Service Manual

General Description
Adjustment Procedures
Block / Schematic Diagrams
Exploded Views / Parts List

Digital Versatile Disc

DVD VIDEO

CLASS 1
LASER PRODUCT

LOEWE *systems*
DVD-Player
Auro
Art.-Nr. 59502

LOEWE.
DVD-Player
Xemix
Art.-Nr. 59501

LOEWE.

GB 230-90347.911

1. Technical specifications

1.1 General:

Mains voltage	:	230V (196 - 263V AC)
Mains frequency	:	50 Hz -60Hz
Power consumption	:	20W
Power consumption standby	:	<10W (≤5W for low power standby; without P50)

1.2 Audio performance

Test equipment	:	Audio Precision
Testdiscs	:	CDDA: Philips audio signal testdisc 1
	:	VCD: Philips A/V testdisc & ABEX A/V testdisc
	:	DVD: Philips LVP09.00 audio testdisc

1.3 Line output

1.3.1 'Normal' mode (stereo)

Output voltage	:	
2 channel mode	:	2Vrms +/- 1.5dB
5.1 channel Dolby	:	1.41 +/- 1.5 dB
Channel unbalance (1kHz)	:	<0.85dB
Crosstalk	:	
1kHz	:	>105dB
20Hz-20kHz	:	> 95dB
Frequency response	:	
20Hz- 12kHz	:	+/- 0.1dB max
Signal to noise ratio	:	>100 dB
Dynamic range	:	
1kHz	:	>90dB
20Hz-20kHz	:	>88dB
Distortion and noise	:	
1kHz	:	>90dB
20Hz-20kHz	:	>80dB
Intermodulation distortion	:	>87dB
Phase non linearity	:	+/- 1° max.
Level non linearity	:	+/- 0.5dB max.
Mute (spin-up, pause, access)	:	>100dB
Outband attenuation	:	> 50dB above 25kHz

1.3.2 'Center on' mode (mono)

Output voltage	:	2Vrms typ
Channel unbalance (1kHz	:	<0.85dB
Crosstalk:	:	mono
Frequency response(20Hz- 12kHz)	:	0.1dB max
Signal to noise ratio	:	>85 dB
Dynamic range 20Hz-20kHz	:	>85 dB
Distortion and noise 20Hz-20kHz	:	>80 dB
Intermodulation distortion	:	>87 dB
Phase non linearity	:	not applicable
Level non linearity	:	+/- 1 dB
Mute (spin-up, pause, access)	:	>100dB
Outband attenuation	:	> 50dB above 25kHz
Centerdelay adjusting	:	0-5 msec (steps 1 msec)

1.4 6-channel output

1.4.1 Front Line out(channel 1 and 2)

fully according to PQR class III

Output voltage	:	
channel mode	:	1.41Vrms +/- 1.5dB
5.1 channel Dolby	:	1.41V +/- 1.5 dB
Channel unbalance (1kHz)	:	<0.85dB
Crosstalk	:	
1kHz	:	>105dB
20Hz-20kHz	:	> 95dB
Frequency response 20Hz- 12kHz	:	+/- 0.1dB max
Signal to noise ratio	:	>100 dB
Dynamic range	:	
1kHz	:	>90dB
20Hz-20kHz	:	>88dB
Distortion and noise	:	
1kHz	:	>90dB
20Hz-20kHz	:	>80dB
Intermodulation distortion	:	>87dB
Phase non linearity	:	+/- 1° max.
Level non linearity	:	+/- 0.5dB max.
Mute (spin-up, pause, access)	:	>100dB
Outband attenuation	:	> 50dB above 25kHz

1.4.2 Surround channels (channel 3,4,5 and 6)

Surround channels are according to dolby group C products (*1)
Testequipment: audio precision (*2)
LFE + Center + Rear line out

Output voltage	:	
2 channel mode	:	muted
5.1 channel Dolby	:	1.41Vrms +/-1.5dB
	:	Adjustable 0.7V-2.82 V
	:	(+/- 6dB to front channels)
Channel unbalance	:	<0.85 dB
Signal to noise ratio	:	>100 dB (A-weighted)
Dynamic range	:	>85 dB
Distortion and noise	:	>80 dB (90 typical)
Crosstalk:	:	>95 dB (*3)
*1	:	referenced to dolby digital licensee information manual version 2.0
*2	:	measured in normal mode and with balance control neutral
*3	:	crosstalk from channels 1,3,5(channel 1 is ref) to 2,4,6(measured channels)

1.5 Headphone output

According PQR1 IMS
30mW at 32 Ohm load.
Headphone impedance: 8-2000 Ohm

1.6 Video performance

VCD testdisc	:	Philips A/V disc & ABEX A/V disc

DVD testdisc : Philips MPTD PAL CVP0213 / Philips LVP10.00 video testdisc

1.6.1 CVBS

Fully according PQR3 IMS
Video output : 1Vpp(0.1V into 75 Ohm)

1.6.2 S-video (Y/C)

Fully according PQR3 IMS

1 - GND		⏚
2 - GND		⏚
3 - Y	1Vpp +/- 0.1V into 75 Ohm	
4 - C	burst 300mVpp +1/-4dB into 75 Ohm	

Aspect ratio switching by DC on C(pin4).
Connector type : 4 pin mini- DIN

1.7 Scart

Fully according PQR3 IMS
Connector implementation according EN50049-1; color = black; dual SCART
Fully according to prEN1057-2-1
Signal switching is P50 controlled; supported features of mode 3 see survey of applicable standards.

