Service
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Service Manual

CLASS 1
LASER PRODUCT

DVD+ReWritable

DIGITAL VIDEO

DIGITAL AUDIO

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PHILIPS

1. Technical Specifications and Connection Facilities

1.1 Diversity Matrix

	HDRW720/00	HDRW720/02	HDRW720/05	DVDR725H/00	DVDR725H/02	DVDR725H/05
Front Board						
PBAS DC 04 E1	X	X	X	X	X	X
Analog Board						
PBAS AB HDD E1	X	X		X	X	
PBAS AB HDD E2			X			X
Power Supply Interface						
PBAS PSI SUB	X	X	X	X	X	X
UP Sub PWB						
PBAS UP SUB HDD E1	X	X	X	X	X	X
Digital Board						
PBAS CHRY F EF3_AV3	X	X	X	X	X	X
In / Out Extension Board						
PCB ASSY IOE CST E1	X	X	X	X	X	X
EPG Board						
PBAS EPG MODULE EURO	X	X	X	X	X	X
Basic Engine						
VAD8031/01 (AV3)	X	X	X			
VAD8041/01 (AV3.5)	X	X	X	X	X	X
Power Supply Module						
AC6220 B	X	X	X	X	X	X

1.2 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

1.3 RF Tuner

Test equipment:Fluke 54200 TV Signal generator
Test streams:PAL BG Philips Standard test pattern

1.3.1 System:

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

1.3.2 RF - Loop Through:

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

1.3.3 Radio Interference:

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

1.3.4 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)

1.3.5 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

1.3.6 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 %

1.3.7 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

1.4 Analogue Inputs

1.4.1 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

1.4.2 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

1.4.3 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

1.5 Video Performance

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

1.5.1 SCART (RGB)

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

1.6 Audio Performance CD

1.6.1 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

1.6.2 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

1.7 Digital Output

1.7.1 Coaxial

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

1.8 Digital Video Input (IEEE 1394)

1.8.1 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

1.9 P50 System Control

Via SCART pin nr 10

1.10 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

1.11 Laser Output Power & Wavelength

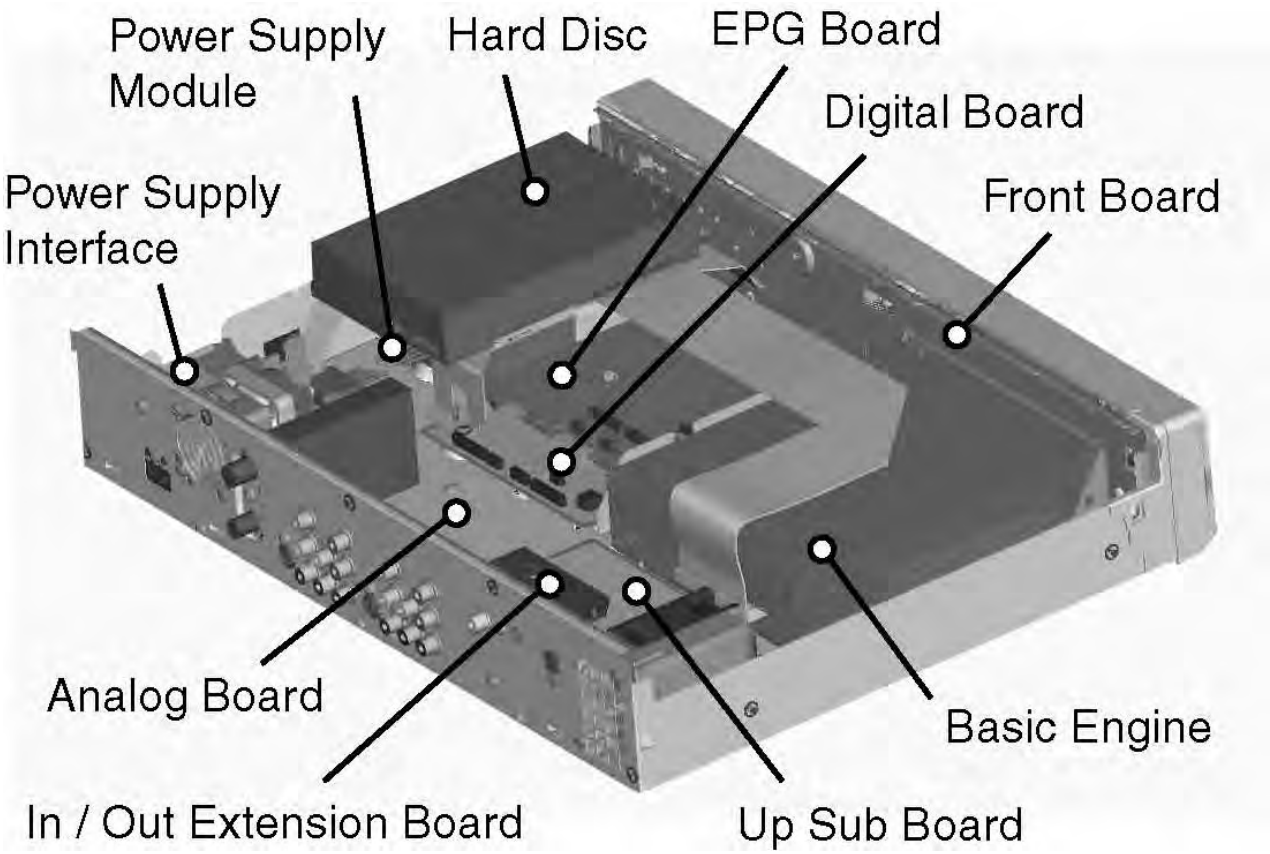
1.11.1 DVD

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

1.11.2 CD

Output power	:	0.3mW
Wavelength	:	780nm

1.12 PCB Locations



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.

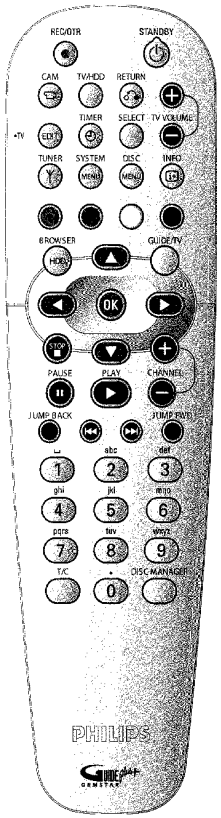
VIDEO Plus+

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

ENGLISH



REC/OTR ● Record the current TV channel on the HDD, mark recordings in the time shift buffer to be stored on HDD.
Hold button down to separate the beginning of a title (Mark the recording from the beginning of the actual position in the Time Shift Buffer).

STANDBY ⏻ To switch set on or off, interrupt menu function.
A programmed recording (TIMER) or an archiving process will be continued until the end, and the device will then be switched off.

CAM Switch to 'Camera mode' (recording directly on the HDD and not through time shift buffer), switch to input sockets (' **S-VIDEO (CAM1)** / **VIDEO (CAM1)** ', ' **DV IN (CAM2)** ').

TV/HDD Switches 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.
This, however, functions only if you have connected your TV set to the DVD recorder using a scart cable (socket **EXT1 TO TV-I/O**) and your TV set reacts to the switching.

RETURN Return to previous menu on a video CD (VCD). This also works with some DVD discs.
Moreover, you can jump back to the previous scene of the time shift buffer or to playback from the HDD. You can switch to the picture of the actual running TV show with the **TUNER** buttoen.

EDIT Call up/Cancel the edit menu.
Call up/Cancel the menu for editing titles during playback.

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

SELECT Select function/value.
You can mark several titles in the media browser.
Switch on repeat play during playback from a disc.

TUNER This button lets you switch to the picture of the internal tuner (TV channel).
During play back from the Time Shift Buffer, you can jump to the actual TV show (live) of the selected TV channel.

SYSTEM MENU Call up/Cancel the system menu. Depending on the operating mode from which you press this button:
•)DVD system menu: Press **DISC MENU** first.
•)HDD system menu: Press **TUNER** first.

DISC MENU For displaying the DVD menu or the index screen overview.

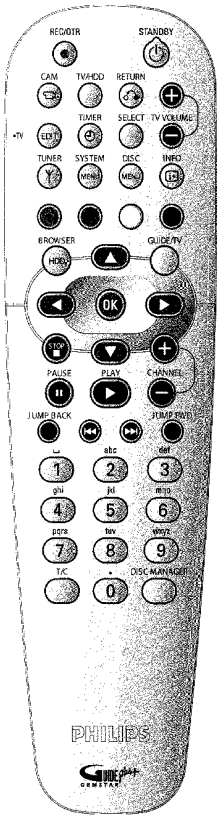
INFO For displaying additional information on the screen or the time shift buffer during playback/recording on the HDD (**TUNER** / **BROWSER HDD** button).
Call up additional information in the GUIDE Plus+® system.

RED Red function button, in some screens the function fo a 'clear' button.

GREEN Green function button

YELLOW Yellow function button

BLUE Blue function button



BROWSER HDD Call up/cancel the overview of HDD recordings (media browser).

GUIDE/TV Call up/Cancel the GUIDE Plus+® System

▲ ▼ Cursor buttons up, down in the menus.
Previous or next position in the time shift buffer during playback from HDD.

◄ ► Cursor buttons left, right in the menus.
Previous or next position during playback of a title from the HDD (media browser or time shift buffer). If you hold down this button you can faster brwose trough the recordings. The speed will increase automatically.

OK Confirming of functions Starting the playback from the beginning in the 'Media Browser'.

STOP ■ Stop playback
Hold down the button to open and close 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 in the 'Camera mode', the DVD recorder switches to pause and inserts a chapter marker.

PLAY ► Play back a recorded disc.
In the GUIDE Plus+® system: OK button.

CHANNEL + Next programme number

CHANNEL – Previous programme number

JUMP BACK To jump back a certain time period that can be changed in the settings of the HDD.

⏮ 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

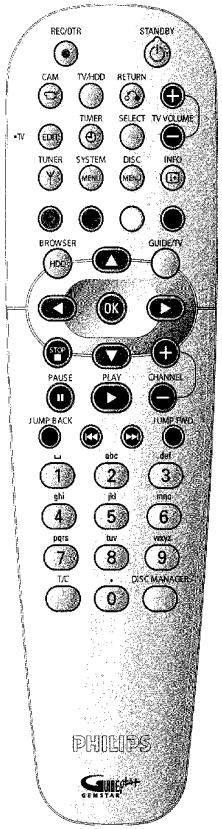
⏭ Briefly press the button during playback: Next chapter or next title
Hold down the button: Search forwards
Hold down the button during the still picture: slow motion forward

JUMP FWD To jump forward by a certain time period that can be changed in the settings of the HDD.

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

T/C Switching between title and chapter for selection using ⏮ , ⏭ .
If '*INFO*' appears in the display, the index menu from a recorded disc will be shown or an introductory film will be played. In this case, this function is not available.

DISC MANAGER Call up/Cancel the disc manager (DM).



Additional TV functions

With the enclosed multicode remote control you can control the main functions of your TV set. To do this, you must first enter a code number that corresponds to the make of your TV set. You will find a summary of all available remote control commands on the last page of this manual. How to enter this code number you will read in the chapter ' Using your DVD-Recorder remote control with your TV set'.

TV VOLUME + Increase TV volume

TV VOLUME − Reduce TV volume

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

Additional TV functions for Philips TV-sets if supported from the TV. You need to hold down the • **TV** button (on the left side).

T/C switch Teletext (TXT) on/off

TIMER ⏲ Clock display on the screen on/off

RETURN To return to the previous selected TV program/ previous menu step

SYSTEM MENU Call up the System Menu from the TV

▼ , ▲ In the menus cursor up/down

◄ , ► In the menus cursor left/right

OK Confirm functions or settings

Colour buttons Colour buttons for special functions

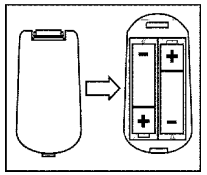
TUNER Switching the TV from the external sockets to the internal tuner.

ENGLISH

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.

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.

Using your DVD-Recorder remote control with your TV set

With the enclosed multicode remote control you can control the main functions of your TV set. To do this, you must first enter a code number that corresponds to the make of your TV set.
You will find a summary of all available remote control codes on the last page of this manual.

1. Hold down the **STANDBY** ⏻ button.
2. Using the number buttons **0..9** , enter the code number that corresponds to the make (manufacturer) of your TV set.
3. When you have entered the code number check that, the TV set will responds to the **TV VOLUME −** or **TV VOLUME +** buttons.

× **My TV set will not react**
✓ Also try to enter the other code numbers or that of other manufacturers.
✓ In some cases, it is possible that your TV set will not react to the selected code numbers. If this is the case, you unfortunately cannot use this function.

× **How can I reset the code?**
✓ Enter the number 000.

If you remove the batteries, the selected code will be stored for about 5 minutes before resetted to 000.

4. By using the **TV** buttons of the control, you can:

TV VOLUME +	increase the TV volume
TV VOLUME −	decrease the TV volume
STANDBY ⏻	switch off the TV set
CHANNEL +	next programme number
CHANNEL −	previous programme number

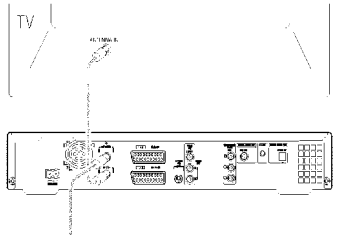
Additionally on Philips TV-sets:

T/C	switch Teletext (TXT) on/off
TIMER ⏲	Clock display on the screen on/off
RETURN	To return to the previous menu step
SYSTEM MENU	Call up the System Menu from the TV
▼ , ▲	In the menus cursor up/down
◄ , ►	In the menus cursor left/right
OK	Confirm functions or settings
Colour buttons	Colour buttons for special functions
TUNER	Switchng the TV from the external sockets to the internal tuner.

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.



Connecting to the TV

Choose from the following connections:

Connection with scart cable

Connection with S-videocable

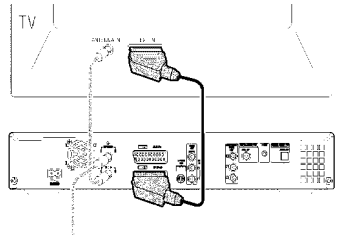
Connection with Video (CVBS) cable

Connection with the aerial cable

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?

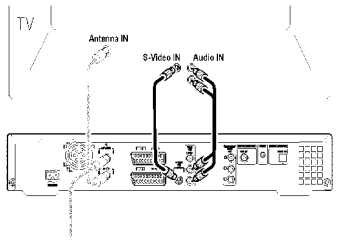
On some TV sets select 'VCR' as the source for this scart socket. Read your instruction manual for your TV set for further information.

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

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).

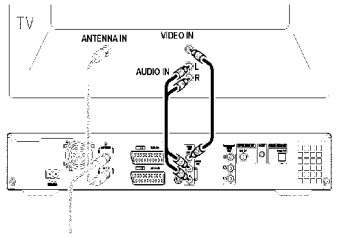


- Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

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.

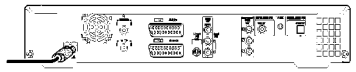
Connecting with the aerial cable

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 printet 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.

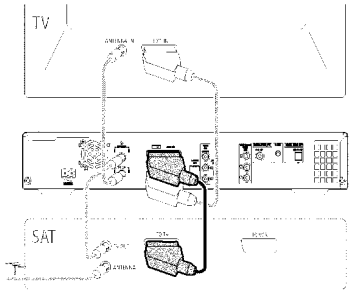


→ The most important features of the DVD recorder will appear in scrolling text on the display.

After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.

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

Connecting additional devices to the second scart socket

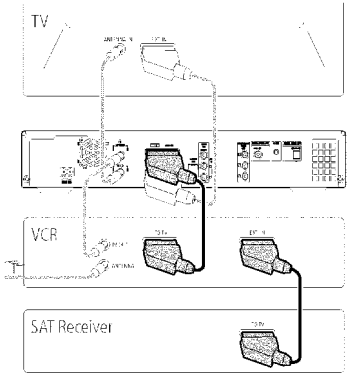


You can connect additional devices such as decoders, satellite receivers, camcorders, etc. to the **EXT2 AUX-I/O** socket.

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/HDD** 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 **L AUDIO R (CAM1)** audio sockets.
  For more information read the chapter 'Recording on the HDD'.

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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.

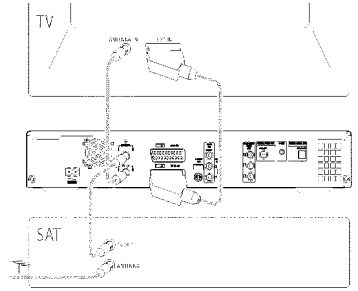
Connecting additional receivers

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).*

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.

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Connect 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. 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.

When films are transferred to the HDD or 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 **L AUDIO 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 **L AUDIO R (CAM1)** on the DVD recorder to the audio output on the camcorder.

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

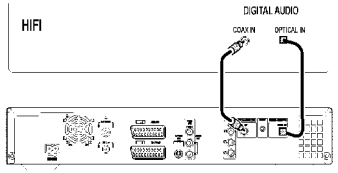
Connecting audio devices to the analogue audio sockets

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

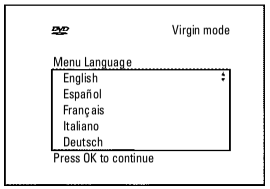
After successfully connecting your DVD recorder to the TV set and other additional devices as described in the previous chapters, this chapter will show you how to start the initial installation. The DVD recorder automatically seeks and stores all available TV channels.

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.

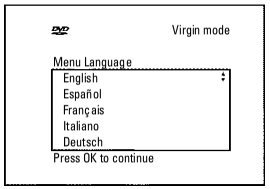
1 Press **STANDBY-ON** ⏻ on the front of the DVD-recorder
→ 'WELCOME' will appear on the display.

→ If the connection was properly made and your TV was **automatically switched** to the programme number for the scart 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 scart socket programme number, manually change to the corresponding programme number on your TV set (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.

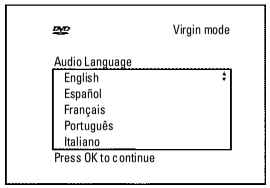
2 Select the desired language for the on-screen menu by pressing ▼ or ▲ .



What is an on-screen menu?
The multi-language on-screen menu takes the mystery out of using your new DVD recorder. All settings and/or functions are displayed on your TV screen in the relevant language.

3 Confirm with **OK** .

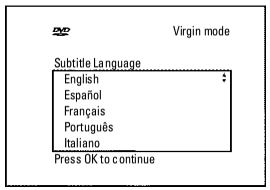
4 Select the desired audio language using ▼ or ▲ .



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** .

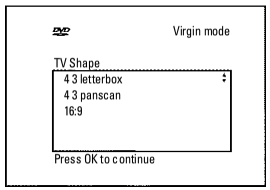
6 Select the desired language for the subtitles by pressing ▼ or ▲ .



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** .

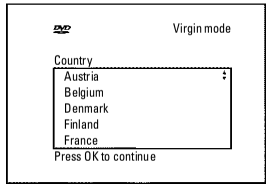
8 Select the desired screen format position using ▼ or ▲ .



- '***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** .

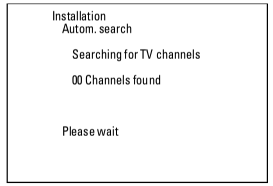
10 Select the country of your residence with ▼ or ▲ .
- If your country does not appear, select '***Other***'.



Why do I have to set the country?
To call up the specific settings for the respective country, you must first install the country.
After the first installation you can set the country in the 'Setup' of the GUIDE Plus+® System only.

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 station search').

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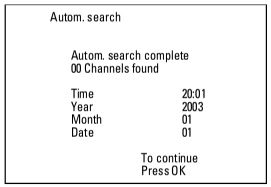
→ When the automatic TV channel search is complete, '***Autom. search complete***' will appear on the TV screen along with the number of TV channels found.

→ '***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** .
→ '***Dealer demo***' appears on the screen.
- Select '***Yes***' and confirm with **OK** if you want to see a demonstration of the function of the DVD-Recorder. Playback starts automatically.
  The demontration movie is stored for each language as a title in the 'Media Browser'. If you need additional capacity on the HDD you can delete the demonstration as you delete a titel (recording). Read therefor the section 'Delete titles/recordings from the HDD' in the chapter 'Playback from the HDD'.
- Select '***No***' and confirm with **OK** if you do not want to see the demonstration movie automatically.

× **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.

Further settings relate to the GUIDE Plus+® System. This offers a free interactive guide to the TV programmes available in your area.

To install this system, please read the instructions in the section entitled 'The GUIDE Plus+® 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 **TUNER** 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.

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 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 **TUNER** button to switch to the internal tuner.

2 Press the **BROWSER HDD** button and then the **SYSTEM MENU** button on the remote control.
→ The 'SYSTEM MENU' appears.

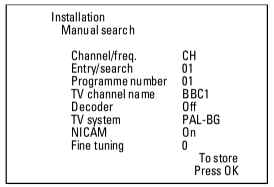
3 Select '***Set up***' using ▼ .

4 Press ▶ to select '***System***'.

5 Select the line '***Installation***' using ▼ and confirm with ▶ .
→ A message appears on the screen that this setting will flush the 'Time Shift Buffer'.
- If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR ●** button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.

6 Select '***Yes***' with ◀ and confirm with **OK** .
- If the message window was closed, confirm the line with ▶ again.

7 Select '***Manual search***' using ▼ or ▲ and confirm with ▶ .



8 Select '***Decoder***' using ▼ or ▲ .

9 Select '***On***' with ▶ .
- To switch off the decoder use ▶ to select '***Off***' (Decoder switched off).

10 Confirm with **OK** .

11 To end, press **SYSTEM MENU** .

Your decoder has now been allocated to this TV channel.

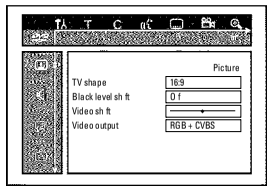
Connection using a component video (Y Pb Pr/YUV) cable (no progressive scan)

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.

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.

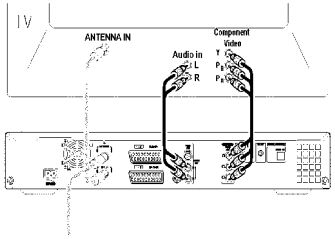
1. Press the **DISC MENU** and then the **SYSTEM MENU** button on the remote control.
   → The menu bar appears.
2. Select '⚙' symbol with ◄ or ► .
3. Select the '👤' symbol using ▼ or ▲ and confirm with ► .



4. Select the line '***Video output***' using ▲ or ▼ and confirm with ► .
5. Select your setting with ▼ or ▲ . If the YPbPr output (YUV signal) is switched on, S-video (Y/C) and video (FBAS/CVBS) signals will not be transmitted simultaneously.
   The RGB' signal is switched off.
   - **'*S-video + YPbPr*'**
     Component Video (YUV) and S-Video(Y/C).
     GUIDE Plus+® menus only available on YUV ouput sockets.
   - **'*CVBS + YPbPr*'**
     Component Video (YUV) and Video (FBAS/CVBS).
     GUIDE Plus+® menus only available on YUV ouput sockets.

   With all other settings, the signal is switched off at the **COMPONENT VIDEO OUT** sockets. This will also be displayed as information on the screen.

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



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 (interlaced) 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).

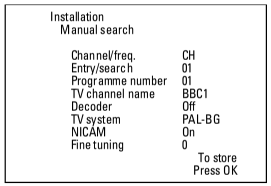
   Please observe the colour sequence
   The colours of the sockets at the DVD recorder and the connectors must match those of the socket colours at the TV set (red-red/blue-blue/green-green). If they don't, the colours of the picture may get mixed up or the picture may not be visible.
8. Use an audio (cinch) 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 your TV set to the component video (Interlaced) input sockets. If there is a switch or selection on your TV-set between Interlaced' and 'Progressive scan' select 'Interlaced'. 'Progressive scan' will be not supported from this DVD-Recorder.
   Also consult the instruction manual of your TV set.
   → 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.

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 **DISC MENU** button and then the **SYSTEM MENU** button on the remote control.
   → The 'SYSTEM MENU' appears.
2. Select '***Set up***' using ▼ .
3. Press ► to select '***System***'.
4. Select the line '***Installation***' using ▼ and confirm with ► .
   → A message appears on the screen that this setting will flush the 'Time Shift Buffer'.
   - If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.
5. Select '***Yes***' with ◄ and confirm with **OK** .
   - If the message window was closed, confirm the line with ► again.
6. Select '***Manual search***' using ▼ or ▲ and confirm with ► .



7. In '***Channel/freq.***', select the desired display using ► .
   'Freq.'(Frequency), ***'CH'***(Channel), ***'S-CH'***(Special/hyperband channel)
8. 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.
9. Using ◄ or ► in '***Programme number***', select the programme number you want to use for the TV channel, e.g. '***01***'.
10. Press **OK** to store the TV channel.
    × **The message '*EPG PRESETLIST INCOMPLETE*' appears on the screen**
    ✓ In the GUIDE Plus+® System the allocation from the TV channels ('***Editor***' screen) can not be finished (no data available). Check the allocation in the GUIDE Plus+® System ('***Editor***' screen) as soon as GUIDE Plus+® data are available.
11. To search for other TV channels, begin again at 8 .
    - **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***'.
12. To end, press **SYSTEM MENU** .

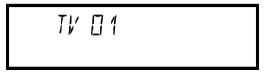
ENGLISH

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**.

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 **BROWSER HDD** and then the **SYSTEM MENU** button on the remote control.
   → The 'SYSTEM MENU' appears.
2. Select '***Set up***' using ▼ .
3. Press ▶ to select '***System***'.
4. Select the line '***Installation***' using ▼ and confirm with ▶ .
   → A message appears on the screen that this setting will flush the 'Time Shift Buffer'.
   O If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.
5. Select '***Yes***' with ◀ and confirm with **OK** .
   O If the message window was closed, confirm the line with ▶ again.
6. Select line '***Follow TV***' with ▼ or ▲ . and confirm with the ▶ button.
7. Confirm the message on the screen with **OK** .
   → 'TV 01' will appear in the DVD recorder display.



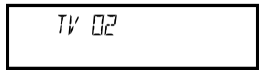
8. Select programme number '1' **on the TV set**.

× **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.

9. 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'.

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



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

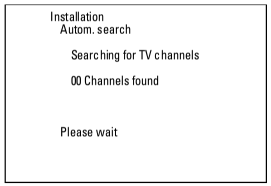
× ***'New preset, please switch to standby'* appears on the screen**
✓ In order to transfer the new TV channel order to the GUIDE Plus+® system, it is necessary to switch off the DVD recorder (**STANDBY** ⏻). Wait for approx. 4 minutes before you switch the DVD recorder on again.
✓ If this message appears after you switch on the DVD recorder, it was not possible to complete the transfer process. Switch off the DVD recorder using **STANDBY** ⏻ .

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.

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 **BROWSER HDD** button and then the **SYSTEM MENU** button on the remote control.
   → The 'SYSTEM MENU' appears.
2. Select '***Set up***' using ▼ .
3. Press ▶ to select '***System***'.
4. Select the line '***Installation***' using ▼ and confirm with ▶ .
   → A message appears on the screen that this setting will flush the 'Time Shift Buffer'.
   O If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.
5. Select '***Yes***' with ◀ and confirm with **OK** .
   O If the message window was closed, confirm the line with ▶ again.
6. Select '***Autom. search***' using ▼ or ▲ .
7. Press ▶ .
   → The automatic TV channel search starts. This allows the DVD recorder to save all available TV channels. This procedure may take several minutes.



   → When all the TV channels have been found, '***Autom. search complete***' will appear on the TV screen.
8. To end, press **SYSTEM MENU** .

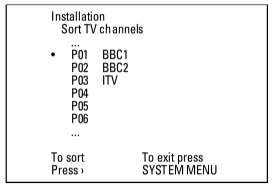
You can read about how to search for a TV channel manually in 'Manual TV channel search'.

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.

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 **BROWSER HDD** button and then the **SYSTEM MENU** button on the remote control.
   → The 'SYSTEM MENU' appears.
2. Select '***Set up***' using ▼ .
3. Press ▶ to select '***System***'.
4. Select the line '***Installation***' using ▼ and confirm with ▶ .
   → A message appears on the screen that this setting will flush the 'Time Shift Buffer'.
   O If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.
5. Select '***Yes***' with ◀ and confirm with **OK** .
   O If the message window was closed, confirm the line with ▶ again.
6. Select '***Sort TV channels***' using ▼ or ▲ and confirm with ▶ .



7. Using ▼ or ▲ select the TV channel that you want to delete or whose order you want to change.
8. Confirm with ▶ .
   O **Deleting TV channels**
   Unwanted channels or those with poor reception can be deleted using the red function button.
9. Using ▼ or ▲ , shift the TV channel to the desired position and press the ◀ button.
   → The DVD recorder will insert the TV channel.
10. Repeat steps 7 to 9 until you have resorted/deleted all the TV channels you want.

11 To store, press **OK** .

12 To end, press **SYSTEM MENU** .

× ***'New preset, please switch to standby'* appears on the screen**
✓ In order to transfer the new TV channel order to the GUIDE Plus+® system, it is necessary to switch off the DVD recorder (**STANDBY** ⏻). Wait for approx. 4 minutes before you switch the DVD recorder on again.
✓ If this message reappears after you switch on the DVD recorder, it was not possible to complete the transfer process.
Switch off the DVD recorder using **STANDBY** ⏻ .

Setting the language

ENGLISH

For the basic setting of DVD playback, you can select the language for the subtitles and the audio language.

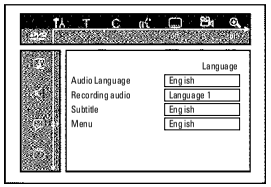
Please note that with some DVDs the audio language and/or subtitle language can be changed only via the DVD menu.
For bilingual shows, you can also select the sound channel of the TV station via the internal tuner (**TUNER** button) for recording or playback.

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 the **BROWSER HDD** button and then the **SYSTEM MENU** button on the remote control.
→ The menu bar appears.

2 Select '🔧' symbol with ◄ or ► .

3 Select line '💬' with ▼ or ▲ and confirm with the ► button.



4 Select the appropriate line and confirm with ► .

- ***Audio Language***
  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.

  The language can also be set in the installation menu from the GUIDE Plus+® system.

  To activate the new language you must switch the DVD-Recorder off and on again (button **STANDBY** ⏻).

5 Select the appropriate setting using ▼ or ▲ and confirm with **OK** .

6 To end, press **SYSTEM MENU** .

Setting the time

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 the **BROWSER HDD** button and then the **SYSTEM MENU** button on the remote control.
→ The 'SYSTEM MENU' appears.

2 Select '***Set up***' using ▼ .

3 Press ► to select '***System***'.

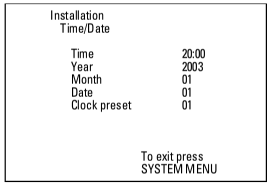
4 Select the line '***Installation***' using ▼ and confirm with ► .
→ A message appears on the screen that this setting will flush the 'Time Shift Buffer'.

- If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information to the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.

5 Select '***Yes***' with ◄ and confirm with **OK** .

- If the message window was closed, confirm the line with ► again.

6 Select '***Time/Date***' using ▼ or ▲ and confirm with ► .



7 Change the time in '***Time***' using the number buttons **0..9** on your remote control.

8 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***'.

9 Check the displayed settings and confirm with **OK** .
→ '***Stored***' will appear briefly on the screen.

10 To end, press **SYSTEM MENU** .

General information

Your DVD Recorder is equipped with the GUIDE Plus+® System. The GUIDE Plus+® System offers a free interactive electronic programme guide that lists all the TV programmes available in your area. You can also use the GUIDE Plus+® System to program your DVD recorder to record your favourite shows.

Press **GUIDE/TV** to see a summary of all the TV programmes currently being shown on the various TV channels. For the summary, you can either display all shows for a particular start time or sorted according to category.

For the GUIDE Plus+® System to operate correctly, it is necessary for the DVD recorder to collect the necessary data. The DVD recorder may take up to 24 hours to do this.

Please note the following:
•) All the TV channels must already have been installed.
•) The TV channel that transmits the GUIDE Plus+® system information must be installed.
If you did not find your country in this list, no TV channel will be provided the GUIDE Plus+® system information.
On the internet page http://www.europe.guideplus.com you will find further informations and tips.

Country/City (Language)	TV-channel
Deutschland	Eurosport
Österreich	Eurosport
Schweiz (Deutsch)	Eurosport
United Kingdom	ITV
France	Canal+
España	Tele 5
Nederland	Eurosport
Eindhoven	Music Factory (TMF)
Rotterdam	Music Factory (TMF)
Amsterdam	Music Factory (TMF)
Belgique (Français)	Canal+
België (Nederlands)	Music Factory (TMF)

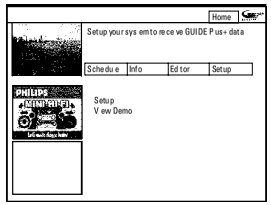
•)The time and date must have been set.
•)**The country and the local post code must have been set in the GUIDE Plus+® system** .
•)The aerial/cable network must be connected; it must be possible to receive TV channels.
•)The DVD recorder must be connected to the mains
•)The DVD recorder must be switched to standby with the **STANDBY** ⏻ button.
•) If you have connected an external receiver (satellite receiver, set-top box, cable TV box,...), it must be switched on and tuned to the right TV channel (see table above).

Setting up the GUIDE Plus+® System

ENGLISH

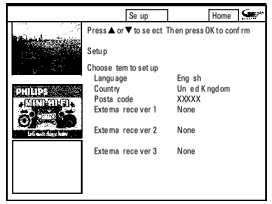
Below we'll tell you how to set up the GUIDE Plus+® System to suit your own particular needs and how to install the external receiver (satellite receiver, ...) if you have one.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press the **GUIDE/TV** button on the remote control.
   → The '***Grid***' screen will appear.
   If the GUIDE Plus+® system has not been installed yet, the '***Setup***' screen will appear and you can start with the installation right now.
   - If an 'Installlation-screen' appears, select the settings described in the next chapter and follow the instructions on the screen.
3. Press ▲ . Select the setting '***Setup***' with ▶ . This setting is located on the second menu page.



4. Select one of the following options using ▼ or ▲ and confirm with **OK** .
   - '***Setup***'
     Installation of the GUIDE Plus+® system.
     Continue reading in the next chapter.
   - '***View Demo***'
     At this point you will be introduced to the functions of the GUIDE Plus+® system. This will be done using stored demo data.
     If you start the demo, programmed recordings can be deleted.
     By pressing **OK** during the presentation, you can proceed directly to the installation of the GUIDE Plus+® system. Read the next section.

'*Setup*'



Check the data displayed on the screen. If necessary, you can change these. To do so, select the corresponding line with ▼ or ▲ .

'*Language*'

Here you can change the language for the on-screen menu.

1. Press **OK** .
2. Select the desired language using ▼ or ▲ and confirm with **OK** .
3. Press **OK** to return to the '***Setup***' screen.

'*Country*'

Select the country you currently live from the list. The DVD recorder needs this information to load the right channel list.

1. Press **OK** .
2. Select the country you live in using ▼ or ▲ and confirm with **OK** .
3. Press **OK** to return to the '***Setup***' screen.

'*Postal code*'

In order to adjust the GUIDE Plus+® system correctly, it is necessary to know your current location with the TV channels available. Using the local post code and the country, the DVD recorder can automatically make the settings.

1. Press **OK** .
2. Choose the entry position using ▶ , ◀ . Select the local post code of your location using ▲ , ▼ , or the number buttons **0..9** .
   - Depending on the country you select, you can also enter letters using ▼ or ▲ .

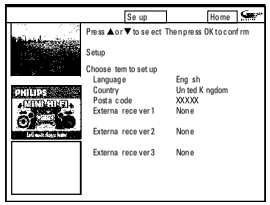
× **I cannot enter a local post code**
✓ You have selected a country in which none of the channels transmits GUIDE Plus+® data yet.

3. Confirm the local post code with **OK** .
4. Press **OK** to return to the '***Setup***' screen.

'*External receiver 1*'

- How you install the external receiver you will read in the next chapter.
- If you have no external receiver connected, read the section 'Finalise set-up'.

Installation of the '*External receiver 1*'



If you have connected an external receiver (satellite receiver, set-top box, cable TV box), you must also install it in the GUIDE Plus+® system. TV programmes (TV channels) that you can only watch via the receiver can also be displayed in the GUIDE Plus+® system and be programmed for recording.
You can connect up to three external receivers to the DVD-Recorder.

1. Select with ▼ or ▲ in the '***Setup***'screen the line '***External receiver 1***' and confirm with **OK** .
2. Read the information on the screen and confirm with **OK** .
3. Select the type of the external receiver. This setting serves to preselect the type used.

   Which types can I choose?
   This selection depends on the country and the GUIDE Plus+® system provider. Therefore, some types may have no function.
   '***Cable***': *Cable receiver, cable box.*
   '***Satellite***': *Analogue or digital satellite receiver.*
   '***Terrestrial***': *Digital terrestrial decoder box.*
   '***None***': *No external device connected.*

4. Confirm with **OK** .
   If you selected '***None***', there is nothing further you need to do here. Read on in the section entitled 'Continue set-up'.
   Otherwise, you should continue here.
5. Select your provider from the list.
   - If you do not have a provider, select '***No provider***'
6. Confirm with **OK** .
7. Select the brand of your external receiver from the list. If, additionally your provider is printed on your receiver (e.g. Sky,...), you must choose the provider as brand.
   - Depending on the type and provider you selected, a limited selection will appear.

- Browse through the pages of the list using ▶▶| , |◀◀ .

× **My brand is not included in the list**
✓ Select '***Satellite***' and as provider '***No provider***'.
You will see a list of all stored brands.
✓ If you do not find your brand, please proceed as follows:
- Select '***None***'. You will find this setting at the end of the list.
- Tune your external receiver to the TV channel which transmits the GUIDE Plus+® data (see table in the section 'General information). If this TV channel is available at the internal tuner of the DVD-recorder, select this channel.
- Wait till the GUIDE Plus+® data is loaded (24 hours) and search for your brand again.
The control data of the external receivers are automatically updated (completed) via the GUIDE Plus+® system. This is done through the aerial, the cable, or the external receiver. You do not need to bring the device to a service centre.
- If your brand is still missing, note the type and manufacturer of your external receiver and call the customer support service in your country. You will find the telephone number on the back of this instruction manual.

8 Press **OK** .

9 Select the input socket of the DVD recorder to which the receiver is connected.

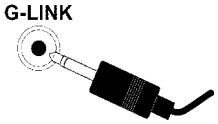
× **My external receiver is connected only via aerial cable**
- Press ▶▶| to move to the next page.
Confirm '***Antenna (RF lead)***' using **OK** .
- Enter the channel number under which the external receiver is stored in the DVD recorder. (e.g.: channel number 'P 04'). Use the number buttons **0..9** , or ▼ , ▲ , ◀ , ▶ .
If the external receiver is not allocated to a channel number, you must search and store it in the DVD recorder as if it were a new TV channel. Read section 'Search TV channels manually'. Please make sure that the receiver remains switched on during search and, if necessary, switch it on to a 'test signal'.

10 Confirm with **OK** .

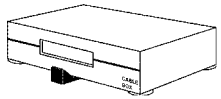
Connecting G-LINK transmitter

The external receiver (satellite receiver, set-top box, cable TV box) is controlled via the DVD recorder with the G-LINK cable (supplied). This means you can record TV shows that are received only through the external receiver.
Connection of the G-LINK cable enables the GUIDE Plus+® system to show the correct guide listing.

1 Connect the G-LINK cable to the **G-LINK** socket at the back of the DVD recorder.



2 Position the G-LINK transmitter in front of the external receiver so that the control signal (IR signal) can be transmitted and received by the receiver unhindered.



How do I find the right position?
If the position of the remote (IR) receiver is indicated on your external receiver (IR, remote sensor, or such like), place the transmitter about 1 to 10 cm in front of it.
If the position is not indicated, proceed as follows:
- *Switch off the external receiver.*
- *Point the remote control at the front of the external receiver.*
- *Move the remote control slowly along the front while repeatedly pressing the on/off button.*
- *When the external receiver switches on or off, you've found the receiver.*
- *Attach the G-LINK transmitter about one to 10 cm in front of it.*

3 Switch the receiver on and select programme number 02 on the receiver or using its remote control.

× **My external receiver does not display the programme number**
During installation, the external receiver will be switched to a different programme number. If the receiver does not display the programme number, you must check the 'Video window' (left top corner in the GUIDE Plus+® system) to see whether switching has taken place.
- Select on the DVD-Recorder the socket where the receiver is connected using **CHANNEL +** , **CHANNEL −** (e.g. ***E2***for **EXT2 AUX-I/O**)
- Please check the TV show in the 'Video window' in the left top corner of the screen.
- Check whether the picture changes during the next step (**OK** button).

4 Read the information on the screen carefully.
Confirm with **OK** .
→ The DVD recorder will now attempt to use the G-Link connection on the external receiver to select a different programme number (e.g.12). This programme number depends on your external receiver.

5 Has the external receiver been switched to the programme number displayed on the screen?
If this is the case, select '***YES***'.
If no switching has taken place, select '***NO***'.

× **My external receiver has not switched to the other programme number.**
- Check that the external receiver is connected and switched on.
- Check the connection and position of the G-LINK transmitter.
- For another attempt with a new code of the chosen brand, select '***NO***'.
- Confirm with **OK** on the remote control.
- If the receiver has not switched yet, select '***NO***' again and confirm with **OK** . It may take several attempts for a receiver brand.

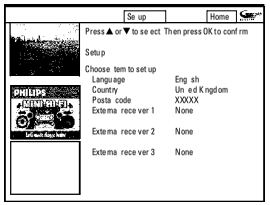
If you return to the setup screen after confirming '***NO***', your receiver may not have been installed. Check the connections again.
- Tune your external receiver to the TV channel which transmits the GUIDE Plus+® data (see table in the section 'General information). If this TV channel is available at the internal tuner of the DVD-recorder, select this channel.
- Wait till the GUIDE Plus+® data is loaded (24 hours) and try the switch over again.
The control data of the external receivers are automatically updated (completed) via the GUIDE Plus+® system. This is done through the aerial, the cable, or the external receiver. You do not need to bring the device to a service centre.
- If your receiver still does not switch, note the type and manufacturer of your external receiver and call the customer support service in your country. You will find the telephone number on the back of this instruction manual.

6 Your external receiver has now been installed.

7 Press **OK** to return to the setup overview.

× **I want to install additional external receivers**
When installing additional external receivers, please observe the following: The external receiver which is controlled by the G-LINK transmitter must be **below** the other additional receivers. The IR(infrared) remote control signal is reflected diagonally upwards and can therefore be used to control additional external receivers which are on top.

Finalise set-up



1 Check the settings shown on the screen.
If the settings are not correct, choose the line in which you want to change the settings and confirm with **OK** .

2 Press the green function button to leave the screen.

- If you want to view a demonstration of the GUIDE Plus+® system select '***View Demo***' with ▼ and confirm with **OK** .
If you start the demo, programmed recordings can be deleted.

- If you do not want to see the demonstration of the GUIDE Plus+® system, end using **GUIDE/TV** .

3 This completes the set-up process for the GUIDE Plus+® system.

4 Switch the DVD-recorder to the TV channel which transmits the GUIDE Plus+® data. The right TV-channel for your country you will in the table in the chapter 'The GUIDE Plus+® system' in the section 'General information'.
Leave the DVD recorder switched on during the night to load the GUIDE Plus+® data.
The information will be available in the next 24 hours.

5 If data are available check in the '***Editor***' screen that the TV channel which transmits the GUIDE Plus+® is allocated to the right programme number. Change the programme number if necessary.

What must I pay attention to when installing an external receiver for the first time?
•) The receiver must be switched on.
•) If you can switch between 'TV' and 'Radio' on the receiver, select 'TV'.
•) Select the TV channel that transmits the GUIDE Plus+® data on the receiver. You will find the corresponding TV channel for your country in the table in section 'General Information' in chapter 'The GUIDE Plus+ System'.
•) On the DVD recorder, select the programme number of the input socket to which the external receiver is connected:
'E2' *Scart socket at the back of the DVD recorder* **EXT2 AUX-I/O**
'EXT 1' Scart socket at the back of the DVD recorder **EXT1 TO TV-I/O**
•) If the external receiver is only connected to the aerial socket, you must select the programme number on the DVD recorder under which the external receiver is stored.
•) The DVD recorder must be switched on.
•) If GUIDE Plus+® data were loaded, switch the DVD-Recorder off with the **STANDBY** ⏻ *button for approx. 10 minutes. During this time, the data will be stored in a memory to prevent them from being erased in case of malfunction (power failure).*
You must observe this information only when installing the receiver for the first time. At this point, there is no GUIDE Plus+® data available yet in order to automatically detect the TV channel that delivers the GUIDE Plus+® data.

Using the GUIDE Plus+ ® System

General

The GUIDE Plus+® System provides you with a free on-screen listing for all the TV channels in your location. You can also use it to control a connected external receiver (satellite receiver, set top box, cable box).

The information of the GUIDE Plus+® System is divided in six screen components:
•) Function buttons (colour panels) along the top of the screen. These correspond to the colour buttons of the remote control
•) The video window
•) Programme information or instructions for use
•) A line for the selection of available GUIDE Plus+® menus
•) The channel guide with the current listings
•) Advertising information or instructions on the GUIDE Plus+® system

Calling up the GUIDE Plus+ ® System:
Press **GUIDE/TV** on the remote control.

Closing the GUIDE Plus+ ® System:
•) Press **GUIDE/TV** to leave the GUIDE Plus+® System and continue viewing the program you were viewing before you called up the GUIDE Plus+® System.

Using the buttons on the front of the DVD recorder
Calling up the GUIDE Plus+® System: **GUIDE** button.
Closing the GUIDE Plus+® System: **GUIDE** button.
Confirm the function: **OK** button.
Red function button: ● button.
Cursor buttons: **UP** , **DOWN** , **LEFT** , **RIGHT** .

The navigation in the GUIDE Plus+® System

Press **GUIDE/TV** to view the main menu. Press ▲ to select the menu line. You can select one of the following functions with ◄ or ► . Press at the desired function the ▼ button for confirmation.

- **'*Grid*':**
  Standard GUIDE Plus+® system screen (programme guide)
- **'*Search*'**
  TV shows sorted by category (movies, sport, etc.)
- **'*Schedule*':**
  Scheduled (pre-programmed) recordings
- **'*Info*':**
  Additional special functions in the GUIDE Plus+® system.
- **'*Editor*':**
  Display/Change the channel settings for the '***Grid***' screen
- **'*Setup*':**
  For changing the basic settings. Read further information in the chapter 'Set up the GUIDE Plus+® System'.

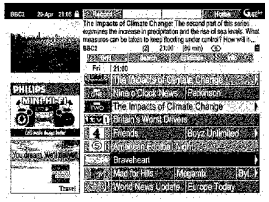
  Function buttons (colour buttons)
  If GUIDE Plus+® information has been loaded, function buttons (colour fields) at the top of the screen indicate that you can perform various actions in the GUIDE Plus+® screen. Red, Green, Yellow, Blue whose function depends on the respective menu. Always check the function (description) in the corresponding colour field before pressing a button.

If no colour buttons are displayed, pressing them will have no effect.

INFO button
An **INFO** button is also available. If additional information is available (symbol i on the screen), you can use this button to retrieve the information.

ENGLISH

The '*Grid*' screen



This list appears when you press the **GUIDE/TV** button. You can view the current listing for all the TV channels from today to the same day next week.

ATTENTION!
If data from the GUIDE Plus+® system is already available after the initial installation, check the allocation of programme numbers to the channels in the '***Editor***' screen.
Read therefore the section 'The '***Editor***' screen'.
If the TV-channel that transmits the GUIDE Plus+® data was allocated to the wrong programme number, no further GUIDE Plus+® data can be loaded.

1. Press **GUIDE/TV** . The '***Grid***' screen will appear.
   → In the top left corner the picture of the TV channel appears which was selected before you call up the GUIDE Plus+® system.
2. Select the TV channel you require with ▲ or ▼ .
   - You can use the number buttons **0..9** to select a TV channel directly.
   - You can use the ▶▶| and |◀◀ buttons to scroll a page at a time.

   Choosing a TV channel from a listing
   - Press the yellow function button.
   - An overview of all TV channels appears.
   - Select the TV channel you want using ► , ◄ , ▼ , ▲ .
   - Confirm with **OK** .
3. Use the ◄ or ► button to select the show you want.
   - You can hold down ◄ or ► to browse faster through the start times.
   - If you hold the button |◀◀ or ▶▶| pressed, you can switch forward or back one day.

I want to call the additional information/advertisement on the left hand side of the screen
Press ◄ in the line of the TV channel repeatedly, until the additional information/advertisement on the left hand side of the screen is highlighted. You can toggle between the two sets of information using ▼ , ▲ .
You can exit these areas with ► or with the blue function button.

Function buttons (colour buttons) in the '*Grid*' screen

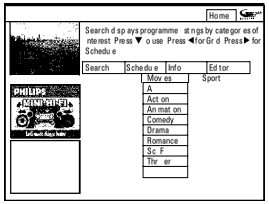
You can use the colour buttons on the remote control to select the following:

'*Record*' (red button):
The highlighted show will be programmed for automatic recording. It appears in the '***Schedule***' screen.
You can store up to 6 TV shows for recording.
You can store up to 30 TV shows for recording.

'*Watch*' (green button):
The highlighted TV show is stored as a reminder using the start time and appears in the '***Schedule***' screen in a different colour than the '***Record***' recording.
When the start time is reached, a message appears on the GUIDE Plus+® screen. You can store up to three such events.

'*Home*' (blue button):
Return to the current time in the listing ('***Grid***' screen).

The '*Search*' screen



This menu lets you access show listings organised by category. This is an even easier way of searching the show you want to watch.
Make your selection from a general category (Movies, Sport, Children's, Series, etc.) and a detailed category (Adventure, Comedy, Drama, etc.)

Colours of the categories:
Purple-Movies
Green-Sport,
Blue-Children's,
Teal-Others,
The Sort service gives you show listings for the next 7 days.

1. Select the category with ◄ , ► .
   Confirm with ▼ . Select the minor category with ▼ , ◄ , ► .
2. Confirm with **OK**
3. Use the ▼ , ▲ , ◄ , ► buttons to scroll through the shows.

   × ***'No Program was found' appears on the screen***
   There is no TV show today that matches the selected category.
   - Select a different day with ► , ◄ .
   - Press ▲ to return to the '***Search***' screen.

Function buttons (colour buttons) in the '*Search*' screen

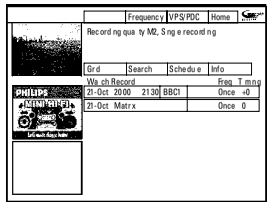
If you have highlighted a show you can use the coloured buttons to perform the following actions:

'*Record*' (red button):
The highlighted show will be programmed for recording. It appears in the '***Schedule***' screen.

'*Watch*' (green button):
The highlighted TV show is stored as a reminder using the start time and appears in the '***Schedule***' screen in a different colour than the '***Record***' recording.
When the start time is reached, a message appears on the GUIDE Plus+® screen. You can store up to three such TV shows.

'*Home*' (blue button):
Return to the current time in the listing ('***Grid***' screen).

The '*Schedule*' screen



This menu displays the shows that are set to record or as a reminder to watch them. You can clear recordings or make changes using the function buttons. Moreover, you can manually program recordings. Depending of the type of programming a recording appears:

Programming from the '*Grid*' screen:

'***21-Oct***: Day and month of the recording
'***Matrix***': Title of the show (if it is transmitted)

Programming from the '*Schedule*' screen:

'***21-Oct***': Day and month of the recording
'***20:00***': Start time
'***21:30***': Stop time
'***BBC1***': TV channel

Additionally appears to each programmed recording:
'***Freq.***':
Frequency '***Once***'..once/'***M-F***'..daily (Monday to Friday)/'***Mon***'..weekly (every week on the same day, e.g. Monday)
'***Timing***': In case an extended switch-off time has been entered or 'VPS/PDC' (V-P) is switched on.

Function buttons (colour buttons) in the '*Schedule*' screen

You can select between programming with ShowView® (red button) or manual programming (green button).

If you selected an already programmed TV show, you can make changes using the colour buttons of the remote control.
The function of the colour buttons will change depending on the tile you select. Always check the function (description) in the corresponding colour field before pressing a button.

1. Press ▼ .
   Select the corresponding recording with ▼ , ▲ .
2. Select the corresponding tile with ◄ , ► .

left tile
red button: clear the recording
green button: change the data

center tile
yellow button: change the TV channel

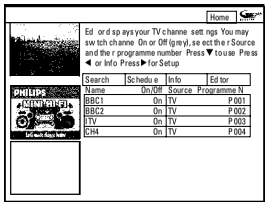
right tile
green button: repeat
yellow button: extend switch-off time, switch VPS/PDC on/off

The '*Info*' screen

This screen can be divided in subcategories. These depend on the information provided by the GUIDE Plus+® system. If there are no categories available, no data has been provided yet. Try visiting this page later.

1. Press ▼ .
   Select the corresponding subcategory with ▼ , ▲ .
2. Select from the displayed data with ▼ or ▲ .
3. Confirm using **OK** to receive more information.
4. Return to the '***Info***' screen by pressing the red function button ('***Info***').

The '*Editor*' screen



Here you can allocate the programme numbers to the corresponding TV channels and switch them on/off for the programme listings ('***Grid***' screen). Moreover, you can define the use of the TV channels on the external receiver.

1. Press ▼ .
2. Select the TV channel you want to change using ▼ , ▲ .
   - Use the ◄ and ► buttons to switch between tiles.

left tile
This tile contains the TV channels with their short descriptions and indicates whether the TV channel is displayed in the programme listing ('***Grid***' screen) or not.

- You can switch on/off a TV channel for the '***Grid***' screen using the red function buttonn

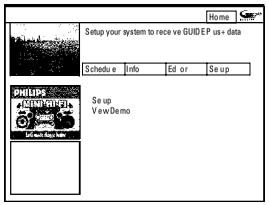
right tile
This tile contains the TV channel properties and the programme numbers. You can modify channel allocation or assign an external receiver. In order to assign a receiver, it must be already installed in the GUIDE Plus+® system.
To change allocations, proceed as follows:

1. Select the TV channel you want to change using ▼ , ▲ .
2. Press the green function button.
3. Enter the programme number of the TV channel using the number buttons **0..9** . You can only enter programme numbers of TV channels that have already been installed.

Entering the TV-channel of an external receiver
- Select the TV channel you want to watch only through the external receiver using ▼ , ▲ .
- Choose the corresponding source using the red function button. This function button is only available when at least one external receiver has been installed. Read section 'Setting up the GUIDE Plus+® system' on how to install an external receiver.
- Press the green function button. Enter the programme number of the TV channel which you would also enter for this TV channel on the external receiver.

Please observe that in the case of modified TV channels, the transfer of GUIDE Plus+® channel data may take up to 24 hours.

The '*Setup*' screen



Here you can make or change the basic settings such as language, country, external receiver. Moreover, you can watch an automatic demonstration of the GUIDE Plus+® system.

'*Setup*'

All the settings you have already made are displayed here. Select the desired line using ▼ or ▲ and confirm with **OK** . For more information on the settings, read section 'Setting up the GUIDE Plus+® system' in chapter 'The GUIDE Plus+® system'.

'*View Demo*'

Here you can view a demonstration of the different functions of the GUIDE Plus+® system.
Start the automatic presentation with **OK** .
If you start the demonstration, programmed recordings can be deleted.
If you cancel the presentation by pressing **OK** , you will go directly to the setup menu.

Information on the screen of your TV

ENGLISH

You can check or change many of the functions and settings of your DVD recorder via the system menu bar.

Symbols in the menu bar

Press **DISC MENU** and then **SYSTEM MENU** to open the menu bar. If a disc is played back, you can open the menubar with **SYSTEM 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

Title/track

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

During playback of a disc, 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

Recording on the HDD

General

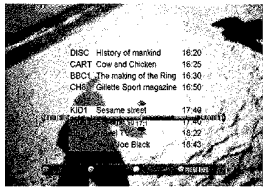
As soon as you turn on the DVD recorder, the currently selected TV channel is recorded in a temporary storage (Time shift Buffer).

Recordings in the time shift buffer will be automatically deleted e.g. after 3 hours if the period of the time shift buffer is set to 3 hours (factory setting). Only recordings marked in the Time shift Buffer will be stored on the the built-in HDD
For more information, read the next section 'The Time Shift Buffer'.

The following additional information is stored with each recording:
•) name of the recording
If no name is recognised from the GUIDE Plus+® systems data, only the programme number (programme name) and the time will be stored as the name.
•) length of the recording
•) recording mode (quality)
•) date of the recording
•) index picture of the recording

To facilitate the search of a specific position, a chapter marker is recorded every 5 minutes. How you switch off this function you will read in chapter 'User preferences for the HDD' in the section '***Preferences***', '***Recording***', '***Chapters***'. After the recording is completed, you can select these markers with ⏮ , ⏭ . Please make sure that the chapter selection is activated (the '***CHAPTER***' symbol lights up in the info bar at the top of the screen). If necessary, you can activate it using **T/C** .

The Time shift Buffer



As a result of the high data transfer speed of the HDD, it is possible to play back recordings from the time shift buffer while the recording is still in process.

Therefore, you can jump back to the currently selected TV programme using **JUMP BACK** and watch a scene again.

Moreover, you can use all playback features such as still picture, slow motion, search by time, search with ⏮ , ⏭ even with recordings that are still in the time shift buffer.
In the meantime, the recording continues.

If you change the TV channel (**CHANNEL +** , **CHANNEL −**) a new title is created with the new TV channel in the time shift buffer. If you watch a TV show only for a short time (less than 60 seconds) before you change to a different TV channel, no new title is created.

For easier navigation, you can change the time period of the time shift buffer from 1 to 6 hours. 1 hour means that a recording is available only for one hour before it is automatically deleted to make room for the current recording.

If the GUIDE Plus+® system delivers title information, the latter is also stored with the recording. When recording TV shows without GUIDE Plus+® information, only the date and the time of the recording are stored as title.

What is the advantage from 1 hour and 6 hours?

The complete time periode of the time will be displayed on the whole screen of your TV.
With 1 hour you will get the highest comfort for searching a specific scene.
With 6 hours you will get the highest possible recording time.

Please observe that the Time shift Buffer needs also storage capacity on the HDD. Depending of the selected record mode (picture quality):
*6 hours in '**M1**' = approx. 28GB*
*6 hours in '**M8**' = approx. 3,4GB*
You can enter the time periode from 1 to 6 hours in the 'User preferences for the HDD'.

Symbols in the 'Time Shift Buffer'

Following symbols can appear in the info bar at the top of the screen in the 'Time Shift Buffer'. With the **INFO** button on the remote control you can also call up this infobar.

Left area

Information about the input signal were displayed here:
TUNER: Actual TV show (live picture) from the selected TV channel
P01: Programme/Channel number of the selected TV channel
ARD: Name of the TV-channel

Right area

Information about the current operating status were displayed here:
Clock Symbol: Actual (live) picture of the selected TV-channel
(**TUNER** button)
PLAY: Playback from the HDD
PAUSE: Still picture
1/8, 1/4, 1/2: Slow motion forwards
-1/8, -1/4, -1/2: Slow motion backwards
4X, 8X, 16X, 32X: Fast motion forwards
-4X, -8X, -16X, -32X: Fast motion backwards

Navigation in the time shift buffer

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 to tuner mode (button **TUNER**).

1. Press **INFO** to display the bar of the time shift buffer on the screen.
2. The following buttons are available:
   - **⏮ , ⏭ , PLAY ► , PAUSE II , ◄ , ► , JUMP FWD , JUMP BACK** for navigation in the time bar.
   - **T/C**
     Switching between title/chapter for selection using ⏮ , ⏭ . The top screen line displays either '***TITLE***' for selecting titles or '***CHAPTER***' for selecting chapters
   - **REC/OTR ●** :
     - To start a recording that will be stored on the HDD.
     - To mark a title that will be stored on the HDD.
     - Hold button down to separate the beginning of a title.
   - **Red function button:**
     - To cancel the marked recording that was set with the **REC/OTR ●** button.
     - Hold button down to separate the end of a title.
   - **Yellow function button: ('*OVERVIEW*')**
     To display an overview of all content of the time shift buffer.
   - **Blue function button:('*MORE INFO*'):**
     To display any additional information for the actual TV show transmitted by the GUIDE Plus+® system.

Mark TV shows for recording

As a rule, recordings in the time shift butter are automatically deleted after a certain time (1 to 6 hours). In order to store recordings on the HDD permanently, you can mark sections of the time shift buffer that will not be deleted and will be available as titles for later playback.

Mark an entire title

A title marker is set if you are watching a TV show longer than 60 seconds. (No change of programme number within 60 seconds)
If you want to mark an entire title (title marker at the beginning and at the end), proceed as follows:

1. Press **INFO** to display the bar of the time shift buffer on the screen.
   - You can also press the yellow colour button to get a better overview of the recordings.
2. Select the title you want to store with ▼ , ▲ .
3. Press **REC/OTR ●** to mark the title.
   → The colour within the bar changes to red. If you press the yellow button, you will see programmes marked for recording with a red dot.
   - To remove the marker, press the red function button. The red title marker disappears.
4. If you want to mark other titles, repeat steps 2 and 3 , until you have selected all the titles you want.
   - If you want to mark several titles in a sequence, go to the oldest title and press **REC/OTR ●** several times.
   - Using **REC/OTR ●** you can also mark the future end of a title. You will see this in the red marked '**IIIIIIIIIIIIIII**' symbol on the right end of the Time Shift Buffer bar.
     The recording will be stoped automatically at the end of the program.
     If the start (titlemarker) of the TV-Show was not taken from the GUIDE Plus+® System, or no GUIDE Plus+® is available, you can extend the end by +30, +60, +90 ,... minutes

Mark part of a title

You can also mark only parts of a title.
If you mark several parts of a title, each part will be stored as a separate title on the HDD.

1. Press **INFO** to display the bar of the time shift buffer on the screen.
   - You can also press the yellow colour button to get a better overview of the recordings.
2. Select the title you want to store with ▼ , ▲ .
3. The following options are available:
   - **Freely selectable end:**
     - Press **REC/OTR ●** to select the entire title. The colour changes to red.
     - Search for the desired end using ◄ , ► .
     - Hold down the red button:
       Red marked recording changes to its original colour from the current position to the end of the title.

       If you want to set more markers in one title, start marking at the begin of the title.
   - **Freely selectable beginning:**
     - Search for the desired beginning using ◄ , ► .
     - Hold down the **REC/OTR ●** button.
       The marker changes to red from the current position to the end of the title.
   - **Freely selectable beginning and end:**
     First, you must define the beginning and then cut off the end.
     - Search for the desired beginning using ◄ , ► .
     - Hold down the **REC/OTR ●** button.
       The marker changes to red from the current position to the end of the title.
     - Search for the desired end using ◄ , ► .
     - Hold down the red button:
       Red marker changes to its original colour from the current position to the end of the title.

How can I delete the changes?
Press **REC/OTR ●** *to mark the entire title.*
To remove the marker, press the red function button.

'*Auto delete*'

If there is no space for new recordings on the HDD, recordings will be automatically deleted in the following order:
1) Titles that have already been viewed. Symbol '***Symb seen***'.
2) Titles that were not protected. No symbol '***Symb protect***' available.

More information you will find in the chapter 'User preferences for the HDD'.

Manual recordings

Recordings are always started and stored in the time shift buffer as soon as you switch on the device.

- You can mark a recording for storage on the HDD using **REC/OTR ●** on the remote control or ● on the device.
  Such marked recordings are displayed as a red bar in the time shift buffer and are not automatically deleted after the time shift buffer period (1 to 6 hours) expires.
- If you switch off the DVD recorder with **STANDBY ⏻** or select the '***Flush Buffer***' function, all other recordings of the time shift buffer will be deleted.

If you press the red function button, the marker for the recording is removed.

OTR recordings

Recordings made using **REC/OTR ●** will be automatically stopped after the end of the TV show if information is available from the GUIDE Plus+® system. If no information is available, you can select the time after which a recording will automatically stop using **REC/OTR ●** . (each time you press the button, you prolong the switch-off time by 30 minutes)

If you press the red function button, the marker for the recording is removed.

Direct Record

If the recording is manually started, the **switched off** DVD recorder receives the currently selected TV channel through the scart cable. The selected TV channel is compared with the stored TV channel of the DVD recorder. If the TV channel can be found, the DVD recorder selects it and starts the recording.
If no corresponding TV channel is found in the DVD recorder, an error message appears.
Read the next section 'Switching Direct Record on or off' on how to switch Direct Record on or off.

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, the DVD recorder switches to the corresponding programme number and starts recording.

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

1. Select the programme number on the TV set from which you want to make the recording.
2. Press **REC/OTR ●** while the DVD recorder is **switched off** .

× '**WAIT**' **appears in the display**
✓ The DVD recorder compares its stored TV channels with those of the TV set. Please do not change channel on the TV set while 'WAIT' appears in the display.

× **'NOTV' appears on the display**
✓ This TV channel was not found in the memory of the DVD recorder. Check whether all TV channels stored in the TV set are available on the DVD recorder. If necessary, store the missing TV channels. Read section 'Manual TV channel search' in the chapter Installing your DVD recorder'.
✓ Check the connectors of the scart cable.
✓ Consult the instruction manual of your TV set to find out which scart socket sends out video signals.
✓ If all this is to no avail, you cannot use this function.

3 To stop the recording press and hold the red function button on the remote control until the red light around the ● button is switched off.

Switching 'Direct Record' on or off

1 Press **BROWSER HDD** and then **SYSTEM MENU** button on the remote control.
→ The 'SYSTEM MENU' appears.

2 Select '***Preferences***' with ▼ .

3 Press ▶ to select '***Recording***'.

4 Select '***Direct rec.***'(second menu page) using ▼ .

5 Select '***On***' using ▶ .
O To switch off the function, select '***Off***' using ▶ .

6 End with **SYSTEM MENU** .

Automatic recording from a satellite receiver (sat recording)

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You can only use this function if you have a satellite receiver that can control other devices via a scart cable and a programming function (timer). For more information, consult the instruction manual of your satellite receiver.

1 Switch on the TV set. If necessary, select the programme number for the DVD recorder.

2 Press the **BROWSER HDD** and then the **SYSTEM MENU** button on the remote control.
→ The 'SYSTEM MENU' appears.

3 Select '***Preferences***' with ▼ .

4 Press ▶ to select '***Recording***'.

5 Select '***Sat record***' (second menu page) using ▼ .

6 Select '***On***' using ▶ .
O To switch off the function, select '***Off***' using ▶ .

7 To end, press **SYSTEM MENU** .

8 Connect the **EXT2 AUX-I/O** scart socket of the DVD recorder with the corresponding scart socket of the satellite receiver using a scart cable.

9 Program the satellite receiver with the desired data for recording (programme number of the TV channel, start time and end time). If necessary, also consult the instruction manual of your satellite receiver.

10 Switch off the DVD recorder using **STANDBY** ⏻ .
→ In addition, 'SAT' will appear in the display to indicate that the function is activated.

11 If necessary switch the satellite receiver to standby. See the instruction manual for the satellite receiver for details.

The DVD recorder is now ready for recording.
→ The start and the end of the recording will be controlled via the **EXT2 AUX-I/O** scart socket.

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.

Preparation:
•) Switch on the TV set and, if necessary, select the programme number for the DVD recorder.
•)Switch on the DVD recorder.
•) Select recording mode (button **TUNER** , button **SYSTEM MENU** , '***Preferences***', button ▶ '***Record mode***').

1 Connect the video recorder/DVD Player as described in the chapter 'Connecting additional devices'.

2 Press **TUNER** to display the picture of the Video recorder/DVD player on the screen.

3 Use ▼ , ▲ to select the programme number of the input socket to which the Video recorder/DVD player is connected. ('***E1***' for **EXT1 TO TV-I/O** , '***E2***' for **EXT2 AUX-I/O**)

Please observe that for recordings via the front sockets **S-VIDEO (CAM1)** / **VIDEO (CAM1)** /'***CAM1***' or **DV IN (CAM2)** / '***CAM2***' the recording mode must be selected under '***Camera mode***' in '***Preferences***' of the system menu.

4 Switch on the video recorder/DVD player.
O In case playback has started automatically, interrupt it with **STOP** ■ or **PAUSE II** .

5 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.

6 To stop the recording press and hold the red function button on the remote control until the red light around the ● button is switched off.

Recording from a camera connected to the front sockets

Using this function, you can store recordings via the front sockets directly on the HDD. These titles will be automatically protected to prevent them from being automatically deleted in case the HDD is full.

Please observe the following:
•) Any programmed recordings (TIMER) will not be carried out during this operating mode.
•) If there are any recordings in the time shift buffer, they will be deleted. Therefore, store important recordings on the HDD (**REC/OTR** ●). For more information on the time shift buffer, read the chapter 'The Time Shift Buffer'.

1 Connect the camera as described in the chapter ' Connecting additonal devices/Connect camcorder to the front sockets'

2 Press **CAM** on the remote control.
→ The DVD recorder will switch to camera mode.

3 Select the socket to which the camera is connected using **CAM** .
O '***CAM1***'
For recordings from the **VIDEO (CAM1)** , **S-VIDEO (CAM1)** sockets.
Switching between the two sockets 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 socket (unplug), you must re-select the socket using **CAM** (press twice).

O '***CAM2***'
For recordings from the **DV IN (CAM2)** socket.

4 Press **REC/OTR** ● to start the recording.
→ If no signal is available, no recording will be made or the recording in progress will be stopped.
→ During the playback of a recorded 'copy protected' signal you will see only that parts of the recording where no copy protection can be recognised.

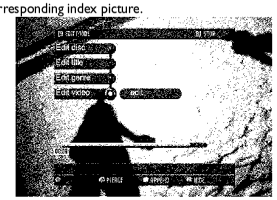
5 You can stop the recording using the following buttons:
O **PAUSE II**
The recording will be paused. If you press the button again, the recording will resume.
A new chapter is created.

O **STOP** ■
The recording will be interrupted. You can start a new recording by pressing **REC/OTR** ● .
A new title is created.

6 Press the red function button to terminate the camera operating mode.
→ The recording will be stored on the HDD as a new title.

General

Each recording stored on the HDD is displayed in the media browser with a corresponding index picture.



1. Press **BROWSER HDD** on the remote control or **HDD** on the DVD recorder.
   → The Media Browser appears.

2. Select the title you want using ▼ , ▲ on the remote control or **DOWN** , **UP** on the device.

3. You can choose one of the following options to start playback:
   - **OK**
     Playback always starts at the beginning of the selected title.
   - **PLAY ►**
     Playback will start at the position where it was interrupted in the selected title(**STOP ■**). This also works if other titles or DVDs have been played in the meantime.

4. You can use the following buttons during playback:
   - **|◄◄ , ►►|**
     Briefly press: If chapter markers are available, start of current chapter, previous chapter (press twice), next chapter
     Hold down: during pause: Slow motion
     during playback: Qquick motion.
   - **JUMP FWD , JUMP BACK**
     Jump back or forward by a fixed time period.
     Read section 'Set up/Jump forward, Jump back' in chapter 'User preferences for the HDD' on how to set up this time period.
   - **INFO**
     Display/Hide navigation bar with additional information.
   - **PAUSE II**
     Still picture. Go forwards or backwards one frame at a time using ► , ◄ .

5. Press **STOP ■** to end playback.
   → You will return to the media browser.

The position where playback was interrupted will be automatically stored. By pressing **PLAY ►** , playback resumes at this position.

Additional playback features

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Search by time

During playback of a title from the HDD or recordings in the time shift buffer, you can search for positions by directly entering the time:

1. Press **SYSTEM MENU** during playback of a title.
   → The system menu appears.

2. Press ► in line '***Toolbar***' to select '***Options***'.

3. Press ▼ to select '***Time search***' and confirm with ► .
   × **It is not possible to select '*Time search*'.**
   ✓ A title of the time shift buffer is played back that has no end yet (no programme change, or TV show is not over yet).
   → The time of the current playback position is displayed.

4. Use the number buttons **0..9** of the remote control to enter the time where you want playback to start.

5. Confirm with **OK** .
   → Playback starts at the desired position.

Repeat

You can choose a certain position of the title or the entire title for repeated playback.

1. Press **BROWSER HDD** and choose the desired title with ▼ , ▲ .

2. Press **OK** to start playback.
   - **Repeat entire title**
     Press the green function button.

Zoom feature

The Zoom feature allows you to enlarge the video image and pan through the enlarged image during play back from the HDD or from the time shift buffer.

1. During playback, press **PAUSE II** at the position where you want to enlarge the picture.
   → You will see a still picture.
   Press **SYSTEM MENU** .
   → The 'System Menu' appears.

2. Press ► in line '***Toolbar***' to select '***Options***'.

3. Press ▼ to select '***Zoom***' and confirm with ► .
   → On the screen arrows appears to indicate the directions. If neccessary switch on the info bar with **INFO** .

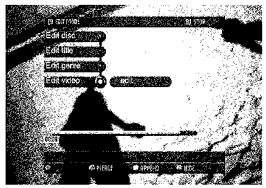
4. Select with ▼ , ► , ▲ , ▼ the area you want to enlarge.
   - **zoom in**
     blue function button

- **zoom out**
  yellow function button

- You can also pan in the enlarged picture using ▼ , ▲ , ◄ , ► .

5. End with the red function button.
   → Play back starts automatically

The media browser



Each recording stored on the HDD is displayed in the media browser with an index picture. A actual recording of a TV show in the time shift buffer is also displayed here.
Please observe that title/chapter editing is only possible to a certain degree with such recordings.

Title editing includes:
- change
- delete
- archive
- lock (child lock)
- protect (against automatic deletion)

Titles in the Time shift Buffer marked for storage on the HDD, can only be locked or deleted.

Symbols in the 'Media Browser'

If you call up the Media Browser with the **BROWSER HDD** button, following symbols can appear in the infobar at the top of the screen:

Virtual title
This title was marked in the Time Shift Buffer for the storage on the HDD. This title can only be deleted or locked (child lock)

'***Symb seen***'
This title has been played once (has been 'watched'). If there is no storage capacity free on the HDD such 'watched' titles will be deleted automatically. You can change these setting in the title edit menu (**EDIT** button, blue button, **EDIT** button)
Titles that were not played back, will have no symbol.

'***Symb protect***'
The title is protected against editing and deleting. If the title is not protected, no symbol will be shown.

'***Symb lock***'
Child lock is activated. The index picture is switched off. Playback starts only if the right PIN code was entered. By default '0000' is defined as the PIN code. In the section 'Changing the PIN code' in chapter 'Access control (Child Lock)' you will find how you can change this code.

'***Symb archive***'
The marked titles will be stored (archived) on a DVD+RW/+R.

Change order for the media browser

Your may choose only titles that meet certain criteria for the overview. This order will remain until you exit the media browser.
This order will also be considered when archiving titles on a DVD+RW/+R.

1. Press **BROWSER HDD** on the remote control.
   → The Media Browser appears.

2. Press ◄ .
   → The 'Order Menu' appears.

3. Select one of the following options using ▼ or ▲ and confirm with **OK** .
   - '***Alphabetical***':
     Alphabetic order
   - '***Recording Date***':
     Sorting according to the date of the recording
   - '***Delete Order***':
     Sorting according to the order of the automatic deletion. If there is too less space for new recordings on the HDD , this order shows which recordings will be automatically deleted first.
   - '***Protected***':
     Order according to the recordings protected against deletion.
   - '***Last Played***':
     Sorting according to the titles last viewed.

Depending on the selected order, it may not be possible to select some titles.

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Change title settings

Use this function to change the title settings.

1. Press **BROWSER HDD** on the remote control.
   → The Media Browser appears.
2. Select the title you want to change with ▼ , ▲ .
3. Choose one of the following functions with the colour buttons of your remote control:
   - **Delete title**:
     red function button
     The title (recordings) will be erased from the HDD.
   - **Archive title**:
     green function button
     The title will be transferred to DVD+RW/+R. If it is not possible to record on a DVD+RW/+R, an error message appears (disc not inserted,...).
     If you want to archive several titles, mark the desired titles with **SELECT** . You can unmark the title using the same button.
   - **Lock title (child lock)**:
     yellow function button
     You must enter a PIN code for playback. Read chapter 'Access control (child lock)' on how to enter or change the PIN code.
   - **Protect title against editing, automatic deletion**:
     blue function button
     An error message will appear if you try to edit this title. Automatically deletion will take place, if your HDD will run full with recordings. Stored recordings will be deleted in a certain order. See details in the section 'Symbols in the media browser'

Edit title

Use this function to adapt the title (recording) to your personal preferences.

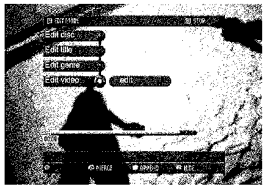
1. Press **BROWSER HDD** on the remote control.
   → The Media Browser appears.
2. Select the title whose settings you want to change with ▼ , ▲ .
   Press **EDIT** .
3. Select one of the displayed functions with ▼ , ▲ and confirm with ▶ to proceed with the changes.

   Depending on the selected function, you can choose different functions using the colour buttons on the remote control. The function of the button may vary. Therefore, read the function in the help line before pressing the button.

   - '***Title name***'
     Change the name of the title.
   - '***Clear chapters***'
     All chapter markers within the selected title will be deleted.
   - '***Video edit***'
     Please read in the next chapter which modifications were possible.

'*Video edit*'

Here you can insert/clear chapter markers, hide chapters, merge chapters, or divide the title.



1. Press **BROWSER HDD** on the remote control.
   → The Media Browser appears.
2. Select the title whose settings you want to change with ▼ , ▲ .
   Press **EDIT** .
3. Select '***Video edit***' and confirm with ▶ .
   → Playback starts automatically.
4. Search the position where you want to make changes with ◀ , ▶ , ⏮ , ⏭ .

   You can expand the timebar of a title over the whole TV-screen using ▲ .

5. Press **PAUSE II** :

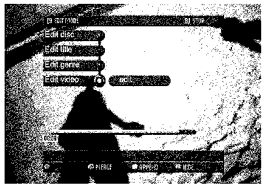
- You can insert or remove chapter markers to find a scene easily with the **OK** button.

6. Choose one of the following functions with the colour buttons of your remote control:
   - '***DIVIDE***'(red function button):
     You can divide a title in as many parts as you like.
   - '***MERGE***'(green function button):
     You can merge the current chapter with the previous chapter. (The previous chapter marker will be deleted). Please observe that you cannot use this function with titles.
   - '***KEYFRAME***'(yellow function button):
     To select an index picture that designates this title in the media browser.
     You can select this function only during still (button **PAUSE II**).
   - '***HIDE***'(blue function button):
     You can hide or unhide certain chapters during playback (e.g. commercials).

Editing recorded titles (name)

From the GUIDE Plus+® data the title (name) of a TV show will be taken automatically (e.g. 'ROCKY'). Otherwise, only the programme number (programme name) and the time will be stored as the name of the recording. The name of the recording can only be changed after the recording has finished.

1. If necessary, press **STOP** ■ to stop playback.
2. Press **BROWSER HDD** on the remote control.
   → The Media Browser appears.
3. Use ▲ or ▼ to select the title whose title you want to edit.
4. Press **EDIT** .
   → The title edit menu appears on the screen.
5. Select the line '***Title name***' and confirm using ▶ .
   → The field for editing the title appears.



6. Use ▶ or ◀ to select the position where the letter/number/icon is to be changed or re-entered.
7. Change the icon using ▲ or ▼ .
   - You can switch between upper and lowercase using **SELECT** .
   - You can clear all characters using the red function button ('***CLEAR***').
   - You can stop editing without storing the change by pressing the green function button('***CANCEL***').

   Enter characters using 0..9

   Keep pressing the number button until the desired character or number is displayed. You can select language-dependent special characters at the corresponding letter using ⏮ or ⏭ e.g.: ä, press **2** *for a and keep pressing ⏭ until ä appears.*
   For special characters, press **1** *several times.*
   The position for the following character is selected automatically.
   Press **1** *to insert an empty space.*
   Press **SELECT** *to switch to upper case.*

8. Repeat 4 and 5 until you have made the changes you want.
9. Save the new name with **OK** .
10. To end, press **EDIT** .

× **I can see the message** 'EMPTY TI SC'
✓ 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

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 show on the TV screen and on the recorder display.
During stopped playback (**STOP** ■ *button) the numbers of the albums will show 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 (**SELECT** button).

Playing a (Super) Video CD

(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** ■ .

DVD's were 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.

ENGLISH

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 **SELECT** . By pressing **SELECT** again you can chose from the following options:
   - •) ' ': repeat chapter (DVD only)
   - •) ' ': repeat track/title
   - •) ' ': repeat entire disc (Video CD, Audio CD only)
   - •) ' ': Shuffle
   - •) Display disappears: no repeat
3. To end the repeat, press the **STOP** ■ button.
   - O You can also keep pressing the **SELECT** 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 **SELECT** until ' ' 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** .
   - → ' ' appears on the TV screen.
   Playback now takes place within these points.
5. To end the repeat, press the **STOP** ■ button.
   - O You can also keep pressing the **SELECT** 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 **SELECT** . Select ' ' using **SELECT** .
   - → After 10 seconds the DVD recorder switches to the next chapter/index.
   - O 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 ▲ .
   - O 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 **PAUSE II** .
   - → The DVD recorder switches to 'PAUSE'. You will see a still picture.
2. Press **SYSTEM MENU** and select the '' icon using ► .
3. Select the required zoom factor using ▼ or ▲ .
   - → When '***press OK to pan***' appears on the screen, the zoom process is complete.
4. Press **OK** . Using ▲ , ▼ , ► , ◄ select the part of the image you wish to view.
5. Confirm with **OK** .
6. To stop the feature, press **PLAY** ► and then **SYSTEM MENU** .

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 DVD recorder's menu bar (**SYSTEM MENU** 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 **SYSTEM MENU** and select the ' ' icon using ► .
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 menu bar (**SYSTEM MENU** button). The subtitle languages in the menus may differ.

1. During playback press **SYSTEM MENU** and select the '' icon using ► .
2. 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.

General information

The 'Disc Manager' is an integrated database in the DVD recorder that remembers all recordings 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 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

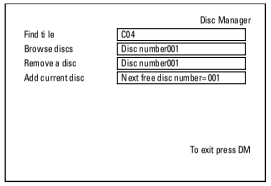
You can only add DVD+RW or DVD+R discs to the Disc Manager since other discs do not hold any information on the titles or lengths of the recordings. These discs have to be at least once recorded in the DVD-Recorder. A table of content have to be available.
DVD+R discs can also be finalised. Other discs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

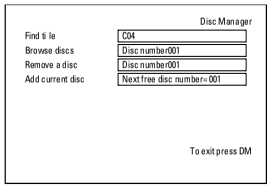
5. To end, press **DISC MANAGER** .

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.

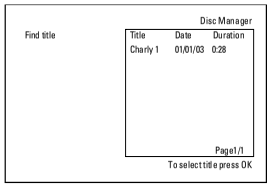
The disc is only removed from the Disc Manager's memory. Its contents remain unchanged.

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*

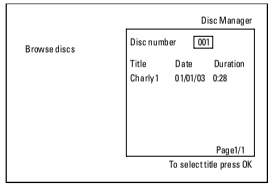
3. Select the title that you want to play back with ▼ or ▲ .
4. Confirm with **OK** .
   → The DVD recorder will jump to the start of the selected recording.

× **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.



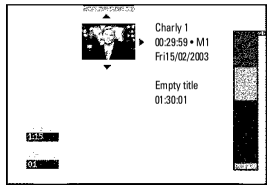
4. Use ▲ or ▼ to select a different disc number if necessary and confirm with ▶ .

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.

General



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 a name has not been assigned to the TV channel, only the programme number and time are 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, such as commercials, can be hidden or skipped. During playback you can watch your recording as a continuous sequence without the hidden chapters.

Favorite Scene Selection

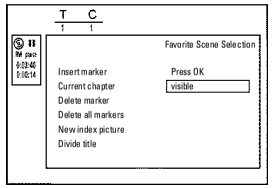
In this menu you can adapt a title to suit your particular needs.
You can insert/delete chapter markers, hide chapters, select a new index, or split up a title.

In this menu you can adapt a title on a DVD+RW/+R to suit your particular needs.
You can insert/delete chapter markers, delete all chapter markers, or split up the 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.

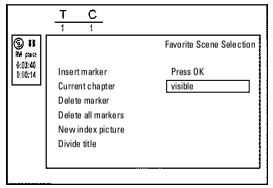
'X' will appear on the screen:
This DVD is write-protected or the disc is a finalised DVD-R. Subsequent changes cannot be made.

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

Hiding chapters

Initially, all the chapters are visible. You can hide chapters for playback (e.g. advertisements) 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.

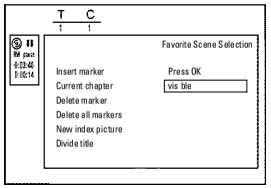
Switching quickly
*You can switch between show chapters ('**visible**') and hide chapters ('**hidden**') quickly and easily using* **SELECT**.
This function is independent from the selected line.

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.

