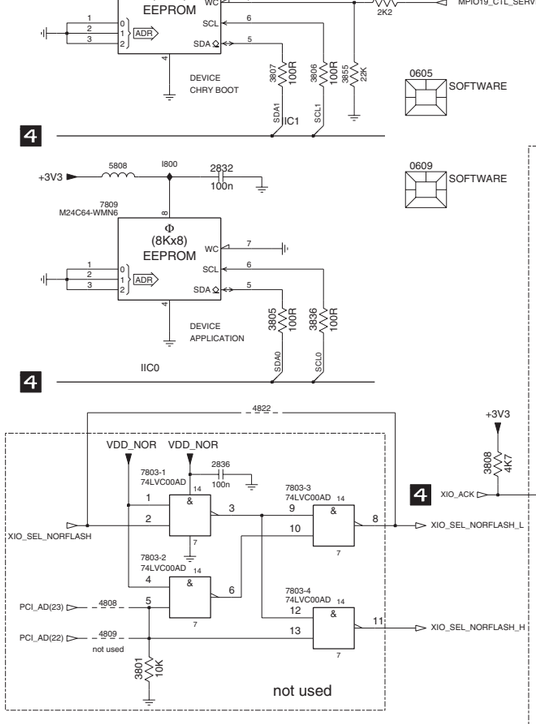


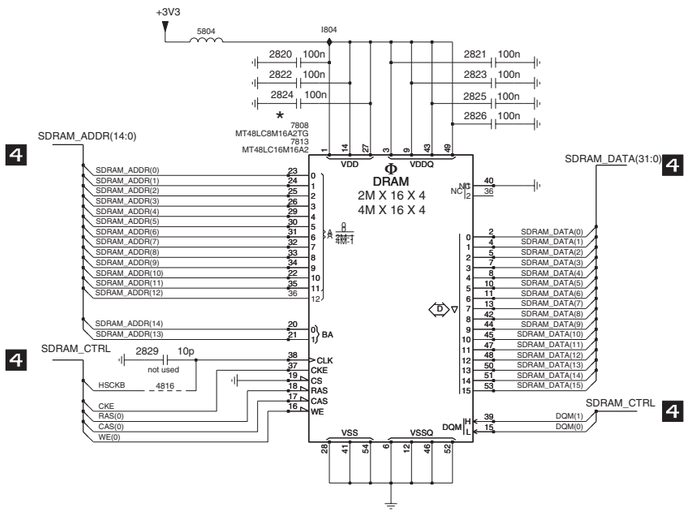












* for BOARD with	SDRAM	NOR FLASH	NAND FLASH
32 Mbyte SDRAM 4 Mbyte NOR FLASH	7804, 7808	7801	not used
64 Mbyte SDRAM 8 Mbyte NOR FLASH	7812, 7813	7807	not used

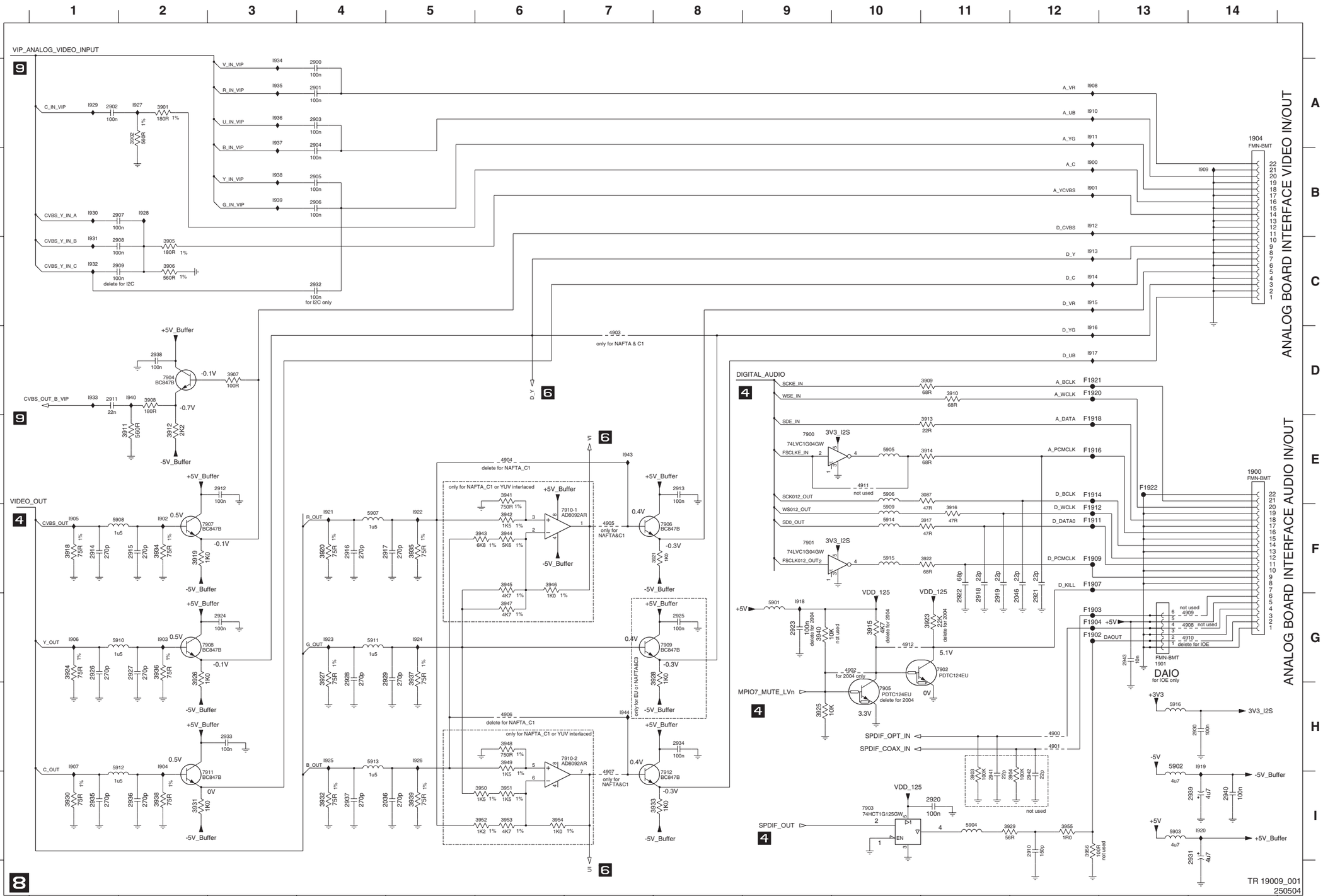
TRUTH TABLE - NORFLASH SELECTION

XIO_SEL_NORFLASH	PCI_AD(23)	XIO_SEL_NORFLASH_L	XIO_SEL_NORFLASH_H
0	0	0	1
0	1	1	0
1	0	1	1
1	1	1	1

TR 19008_001
250504

0605 E3
0609 F3
2806 A12
2807 A13
2808 A12
2809 A13
2810 A12
2811 A13
2812 B13
2814 C11
2818 F6
2819 F6
2820 E12
2821 E13
2822 E12
2823 E13
2824 E12
2825 E13
2826 E13
2827 F9
2828 F9
2829 G11
2830 D3
2832 F2
2833 D2
2834 D7
2836 H2
3801 I1
3802 H8
3804 H5
3805 G2
3806 E2
3807 E2
3808 H4
3809 C2
3810 C1
3811 B2
3812 B1
3813 B2
3814 B1
3815 B2
3816 C5
3817 C5
3818 C9
3819 C9
3836 G2
3841 B6
3842 B6
3843 B6
3844 B6
3845 B6
3846 C6
3847 C6
3848 D8
3849 D4
3854 D3
3855 E3
4800 C4
4801 C8
4802 D1
4803 D1
4804 C2
4805 H8
4806 H8
4807 H8
4808 I1
4809 I1
4812 C6
4813 D4
4814 D9
4815 C11
4816 G11
4817 G5
4818 G5
4819 H5
4822 G2
5802 A11
5803 A2
5804 E11
5805 F5
5808 F1
5809 D1
7801 A3
7802 F5
7803-1 H1
7803-2 H1
7803-3 H2
7803-4 I2
7804 B12
7805 A8
7806 F8
7807 A3
7808 E12
7809 F1
7810 D1
7811 A8
7812 B12
7813 E12
7814 F8
I800 F1
I801 D1
I802 A12
I803 F6
I804 E12
I805 A3
I806 H4

Digital Board Chrysalis 2.1: Video IO



1900	E14	5913	H4
1901	G13	5914	F10
1904	A14	5915	F10
2036	I5	5916	H13
2046	G12	7900	E9
2900	A4	7901	F9
2901	A4	7902	G11
2902	A1	7903	I10
2903	A4	7904	D2
2904	A4	7905	H10
2905	B4	7906	F8
2906	B4	7907	F2
2907	B1	7908	G2
2908	C1	7909	G8
2909	C1	7910-1	F6
2910	I12	7910-2	H6
2911	D1	7911	I2
2912	E3	7912	I8
2913	E8	F1902	G12
2914	F1	F1903	G12
2915	F2	F1904	G12
2916	F4	F1907	F12
2917	F5	F1909	F12
2918	G11	F1911	F12
2919	G11	F1912	F12
2920	I11	F1914	E12
2921	G12	F1916	E12
2922	G11	F1918	E12
2923	G9	F1920	D12
2924	G3	F1921	D12
2925	G8	F1922	E13
2926	G1	I900	B12
2927	G2	I901	B12
2928	G4	I902	F2
2929	G5	I903	G2
2930	H14	I904	H2
2931	I14	I905	F1
2932	C4	I906	G1
2933	H3	I907	H1
2934	H8	I908	A12
2935	I1	I909	B14
2936	I2	I910	A12
2937	I4	I911	A12
2938	D2	I912	B12
2939	I14	I913	C12
2940	I14	I914	C12
2941	I11	I915	C12
2942	I12	I916	D12
2943	G13	I917	D12
3087	E11	I918	G9
3901	A2	I919	H14
3902	A2	I920	I14
3903	I11	I921	F4
3904	I12	I922	F5
3905	C2	I923	G4
3906	C2	I924	G5
3907	D3	I925	H4
3908	D2	I926	H5
3909	D11	I927	A2
3910	D11	I928	B2
3911	E2	I929	A1
3912	E2	I930	B1
3913	E11	I931	C1
3914	E11	I932	C1
3915	G10	I933	D1
3916	F11	I934	A3
3917	F11	I935	A3
3918	F1	I936	A3
3919	F2	I937	A3
3920	F4	I938	B3
3921	F8	I939	B3
3922	F11	I940	D2
3923	G11	I943	E7
3924	G1	I944	H7
3925	H9		
3926	G2		
3927	G4		
3928	G8		
3929	I11		
3930	I1		
3931	I2		
3932	I4		
3933	I8		
3934	F2		
3935	F5		
3936	G2		
3937	G5		
3938	I2		
3939	I5		
3940	G9		
3941	E6		
3942	F6		
3943	F6		
3944	F6		
3945	F6		
3946	F6		
3947	G6		
3948	H6		
3949	H6		
3950	I6		
3951	I6		
3952	I6		
3953	I6		
3954	I6		
3955	I12		
3956	I12		
4900	H12		
4901	H12		
4902	G10		
4903	D7		
4904	E6		
4905	F7		
4906	H6		
4907	I7		
4908	G13		
4909	G13		
4910	G13		
4911	E10		
4912	G10		
5901	G9		
5902	H13		
5903	I13		
5904	I11		
5905	E10		
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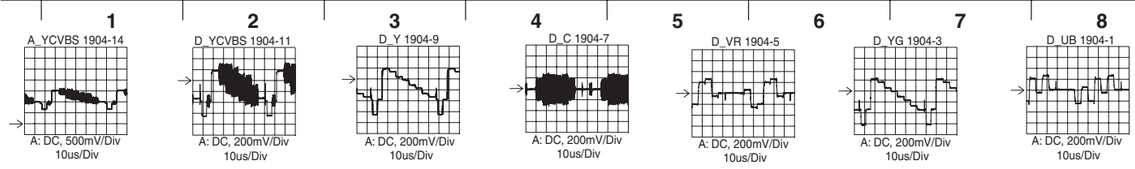
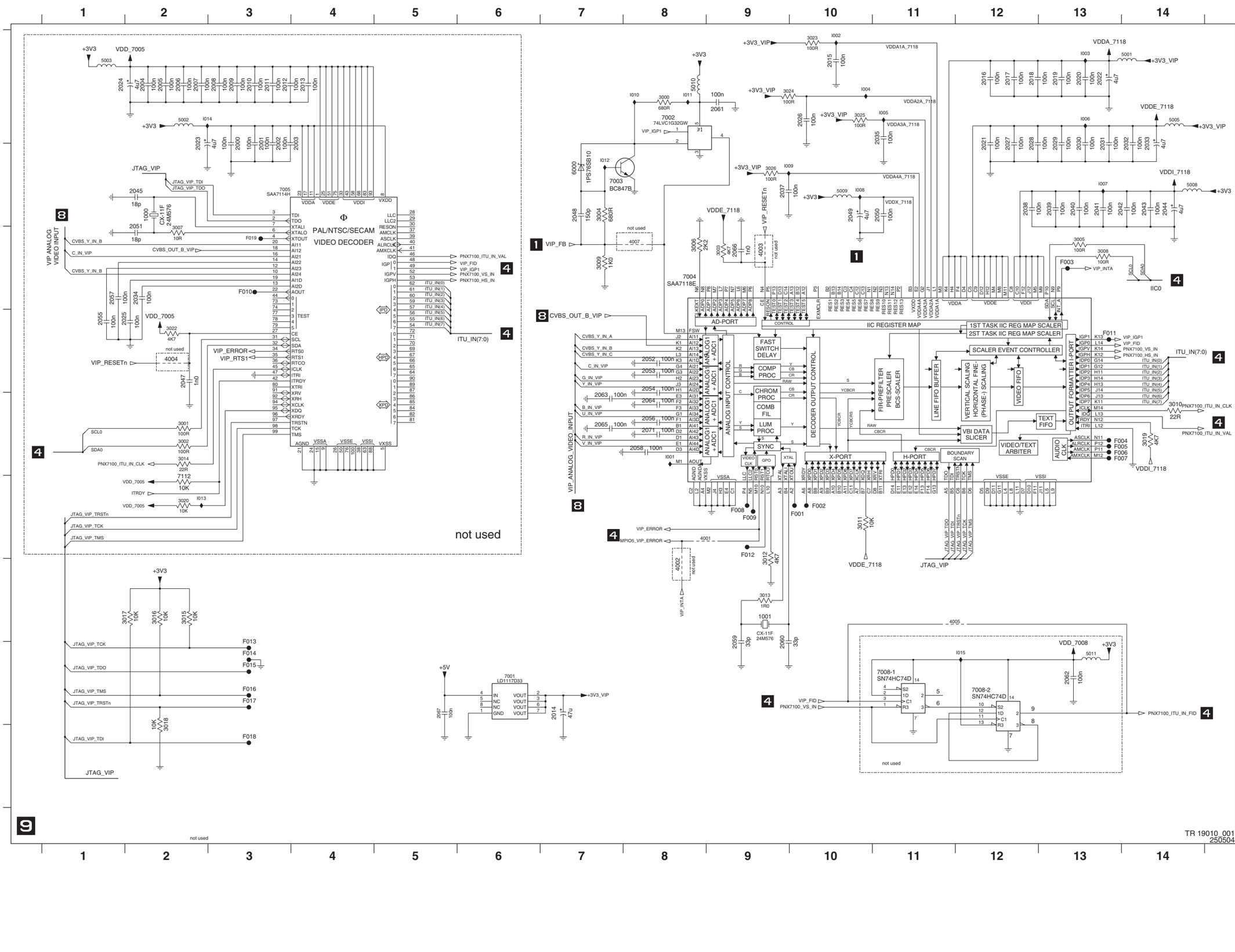
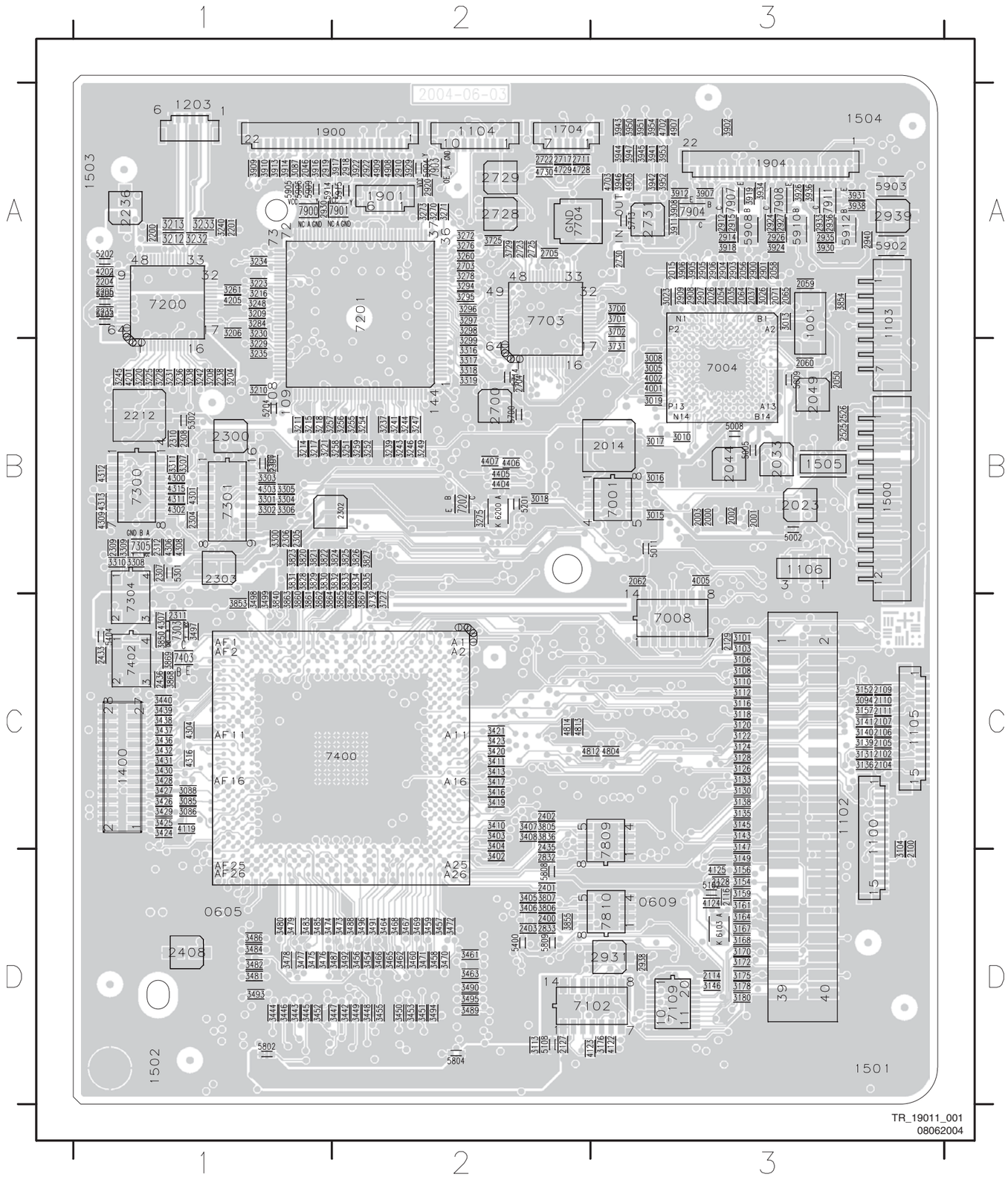
5909	F10		
5910	G1		
5911	G4		
5912	H1		



Digital Board Chrysalis 2.1: VIPs



Layout Digital Board Chrysalis 2.1 (Top View)



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0609	D3	2704	B2	3154	D3	3310	B1	3493	D1	4002	B3	7301	B1		
1001	A3	2705	A2	3156	D3	3311	B1	3494	D2	4005	B3	7303	C1		
1100	C3	2711	A2	3157	C3	3316	B2	3495	D2	4119	C1	7304	C1		
1102	C3	2717	A2	3159	D3	3317	B2	3496	D2	4122	D3	7305	B1		
1103	A3	2722	A2	3161	D3	3318	B2	3497	C1	4123	D2	7400	C2		
1104	A2	2723	A2	3164	D3	3319	B2	3498	C1	4124	D3	7402	C1		
1105	C3	2725	A2	3167	D3	3402	D2	3499	C1	4125	D3	7403	C1		
1106	B3	2728	A2	3168	D3	3403	C2	3700	A3	4201	B1	7703	A2		
1203	A1	2729	A2	3170	D3	3404	C2	3701	A3	4202	A1	7704	A2		
1400	C1	2730	A3	3172	D3	3405	D2	3702	A3	4205	A1	7809	C3		
1500	B3	2731	A3	3175	D3	3406	D2	3725	A2	4300	B1	7810	D3		
1505	B3	2832	D2	3176	D3	3407	C2	3727	C2	4301	B1	7900	A1		
1704	A2	2833	D2	3178	D3	3408	C2	3729	A2	4302	B1	7901	A2		
1900	A1	2900	A3	3180	D3	3410	C2	3731	B3	4303	B1	7903	A2		
1901	A2	2901	A3	3204	B1	3411	C2	3732	C2	4304	C1	7904	A3		
1904	A3	2903	A3	3206	A1	3413	C2	3805	C2	4306	B1	7907	A3		
2000	B3	2904	A3	3208	B1	3416	C2	3806	D2	4307	C1	7908	A3		
2001	B3	2905	A3	3209	A1	3417	C2	3807	D2	4308	B1	7911	A3		
2002	B3	2906	A3	3210	B1	3419	C2	3820	B1	4309	B1				
2003	B3	2907	A3	3211	B1	3420	C2	3821	B1	4311	B1				
2014	B3	2908	A3	3212	A1	3421	C2	3822	B1	4312	B1				
2015	A3	2909	A3	3213	A1	3423	C2	3823	B1	4313	B1				
2023	B3	2910	A2	3214	B1	3424	C1	3824	B2	4315	B1				
2026	A3	2912	A3	3215	B1	3425	C1	3825	B2	4316	C1				
2033	B3	2914	A3	3216	A1	3426	C1	3826	B2	4404	B2				
2035	A3	2915	A3	3217	B1	3427	C1	3827	B2	4405	B2				
2037	A3	2918	A2	3218	B1	3428	C1	3828	B1	4406	B2				
2044	B3	2919	A1	3220	B1	3429	C1	3829	B1	4407	B2				
2046	A1	2920	A2	3221	B1	3430	C1	3830	B1	4702	A3				
2049	B3	2922	A2	3223	A1	3431	C1	3831	B1	4703	A3				
2050	B3	2924	A3	3225	B1	3432	C1	3832	B2	4728	A2				
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2056	A3	2927	A3	3229	B1	3437	C1	3834	B2	4730	A2				
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2059	A3	2931	D3	3231	B1	3439	C1	3836	C2	4812	C3				
2060	B3	2933	A3	3232	A1	3440	C1	3840	C1	4813	C2				
2062	B3	2935	A3	3233	A1	3442	D2	3850	C1	4814	C2				
2064	A3	2936	A3	3234	A1	3443	D1	3853	C1	4905	A3				
2065	A3	2938	D3	3235	B1	3444	D1	3854	A3	4907	A3				
2071	A3	2939	A3	3236	B1	3445	D1	3855	D2	4908	A2				
2100	D3	2940	A3	3237	B2	3446	D1	3860	C1	4909	A2				
2102	C3	3005	B3	3238	B1	3447	D2	3861	C1	5002	B3				
2104	C3	3008	B3	3239	B2	3448	D2	3862	C1	5005	B3				
2105	C3	3010	B3	3240	A1	3449	D2	3863	C1	5008	B3				
2106	C3	3013	A3	3241	B2	3450	D2	3864	C1	5009	B3				
2107	C3	3015	B3	3242	B1	3451	D2	3865	C2	5011	B3				
2109	C3	3016	B3	3243	B2	3452	D1	3866	C2	5102	D3				
2110	C3	3017	B3	3244	B2	3453	D2	3867	C2	5108	D2				
2111	C3	3018	B2	3245	B1	3454	D2	3868	C1	5200	A1				
2114	D3	3019	B3	3246	B2	3455	D2	3869	C1	5201	B2				
2116	D3	3023	A3	3247	B2	3456	D2	3902	A3	5202	A1				
2127	D2	3026	A3	3248	A1	3457	D2	3905	A3	5203	A1				
2128	D3	3085	C1	3249	B2	3458	D2	3906	A3	5204	B1				
2129	C3	3086	C1	3251	B2	3459	D2	3907	A3	5300	B1				
2200	A1	3087	A1	3252	B2	3460	D2	3908	A3	5301	B1				
2201	A1	3088	C1	3254	B2	3461	D2	3909	A1	5302	B1				
2204	A1	3094	C3	3255	B2	3462	D2	3910	A1	5400	D2				
2205	A1	3101	C3	3256	B2	3463	D2	3911	A3	5404	C1				
2212	B1	3103	C3	3257	B1	3464	D2	3912	A3	5700	B2				
2235	A1	3104	D3	3258	B2	3465	D2	3913	A1	5713	A3				
2236	A1	3106	C3	3259	B2	3466	D2	3914	A1	5714	B2				
2238	B1	3108	C3	3260	A2	3467	D2	3916	A1	5802	D1				
2300	B1	3110	C3	3261	A1	3468	D2	3917	A2	5804	D2				
2301	B1	3112	C3	3270	A2	3469	D2	3918	A3	5808	D2				
2302	B2	3113	D2	3271	A2	3470	D2	3919	A3	5809	D2				
2303	B1	3116	C3	3272	A2	3471	D2	3922	A2	5902	A3				
2304	B1	3118	C3	3273	A2	3472	D2	3924	A3	5903	A3				
2305	B1	3120	C3	3275	B2	3473	D2	3926	A3	5904	A2				
2306	B1	3122	C3	3276	A2	3474	D1	3929	A2	5905	A1				
2307	B1	3124	C3	3278	A2	3475	D1	3930	A3	5906	A1				
2308	B1	3126	C3	3284	A1	3476	D1	3931	A3	5908	A3				
2309	B1	3128	C3	3294	A2	3477	D1	3934	A3	5909	A1				
2310	B1	3130	C3	3295	A2	3478	D1	3936	A3	5910	A3				
2311	C1	3131	C3	3296	A2	3479	D1	3938	A3	5912	A3				
2312	B1	3133	C3	3297	A2	3480	D1	3941	A3	5914	A1				
2400	D2	3135	C3	3298	A2	3481	D1	3942	A3	5915	A2				
2401	D2	3136	C3	3299	B2	3482	D1	3943	A3	6103	D3				
2402	C2	3138	C3	3300	B1	3483	D1	3944	A3	6200	B2				
2403	D2	3139	C3	3301	B1	3484	D1	3945	A3	7001	B3				
2408	D1	3140	C3	3302	B1	3485	D1	3946	A3	7004	B3				
2433	C1	3141	C3	3303	B1	3486	D1	3947	A3	7008	C3				
2435	C2	3143	C3	3304	B1	3487	D2	3950	A3	7102	D3				
2436	C1	3145	C3	3305	B1	3488	D2	3951	A3	7109	D3				
2525	B3	3146	D3	3306	B1	3489	D2	3952	A3	7200	A1				
2526	B3	3147	C3	3307	B1	3490	D2	3953	A3	7201	A2				
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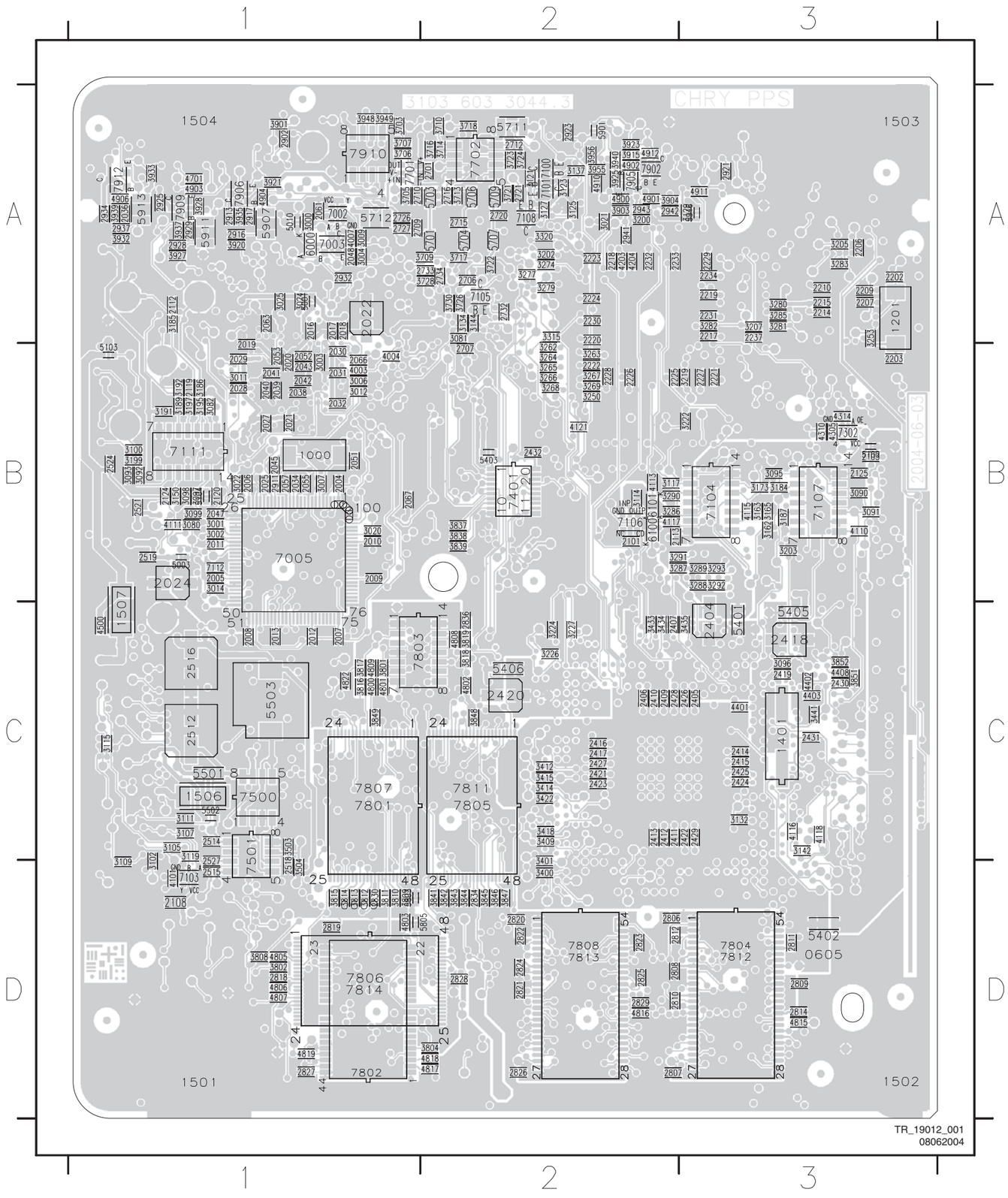
Layout Digital Board Chrysalis 2.1 (Bottom View)



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1401	C3	2407	C2	2943	A2	3280	A3	3933	A1	6101	B2
1506	C1	2409	C2	3000	A1	3281	A3	3935	A1	7002	A1
1507	C1	2410	C2	3001	B1	3282	A3	3937	A1	7003	A1
2004	B1	2411	C2	3002	B1	3283	A3	3939	A1	7005	B1
2005	B1	2412	C2	3003	B1	3285	A3	3940	A2	7100	A2
2006	B1	2413	C2	3004	A1	3286	B2	3948	A1	7101	A2
2007	C1	2414	C3	3006	B1	3287	B2	3949	A1	7103	D1
2008	C1	2415	C3	3007	B1	3288	B3	3955	A2	7104	B3
2009	B1	2416	C2	3009	A1	3289	B3	3956	A2	7105	A2
2010	B1	2417	C2	3011	B1	3290	B2	4003	B1	7106	B2
2011	B1	2418	C3	3012	B1	3291	B2	4004	B1	7107	B3
2012	C1	2419	C3	3014	B1	3292	B3	4007	A1	7108	A2
2013	C1	2420	C2	3020	B1	3293	B3	4101	D1	7111	B1
2016	A1	2421	C2	3021	A2	3315	A2	4110	B3	7112	B1
2017	A1	2422	C3	3022	B1	3320	A2	4111	B1	7302	B3
2018	A1	2423	C2	3024	A1	3400	D2	4113	B2	7401	B2
2019	B1	2424	C3	3025	A1	3401	D2	4115	B3	7500	C1
2020	B1	2425	C3	3080	B1	3409	C2	4116	C3	7501	C1
2021	B1	2426	C3	3081	A2	3412	C2	4117	B2	7701	A1
2022	A1	2427	C2	3082	B1	3414	C2	4118	C3	7702	A2
2024	B1	2428	C2	3090	B3	3415	C2	4121	B2	7801	C1
2025	B1	2429	C3	3091	B3	3418	C2	4203	A2	7802	D1
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2029	B1	2432	B2	3095	B3	3434	C2	4310	B3	7805	C2
2030	B1	2512	C1	3096	C3	3435	C3	4314	B3	7806	D1
2031	B1	2514	C1	3097	B1	3441	C3	4401	C3	7807	C1
2032	B1	2515	D1	3098	B1	3503	C1	4402	C3	7808	D2
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2041	B1	2527	D1	3109	D1	3709	A2	4801	C1	7905	A2
2042	B1	2701	A2	3111	C1	3710	A2	4802	C2	7906	A1
2043	B1	2706	A2	3114	B2	3713	A2	4803	D1	7909	A1
2045	B1	2707	B2	3115	C1	3714	A2	4805	D1	7910	A1
2047	B1	2709	A1	3117	B2	3716	A2	4806	D1	7912	A1
2048	A1	2710	A1	3119	C1	3717	A2	4807	D1		
2051	B1	2712	A2	3121	A2	3718	A2	4808	C2		
2052	B1	2715	A2	3123	A2	3721	A2	4809	C1		
2053	B1	2716	A2	3125	A2	3722	A2	4815	D3		
2055	B1	2720	A2	3127	A2	3723	A2	4816	D2		
2057	B1	2721	A2	3129	A3	3724	A2	4817	D2		
2061	A1	2726	A1	3132	C3	3726	A2	4818	D2		
2063	A1	2727	A1	3134	A2	3728	A2	4819	D1		
2066	B1	2732	A2	3137	A2	3730	A2	4822	C1		
2067	B1	2733	A2	3142	C3	3801	C1	4900	A2		
2101	B2	2734	A2	3144	A2	3802	D1	4901	A2		
2103	B3	2806	D2	3150	B1	3804	D2	4902	A2		
2108	D1	2807	D2	3162	B3	3808	D1	4903	A1		
2112	A1	2808	D2	3163	B3	3809	D1	4904	A1		
2113	B2	2809	D3	3165	B3	3810	D1	4906	A1		
2119	B1	2810	D2	3173	B3	3811	D1	4910	A2		
2120	B1	2811	D3	3184	B3	3812	D1	4911	A3		
2124	B1	2812	D2	3185	A1	3813	D1	4912	A2		
2125	B3	2814	D3	3186	B1	3814	D1	5001	A1		
2202	A3	2818	D1	3187	B3	3815	D1	5003	B1		
2203	B3	2819	D1	3189	B1	3816	C1	5010	A1		
2206	A3	2820	D2	3191	B1	3817	C1	5100	B3		
2207	A3	2821	D2	3192	B1	3818	C2	5103	B1		
2209	A3	2822	D2	3195	B1	3819	C2	5104	B1		
2210	A3	2823	D2	3197	B1	3837	B2	5401	C3		
2214	A3	2824	D2	3199	B1	3838	B2	5402	D3		
2215	A3	2825	D2	3200	A2	3839	B2	5403	B2		
2217	A3	2826	D2	3202	A2	3841	D2	5405	C3		
2218	A2	2827	D1	3203	B3	3842	D2	5406	C2		
2219	A3	2828	D2	3205	A3	3843	D2	5501	C1		
2220	A2	2829	D2	3207	A3	3844	D2	5502	C1		
2221	B3	2830	D1	3219	B3	3845	D2	5503	C1		
2222	B2	2834	D2	3222	B3	3846	D2	5701	A2		
2223	A2	2836	C2	3224	C2	3847	D2	5703	A2		
2224	A2	2902	A1	3226	C2	3848	C2	5704	A2		
2225	B2	2911	B1	3227	C2	3849	C1	5706	A2		
2226	B2	2913	A1	3250	B2	3851	C3	5707	A2		
2227	B3	2916	A1	3253	A3	3852	C3	5709	A2		
2228	B2	2917	A1	3262	B2	3901	A1	5711	A2		
2229	A3	2921	A3	3263	B2	3903	A2	5712	A1		
2230	A2	2923	A2	3264	B2	3904	A2	5803	D1		
2231	A3	2925	A1	3265	B2	3915	A2	5805	D2		
2232	A2	2928	A1	3266	B2	3920	A1	5901	A2		
2233	A2	2929	A1	3267	B2	3921	A1	5907	A1		
2234	A3	2932	A1	3268	B2	3923	A2	5911	A1		
2237	A3	2934	A1	3269	B2	3925	A2	5913	A1		
2404	C3	2937	A1	3274	A2	3927	A1	5916	A3		

8. Alignments

8.1 Alignment Instructions Analog Board

Test equipment:

1. Dual-trace oscilloscope
   Voltage range : 0.001 ~ 50 V/div
   Frequency : DC ~ 50 MHz
   Probe : 10:1, 1:1

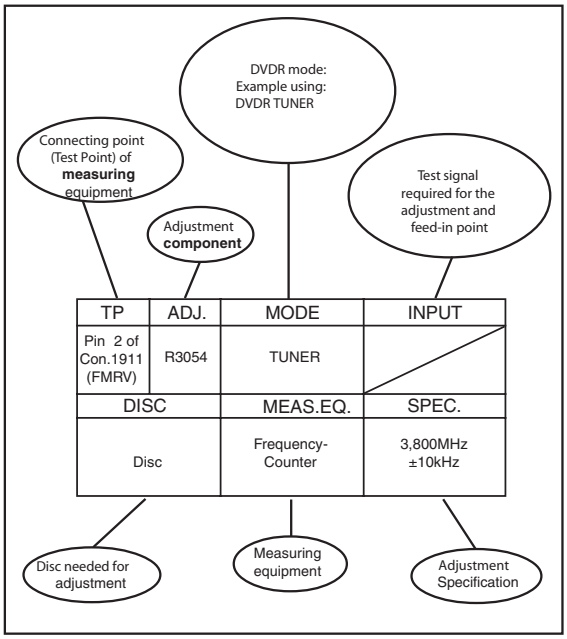
2. DVM (Digital voltmeter)

3. Frequency counter

4. Sinus generator
   Sinus : 0 ~ 50 MHz

5. Test pattern generator

How to read the adjustment procedures:



Front End (FV)

Service tasks after replacement of IC 7710, coil L5710 and L5711:

1 AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:
Bad or disturbed TV channel reception.

PAL - AFC adjustment [5711]:

TP	ADJ.	MODE	INPUT
IC 7710 Pin 17 (F708)	L5711	TUNER	38,9MHz 500mV$_{pp}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,1V

Storage in NVRAM via command mode interface of DSW:
After adjustment, the AFC reference value has to be stored in the NVRAM.
This reference value is 256 * measured voltage/Ucc. Ucc is 5.0V.
Store the reference value via command 1119 , followed by the ref. value.
Example: DD:> 1119 128

2 HF - AGC adjustment [3724]:

Service tasks after replacement of IC 7710:

Purpose: Set amplifier control.