1.7.1 SCART II (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- Nc		
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 in case of Chroma	⊖→
16- Fast switch RGB/ CVBS	or Y <0.4V into 75 Ohm = CVBS >1V / <3V into 75 Ohm = RGB	⊖→
17- Y/CVBS	GND	⏚
18- Fast switching	GND	⏚
19- CVBS/Y/RGB sync	1Vpp +/- 0.1V into 75 Ohm (*)	⊖→
20- CVBS/Y		⊕
21- Shield		⏚

1.7.2 SCART I (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	⏚
18- Fast switching	GND	⏚
19- CVBS/Y/RGB sync	1Vpp +/- 0.1V into 75 Ohm (*)	⊖→
20- CVBS/Y		⊕
21- Shield		⏚

(*) for 100% white

1.8 Digital output

1.8.1 Coaxial

CDDA/ LPCM (incl MPEG1) : According IEC958
MPEG2, AC3 audio : According IEC1937
Remark:
DTS audio output mode is only available on “digital out”

1.8.2 Optical

Identical to coaxial

1.9 Dimensions and weight

Place and height of feet : acc. to Loewe Harmonisation line
Apparatus tray closed : WxDxH: 435 x 315x 75/88
Apparatus tray open : WxDxH: 435 x 442 x 75/88
Weight without packaging : ca. 4 Kg
Weight in packaging : ca. 6 Kg

1.10 Laser output power & wavelength

1.10.1 DVD

Output power : 7mW
Wavelength : 650nm

1.10.2 CD

Output power : 10mW
Wavelength : 785nm

2. Warnings and Laser safety instructions

GB **WARNING**

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

ESD

NL **WAARSCHUWING**

Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen.
Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

F **ATTENTION**

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD).
Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise a leur manipulation.
Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité.
Veiller a ce que les composants ainsi que les outils que l'on utilise soient également a ce potentiel.

D **WARNUNG**

Alle IC und viele andere Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD).
Unsorgfältige Behandlung bei der Reparatur kann die Lebensdauer drastisch vermindern.
Sorgen sie dafür, das Sie im Reparaturfall über ein Pulsarmband mit Widerstand mit dem Massepotential des Gerätes verbunden sind.
Halten Sie Bauteile und Hilfsmittel ebenfalls auf diesem Potential.

I **AVVERTIMENTO**

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevita potrebbe essere fortemente ridatta in caso di non osservazione della piu grande cauzione alla loro manipolazione.
Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

GB

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

NL

Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt terug gebracht en dat onderdelen, identiek aan de gespecifieerde worden toegepast.

D

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten.
Der Originalzustand des Gerats darf nicht verandert werden.
Fur Reparaturen sind Original-Ersatzteile zu verwenden.

I

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati pezzi di ricambiago idetici a quelli specificati.

F

Les normes de sécurité exigent que l'appareil soit remis a l'état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.

SHOCK, FIRE HAZARD SERVICE TEST:

CAUTION: After servicing this appliance and prior to returning to customer, measure the resistance between either primary AC cord connector pins (with unit NOT connected to AC mains and its Power switch ON), and the face or Front Panel of product and controls and chassis bottom,
Any resistance measurement less than 1 Megohms should cause unit to be repaired or corrected before AC power is applied, and verified before return to user/customer.
Ref.UL Standard NO.1492.

NOTE ON SAFETY:

Symbol ⚠ : Fire or electrical shock hazard. Only original parts should be used to replace any part with symbol ⚠
Any other component substitution(other than original type), may increase risk or fire or electrical shock hazard.

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agrées, seuls habilités à réparer votre appareil en panne."

LASER SAFETY

This unit employs a laser. Only a qualified service person should remove the cover or attempt to service this device, due to possible eye injury.

LASER DEVICE UNIT

Type:	SemiconductorlaserGaAlAs
Wave length:	650 nm (DVD)
	780 nm (VCD/CD)
Output Power:	7 mW (DVD)
	10 mW (VCD/CD)
Beam divergence:	60 degree

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

WARNING

The use of optical instruments with this product will increase eye hazard.
Repair handling should take place as much as possible with a disc loaded inside the player

WARNING LOCATION: INSIDE ON LASER COVERSHIELD

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 AUSSETZEN
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

Warning for powersupply on position 1005

The primary side of the powersupply including the heatsink carries live mains voltage when the player is connected to the mains even when the player is swiched off !
This primary area is not shielded so it is possible to touch copper tracks and/or components when servicing the player. Service personnel have to take precautions to prevent touching this area or components in this area .
The primary side of the powersupply has been indicated with a lightning stroke and a stripe-marked printed on the printed wiring board

Note:
The screws on the basic Engine (position 82 in on the exploded view drawing) may never be touched removed or re-adjusted.
Handle the Basic engine with care when the unit has to be exchanged!
The mechanism of the basic engine is very sensative for droping or shocks

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3. Service hints

The DVD module(Basic Engine and the mono board) has to be exchanged completely in case of failure. A new module for Xemix can be ordered with codenumber 291-90350.969 for Region Code 4 (Australia), 291-90350.970 for Region Code 5 (Russia), and 291-90350.968 for all European countries Region Code 2.
A new module for Auro can be ordered with codenumber 291-90350.988 for Region Code 4 (Australia), 291-90350.989 for Region Code 5 (Russia),and 291-90350.987 for all European countries Region Code 2.