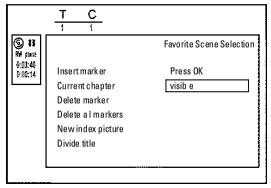
How can I select different chapters?
- *Press the* **T/C** *button on the remote control. Titles and chapters are displayed at the top of the screen.*
- *Select title (T) or chapter (C) with ▶ or ◀.*
- *Use ▲ or ▼ to select the title/chapter channel you want to edit.*

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.

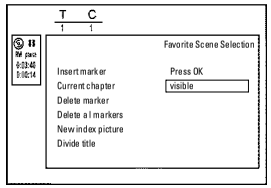
Once the revision has been completed successfully the DVD recorder reverts to the index overview.

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.

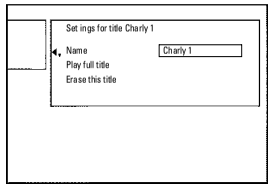
4 Wait until the new title is displayed with an index picture in the index picture overview.

The process of splitting the title is now complete.

Editing recording titles (name)

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 the red function button.

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 switch over to upper case characters press **SELECT** .*

To erase a character press the red function button.

6 Repeat 4 and 5 until you have made the changes you want.

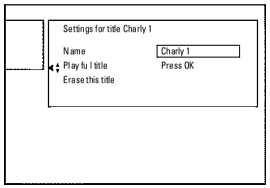
7 Save the new name with **OK** .
→ '***Storing name***' appears on the TV screen for confirmation.

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** .

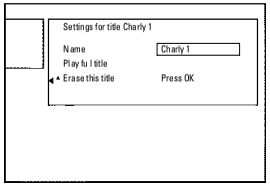
→ Playback starts automatically. The title is played in its entirety - including the hidden chapters.

Erasing recordings/titles

You can erase specific recordings from a disc.
Please note: If there is an '***Empty title***' between titles, this space can not be used from this DVD-Recorder.
Each recording from the HDD to a DVD+RW/+R (archiving) will be added at the end of existing recordings

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.

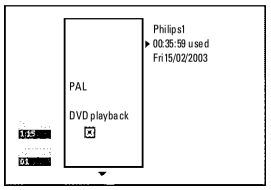
- If you want to delete this title, press **OK** to confirm.
- Otherwise press ◀ .

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** .

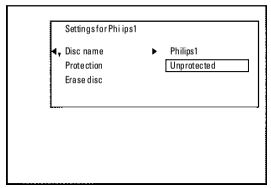
2 Select the first title with ▲ or press **STOP** ■ . **STOP** ■ .

3 Press ▲ .
→ The disc info display will appear.

ENGLISH

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 the red function button.

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** .

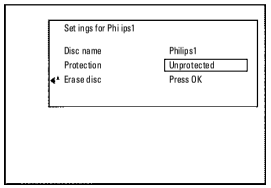
× ***The 'Settings for' menu does not appear***
✓ The menu may not appear if the disc has been recorded on another DVD recorder. In this case, use the '***Finalise disc***' feature in the '🔧' menu, under '***Features***'.

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.
On this DVD recorder you can pre-programme up to 30 recordings and 3 reminders (to watch) 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

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.*

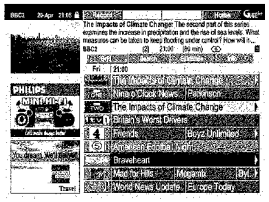
What do I need to know about 'VPS/PDC'?
- *Usually the start time is the **same** as the VPS or PDC time. If a different 'VPS/PDC time' is indicated, e.g.: '20.15 (VPS/PDC 20.14)', the **VPS/PDC time** '20.14' must be entered **exactly to the minute** during programming.*
If you want to programme a time 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 GUIDE Plus+® System

The GUIDE Plus+® System has made it even easier to programme recordings. All you have to do is select the show you want to record from a channel listing.

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 **GUIDE/TV** on the remote control.



2 Use ▲ or ▼ to select the TV station, and ◀ or ▶ to select the show to record.

× ***I do not see all available TV channels***
✓ Please check your correct channel line up in the '***Editor***' screen. Read therefore the section 'The '***Editor***' screen in the chapter The GUIDE Plus+® system.
✓ The GUIDE Plus+® '***Grid***' screen contains only those TV channels that were detected by the GUIDE Plus+® system using a 'channel identification'. TV channels that do not have this 'channel identification' are not available in the GUIDE Plus+® system.
Please use 'Manual TIMER programming' to program TV shows of such TV channels.

3 Confirm using the red function button of the remote control ('***Record***' on the screen).
The TV -show is programmed for recording.
Read the information on the screen.

× **'Warning, this programme number has not been allocated, please go to Editor to set it.' appears on the screen**

✓ The programme number of the TV channel is not available in the GUIDE Plus+® system or allocation is wrong.
To change or check the channel data, proceed as follows:

- Press ▲ .
  Select '***Editor***' with ▶ .
- Select the TV channel using ▼ or ▲ .
- Press ▶ to go to the right tile.
  In case you can receive the selected channel only via an external receiver, press the red button to select the corresponding source.
- Press the green button.
- Enter the programme number of the TV channel using the number buttons.
  If the source you have selected is an external receiver, enter the programme number that you would also enter at the external receiver for this TV channel.

You can also program TV shows that you just want to watch

*Press the green function button ('**Watch**' on the screen) instead of the red.*
The TV show is stored in the memory for favourite shows. The line is displayed in a different colour.

4 Repeat steps 2 to 3 to program all your recordings.

5 End with the **GUIDE/TV** button.
To find out how you can check which shows you have programmed, read the section on 'How to change or delete a programmed recording (TIMER)'.

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

Programming recordings with the ShowView® System

ENGLISH

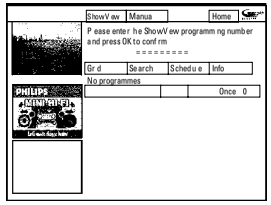
SHOWVIEW®

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 '***Schedule***' screen will appear

3 Press the red function button ('***ShowView***').
If this button is not visible in the menu line or without function, no GUIDE Plus+® data is yet available. Therefore, you cannot use programming with the ShowView® system yet.



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.
Use therefore the number buttons **0..9** on the remote control.
If you make a mistake you can press ◀ or the green action button to go back a position.

5 Confirm with **OK** .

× ***'Please enter programme number'* appears on the screen**

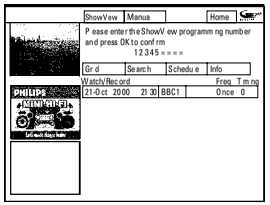
✓ This message appears when the TV channel has not been assigned in the GUIDE Plus+® system yet.
To change channel data, proceed as follows:

- Press ▲ .
- Select '***Editor***' with ▶ .
- Select the TV channel using ▼ or ▲ .
- Press ▶ to go to the right tile.
  In case you can receive the selected channel only via an external receiver, press the red button to se lect the corresponding source.
- Press the green button.
- Enter the programme number of the TV channel using the number buttons.
  If the source you have selected is an external receiver, enter the programme number that you would also enter at the external receiver for this TV channel.
- Confirm with **OK** .

× **The following message appears on the screen: '*ShowView number wrong*'**

✓ The entered ShowView number is incorrect. Repeat the entry or end with **TIMER** .

✓ Check time/date (see chapter 'Installing your DVD recorder', section 'Setting the time & date').



6 The decoded data appears after confirmation.
You can use the colour buttons to make the following settings. First, the right tile must be highlighted (▶ button). Check the functions (descriptions) in the corresponding colour field before pressing a button.

Activate 'VPS/PDC'

Keep pressing the yellow action button until 'VPS/PDC' appears instead of the time.

Setting up repeat recordings

You can choose from the following settings with the green action button:

***'Frequency': 'Once'**: single recordings*
***'M-F'**: Repeated daily recordings (Monday to Friday).*
***'Mon'**: Repeated weekly recordings (every week on the same day e.g. Monday).*

7 If all information is correct, press the **OK** button. The data is stored.

8 To end, press **TIMER** .

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

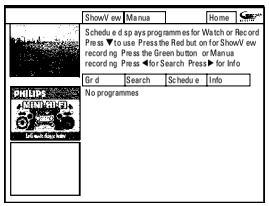
Programming recordings without the ShowView® System

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 **TIMER** on the remote control.
→ The '***Schedule***' screen appears

× **I will see some informations about the GUIDE Plus+® System**

✓ The GUIDE Plus+® System was not installed yet. Read therefore in the chapter The GUIDE Plus+® System' the section 'Set up the GUIDE Plus+® System'.



2 Press the green button.
→ The current date will be displayed.

3 Enter the date using the number buttons **0..9**

4 Confirm with **OK** .

How can I correct wrong entries?

*If you have already confirmed the entry with **OK** , you can select one of the following functions:*
Repeat entry: Green colour button
Cancel: Red colour button

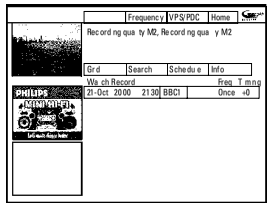
5 Enter the start time for the show using the number buttons **0..9** . Confirm with **OK** .

6 Enter the finish time for the TV show using the number buttons **0..9** Confirm with **OK** .

7 Check the data you entered.

O If necessary, go back a position to change entered data using the green function button.

8 Enter the programme number of the TV channel using the number buttons **0..9**



Selecting a TV channel from the listing

You can only use this function if data from the GUIDE Plus+® system is already available.

- *Press the yellow function button. You will see an overview of all channels*
- *Select the TV channel you want to program using* ◄ , ► , ▼ , ▲ . *You can browse back or forth using* ▶▶| , |◀◀ .
- *Confirm with* **OK** .

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

You can also program recordings from external sources.

- *Select the corresponding input socket using* ▼ *or* ▲ . ***'EXT1'*** *(* **EXT1 TO TV-I/O** *),* ***'EXT2'*** *(* **EXT2 AUX-I/O** *).*
- *Confirm with* **OK** .

Changes using the colour buttons

You can use the colour function buttons to make the following settings. Make sure that the right tile is selected.

'Frequency': Green function button

'Once'*: single recordings*
'M-F'*: Repeated daily recordings (Monday to Friday).*
'Mon'*: Repeated weekly recordings (every week on the same day, e.g. Monday).*

Activate VPS/PDC ('Timing'): Yellow function button

Using this button, you can activate (appears) or deactivate ('VPS/PDC' disappears) 'VPS/PDC' in tile ***'Timing'***

9 To find out how you can go back and change the data, read the section on 'How to change or delete a programmed recording (TIMER)'

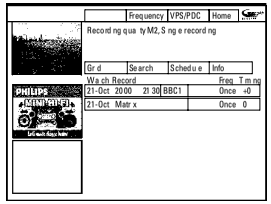
If any of the TIMER blocks are in use, '***TIMER***' will light up on the recorder display.

How to change or delete a programmed recording (TIMER)

ENGLISH

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 **TIMER** ⏲ on the remote control while the DVD recorder is switched on.
→ The '***Schedule***' screen will appear.



2 Use ▼ or ▲ to select the programmed recording you want to change or delete.
Depending on the programming method (using GUIDE Plus+® system, with/without ShowView® system), it is not possible to carry out certain changes using the function buttons. Therefore, always check the function of the corresponding button (description in the colour field) before pressing the button.

Delete programmed recording

Press the red action button in the left tile.

Changing the TV channel

You can make this change only for recordings that were not set using the ***'Grid'*** *screen.*
In the case of recordings using the ***'Grid'*** *screen, centre tile is not available.*

- *Select the centre tile with* ► .
- *Press the yellow function button.*
- *Select the TV channel you want using* ▼ , ▲ , ◄ , ► . *Sender.*
- *Confirm with* **OK** .

Activate VPS/PDC

Keep pressing the yellow function button in the right tile until 'VPS/PDC' appears in the ***'Timing'*** *line instead of the time.*
If you programm a recording using the GUIDE Plus+® System, the VPS/PDC time will be taken automatically. VPS/PDC can be switched on or off without readjusting the start time.

Setting up repeat recordings

You can choose from the following settings in the right tile using the green function button:

'Frequency''Once'*: Once recordings*
'M-F'*: Repeated daily recordings (Monday to Friday).*
'Mon'*: Repeated weekly recordings (every week on the same day, e.g. Monday).*

3 To end, press **TIMER** ⏲ .

A message appears few minutes before the recording is about to start if the DVD-recorder is tuned to a different TV channel as programmed. If you confirm this message the TV channel will be changed and the reording started.

Cancel a programmed recording in progress

A programmed recording will run as long as the end of the TV show is reached (end time of the schedule or end time out of the GUIDE Plus+® System)
If you switch off the DVD-Recorder with **STANDBY** ⏻ the DVD-Recorder will be switched off after the recording is completed.
If you want to cancel the programmed recording proceed as follows:

1 Press the red function button

2 Select '***Yes***' using ◄ and confirm with **OK** .

3 The programmed recording can also be canceled as described in the previous section 'How to chnage or delete a programmed recording (Timer)'.

This section describes how you can adjust the functions of the HDD to your personal preferences.
When you press **SYSTEM MENU** , a so-called puck appears on a line.
If there are further selection options within a line, an arrow will appear in the respective segments. Using the corresponding buttons on the remote control (e.g. ▶) you can call up further features or selection options.

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

1. Press **TUNER** on the remote control to switch to HDD mode.

   You can also switch to HDD mode by pressing **BROWSER HDD** but you will not see the picture of the currently selected TV channel as a background picture.

2. Press **SYSTEM MENU** on the remote control
   → The system menu for the HDD appears.

3. Select the corresponding line using ▼ or ▲ .
   - If the arrow ▶ in the puck is visible in one of the lines, you can select additional functions with ▶ on the remote control.
   - To return to the previous menu, keep pressing ▼ until the top menu item is selected.
     Press ◀ to return to the previous menu item.

4. Select the corresponding function using ▼ or ▲ , or the setting with ◀ or ▶ . Select the functions you want to change as described in the following pages.

5. Confirm the new setting with **OK** .

6. Close the menu item with ◀ .

Toolbar

ENGLISH

Options

In this menu, you can choose functions for the playback of recordings (titles) on the HDD:

'Audio'

Selection of the language for the TV show currently selected on the DVD recorder.
'Lang I' or 'Lang II' in the display also indicates whether a TV show is broadcast in two languages. This setting only affects playback through the internal tuner of the DVD recorder. The setting for the recording will not be affected.
If you also want to use/change the language for the recording, you must change the language in the 'Preferences' menu.

- *'Off'*
  Recording is done in stereo. If you are receiving a 'two-channel' TV show, you will hear both languages simultaneously. You can switch to the desired language only on the TV set or the in audio device you may have connected to the DVD recorder ('balance' feature).
- *'Lang. I'*
  Playback is carried out in the original or main language.
  'Lang I' also appears in the display.
- *'Lang.II'*
  Playback is carried out in the dubbed language available.
  'Lang II' appears in the display.

'Zoom'

Using this function, you can enlarge (blue function button) or reduce the size (yellow function button) of the still picture or pan through the enlarged picture using ▼ , ▲ , ◀ , ▶ during playback from the HDD (time shift buffer or media browser).
Press the red function button to stop this function.

'Time search'

Using this feature, you can search a position by time. You can use this feature both for titles in the media browser and for playback from the time shift buffer.

''

This function is only required if recordings were made through a video camera connected to the **DV IN (CAM2)** socket. In this case, you can display/hide information on the date and time of the recording.

Preferences

Recording

In this menu, you can select one of the following functions for recording:

I can not select some functions
*During a recording the selection of some functions are not possible. e.g. '**HD Buffer**'.*

'Record mode'

Select from the settings displayed the record mode (picture quality of the recording). M1, M2x, M3,... M8.
For recordings on a DVD+RW/+R (archiving function) always the recording mode used for the recording on the HDD will be taken.
Observe the maximum possible recording time on a DVD+RW/+R.
The maximum possible recording time on the HDD depends from the recording mode and the average length of the recordings (titles).

- *'M1'*
  High Quality (high recording quality)
  offers the best picture quality and a recording time of:
  DVD+RW/+R: 1 hour.
  HDD: approx. 16 hours
- *'M2'*
  Standard Play (pre-recorded DVD quality)
  offers standard picture quality and a recording time of:
  DVD+RW/+R: 2 hours.
  HDD: approx. 32 hours
- *'M2x'*
  Standard Play plus (better than S-VHS quality)
  offers standard picture quality and a recording time of:
  DVD+RW/+R: 2,5 hours.
  HDD: approx. 40 hours
- *'M3'*
  Long Play (S-VHS picture quality).
  Recording time of:
  DVD+RW/+R: 3 hours.
  HDD: approx. 48 hours
- *'M4'*
  Extended Play (better than VHS picture quality).
  Recording time of:
  DVD+RW/+R: 4 hours.
  HDD: approx. 64 hours
- *'M6'*
  Super Long Play (VHS-picture quality).
  Recording time of:
  DVD+RW/+R: 6 hours.
  HDD: approx. 96 hours if the average recording time for a title is at least 20 minutes.
- *'M8'*
  Super Extendend Play (VHS-LP-picture quality).
  Recording time of:
  DVD+RW/+R: 8 hours.
  HDD: approx. 128 hours if the average recording time for a title is at least 20 minutes.

'Camera mode'

Select the recording mode (picture quality for recording) from one of the displayed settings for the recording from external sockets. ***M1***, ***M2x***, ***M3***,... ***M8***). Read the previous section (Record Mode) on the picture quality that corresponds to each setting.

'Chapters'

- *'Off'*
  No auto chapters
- *'On'*
  Automatic chapter marking after 5 minutes (depending on the selected recording quality).
- *'Smart'*
  Chapter marking will depend on the time stamp of the digital camera connected to the **DV IN (CAM2)** socket.

'HD Buffer'

Choose one the displayed settings to define how long a recording will be kept stored.

- **'1h'**
  The recording will be kept stored for 1 hour
- **'6h'**
  The recording will be kept stored for 6 hours

'Language'

Here you can set the default language to be used for the recording of bilingual TV shows. You can no longer change the language once playback has started.

- *'Off'*
  Recording is done in stereo. Both languages will be recorded.
  e.g.: Left channel: Original language, Right channel: Dubbed language.
- *'Lang. I'*
  Recording is carried out in the standard language.
- *'Lang.II'*
  Recording is carried out in the dubbed language available.

'Sat record'

If a video signal is detected at the **EXT2 AUX-I/O** scart socket, recording will begin.

- *'On'*:
  Sat Record is activated.
- *'Off'*:
  Sat Record is deactivated.

'Direct rec.'

If a recording starts while the DVD recorder is switched off, the TV channel currently selected on the TV set will be compared with the TV channels stored in the DVD recorder.
- If the TV channel is found, recording will start.
- If the TV channel is not found, a message will appear on the screen and in the display.

- '*On*':
  Direct Record is activated.
- '*Off*':
  Direct Record is deactivated.

'*Filter*'

Here you can choose between:

- '*Sport*':
  Picture quality is optimised for rapid movements in the recording modes (picture qualities) M3 to M8.
  Please observe that this setting will reduce the overall impression of the picture quality.
- '*Normal*':
  Better overall picture quality.
  Please observe that this setting may cause picture artefacts (MPEG artefacts) to appear in rapid movements.

I can not select this function
*Check the actual record mode selected. This function is available in the record modes '**M3**' to '**M8**' only.*

'*Safety Slot*'

Here you can enter a time (one to five minutes) when a programmed recording (Timer) should start earlier and end later.This is necessary if the information from the GUIDE Plus+® system about the starttime were sent too late or too early

'*Set up*'

'*System*'

In this menu, you can select one of the following features:

'*Auto delete*'

If there is no space for new recordings on the HDD, you can determine here whether recordings will be automatically deleted or not. You can see the titles and the sequence according to which they will be deleted in the '***Delete Order***' setting in the media browser. For more information, read the chapter 'The Media Browser'.

- '*On*': Recordings will be automatically deleted in the following order:
  1) Titles that have already been viewed. Symbol '***Symb seen***'.
  2) Titles that were not protected. No symbol '***Symb protect***' available.
- '*Off*': No recordings will be automatically deleted.

'*Jump forward*'

Set the time you want to jump forward when you press **JUMP FWD** in the time shift buffer.

'*Jump back*'

Set the time you want to jump backward when you press **JUMP BACK** in the time shift buffer.

Use the setting 5 minutes for ***Jump forward*** and 1 minute for '***Jump back***', to make it easy to skip unwanted scenes.

'*Installation*'

Please observe that for selection of function in this menu the Time shift Buffer will be flushed. If the 'Time Shift Buffer ' contains important recordings, save them with the **REC/OTR** ● button first. Read additional information about the 'Time Shift Buffer' in the chapter 'The Time Shift Buffer'.

- '***Autom. search***':
  Automatic channel search
- '***Follow TV***':
  Sorting TV channels automatically
- '***Manual search***':
  Manual TV channel search
- '***Sort TV channels***':
  Sorting TV channels manually
- '***Time/Date***':
  Setting/Correcting the time and date

For more information, please read chapter 'Installing your DVD recorder'.

'*Flush Buffer*'

Using this function, you can store recordings on the HDD that were marked for recording in the time shift buffer. Recordings that were not marked will be deleted.

- '***Yes***':
  Recordings will be stored
- '***No***':
  This interrupts the process

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

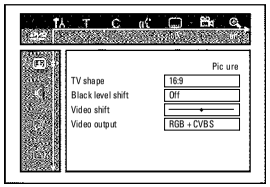
Installation

Preparation:
•) 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 **DISC MENU** button and then the **SYSTEM MENU** button on the remote control.
   → The menubar appears.
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

You can select the following functions in this menu:



'*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)

'*Black level shift*'

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

'*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.

'*Video output*'

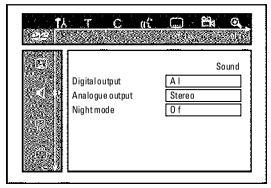
Since RGB and S-VIDEO signals sometimes use the same connections on a scart cable, the two signals cannot be transmitted simultaneously. With these settings, you can decide whether RGB or S-VIDEO signals are to be transmitted. This setting affects only the scart sockets of the DVD recorder (**EXT1 TO TV-I/O** output socket and **EXT2 AUX-I/O** input socket).
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.

- '***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***'
  Only the S-Video signal will be processed at both scart sockets (**EXT1 TO TV-I/O** output socket and **EXT2 AUX-I/O** input socket).
  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, although the recording will be made in colour. Moreover, only the video (CVBS, FBAS) signal will be used for recordings via the **EXT1 TO TV-I/O** scart socket.
  Please observe that when making recordings from a video recorder that transmits only video (CVBS/FBAS) signals through the scart cable, recordings via scart socket **EXT2 AUX-I/O** may be made in black and white.
  Therefore, use this setting with caution.
- '***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.

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

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.



'*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.

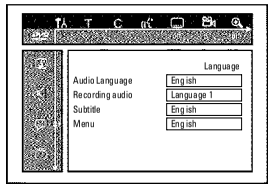
- '***Surround***'
  Dolby Digital and MPEG-2 multi-channel are mixed down to a Dolby Surround-compatible two-channel output signal.
  For devices **with Dolby Surround / Pro Logic Decoder** .

'*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:



'*Audio Language*'

Playback audio language.

'*Subtitle*'

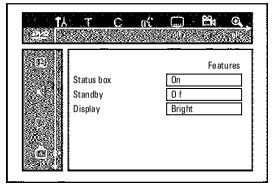
Subtitle language

'*Menu*'

Screen menu language

Additional settings

You can select the following functions in this menu:



'*Status box*'

During play back from a disc, information of the current operating status (counter, playback) will be shown 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.

'*Standby*'

You can switch off the clock display on your DVD recorder to save energy. Programmed recordings will be carried out despite of this.
In addition, you can have the most important features of your DVD recorder appear in scrolling text in the display (demo).

- '***Low power***':
  When the DVD recorder was switched off using **STANDBY** ⏻ , the clock display is also switched off.

- '***Off***':
  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.

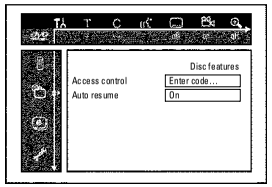
- '***Bright***':
  The display appears with normal brightness. The disc tray light is switched on.

- '***Dimmed***':
  The display appears less bright. The disc tray light is switched off.

- '***Off***':
  The display and the disc tray light are switched off.

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.

ENGLISH

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

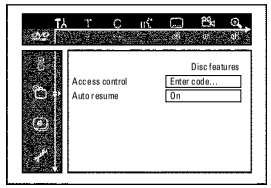
•)'***Play always***':
This disc is stored in a memory with space for 50 child-safe discs. If more than 50 discs are stored, the last disc in the list is removed and the new disc is added. The screen shows 'Child safe' at the start of playback.

•)'***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:
•) 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 **TUNER** and then **SYSTEM MENU** on the remote control. If playback from a disc starts automatically, remove the disc (button **OPEN/CLOSE** ≙).
   → The menubar appears on the screen.
2. Select the '🔧' icon using ◄ or ► .
   → The 'SYSTEM MENU' appears.
3. Select '(***Disc features***)' using ▼ or ▲ and confirm with ► .



4. Confirm '***Access control***' using ► .
5. Enter a 4-digit code of your choice.
   This code will also be used for locking titles on the HDD (Media Browser).
   → 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 ' ' icon is visible. The icon changes to ''. The disc is now locked.

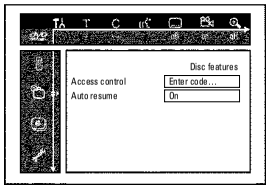
Parental level control (DVD video only)

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:
•) 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 **DISC MENU** and then **SYSTEM MENU** 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.

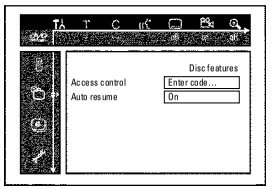
10. Confirm with **OK** . Quit using ◄ and **SYSTEM MENU** .

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:
•) 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 **TUNER** and then 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

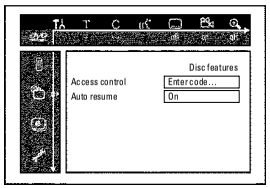
Preparation:
•) The TV set is switched on, and if necessary, the programme number for the DVD recorder has been selected.
•) the DVD recorder is switched on.

1. Press the **TUNER** and then the **SYSTEM MENU** button on the remote control.
   → The menubar appears.

Access control (Child Lock)

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.*

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 again been applied to the drive when repair is finished!**

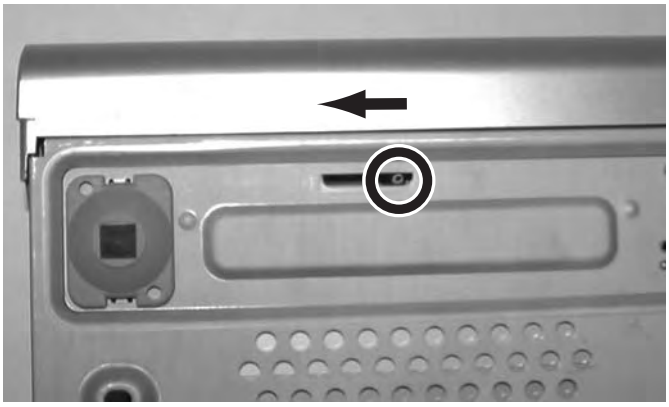


Figure 4-1

4.1.2 Hard Disc and Power Supply Module

- Remove the 3 screws (1) fixing the HDD module, see figure 4-2
- Move the the hard disc module out of the slots in the front plate (2) and put the hard disc to the side
- The fixing screws for HDD and power supply module are at the underside of the mounting bracket. Release the corresponding screws, see figure 4-3.

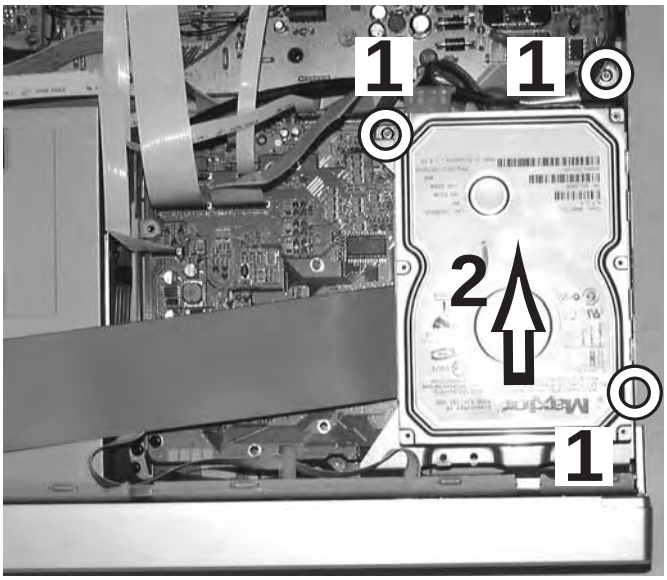


Figure 4-2

Figure 4-3

4.1.3 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 figure 4-4
- The black i-Link cable could be unplugged temporarily (2), see figure 4-5
- Remove the Hard Disc module as described in previous chapter and put it to the side (3)
- Remove the three screws (4) fixing the front panel
- Release the cables from the clamps (5)
- Release the two snap hooks at the sides (6) and remove the front (7), see figure 4-6
- Release the screws (8), see figure 4-7, to remove the front plate (9), see figure 4-8

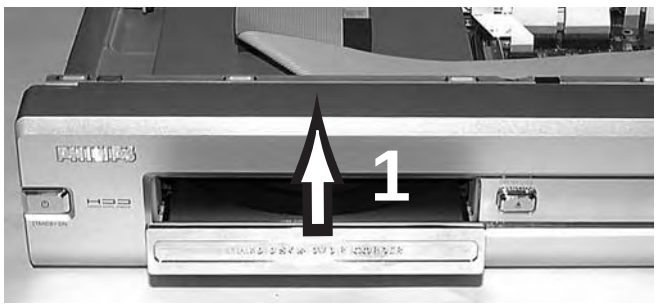


Figure 4-4

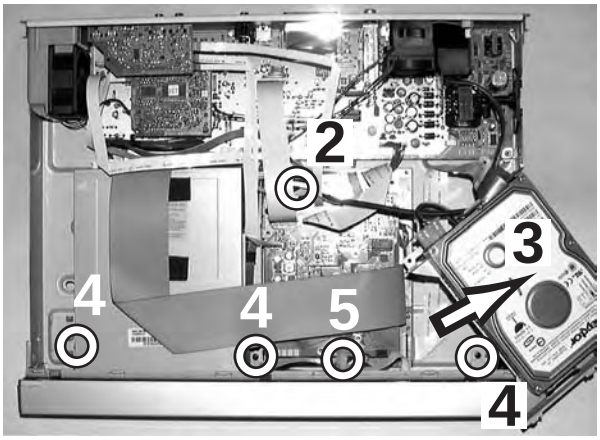


Figure 4-5

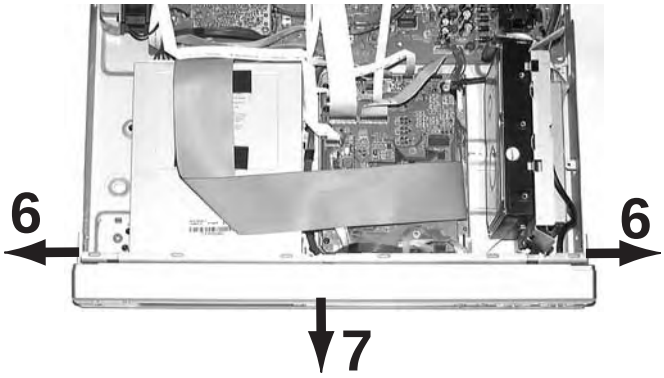


Figure 4-6

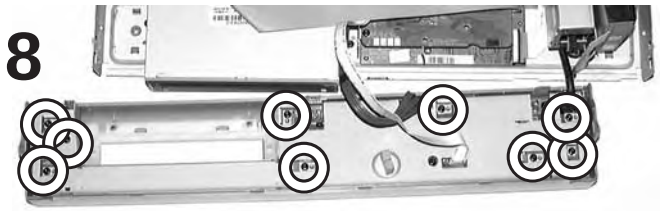


Figure 4-7

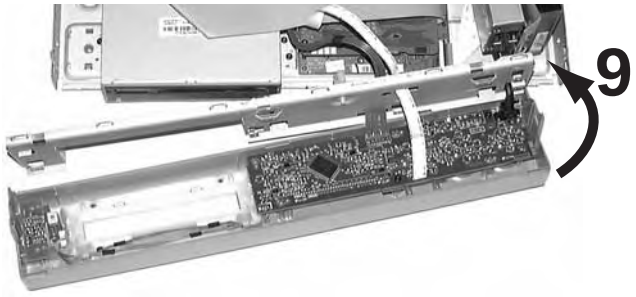


Figure 4-8

4.1.4 EPG Board

- Remove the two screws (1), see figure 4-9
- Release the snap hook (2)
- Turn the PCB in the service position, see picture 4-10

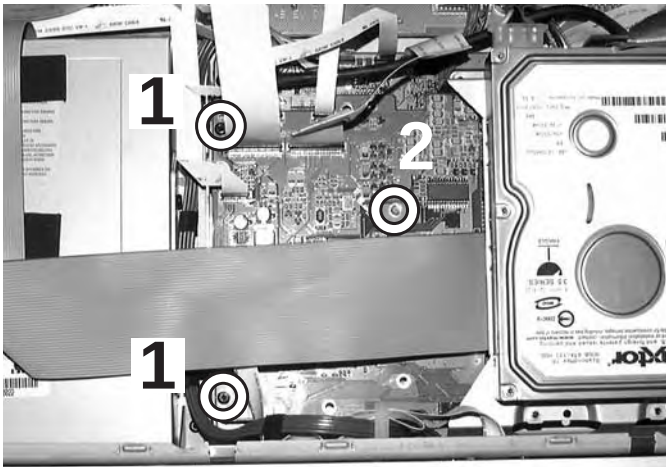


Figure 4-9

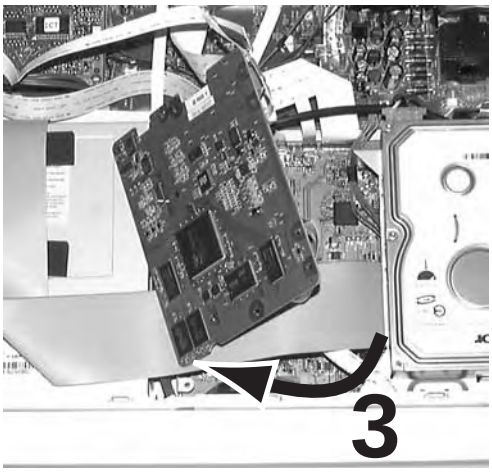


Figure 4-10

4.1.5 Digital Board

- Remove the EPG Board as stated in previous chapter
- Release the hard disc module if not already done
- Remove the remaining 3 screws that fix the Digital Board (1), see figure 4-11, and turn the Digital Board to the required service position, see figure 4-12

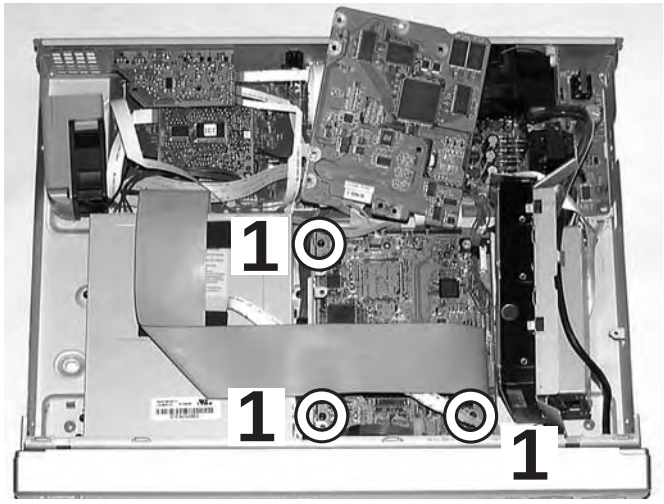


Figure 4-11

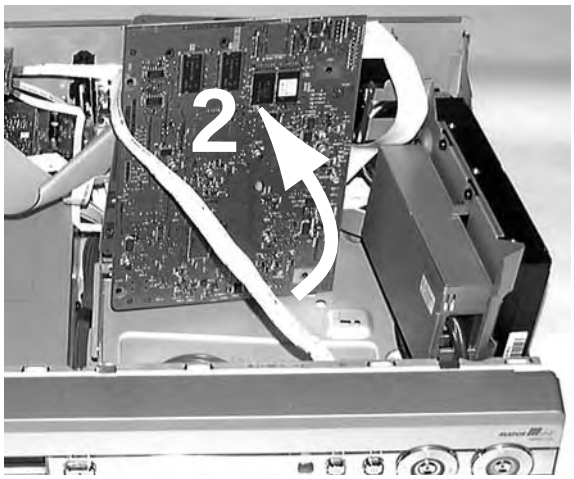


Figure 4-12

4.1.6 Basic Engine

- Remove the tray front
- Remove the 4 screws that fix the drive, see figure 4-13, and pull out the drive

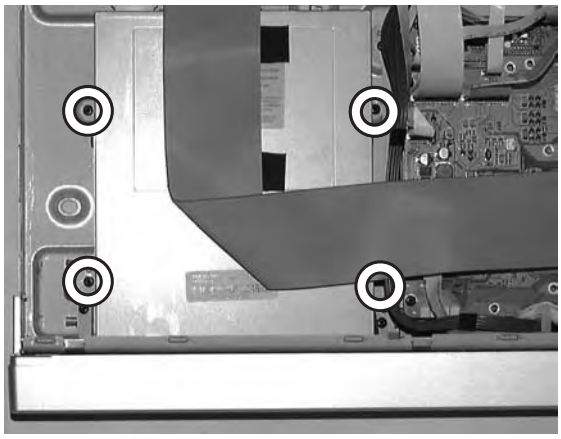


Figure 4-13

4.1.7 Analog Board

- Remove the 3 screws (1) that fix the back plate to the bottom plate, see figure 4-14
- Remove the Fan assy by releasing the fixing screws (2)
- Remove the 3 screws (3) fixing the Analog Board to the bottom plate
- Remove the 2 screws fixing the hard disc module (4), see figure 4-15
- Remove screw safety holder (5)
- Unlock the two snaps hooks at the left and right (6), see figure 4-16, and pull the board and backplate out gently (7)
- Turn the PCB in the service position (8), see figure 4-17

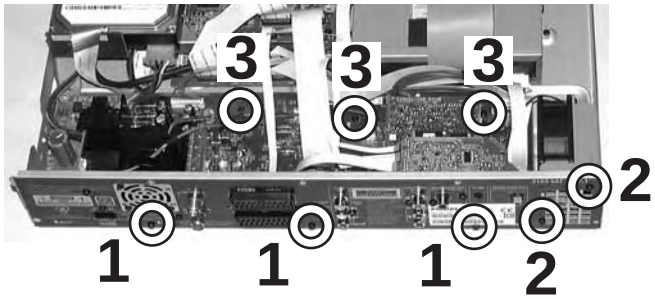


Figure 4-14

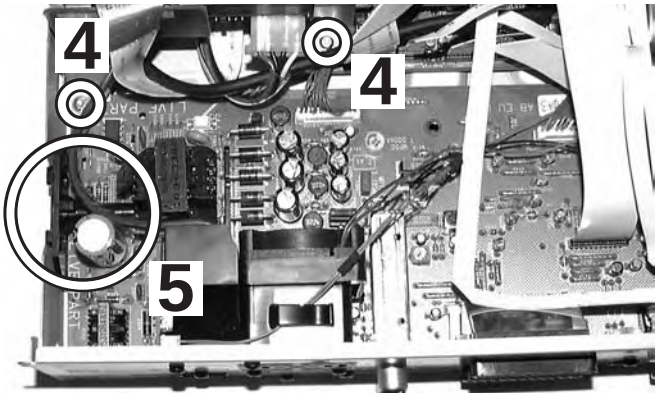


Figure 4-15

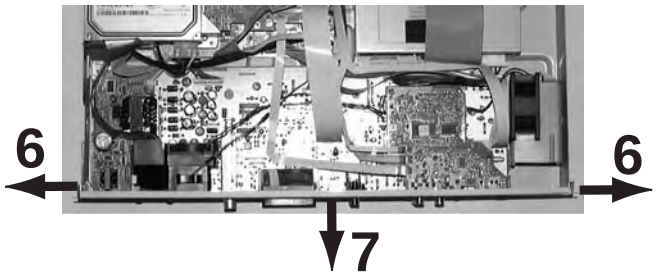


Figure 4-16

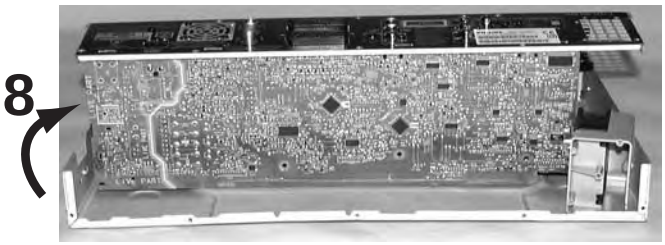


Figure 4-17

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

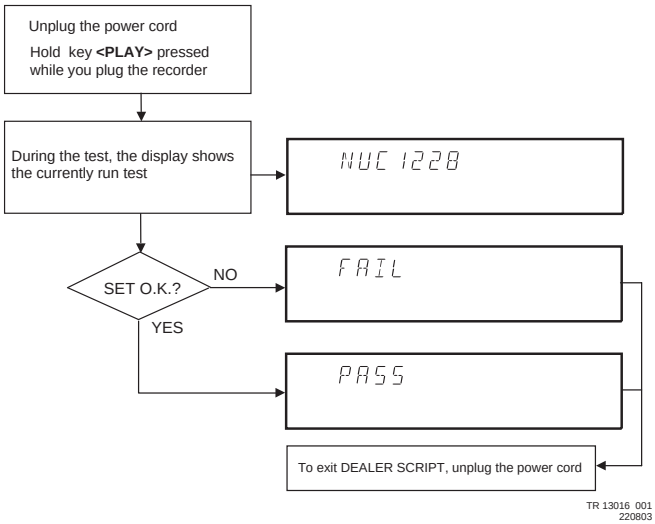


Figure 5-1

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

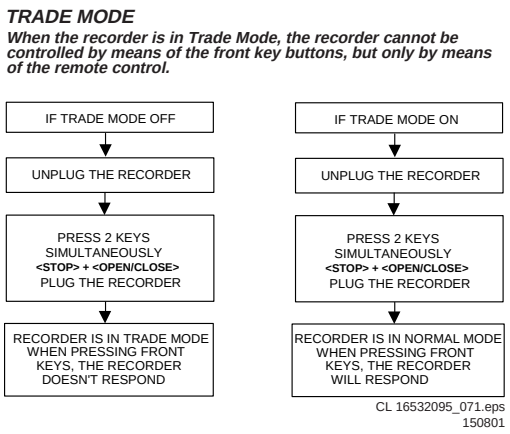


Figure 5-2

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.

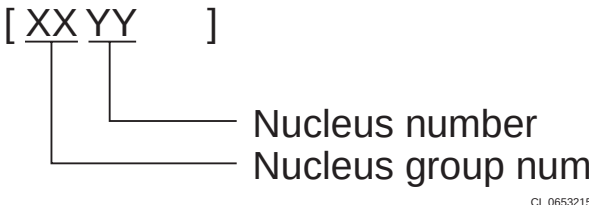


Figure 5-3

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:

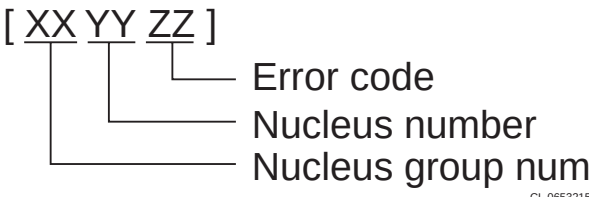


Figure 5-4

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

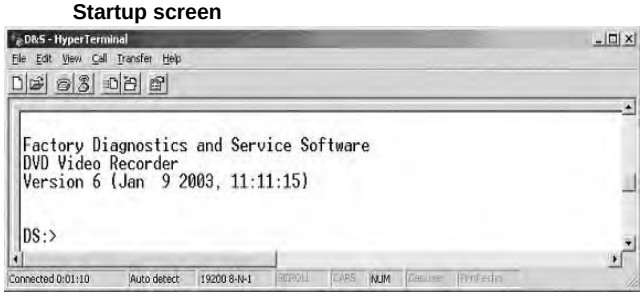


Figure 5-5

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

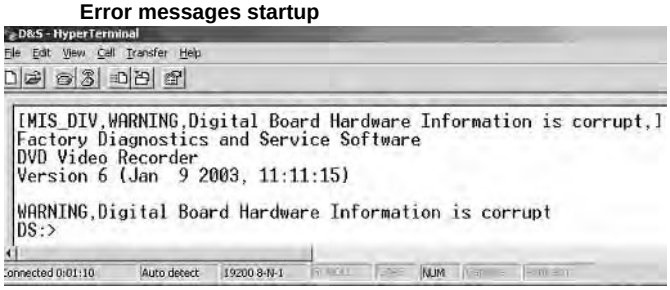


Figure 5-6

Error messages D&S program

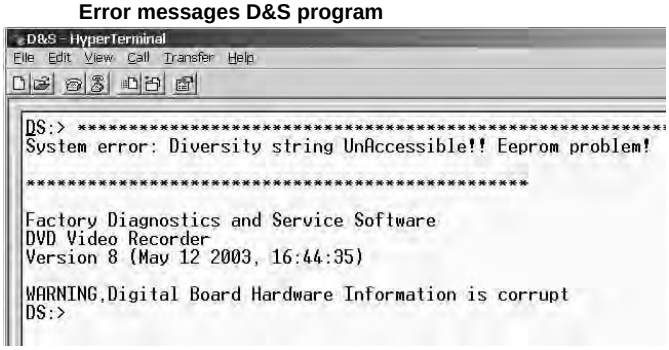


Figure 5-7

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.

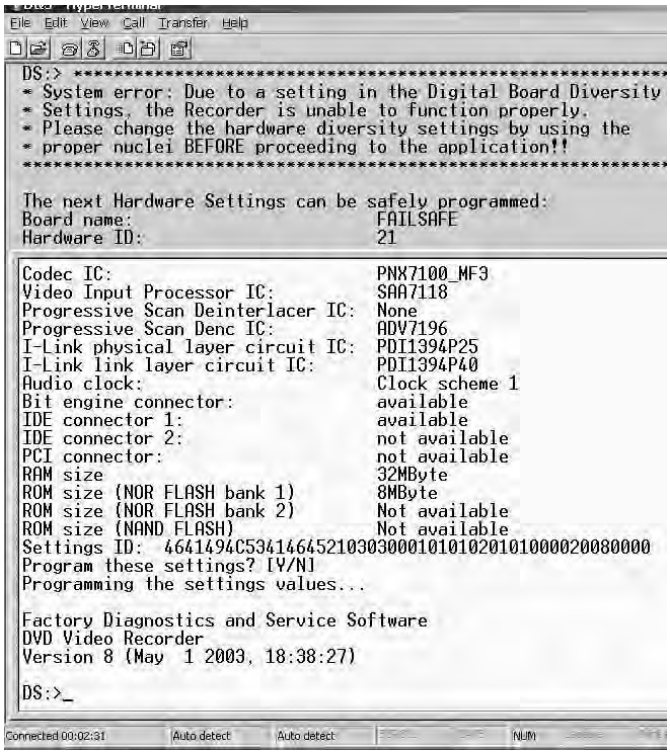


Figure 5-8

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

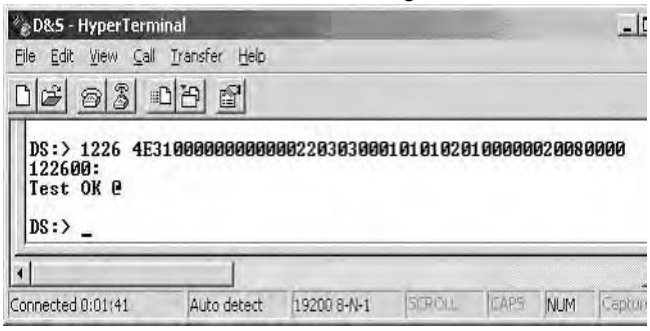


Figure 5-9

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_Communication**
Nucleus Number	2100
Description	Check the communication between the digital board and the hard disk drive by querying the device type of the hard disk drive
User Input	None
Example	DS:> 2100 210000:Found a hard disk drive: MASTER device on IDE interface 1 Test OK @

Nucleus Name	**DS_HDD_Reset**
Nucleus Number	2101
Description	Reset the hard disk drive
User Input	None
Example	DS:> 2101 210100: Resetting IDE interface 1 succeeded Test OK @

Nucleus Name	**DS_HDD_VersionGet**
Nucleus Number	2102
Description	Get the vendor- and product identification and the product revision level of the hard disk drive
User Input	None
Example	DS:> 2102 210200: Serial number = F19LP8WE,Firmware rev. = VAM51JJ0 ,Model number = Maxtor 2F040L0 Test OK @

Nucleus Name	**DS_HDD_WriteRead**
Nucleus Number	2103
Description	Write data to the hard disk, read it back and verify the data read back. **ATTENTION:** THIS NUCLEUS DESTROYS DATA ON THE DISK! A COMPLETE FORMAT OF THE HDD MIGHT BE NECESSARY!
User Input	None
Example	DS:> 2103 210300: OK, writing to sector 3f95776 Test OK @

Nucleus Name	**DS_HDD_CapabilitiesGet**
Nucleus Number	2104
Description	Get the cylinders, heads and track information of the hard disk drive
User Input	None
Example	DS:> 2104 Number of cylinders 16383 Number of heads 16 Number of sectors per track 63 Capacity in sectors 80293248 Number of current cylinders 16383 Number of current heads 16 Number of current sectors per track 63 Current capacity in sectors 16514064 Number of unformatted bytes per track 0 Number of unformatted bytes per sector 0 210400: Test OK @

Nucleus Name	**DS_HDD_Diagnostics**
Nucleus Number	2105
Description	Shall perform the internal diagnostic tests implemented by the hard disk drive.
User Input	None
Example	DS:> 2105 210500: Test OK @

Nucleus Name	**DS_HDD_UploadImage**
Nucleus Number	2106

Description	Upload raw data from the HDD to a DVD+RW
User Input	The user can enter 3 parameters in the next format: <COMMAND> <HDD sector> <nr of HDD sectors> <COMMAND> is one of the next strings: · NEW: Create a new transfer image table, <HDD sector> and <nr of HDD sectors> must be entered. The tray of the DVD drive is sent out an the user is asked to insert a DVD+RW · ADD: Add a section to the current transfer table, <HDD sector> and <nr of HDD sectors> must be entered · READ: Read the current transfer image table from the DVD. The tray of the DVD drive is sent out an the user is asked to insert a DVD+RW · VIEW: View the contents of the current transfer table · GO: Copy data from the HDD to the DVD+RW according to the currently entered transfer table <HDD sector> = the sector on HDD to start reading from <HDD sectors> = the number of HDD sectors to transfer
Example	DS:> 2106 210605: Invalid user input Error @ DS:> 2106 READ Please insert a writable DVD+RW 210609: Unable to update transfer table Error @ DS:> 2106 NEW 0x1 2048 Creating new transfer table Adding entry 1 to transfer table Length 1 entries 210605: NEW 0X1 2048 Test OK @ DS:> 2106 VIEW Length 1 entries Entry 1: hdd Position : 0x1 nrHddSectors : 0x800 dvdPosition : 0x34040 nrDvdSectors : 0x200 210605: VIEW Test OK @ DS:> 2106 ADD 0x2001 20480 Adding entry 2 to transfer table Length 2 entries 210605: ADD 0X2001 20480 Test OK @ DS:> 2106 GO Please insert a writable DVD+RW Executing transfer table 1 of 1, size 1048576 bytes (=1 MB) Calibrating laser of DVD drive Start creating image on DVD at 0x34040. Checking ... <OK> 210600: Transfer OK Test OK @

Nucleus Name	**DS_HDD_DownloadImage**
Nucleus Number	2107
Description	Download a raw image from a DVD+RW disc to the hard disc drive. This image will be written on the hard disc drive.
User Input	Actions: The tray of the DVD drive is sent out an the user is asked to insert a DVD+RW

Example	DS:> 2107 Please insert the Master DVD <OK> Executing transfer table 1 of 4 524288 bytes Dvd Sector 0x50000 Dvd Sector Count 256 Hdd Sector 0x40000 Hdd Sector Count 1024 please wait ..<OK> Executing transfer table 2 of 4 10485760 bytes (=10 MB) Dvd Sector 0x70000 Dvd Sector Count 5120 Hdd Sector 0x60000 Hdd Sector Count 20480 please wait ..<OK> Executing transfer table 3 of 4 524288 bytes Dvd Sector 0x50000 Dvd Sector Count 256 Hdd Sector 0x40000 Hdd Sector Count 1024 please wait ..<OK> Executing transfer table 4 of 4 524288 bytes Dvd Sector 0x50000 Dvd Sector Count 256 Hdd Sector 0x40000 Hdd Sector Count 1024 please wait ..<OK> 210700: Transfer OK Test OK @

Nucleus Name	**DS_HDD_RandomReadScan**
Nucleus Number	2108
Description	Perform a short random read scan of x times 1000 commands.
User Input	Number of commands to send (in multiples of 1000), if no input is given 1000 commands will be sent
Technical	-Initialise the HDD connection -Get the user input -Generate a random sequence of test sectors -For every sector in the random sequence do -Read the sector and measure the time to perform this action -Update a list of statistics about the measurement -Display statistical information about the test sequence -If more than 10% above 50 ms and/or more than 1 request in between 100 & 200ms and/or requests above 200 ms make the result of the test fail.
Execution Time	Depending on the user input x times 30 seconds
User Input	parameters in the next format: <nr_cmds><GRAPH> - Number of commands to send (in multiples of 1000), if no input is given 1000 commands will be sent - "GRAPH" optional to print out the measured read scan graph

Example	DS:> 2108 210800: Minimum access time = 9 msec (sector 4822201) Maximum access time = 41 msec (sector 23668107) Average access time = 28 msec 999 commands below 50 msec 1 command between 50 and 100 msec 0 commands between 100 and 200 msec 0 commands above 200 mesc Test OK @ DS:> 2108 210802: Performance failure Minimum access time = 9 msec (sector 4822201) Maximum access time = 101 msec (sector 23668107) Average access time = 35 msec 980 commands below 50 msec 19 command between 50 and 100 msec 1 commands between 100 and 200 msec 0 commands above 200 mesc Error @

Nucleus Name	**DS_HDD_LinearSurfaceScan**
Nucleus Number	2109
Description	Perform a linear surface scan so that most of the disc is covered.
Technical	- Initialise the HDD connection - Get the user input - Generate a sequence of test sectors according to the user input - For every sector in the sequence do - Read the sector and measure the time to perform this action - Update a list of statistics about the measurement - Display statistical information about the test sequence - If more than 1% above 100 ms and/or more than 0.1% above 200 msec and/ or requests above 300 msec make the result of the test fail.
Execution Time	Depending on the user input x times 30 seconds
User Input	parameters in the next format: <SECTORS> <STEP> <LOW> <HIGH> <GRAPH> - SECTORS: Specifies the number of sectors to read in each access - STEP: Specifies the step (in sectors) between each access. - LOW: The start sector address of an explicit range of LBA addresses to be used for testing. If no value is entered LBA 0 will be used - HIGH: The end sector address of an explicit range of LBA addresses to be used for testing. If no value is entered the maximum LBA will be used. - "GRAPH" optional to print out the measured read scan graph
Example	DS:> 2109 210900: Minimum access time = 9 msec (sector 4822201) Maximum access time = 41 msec (sector 23668107) Average access time = 28 msec 999 commands below 50 msec 1 command between 100 and 200 msec 0 commands between 200 and 300 msec 0 commands above 300 msec Test OK @ DS:> 2109 210903: Performance failure Minimum access time = 9 msec (sector 4822200) Maximum access time = 101 msec (sector 23662200) Average access time = 35 msec 980 commands below 50 msec 19 command between 100 and 200 msec 1 commands between 200 and 300 msec 0 commands above 300 mesc Error @

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 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:>

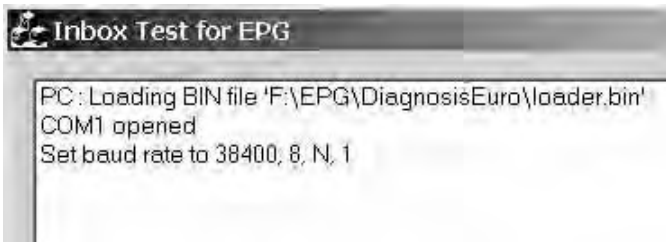
5.5 Diagnosis of EPG Euro Board

The EPG Board can be diagnosed by the help of a PC tool.
Hardware required:

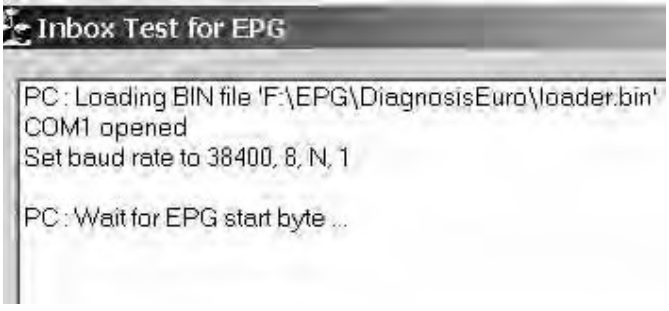
- Service PC
- one free COM port on the Service PC
- ComPair Interface 4822 727 21631 (and serial cable and power supply)
- EPG Interface cable 3122 785 90590

5.5.1 Diagnosis procedure

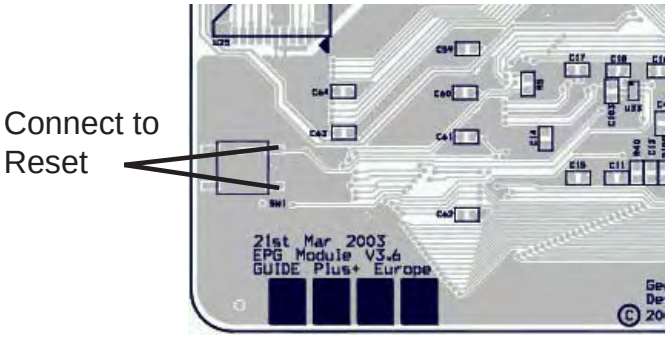
1. Plug the EPG Interface cable to the connector labelled “VCR” on the ComPair interface. Connect the 3.5mm inline plug of the EPG Interface cable to the G-Link connector (Sat Control connector) at the rear side of the DVDR.
2. Power on the DVDR.
3. Browse to the directory that contains the needed diagnosis software. The directory should contain 2 files:
   - “Inbox.exe”
   - “loader.bin”
4. Execute the program Inbox.exe. The following screen appears:



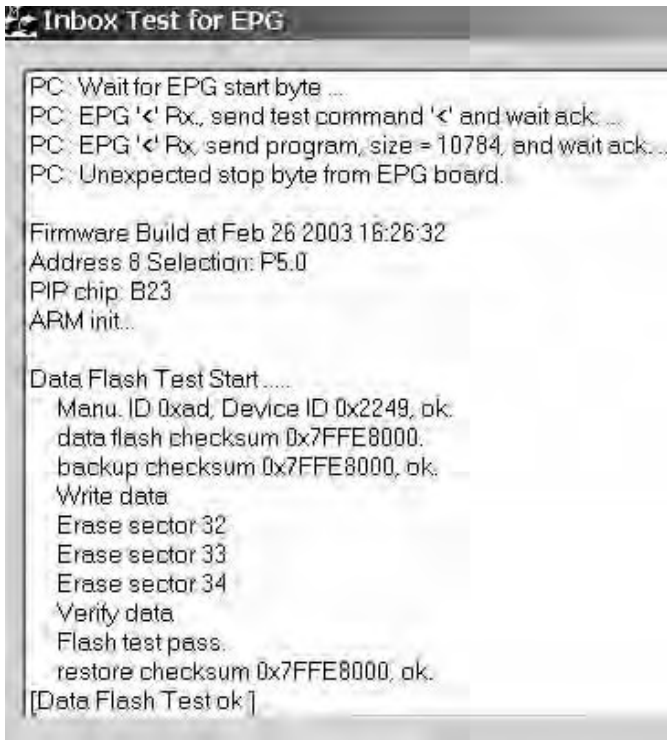
5. Press Button “Set Ready”



6. Make a reset of the EPG Board by connecting 2 pins on the EPG Board for a short moment by means of a pair of tweezers.



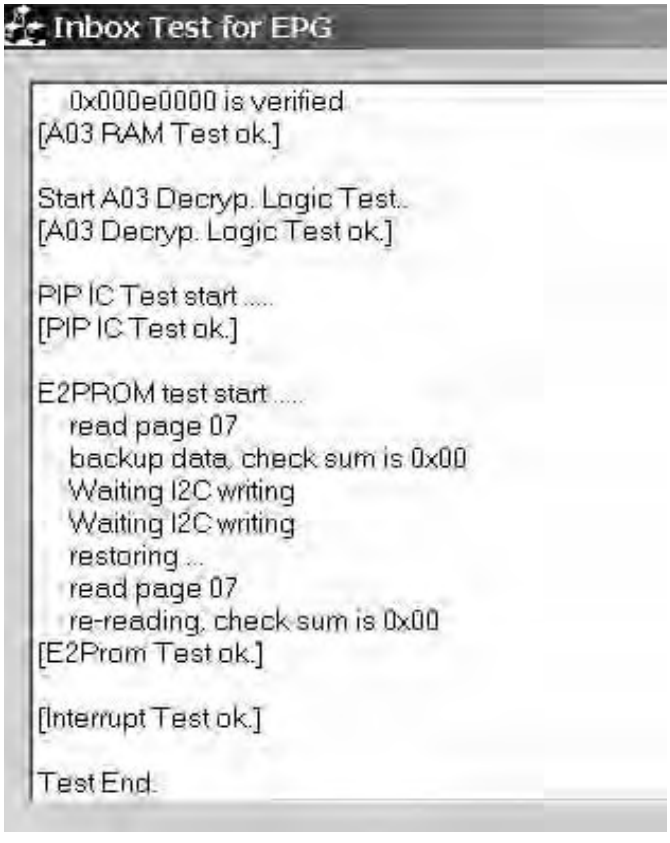
7. The diagnosis procedure should now take place and tests of the main components of the board are performed.



```
Code Flash Test Start .....
   Manu. ID 0xad, Device ID 0x2249, ok.
   data flash checksum 0x7CF6CCB8.
   backup checksum 0x7CF6CCB8, ok.
   Write data
   Erase sector 32
   Erase sector 33
   Erase sector 34
   Verify data
   Flash test pass.
   restore checksum 0x7CF6CCB8, ok.
[Code Flash Test ok.]
```

```
Start A03 RAM Test .....
   Writing A03 RAM
   0x00020000 is written
   0x00040000 is written
   0x00060000 is written
   0x00080000 is written
   0x000A0000 is written
   0x000C0000 is written
   0x000E0000 is written
   Verify A03 RAM
   0x00020000 is verified
   0x00040000 is verified
   0x00060000 is verified
   0x00080000 is verified
   0x000a0000 is verified
   0x000c0000 is verified
   0x000e0000 is verified
[A03 RAM Test ok.]
```

8. Finally “Test End.” should be stated:



5.6 Format of Hard Disk

After replacement of the hard disk by a new one, the HDD has to be formatted with a special Format DVD.
Format DVD for HDRW720 with 80GB HDD... 3122 785 90710, for DVDR725H with 160GB HDD ... 3122 785 90740.

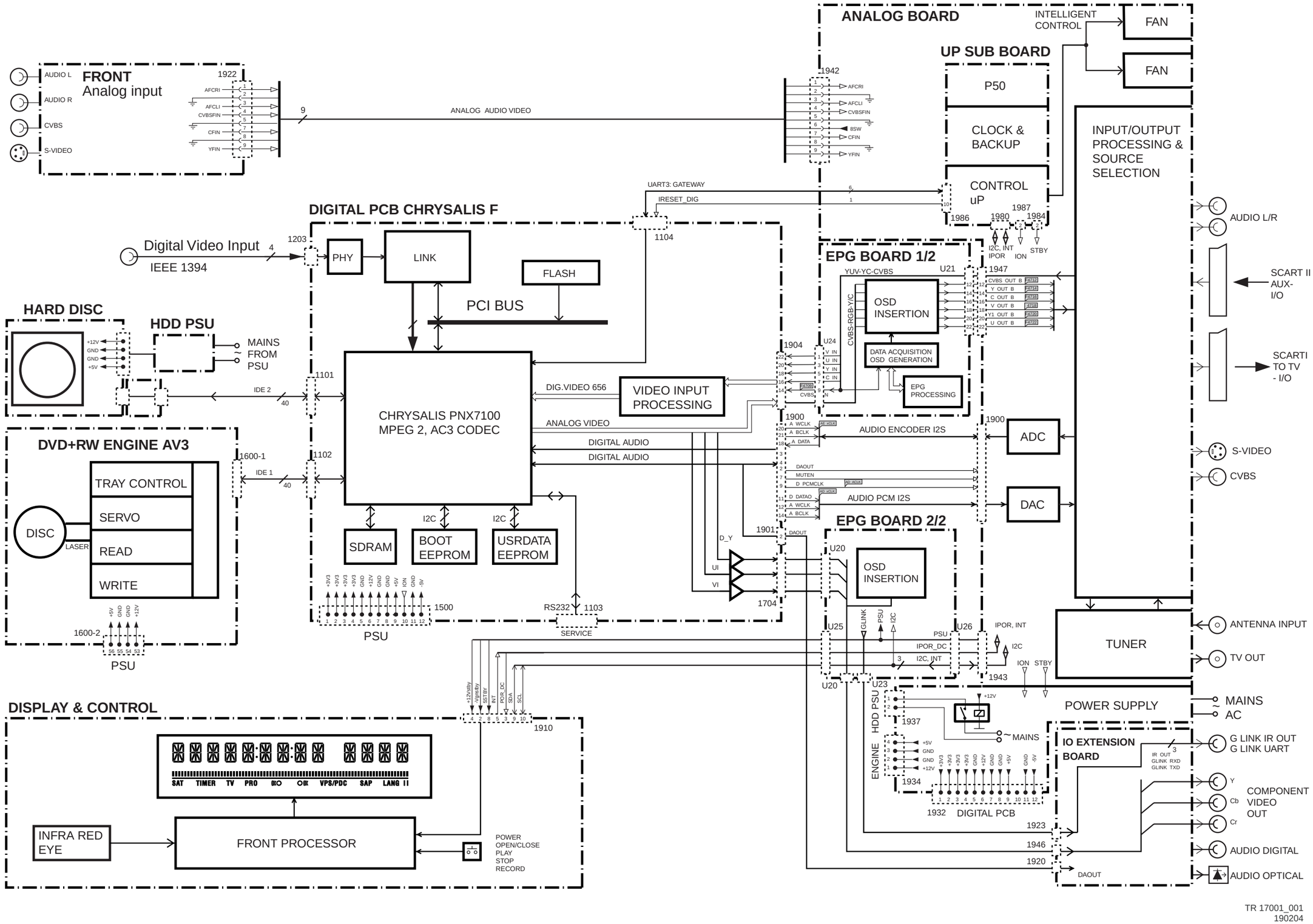
5.6.1 Format Procedure

- Connect the Digital Board to a PC via serial cable 3122 785 90017
- Start up Hyperterminal or any other terminal program on the PC with the correct settings (19200 8-N-1)
- Power on the set
- Call up nucleus 2107 of the DSW.
- Insert the format DVD to start the format procedure

Example:
DS:> 2107
Please insert the Master DVD
Executing transfer table 1 of 4
524288 bytes
Dvd Sector 0x50000
Dvd Sector Count 256
Hdd Sector 0x40000
Hdd Sector Count 1024
please wait ..
Executing transfer table 2 of 4
10485760 bytes (=10 MB)
Dvd Sector 0x70000
Dvd Sector Count 5120
Hdd Sector 0x60000
Hdd Sector Count 20480
please wait ..
Executing transfer table 3 of 4
524288 bytes
Dvd Sector 0x50000
Dvd Sector Count 256
Hdd Sector 0x40000
Hdd Sector Count 1024
please wait ..
Executing transfer table 4 of 4
524288 bytes
Dvd Sector 0x50000
Dvd Sector Count 256
Hdd Sector 0x40000
Hdd Sector Count 1024
please wait ..
210700: Transfer OK
Test OK @
After this procedure the HDD contains the file system and commercial demo videos

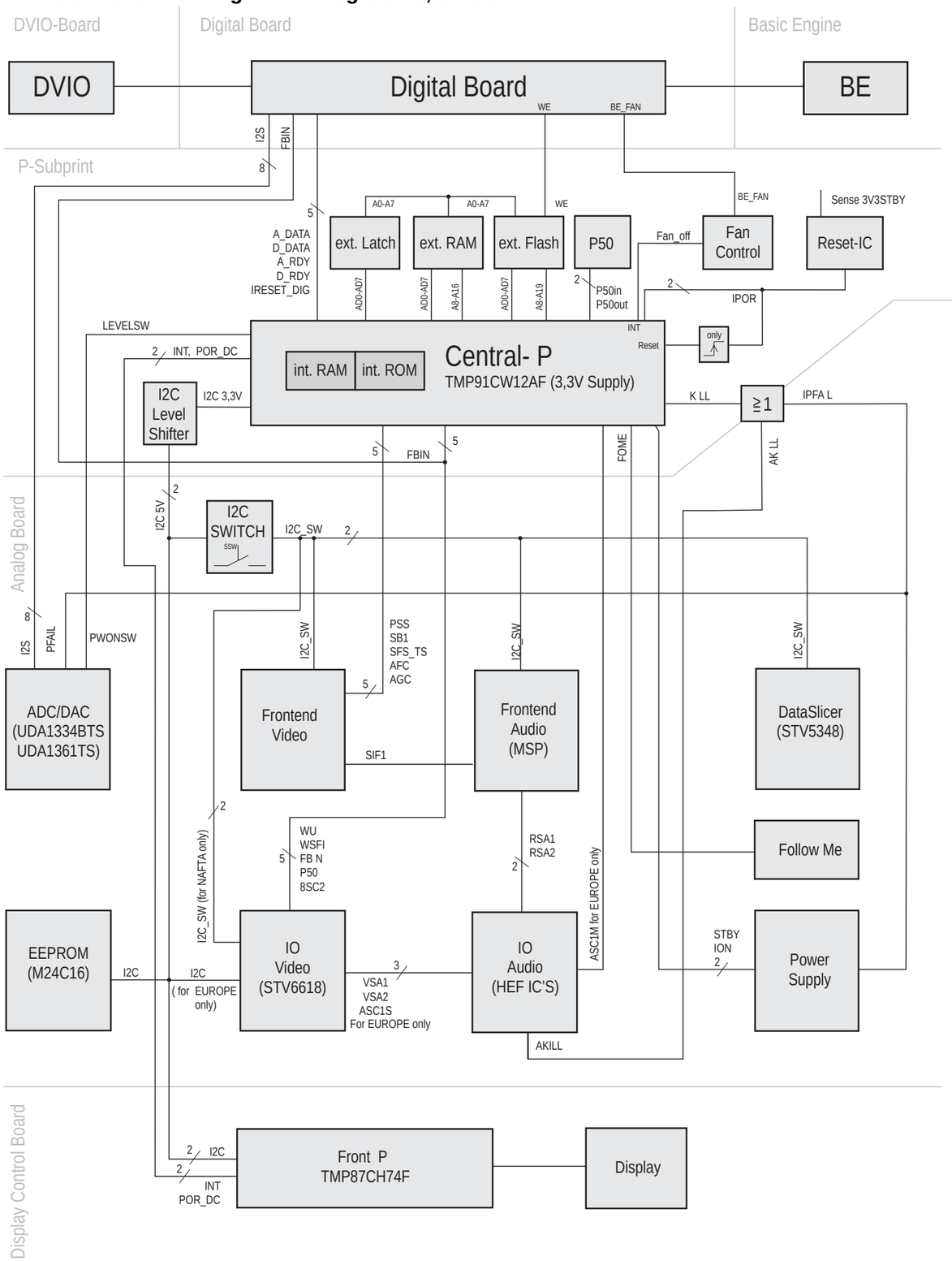
6. Block Diagrams, Waveforms, Wiring Diagram.

Overall Block Diagram



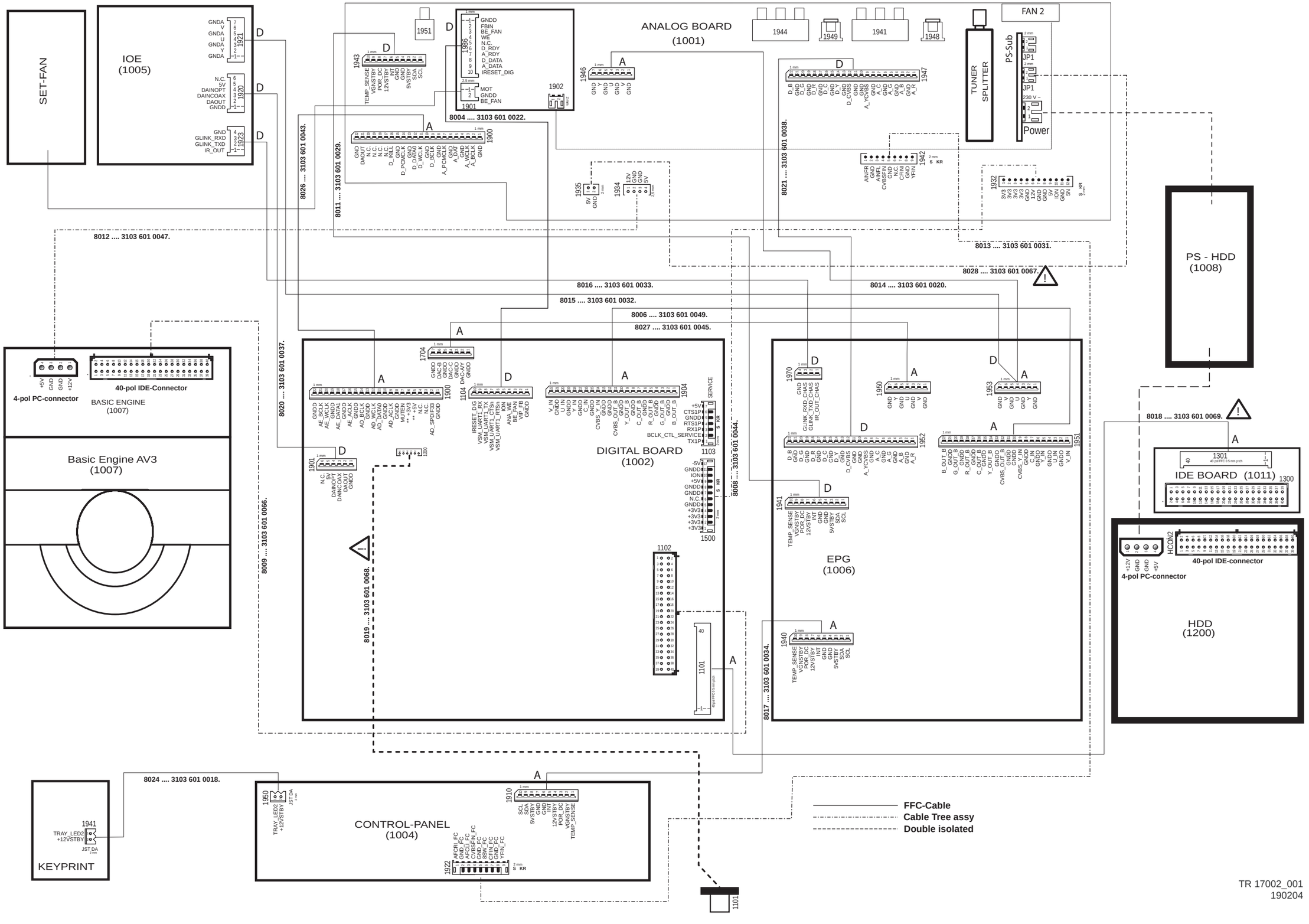
TR 17001_001
190204

Control Block Diagram Analog Board, uP Board



TR 01019_001
130502

Wiring Diagram



TR 17002_001
190204

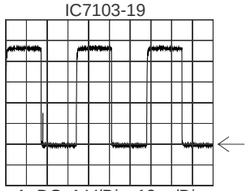
Waveforms

Waveforms Display Board

7106/7108-Emitter

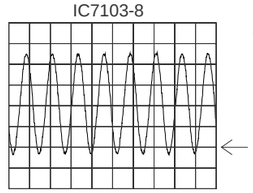
A: DC, 2 V/Div, 10us/Div

IC7103-19



A: DC, 1 V/Div, 10us/Div

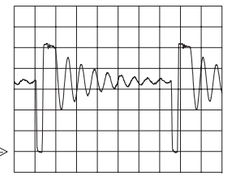
IC7103-8



A: DC, 1 V/Div, 100ns/Div

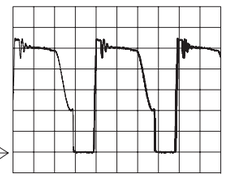
Waveforms Analog Board

F327 VDrain (Standby)



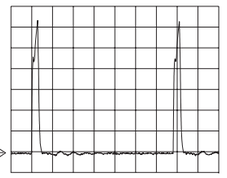
A: DC, 100V/Div
5us/Div

F327 VDrain (no disc loaded)



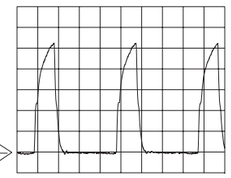
A: DC, 100V/Div
2us/Div

I324 VGate (Standby)



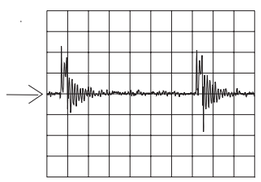
A: DC, 1V/Div
5us/Div

I324 VGate (no disc loaded)



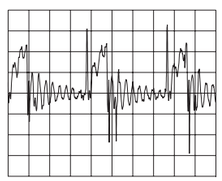
A: DC, 2V/Div
2us/Div

I324 VSource (Standby)



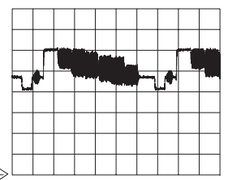
A: DC, 50mV/Div
5us/Div

I324 VSource (no disc loaded)