Symptom, if incorrectly set:
Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1705 Pin 11 (F710, IF-out)	R3707	Set tuned to channel 25 503.25 MHz	5mV(74dBµV) on aerial input PAL white picture, audio IF on, no modulation
DISC		MEAS.EQ.	SPEC.
		Oscilloscope Video Pattern Generator	500mV$_{pp}$ +/-0.5dB (use a 10:1 probe)

3 Attenuating the 40.4 MHz [5710]: (SECAM only)

Service tasks after replacement of coil 5710:

Purpose: To attenuate the band I carrier rests.

Symptom, if incorrectly set:
Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1701 Pin 1 (F709)	L5710	TUNER	40.4 MHz, 200mV$_{rms}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of OFW [1701] must be smaller than the input signal amplitude by at least 6 dB.

Figure 8-1

8.2 Reprogramming Procedure of NVM on the Microprocessor Sub PCB

The NVM, item 7808, on the Microprocessor Sub board contains the following factory settings:
1. Clock correction factor
2. AFC reference value
3. Slash version

The settings 1,2 and 3 are stored in the NVM during the production of the analogue board.
The slash version is stored at the end of the production line of the set.
In case of failure, the NVM must be replaced by an empty device. By way of commands via the Diagnostic Software or via ComPair, the factory settings must be restored in the NVM.

8.2.1 Clock Correction Adjustment

To guarantee an exact function of the real time clock, an adjustment of the clock frequency is possibe. The adjustment value is stored in the NVM.
Procedure:
- put the set in service command mode
- execute command 1117 to initiate that a signal with 32768 Hz is available on pin 3 of connector 1988
  example:
  DD:>1117
- measure the frequency fmeas of the Clock Crystal with an accuracy of 0.1 Hz.
- Calculate the parameter to be entered: 32768/fmeas * 106
- Normally the parameter must be between 999902 and 1000097. If the parameter and therefore the frequency of the crystal is outside this range, the crystal must be replaced.
- Execute command 1118 with the parameter as input
  example:
  DD:>1118 1000023

8.2.2 AFC Reference Voltage Tuner

This function stores the reference voltage for the tuner in the NVM. Before this value can be stored, the AFC adjustment, described in the adjustment instructions of the analogue board, must be carried out.
Procedure:
- Adjust AFC circuit
- Calculate the reference value
- Execute command 1119 and use the calculated reference value as parameter example: DD:>1119 128

8.2.3 Slash Version

The slash version is stored with command 1217, followed by the slash version as parameter.
The slash versions used in DVDR730/0x are the following:
- DVDR730/00/02: 73
- DVDR730/05: 76

Example:
DD:>1217 65

Reset of Slash Version
Use command 1115 to reset the analogue board to the default setting.
Procedure:
- Put the set in DSW command mode
- Execute command 1115 with the following parameters:
  DD:> 1115 w 0xAE 2 0xD0 0x00
- Leave the DSW command mode and start up the set in application mode
  No background is visible on the TV screen. The analogue board is ready to accept the appropriate slash version

8.3 Rework Procedure IEEE Unique Number

8.3.1 Scope:

The procedure describes how to upgrade sets with a unique number after repair. This unique number is stored in the NVRAM (item 7809) of the digital board at the end of the production line.
This procedure is only valid or necessary when:
- The digital board is replaced
- NVRAM on the digital board is replaced
- NVRAM is cleared

In all other cases the repaired set retains its unique number.
The procedure defines several means to re-assure the unique number depending on the possibilities of repair or the state the faulty set is in.

8.3.2 Handling:

State of original (defective) board:
1. The digital board starts up in Diagnostics Mode: follow procedure A to retrieve the valid unique number
2. The digital board does NOT start up in Diagnostics Mode: follow procedure B.

8.3.3 Procedure A

1. Connect defective digital board to PC via serial cable (3122 785 90017)
2. start up hyper terminal or any other serial terminal via the correct settings (DSW command mode interface)
3. read out existing unique number via nucleus 1208
   example:
   DD:> 1208
   120800: DV Unique ID = 00D7A1FC6C Test OK @
4. note read out
5. program new digital board via nucleus 1207
   example:
   DD:> 1207 00D7A1FC6C 120700: Test OK @

The set has now the original unique number

8.3.4 Procedure B

1. Note the serial number of the set example:
   VN050136130156
   – VN = production centre (VN....Szekesfehervar). According to UAW-500: V=22 and N=14
   – 05 = change code (this is not used for this calculation)
   – 01 = YEAR

- 36 = Production WEEK
- 130156 = Lot and SERIAL number

2. Calculate the unique number: this number always exists out of 10 hexadecimal numbers.
3. First 5 numbers: First we calculate a decimal number according to the formula below:
   35828*YEAR + 676* WEEK + 26*V + N+ 8788
   The figures are fixed, YEAR + WEEK + factory code (V+ N) are variable
   Example: 35828*01+676*36+26*22+14+8788 = 69538 (decimal)
   Then we translate the decimal number to a hexadecimal number. example: 69538 (decimal)= 10FA2 (hex)
4. Last 5 numbers: The last 5 numbers exist out of the Lot and SERIAL number according formula below:
   serial nr + 1 * 100000
   Example: 130156 + 100000 = 230156 (decimal)
   230156 (decimal) = 3830C (hex)
5. Program new digital board via nucleus or 1207. Therefore we use the 10 hexadecimal numbers we calculated above: example:
   >1207 10D7A3830C
   12700: Test OK @

The set has now its original unique number

8.4 Alignments after replacing the Boot EEPROM 7810 in sets with Digital Board Chrysalis

The NVM, item 7810, on the Digitalt Board Chrysalis contains the “Diversity String” that tells the software during startup which hardware version is present.
The setting is stored in the NVM during the production of the Digital Board Chrysalis
In case of a fault the NVM must be replaced by a programmed device containing the boot script.
Via the Diagnostic Software the Diversity String is stored with command 1226, followed by the Diversity String as parameter.

The diversity strings used in DVDR77/0x1 are the following:

ChrysalisString
Board
Type
E5_AV3_PLUS
44424849F27E200145355F4156332B003904030002010102
0001000040080000
Example:
DD:> 1226 44424849F27E200145355F4156332B00390403
0002010102000100040080000
122600
Test OK @

With command 1228 the settings can be displayed.

9. Circuit-, IC descriptions and list of abbreviations

9.1 Display Board

9.1.1 Microcontroller

The core element of the Display Control unit is the microcontroller TMP87CH74AF [7103]. The TMP87CH74AF is an 8 bit microcontroller fitted with 32kB ROM and 1kB RAM. It requires 5V supply and is responsible for the following functions:

– Interface to Central Controller-P
– Evaluation of the keyboard matrix
– Decoding the remote control commands from the infra-red receiver
– Activation and control of the local display
– Heater voltage generation

The 8 MHz resonator (Pos. 1110) generates the system clock. The reset is generated by the CC-P via “POR_DC”-signal where the transistor [7104] is used as a level-shifter from 3V3 to 5V.

9.1.2 Interface to the Central Control µP

The communication to the main microcontroller (CC) on the P-Sub-PCB is done via I2C-Interface, where the TMP87CH74AF acts in slave-mode.
An additional wire (“INT”-line) is used to signal the Central controller that data are ready, e.g. when a key has been pressed.

9.1.3 Evaluation of the keyboard matrix

There are 12 different keys on the display board. A resistor network is used to generate a specific direct voltage value, depending on the pressed key. Via the resistors 3107 and 3102 on the analog/digital (A/D) ports (7103 pin 36 and 37) the evaluation is done.

9.1.4 IR receiver and signal evaluation

The IR receiver [7107] contains a selectively controlled amplifier as well as a photo-diode. The photo-diode changes the received infra red transmission (approx. 940nm) to electrical pulses, which are then amplified and demodulated. On the output of the IR receiver [7107], a pulse sequence with TTL-level, which corresponds to the envelope curve of the received IR remote control command, can be measured. This pulse sequence is fed into the controller for further processing via port TC1 [7103, pin20].

9.1.5 Vacuum Fluorescence Display

The VFD “BJ900GNK” [POS 7100] is fully controlled by the microcontroller. The µC also includes the driving stages. Only two additional drivers [POS 7101 and 7102] are necessary for the grids 8 and 9 because of their large size.

9.1.6 VFD Heater Voltage Generator

The circuit around POS [7106, 7108 and 7109] is used to generate a proper AC-Voltage for the filament of the VFD. For this the microcontroller generates an appropriate rectangular signal with 50% duty-cycle and a frequency of 30 kHz at pin 19. Pos. [5104] and [2113] are acting as a resonance-circuit. Via Zener-Diode (POS[6100]) and resistors [3119, 3122 and 3123] the two heater-pins of the VFD (“FIL1” and “FIL2”) are clamped so that the grids and segments can be fully switched off.

9.1.7 REC-LED

The REC-LED-ring is made with 3 red LED, controlled via pin 3 (only for flashing) and pin 12 for on/off switching, of the microcontroller. The POS [7105] is used as a driver for the led.

9.1.8 EPG-LED

The EPG led is a white led and controlled from the pin 14 from the microcontroller. The POS [7110] is used as a driver for the led.

9.1.9 TRAY-LED

There are 6 leds (chip) necessary to illuminate the tray, these 6 leds are located on a little sub-pcb connected over a 4 pin connector POS [1911] from the DC-print. The leds are controlled from pin 11 of the microcontroller.

9.2 Microcontroller Sub Board (UP SUB Board)

9.2.1 General

This small PCB is directly soldered in on top of the Analogue-Board.
It is used with no diversity in all three different basic versions (Europe, NAFTA and APAC-Pal). Only the software being loaded into the external Flash-memory is not the same.

9.2.2 Microcontroller

The main part of the Sub-PCB is the central controller (CC) µP [7804] TMP91CW12AF, which is a 16-bit CPU with 128kBROM and 4kB RAM.
It works with a 3V3 supply and a system clock of 24,576MHz [1801].
The 3V3-supply is made out of the “5VSTBY” by the circuit around [7816].
After connecting the set to the mains (power-up) the IC [7806] generates a reset pulse. This signal (“IPOR”) is directly fed to first priority interrupt input (pin 63) for power fail detection and also to the Reset-Input of the CC (Pin30) via [7802], which is necessary to generate a reset only during power-up. In case of power fail pin 30 of the CC must be kept high (3V3).
The internal memory of the CC is too small for all necessary demands. Therefore an external Flash-ROM [7805] with 1MByte in size and a RAM [7803] with 128kByte are necessary. Both parts are connected to the µP via a parallel address-/data-bus. The lower eight bus-lines (AD0 to AD7) are multiplexed by [7801] and the “ALE”-signal of the CC.
For updating of the software the external Flash-ROM can be reprogrammed by the µP. During this process [7807] is switched on by the “WE”-signal.
When no mains is connected, the CC is supplied via Gold-Cap [2816] during the power backup period. The diode [6802] prevents unwanted current consumption of other components.
The internal ROM of the µP holds the program code for the Real-Time-Clock. Only the microprocessor is supplied by the backup cell, not the external memories and the µP operates in a low frequency mode with the clock crystal [1805] only (32.768 kHz). To adjust the clock the frequency can be measured at pin 87 of the µP in a special test-mode.

9.2.3 Control-Interfaces

The CC is communicating with the digital board via a serial connection, which operates at a speed of 19,4 kbit/s (“D_DATA”-, “A_DATA”, “D_RDY”- and “A_RDY”-signal on

[1986]). By generating a high level on pin 16 of the CC the digital PCB can be reset (inverter [7817] in between).
Most of the other parts are controlled by the µP via I2C-bus ("SDA"- and "SCL"-signal). The FETs [7821] and [7822] are used for adaptation of the 3V3-level on CC-side to the components supplied with 5V.
The CC can also reset the display-board-µP by pulling pin 39 to high.
The transistor [7819] acts as a level shifter for the "INT"-signal. In the European sets a bi-directional interface is established between the recording unit and the TV device at pin 10 of the Scart ("P50"-line/Easy Link). The processing is done via pin 14 (output) and pin 38 (input) of the CC and the circuit around [7813], [7814] and [7815].

9.2.4 EEPROM

The EEPROM M24C16 [7808] is an electrical erasable and programmable, non-volatile memory. The EEPROM stores data specific to the device, such as the AFC-reference value of the Europe IF-part, the clock-correction-factor, etc. It is accessed by the µP via the I2C-bus.

9.2.5 Sync Separator

To detect whether a video signal is available or not a separate IC [7825] is used to extract the sync information out of the video signal that is also routed to the digital board for recording. While on the input a low-pass-filter ([2823] and [3869]) limits the bandwidth an additional filter (circuit around [7818]) on the output avoids distortions. Afterwards the sync-signal is routed to pin11 of the CC.

9.2.6 Fan Control

To avoid unwanted temperatures inside the set (especially the Laser on the OPU of the drive is very sensitive) a fan is located on top of the basic engine. The speed control is dependent on the ambient temp. A NTC resistor [3134] located on the display board measures the temperature. An operational amplifier [7902-B] generates a proper voltage, which is then fed to the engine ("BE_FAN"-line). Below 28°C ambient temp. the fan-voltage is approx. 5V and is increased to 10V when the ambient temperature goes up to approx. 38°C. The second part of the Op-Amp. [7902-A] prevents damage of any temperature-sensitive part in case the NTC or the wire in between is damaged. It acts as a comparator and pulls the "BE_FAN"-signal to 10V. As the fan has to be stopped in case the tray of the drive is open this voltage is "killed" by the CC ("FAN_OFF"-signal). The double-diode [6901] acts for both Op.-Amp.-circuits. The circuit is also prepared for a set-fan (circuit around the Op-Amp. [7902-C]).

9.3 Analog board Europe

9.3.1 General

This PCB consists out of the following parts:
- Power-Supply-Unit
- Frontend (Audio & Video)
- Input-/Output-switching
- Audio ADC- & DAC-processing
- VPS/PDC- and Text-Data slicer
- Analog Follow-Me Circuit

All functional groups are either controlled via I2C-bus or via separate signal lines by the Central-Controller on the µP-Sub-Board. This sub board is directly soldered in onto the analog PCB. During Stand-By mode of the set, several parts are not supplied (Tuner, MSP, ...). The microprocessor is running and maintains the clock of the set.
To avoid bus blockades the I2C-bus ("SCLSW" & "SDASW") to/from these units is decoupled via transistors [7419], [7420] from the general bus ("SCL" & "SDA").

9.3.2 Power Supply Unit

Functional principle:
This power supply works in the way of a flyback converter. In the mains input part [1931 to 2309], the mains voltage is rectified and buffered in the capacitor [2309]. From this direct voltage at [2309] energy is transferred into the transformer [5300, pins 7-5] during the conductive phase of the switching transistor [7307] and is stored there as magnetic energy. This energy is passed to the secondary outputs of the power supply in the blocking phase of the switching transistor [7307]. With the switch-on time of the switching transistor [7307], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or mains voltage. The power transistor is driven by the integrated circuit [7313].

Mains input part:
The mains input part extends from the mains socket [1931] to the capacitor [2309]. The diodes [6301, 6302, 6305 and 6306] rectify the AC supply voltage, which is then buffered by the capacitor [2309]. The common mode coil [5302] and capacitor [2302] work as a filter to block interference arising in the power supply from the mains. Components [1302], [3306] and [3304] protect the power supply against short-term over voltages in the mains, e.g. caused by indirect lightning.

Start-up with Mains-on:
After connecting the power cord to the mains, the capacitor [2325] is loaded via a current source between pin 8 and pin 1 in the IC [7313]. Once the voltage on [2325] and therefore the supply voltage Vcc of the IC [7313] has reached approx. 11V, the IC starts up and provides pulses at its output pin 5. These pulses are used to drive the gate of the power transistor [7307]. The frequency of these pulses is depending on load and mains voltage. The current consumption of the IC is approx. 5 mA at Vcc in normal mode.
If Vcc drops to below approx. 9V (e.g. with power limitation) or if Vac exceeds approximately 16V (e.g. interruption of the control loop), the output of the IC [7313, pin 5] is blocked and a new start-up cycle begins. (See also "Overload, Power Limitation, Burst Mode" section)

Normal operation:
With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7307]. During the conductive phase of the switching transistor [7307], current flows from the rectified mains voltage at capacitor [2309] through the primary coil of the transformer [5300, pins 7-5], the transistor [7307] and resistors [3321, 3352] to ground. The positive voltage on pin 7 of the transformer [5300] can be assumed as constant for a switching cycle. The current in the primary coil of the transformer [5300] increases linearly. A magnetic field representing a certain value of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarized such that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] block. From the controller [7315] a current is supplied into the CTRL input on the IC [pin 3, 7313] via optocoupler [7314]. Once the switch on time of the switching transistor [7307] - that corresponds to the current supplied into the CTRL input - has been reached, the switching transistor [7307] is switched off. When the switching transistor has been switched off, the blocking phase begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to keep the current flowing at a constant level (U=L*di/dt). Switching off transistor [7307] interrupts the primary current circuit. The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] become conductive and current flows into the capacitors [2305, 2312, 2319, 2322, 2326 and 2328] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).

The feedback control for the switched-mode power supply is done by changing the conductive phase of the switching transistor so that either more or less energy is transferred from the rectified mains voltage at [2309] into the transformer. The regulation information is provided by voltage reference [7315]. This element compares the 5V-output voltage via voltage divider [3332, 3333, 3334] with an internal 2.5V reference voltage. The output voltage of [7315] passes via an optocoupler [7314] for insulation of primary and secondary parts as a current value into pin 3 on the IC [7313]. The switch-on time of the transistor [7307] is inversely proportional to the value of this current.

Overload, power limitation, burst mode:
With increasing load on one or more of the power supply outputs, the switch-on time for the power transistor [7307] increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage of this current profile is passed from resistors [3321] and [3352] via [3365] to pin 5 of the IC [7313]. If the voltage on pin 2 reaches approx. 0.4V in one switching cycle, the conductive phase of the switching transistor is ended immediately. The check is done in each individual switching cycle. This process ensures that no more than approx. 60W can be taken out from the mains (= power limitation).
If the power supply reaches the power limit, the output voltages and the supply voltage Vcc on pin 1 of the IC [7313] will be reduced following further loading. If Vcc is less than approx. 9V at any point during this process, the output of the IC [7313, pin 6] is blocked. All output voltages and Vcc decrease and a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will again decrease, followed by another start-up cycle (Burst Mode). The amount of power taken up from the mains in burst mode is low.

Standby modes:
In the 'AV-Standby' operating mode of the set, the 'ION' control line is primarily used to switch off all output voltages for Basic Engine and Digital Board (supplies 3V3, 5V, 12V, 5N and 4V6 at Connectors 1932 and 1933) of the power supply. This reduces the amount of power taken from the mains. In Low Power Standby mode additionally the 'STBY' control line is used to switch off output voltages 5SW and 8SW. This reduces power consumption to less than 3W, if additionally the display is switched off. The power supply will continue operating in Standby mode with a switching frequency of approx. 25 kHz.

9.3.3 Frontend

This unit is designed to support two basic versions, which are distinguished by a different assembly variant only (one for multistandard and the second for Pal-I only) and comprises the following parts:

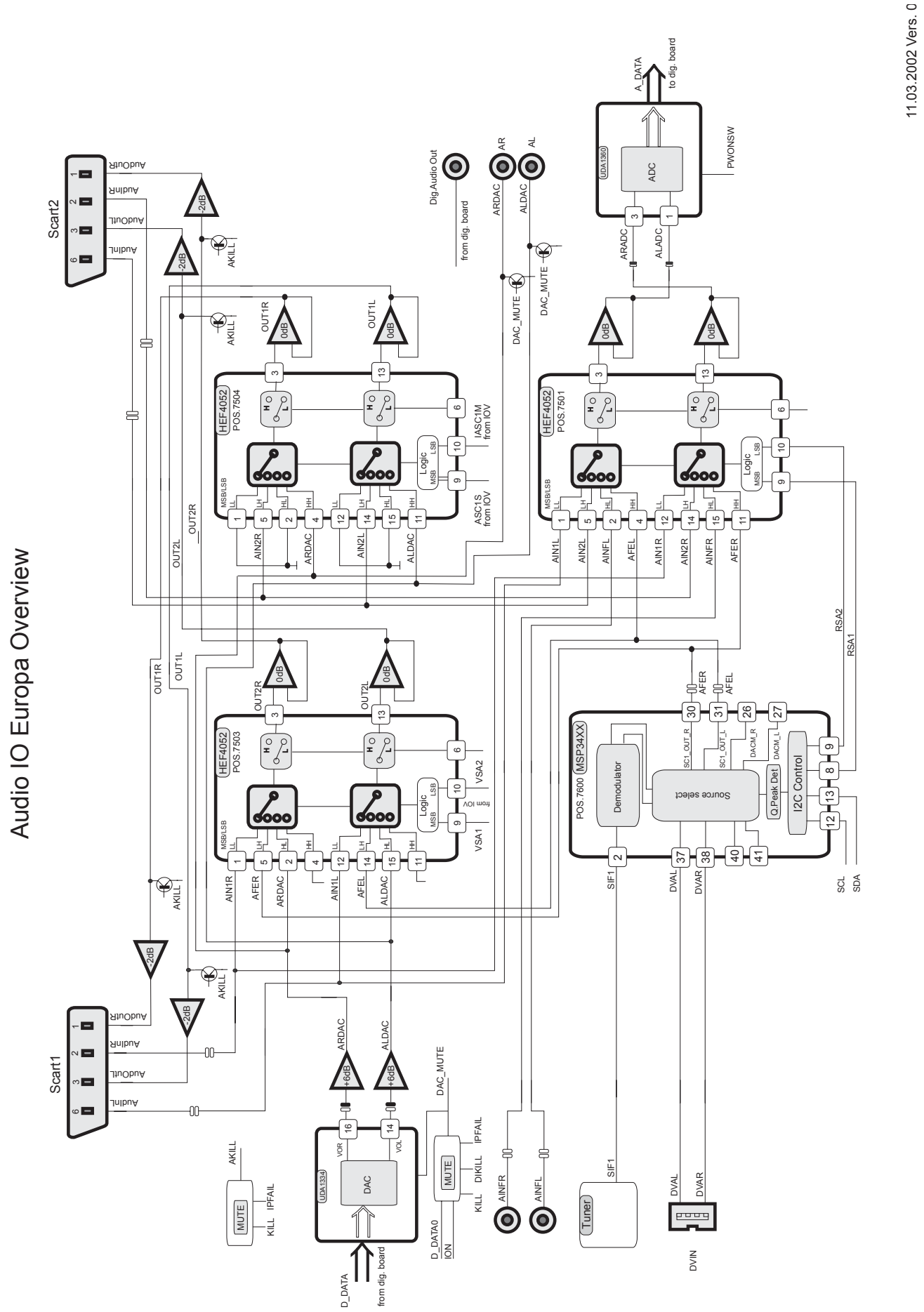
- Tuner UV1316K [1705]
- IF amplifier & video demodulator IC TDA 9818/9817 [7710]
- Sound processor MSP3415G [7600]

Tuner and IF selection
The Tuner [1705] converts the RF-signal coming from the antenna input to an IF-signal. The tuner is fully controlled via I^2C-bus of the CC-µP. [1705] is also equipped with a "passive-loop-through" between antenna-in and -out to save power in stand-by of the set, when the complete part is not supplied. The IF frequency of the video carrier is 38.9 MHz for all systems except SECAM L' (34,0 MHz).
A quasi-split audio system is used. Separate surface-wave filters (SAW) are required. [1701], [1703] for video, [1702] for audio. [1701] is switched into the signal path for DK/I-SECAM L/L' reception, if the signal "SFS_TS" is "high". In this case the switches [7704], [7705] are open and the diode [6703] is conducting. [1703] is switched into the signal path for BG reception ("SFS_TS" is "low"). Then the switch [7712] is open and the diode [6704] is conducting. For DK/I-SECAM L/L' reception, an additional circuit for suppressing the audio carrier of the adjacent channel is used. This circuitry is adjusted by coil [5710] for maximum suppression at 40.4MHz.

IF demodulator
The signal from the tuner and IF-selection circuit is processed by the demodulator IC TDA 9818/9817 [7710]. The signal "PSS" to pin 3 switches between demodulation of positive (SECAM only) or negative modulated video carriers. A QSS-audio-IF signal SIF1 is generated for demodulation in the sound processor [7600]. The audio-IF carrier is selected in the audio SAW filter [1702]. This filter is switched for SECAM L'. If the signal "SB1" is "high", the switch [7714] is closed and the diode [6705] is not conducting. For all other standards the diode [6705] is conducting and the switch [7714] is open. The output signal of this SAW filter is firstly processed in the TDA 9818. Audio carriers are converted from the tuner IF level to the audio IF position and further processed in the audio demodulator [7600]. The AFC coil [5711] on the TDA 9818/ 9817 is adjusted so that when a frequency of 38.90 MHz is supplied to the IF output of the tuner, the AFC voltage on pin 17 of [7710] is 2.5V. The setting of the picture carrier frequency for SECAM L in the TDA 9818 is achieved by connecting pin 7 of the IC via a resistor [3710] to ground. The switch [7701] and the signal "SB1" do this. The HF-AGC is set using the potentiometer [3724] so that, with a sufficiently large antenna input signal (74 dBµV), the voltage at the IF output of the tuner [1705] pin 11 is 500 mVpp. This setting must be carried out when the audio carrier is switched off. The demodulated video signal appears on pin 16 of [7710]. The AGC voltage at pin 4 is used to determine the antenna signal strength after a buffer [7717] with the signal "AGC" and an analog input port of the CC-P. The trap [1704] reduces the sound carrier remainders in the video for BG standards. The trap [1706] works in the same way for the Pal-I standard only. For all other standards the switch [7713] is closed via [7706] and "SFS_TS"-line set "high" to bypass this trap. In these cases the selectivity of the SAW filter [1701] is sufficient. The coil [5713] for non-BG standards realizes a frequency response correction. This correction is not desired for SECAM L' and therefore short-circuited by [7716] (signal SB1 is "high" and [7702] has on-status). The demodulated video signal "VFV" is available after the buffer and limiting stage for noise peaks [7711]. The FM-PLL demodulator function of TDA 9818 is not necessary and therefore deactivated by the resistor [3739].

Audio demodulator
The sound demodulation is done by the MSP3415 [7600], which is also fully controlled via I^2C-bus by the CC-P (determination of bandwidth, amplitude, standard, ...).The audio signals are available at pin 30 and pin 31 of [7600] and fed as "AFER"- & "AFEL"-line to the audio-I/O for further processing.

9.3.4 Audio routing



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The processing of audio is always done in stereo (e.g. separate left- and right-channel) and the complete switching is realized by using HEF4052, which is a dual four-to-one multiplexer. In principle there are three independent selectors:
a) Scart 1-Output-Path:
Pos [7504] is used to select either Scart 2-Input (“AIN2L”/ ”AIN2R”) or the signal directly from the audio DAC [7004] (“ALDAC”/”ARDAC”) as the output source for Scart 1 (“AOUT1L”/”AOUT1R”).
The control is done by means of the lines “ASC1S” coming from [7408] (IC [7408] acts as a port expander for the CC-P) and “IASC1M”, which is directly coming from the CC. Pos [7412] is used for level adaptation (3V3 to 5V) for the “IASC1M”-signal.
b) Scart 2-Output-Path:
Pos [7503] selects between Scart 1-Input (“AIN1L”/”AIN1R”), signals from the internal frontend (“AFEL”/”AFER”) via MSP [7600] or audio directly from the DAC [7004] (“ALDAC”/ ”ARDAC”). The outputs of this switch are routed to Scart 2 (“AOUT2L”/AOUT2R”). This switch is controlled via “VSA1”- and “VSA2”-line. These lines come from [7408] that is acting as a port expander for the CC-P.
c) Record-Path:
Pos [7501] selects either signals from Scart 1 (“AIN1L”/ ”AIN1R”) or Scart 2 (“AIN2L”/”AIN2R”) or Cinch-Front (“AINFL”/ ”AINFR”) or the MSP [7600] (“AFEL”/”AFER”) and routes to the audio ADC [7007] (“ALADC”/”ARADC”) for record purposes. The switch is controlled via “RSA1”- and “RSA2”-signals. These signals come from the MSP [7600], which acts as a port expander of the CC-P. As there can also exist a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP. The MSP acts as a preselector between audio from internal frontend or the DV-Input.
Each of these three selectors ([7501], [7503] & [7504]) has a separate Op-Amp on the output for level-adaptation-, performance- and line-driving-reasons. [7505-A & -B] for record, [7502-C & -D] for Scart 1-Output and [7502-A & -B] respectively for Scart 2. Every audio output line on the two Scart connectors can be “killed” (muted) by an extra transistors ([7506], [7508], [7509] &[7511]), which can be activated by the “AKILL”-line. This signal is generated by the circuit around [7404]/[7421] and is a combination of the “KILL”- from the CC-P and the “IPFAIL” of the power-supply-unit.
d) Line-Out-Path:
see chapter 9.3.5
e) Digital Audio Output-Path without IOE-Print:
Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the “DAOUT”-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3580] to cinch plug [1951]. The capacitor [2580] performs an AC-coupling between connector- and set-ground.
f) Digital Audio Output-Path with IOE-Print:
In case of usage of the IOE-print the digital audio signals (input and output) are directly routed from digital board via interface cable to plug [1920] on the IOE-print. The “DAOUT”-line is splitted into two signals, one for cinch out and one for optical out. The signal to cinch out first passes a 5-fold inverter [7250] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5250] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3259] to the cinch plug [1925] (or [1926-B] in case of option “DIGITAL IN”). The capacitors [2256] and [2266] perform an AC-coupling between connector- and set-ground. The second “DAOUT”-signal is fed directly via [3264] to the optical out transmitter [6255].
g) Digital Audio Input-Path with IOE-Print:
There are two possibilities for a digital audio input signal in case of option “DIGITAL IN”. One is the signal from the optical receiver [6259], which is routed via [3269] directly to plug [1920]. The second is the signal from the cinch plug [1926-A]. This signal then passes an inverting amplifier [7250-6] and is then routed via [2253] to the plug [1920].