Return the defective unit complete assembled in original package to Loewe Consumer Service in Kronach.

6. DIAGNOSTIC SOFTWARE : SCRIPT INTERFACES

6.1 DEALER SCRIPT

6.1.1 Purpose of Dealer Script

The dealer script can give a diagnosis on a standalone DVD player; no other equipment is needed to perform a number of hardware tests to check if the DVD player is faulty. The diagnosis is simply a "error" or "pass" message; no indication is given of faulty hardware modules. Only tests within the scope of the diagnostic software will be executed hence only faults within this scope can be detected.

6.1.2 Contents of Dealer Script

The dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD player.
The nuclei called in the dealer script are the following (the number after each nucleus name corresponds with the number being on the local display when the nucleus is executed during the dealer script):

Nucleus		Description
VideoColSetupComm	9	Checks the I2C interface with the RGB video processor on the Audio/Video board (only for DVD players with RGB video processor).
VideoScartSwComm	8	Checks the I2C interface with the scart switch on the Audio/Video board
PapChksFl	7	Calculate and verify checksum of FLASH memory.
PapDramWrR	6	Pattern test of all locations in the DRAM(s).
PapI2cDisp	5	Checks the I2C interface with the slave processor on the display PCB.
PapS2bEcho	4	Checks the I2C interface to the basic engine.
PapI2cNvram	3	Checks the I2C interface with the NVRAM.
PapNvramWrR	2	Pattern test of all locations in the NVRAM
CompSdramWrR	1	Pattern test of all locations in the SDRAM(s).

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Figure 6-1

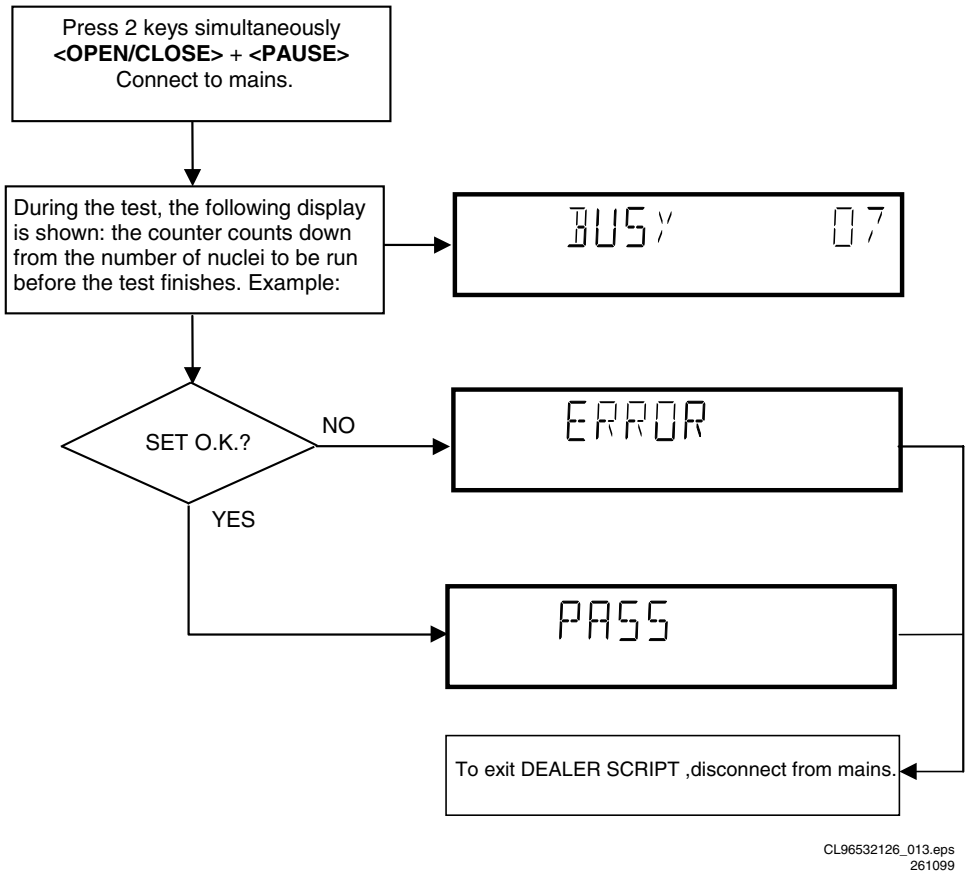

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Figure 6-2

6.2 PLAYER SCRIPT

6.2.1 Purpose of Player Script

The Player script will give the opportunity to perform a test that will determine which of the DVD player's modules are faulty, to read the error log and error bits and to perform an endurance loop test. To successfully perform the tests, the DVD player must be connected to a tv set to check the output of a number of nuclei. For DVDv2b a multi-channel amplifier, a set of 6 boxes and an external video source are necessary to test. To be able to check results of certain nuclei, the player script expects some interaction of the user (i.e. to approve a test picture or a test sound). Some nuclei (e.g. nuclei that test functionality of the Basic Engine module) require that the DVD player itself is opened, to enable the user to observe moving parts and approve their movement visually. Only tests within the scope of the diagnostic software will be executed hence only faults within this scope can be detected.

6.2.2 Contents of Player Script

The player script contains all nuclei that are useful on a DVD player that is connected to a tv-set and help to determine which module of the DVD player is faulty, as well as to read out the contents of the error logs.