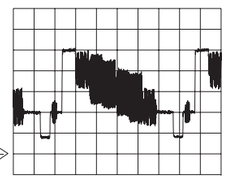
A: DC, 50mV/Div
2us/Div

F723 VFV I723



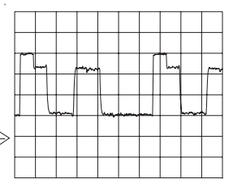
A: DC, 500mV/Div
10us/Div

E465



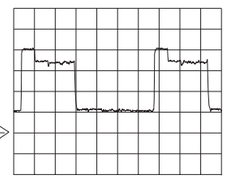
A: DC, 500mV/Div
10us/Div

E461



A: DC, 500mV/Div
10us/Div

E462

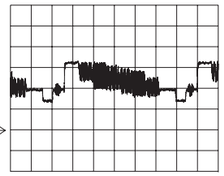


A: DC, 500mV/Div
10us/Div

E463

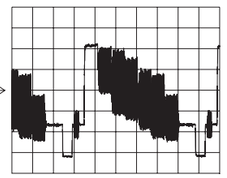
A: DC, 500mV/Div
10us/Div

A_CVBS I405



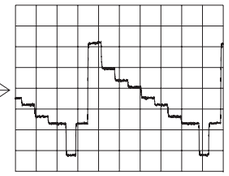
A: DC, 500mV/Div
10us/Div

D_CVBS F4712



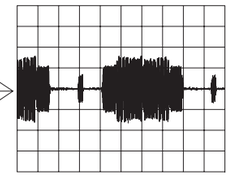
A: DC, 200mV/Div
10us/Div

D_Y F4714



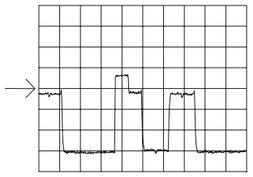
A: DC, 200mV/Div
10us/Div

D_C F4716



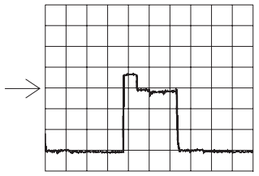
A: DC, 200mV/Div
10us/Div

D_R F4718



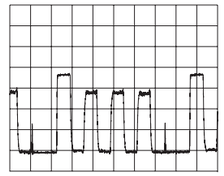
A: DC, 200mV/Div
10us/Div

D_G F4720



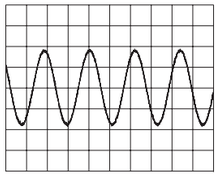
A: DC, 200mV/Div
10us/Div

D_B F4722



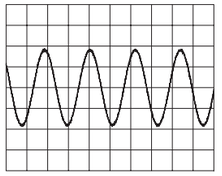
A: DC, 200mV/Div
10us/Div

I502/I504



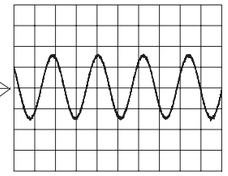
A: DC, 500mV/Div
500us/Div

I517/I518



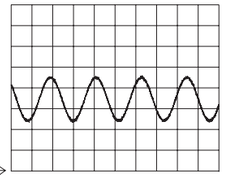
A: DC, 500mV/Div
500us/Div

F501/F502



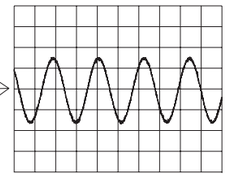
A: DC, 500mV/Div
500us/Div

I014/I032



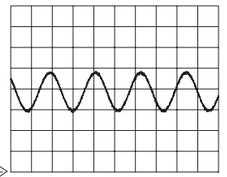
A: DC, 500mV/Div
500us/Div

ARDAC/ALDAC F010/F011



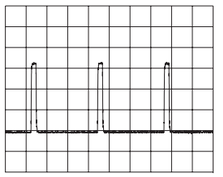
A: DC, 500mV/Div
500us/Div

I623



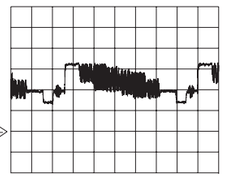
A: DC, 1 V/Div
500us/Div

SYNC F843



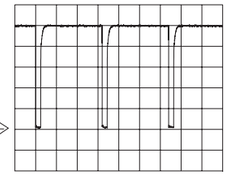
A: DC, 500mV/Div
10us/Div

A_CVBS F8008



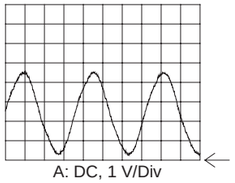
A: DC, 500mV/Div

I818



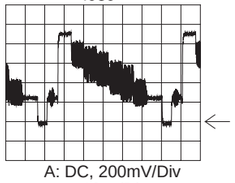
A: DC, 1 V/Div

I994



A: DC, 1 V/Div
20ns/Div

I989

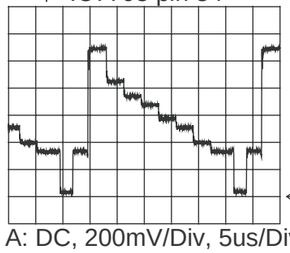


A: DC, 200mV/Div
10us/Div

TR 070018_001
200303

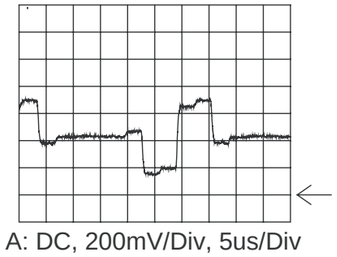
Waveforms Digital Board Chrysalis 2.1

IC7703 pin 34



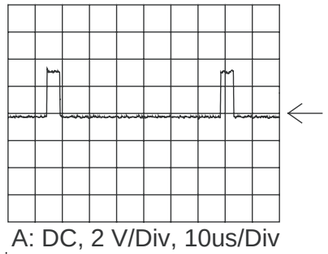
A: DC, 200mV/Div, 5us/Div

IC7703 pin 36



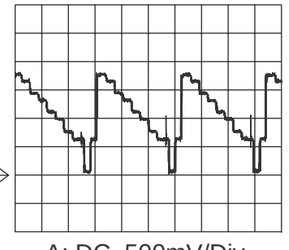
A: DC, 200mV/Div, 5us/Div

HS_IN



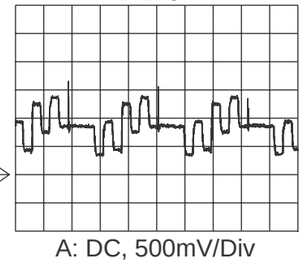
A: DC, 2 V/Div, 10us/Div

Y 1704-2



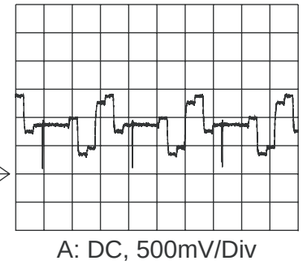
A: DC, 500mV/Div
10us/Div

PB 1704-4



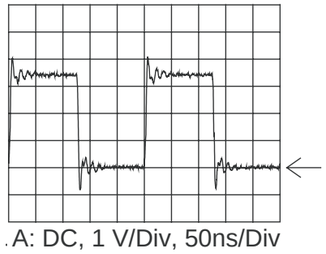
A: DC, 500mV/Div
10us/Div

PR 1704-6



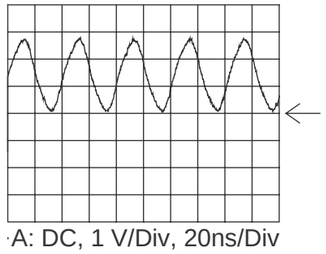
A: DC, 500mV/Div
10us/Div

IC7402 pin 3, F405



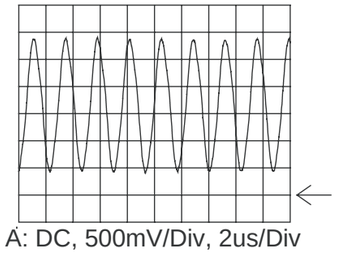
A: DC, 1 V/Div, 50ns/Div

IC7200 pin 60, F203



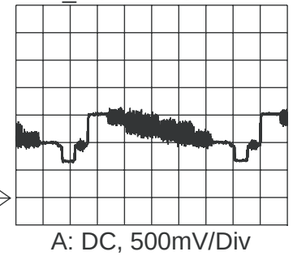
A: DC, 1 V/Div, 20ns/Div

X1001



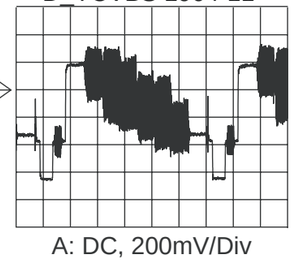
A: DC, 500mV/Div, 2us/Div

A_YCVBS 1904-14



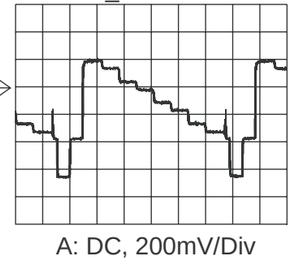
A: DC, 500mV/Div
10us/Div

D_YCVBS 1904-11



A: DC, 200mV/Div
10us/Div

D_Y 1904-9

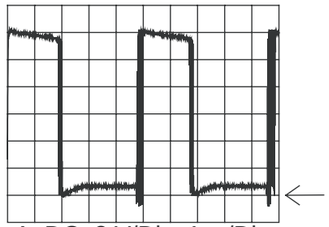


A: DC, 200mV/Div
10us/Div

IC7501 pin 5

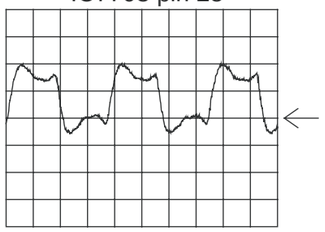
A: DC, 2 V/Div, 1us/Div

IC7501 pin 6



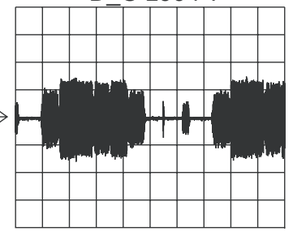
A: DC, 2 V/Div, 1us/Div

IC7703 pin 25



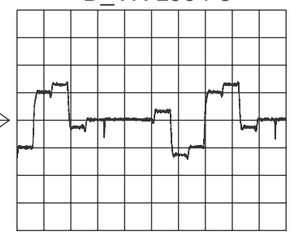
A: DC, 2 V/Div, 10ns/Div

D_C 1904-7



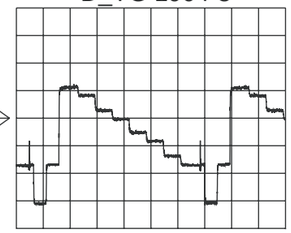
A: DC, 200mV/Div
10us/Div

D_VR 1904-5



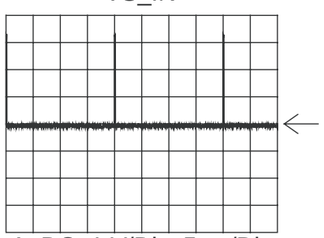
A: DC, 200mV/Div
10us/Div

D_YG 1904-3



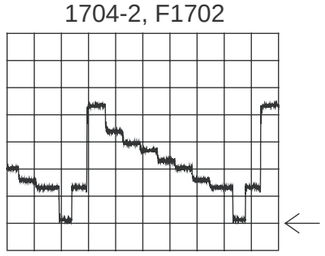
A: DC, 200mV/Div
10us/Div

VS_IN



A: DC, 1 V/Div, 5ms/Div

1704-2, F1702

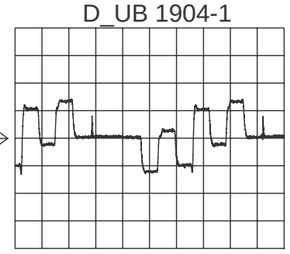


A: DC, 500mV/Div, 5us/Div

IC7703 pin 32

A: DC, 200mV/Div, 5us/Div

D_UB 1904-1

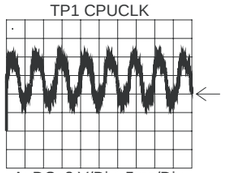


A: DC, 200mV/Div
10us/Div

TR 09014_001
220403

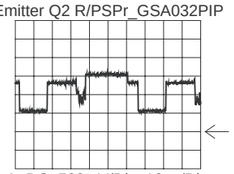
EPG waveforms

TP1 CPUCLK



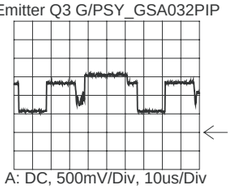
A: DC, 2 V/Div, 5ms/Div

Emitter Q2 R/PSPr_GSA032PIP



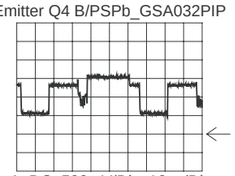
A: DC, 500mV/Div, 10us/Div

Emitter Q3 G/PSY_GSA032PIP



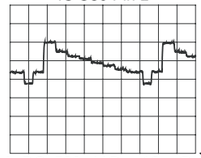
A: DC, 500mV/Div, 10us/Div

Emitter Q4 B/PSPb_GSA032PIP



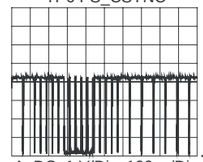
A: DC, 500mV/Div, 10us/Div

IC U50 Pin 1



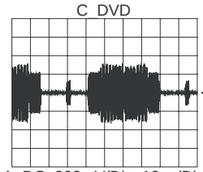
A: DC, 500mV/Div, 10us/Div

TP6 PS_CSYNC



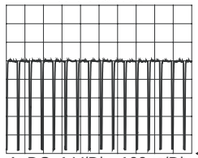
A: DC, 1 V/Div, 100us/Div

C_DVD



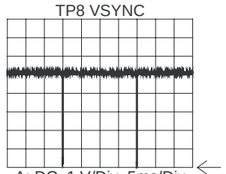
A: DC, 200mV/Div, 10us/Div

TP7 HSYNC



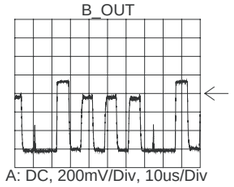
A: DC, 1 V/Div, 100us/Div

TP8 VSYNC



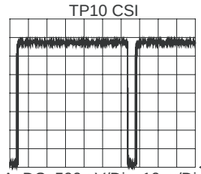
A: DC, 1 V/Div, 5ms/Div

B_OUT



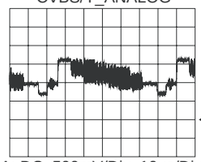
A: DC, 200mV/Div, 10us/Div

TP10 CSI



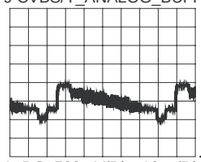
A: DC, 500mV/Div, 10us/Div

CVBS/Y_ANALOG



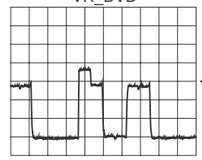
A: DC, 500mV/Div, 10us/Div

TP9 CVBS/Y_ANALOG_BUFFER



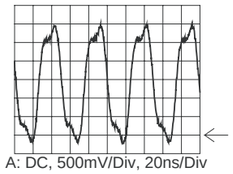
A: DC, 500mV/Div, 10us/Div

VR_DVD



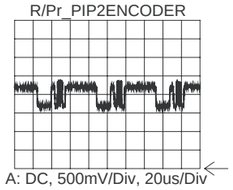
A: DC, 200mV/Div, 10us/Div

IC U11 Pin 1



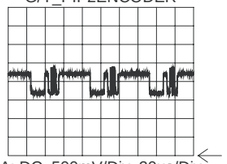
A: DC, 500mV/Div, 20ns/Div

R/Pr_PIP2ENCODER



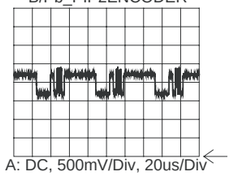
A: DC, 500mV/Div, 20us/Div

G/Y_PIP2ENCODER



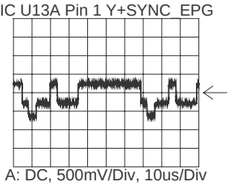
A: DC, 500mV/Div, 20us/Div

B/Pb_PIP2ENCODER



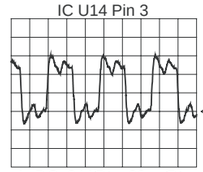
A: DC, 500mV/Div, 20us/Div

IC U13A Pin 1 Y+SYNC_EPG



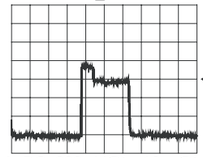
A: DC, 500mV/Div, 10us/Div

IC U14 Pin 3



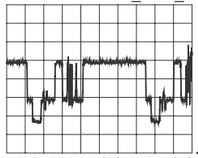
A: DC, 2 V/Div, 20ns/Div

YG_DVD



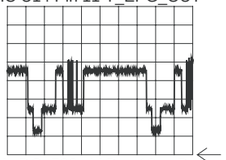
A: DC, 200mV/Div, 10us/Div

IC U14 Pin 10 CVBS_EPG_OUT



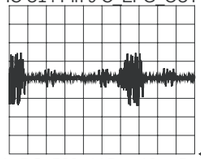
A: DC, 500mV/Div, 10us/Div

IC U14 Pin 11 Y_EPG_OUT



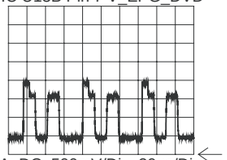
A: DC, 500mV/Div, 10us/Div

IC U14 Pin 9 C_EPG_OUT



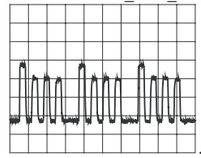
A: DC, 500mV/Div, 10us/Div

IC U13B Pin 7 V_EPG_DVD



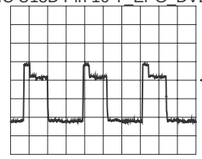
A: DC, 500mV/Div, 20us/Div

IC U13C Pin 10 U_EPG_DVD



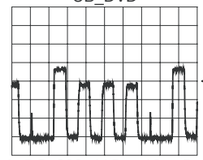
A: DC, 500mV/Div, 20us/Div

IC U13D Pin 16 Y_EPG_DVD



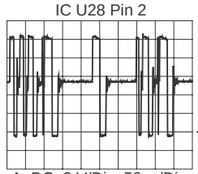
A: DC, 50mV/Div, 20us/Div

UB_DVD



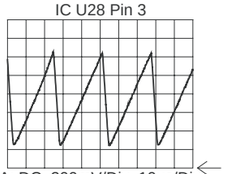
A: DC, 200mV/Div, 10us/Div

IC U28 Pin 2



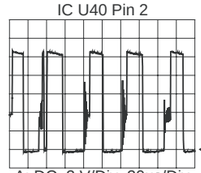
A: DC, 2 V/Div, 50us/Div

IC U28 Pin 3



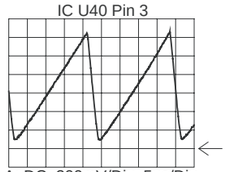
A: DC, 200mV/Div, 10us/Div

IC U40 Pin 2



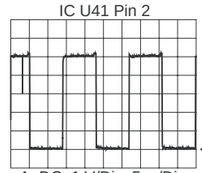
A: DC, 2 V/Div, 20us/Div

IC U40 Pin 3



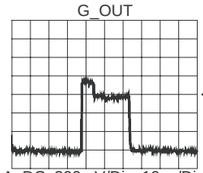
A: DC, 200mV/Div, 5us/Div

IC U41 Pin 2



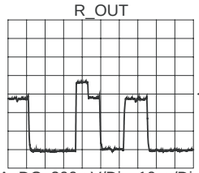
A: DC, 1 V/Div, 5us/Div

G_OUT



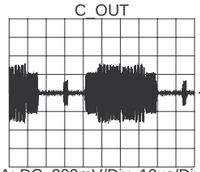
A: DC, 200mV/Div, 10us/Div

R_OUT



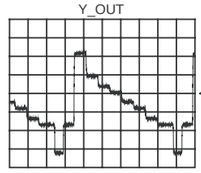
A: DC, 200mV/Div, 10us/Div

C_OUT



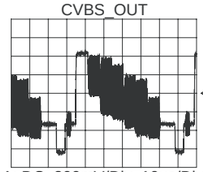
A: DC, 200mV/Div, 10us/Div

Y_OUT



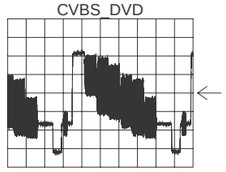
A: DC, 200mV/Div, 10us/Div

CVBS_OUT



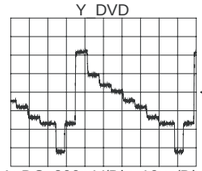
A: DC, 200mV/Div, 10us/Div

CVBS_DVD



A: DC, 200mV/Div, 10us/Div

Y_DVD



A: DC, 200mV/Div, 10us/Div

TR 11003_001
120603

Test points overview Analog Board

F0001 A10
F0002 C10
F0003 C10
F0005 C10
F0007 C10
F0009 C10
F0010 C9
F0011 C10
F0012 C10
F0014 C10
F0016 C10
F0021 A10
F006 C9
F007 C8
F008 C9
F009 C9
F010 A10
F011 B10
F300 A3

F301 A3
F302 A4
F304 B1
F305 B2
F306 A1
F307 B1
F308 A2
F309 A2
F310 A2
F311 A2
F312 B1
F313 A1
F314 A1
F315 C1
F316 C2
F317 C4
F318 C2
F319 C2
F320 C1

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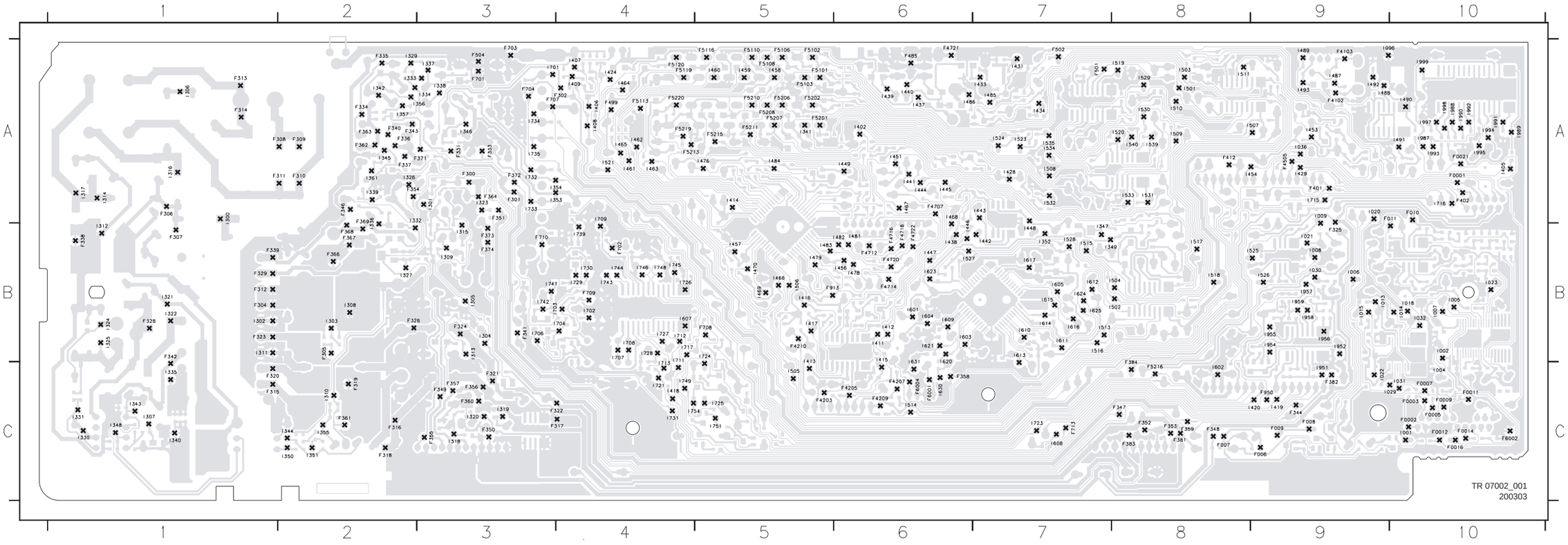
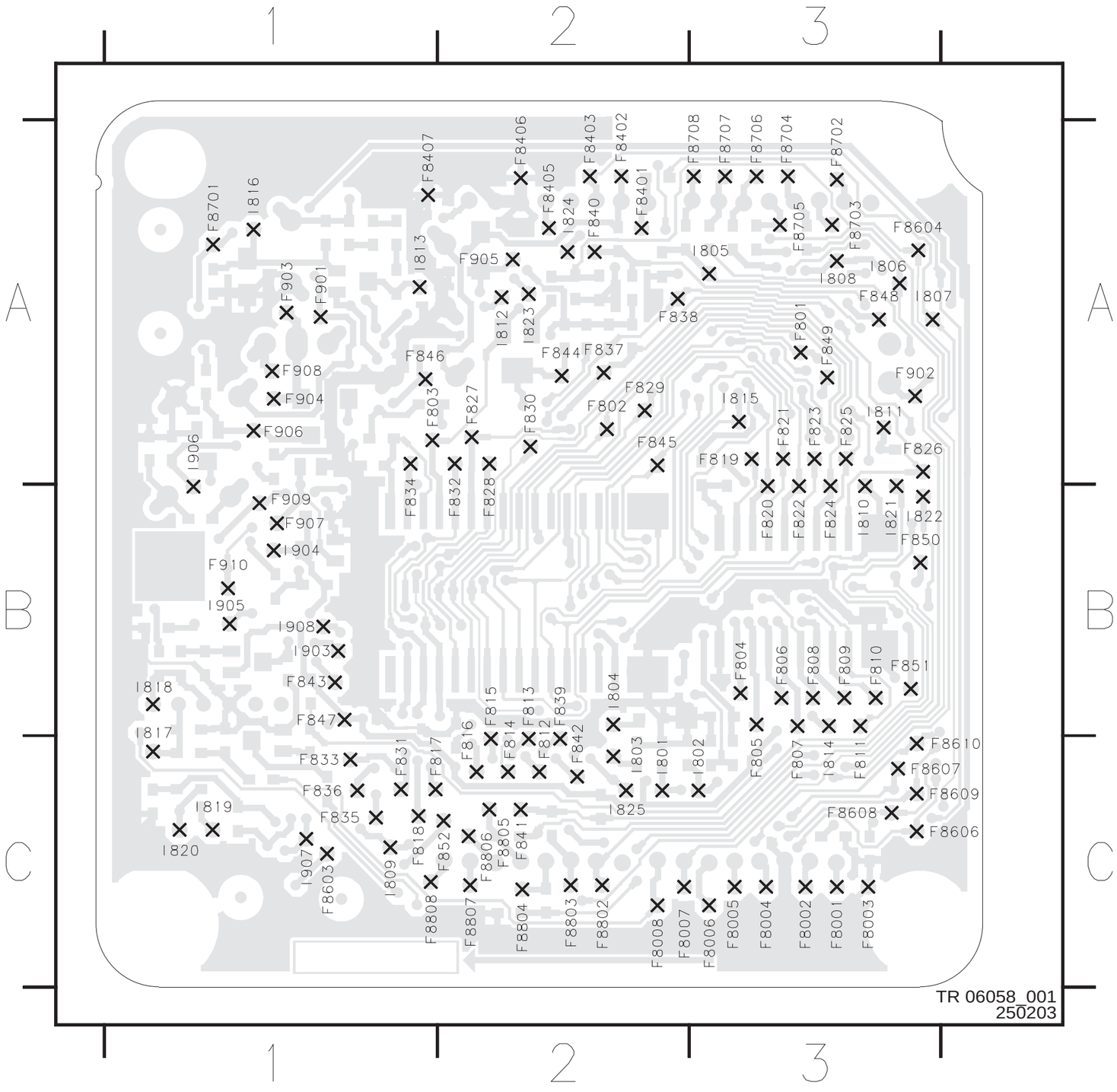


Test points overview UP Sub Board



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F830 A2	F8609 C3	I807 A3	

Test points overview Digital Board Chrysalis F

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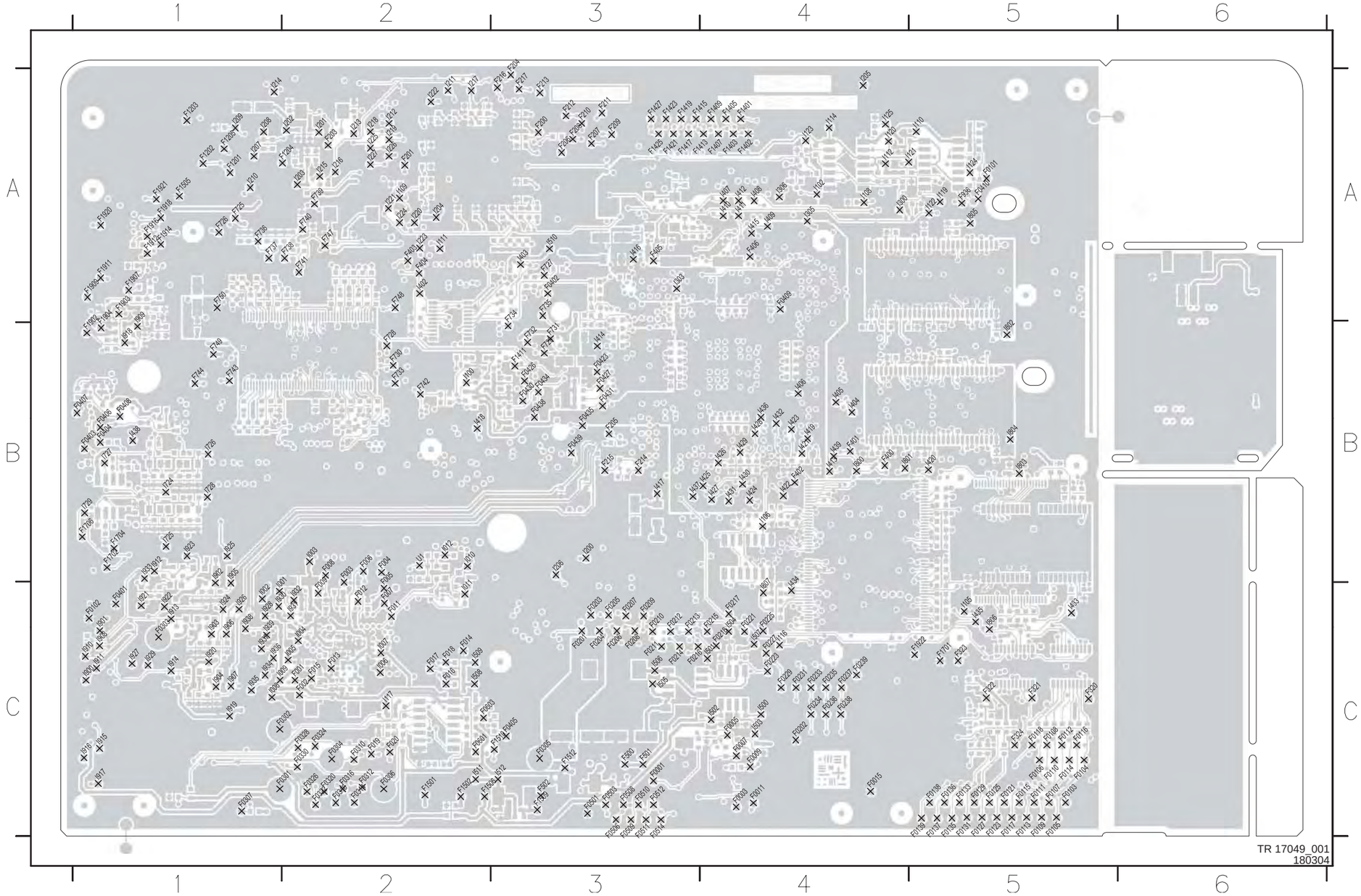
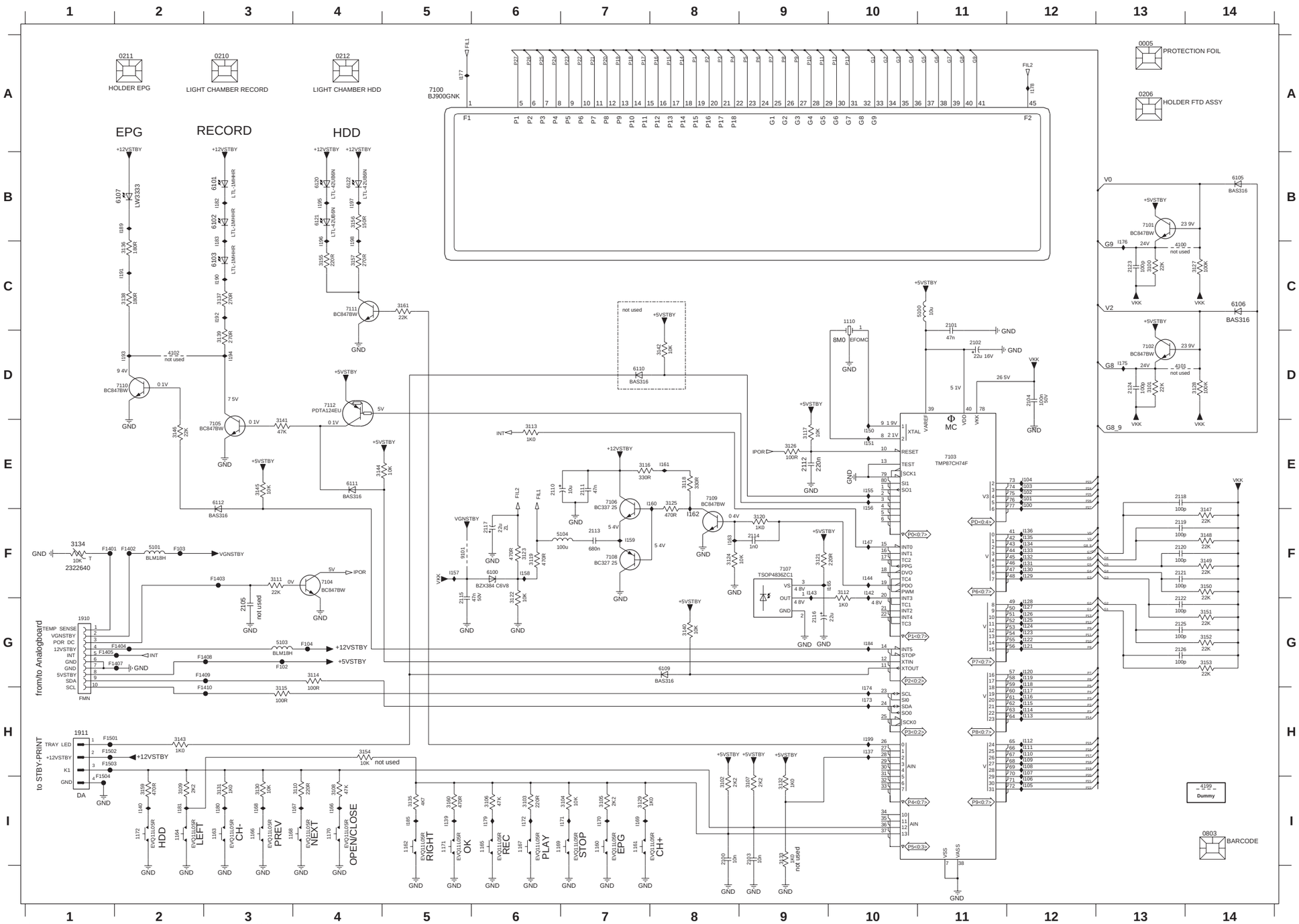
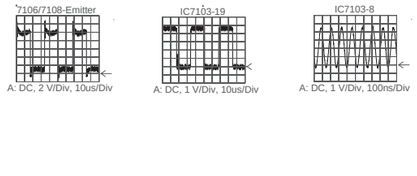


7. Circuit Diagrams and PWB Layouts

Display Panel





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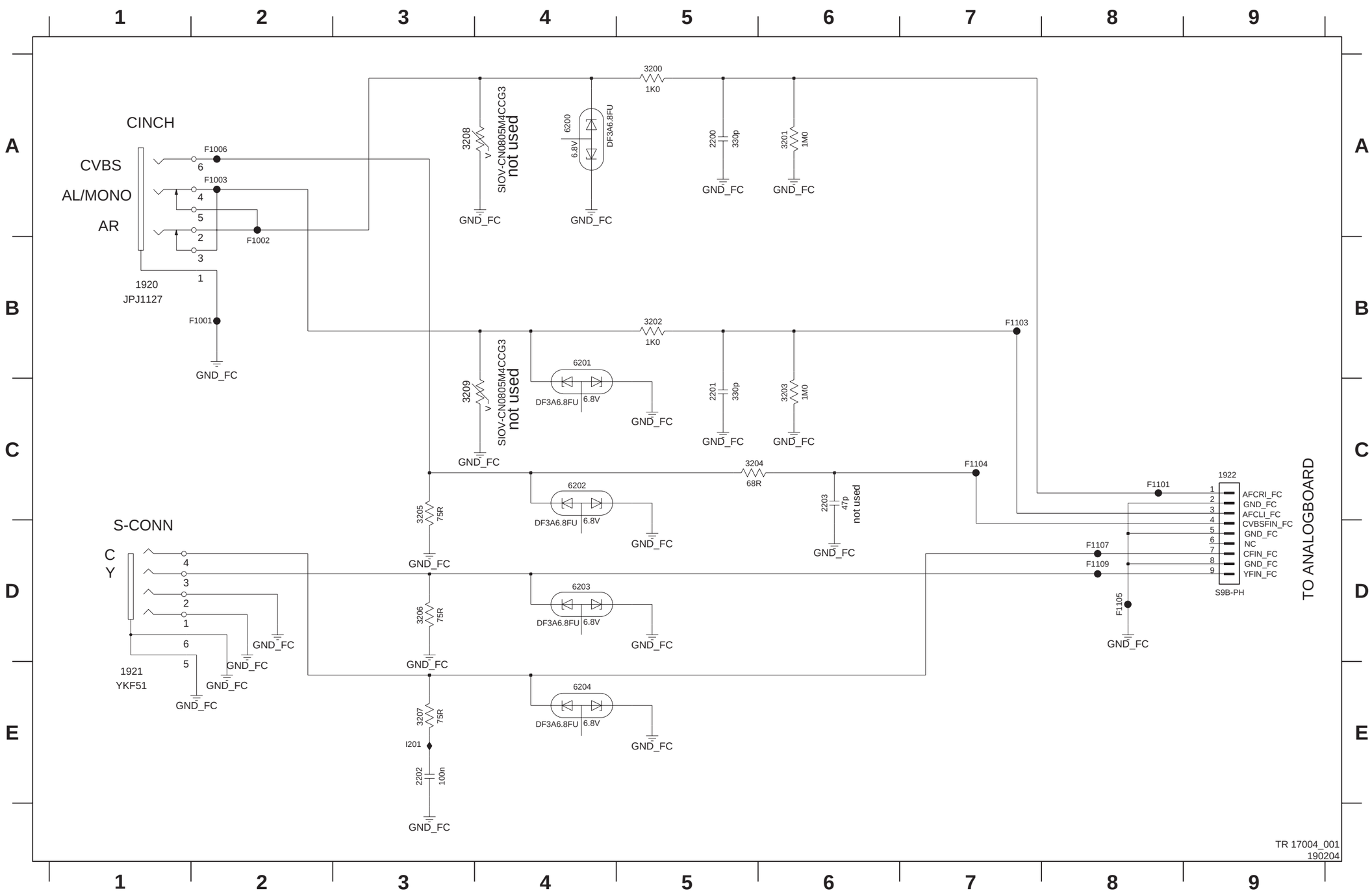
I185 I5
I189 B2
I190 C3
I191 C2
I192 C3
I193 D2
I194 D3
I195 B4
I196 C4
I197 B4
I198 C4
I199 H10

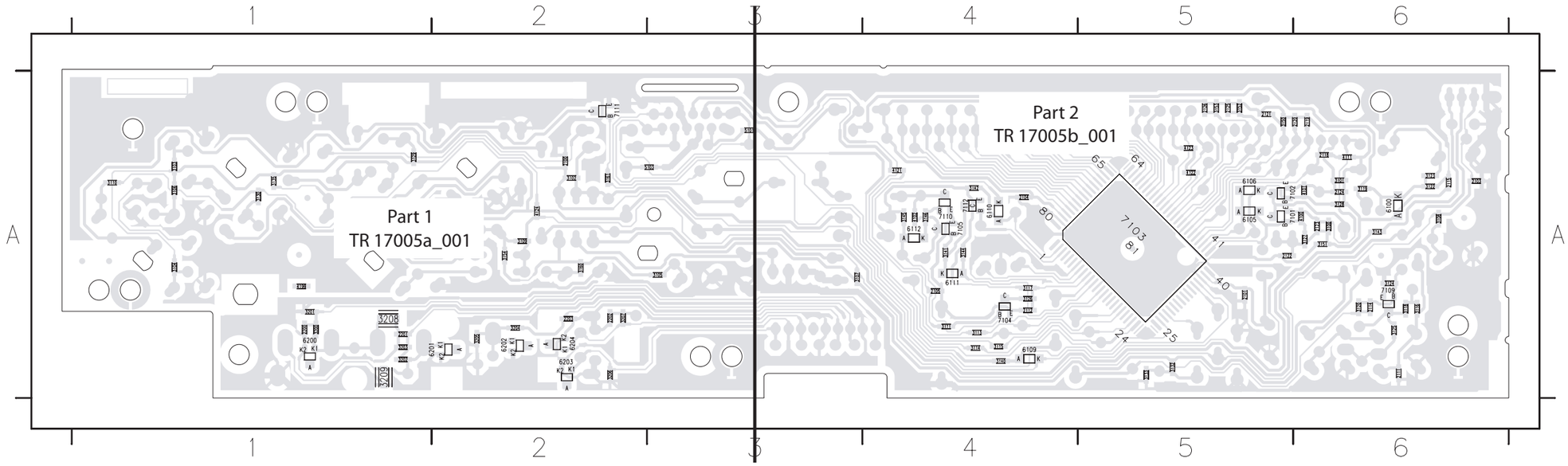
TR 17003_001
190204

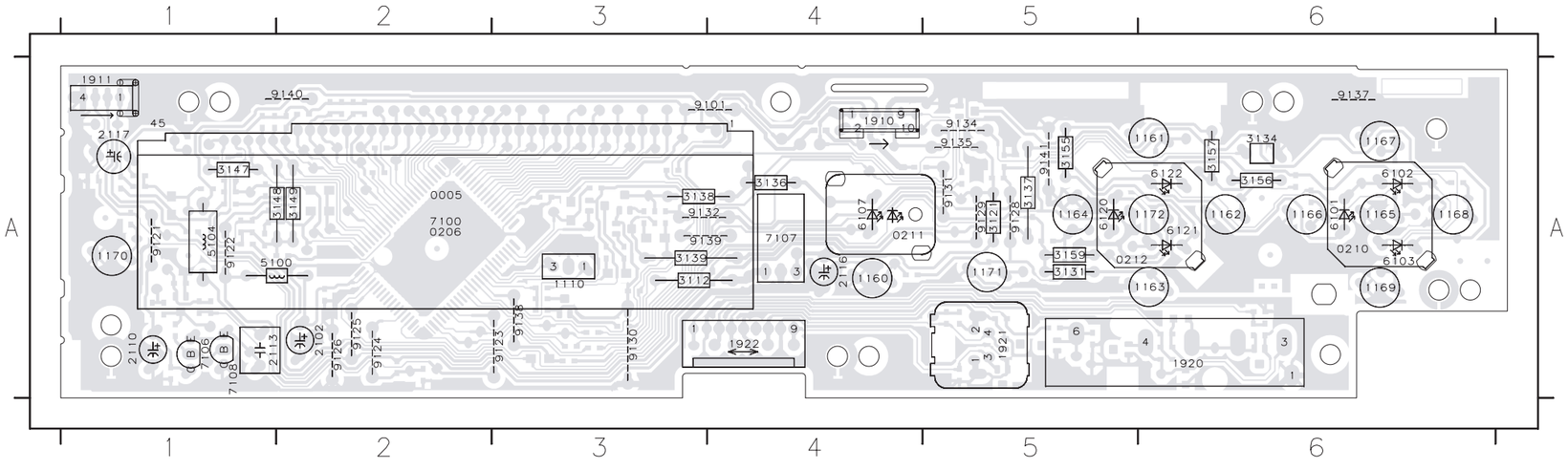
Display Board Front Connector (FC)



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



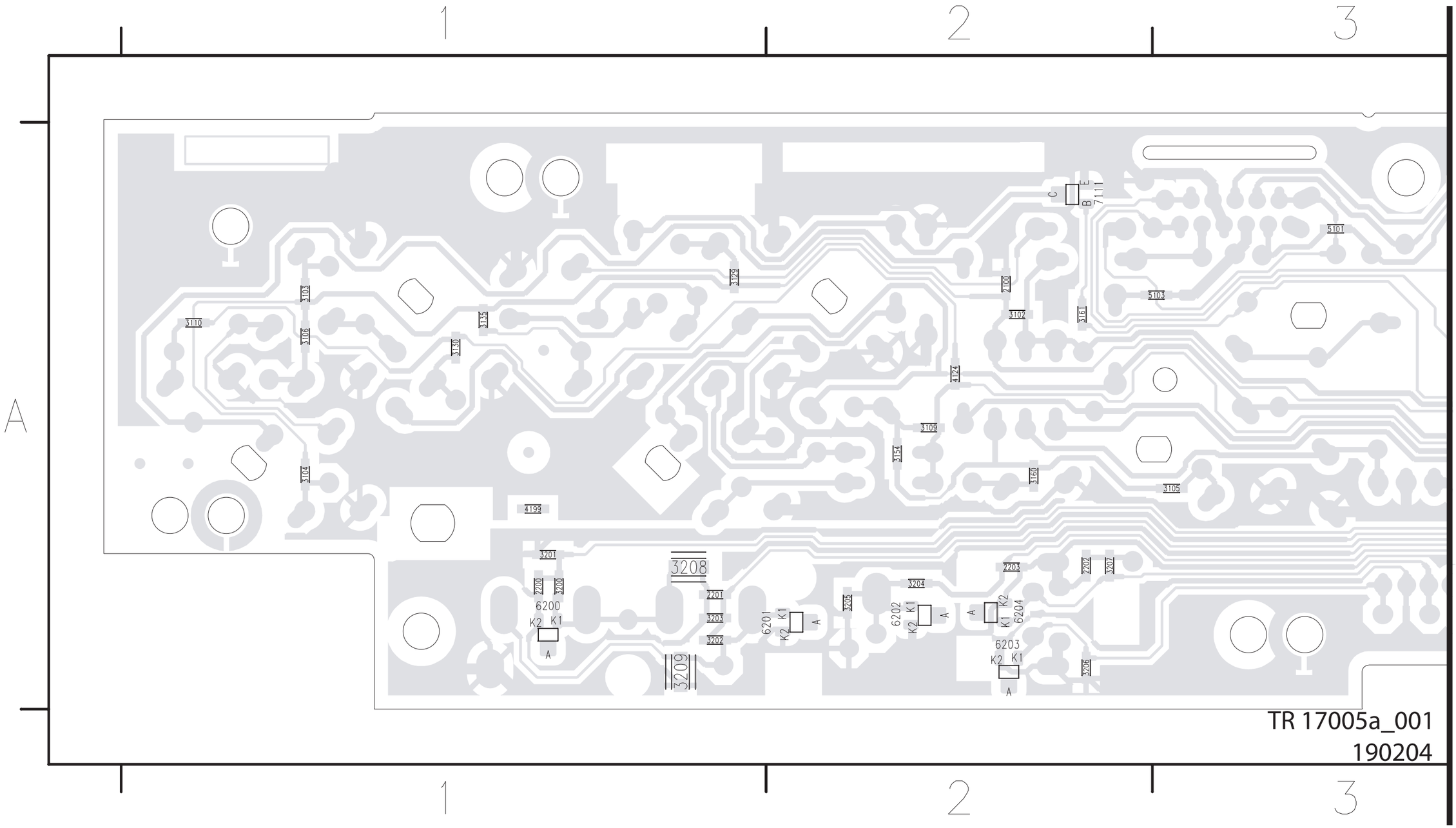


2100 A2	3117 A4	3208 A1
2101 A5	3118 A6	3209 A1
2103 A6	3119 A6	4100 A6
2104 A4	3120 A6	4101 A6
2105 A4	3122 A6	4102 A4
2111 A6	3123 A6	4111 A6
2112 A4	3124 A6	4121 A4
2114 A6	3125 A6	4122 AS
2115 A6	3126 A4	4123 AS
2118 A6	3127 A6	4124 A2
2119 A6	3128 A6	4199 A1
2120 A6	3129 A1	5101 A3
2121 A5	3130 A1	5103 A3
2122 A5	3132 A5	6100 A6
2123 A6	3133 A5	6105 AS
2124 A6	3135 A1	6106 AS
2125 A5	3140 A4	6109 A4
2126 A5	3141 A4	6110 A4
2200 A1	3142 A4	6111 A4
2201 A1	3143 A6	6112 A4
2202 A2	3144 A4	6200 A1
2203 A2	3145 A4	6201 A1
3100 A6	3146 A4	6202 A2
3101 A6	3150 A5	6203 A2
3102 A2	3151 A6	6204 A2
3103 A1	3152 A5	7101 AS
3104 A1	3153 A5	7102 AS
3105 A3	3154 A2	7103 AS
3106 A1	3160 A2	7104 A4
3107 A3	3161 A2	7105 A4
3108 A6	3200 A1	7109 A6
3109 A2	3201 A1	7110 A4
3110 A1	3202 A1	7111 A2
3111 A4	3203 A1	7112 A4
3113 A4	3204 A2	
3114 A4	3205 A2	
3115 A4	3206 A2	
3116 A6	3207 A2	

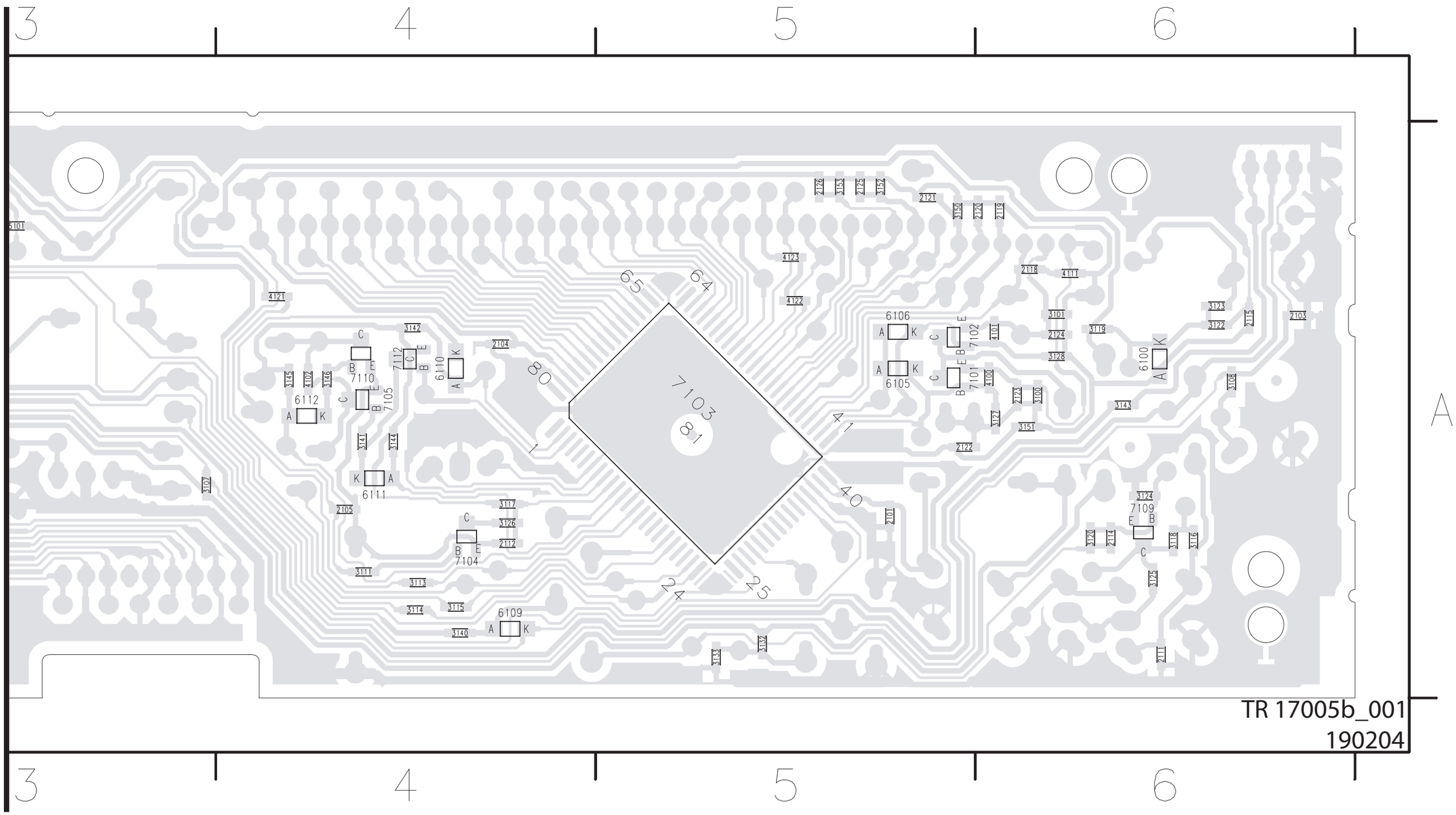
0005 A2	3148 A2
0206 A2	3149 A2
0210 A6	3155 A5
0211 A4	3156 A6
0212 A5	3157 A6
1110 A3	3159 A5
1160 A4	5100 A1
1161 A6	5104 A1
1162 A6	6101 A6
1163 A6	6102 A6
1164 A5	6103 A6
1165 A6	6107 A4
1166 A6	6120 A5
1167 A6	6121 A6
1168 A6	6122 A6
1169 A6	7100 A2
1170 A 1	7106 A1
1171 A5	7107 A4
1172 A6	7108 A1
1910 A4	9101 A4
1911 A1	9121 A1
1920 A6	9122 A1
1921 A5	9123 A3
1922 A4	9124 A2
2102 A2	9125 A2
2110 A1	9126 A2
2113 A1	9128 A5
2116 A4	9129 A5
2117 A1	9130 A3
3112 A3	9131 A5
3121 A5	9132 A3
3131 A5	9134 A5
3134 A6	9135 A5
3136 A4	9137 A6
3137 A5	9138 A3
3138 A3	9139 A3
3139 A3	9140 A2
3147 A1	9141 A5

TR 17005_001
190204

Layout Display Panel (Part 1 Bottom View)

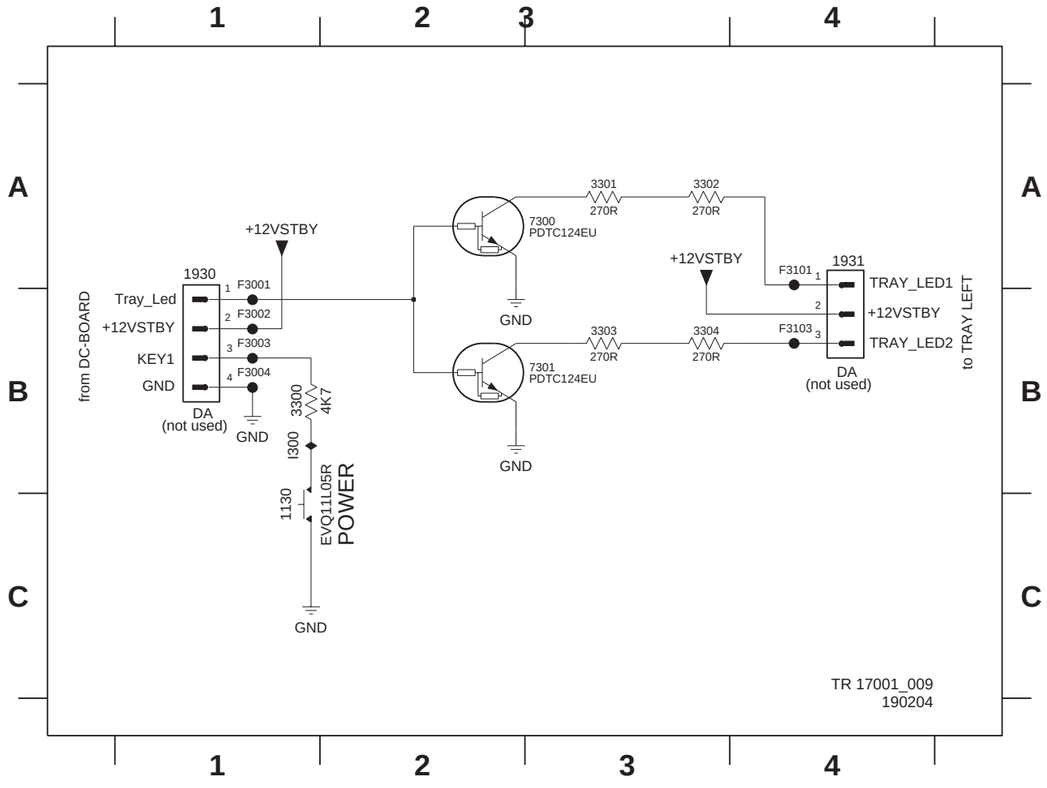


Layout Display Panel (Part 2 Bottom View)

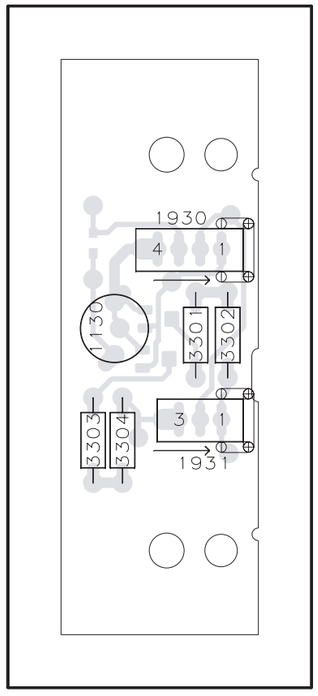


Standby Panel (STBY)

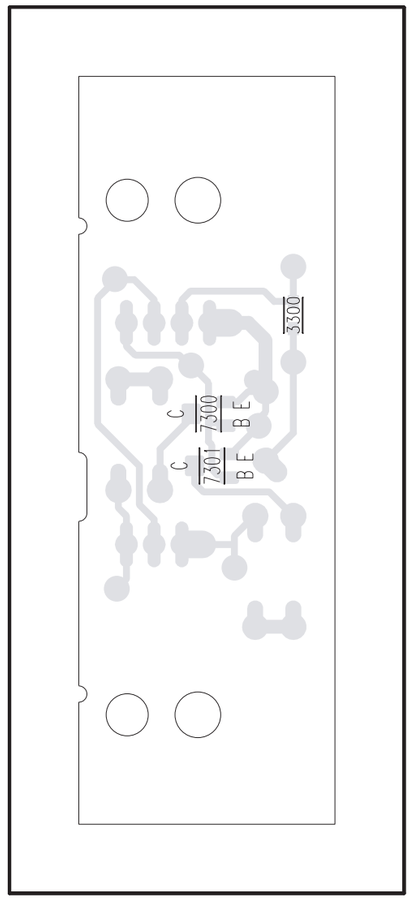
1130 C1 **1931 A4** **3301 A3** **3303 B3** **7300 A3** **F3001 A1** **F3003 B1** **F3101 A4** **I300 B1**
1930 A1 **3300 B1** **3302 A3** **3304 B3** **7301 B3** **F3002 B1** **F3004 B1** **F3103 B4**



Layout Standby Panel



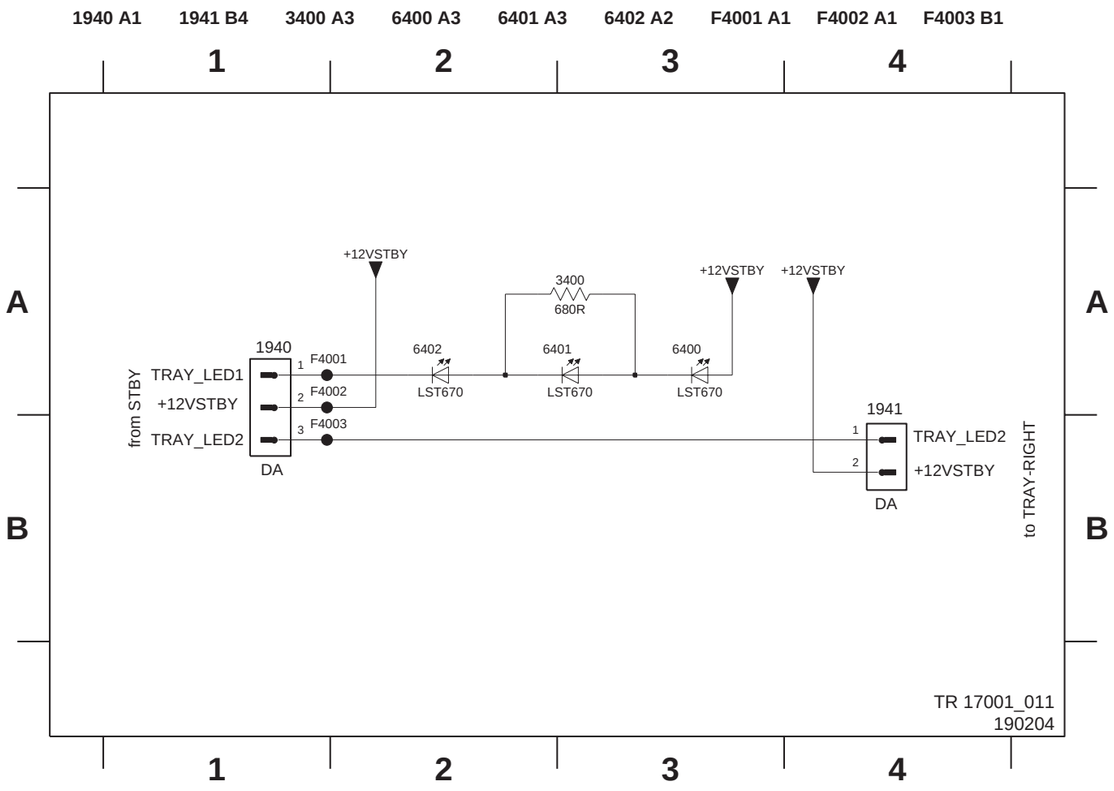
1130 A1
1930 A1
1931 A1
3301 A1
3302 A1
3303 A1
3304 A1



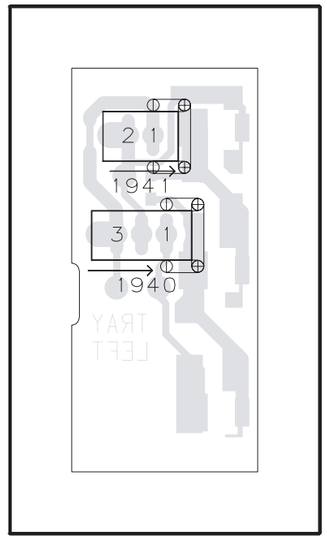
3300 A1
7300 A1
7301 A1

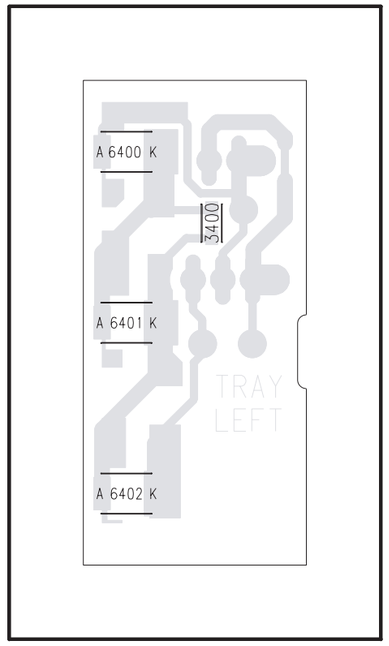
TR 17010_001
190204

Tray Left Panel (TRL)



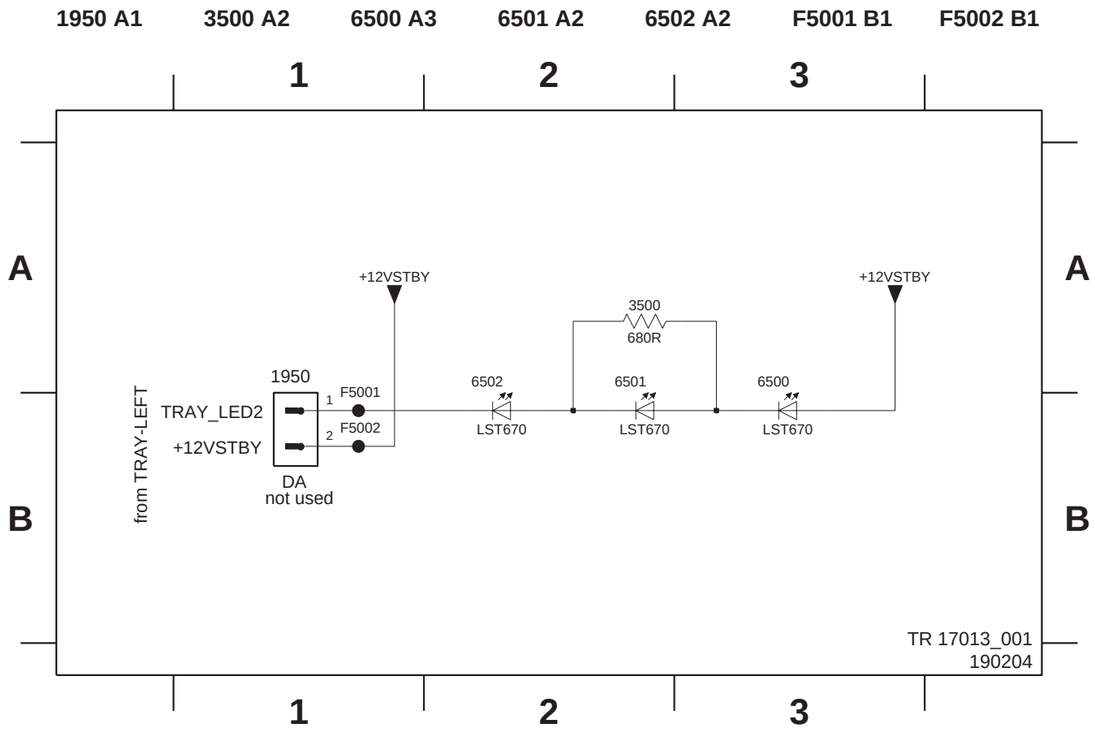
Layout Tray Left Panel



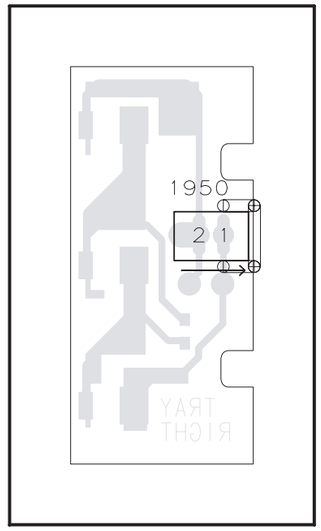


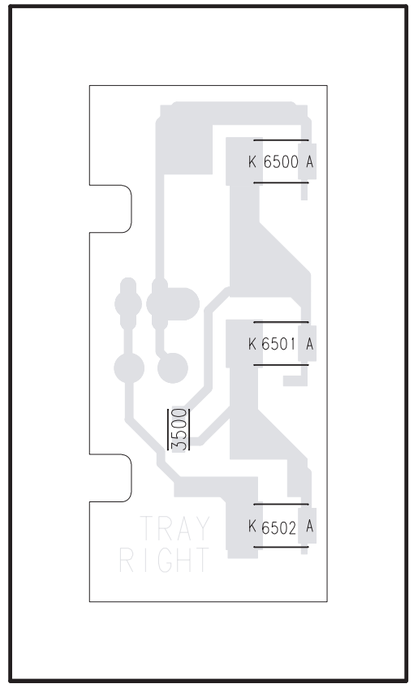
TR 17012_001
190204

Tray Right Panel (TRR)



Layout Tray Right Panel

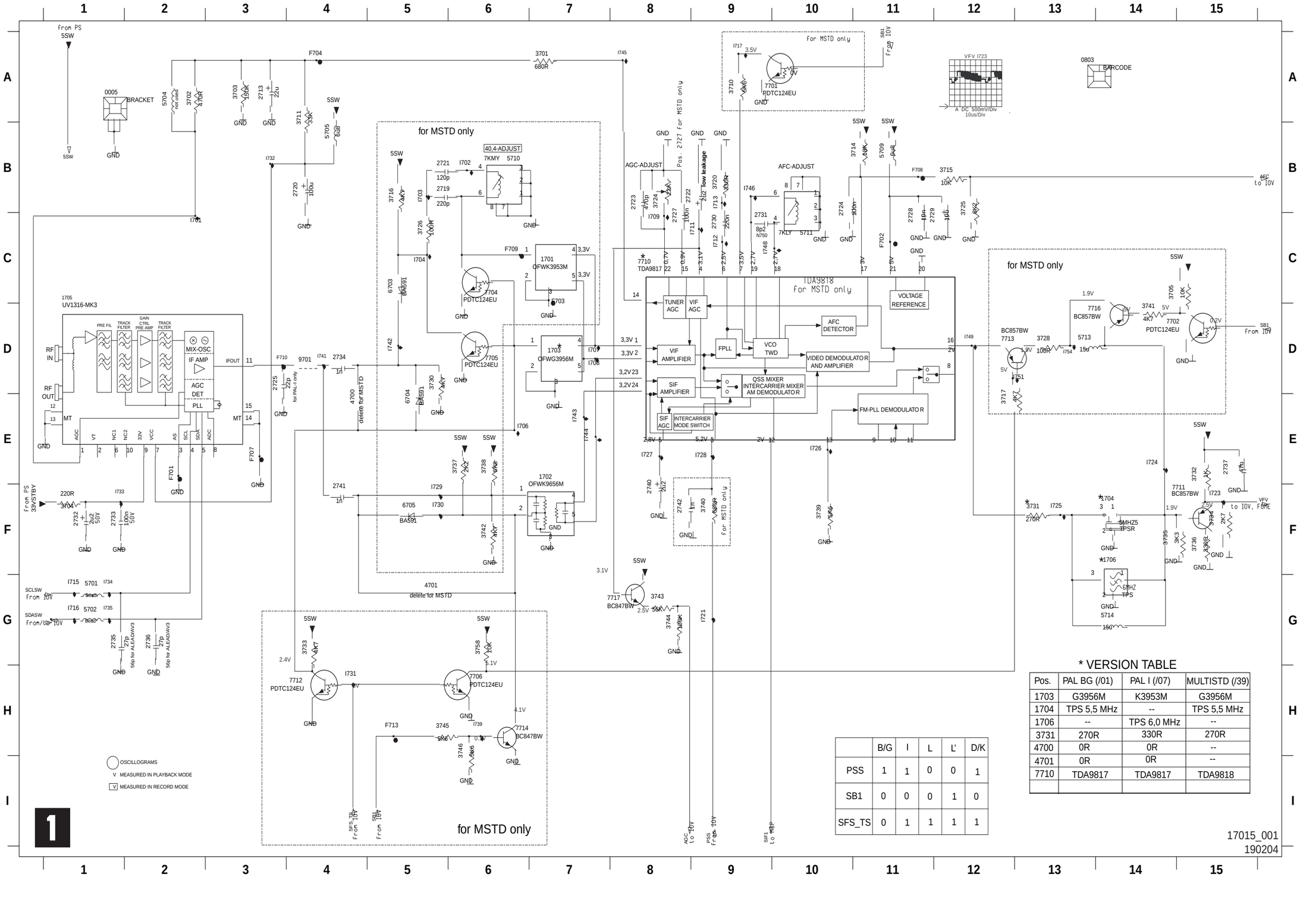




TR 17014_001
190204

Analog Board: Frontend Video (FV)

0005 A1 1703 D7 2713 A3 2722 B8 2727 C8 2731 C9 2735 G1 2741 F4 3703 A3 3711 A4 3717 E12 3726 C5 3732 E15 3736 F15 3740 F9 3744 G8 4700 E4 5704 A2 5711 C10 6704 E5 7704 C6 7711 F14 7716 D14 F702 C11 F708 B11 I701 C2 I706 E6 I711 C9 I716 G1 I724 E14 I728 E9 I732 B3 I739 H6 I744 E7 I749 D12
0803 A13 1704 F14 2719 B5 2723 B8 2728 C11 2732 F1 2736 G2 2742 F8 3704 F1 3714 B11 3720 B9 3728 D13 3733 G4 3737 E6 3741 D14 3745 H5 4701 G5 5705 B4 5713 D13 6705 F5 7705 D6 7712 H4 7717 G7 F703 D7 F709 C6 I702 B6 I707 D7 I712 C9 I717 A9 I725 F13 I729 F5 I733 F1 I741 D4 I745 A8 I751 D13
1701 C7 1705 C1 2720 B4 2724 B10 2729 C12 2733 F1 2737 E15 3701 A7 3705 C14 3715 B12 3724 B8 3730 D5 3734 F15 3738 E6 3742 F6 3746 H6 4701 G1 5709 B11 5714 G14 7701 A10 7706 H6 7713 D12 9701 D4 F704 A4 F710 D3 I703 B5 I708 D7 I713 B9 I721 G9 I726 E10 I730 F5 I734 G1 I742 D5 I746 B9 I754 D13
1702 E7 1706 F14 2721 B5 2725 D3 2730 C9 2734 D4 2740 F8 3702 A2 3710 A9 3716 B5 3725 B12 3731 F13 3735 F14 3739 F10 3743 G8 3758 G6 5702 G1 5710 B6 6703 C5 7702 D15 7710 C8 7714 H6 F701 E2 F707 E3 F713 H5 I704 C5 I709 C8 I715 G1 I723 F15 I727 E8 I731 H4 I735 G1 I743 E7 I748 C9



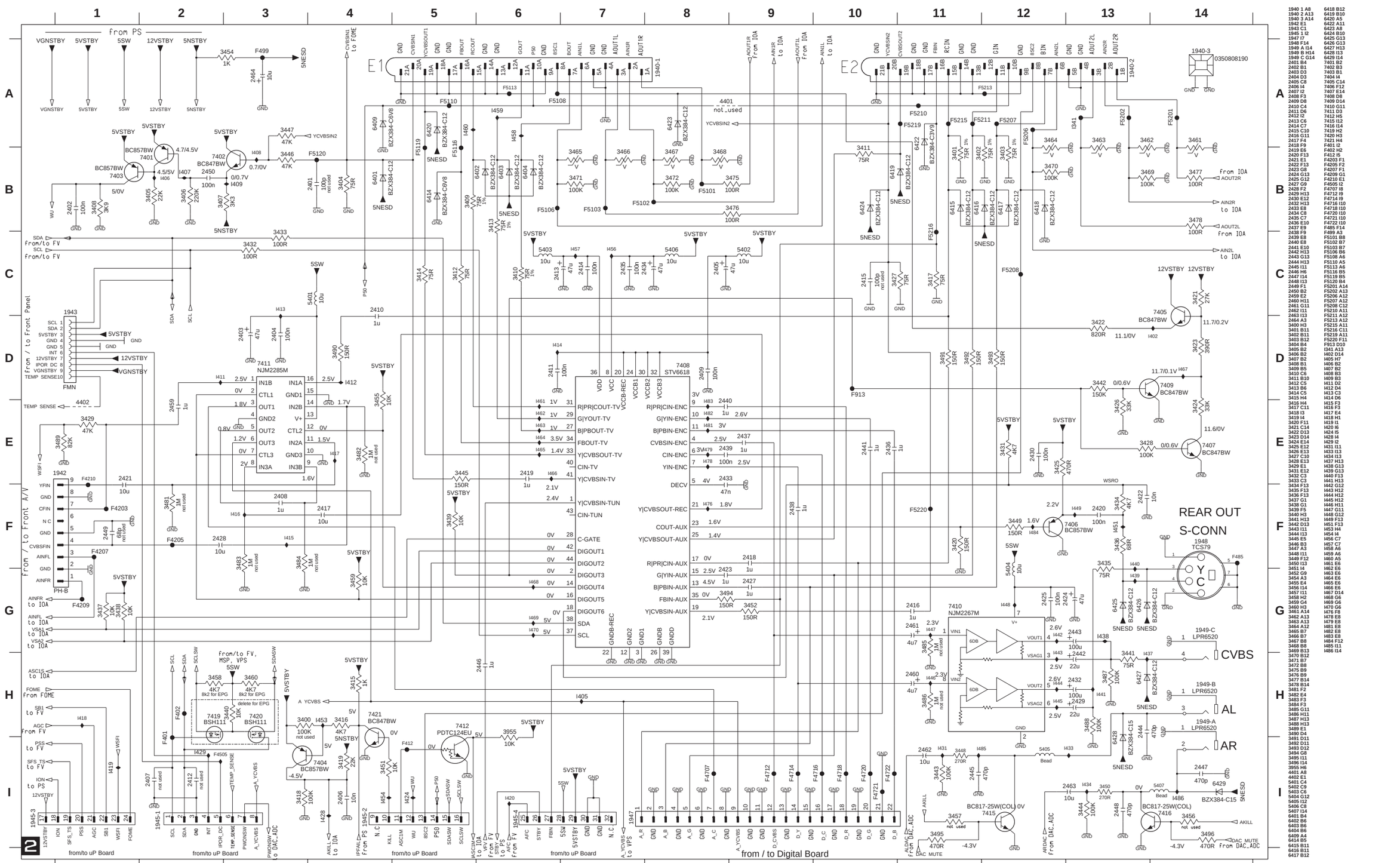
* VERSION TABLE

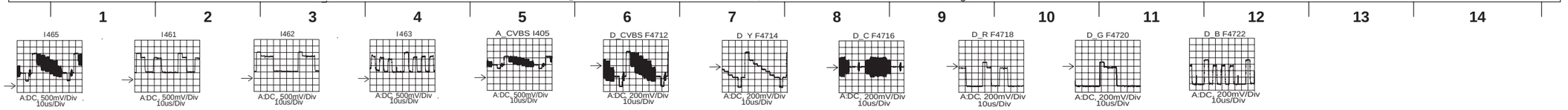
Pos.	PAL BG (/01)	PAL I (/07)	MULTISTD (/39)
1703	G3956M	K3953M	G3956M
1704	TPS 5,5 MHz	--	TPS 5,5 MHz
1706	--	TPS 6,0 MHz	--
3731	270R	330R	270R
4700	0R	0R	--
4701	0R	0R	--
7710	TDA9817	TDA9817	TDA9818

	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

17015_001
190204

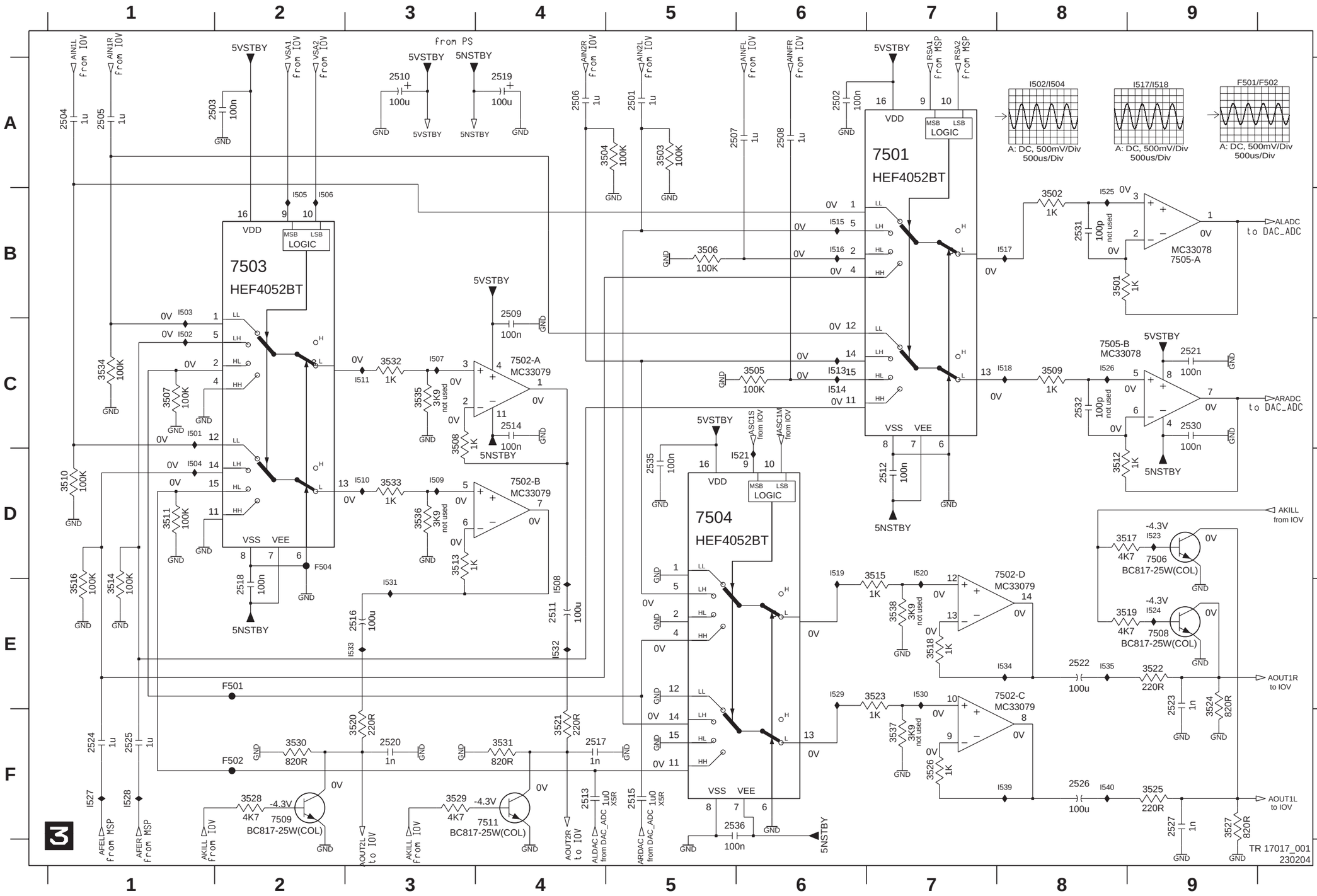
Analog Board: In/Out Video (IOV)





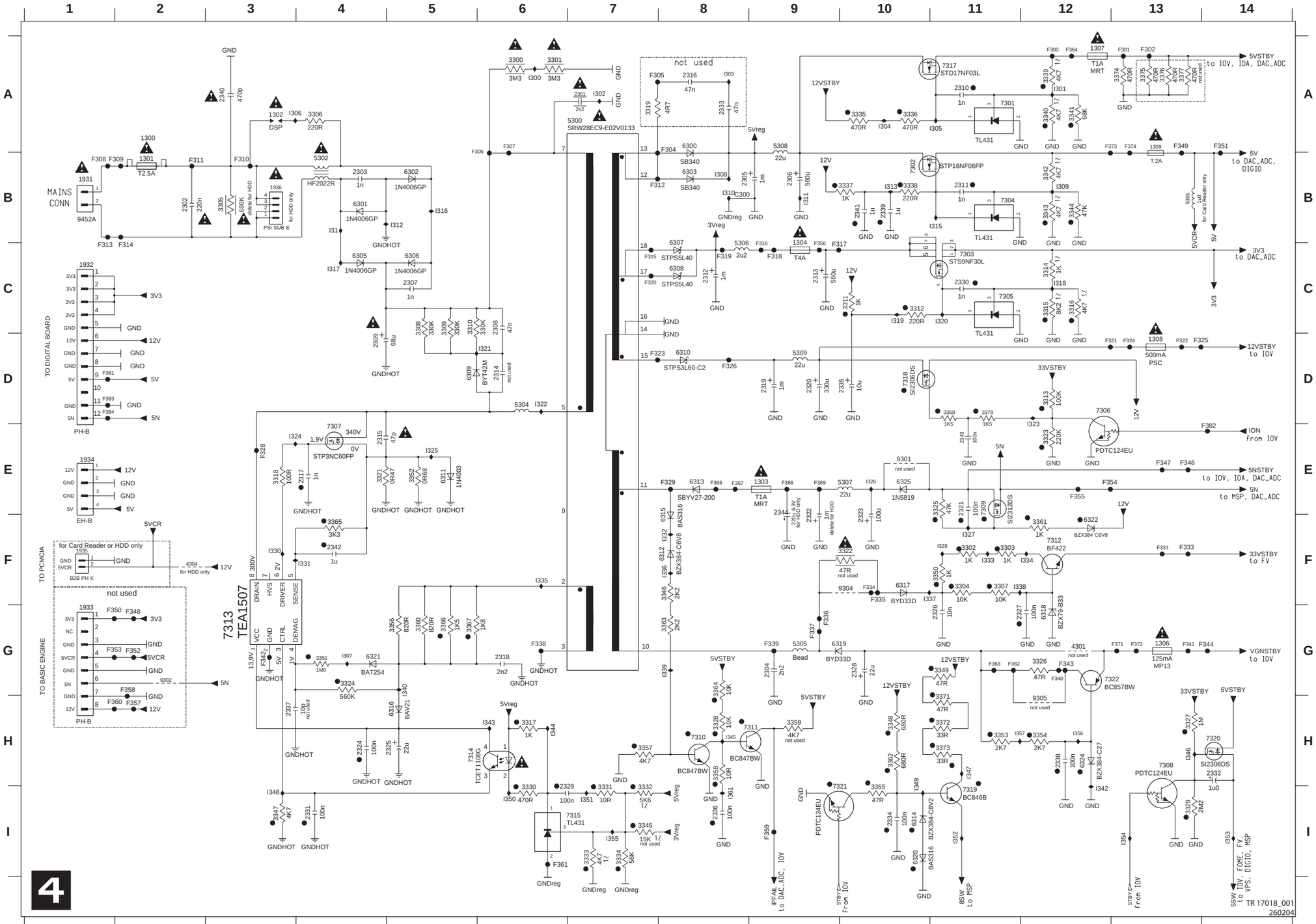
17016_001
190204

Analog Board: IN/Out Audio (IOA)

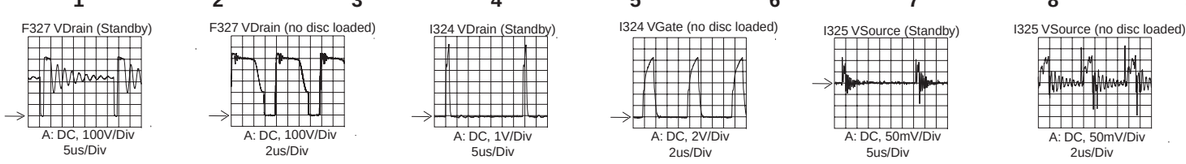


2501 A5 I503 B1
2502 A6 I504 D1
2503 A2 I505 B2
2504 A1 I506 B2
2505 A1 I507 C3
2506 A4 I508 E4
2507 A6 I509 D3
2508 A6 I510 D3
2509 B4 I511 C3
2510 A3 I513 C6
2511 E4 I514 C6
2512 D7 I515 B6
2513 F4 I516 B6
2514 C4 I517 B8
2515 F5 I518 C8
2516 E3 I519 D6
2517 F4 I520 D7
2518 E2 I521 D6
2519 A4
2520 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

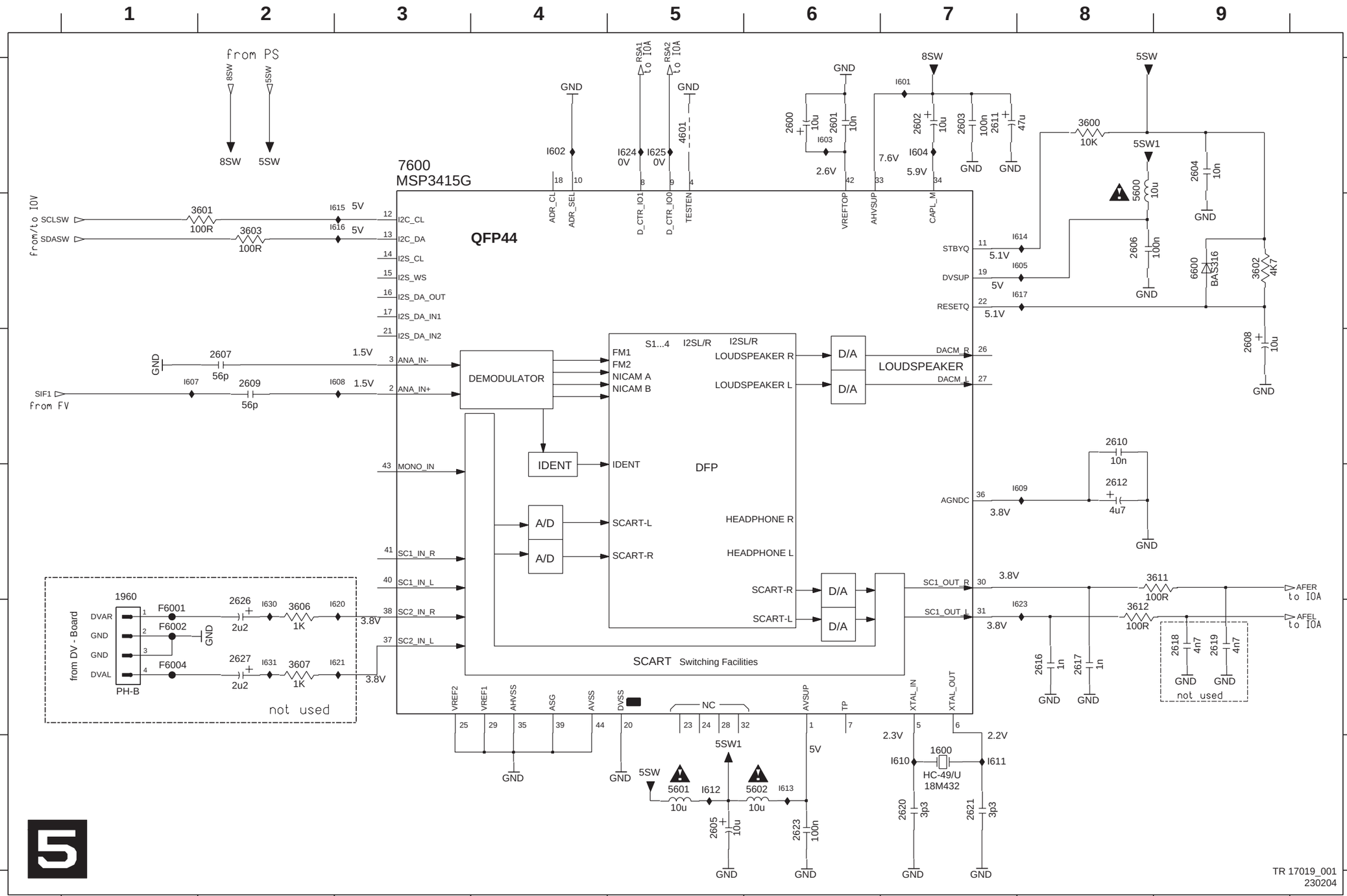
Analog Board: Power Supply (PS)



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	9305 H12	I345 H8
3317 H6	C300 B8	I346 H13
3318 E3	F300 A12	I347 H11
3319 A7	F301 A13	I348 I3
3321 E4	F302 A13	I349 H10
3322 F10	F304 A8	I350 I6
3323 E12	F305 A7	I351 I7
3324 G4	F306 B6	I352 I11
3325 E11	F307 A6	I353 I14
3326 G12	F308 B1	I354 I13
3327 H13	F309 B2	I355 I7
3328 H8	F310 B3	I356 H12
3329 I13	F311 B2	I357 H11
3330 I6	F312 B7	I361 I8
3331 I7	F313 C1	
3332 I7	F314 C2	
3333 I7	F315 C7	
3334 I7	F316 C9	
3335 A10	F317 C9	
3336 A10	F318 C9	
3337 B10	F319 C8	
3338 B10	F320 C7	
3339 A12	F321 D12	
3340 A12	F322 D13	
3341 A12	F323 D7	
3342 B12	F324 D13	
3343 B12	F325 D13	
3344 B12	F326 D8	
3345 I7	F328 E3	
3346 F8	F329 E8	
3347 I3	F331 F13	
3348 H10	F333 F13	
3349 G11	F334 F10	
3350 F11	F335 F10	
3351 G4	F336 G9	
3352 E5	F337 G9	
3353 H11	F338 G6	
3354 H12	F339 G9	
3355 I10	F340 G12	
3356 G5	F341 G13	
3357 H7	F342 G3	
3358 H8	F343 G12	
3359 H9		