9.3.5 Audio ADC/DAC

a) PCBs with AD1852 [7004]:
The conversion of analog audio signals from the record-selector [7501] in the I/O (“ALADC”- & “ARADC”) is done via UDA1361TS [7007]. This IC can process input signals up to 2Vrms by using external resistors [3047], [3053] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7007] to 3,3V via [7008] and the “PWONSW”-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data (“A_DAT”-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back into the analog domain is done by AD1852 [7004]. All necessary clock signals are coming from the dig. board and dig. audio data (“D_DATA0”-line) are converted into analog signals, which are available at pin 17/16 and pin 12/13 of [7004] as symmetrical signals. Afterwards an Op-Amp. [7003] (line driver & converting to unsymmetrical signal, gain = 1), which is also working as low-pass-filter to increase signal performance (noise, distortions,...), is passed. Then both signals (“ALDAC” & “ARDAC”) are directly routed to the rear cinch output and also used in the audio-I/O for further processing. The DAC has also a mute possibility, which can be activated by setting pin 23 to 5V via [7001]. This mute is controlled either by the dig. board (“D_IKLL”-line) or the “IPFAIL”-signal from power-supply-unit (in this case it’s the combination of “A_KILL” and “IPFAIL”). If the DAC is muted externally via pin 23 or if there are no audio data available (e.g. “D_DATA0”-line zero), the output pins 8 and 22 of the DAC change to high (+ 5V). These two signals are then combined with diode pos. 6006. After decoupling via [7009] the signal “DAC_MUTE” is used as mute signal for the mute transistors [7415], [7416] for cinch rear out.
b) PCBs with UDA1334BTS [7001]:
The conversion of analog audio signals from the record-selector [7501] in the I/O (“ALADC”- & “ARADC”) is done via UDA1361TS [7005]. This IC can process input signals up to 2Vrms by using external resistors [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and the “PWONSW”-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data (“A_DAT”-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back into the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data (“D_DATA0”-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation, gain = 2) which is also working as low-pass-filter to increase signal performance (noise, distortions,...), is passed. Then both signals (“ALDAC” & “ARDAC”) are directly routed to the rear cinch output and also used in the audio-I/O for further processing. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board (“D_IKLL”-line) or the “IPFAIL”-signal from power-supply-unit (in this case it’s the combination of “A_KILL” and “IPFAIL”). In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of “digital silence” by the circuit around [7008], [7009] and [7010], when no audio data are available (e.g. “D_DATA0”-line zero).
This function can be also activated via the “ION”-line (set to high during any stand-by mode). To avoid signal distortions

(clipping) the mute transistors for cinch rear out [7415], [7416] are decoupled via [7011].

9.3.6 Video-routing

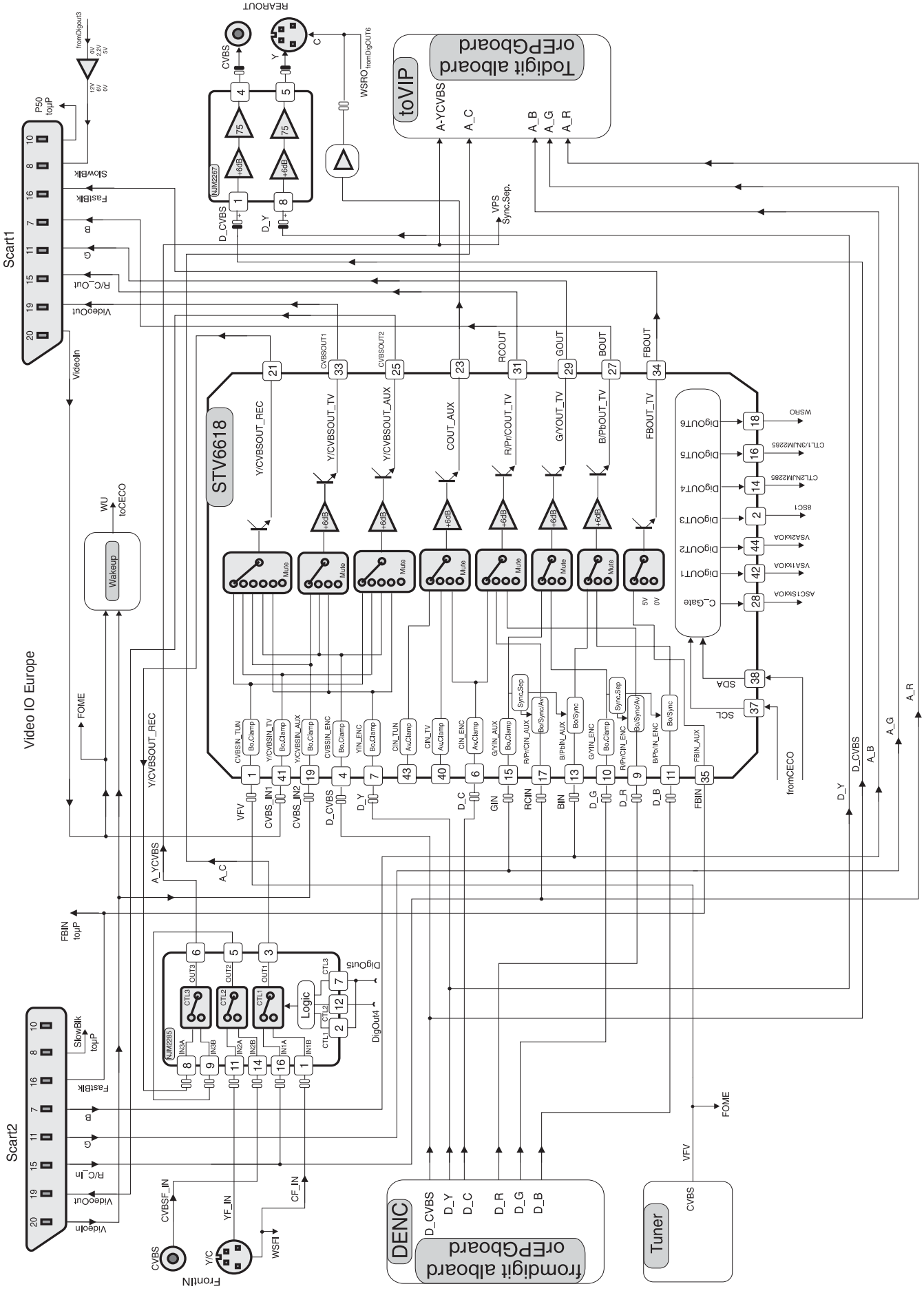


Figure 9-1

The Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I^2C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6 dB-amplification and a 75 Ohms driver-stage inside. This IC includes also several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend ("VFV"), the input from Scart 1 ("YCVBSIN1") or the signal from Scart 2 ("YCVBSIN2"). Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the preselected ones are done. The output signals of [7411] are fed as "A_YCVBS"- and "A_C"-line to the digital board for further processing.
To reduce the number of external presets there exists only one preset for CVBS- and Y/C-front. The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on µP-sub-board) where Y/C has higher priority.
The R/G/B-inputs and the Fast-Blanking-line from Scart 2 are routed over the optional EPG board to the digital PCB. Also all other video signal from the analog board are routed through the EPG board if present. These signals are also available on the corresponding input-pins of the STV6618 to enable a loop-through in AV-Standby. In this mode the set has to behave like a cable between the two Scart-connectors. AV-Standby is activated either by a "high" level on pin 8 of Scart 2 ("active device is present") or by the "WU"-line (wake up). This signal is generated out of the circuit around [7401], [7402] & [7403] and will become "high" if there is a signal on pin 20 of Scart 1- or Scart 2. The detection of the input level on pin 8 of Scart 2 ("8SC2") is done via an analog input of the CC-P (less than 2V means inactive; 4,5V to 7V determines a source with 16:9 picture-ratio and greater than 9,5V is an active 4:3 source).
All signals from the digital board ("D_R", "D_G", "D_B", D_C", "D_Y" and "D_CVBS" are routed to the proper inputs of the STV6618 for amplification and driving purpose before they can be seen on the appropriate Scart outputs. In case of EPG the signals from the digital board are routed through the EPG board where the selection between digital board video or EPG OSD is taken.
The "D_CVBS"- and the "D_Y"-line are passing a 6 dB-amplifier and driver-IC [7410] and are then routed to the CVBS-Cinch and Y/C-out rear. The chroma signal for this Y/C out is coming from the STV6618 - which makes the 6 dB-amplification - and a driver [7406] in between.
The detection of the picture ratio information on the Y/C-input front is made by measuring the DC-level on the Chroma signal via analog input of the CC-P ("WSFI"-line). In case the level is higher than 3,5V the input signal is a 16:9 source. If the level is lower than 2,4V the picture ratio is 4:3.
For generation of the appropriate DC-voltage on the Y/C-out rear the "WSRO"-line is controlled via pin 18 of [7408] by the CC-P (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).
The control of the switching voltage (Pin 8 of Scart 1) is done via 3-level-pin (nr.2) of the STV6618 [7408] and the transistors [7405], [7407] & [7409]. A "low" on pin 2 of [7408] causes around 11V on pin 8-Scart 1 (e.g. source with 4:3 picture-ratio active). Medium level (2,5V) on pin 2 of the STV6618 generates medium level (approx. 6V) on pin 8-Scart 1 (e.g. active source with 16:9) and a "high" on pin 2 of the STV6618 pushes pin 8-Scart 1 to "low" (e.g. inactive).

9.3.7 VPS/PDC- and Text-Dataslicer

For extraction of relevant information out of the video signal (time controlled recording, net-name-identification, time- & date- download) the STV5348 [7931] is used. Data transfer to/ from the CC is fully done via I^2C-bus and the input signal for decoding is the same as the one being routed to the digital board for recording purposes ("A_YCVBS"-line).

9.3.8 Analog Follow-Me

This circuit compares the video signal from the internal frontend ("VFV") of the recorder with that one of the connected TV-set ("CVBS1"). The TV set delivers the signal via Scart-cable. A comparator [7934] and several additional parts ([7932], [7933], ...) are used to compare the two video signals. In case of both input signals are equal the output-line of this circuit ("FOME") is set to low. Detection is made via an input port of the CC-P.

9.4 Analog board NAFTA- & APAC-Pal- version

9.4.1 Frontend NAFTA

[1701] demodulates the video signal from the antenna input. Tuner and IF-demodulator are in one unit. Also a modulator is included in that part. The audio- and video-signal to the modulator are the ones from the selected input or the playback path of the set ("AMCO"- and "D_CVBS"-line). The control of the tuner is fully done via I^2C-bus by the CC-P. Via the "MSW"-signal and [7701] the modulator is switched on and off. In opposite to this the antenna loop-through is opened or closed.
In the APAC-Pal version POS [1700] is used with the difference that it demodulates only PAL- instead of NTSC-signals and has also no modulator. The "CSW_SSW" line switches the modulator between CH3 or CH4 in the NTSC-version.
To achieve optimal tuning the "AFC"-signal is detected by the CC via an analog input; [3701], [3702] and [3703] are used for level adaptation (5V to 3V3). Pos [7700] is a driver for the video signal.
The sound demodulation is realized by the MSP34x5 [7600], which is also fully controlled via I^2C-bus by the CC-P (determination of bandwidth, amplitude, standard, ...). The audio signals are available at pin 30 and pin 31 of [7600] and fed as "AFER"- & "AFEL"-line to the audio-I/O for further processing. As this PCB is used for different regions (NAFTA and APAC) either MSP3425 or MSP3415 are assembled.

9.4.2 Audio routing

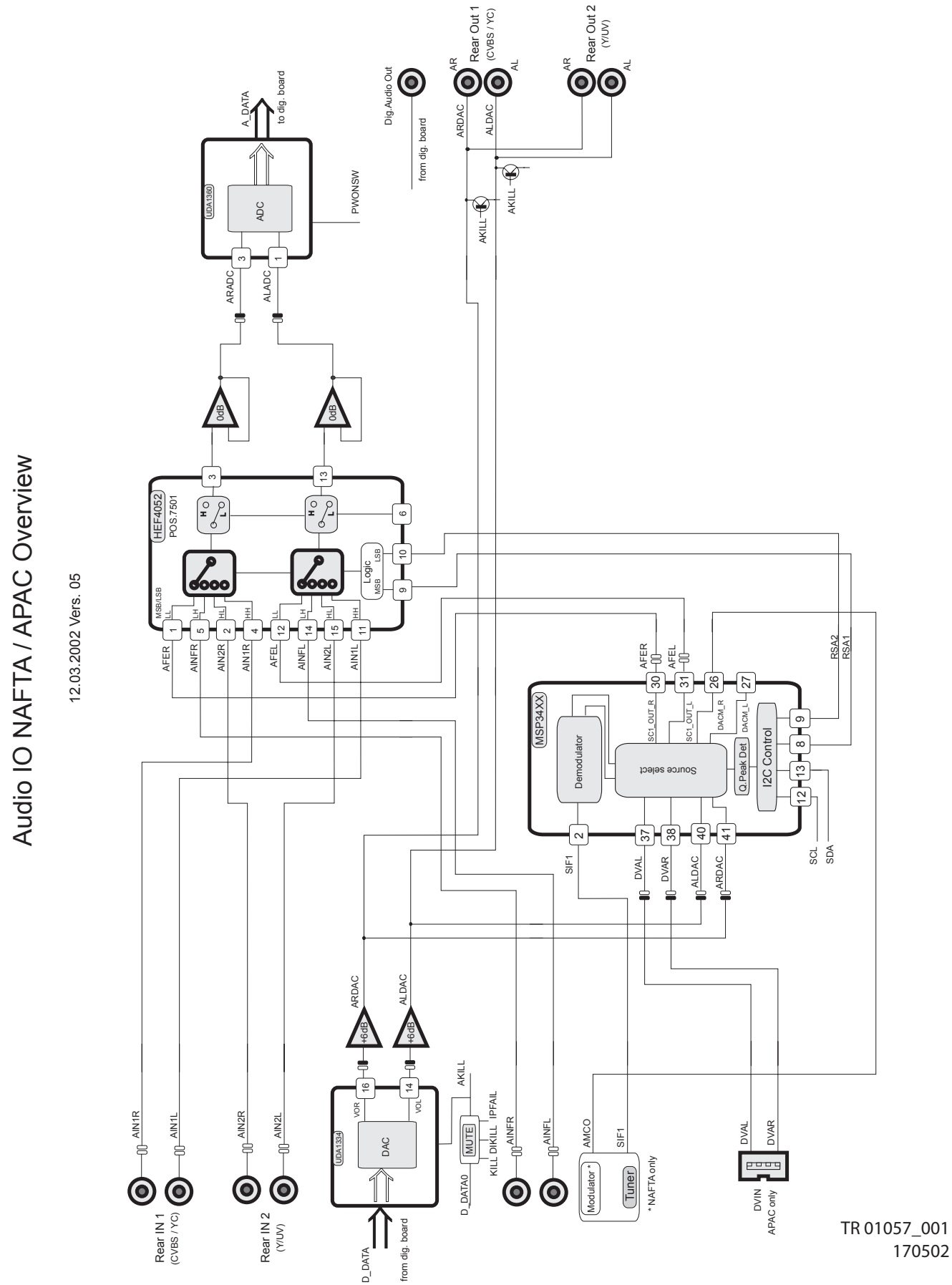


Figure 9-2

The sound processing is always done in stereo (that means separate left- and right-channel).
a) Record-Path:
The complete selection of the audio signal for recording is done by a HEF4052 [7501], which is a dual four-to-one multiplexer. The input lines for the selector [7501] are coming either from MSP [7600] (“AFEL”/”AFER”) or cinch rear in 1 (“AIN1L”/ ”AIN1R”) or cinch rear in 2 (“AIN2L”/”AIN2R”) or the cinch in front (“AINFL”/AINFR”). The [7501] is controlled via “RSA1”- and “RSA2”-signals coming from the MSP [7600]. The MSP acts as a port expander of the CC-P. The Op-Amp on the output [7504] is necessary for performance reasons and acts also as a driver. The selected signals “ARADC” and “ALADC” are directly fed to the Audio-ADC.
As there can exist also a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP, which acts as a preselector between audio from internal frontend or the DV-Input.
b) Line-Out-Path:
see chapter 9.4.3
c) Digital Audio Output-Path without IOE-Print:
Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the “DAOUT”-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3580] to cinch plug [1951]. The capacitors [2580], [2582] and [2583] perform an AC-coupling between connector- and set-ground.
d) Digital Audio Output-Path with IOE-Print:
see chapter 9.3.4.f
e) Digital Audio Input-Path with IOE-Print:
see chapter 9.3.4.g

9.4.3 Audio ADC/DAC

The conversion of analog audio signals from the record-selector [7501] in the I/O (“ALADC”- & “ARADC”) is done via UDA1361TS [7005]. This IC can process input signals up to 2Vrms by using an external resistor [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and “PWONSW”-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data (“A_DAT”-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back to the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data (“D_DATA0”-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation) which also works as a low-pass-filter to increase signal performance (noise, distortions,...) is passed. Then both signals (“ALDAC” & “ARDAC”) are directly routed to the rear cinch output. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board (“D_IKLL”-line) or the “IPFAIL”-signal from power-supply-unit. In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of “digital silence” by the circuit around [7008], [7009] and [7010], when no audio data are available (e.g. “D_DATA0”-line zero).
The signals from the audio DAC part (“ARDAC”/”ALDAC”) are directly routed to both cinch rear outputs, which are connected in parallel. To avoid plops and any other audible noise on the output there is a mute-stage implemented [7509], [7511] for each channel. The activation is done via “AKILL”-line, which is a combination of the “KILL” from CC-P, “DAC_MUTE” from DAC-part and “IPFAIL” from the power-supply-unit. The circuit around [6430], [6431], [7430] and [7404] generates this signal.

9.4.4 Video-routing

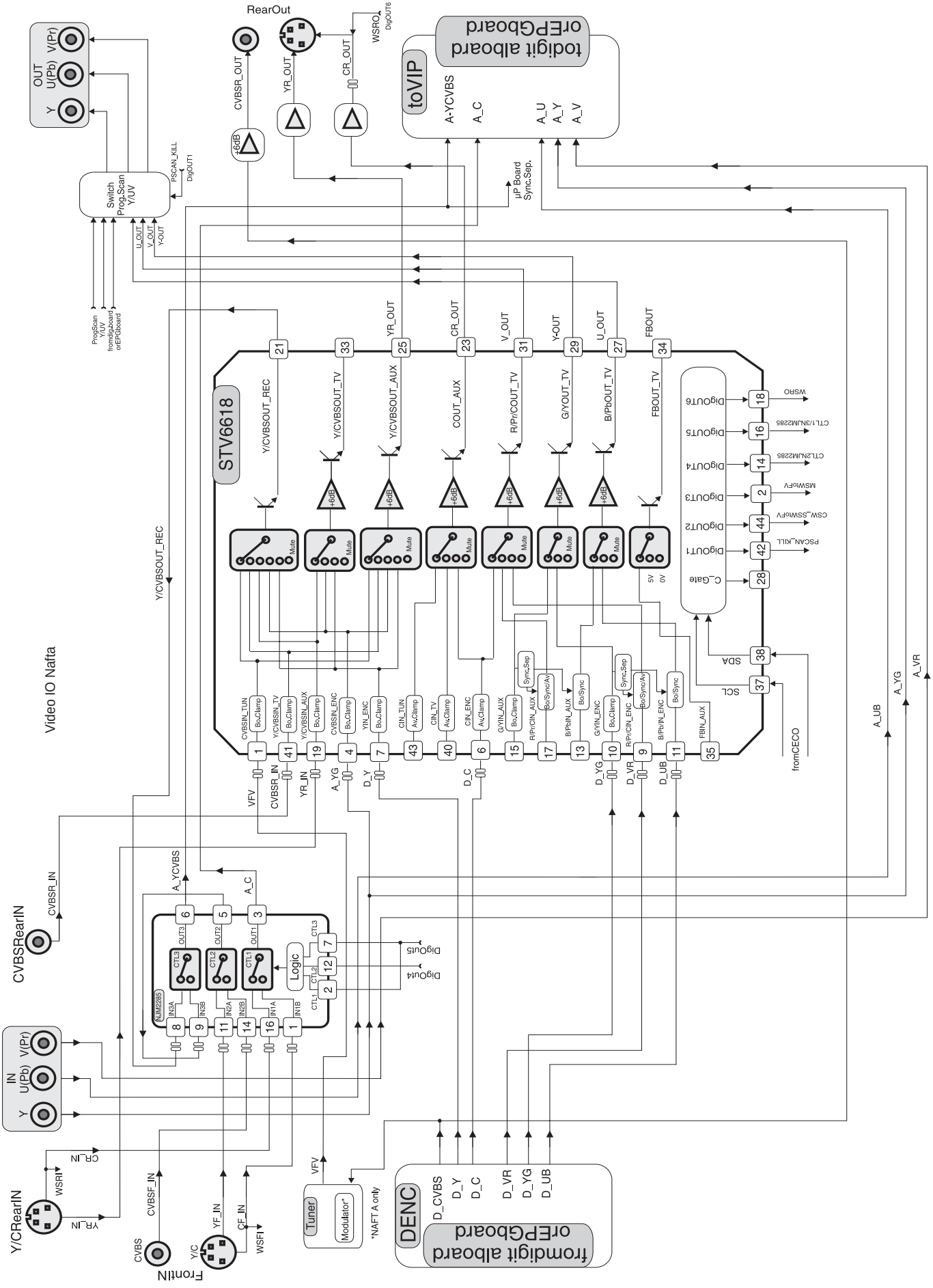


Figure 9-3

The Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I^2C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6dB-amplification and a 75 Ohms-driver-stage inside. This IC also includes several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend, the CVBS from Cinch-Rear or Y from the S-Video-input rear. Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the preselected ones is done. The output signals of [7411] are fed as “A_YCVBS”- and “A_C”-line to the digital board for further processing.
To reduce the number of external presets there is only one station for CVBS or Y/C (front and rear). The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on µP-sub-board) where Y/C has higher priority.
The Y/U/V-inputs are routed over the optional EPG board to the digital PCB. Only the Y-line has to be present additionally on pin 4 of [7408] for video recognition. Also all other video signal from the analog board are routed through the EPG board if present.
The signals “D_C” and “D_Y” are fed through [7408] (6dB amplification) and via [7406], [7409] used as driver to the S-Video output connector. The “D_CVBS” line is directly routed to the modulator and via the circuit around [7431] and [7432] amplified by 6dB before it is fed to the CVBS output plug. In case of EPG the signals from the digital board are routet through the EPG board where the selection between digital board video or EPG OSD is taken.
The Y/U/V signals from the digital board are also passing [7408] for 6dB amplification and driving purpose.
To achieve optimal picture quality the set is equipped with a simple progressive scan function based on a so-called line doubler. The complete generation of the signal is done on the digital board and via a separate cable and connector [1946] the corresponding Y/U/V lines are routed to the analog PCB. Also the YUVprogressive signals are switchable to EPG OSD on the EPG board if implemented. As there is only one Y/U/V output available a switching between interlaced and progressive output is necessary. While the transistors [7421], [7422], [7424], [7425], [7427] and [7428] are used as driver for Y/U/V progressive, [7423], [7426] and [7429] together with [7405] are necessary for killing these signals via pin 42 of [7408] in case the interlaced is selected (“PSCAN_KILL”-line set to low). If progressive output is active the pins 27, 29 and 31 of [7408] are set to high impedance and “PSCAN_KILL” is also high (e.g. 5V).
The detection of the picture ratio information on the Y/C inputs (rear or front) is done by measuring the DC-level on the Chroma signal via an analog input of the CC-P (“WSRI”- and “WSFI”-line). In case the level is higher than 3,5V the input signal is a 16:9 source, if the level is lower than 2,4V the picture ratio is 4:3.
For generation of the appropriate DC-voltage on the Y/C output the “WSRO”-line is controlled via pin18 of [7408] by the CC-P (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).
During Stand-By there is also no loop-through of any input to any output performed.

9.5 Digital Board Chrysalis 2.1

9.5.1 Introduction

Block diagram 2nd generation DVD recorder

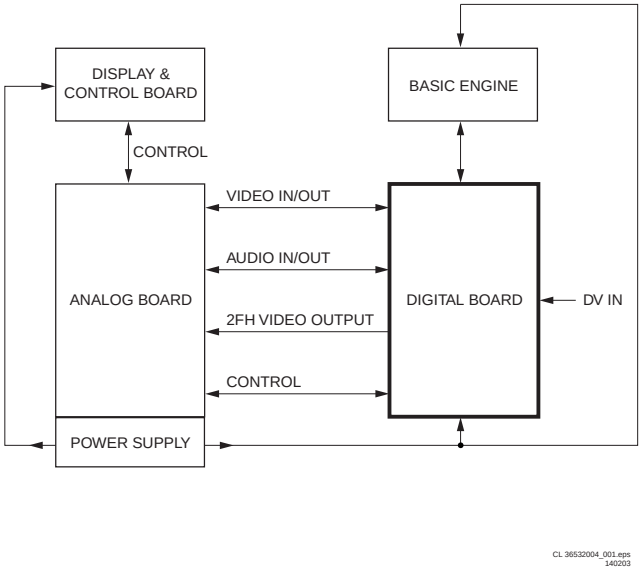


Figure 9-4

This 2nd generation Digital Board is based on the highly integrated 'Chrysalis' IC. Its predecessors, the 'Empire' and 'Empress' based boards, had two PWBs mounted on top of each other (due to separate DVIO board). For this new generation, all functionality is now available on one PWB in one BGA IC (Ball Grid Array) i.s.o. four VLSI ICs.

The board encodes and multiplexes analogue video and digital uncompressed audio (I2S) into an MPEG2 stream. This MPEG2 stream is formatted, to be recorded by the DVD+RW engine. In playback, the board will decode the MPEG2 stream into analogue and digital audio and into analogue video. In addition, a DV stream can be received via IEEE1394 (i-Link), and transformed to MPEG2 format.

There are versions foreseen, to generate a progressive scan analogue video output. In the standard Chrysalis board, the progressive video output is generated by the PNX7100. In the Chrysalis 'F' it is generated by the Faroudja FLi2301.

The Chrysalis Digital board is pin compatible with the Empress digital board in terms of A/V IO, BE interface, Power Supply, and Service interface. For functional enhancements, several connectors are added:IDE connector (HDD, AV3, PCMCIA, etc.).

9.5.2 Record Mode

Block diagram Chrysalis Digital Board

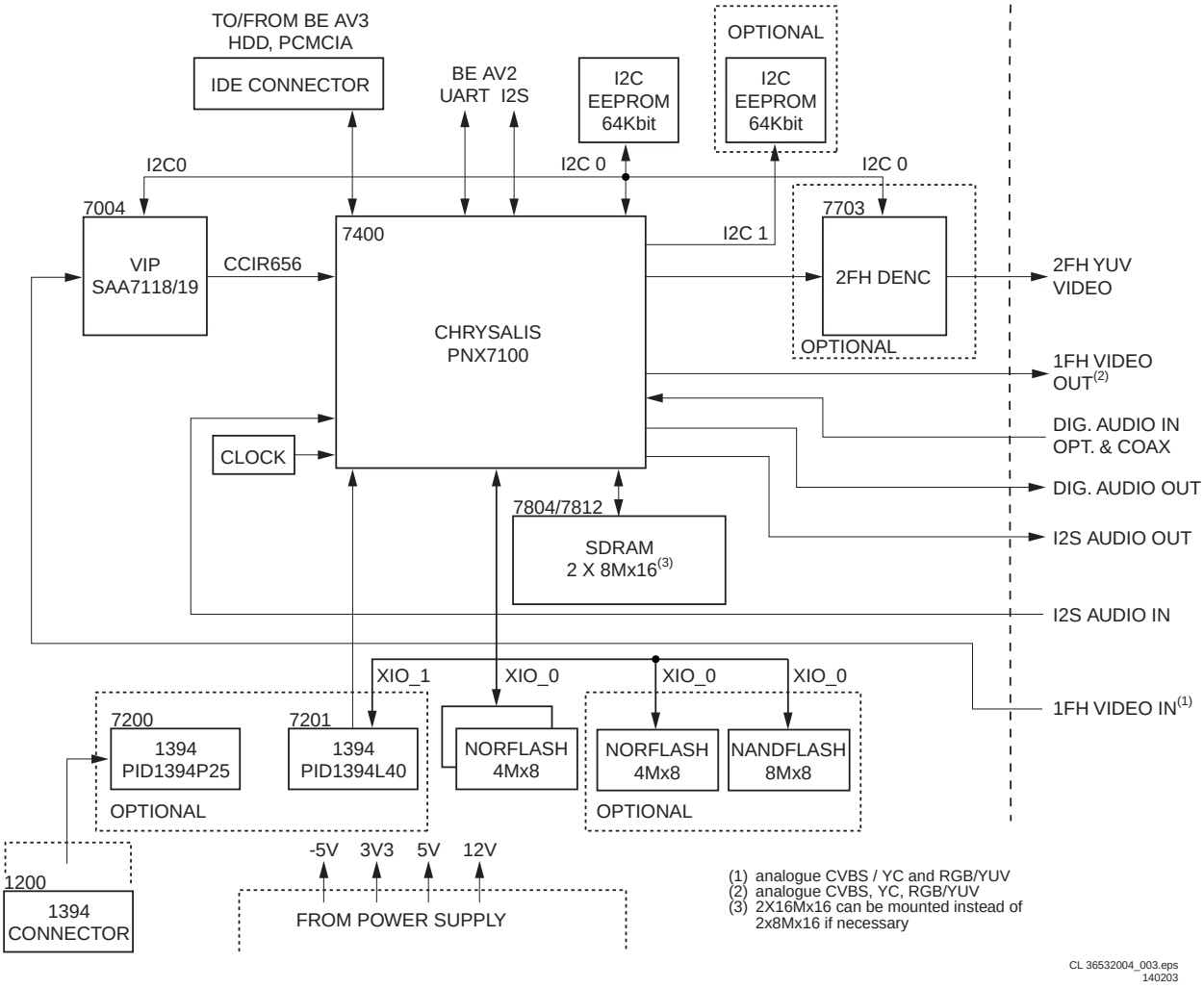


Figure 9-5

Video Part
The analogue video input signals CVBS, YC, and YUV/RGB (RGB for EURO and YUV for USA), are routed via the analogue board to connector 1904 and sent to IC7004 (SAA7118, Video Input Processor).
The digital video input signals are routed from the DV-In connector (item 1200) via ICs 7200 (1394 PHY) and 7201 (1394 LINK) to IC7400 (PNX7100, Chrysalis).
The multistandard Video Input Processor (VIP, IC7400) encodes the analogue video to digital video stream (CCIR656 format). It provides filtering of the analogue signals and separation of luminance and chrominance by a comb filter. The output stream, named ITU_IN(7:0), is then routed to the Chrysalis IC (PNX7100). This IC encodes and decodes the digital video stream into/from MPEG2 format.

Audio Part
I2S audio is sent from the analog board to the Chrysalis IC via connector 1900. The Chrysalis compresses the I2S audio data into an MPEG1-L2/AC3 audio stream.

Front-end I2S
IC7400 (Chrysalis) interfaces directly to the Basic Engine (BE) via connectors 1100 (clock and data) and 1105 (control). For future use (with AV3 BE module, HDD, or card reader) it also interfaces to an IDE bus via connector 1102 .

For detailed information on the AV2 BE module, see Service Manual 3122 785 12470.

It buffers the data streams that are coming from (or going to) these hardware modules.
In the Chrysalis, the video MPEG2 stream and the audio AC3 stream are multiplexed into an I2S stream. The serial data are sent to the Basic Engine for recording.

9.5.3 Playback Mode

During playback, the serial data from the Basic Engine is going directly to the PNX7100 via the serial front-end I2S interface. The PNX7100 is an MPEG CoDec and has the following outputs:

- To the analogue board: analogue video RGB, YC, CVBS on connector 1904.
- I2S audio (PCM format) on connector 1900.
- SPDIF audio (digital audio output) on connector 1904.
- Progressive video on connector 1704.
- Communication gateway (RS232) on connector 1104.

9.5.4 Basic Engine Interfaces

AV2 Basic Engine (VAE8015 and VAE8020)
The UART interface (for the S2B commands) between the Chrysalis and the servo processor (MACE3 on the BE module), controls the AV2 Basic Engine during record and playback mode. For data transport, an I2S bus is used.

AV3 Basic Engine (VAE8030)

To be prepared for new developments, the Chrysalis Digital Board is equipped with two IDE busses (ATAPI). They can be used for connecting to the new generation Basic Engine (e.g. the AV3), a Hard Disc Drive (HDD), or a Smart Card Reader.

9.5.5 Clock Distribution

Clock distribution on Chrysalis board

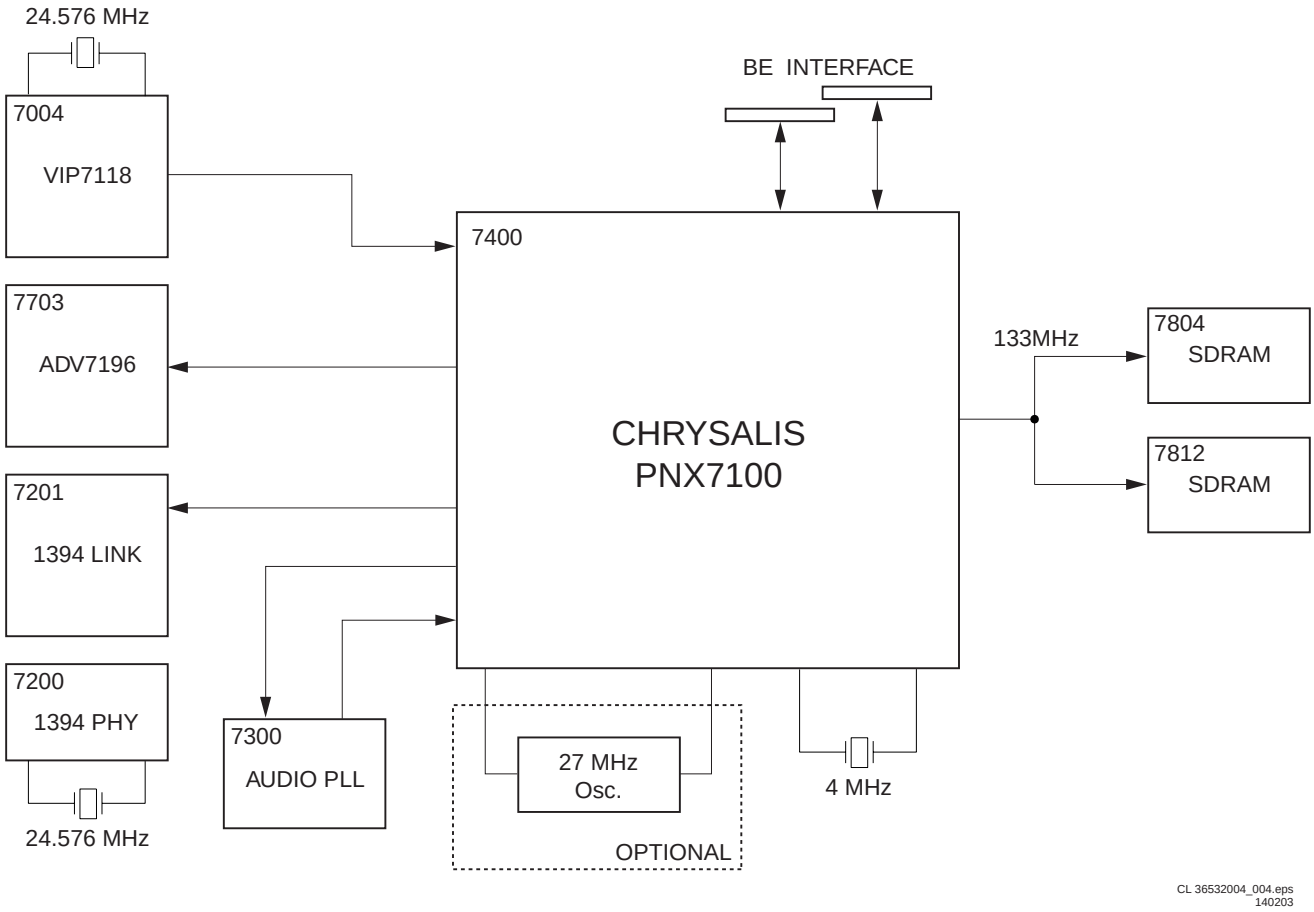


Figure 9-6

The PNX7100 has a complex clock system, which is needed to support the processes running at different frequencies such as video decoding, audio decoding or peripheral I/O devices etc. To ensure a synchronous initialisation of all the registers and state machines, all the PLLs are switched to their default frequency and the reset sequence is run at 4 MHz. Then when the booting control unit is correctly initialized and once it has captured all the booting parameters, it sets the PLLs to its functional frequency to allow the modules to run at their nominal frequencies. Thanks to a clock blocking mechanism, the frequency switching is glitch free.