6.2.3 Structure of Player Script

The player script consists of a set of nuclei testing the three hardware modules in the DVD player: the Display PWB, the Digital PWB and the Basic Engine.
Nuclei run by the player test need some user interaction; in the next paragraph this interaction is described. The player test is done in two phases:

1. Interactive tests: this part of the player test depends strongly on user interaction and input to determine nucleus results and to progress through the full test. Reading the error log and error bits information can be useful to determine any errors that occurred recently during normal operation of the DVD player.
2. The loop test will perform the same nuclei as the dealer test, but it will loop through the list of nuclei indefinitely.

6.2.4 Survey

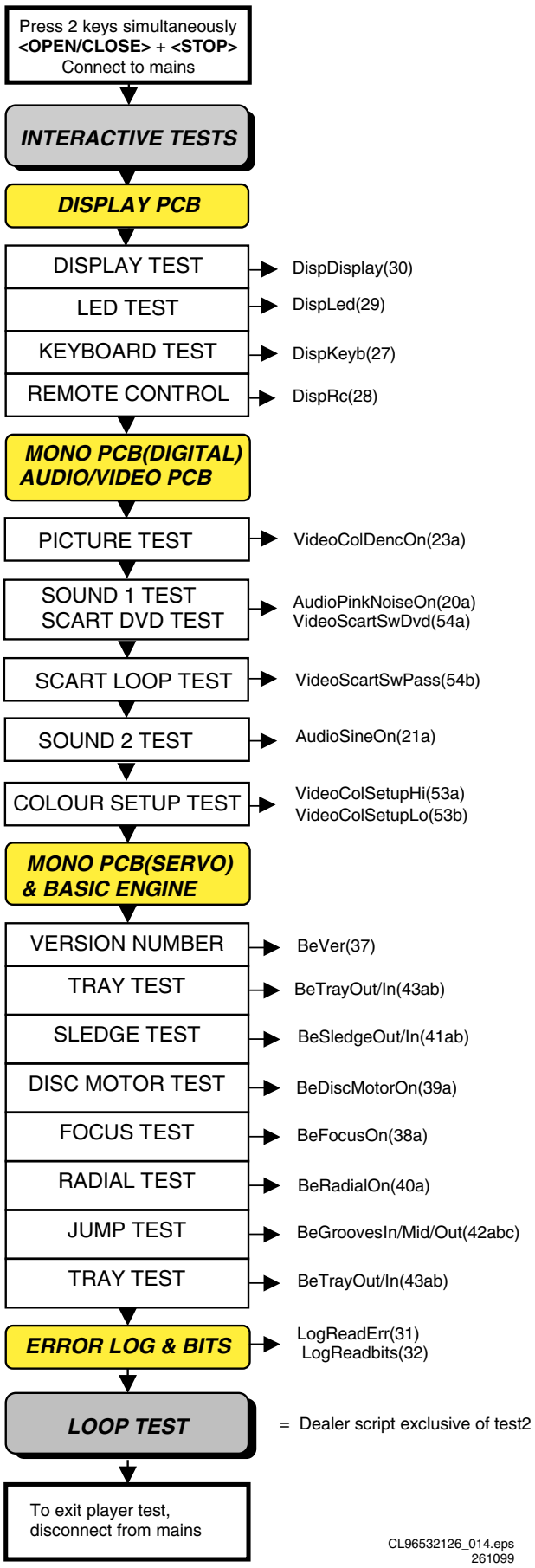

Figure 6-3

6.3 INTERACTIVE TESTS

6.3.1 DISPLAY PCB

DISPLAY TEST

The display test is performed by nucleus DispDisplay. By putting a series of test patterns on the local display, the local display is tested. To step through all different patterns, the user must either press PLAY (pattern is ok) or PAUSE (pattern was incorrect) to proceed to the next pattern. The display of patterns is continued in a cyclic manner until the user presses NEXT. If the user presses NEXT before all display patterns are tested, the DispDisplay nucleus will return TRUE (display test successful).

LED TEST

The LED(s) on the DVD player is (are) tested by nucleus DispLed. The user must check if the LED(s) is (are) lighted; if it is, press PLAY, if it is not, press PAUSE. By pressing NEXT the script will proceed to the next test. If the user presses NEXT before PLAY or PAUSE, the DispLed nucleus will return TRUE (LED test successful).

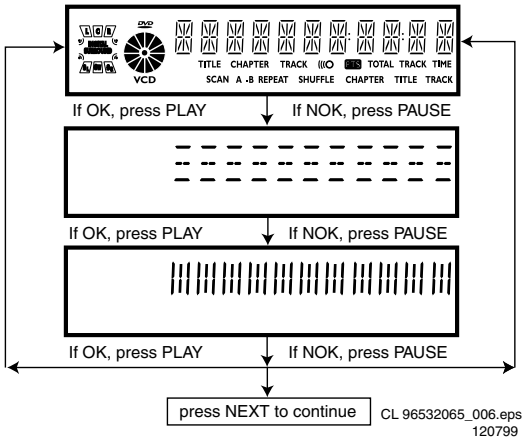

Figure 6-4

KEYBOARD TEST

The keyboard of the DVD player is tested by nucleus DispKeyb. The user is expected to press all keys on the local keyboard once. The code of the key pressed is shown on the local display (1 hexadecimal digit) immediately followed by a (hexadecimal) number indicating how many times that key has been pressed. Example of the local display during this test:

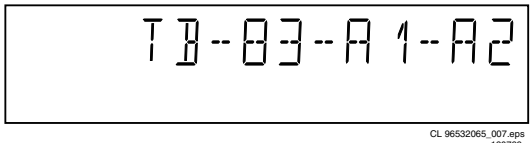

Figure 6-5

The key-codes displayed on the local display will scroll from right to left when the display gets full, the text "tb-" will remain on display.

key id.	key
0	PLAY
1	NEXT
2	PREVIOUS
3	PAUSE
4	STOP
5	OPEN/CLOSE
6	3D-SOUND
A	STANDBY

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Figure 6-6

If any keys are detected more than once (due to hardware error), the key-code is displayed twice (or more), with the second digit increased by 1.
If the user does not press all keys minimally once (in any order), the DispKeys nucleus will return FALSE and cause an error in the overall result of the player script.
The user can leave the keyboard test by pressing the NEXT key on the local display of the DVD player for at least one full second.
The result of the keyboard test is shown on local display as follows:

Figure 6-7

Or

Figure 6-8

Pressing NEXT on the local keyboard again will proceed to the next text.

REMOTE CONTROL TEST

The remote control of the DVD player is tested by nucleus DispRc. The user must press any key on the remote control just once. The codes of the key pressed will be shown on the local display in hexadecimal format. Example:

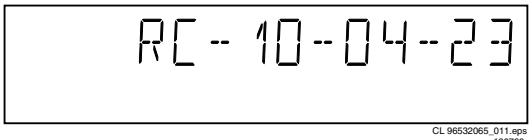

Figure 6-9

In this example 23 is the hexidecimal code of the pressed RC key. The user can leave the remote-control test by pressing NEXT on the local keyboard of the DVD player. The remote control test is successful if a code was received before the user pressed the NEXT key; pressing the NEXT key before pressing a key on the remote control gives an error in the remote control

test (note that the remote control test will also fail if a key on the remote control was pressed but no code was received). The remote control test does not check upon the contents of the received code, that is it will not be checked if the received code matches the key pressed. If desired, the user can manually check this code by using a code-table for the remote control key-codes.

RC Key id	Hexadecimal code
STANDBY	**C**
STOP	**31**
PLAY	**2C**
PLAY BACKWARD	**2D**
PAUSE	**30**
STEP FORWARD	**F6**
STEP BACKWARD	**F5**
FORWARD	**28**
FORWARD 4X	**DF**
FORWARD 8X	**E0**
BACKWARD	**29**
BACKWARD 4X	**DE**
BACKWARD 8X	**DD**
SLOW	**22**
SLOW 2	**D8**
SLOW BACKWARD	**23**
SLOW BACKWARD 2	**DB**
NEXT	**20**
PREVIOUS	**21**
CURSOR UP	**58**
CURSOR DOWN	**59**
CURSOR LEFT	**5A**
CURSOR RIGHT	**5B**
OK	**5C**
0	**0**
1	**1**
2	**2**
3	**3**
4	**4**
5	**5**
6	**6**
7	**7**
8	**8**
9	**9**
TOGGLE	**C8**
ANGLE	**85**
AUDIO	**4E**
SUBTITLES	**4B**
SUBTITLE ON/OFF	**E3**
ROOT MENU	**54**
TITLE MENU	**71**
MENU	**D1**
SETUP MENU	**82**
OSD ON/OFF	**F**
RETURN	**83**
RESUME	**D7**
SCAN	**2A**
SHUFFLE	**1C**
REPEAT	**1D**
A/B REPEAT	**3D**
TOGGLE SCART	**43**
OPEN/CLOSE	**42**
FTS	**FB**
KARAOKE	**E4**
OPTION	**FA**

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Figure 6-10

After pressing NEXT, the result of the remote control test is displayed on the local display of the DVD player as follows:

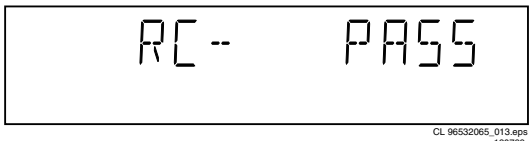

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Figure 6-11

Or

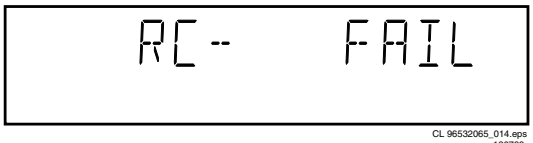

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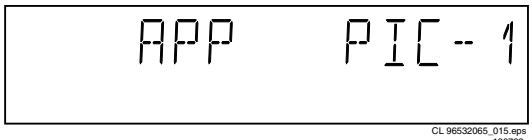
Figure 6-12

Pressing NEXT on the local keyboard again will proceed to the next test.

6.3.2 MONO PCB DIGITAL PART

PICTURE TEST

The picture test is performed by putting a predefined picture (colour bar) on the display (nucleus VideoColDencOn) and asking the user for confirmation. The display will show the following message:



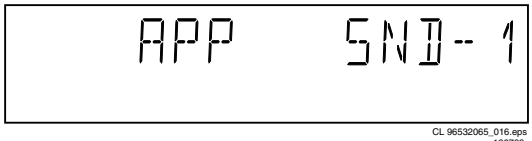
CL 96532065_015.eps
120799

Figure 6-13

By pressing PLAY the user confirms the test, pressing PAUSE will indicate the picture was invisible or incorrect. Pressing NEXT will proceed to the next test