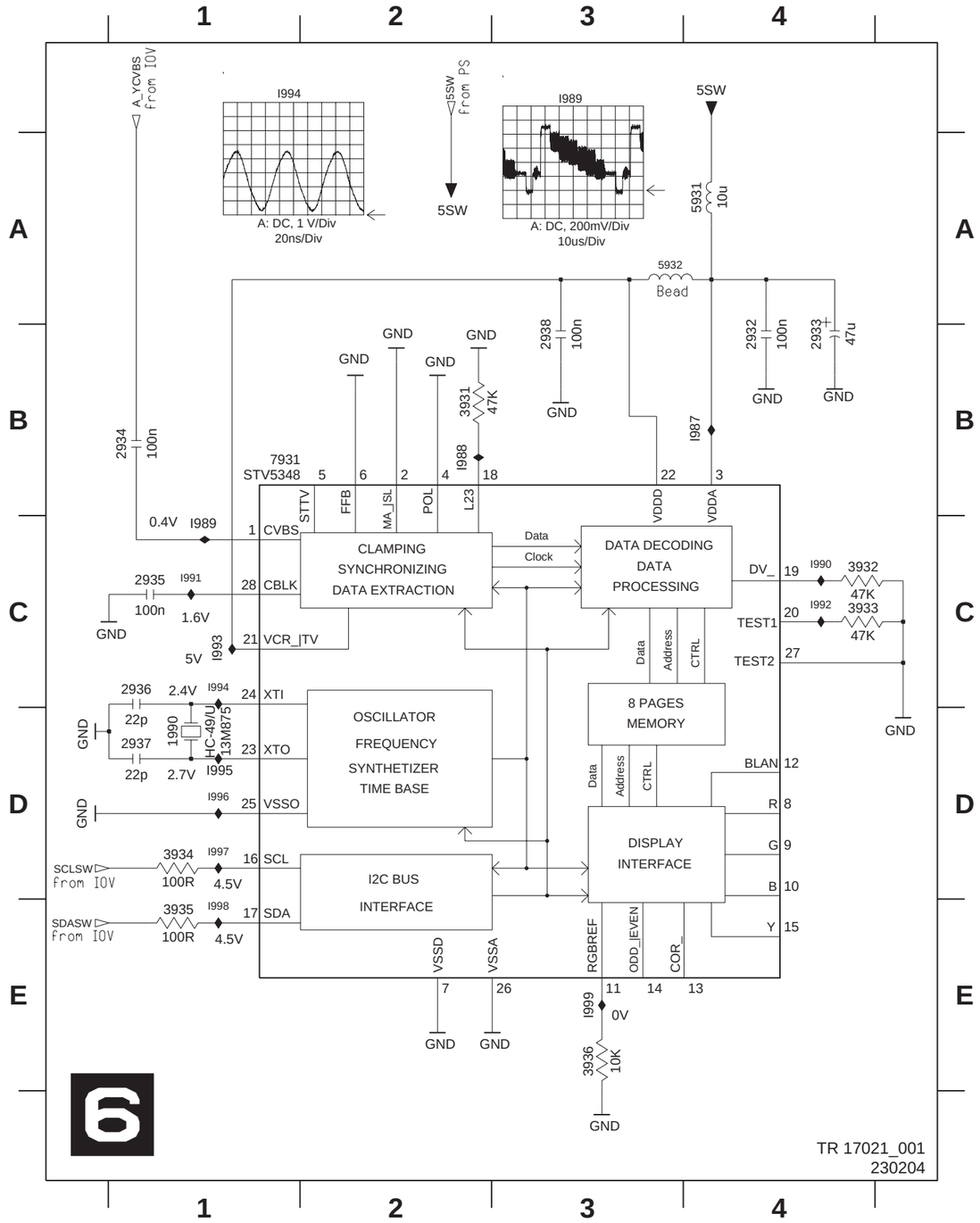
Analog Board: Multi Sound Processing (MSP)



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

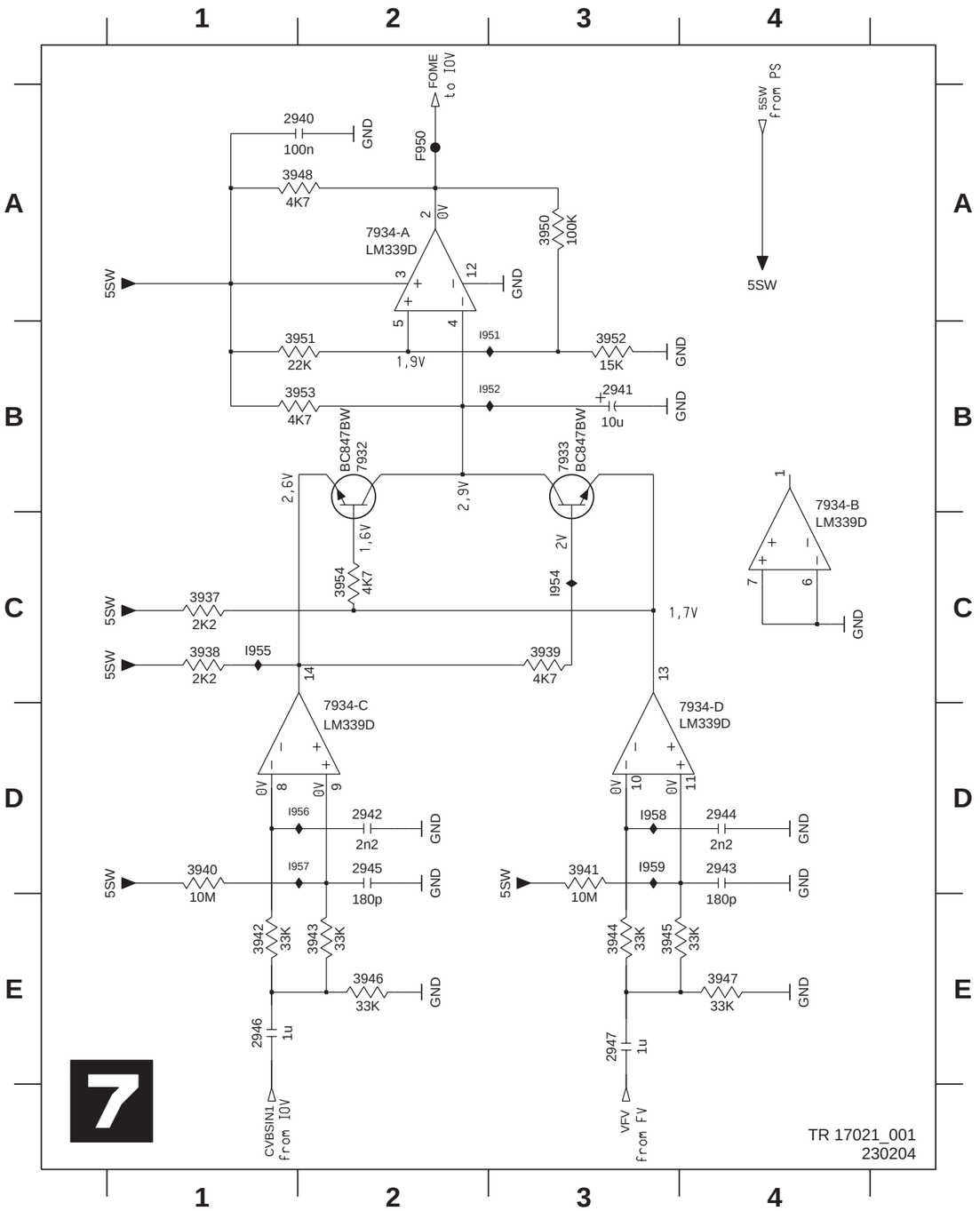
Analog Board: VPS

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



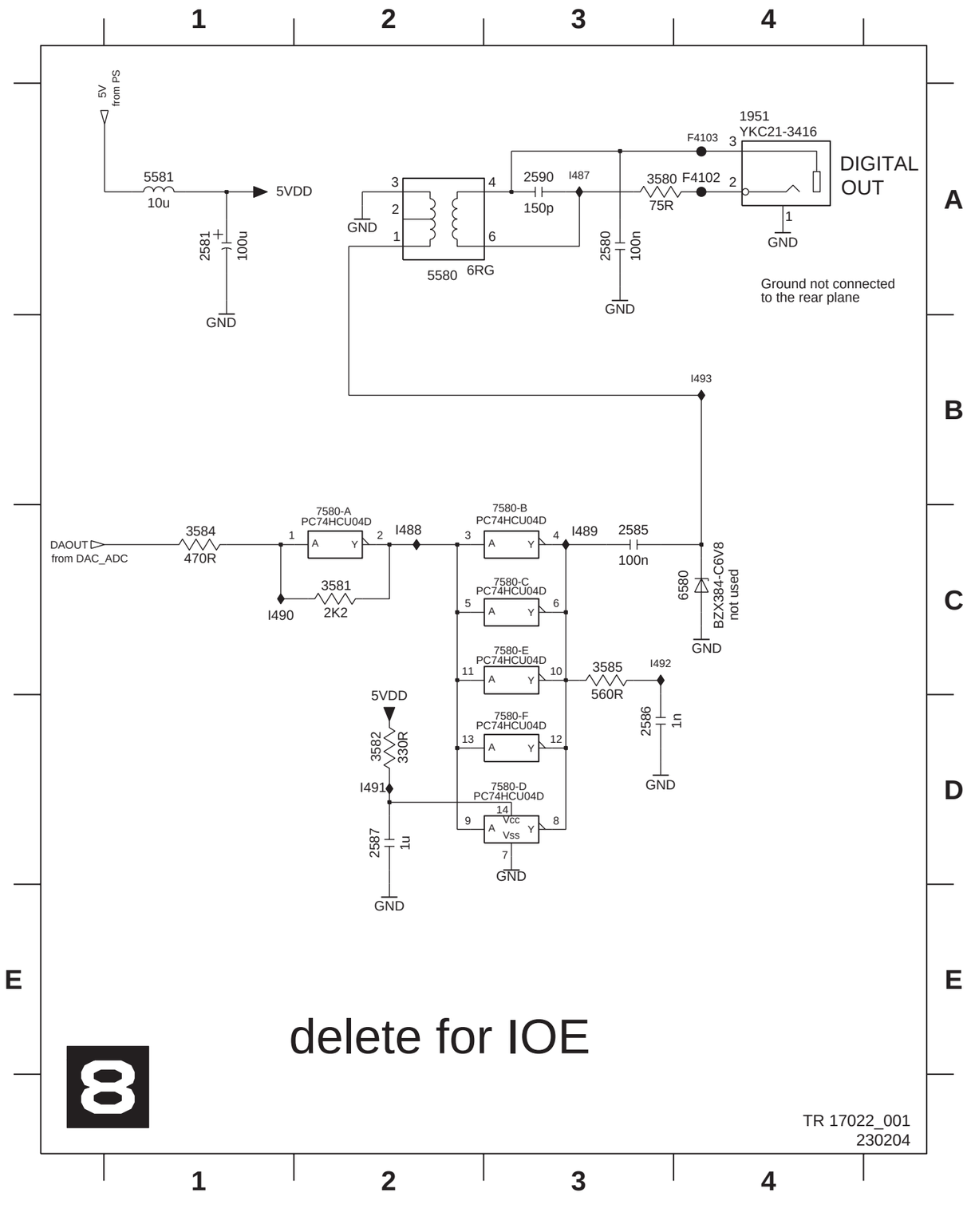
Analog Board: Follow Me (FOME)

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

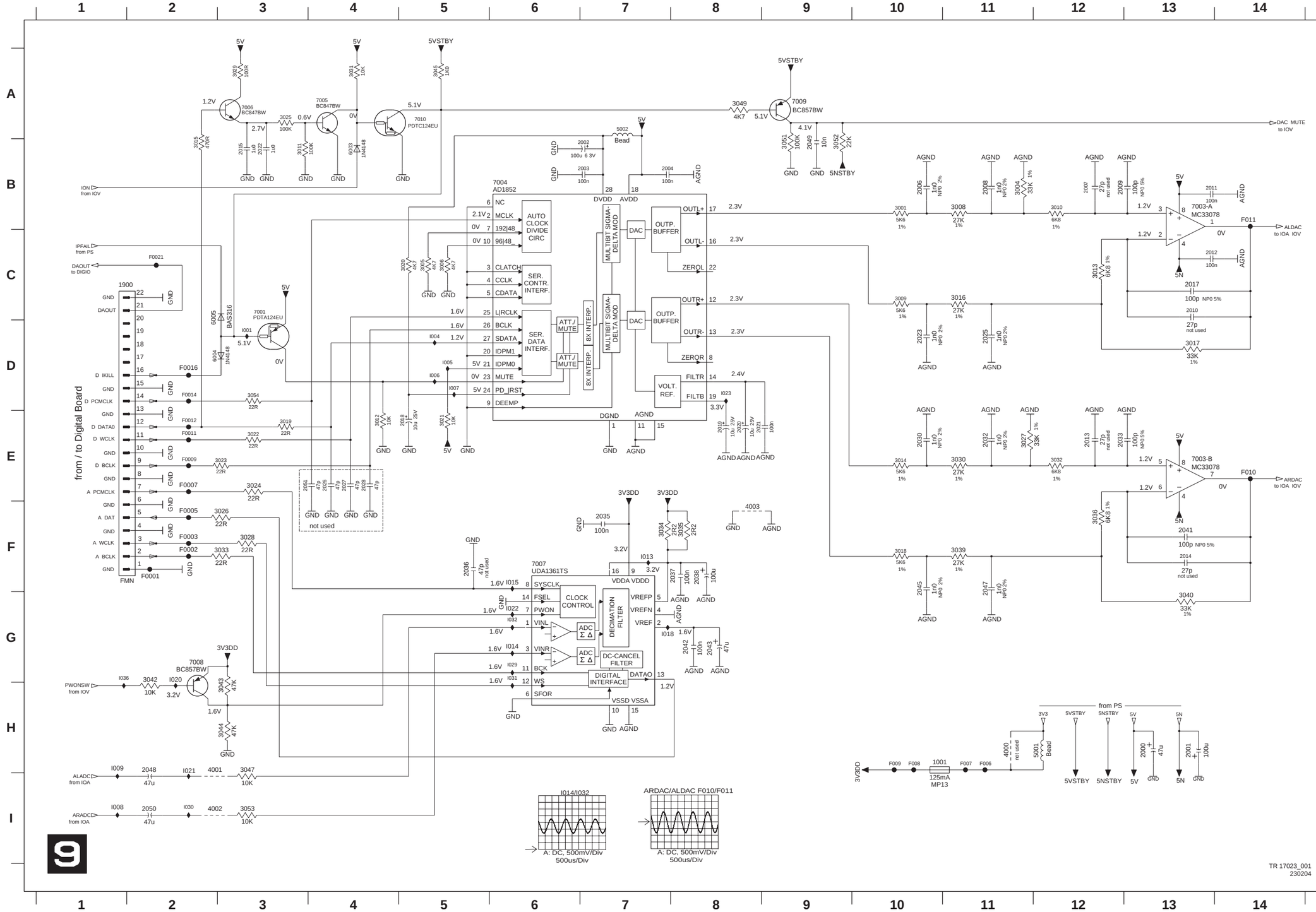


Analog Board: Digital In / Out (DIGIO)

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



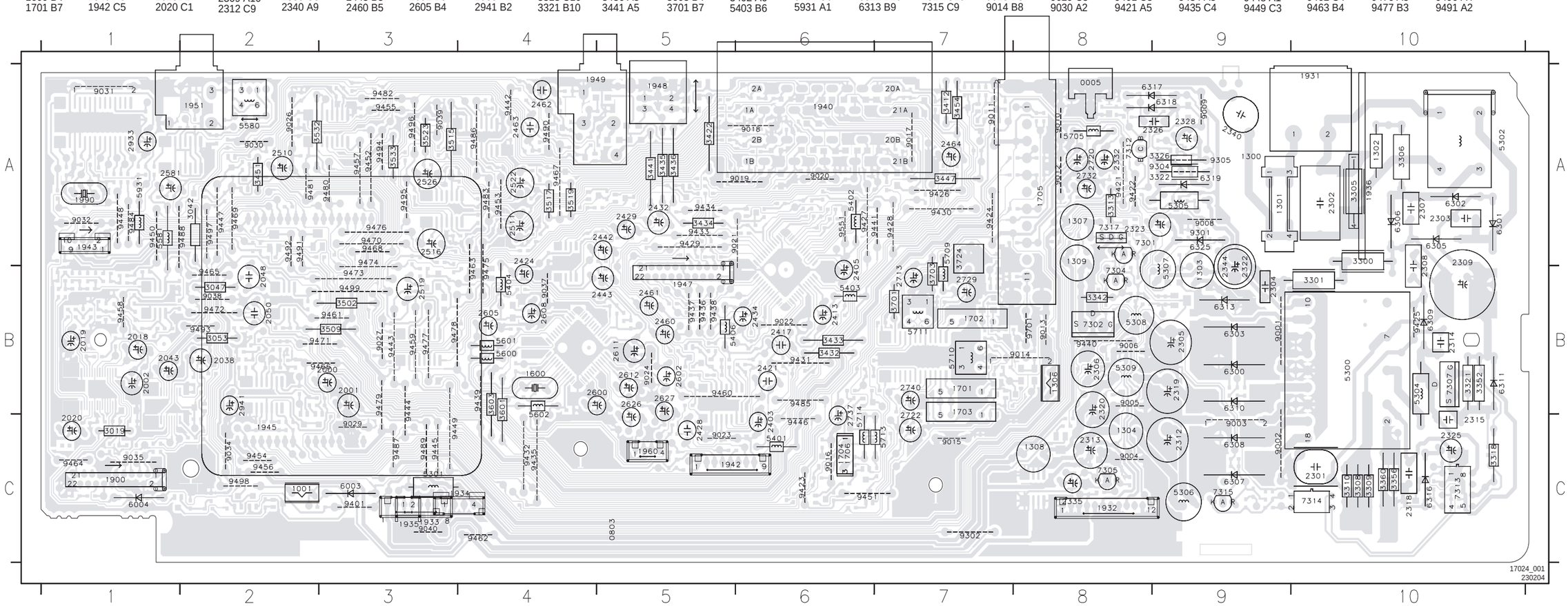
Analog Board: Audio Converter (DAC_ADC)



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 D8
I023 G6
I029 G6
I030 I2
I031 G6
I032 G6
I036 G1

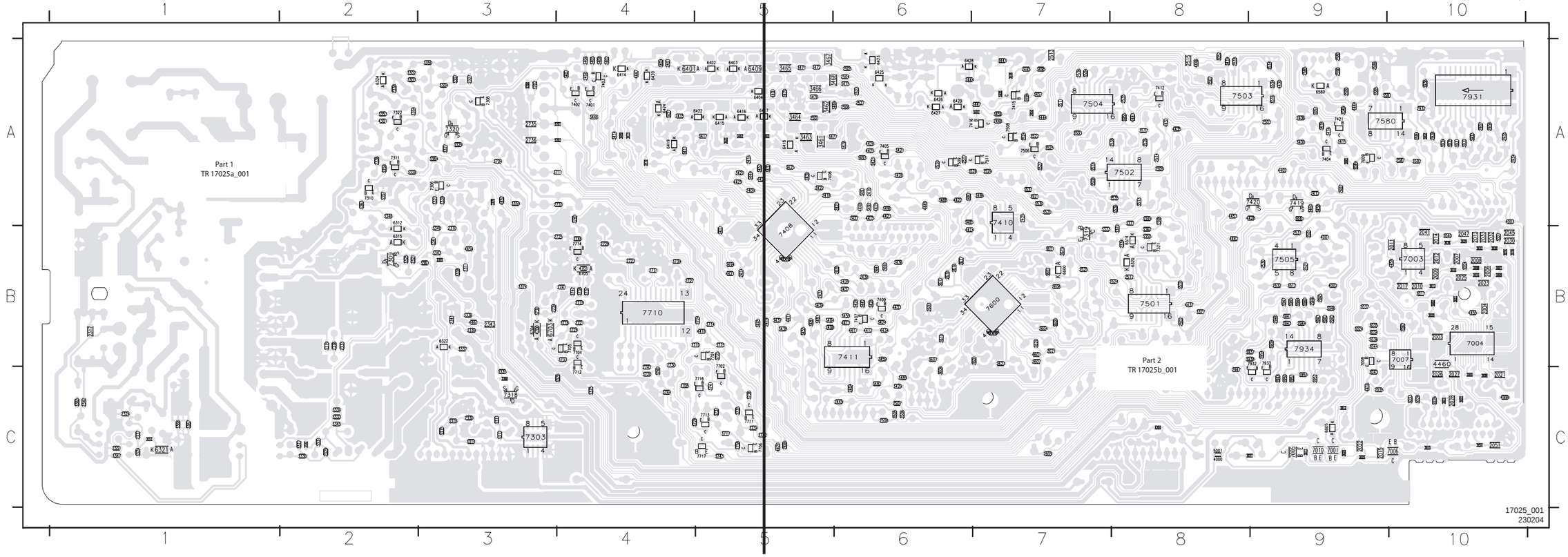
Layout Analog Board (Top View)

0005 A8	1702 B7	1943 A1	2038 B2	2313 C8	2344 B9	2461 B5	2608 B4	3019 C1	3322 A9	3447 A7	3703 B7	5404 B4	6003 C3	6316 C10	7317 A8	9015 C7	9031 A1	9422 A8	9436 B5	9450 A1	9464 C1	9478 B3	9492 A2
0803 C5	1703 B7	1945 C2	2043 B1	2314 B10	2403 C6	2462 A4	2611 B5	3042 A2	3326 A9	3451 A2	3724 A7	5406 B5	6004 C1	6317 A8	9001 B9	9016 C6	9032 A1	9423 C6	9437 B5	9451 C6	9465 B2	9479 B3	9493 B2
1001 C2	1704 C6	1947 B5	2048 B2	2315 C10	2405 B6	2463 A4	2612 B5	3047 B2	3342 B8	3454 A7	5300 B10	5580 A2	6300 B9	6318 A9	9002 C9	9017 A7	9034 C2	9424 A7	9438 B5	9452 A3	9466 B3	9480 A3	9494 A3
1300 A9	1705 A8	1948 A5	2050 B2	2318 C10	2413 B6	2464 A7	2626 B5	3053 B2	3352 B10	3502 B3	5301 C3	5581 A1	6301 A10	6319 A9	9003 C9	9018 A6	9035 C1	9425 B10	9439 B4	9453 A4	9467 A4	9481 A2	9495 A3
1301 A9	1706 C6	1949 A4	2301 C10	2319 B9	2417 B6	2510 A2	2627 B5	3300 A10	3356 C10	3509 B3	5302 A10	5600 B4	6302 A10	6325 A9	9004 C8	9019 A6	9037 B4	9426 A7	9440 B8	9454 C2	9468 A3	9482 A3	9496 A3
1302 A10	1900 C1	1951 A2	2302 A10	2320 B8	2421 B6	2511 A4	2713 B7	3301 B10	3360 C10	3515 A3	5304 B10	5601 B4	6303 B9	7301 A8	9005 B8	9020 A6	9038 B2	9427 A6	9441 A6	9455 A3	9469 A2	9483 A4	9497 A2
1303 B9	1931 A10	1960 C5	2303 A10	2322 B9	2424 A4	2516 A3	2720 A8	3305 A10	3412 A7	3517 A4	5305 A9	5602 C4	6305 A10	7302 B8	9006 B8	9021 A5	9039 A3	9428 A7	9442 A4	9456 C2	9470 A3	9484 A1	9498 C2
1304 C8	1932 C8	1990 A1	2304 B9	2323 A8	2428 C5	2519 B3	2722 C7	3306 A10	3422 A5	3519 A4	5306 C9	5705 A8	6306 A10	7304 B8	9008 A9	9022 B6	9040 C3	9429 A5	9443 B3	9457 A3	9471 B3	9485 B6	9499 B3
1306B8	1933 C3	2000 B3	2305 B9	2325 C10	2429 A5	2522 A4	2729 B7	3308 C10	3432 B6	3523 A3	5307 B9	5709 A7	6307 C9	7305 C8	9009 A9	9023 C5	9301 A9	9430 A7	9444 B3	9458 B1	9472 B2	9486 A4	9551 A6
1307 A8	1934 C4	2001 B3	2306 B8	2326 A9	2432 A5	2526 A3	2732 A8	3309 C10	3433 B6	3532 A2	5308 B8	5710 B7	6308 C9	7307 B10	9010 A8	9024 B5	9302 C7	9431 B6	9445 C3	9459 B3	9473 B3	9487 C3	9701 B8
1308 C8	1935 C3	2002 B1	2307 A10	2328 A9	2434 B6	2581 A1	2737 C6	3310 C10	3434 A5	3533 A3	5309 B8	5711 B7	6309 B10	7312 A8	9011 A7	9026 A2	9304 A9	9432 C4	9446 C6	9460 B5	9474 A3	9488 A2	
1309 A8	1936 A10	2018 B1	2308 B10	2332 A8	2442 A5	2600 B5	2740 B7	3313 A8	3435 A5	3601 B4	5401 C6	5713 C7	6310 B9	7313 C10	9012 A8	9027 B3	9305 A9	9433 A5	9447 A2	9461 B3	9475 B4	9489 C3	
1600 B4	1940 A6	2019B1	2309 A10	2335 C8	2443 B5	2602 B5	2933 A1	3318 C10	3436 A5	3603 B4	5402 A6	5714 C6	6311 B10	7314 C10	9013 B8	9029 C3	9401 C3	9434 A5	9448 A1	9462 C4	9476 A3	9490 A4	
1701 B7	1942 C5	2020 C1	2312 C9	2340 A9	2460 B5	2605 B4	2941 B2	3321 B10	3441 A5	3701 B7	5403 B6	5931 A1	6313 B9	7315 C9	9014 B8	9030 A2	9421 A5	9435 C4	9449 C3	9463 B4	9477 B3	9491 A2	

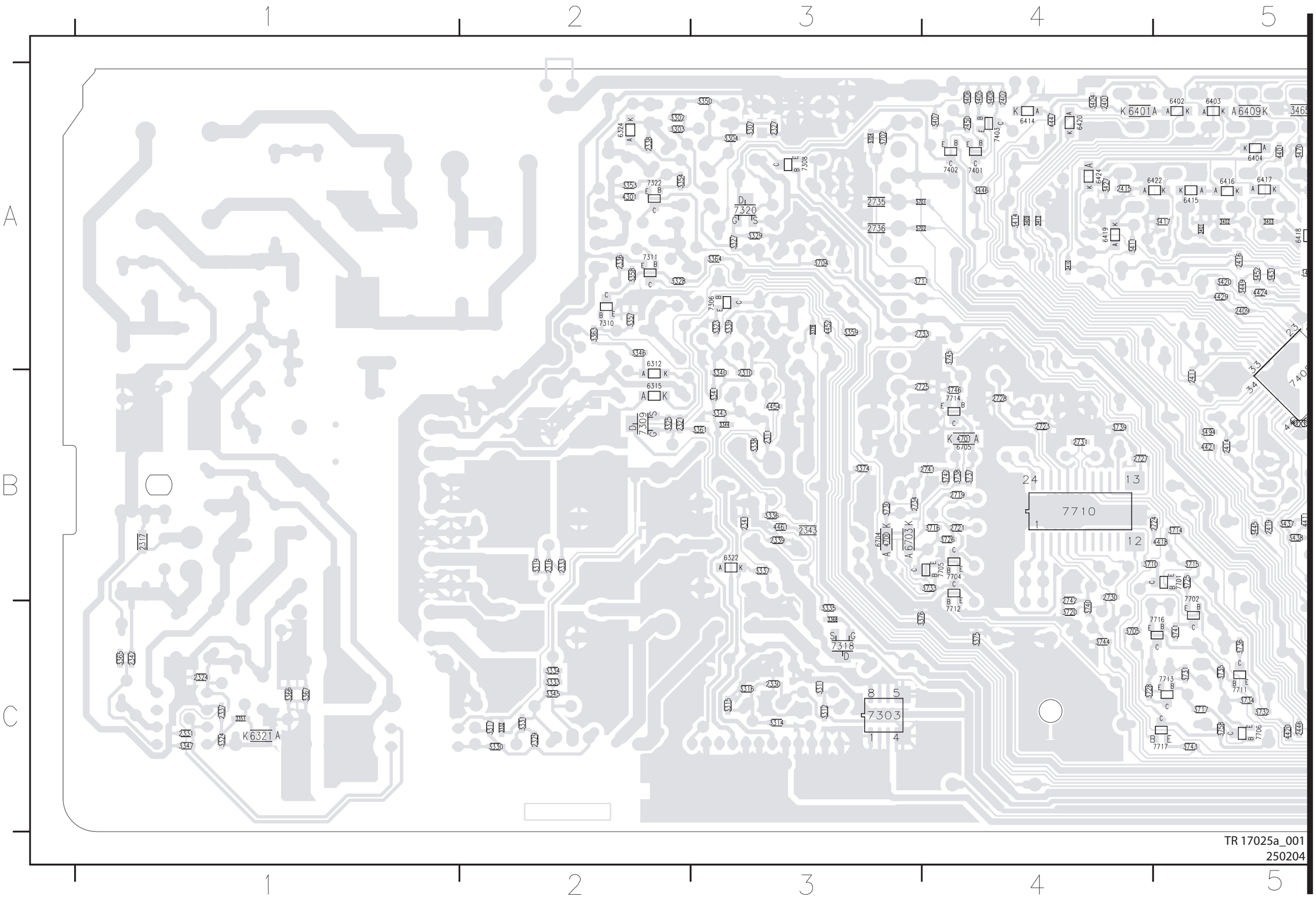


Layout Analog Board (Overview Bottom View)

2003 B10 2023 B10 2049 A9 2337 C1 2412 A9 2437 B6 2503 A9 2523 A6 2603 B6 2723 B4 2935 A10 3008 B10 3024 B9 3043 C9 3316 C3 3336 B3 3353 A2 3372 B8 3408 A4 3425 A5 3448 A7 3466 A5 3485 A6 3505 C6 3525 A7 3584 A1 3716 B4 3739 B4 3937 B8 3953 C9 4415 A6 4431 A8 4455 B10 5932 A1 6415 A5 6600 B7 7308 A3 7407 B6 7505 B9 7713 C5
2004 B10 2025 B10 2051 C10 2338 A2 2414 B5 2438 B6 2504 A6 2524 B8 2604 B7 2724 B5 2936 A10 3009 B10 3025 C9 3044 B9 3317 C2 3337 B3 3354 A2 3373 B7 3409 A4 3426 B6 3449 A5 3467 A5 3486 A7 3506 C6 3526 A8 3585 A9 3717 C5 3740 C4 3938 B8 3954 B9 4416 C9 4433 B6 4459 B10 6005 C9 6416 A5 6703 B3 7309 B2 7408 B5 7506 A7 7714 B4
2006 B10 2026 C10 2310 B3 2339 B3 2415 A4 2439 B6 2505 A6 2525 B7 2606 B7 2725 B3 2937 A10 3010 B10 3026 C10 3045 A9 3319 B2 3338 B3 3355 B8 3374 B3 3410 A4 3427 A4 3450 A7 3468 A5 3487 A6 3507 A8 3527 A7 3600 B7 3720 C4 3741 C5 3939 B9 3955 A8 4417 B6 4434 B6 4460 B10 6312 A2 6417 A5 6704 B3 7310 A2 7409 B6 7508 A7 7716 C5
2007 B10 2027 C10 2311 B3 2341 B3 2416 A5 2440 B6 2506 A6 2527 A6 2607 B7 2727 B4 2938 A10 3011 C9 3027 B10 3049 A9 3323 A3 3339 A3 3357 A2 3375 C4 3411 A4 3428 B6 3452 A5 3469 A5 3488 A6 3508 A7 3528 A6 3602 B7 3725 B5 3742 B4 3940 B9 4000 C8 4418 B5 4435 A8 4461 B3 6314 B8 6418 A5 6705 B4 7311 A2 7410 A7 7509 A6 7717 C5
2008 B10 2028 C10 2316 B2 2342 C1 2418 A5 2441 B6 2507 C6 2530 B9 2609 C7 2728 B4 2940 B9 3012 C9 3028 C10 3051 A9 3324 C10 3340 B3 3358 A2 3376 C3 3413 A4 3429 C6 3455 B5 3470 A5 3489 C6 3510 B8 3529 A7 3606 C6 3726 B4 3743 C5 3941 B9 4001 B9 4419 A6 4437 B8 4601 B7 6315 B2 6419 A4 7001 C9 7318 C3 7411 B6 7511 A7 7931 A10
2009 B10 2030 B10 2317 B1 2343 B3 2419 B5 2444 A6 2508 C6 2531 B9 2610 B6 2730 B4 2942 B9 3013 B10 3029 C9 3052 A8 3325 B2 3341 B3 3359 A3 3377 B8 3414 A4 3431 A5 3456 A7 3471 A5 3490 A6 3511 A7 3530 A7 3607 B6 3728 C4 3744 C4 3942 B9 4002 B9 4420 C5 4442 B8 4700 B3 6320 B8 6420 A4 7003 B10 7319 B7 7412 A8 7580 A9 7932 B8
2010 B10 2032 B10 2321 B2 2401 A4 2420 A6 2445 A7 2509 A8 2532 B9 2616 B6 2731 B4 2943 B9 3014 B10 3030 B10 3054 C10 3327 A3 3343 B3 3361 B3 3378 A3 3415 A9 3437 B5 3457 A7 3472 A5 3491 A6 3512 B9 3531 A7 3611 B7 3730 B3 3745 A4 3943 B9 4003 A1 4421 B5 4443 A8 4701 B4 6321 C1 6422 A5 7004 B10 7320 A3 7415 A7 7600 B7 7933 B9
2011 B10 2033 B10 2324 C1 2402 A4 2422 A5 2446 C5 2512 B8 2535 A8 2617 B6 2733 A3 2944 B9 3015 C10 3031 C8 3302 A2 3328 A2 3344 B3 3362 B8 3400 A9 3416 A9 3438 B5 3458 A9 3475 A6 3492 A6 3513 A8 3534 A9 3612 B6 3731 C5 3746 B4 3944 B9 4301 A2 4422 A6 4444 A9 4999 C10 6322 B3 6423 A6 7005 C9 7321 B8 7416 A6 7701 B5 7934 B9
2012 B10 2035 C9 2327 A3 2404 C6 2423 A6 2447 A7 2513 A7 2536 A7 2618 B6 2734 B3 2945 B9 3016 B10 3032 B10 3303 A2 3329 A3 3345 C2 3363 A2 3401 A5 3417 A5 3439 B5 3459B6 3476 A5 3493 A6 3514 A9 3535 A8 3702 A3 3732 C5 3758 C5 3945 B9 4304 C8 4423 A6 4446 A8 5001 C8 6324 A2 6424 A4 7006 C10 7322 A2 7419 A9 7702 B5
2013 B10 2036 B9 2329 C2 2406 A9 2425 A7 2448 A7 2514 A8 2580 A9 2619 B7 2735 A3 2946 B9 3017 B10 3033 C10 3304 A3 3330 C2 3346 A2 3364 A3 3402 A5 3418 A9 3440 A9 3460 A9 3477 A5 3494 B5 3516 A9 3536 A8 3704 A3 3733 B4 3931 A1 3946 B9 4401 A5 4424 A5 4447 A4 5002 B10 6401 A4 6425 A6 7007 B10 7401 A4 7420 A9 7704 B4
2014 B10 2037 B9 2330 C3 2407 A9 2427 A6 2449 C6 2515 A8 2585 A9 2620 B7 2736 A3 2947 C8 3018 B10 3034 B9 3307 A3 3331 C2 3347 C1 3365 C1 3403 A5 3419 A8 3442 B6 3461 A5 3478 A6 3495 A7 3518 A7 3537 A8 3705 C4 3734 C5 3932 A1 3947 B9 4402 A9 4425 A6 4448 A6 5405 A7 6402 A5 6426 A6 7008 B9 7402 A4 7421 A9 7705 B4
2015 C9 2041 B10 2331 C1 2408 B5 2430 A5 2450 A4 2517 A6 2586 A9 2621 B7 2741 B4 3001 B10 3020 B10 3035 B9 3311 C3 3332 C2 3348 A8 3366 C1 3404 A4 3420 A5 3443 A7 3462 A5 3481 B5 3496 A7 3520 A7 3538 A7 3710 B4 3735 C5 3933 A1 3948 C9 4411 B5 4426 A6 4449 A6 5407 A7 6403 A5 6427 A6 7009 A9 7403 A4 7501 B8 7706 C5
2017 B10 2042 B10 2333 B2 2409 A5 2433 B5 2459 B6 2518 A8 2587 A10 2623 B7 2742 B4 3004 B10 3021 B10 3036 B10 3312 C3 3333 C2 3349 A8 3367 C1 3405 A4 3421 A6 3444 A7 3463 A5 3482 C6 3501 B9 3521 A7 3580 A9 3711 A3 3736 C5 3934 A1 3950 C9 4412 B6 4428 A8 4452 A3 5701 A3 6404 A5 6428 A6 7010 C9 7404 A9 7502 B8 7707 B5
2021 C10 2045 B10 2334 B8 2410 A6 2435 B6 2501 A5 2520 A6 2590 A9 2719 B4 2932 A1 3005 C10 3022 C10 3039 B10 3314 C3 3334 C2 3350 A3 3368 C3 3406 A4 3423 A6 3445 B5 3464 A5 3483 B5 3503 A7 3522 A7 3581 A9 3714 B5 3737 B4 3935 A1 3951 C9 4413 B6 4429 A5 4453 A8 5702 A3 6409 A5 6429 A6 7303 C3 7405 A6 7503 A8 7711 C5
2022 C9 2047 B10 2336 A2 2411 B5 2436 B6 2502 B8 2521 B9 2601 B6 2721 B4 2934 A1 3006 C10 3023 C10 3040 B10 3315 C3 3335 C3 3351 C1 3371 A8 3407 A4 3424 B6 3446 A4 3465 A5 3484 B5 3504 A7 3524 A7 3582 A10 3715 B5 3738 B4 3936 A10 3952 C9 4414 B6 4430 A9 4454 B3 5704 A3 6414 A4 6580 A9 7306 A3 7406 A5 7504 A7 7712 C4



Layout Analog Board (Part 1 Bottom View)



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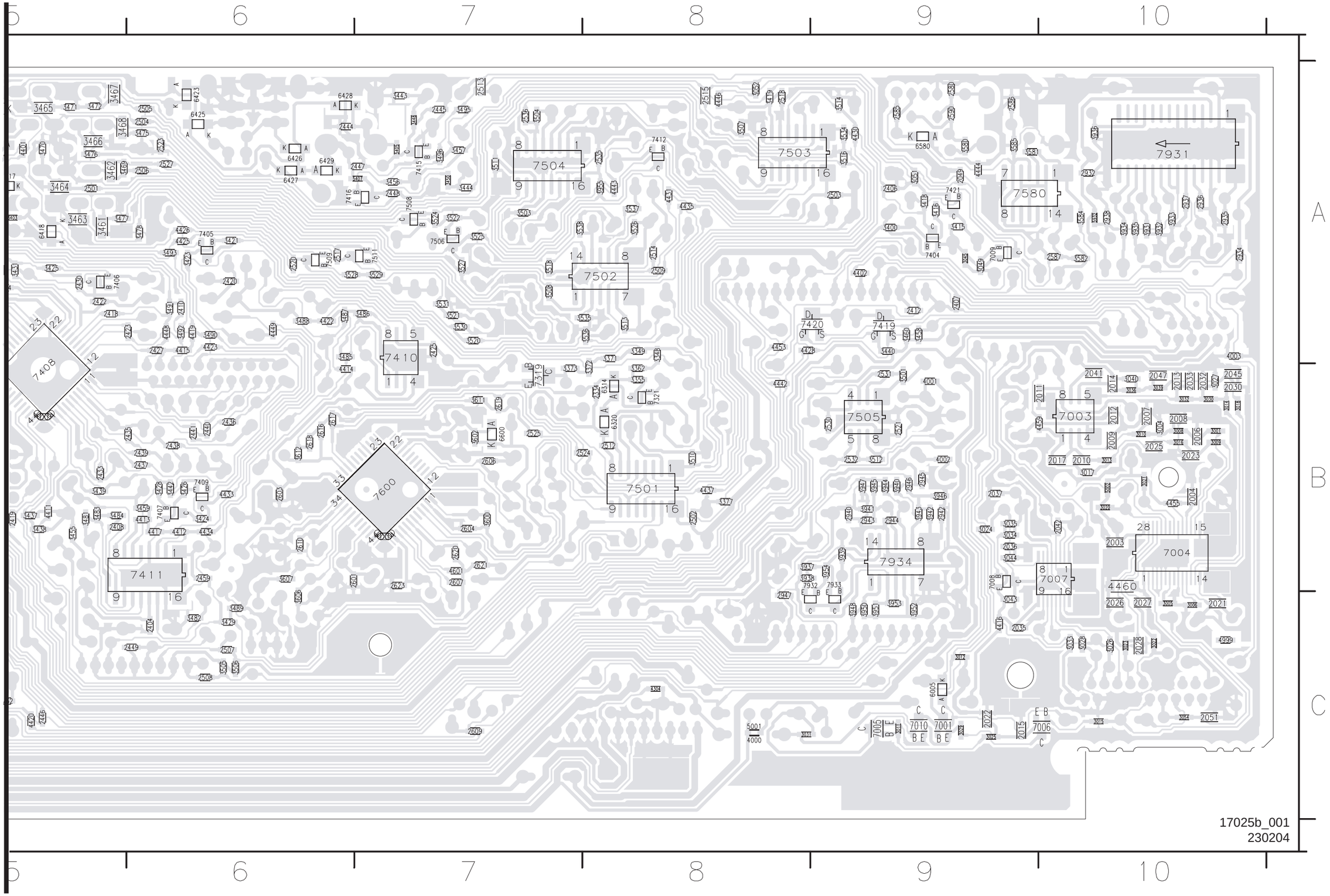
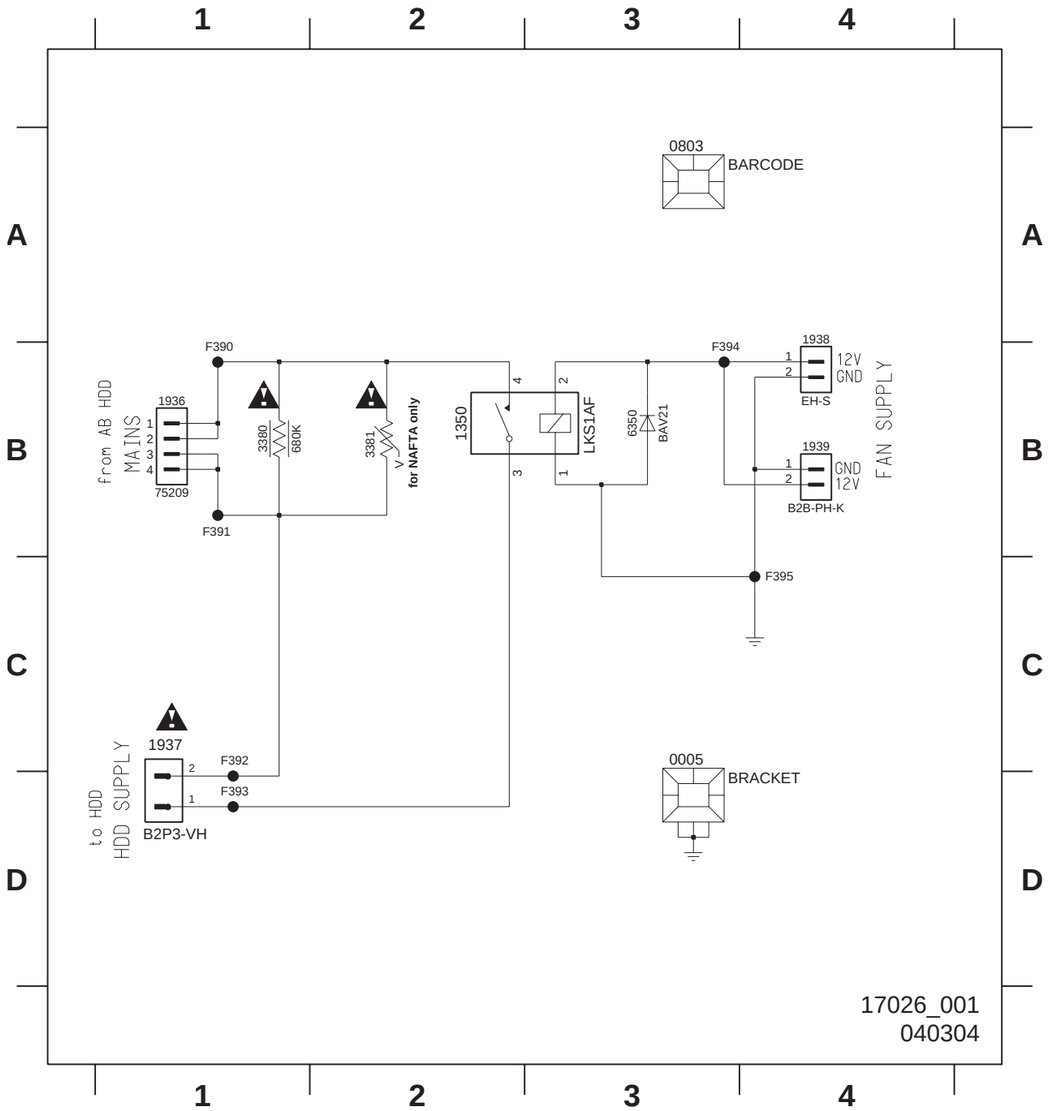
Layout Analog Board (Part 2 Bottom View)



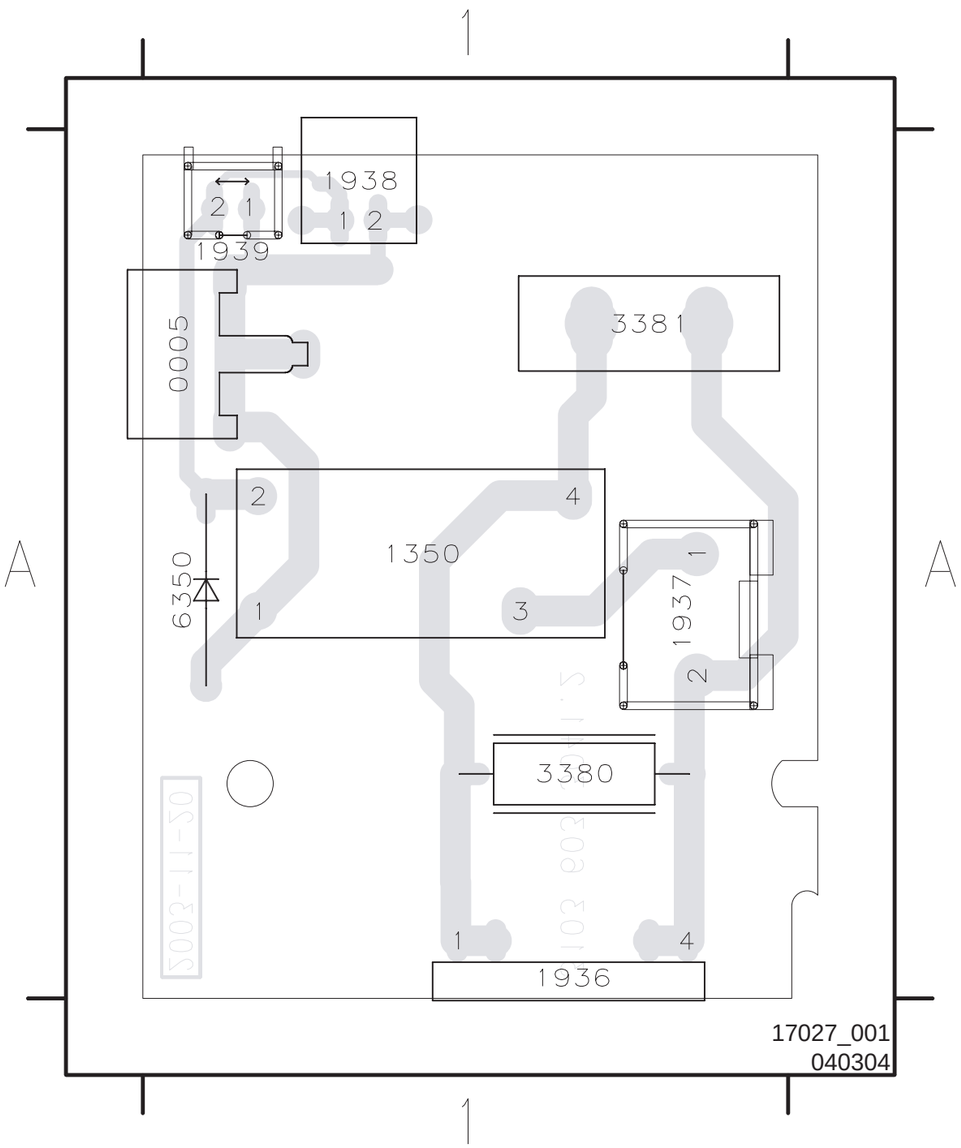
Power Supply Interface (PSI)

0005 C3 **1350 B2** **1937 C1** **1939 B4** **3381 B2** **F390 B1** **F392 C1** **F394 B3**
0803 A3 **1936 B1** **1938 B4** **3380 B1** **6350 B3** **F391 B1** **F393 D1** **F395 C4**

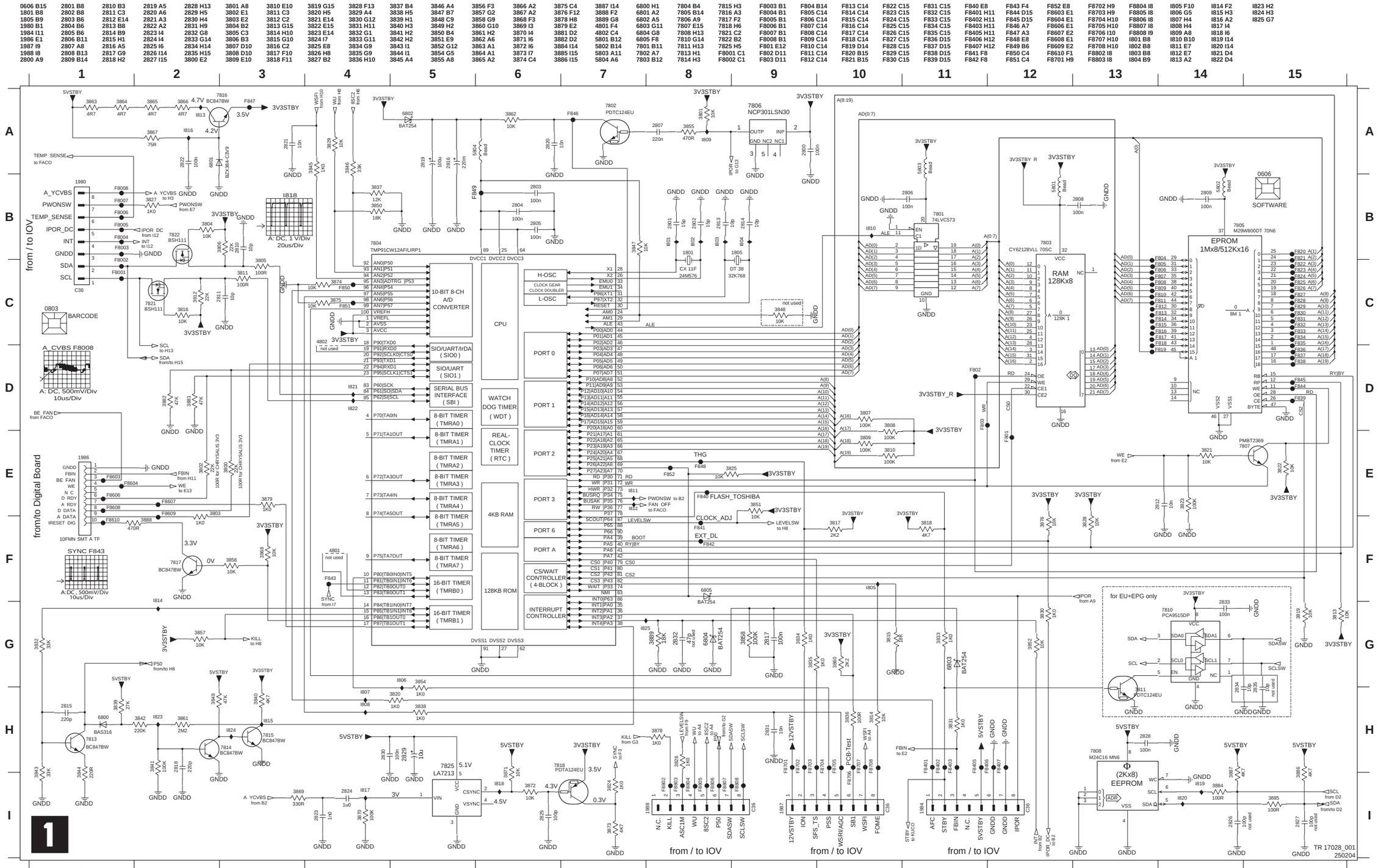


Layout Power Supply Interface

0005 A1 1937 A1 3380 A1
1350 A1 1938 A1 3381 A1
1936 A1 1939 A1 6350 A1

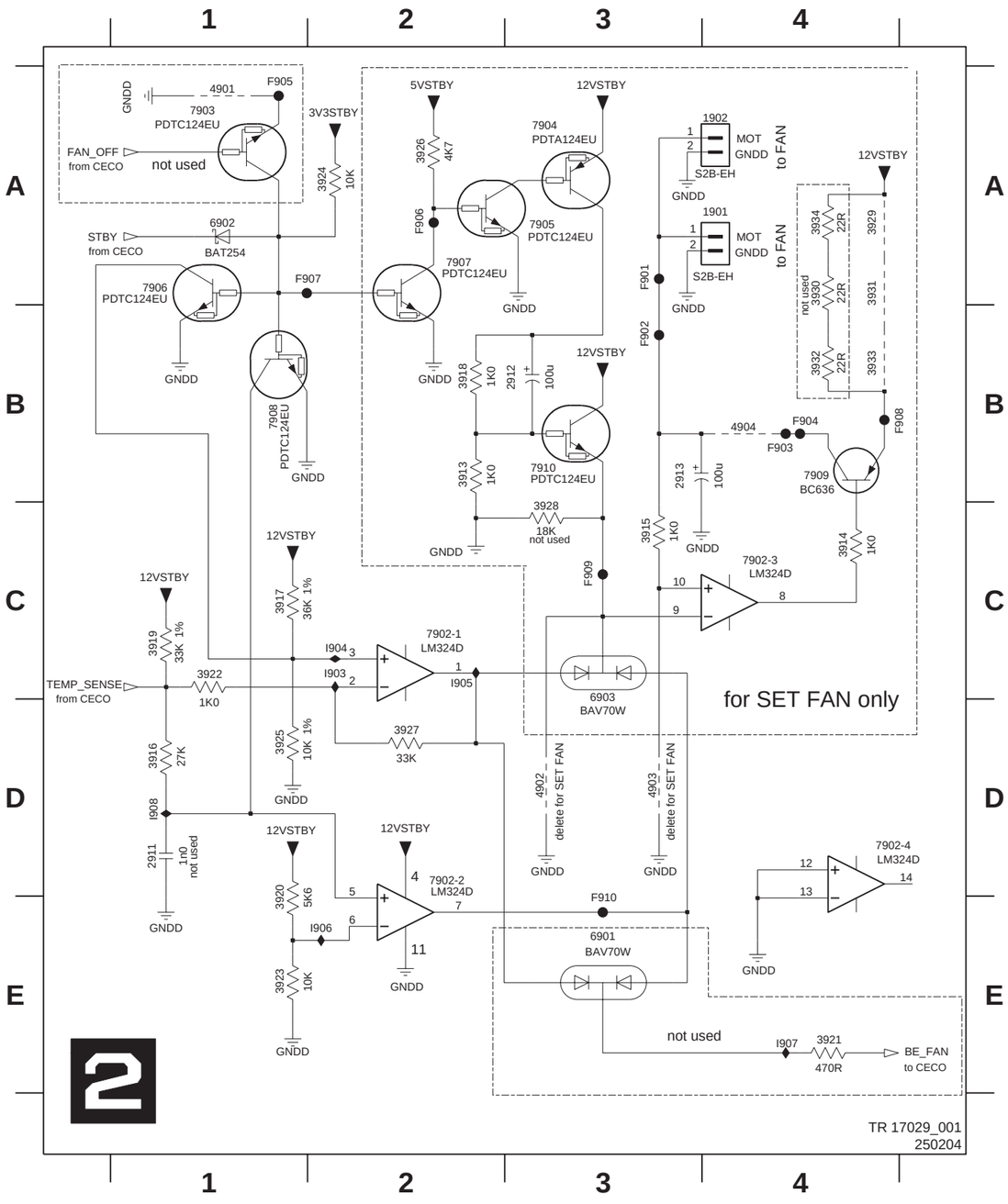


UP Sub Board: Central Controller (CECO) Layout 603 3051.1



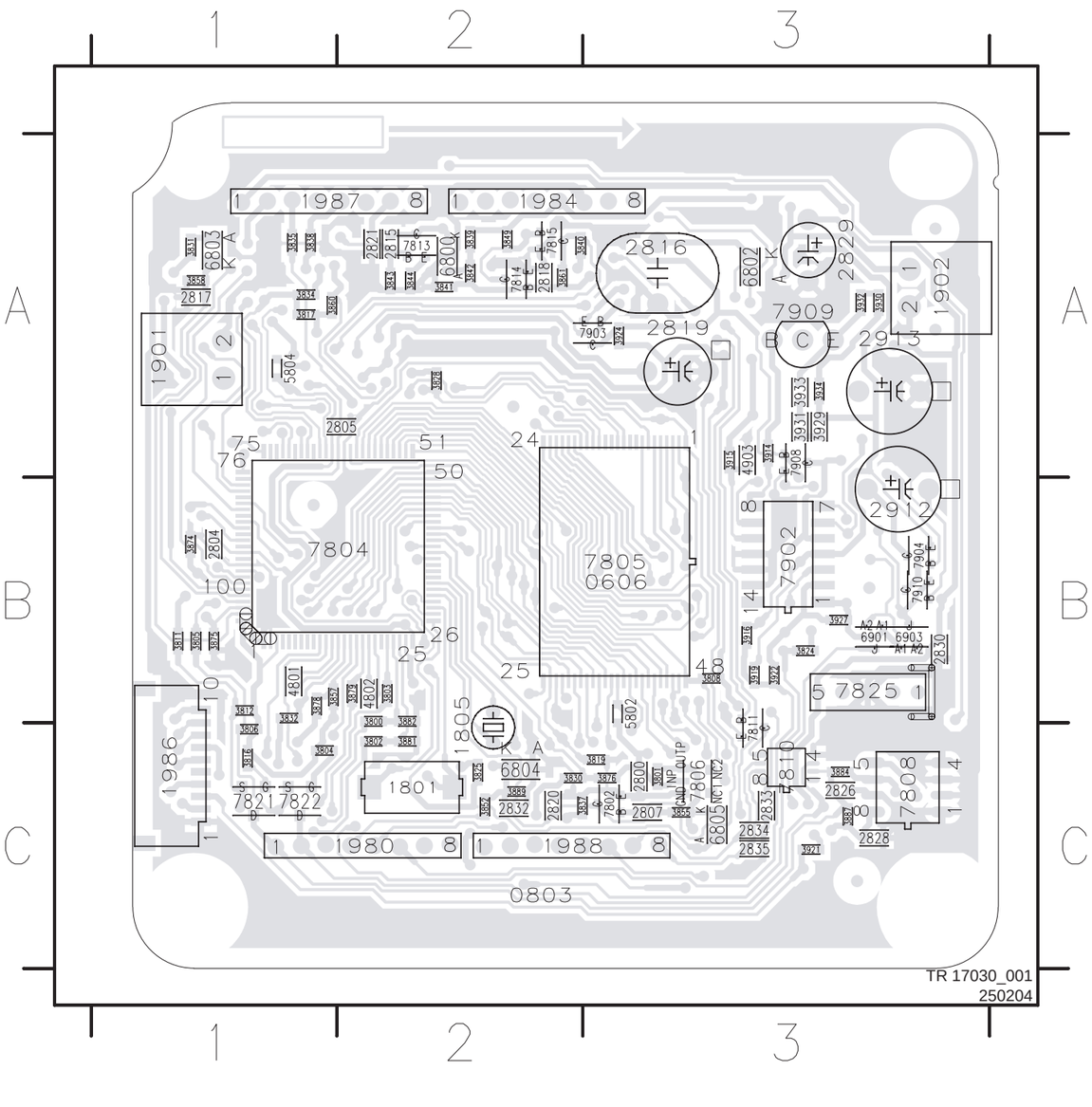
UP Sub Board: Fan Control (FACO) Layout 603 3051.1

1901 A4	3915 C3	3922 C1	3929 A4	4902 D3	7902-2 D2	7907 A2	F904 B4	I903 C2
1902 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 A2	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 B3	F909 C3	I908 D1
3914 C4	3921 E4	3928 C3	4901 A1	7902-1 C2	7906 A1	F903 B4	F910 E3	



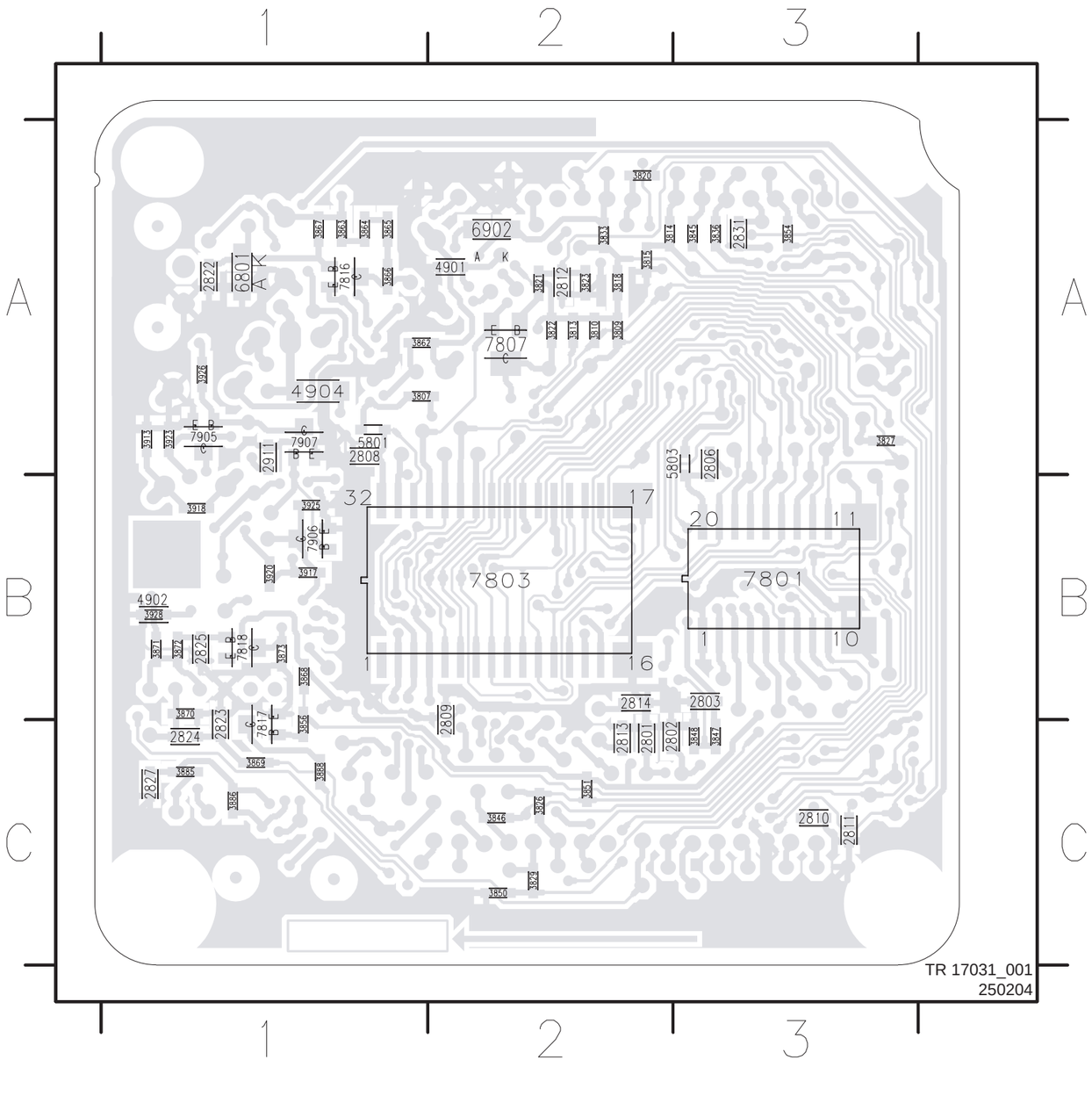
Layout UP Sub Board (Top View) Layout 603 3051.1

0606	B3	2821	A2	3816	C1	3855	C3	3924	A3	7804	B2
0803	C2	2826	C3	3817	A1	3857	B1	3927	B3	7805	B3
1801	C2	2828	C3	3819	C3	3858	A1	3929	A3	7806	C3
1805	C2	2829	A3	3824	B3	3860	A1	3930	A3	7808	C3
1901	A1	2830	B3	3825	C2	3861	A2	3931	A3	7810	C3
1902	A3	2832	C2	3828	A2	3874	B1	3932	A3	7811	C3
1980	C2	2833	C3	3830	C2	3875	B1	3933	A3	7813	A2
1984	A2	2834	C3	3831	A1	3876	C3	3934	A3	7814	A2
1986	C1	2835	C3	3832	B1	3878	B1	4801	B1	7815	A2
1987	A1	2912	B3	3834	A1	3879	B2	4802	B2	7821	C1
1988	C2	2913	A3	3835	A1	3881	C2	4903	A3	7822	C1
2800	C3	3800	B2	3837	C2	3882	B2	5802	B3	7825	B3
2804	B1	3801	C3	3838	A1	3884	C3	5804	A1	7902	B3
2805	A2	3802	C2	3839	A2	3887	C3	6800	A2	7903	A3
2807	C3	3803	B2	3840	A2	3889	C2	6802	A3	7904	B3
2815	A2	3804	C1	3841	A2	3914	A3	6803	A1	7908	A3
2816	A3	3805	B1	3842	A2	3915	A3	6804	C2	7909	A3
2817	A1	3806	C1	3843	A2	3916	B3	6805	C3	7910	B3
2818	A2	3808	B3	3844	A2	3919	B3	6901	B3		
2819	A3	3811	B1	3849	A2	3921	C3	6903	B3		
2820	C2	3812	B1	3852	C2	3922	B3	7802	C3		



Layout UP Sub Board (Bottom View) Layout 603 3051.1

2801	C2	2825	B1	3823	A2	3862	A1	3888	C1	6801	A1
2802	C2	2827	C1	3826	C2	3863	A1	3913	A1	6902	A2
2803	B3	2831	A3	3827	A3	3864	A1	3917	B1	7801	B3
2806	A3	2911	A1	3829	C2	3865	A1	3918	B1	7803	B2
2808	A1	3807	A1	3833	A2	3866	A1	3920	B1	7807	A2
2809	B2	3809	A2	3836	A3	3867	A1	3923	A1	7816	A1
2810	C3	3810	A2	3845	A3	3868	B1	3925	B1	7817	C1
2811	C3	3813	A2	3846	C2	3869	C1	3926	A1	7818	B1
2812	A2	3814	A2	3847	C3	3870	B1	3928	B1	7905	A1
2813	C2	3815	A2	3848	C3	3871	B1	4901	A2	7906	B1
2814	B2	3818	A2	3850	C2	3872	B1	4902	B1	7907	A1
2822	A1	3820	A2	3851	C2	3873	B1	4904	A1		
2823	C1	3821	A2	3854	A3	3885	C1	5801	A1		
2824	C1	3822	A2	3856	C1	3886	C1	5803	A2		



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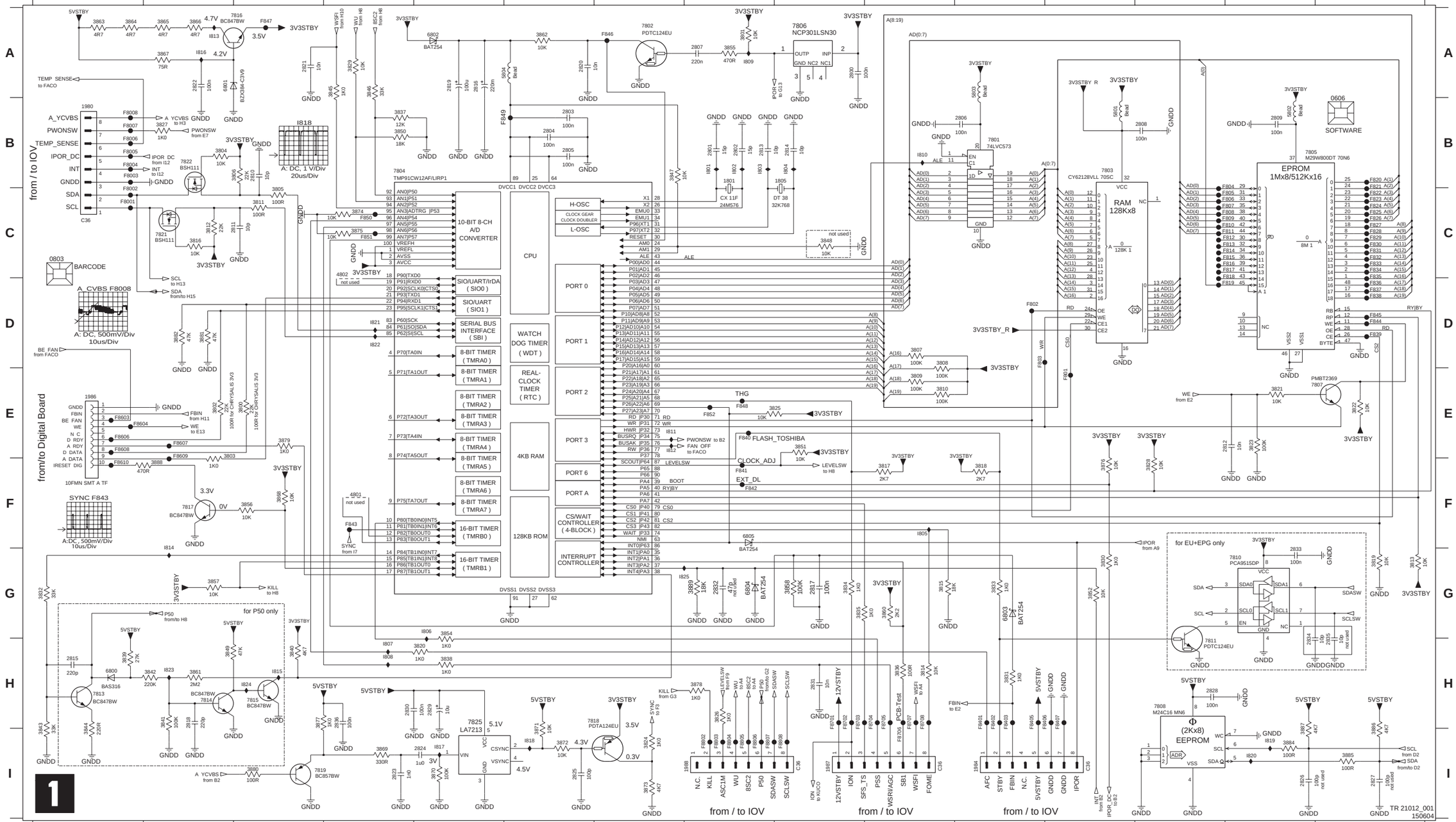
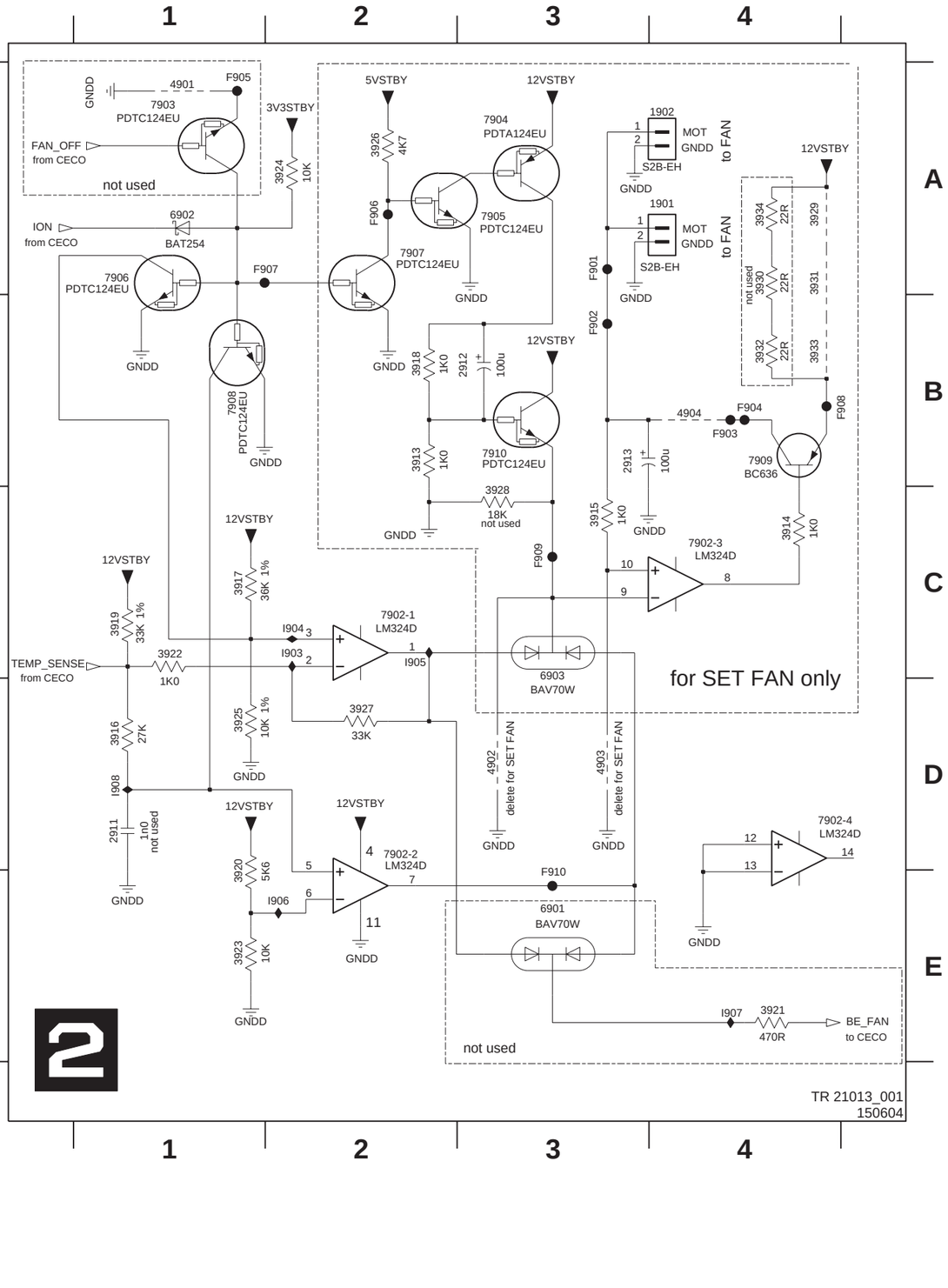
UP Sub Board: Central Controller (CECO) Layout 603 3051.2

0606 B15 0803 C1 1801 B8 1805 B9 1980 B1 1984 I11 1986 E1 1987 I9 1988 I8
2800 A9 2801 B8 2802 B8 2803 B6 2804 B6 2805 B6 2806 B11 2807 A8 2808 B13
2809 B14 2810 B3 2811 C3 2812 E14 2813 B8 2814 B9 2815 H1 2816 A5 2817 G9
2818 H2 2819 A5 2820 A6 2821 A3 2822 A2 2823 I4 2824 I5 2825 I6 2826 I14
2827 I15 2828 H13 2829 H5 2830 H4 2831 H9 2832 G8 2833 G14 2834 H14 2835 H15
2836 H4 3800 E3 3801 A8 3802 E2 3803 E2 3804 B2 3805 C3 3806 B3 3807 D10
3808 D10 3809 E10 3810 E10 3811 C3 3812 C2 3813 G15 3814 H10 3815 G10 3816 C2
3817 F10 3818 F11 3819 G15 3820 H5 3821 E14 3822 E15 3823 E14 3824 I7 3825 E9
3826 H8 3827 B2 3828 F13 3829 A4 3830 G12 3831 H11 3832 G1 3833 G11 3834 G9
3835 G9 3836 H10 3837 B4 3838 H5 3839 H1 3840 H3 3841 H2 3842 H2 3843 I1
3844 I1 3845 A4 3846 A4 3847 B7 3848 C9 3849 H2 3850 B4 3851 H2 3852 G12
3854 G5 3855 A8 3856 F3 3857 G2 3858 G9 3860 G10 3861 H2 3862 A6 3863 A1
3864 A1 3865 A2 3866 A2 3867 A2 3868 F3 3869 I4 3870 I5 3871 I6 3872 I6
3873 I7 3874 C4 3875 C4 3876 F12 3877 H3 3878 H8 3879 E3 3880 I3 3881 D2
3882 D2 3884 I14 3885 I15 3886 I15 3887 I14 3888 F2 3889 G8 4801 F4 4802 C4
5801 B12 5802 B14 5803 A11 5804 A6 6800 H1 6801 A2 6802 A5 6803 G11 6804 G8
6805 F8 7801 B11 7802 A7 7803 B12 7804 B4 7805 B14 7806 A9 7807 E15 7808 H13
7810 G14 7811 H13 7813 H1 7814 H3 7815 H3 7816 A3 7817 F2 7818 H6 7819 I3
7821 C2 7822 B2 7825 H5 F8001 C1 F8002 C1 F8003 B1 F8004 B1 F8005 B1 F8006 B1
F8007 B1 F8008 B1 F801 E12 F802 D11 F803 D11 F804 C14 F805 C14 F806 C14 F807 C14
F808 C14 F809 C14 F810 C14 F811 C14 F812 C14 F813 C14 F814 C14 F815 C14 F816 C14
F817 C14 F818 D14 F819 D14 F820 B15 F821 C15 F822 C15 F823 C15 F824 C15 F825 C15
F826 C15 F827 C15 F828 C15 F829 C15 F830 C15 F831 C15 F832 C15 F833 C15 F834 C15
F835 D15 F836 D15 F837 D15 F838 D15 F839 D15 F840 E8 F841 F8 F842 F8 F843 F4
F8405 H11 F8406 H12 F8407 H12 F8408 E8 F8409 E8 F8410 E8 F8411 H11 F8402 H11
F8403 H11 F846 A7 F847 A3 F848 E8 F849 B6 F850 C4 F851 C4 F852 E8 F8603 E1
F8604 E1 F8605 E1 F8606 E1 F8607 E1 F8607 E2 F8608 E1 F8609 E2 F8610 F1
F8702 H9 F8703 H9 F8704 H10 F8705 H10 F8706 I10 F8707 H10 F8708 H10 F8802 I8
F8803 I8 F8804 I8 F8805 I8 F8806 I8 F8807 I8 F8808 I9 I801 B8 I802 B8 I803 B8
I804 B9 I805 F10 I806 G5 I807 H4 I808 H4 I809 A8 I810 B10 I811 E7 I812 E7
I813 A2 I814 F2 I815 H3 I816 A2 I817 I5 I818 I6 I819 I14 I820 I14 I821 D4
I822 D4 I823 H2 I824 H3 I825 G7



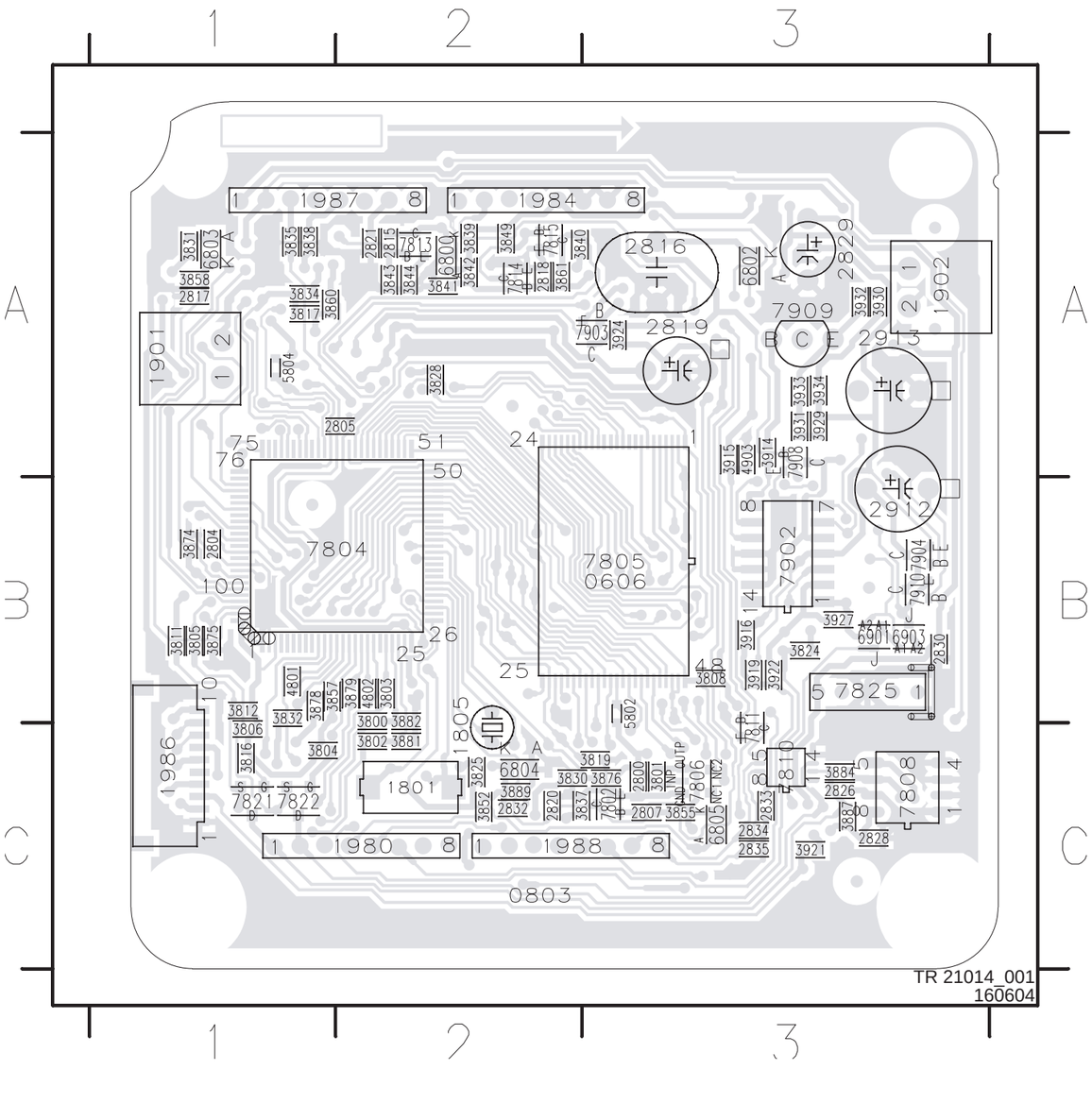
UP Sub Board: Fan Control (FACO) Layout 603 3051.2

1901 A4	3915 C3	3922 C1	3929 A4	4902 D3	7902-2 D2	7907 A2	F904 B4	I903 C2
1902 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 A2	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 B3	F909 C3	I908 D1
3914 C4	3921 E4	3928 C3	4901 A1	7902-1 C2	7906 A1	F903 B4	F910 E3	