System clocks:

- PNX7100 (IC7400, pins AF9 and AF10) : 4 MHz provided by the xtal oscillator 7402.
- SAA7118 (IC7004, pins A3 and B4): 24.576 MHz provided by xtal 1001.
- ADV7196 (IC7703, pin 25): 27 MHz provided by PNX7100.
- SDRAM (IC7804 and 7808, pin 38): 133 MHz provided by the PNX7100.
- 1394-LINK (IC7201, pin 88): 49.152 MHz provided by 1394-PHY.
- 1394-PHY (IC7200, pins 59 and 60): 24.576 MHz provided by xtal 1201.

9.5.6 Power Supply

The Digital Board is not powered in standby mode. The control signal 'ION' (Inverse On), coming from the analogue board, will enable the PSU, and power the digital board.

- ION = High: the digital board is in powered down standby mode.
- ION = Low: the power supply to the digital board is enabled.

The 3V3, +5V, -5V, and +12V come from the PSU, while the 1V8 core voltage is generated on the board by a low voltage buck controller (item 7501). It provides the control for a DC-DC power solution producing an 1.8V output voltage over a wide current range. The NCP1570-based solution is powered from 12 V with the output derived from the 3V3 supply. It contains all required circuitry for a synchronous NFET (IC7500-1 and -2) buck regulator.

9.5.7 Memory

Several memories are used on the Chrysalis Digital Board:

- EEPROM IC7810: this memory contains all the necessary boot parameters of the board.
- EEPROM IC7809: this memory contains all the necessary parameters for the application.
- FLASH IC7807(05/11): this memory contains the application-, diagnosis-, and service software.

9.5.8 Reset

Reset concept Chrysalis board

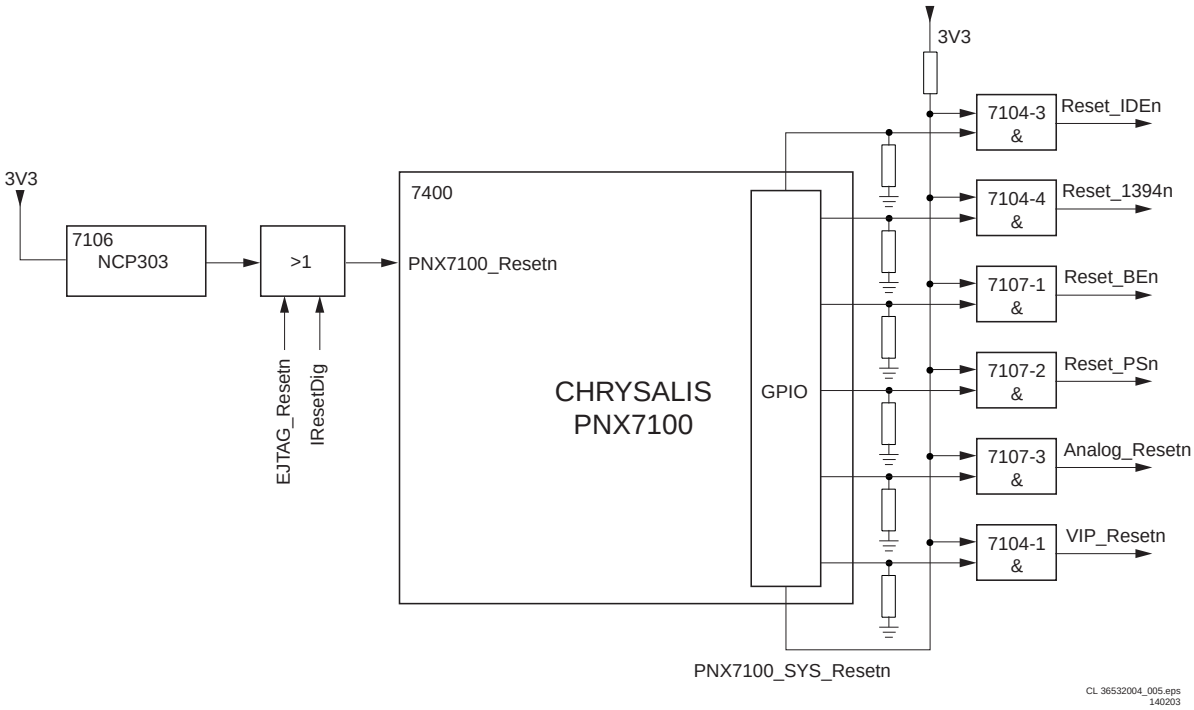


Figure 9-7

The voltage detector NCP303LSN29 (IC7600) provides the reset signal PNX7100_RESETn (active 'low') with the correct timing behavior. This circuitry functions as a Power-On Reset (POR) module, which detects the minimum functional voltage that is needed by the device. It also detects any voltage drop. When the power voltage is outside the nominal range, a reset signal is generated by the POR module and fed to the reset module which controls the individual reset of the different peripherals and processing units.
There are two control lines which can overrule this reset signal:

- IRESET_DIG (controlled by the microprocessor on the Analogue Board).
- EJTAG_RESETn (only for production).

They can pull the output of the NCP303LSN29 (item 7106) down via a shottky diode.
So when the output signal PNX7100_RESETn is 'low', the board will reset. When this signal is 'high', the board is up and running.

The PNX7100_SYS_RESETn is a general enabling signal for the different reset lines. All other reset lines are directly driven from Chrysalis port pins (e.g. MPIO13_IDE1_RESETn). All reset lines are logically connected via 74LVC08D (item 7104) and (item 7107) AND-gates. If both reset signals are low, all other external devices are initialised.

9.5.9 I2C Bus

The PNX7100 is the master of the I2C bus (during reset, external I2C masters are allowed). The following ICs are controlled by the I2C bus:

- IC7809.
- IC7810 NVRAMs.
- IC7004 VIP.
- IC7700 FLI2301 Video De-interlacer Line Doubler (for Chrysalis-F boards).
- IC7703 ADV7196 Video Enc (for progressive scan done by Chrysalis).

9.5.10 I/O Connectors

AIO Connector (item 1900)
The Audio In/Out (AIO) connector is used to interchange digital audio signals between Analog- and Digital Board.

DAIO Connector (item 1901)
The Digital Audio In/Out (DAIO) connector is used to interchange digital audio (SPDIF) signals between the IOE-Board and the Digital Board.

VIO Connector (item 1904)
The Video In/Out (VIO) connector is used to interchange analogue video signals between Analog- and Digital-Board.

9.5.11 Progressive Scan

Introduction
There are two versions foreseen, to generate a progressive scan analogue video output:

- In the standard Chrysalis board, the 'low end' progressive video output is generated by the PNX7100.
- In the Chrysalis 'F', the 'high end' progressive output is generated by the Faroudja FLI2301. This IC offers additionaly DCDi, upscaling to HDTV, and picture enhancement.

Description
The progressive scan part is integrated in the Digital Board and built around the FLI2301 de-interlace/line doubler (7701). This I2C controlled de-interlace uses a 64Mbit SDRAM (32bit x 2M) to perform high quality de-interlacing (meshing). The de-interlace gets its digital YUV input data from the PNX7100 (7400). The format of the digital YUV input to the Fli2301 is CCIR656 with separated Hsync, Vsync, and odd/even signal running on 27MHz.

9.6 Service UART Interface

Logic IC 74HCT14D (item 7111) is used to make a level conversion from microprocessor (LVTTL) to +/-5V (compatible with most RS232 interfaces) and vice versa. The control line MPIO19_CTL_SERVICE is used to activate service and diagnostic SW at start up procedure. The connectivity is provided via an external service tool.

9.7 I/O Extension Board

This board feeds the internal S/PDIF signal from the Digital board to an optical and/or digital out connector. For European players, also an YUV output is present on this board.

9.8 IC Descriptions

9.8.1 Display Board

IC 7103 TMP87CH74F Display Board, Front Microprocessor

Block Diagram

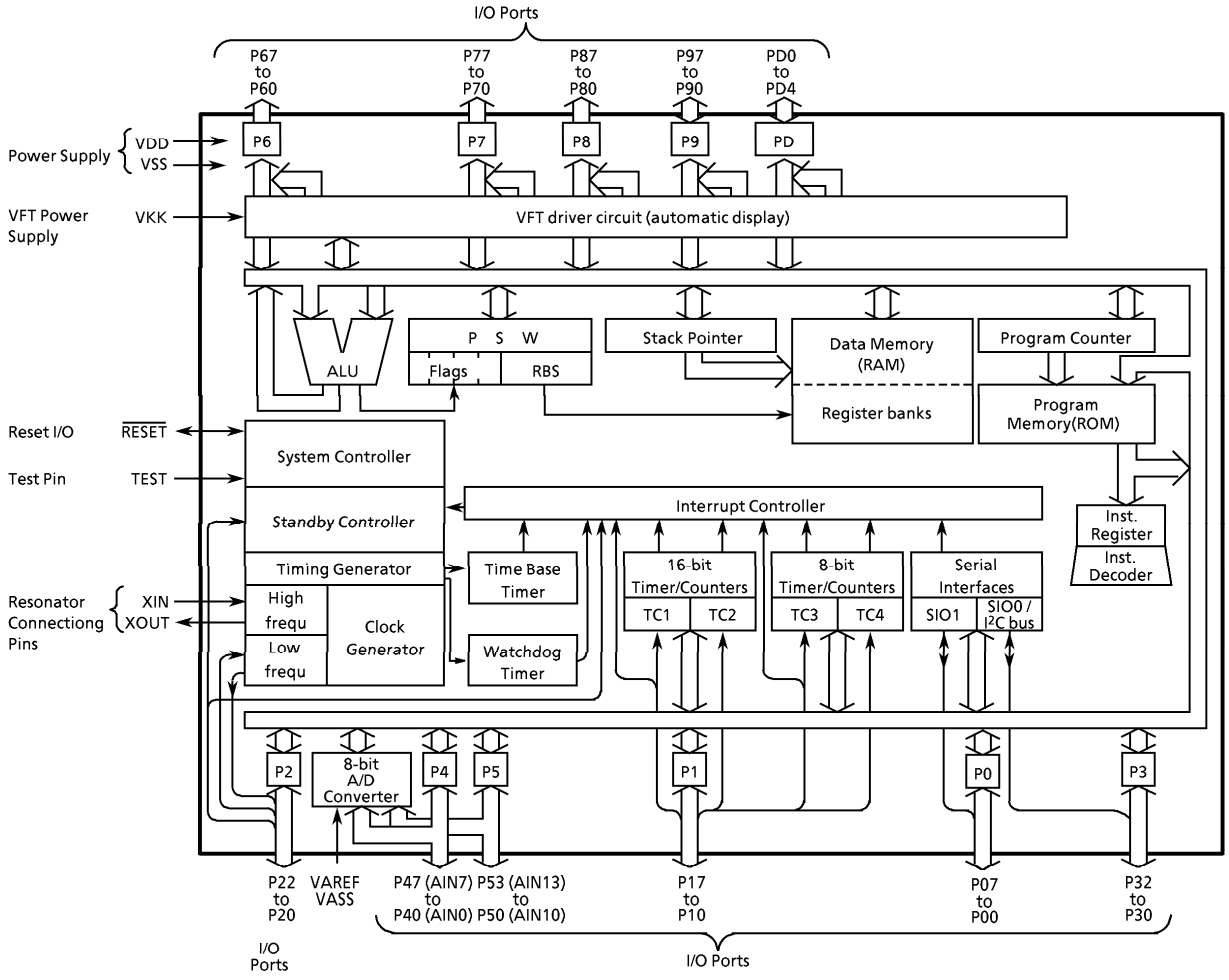


Figure 9-8

Pin Function

Pin Name	Input / Output	Function	
P07 to P03	I/O	Two 8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a SIO input/output, an External interrupt input, a timer/counter input, the latch must be set to "0". When used as a PPG output or divider output, the latch must be set to "1".	
P02 (SO1)	I/O (Output)		SIO1 serial data Output
P01 (SI1)	I/O (Input)		SIO1 serial data Input
P00 ($\overline{SCK1}$)	I/O (I/O)		SIO1 serial clock input/output
P17 (INT4/TC3)	I/O (Input)		External interrupt input 4 or Timer/Counter 3 input
P16 (INT2)			External interrupt input 2
P15 (INT3/TC1)			External interrupt input 3 or Timer/Counter 1 input
P14 (TC4/$\overline{PDO}$/$\overline{PWM}$)	I/O (I/O)		Timer counter 4 input or 8-bit programmable divider output or 8-bit PWM output
P13 ($\overline{DVO}$)	I/O (Output)		Divider output
P12 (TC2/$\overline{PPG}$)	I/O (I/O)		Timer counter 2 input or Programmable pulse generator output
P11 (INT1)	I/O (Input)		External interrupt input 1
P10 ($\overline{INT0}$)			External interrupt input 0
P22 (XTOUT)	I/O (Output)	3-bit input/output port with latch. When used as input port, or external interrupt input, STOP mode release signal input, the latch must be set to "1".	Resonator connecting pins (32.768 kHz). For inputting external clock, XTIN is used and XTOUT is opened.
P21 (XTIN)	I/O (Input)		
P20 ($\overline{INT5}$/$\overline{STOP}$)			External interrupt input 5 or STOP mode release signal input
P32 ($\overline{SCK0}$)	I/O (I/O)	3-bit programmable input/output ports (Sink open drain). Each bit of these ports can be individually configured as an input or an output under software control. When used as a I²C input/output, the latch must be set to "1".	SIO0 serial clock input/output
P31 (SDA/SO0)	I/O (I/O/Output)		I²Cbus serial data input/output or SIO0 serial data output
P30 (SCL/SI0)	I/O (I/O/Input)		I²Cbus serial clock input/output or SIO0 serial data Input
P47 (AIN7) to P40 (AIN0)	I/O (Input)	8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P4CR must be set to "0".	A/D converter analog inputs
P53 (AIN13) to P50 (AIN10)	I/O (Input)	4-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P5CR must be set to "0".	A/D converter analog inputs
P67 (V7) to P60 (V0)	I/O (Output)	Four 8-bit high brackdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	VFT driver outputs
P77 (V15) to P70 (V8)			
P87 (V23) to P80 (V16)			
P97 (V31) to P90 (V24)			
PD4 (V36) toPD0 (V32)	I/O (Output)	5-bit high breakdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	

Figure 9-9

Pin Name	Input / Output	Function
XIN, XOUT	Input, Output	Resonator connecting pins for high-frequency clock. For inputting external clock, XIN is used and XOUT is opened.
$\overline{\text{RESET}}$	I/O	Reset signal input or watchdog timer output/address-trap-reset output/system-clock-reset outputted.
TEST	Input	Test pin for out-going test. Be tied to low.
VDD, VSS	Power Supply	+ 5 V, 0 V (GND)
VKK		VFT driver power supply
VAREF, VASS		Analog reference voltage inputs (High, Low)

Figure 9-10

9.8.2 IC's Analog Board

IC7408: STV6618 Analog Board, Video Switch Matrix

1.2 Pin Description

Pin No.	Symbol	Description
1	Y/CVBSIN_TUN	Y/CVBS Input from Tuner
2	DIGOUT3	Digital Output Pin 3
3	GND1	Ground Supply 1 for Video Inputs
4	CVBSIN_ENC	CVBS Input from Encoder
5	DECV	Video decoupling capacitor
6	CIN_ENC	Chroma Input from Encoder
7	YIN_ENC	Y Input from Encoder
8	V_{CC}	+5 V Power Supply for Video Inputs
9	R/PR/CIN_ENC	Red or Pr or Chroma Input from Encoder
10	G/YIN_ENC	Green or Y Input from Encoder
11	B/PBIN_ENC	Blue or Pb Input from Encoder
12	GND2	Ground Supply 2 for Video Inputs
13	B/PBIN_AUX	Blue or Pb Input from Auxiliary (SCART2 or external Cinch)
14	DIGOUT4	Digital Output Pin 4
15	G/YIN_AUX	Green or Y Input from Auxiliary (SCART2 or external Cinch)
16	DIGOUT5	Digital Output Pin 5
17	R/PR/CIN_AUX	Red or Pr or Chroma input from Auxiliary (SCART2 or external Cinch)
18	DIGOUT6	Digital Output Pin 6
19	Y/CVBSIN_AUX	Y/CVBS Input from Auxiliary (SCART2 or external Cinch)
20	VCCB_REC	Video Output Recorder Buffer Supply Pin
21	Y/CVBSOUT_REC	Y/CVBS Output to Recorder
22	GNDB_REC	Ground Supply for Recorder Buffer
23	COUT_AUX	Chroma Output to Auxiliary (SCART2 or external Cinch)
24	VCCB1	Video Output Buffer Supply Pin
25	Y/CVBSOUT_AUX	Y/CVBS Output to Auxiliary (SCART2 or external Cinch)
26	GNDB	Ground Supply for Video Buffer
27	B/PBOUT_TV	Blue or Pb Output to TV (SCART1 or external Cinch)
28	C_GATE	External Transistor Command for Bidirectinnal B/C SCART I/O
29	G/YOUT_TV	Green or Y Output to TV (SCART1 or external Cinch)
30	VCCB2	Video Buffer
31	R/PR/COUT_TV	Red or Pr or Chroma Output to TV (SCART1 or external Cinch)
32	VCCB3	Video Output Buffer Supply Pin
33	Y/CVBSOUT_TV	Y/CVBS Output to TV (SCART1 or external Cinch)
34	FBOUT_TV	Fast Blanking Output to TV (SCART1)
35	FBIN_AUX	Fast Blanking Input from Auxiliary (SCART2)

Pin No.	Symbol	Description
36	VDD	+5 V Digital Power Supply
37	SCL	I²C Bus Clock
38	SDA	I²C Bus Data
39	GNDD	Digital Ground Supply
40	CIN_TV	Chroma Input from TV (SCART1 or external Cinch)
41	Y/CVBSIN_TV	Y/CVBS Input from TV (SCART1 or external Cinch)
42	DIGOUT1	Digital Output Pin 1
43	CIN_TUN	Chroma Input from Tuner
44	DIGOUT2	Digital Output Pin 2

Figure 2: STV6618 Input/Output Diagram

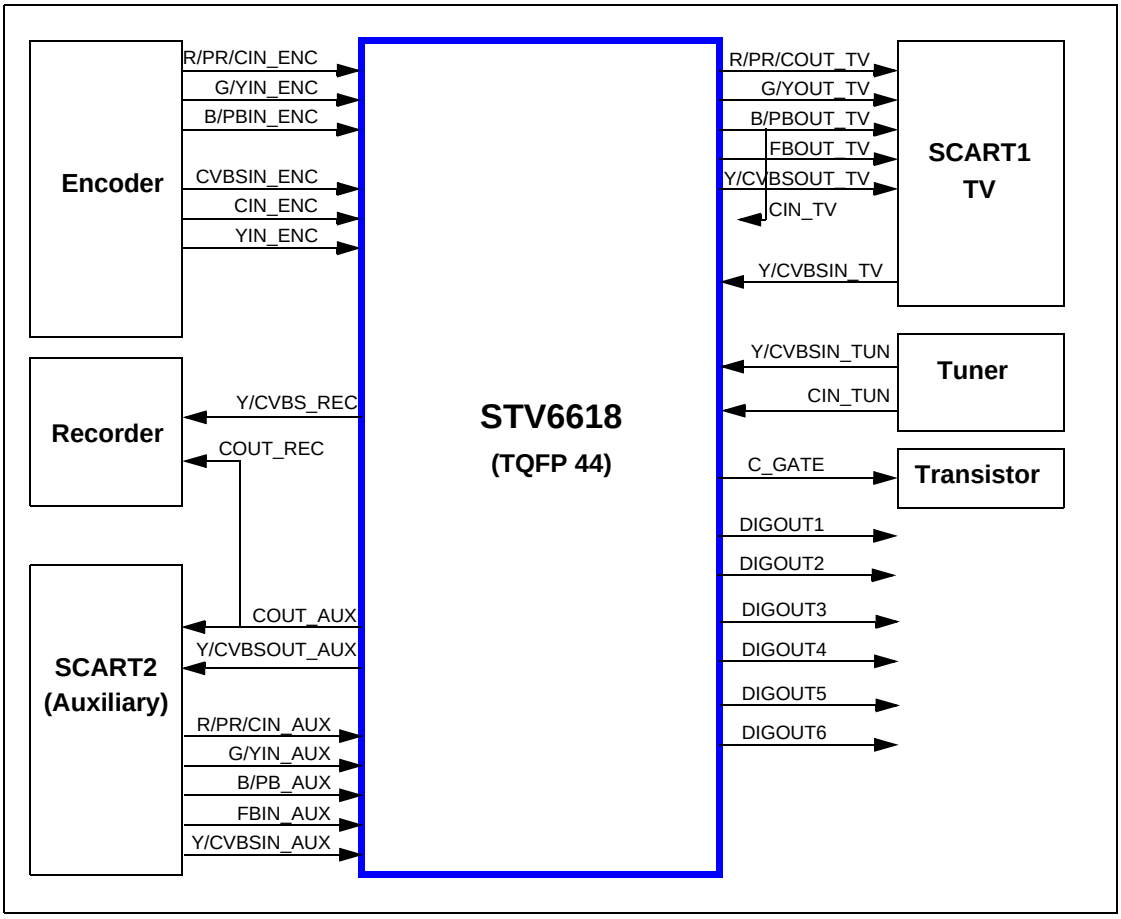
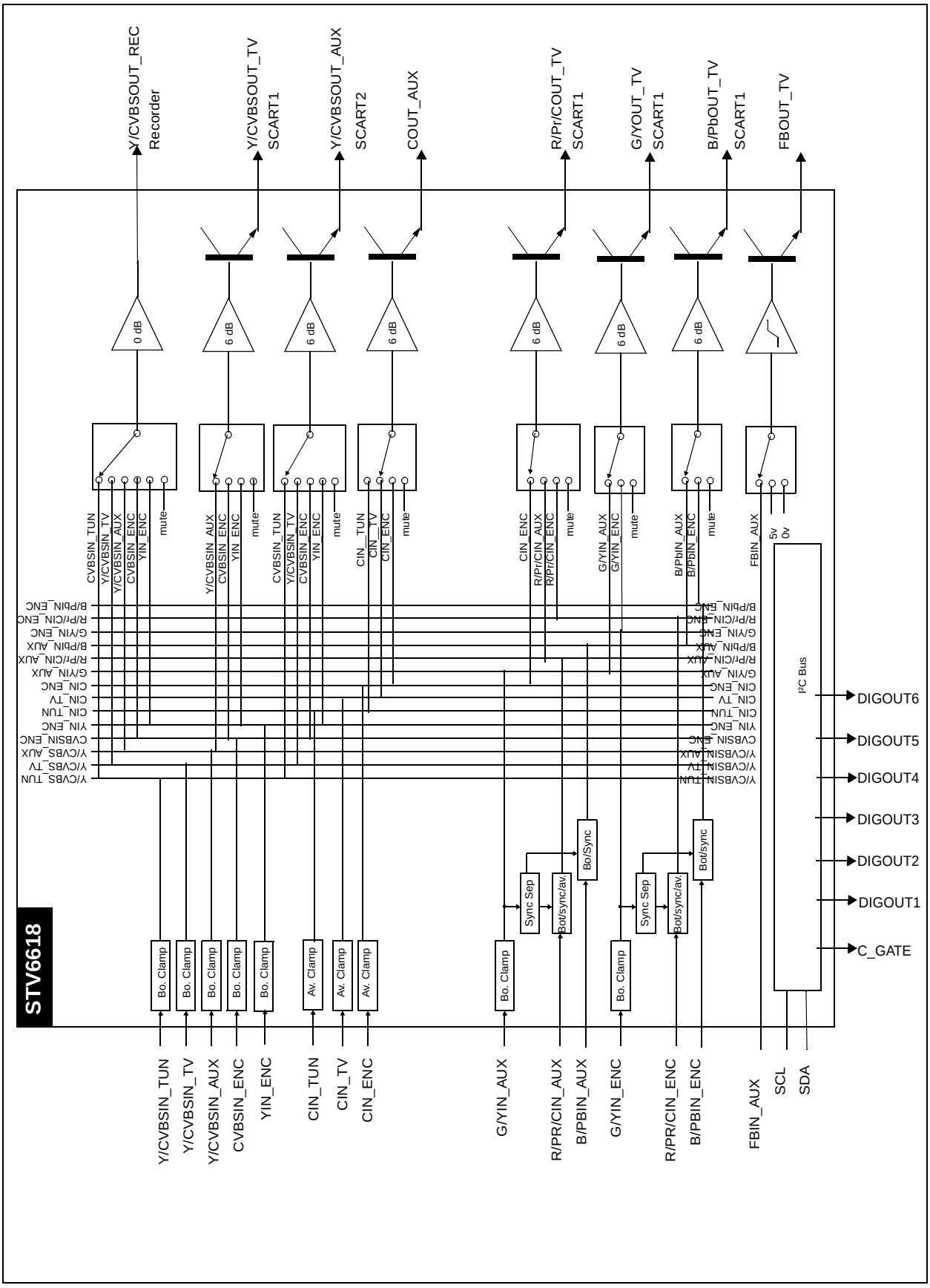
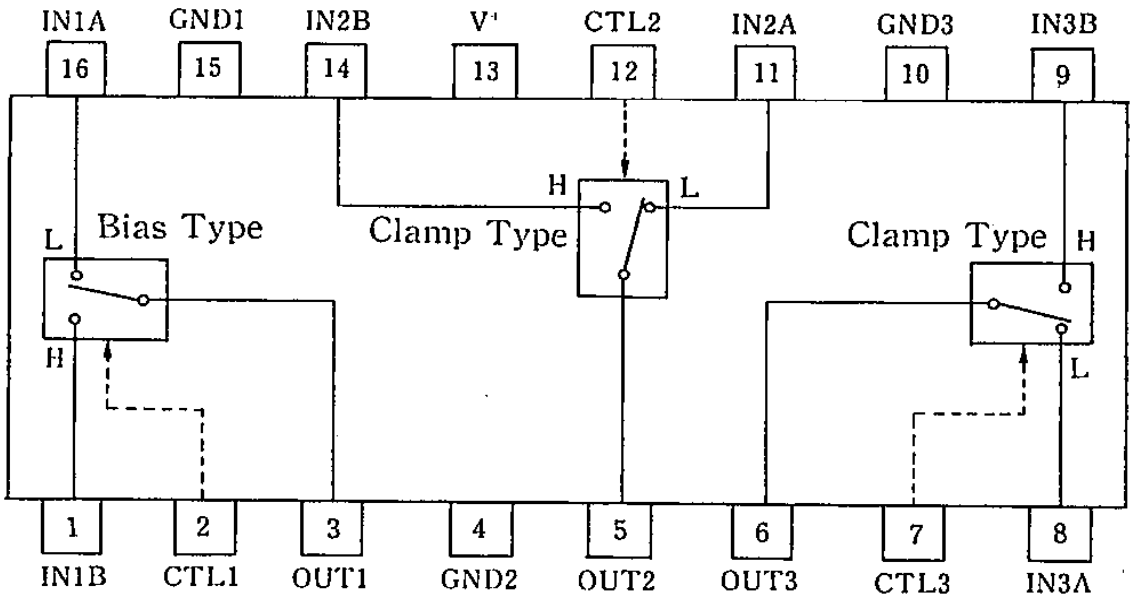


Figure 3: STV6618 Block Diagram



IC7411: NJM2285 Analog Board, Video Switch



NJM2285D
NJM2285M
NJM2285V

IC7313 TEA 1507 Analog Board, Power Supply Control

BLOCK DIAGRAM

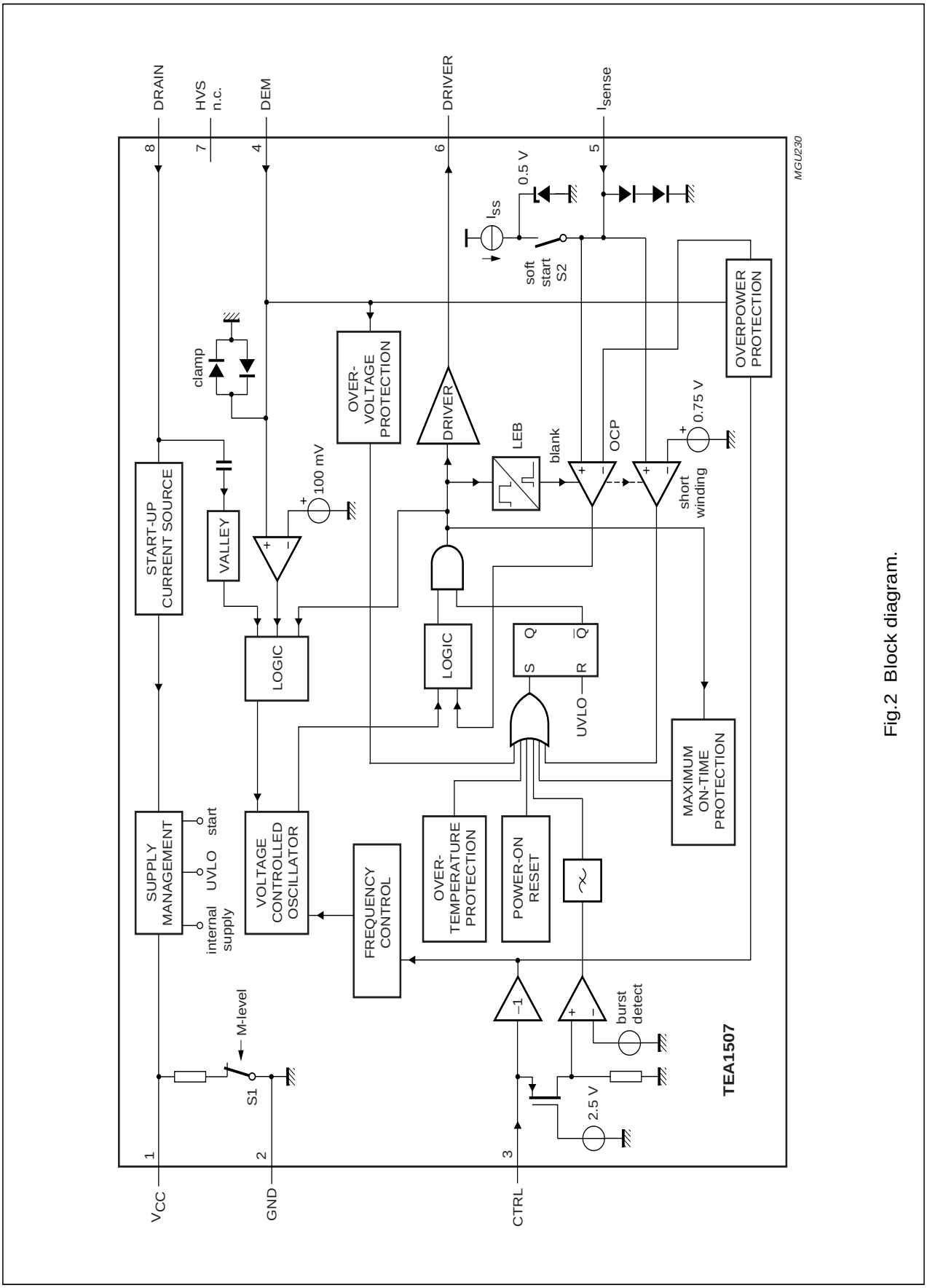
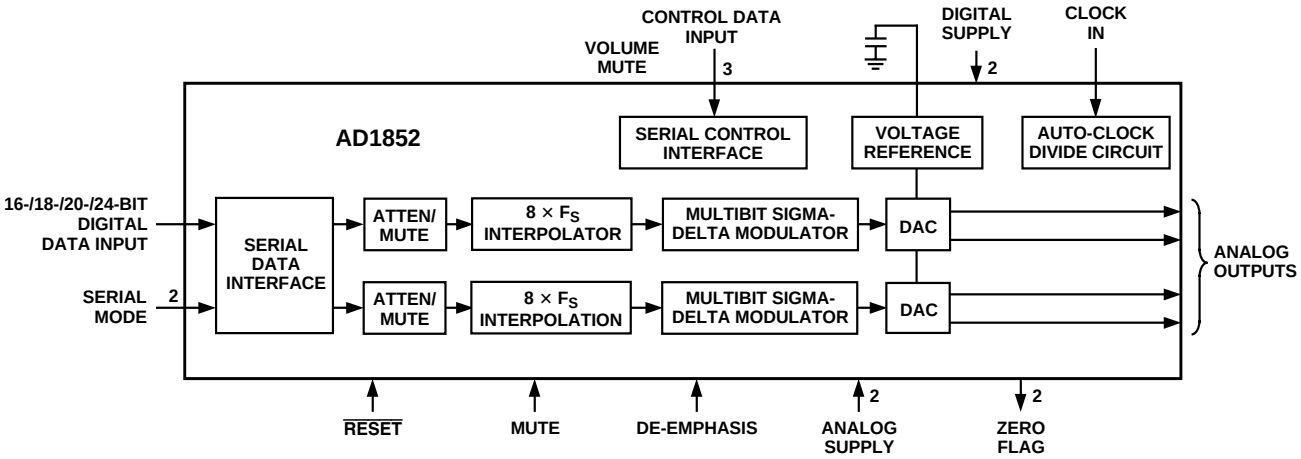


Fig.2 Block diagram.