SOUND 1 & SCART DVD TEST

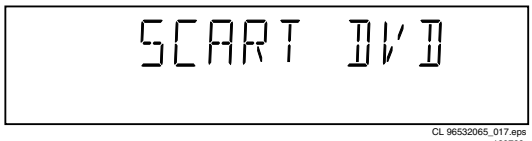
The first soundtest is performed by starting a pink noise sound that needs confirmation from the user (nucleus AudioPinkNoiseOn); the display will show the following message very shortly:



CL 96532065_016.eps
120799

Figure 6-14

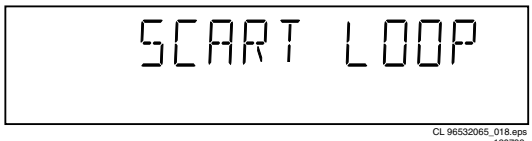
This sound will only be audible from version cut3.1 of Sti5505(item7503 on mono board) onwards. After starting up sound 1, SCART loop-trough will be simultaneously active during this test. SCART loop-trough will be measured with the aid of an external video source.
When entering the SCART loop-trough, the local display indicates:



CL 96532065_017.eps
120799

Figure 6-15

On the TV screen a colour bar (generated by nucleus VideoColDencOn) is visual and the internally generated pinknoise is audible. By pressing PLAY the user confirms the test, pressing PAUSE will indicate the sound was inaudible or incorrect. Pressing NEXT will proceed to the next test; if the user presses NEXT without pressing PLAY or PAUSE first, the result of this test will be TRUE (sound ok). By pressing the NEXT button there will be switched over to the external source, this must become now visible on the TV screen (using the SCART). The local display indicates:

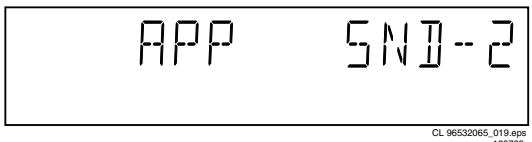


CL 96532065_018.eps
120799

Figure 6-16

The internally generated colour bar is still available on the CVBS and Y/C outputs. And the pinknoise-signal is still available on the cinch audio outputs. By pressing the PREV button, the internal generated colour bar becomes visual again. The test can be left by pressing the NEXT key for more than one second.

SOUND 2 TEST
The second soundtest is performed by producing a sine sound (nucleus AudioSineOn). The signal can be stopped by pressing the STOP-key. The display will show the following message:



CL 96532065_019.eps
120799

Figure 6-17

By pressing PLAY the user confirms the test, pressing PAUSE will indicate that something went wrong. Pressing NEXT will proceed to the next; if the user presses NEXT without pressing PLAY or PAUSE first, the result of this test will be TRUE (sound ok).

Colour set-up test
The colour set-up test is performed by putting the internally generated colour bar in diffferent settings on the TV screen. The first colour bar will be displayed in setting 1. The display will show the following message:

CL96532126_016.eps
261099

Figure 6-18

By pressing the NEXT button, you can go to the second setting. The local display indicates:

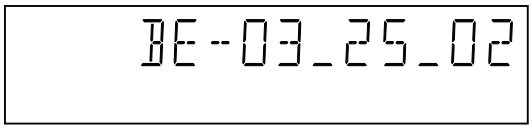
CL96532126_017.eps
261099

Figure 6-19

By pressing the PREVIOUS button, the colour bar with the first setting becomes visual again.
By pressing PLAY the user confirms the test, pressing PAUSE will indicate that something went wrong. The test can be left by pressing the NEXT key for more than one second; if the user presses NEXT without pressing PLAY or PAUSE first, the result of this test will be TRUE (colour set-up ok).

6.3.3 BASIC ENGINE

VERSION NUMBER
In the basic engine tests, the version number of the Basic Engine will be shown first, as the following example:

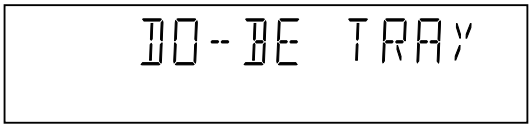


CL96532126_018.eps
261099

Figure 6-20

By pressing the NEXT key, the Basic Engine tests are started.

TRAY TEST
First, the tray is tested. The purpose of this test is also to give the user the opportunity to put a disc in the tray of the DVD player. Some tests on the Basic Engine require that a disc(e.g. DVD MPTD test disc) is present in the player. At the end of the Basic Engine tests this tray test will be repeated solely to enable the user to remove the disc in the tray. The local display will look as follows:

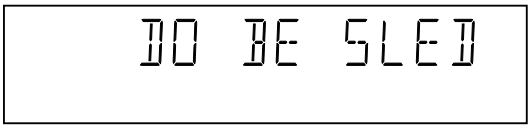


CL 96532065_021.eps
120799

Figure 6-21

By pressing PLAY or PAUSE the user can toggle the position of the tray. Note that this test will not contribute to the test result of the Basic Engine. Pressing NEXT will proceed to the next test, after the tray has been closed (by the software) if it was open.