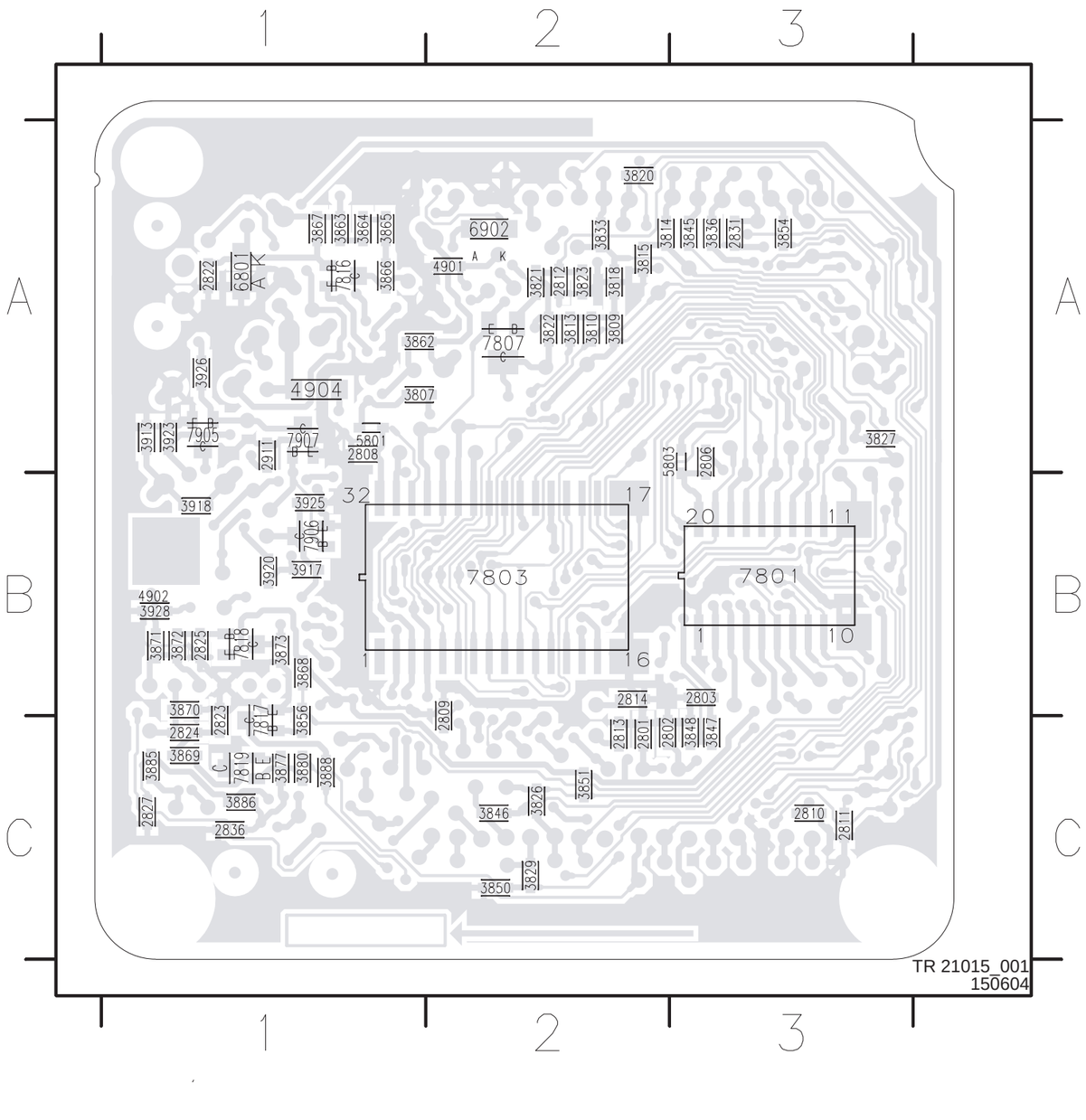
Layout UP Sub Board (Top View) Layout 603 3051.2

0606	B3	2821	A2	3816	C1	3855	C3	3924	A3	7804	B2				
0803	C2	2826	C3	3817	A1	3857	B1	3927	B3	7805	B3				
1801	C2	2828	C3	3819	C3	3858	A1	3929	A3	7806	C3				
1805	C2	2829	A3	3824	B3	3860	A1	3930	A3	7808	C3				
1901	A1	2830	B3	3825	C2	3861	A2	3931	A3	7810	C3				
1902	A3	2832	C2	3828	A2	3874	B1	3932	A3	7811	C3				
1980	C2	2833	C3	3830	C2	3875	B1	3933	A3	7813	A2				
1984	A2	2834	C3	3831	A1	3876	C3	3934	A3	7814	A2				
1986	C1	2835	C3	3832	B1	3878	B1	4801	B1	7815	A2				
1987	A1	2912	B3	3834	A1	3879	B2	4802	B2	7821	C1				
1988	C2	2913	A3	3835	A1	3881	C2	4903	A3	7822	C1				
2800	C3	3800	B2	3837	C2	3882	B2	5802	B3	7825	B3				
2804	B1	3801	C3	3838	A1	3884	C3	5804	A1	7902	B3				
2805	A2	3802	C2	3839	A2	3887	C3	6800	A2	7903	A3				
2807	C3	3803	B2	3840	A2	3889	C2	6802	A3	7904	B3				
2815	A2	3804	C1	3841	A2	3914	A3	6803	A1	7908	A3				
2816	A3	3805	B1	3842	A2	3915	A3	6804	C2	7909	A3				
2817	A1	3806	C1	3843	A2	3916	B3	6805	C3	7910	B3				
2818	A2	3808	B3	3844	A2	3919	B3	6901	B3						
2819	A3	3811	B1	3849	A2	3921	C3	6903	B3						
2820	C2	3812	B1	3852	C2	3922	B3	7802	C3						



Layout UP Sub Board (Bottom View) Layout 603 3051.2

2801	C2	2827	C1	3826	C2	3864	A1	3913	A1	7801	B3
2802	C2	2831	A3	3827	A3	3865	A1	3917	B1	7803	B2
2803	B3	2836	C1	3829	C2	3866	A1	3918	B1	7807	A2
2806	A3	2911	A1	3833	A2	3867	A1	3920	B1	7816	A1
2808	A1	3807	A1	3836	A3	3868	B1	3923	A1	7817	C1
2809	B2	3809	A2	3845	A3	3869	C1	3925	B1	7818	B1
2810	C3	3810	A2	3846	C2	3870	B1	3926	A1	7819	C1
2811	C3	3813	A2	3847	C3	3871	B1	3928	B1	7905	A1
2812	A2	3814	A2	3848	C3	3872	B1	4901	A2	7906	B1
2813	C2	3815	A2	3850	C2	3873	B1	4902	B1	7907	A1
2814	B2	3818	A2	3851	C2	3877	C1	4904	A1		
2822	A1	3820	A2	3854	A3	3880	C1	5801	A1		
2823	C1	3821	A2	3856	C1	3885	C1	5803	A2		
2824	C1	3822	A2	3862	A1	3886	C1	6801	A1		
2825	B1	3823	A2	3863	A1	3888	C1	6902	A2		



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
F2002 E1
F2003 E1
F2004 E1
F2005 E9
F2006 E1
F2107 D6
F2201 D9
F2202 E1
F2203 D9
F2205 E9
F2301 A10
F2302 A8
F2303 A8
F2304 A8
F2401 A10
F2402 A9
F2403 A10
F2404 A9
F250 E4
F251 D5
F253 C5
F254 B5
F255 A5
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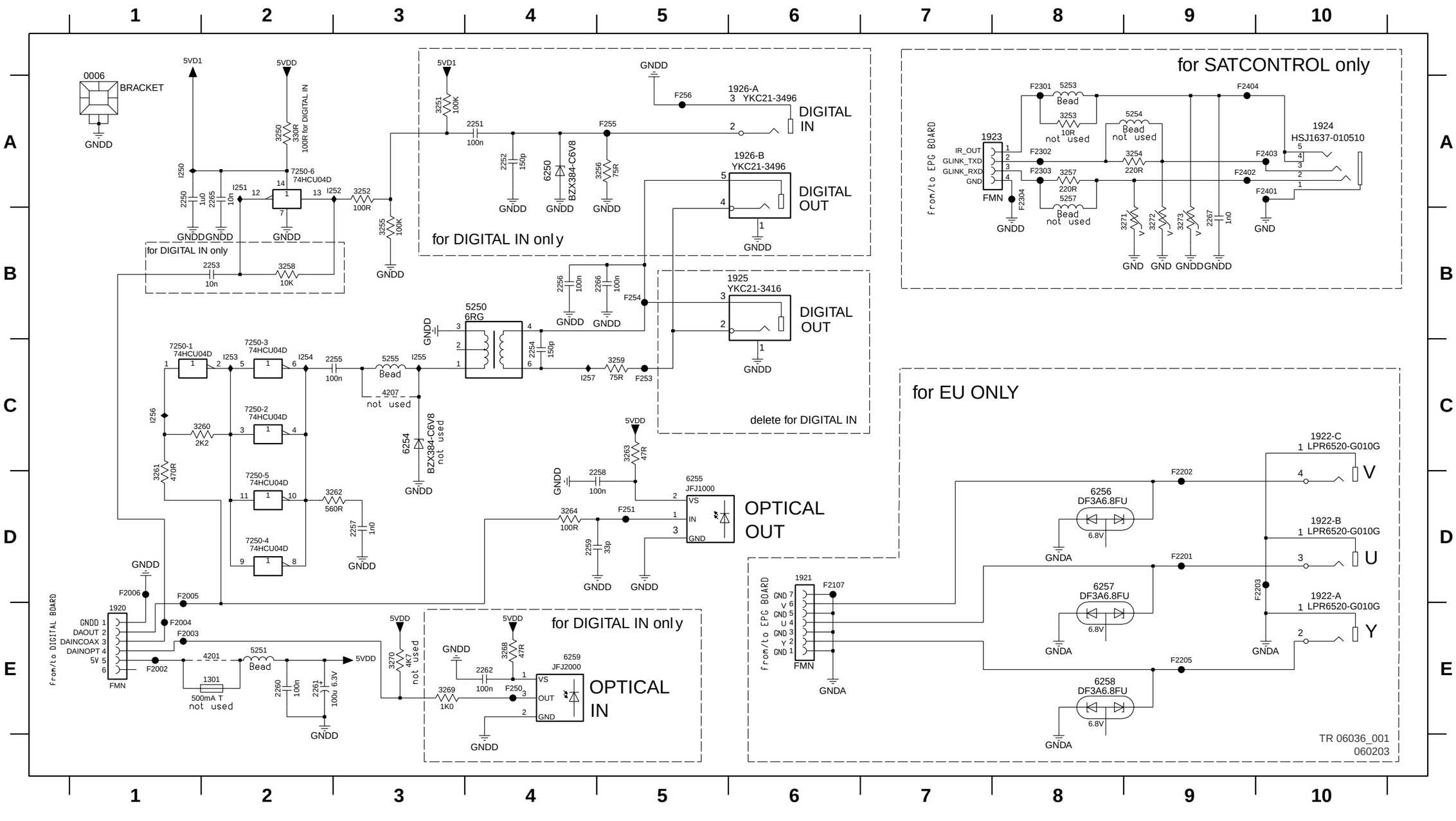
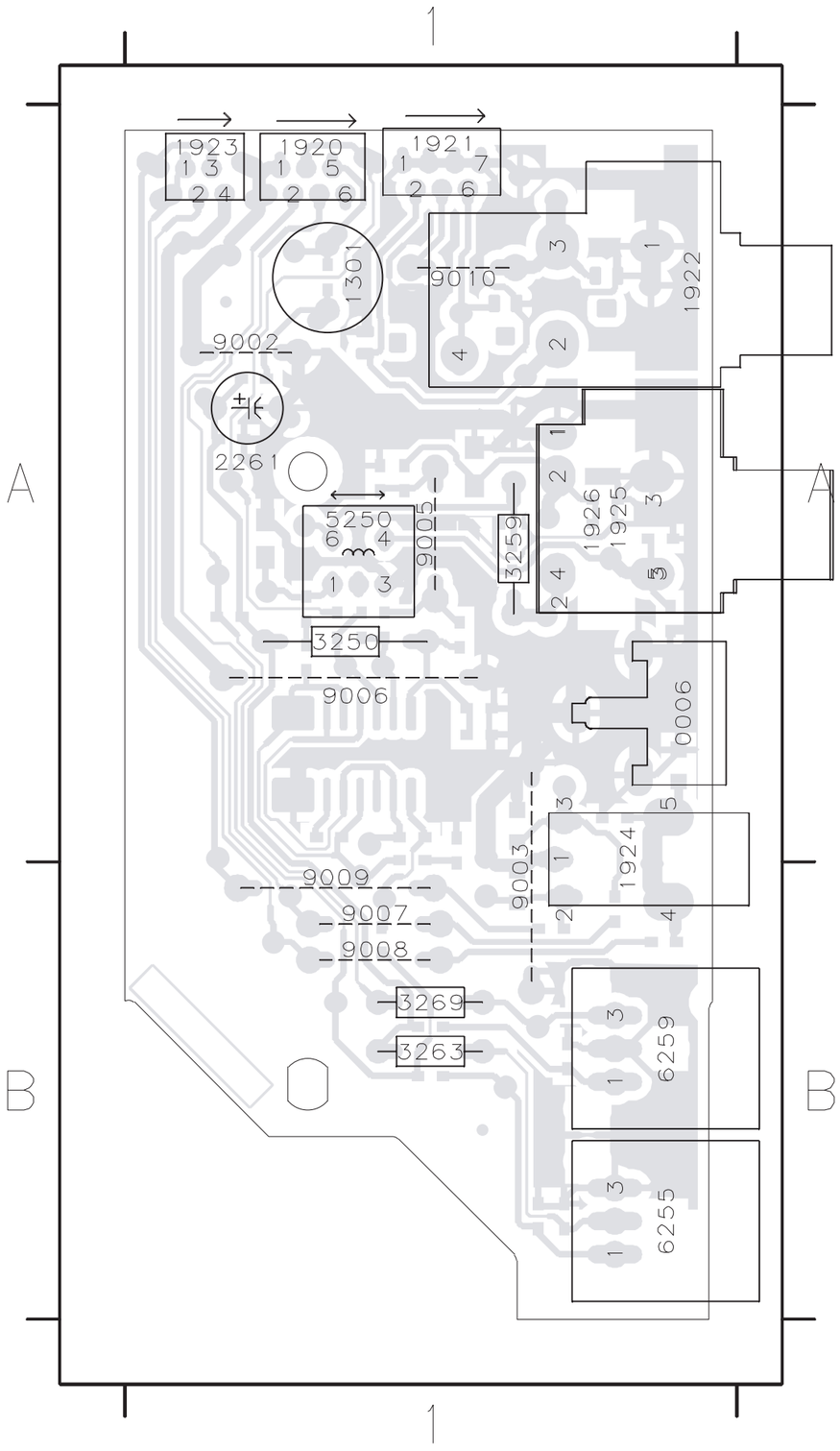
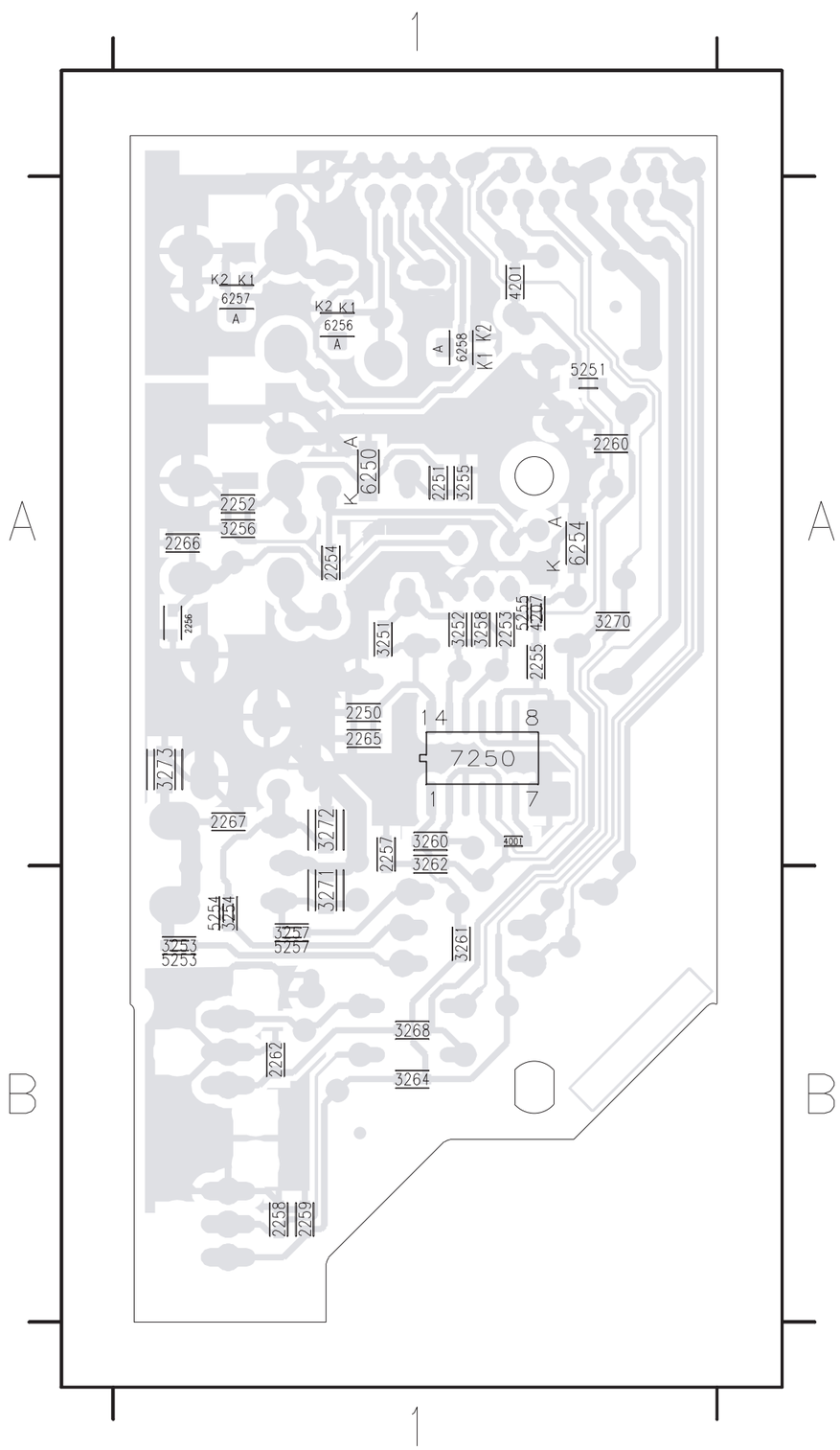
I250 A1
I251 A2
I252 A3
I253 C2
I254 C2
I255 C3
I256 C1
I257 C4



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
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3254 B1
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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
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6257 A1
6258 A1
7250 A1

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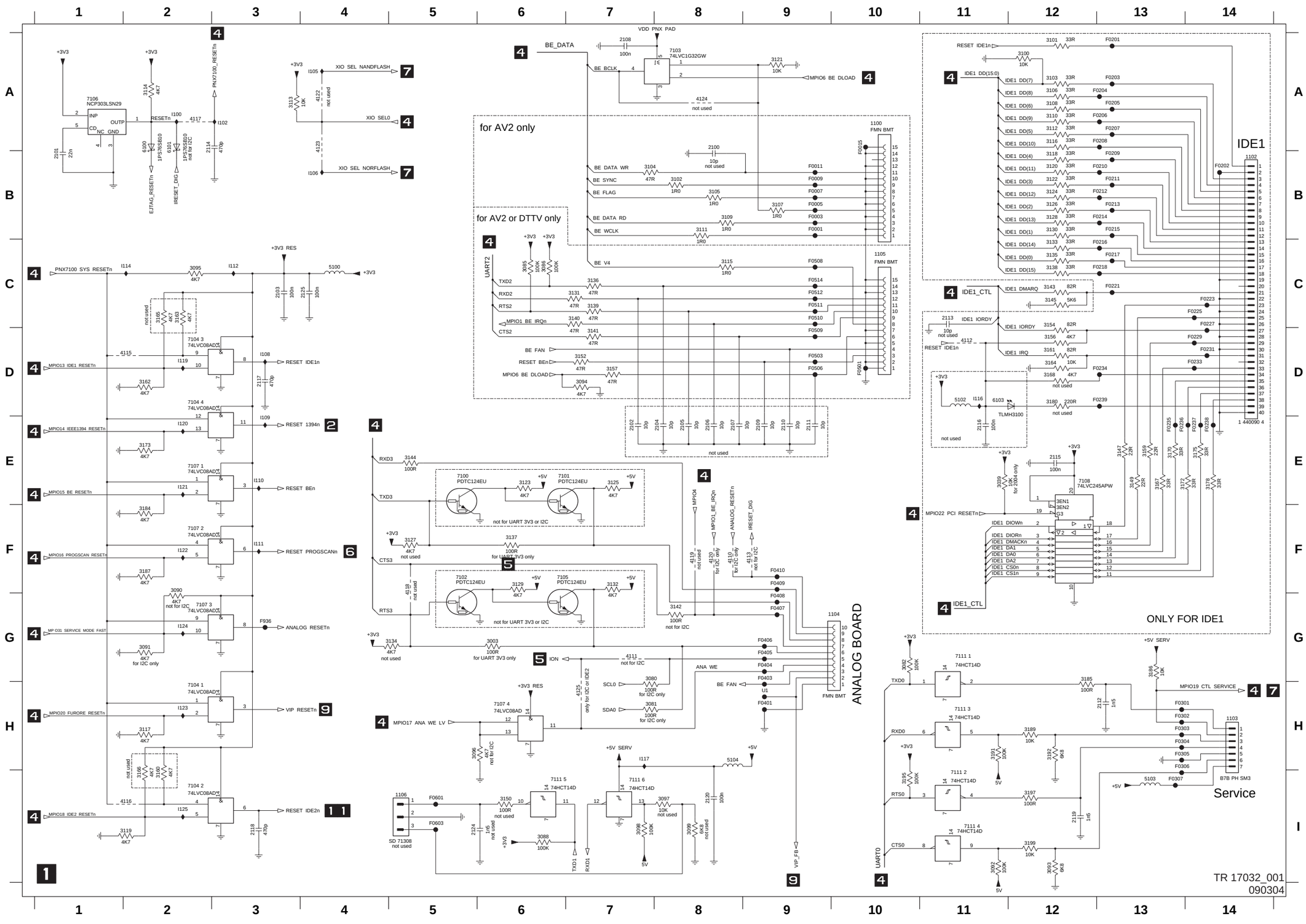
Digital Board Chrysalis F: IDE, UARTS, RESET, BE



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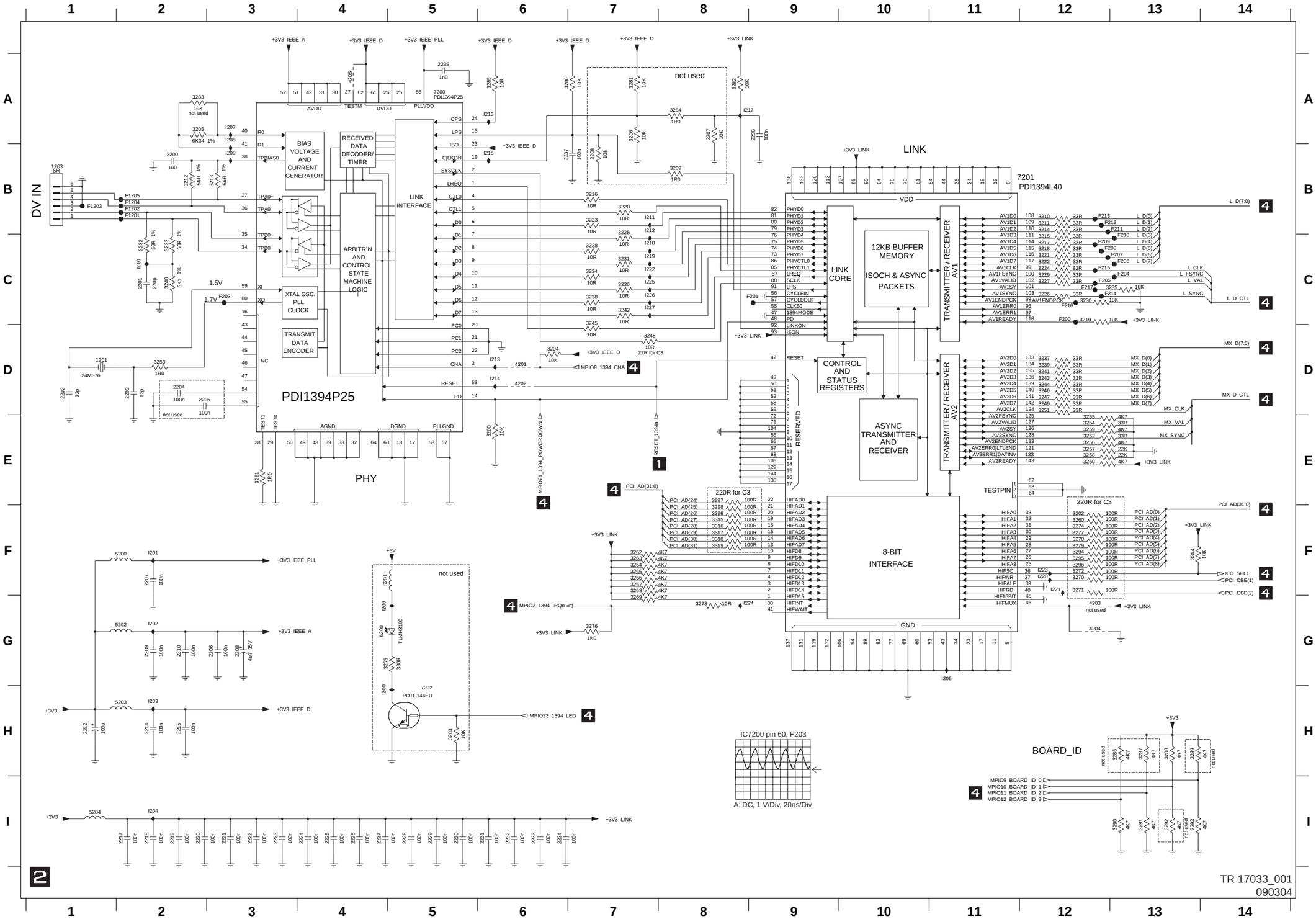
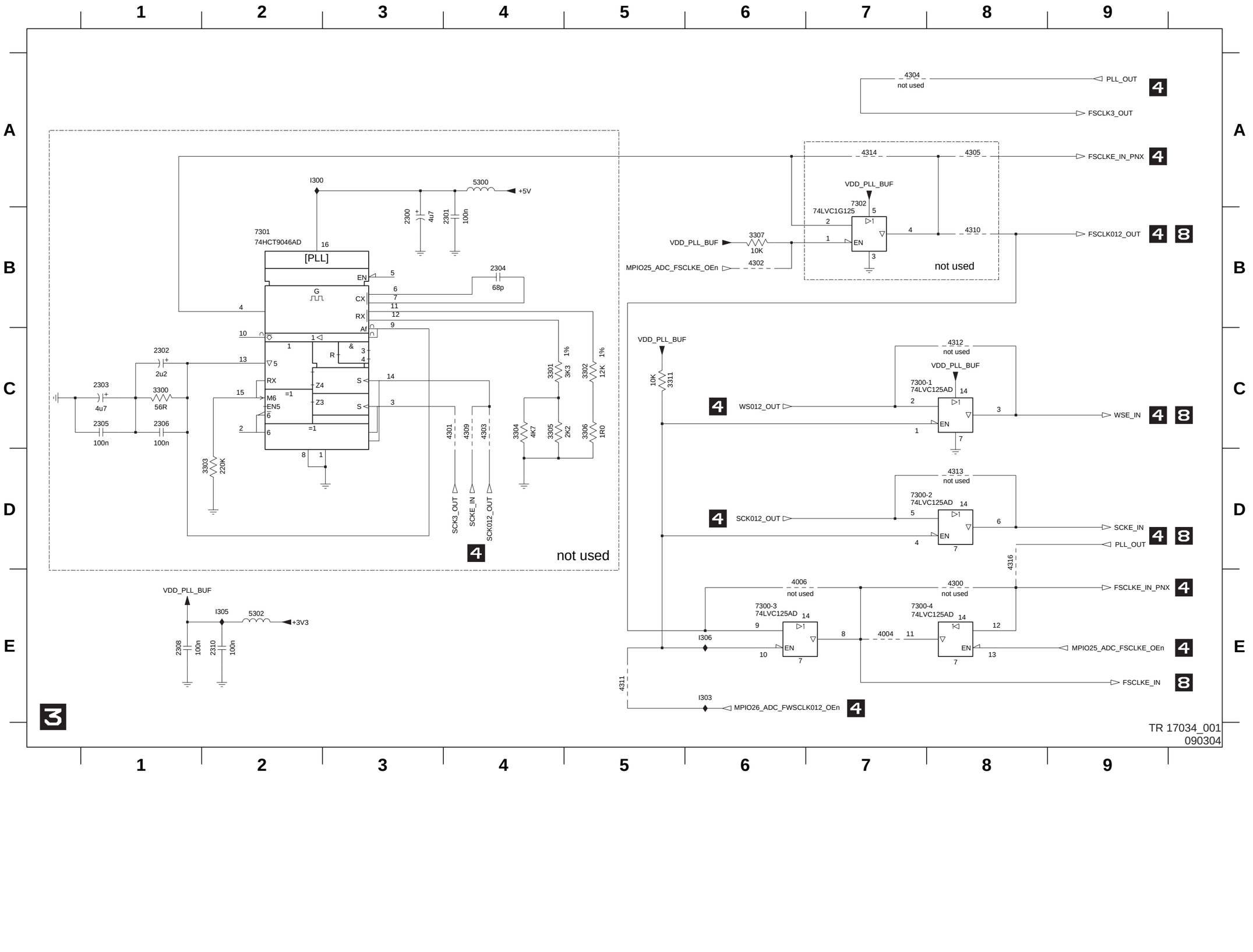
1100 A10	4112 D11	F0214 B13	
1102 B14	4113 F9	F0215 B13	
1103 H14	4115 D2	F0216 C13	
1104 G9	4116 I2	F0217 C13	
1105 C10	4117 A2	F0218 C13	
1106 I5	4118 F5	F0221 C13	
2100 A8	4119 F8	F0223 C14	
2101 B1	4120 F8	F0225 C14	
2102 E7	4122 A4	F0227 C14	
2103 C3	4123 A4	F0229 D14	
2104 E8	4124 A8	F0231 D14	
2105 E8	4125 H7	F0233 D14	
2106 E8	5100 C4	F0234 D13	
2107 E8	5102 D11	F0235 E13	
2108 A7	5103 I13	F0236 E13	
2109 E9	5104 H8	F0237 E14	
2110 E9	6100 A2	F0238 E14	
2111 E9	6101 A2	F0239 D13	
2112 H13	6103 D11	F0301 H13	
2113 C11	7100 E5	F0302 H13	
2114 A2	7101 E6	F0303 H13	
2115 E12	7102 F5	F0304 H13	
2116 E11	7103 A8	F0305 H13	
2117 D3	7104-1 H2	F0306 H13	
2118 I3	7104-2 I2	F0307 I13	
2119 I12	7104-3 D2	F0401 H9	
2120 I8	7104-4 D2	F0403 G9	
2124 I5	7105 F6	F0404 G9	
2125 C4	7106 A1	F0405 G9	
3003 G6	7107-1 E2	F0406 G9	
3039 E11	7107-2 F2	F0407 G9	
3080 G7	7107-3 G2	F0408 G9	
3081 H7	7107-4 H6	F0409 F9	
3082 G10	7108 E12	F0410 F9	
3085 C6	7111-1 G11	F0501 D10	
3086 C6	7111-2 I11	F0503 D9	
3088 I6	7111-3 H11	F0506 D9	
3090 F2	7111-4 I11	F0508 C9	
3091 G2	7111-5 I6	F0509 D9	
3092 I11	7111-6 I7	F0510 C9	
3093 I12	F0001 B9	F0511 C9	
3094 D7	F0003 B9	F0512 C9	
3095 C2	F0005 B9	F0514 C9	
3096 H5	F0007 B9	F0601 I5	
3097 I8	F0009 B9	F0603 I5	
3098 I7	F0011 B9	F936 G3	
3099 I8	F0015 A10	I100 A2	
3100 A12	F0201 A13	I102 A3	
3101 A12	F0202 B14	I105 A4	
3102 B8	F0203 A13	I106 B4	
3103 A12	F0204 A13	I108 D3	
3104 B7	F0205 A13	I109 E3	
3105 B8	F0206 A13	I110 E3	
3106 A12	F0207 A13	I111 F3	
3107 B9	F0208 A13	I112 C3	
3108 A12	F0209 B13	I114 C2	
3109 B8	F0210 B13	I116 D11	
3110 A12	F0211 B13	I117 H7	
3111 B8	F0212 B13	I119 D2	
3112 A12	F0213 B13	I120 E2	
3113 A3	F0214 B13	I121 E2	
3114 A2	F0215 B13	I122 F2	
3115 C8	F0216 C13	I123 H2	
3116 A12	F0217 C13	I124 G2	
3117 H2	F0218 C13	I125 I2	
3118 B12	F0221 C13		
3119 I2	F0223 C14		
3120 B12	F0225 C14		
3121 A9	F0227 C14		
3122 B12	F0229 D14		
3123 E6	F0231 D14		
3124 B12	F0233 D14		
3125 E7	F0234 D13		
3126 B12	F0235 E13		
3127 F5	F0236 E13		
3128 B12	F0237 E14		
3129 F6	F0238 E14		
3130 B12	F0239 D13		
3131 C7	F0301 H13		
3132 F7	F0302 H13		
3133 C12	F0303 H13		
3134 G5	F0304 H13		
3135 C12	F0305 H13		
3136 C7	F0306 H13		
3137 F6	F0307 I13		
3138 C12	F0401 H9		
3139 C7	F0403 G9		
3140 C7	F0404 G9		
3141 D7	F0405 G9		
3142 G8	F0406 G9		
3143 C12	F0407 G9		
3144 E5	F0408 G9		
3145 C12	F0409 F9		
3147 E13	F0410 F9		
3149 E13	F0501 D10		
3150 I6	F0503 D9		
3152 D7	F0506 D9		
3154 C12	F0508 C9		
3156 D12	F0509 D9		
3157 D7	F0510 C9		
3159 E13	F0511 C9		
3160 I2	F0512 C9		
3161 D12	F0514 C9		
3162 D2	F0601 I5		
3163 C2	F0603 I5		
3164 D12	F936 G3		
3165 C2	I100 A2		
3166 I2	I102 A3		
3167 E13	I105 A4		
3168 D12	I106 B4		
3170 E13	I108 D3		
3172 E13	I109 E3		
3173 E2	I110 E3		
3175 E14	I111 F3		
3178 E14	I112 C3		
3180 D12	I114 C2		
3184 F2	I116 D11		
3185 G12	I117 H7		
3186 G13	I119 D2		
3187 F2	I120 E2		
3189 H12	I121 E2		
3191 H11	I122 F2		
3192 H12	I123 H2		
3195 I10	I124 G2		
3197 I12	I125 I2		
3199 I12			
4110 F8			

Digital Board Chrysalis F: 1394



1201 D1	3290 I13
1203 B1	3291 I13
2200 B2	3292 I13
2201 C2	3293 I13
2202 D1	3294 F12
2203 D2	3295 F12
2204 D2	3296 F12
2205 D2	3297 E8
2206 G3	3298 F8
2207 F2	3299 F8
2208 G3	3314 F13
2209 G2	3315 F8
2210 G2	3316 F8
2212 H1	3317 F8
2214 H2	3318 F8
2215 H2	3319 F8
2217 I2	4201 D6
2218 I2	4202 D6
2219 I2	4203 G12
2220 I2	4204 G12
2221 I3	4205 A4
2222 I3	5200 F2
2223 I3	5201 F4
2224 I4	5202 G2
2225 I4	5203 H2
2226 I4	5204 I1
2227 I4	6200 G4
2228 I5	7200 A5
2229 I5	7201 A11
2230 I5	7202 H5
2231 I6	F1201 B2
2232 I6	F1202 B2
2233 I6	F1203 B1
2234 I6	F1204 B2
2235 A5	F1205 B2
2236 A9	F200 C12
2237 B6	F201 C9
3200 E6	F203 C3
3202 F12	F204 C13
3203 H5	F205 C12
3204 D6	F206 C13
3205 A2	F207 C13
3206 A7	F208 C12
3207 A8	F209 C12
3208 B7	F210 C13
3209 B8	F211 B13
3210 B12	F212 B12
3211 B12	F213 B12
3212 B2	F214 C12
3213 B3	F215 C12
3214 B12	F216 C12
3215 C12	F217 C12
3216 B7	I200 H4
3217 C12	I201 F2
3218 C12	I202 G2
3219 C12	I203 H2
3220 B7	I204 I2
3221 C12	I205 G11
3222 C12	I206 G4
3223 B7	I207 A3
3224 C12	I208 A3
3225 C7	I209 B3
3226 C12	I210 C2
3227 C12	I211 B7
3228 C7	I212 B7
3229 C12	I213 D6
3230 C12	I214 D6
3231 C7	I215 A6
3232 C2	I216 B6
3233 C2	I217 A8
3234 C7	I218 C7
3235 C13	I219 C7
3236 C7	I220 F12
3237 D12	I221 F12
3238 C7	I222 C7
3239 D12	I223 F12
3240 C2	I224 G8
3241 D12	I225 C7
3242 C7	I226 C7
3243 D12	I227 C7
3244 D12	
3245 D7	
3246 D12	
3247 D12	
3248 D7	
3249 D12	
3250 E12	
3251 D12	
3252 E12	
3253 D2	
3254 E12	
3255 E12	
3256 E12	
3257 E12	
3258 E12	
3259 E12	
3260 F12	
3261 E3	
3262 F7	
3263 F7	
3264 F7	
3265 F7	
3266 F7	
3267 F7	
3268 F7	
3269 G7	
3270 F12	
3271 F12	
3272 F12	
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	
3289 H13	

Digital Board Chrysalis F: Audio PLL



TR 17034_001
090304

2300 B3
2301 B4
2302 C1
2303 C1
2304 B4
2305 C1
2306 C1
2308 E1
2310 E2
3300 C1
3301 C4
3302 C5
3303 D2
3304 C4
3305 C4
3306 C5
3307 B6
3311 C5
4004 E7
4006 E6
4300 E8
4301 C4
4302 B6
4303 C4
4304 A7
4305 A8
4309 C4
4310 B8
4311 E5
4312 C8
4313 D8
4314 A7
4316 D8
5300 A4
5302 E2
7300-1 C7
7300-2 D7
7300-3 E6
7300-4 E7
7301 B2
7302 A7
I300 A2
I303 E6
I305 E2
I306 E6

Digital Board Chrysalis F: Chrysalis

	3831	3823
32 MB	-	X
64 MB	X	-

SDRAM

VDD_PNX_PAD

ITU OUT(7:0)

L_D_CTL

7400 PNX7100E

1394 IN

1394 OUT

PCI_AD(31:0)

PCI_CON

PCI/XIO

I2C

DIGITAL VIDEO INTERFACE

VIDEO_OUT

VDD_PNX_ANA

ANALOG VIDEO

PROG SCAN

PROGY OUT0 PROGY OUT1 PROGY OUT2 PROGY OUT3 PROGY OUT4 PROGY OUT5 PROGY OUT6 PROGY OUT7 PROG OUT CLK

PROGC OUT0 PROGC OUT1 PROGC OUT2 PROGC OUT3 PROGC OUT4 PROGC OUT5 PROGC OUT6 PROGC OUT7

MPIO1 BE IRQn MPIO2 1394 IRQn MPIO3 FURORE IRQn MPIO4 MPIO5 VIP ERROR MPIO6 BE DLOAD MPIO7 MUTE LVn MPIO8 1394 CNA MPIO9 BOARD ID 0 MPIO10 BOARD ID 1

PIOS

TEST

GENERAL

DIGITAL AUDIO INTERFACE

UARTS

SDRAM ADDR0 … SDRAM ADDR14

SDRAM DATA0 … SDRAM DATA31

CAS0 CAS1 DQM0 DQM1 DQM2 DQM3 RAS0 RAS1 WE0 WE1 RP CKE HSCKB

BE BCLK BE DAT BE DATO BE FLAG BE SYNC BE V4 BE WCLK — BE-1 — BE_DATA

IDE DD0 … IDE DD15 — IDE — IDE1_DD(15:0)

IDE_CTL

PNX7100 TRST PNX7100 TDI PNX7100 TDO_DSU_TRCO PNX7100 TMS PNX7100 TCK EJTAG RESETn PNX7100 PCST0(0) PNX7100 PCST0(1) PNX7100 PCST0(2) PNX7100 DSU CLK PNX7100 DSU TPC1 PNX7100 PCST1(0) PNX7100 PCST1(1) PNX7100 PCST1(2) — STL21

SDRAM CTRL

EJTAG pitch 1.27 mm (for new versions only)

UART0: DEBUG / SERVICE

UART1: DEV ONLY

UART2: S2B (BASIC ENGINE)

UART3: GATEWAY (ANALOG BOARD)

TR 17035_001 090304

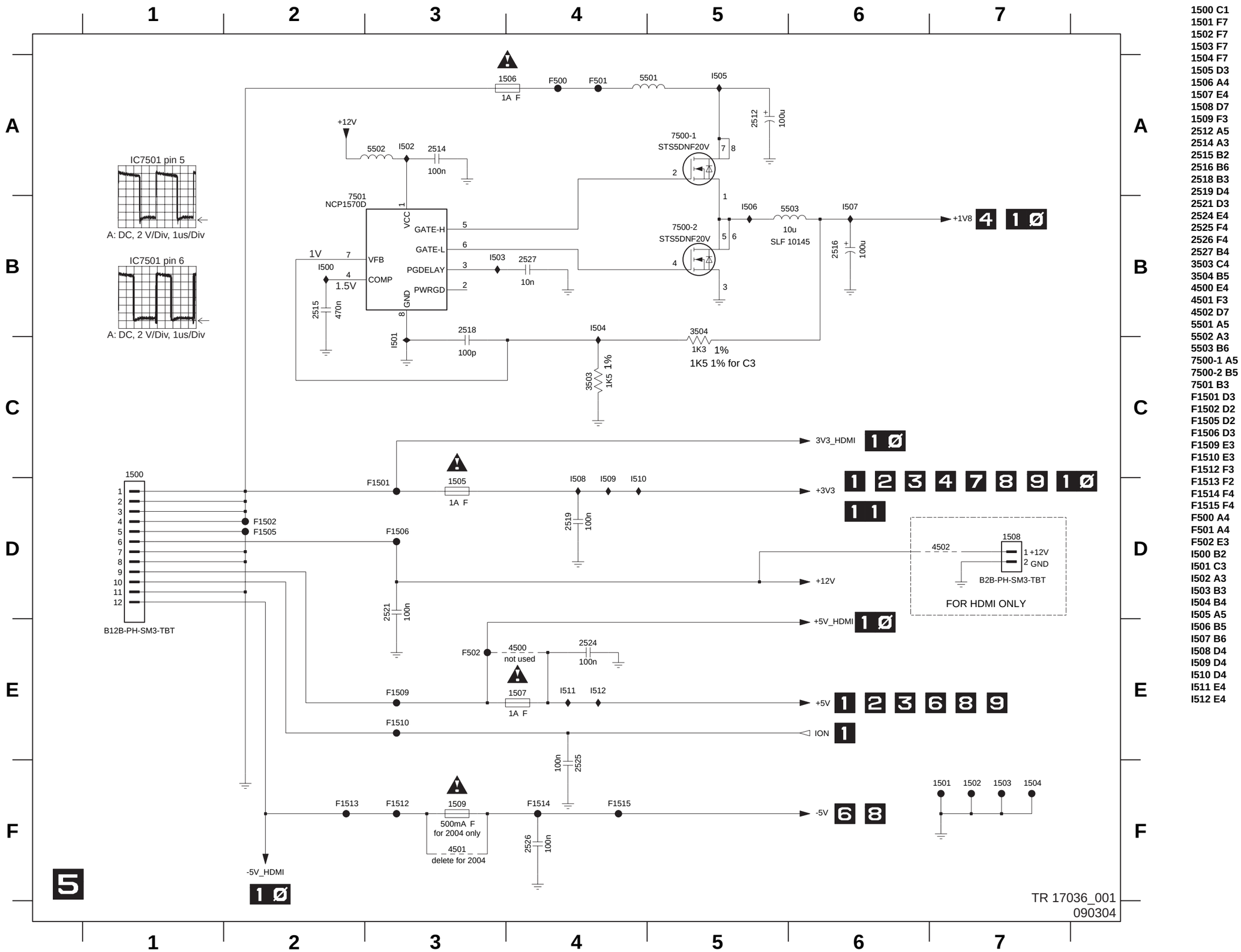
HS_IN — A: DC, 2 V/Div, 10us/Div

VS_IN — A: DC, 1 V/Div, 5ms/Div

IC7402 pin 3, F405 — A: DC, 1 V/Div, 50ns/Div

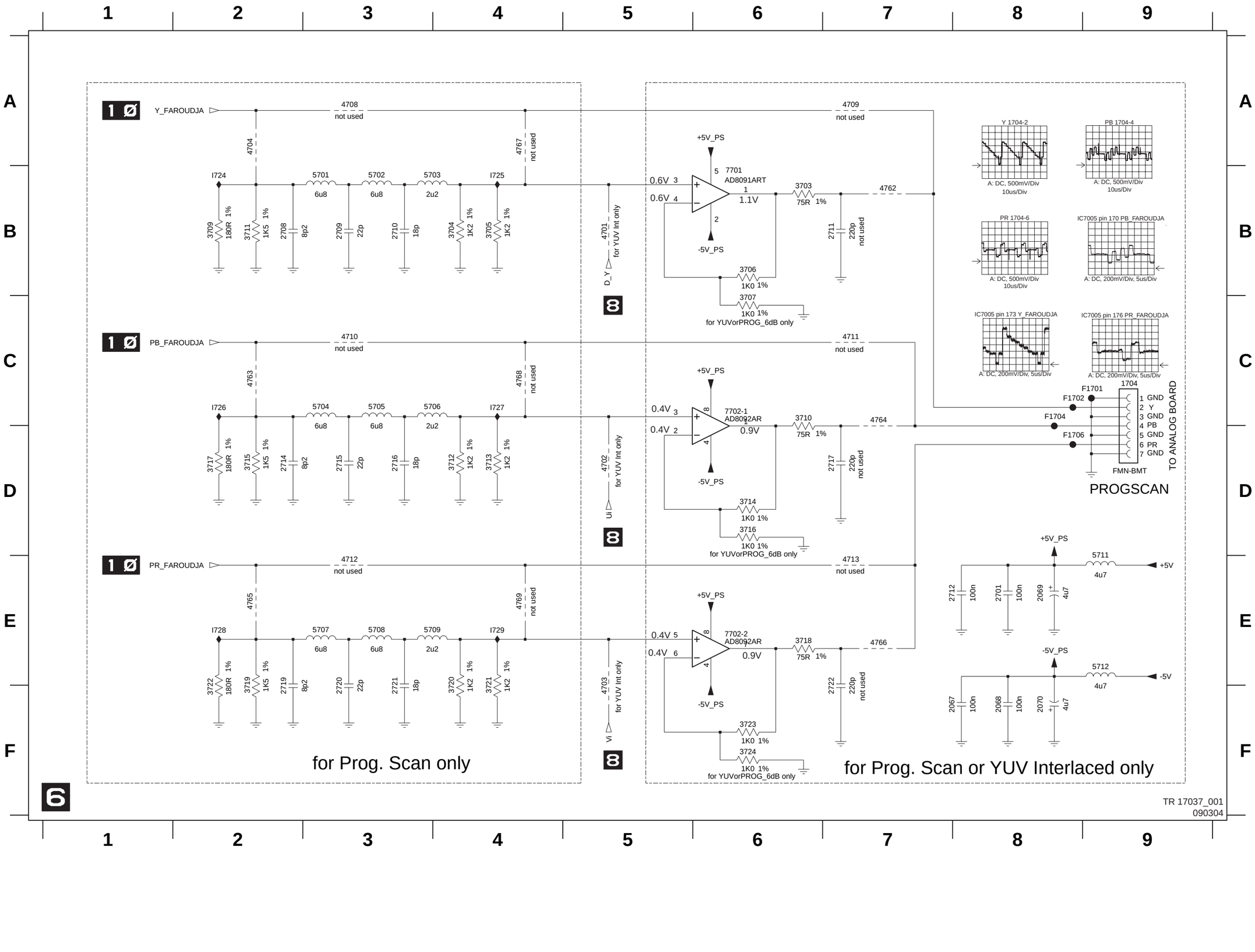
1400 C14	3493 D11	2431 I6	5400 A13
1401 I5	3494 D10	2432 H1	5401 G12
2400 A9	3495 D11	2433 I7	5402 H12
2401 A9	3496 D10	2434 I6	5403 I4
2402 A9	3497 I4	2435 A9	5404 I7
2403 A12	3498 F1	3400 A14	5405 I12
2404 H12	3499 F1	3401 A14	5406 I12
2405 G13	3820 D1	3402 A14	5407 C14
2406 G13	3821 D1	3403 A14	7400 A2
2407 G13	3822 D1	3404 A14	7401 H1
2408 H12	3823 D1	3405 A12	7402 I6
2409 H12	3824 D1	3406 A12	7403 I5
2410 H13	3825 D1	3407 A12	F1401 C14
2411 H13	3826 D1	3408 A12	F1402 C14
2412 H13	3827 D1	3409 A14	F1403 C14
2413 H13	3828 A1	3410 A14	F1405 D14
2414 H13	3829 A1	3411 A14	F1407 D14
2415 H14	3830 B1	3412 A14	F1409 D14
2416 H14	3831 B1	3413 B14	F1411 E14
2417 H14	3832 B1	3414 B14	F1413 E14
2418 I12	3833 B1	3415 B14	F1415 E14
2419 I13	3834 B1	3416 B14	F1417 E14
2420 I12	3835 B1	3417 B14	F1419 F14
2421 I12	3836 D11	3418 B14	F1421 F14
2422 I13	3837 I1	3419 B14	F1423 F14
2423 I13	3838 I1	3420 C14	F1425 G14
2424 I13	3839 I1	3421 C14	F1427 G14
2425 I13	3840 D10	3422 C14	F400 A12
2426 I13	3850 G1	3423 C14	F401 A12
2427 I14	3851 H2	3424 C13	F402 A8
2428 I14	3852 E11	3425 C13	F403 C2
2429 I14	3853 E10	3426 C13	F404 C2
2430 I5	3854 E11	3427 C13	F405 I5
2431 I6	3855 E10	3428 C13	F406 I5
2432 H1	3856 E11	3429 D13	I402 I1
2433 I7	3857 E10	3430 E13	I403 I4
2434 I6	3858 E11	3431 E13	I404 E10
2435 A9	3859 E11	3432 E13	I405 E10
3400 A14	3860 F11	3433 E2	I406 E10
3401 A14	3861 I6	3434 E2	I407 I6
3402 A14	3862 I5	3435 E2	I408 I6
3403 A14	3863 I6	3436 F13	I409 I6
3404 A14	3864 I5	3437 F13	I410 I7
3405 A12	4402 I4	3438 F13	I411 I7
3406 A12	4403 I2	3439 G13	I412 I7
3407 A12	4404 H2	3440 G13	I413 A12
3408 A12	4405 G1	3441 F2	I414 G12
3409 A14	4406 I2	3442 D2	I415 H12
3410 A14	4407 I2	3443 D1	I416 I12
3411 A14	4408 I2	3444 D2	I417 I12
3412 A14	4409 I2	3445 D1	I418 A14
3413 B14	4410 I2	3446 D2	I419 A14
3414 B14	5400 A13	3447 D1	I420 A14
3415 B14	5401 G12	3448 D2	I421 A14
3416 B14	5402 H12	3449 D1	I422 A14
3417 B14	5403 H1	3450 C2	I423 A14
3418 B14	5404 I7	3451 C2	I424 A14
3419 B14	5405 I12	3452 G1	I425 A14
3420 C14	5406 I12	3453 A10	I426 A14
3421 C14	7400 A2	3454 A11	I427 A14
3422 C14	7401 H1	3455 A10	I428 B14
3423 C14	7402 I6	3456 A11	I429 B14
3424 C13	7403 I5	3457 A10	I430 B14
3425 C13	F1401 C14	3458 B11	I431 B14
3426 C13	F1402 C14	3459 B10	I432 B14
3427 C13	F1403 C14	3460 B11	I433 B14
3428 C13	F1405 D14	3461 B10	I434 B14
3429 D13	F1407 D14	3462 B11	I435 C14
3430 E13	F1409 D14	3463 B10	I436 C14
3431 E13	F1411 E14	3464 B11	I437 C14
3432 E13	F1413 E14	3465 B10	I438 A12
3433 E2	F1415 E14	3466 B11	I439 B14
3434 E2	F1417 E14	3467 B10	
3435 E2	F1419 F14		
3436 F13	F1421 F14		
3437 F13	F1423 F14		
3438 F13	F1425 G14		
3439 G13	F1427 G14		
3440 G13	F400 A12		
3441 F2	F401 A12		
3442 D2	F402 A8		
3443 D1	F403 C2		
3444 D2	F404 C2		
3445 D1	F405 I5		
3446 D2	F406 I5		
3447 D1	I402 I1		
3448 D2	I403 I4		
3449 D1	I404 E10		
3450 C2	I405 E10		
3451 C2	I406 E10		
3452 G1	I407 I6		
3453 A10	I408 I6		
3454 A11	I409 I6		
3455 A10	I410 I7		
3456 A11	I411 I7		
3457 A10	I412 I7		
3458 B11	I413 A12		
3459 B10	I414 G12		
3460 B11	I415 H12		
3461 B10	I416 I12		
3462 B11	I417 I12		
3463 B10	I418 A14		
3464 B11	I419 A14		
3465 B10	I420 A14		
3466 B11	I421 A14		
3467 B10	I422 A14		
3468 B10	I423 A14		
3469 B11	I424 A14		
3470 B10	I425 A14		
3471 C11	I426 A14		
3472 C10	I427 A14		
3473 C11	I428 B14		
3474 C10	I429 B14		
3475 C11	I430 B14		
3476 C10	I431 B14		
3477 C11	I432 B14		
3478 C10	I433 B14		
3479 C11	I434 B14		
3480 C10	I435 C14		
3481 C11	I436 C14		
3482 C10	I437 C14		
3483 C11	I438 A12		
3484 C10	I439 A12		
3485 D11			
3486 D10			
3487 D11			
3488 D10			
3489 D11			
3490 D10			
3491 D11			
3492 D10			

Digital Board Chrysalis F: 1.8V Power



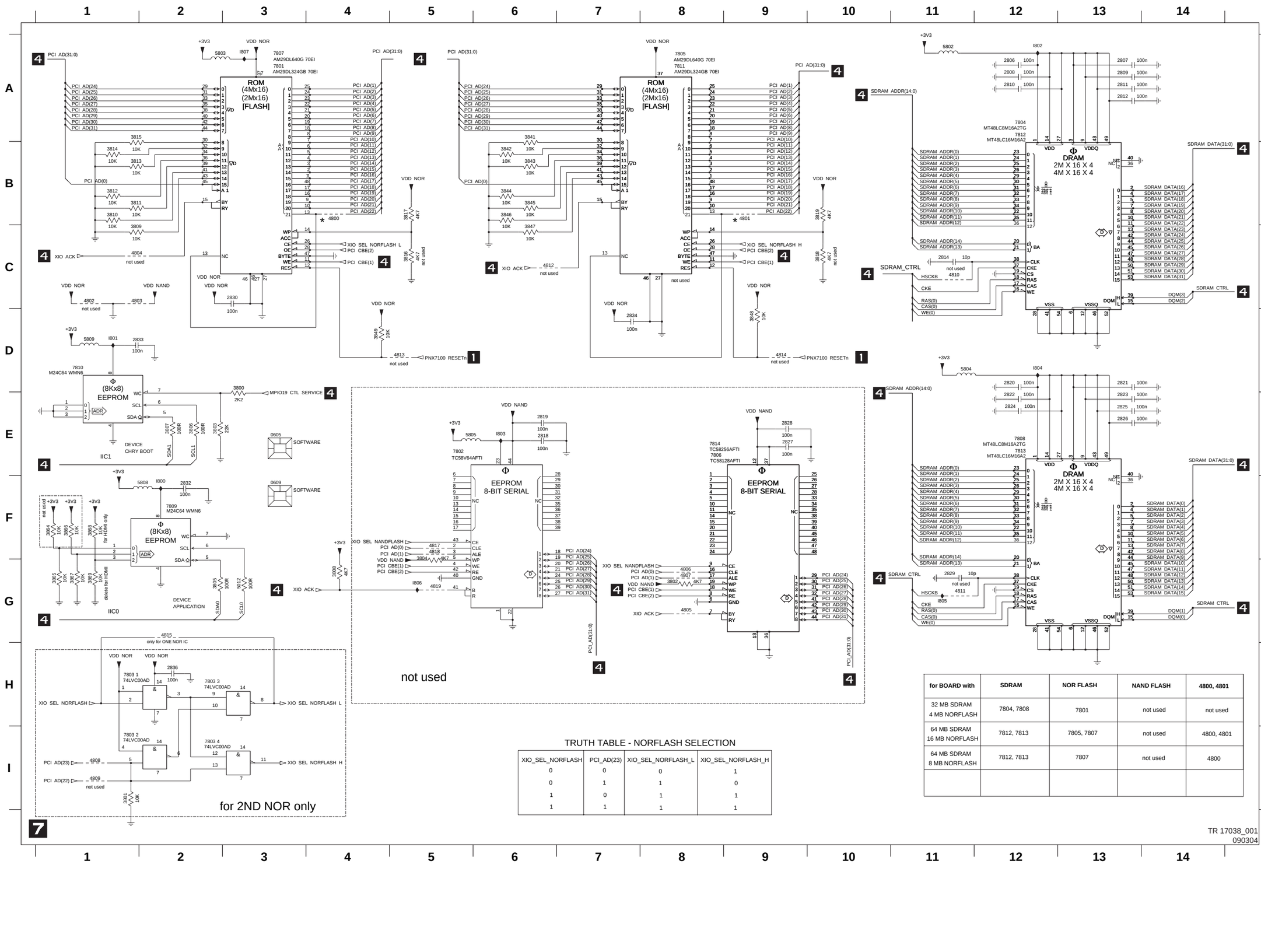
1500 C1
1501 F7
1502 F7
1503 F7
1504 F7
1505 D3
1506 A4
1507 E4
1508 D7
1509 F3
2512 A5
2514 A3
2515 B2
2516 B6
2518 B3
2519 D4
2521 D3
2524 E4
2525 F4
2526 F4
2527 B4
3503 C4
3504 B5
4500 E4
4501 F3
4502 D7
5501 A5
5502 A3
5503 B6
7500-1 A5
7500-2 B5
7501 B3
F1501 D3
F1502 D2
F1505 D2
F1506 D3
F1509 E3
F1510 E3
F1512 F3
F1513 F2
F1514 F4
F1515 F4
F500 A4
F501 A4
F502 E3
I500 B2
I501 C3
I502 A3
I503 B3
I504 B4
I505 A5
I506 B5
I507 B6
I508 D4
I509 D4
I510 D4
I511 E4
I512 E4

Digital Board Chrysalis F: Prog. scan DAC



1704 C9
2067 F8
2068 F8
2069 E8
2070 F8
2701 E8
2708 B2
2709 B3
2710 B3
2711 B7
2712 E8
2714 D2
2715 D3
2716 D3
2717 D7
2719 F2
2720 F3
2721 F3
2722 F7
3703 B6
3704 B4
3705 B4
3706 B6
3707 C6
3709 B2
3710 C6
3711 B2
3712 D4
3713 D4
3714 D6
3715 D2
3716 D6
3717 D2
3718 E6
3719 E2
3720 E4
3721 E4
3722 F2
3723 F6
3724 F6
4701 B5
4702 D5
4703 F5
4704 A2
4708 A3
4709 A7
4710 C3
4711 C7
4712 E3
4713 E7
4762 B7
4763 C2
4764 C7
4765 E2
4766 E7
4767 A4
4768 C4
4769 E4
5701 B3
5702 B3
5703 B3
5704 C3
5705 C3
5706 C3
5707 E3
5708 E3
5709 E3
5711 E9
5712 E9
7701 B6
7702-1 C6
7702-2 E6
F1701 C9
F1702 C8
F1704 C8
F1706 D8
I724 B2
I725 B4
I726 C2
I727 C4
I728 E2
I729 E4

Digital Board Chrysalis F: Flash SDRAM EEPROM



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

for BOARD with	SDRAM	NOR FLASH	NAND FLASH	4800, 4801
32 MB SDRAM 4 MB NORFLASH	7804, 7808	7801	not used	not used
64 MB SDRAM 16 MB NORFLASH	7812, 7813	7805, 7807	not used	4800, 4801
64 MB SDRAM 8 MB NORFLASH	7812, 7813	7807	not used	4800

TR 17038_001
090304

0605 E3
0609 F3
2806 A12
2807 A13
2808 A12
2809 A13
2810 A12
2811 A13
2812 A13
2814 C11
2818 E6
2819 E6
2820 D12
2821 D13
2822 E12
2823 E13
2824 E12
2825 E13
2826 E13
2827 E9
2828 E9
2829 G11
2830 C3
2832 F2
2833 D1
2834 D7
2836 H2
3800 D3
3801 I1
3802 G8
3803 E2
3804 G5
3805 G2
3806 E2
3807 E2
3808 G4
3809 C1
3810 B1
3811 B1
3812 B1
3813 B1
3814 B1
3815 A1
3816 C5
3817 B5
3818 C10
3819 B10
3841 A6
3842 B6
3843 B6
3844 B6
3845 B6
3846 B6
3847 C6
3848 D9
3849 D4
3864 F1
3865 G1
3866 F1
3867 G1
3868 F1
3869 G1
4800 B4
4801 B9
4802 C1
4803 C1
4804 C2
4805 G8
4806 G8
4807 G8
4808 I1
4809 I1
4810 C11
4811 G11
4812 C6
4813 D5
4814 D9
4815 G2
4817 F5
4818 F5
4819 G5
5012 G3
5802 A11
5803 A2
5804 D11
5805 E5
5808 F2
5809 D1
7801 A3
7802 E5
7803-1 H1
7803-2 I1
7803-3 H2
7803-4 I2
7804 A12
7805 A8
7806 E8
7807 A3
7808 E12
7809 F2
7810 D1
7811 A8
7812 A12
7813 E12
7814 E8
I800 F2
I801 D1
I802 A12
I803 E6
I804 D12
I805 G11
I806 G5
I807 A3

Digital Board Chrysalis F: Video IO

VIP_ANALOG_VIDEO_INPUT

V_IN_VIP I934 2900 47n
R_IN_VIP I935 2901 47n
U_IN_VIP I936 2903 47n
B_IN_VIP I937 2904 47n
Y_IN_VIP I938 2905 47n
G_IN_VIP I939 2906 47n
C_IN_VIP I929 2902 47n I927 3901 180R 1% 3902 909R 1%
CVBS_Y_IN_A I930 2907 47n I928
CVBS_Y_IN_B I931 2908 47n 3905 180R 1%
CVBS_Y_IN_C I932 2909 47n not for I2C 3906 560R 1%
2941 47n for I2C only

CVBS_OUT_B_VIP I933 2911 22n 3908 180R -0.7V
+5V Buffer 2938 100n 7904 BC847B -0.1V 3907 100R
3911 560R 3912 2K2 5V Buffer

CVBS_OUT I905 5908 1u5 I902 3967 100R 0.5V 7907 BC847B -0.1V
3918 75R 1% 2914 270p 2915 270p 3934 75R 1% 3919 1K0 5V Buffer

Y_OUT I906 5910 1u5 I903 3958 100R 0.5V 7908 BC847B -0.1V
3924 75R 1% 2926 270p 2927 270p 3936 75R 1% 3926 1K0 5V Buffer

C_OUT I907 5912 1u5 I904 3969 100R 0.5V 7911 BC847B 0V
3930 75R 1% 2935 270p 2936 270p 3938 75R 1% 3931 1K0 5V Buffer

VIDEO_OUT

R_OUT I921 5907 1u5 I922
G_OUT I923 5911 1u5 I924
B_OUT I925 5913 1u5 I926
3920 75R 1% 2916 270p 2917 270p 3935 75R 1%
3927 75R 1% 2928 270p 2929 270p 3937 75R 1%
3932 75R 1% 2937 270p 2938 270p 3939 75R 1%

4904 only for EU or NAFTA & C3
3941 750R 1% 3942 1K5 1% 3943 6K8 1% 3944 5K6 1% 3945 4K7 1% 3947 4K7 1% 3946 1K0 1%
7910 1 AD8092AR
only for NAFTA & C1 or YUV Interlaced
4906 only for NAFTA & C1
2913 100n 3960 100R 0.4V 7906 BC847B -0.3V 3921 1K0 5V Buffer

2925 100n 3961 100R 0.4V 7909 BC847B -0.3V 3928 1K0 5V Buffer
only for EU or NAFTA&C3

4905 only for EU or NAFTA & C3
3948 750R 1% 3949 1K5 1% 3950 1K5 1% 3951 1K5 1% 3952 1K2 1% 3953 4K7 1% 3954 1K0 1%
7910 2 AD8092AR
only for NAFTA & C1 or YUV Interlaced
4907 only for NAFTA & C1
2934 100n 3962 100R 0.4V 7912 BC847B -0.3V 3933 1K0 5V Buffer

4903 only for NAFTA &C1

A_VR I908
A_UB I910
A_YG I911
A_C I900
A_YCVBS I901
D_CVBS I912
D_Y I913
D_C I914
D_VR I915
D_YG I916
D_UB I917
1904 FMN BMT

DIGITAL_AUDIO
SCKE_IN 3909 68R
WSE_IN 3910 68R
SDE_IN 3913 22R
7900 74LVC1G04GW FSCLKE_IN 5905 3914 68R 4911 not used
SCK012_OUT 5906 3087 47R
WS012_OUT 5909 3916 47R
SD0_OUT 5914 3917 47R
7901 74LVC1G04GW FSCLK012_OUT 5915 3922 68R
A_BCLK F1921
A_WCLK F1920
A_DATA F1918
A_PCMCLK F1916
D_BCLK F1914
D_WCLK F1912
D_DATA0 F1911
D_PCMCLK F1909
D_KILL F1907
1900 FMN BMT
F1922

VDD 125 2918 22p 2919 22p 2920 22p 2921 22p 2922 68p
5901 delete for 2004 I918 2923 10n delete for 2004 3940 not used 3915 4K7 delete for 2004 3923 22K delete for 2004
4902 for 2004 only 7902 PDTC124EU 0V 5.1V
MPIO7_MUTE_LVn 7905 PDTC124EU delete for 2004 3.3V 3925 10K
F1903 F1904 +5V F1902 DAOUT 2944 10n
1901 FMN BMT 4909 for DVDR745 /h5 only 4908 for DVDR755 only 4910
DAIO

SPDIF_OPT_IN 4900
SPDIF_COAX_IN 4901
3926 100K 2942 22p 3804 10K 2943 22p not used

SPDIF_OUT 7903 74HCT1G125GW 2910 100n 5904 3929 56R 3955 1R0 2932 150p 3956 10KR not used

3V3_I2S 5916 +3V3 2930 100n
5V Buffer I919 5902 5V 4u7 2940 100n 2939 4u7
+5V Buffer I920 5903 +5V 4u7 2931 4u7

ANALOG BOARD INTERFACE AUDIO IN/OUT
ANALOG BOARD INTERFACE VIDEO IN/OUT

TR 17039_001 090304

1900	E14	5907	E4
1901	G13	5908	F2
1904	A14	5909	E10
2036	H4	5910	G2
2900	A4	5911	G4
2901	A4	5912	H2
2902	A2	5913	H4
2903	A4	5914	F10
2904	A4	5915	F10
2905	B4	5916	H14
2906	B4	7900	E9
2907	B2	7901	F9
2908	B2	7902	G11
2909	C2	7903	I10
2910	I10	7904	D2
2911	D2	7905	G10
2912	E3	7906	E8
2913	E8	7907	F3
2914	F1	7908	G3
2915	F2	7909	G8
2916	E4	7910-1	E6
2917	E4	7910-2	H7
2918	F11	7911	H3
2919	F11	7912	H8
2920	F11	F1902	G12
2921	F12	F1903	G12
2922	F12	F1904	G12
2923	G9	F1907	F12
2924	G3	F1909	F12
2925	F8	F1911	F12
2926	G1	F1912	E12
2927	G2	F1914	E12
2928	G4	F1916	E12
2929	G4	F1918	D12
2930	H13	F1920	D12
2931	I13	F1921	D12
2932	I12	F1922	E13
2933	H2	I900	B12
2934	H8	I901	B12
2935	I1	I902	E2
2936	I2	I903	G2
2937	H4	I904	H2
2938	D2	I905	E1
2939	I13	I906	G1
2940	I13	I907	H1
2941	C4	I908	A12
2942	I11	I909	B14
2943	I11	I910	A12
2944	G13	I911	A12
3087	E10	I912	B12
3901	A2	I913	C12
3902	A2	I914	C12
3903	I11	I915	C12
3904	I11	I916	C12
3905	B2	I917	D12
3906	C2	I918	G9
3907	D3	I919	H13
3908	D2	I920	I13
3909	D10	I921	E4
3910	D11	I922	E5
3911	D2	I923	F4
3912	D2	I924	F5
3913	D10	I925	H4
3914	E11	I926	H5
3915	G10	I927	A2
3916	E11	I928	B2
3917	F10	I929	A1
3918	F1	I930	B1
3919	F3	I931	B1
3920	E4	I932	C1
3921	E8	I933	D1
3922	F10	I934	A3
3923	G11	I935	A3
3924	G1	I936	A3
3925	H9	I937	A3
3926	G3	I938	B3
3927	G4	I939	B3
3928	G8		
3929	I11		
3930	I1		
3931	I3		
3932	H4		
3933	H8		
3934	F2		
3935	E5		
3936	G2		
3937	G5		
3938	I2		
3939	H5		
3940	G9		
3941	E6		
3942	E6		
3943	E5		
3944	E6		
3945	F6		
3946	F6		
3947	F6		
3948	H6		
3949	H6		
3950	H5		
3951	H6		
3952	H5		
3953	H6		
3954	H6		
3955	I12		
3956	I12		
3957	F2		
3958	G2		
3959	H2		
3960	E7		
3961	G7		
3962	H8		
4900	H12		
4901	H12		
4902	G10		
4903	D7		
4904	D6		
4905	G6		
4906	E7		
4907	H7		
4908	G13		
4909	G13		
4910	G13		
4911	E10		
5901	G9		
5902	H14		
5903	I14		
5904	I10		
5905	E10		
5906	E10		

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

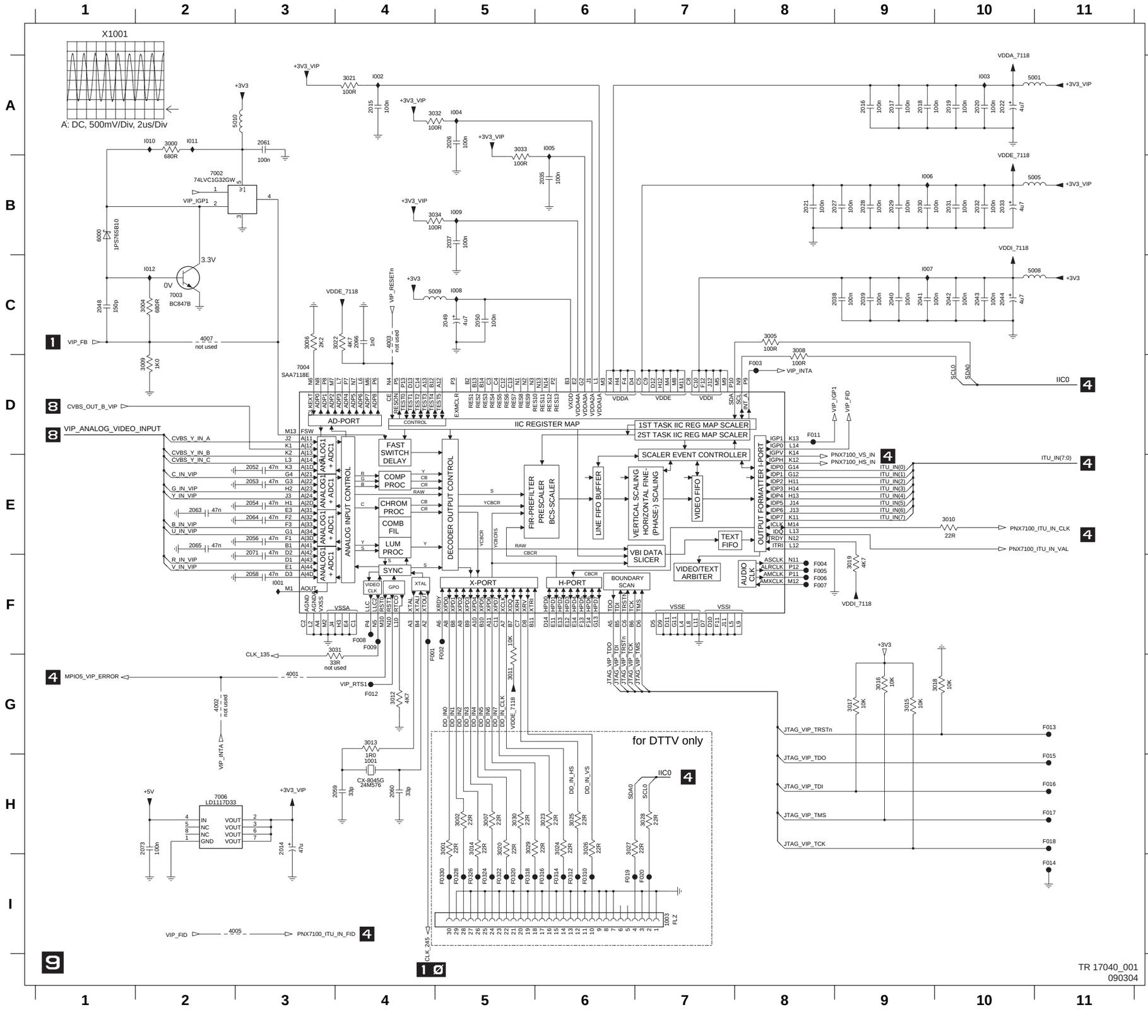
D_C 1904-7
A: DC, 200mV/Div
10us/Div

D_VR 1904-5
A: DC, 200mV/Div
10us/Div

D_YG 1904-3
A: DC, 200mV/Div
10us/Div

D_UB 1904-1
A: DC, 200mV/Div
10us/Div

Digital Board Chrysalis F: VIPs



1001 H4	I002 A4	2025 A10	I010 A2
1003 I7	I003 A10	2026 A5	I011 A2
2014 H3	I004 A5	2027 B9	I012 C2
2015 A4	I005 A6	2028 B9	
2016 A9	I006 B9	2029 B9	
2017 A9	I007 C9	2030 B9	
2018 A9	I008 C5	2031 B10	
2019 A10	I009 B5	2032 B10	
2020 A10	I010 A2	2033 B10	
2021 B8	I011 A2	2035 B6	
2022 A10	I012 C2	2037 B5	
		2038 C9	
		2039 C9	
		2040 C9	
		2041 C9	
		2042 C10	
		2043 C10	
		2044 C10	
		2048 C1	
		2049 C5	
		2050 C5	
		2052 E3	
		2053 E3	
		2054 E3	
		2056 E3	
		2058 F3	
		2059 H4	
		2060 H4	
		2061 A3	
		2063 E2	
		2064 E3	
		2065 E2	
		2066 C4	
		2071 F3	
		2073 H2	
		3000 A2	
		3001 H5	
		3002 H5	
		3004 C2	
		3005 C8	
		3006 C3	
		3007 H5	
		3008 C8	
		3009 D2	
		3010 E10	
		3011 G5	
		3012 G4	
		3013 G4	
		3014 H5	
		3015 G9	
		3016 G9	
		3017 G9	
		3018 G10	
		3019 F9	
		3020 H5	
		3021 A4	
		3022 C4	
		3023 H6	
		3024 H6	
		3025 H6	
		3026 H6	
		3027 H6	
		3028 H7	
		3029 H5	
		3030 H5	
		3031 F3	
		3032 A4	
		3033 A5	
		3034 B4	
		4001 G3	
		4002 G2	
		4003 C4	
		4005 I2	
		4007 C2	
		5001 A10	
		5005 B10	
		5008 C10	
		5009 C4	
		5010 A3	
		6000 B1	
		7002 B2	
		7003 C2	
		7004 D3	
		7006 H2	
		F001 F4	
		F002 F5	
		F003 D8	
		F004 F8	
		F005 F8	
		F006 F8	
		F007 F8	
		F008 F4	
		F009 F4	
		F011 D8	
		F012 G4	
		F013 G11	
		F014 I11	
		F015 H11	
		F016 H11	
		F017 H11	
		F018 H11	
		F019 I6	
		F020 I7	
		F0310 I6	
		F0312 I6	
		F0314 I6	
		F0316 I6	
		F0318 I5	
		F0320 I5	
		F0322 I5	
		F0324 I5	
		F0326 I5	
		F0328 I5	
		F0330 I5	
		I001 F3	

Digital Board Chrysalis F: Faroudja

DATA BUS

SDRAM 2M x 32

SDRAM

MT48LC2M32B2TG 6

for PROG. SCAN only

ADDRESS BUS

CONTROL BUS

MISC

POWER

PLL

DAC

VIDEO

HDMI

for HDMI only

IC7005 pin 170 PB_FAROUDJA

A: DC. 200mV/Div. 5us/Div

IC7005 pin 173 Y_FAROUDJA

A: DC, 200mV/Div, 5us/Div

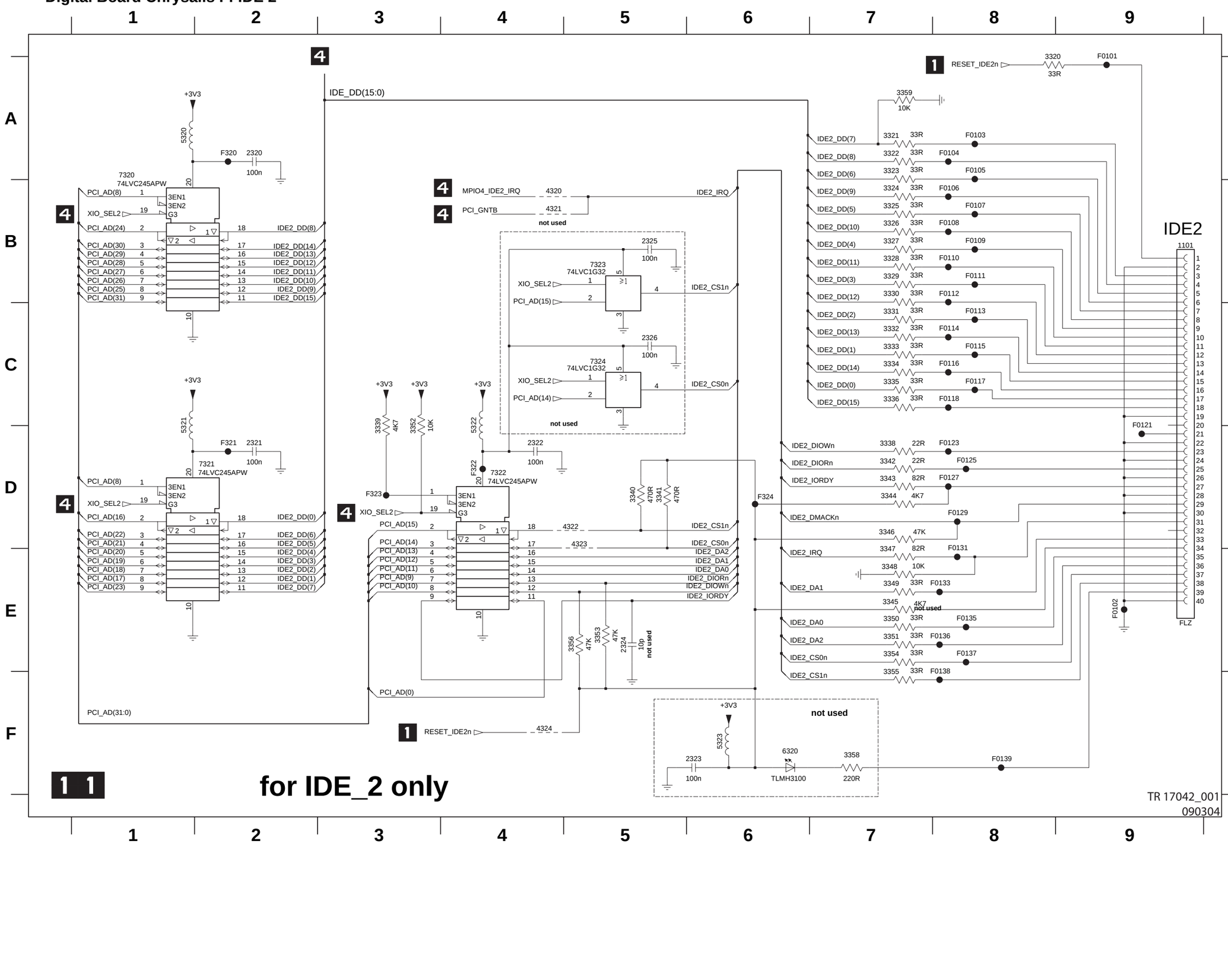
IC7005 pin 176 PR_FAROUDJA

A: DC, 200mV/Div, 5us/Div

TR 17041_001
090304

1004 E14
1725 I1
2023 I12
2702 H12
2703 H13
2704 E13
2725 I5
2726 I5
2727 I5
2728 I5
2729 I6
2730 I6
2732 I6
2738 F10
2739 F10
2740 F10
2742 F10
2744 I1
2745 H1
2746 F5
2747 F5
2748 F5
2749 E3
2750 E3
2751 H2
2753 I7
2754 I7
2755 I7
2756 I8
2757 I8
2758 I8
2759 I8
2760 I9
2761 I9
2762 I7
2763 I12
2764 I12
2765 I12
2766 I12
2767 I13
2768 I13
2769 I13
2770 I13
2771 I14
2772 I14
2773 E13
2774 I10
2775 I10
2776 I10
2777 I10
2778 I10
2779 I11
2780 I11
2781 I11
2782 I11
2784 I9
3691 G13
3692 H13
3693 G13
3694 H13
3695 H13
3696 H13
3697 H13
3700 B7
3701 C6
3702 C7
3708 C6
3725 A1
3726 A1
3727 A1
3728 A1
3729 A1
3730 A1
3731 A1
3732 B1
3733 B1
3734 B1
3735 B1
3736 B1
3737 B1
3738 H5
3739 H6
3740 H6
3741 F5
3742 B1
3743 C1
3744 A6
3745 C1
3746 A7
3747 C1
3748 A6
3749 H2
3750 H4
3751 C1
3752 A7
3753 H4
3754 C1
3755 A6
3756 C1
3757 B7
3758 C1
3759 B6
3760 D1
3761 B7
3762 D1
3763 B6
3764 D1
3765 B7
3766 D1
3767 B6
3768 C7
3769 C6
3770 D1
3773 D1
3774 D1
3775 E1
3776 D7
3777 H5
3778 E1
3779 E1
3780 E1
3781 H6
3782 I2
3783 G2
3784 E13
3785 H6
3786 I2
3791 F1
3792 F2
3793 G1
3794 G2
3797 G13
3798 G13
3799 G13
4784 F4
4785 H2
4786 H2
4787 I2
4788 H14
4789 H14
4792 I1
4794 I1
5002 I12
5725 I5
5726 F10
7005-1 F3
7005-2 G8
7005-3 A9
7005-4 A13
7726 E5
F0402 E14
F0423 G14
F0426 G14
F0427 G14
F0430 G14
F0431 G14
F0434 H14
F0435 H14
F0438 H14
F0439 H14
F725 I5
F726 F10
F727 I2
F728 C12
F729 C12
F730 C12
F731 C12
F732 D12
F733 D12
F734 D12
F735 D12
F736 G4
F737 G4
F738 G4
F739 G4
F740 F4
F741 F4
F742 H2
F743 G4
F744 G4
F747 E4
F748 I7
F749 I10
F750 I12