IC7404: AD1582 Analog Board, Digital/Analogue Converter

FUNCTIONAL BLOCK DIAGRAM



AD1852

PIN FUNCTION DESCRIPTIONS

Pin	Input/Output	Pin Name	Description
1	I	DGND	Digital Ground.
2	I	MCLK	Master Clock Input. Connect to an external clock source at either 256 F_S, 384 F_S, 512 F_S, 768 F_S, or 1024 F_S.
3	I	CLATCH	Latch Input for Control Data. This input is rising-edge sensitive.
4	I	CCLK	Control Clock Input for Control Data. Control input data must be valid on the rising edge of CCLK. CCLK may be continuous or gated.
5	I	CDATA	Serial Control Input, MSB first, containing 16 bits of unsigned data per channel. Used for specifying channel-specific attenuation and mute.
6		NC	No Connect.
7	I	192/$\overline{48}$	Selects 48 kHz (LO) or 192 kHz Sample Frequency.
8	O	ZEROR	Right Channel Zero Flag Output. This pin goes HI when Right Channel has no signal input for more than 1024 LR Clock Cycles.
9	I	DEEMP	De-Emphasis. Digital de-emphasis is enabled when this input signal is HI. This is used to impose a 50 µs/15 µs response characteristic on the output audio spectrum at an assumed 44.1 kHz sample rate. Curves for 32 kHz and 48 kHz sample rates may be selected via SPI control register.
10	I	96/$\overline{48}$	Selects 48 kHz (LO) or 96 kHz Sample Frequency.
11, 15	I	AGND	Analog Ground.
12	O	OUTR+	Right Channel Positive Line Level Analog Output.
13	O	OUTR–	Right Channel Negative Line Level Analog Output.
14	O	FILTR	Voltage Reference Filter Capacitor Connection. Bypass and decouple the voltage reference with parallel 10 µF and 0.1 µF capacitors to the AGND.
16	O	OUTL–	Left Channel Negative Line Level Analog Output.
17	O	OUTL+	Left Channel Positive Line Level Analog Output.
18	I	AVDD	Analog Power Supply. Connect to Analog 5 V Supply.
19		FILTB	Filter Capacitor Connection. Connect 10 µF capacitor to AGND (Pin 15).
20	I	IDPM1	Input Serial Data Port Mode Control One. With IDPM0, defines 1 of 4 serial modes.
21	I	IDPM0	Input Serial Data Port Mode Control Zero. With IDPM1, defines 1 of 4 serial modes.
22	O	ZEROL	Left Channel Zero Flag Output. This pin goes HI when Left Channel has no signal input for more than 1024 LR Clock Cycles.
23	I	MUTE	Mute. Assert HI to mute both stereo analog outputs. Deassert LO for normal operation.
24	I	$\overline{\text{RESET}}$	Reset. The AD1852 is reset on the rising edge of this signal. The serial control port registers are reset to the default values. Connect HI for normal operation.
25	I	L/$\overline{\text{R}}$CLK	Left/$\overline{\text{Right}}$ Clock Input for Input Data. Must run continuously.
26	I	BCLK	Bit Clock Input for Input Data. Need not run continuously; may be gated or used in a burst fashion.
27	I	SDATA	Serial Input, MSB first, containing two channels of 16, 18, 20, and 24 bits of twos complement data per channel.
28	I	DVDD	Digital Power Supply Connect to digital 5 V supply.

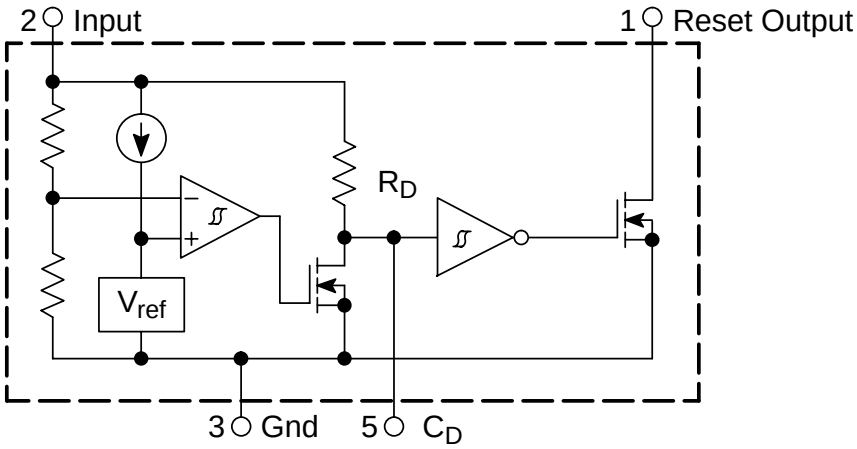
Table I. Serial Data Input Mode

IDPM1 (Pin 20)	IDPM0 (Pin 21)	Serial Data Input Format
0	0	Right-Justified
0	1	I^2S-Compatible
1	0	Left-Justified
1	1	DSP

9.8.3 ICs Digital Board Chrysalis

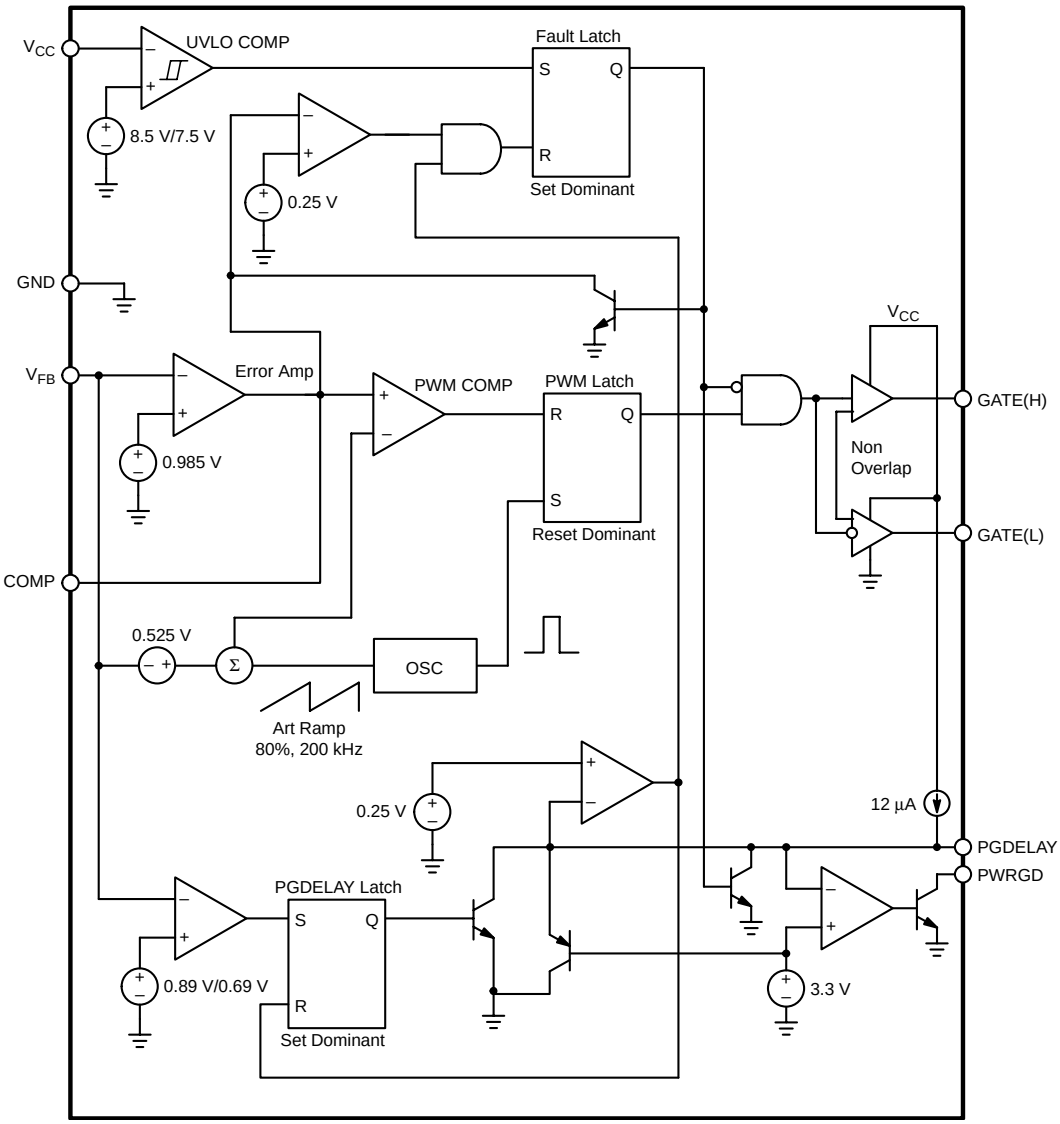
IC7106 NCP303LSN29, Digital Board 2.1 Chrysalis, Reset Circuit

NCP303LSNxxT1
Open Drain Output Configuration



IC7501 NCP1570D, Digital Board 2.1 Chrysalis, DC/DC Converter Control

NCP1570

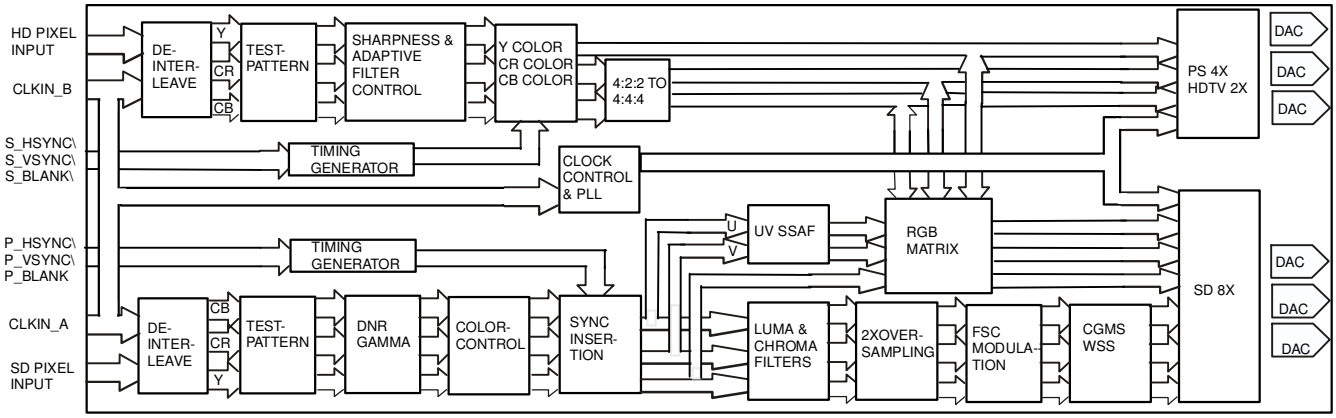


PACKAGE PIN DESCRIPTION

PACKAGE PIN # SO–8	PIN SYMBOL	FUNCTION
1	V_{CC}	Power supply input.
2	PWRGD	Open collector output goes low when V_{FB} is out of regulation. User must externally limit current into this pin to less than 20 mA.
3	PGDELAY	External capacitor programs PWRGD low–to–high transition delay.
4	COMP	Error amp output. PWM comparator reference input. A capacitor to LGND provides error amp compensation and Soft Start. Pulling pin < 0.45 locks gate outputs to a zero percent duty cycle state.
5	GATE(H)	High–side switch FET driver pin. Capable of delivering peak currents of 1.5 A.
6	GATE(L)	Low–side synchronous FET driver pin. Capable of delivering peak currents of 1.5 A.
7	V_{FB}	Error amplifier and PWM comparator input.
8	GND	Power supply return.

IC7703: ADV7302 Digital Board, Multi Format Progressive Scan Video Encoder

Block diagram of the ADV7302A/03A



PIN FUNCTION DESCRIPTIONS

Pin Mnemonic		Input/Output	Function
DGND	G		Digital Ground
AGND	G		Analog Ground
CLKIN_B	I		Pixel Clock Input. Requires a 27MHz reference clock for Progressive Scan Mode or a 74.25MHz (74.1758MHz) reference clock in HDTV mode. This clock input pin is only used in simultaneous SD and HD mode.
CLKIN_A	I		Pixel Clock Input for HD only or SD only modes.
COMP 1,2	O		Compensation Pin for DACs. Connect 0.1 µF Capacitor from COMP pin to V_{AA}.
DAC A	O		CVBS/ GREEN/ Y SD analog output.
DAC B	O		Luma/ BLUE/ U SD analog output.
DAC C	O		Chroma/ RED/ V SD analog output.
DAC D	O		in SD only mode: CVBS/GREEN/ Y analog output in HD only mode and simultaneous HD/SD : Y/ GREEN (HD) analog output.
DAC E	O		in SD only mode: Luma/BLUE/ U analog output in HD only mode and simultaneous HD/SD : Pr/ RED (HD) analog output.
DAC F	O		in SD only mode: Chroma/RED/ V analog output in HD only mode and simultaneous HD/SD : Pb/ BLUE (HD) analog output.
P_BLANK	I		Video Blanking Control Signal for HD sync in simultaneous SD/HD mode and HD HD only mode.
P_HSYNC	I		Video Horizontal Sync Control Signal for HD sync in simultaneous SD/HD mode and HD only mode.
P_VSYNC	I		Video Vertical Sync Control Signal for HD sync in simultaneous SD/HD mode and HD only mode.
S_BLANK	I/O		Video Blanking Control Signal for SD.
S_HSYNC	I/O		Video Horizontal Control Signal for SD. Option to o/p SD HSYNC or HD HSYNC in SD Slave Mode 0 and/or any HD mode.
S_VSYNC	I/O		Video Vertical Control Signal for SD. Option to o/p SD VSYNC or SD HSYNC in SD Slave Mode 0 and/or any HD mode.
C7-0	I		8-Bit Progressive scan/ HDTV input port for CrCb color data in 4:2:2 input mode. In 4:4:4 input mode this input port is used for the Cb [Blue/U] data. The LSB is set up on pin C0. In default mode the input on this port is output on DAC E.
Y7-0	I		8-Bit Progressive scan/ HDTV input port for Y data. The LSB is set up on pin Y0. In default mode the input on this port is output on DAC D.
S7-S0	I		8-Bit Standard Definition input port. Or Progressive Scan/ HDTV input port for Cr [Red/V] color data in 4:4:4 input mode. The LSB is set up on pin S0. In default mode the input on this port is output on DAC F.
RESET	I		This input resets the on-chip timing generator and sets the ADV7302A/03A into Default Register setting. Reset is an active low signal.

$R_{SET1,2}$	I	A 760 Ohms resistor must be connected from this pin to AGND and is used to control the amplitudes of the DAC outputs.
SCL	I	Multifunctional input: MPU Port Serial Interface Clock Input.
SDA	I/O	Multifunctional pin: MPU Port Serial Data Input/Output.
ALSB	I	Multifunctional pin. TTL Address Input. This signal sets up the LSB of the MPU address. When this pin is tied low the I2C filter is activated which reduces noise on the I2C interface. When this pin is tied high, the input bandwidth on the I2C lines is increased.
I2C	I	When this input pin is tied high [Vdd_IO], the ADV7302A/03A interfaces over the I2C port.
V_{DD_IO}	P	Power supply for digital i/ps and o/ps
V_{DD}	P	Digital power supply
V_{AA}	P	Analog power supply
V_{REF}	I/O	Optional External Voltage Reference Input for DACs or Voltage Reference Output (1.235V).
EXT_LF	I	External Loop filter for the internal PLL.
RTC_SCR_TR	I	Multifunctional Input: Real Time Control (RTC) input, Timing Reset input, Subcarrier Reset input.

9.9 List of Abbreviations

Analog Board

+5VSTBY	Permanent Supply 5V
8SC2	Pin8 Scart2 (only for Europe)
A_DATA	Data from Analog- to Digital-Board (UART-Communication)
A_RDY	Analog-board ready (status information to digital-board)
A18 - A19	Parallel Address Bus (CC - Flash-ROM and S-RAM)
A8 - A17	Parallel Address Bus (CC - Flash-ROM and S-RAM)
AD0 - AD7	Parallel Address Bus (CC - Flash-ROM and S-RAM)
AFC	Automatic Frequency Control
AFEL	Audio Frontend Left
AFER	Audio Frontend Right
AGC / WSRI	Automatic Gain Control (for Europe), Wide Screen Rear In (for NTSC)
AINFL	Audio In Front Left
AINFR	Audio In Front Right
AKILL	Audio Kill Signal
ALADC	Audio Left to ADC
ALDAC	Audio Left from DAC
ALE	Address Latch Enable
AM0	Adress-mode 0
AM1	Adress-mode 1
ARADC	Audio Right to ADC
ARDAC	Audio Right from DAC
ASCC1	Audio Scart 1 Mute (System Clock Output for Real time Clock-Adjustment)
AVCC	Power Supply for A/D-converter
AVSS	GND-Pin for A/D-converter
CFIN	Chroma Front In
CS0_	Chip Select 0 (CC - S-RAM)
CS2_	Chip Select 2 (CC - Flash-ROM)
CVBSFIN	Video Front In
D_DATA	Data from Digital- to Analog-Board (UART-Communication)
D_RDY	Digital-board ready (status information from digital-board)
DAC_MUTE	Mute Signal for DAC
DAOUT	Digital Audio Out
DVAL	Audio from Digital Video In Left
DVAR	Audio from Digital Video In Right
DVCC1	Power Supply Pin
DVCC2	Power Supply Pin
DVCC3	Power Supply Pin
DVSS1	GND Pin
DVSS2	GND Pin
DVSS3	GND Pin
FAN_OFF	Fan for Basic engine
FBIN	Fast Blanking input
FOME	FOllow ME Status line (matching signals yes/no; only for Europe)
G1…10	DISPLAY GRID
INT	Interrupt OUT for the CC
INT	Interrupt – line from Display Print
ION	Inverse ON-Line
IPFAIL	Inverse Power Fail Detection
IPOR	Inverse Power On Reset
IRESET	Inverse Reset Input
K1	Key-Input-Line
K2	Key-Input-Line
KILL	Signal from IR-Receiver
P50 IN	P50 INput-line (only for Europe)
P50 OUT	P50 OUTput-line (only for Europe)
POR_DC	Power On Reset for Display Control Print (Ext_DL)
PSS	Output Enable ReaD (CC - Flash-ROM and S-RAM)
PWM_FIL	Control line for Filament Voltage Generation
PWONSW	Amplifier Switch Audio A/D Converter
RD_	Pal/Secam-Select
RECLED	Control Signal for REC-LED
RESET_DIG	Reset Line to Digital Board
RP_	Inverse Reset line to Flash-ROM
RSA1/2	Record Selector 1/2

RY/BY_	Ready/Busy – input line (from Flash-ROM)
SIF1	Sound intermediate frequency
SB1	Secam Band 1 (PCB-Test entrance)
SCL	IC-Bus
SCLSW	Switched I^2C-Bus
SDA	IC-Bus
SDASW	Switched I^2C-Bus
SFS_TS	SAW Filter Select Trap Select
STBY	Standby-Line (Flash_Toshiba)
SYNC	Video Sync input
TEMP_SENSE	Temperature Sense Line
VER	HW-version input
VFV	Video from Frontend
VKK	VFT Driver Power Supply
VREFH	Pin for Reference-voltage input to A/D-converter
VREFL	Pin for Reference-voltage input to A/D-converter
VS1/2	View Selector 1/2
WR_	Write Enable (CC - Flash-ROM and S-RAM)
WSFI	Wide Screen Signalling Front In
WU	Wake Up
X1	Oscillator Pin
X12	Oscillator Pin
XIN	Oscillator Pin
XOUT	Oscillator Pin
XT1	Low Frequency Oscillator Pin
XT2	Low Frequency Oscillator Pin
YFIN	Luminance Front In

Digital Board Chrysalis

ADC	Analog to Digital Converter
DAC	Digital to Analog Converter
DENC	Digital (Video) Encoder (Video DAC)
DV	Digital Video (Camcorder)
EF	Emitter Follower
OSD	On-Screen Display
VIP	Video Input Processor (Video ADC)
2Fh	Progressive scan video
2V5	+2V5 Power supply for Link+Codec IC7431
3V3	+3V3 Power supply
3V3_A	+3V3 Analog power supply for PHY IC7400
3V3_D	+3V3 Digital power supply for PHY IC7400
3V3_DLY	+3V3 Power supply for IC7500
3V3_LINK	+3V3 Power supply for Link+Codec IC7431
3V3_F	+3V3 Power supply for optional Flash memory IC7432
3V3_RAM	+3V3 Power supply for SDRAM IC7430
3V3_uP	+3V3 Power supply for Micro-controller IC7802
3V3_32kHz	+3V3 Power supply for audio format adaptation circuitry IC7507 and IC7508
3V3_AC	+3V3 Power supply for audio system clock generator IC7605 and IC7606
+5V	+5V Power supply
5V_PLL	+5V Power supply for VCO of audio PLL IC7604
A (1:17)	Flash address lines of uPD72893
A_MUTE	Audio Mute
ABCK	Audio Bit Clock
AD (1:10)	Address bus lines for Host I/F of Link+Codec IC7431
AEMP1	PCM1 emphasis ON/OFF for PCM1 output
AFS1	Audio sampling frequency indication signal
ALRCLK	Audio Word Select
AMCLK44	11.2896MHz (=256 * 44.1 kHz) audio master clock signal for 44.1 kHz audio
AMCLK48	12.288MHz (=256 * 48 kHz) audio master clock signal for 32 kHz and 48 kHz audio
APWM	PWM signal for audio PLL
ASIC	Application Specific Integrated Circuit
BUFENn_AUD	Buffer Enable Audio
BUFENn_VID	Buffer Enable Video
CLK27M_CON	27MHz Clock to Digital Board
CS	Parallel interface chip select input of Link+Codec IC7431
CTL (0:1)	Link interface control lines
CTSN	Clear to Send
D (0:15)	Flash data lines of Link+Codec IC7431
DCDi	Directional Correlational Deinterlacing. Circuitry that reduces jaggies on diagonal edges when deinterlacing video-sourced material.
DV_STATUS	Interrupt pin for reading DV-status
HS_CLK	Video clock input of Link+Codec IC7431
INT	Interrupt request output of Link+Codec IC7431 (input to Micro-Controller)
IOR	Parallel interface IO read control input of Link+Codec IC7431
ISPN	In System Programming signal (used for programming IC7802)
LKON	Link-on signal outputLPSLink power status inputLREQLink request input
MA (0:10)	SDRAM address lines of Link+Codec IC7431
MCAS	SDRAM column address strobe signal
MCLK	SDRAM clock signal
MD (0:15)	SDRAM data lines of Link+Codec IC7431
MRAS	SDRAM row-address strobe signal
MWE	SDRAM write enable signal
PCM1	Audio Serial Data Output of Link+Codec IC7431
PCM1_NEW	'MSB justified' to I2S converted audio serial data; audio serial data input of audio DAC UDA1334A
PD (0:15)	Data bus lines for Host I/F of Link+Codec IC7431
PHY_D (0:7)	Data bus connection between PHY and LINK device
RESETn	DVIO board reset
RESET_FM	Reset signal driven by Flashmaster programming device
RESTB	Reset input of Link+Codec IC7431
RTSN	Request to Send
RWZ	Parallel interface read/write control input of Link+Codec IC7431
RXD	Receive Data
SCLK	Link control output clock
TXD	Transmit Data
VPP	+10V switchable programming voltage of microcontroller
YUV (0:7)	Digital Video

10. Spare Parts List

10.1 Exploded View of the Set

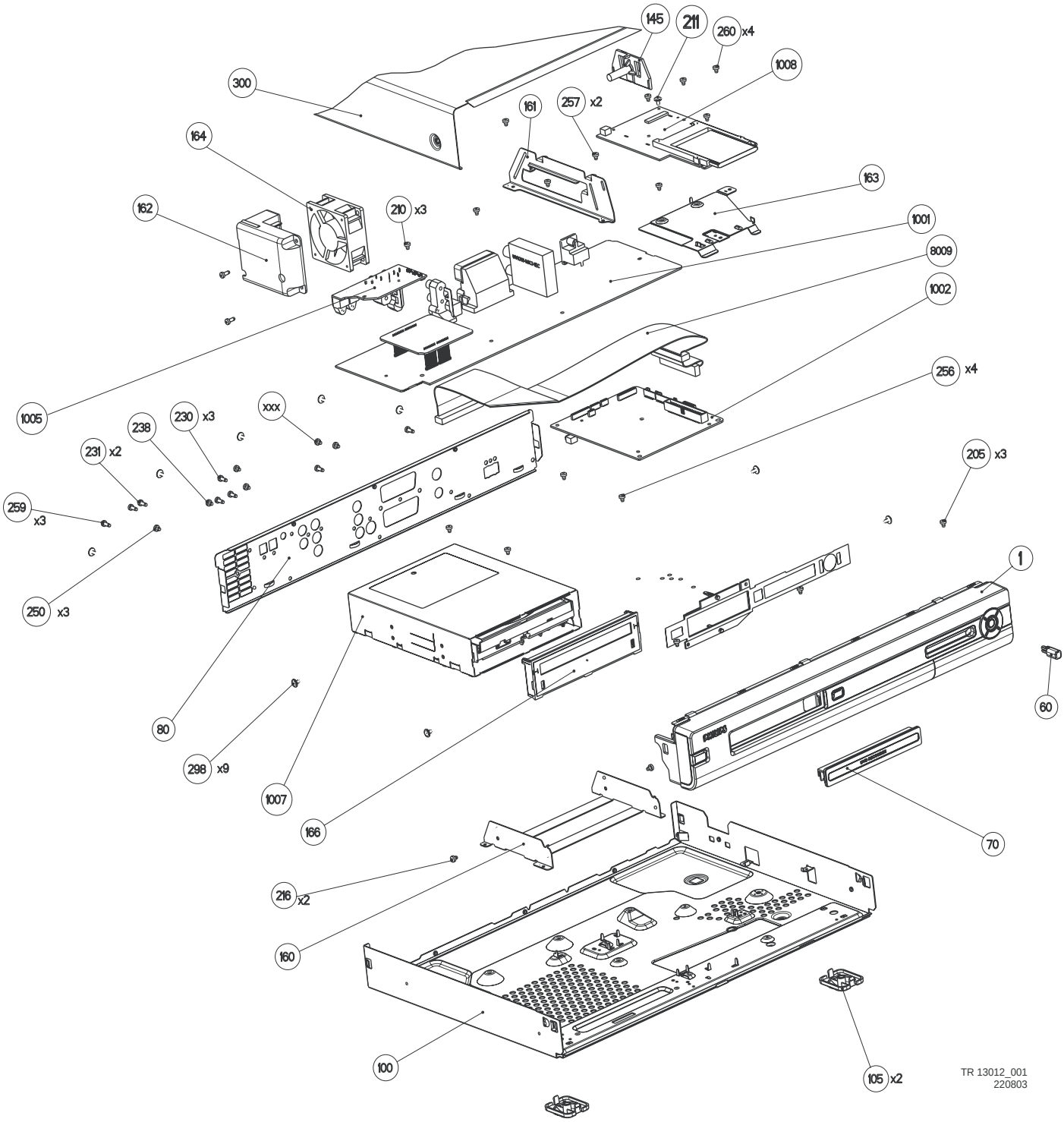


Figure 10-1

10.2 Exploded View of the Front Panel Complete

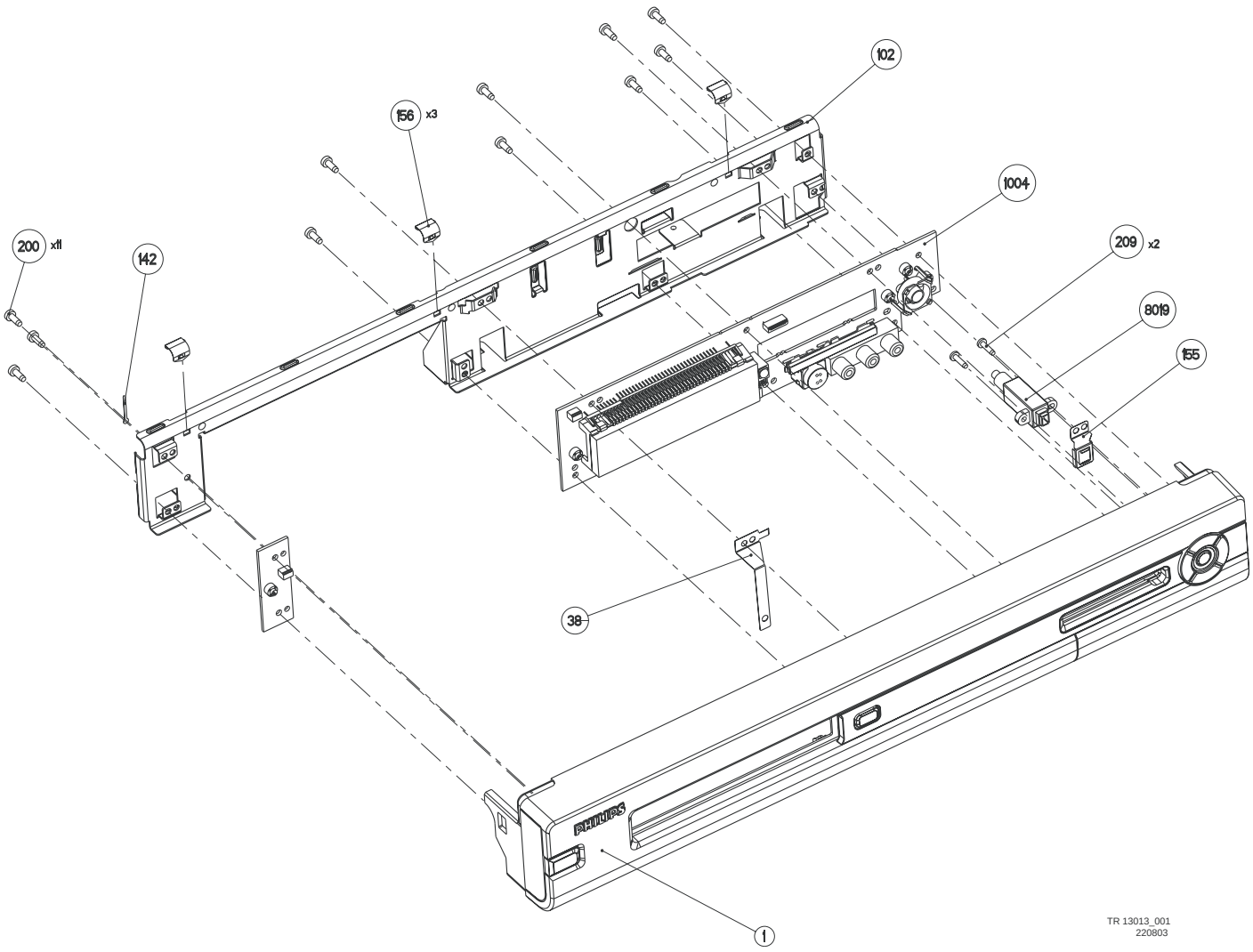


Figure 10-2

10.3 Exploded View of the Front without PWBs

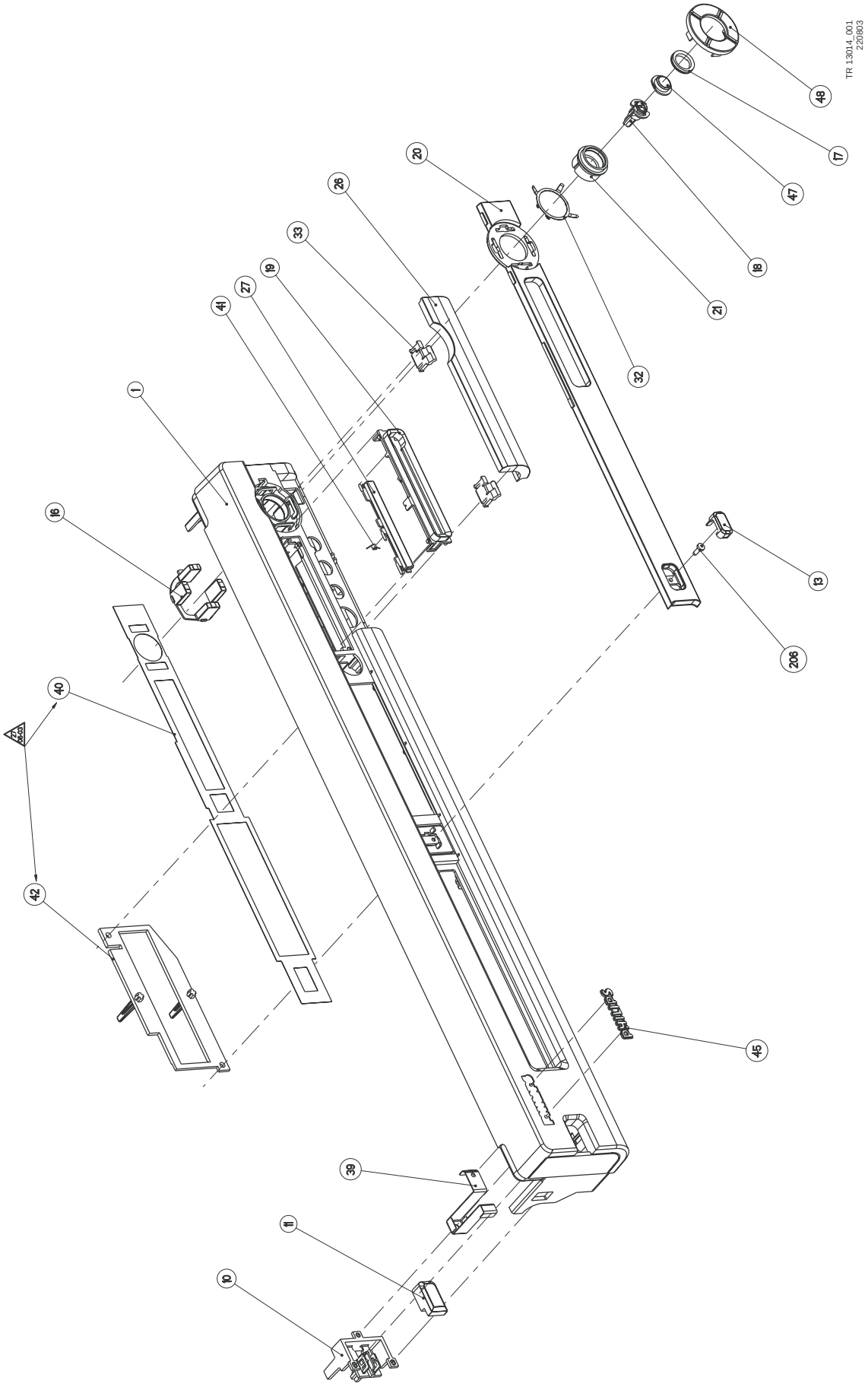


Figure 10-3

Mechanical

Various

0001	3103 607 90551	PANEL FRONT UK
0001	3103 607 90831	PANEL FRONT 730/EU
0011	3103 607 50341	BUTTON CAP STAND BY
0013	3103 607 50361	BUTTON CAP OPEN CL.
0020	3103 607 50611	WINDOW DISPLAY
0026	3103 607 50961	DOOR FRONT AV UK
0026	3103 607 51381	DOOR FRONT AV 730/EU
0033	3103 604 00441	HINGE DOOR FRONT AV
0047	3103 607 50411	BUTTON CAP RECORD
0048	3103 607 50991	RING ROCKER PL/ PAUSE
0048	3103 607 51101	RING ROCKER PL/ PAUSE
0060	3103 607 50671	BUTTON CAP EJECT ASSY
0070	3103 607 90411	COVER TRAY
0105	3103 607 50491	FOOT ASSY
0164	3103 308 52950	FAN KD120 6PTS 3 - C112
0300	3103 607 50681	COVER ASSY
0350	3128 147 15411	RC19046005/01
0351	2422 070 98133	MAINSCORD EUR 1M5 BK
0351	4822 321 10713	MAINS CORD UK
0352	2422 076 00532	CBLE SCART 1M5
0357	4822 320 50377	CONNECT. CABLE PAL
1008	2822 062 41022	CARD READER WRITER IIA
8004	3103 601 00220	FFC 10-POL-D-TYP 350MM (UP-DB)
8005	3103 601 00230	FFC 22-POL-A-TYP 210MM (AB-DB)
8008	3103 601 00441	CBLE KR 12P/130/12P UL
8009	3103 601 00461	CBLE IDE 40P/470/40P UL
8010	3103 601 00280	FFC 10-POL-A-TYP 650MM (AB-DC)
8012	3103 601 00471	CBLE EHR 4P/180/4P LC UL
8013	3103 601 00310	KR 9POL GESCH 370MM
8019	3103 601 00360	IEEE 1394 CHRYSALIS 350MM
8020	3103 601 00370	FFC 6-POL-D-TYP 220MM (DIO-DB)
8026	3103 601 00431	FFC 22-POL-A-TYP 245MM (AB-DB)
8028	3103 601 00481	CBLE KR 2P/230/2P KR UL
8029	3103 601 00320	FFC 7-POL-D-TYP 280MM (DIO-EP)