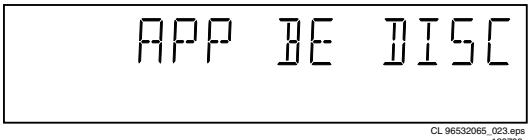
SLEDGE TEST(visual test)
The second Basic Engine test tests the sledge; the user can move the sledge as many times as desired by using PLAY (nucleus BeSledgeOut) and PAUSE (nucleus BeSledgeIn). Pressing NEXT on the local keyboard proceeds to the next test. Note that this test will not contribute to the test result of the Basic Engine. The local display will look as follows during the sledge test:



CL 96532065_022.eps
120799

Figure 6-22

DISC MOTOR TEST(visual test)
The third Basic Engine test tests the disc motor (nucleus BeDiscMotorOn); the local display looks as follows:

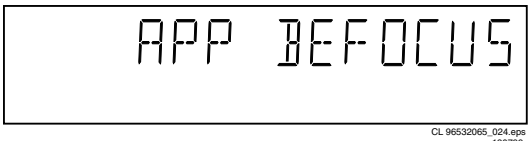


CL 96532065_023.eps
120799

Figure 6-23

By pressing PLAY the user confirms that the disc motor is running; pressing PAUSE indicates the disc motor does not work. Pressing NEXT proceeds to the next test, after a reset of the disc motor (nucleus BeDiscMotorOff). If the user presses NEXT before pressing PLAY or PAUSE, the result of this test will be TRUE (disc motor is running).

FOCUS TEST(visual test)
The fourth Basic Engine test tests the focussing; first focussing is turned on by calling nucleus BeFocusOn. The display will look as follows:

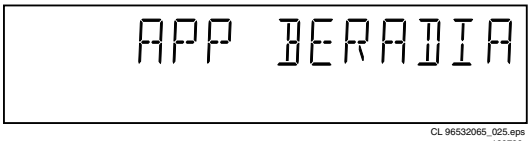


CL 96532065_024.eps
120799

Figure 6-24

By pressing PLAY the user confirms that the focussing was succesful; pressing PAUSE indicates a focussing failure. Pressing NEXT proceeds to the next test after a reset of the focussing (nucleus BeFocusOff); if NEXT is pressed before PLAY or PAUSE, the result of this test will be TRUE (focus successful).

RADIAL TEST(visual & listening test)
The fifth Basic Engine test tests the radial functionality (nucleus BeRadialOn); the local display looks as follows:

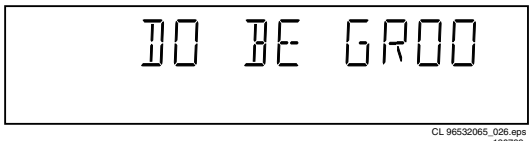


CL 96532065_025.eps
120799

Figure 6-25

By pressing PLAY the user confirms that the radial function worked; pressing PAUSE indicates the function does not work. Pressing NEXT proceeds to the next test, after a reset of the radial (nucleus BeRadialOff). If the user presses NEXT before pressing PLAY or PAUSE, the result of this test will be TRUE (radial successful).

JUMP TEST(listening test)
The sixth and last Basic Engine test tests the jumping by calling nuclei BeGroovesIn, BeGroovesMid and BeGroovesOut. During this test, the local display looks as follows:

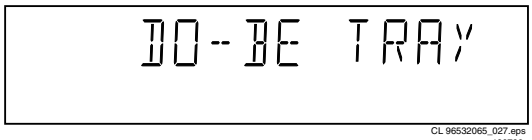


CL 96532065_026.eps
120799

Figure 6-26

The user can switch between the three different types of groove settings by pressing PLAY (forward to next nucleus in the list In-Mid-Out) or PAUSE (backward in the list In-Mid-Out). This is done in a cyclic manner; note that this test will not contribute to the test result of the Basic Engine. Pressing NEXT proceeds to the next test, after the disc motor has been shut off with a call to nucleus BeDiscMotorOff.

TRAY TEST
As a last action for the Basic Engine tests, the tray test is repeated. The local display will look as follows:



CL 96532065_027.eps
120799

Figure 6-27

This test is meant to give the user the opportunity to remove the disc in the tray. The tray position can be toggled using the PLAY and PAUSE key. The tray will be closed (by the software, if it is open) before proceeding to the next test when the user presses the NEXT key.

ERROR LOG

Reading the error log and error bits information can be useful to determine any errors that occurred recently during normal operation of the DVD player. Reading the error log is done by nucleus LogReadErr. The display during the errorlog readout looks as follows :

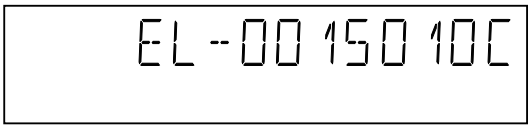


Figure 6-28

By pressing PLAY or PAUSE the user can move forward or backward (respectively) through the logged error codes. The highlighted number indicates which errorcode is currently on display (in the example above, errorcode number 4 is displayed). If "0000" is displayed at all positions, the error log is empty. Display of the logged errors is done in a cyclic manner. The errorcode with the lowest highlighted number is the most recent. By pressing NEXT on the local keyboard, the user can proceed to the next test.