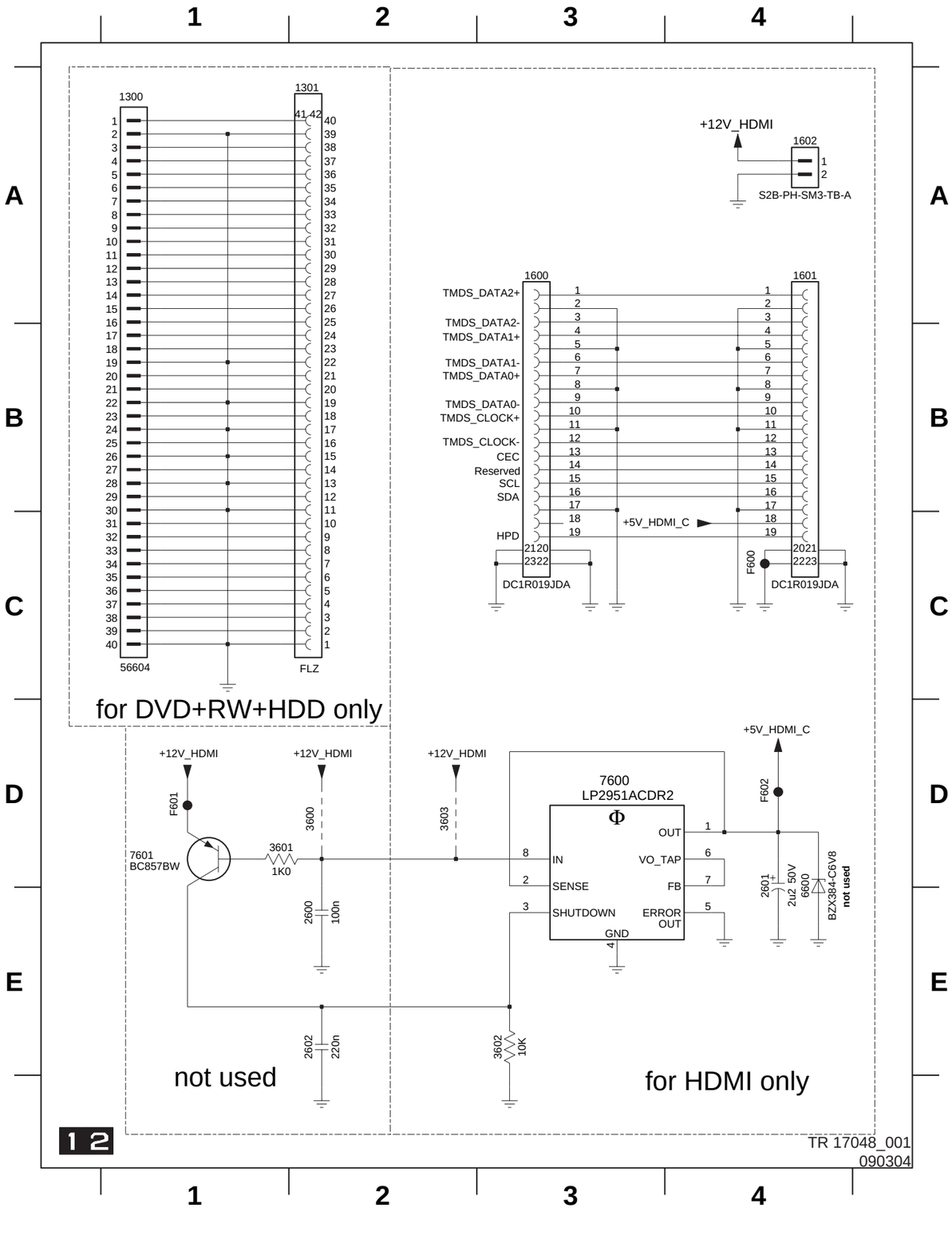
Digital Board Chrysalis F: IDE 2



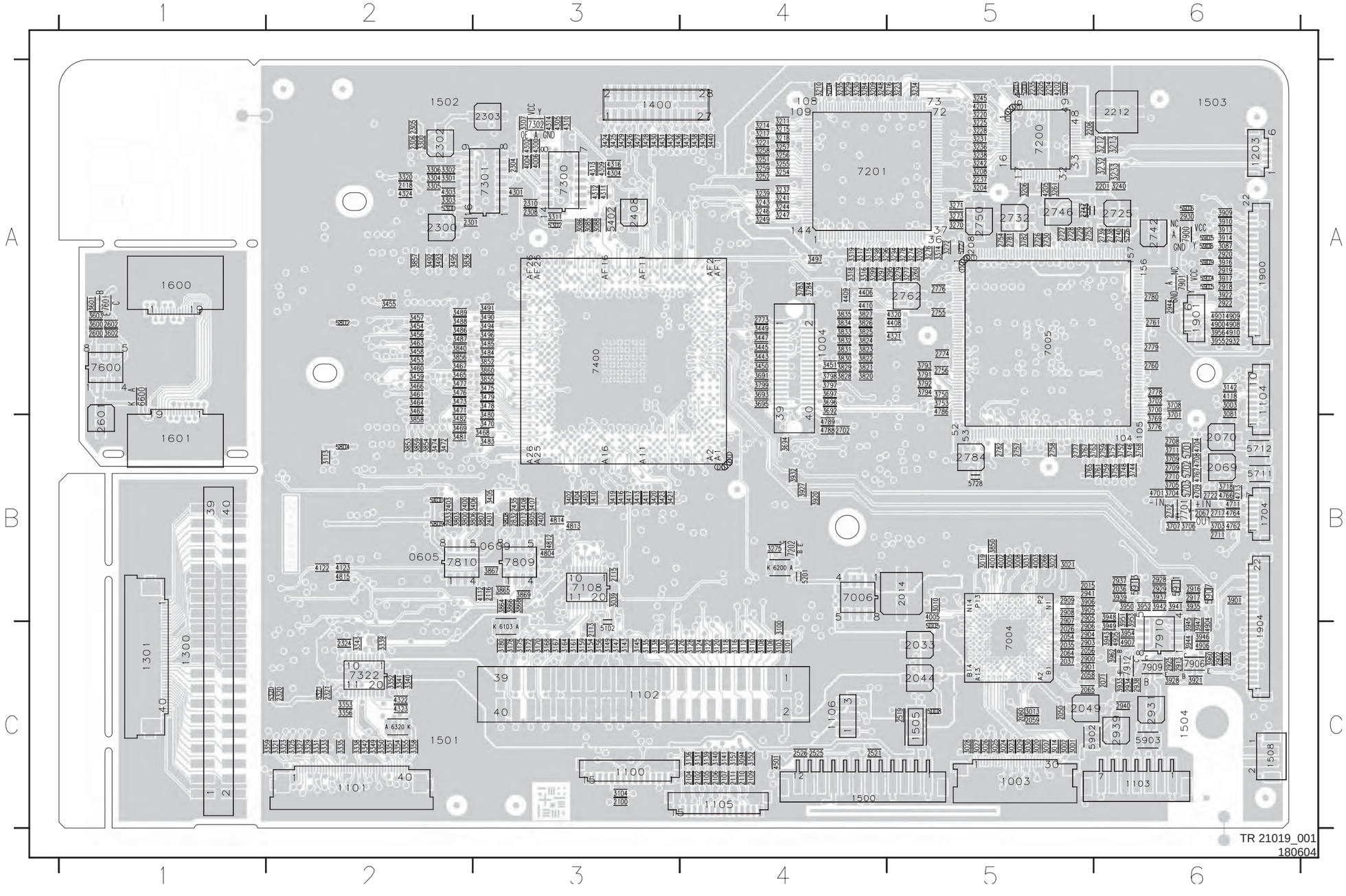
1101	B9	F0116	C8
2320	A2	F0117	C8
2321	D2	F0118	C8
2322	D4	F0121	D9
2323	F6	F0123	D8
2324	E5	F0125	D8
2325	B5	F0127	D8
2326	C5	F0129	D8
3320	A8	F0131	E8
3321	A7	F0133	E8
3322	A7	F0135	E8
3323	A7	F0136	E8
3324	B7	F0137	E8
3325	B7	F0138	F8
3326	B7	F0139	F8
3327	B7	F320	A2
3328	B7	F321	D2
3329	B7	F322	D4
3330	B7	F323	D3
3331	C7	F324	D6
3332	C7		
3333	C7		
3334	C7		
3335	C7		
3336	C7		
3338	D7		
3339	D3		
3340	D5		
3341	D5		
3342	D7		
3343	D7		
3344	D7		
3345	E7		
3346	D7		
3347	E7		
3348	E7		
3349	E7		
3350	E7		
3351	E7		
3352	D3		
3353	E5		
3354	E7		
3355	F7		
3356	E5		
3358	F7		
3359	A7		
4320	B4		
4321	B4		
4322	D5		
4323	D5		
4324	F4		
5320	A1		
5321	C1		
5322	C4		
5323	F6		
6320	F6		
7320	A1		
7321	D1		
7322	D3		
7323	B5		
7324	C5		
F0101	A8		
F0102	E9		
F0103	A8		
F0104	A8		
F0105	A8		
F0106	B8		
F0107	B8		
F0108	B8		
F0109	B8		
F0110	B8		
F0111	B8		
F0112	B8		
F0113	C8		
F0114	C8		
F0115	C8		

Digital Board Chrysalis F: IDE / HDMI Interface

1300 A1 **1600 A3** **1602 A4** **2601 D4** **3600 D2** **3602 E3** **6600 D4** **7601 D1** **F601 D1**
1301 A2 **1601 A4** **2600 E2** **2602 E2** **3601 D1** **3603 D2** **7600 D3** **F600 C4** **F602 D4**



Layout Digital Board Chrysalis F (Top View)



0605	B2	1301	C1	2026	C5	2064	C5	2109	C4	2237	A5	2400	B2	2702	B4	2730	A5	2757	B5	2780	A6	2907	B5	2930	A6
0609	B3	1400	A3	2033	C5	2065	C5	2110	C4	2300	A2	2401	B3	2708	B6	2732	A5	2758	B5	2781	A5	2908	B5	2931	C6
1003	C5	1500	C4	2035	C5	2066	B5	2111	C4	2301	A2	2402	B3	2709	B6	2738	A6	2759	B6	2782	B5	2909	B5	2932	A6
1004	A4	1505	C5	2036	B6	2067	B6	2113	C3	2302	A2	2403	B2	2710	B6	2739	A6	2760	A6	2784	B5	2913	C6	2934	C6
1100	C3	1508	C6	2037	C5	2069	B6	2115	B3	2303	A3	2408	A3	2711	B6	2740	A6	2761	A6	2832	B3	2916	B6	2937	B6
1101	C2	1600	A1	2044	C5	2070	B6	2116	B3	2304	A3	2435	B3	2712	B6	2742	A6	2762	A5	2833	B2	2917	B6	2938	C6
1102	C3	1601	B1	2049	C5	2071	C6	2118	A2	2305	A2	2519	C5	2717	B6	2746	A5	2773	A4	2900	C5	2918	A6	2939	C6
1103	C6	1704	B6	2050	C5	2100	C3	2201	A6	2306	A2	2521	C4	2722	B6	2747	A5	2774	A5	2901	C5	2919	A6	2940	C6
1104	A6	1900	A6	2054	C5	2102	C4	2204	A5	2308	A3	2525	C4	2725	A6	2750	A5	2775	B5	2902	C6	2920	A6	2941	B5
1105	C4	1901	A6	2056	C5	2104	C4	2205	A5	2310	A3	2526	C4	2726	A5	2753	A5	2776	A5	2903	C5	2922	A6	2944	A6
1106	C4	1904	C6	2058	C5	2105	C4	2206	A5	2320	C2	2600	A1	2727	A5	2754	A5	2777	B5	2904	C5	2925	C6	3001	C5
1203	A6	2014	B5	2059	C5	2106	C4	2212	A6	2321	C2	2601	B1	2728	A5	2755	A5	2778	A6	2905	B5	2928	B6	3002	C5
1300	C1	2015	B5	2060	C5	2107	C4	2235	A5	2324	C2	2602	A1	2729	A5	2756	A5	2779	A6	2906	C5	2929	B6	3003	A6

3005	B5	3026	C5	3100	C4	3124	C4	3143	C3	3170	C3	3213	A6	3231	A5	3244	A4	3420	B3	3707	B6	3311	A3	3471	A2
3007	C5	3027	C5	3101	C4	3126	C4	3145	C3	3172	C3	3214	A4	3232	A6	3245	A5	3421	B3	3708	A6	3314	A5	3472	B2
3008	B5	3028	C5	3103	C4	3128	C4	3147	C3	3175	C3	3215	A4	3233	A6	3246	A4	3423	B3	3709	B6	3315	A4	3473	A2
3010	B5	3029	C5	3104	C3	3130	C3	3149	C3	3178	C3	3216	A5	3234	A5	3247	A4	3424	A3	3711	B6	3316	A4	3474	B2
3013	C5	3030	C5	3106	C4	3131	C4	3152	C4	3180	C3	3217	A4	3235	A4	3248	A4	3425	A3	3718	B6	3317	A4	3475	A3
3014	C5	3031	B5	3108	C4	3133	C3	3154	C3	3202	A5	3218	A4	3236	A5	3249	A4	3426	A3	3744	B6	3318	A4	3476	A2
3019	B5	3039	B3	3110	C4	3135	C3	3156	C3	3204	A5	3220	A5	3237	A4	3251	A4	3427	A3	3746	B6	3319	A4	3477	A2
3020	C5	3081	A6	3112	C4	3136	C4	3157	C4	3206	A5	3221	A4	3238	A5	3252	A4	3428	A3	3748	B6	3320	A2	3478	A3
3021	B5	3085	A3	3113	B2	3138	C3	3159	C3	3208	A5	3223	A5	3239	A4	3254	A4	3429	A3	3750	A5	3321	C2	3479	A3
3022	B5	3086	A3	3116	C4	3139	C4	3161	C3	3209	A4	3225	A5	3240	A6	3255	A4	3430	A3	3752	B6	3323	C2	3480	B3
3023	C5	3087	A6	3118	C4	3140	C4	3164	C3	3210	A4	3228	A5	3241	A4	3256	A4	3431	A3	3753	A5	3325	C2	3481	B2
3024	C5	3088	A3	3120	C4	3141	C4	3167	C3	3211	A4	3229	A4	3242	A5	3257	A4	3432	A3	3755	B6	3327	C2	3482	B2
3025	C5	3094	C4	3122	C4	3142	A6	3168	C3	3212	A6	3230	A4	3243	A4	3258	A4	3436	A3	3757	B6	3329	C2	3483	B3
																3259	A4	3437	A4	3759	B6	3331	C2	3484	A3
																3260	A5	3438	A4	3761	B6	3333	C2	3485	A3
																3261	A5	3439	A4	3763	B5	3335	C2	3486	A2
																3270	A5	3440	A4	3765	B5	3338	C2	3487	A2
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Layout Digital Board Chrysalis F (Bottom View)

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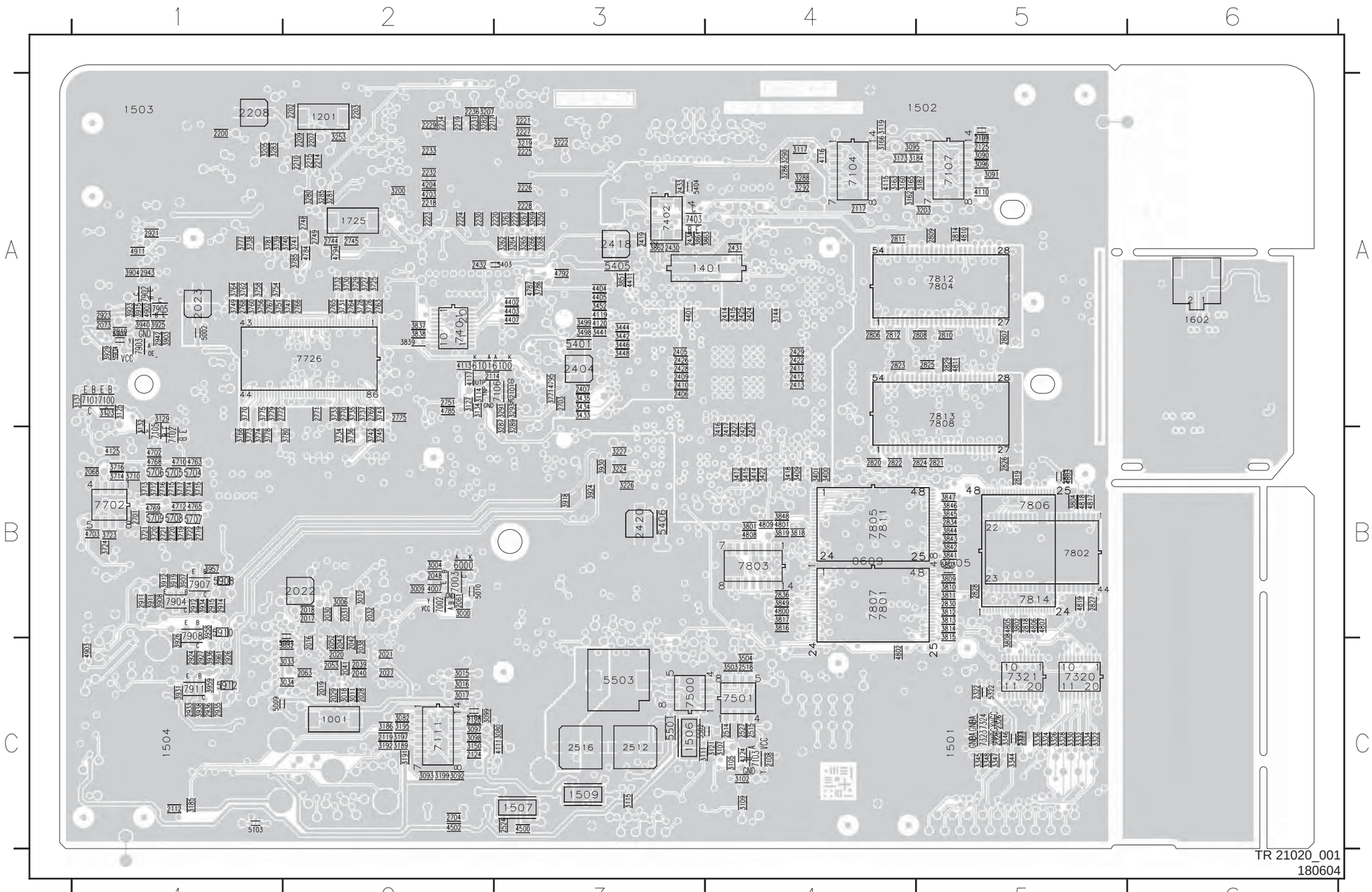
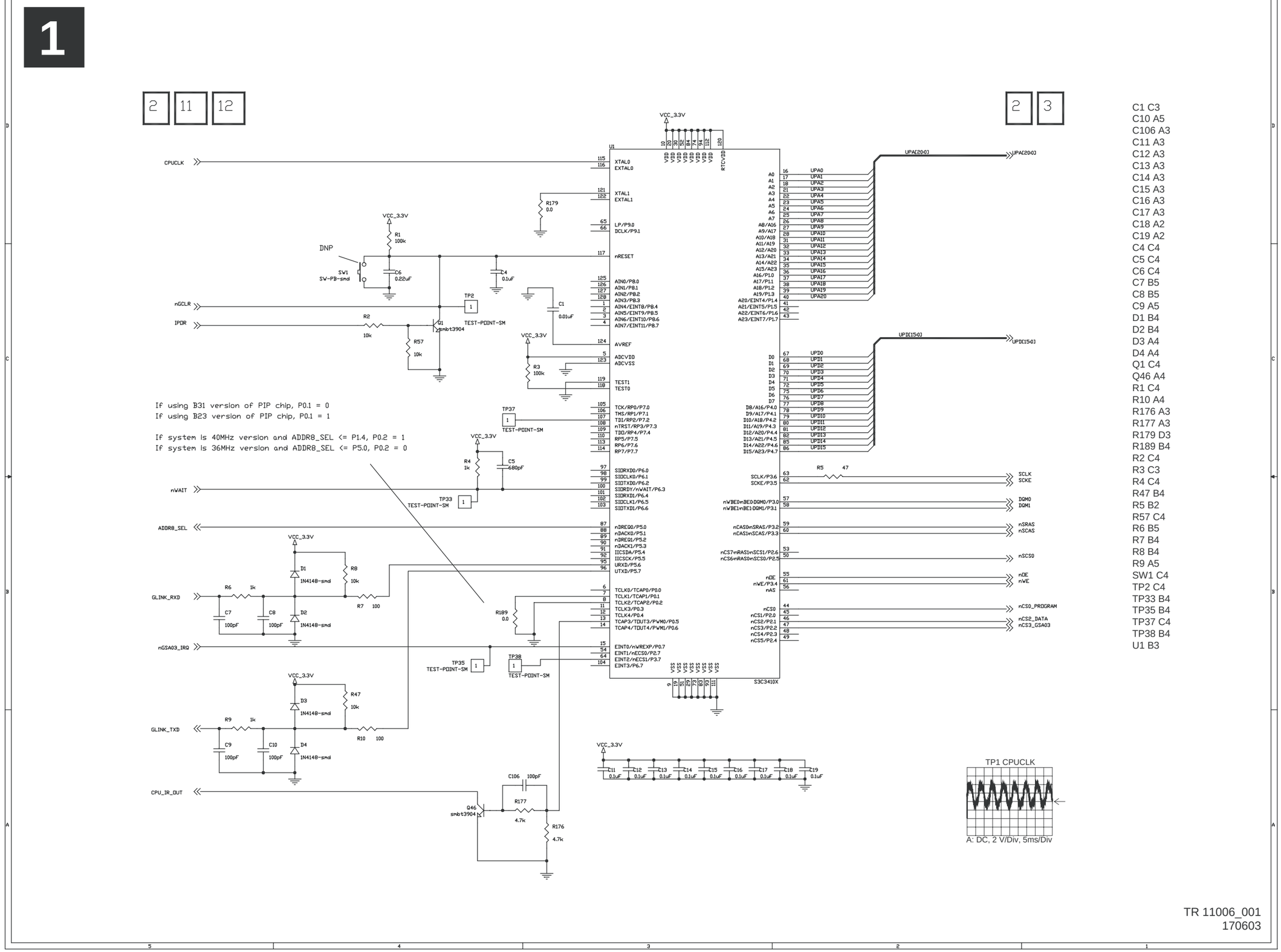


EPG Board: MCU



C1 C3
C10 A5
C106 A3
C11 A3
C12 A3
C13 A3
C14 A3
C15 A3
C16 A3
C17 A3
C18 A2
C19 A2
C4 C4
C5 C4
C6 C4
C7 B5
C8 B5
C9 A5
D1 B4
D2 B4
D3 A4
D4 A4
Q1 C4
Q46 A4
R1 C4
R10 A4
R176 A3
R177 A3
R179 D3
R189 B4
R2 C4
R3 C3
R4 C4
R47 B4
R5 B2
R57 C4
R6 B5
R7 B4
R8 B4
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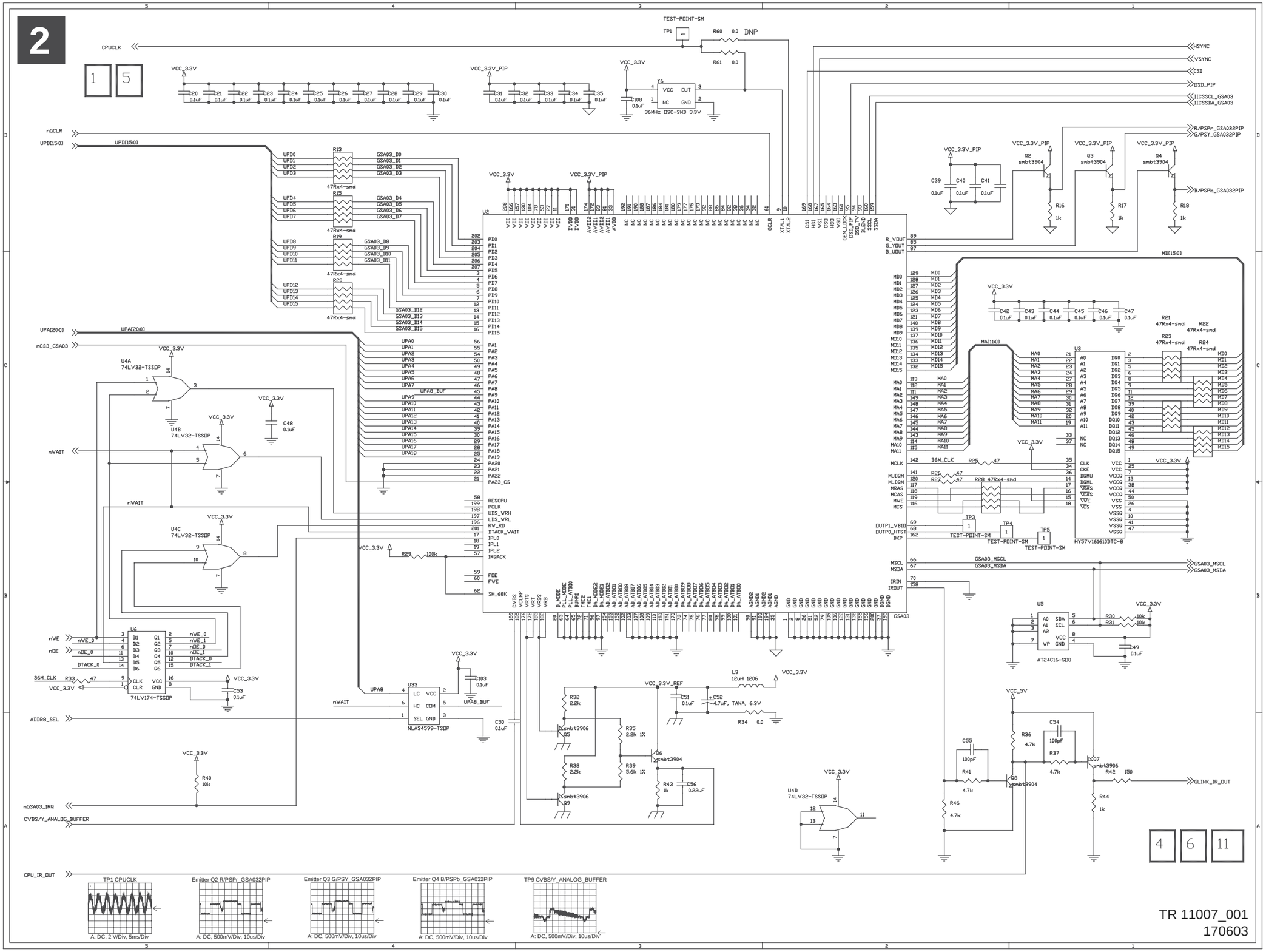
SW1 C4
TP2 C4
TP33 B4
TP35 B4
TP37 C4
TP38 B4
U1 B3

EPG Board: GSA03



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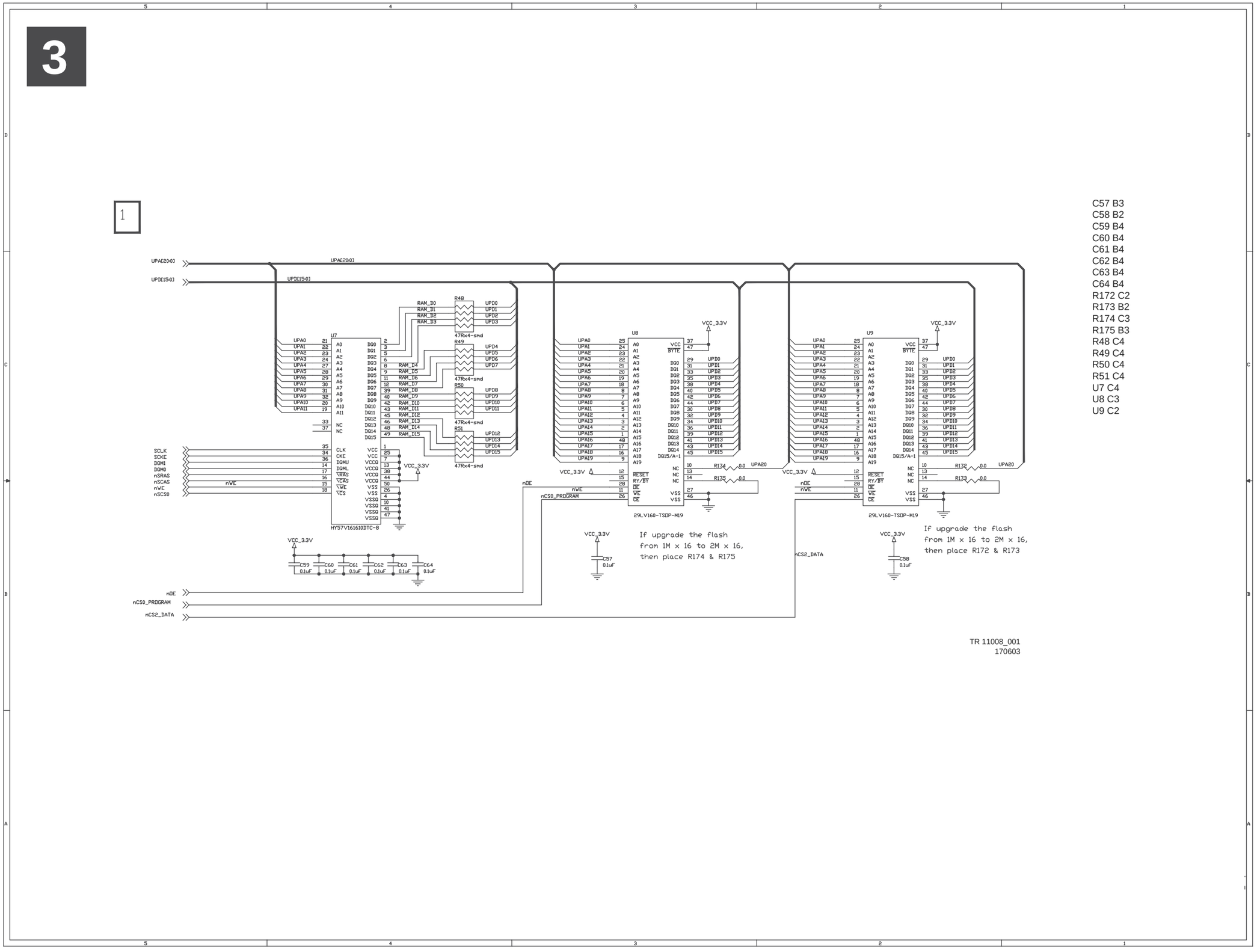
C106 D3
C20 D5
C21 D5
C22 D5
C23 D5
C24 D4
C25 D4
C26 D4
C27 D4
C28 D4
C29 D4
C30 D4
C32 D3
C33 D3
C34 D3
C35 D3
C39 D2
C40 D2
C41 D2
C42 C2
C43 C1
C44 C1
C45 C1
C46 C1
C47 C1
C48 C4
C49 B1
C50 A3
C51 B3
C52 B3
C53 B5
C54 A1
C55 A2
C56 A3
L3 B3
Q2 D1
Q3 D1
Q4 D1
Q5 A3
Q6 A3
Q7 A1
Q8 A1
Q9 A3
R13 D4
R15 D4
R16 D1
R17 D1
R18 D1
R21 C1
R22 C1
R23 C1
R24 C1
R25 C2
R26 B2
R27 B2
R28 B2
R29 B4
R30 B1
R31 B1
R32 B3
R33 B5
R34 A3
R35 A3
R36 A1
R37 A1
R38 A3
R39 A3
R40 A5
R41 A2
R42 A1
R43 A3
R44 A1
R46 A2
R60 D3
R61 D3
TP1 D3
TP3 B2
TP4 B2
U2 C3
U3 C1
U33 B4
U4A C5
U4B C5
U4C B5
U4D A2
U5 B1
U6 B5
Y6 D3

EPG Board: Memory



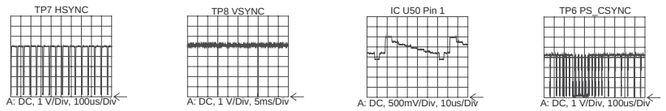
C57 B3
C58 B2
C59 B4
C60 B4
C61 B4
C62 B4
C63 B4
C64 B4
R172 C2
R173 B2
R174 C3
R175 B3
R48 C4
R49 C4
R50 C4
R51 C4
U7 C4
U8 C3
U9 C2

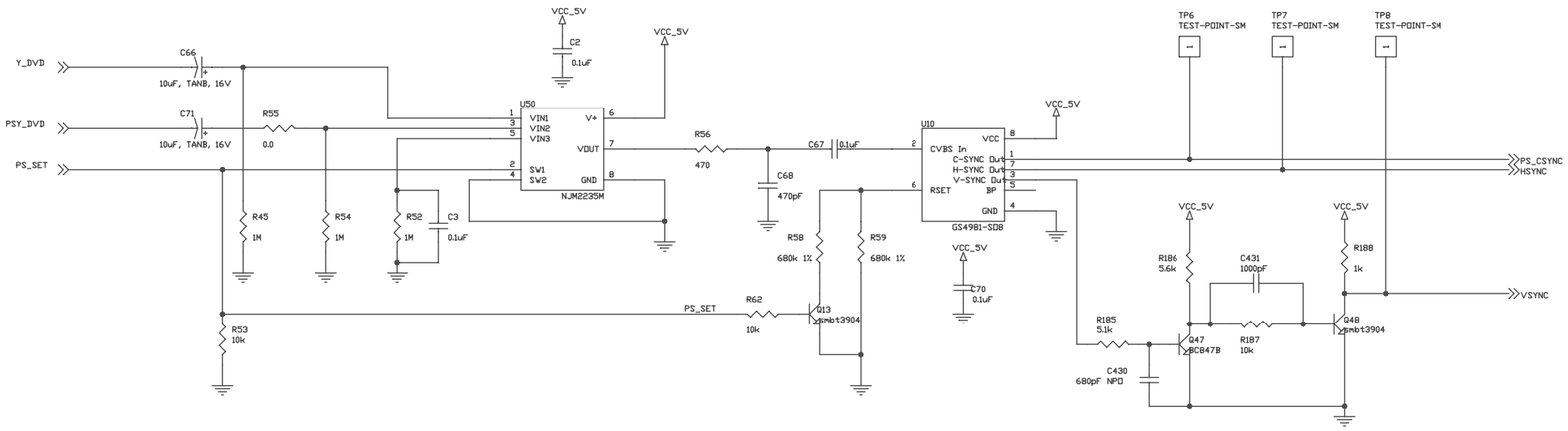
EPG Board: Sync Separator for System

4

6 11 12

3 7 8





C2 C4
C3 C4
C430 B2
C431 B2
C66 C5
C67 C3
C68 C3
C70 B3
C71 C5
Q13 B3
Q47 B2
Q48 B2
R185 B2
R186 B2
R187 B2
R188 B2
R45 C4
R52 C4
R53 B4
R54 C4
R55 C4
R56 C3
R58 B3
R59 B3
R62 B3
TP6 C2
TP7 C2
TP8 C2
U10 C3
U50 C4

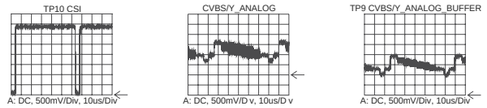
TR 11009_001
170603W

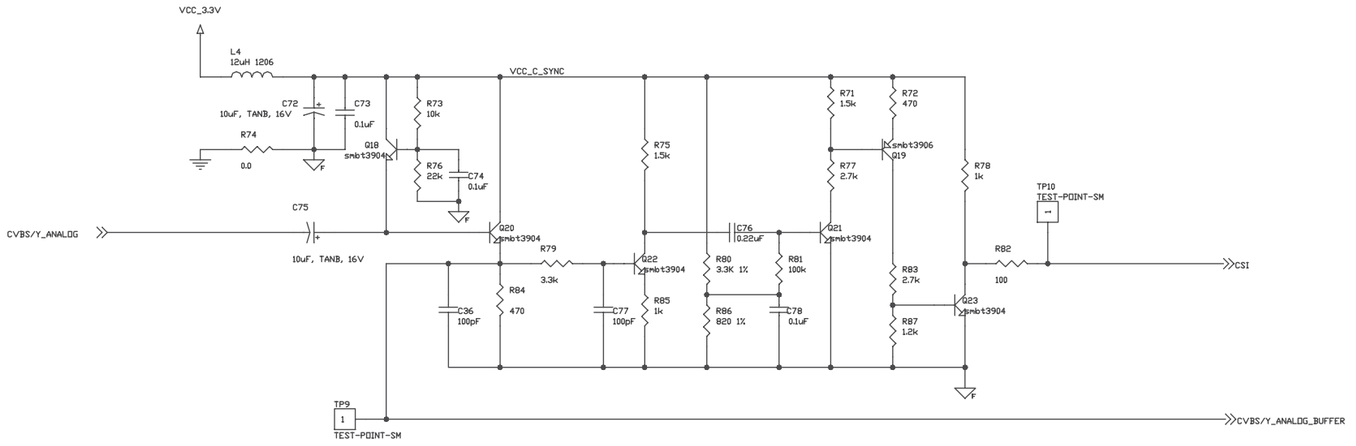
EPG Board: C-Sync Separator for data Capture

5

11

2





TR 11010_001
170603

C36 B3
C72 C4
C73 C4
C74 C3
C75 C4
C76 B3
C77 B3
C78 B3
L4 C4
Q18 C4
Q19 C2
Q20 B3
Q21 B3
Q22 B3
Q23 B2
R71 C3
R72 C2
R73 C4
R74 C4
R75 C3
R76 C4
R77 C3
R78 C2
R79 B3
R80 B3
R81 B3
R82 B2
R83 B2
R84 B3
R85 B3
R86 B3
R87 B2
TP10 C2
TP9 B4

EPG Board: PIP Controller

6

C100 B2	C89 B4	Q26 B2
C101 B3	C90 B4	R100 B4
C102 B3	C91 B3	R88 C4
C200 B4	C92 B2	R89 C4
C201 B4	C93 B3	R90 C4
C202 B3	C94 B2	R91 C2
C79 C4	C95 B4	R92 C2
C80 C4	C96 B3	R93 C2
C81 C4	C97 B4	R94 C4
C82 C4	C98 B4	R95 B2
C83 C4	C99 B4	R96 B2
C84 C4	L15 B4	R97 B4
C85 C2	L5 B2	R98 B2
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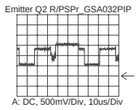
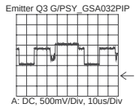
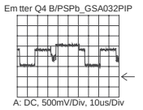
C87 C2	Q24 B2	U11 B3
C88 C4	Q25 B2	Y4 B3

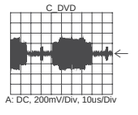
2 3 11

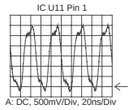
7 8 9 10

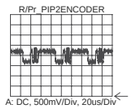


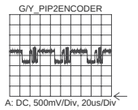


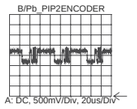


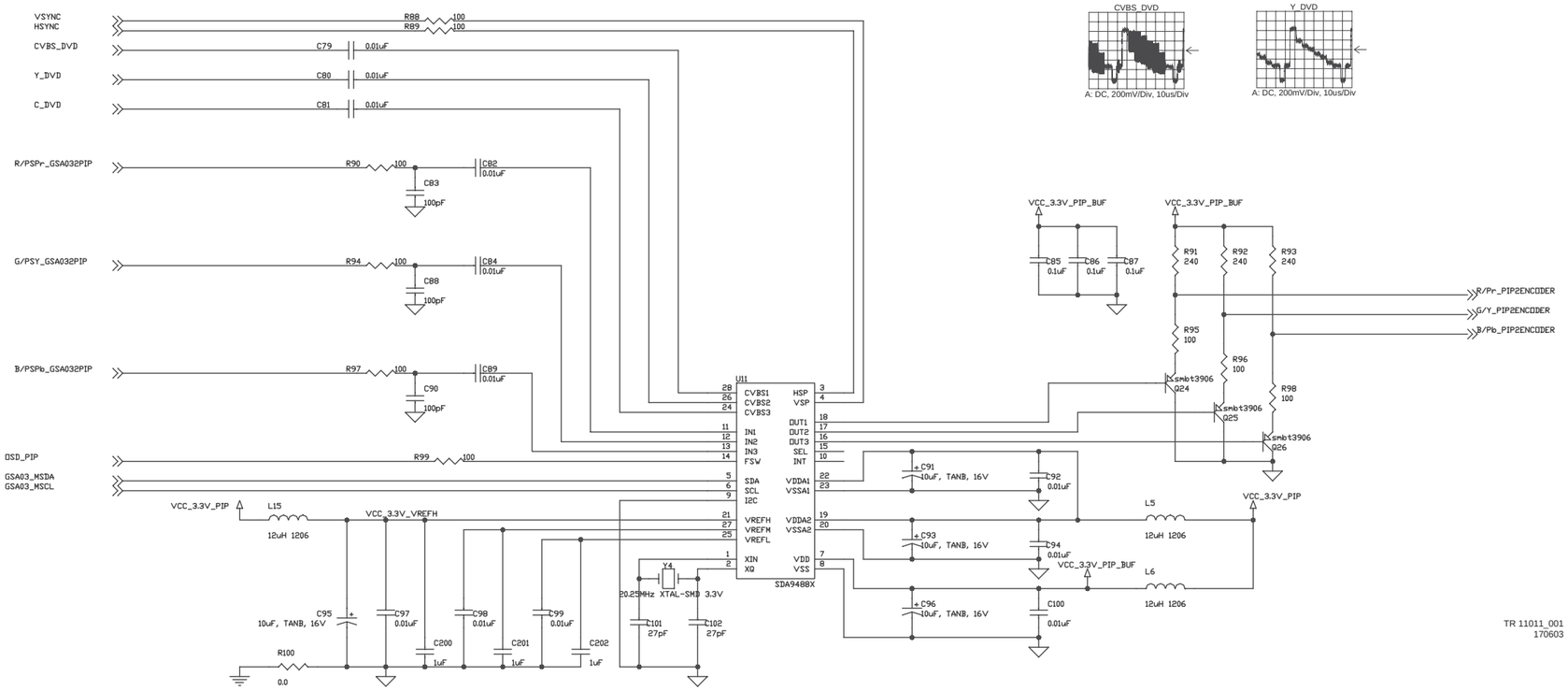












TR 11011_001
170603

EPG Board: Sync Adder for Y

7

2 6 12

C116 C3
C117 C2
C118 B3
C119 B2
C203 C4
Q10 B3
Q27 C3
R101 C3
R102 C3
R104 C3
R105 C3
R106 C3

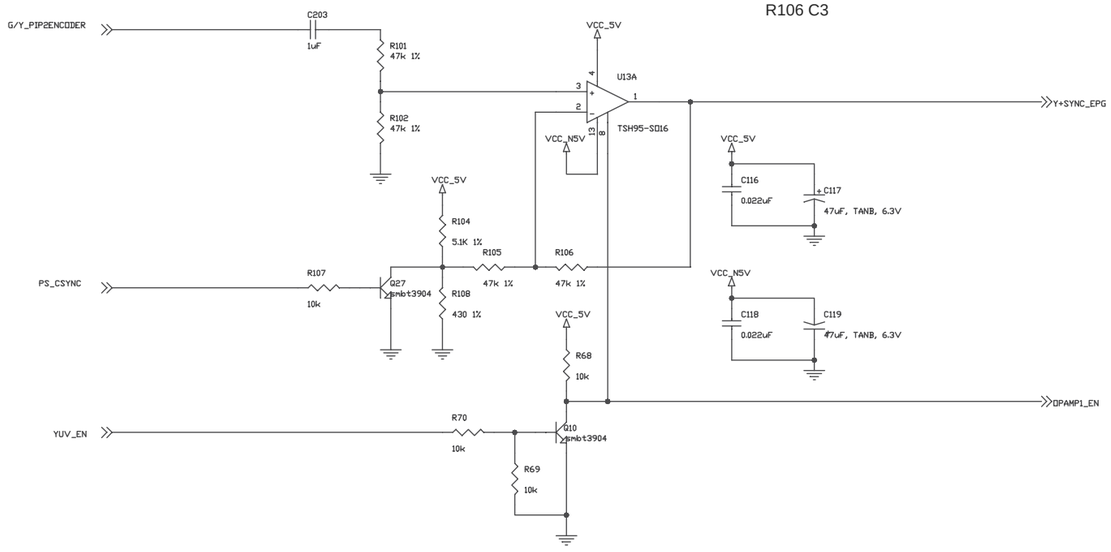
R107 C4
R108 C3
R68 B3
R69 B3
R70 B3
U13 C3

10

TP6 PS_CSYNC
A: DC, 1 V/Div, 100us/Div

G/Y_PIP2ENCODER
A: DC, 500mV/Div, 20us/Div

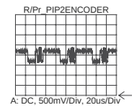
IC U13A Pin 1 Y+SYNC_EPG
A: DC, 500mV/Div, 10us/Div

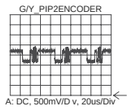


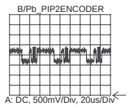
TR 11012_001
170603

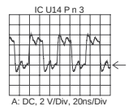
EPG Board: Colour Encoder

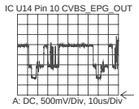
8

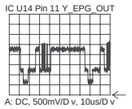


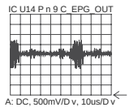


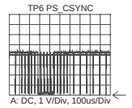








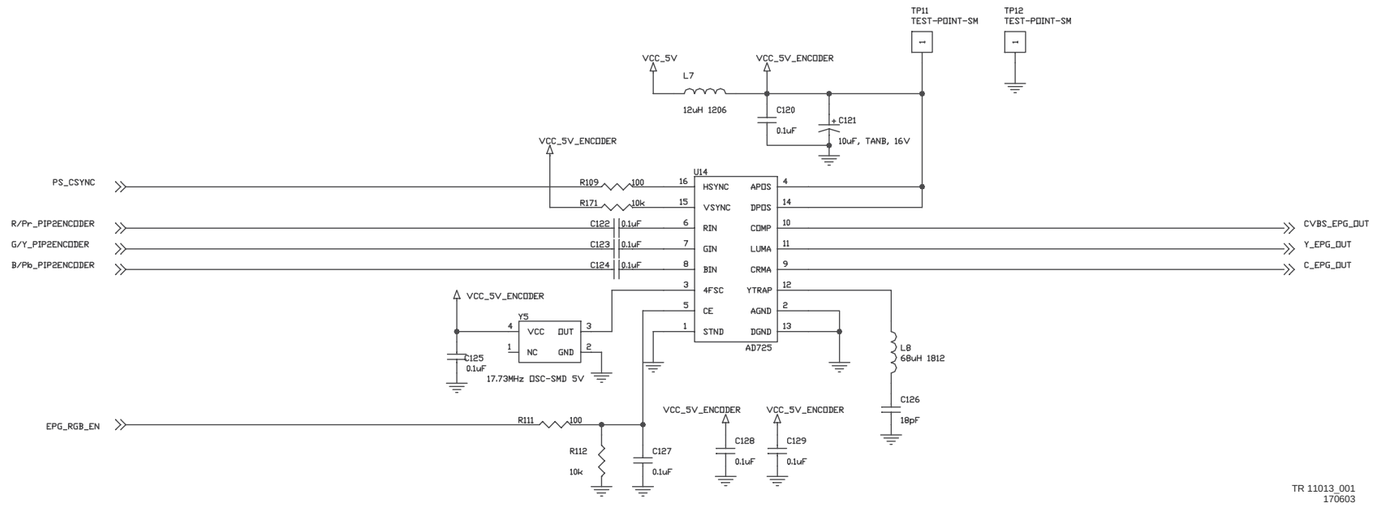




C120 C3
C121 C3
C122 C3
C123 C3
C124 B3
C125 B4
C126 B3
C127 B3
C128 B3
C129 B3
L7 C3
L8 B3
R109 C3
R111 B3
R112 B3
R171 C3
TP11 C3
TP12 C2
U14 C3
Y5 B3

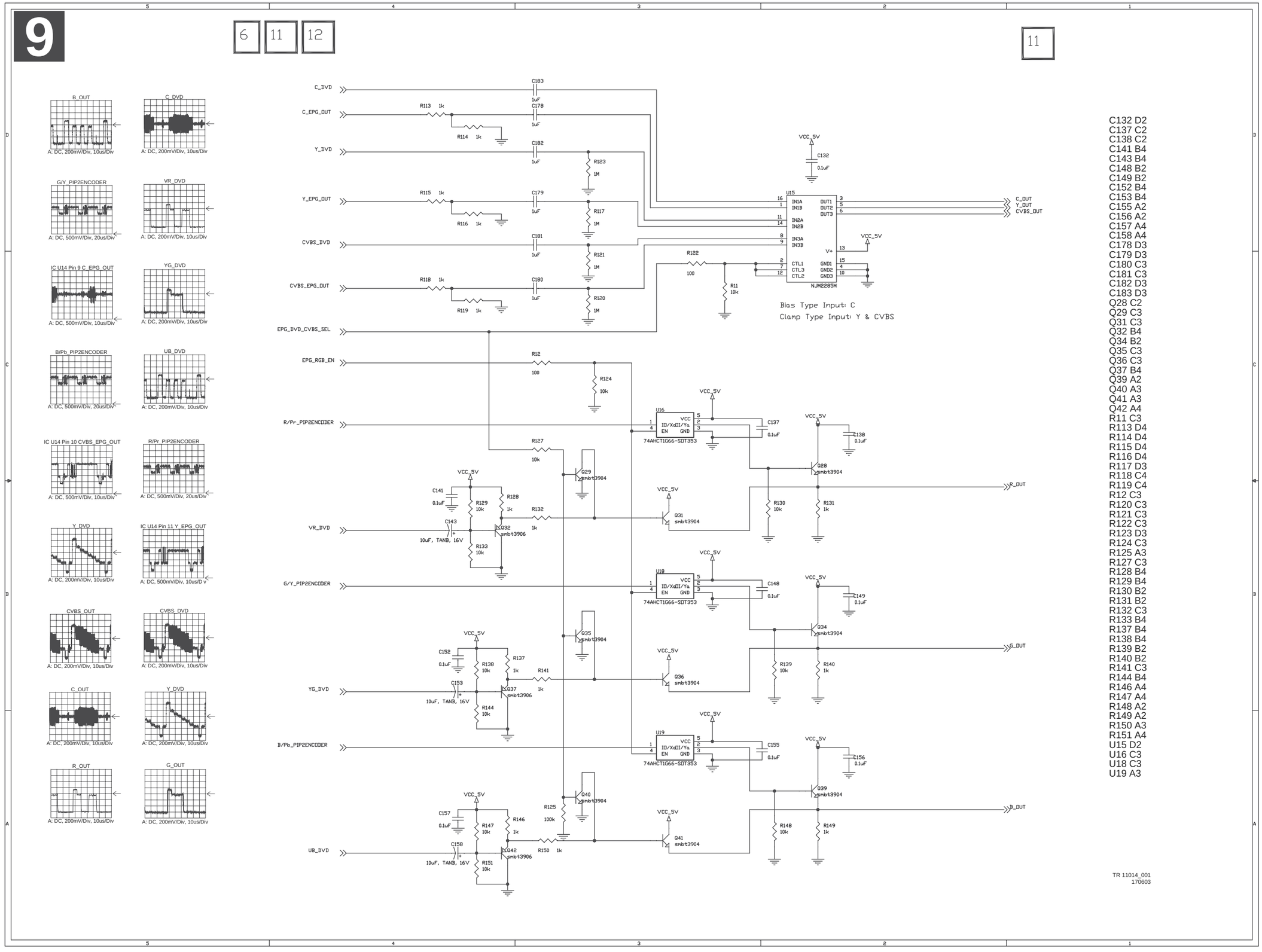
4 6 12

11



TR 11013_001
170603

EPG Board: Analogue Switches for CVBS, Y, C, RGB



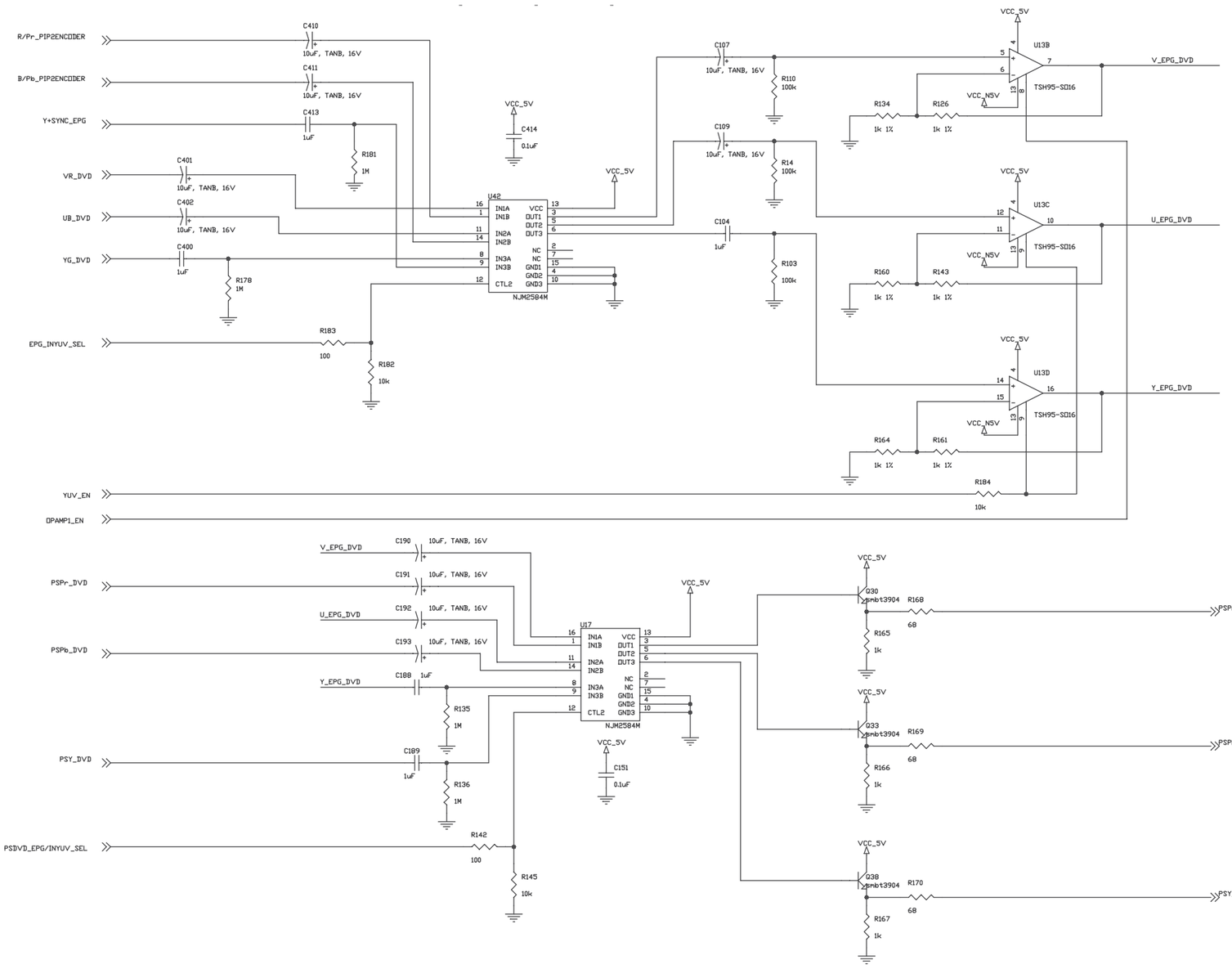
C132 D2
C137 C2
C138 C2
C141 B4
C143 B4
C148 B2
C149 B2
C152 B4
C153 B4
C155 A2
C156 A2
C157 A4
C158 A4
C178 D3
C179 D3
C180 C3
C181 C3
C182 D3
C183 D3
Q28 C2
Q29 C3
Q31 C3
Q32 B4
Q34 B2
Q35 C3
Q36 C3
Q37 B4
Q39 A2
Q40 A3
Q41 A3
Q42 A4
R11 C3
R113 D4
R114 D4
R115 D4
R116 D4
R117 D3
R118 C4
R119 C4
R12 C3
R120 C3
R121 C3
R122 C3
R123 D3
R124 C3
R125 A3
R127 C3
R128 B4
R129 B4
R130 B2
R131 B2
R132 C3
R133 B4
R137 B4
R138 B4
R139 B2
R140 B2
R141 C3
R144 B4
R146 A4
R147 A4
R148 A2
R149 A2
R150 A3
R151 A4
U15 D2
U16 C3
U18 C3
U19 A3

EPG Board: Analogue Switches for YUV, YPbPr

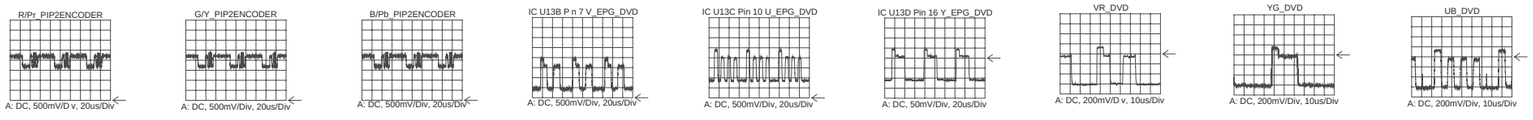
10

6 7 11 12

11



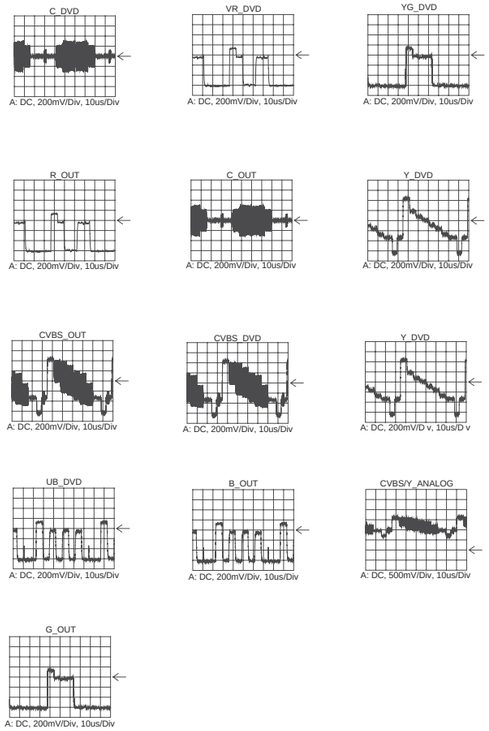
C104 C3
C107 D3
C109 D3
C151 B3
C188 B4
C190 B4
C191 B4
C192 B4
C193 B4
C400 C4
C401 C4
C402 C4
C410 D4
C411 D4
C413 D4
C414 D3
Q30 B2
Q33 B2
Q38 A2
R103 C3
R110 D3
R126 D2
R134 D2
R135 B4
R136 B4
R14 C3
R142 A3
R143 C2
R145 A3
R146 C2
R160 C2
R161 C2
R165 B2
R166 B2
R167 A2
R168 B2
R169 B2
R170 A2
R178 C4
R181 D4
R182 C4
R183 C4
U13B D2
U13C C2
U13D C2
U17 B3
U42 C3

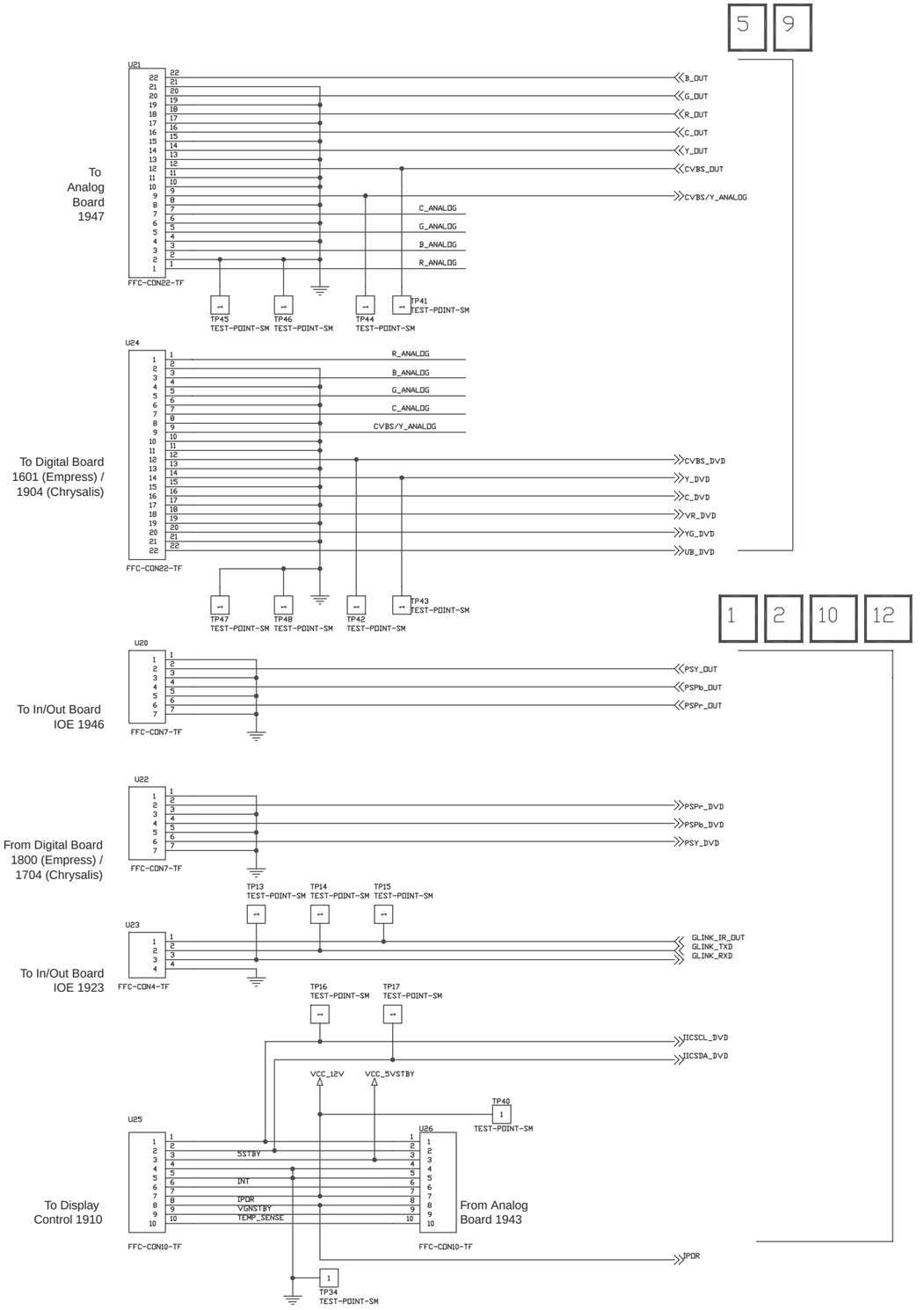


TR 11015_001
170603

EPG Board: Connectors

11





TP13 B3
TP14 B3
TP15 B3
TP16 A3
TP17 A3
TP34 A3
TP40 A2
TP41 D3
TP42 C3
TP43 C3
TP44 D3
TP45 D3
TP46 D3
TP47 C3
TP48 C3
U20 B3
U21 D3
U22 B3
U23 B3
U24 C3
U25 A3
U26 A3

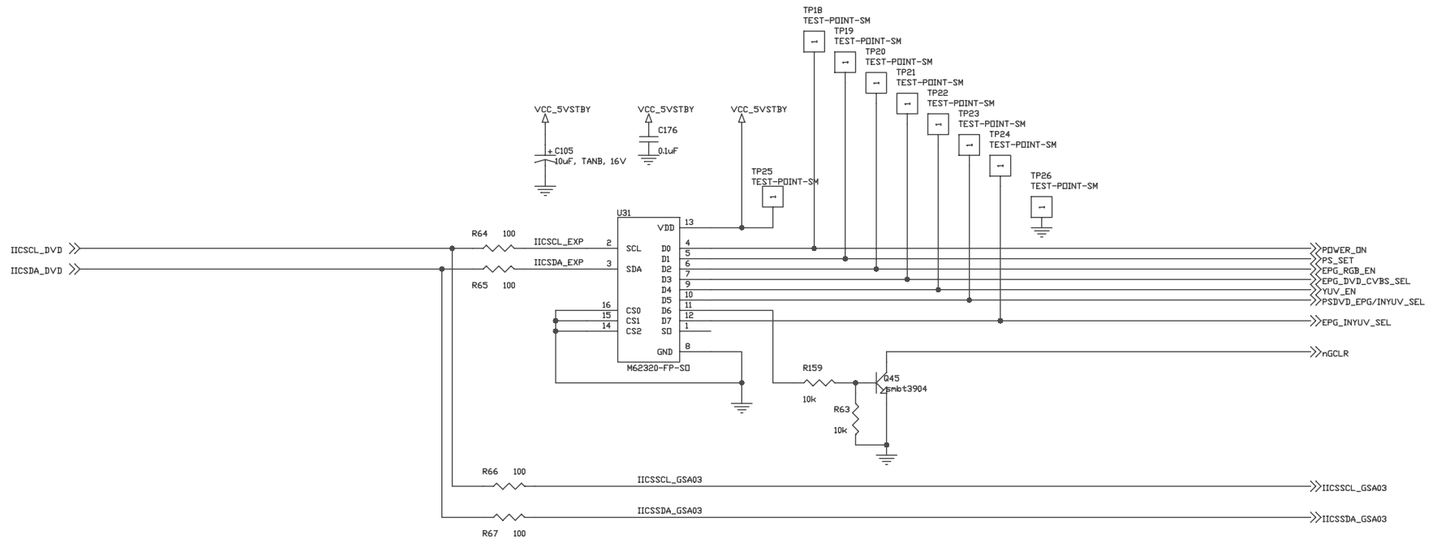
TR 11016_001
120603

EPG Board: IIC Expander

12

11

4 7 8 9 10 13



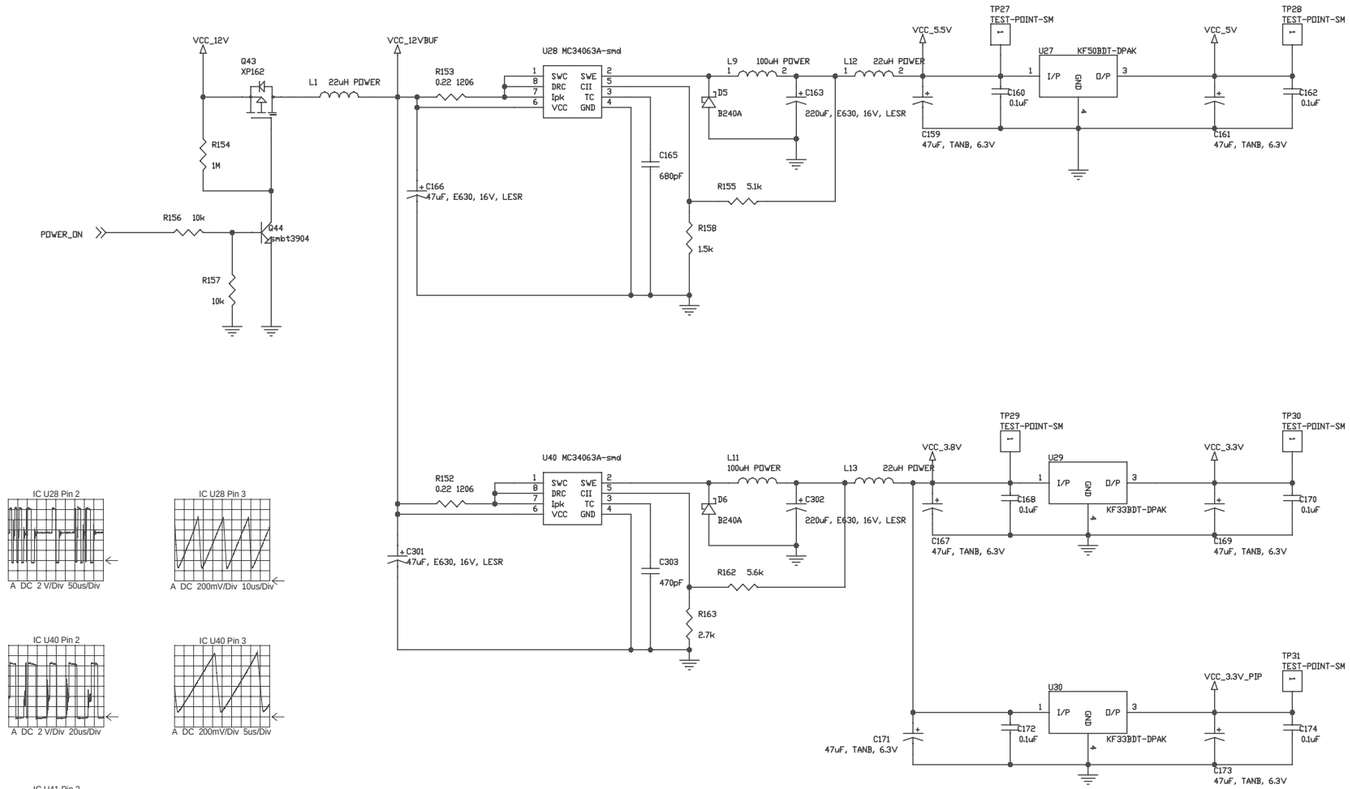
C105 C4
C176 C3
Q45 B3
R159 B3
R63 B3
R64 C4
R65 C4
R66 B4
R67 B4
TP18 C3
TP19 C3
TP20 C3
TP21 C3
TP22 C3
TP23 C3
TP24 C2
TP25 C3
TP26 C2
U31 C3

TR 11017_001
170603

EPG Board: Power Conversion

13

12



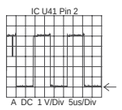
IC U28 Pin 2

IC U28 Pin 3

IC U40 Pin 2

IC U40 Pin 3

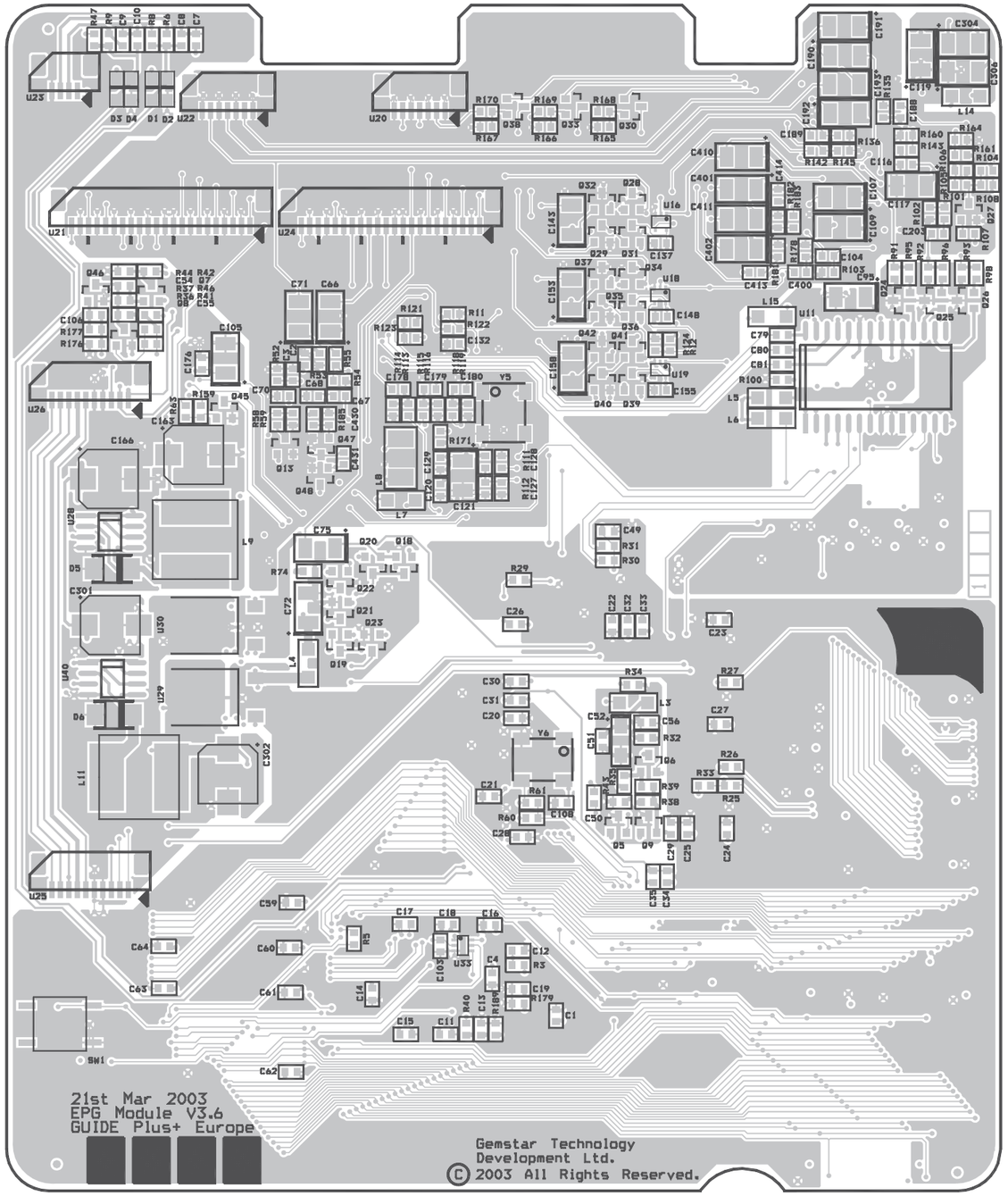
IC U41 Pin 2



C159 D3
C160 D2
C161 D2
C162 D2
C163 D3
C165 C3
C166 C4
C167 C3
C168 C2
C169 C2
C170 C2
C171 B3
C172 B2
C173 B2
C174 B2
C301 B4
C302 C3
C303 B3
C304 A4
C305 B3
C306 A3
C307 A3
D5 D3
D6 C3
L1 D4
L11 C3
L12 D3
L13 C3
L14 A3
L9 D3
Q43 D4
Q44 C4
R152 C4
R153 D4
R154 C4
R155 C3
R156 C4
R157 C4
R158 C3
R162 B3
R163 B3
TP27 D2
TP28 D2
TP29 C2
TP30 C2
TP31 B2
TP32 A2
U27 D2
U28 D3
U29 C2
U30 B2
U40 C3
U41 A3

TR 11018_001
170603

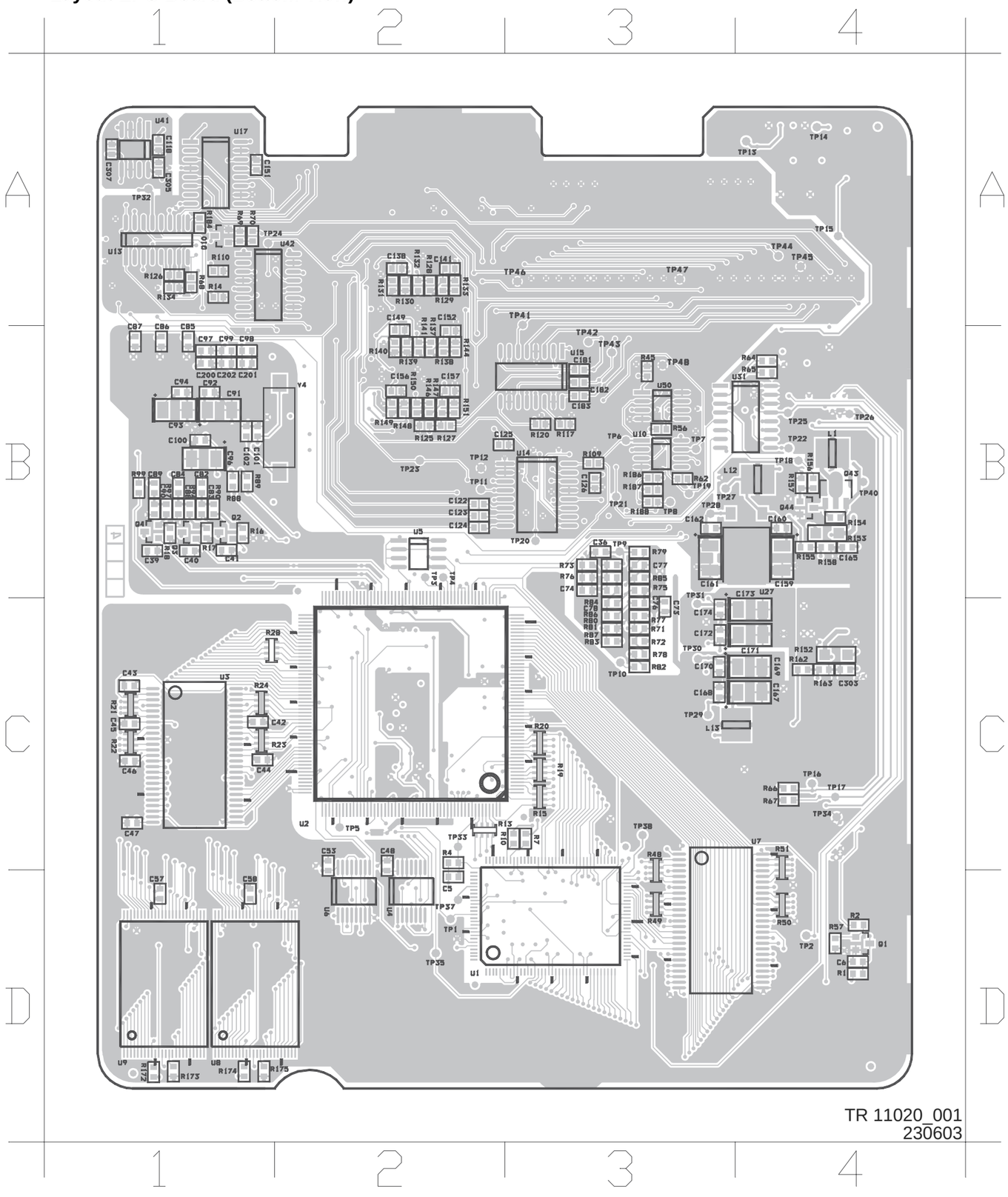
Layout EPG Board (Top View)



TR 11019_001
200603

C1 D3
C10 A1
C103 D2
C104 A4
C105 B1
C106 B1
C107 A4
C108 C3
C109 A4
C11 D2
C116 A4
C117 A4
C119 A4
C12 D3
C120 B2
C121 B2
C127 B2
C129 B2
C13 D2
C132 B2
C137 A3
C14 D2
C140 B3
C143 A3
C15 D2
C150 B3
C153 B3
C155 B3
C16 C2
C163 B1
C166 B1
C17 C2
C176 B1
C178 B2
C179 B2
C18 C2
C180 B2
C188 A4
C189 A4
C19 D3
C190 A4
C191 A4
C192 A4
C193 A4
C2 B2
C20 C3
C21 C2
C22 C3
C23 C3
C24 C3
C25 C3
C26 C3
C27 C3
C29 C3
C3 B2
C30 C3
C302 C1
C304 A4
C306 A4
C31 C3
C32 C3
C33 C3
C34 C3
C35 C3
C4 D2
C400 B4
C401 A3
C402 A3
C410 A3
C411 A3
C413 B3
C414 A3
C430 B2
C431 B2
C49 B3
C50 C3
C51 C3
C52 C3
C54 B1
C55 B1
C56 C3
C59 C2
C60 D2
C61 D2
C62 D2
C63 D1
C64 D1
C66 B2
C67 B2
C68 B2
C7 A1
C70 B2
C71 B2
C72 C2
C75 B2
C79 B3
C8 A1
C80 B3
C81 B3
C95 B4
D1 A1
D2 A1
D3 A1
D4 A1
D5 B1
D6 C1
L11 C1
L14 A4
L15 B3
L3 C3
L4 C2
L5 B3
L6 B3
L7 B2
L8 B2
L9 B1
Q13 B2
Q18 B2
Q19 C2
Q20 B2
Q20 A3
Q21 C2
Q22 B2
Q23 C2
Q24 B4
Q25 B4
Q26 B4
Q27 A4
Q29 A3
Q30 A3
Q31 A3
Q32 A3
Q33 A3
Q34 B3
Q35 B3
Q36 B3
Q37 B3
Q38 A3
Q39 B3
Q40 B3
Q40 B2
Q41 B3
Q42 B3
Q45 B1
Q46 B1
Q47 B2
Q5 C3
Q6 C3
Q7 B1
Q8 B1
Q9 C3
R100 B3
R101 A4
R102 A4
R103 B4
R104 A4
R105 A4
R106 A4
R108 A4
R11 B2
R111 B2
R112 B2
R113 B2
R114 B2
R115 B2
R116 B2
R118 B2
R119 B2
R12 B3
R121 B2
R122 B2
R123 B2
R124 B3
R135 A4
R136 A4
R142 A4
R143 A4
R145 A4
R159 B1
R160 A4
R161 A4
R164 A4
R165 A3
R166 A3
R169 A3
R170 A4
R170 A2
R171 B2
R176 B1
R177 B1
R179 D3
R181 A3
R182 A3
R183 A4
R185 B2
R189 D2
R25 C3
R26 C3
R27 C3
R29 B3
R3 D3
R30 B3
R31 B3
R32 C3
R33 C3
R34 C3
R35 C3
R36 B1
R37 B1
R38 C3
R39 C3
R40 D2
R41 B1
R42 B1
R43 C3
R44 B1
R46 B1
R47 A1
R5 D2
R52 B2
R53 B2
R54 B2
R55 B2
R58 B2
R59 B2
R6 A1
R60 C3
R61 C3
R63 B1
R74 B2
R8 A1
R9 A1
R91 B4
R92 B4
R93 B4
R95 B4
R96 B4
R98 B4
U11 B4
U16 A3
U18 B3
U19 B3
U20 B1
U20 A2
U21 A1
U22 A1
U23 A1
U24 A2
U25 C1
U26 B1
U29 C1
U30 C1
U33 D2
U40 C1
SW1 D1
Y5 B2
Y6 C3

Layout EPG Board (Bottom View)



C100 B1
C101 B1
C102 B1
C110 A1
C122 B2
C123 B2
C124 B2
C125 B2
C126 B3
C138 A2
C141 A2
C149 B2
C151 A1
C152 B2
C156 B2
C157 B2
C159 B4
C160 B4
C161 B3
C162 B3
C165 B4
C167 C4
C168 C3
C169 C4
C170 C3
C171 C4
C172 C3
C173 C4
C174 C3
C181 B3
C182 B3
C183 B3
C200 B1
C201 B1
C202 B1
C303 C4
C305 A1
C307 A1
C36 B3
C39 B1
C40 B1
C41 B1
C42 C1
C43 C1
C44 C1
C45 C1
C46 C1
C47 C1
C48 C2
C5 D2
C53 C2
C57 D1
C58 D1
C6 D4
C73 C3
C74 B3
C76 C3
C77 B3
C78 B3
C82 B1
C83 B1
C84 B1
C85 B1
C86 B1
C87 B1
C88 B1
C89 B1
C90 B1
C91 B1
C92 B1
C93 B1
C94 B1
C96 B1
C97 B1
C98 B1
C99 B1
L1 B4
L12 B4
L13 C3
Q1 D4
Q10 A1
Q2 B1
Q3 B1
Q4 B1
Q43 B4
Q44 B4
R1 D4
R10 C3
R104 A1
R109 B3
R110 A1
R117 B3
R120 B3
R125 B2
R126 A1
R127 B2
R128 A2
R129 A2
R13 C2
R130 A2
R131 A2
R132 A2
R133 A2
R134 A1
R137 B2
R138 B2
R139 B2
R14 A1
R140 B2
R141 B2
R144 B2
R146 B2
R147 B2
R148 B2
R149 B2
R15 C3
R150 B2
R151 B2
R152 C4
R153 B4
R154 B4
R155 B4
R156 B4
R157 B4
R158 B4
R16 B1
R162 C4
R163 C4
R17 B1
R172 D1
R173 D1
R174 D1
R175 D1
R18 B1
R186 B3
R187 B3
R188 B3
R19 C3
R2 D4
R20 C3
R21 C1
R22 C1
R23 C1
R24 C1
R28 C1
R4 C2
R45 B3
R48 D3
R49 D3
R50 D4
R51 C4
R56 B3
R57 D4
R62 B3
R64 B4
R65 B4
R66 C4
R67 C4
R68 A1
R69 A1
R7 C3
R70 A1
R71 C3
R72 C3
R73 B3
R75 B3
R76 B3
R77 C3
R78 C3
R79 B3
R80 C3
R81 C3
R82 C3
R83 C3
R84 B3
R85 B3
R86 B3
R87 C3
R88 B1
R89 B1
R90 B1
R94 B1
R97 B1
R99 B1
U1 D3
U10 B3
U13 A1
U14 B3
U15 B3
U17 A1
U2 C2
U27 B4
U3 C1
U31 B4
U4 D2
U41 A1
U42 A1
U5 B2
U50 B3
U6 D2
U7 D3
U8 D1
U9 D1
TP1 D2
TP10 C3
TP11 B2
TP12 B2
TP13 A4
TP14 A4
TP15 A4
TP16 C4
TP17 C4
TP18 B4
TP19 B3
TP2 D4
TP20 B3
TP21 B3
TP22 B4
TP23 B2
TP24 A1
TP25 B4
TP26 B4
TP27 B3
TP28 B3
TP29 C3
TP3 B2
TP30 C3
TP31 C3
TP32 A1
TP33 C2
TP34 C4
TP35 D2
TP37 D2
TP38 C3
TP4 B2
TP40 B4
TP41 A3
TP42 B3
TP43 B3
TP44 A4
TP45 A4
TP46 A3
TP47 A3
TP48 B3
TP5 C2
TP6 B3
TP7 B3
TP8 B3
TP9 B3

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

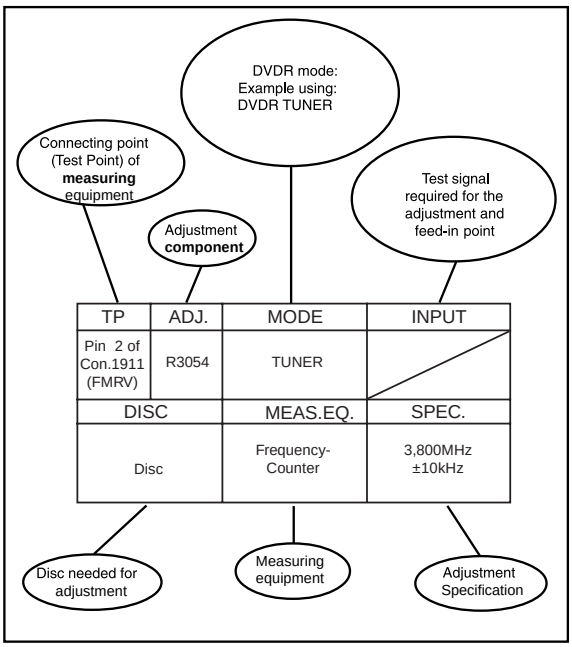
2. DVM (Digital voltmeter)