Display Board

Various

1110	4822 242 82114	EFOEC8004/T4
1130	4822 276 13732	Tact switch
1165	4822 276 13732	Tact switch
1166	4822 276 13732	Tact switch
1167	4822 276 13732	Tact switch
1168	4822 276 13732	Tact switch
1169	4822 276 13732	Tact switch
1170	4822 276 13732	Tact switch
1910	4822 267 11031	10P. FEM. V
1911	3103 601 00180	CABLE TREE ASSY 2 POL
1920	2422 026 05301	SOC CINCH V 3P
1921	2422 026 05307	CON MDIN H 4P F YKF51
1922	2422 025 10185	CON H 9P M

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2100	5322 126 11583	10nF 10% 50V 0603
2101	3198 017 34730	47nF 16V 0603
2102	4822 124 11946	22µF 20% 16V
2103	5322 126 11583	10nF 10% 50V 0603
2104	2238 586 59812	100nF 20-80% 50V 0603
2110	4822 124 21732	10µF 20% 25V
2111	3198 017 34730	47nF 16V 0603
2112	4822 126 13879	220nF 20% 16V
2113	5322 121 42498	680nF 5% 63V
2114	5322 126 11578	1nF 10% 50V 0603
2115	3198 024 44730	47nF 50V 0603
2116	4822 124 11946	22µF 20% 16V
2117	4822 124 81151	22µF 50V
2118	2020 552 94427	100pF 5% 50v 0603
2119	2020 552 94427	100pF 5% 50v 0603
2120	2020 552 94427	100pF 5% 50v 0603
2121	2020 552 94427	100pF 5% 50v 0603
2122	2020 552 94427	100pF 5% 50v 0603
2123	2020 552 94427	100pF 5% 50v 0603
2124	2020 552 94427	100pF 5% 50v 0603
2125	2020 552 94427	100pF 5% 50v 0603
2126	2020 552 94427	100pF 5% 50v 0603
2200	4822 126 14241	330pF 50V 0603
2201	4822 126 14241	330pF 50V 0603
2202	2238 586 59812	100nF 20-80% 50V 0603

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3100	4822 051 30223	22kΩ 5% 0.062W
3101	4822 051 30223	22kΩ 5% 0.062W
3102	4822 051 30222	2.2kΩ 5% 0.062W
3103	4822 051 30221	220Ω 5% 0.062W
3104	4822 051 30103	10kΩ 5% 0.062W
3106	4822 117 12925	47kΩ 1% 0.063W 0603
3107	4822 051 30222	2.2kΩ 5% 0.062W
3108	4822 117 12925	47kΩ 1% 0.063W 0603
3110	4822 051 30221	220Ω 5% 0.062W
3111	4822 051 30223	22kΩ 5% 0.062W
3112	4822 050 11002	1kΩ 1% 0.4W
3113	4822 051 30102	1kΩ 5% 0.062W
3114	4822 051 30101	100Ω 5% 0.062W
3115	4822 051 30101	100Ω 5% 0.062W
3116	4822 051 30331	330Ω 5% 0.062W
3117	4822 051 30103	10kΩ 5% 0.062W
3118	4822 051 30331	330Ω 5% 0.062W
3119	4822 051 30471	470Ω 5% 0.062W
3120	4822 051 30102	1kΩ 5% 0.062W
3121	4822 116 83872	220Ω 5% 0.5W
3122	4822 051 30103	10kΩ 5% 0.062W
3123	4822 051 30471	470Ω 5% 0.062W
3124	4822 051 30103	10kΩ 5% 0.062W
3125	4822 051 30471	470Ω 5% 0.062W
3126	4822 051 30101	100Ω 5% 0.062W
3127	4822 117 13632	100kΩ 1% 0603 0.62W
3128	4822 117 13632	100kΩ 1% 0603 0.62W
3130	4822 051 30103	10kΩ 5% 0.062W
3132	4822 051 30102	1kΩ 5% 0.062W
3134	4822 117 12063	NTC DC 5W 10K 5%
3137	4822 116 83876	270Ω 5% 0.5W
3139	4822 116 83876	270Ω 5% 0.5W
3141	4822 117 12925	47kΩ 1% 0.063W 0603
3144	4822 051 30103	10kΩ 5% 0.062W
3147	4822 051 30223	22kΩ 5% 0.062W
3148	4822 051 30223	22kΩ 5% 0.062W
3149	4822 051 30223	22kΩ 5% 0.062W
3150	4822 051 30223	22kΩ 5% 0.062W
3151	4822 051 30223	22kΩ 5% 0.062W
3152	4822 051 30223	22kΩ 5% 0.062W
3153	4822 051 30223	22kΩ 5% 0.062W
3200	4822 051 30102	1kΩ 5% 0.062W
3201	4822 051 30105	1MΩ 5% 0.062W
3202	4822 051 30102	1kΩ 5% 0.062W
3203	4822 051 30105	1MΩ 5% 0.062W
3204	4822 051 30689	68Ω 5% 0.063W 0603
3205	4822 051 30759	75Ω 5% 0.062W
3206	4822 051 30759	75Ω 5% 0.062W
3207	4822 051 30759	75Ω 5% 0.062W
3300	4822 051 30472	4.7kΩ 5% 0.062W
4112	4822 051 30008	Jumper 0603
4113	4822 051 20008	Jumper 0805
4121	4822 051 30008	Jumper 0603
4122	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603

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5100	4822 157 11706	10µH 5%
5101	2422 549 44607	Bead 600Ω at 100MHz
5103	2422 549 44607	Bead 600Ω at 100MHz
5104	4822 157 50964	100µH 20%

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6100	4822 130 11416	PDZ6.8B
6101	9322 190 44676	LTL-1MHHR
6102	9322 190 44676	LTL-1MHHR
6103	9322 190 44676	LTL-1MHHR
6105	4822 130 11397	BAS316
6106	4822 130 11397	BAS316
6111	4822 130 11397	BAS316
6200	9322 146 61685	DF3A6.8FU
6201	9322 146 61685	DF3A6.8FU
6202	9322 146 61685	DF3A6.8FU
6203	9322 146 61685	DF3A6.8FU
6204	9322 146 61685	DF3A6.8FU

7100	2722 171 07736	VFD BJ900GNK
7101	3198 010 42310	BC847BW
7102	3198 010 42310	BC847BW
7103	3103 165 13731	TMP87C874F/LDCP1
7104	3198 010 42310	BC847BW
7105	3198 010 42310	BC847BW
7106	4822 130 40981	BC337-25
7107	9322 185 95667	TSOP4836
7108	4822 130 41246	BC327-25
7109	3198 010 42310	BC847BW
7112	4822 130 60854	DTA124EU-W

Analog Board

Various

1001	2422 086 10919	Fuse 65V 125mA
1300	4822 253 30383	19181 (2,5A)
1301	4822 265 11253	Fuse holder 2p
1302	4822 252 11215	Spark gap
1303	4822 071 51002	19372(1A)
1304	2422 086 10786	FUSE 4A
1304	4822 071 54002	19372(4A)
1306	2422 086 10919	Fuse 65V 125mA
1307	4822 071 51002	19372(1A)
1308	2422 086 10951	PROT DEV 65V 500MA PSC
1308	4822 252 51187	19398E1(0,500A)
1309	2422 086 10783	FUSE RAD LT 2A 250V IECA
1309	9965 000 07788	FUSE RAD T2A IEC UL250V
1600	4822 242 10434	Crystal 18.432 MHz
1701	4822 242 81436	Filter OFWK3953M
1702	2422 549 44341	SAW 38.9MHz OFWK9656M
1703	4822 242 10307	OFWG3956M
1704	2422 549 44611	FIL CER 5MHZ5 TPSR*MBQ2 BS
1704	4822 242 72586	TPS5,5MB-TF20
1705	3139 147 17001	TUNER UV1316MK3
1900	2422 025 18009	CON V 22P F
1900	4822 265 11154	Connector 22p
1931	2422 030 00304	Socket 2P m h mains
1931	2422 030 00413	SOC POW 2P M
1932	2422 025 10772	CON V 12P M
1934	4822 267 10565	Connector 4p
1935	2422 025 09405	CON 2P M
1940	2422 033 00334	CON BM EURO H 42P
1942	2422 025 10769	CON 9P VERT
1943	2422 025 18143	CON V 10P F
1943	4822 267 11031	10P. FEM. V
1947	2422 025 18009	CON V 22P F
1947	4822 265 11154	Connector 22p
1948	4822 267 10994	Socket SVHS
1949	2422 026 05308	SOC CINCH H 3P
1990	4822 242 73552	13,875 000 MC

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2000	4822 124 80483	47µF20% 6,3V
2001	4822 124 42234	100µF 20% 6,3V
2002	4822 124 42234	100µF 20% 6,3V
2003	2238 586 59812	100nF 20-80% 50V 0603
2004	2238 586 59812	100nF 20-80% 50V 0603
2006	2238 916 11449	1NF 2% NPO 25V 0603
2008	2238 916 11449	1NF 2% NPO 25V 0603
2009	2020 552 94427	100pF 5% 50v 0603
2011	2238 586 59812	100nF 20-80% 50V 0603
2012	2238 586 59812	100nF 20-80% 50V 0603
2015	3198 017 41050	1µF 10V 0603
2017	2020 552 94427	100pF 5% 50v 0603
2018	4822 124 21732	10µF 20% 25V
2019	4822 124 21732	10µF 20% 25V
2020	4822 124 21732	10µF 20% 25V
2021	2238 586 59812	100nF 20-80% 50V 0603
2022	3198 017 41050	1µF 10V 0603
2023	2238 916 11449	1NF 2% NPO 25V 0603
2025	2238 916 11449	1NF 2% NPO 25V 0603
2030	2238 916 11449	1NF 2% NPO 25V 0603
2032	2238 916 11449	1NF 2% NPO 25V 0603
2033	2020 552 94427	100pF 5% 50v 0603
2035	2238 586 59812	100nF 20-80% 50V 0603
2037	2238 586 59812	100nF 20-80% 50V 0603
2038	4822 124 42234	100µF 20% 6,3V
2041	2020 552 94427	100pF 5% 50v 0603
2042	2238 586 59812	100nF 20-80% 50V 0603
2043	4822 124 80483	47µF20% 6,3V
2045	2238 916 11449	1NF 2% NPO 25V 0603
2047	2238 916 11449	1NF 2% NPO 25V 0603
2048	2020 009 90097	100µF BP 16V 20%
2048	2022 036 00005	10µF 16V 20%
2048	4822 124 12392	47?F 20% 16V
2049	5322 126 11583	10nF 10% 50V 0603
2050	2020 009 90097	100µF BP 16V 20%
2050	2022 036 00005	10µF 16V 20%
2050	4822 124 12392	47?F 20% 16V
2301	2020 554 90173	2.2nF 20% 250V
2302	4822 121 10512	220nF 275V 20%
2303	4822 122 31175	1nF 10% 500V
2304	4822 121 51598	2.2nF 5% 400V
2305	2020 021 91506	1000µF 20% 16V

2306	2020 021 91528	560µF 6V3 20%
2307	4822 122 31175	1nF 10% 500V
2308	2022 318 00108	47nF 250V 10%
2308	4822 121 70386	47nF 10% 250V
2309	2222 151 90053	68µF 400V 20%
2310	5322 126 11578	1nF 10% 50V 0603
2311	5322 126 11578	1nF 10% 50V 0603
2312	2020 021 91506	1000µF 20% 16V
2313	2020 021 91528	560µF 6V3 20%
2315	4822 126 14525	47pF 5% 1kV
2317	5322 126 11578	1nF 10% 50V 0603
2318	4822 126 10206	2.2nF 10% 500V
2319	2020 021 91506	1000µF 20% 16V
2320	4822 124 40849	330µF 20% 16V
2321	2238 586 59812	100nF 20-80% 50V 0603
2322	2020 021 91506	1000µF 20% 16V
2323	4822 124 42234	100µF 20% 6,3V
2324	2238 586 59812	100nF 20-80% 50V 0603
2325	4822 124 81151	22µF 50V
2326	4822 121 41857	10nF 5% 250V
2327	2238 586 59812	100nF 20-80% 50V 0603
2328	4822 124 81151	22µF 50V
2329	2238 586 59812	100nF 20-80% 50V 0603
2330	5322 126 11578	1nF 10% 50V 0603
2331	2238 586 59812	100nF 20-80% 50V 0603
2332	4822 124 22651	1µF 20% 50V
2334	2238 586 59812	100nF 20-80% 50V 0603
2335	4822 124 21732	10µF 20% 25V
2336	2238 586 59812	100nF 20-80% 50V 0603
2338	2238 586 59812	100nF 20-80% 50V 0603
2339	3198 017 41050	1µF 10V 0603
2340	2020 554 90169	470pF 250V 10%
2341	3198 017 41050	1µF 10V 0603
2342	3198 017 41050	1µF 10V 0603
2343	2238 586 59812	100nF 20-80% 50V 0603
2402	2238 586 59812	100nF 20-80% 50V 0603
2403	4822 124 80483	47µF20% 6,3V
2404	2238 586 59812	100nF 20-80% 50V 0603
2405	4822 124 80483	47µF20% 6,3V
2406	5322 126 11583	10nF 10% 50V 0603
2407	4822 122 33741	10pF 10% 50V
2408	3198 017 41050	1µF 10V 0603
2409	2238 586 59812	100nF 20-80% 50V 0603
2410	3198 017 41050	1µF 10V 0603
2411	2238 586 59812	100nF 20-80% 50V 0603
2412	4822 122 33741	10pF 10% 50V
2413	4822 124 80483	47µF20% 6,3V
2414	2238 586 59812	100nF 20-80% 50V 0603
2416	3198 017 41050	1µF 10V 0603
2417	4822 124 11947	10?F 20% 16V
2418	3198 017 41050	1µF 10V 0603
2419	3198 017 41050	1µF 10V 0603
2420	2238 586 59812	100nF 20-80% 50V 0603
2421	4822 124 11947	10?F 20% 16V
2422	5322 126 11583	10nF 10% 50V 0603
2423	3198 017 41050	1µF 10V 0603
2424	4822 124 80483	47µF20% 6,3V
2425	2238 586 59812	100nF 20-80% 50V 0603
2427	3198 017 41050	1µF 10V 0603
2428	4822 124 11947	10?F 20% 16V
2429	4822 124 11946	22µF 20% 16V
2430	2238 586 59812	100nF 20-80% 50V 0603
2432	4822 124 42234	100µF 20% 6,3V
2433	3198 017 34730	47nF 16V 0603
2434	4822 124 80483	47µF20% 6,3V
2435	2238 586 59812	100nF 20-80% 50V 0603
2436	3198 017 41050	1µF 10V 0603
2437	3198 017 41050	1µF 10V 0603
2438	3198 017 41050	1µF 10V 0603
2439	2238 586 59812	100nF 20-80% 50V 0603
2440	3198 017 41050	1µF 10V 0603
2441	3198 017 41050	1µF 10V 0603
2442	4822 124 11946	22µF 20% 16V
2443	4822 124 42234	100µF 20% 6,3V
2444	4822 126 13881	470pF 5% 50V
2445	4822 126 13881	470pF 5% 50V
2446	3198 017 41050	1µF 10V 0603
2447	4822 126 13881	470pF 5% 50V
2448	4822 126 13881	470pF 5% 50V
2450	2238 586 59812	100nF 20-80% 50V 0603
2459	3198 017 41050	1µF 10V 0603
2460	4822 124 40769	4.7µF 20% 100V
2461	4822 124 40769	4.7µF 20% 100V
2462	4822 124 11947	10?F 20% 16V
2463	4822 124 11947	10?F 20% 16V
2464	4822 124 21732	10µF 20% 25V
2501	3198 017 41050	1µF 10V 0603
2502	2238 586 59812	100nF 20-80% 50V 0603
2503	2238 586 59812	100nF 20-80% 50V 0603
2504	3198 017 41050	1µF 10V 0603
2505	3198 017 41050	1µF 10V 0603
2506	3198 017 41050	1µF 10V 0603
2507	3198 017 41050	1µF 10V 0603
2508	3198 017 41050	1µF 10V 0603
2509	2238 586 59812	100nF 20-80% 50V 0603
2510	4822 124 42234	100µF 20% 6,3V
2511	2020 009 90097	100µF BP 16V 20%
2511	2022 036 00005	10µF 16V 20%
2512	2238 586 59812	100nF 20-80% 50V 0603
2513	2020 552 96807	1µF 10V 0603 X5R
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	2020 552 96807	1µF 10V 0603 X5R
2516	2020 009 90097	100µF BP 16V 20%
2516	2022 036 00005	10µF 16V 20%
2517	5322 126 11578	1nF 10% 50V 0603
2518	2238 586 59812	100nF 20-80% 50V 0603
2519	4822 124 42234	100µF 20% 6,3V
2520	5322 126 11578	1nF 10% 50V 0603
2521	2238 586 59812	100nF 20-80% 50V 0603
2522	2020 009 90097	100µF BP 16V 20%
2522	2022 036 00005	10µF 16V 20%
2523	5322 126 11578	1nF 10% 50V 0603
2524	3198 017 41050	1µF 10V 0603
2525	3198 017 41050	1µF 10V 0603
2526	2020 009 90097	100µF BP 16V 20%
2526	2022 036 00005	10µF 16V 20%
2527	5322 126 11578	1nF 10% 50V 0603
2530	2238 586 59812	100nF 20-80% 50V 0603
2535	2238 586 59812	100nF 20-80% 50V 0603
2536	2238 586 59812	100nF 20-80% 50V 0603
2600	4822 124 21732	10µF 20% 25V
2601	5322 126 11583	10nF 10% 50V 0603
2602	4822 124 21732	10µF 20% 25V
2603	2238 586 59812	100nF 20-80% 50V 0603
2604	5322 126 11583	10nF 10% 50V 0603
2605	4822 124 21732	10µF 20% 25V
2606	2238 586 59812	100nF 20-80% 50V 0603
2607	4822 126 14225	56pF 5% 50V 0603
2608	4822 124 21732	10µF 20% 25V
2609	4822 126 14225	56pF 5% 50V 0603
2610	5322 126 11583	10nF 10% 50V 0603
2611	4822 124 80231	47µF20% 16V
2612	4822 124 40769	4.7µF 20% 100V
2616	5322 126 11578	1nF 10% 50V 0603
2617	5322 126 11578	1nF 10% 50V 0603
2620	3198 016 33380	3.3pF 50V 0603
2621	3198 016 33380	3.3pF 50V 0603
2623	2238 586 59812	100nF 20-80% 50V 0603
2713	4822 124 11946	22µF 20% 16V
2719	4822 126 13883	220pF 5% 50V
2720	4822 124 42234	100µF 20% 6,3V
2721	5322 122 33861	120pF10% 50V
2722	2022 020 00861	2.2µF 50V 20%
2722	5322 124 41379	2.2?F 20% 50V
2723	4822 126 13881	470pF 5% 50V
2724	2238 586 59812	100nF 20-80% 50V 0603
2727	2238 586 59812	100nF 20-80% 50V 0603
2728	5322 126 11583	10nF 10% 50V 0603
2729	4822 124 21732	10µF 20% 25V
2730	4822 126 13879	220nF 20% 16V
2731	2020 552 94523	8.2pF 50V 0603
2732	4822 124 22652	2.2µF 20% 50V
2733	2238 586 59812	100nF 20-80% 50V 0603
2734	5322 126 11578	1nF 10% 50V 0603
2735	4822 126 11669	27pF 5% 50V 0603
2736	4822 126 11669	27pF 5% 50V 0603
2737	4822 124 80483	47µF20% 6,3V
2740	4822 124 22652	2.2µF 20% 50V
2741	5322 126 11578	1nF 10% 50V 0603
2742	5322 126 11578	1nF 10% 50V 0603
2932	2238 586 59812	100nF 20-80% 50V 0603
2933	4822 124 80483	47µF20% 6,3V
2934	2238 586 59812	100nF 20-80% 50V 0603
2935	2238 586 59812	100nF 20-80% 50V 0603
2936	4822 122 33761	22pF 5% 50V
2937	4822 122 33761	22pF 5% 50V
2938	2238 586 59812	100nF 20-80% 50V 0603
2940	2238 586 59812	100nF 20-80% 50V 0603
2941	4822 124 21732	10µF 20% 25V
2942	4822 126 14238	2.2nF 50V 0603
2943	4822 126 14508	180pF 5% 50V
2944	4822 126 14238	2.2nF 50V 0603
2945	4822 126 14508	180pF 5% 50V
2946	3198 017 41050	1µF 10V 0603
2947	3198 017 41050	1µF 10V 0603

⊣WW⊢

3001	5322 117 13031	5.6kΩ 1% 0603
3004	2120 108 93058	33kΩ 1% 0603
3004	2322 704 63303	33k 1% 0603
3005	4822 051 30472	4.7kΩ 5% 0.062W
3006	4822 051 30472	4.7kΩ 5% 0.062W
3008	2322 704 62703	27kΩ 1% 0603
3009	5322 117 13031	5.6kΩ 1% 0603
3010	5322 117 13053	6.8kΩ 1% 0.063W 0603
3011	4822 117 13632	100kΩ 1% 0603 0.62W
3012	4822 051 30103	10kΩ 5% 0.062W
3013	5322 117 13053	6.8kΩ 1% 0.063W 0603
3014	5322 117 13031	5.6kΩ 1% 0603
3015	4822 051 30471	470Ω 5% 0.062W
3016	2322 704 62703	27kΩ 1% 0603
3017	2120 108 93058	33kΩ 1% 0603
3017	2322 704 63303	33k 1% 0603
3018	5322 117 13031	5.6kΩ 1% 0603
3019	4822 116 52186	22Ω 5% 0.5W
3020	4822 051 30472	4.7kΩ 5% 0.062W
3021	4822 051 30103	10kΩ 5% 0.062W
3022	4822 117 12139	22Ω 5% 0.062W
3023	4822 117 12139	22Ω 5% 0.062W
3024	4822 117 12139	22Ω 5% 0.062W
3025	4822 117 13632	100kΩ 1% 0603 0.62W
3026	4822 117 12139	22Ω 5% 0.062W
3027	2120 108 93058	33kΩ 1% 0603
3027	2322 704 63303	33k 1% 0603
3028	4822 117 12139	22Ω 5% 0.062W
3029	4822 051 30101	100Ω 5% 0.062W
3030	2322 704 62703	27kΩ 1% 0603
3031	4822 051 30103	10kΩ 5% 0.062W
3032	5322 117 13053	6.8kΩ 1% 0.063W 0603
3033	4822 117 12139	22Ω 5% 0.062W
3034	4822 117 13613	2R2 5% 0603
3035	4822 117 13613	2R2 5% 0603
3036	5322 117 13053	6.8kΩ 1% 0.063W 0603
3039	2322 704 62703	27kΩ 1% 0603
3040	2120 108 93058	33kΩ 1% 0603
3040	2322 704 63303	33k 1% 0603
3042	4822 050 21003	10kΩ 1% 0.6W
3043	4822 117 12925	47kΩ 1% 0.063W 0603
3044	4822 117 12925	47kΩ 1% 0.063W 0603
3045	4822 051 30102	1kΩ 5% 0.062W
3047	4822 050 21003	10kΩ 1% 0.6W
3049	4822 051 30472	4.7kΩ 5% 0.062W
3051	4822 117 13632	100kΩ 1% 0603 0.62W
3052	4822 051 30223	22kΩ 5% 0.062W
3053	4822 050 21003	10kΩ 1% 0.6W
3054	4822 117 12139	22Ω 5% 0.062W
3300	4822 053 21335	3.3MΩ 5% 0.5W
3301	4822 053 21335	3.3MΩ 5% 0.5W
3302	4822 051 30102	1kΩ 5% 0.062W
3303	4822 051 30102	1kΩ 5% 0.062W
3304	4822 051 30103	10kΩ 5% 0.062W
3305	4822 053 21684	680kΩ 5% 0,5W
3306	4822 116 83872	220Ω 5% 0.5W
3307	4822 051 30103	10kΩ 5% 0.062W
3308	4822 116 52272	330k 5% 0.5W
3309	4822 116 52272	330k 5% 0.5W
3310	4822 116 52272	330k 5% 0.5W
3311	4822 051 30102	1kΩ 5% 0.062W
3312	4822 051 30221	220Ω 5% 0.062W
3313	4822 116 52234	100kΩ 5% 0,5W
3314	2322 704 61002	1kΩ 0603 RC22H PM1
3314	4822 117 13611	1KΩ 1% 0603 ERJ3E
3315	5322 117 13056	8.2K 1% 0.063W 0603
3316	5322 117 13026	4.7kΩ 1% 0.063W 0603
3317	4822 051 30102	1kΩ 5% 0.062W
3318	4822 116 52175	100Ω 5% 0.5W
3321	2322 193 14477	0.47Ω PR01 PM5
3323	4822 117 12891	220kΩ 1% 0.063W 0603
3324	2322 702 60564	560kΩ 5% 0603
3325	4822 117 12925	47kΩ 1% 0.063W 0603
3326	4822 116 52195	47Ω 5% 0.5W
3327	4822 051 30105	1MΩ 5% 0.062W
3328	4822 051 30103	10kΩ 5% 0.062W
3329	3198 021 32250	2.2MΩ 5% 0603
3330	4822 051 30471	470Ω 5% 0.062W
3331	4822 051 30109	10Ω 5% 0.062W
3332	5322 117 13031	5.6kΩ 1% 0603
3333	5322 117 13026	4.7kΩ 1% 0.063W 0603
3334	4822 051 30563	56kΩ 5% 0.062W
3335	4822 051 30471	470Ω 5% 0.062W
3336	4822 051 30471	470Ω 5% 0.062W
3337	4822 051 30102	1kΩ 5% 0.062W
3338	4822 051 30221	220Ω 5% 0.062W
3339	5322 117 13026	4.7kΩ 1% 0.063W 0603
3340	5322 117 13026	4.7kΩ 1% 0.063W 0603
3341	4822 051 30683	68kΩ 5% 0.062W
3342	4822 116 52283	4.7kΩ 5% 0.5W
3343	5322 117 13026	4.7kΩ 1% 0.063W 0603
3344	4822 117 12925	47kΩ 1% 0.063W 0603
3346	4822 051 30222	2.2kΩ 5% 0.062W
3347	4822 051 30472	4.7kΩ 5% 0.062W
3348	4822 051 30681	680Ω 5% 0.062W
3349	4822 051 30479	47Ω 5% 0.062W
3350	4822 051 30102	1kΩ 5% 0.062W
3351	4822 051 30105	1MΩ 5% 0.062W
3352	2322 193 14687	0.68Ω PR01 PM5
3353	4822 051 30272	2.7kΩ 5% 0.062W
3354	4822 051 30272	2.7kΩ 5% 0.062W
3355	4822 051 30479	47Ω 5% 0.062W
3356	4822 116 52231	820Ω 5% 0.5W

3357	4822 051 30472	4.7kΩ 5% 0.062W
3358	4822 051 30109	10Ω 5% 0.062W
3360	4822 116 52231	820Ω 5% 0.5W
3361	4822 051 30102	1kΩ 5% 0.062W
3362	4822 051 30681	680Ω 5% 0.062W
3363	4822 051 30222	2.2kΩ 5% 0.062W
3364	4822 051 30103	10kΩ 5% 0.062W
3365	4822 051 30332	3.3kΩ 5% 0.062W
3366	4822 051 30152	1.5kΩ 5% 0.062W
3367	4822 117 12903	1.8kΩ 1% 0.063W 0603
3368	4822 051 30152	1.5kΩ 5% 0.062W
3371	4822 051 30479	47Ω 5% 0.062W
3372	4822 051 30339	33Ω 5% 0.062W
3373	4822 051 30339	33Ω 5% 0.062W
3374	4822 051 30471	470Ω 5% 0.062W
3378	4822 051 30152	1.5kΩ 5% 0.062W
3401	5322 117 13055	75R 1% 0.063W 0603
3402	5322 117 13055	75R 1% 0.063W 0603
3403	5322 117 13055	75R 1% 0.063W 0603
3404	4822 051 30759	75Ω 5% 0.062W
3405	4822 051 30223	22kΩ 5% 0.062W
3406	4822 117 12891	220kΩ 1% 0.063W 0603
3407	4822 051 30332	3.3kΩ 5% 0.062W
3408	4822 051 30392	3.9kΩ 5% 0.063W 0603
3409	5322 117 13055	75R 1% 0.063W 0603
3410	5322 117 13055	75R 1% 0.063W 0603
3411	4822 051 30759	75Ω 5% 0.062W
3412	4822 116 52201	75Ω 5% 0.5W
3413	5322 117 13055	75R 1% 0.063W 0603
3414	4822 051 30759	75Ω 5% 0.062W
3415	4822 051 30102	1kΩ 5% 0.062W
3416	4822 051 30472	4.7kΩ 5% 0.062W
3417	4822 051 30759	75Ω 5% 0.062W
3418	4822 117 13632	100kΩ 1% 0603 0.62W
3419	4822 051 30223	22kΩ 5% 0.062W
3420	4822 051 30151	150Ω 5% 0.062W
3421	4822 051 30273	27kΩ 5% 0.062W
3422	4822 116 52231	820Ω 5% 0.5W
3423	4822 051 30391	390Ω 5% 0.062W
3424	4822 051 30333	33kΩ 5% 0.062W
3425	4822 051 30471	470Ω 5% 0.062W
3426	4822 051 30333	33kΩ 5% 0.062W
3427	4822 051 30759	75Ω 5% 0.062W
3428	4822 117 13632	100kΩ 1% 0603 0.62W
3429	4822 117 12925	47kΩ 1% 0.063W 0603
3431	4822 051 30472	4.7kΩ 5% 0.062W
3432	4822 116 52175	100Ω 5% 0.5W
3433	4822 116 52175	100Ω 5% 0.5W
3434	4822 116 52283	4.7kΩ 5% 0.5W
3435	2122 101 02073	82Ω 5% 0,5W
3436	4822 116 52199	68Ω 5% 0.5W
3437	4822 051 30103	10kΩ 5% 0.062W
3438	4822 051 30103	10kΩ 5% 0.062W
3439	4822 051 30103	10kΩ 5% 0.062W
3440	4822 051 30103	10kΩ 5% 0.062W
3441	2122 101 02073	82Ω 5% 0,5W
3442	4822 051 30154	150kΩ 5% 0.062W
3443	4822 117 13632	100kΩ 1% 0603 0.62W
3444	4822 117 13632	100kΩ 1% 0603 0.62W
3445	4822 051 30151	150Ω 5% 0.062W
3446	4822 117 12925	47kΩ 1% 0.063W 0603
3447	4822 116 83884	47kΩ 5% 0.5W
3448	4822 051 30271	270Ω 5% 0.062W
3449	4822 051 30151	150Ω 5% 0.062W
3450	4822 051 30271	270Ω 5% 0.062W
3451	4822 050 21003	10kΩ 1% 0.6W
3452	4822 051 30151	150Ω 5% 0.062W
3454	4822 050 11002	1kΩ 1% 0.4W
3455	4822 051 30103	10kΩ 5% 0.062W
3458	4822 051 30472	4.7kΩ 5% 0.062W
3459	4822 051 30103	10kΩ 5% 0.062W
3460	4822 051 30472	4.7kΩ 5% 0.062W
3461	2122 551 00031	VDR 0805 1mA/6V4 21V
3461	2322 574 10402	VDR 0805 1mA/6V4 21V
3462	2122 551 00031	VDR 0805 1mA/6V4 21V
3462	2322 574 10402	VDR 0805 1mA/6V4 21V
3463	2122 551 00031	VDR 0805 1mA/6V4 21V
3463	2322 574 10402	VDR 0805 1mA/6V4 21V
3464	2122 551 00031	VDR 0805 1mA/6V4 21V
3464	2322 574 10402	VDR 0805 1mA/6V4 21V
3465	2122 551 00031	VDR 0805 1mA/6V4 21V
3465	2322 574 10402	VDR 0805 1mA/6V4 21V
3466	2122 551 00031	VDR 0805 1mA/6V4 21V
3466	2322 574 10402	VDR 0805 1mA/6V4 21V
3467	2122 551 00031	VDR 0805 1mA/6V4 21V
3467	2322 574 10402	VDR 0805 1mA/6V4 21V
3468	2122 551 00031	VDR 0805 1mA/6V4 21V
3468	2322 574 10402	VDR 0805 1mA/6V4 21V
3469	4822 117 13632	100kΩ 1% 0603 0.62W
3470	4822 117 13632	100kΩ 1% 0603 0.62W
3471	4822 117 13632	100kΩ 1% 0603 0.62W
3472	4822 117 13632	100kΩ 1% 0603 0.62W
3475	4822 051 30101	100Ω 5% 0.062W
3476	4822 051 30101	100Ω 5% 0.062W
3477	4822 051 30101	100Ω 5% 0.062W
3478	4822 051 30101	100Ω 5% 0.062W
3487	4822 117 13632	100kΩ 1% 0603 0.62W
3488	4822 117 13632	100kΩ 1% 0603 0.62W
3489	4822 117 12864	82kΩ 5% 0.6W
3490	4822 051 30151	150Ω 5% 0.062W
3491	4822 051 30151	150Ω 5% 0.062W
3492	4822 051 30151	150Ω 5% 0.062W
3493	4822 051 30151	150Ω 5% 0.062W
3494	4822 051 30151	150Ω 5% 0.062W
3495	4822 051 30471	470Ω 5% 0.062W
3496	4822 051 30471	470Ω 5% 0.062W
3501	4822 051 30102	1kΩ 5% 0.062W
3502	4822 050 11002	1kΩ 1% 0.4W
3503	4822 117 13632	100kΩ 1% 0603 0.62W
3504	4822 117 13632	100kΩ 1% 0603 0.62W
3505	4822 117 13632	100kΩ 1% 0603 0.62W
3506	4822 117 13632	100kΩ 1% 0603 0.62W
3507	4822 117 13632	100kΩ 1% 0603 0.62W
3508	4822 051 30102	1kΩ 5% 0.062W
3509	4822 050 11002	1kΩ 1% 0.4W
3510	4822 117 13632	100kΩ 1% 0603 0.62W
3511	4822 117 13632	100kΩ 1% 0603 0.62W
3512	4822 051 30102	1kΩ 5% 0.062W
3513	4822 051 30102	1kΩ 5% 0.062W
3514	4822 117 13632	100kΩ 1% 0603 0.62W
3515	4822 050 11002	1kΩ 1% 0.4W
3516	4822 117 13632	100kΩ 1% 0603 0.62W
3517	4822 116 52283	4.7kΩ 5% 0.5W
3518	4822 051 30102	1kΩ 5% 0.062W
3519	4822 116 52283	4.7kΩ 5% 0.5W
3520	4822 051 30221	220Ω 5% 0.062W
3521	4822 051 30221	220Ω 5% 0.062W
3522	4822 051 30221	220Ω 5% 0.062W
3523	4822 050 11002	1kΩ 1% 0.4W
3524	4822 117 12968	820Ω 5% 0.62W
3525	4822 051 30221	220Ω 5% 0.062W
3526	4822 051 30102	1kΩ 5% 0.062W
3527	4822 117 12968	820Ω 5% 0.62W
3528	4822 051 30472	4.7kΩ 5% 0.062W
3529	4822 051 30472	4.7kΩ 5% 0.062W
3530	4822 117 12968	820Ω 5% 0.62W
3531	4822 117 12968	820Ω 5% 0.62W
3532	4822 050 11002	1kΩ 1% 0.4W
3533	4822 050 11002	1kΩ 1% 0.4W
3534	4822 117 13632	100kΩ 1% 0603 0.62W
3600	4822 051 30103	10kΩ 5% 0.062W
3601	4822 116 52175	100Ω 5% 0.5W
3602	4822 051 30472	4.7kΩ 5% 0.062W
3603	4822 116 52175	100Ω 5% 0.5W
3611	4822 051 30101	100Ω 5% 0.062W
3612	4822 051 30101	100Ω 5% 0.062W
3701	4822 116 52228	680Ω 5% 0.5W
3702	4822 051 30471	470Ω 5% 0.062W
3703	4822 116 52245	150kΩ 5% 0.5W
3704	4822 051 30221	220Ω 5% 0.062W
3705	4822 051 30103	10kΩ 5% 0.062W
3710	4822 051 30562	5.6kΩ 5% 0.063W 0603
3711	4822 051 30333	33kΩ 5% 0.062W
3714	4822 051 30183	18kΩ 5% 0.062W
3715	4822 051 30103	10kΩ 5% 0.062W
3716	4822 051 30472	4.7kΩ 5% 0.062W
3717	4822 051 30472	4.7kΩ 5% 0.062W
3720	4822 051 30331	330Ω 5% 0.062W
3724	4822 100 12158	22K 30%
3725	5322 117 13056	8.2K 1% 0.063W 0603
3726	4822 051 30101	100Ω 5% 0.062W
3728	4822 051 30101	100Ω 5% 0.062W
3730	4822 051 30472	4.7kΩ 5% 0.062W
3731	4822 051 30271	270Ω 5% 0.062W
3732	4822 051 30102	1kΩ 5% 0.062W
3733	4822 051 30472	4.7kΩ 5% 0.062W
3734	4822 051 30272	2.7kΩ 5% 0.062W
3735	4822 051 30332	3.3kΩ 5% 0.062W
3736	4822 051 30331	330Ω 5% 0.062W
3737	4822 051 30222	2.2kΩ 5% 0.062W
3738	4822 051 30682	6.8kΩ 5% 0.062W
3739	4822 051 30562	5.6kΩ 5% 0.063W 0603
3740	4822 051 30681	680Ω 5% 0.062W
3741	4822 051 30472	4.7kΩ 5% 0.062W
3742	4822 051 30472	4.7kΩ 5% 0.062W
3743	4822 051 30563	56kΩ 5% 0.062W
3744	4822 117 13632	100kΩ 1% 0603 0.62W
3745	4822 051 30562	5.6kΩ 5% 0.063W 0603
3746	4822 051 30562	5.6kΩ 5% 0.063W 0603
3758	4822 051 30103	10kΩ 5% 0.062W
3931	4822 117 12925	47kΩ 1% 0.063W 0603
3932	4822 117 12925	47kΩ 1% 0.063W 0603
3933	4822 117 12925	47kΩ 1% 0.063W 0603
3934	4822 051 30101	100Ω 5% 0.062W
3935	4822 051 30101	100Ω 5% 0.062W
3936	4822 051 30103	10kΩ 5% 0.062W
3937	4822 051 30222	2.2kΩ 5% 0.062W
3938	4822 051 30222	2.2kΩ 5% 0.062W
3939	4822 051 30472	4.7kΩ 5% 0.062W
3940	3198 021 31060	10MΩ 5% 0.062W 0603
3941	3198 021 31060	10MΩ 5% 0.062W 0603
3942	4822 051 30333	33kΩ 5% 0.062W
3943	4822 051 30333	33kΩ 5% 0.062W
3944	4822 051 30333	33kΩ 5% 0.062W
3945	4822 051 30333	33kΩ 5% 0.062W
3946	4822 051 30333	33kΩ 5% 0.062W
3947	4822 051 30333	33kΩ 5% 0.062W
3948	4822 051 30472	4.7kΩ 5% 0.062W
3950	4822 117 13632	100kΩ 1% 0603 0.62W
3951	4822 051 30223	22kΩ 5% 0.062W
3952	4822 051 30153	15kΩ 5% 0.062W
3953	4822 051 30472	4.7kΩ 5% 0.062W
3954	4822 051 30472	4.7kΩ 5% 0.062W
3955	4822 051 30103	10kΩ 5% 0.062W
4001	4822 051 30008	Jumper 0603
4002	4822 051 30008	Jumper 0603
4003	4822 051 30008	Jumper 0603
4402	4822 051 30008	Jumper 0603
4411	4822 051 30008	Jumper 0603
4412	4822 051 30008	Jumper 0603
4413	4822 051 30008	Jumper 0603
4414	4822 051 30008	Jumper 0603
4415	4822 051 30008	Jumper 0603
4416	4822 051 30008	Jumper 0603
4417	4822 051 30008	Jumper 0603
4418	4822 051 30008	Jumper 0603
4419	4822 051 30008	Jumper 0603
4420	4822 051 30008	Jumper 0603
4421	4822 051 30008	Jumper 0603
4422	4822 051 30008	Jumper 0603
4423	4822 051 30008	Jumper 0603
4424	4822 051 30008	Jumper 0603
4425	4822 051 30008	Jumper 0603
4426	4822 051 30008	Jumper 0603
4428	4822 051 30008	Jumper 0603
4429	4822 051 30008	Jumper 0603
4430	4822 051 30008	Jumper 0603
4431	4822 051 30008	Jumper 0603
4433	4822 051 30008	Jumper 0603
4434	4822 051 30008	Jumper 0603
4435	4822 051 30008	Jumper 0603
4437	4822 051 30008	Jumper 0603
4442	4822 051 30008	Jumper 0603
4443	4822 051 30008	Jumper 0603
4444	4822 051 30008	Jumper 0603
4446	4822 051 30008	Jumper 0603
4447	4822 051 30008	Jumper 0603
4448	4822 051 30008	Jumper 0603
4449	4822 051 30008	Jumper 0603
4452	4822 051 30008	Jumper 0603
4453	4822 051 30008	Jumper 0603
4454	4822 051 30008	Jumper 0603
4455	4822 051 30008	Jumper 0603
4459	4822 051 30008	Jumper 0603
4460	4822 051 10008	Jumper 1206
4461	4822 051 30008	Jumper 0603
4601	4822 051 30008	Jumper 0603
4999	4822 051 30008	Jumper 0603

5001	2422 549 43062	Bead 600Ω at 100MHz
5002	2422 549 43062	Bead 600Ω at 100MHz
5300	2422 531 02546	TFM SMT SLOT SRW28EC9-E01V0*
5301	4822 157 51195	1 UH 20% 4X9,8MM
5302	2422 549 44509	25MH 0A4 HF2022R
5304	4822 157 70826	2.4µH
5305	4822 157 70826	2.4µH
5306	2422 535 94634	2.2µH LHL08 20%
5307	4822 157 11737	22µH 10%
5308	4822 157 11737	22µH 10%
5309	4822 157 11737	22µH 10%
5401	4822 157 11706	10µH 5%
5402	4822 157 11706	10µH 5%
5403	4822 157 11706	10µH 5%
5404	4822 157 11706	10µH 5%
5405	2422 549 43062	Bead 600Ω at 100MHz
5406	4822 157 11706	10µH 5%
5407	2422 549 43062	Bead 600Ω at 100MHz
5600	4822 157 11706	10µH 5%
5601	4822 157 11706	10µH 5%
5602	4822 157 11706	10µH 5%
5701	2422 549 43062	Bead 600Ω at 100MHz
5702	2422 549 43062	Bead 600Ω at 100MHz
5705	4822 157 11139	6.8µH 5%
5709	4822 157 11139	6.8µH 5%
5710	2422 549 44162	IND VAR 7MM 7KMY 77M8
5711	2422 549 45833	7MM 7KLY 77MHZ8
5713	4822 157 11747	15UH 5%
5714	4822 157 11747	15UH 5%

5931	4822 157 11706	10µH 5%
5932	2422 549 43062	Bead 600Ω at 100MHz

6003	4822 130 30621	1N4148
6004	4822 130 30621	1N4148
6005	4822 130 11397	BAS316
6300	9322 161 76682	SB340L-7024
6301	4822 130 31603	1N4006
6302	4822 130 31603	1N4006
6303	9322 161 76682	SB340L-7024
6305	4822 130 31603	1N4006
6306	4822 130 31603	1N4006
6307	4822 130 82627	SB540
6307	9322 184 68682	STPS5L40-C2
6308	4822 130 82627	SB540
6308	9322 184 68682	STPS5L40-C2
6309	9322 126 71673	BYT42M
6310	9322 161 78682	SB360L-7024
6311	4822 130 31878	1N4003G
6312	4822 130 11416	PDZ6.8B
6313	4822 130 10871	SBYV27-200
6314	4822 130 10837	UDZS8.2B
6315	4822 130 11397	BAS316
6316	4822 130 30842	BAV21
6317	4822 130 41601	BYV95A
6317	9322 126 71673	BYT42M
6318	4822 130 34142	BZX79-B33
6319	4822 130 41601	BYV95A
6319	9322 126 71673	BYT42M
6320	4822 130 11397	BAS316
6321	4822 130 10654	BAT254
6321	9322 199 12685	BAT54WS
6322	4822 130 11416	PDZ6.8B
6324	9340 548 69115	PDZ27B
6325	4822 130 81234	1N5819
6401	9340 548 61115	PDZ12B
6402	9340 548 61115	PDZ12B
6403	9340 548 61115	PDZ12B
6404	9340 548 61115	PDZ12B
6409	4822 130 11416	PDZ6.8B
6414	4822 130 11416	PDZ6.8B
6415	9340 548 61115	PDZ12B
6416	9340 548 61115	PDZ12B
6417	9340 548 61115	PDZ12B
6418	9340 548 61115	PDZ12B
6419	9340 548 61115	PDZ12B
6420	9340 548 61115	PDZ12B
6422	4822 130 11564	UDZ3.9B
6423	9340 548 61115	PDZ12B
6424	9340 548 61115	PDZ12B
6425	9340 548 61115	PDZ12B
6426	9340 548 61115	PDZ12B
6427	9340 548 61115	PDZ12B
6428	4822 130 11522	UDZ15B
6429	4822 130 11522	UDZ15B
6600	4822 130 11397	BAS316
6703	9340 552 30115	BA591
6704	9340 552 30115	BA591
6705	9340 552 30115	BA591

7001	4822 130 60854	DTA124EU-W
7003	4822 209 62312	MC33078D
7004	9322 148 78668	AD1852JRS
7005	3198 010 42310	BC847BW
7006	3198 010 42310	BC847BW
7007	9352 670 99118	UDA1361TS/N1
7008	3198 010 42320	BC857BW
7009	3198 010 42320	BC857BW
7010	4822 130 61553	DTC124EU
7301	4822 209 14933	TL431IZ
7302	4822 130 11336	STP16NE06FP
7303	9322 160 70668	SI4936ADY
7303	9322 183 38668	STS9NF30L
7304	4822 209 14933	TL431IZ
7305	4822 209 14933	TL431IZ
7306	4822 130 61553	DTC124EU
7307	9322 157 37687	STP3NC60FP
7308	4822 130 61553	DTC124EU
7309	9322 180 12685	SI2312DS
7310	3198 010 42310	BC847BW
7311	3198 010 42310	BC847BW
7312	4822 130 41782	BF422
7313	9352 673 56112	TEA1507P/N1
7314	9322 153 43682	LTV817BM-V
7314	9965 000 09548	TCET1108G
7315	4822 209 14933	TL431IZ
7317	9322 191 71687	STD17NF03L-1
7318	9322 163 75685	SI2306DS
7319	5322 130 60159	BC846B
7320	9322 163 75685	SI2306DS
7321	4822 130 61553	DTC124EU
7322	3198 010 42320	BC857BW
7401	3198 010 42320	BC857BW
7402	3198 010 42310	BC847BW
7403	3198 010 42320	BC857BW
7404	3198 010 42320	BC857BW
7405	3198 010 42310	BC847BW
7406	3198 010 42320	BC857BW
7407	3198 010 42310	BC847BW
7408	9322 173 41668	ST6618
7409	3198 010 42310	BC847BW
7410	9322 174 76668	NJM2267M
7411	9322 179 71668	NJM2285M
7412	4822 130 61553	DTC124EU
7415	9340 219 30115	BC817-25W
7416	9340 219 30115	BC817-25W
7419	9340 560 36235	BSH111
7420	9340 560 36235	BSH111
7421	3198 010 42310	BC847BW
7501	5322 209 11102	HEF4052BT
7502	4822 209 32071	MC33079D
7503	5322 209 11102	HEF4052BT
7504	5322 209 11102	HEF4052BT
7505	4822 209 62312	MC33078D
7506	9340 219 30115	BC817-25W
7508	9340 219 30115	BC817-25W
7509	9340 219 30115	BC817-25W
7511	9340 219 30115	BC817-25W
7600	9322 186 87668	MSP3415G-QG-B8V3
7701	4822 130 61553	DTC124EU
7702	4822 130 61553	DTC124EU
7704	4822 130 61553	DTC124EU
7705	4822 130 61553	DTC124EU
7706	4822 130 61553	DTC124EU
7710	9352 606 11118	TDA9818T/V1
7711	3198 010 42320	BC857BW
7712	4822 130 61553	DTC124EU
7713	3198 010 42320	BC857BW
7714	3198 010 42310	BC847BW
7716	3198 010 42320	BC857BW
7717	3198 010 42310	BC847BW
7931	4822 209 17505	STV5348D
7932	3198 010 42310	BC847BW
7933	3198 010 42310	BC847BW
7934	4822 209 60177	LM339D

Up Sub Board

Various

1801	2422 543 01115	24.576MHz 12P QS06
1801	2422 543 01368	24M576 12P CX8045
1805	4822 242 70938	TA252E00 (32,768KHZ)
1901	2422 025 12488	CON BM H 2P M 2.50 EH B
1980	2422 025 17723	CON BM V 8P M
1980	2422 025 18217	CON V 8P M 2.00
1984	2422 025 17723	CON BM V 8P M
1984	2422 025 18217	CON V 8P M 2.00
1986	2422 025 16677	Connector 10P
1987	2422 025 17723	CON BM V 8P M
1987	2422 025 18217	CON V 8P M 2.00
1988	2422 025 17723	CON BM V 8P M
1988	2422 025 18217	CON V 8P M 2.00

2800	2238 586 59812	100nF 20-80% 50V 0603
2801	4822 122 33752	15pF 5% 50V
2802	4822 122 33752	15pF 5% 50V
2803	2238 586 59812	100nF 20-80% 50V 0603
2804	2238 586 59812	100nF 20-80% 50V 0603
2805	2238 586 59812	100nF 20-80% 50V 0603
2806	2238 586 59812	100nF 20-80% 50V 0603
2807	4822 126 13879	220nF 20% 16V
2808	2238 586 59812	100nF 20-80% 50V 0603
2809	2238 586 59812	100nF 20-80% 50V 0603
2810	4822 122 33741	10pF 10% 50V
2811	4822 122 33741	10pF 10% 50V
2812	5322 126 11583	10nF 10% 50V 0603
2813	4822 122 33741	10pF 10% 50V
2814	4822 122 33741	10pF 10% 50V
2815	4822 126 13883	220pF 5% 50V
2816	4822 124 11968	220mF +80-20% 5,5V
2817	2238 586 59812	100nF 20-80% 50V 0603
2818	4822 126 13883	220pF 5% 50V
2819	4822 124 42234	100µF 20% 6,3V
2820	5322 126 11583	10nF 10% 50V 0603
2821	5322 126 11583	10nF 10% 50V 0603
2822	2238 586 59812	100nF 20-80% 50V 0603
2823	5322 126 11578	1nF 10% 50V 0603
2824	3198 017 41050	1µF 10V 0603
2825	2020 552 94427	100pF 5% 50v 0603
2828	2238 586 59812	100nF 20-80% 50V 0603
2829	4822 124 21732	10µF 20% 25V
2830	2238 586 59812	100nF 20-80% 50V 0603
2831	5322 126 11583	10nF 10% 50V 0603
2912	4822 124 23052	100UF20% 16V
2913	4822 124 23052	100UF20% 16V

3800	4822 051 30101	100Ω 5% 0.062W
3801	4822 051 30103	10kΩ 5% 0.062W
3802	4822 051 30101	100Ω 5% 0.062W
3803	4822 051 30102	1kΩ 5% 0.062W
3804	4822 051 30103	10kΩ 5% 0.062W
3805	4822 051 30101	100Ω 5% 0.062W
3806	4822 051 30223	22kΩ 5% 0.062W
3807	4822 117 13632	100kΩ 1% 0603 0.62W
3808	4822 117 13632	100kΩ 1% 0603 0.62W
3809	4822 117 13632	100kΩ 1% 0603 0.62W
3810	4822 117 13632	100kΩ 1% 0603 0.62W
3811	4822 051 30101	100Ω 5% 0.062W
3812	4822 051 30223	22kΩ 5% 0.062W
3813	4822 051 30103	10kΩ 5% 0.062W
3814	4822 051 30103	10kΩ 5% 0.062W
3815	4822 051 30183	18kΩ 5% 0.062W
3816	4822 051 30103	10kΩ 5% 0.062W
3817	4822 051 30222	2.2kΩ 5% 0.062W
3818	4822 051 30472	4.7kΩ 5% 0.062W
3819	4822 051 30103	10kΩ 5% 0.062W
3820	4822 051 30102	1kΩ 5% 0.062W
3821	4822 051 30103	10kΩ 5% 0.062W
3822	4822 051 30103	10kΩ 5% 0.062W
3823	4822 117 13632	100kΩ 1% 0603 0.62W
3824	4822 051 30102	1kΩ 5% 0.062W
3825	4822 051 30103	10kΩ 5% 0.062W
3826	4822 051 30102	1kΩ 5% 0.062W
3827	4822 051 30102	1kΩ 5% 0.062W
3828	4822 051 30103	10kΩ 5% 0.062W
3829	4822 051 30103	10kΩ 5% 0.062W
3830	4822 051 30102	1kΩ 5% 0.062W
3831	4822 051 30102	1kΩ 5% 0.062W
3832	4822 051 30333	33kΩ 5% 0.062W
3833	4822 051 30102	1kΩ 5% 0.062W
3834	4822 051 30102	1kΩ 5% 0.062W
3835	4822 051 30102	1kΩ 5% 0.062W
3836	4822 051 30101	100Ω 5% 0.062W
3837	4822 051 30123	12kΩ 5% 0.062W
3838	4822 051 30102	1kΩ 5% 0.062W
3839	4822 051 30273	27kΩ 5% 0.062W
3840	4822 051 30472	4.7kΩ 5% 0.062W
3841	4822 117 13632	100kΩ 1% 0603 0.62W
3842	4822 117 12891	220kΩ 1% 0.063W 0603
3843	4822 051 30333	33kΩ 5% 0.062W
3844	4822 051 30221	220Ω 5% 0.062W
3845	4822 051 30102	1kΩ 5% 0.062W
3846	4822 051 30333	33kΩ 5% 0.062W
3847	4822 051 30103	10kΩ 5% 0.062W
3849	4822 117 12925	47kΩ 1% 0.063W 0603
3850	4822 051 30183	18kΩ 5% 0.062W
3851	4822 051 30103	10kΩ 5% 0.062W
3852	4822 051 30103	10kΩ 5% 0.062W
3854	4822 051 30102	1kΩ 5% 0.062W
3855	4822 051 30471	470Ω 5% 0.062W
3856	4822 051 30103	10kΩ 5% 0.062W
3857	4822 051 30103	10kΩ 5% 0.062W
3858	4822 117 13632	100kΩ 1% 0603 0.62W
3860	4822 051 30222	2.2kΩ 5% 0.062W
3861	3198 021 32250	2.2MΩ 5% 0603
3862	4822 051 30103	10kΩ 5% 0.062W
3863	4822 117 13608	4.7Ω 5% 0603 0.62W
3864	4822 117 13608	4.7Ω 5% 0603 0.62W
3865	4822 117 13608	4.7Ω 5% 0603 0.62W
3866	4822 117 13608	4.7Ω 5% 0603 0.62W
3867	4822 051 30759	75Ω 5% 0.062W
3868	4822 051 30103	10kΩ 5% 0.062W
3869	4822 051 30331	330Ω 5% 0.062W
3870	4822 117 13632	100kΩ 1% 0603 0.62W
3871	4822 051 30103	10kΩ 5% 0.062W
3872	4822 051 30103	10kΩ 5% 0.062W
3873	4822 051 30472	4.7kΩ 5% 0.062W
3874	4822 051 30103	10kΩ 5% 0.062W
3875	4822 051 30103	10kΩ 5% 0.062W
3876	4822 051 30103	10kΩ 5% 0.062W
3878	4822 051 30102	1kΩ 5% 0.062W
3879	4822 051 30102	1kΩ 5% 0.062W
3881	4822 117 12925	47kΩ 1% 0.063W 0603
3882	4822 117 12925	47kΩ 1% 0.063W 0603
3884	4822 051 30101	100Ω 5% 0.062W
3885	4822 051 30101	100Ω 5% 0.062W
3886	4822 051 30472	4.7kΩ 5% 0.062W

3887	4822 051 30472	4.7kΩ 5% 0.062W
3888	4822 051 30471	470Ω 5% 0.062W
3889	4822 051 30183	18kΩ 5% 0.062W
3913	4822 051 30102	1kΩ 5% 0.062W
3914	4822 051 30102	1kΩ 5% 0.062W
3915	4822 051 30102	1kΩ 5% 0.062W
3916	4822 051 30273	27kΩ 5% 0.062W
3917	2322 704 63603	36kΩ 0603 RC22H 1%
3918	4822 051 30102	1kΩ 5% 0.062W
3919	2120 108 93058	33kΩ 1% 0603
3920	4822 051 30562	5.6kΩ 5% 0.063W 0603
3921	4822 051 30471	470Ω 5% 0.062W
3922	4822 051 30102	1kΩ 5% 0.062W
3923	4822 051 30103	10kΩ 5% 0.062W
3924	4822 051 30103	10kΩ 5% 0.062W
3925	4822 117 12706	10kΩ 1% 0.063W 0603
3926	4822 051 30472	4.7kΩ 5% 0.062W
3927	4822 051 30333	33kΩ 5% 0.062W
3929	4822 051 30008	Jumper 0603
3931	4822 051 30008	Jumper 0603
3933	4822 051 30008	Jumper 0603
4901	4822 051 30008	Jumper 0603
4904	4822 051 10008	Jumper 1206

5801	2422 549 44607	Bead 600Ω at 100MHz
5802	2422 549 44607	Bead 600Ω at 100MHz
5803	2422 549 44607	Bead 600Ω at 100MHz
5804	2422 549 44607	Bead 600Ω at 100MHz

6800	4822 130 11397	BAS316
6801	4822 130 11564	UDZ3.9B
6802	4822 130 10654	BAT254
6803	4822 130 10654	BAT254
6804	4822 130 10654	BAT254
6805	4822 130 10654	BAT254
6901	5322 130 34331	BAV70
6903	5322 130 34331	BAV70

7801	9352 190 00118	74LVC573AD
7802	4822 130 61553	DTC124EU
7803	9322 186 16668	CY62128VLL-70SC
7804	3103 165 13721	TMP91CW12AF/LIRP1
7805	9965 000 17112	M29W800DT-70N6/ AN130067
7806	9322 163 26685	NCP301LSN30
7807	4822 209 73852	PMBT2369
7808	4822 209 16907	M24C16-MN6T
7813	3198 010 42310	BC847BW
7814	3198 010 42310	BC847BW
7815	3198 010 42310	BC847BW
7816	3198 010 42310	BC847BW
7817	3198 010 42310	BC847BW
7818	4822 130 60854	DTA124EU-W
7821	9340 560 36235	BSH111
7822	9340 560 36235	BSH111
7825	9322 181 92682	LA7213
7902	4822 209 63709	LM324D
7903	4822 130 61553	DTC124EU
7904	4822 130 60854	DTA124EU-W
7905	4822 130 61553	DTC124EU
7906	4822 130 61553	DTC124EU
7907	4822 130 61553	DTC124EU
7908	4822 130 61553	DTC124EU
7909	4822 130 41087	BC638
7910	4822 130 61553	DTC124EU

Digital Board

Various

1001	2422 543 01422	24M576 18P CX8045
1102	2422 025 18185	CON V 40P M 2.54
1103	2422 025 17104	Connector 7p m
1104	2422 025 16729	Connector FFC 10p m
1201	2422 543 01115	24.576MHz 12P QS06
1201	2422 543 01368	24M576 12P CX8045
1203	2422 025 17955	CON V 6P M
1400	2422 025 18219	CON 28P M
1500	2422 025 17441	CON BM V 12P M
1505	2422 086 11087	FUSE F 1A 125V
1506	2422 086 11087	FUSE F 1A 125V
1507	2422 086 11087	FUSE F 1A 125V
1704	2422 025 16794	CON BM V 7P F
1900	2422 025 16389	CON V 22P F
1901	2422 025 16987	CON V 6P F
1904	2422 025 16389	CON V 22P F

2014	4822 124 80151	47µF 20% 16V
2015	2238 586 59812	100nF 20-80% 50V 0603
2016	2238 586 59812	100nF 20-80% 50V 0603
2017	2238 586 59812	100nF 20-80% 50V 0603
2018	2238 586 59812	100nF 20-80% 50V 0603
2019	2238 586 59812	100nF 20-80% 50V 0603
2020	2238 586 59812	100nF 20-80% 50V 0603
2021	2238 586 59812	100nF 20-80% 50V 0603
2022	2020 021 91729	4.7µF 20% 35V
2026	2238 586 59812	100nF 20-80% 50V 0603
2027	2238 586 59812	100nF 20-80% 50V 0603
2028	2238 586 59812	100nF 20-80% 50V 0603
2029	2238 586 59812	100nF 20-80% 50V 0603
2030	2238 586 59812	100nF 20-80% 50V 0603
2031	2238 586 59812	100nF 20-80% 50V 0603
2032	2238 586 59812	100nF 20-80% 50V 0603
2033	2020 021 91729	4.7µF 20% 35V
2035	2238 586 59812	100nF 20-80% 50V 0603
2036	4822 126 14506	270pF 5% 50V 0603
2037	2238 586 59812	100nF 20-80% 50V 0603
2038	2238 586 59812	100nF 20-80% 50V 0603
2039	2238 586 59812	100nF 20-80% 50V 0603
2040	2238 586 59812	100nF 20-80% 50V 0603
2041	2238 586 59812	100nF 20-80% 50V 0603
2042	2238 586 59812	100nF 20-80% 50V 0603
2043	2238 586 59812	100nF 20-80% 50V 0603
2044	2020 021 91729	4.7µF 20% 35V
2046	4822 122 33761	22pF 5% 50V
2048	3198 016 31510	150pF 10% 50V 0603
2049	2020 021 91729	4.7µF 20% 35V
2050	2238 586 59812	100nF 20-80% 50V 0603
2052	2238 586 59812	100nF 20-80% 50V 0603
2053	2238 586 59812	100nF 20-80% 50V 0603
2054	2238 586 59812	100nF 20-80% 50V 0603
2056	2238 586 59812	100nF 20-80% 50V 0603
2058	2238 586 59812	100nF 20-80% 50V 0603
2059	2222 867 15339	33pF 5% 50V 0603
2060	2222 867 15339	33pF 5% 50V 0603
2061	2238 586 59812	100nF 20-80% 50V 0603
2063	2238 586 59812	100nF 20-80% 50V 0603
2064	2238 586 59812	100nF 20-80% 50V 0603
2065	2238 586 59812	100nF 20-80% 50V 0603
2066	3198 016 31020	1nF 10% 25V 0603
2067	2238 586 59812	100nF 20-80% 50V 0603
2071	2238 586 59812	100nF 20-80% 50V 0603
2101	2238 916 15641	22nF 10% 25V 0603
2103	2238 586 59812	100nF 20-80% 50V 0603
2108	4822 126 14585	100nF 10% 50V
2112	4822 126 14247	1.5nF 50V 0603
2113	4822 126 13881	470pF 5% 50V
2114	2238 586 59812	100nF 20-80% 50V 0603
2119	4822 126 14247	1.5nF 50V 0603
2120	2238 586 59812	100nF 20-80% 50V 0603
2125	2238 586 59812	100nF 20-80% 50V 0603
2129	4822 126 13881	470pF 5% 50V
2200	3198 017 41050	1µF 10V 0603
2201	4822 126 14506	270pF 5% 50V 0603
2202	4822 126 11663	12pF 5% 50V 0603
2203	4822 126 11663	12pF 5% 50V 0603
2206	2238 586 59812	100nF 20-80% 50V 0603
2207	2238 586 59812	100nF 20-80% 50V 0603
2209	2238 586 59812	100nF 20-80% 50V 0603
2210	2238 586 59812	100nF 20-80% 50V 0603
2212	4822 124 12095	100µF 20% 16V
2214	2238 586 59812	100nF 20-80% 50V 0603
2215	2238 586 59812	100nF 20-80% 50V 0603
2217	2238 586 59812	100nF 20-80% 50V 0603
2218	2238 586 59812	100nF 20-80% 50V 0603
2219	2238 586 59812	100nF 20-80% 50V 0603
2220	2238 586 59812	100nF 20-80% 50V 0603
2221	2238 586 59812	100nF 20-80% 50V 0603
2222	2238 586 59812	100nF 20-80% 50V 0603
2223	2238 586 59812	100nF 20-80% 50V 0603
2224	2238 586 59812	100nF 20-80% 50V 0603
2225	2238 586 59812	100nF 20-80% 50V 0603
2226	2238 586 59812	100nF 20-80% 50V 0603
2227	2238 586 59812	100nF 20-80% 50V 0603
2228	2238 586 59812	100nF 20-80% 50V 0603
2229	2238 586 59812	100nF 20-80% 50V 0603
2230	2238 586 59812	100nF 20-80% 50V 0603
2231	2238 586 59812	100nF 20-80% 50V 0603
2232	2238 586 59812	100nF 20-80% 50V 0603
2233	2238 586 59812	100nF 20-80% 50V 0603
2234	2238 586 59812	100nF 20-80% 50V 0603
2235	3198 016 31020	1nF 10% 25V 0603
2236	2020 021 91729	4.7µF 20% 35V
2237	2238 586 59812	100nF 20-80% 50V 0603
2238	2238 586 59812	100nF 20-80% 50V 0603
2308	2238 586 59812	100nF 20-80% 50V 0603
2310	2238 586 59812	100nF 20-80% 50V 0603
2403	2238 586 59812	100nF 20-80% 50V 0603
2404	4822 124 23002	10µF 20% 16V
2405	2238 586 59812	100nF 20-80% 50V 0603
2406	2238 586 59812	100nF 20-80% 50V 0603
2407	2238 586 59812	100nF 20-80% 50V 0603
2408	4822 124 23002	10µF 20% 16V
2409	2238 586 59812	100nF 20-80% 50V 0603
2410	2238 586 59812	100nF 20-80% 50V 0603
2411	2238 586 59812	100nF 20-80% 50V 0603
2412	2238 586 59812	100nF 20-80% 50V 0603
2413	2238 586 59812	100nF 20-80% 50V 0603
2414	2238 586 59812	100nF 20-80% 50V 0603
2415	2238 586 59812	100nF 20-80% 50V 0603
2416	2238 586 59812	100nF 20-80% 50V 0603
2417	2238 586 59812	100nF 20-80% 50V 0603
2418	4822 124 23002	10µF 20% 16V
2419	2238 586 59812	100nF 20-80% 50V 0603
2420	4822 124 23002	10µF 20% 16V
2421	2238 586 59812	100nF 20-80% 50V 0603
2422	2238 586 59812	100nF 20-80% 50V 0603
2423	2238 586 59812	100nF 20-80% 50V 0603
2424	2238 586 59812	100nF 20-80% 50V 0603
2425	2238 586 59812	100nF 20-80% 50V 0603
2426	2238 586 59812	100nF 20-80% 50V 0603
2427	2238 586 59812	100nF 20-80% 50V 0603
2428	2238 586 59812	100nF 20-80% 50V 0603
2429	2238 586 59812	100nF 20-80% 50V 0603
2433	2238 586 59812	100nF 20-80% 50V 0603
2436	2222 867 15339	33pF 5% 50V 0603
2512	2020 021 91672	100µF 6V3 20%
2512	2020 021 91857	100µF 6V3 20%
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	3198 017 44740	470nF 10V 0603
2516	2020 021 91672	100µF 6V3 20%
2518	2020 552 94427	100pF 5% 50v 0603
2519	2238 586 59812	100nF 20-80% 50V 0603
2521	2238 586 59812	100nF 20-80% 50V 0603
2524	2238 586 59812	100nF 20-80% 50V 0603
2525	2238 586 59812	100nF 20-80% 50V 0603
2526	2238 586 59812	100nF 20-80% 50V 0603
2527	5322 126 11583	10nF 10% 50V 0603
2700	2020 021 91729	4.7µF 20% 35V
2701	2238 586 59812	100nF 20-80% 50V 0603
2703	3198 016 31020	1nF 10% 25V 0603
2704	2238 586 59812	100nF 20-80% 50V 0603
2705	2238 586 59812	100nF 20-80% 50V 0603
2706	2238 586 59812	100nF 20-80% 50V 0603
2707	2238 586 59812	100nF 20-80% 50V 0603
2709	4822 126 13956	68pF 5% 63V 0603
2710	4822 126 14507	18pF 5% 50V 0603
2712	2238 586 59812	100nF 20-80% 50V 0603
2715	4822 126 13956	68pF 5% 63V 0603
2716	4822 126 14507	18pF 5% 50V 0603
2720	4822 126 13956	68pF 5% 63V 0603
2721	4822 126 14507	18pF 5% 50V 0603
2723	2238 586 59812	100nF 20-80% 50V 0603
2725	2238 586 59812	100nF 20-80% 50V 0603
2726	2238 586 59812	100nF 20-80% 50V 0603
2727	2238 586 59812	100nF 20-80% 50V 0603
2728	2020 021 91729	4.7µF 20% 35V
2729	2020 021 91729	4.7µF 20% 35V
2730	2238 586 59812	100nF 20-80% 50V 0603
2731	2020 021 91729	4.7µF 20% 35V
2732	2238 586 59812	100nF 20-80% 50V 0603
2733	2238 586 15631	3.9nF 0603 X7R 50V 10%
2734	3198 016 38210	820pF 25V
2806	2238 586 59812	100nF 20-80% 50V 0603
2807	2238 586 59812	100nF 20-80% 50V 0603
2808	2238 586 59812	100nF 20-80% 50V 0603
2809	2238 586 59812	100nF 20-80% 50V 0603
2810	2238 586 59812	100nF 20-80% 50V 0603
2811	2238 586 59812	100nF 20-80% 50V 0603
2812	2238 586 59812	100nF 20-80% 50V 0603
2820	2238 586 59812	100nF 20-80% 50V 0603
2821	2238 586 59812	100nF 20-80% 50V 0603
2822	2238 586 59812	100nF 20-80% 50V 0603
2823	2238 586 59812	100nF 20-80% 50V 0603
2824	2238 586 59812	100nF 20-80% 50V 0603
2825	2238 586 59812	100nF 20-80% 50V 0603
2826	2238 586 59812	100nF 20-80% 50V 0603
2830	2238 586 59812	100nF 20-80% 50V 0603
2832	2238 586 59812	100nF 20-80% 50V 0603
2833	2238 586 59812	100nF 20-80% 50V 0603
2900	2238 586 59812	100nF 20-80% 50V 0603
2901	2238 586 59812	100nF 20-80% 50V 0603
2902	2238 586 59812	100nF 20-80% 50V 0603
2903	2238 586 59812	100nF 20-80% 50V 0603
2904	2238 586 59812	100nF 20-80% 50V 0603
2905	2238 586 59812	100nF 20-80% 50V 0603
2906	2238 586 59812	100nF 20-80% 50V 0603
2907	2238 586 59812	100nF 20-80% 50V 0603
2908	2238 586 59812	100nF 20-80% 50V 0603