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 732 , followed by the ref. value.
Example: DD:> 732 128

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 HDRW720 and HDRW725H are the following:
- /00/02: 74
- /05: 75

Example:
DD:>1217 74

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

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 HDRW720/0x are the following:

ChrysalisString
Board
Type
CHRY F EF3_AV3 4442484917902001454633 5
F41563300340303000001010200010100400808 00

Example:
DD:> 1226 4442484917902001454633 5F41
56330034030300000101020001010040080800

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 [7110]. 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. 1111) generates the system clock. The reset is generated by the CC-P via “POR_DC”-signal where the transistor [7106] 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 37 and 38) 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:

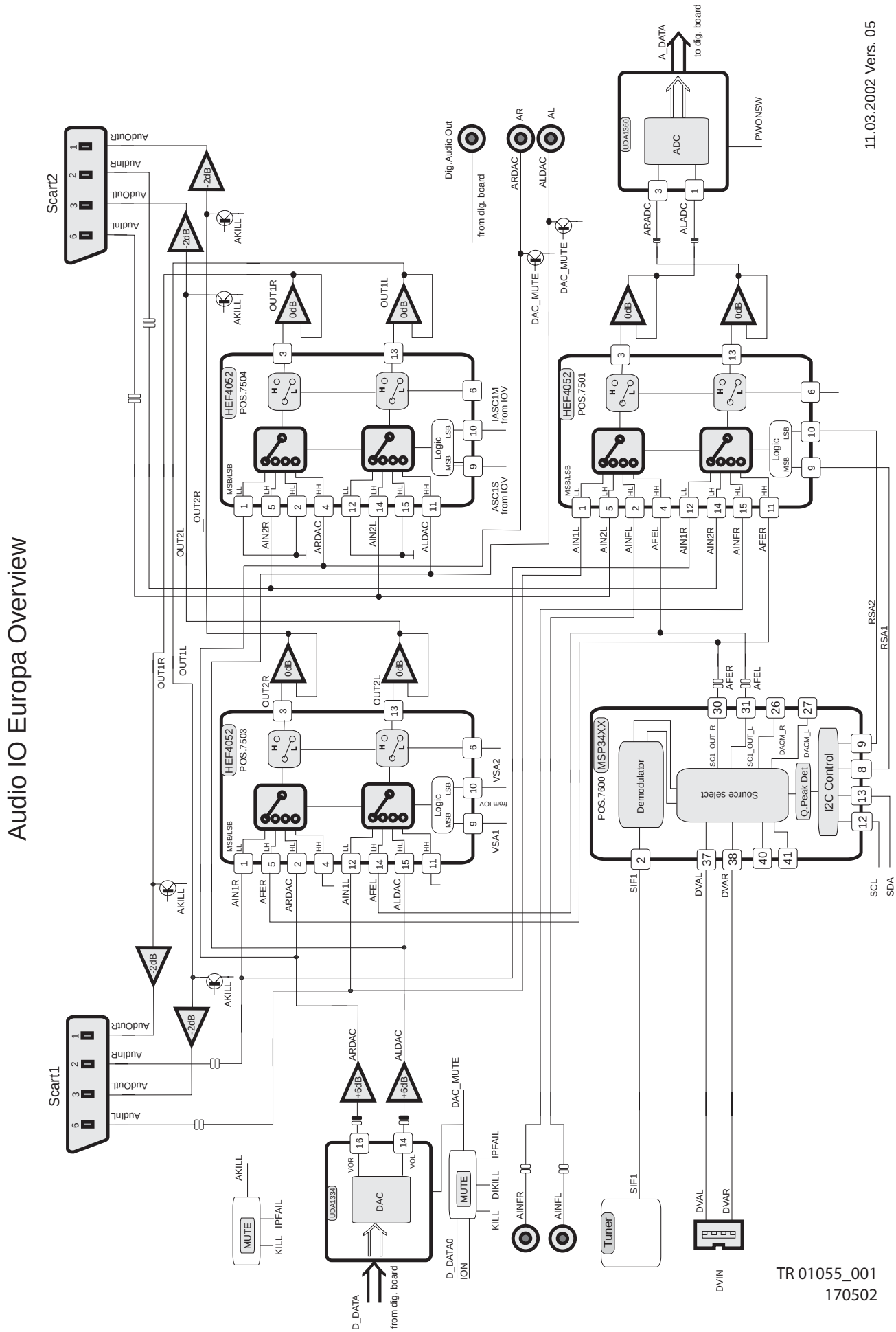
- Tuner UV1316K [1705]
- IF amplifier & video demodulator IC TDA 9818/9817 [7710]
- Sound processor MSP3415G [7600]

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



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

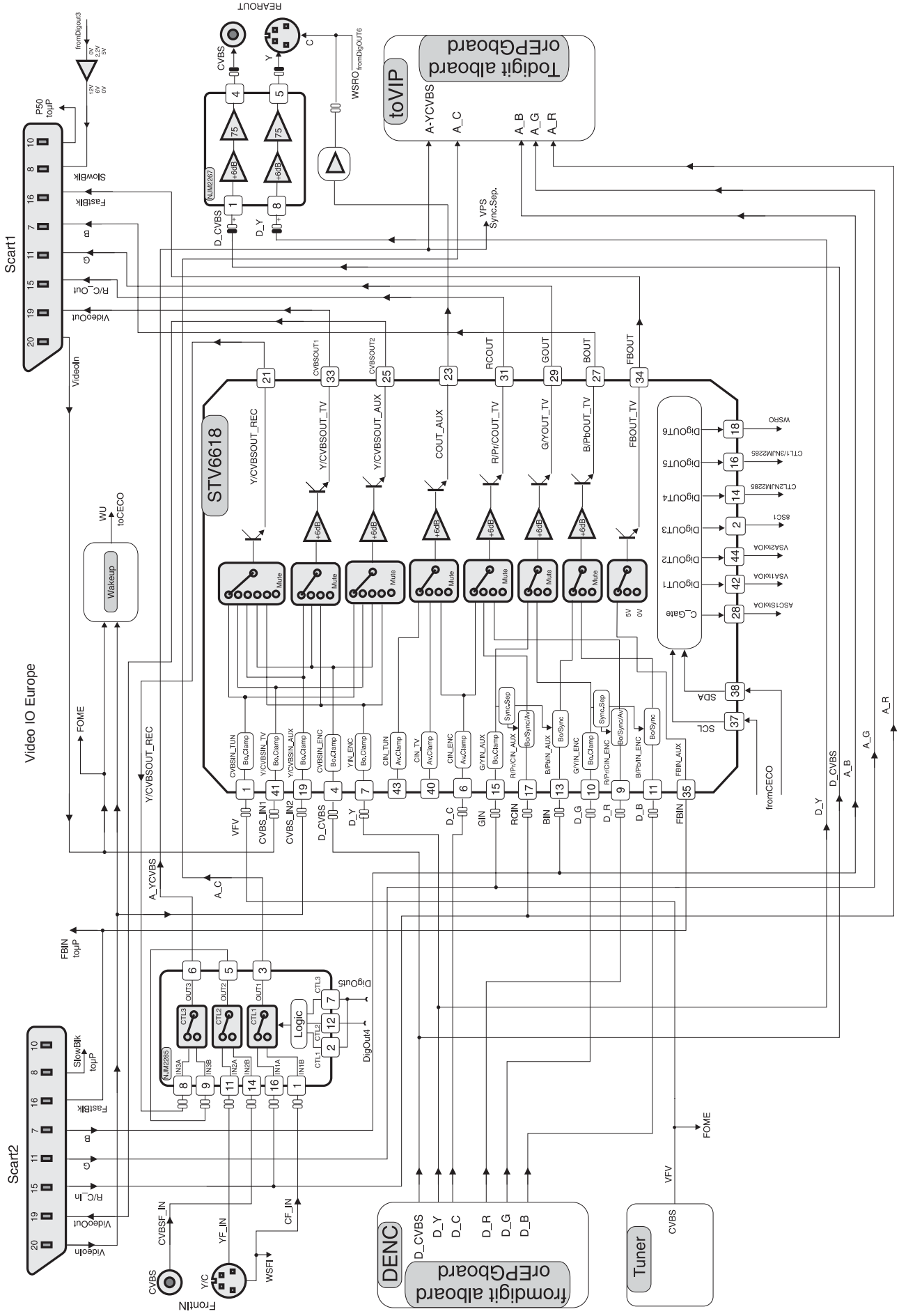


Figure 9-1

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

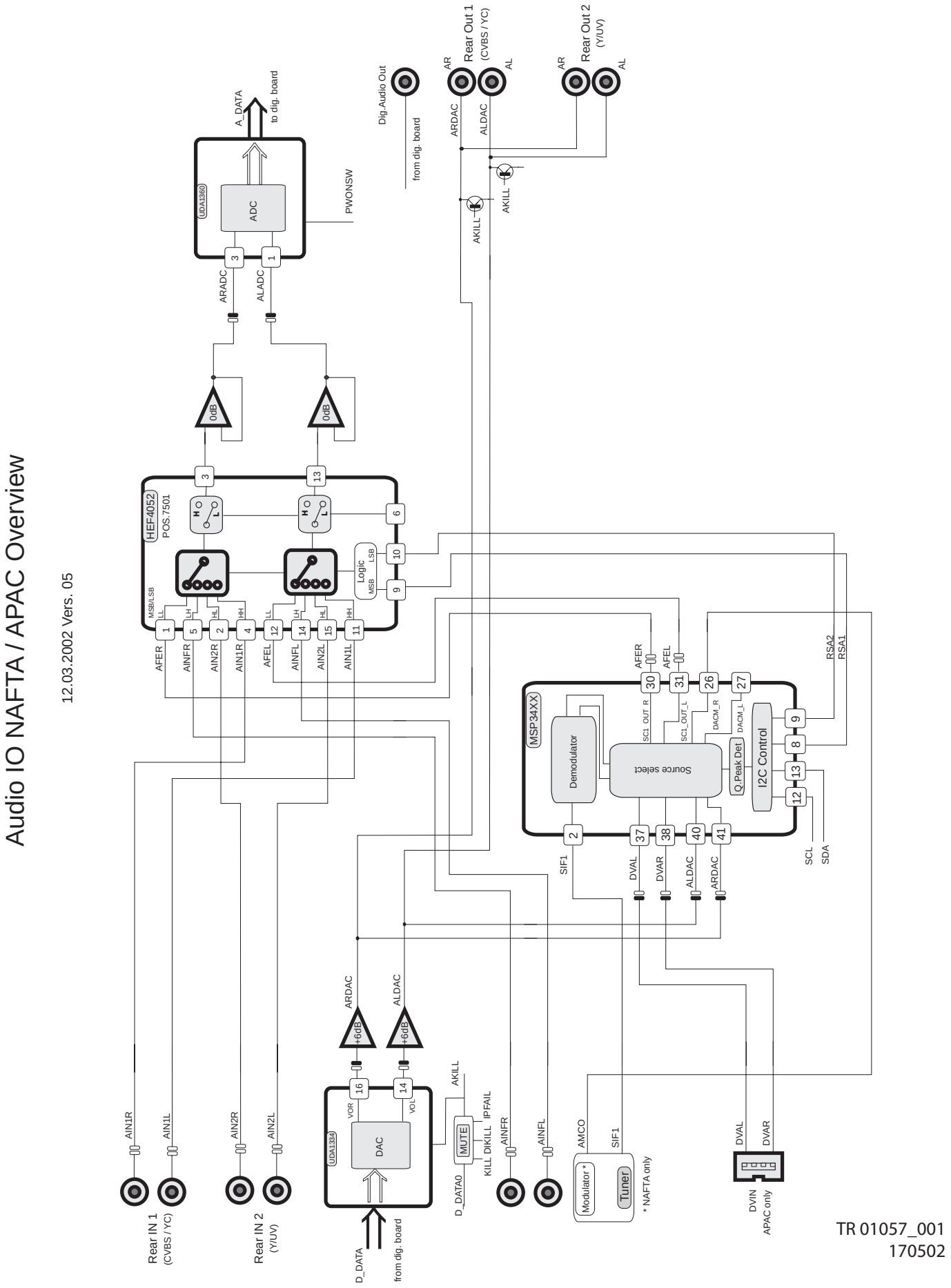


Figure 9-2

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

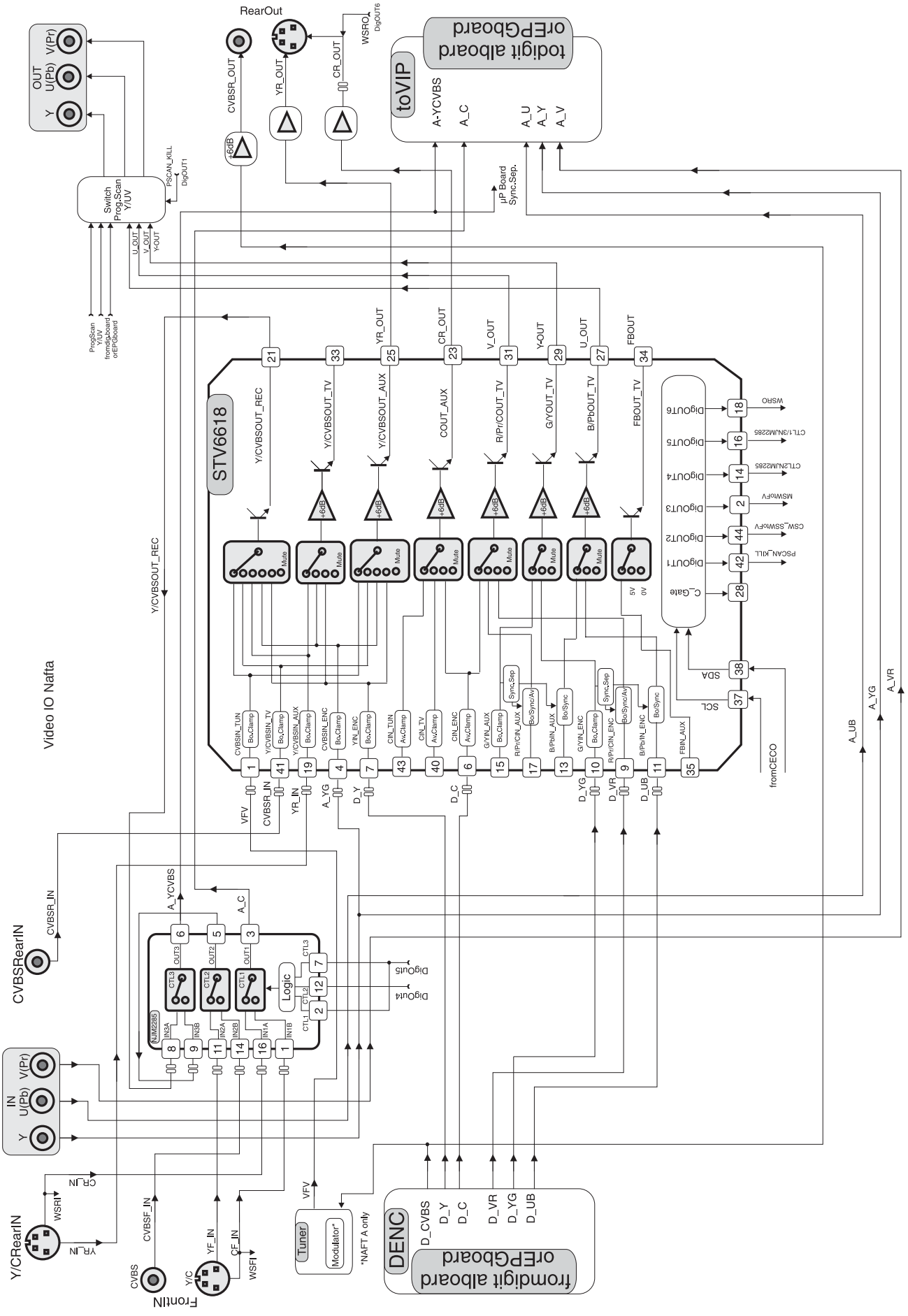


Figure 9-3

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 F

9.5.1 Introduction

Block diagram 2nd generation DVD recorder

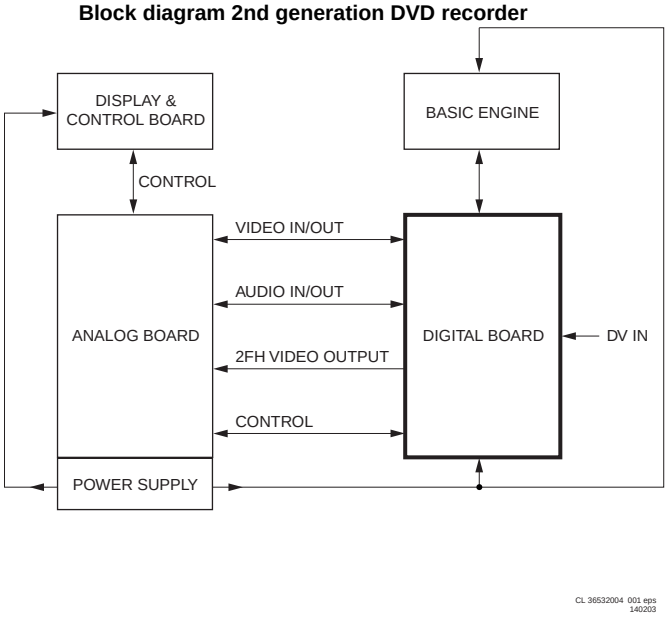


Figure 9-4

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

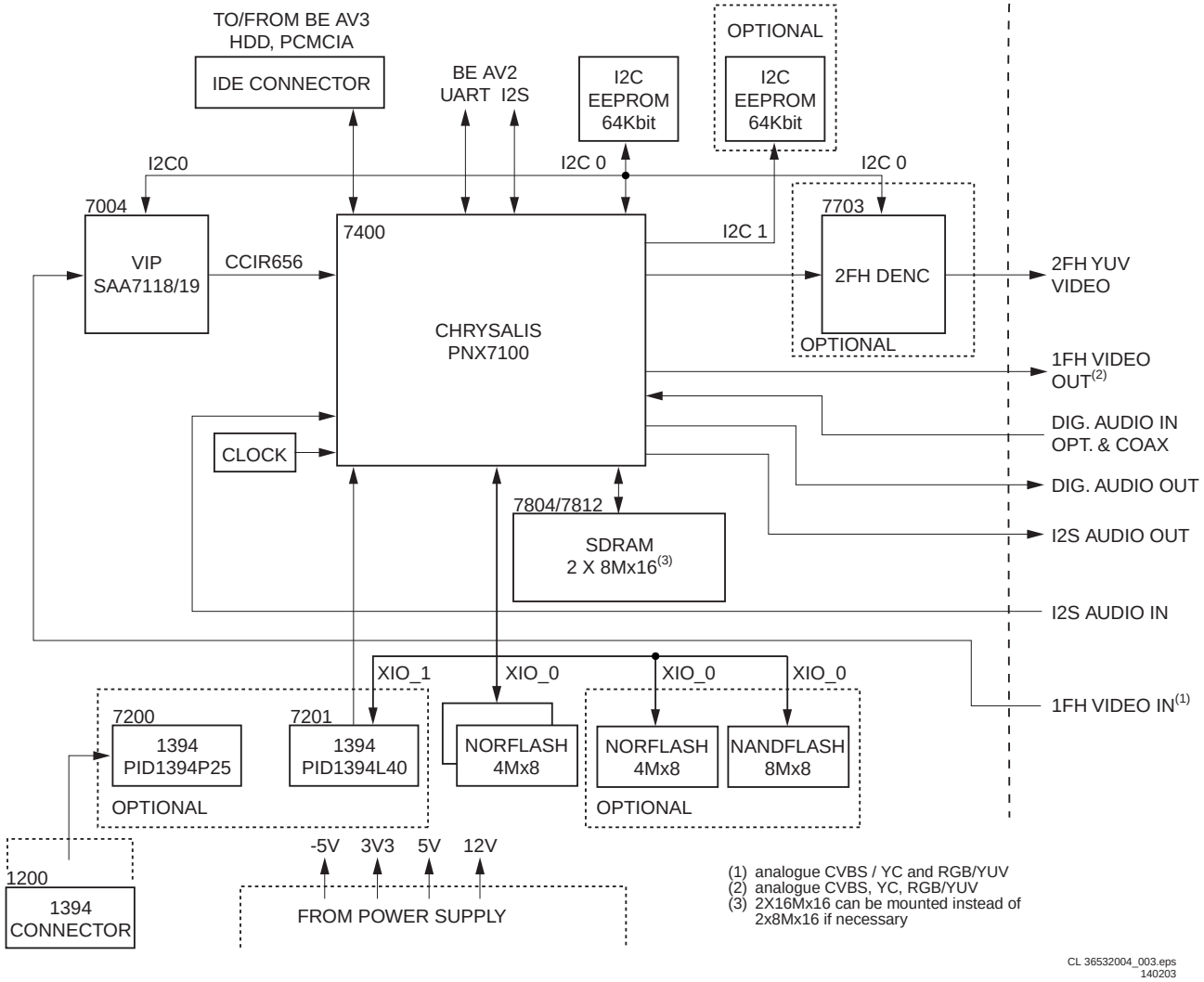


Figure 9-5

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 .
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.

Front-end IDE Interface
IC7400 (Chrysalis) interfaces directly to the Basic Engine (BE) IDE bus via connector 1102.
Via connector 1101 it connects to the hard disk.
The normal recording is always done on the hard disk. Only archiving and playback is done with optical disk.

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 Clock Distribution

Clock distribution on Chrysalis board

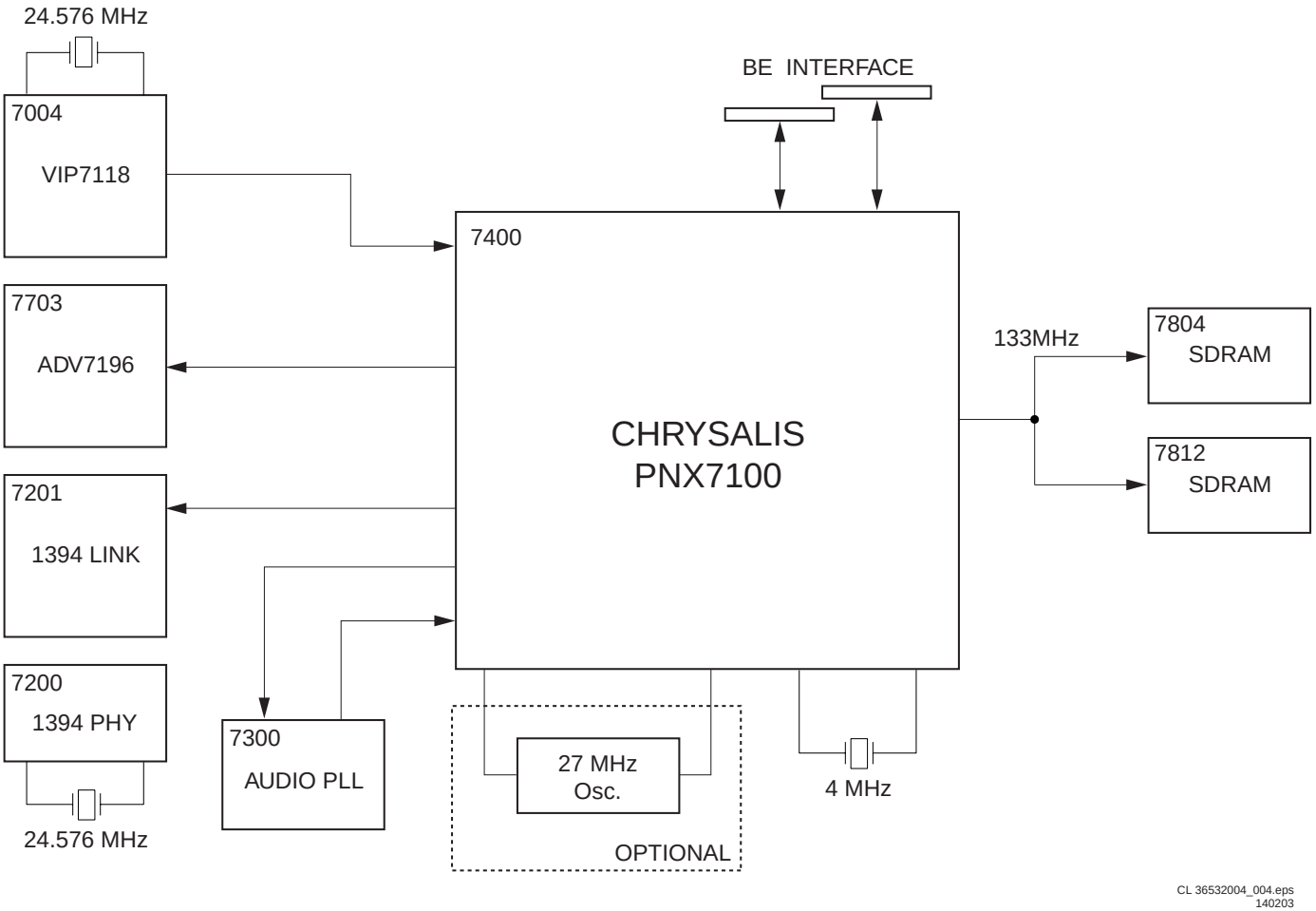


Figure 9-6

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.

9.5.5 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.

9.5.6 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.

9.5.7 Reset

Reset concept Chrysalis board

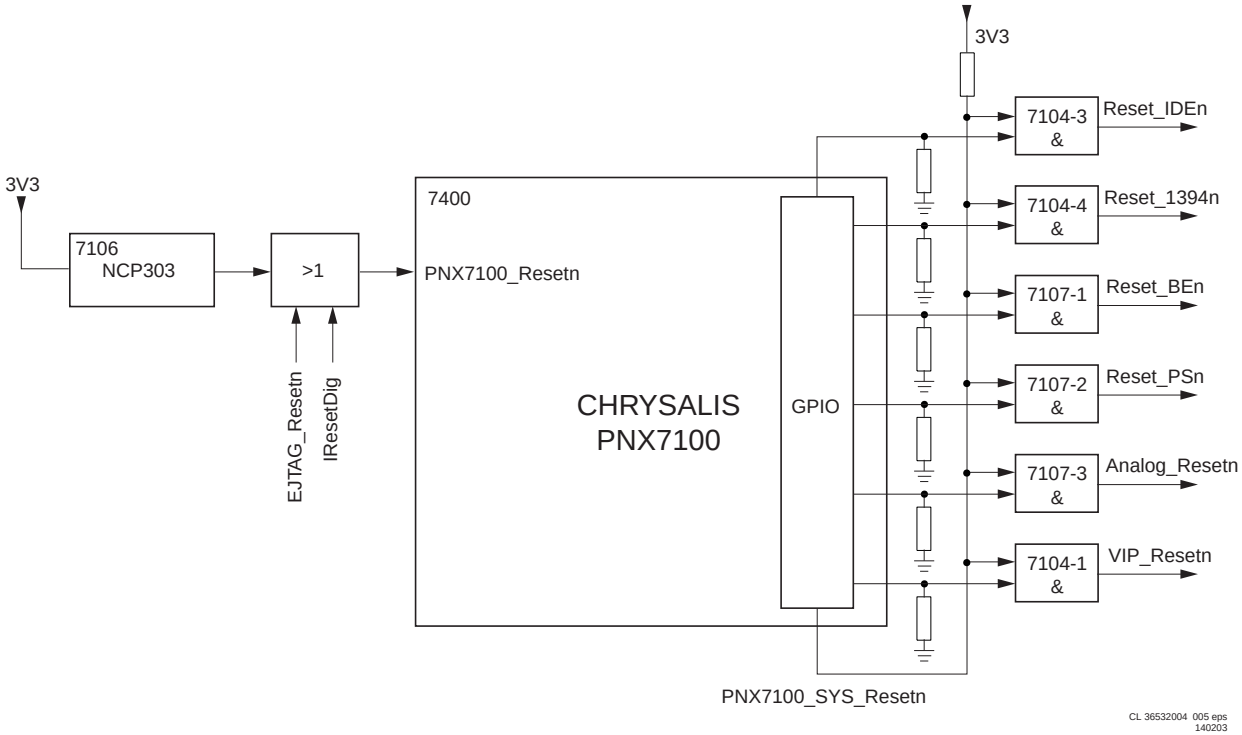


Figure 9-7

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.

9.5.8 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).

9.5.9 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.

9.5.10 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 EPG Nafta Board

9.7.1 General

Two ASICs from Gemstar, GS501 (item 7100) and GS502 (item 7201), generate the EPG OSD. The host P controls both ICs via the I2C bus (pins 45 and 48). A RAM memory (item 7102) and a Flash memory with the firmware (item 7101) belong also to the periphery of these ASICs.
A PIC processor (item 7303) generates the POR_N reset for this system. The POR_DC reset comes from the set, and is active after AC power 'on'. A port expander from the host, controls the EXT_RESET signal. This port expander (item 7200) is also used for switching the video paths on the EPG board.

Either the board works in 'Loop Trough' mode, or (for EPG) the output path is switched to the 'EPG RGB' video.

Blockdiagramm EPG-Modul Nafta

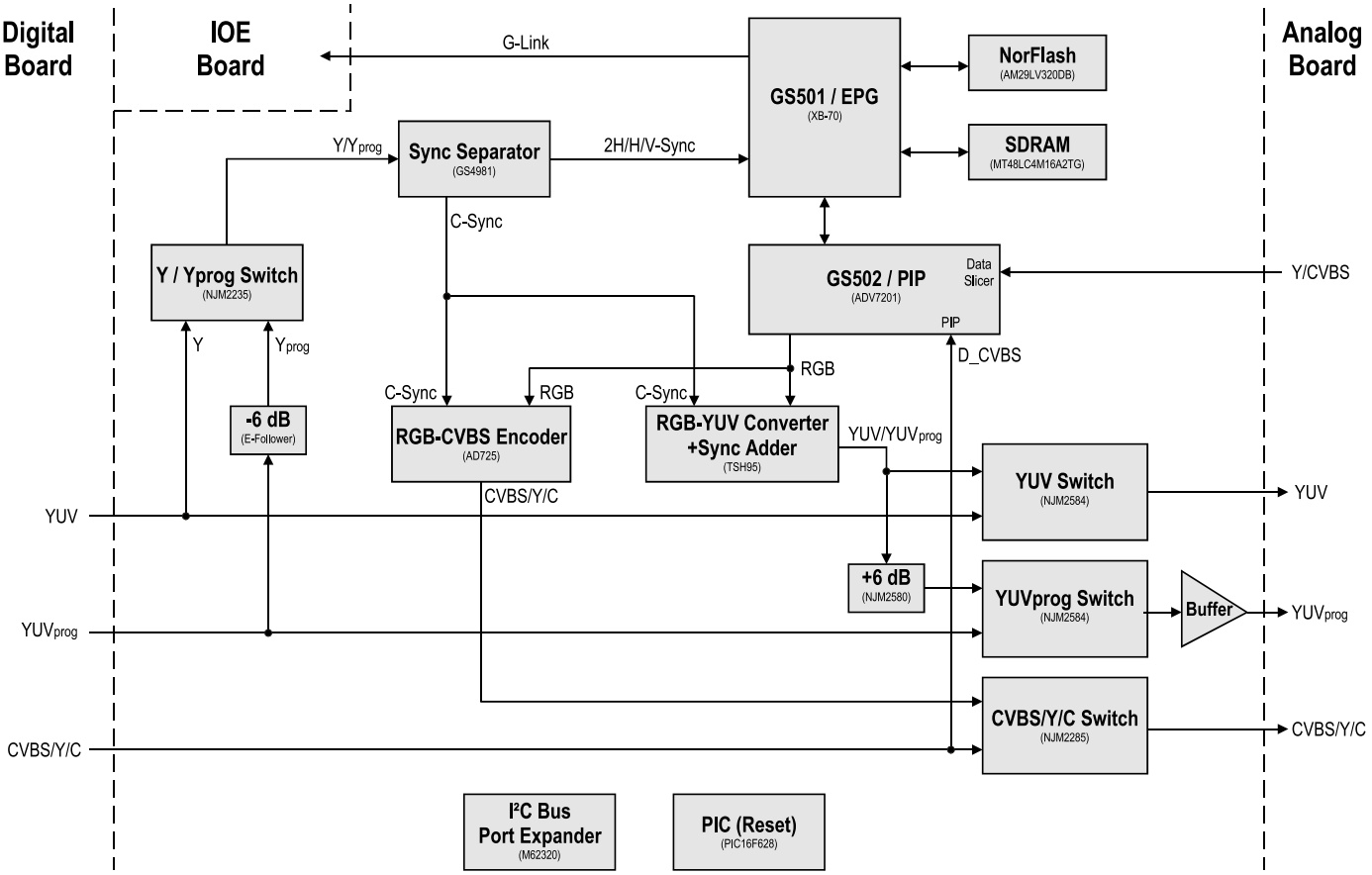


Figure 9-8

9.7.2 Loop trough

For 'Loop Trough' the input video signals (CVBS, YC, YUV, and YUV-progressive) from the Digital board are passing three video switches before going to the Analog board.

- Item 7503 for CVBS and Y/C.
- Item 7502 for YUV-interlaced.
- Item 7501 for YUV-progressive.

9.7.3 EPG RGB Video

A V-sync and H-sync (for progressive = 2H-sync) are necessary for outputting an RGB video. A sync separator (item 7703) generates these syncs. Input for the sync separator is either the 1fh or the 2fh luminance signal from the Digital board. A video switch (item 7700) makes the selection. For progressive video, the signal must be attenuated (item 7701).

The RGB signal goes via emitter followers (items 7202, 7203, and 7204) to an RGB-to-YUV converter and to an RGB-to-CVBS, Y/C converter.
The RGB-to-YUV converter consists of four OpAmp's, which are necessary for RGB/YUV conversion (item 7600-B, -C, and -D) and for adding the C-sync to the Y signal (item 7600-A). The RGB-to-CVBS, Y/C conversion is realized by IC7602. The oscillator (item 7601) is necessary for generating the chroma carrier.
With transistor 7603 the conversion stages can be switched 'off' for power saving.

For the PIP (Picture in Picture) feature, the D_CVBS video signal from the Digital board is used. This signal is fed to Pin 10 of IC7201. For scanning the EPG data, the A_YCVBS signal from the Analogue board is fed to pin 8 of IC7201.

9.7.4 Power supply

The supply for the video stages and the EPG digital part, are generated via DC-DC converters (items 7400, 7401, and 7403) out of the 12STBY.

9.8 EPG Europe Board

9.8.1 General

The ARM7 based microprocessor (item U1) and an ASIC (Gemstar GSA03, item U2) generates the EPG OSD data (RGB or YUV-interl./progr.). The host P on the Digital board, controls both ICs via the I2C bus. A RAM memory (item U7) and two Flash memories (items U8 and U9) with the firmware and EPG data, belong also to the periphery of the ASIC.
A resistor and capacitor (items R1 and C6) generate the reset for this system. The IPOR reset comes from the set and is active after main power 'on'. A port expander from the host, controls the nGCLR reset signal. This port expander (item U31) is also used for switching the video paths on the EPG board.

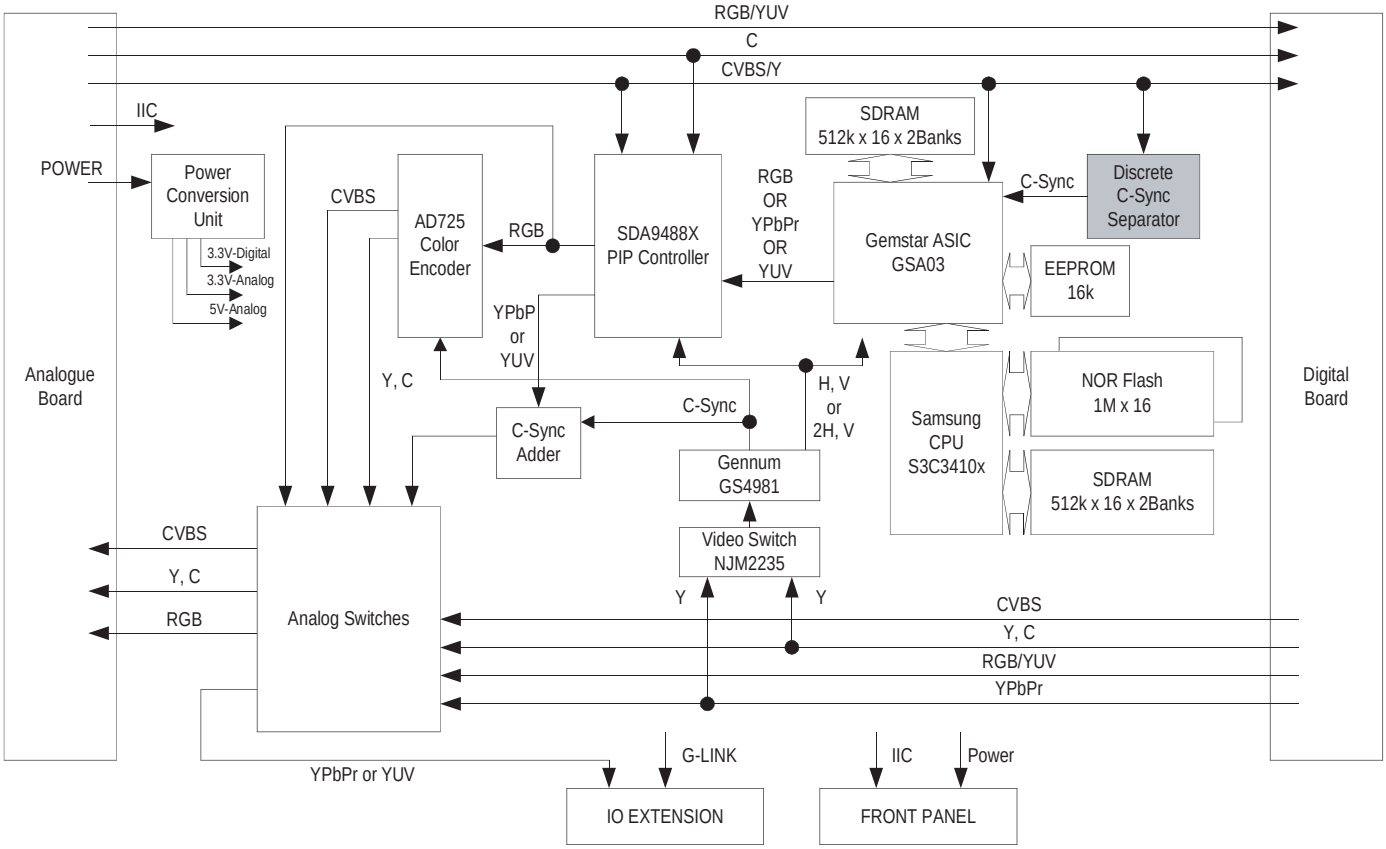


Figure 9-9

Either the board works in 'Loop Trough' mode, or (for EPG) the output path is switched to the 'EPG RGB' video.

9.8.2 Loop Trough

For 'Loop Trough', the input video signals (CVBS, YC, RGB, YUV-interlaced, and YUV-progressive) from the digital board are passing three video switches before going to the Analogue board.

- Item U15 for CVBS and Y/C selection between EPG and Loop trough.
- Items U16, U18, and U19 (and periphery) for RGB selection between EPG and Loop trough.
- Items U42 and U17 for YUV-interlaced and YUV-progressive selection between EPG and Loop trough. These signals are amplified (items U13B, C, and D) for driving a 75-Ohm output.

Note: RGB and YUV-interlaced (VR_DVD, UB_DVD, YG_DVD) are the same signals. It depends on the software, which signal is chosen.

9.8.3 EPG RGB

A V-sync and H-sync (for progressive = 2H-sync) are necessary for outputting an EPG video. A sync separator (item U10) generates these syncs. Input for the sync separator is either the 1fh or the 2fh luminance signal from the Digital board. A video switch (item U50) makes the selection.

The EPG signal goes via a PIP-inserter IC (item U11 and pheripherals) that inserts a PIP (Picture In Picture) into the EPG OSD. Source for this PIP is the CVBS signal from the digital board.
When the PIP output is a YUV signal, the Y signal is without a sync. Therefore, this sync must is added with item U13A.

For RGB-to-CVBS, Y/C conversion is realized by a PAL conversion IC (item U14). The oscillator (item Y5) is necessary for generating the chroma carrier.

For scanning EPG data, the A_YCVBS signal from the Analog board is used. This signal is fed to pin 189 of item U2.
There is also a sync from the Analog board necessary. A discrete circuit (items Q18-Q23 and periphery) generates it.

9.8.4 Power supply

The supply for the video stages and the EPG digital part are generated via DC-DC converters and linear regulators (items U28, U40, and U41) out of the 12VSTBY.

9.9 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.

9.10 IC Descriptions

9.10.1 Display Board

IC 7103 TMP87CH74F Display Board, Front Microprocessor

Block Diagram

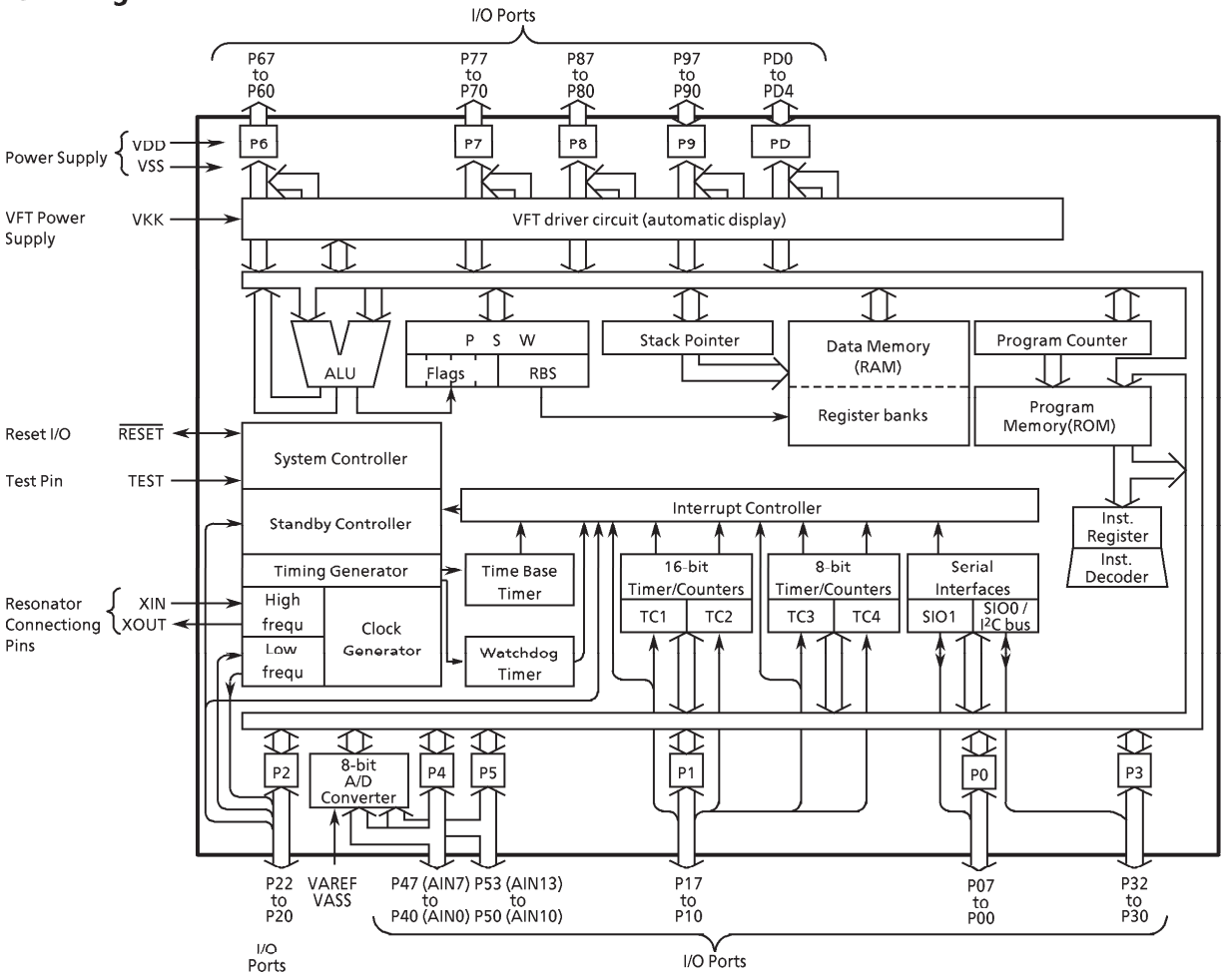


Figure 9-10

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 9-11

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 9-12

9.10.2IC'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

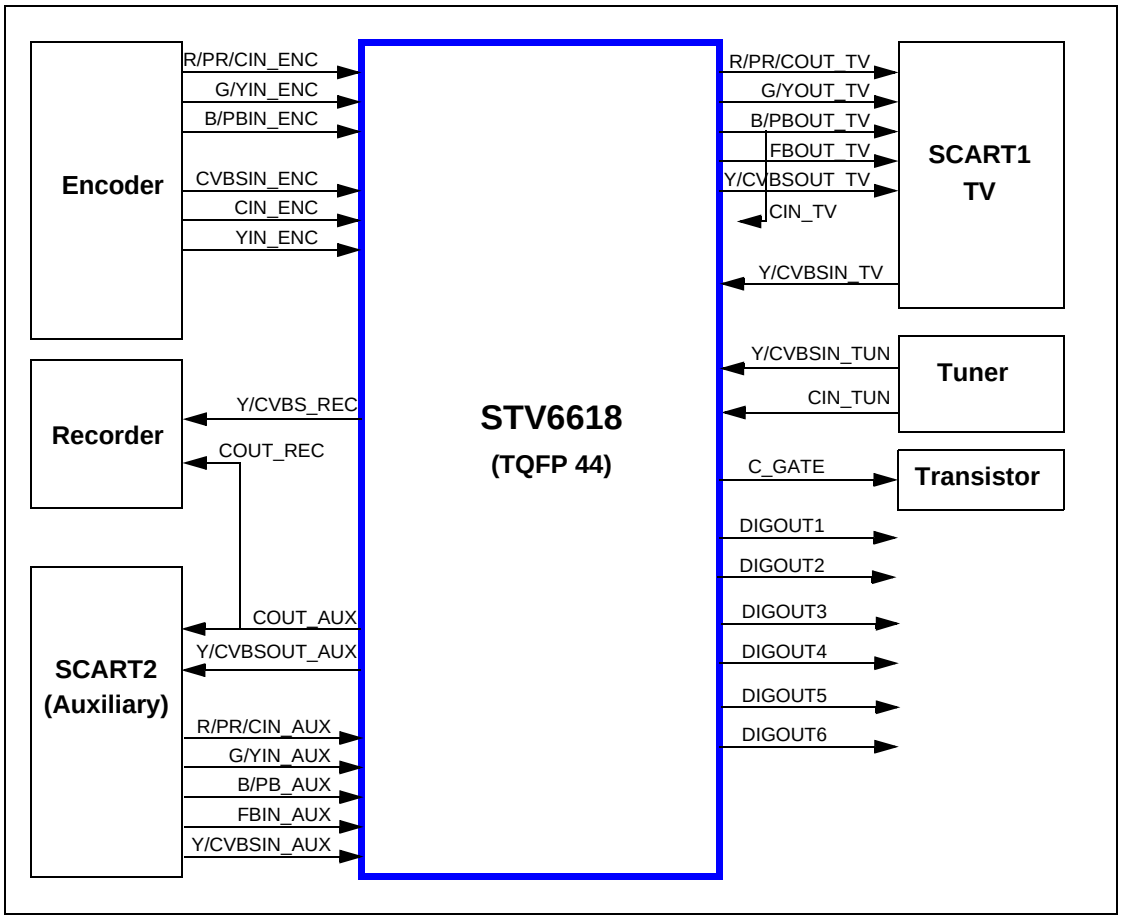
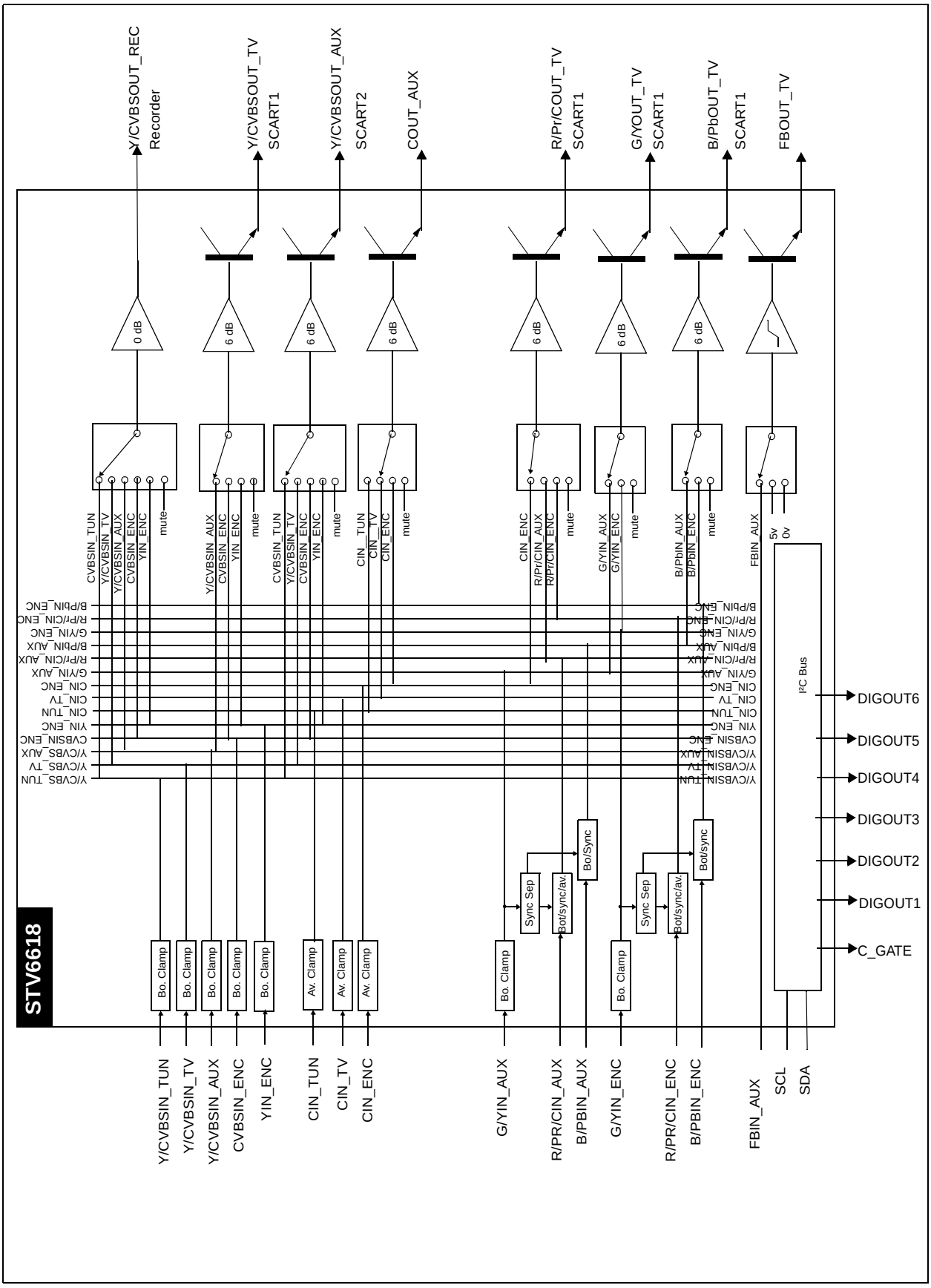
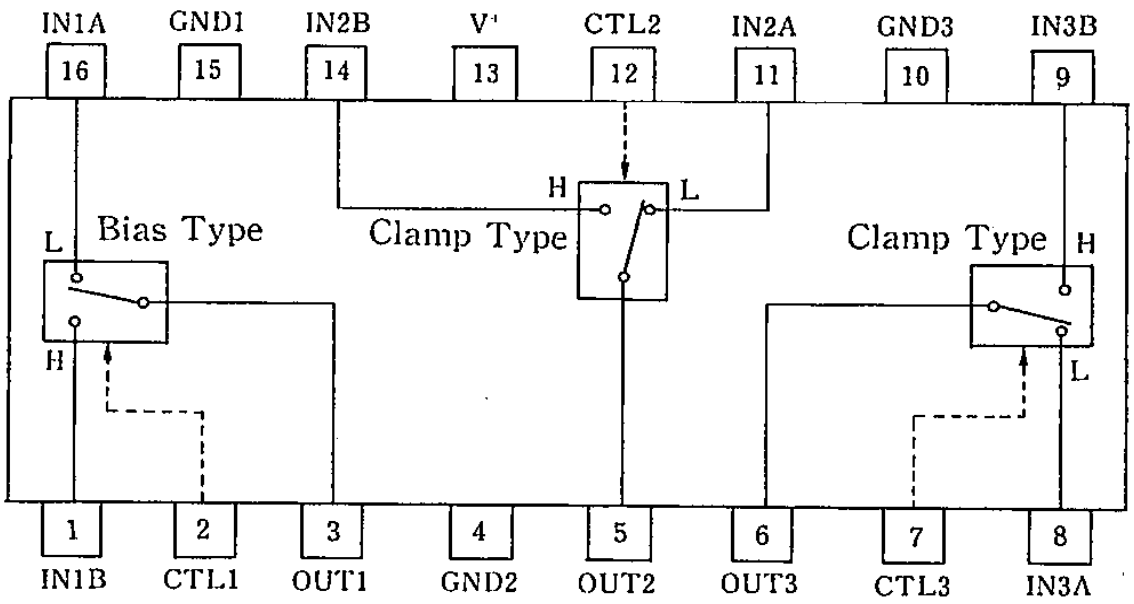


Figure 3: STV6618 Block Diagram



IC7411: NJM2285 Analog Board, Video Switch



NJM2285D
NJM2285M
NJM2285V

IC7313 TEA 1507 Analog Board, Power Supply Control

BLOCK DIAGRAM

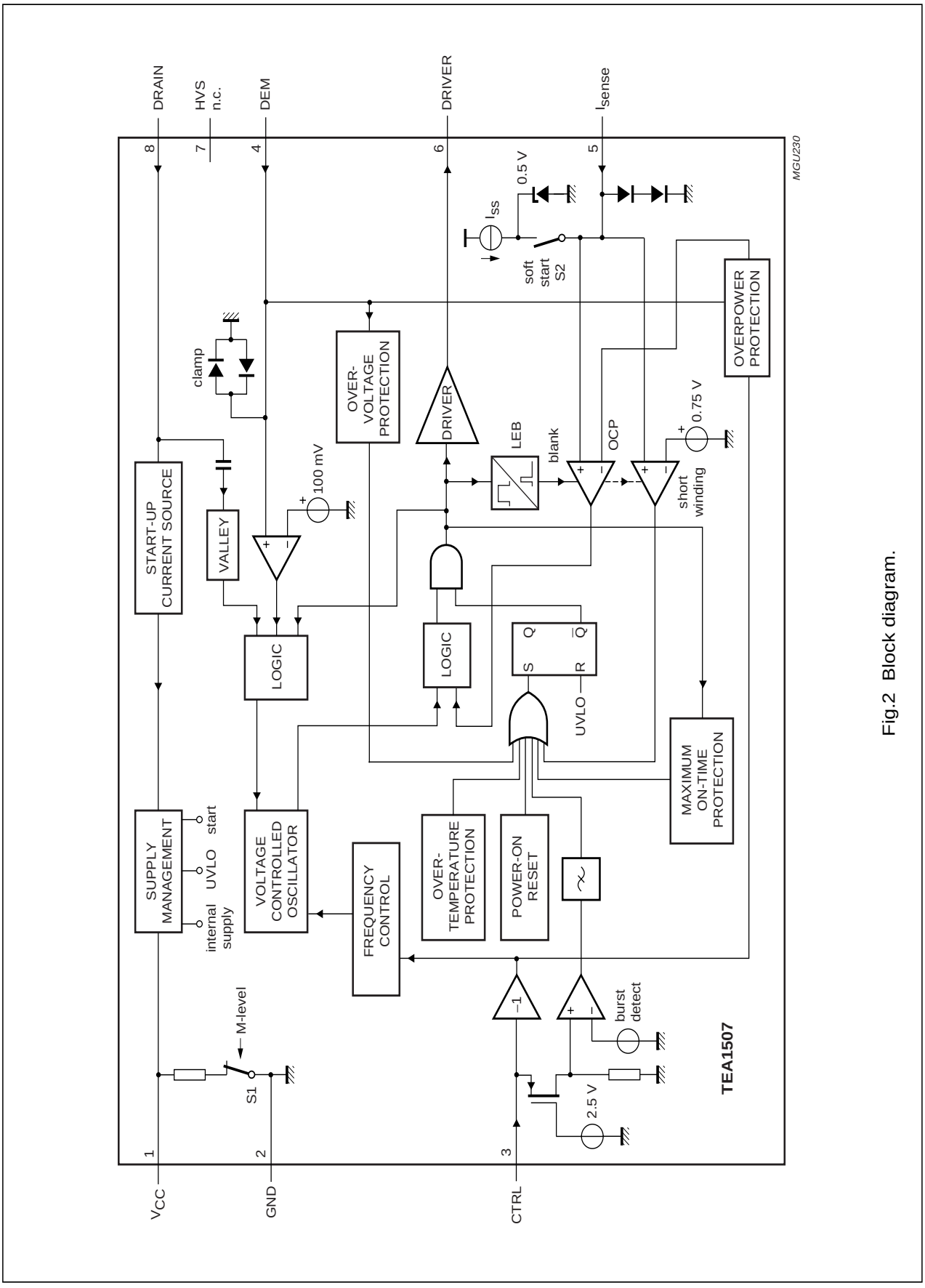
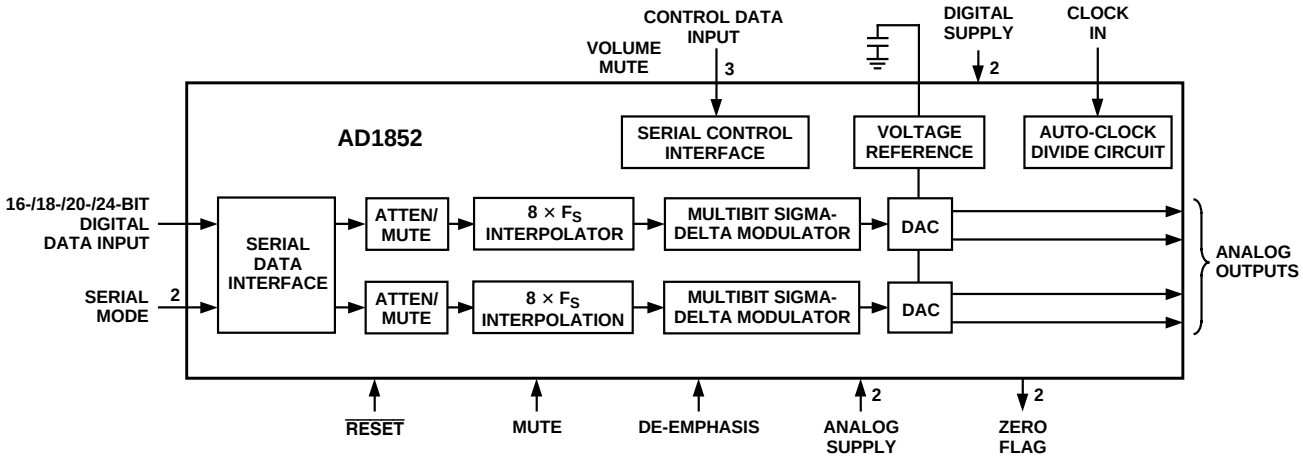


Fig.2 Block diagram.

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.

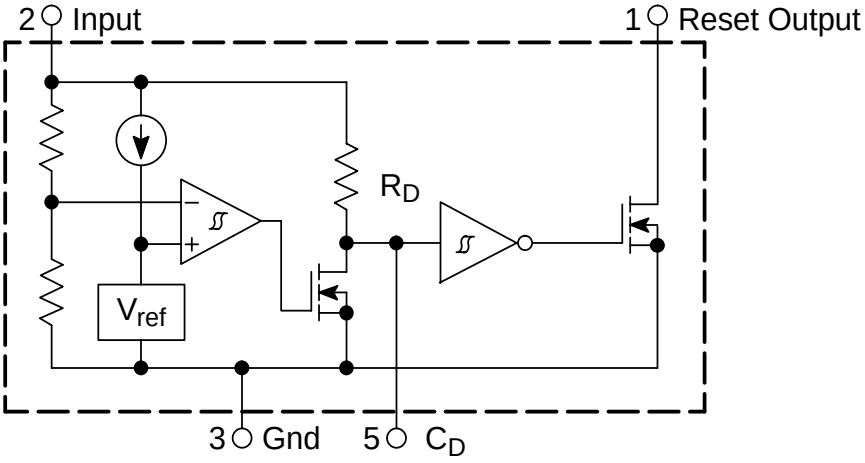
Table I. Serial Data Input Mode

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

9.10.3ICs 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

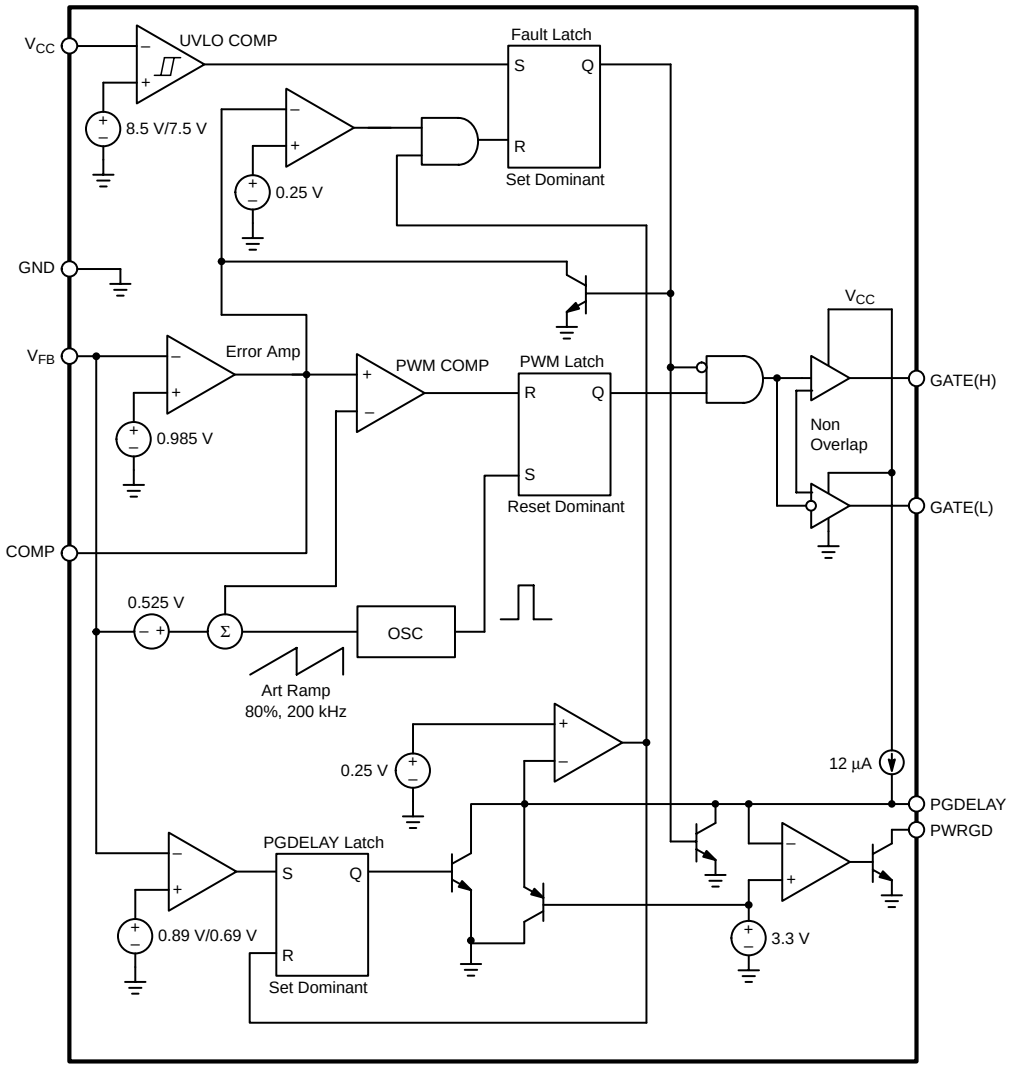


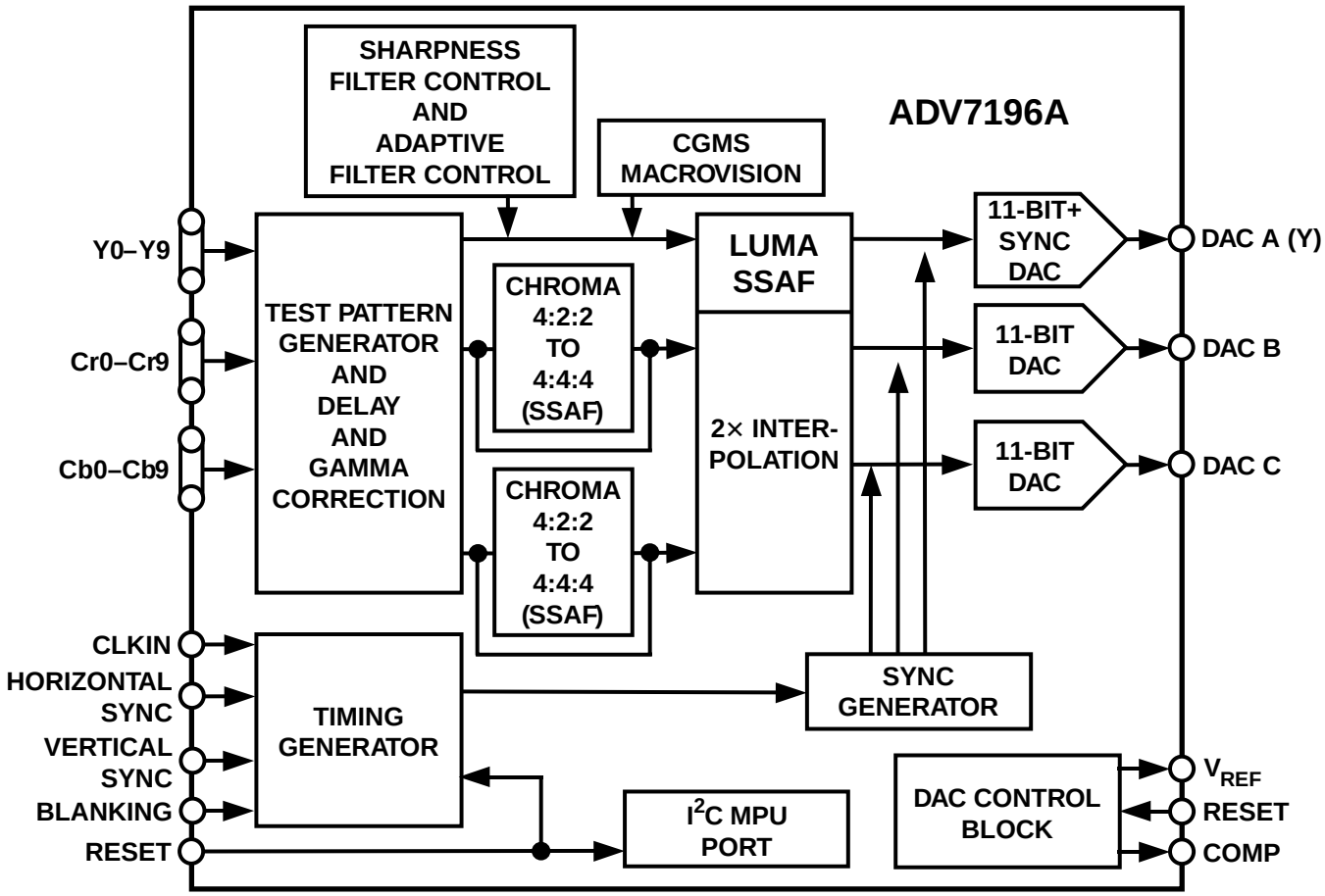
Figure 2. Block Diagram

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 ADV7196A, Digital Board 2.1 Chrysalis, Progressive Scan Video Encoder

FUNCTIONAL BLOCK DIAGRAM



ADV7196A

PIN FUNCTION DESCRIPTIONS

Pin	Mnemonic	Input/Output	Function
1, 12	V_{DD}	P	Digital Power Supply
2–11	Y0–Y9	I	10-Bit Progressive Scan/HDTV Input Port for Y Data. Input for G data when RGB data is input.
13, 52	GND	G	Digital Ground
14–23	Cr0–Cr9	I	10-Bit Progressive Scan/HDTV Input Port for Color Data in 4:4:4 Input Mode. In 4:2:2 mode this input port is not used. Input port for R data when RGB data is input.
24, 35	V_{AA}	P	Analog Power Supply
25	CLKIN	I	Pixel Clock Input. Requires a 27 MHz reference clock for standard operation in Progressive Scan Mode or a 74.25 MHz (74.1758 MHz) reference clock in HDTV mode.
26, 33	AGND	G	Analog Ground
27	DV	I	Video Blanking Control Signal Input
28	$\overline{\text{VSYNC}}$/ TSYNC	I	$\overline{\text{VSYNC}}$, Vertical Sync Control Signal Input or TSYNC Input Control Signal in Async Timing Mode
29	$\overline{\text{HSYNC}}$/ $\overline{\text{SYNC}}$	I	$\overline{\text{HSYNC}}$, Horizontal Sync Control Signal Input or $\overline{\text{SYNC}}$ Input Control Signal in Async Timing Mode
30	SCL	I	MPU Port Serial Interface Clock Input
31	SDA	I/O	MPU Port Serial Data Input/Output
32	DAC C	O	Color Component Analog Output of Input Data on Cb/Cr9–0 Input Pins
34	DAC A	O	Y Analog Output
36	DAC B	O	Color Component Analog Output of Input Data on Cr9–Cr0 Input Pins
37	COMP	O	Compensation Pin for DACs. Connect 0.1 μF capacitor from COMP pin to V_{AA}.
38	R_{SET}	I	A 2470 Ω resistor (for input ranges 64–940 and 64–960; output standards EIA-770.1–EIA-770.3) must be connected from this pin to ground and is used to control the amplitudes of the DAC outputs. For input ranges 0–1023 (output standards RS-170, RS-343A) the R_{SET} value must be 2820 Ω.
39	V_{REF}	I/O	Optional External Voltage Reference Input for DACs or Voltage Reference Output (1.235 V)
40	$\overline{\text{RESET}}$	I	This input resets the on-chip timing generator and sets the ADV7196A into Default Register setting. Reset is an active low signal.
41	ALSB	I	TTL Address Input. This signal sets up the LSB of the MPU address. When this pin is tied high, the I^2C filter is activated which reduces noise on the I^2C interface. When this pin is tied low, the input bandwidth on the I^2C interface is increased.
42–51	Cb/Cr9–0	I	10-Bit Progressive Scan/HDTV Input Port for Color Data. In 4:2:2 mode the multiplexed CrCb data must be input on these pins. Input port for B data when RGB is input.

9.10.4ICs EPG Board

IC U1 : S3C3410X, EPG Board, Microcontroller

BLOCK DIAGRAM

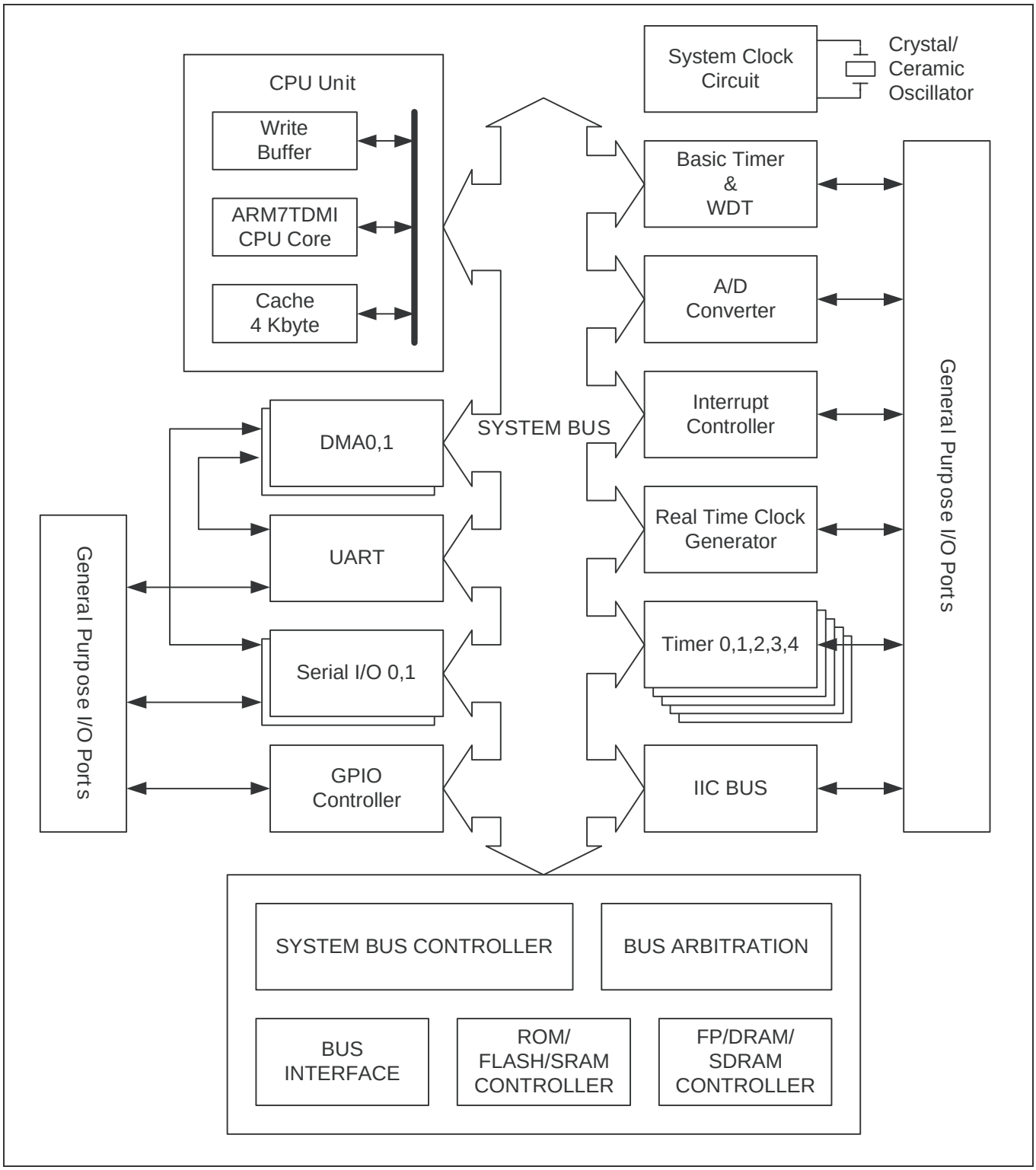


Figure 1-1. S3C3410X Block Diagram

10	VDDP		vdd	
11	TCLK3/P0.3	IO	pbseuct4	P0.3
12	TCLK4/P0.4	IO	pbseuct4	P0.4
13	TCAP3/TOUT3/PWM0/P0.5	IO	pbseuct4	P0.5
14	TCAP4/TOUT4/PWM1/P0.6	IO	pbseuct4	P0.6
15	EINT0/nWREXP/P0.7	IO	pbseuct8	P0.7
16	A0	O	pob8	A0
17	A1	O	pob8	A1
18	A2	O	pob8	A2
19	VSS	P	vss	
20	VDDP		vdd	
21	A3	O	pob8	A3

Table 1-1. 128-Pin QFP Pin Assignment (Continued)

Pin No	Function	I/O State @Initial	I/O Type	Reset
33	A13/A21O		pob8	A13
34	A14/A22O		pob8	A14
35	A15/A23O		pob8	A15
36	A16/P1.0	IO	pbcedct8	P1.0
37	A17/P1.1	IO	pbcedct8	P1.1
38	A18/P1.2	IO	pbcedct8	P1.2
39	A19/P1.3	IO	pbcedct8	P1.3
40	A20/EINT4/P1.4	IO	pbsedct8	P1.4
41	A21/EINT5/P1.5	IO	pbsedct8	P1.5
42	A22/EINT6/P1.6	IO	pbsedct8	P1.6
43	A23/EINT7/P1.7	IO	pbsedct8	P1.7
44	nCS0	O	pob8	nCS0
45	nCS1/P2.0I	O	pbceuct8	P2.0
46	nCS2/P2.1I	O	pbceuct8	P2.1
47	nCS3/P2.2I	O	pbceuct8	P2.2
48	nCS4/P2.3I	O	pbceuct8	P2.3
49	nCS5/P2.4I	O	pbceuct8	P2.4
50	nCS6:nRAS0:nSCS0/P2.5I	O	pbceuct8	P2.5
51	VSS	P	vss	
52	VDDP		vdd	
53	nCS7:nRAS1:nSCS1/P2.6I	O	pbceuct8	P2.6
54	EINT1/nECS0/P2.7	IO	pbseuct8	P2.7
55	nOEO		pob8	nOE
56	nASO		pob8	nAS
57	nWBE0:nBE0:DQM0/P3.0	IO	pbceuct8	P3.0
58	nWBE1:nBE1:DQM1/P3.1	IO	pbceuct8	P3.1
59	nCAS0:nSRAS/P3.2	IO	pbceuct8	P3.2
60	nCAS1:nSCAS/P3.3	IO	pbceuct8	P3.3
61	nWE/P3.4	IO	pbceuct8	P3.4
62	SCKE/P3.5	IO	pbceuct8	P3.5
63	SCLK/P3.6I	Op	bceuct8	P3.6
64	EINT2/nECS1/P3.7	IO	pbseuct8	P3.7

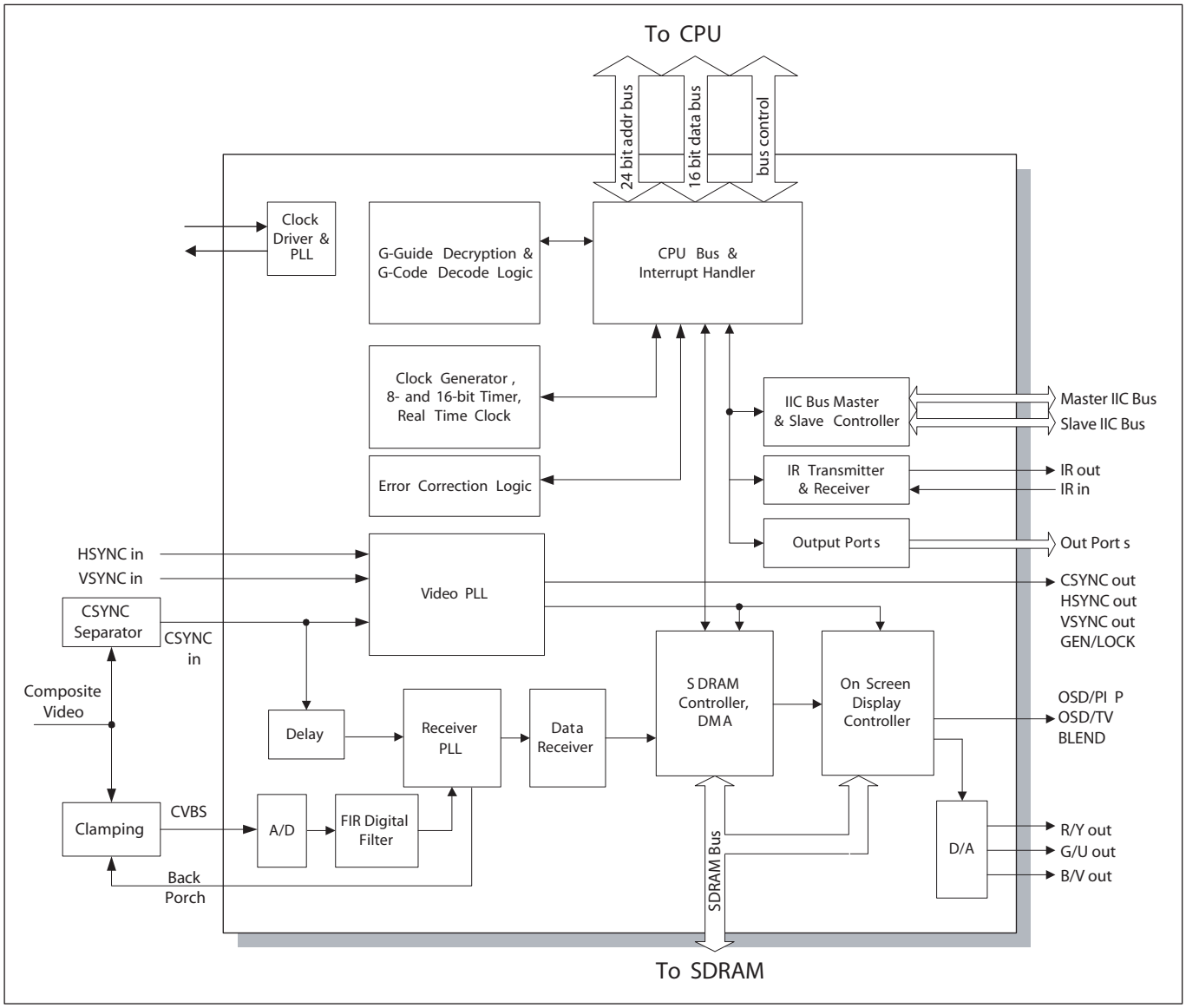
Table 1-1. 128-Pin QFP Pin Assignment (Continued)

Pin No	Function	I/O State @Initial	I/O Type	Reset
65	LP/P9.0O		pob8	LP
66	DCLK/P9.1O		pob8	DCLK
67	D0	IO	pbcedct8	D0
68	D1	IO	pbcedct8	D1
69	D2	IO	pbcedct8	D2
70	D3	IO	pbcedct8	D3
71	D4	IO	pbcedct8	D4
72	D5	IO	pbcedct8	D5
73	VSS	P	vss	
74	VDDP		vdd	
75	D6	IO	pbcedct8	D6
76	D7	IO	pbsedct8D	7
77	D8/A16/P4.0I	O	pbcedct8	P4.0
78	D9/A17/P4.1I	O	pbcedct8	P4.1
79	D10/A18/P4.2	IO	pbcedct8	P4.2
80	D11/A19/P4.3	IO	pbcedct8	P4.3
81	D12/A20/P4.4	IO	pbcedct8	P4.4
82	D13/A21/P4.5	IO	pbcedct8	P4.5
83	VSS	P	vss	
84	VDDP		vdd	
85	D14/A22/P4.6	IO	pbcedct8	P4.6
86	D15/A23/P4.7	IO	pbcedct8	P4.7
87	nDREQ0/P5.0I	O	pbceuct4	P5.0
88	nDACK0/P5.1	IO	pbceuct4	P5.1
89	nDREQ1/P5.2I	O	pbceuct4	P5.2
90	nDACK1/P5.3	IO	pbceuct4	P5.3
91	IICSDA/P5.4	IO	pbceuct8	P5.4
92	IICSCK/P5.5	IO	pbceuct8	P5.5
93	VSS	P	vss	
94	VDDP		vdd	
95	URXD/P5.6	IO	pbceuct4	P5.6
96	UTXD/P5.7I	O	pbceuct4	P5.7

Table 1-1. 128-Pin QFP Pin Assignment (Continued)

Pin No	Function	I/O State @Initial	I/O Type	Reset
97	SIORXD0/P6.0	IO	pbseuct4	P6.0
98	SIOCLK0/P6.1	IO	pbseuct4	P6.1
99	SIOTXD0/P6.2I	O	pbseuct4	P6.2
100	SIORDY/nWAIT/P6.3I	O	pbseuct4	P6.3
101	SIORXD1/P6.4	IO	pbseuct4	P6.4
102	SIOCLK1/P6.5	IO	pbseuct4	P6.5
103	SIOTXD1/P6.6	IO	pbseuct4	P6.6
104	EINT3/P6.7	IO	pbseuct4	P6.7
105	TCK/RP0/P7.0	IO	pbceuct4	P7.0
106T	MS/RP1/P7.1	IO	pbceuct4	P7.1
107T	DI/RP2/P7.2	IO	pbceuct4	P7.2
108	nTRST/RP3/P7.3	IO	pbceuct4	P7.3
109T	DO/RP4/P7.4	IO	pbceuct4	P7.4
110	RP5/P7.5	IO	pbceuct4	P7.5
111	VSS	P	vss	
112	VDDP		vdd	
113	RP6/P7.6	IO	pbceuct4	P7.6
114	RP7/P7.7	IO	pbceuct4	P7.7
115	XTAL0I		oscm	XTAL0
116	EXTAL0O		oscm	EXTAL0
117	RESET	I	pisu	RESET
118	TEST0I		pisT	EST0
119	TEST1I		pisT	EST1
120	RTCVDD	Pv	ddt	
121	XTAL1I		oscm	XTAL1
122	EXTAL1O		oscm	EXTAL1
123	ADCVSS	P	vsst	
124	AVREF	A	apad	AVREF
125	AIN0/P8.0	Ip	iseuc	P8.0
126	AIN1/P8.1	Ip	iseuc	P8.1
127	AIN2/P8.2	Ip	iseuc	P8.2
128	AIN3/P8.3	Ip	iseuc	P8.3

IC U2: GSA03, EPG Board, G-Guide System Controller



Pin Functions

Pin Name	Pin Number	I/O	Function
SDRAM contro l			
MA [11..0]	115, 114, 143-149, 111-113	OA	ddress Bus to SDRAM
MD [15..0]	132-137, 139-140, 121, 123-129	I/O	Data Bus to SDRAM
MCLK	142	O	Clock to SDRAM
MCS	116	O	Chip Select to SDRAM
MRAS	117	O	Row Address Strobe to SDRAM
MCAS	118	O	Column Address Strobe to SDRAM
MWE	119	OW	rite Enable to SDRAM
MLDQM	120	OL	ower Data Input / Output Mask to SDRAM
MUDQM1	41	OU	pper Data Input / Output Mask to SDRAM
CPU interface			
RESCPU	58	OC	PU reset signal
SH/68K	62	IC	PU Bus mode selection
PCLK	199	O	Clock to CPU
LDS/WRL	197	I	68EC000 mode: Lower Data Strobe SH mode: Low Write strobe
UDS/WRH	198	I	68EC000 mode: Upper Data Strobe SH mode: High Write strobe
RW/RD	196	I	68EC000 mode: Read/Write strobe SH mode: Read strobe
DTACK/WAIT	201	O	68EC000 mode: Data Transfer Acknowledge SH mode: WAIT
IPL[2..0]	19-17	OI	nterrupt Privilege Level
IRQACK	57	I	68EC000 mode: interrupt acknowledge † SH mode: IRQOUT from CPU
PA23/CS	21	I	68EC000 mode: Address pin 23 SH mode: Chip Select input
PA[22..1]	22-25,28-30,39-50,54-56	IC	PU address bus (SH mode use UPA[21..1] only)
PD[15..0]1	6-12, 7-3, 207-202	I/O	CPU data bus
Flash/ROM control			
FOE5	9O		Output Enable to Flash memory / ROM
FWE	60	OW	rite Enable to Flash memory
Video signal			
CSI	169	Ic	omposite sync input
HSI1	68	IH	sync input

† Interrupt acknowledge is derived from the logical combination of the Function Code FC0, FC1, FC2 of 68EC000.