2909	2238 586 59812	100nF 20-80% 50V 0603
2910	3198 016 31510	150pF 10% 50V 0603
2911	2238 916 15641	22nF 10% 25V 0603
2912	2238 586 59812	100nF 20-80% 50V 0603
2913	2238 586 59812	100nF 20-80% 50V 0603
2914	4822 126 14506	270pF 5% 50V 0603
2915	4822 126 14506	270pF 5% 50V 0603
2916	4822 126 14506	270pF 5% 50V 0603
2917	4822 126 14506	270pF 5% 50V 0603
2918	4822 122 33761	22pF 5% 50V
2919	4822 122 33761	22pF 5% 50V
2920	2238 586 59812	100nF 20-80% 50V 0603
2921	4822 122 33761	22pF 5% 50V
2922	4822 126 14221	68PF 5% NP0 50V 0603
2923	2238 586 59812	100nF 20-80% 50V 0603
2924	2238 586 59812	100nF 20-80% 50V 0603
2925	2238 586 59812	100nF 20-80% 50V 0603
2926	4822 126 14506	270pF 5% 50V 0603
2927	4822 126 14506	270pF 5% 50V 0603
2928	4822 126 14506	270pF 5% 50V 0603
2929	4822 126 14506	270pF 5% 50V 0603
2930	2238 586 59812	100nF 20-80% 50V 0603
2931	2020 021 91729	4.7µF 20% 35V
2933	2238 586 59812	100nF 20-80% 50V 0603
2934	2238 586 59812	100nF 20-80% 50V 0603
2935	4822 126 14506	270pF 5% 50V 0603
2936	4822 126 14506	270pF 5% 50V 0603
2937	4822 126 14506	270pF 5% 50V 0603
2938	2238 586 59812	100nF 20-80% 50V 0603
2939	2020 021 91729	4.7µF 20% 35V
2940	2238 586 59812	100nF 20-80% 50V 0603
2943	5322 126 11583	10nF 10% 50V 0603

–WW–

3000	4822 051 30681	680Ω 5% 0.062W
3003	4822 051 30472	4.7kΩ 5% 0.062W
3004	4822 051 30681	680Ω 5% 0.062W
3005	4822 051 30101	100Ω 5% 0.062W
3006	4822 051 30222	2.2kΩ 5% 0.062W
3008	4822 051 30101	100Ω 5% 0.062W
3009	4822 051 30102	1kΩ 5% 0.062W
3010	4822 117 12139	22Ω 5% 0.062W
3011	4822 051 30103	10kΩ 5% 0.062W
3012	4822 051 30472	4.7kΩ 5% 0.062W
3013	4822 117 12917	1Ω 5% 0.062W 0603
3015	4822 051 30103	10kΩ 5% 0.062W
3016	4822 051 30103	10kΩ 5% 0.062W
3017	4822 051 30103	10kΩ 5% 0.062W
3018	4822 051 30103	10kΩ 5% 0.062W
3019	4822 051 30472	4.7kΩ 5% 0.062W
3023	4822 051 30101	100Ω 5% 0.062W
3024	4822 051 30101	100Ω 5% 0.062W
3025	4822 051 30101	100Ω 5% 0.062W
3026	4822 051 30101	100Ω 5% 0.062W
3082	4822 117 13632	100kΩ 1% 0603 0.62W
3087	4822 051 30479	47Ω 5% 0.062W
3088	4822 117 13632	100kΩ 1% 0603 0.62W
3090	4822 051 30472	4.7kΩ 5% 0.062W
3092	4822 117 13632	100kΩ 1% 0603 0.62W
3093	4822 051 30682	6.8kΩ 5% 0.062W
3095	4822 051 30472	4.7kΩ 5% 0.062W
3096	4822 051 30472	4.7kΩ 5% 0.062W
3098	4822 117 13632	100kΩ 1% 0603 0.62W
3100	4822 051 30103	10kΩ 5% 0.062W
3101	4822 051 30339	33Ω 5% 0.062W
3103	4822 051 30339	33Ω 5% 0.062W
3106	4822 051 30339	33Ω 5% 0.062W
3108	4822 051 30339	33Ω 5% 0.062W
3110	4822 051 30339	33Ω 5% 0.062W
3112	4822 051 30339	33Ω 5% 0.062W
3113	4822 051 30103	10kΩ 5% 0.062W
3114	4822 051 30472	4.7kΩ 5% 0.062W
3116	4822 051 30339	33Ω 5% 0.062W
3117	4822 051 30472	4.7kΩ 5% 0.062W
3118	4822 051 30339	33Ω 5% 0.062W
3119	4822 051 30103	10kΩ 5% 0.062W
3120	4822 051 30339	33Ω 5% 0.062W
3122	4822 051 30339	33Ω 5% 0.062W
3124	4822 051 30339	33Ω 5% 0.062W
3126	4822 051 30339	33Ω 5% 0.062W
3128	4822 051 30339	33Ω 5% 0.062W
3130	4822 051 30339	33Ω 5% 0.062W
3132	4822 051 30101	100Ω 5% 0.062W
3133	4822 051 30339	33Ω 5% 0.062W
3135	4822 051 30339	33Ω 5% 0.062W
3137	4822 051 30101	100Ω 5% 0.062W
3138	4822 051 30339	33Ω 5% 0.062W
3142	4822 051 30101	100Ω 5% 0.062W
3143	2322 702 60829	82Ω 5% 0603
3144	4822 051 30101	100Ω 5% 0.062W
3145	4822 051 30562	5.6kΩ 5% 0.063W 0603
3147	4822 117 12139	22Ω 5% 0.062W
3149	4822 117 12139	22Ω 5% 0.062W
3154	2322 702 60829	82Ω 5% 0603
3156	4822 051 30472	4.7kΩ 5% 0.062W
3159	4822 117 12139	22Ω 5% 0.062W
3161	2322 702 60829	82Ω 5% 0603
3162	4822 051 30472	4.7kΩ 5% 0.062W
3164	4822 051 30103	10kΩ 5% 0.062W
3167	4822 051 30339	33Ω 5% 0.062W
3170	4822 051 30339	33Ω 5% 0.062W
3172	4822 051 30339	33Ω 5% 0.062W
3173	4822 051 30472	4.7kΩ 5% 0.062W
3175	4822 051 30339	33Ω 5% 0.062W
3178	4822 051 30339	33Ω 5% 0.062W
3184	4822 051 30472	4.7kΩ 5% 0.062W
3185	4822 051 30101	100Ω 5% 0.062W
3186	4822 051 30103	10kΩ 5% 0.062W
3187	4822 051 30472	4.7kΩ 5% 0.062W
3189	4822 051 30103	10kΩ 5% 0.062W
3191	4822 117 13632	100kΩ 1% 0603 0.62W
3192	4822 051 30682	6.8kΩ 5% 0.062W
3195	4822 117 13632	100kΩ 1% 0603 0.62W
3197	4822 051 30101	100Ω 5% 0.062W
3199	4822 051 30103	10kΩ 5% 0.062W
3200	4822 051 30103	10kΩ 5% 0.062W
3202	4822 051 30221	220Ω 5% 0.062W
3204	4822 051 30103	10kΩ 5% 0.062W
3205	2322 704 66342	6.34kΩ 0603 RC22H 1%
3210	4822 051 30339	33Ω 5% 0.062W
3211	4822 051 30339	33Ω 5% 0.062W
3212	2322 734 65609	56Ω 1% 0.125W 0805
3213	2322 734 65609	56Ω 1% 0.125W 0805
3214	4822 051 30339	33Ω 5% 0.062W
3215	4822 051 30339	33Ω 5% 0.062W
3216	4822 051 30109	10Ω 5% 0.062W
3217	4822 051 30339	33Ω 5% 0.062W
3218	4822 051 30339	33Ω 5% 0.062W
3219	4822 051 30103	10kΩ 5% 0.062W
3220	4822 051 30109	10Ω 5% 0.062W
3221	4822 051 30339	33Ω 5% 0.062W
3222	4822 051 30339	33Ω 5% 0.062W
3223	4822 051 30109	10Ω 5% 0.062W
3224	2322 702 60829	82Ω 5% 0603
3225	4822 051 30109	10Ω 5% 0.062W
3226	4822 051 30339	33Ω 5% 0.062W
3227	4822 051 30339	33Ω 5% 0.062W
3228	4822 051 30109	10Ω 5% 0.062W
3229	4822 051 30339	33Ω 5% 0.062W
3230	4822 051 30103	10kΩ 5% 0.062W
3231	4822 051 30109	10Ω 5% 0.062W
3232	2322 734 65609	56Ω 1% 0.125W 0805
3233	2322 734 65609	56Ω 1% 0.125W 0805
3234	4822 051 30109	10Ω 5% 0.062W
3235	4822 051 30103	10kΩ 5% 0.062W
3236	4822 051 30109	10Ω 5% 0.062W
3237	4822 051 30339	33Ω 5% 0.062W
3238	4822 051 30109	10Ω 5% 0.062W
3239	4822 051 30339	33Ω 5% 0.062W
3240	2322 704 65102	5.1kΩ 1% 0603
3241	4822 051 30339	33Ω 5% 0.062W
3242	4822 051 30109	10Ω 5% 0.062W
3243	4822 051 30339	33Ω 5% 0.062W
3244	4822 051 30339	33Ω 5% 0.062W
3245	4822 051 30109	10Ω 5% 0.062W
3246	4822 051 30339	33Ω 5% 0.062W
3247	4822 051 30339	33Ω 5% 0.062W
3248	4822 117 12139	22Ω 5% 0.062W
3249	4822 051 30339	33Ω 5% 0.062W
3250	4822 051 30472	4.7kΩ 5% 0.062W
3251	4822 051 30339	33Ω 5% 0.062W
3252	4822 051 30339	33Ω 5% 0.062W
3253	4822 117 12917	1Ω 5% 0.062W 0603
3254	4822 051 30339	33Ω 5% 0.062W
3255	4822 051 30472	4.7kΩ 5% 0.062W
3256	4822 051 30472	4.7kΩ 5% 0.062W
3257	4822 051 30223	22kΩ 5% 0.062W
3258	4822 051 30223	22kΩ 5% 0.062W
3259	4822 051 30472	4.7kΩ 5% 0.062W
3260	4822 051 30221	220Ω 5% 0.062W
3261	4822 117 12917	1Ω 5% 0.062W 0603
3262	4822 051 30472	4.7kΩ 5% 0.062W
3263	4822 051 30472	4.7kΩ 5% 0.062W
3264	4822 051 30472	4.7kΩ 5% 0.062W
3265	4822 051 30472	4.7kΩ 5% 0.062W
3266	4822 051 30472	4.7kΩ 5% 0.062W
3267	4822 051 30472	4.7kΩ 5% 0.062W
3268	4822 051 30472	4.7kΩ 5% 0.062W
3269	4822 051 30472	4.7kΩ 5% 0.062W
3270	4822 051 30221	220Ω 5% 0.062W
3271	4822 051 30221	220Ω 5% 0.062W
3272	4822 051 30221	220Ω 5% 0.062W
3273	4822 051 30339	33Ω 5% 0.062W
3274	4822 051 30221	220Ω 5% 0.062W
3276	4822 051 30102	1kΩ 5% 0.062W
3277	4822 051 30221	220Ω 5% 0.062W
3278	4822 051 30221	220Ω 5% 0.062W
3279	4822 051 30221	220Ω 5% 0.062W
3280	4822 051 30103	10kΩ 5% 0.062W
3281	4822 051 30103	10kΩ 5% 0.062W
3282	4822 051 30103	10kΩ 5% 0.062W
3285	4822 051 30109	10Ω 5% 0.062W
3287	4822 051 30472	4.7kΩ 5% 0.062W
3289	4822 051 30472	4.7kΩ 5% 0.062W
3290	4822 051 30472	4.7kΩ 5% 0.062W
3292	4822 051 30472	4.7kΩ 5% 0.062W
3294	4822 051 30221	220Ω 5% 0.062W
3295	4822 051 30221	220Ω 5% 0.062W
3296	4822 051 30221	220Ω 5% 0.062W
3297	4822 051 30221	220Ω 5% 0.062W
3298	4822 051 30221	220Ω 5% 0.062W
3299	4822 051 30221	220Ω 5% 0.062W
3307	4822 051 30103	10kΩ 5% 0.062W
3311	4822 051 30103	10kΩ 5% 0.062W
3315	4822 051 30221	220Ω 5% 0.062W
3316	4822 051 30221	220Ω 5% 0.062W
3317	4822 051 30221	220Ω 5% 0.062W
3318	4822 051 30221	220Ω 5% 0.062W
3319	4822 051 30221	220Ω 5% 0.062W
3320	4822 051 30103	10kΩ 5% 0.062W
3400	4822 051 30472	4.7kΩ 5% 0.062W
3401	4822 051 30472	4.7kΩ 5% 0.062W
3402	4822 051 30472	4.7kΩ 5% 0.062W
3403	4822 051 30472	4.7kΩ 5% 0.062W
3404	4822 051 30472	4.7kΩ 5% 0.062W
3405	4822 051 30332	3.3kΩ 5% 0.062W
3406	4822 051 30332	3.3kΩ 5% 0.062W
3407	4822 051 30332	3.3kΩ 5% 0.062W
3408	4822 051 30332	3.3kΩ 5% 0.062W
3409	4822 051 30472	4.7kΩ 5% 0.062W
3410	4822 051 30472	4.7kΩ 5% 0.062W
3411	4822 051 30472	4.7kΩ 5% 0.062W
3412	4822 051 30472	4.7kΩ 5% 0.062W
3413	4822 051 30472	4.7kΩ 5% 0.062W
3414	4822 051 30472	4.7kΩ 5% 0.062W
3415	4822 051 30472	4.7kΩ 5% 0.062W
3416	4822 051 30472	4.7kΩ 5% 0.062W
3417	4822 051 30472	4.7kΩ 5% 0.062W
3418	4822 051 30472	4.7kΩ 5% 0.062W
3419	4822 051 30472	4.7kΩ 5% 0.062W
3420	4822 051 30472	4.7kΩ 5% 0.062W
3421	4822 051 30472	4.7kΩ 5% 0.062W
3422	4822 051 30472	4.7kΩ 5% 0.062W
3423	4822 051 30472	4.7kΩ 5% 0.062W
3424	4822 051 30103	10kΩ 5% 0.062W
3425	4822 051 30103	10kΩ 5% 0.062W
3426	4822 051 30103	10kΩ 5% 0.062W
3427	4822 051 30103	10kΩ 5% 0.062W
3428	4822 051 30103	10kΩ 5% 0.062W
3429	4822 051 30339	33Ω 5% 0.062W
3430	4822 051 30339	33Ω 5% 0.062W
3431	4822 051 30339	33Ω 5% 0.062W
3432	4822 051 30339	33Ω 5% 0.062W
3433	5322 117 13036	1.2kΩ 1% 0.063W 0603
3434	4822 117 12971	15Ω 5% 0.62W 0603
3435	4822 117 12971	15Ω 5% 0.62W 0603
3436	4822 051 30339	33Ω 5% 0.062W
3437	4822 051 30339	33Ω 5% 0.062W
3438	4822 051 30339	33Ω 5% 0.062W
3439	4822 051 30339	33Ω 5% 0.062W
3440	4822 051 30339	33Ω 5% 0.062W
3441	4822 051 30331	330Ω 5% 0.062W
3442	4822 117 12139	22Ω 5% 0.062W
3443	4822 117 12139	22Ω 5% 0.062W
3444	4822 117 12139	22Ω 5% 0.062W
3445	4822 117 12139	22Ω 5% 0.062W
3446	4822 117 12139	22Ω 5% 0.062W
3447	4822 117 12139	22Ω 5% 0.062W
3448	4822 117 12139	22Ω 5% 0.062W
3449	4822 117 12139	22Ω 5% 0.062W
3450	4822 117 12139	22Ω 5% 0.062W
3451	4822 117 12139	22Ω 5% 0.062W
3452	4822 117 12139	22Ω 5% 0.062W
3453	4822 117 12139	22Ω 5% 0.062W
3454	4822 117 12139	22Ω 5% 0.062W
3455	4822 117 12139	22Ω 5% 0.062W
3456	4822 117 12139	22Ω 5% 0.062W
3457	4822 117 12139	22Ω 5% 0.062W
3458	4822 117 12139	22Ω 5% 0.062W
3459	4822 117 12139	22Ω 5% 0.062W
3460	4822 117 12139	22Ω 5% 0.062W
3461	4822 117 12139	22Ω 5% 0.062W
3462	4822 117 12139	22Ω 5% 0.062W
3463	4822 117 12139	22Ω 5% 0.062W
3464	4822 117 12139	22Ω 5% 0.062W
3465	4822 117 12139	22Ω 5% 0.062W
3466	4822 117 12139	22Ω 5% 0.062W
3467	4822 117 12139	22Ω 5% 0.062W
3468	4822 117 12139	22Ω 5% 0.062W
3469	4822 117 12139	22Ω 5% 0.062W

3470	4822 117 12139	22Ω 5% 0.062W
3471	4822 117 12139	22Ω 5% 0.062W
3472	4822 117 12139	22Ω 5% 0.062W
3473	4822 117 12139	22Ω 5% 0.062W
3474	4822 117 12139	22Ω 5% 0.062W
3475	4822 117 12139	22Ω 5% 0.062W
3476	4822 117 12139	22Ω 5% 0.062W
3477	4822 117 12139	22Ω 5% 0.062W
3478	4822 117 12139	22Ω 5% 0.062W
3479	4822 117 12139	22Ω 5% 0.062W
3480	4822 117 12139	22Ω 5% 0.062W
3481	4822 117 12139	22Ω 5% 0.062W
3482	4822 117 12139	22Ω 5% 0.062W
3483	4822 117 12139	22Ω 5% 0.062W
3484	4822 117 12139	22Ω 5% 0.062W
3485	4822 117 12139	22Ω 5% 0.062W
3486	4822 117 12139	22Ω 5% 0.062W
3487	4822 117 12139	22Ω 5% 0.062W
3488	4822 117 12139	22Ω 5% 0.062W
3489	4822 117 12139	22Ω 5% 0.062W
3490	4822 117 12139	22Ω 5% 0.062W
3491	4822 117 12139	22Ω 5% 0.062W
3492	4822 117 12139	22Ω 5% 0.062W
3493	4822 117 12139	22Ω 5% 0.062W
3494	4822 117 12139	22Ω 5% 0.062W
3495	4822 117 12139	22Ω 5% 0.062W
3496	4822 051 30339	33Ω 5% 0.062W
3497	4822 117 13632	100kΩ 1% 0603 0.62W
3498	4822 051 30103	10kΩ 5% 0.062W
3499	4822 051 30103	10kΩ 5% 0.062W
3503	5322 117 13034	1.5kΩ 1% 0.063W 0603
3504	5322 117 13034	1.5kΩ 1% 0.063W 0603
3700	4822 051 30101	100Ω 5% 0.062W
3701	4822 051 30101	100Ω 5% 0.062W
3702	4822 051 30472	4.7kΩ 5% 0.062W
3703	5322 117 13055	75R 1% 0.063W 0603
3705	2322 704 63001	300Ω 0603 1%
3706	2322 704 61002	1kΩ 0603 RC22H PM1
3707	2322 704 61002	1kΩ 0603 RC22H PM1
3709	2322 704 63001	300Ω 0603 1%
3710	5322 117 13055	75R 1% 0.063W 0603
3713	2322 704 63001	300Ω 0603 1%
3714	2322 704 61002	1kΩ 0603 RC22H PM1
3716	2322 704 61002	1kΩ 0603 RC22H PM1
3717	2322 704 63001	300Ω 0603 1%
3718	5322 117 13055	75R 1% 0.063W 0603
3721	2322 704 63001	300Ω 0603 1%
3722	2322 704 63001	300Ω 0603 1%
3723	2322 704 61002	1kΩ 0603 RC22H PM1
3724	2322 704 61002	1kΩ 0603 RC22H PM1
3725	2322 704 87501	750Ω 603 RC22H 1%
3726	2322 704 87501	750Ω 603 RC22H 1%
3727	4822 051 30339	33Ω 5% 0.062W
3728	4822 051 30681	680Ω 5% 0.062W
3729	4822 051 30109	10Ω 5% 0.062W
3730	4822 051 30109	10Ω 5% 0.062W
3731	4822 051 30472	4.7kΩ 5% 0.062W
3732	4822 051 30339	33Ω 5% 0.062W
3805	4822 051 30101	100Ω 5% 0.062W
3806	4822 051 30101	100Ω 5% 0.062W
3807	4822 051 30101	100Ω 5% 0.062W
3808	4822 051 30472	4.7kΩ 5% 0.062W
3809	4822 051 30103	10kΩ 5% 0.062W
3810	4822 051 30103	10kΩ 5% 0.062W
3811	4822 051 30103	10kΩ 5% 0.062W
3812	4822 051 30103	10kΩ 5% 0.062W
3813	4822 051 30103	10kΩ 5% 0.062W
3814	4822 051 30103	10kΩ 5% 0.062W
3815	4822 051 30103	10kΩ 5% 0.062W
3817	4822 051 30472	4.7kΩ 5% 0.062W
3820	4822 051 30472	4.7kΩ 5% 0.062W
3821	4822 051 30472	4.7kΩ 5% 0.062W
3822	4822 051 30472	4.7kΩ 5% 0.062W
3825	4822 051 30472	4.7kΩ 5% 0.062W
3826	4822 051 30472	4.7kΩ 5% 0.062W
3827	4822 051 30472	4.7kΩ 5% 0.062W
3831	4822 051 30472	4.7kΩ 5% 0.062W
3832	4822 051 30472	4.7kΩ 5% 0.062W
3836	4822 051 30101	100Ω 5% 0.062W
3840	4822 051 30103	10kΩ 5% 0.062W
3849	4822 051 30103	10kΩ 5% 0.062W
3850	4822 051 30103	10kΩ 5% 0.062W
3851	4822 051 30103	10kΩ 5% 0.062W
3852	4822 051 30103	10kΩ 5% 0.062W
3854	4822 051 30222	2.2kΩ 5% 0.062W
3855	4822 051 30223	22kΩ 5% 0.062W
3860	4822 117 12139	22Ω 5% 0.062W
3861	4822 117 12139	22Ω 5% 0.062W
3862	4822 117 12139	22Ω 5% 0.062W
3863	4822 117 12139	22Ω 5% 0.062W
3864	4822 117 12139	22Ω 5% 0.062W
3865	4822 117 12139	22Ω 5% 0.062W
3866	4822 117 12139	22Ω 5% 0.062W
3867	4822 117 12139	22Ω 5% 0.062W
3868	4822 117 11817	1.2kΩ 1% 1/16W
3869	4822 051 30472	4.7kΩ 5% 0.062W
3901	2322 704 61801	180Ω 0603 RC22H PM1
3902	2322 704 65601	560Ω 1% 0603
3905	2322 704 61801	180Ω 0603 RC22H PM1
3906	2322 704 65601	560Ω 1% 0603
3907	4822 051 30101	100Ω 5% 0.062W
3908	4822 051 30181	180Ω 5% 0.062W
3909	4822 051 30689	68Ω 5% 0.063W 0603
3910	4822 051 30689	68Ω 5% 0.063W 0603
3911	4822 051 30561	560Ω 5% 0.062W
3912	4822 051 30222	2.2kΩ 5% 0.062W
3913	4822 117 12139	22Ω 5% 0.062W
3914	4822 051 30689	68Ω 5% 0.063W 0603
3915	4822 051 30472	4.7kΩ 5% 0.062W
3916	4822 051 30479	47Ω 5% 0.062W
3917	4822 051 30479	47Ω 5% 0.062W
3918	5322 117 13055	75R 1% 0.063W 0603
3919	4822 051 30102	1kΩ 5% 0.062W
3920	5322 117 13055	75R 1% 0.063W 0603
3921	4822 051 30102	1kΩ 5% 0.062W
3922	4822 051 30689	68Ω 5% 0.063W 0603
3923	4822 051 30223	22kΩ 5% 0.062W
3924	5322 117 13055	75R 1% 0.063W 0603
3925	4822 051 30103	10kΩ 5% 0.062W
3926	4822 051 30102	1kΩ 5% 0.062W
3927	5322 117 13055	75R 1% 0.063W 0603
3928	4822 051 30102	1kΩ 5% 0.062W
3929	2322 704 65609	56Ω 0603 RC22H 1%
3930	5322 117 13055	75R 1% 0.063W 0603
3931	4822 051 30102	1kΩ 5% 0.062W
3932	5322 117 13055	75R 1% 0.063W 0603
3933	4822 051 30102	1kΩ 5% 0.062W
3934	5322 117 13055	75R 1% 0.063W 0603
3935	5322 117 13055	75R 1% 0.063W 0603
3936	5322 117 13055	75R 1% 0.063W 0603
3937	5322 117 13055	75R 1% 0.063W 0603
3938	5322 117 13055	75R 1% 0.063W 0603
3939	5322 117 13055	75R 1% 0.063W 0603
3955	4822 117 12917	1Ω 5% 0.062W 0603
4001	4822 051 30008	Jumper 0603
4005	4822 051 30008	Jumper 0603
4111	4822 051 30008	Jumper 0603
4113	4822 051 30008	Jumper 0603
4115	4822 051 30008	Jumper 0603
4117	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603
4125	4822 051 30008	Jumper 0603
4201	4822 051 30008	Jumper 0603
4202	4822 051 30008	Jumper 0603
4204	4822 051 30008	Jumper 0603
4205	4822 051 30008	Jumper 0603
4308	4822 051 30008	Jumper 0603
4311	4822 051 30008	Jumper 0603
4315	4822 051 30008	Jumper 0603
4316	4822 051 30008	Jumper 0603
4401	4822 051 30008	Jumper 0603
4402	4822 051 30008	Jumper 0603
4404	4822 051 30008	Jumper 0603
4406	4822 051 30008	Jumper 0603
4407	4822 051 30008	Jumper 0603
4800	4822 051 30008	Jumper 0603
4803	4822 051 30008	Jumper 0603
4815	4822 051 30008	Jumper 0603
4816	4822 051 30008	Jumper 0603
4822	4822 051 30008	Jumper 0603
4900	4822 051 30008	Jumper 0603
4901	4822 051 30008	Jumper 0603
4904	4822 051 30008	Jumper 0603
4906	4822 051 30008	Jumper 0603

5001	4822 157 11499	BLM11P600SPT
5005	4822 157 11499	BLM11P600SPT
5008	4822 157 11499	BLM11P600SPT
5009	4822 157 11499	BLM11P600SPT
5010	4822 157 11499	BLM11P600SPT
5100	4822 157 11499	BLM11P600SPT
5103	4822 157 11499	BLM11P600SPT
5104	4822 157 11499	BLM11P600SPT
5200	4822 157 11499	BLM11P600SPT
5202	4822 157 11499	BLM11P600SPT
5203	4822 157 11499	BLM11P600SPT
5204	4822 157 11499	BLM11P600SPT
5302	4822 157 11499	BLM11P600SPT
5400	4822 157 11499	BLM11P600SPT
5401	4822 157 11717	BLM31P500SPT
5402	4822 157 11717	BLM31P500SPT
5404	4822 157 11499	BLM11P600SPT
5405	4822 157 11717	BLM31P500SPT
5406	4822 157 11717	BLM31P500SPT
5501	4822 157 11717	BLM31P500SPT
5502	4822 157 11499	BLM11P600SPT
5503	2422 535 94995	10µH 1014520%
5700	4822 157 11499	BLM11P600SPT
5701	4822 157 11876	6.8µH 10% 0805
5703	4822 157 10586	2.2µH 10% 0805
5704	4822 157 11876	6.8µH 10% 0805
5706	4822 157 10586	2.2µH 10% 0805
5707	4822 157 11876	6.8µH 10% 0805
5709	4822 157 10586	2.2µH 10% 0805
5711	4822 157 70649	4,7µH (NL322522T-4R7J)
5712	4822 157 70649	4,7µH (NL322522T-4R7J)
5713	4822 157 11499	BLM11P600SPT
5802	4822 157 11499	BLM11P600SPT
5803	4822 157 11499	BLM11P600SPT
5804	4822 157 11499	BLM11P600SPT
5808	4822 157 11499	BLM11P600SPT
5809	4822 157 11499	BLM11P600SPT
5901	4822 157 11499	BLM11P600SPT
5902	4822 157 70649	4,7µH (NL322522T-4R7J)
5903	4822 157 70649	4,7µH (NL322522T-4R7J)
5904	3198 018 90050	Bead 1kΩ at 100MHz
5905	2422 549 45634	0603 EMI 100MHZ 60R
5906	2422 549 45634	0603 EMI 100MHZ 60R
5907	2422 536 00598	1.5µH 1210 20%
5908	2422 536 00598	1.5µH 1210 20%
5909	2422 549 45634	0603 EMI 100MHZ 60R
5910	2422 536 00598	1.5µH 1210 20%
5911	2422 536 00598	1.5µH 1210 20%
5912	2422 536 00598	1.5µH 1210 20%
5913	2422 536 00598	1.5µH 1210 20%
5914	2422 549 45634	0603 EMI 100MHZ 60R
5915	2422 549 45634	0603 EMI 100MHZ 60R
5916	4822 157 11499	BLM11P600SPT

6000	4822 130 11528	1PS76SB10
6100	4822 130 11528	1PS76SB10
6101	4822 130 11528	1PS76SB10

7001	9322 116 74668	LD1117D33
7002	9352 683 81115	74LVC1G32GW
7003	5322 130 60159	BC846B
7004	9352 673 95518	SAA7118E/V1
7103	9352 683 81115	74LVC1G32GW
7104	9352 500 20118	74LVC08AD
7106	9322 191 99685	NCP303LSN29
7107	9352 500 20118	74LVC08AD
7109	9352 115 40118	74LVC245APW
7111	5322 209 71568	PC74HCT14T
7300	9352 317 00118	74LVC125AD
7400	8203 600 00371	PNX7100EH/C3
7402	2722 171 08819	4MHZ 15P FXO34FL
7403	3198 010 42310	BC847BW
7500	9322 188 69668	STS5DNF20V
7501	9322 207 93668	NCP1571D
7701	9322 200 00685	AD8091ART
7702	9322 205 55668	AD8092AR
7703	9322 190 09671	ADV7302AKST
7704	9322 142 88668	LF25CDT
7807	9965 000 24409	AM29DL640G-70EI/'FF8.1'
7809	9322 130 41668	M24C64-WMN6
7810	9965 000 18099	M24C64-WMN6/CHR BOOT1.0
7812	9322 187 09668	MT48LC16M16A2TG-7E
7813	9322 187 09668	MT48LC16M16A2TG-7E
7900	9352 684 56115	74LVC1G04GW
7901	9352 684 56115	74LVC1G04GW
7902	4822 130 61553	DTC124EU
7903	9352 456 80115	74HCT1G125GW
7904	5322 130 60159	BC846B
7905	4822 130 61553	DTC124EU
7906	5322 130 60159	BC846B
7907	5322 130 60159	BC846B
7908	5322 130 60159	BC846B
7909	5322 130 60159	BC846B
7911	5322 130 60159	BC846B
7912	5322 130 60159	BC846B

In / Out Extension Board

Various

1920	2422 025 17897	CON H 6P F
1921	2422 025 16924	CON H 7P
1922	2422 026 05374	SOC CINCH H 3P F 3L1
1925	4822 267 31729	CONNECTOR

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2250	3198 017 41050	1µF 10V 0603
2254	4822 122 33753	150pF 5% 50V
2255	2238 586 59812	100nF 20-80% 50V 0603
2256	2238 586 59812	100nF 20-80% 50V 0603
2257	5322 126 11578	1nF 10% 50V 0603
2258	2238 586 59812	100nF 20-80% 50V 0603
2259	2222 867 15339	33pF 5% 50V 0603
2260	2238 586 59812	100nF 20-80% 50V 0603
2261	4822 124 42234	100µF 20% 6,3V
2265	5322 126 11583	10nF 10% 50V 0603
2266	2238 586 59812	100nF 20-80% 50V 0603

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3250	4822 116 52219	330Ω 5% 0.5W
3252	4822 051 30101	100Ω 5% 0.062W
3255	4822 117 13632	100kΩ 1% 0603 0.62W
3259	4822 116 52201	75Ω 5% 0.5W
3260	4822 051 30222	2.2kΩ 5% 0.062W
3261	4822 051 30471	470Ω 5% 0.062W
3262	4822 051 30561	560Ω 5% 0.062W
3263	4822 116 52195	47Ω 5% 0.5W
3264	4822 051 30101	100Ω 5% 0.062W
4001	4822 051 30008	Jumper 0603
4201	4822 051 30008	Jumper 0603

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5250	2422 536 00019	TRANSFORMER 6RG
5251	2422 549 43062	Bead 600Ω at 100MHz
5255	2422 549 43062	Bead 600Ω at 100MHz

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6255	9322 175 41687	SOC OPT JFJ1000-010010
6256	9322 146 61685	DF3A6.8FU
6257	9322 146 61685	DF3A6.8FU
6258	9322 146 61685	DF3A6.8FU

7250	5322 209 11517	PC74HCU04T