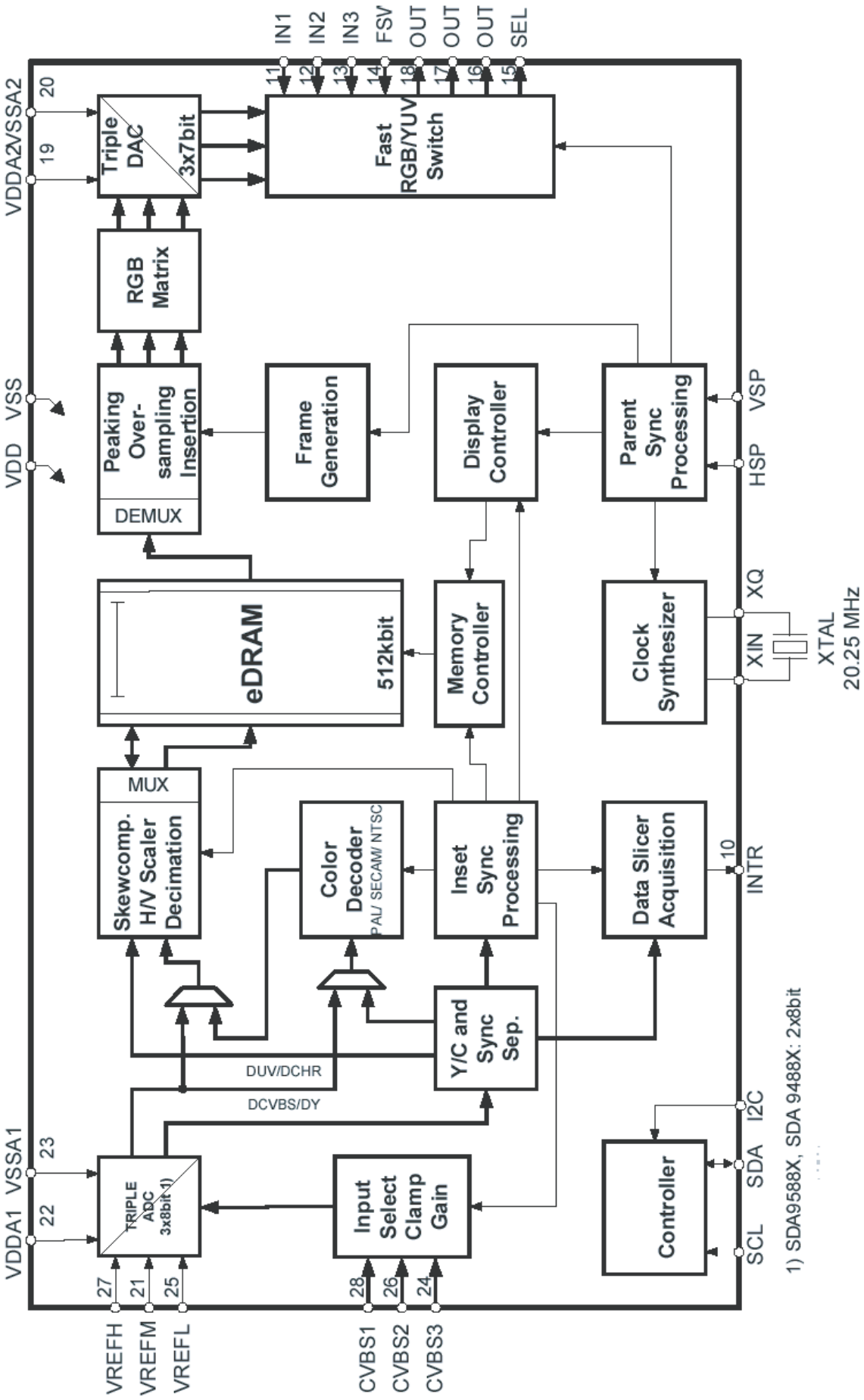
Pin Name	Pin Number	I/O	Function
VSI	167	IV	sync input
CSO	165	Oc	omposite sync output
HSO	164	OH	sync output
VSO	163	OV	sync output
BLEND9	3O		Alpha Blending Switch
OSD/TV	94	OO	SD / TV Switch
OSD/PIP9	5O		OSD / PIP Switch
BKP	162	OB	ack Porch signal for external clamping circuit
GEN/LOCK	161	OG	EN / LOCK PLL mode indicator
I^2C bus contro l			
MSCL6	6	I/O	Master IIC Bus Clock
MSDA6	7	I/O	Master IIC Bus Data
SSCL	160	I/O	Slave IIC Bus Clock
SSDA	159	I/O	Slave IIC Bus Data
Infra-Red interface			
IRIN	70	II	R code input
IROUT	158	OI	R code output
Miscellaneous			
OUTP0/HTST	68	O	Programmable output port 0 / H sync Test output
OUTP1/VBID6	9O		Programmable output port 1 / VBI Data test output
GCLR	61	IG	lobal Clear
Oscillation			
XTAL19		I	Connect to an 36MHze xternal resonator. When in external clock input mode, an external clock is input via this pin.
XTAL21	0O		Connect to an 36MHze xternal resonator. When in external clock input mode, this pin is left open
Analog Signals			
R/YOUT	85	O	Red or Y Output
G/UOUT8	7O		Green or U Output
B/VOUT	89	OB	lue or V Output
CVBS	189	I	Composite Video Base-band Signal

Pin Name	Pin Number	Function
Powe r		
DVDD	31, 171	3.3V power supply for digital portion of internal hybrid circuit
DGND	37, 195	0V ground reference for digital portion of internal hybrid circuit
AVDD	33, 81, 83, 172, 174	3.3V power supply for analog portion of internal hybrid circuit
AGND	35, 90, 91, 193, 194	0V ground reference for analog portion of internal hybrid circuit

Pin Name	Pin Number	Function
VDD	11, 27, 53, 78, 104, 130, 157, 166, 208	3.3V power supply for the digital logic circuit
GND	1, 2, 8, 20, 26, 51, 52, 63-65, 71, 72, 79, 96, 97, 102, 103, 105-110, 122, 131, 138, 150, 151, 155, 156, 170, 200	0V ground reference for the digital logic circuit
Miscellaneou s		
VRTS, VRT, VRB, VRBS, VCLMP	176, 178, 182, 183, 185	Reference voltage inputs for internal A/D converter(See Chapter 6)
NC	32, 34, 36, 38, 73-77, 80, 82, 84, 86, 88, 92, 98-.101, 152-154, 173, 175, 177, 179-181, 184, 186-188, 190-192	Not connected

IC U11: SDA9488X, EPG Board, Picture in Picture IC

Block Diagram



Number	Name	Type	Description
1	XIN	I	crystal oscillator (input) or external clock input
2	XQ	O	crystal oscillator (output)
3	HSP	I/TTL	horizontal sync for parent channel
4	VSP	I/TTL	vertical sync for parent channel
5	SDA	I/O	I^2C-bus data
6	SCL	I	I^2C-bus clock
7	VDD	S	digital supply voltage
8	VSS	S	digital ground
9	I2C	I	I^2C Address
10	INT	O/TTL	interrupt
11	IN1	I/ana	V/R input for external YUV/RGB source
12	IN2	I/ana	Y/G input for external YUV/RGB source
13	IN3	I/ana	U/B input for external YUV/RGB source
14	FSW	I	fast switch input for YUV/RGB switch
15	SEL	O	fast blanking output for PIP
16	OUT3	O/ana	analog output: chrominance signal +(B-Y) or -(B-Y) or B
17	OUT2	O/ana	analog output: luminance signal Y or G
18	OUT1	O/ana	analog output: chrominance signal +(R-Y) or -(R-Y) or R
19	VDDA2	S	analog supply voltage for DAC
20	VSSA2	S	analog ground for DAC
21	VREFH	I/ana	uppper reference voltage for ADC and DAC
22	VDDA1	S	analog supply voltage for ADC
23	VSSA1	S	analog ground for ADC
24	CVBS3	I/ana	CVBS3 or V (SDA 9588X) or C Input
25	VREFL	I/O	lower reference voltage for ADC
26	CVBS2	I/ana	CVBS2 or U (SDA 9588X) or Y (of Y/C) Input
27	VREFM	I/O	mid-level reference voltage for ADC
28	CVBS1	I/ana	CVBS1 or Y (of YUV, SDA 9588X) Input
I= Input / ana=analog / O= Output / TTL=Digital (TTL) / S=Supply voltage			

9.11 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

+12V	+12V Power Supply
+2V5_FLI	+2V5 Power Supply for FLI
+2V5_PLL	+2V5 Power Supply for PLL
+3V3	+3V3 Power Supply
+3V3_ANA	+3V3 Power Supply Analogue
+3V3_DD	+3V3 Power Supply Digital
+3V3_FLI	+3V3 Power Supply for FLI
+5V	+5V Power Supply
+5V_BUFFER	+5V Power Supply for Video Filters
5508_HS	Horizontal Synchronisation from Host Decoder to Progressive Scan
5508_ODD_EVEN	Odd - Even control from Host Decoder to Progressive Scan
-5V	-5V Power Supply
-5V_BUFFER	-5V Power Supply for Video Filters
A_EMPRESS(13:0)	EMPRESS address output to SDRAM
ACC_ACLK_OSC	Audio Clock PLL output sync with incoming video for record
ACC_ACLK_PLL	Audio Clock PLL output for play back
ACLK_EMP	EMPRESS audio clock output
AD_ACLK	Audio Decoder Clock
AD_BCLK	Audio Decoder I2S bit clock
AD_DATAO	Audio Decoder Output data (PCM)
AD_SPDIF33	Audio digital output to the analog board
AD_WCLK	Audio Decoder I2S word clock
AE_ACLK	Audio Encoder Clock
AE_ACLK_OEN	Audio Encoder Clock Output Enable
AE_BCLK	Audio Encoder I2S bit clock
AE_BCLK_DV	Audio Encoder I2S bit clock to DVIO
AE_BCLK_VSM	Audio Encoder I2S bit clock to VSM
AE_DATAI	Audio Encoder Input data (PCM

AE_DATAI_DV	Audio Encoder Input data (PCM) from DVIO
AE_DATAO	Audio Encoder Output data (PCM)
AE_WCLK	Audio Encoder I2S word clock
AE_WCLK_DV	Audio Encoder I2S word clock to DVIO
AE_WCLK_VSM	Audio Encoder I2S word clock to VSM
ANA_WE	Analogue write enable
ANA_WE_LV	Analogue write enable Low Voltage
B_IN_VIP	Video blue input to Video Input Processor
B_OUT	Video blue output from Host Decoder
B_OUT_B	Filtered blue video output
BA	Bank Address
BCLK_CTL_SERVICE	Bitclock control Service Interface
BE_BCLK	Basic Engine I2S bit clock
BE_BCLK_VSM	Basic Engine I2S bit clock to VSM
BE_CPR	Basic Engine Control Processor ready to accept data
BE_DATA_RD	Basic Engine Data read
BE_DATA_WR	Basic Engine Data write
BE_FAN	Basic Engine FAN
BE_FLAG	Basic Engine error flag
BE_IRQN	Basic Engine interrupt request
BE_LOADN	Basic Engine LOAD(LOW active)
BE_RXD	Basic Engine S2B received data
BE_SUR	Basic Engine servo unit ready to accept data (S2B)
BE_SYNC	Basic Engine sector/abs time sync
BE_TXD	Basic Engine S2B transmitted data
BE_V4	Basic Engine versatile input pin
BE_WCLK	Basic Engine I2S word clock
C_IN	Video Chrominance input
C_IN_VIP	Chrominance input to Video Input Processor
C_OUT	Chrominance output from Host Decoder
C_OUT_B	Filtered Chrominance output
CAS	Column Address strobe
CB_OUT(9:0)	Chrominance Blue out
CLK4	SDRAM clock
CPUINT0	Control processor unit interrupt
CPUINT1	Control processor unit interrupt
CR_OUT(9:0)	Chrominance Red out
CTS1P	Clear to send (Service Interface)
CVBS_OUT	Composite video output out of the Host Decoder
CVBS_OUT_B	Filtered Composite video output
CVBS_OUT_B_VIP	Composite video output to Video Input Processor(digital board video loop)
CVBS_Y_IN	Composite video/Luminance input
CVBS_Y_IN_A	Composite video/Luminance input to Video Input Processor
CVBS_Y_IN_B	Composite video/Luminance input to Video Input Processor
CVBS_Y_IN_C	Composite video/Luminance input to Video Input Processor
D_ADDR(10:0)	Address bus
D_DATA(29:0)	Data bus
D_EMPRESS(15:0)	SDRAM data input/output of EMPRESS
D_PAR_D(7:0)	Front-end parallel interface data (record)
D_PAR_DVALID	Front-end parallel interface data valid
D_PAR_REQ	Front-end parallel interface request
D_PAR_STR	Front-end parallel interface strobe
D_PAR_SYNC	Front-end parallel interface sync
DV_IN_CLK	Digital Video in clock from DVIO board
DV_IN_CLK	Digital Video in data bus from DVIO board
DV_IN_HS	Digital Video in horizontal synchronisation from DVIO board
DV_IN_VS	Digital Video in vertical synchronisation from DVIO board
EMI_A(21:1)	External Memory Interface Address Bus(Host Decoder)
EMI_BE0N	External Memory Interface Lower byte enable(Host Decoder)
EMI_BE1N	External Memory Interface Upper byte enable(Host Decoder)
EMI_CAS0N	External Memory Interface SDRAM column address strobe(Host Decoder)
EMI_CE1N	External Memory Interface VSM Lower bank enable
EMI_CE2N	External Memory Interface VSM Higher bank enable
EMI_CE3N	External Memory Interface flash IC's enable
EMI_D(15:0)	External Memory Interface Data Bus(Host Decoder)
EMI_PROCCLK	External Memory Interface Processor Clock(Host Decoder)
EMI_RWN	External Memory Interface Read/Write control signal(Host Decoder)
EMI_WAIT	External Memory Interface Wait state request(Host Decoder)
EMPRESS_BOOT	EMPRESS BOOT select input
EMPRESS_IRQN	EMPRESS Interrupt request output
FLASH_OEN	FLASH output enable control signal
G_IN_VIP	Video green input to Video Input Processor
G_OUT	Video green output from Host Decoder
G_OUT_B	Filtered green video output from Host Decoder
GNDD	Digital Ground
HD_M_AD(13:0)	Host Decoder SDRAM address bus
HD_M_CASN	Host Decoder SDRAM column address strobe
HD_M_CLK	Host Decoder SDRAM clock
HD_M_CS0N	Host Decoder SDRAM chip select
HD_M_DQ(15:0)	Host Decoder SDRAM data bus
HD_M_DQML	Host Decoder SDRAM data mask enable(Lower)
HD_M_DQMU	Host Decoder SDRAM data mask enable(Upper)
HD_M_RASN	Host Decoder SDRAM row address strobe
HD_M_WEN	Host Decoder SDRAM write enable
HSOUT	Horizontal synchronisation OUT
ION	Inverted ON: Enable the power supply for the digital board when LOW
IRESET_DIG	Initialisation of the digital board, HIGH when power ON
JTAG3_TCK	JTAG Test Clock
JTAG3_TD_VIP_TO_VEJTAG	Transmitted Data Video Input Processor to Video Encoder
JTAG3_TD_VSM_TO_VIPJTAG	Transmitted Data Versatile Stream Manager to Video Input Processor
JTAG3_TMS	JTAG Test Mode Select
JTAG3_TRSTN	JTAG Test part ResetN
LOAD_DVN	LOAD Digital Video(LOW active)
MUTEN	Mute enable
MUTEN_LV	Mute enable Low Voltage
P_SCAN_YUV(7:0)	Progressive Scan digital video bus
R_IN_VIP	Video Red input to Video Input Processor
R_OUT	Video Red output from Host Decoder
R_OUT_B	Filtered Red Video output from Host Decoder
RAS	Row Address Strobe
RESETN	Reset Host Decoder
RESETN_BE	System reset basic engine (buffered)
RESETN_DVIO	System reset Digital Video Input Output (buffered)
RESETN_VE	System reset Video Encoder
ROMH_CEN	Flash 2 chip enable

ROML_CEN	Flash 1 chip enable
RSTN_BE	Reset control of basic engine
RSTN_DVIO	Reset control of DVIO
RTS1P	Ready To Send data to service serial interface
RX1P	Receive data from service serial interface
SCL	I2C bus clock
SD_CASN	SDRAMColumn Address strobe output (active LOW)
SD_CLK	SDRAMclock output
SD_CLKE	SDRAMclock enable output
SD_CSN	SDRAM
SD_DQM(1:0)	SDRAMdata mask enable output
SD_RASN	SDRAMrow address strobe output
SD_WEN	SDRAMwrite enable output
SDA	I2C bus dataSEL_ACLK1Select audio clock(playback)
SM_CS3N	SRAMchip select
SM_LBN	SRAMlower bank
SM_OEN	SRAMoutput enable
SM_UBN	SRAMupper bank
SM_WEN	SRAMoutput enable
SMA(17:0)	SRAMaddress output
SMD(15:0)SRAM	data input/output
SYSCLK_EMPRESS	System clock EMPRESS
SYSCLK_PROGSCAN	System clock Progressive Scan
SYSCLK_VSM_5508	System clock VSM and Host decoder
TX1P	Transmit data to service serial interface
U_IN	Video U input
U_IN_VIP	Video U input to Video Input Processor
V_IN	Video V input
V_IN_VIP	Video V input to Video Input Processor
VCC3_CLK_BUF	Power supply 3V3 clock buffer
VCC3_VSM	Power supply 3V3 Versatile Stream Manager
VCC3_VSM_MEM	Power supply 3V3 Versatile Stream Manager Memory
VCC5_4046	Power supply 5V to PLL IC
VDD_125	Power supply 5V to buffer 7202
VDD_CORE	Sti5508 Core supply voltage 2.5V
VDD_EMP	Empress supply voltage 3.3V
VDD_EMP_CORE	Empress Core supply voltage 2.5V
VDD_FLASH_H	Flash 7301 supply voltage
VDD_FLASH_L	Flash 7302 supply voltage
VDD_LVC32	Power supply LVC32
VDD_PCM	Power supply Audio decoder of Sti5508
VDD_PLL	Power supply PLL audio decoder of Sti5508
VDD_RGB	Power supply video encoder of Sti5508
VDD_STI	Power supply of Sti5508
VDD_YCC	Power supply video encoder of Sti5508
VDD5_MK2703	Power supply MK2703
VDD5_OSC	Power supply Oscillator
VDDA1A_7118	Power supply for analog input of VIP
VDDA2A_7118	Power supply for analog input of VIP
VDDA3A_7118	Power supply for analog input of VIP
VDDA4A_7118	Power supply for analog input of VIP
VDDE_7118	Power supply digital for peripheral cells of VIP
VDDI_7118	Power supply digital for core of VIP
VDDX_7118	Power supply for crystal oscillator of VIP
VE_DATA(7:0)	Video Encoder data Bus
VE_DSN	Video Encoder Data Strobe
VE_DTACKN	Video Encoder Data Transfer acknowledge
VIP_ERROR	Video Input Processor error
VIP_FB	Video Input Processor Fast Blanking
VIP_FID_FF	Video Input Processor field indentifier to Flip Flop
VIP_HS	Video Input Processor horizontal
VIP_ICLK	Video Input Processor input Clock
VIP_IDQ	Video Input Processor output data qualifier
VIP_IGP1	Video Input Processor input general purpose 1
VIP_INT	Video Input Processor interrupt
VIP_RTS1	Video Input Processor ready to send
VIP_VS	Video Input Processor vertical
VIP_YUV(7:0)	Video Input Processor digital video(CCIR 656)
VS_IN	Vertical synchronisation IN
VSM_M_A(13:0)	Versatile Stream Manager SDRAM address bus
VSM_M_CASN	Versatile Stream Manager SDRAM column address strobe
VSM_M_CLKEN	Versatile Stream Manager SDRAM clock enable
VSM_M_CLKOUT	Versatile Stream Manager SDRAM clock out
VSM_M_D(15:0)	Versatile Stream Manager SDRAM data bus
VSM_M_LDQM	Versatile Stream Manager SDRAM lower data mask enable
VSM_M_RASN	Versatile Stream Manager SDRAM row address strobe
VSM_M_UDQM	Versatile Stream Manager SDRAM upper data mask enable
VSM_M_WEN	Versatile Stream Manager SDRAM write enable
VSM_UART1_CTSN	Versatile Stream Manager UART1 clear to send to analog board (UART1
VSM_UART1_RTSN	Versatile Stream Manager UART2 clear to send to DVIO board (UART2 is gateway to DIVIO board)
VSM_UART1_RX	Versatile Stream Manager UART1 ready to send to analog board
VSM_UART1_TX	Versatile Stream Manager UART2 ready to send to DVIO board
VSM_UART2_CTSN	Versatile Stream Manager UART1 received data to analog board
VSM_UART2_RTSN	Versatile Stream Manager UART2 received data to DVIO board
VSM_UART2_RX	Versatile Stream Manager UART1 transmitted data to analog board
VSM_UART2_TX	VersatileStream Manager UART2 transmitted data to DVIO board
VSOUT	Vertical synchronisation OUT
WE	Write Enable
Y_IN	Luminance input from analog board
Y_OUT	Luminance output from Host Decoder
Y_OUT_B	Filtered luminance output
YY_OUT(9:0)	Luminance output from FLI

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

DVIO 1.8 Board

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 Microcontroller IC7802
3V3_32kHz	+3V3 Power supply for audio format adaptation circuitry IC7507 & IC7508
3V3_AC	+3V3 Power supply for audio system clock generator IC7605 & IC7606
+5V	+5V Power supply
5V_PLL	5V Power supply for VCO of audio PLL IC7604
A(1:17)	Flash adress 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	
AMCLK44	11,2896MHz (=256*44.1kHz) audio master clock signal for 44.1kHz audio
AMCLK48	12,288MHz (=256*48kHz) audio master clock signal for 32kHz and48kHz audio
APWM	PWM signal for audio
PLLBUFENn_AUD	Buffer Enable
AudioBUFENn_VID	Buffer Enable
VideoCLK27M_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
DV_STATUS	Interupt 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

10. Spare Parts List

10.1 Exploded View of the Set

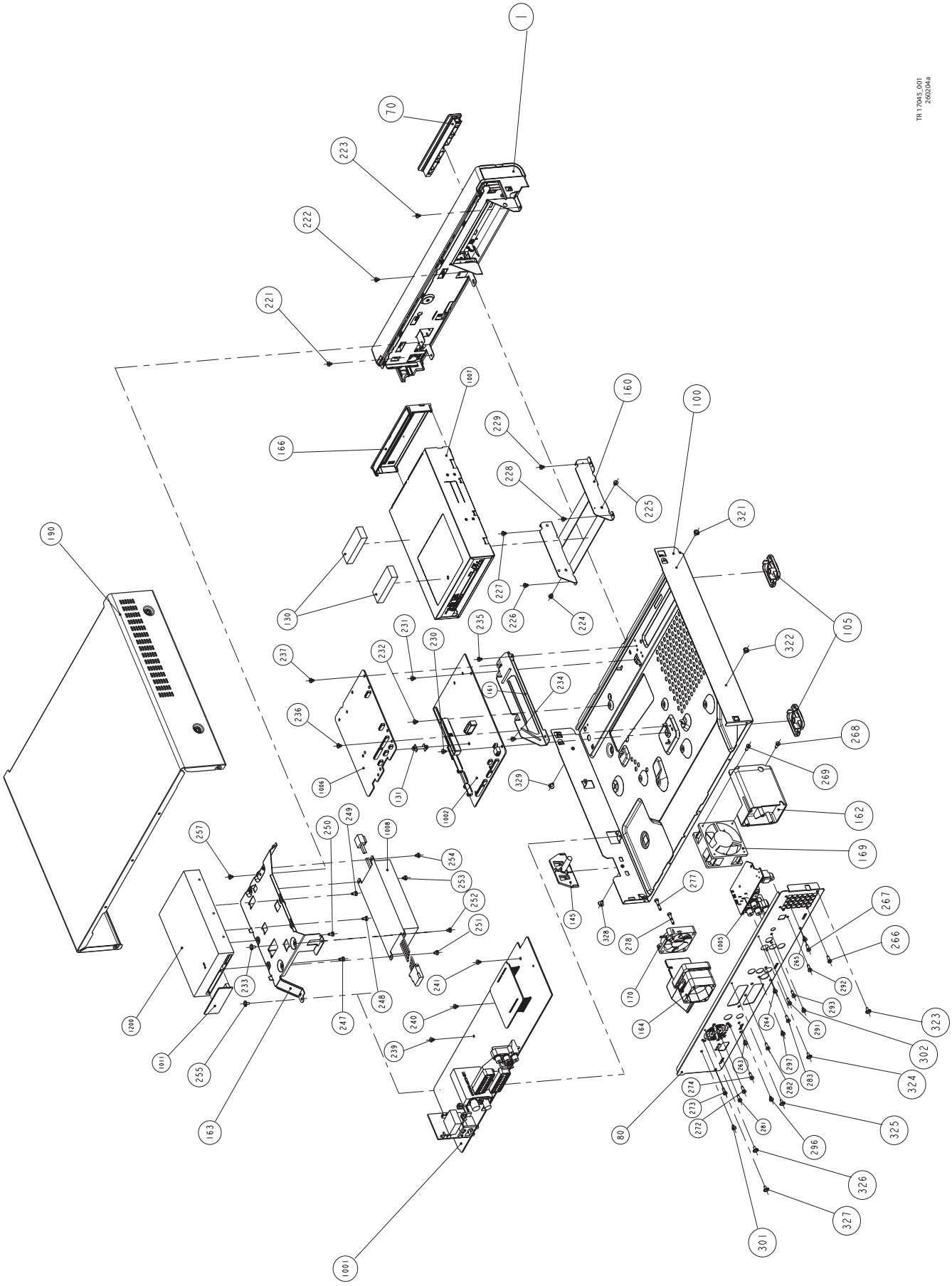


Figure 10-1

10.2 Exploded View of the Front Panel Complete

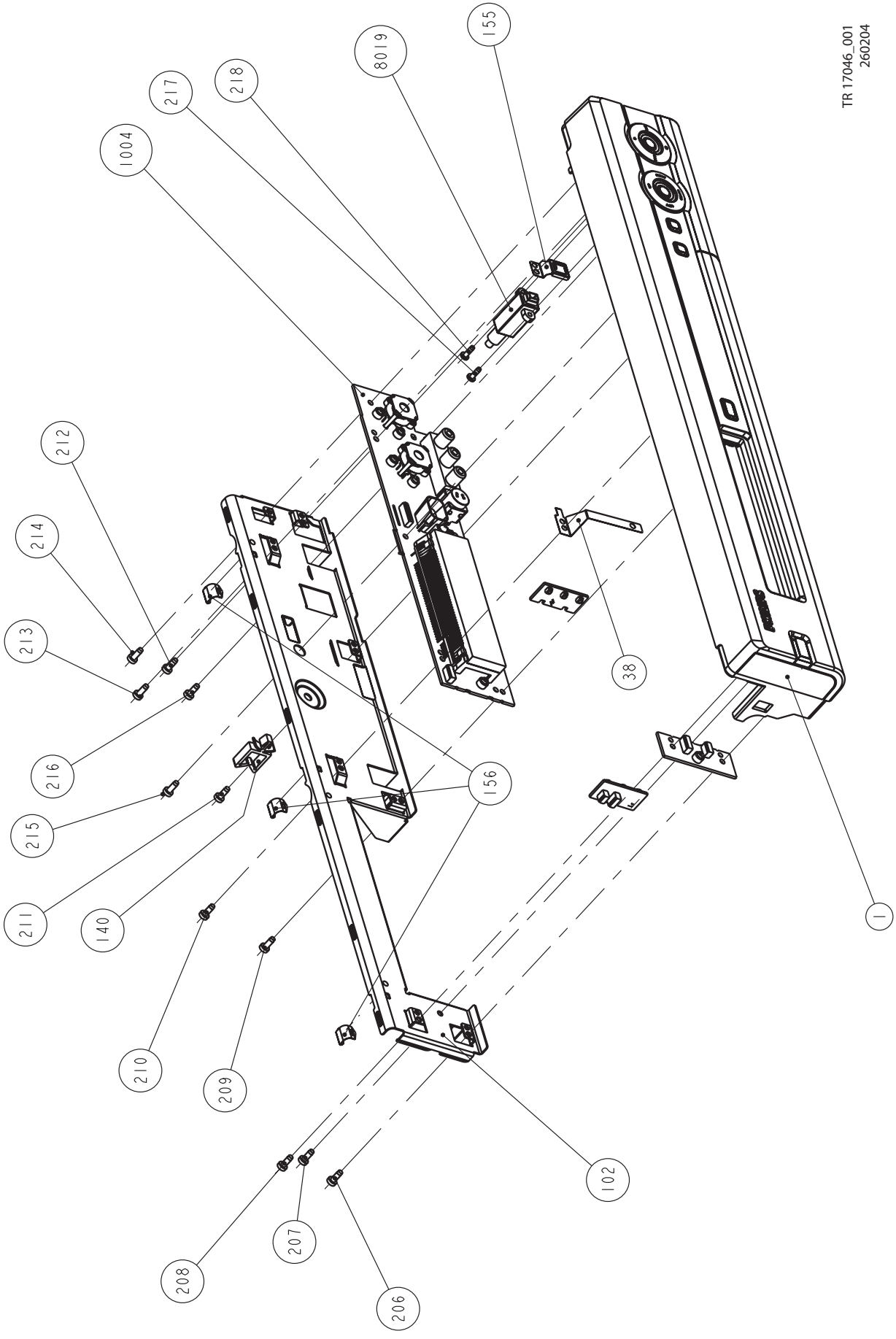


Figure 10-2

10.3 Exploded View of the Front without PWBs

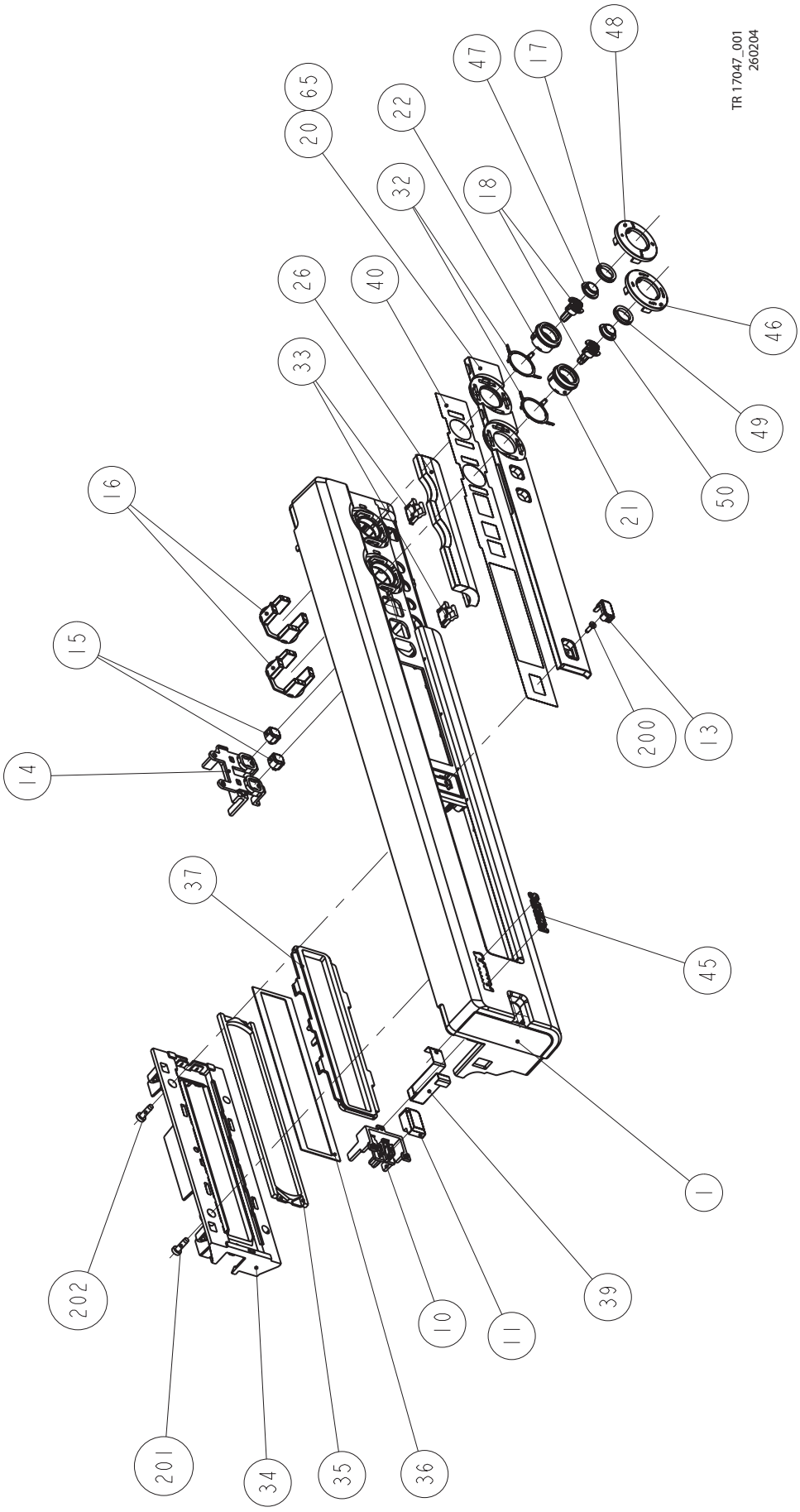


Figure 10-3

Mechanical

	3122 785 90650	FORMAT DVD HDRW720, please see chapter 5.6
	3122 785 90740	FORMAT DVD DVDR725H, please see chapter 5.6
0001	3103 607 90711	FRONT PANEL HDRW720
0001	3103 607 91051	FRONT PANEL DVDR725H
0011	3103 607 50341	BUTTON CAP STAND BY
0013	3103 607 50361	BUTTON CAP OPEN CL.
0015	3103 607 51200	BUTTON CAP EPG
0020	3103 607 51091	DISPLAY WINDOW
0026	3103 607 51131	FLAP HDRW
0033	3103 604 00441	HINGE DOOR FRONT AV
0046	3103 607 51111	RING ROCKER CURSOR
0047	3103 607 50411	BUTTON CAP RECORD
0048	3103 607 51101	RING ROCKER PL / PAUSE
0050	3103 607 51121	BUTTON CAP RECORD
0070	3103 607 90751	COVER TRAY ASSY HDRW
0072	3103 607 90751	COVER TRAY ASSY HDRW
0105	3103 607 50491	FOOT ASSY
0164	3103 604 01651	BRACKET FAN 45 DAMPED
0169	3103 607 10011	FAN KD1206PTS3-H.C112
0170	3103 607 10071	FAN KD1245PFV-311.MSB1068.A
0171	3103 604 01631	DAMPER FAN 10MM
0172	3103 604 01631	DAMPER FAN 10MM
0173	3103 604 01631	DAMPER FAN 10MM
0179	3103 607 51151	COVER HDRW
0190	3103 607 51151	COVER HDRW
0277	4822 502 30411	PL3 X16PAN<STZNBK
0278	4822 502 30411	PL3 X16PAN<STZNBK
0350	3128 147 15791	RC19046006/01
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
0358	2422 076 00522	CABLE PHONE 2P IR-LED
1008 ⚠	2722 171 00137	POW SUPP MOD DVD+RW AC6220-2 B
1011	3103 608 51181	PBAS IDE AV3
1200 ⚠	2822 062 00053	'HDD 3.5"160GB WD1600BB (WESTERN DIGITAL), see chapter 5.6 for instructions
1200 ⚠	2822 062 00045	'HDD 3.5"160GB 4R160L0 (MAXTOR), see chapter 5.6 for instructions
1200	2822 062 41027	'HDD 3.5" 80GB 4R080L0 (MAXTOR), see chapter 5.6 for instructions
8004	3103 601 00220	FFC 10-POL-D-TYP 350MM (UP-DB)
8006	3103 601 00491	FFC 22P/170/22P BD UL (EPG-DB)
8008	3103 601 00441	CBLE KR 12P/130/12P UL
8009	3103 601 00661	IDE-CABLE 440MM
8011	3103 601 00290	FFC 10-POL-D-TYP 360MM (AB-EP)
8012	3103 601 00471	CBLE EHR 4P/180/4P LC UL
8013	3103 601 00310	KR 9POL GESCH 370MM
8015	3103 601 00320	FFC 7-POL-D-TYP 280MM (DIO-EP)
8016	3103 601 00330	FFC 4-POL-D-TYP 190MM (DIO-EP)
8017	3103 601 00340	FFC 10-POL-A-TYP 210MM (EP-DC)
8018⚠	3103 601 00691	FFC 40POL
8019⚠	3103 601 00681	IEEE 1394 390MM
8020	3103 601 00370	FFC 6-POL-D-TYP 220MM (DIO-DB)
8021	3103 601 00380	FFC 22-POL-D-TYP 175MM (AB-EP)
8026	3103 601 00431	FFC 22-POL-A-TYP 245MM (AB-DB)
8027	3103 601 00451	FFC 7-POL-A-TYP 155MM (EPG-DB)
8028⚠	3103 601 00671	KR 2POL 300MM

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5000	2422 549 00107	FERRITE CORE RP 25X5X12

Display Board

Various

1110	4822 242 82114	EFOEC8004/T4
1130	4822 276 13732	Tact switch
1160	4822 276 13732	Tact switch
1161	4822 276 13732	Tact switch
1162	4822 276 13732	Tact switch
1163	4822 276 13732	Tact switch
1164	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
1171	4822 276 13732	Tact switch
1172	4822 276 13732	Tact switch
1910	2422 025 18143	CON V 10P F
1910	4822 267 11031	10P. FEM. V
1911	3103 601 00160	CABLE TREE ASSY 4 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
1940	3103 601 00170	CABLE TREE ASSY 3 POL
1941	3103 601 00180	CABLE TREE ASSY 2 POL

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

⊣WW⊢

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
3105	4822 051 30222	2.2kΩ 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
3109	4822 051 30222	2.2kΩ 5% 0.062W
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
3129	4822 051 30102	1kΩ 5% 0.062W
3130	4822 051 30103	10kΩ 5% 0.062W
3131	4822 050 11002	1kΩ 1% 0.4W
3132	4822 051 30102	1kΩ 5% 0.062W
3134	4822 117 12063	NTC DC 5W 10K 5%
3135	4822 051 30472	4.7kΩ 5% 0.062W
3136	4822 116 52213	180Ω 5% 0.5W
3137	4822 116 83876	270Ω 5% 0.5W
3138	4822 116 52213	180Ω 5% 0.5W
3139	4822 116 83876	270Ω 5% 0.5W
3140	4822 051 30103	10kΩ 5% 0.062W
3141	4822 117 12925	47kΩ 1% 0.063W 0603
3143	4822 051 30102	1kΩ 5% 0.062W
3144	4822 051 30103	10kΩ 5% 0.062W
3145	4822 051 30103	10kΩ 5% 0.062W
3146	4822 051 30223	22kΩ 5% 0.062W
3147	4822 116 52257	22kΩ 5% 0.5W
3148	4822 116 52257	22kΩ 5% 0.5W
3149	4822 116 52257	22kΩ 5% 0.5W
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
3155	4822 116 52249	1k8 5% 0.5W
3156	4822 116 52243	1.5kΩ 5% 0.5W
3157	4822 116 52249	1k8 5% 0.5W
3159	4822 116 83883	470Ω 5% 0.5W
3160	4822 051 30471	470Ω 5% 0.062W
3161	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
3301	4822 116 83876	270Ω 5% 0.5W
3302	4822 116 83876	270Ω 5% 0.5W
3303	4822 116 83876	270Ω 5% 0.5W
3304	4822 116 83876	270Ω 5% 0.5W
3400	4822 051 30681	680Ω 5% 0.062W
3500	4822 051 30681	680Ω 5% 0.062W
4111	4822 051 30008	Jumper 0603
4121	4822 051 30008	Jumper 0603
4122	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603
4124	4822 051 30008	Jumper 0603
4199	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%

⊣▶⊢

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
6107	9322 200 25676	LW3333-T1U1-5-0-20*
6109	4822 130 11397	BAS316
6111	4822 130 11397	BAS316
6112	4822 130 11397	BAS316
6120	9965 000 05596	LTL42UB6N
6121	9965 000 05596	LTL42UB6N
6122	9965 000 05596	LTL42UB6N
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
6400	9322 190 34685	LST670-J2L1-1
6400	9322 203 48685	LTST-T670KRK
6401	9322 190 34685	LST670-J2L1-1
6401	9322 203 48685	LTST-T670KRK
6402	9322 190 34685	LST670-J2L1-1
6402	9322 203 48685	LTST-T670KRK
6500	9322 190 34685	LST670-J2L1-1
6500	9322 203 48685	LTST-T670KRK
6501	9322 190 34685	LST670-J2L1-1
6501	9322 203 48685	LTST-T670KRK
6502	9322 190 34685	LST670-J2L1-1
6502	9322 203 48685	LTST-T670KRK

7100	2722 171 07736	VFD BJ900GNK
7100	2722 171 07744	DISPLAY HUA-09SS47T
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

7110	3198 010 42310	BC847BW
7111	3198 010 42310	BC847BW
7112	4822 130 60854	DTA124EU-W
7300	4822 130 61553	DTC124EU
7301	4822 130 61553	DTC124EU

Analog Board

Various

1001▲	2422 086 10919	Fuse 65V 125mA
1300▲	4822 253 30383	19181 (2,5A)
1302▲	4822 252 11215	Spark gap
1303▲	4822 071 51002	19372(1A)
1304▲	2422 086 10786	FUSE 4A
1304▲	9965 000 07786	Fuse T4.0A 250V
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 IEC A
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
1703	4822 242 81436	Filter OFWK3953M
1704	2422 549 44611	FIL CER 5MHZ5 TPSR*MBQ2 BS
1704	4822 242 72586	TPS5,5MB-TF20
1705	3139 147 17001	TUNER UV1316MK3
1706	4822 242 81572	TPS6,0MB-TF21
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

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
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
2344	4822 124 11912	220µF 20% 6.3V
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
2725	4822 122 33761	22pF 5% 50V
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
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	4822 117 12902	8.2kΩ 1% 0.063W 0603
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	4822 116 52201	75Ω 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
3441	4822 116 52201	75Ω 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	5322 117 13056	8.2K 1% 0.063W 0603
3459	4822 051 30103	10kΩ 5% 0.062W
3460	5322 117 13056	8.2K 1% 0.063W 0603
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
3731	4822 051 30331	330Ω 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
4304	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
4700	4822 051 30008	Jumper 0603
4701	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*
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 42488	BYD33D
6317	9322 126 71673	BYT42M
6318	4822 130 34142	BZX79-B33
6319	4822 130 42488	BYD33D
6319	9322 126 71673	BYT42M
6320	4822 130 11397	BAS316
6321	4822 130 10654	BAT254
6321	9322 199 12685	DIO SIG SM 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	IC SM 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
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
7710	9352 621 13118	IC SM TDA9817T/V1(PHSE)
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
1902	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
2833	2238 586 59812	100nF 20-80% 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	2322 704 69101	910Ω 1% 0.063W 0603
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
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
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
6902	4822 130 10654	BAT254
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 23508	M29W800DT-70N6/ AB140017
7806	9322 163 26685	NCP301LSN30
7807	4822 209 73852	PMBT2369
7808	4822 209 16907	M24C16-MN6T
7810	9352 686 35118	PCA9515DP
7811	4822 130 61553	DTC124EU
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
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

Power Supply Interface Board

Various

1350▲	2422 132 07467	Relay 1p 12V 5A LKS1AF
1936	2422 025 00531	CON 7P M
1937▲	4822 265 20723	Connector 2p m
1938	2422 025 12488	CON BM H 2P M 2.50 EH B
1939	2422 025 09405	CON 2P M

3380▲	4822 053 21684	680kΩ 5% 0,5W

6350	4822 130 30842	BAV21

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
1923	2422 025 16979	CON BM H 4P F
1924	2422 026 05391	SOC PHONE 1P F 3.5
1925	4822 267 31729	CONNECTOR

2250	3198 017 41050	1µF 10V 0603
2254	3198 016 31510	150pF 10% 50V 0603
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
2267	5322 126 11578	1nF 10% 50V 0603

3250	4822 116 52219	330Ω 5% 0.5W
3252	4822 051 30101	100Ω 5% 0.062W
3254	4822 051 30221	220Ω 5% 0.062W
3255	4822 117 13632	100kΩ 1% 0603 0.62W
3257	4822 051 30221	220Ω 5% 0.062W
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
3273	2122 551 00031	VDR 0805 1mA/6V4 21V
3273	2322 574 10402	VDR 0805 1mA/6V4 21V
4001	4822 051 30008	Jumper 0603
4201	4822 051 30008	Jumper 0603

5250	2422 536 00019	TRANSFORMER 6RG
5251	2422 549 43062	Bead 600Ω at 100MHz
5253	2422 549 43062	Bead 600Ω at 100MHz
5255	2422 549 43062	Bead 600Ω at 100MHz

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

Digital Board

Various

1001	2422 543 01422	SM 24M576 18P CX8045
1001	2422 543 89017	24M576 18P CX-11F
1101	2422 025 17728	CON 40P M
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
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
2068	2238 586 59812	100nF 20-80% 50V 0603
2069	2020 021 91729	4.7µF 20% 35V
2070	2020 021 91729	4.7µF 20% 35V
2071	2238 586 59812	100nF 20-80% 50V 0603
2073	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	2238 586 59812	100nF 20-80% 50V 0603
2112	4822 126 14247	1.5nF 50V 0603
2114	4822 126 13881	470pF 5% 50V
2116	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
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
2208	2020 021 91729	4.7µF 20% 35V
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	2238 586 59812	100nF 20-80% 50V 0603
2237	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
2320	2238 586 59812	100nF 20-80% 50V 0603
2321	2238 586 59812	100nF 20-80% 50V 0603
2322	2238 586 59812	100nF 20-80% 50V 0603
2323	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
2432	2238 586 59812	100nF 20-80% 50V 0603
2433	2238 586 59812	100nF 20-80% 50V 0603
2434	4822 126 11785	47pF 5% 50V 0603
2512	2020 021 91857	100µF 6V3 20%
2512	4822 124 11618	NEA70JM-107X (100UF 6.3V)
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	3198 017 44740	470nF 10V 0603
2516	2020 021 91857	100µF 6V3 20%
2516	4822 124 11618	NEA70JM-107X (100UF 6.3V)
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
2701	2238 586 59812	100nF 20-80% 50V 0603
2712	2238 586 59812	100nF 20-80% 50V 0603
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
2834	2238 586 59812	100nF 20-80% 50V 0603
2836	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	2238 586 59812	100nF 20-80% 50V 0603
2911	3198 017 42230	22nF 50V
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	4822 122 33761	22pF 5% 50V
2921	4822 122 33761	22pF 5% 50V
2922	4822 122 33761	22pF 5% 50V
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
2932	4822 122 33761	22pF 5% 50V
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

–WW–

3000	4822 051 30681	680Ω 5% 0.062W
3003	4822 051 30101	100Ω 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
3021	4822 051 30101	100Ω 5% 0.062W
3022	4822 051 30472	4.7kΩ 5% 0.062W
3032	4822 051 30101	100Ω 5% 0.062W
3033	4822 051 30101	100Ω 5% 0.062W
3034	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 30472	4.7kΩ 5% 0.062W
3120	4822 051 30339	33Ω 5% 0.062W
3121	4822 051 30103	10kΩ 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
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 30102	1kΩ 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
3168	4822 051 30472	4.7kΩ 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 30101	100Ω 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 051 30109	10Ω 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 30101	100Ω 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 30101	100Ω 5% 0.062W
3271	4822 051 30101	100Ω 5% 0.062W
3272	4822 051 30101	100Ω 5% 0.062W
3273	4822 051 30109	10Ω 5% 0.062W
3274	4822 051 30101	100Ω 5% 0.062W
3276	4822 051 30102	1kΩ 5% 0.062W
3277	4822 051 30101	100Ω 5% 0.062W
3278	4822 051 30101	100Ω 5% 0.062W
3279	4822 051 30101	100Ω 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
3288	4822 051 30472	4.7kΩ 5% 0.062W
3290	4822 051 30472	4.7kΩ 5% 0.062W
3291	4822 051 30472	4.7kΩ 5% 0.062W
3293	4822 051 30472	4.7kΩ 5% 0.062W
3294	4822 051 30101	100Ω 5% 0.062W
3295	4822 051 30101	100Ω 5% 0.062W
3296	4822 051 30101	100Ω 5% 0.062W
3297	4822 051 30101	100Ω 5% 0.062W
3298	4822 051 30101	100Ω 5% 0.062W
3299	4822 051 30101	100Ω 5% 0.062W
3307	4822 051 30103	10kΩ 5% 0.062W
3314	4822 051 30103	10kΩ 5% 0.062W
3315	4822 051 30101	100Ω 5% 0.062W
3316	4822 051 30101	100Ω 5% 0.062W
3317	4822 051 30101	100Ω 5% 0.062W
3318	4822 051 30101	100Ω 5% 0.062W
3319	4822 051 30101	100Ω 5% 0.062W
3320	4822 051 30339	33Ω 5% 0.062W
3321	4822 051 30339	33Ω 5% 0.062W
3322	4822 051 30339	33Ω 5% 0.062W
3323	4822 051 30339	33Ω 5% 0.062W
3324	4822 051 30339	33Ω 5% 0.062W
3325	4822 051 30339	33Ω 5% 0.062W
3326	4822 051 30339	33Ω 5% 0.062W
3327	4822 051 30339	33Ω 5% 0.062W
3328	4822 051 30339	33Ω 5% 0.062W
3329	4822 051 30339	33Ω 5% 0.062W
3330	4822 051 30339	33Ω 5% 0.062W
3331	4822 051 30339	33Ω 5% 0.062W
3332	4822 051 30339	33Ω 5% 0.062W
3333	4822 051 30339	33Ω 5% 0.062W
3334	4822 051 30339	33Ω 5% 0.062W
3335	4822 051 30339	33Ω 5% 0.062W
3336	4822 051 30339	33Ω 5% 0.062W
3338	4822 117 12139	22Ω 5% 0.062W
3339	4822 051 30472	4.7kΩ 5% 0.062W
3340	4822 051 30471	470Ω 5% 0.062W
3341	4822 051 30471	470Ω 5% 0.062W
3342	4822 117 12139	22Ω 5% 0.062W
3343	2322 702 60829	82Ω 5% 0603
3344	4822 051 30102	1kΩ 5% 0.062W
3345	4822 051 30472	4.7kΩ 5% 0.062W
3346	4822 051 30103	10kΩ 5% 0.062W
3347	2322 702 60829	82Ω 5% 0603
3348	4822 051 30103	10kΩ 5% 0.062W
3349	4822 051 30339	33Ω 5% 0.062W
3350	4822 051 30339	33Ω 5% 0.062W
3351	4822 051 30339	33Ω 5% 0.062W
3352	4822 051 30103	10kΩ 5% 0.062W
3353	4822 051 30472	4.7kΩ 5% 0.062W
3354	4822 051 30339	33Ω 5% 0.062W
3355	4822 051 30339	33Ω 5% 0.062W
3356	4822 051 30472	4.7kΩ 5% 0.062W
3359	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
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 051 30109	10Ω 5% 0.062W
3451	4822 051 30109	10Ω 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 117 12139	22Ω 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	2322 704 61302	1k3 1% 0.063W 0603
3703	5322 117 13055	75R 1% 0.063W 0603
3706	2322 704 61002	1kΩ 0603 RC22H PM1
3707	2322 704 61002	1kΩ 0603 RC22H PM1
3710	5322 117 13055	75R 1% 0.063W 0603
3714	2322 704 61002	1kΩ 0603 RC22H PM1
3716	2322 704 61002	1kΩ 0603 RC22H PM1
3718	5322 117 13055	75R 1% 0.063W 0603
3723	2322 704 61002	1kΩ 0603 RC22H PM1
3724	2322 704 61002	1kΩ 0603 RC22H PM1
3800	4822 051 30222	2.2kΩ 5% 0.062W
3801	4822 051 30103	10kΩ 5% 0.062W
3803	4822 051 30223	22kΩ 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
3819	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 117 12139	22Ω 5% 0.062W
3837	4822 051 30103	10kΩ 5% 0.062W
3838	4822 051 30103	10kΩ 5% 0.062W
3839	4822 051 30103	10kΩ 5% 0.062W
3840	4822 117 12139	22Ω 5% 0.062W
3841	4822 051 30103	10kΩ 5% 0.062W
3842	4822 051 30103	10kΩ 5% 0.062W
3843	4822 051 30103	10kΩ 5% 0.062W
3844	4822 051 30103	10kΩ 5% 0.062W
3845	4822 051 30103	10kΩ 5% 0.062W
3846	4822 051 30103	10kΩ 5% 0.062W
3847	4822 051 30103	10kΩ 5% 0.062W
3848	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 117 12139	22Ω 5% 0.062W
3853	4822 117 12139	22Ω 5% 0.062W
3854	4822 117 12139	22Ω 5% 0.062W
3855	4822 117 12139	22Ω 5% 0.062W
3856	4822 117 12139	22Ω 5% 0.062W
3857	4822 117 12139	22Ω 5% 0.062W
3858	4822 117 12139	22Ω 5% 0.062W
3859	4822 117 12139	22Ω 5% 0.062W
3860	4822 051 30339	33Ω 5% 0.062W
3861	4822 051 30102	1kΩ 5% 0.062W
3862	4822 051 30331	330Ω 5% 0.062W
3863	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
3941	2322 704 87501	750Ω 603 RC22H 1%
3942	5322 117 13034	1.5kΩ 1% 0.063W 0603
3943	5322 117 13053	6.8kΩ 1% 0.063W 0603
3944	5322 117 13031	5.6kΩ 1% 0603
3945	5322 117 13026	4.7kΩ 1% 0.063W 0603
3946	2322 704 61002	1kΩ 0603 RC22H PM1
3947	5322 117 13026	4.7kΩ 1% 0.063W 0603
3948	2322 704 87501	750Ω 603 RC22H 1%
3949	5322 117 13034	1.5kΩ 1% 0.063W 0603
3950	5322 117 13034	1.5kΩ 1% 0.063W 0603
3951	5322 117 13034	1.5kΩ 1% 0.063W 0603
3952	5322 117 13036	1.2kΩ 1% 0.063W 0603
3953	5322 117 13026	4.7kΩ 1% 0.063W 0603
3954	2322 704 61002	1kΩ 0603 RC22H PM1
3955	4822 117 12917	1Ω 5% 0.062W 0603
3957	4822 051 30101	100Ω 5% 0.062W
3958	4822 051 30101	100Ω 5% 0.062W
3959	4822 051 30101	100Ω 5% 0.062W
3960	4822 051 30101	100Ω 5% 0.062W
3961	4822 051 30101	100Ω 5% 0.062W
3962	4822 051 30101	100Ω 5% 0.062W
4001	4822 051 30008	Jumper 0603
4004	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
4116	4822 051 30008	Jumper 0603
4117	4822 051 30008	Jumper 0603
4123	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
4302	4822 051 30008	Jumper 0603
4311	4822 051 30008	Jumper 0603
4316	4822 051 30008	Jumper 0603
4320	4822 051 30008	Jumper 0603
4322	4822 051 30008	Jumper 0603
4323	4822 051 30008	Jumper 0603
4401	4822 051 30008	Jumper 0603
4402	4822 051 30008	Jumper 0603
4404	4822 051 30008	Jumper 0603
4701	4822 051 30008	Jumper 0603
4702	4822 051 30008	Jumper 0603
4703	4822 051 30008	Jumper 0603
4762	4822 051 30008	Jumper 0603
4764	4822 051 30008	Jumper 0603
4766	4822 051 30008	Jumper 0603
4800	4822 051 30008	Jumper 0603
4801	4822 051 30008	Jumper 0603
4803	4822 051 30008	Jumper 0603
4808	4822 051 30008	Jumper 0603
4810	4822 051 30008	Jumper 0603
4811	4822 051 30008	Jumper 0603
4900	4822 051 30008	Jumper 0603
4901	4822 051 30008	Jumper 0603
4904	4822 051 30008	Jumper 0603
4905	4822 051 30008	Jumper 0603
4910	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
5012	4822 051 30101	100Ω 5% 0.062W
5100	4822 157 11499	BLM11P600SPT
5102	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
5320	4822 157 11499	BLM11P600SPT
5321	4822 157 11499	BLM11P600SPT
5322	4822 157 11499	BLM11P600SPT
5323	4822 157 11499	BLM11P600SPT
5400	4822 157 11499	BLM11P600SPT
5401	4822 157 11717	BLM31P500SPT
5402	4822 157 11717	BLM31P500SPT
5403	4822 157 11499	BLM11P600SPT
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%
5711	4822 157 70649	4,7µH (NL322522T-4R7J)
5712	4822 157 70649	4,7µH (NL322522T-4R7J)
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 00609	LBC2518 1U5 PM20
5908	2422 536 00609	LBC2518 1U5 PM20
5909	2422 549 45634	0603 EMI 100MHZ 60R
5910	2422 536 00609	LBC2518 1U5 PM20
5911	2422 536 00609	LBC2518 1U5 PM20
5912	2422 536 00609	LBC2518 1U5 PM20
5913	2422 536 00609	LBC2518 1U5 PM20
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

7002	9352 683 81115	74LVC1G32GW
7003	5322 130 60159	BC846B
7004	9352 673 95518	SAA7118E/V1
7006	9322 116 74668	LD1117D33
7103	9352 683 81115	74LVC1G32GW
7104	9352 500 20118	74LVC08AD
7106	9322 191 99685	NCP303LSN29
7107	9352 500 20118	74LVC08AD
7111	5322 209 71568	PC74HCT14T
7300	9352 317 00118	74LVC125AD
7320	9352 115 40118	74LVC245APW
7321	9352 115 40118	74LVC245APW
7322	9352 115 40118	74LVC245APW
7400	9352 725 55557	PNX7100EH/C1
7401	9352 115 40118	74LVC245APW
7402	2722 171 08819	4MHZ 15P FXO34FL
7403	3198 010 42310	BC847BW
7500	9322 188 69668	STS5DNF20V
7501	9322 188 68668	NCP1570D
7701	9322 200 00685	AD8091ART
7702	9322 205 55668	AD8092AR
7803	9352 499 60118	74LVC00AD
7805	9322 188 64668	AM29DL640G-70EI
7807	3104 123 97321	AM29DL640G-70EI P1_7_A_280.BIN
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
7910	9322 205 55668	AD8092AR
7911	5322 130 60159	BC846B
7912	5322 130 60159	BC846B

EPG Board

Various

Y4	9965 000 20142	20.25 MHZ,+-30PPM, 20PF,FUNDAM,
Y5	9965 000 20143	17.734475 MHZ,5V, +-50PPM, CMOS
Y6	9965 000 20144	36 MHZ,3V,+-50PPM,CMOS/TTL,SMD

C1	0.01uF,+-20%,0603,Y5V,50V
C2	0.1uF,+80-20%,0603,Y5V,25V
C3	0.1uF,+80-20%,0603,Y5V,25V
C4	0.1uF,+80-20%,0603,Y5V,25V
C5	1000pF,+-10%,0603,X7R,50V
C6	0.22uF,+80-20%,0603,Y5V,16V
C7	100pF,+-5%,0603,NPO,50V
C8	100pF,+-5%,0603,NPO,50V
C9	100pF,+-5%,0603,NPO,50V
C10	100pF,+-5%,0603,NPO,50V
C11	0.1uF,+80-20%,0603,Y5V,25V
C12	0.1uF,+80-20%,0603,Y5V,25V
C13	0.1uF,+80-20%,0603,Y5V,25V
C14	0.1uF,+80-20%,0603,Y5V,25V
C15	0.1uF,+80-20%,0603,Y5V,25V
C16	0.1uF,+80-20%,0603,Y5V,25V
C17	0.1uF,+80-20%,0603,Y5V,25V

C18		0.1uF,+80-20%,0603,Y5V,25V
C19		0.1uF,+80-20%,0603,Y5V,25V
C20		0.1uF,+80-20%,0603,Y5V,25V
C21		0.1uF,+80-20%,0603,Y5V,25V
C22		0.1uF,+80-20%,0603,Y5V,25V
C23		0.1uF,+80-20%,0603,Y5V,25V
C24		0.1uF,+80-20%,0603,Y5V,25V
C25		0.1uF,+80-20%,0603,Y5V,25V
C26		0.1uF,+80-20%,0603,Y5V,25V
C27		0.1uF,+80-20%,0603,Y5V,25V
C28		0.1uF,+80-20%,0603,Y5V,25V
C29		0.1uF,+80-20%,0603,Y5V,25V
C30		0.1uF,+80-20%,0603,Y5V,25V
C31		0.1uF,+80-20%,0603,Y5V,25V
C32		0.1uF,+80-20%,0603,Y5V,25V
C33		0.1uF,+80-20%,0603,Y5V,25V
C34		0.1uF,+80-20%,0603,Y5V,25V
C35		0.1uF,+80-20%,0603,Y5V,25V
C36		100pF,+-5%,0603,NPO,50V
C39		0.1uF,+80-20%,0603,Y5V,25V
C40		0.1uF,+80-20%,0603,Y5V,25V
C41		0.1uF,+80-20%,0603,Y5V,25V
C42		0.1uF,+80-20%,0603,Y5V,25V
C43		0.1uF,+80-20%,0603,Y5V,25V
C44		0.1uF,+80-20%,0603,Y5V,25V
C45		0.1uF,+80-20%,0603,Y5V,25V
C46		0.1uF,+80-20%,0603,Y5V,25V
C47		0.1uF,+80-20%,0603,Y5V,25V
C48		0.1uF,+80-20%,0603,Y5V,25V
C49		0.1uF,+80-20%,0603,Y5V,25V
C50		0.1uF,+80-20%,0603,Y5V,25V
C51		0.1uF,+80-20%,0603,Y5V,25V
C53		0.1uF,+80-20%,0603,Y5V,25V
C54		100pF,+-5%,0603,NPO,50V
C55		100pF,+-5%,0603,NPO,50V
C56		0.22uF,+80-20%,0603,Y5V,16V
C57		0.1uF,+80-20%,0603,Y5V,25V
C58		0.1uF,+80-20%,0603,Y5V,25V
C59		0.1uF,+80-20%,0603,Y5V,25V
C60		0.1uF,+80-20%,0603,Y5V,25V
C61		0.1uF,+80-20%,0603,Y5V,25V
C62		0.1uF,+80-20%,0603,Y5V,25V
C63		0.1uF,+80-20%,0603,Y5V,25V
C64		0.1uF,+80-20%,0603,Y5V,25V
C66	4822 124 11606	10UF 20% 16V
C67		0.1uF,+80-20%,0603,Y5V,25V
C68		470pF,+-10%,0603,X7R,50V
C71	4822 124 11606	10UF 20% 16V
C72	4822 124 11606	10UF 20% 16V
C75	4822 124 11606	10UF 20% 16V
C76		0.22uF,+80-20%,0603,Y5V,16V
C77		100pF,+-5%,0603,NPO,50V
C79		0.01uF,+-20%,0603,Y5V,50V
C80		0.01uF,+-20%,0603,Y5V,50V
C81		0.01uF,+-20%,0603,Y5V,50V
C82		0.01uF,+-20%,0603,Y5V,50V
C84		0.01uF,+-20%,0603,Y5V,50V
C89		0.01uF,+-20%,0603,Y5V,50V
C91	4822 124 11606	10UF 20% 16V
C92		0.01uF,+-20%,0603,Y5V,50V
C93	4822 124 11606	10UF 20% 16V
C94		0.01uF,+-20%,0603,Y5V,50V
C95	4822 124 11606	10UF 20% 16V
C96	4822 124 11606	10UF 20% 16V
C97		0.01uF,+-20%,0603,Y5V,50V
C98		0.01uF,+-20%,0603,Y5V,50V
C99		0.01uF,+-20%,0603,Y5V,50V
C100		0.01uF,+-20%,0603,,50V
C101		27pF,+-5%, 0603,NPO,50V
C102		27pF,+-5%, 0603,NPO,50V
C104		1uF,16V,20%,0603,Y5V,16V
C105	4822 124 11606	10µF 20% 16V
C106		100pF,+-5%,0603,,50V
C107	4822 124 11606	10µF 20% 16V
C109	4822 124 11606	10µF 20% 16V
C116		0.022uF,+-10%,0603,,25V
C117	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C118		0.022uF,+-10%,0603,,25V
C119	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C121	4822 124 11606	10µF 20% 16V
C126		18pF,+-10%,0603,,50V
C143	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C153	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C158	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C159	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C161	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C163	9965 000 20147	E 220µF ,16V,+-20%,M6X8,LESR
C166	9965 000 20148	E 47µF ,16V,+-20%,6.3X5.3,LESR
C165		680pF,+-10%,0603,X7R,50V
C166		E 47uF,16V,+-20%,6.3x5.3,LESR
C167	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C171	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C173	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C178		1uF,16V,20%,0603,Y5V,16V
C179		1uF,16V,20%,0603,Y5V,16V
C180		1uF,16V,20%,0603,Y5V,16V
C181		1uF,16V,20%,0603,Y5V,16V
C182		1uF,16V,20%,0603,Y5V,16V
C183		1uF,16V,20%,0603,Y5V,16V
C188		1uF,16V,20%,0603,Y5V,16V
C189		1uF,16V,20%,0603,Y5V,16V
C190	4822 124 11606	10µF 20% 16V
C191	4822 124 11606	10µF 20% 16V
C192	4822 124 11606	10µF 20% 16V
C193	4822 124 11606	10µF 20% 16V
C200		1uF,16V,20%,0603,Y5V,16V
C201		1uF,16V,20%,0603,Y5V,16V
C202		1uF,16V,20%,0603,Y5V,16V
C203		1uF,16V,20%,0603,Y5V,16V
C301	9965 000 20148	E 47µF ,16V,+-20%,6.3X5.3,LESR
C302	9965 000 20147	E 220µF ,16V,+-20%,M6X8,LESR
C304	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C306	9965 000 20146	TAnF 47µF ,B SIZE,6.3V
C400		1uF,16V,20%,0603,Y5V,16V
C401	4822 124 11606	10µF 20% 16V
C402	4822 124 11606	10µF 20% 16V
C410	4822 124 11606	10µF 20% 16V
C411	4822 124 11606	10µF 20% 16V
C413		1uF,16V,20%,0603,Y5V,16V
C430		680pF,+-5%,0603,NPO,50V
C431		1nF,+-10%,0603,X7R,50V

–WW–

R1	100K Ohm,+-5%,0603,1/10W
R2	10K Ohm,+-5%,0603,1/10W
R3	100K Ohm,+-5%,0603,1/10W
R4	1K Ohm,+-5%. 0603,1/10W
R5	47 Ohm,+-5%,0603,1/10W
R6	1K Ohm,+-5%. 0603,1/10W
R7	100 Ohm,+-5%,0603,1/10W
R8	10K Ohm,+-5%,0603,1/10W
R9	1K Ohm,+-5%. 0603,1/10W
R10	100 Ohm,+-5%,0603,1/10W
R11	10K Ohm,+-5%,0603,1/10W
R12	100 Ohm,+-5%,0603,1/10W
R13	Array x 4,47Ohm,8P4R,+-5%,1/16
R14	100K Ohm,+-5%,0603,1/10W
R15	Array x 4,47Ohm,8P4R,+-5%,1/16
R16	1K Ohm,+-5%. 0603,1/10W
R17	1K Ohm,+-5%. 0603,1/10W
R18	1K Ohm,+-5%. 0603,1/10W
R19	Array x 4,47Ohm,8P4R,+-5%,1/16
R20	Array x 4,47Ohm,8P4R,+-5%,1/16
R21	Array x 4,47Ohm,8P4R,+-5%,1/16
R22	Array x 4,47Ohm,8P4R,+-5%,1/16
R23	Array x 4,47Ohm,8P4R,+-5%,1/16
R24	Array x 4,47Ohm,8P4R,+-5%,1/16
R25	47 Ohm,+-5%,0603,1/10W
R26	47 Ohm,+-5%,0603,1/10W
R27	47 Ohm,+-5%,0603,1/10W
R28	Array x 4,47Ohm,8P4R,+-5%,1/16
R29	100K Ohm,+-5%,0603,1/10W
R30	10K Ohm,+-5%,0603,1/10W
R31	10K Ohm,+-5%,0603,1/10W
R32	2.2K Ohm,+-5%,0603,1/10W
R33	47 Ohm,+-5%,0603,1/10W
R34	0 Ohm,+-5%,0603,1/10W
R35	2.2K Ohm,+-1%,0603,1/10W
R36	4.7K Ohm,+-5%,0603,1/10W
R37	4.7K Ohm,+-5%,0603,1/10W
R38	2.2K Ohm,+-5%,0603,1/10W
R39	5.6K Ohm,+-1%,0603,1/10W
R40	10K Ohm,+-5%,0603,1/10W
R41	4.7K Ohm,+-5%,0603,1/10W
R42	150 Ohm,+-5%,0603,1/10W
R43	1K Ohm,+-5%. 0603,1/10W
R44	1K Ohm,+-5%. 0603,1/10W
R45	1M Ohm,+-5%,0603,1/10W
R46	4.7K Ohm,+-5%,0603,1/10W
R47	10K Ohm,+-5%,0603,1/10W
R48	Array x 4,47Ohm,8P4R,+-5%,1/16
R49	Array x 4,47Ohm,8P4R,+-5%,1/16
R50	Array x 4,47Ohm,8P4R,+-5%,1/16
R51	Array x 4,47Ohm,8P4R,+-5%,1/16
R52	1M Ohm,+-5%,0603,1/10W
R53	10K Ohm,+-5%,0603,1/10W
R54	1M Ohm,+-5%,0603,1/10W
R55	0 Ohm,+-5%,0603,1/10W
R56	470 Ohm,+-5%,0603,1/10W
R57	10K Ohm,+-5%,0603,1/10W
R58	680K Ohm,+-1%. 0603,1/10W
R59	680K Ohm,+-1%. 0603,1/10W
R61	0 Ohm,+-5%,0603,1/10W
R62	10K Ohm,+-5%,0603,1/10W
R63	10K Ohm,+-5%,0603,1/10W
R64	100 Ohm,+-5%,0603,1/10W
R65	100 Ohm,+-5%,0603,1/10W

R66		100 Ohm,+-5%,0603,1/10W
R67		100 Ohm,+-5%,0603,1/10W
R68		10K Ohm,+-5%,0603,1/10W
R69		10K Ohm,+-5%,0603,1/10W
R70		10K Ohm,+-5%,0603,1/10W
R71		1.5K Ohm,+-5%,0603,1/10W
R72		470 Ohm,+-5%,0603,1/10W
R73		10K Ohm,+-5%,0603,1/10W
R74		0 Ohm,+-5%,0603,1/10W
R75		1.5K Ohm,+-5%,0603,1/10W
R76		22K Ohm,+-5%,0603,1/10W
R77		2.7K Ohm,+-5%,0603,1/10W
R78		1K Ohm,+-5%. 0603,1/10W
R79		3.3K Ohm,+-5%,0603,1/10W
R80		3.3K Ohm,+-1%,0603,1/10W
R81		100K Ohm,+-5%,0603,1/ 10W
R82		100 Ohm,+-5%,0603,1/10W
R83		2.7K Ohm,+-5%,0603,1/10W
R84		470 Ohm,+-5%,0603,1/10W
R85		1K Ohm,+-5%. 0603,1/10W
R86		820 Ohm,+-1%,0603,1/10W
R87		1.2K Ohm,+-5%,0603,1/10W
R88		100 Ohm,+-5%,0603,1/10W
R89		100 Ohm,+-5%,0603,1/10W
R90		100 Ohm,+-5%,0603,1/10W
R91		240 Ohm,+-5%,0603,1/10W
R92		240 Ohm,+-5%,0603,1/10W
R93		240 Ohm,+-5%,0603,1/10W
R94		100 Ohm,+-5%,0603,1/10W
R95		100 Ohm,+-5%,0603,1/10W
R96		100 Ohm,+-5%,0603,1/10W
R97		100 Ohm,+-5%,0603,1/10W
R98		100 Ohm,+-5%,0603,1/10W
R99		100 Ohm,+-5%,0603,1/10W
R100		0 Ohm,+-5%,0603,1/10W
R101		47k Ohm,+-1%,0603,1/10W
R102		47k Ohm,+-1%,0603,1/10W
R103		100k Ohm,+-5%,0603,1/10W
R104		5.1k Ohm,+-1%,0603,1/10W
R105		47k Ohm,+-1%,0603,1/10W
R106		47k Ohm,+-1%,0603,1/10W
R107		10k Ohm,+-5%,0603,1/10W
R108		430 Ohm,+-1%,0603,1/10W
R109		100 Ohm,+-5%,0603,1/10W
R110		100k Ohm,+-5%,0603,1/10W
R111		100 Ohm,+-5%,0603,1/10W
R112		10k Ohm,+-5%,0603,1/10W
R113		1k Ohm,+-5%. 0603,1/10W
R114		1k Ohm,+-5%. 0603,1/10W
R115		1k Ohm,+-5%. 0603,1/10W
R116		1k Ohm,+-5%. 0603,1/10W
R117		1M Ohm,+-5%,0603,1/10W
R118		1k Ohm,+-5%. 0603,1/10W
R119		1k Ohm,+-5%. 0603,1/10W
R120		1M Ohm,+-5%,0603,1/10W
R121		1M Ohm,+-5%,0603,1/10W
R122		100 Ohm,+-5%,0603,1/10W
R123		1M Ohm,+-5%,0603,1/10W
R124		10k Ohm,+-5%,0603,1/10W
R125		100k Ohm,+-5%,0603,1/10W
R126		1k Ohm,+-1%,0603,1/10W
R127		10k Ohm,+-5%,0603,1/10W
R128		1k Ohm,+-5%. 0603,1/10W
R129		10k Ohm,+-5%,0603,1/10W
R130		10k Ohm,+-5%,0603,1/10W
R131		1k Ohm,+-5%. 0603,1/10W
R132		1k Ohm,+-5%. 0603,1/10W
R133		10k Ohm,+-5%,0603,1/10W
R134		1k Ohm,+-1%,0603,1/10W
R135		1M Ohm,+-5%,0603,1/10W
R136		1M Ohm,+-5%,0603,1/10W
R137		1k Ohm,+-5%. 0603,1/10W
R138		10k Ohm,+-5%,0603,1/10W
R139		10k Ohm,+-5%,0603,1/10W
R140		1k Ohm,+-5%. 0603,1/10W
R141		1k Ohm,+-5%. 0603,1/10W
R142		100 Ohm,+-5%,0603,1/10W
R143		1k Ohm,+-1%,0603,1/10W
R144		10k Ohm,+-5%,0603,1/10W
R145		10k Ohm,+-5%,0603,1/10W
R146		1k Ohm,+-5%. 0603,1/10W
R147		10k Ohm,+-5%,0603,1/10W
R148		10k Ohm,+-5%,0603,1/10W
R149		1k Ohm,+-5%. 0603,1/10W
R150		1k Ohm,+-5%. 0603,1/10W
R151		10k Ohm,+-5%,0603,1/10W
R152		0.22 Ohm,+-5%,1206,1/8W or 1/4
R153		0.22 Ohm,+-5%,1206,1/8W or 1/4
R154		1M Ohm,+-5%,0603,1/10W
R155		5.1k Ohm,+-5%,0603,1/10W
R156		10k Ohm,+-5%,0603,1/10W
R157		10k Ohm,+-5%,0603,1/10W
R158		1.5k Ohm,+-5%,0603,1/10W
R159		10k Ohm,+-5%,0603,1/10W
R160		1k Ohm,+-1%,0603,1/10W
R161		1k Ohm,+-1%,0603,1/10W
R162		5.6k Ohm,+-5%,0603,1/10W
R163		2.7k Ohm,+-5%,0603,1/10W
R164		1k Ohm,+-1%,0603,1/10W
R165		1k Ohm,+-5%. 0603,1/10W
R166		1k Ohm,+-5%. 0603,1/10W
R167		1k Ohm,+-5%. 0603,1/10W
R168		68Ohm,+-5%. 0603,1/10W
R169		68Ohm,+-5%. 0603,1/10W
R170		68Ohm,+-5%. 0603,1/10W
R171		10k Ohm,+-5%,0603,1/10W
R176		4.7k Ohm,+-5%,0603,1/10W
R177		4.7k Ohm,+-5%,0603,1/10W
R178		1M Ohm,+-5%,0603,1/10W
R179		0 Ohm,+-5%,0603,1/10W
R181		1M Ohm,+-5%,0603,1/10W
R182		10k Ohm,+-5%,0603,1/10W
R183		100 Ohm,+-5%,0603,1/10W
R184		10k Ohm,+-5%,0603,1/10W
R185		5.1k Ohm,+-5%,0603,1/10W
R186		5.6k Ohm,+-5%,0603,1/10W
R187		10k Ohm,+-5%,0603,1/10W
R188		1k Ohm,+-5%. 0603,1/10W
R189		0 Ohm,+-5%,0603,1/10W

L1	9965 000 23886	0.7A SMT43-220K
L11	9965 000 20149	POWER 100UH,1A,SMT105-101K
L12	9965 000 23886	0.7A SMT43-220K
L13	9965 000 23886	0.7A SMT43-220K
L14	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L15	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L3	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L4	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L5	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L6	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L7	9965 000 23682	CHIP INDUCTOR 12UH SIZE 1210 M
L8	9965 000 23683	CHIP INDUCTOR 68UH SIZE 1812 W
L9	9965 000 20149	POWER 100UH,1A,SMT105-101K

D1	9965 000 20150	1N4148WS SOD-323
D2	9965 000 20150	1N4148WS SOD-323
D3	9965 000 20150	1N4148WS SOD-323
D4	9965 000 20150	1N4148WS SOD-323
D5	9965 000 20151	SCHOTTKY B240A SMA
D6	9965 000 20151	SCHOTTKY B240A SMA

Q1	9965 000 20152	MMBT3904LT1 SMD SOT23
Q2	9965 000 20152	MMBT3904LT1 SMD SOT23
Q3	9965 000 20152	MMBT3904LT1 SMD SOT23
Q4	9965 000 20152	MMBT3904LT1 SMD SOT23
Q5	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q6	9965 000 20152	MMBT3904LT1 SMD SOT23
Q7	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q8	9965 000 20152	MMBT3904LT1 SMD SOT23
Q9	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q10	9965 000 20152	MMBT3904LT1 SMD SOT23
Q13	9965 000 20152	MMBT3904LT1 SMD SOT23
Q18	9965 000 20152	MMBT3904LT1 SMD SOT23
Q19	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q20	9965 000 20152	MMBT3904LT1 SMD SOT23
Q21	9965 000 20152	MMBT3904LT1 SMD SOT23
Q22	9965 000 20152	MMBT3904LT1 SMD SOT23
Q23	9965 000 20152	MMBT3904LT1 SMD SOT23
Q24	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q25	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q26	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q27	9965 000 20152	MMBT3904LT1 SMD SOT23
Q28	9965 000 20152	MMBT3904LT1 SMD SOT23
Q29	9965 000 20152	MMBT3904LT1 SMD SOT23
Q30	9965 000 20152	MMBT3904LT1 SMD SOT23
Q31	9965 000 20152	MMBT3904LT1 SMD SOT23
Q32	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q33	9965 000 20152	MMBT3904LT1 SMD SOT23
Q34	9965 000 20152	MMBT3904LT1 SMD SOT23
Q35	9965 000 20152	MMBT3904LT1 SMD SOT23
Q36	9965 000 20152	MMBT3904LT1 SMD SOT23
Q37	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q38	9965 000 20152	MMBT3904LT1 SMD SOT23
Q39	9965 000 20152	MMBT3904LT1 SMD SOT23
Q40	9965 000 20152	MMBT3904LT1 SMD SOT23
Q41	9965 000 20152	MMBT3904LT1 SMD SOT23
Q42	9965 000 12392	TR PNP MMBT3906LT1 SOT23
Q43	9965 000 20153	MOSFET XP162A12A6PR, P-CHANNEL
Q44	9965 000 20152	MMBT3904LT1 SMD SOT23
Q45	9965 000 20152	MMBT3904LT1 SMD SOT23
Q46	9965 000 20152	MMBT3904LT1 SMD SOT23
Q47	5322 130 60159	BC846B
Q48	9965 000 20152	MMBT3904LT1 SMD SOT23
U1	9965 000 20154	MCU SAMSUNG S3C3410X
U2	9965 000 20155	GEMSTAR ASIC GSA03 UPD82553GD-
U3	9965 000 13563	HY57V161610D TC-8 SDRAM(16M)
U4	9965 000 20156	74LV32D TSSOP
U5	9965 000 20157	EEPROM AT24C16,S08 AT24C16N-10
U6	9965 000 20158	74LV174D TSSOP
U7	9965 000 13563	HY57V161610D TC-8 SDRAM(16M)
U8	9965 000 20159	HY29LV160BT-90V
U9	9965 000 20159	HY29LV160BT-90V
U10	9965 000 20160	SYNC SEPARATOR GS4981-CKA SO8
U11	9965 000 20161	PIP CONTROLLER SDA9488X-B31
U13	9322 131 22668	IC SM TSH95D R
U14	9322 053 99668	IC SM AD725AR (ANA0) R
U15	9322 179 71668	IC SM NJM2285M (JRC0) R
U16	9965 000 20162	MC74VHC1G66DFT2 SOT353
U17	9322 187 83668	IC SM NJM2584M (JRC0) R
U18	9965 000 20162	MC74VHC1G66DFT2 SOT353
U19	9965 000 20162	MC74VHC1G66DFT2 SOT353
U20	2422 025 17367	CON BM V7P F1.00FFC 0.03B
U21	4822 265 11154	52030-2210 (22P)
U22	2422 025 17367	CON BM V7P F1.00FFC 0.03B
U23	2422 025 16727	CON V 4P F 1.00 FFC 0.3 B
U24	4822 265 11154	52030-2210 (22P)
U25	4822 267 11031	10P. FEM. V
U26	4822 267 11031	10P. FEM. V
U27	9965 000 20163	LOW DROP OUT REGULATOR KF50BDT
U28	9965 000 20164	MC34063ADR2 SMD
U29	9965 000 20165	KF33BDT-DPAK 3.3V
U30	9965 000 20165	KF33BDT-DPAK 3.3V
U31	4822 209 17345	M62320FP
U33	9965 000 20166	NLAST4599DFT2 TSOP
U40	9965 000 20164	MC34063ADR2 SMD
U42	9322 187 83668	IC SM NJM2584M (JRC0) R
U50	9322 174 75668	IC SM NJM2235M (JRC0) R

11. Revision List

11.1 3122 785 14281

- Aug 30th 2004.
Added DVDR725H