ERROR BITS

Reading the error bits is done by nucleus LogReadBits. The display during the errorbits readout looks as follows:

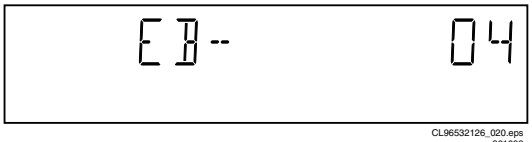


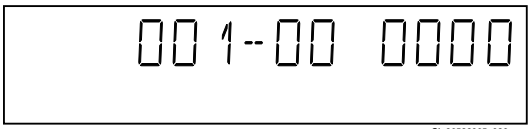
Figure 6-29

Only the set errorbits will be shown by their (decimal) number. Refer to the appropriate documentation for the explanation of each bit number. If the display only shows "EB-0", no error bits were set. By pressing NEXT the user can continue to the next test.
See table below:

Error log / bits table	Read ERROR LOG in player script	Read ERROR BITS in player script
Basic engine errors	Value:	Value:
Command to the Basic Engine not allowed in this stae or unknown command	150101	8
Parameter(s) from the command to the Basic Engine is not valid	150102	7
Sledge could not be moved to the ineer home position	150103	6
Focus failure	150104	5
Turntable motor could not be reached within timeout	150105	4
Radial servo could get on track on the disc	150106	3
PLL could not lock in the accessing or tracking state	150107	2
Subcode or sector information could not be read	150108	1
requested subcode could not be found	150109	16
Tray could not be closed or opened completely	15010A	15
TOC could not be read within timeout	15010B	14
The requested seek on the disc could not be executed	15010C	13
A requested lead is not on the disc	15010D	12
A non existing burst cutting area is requested	15010E	11
S2b communication error	1501F0	10
S2b communication error	1501F1	9
S2b communication error	1501F3	24
S2b communication error	1501F4	23
S2b communication error	1501F5	22
Digital PWB errors		
Communication error with the Sti 5505	90000	32
Communication error with the Sti 5505	90001	31
Disply processor errors		
Communication error with the display processor	190000	40

6.3.4 LOOP TEST

At the start of the loop test, the display will show the result of the interactive player test:



CL 96532065_030.eps
120799

Figure 6-30

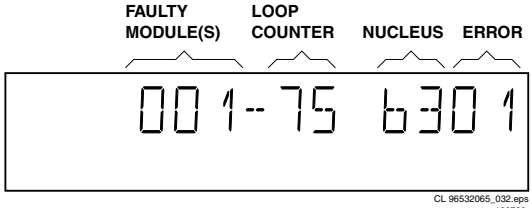
The left side of the display contains a 3-digit code, which can have a value between 000 and 111. These values are to be interpreted as follows:

Displayed Value	Indication for each module		
	Basic Engine	Mono PCB	Display PCB
000	ok	ok	ok
001	ok	ok	faulty
010	ok	faulty	ok
011	ok	faulty	faulty
100	faulty	ok	ok
101	faulty	ok	faulty
110	faulty	faulty	ok
111	faulty	faulty	faulty

CL 96532065_031.eps
120799

Figure 6-31

The loop test will perform the same nuclei as the dealer test, but it will loop through the list of nuclei indefinitely. The display of the DVD player will display not only the three digits indicating correct/faulty modules and the last found error code (as mentioned, faults are detected as far as they can be within the scope of the diagnostic software), but also a loop counter indicating how many times the loop has been gone through. Example:



CL 96532065_032.eps
120799

Figure 6-32

The number after the hyphen indicates the number of times the loop test has been performed; the 4 digits at the right side of the display show the last error that was found when running the loop test: the leftmost two digits of this code indicate which nucleus resulted in a fault; the rightmost two digits refer to the faultcode within that nucleus. For further explanation of this error code, see list of error codes below.

ERROR CODES LOOP TEST

ERROR CODE	NUCLEUS NUMBER	ERROR DESCRIPTION
0601	6	Calculated checksum of FLASH is not correct
0901	9	The DVD DRAM is faulty
1101	11	I2C bus busy before start
1102		NVRAM access time-out
1103		No NVRAM Acknowledge
1104		NVRAM reply time-out
1201	12	I2C bus busy
1202		I2C bus not working
1203		Slave controller not responding
1204		Slave response is not correct
1301	13	Parity error from basic engine to serial
1302		Parity error from serial to basic engine
1303		No communication between serial and basic engine
1304		Communication time-out error
1601	16	The SDRAM is faulty
5201	52	I2c bus busy
5202		I2c bus not working
5203		Colour setup controller not responding
5204		Colour setup controller response not correct
5401	54	I2c bus busy
5402		I2c bus not working
5403		Scart switch controller not responding
5404		Scart switch controller response not correct

CL96532126_021.eps
261099

Figure 6-33

7. Servicing DVD module and MONO board

7.1 Replacing DVD module

The DVD module(Basic Engine and the mono board) has to be exchanged completely in case of failure. A new module for Xemix can be ordered with codenumber 291-90350.969 for Region Code 4 (Australia), 291-90350.970 for Region Code 5 (Russia), and 291-90350.968 for all European countries Region Code 2.
A new module for Auro can be ordered with codenumber 291-90350.988 for Region Code 4 (Australia), 291-90350.989 for Region Code 5 (Russia),and 291-90350.987 for all European countries Region Code 2.
Return the defective unit complete assembled in original package to Loewe Consumer Service in Kronach.

7.2 Reprogramming of new mono boards.

Caution

This information is confidential and may not be distributed. Only a qualified service person should reprogram the mono board.

After replacement of the mono board, all the customer settings and also the region code will be lost.
Reprogramming of the mono board will put the player back in the state in which it has left the factory, i.e. with the default settings and the allowed region code.

Reprogramming is limited to 25 times.
When the counter reaches 25, reprogramming is not possible anymore
Reprogramming will be done by way of the remote control.
Put the player in stop mode, no disc loaded.
Press the following keys on the remote control:
<PLAY> followed by numerical keys ***<2> <7> <4>***
The display shows: "***- - - - - - - - - - - -***"
Press now successively the following keys :
LDV 501L/001 <0><0><1> <0><0><0><0><0><0><0><0><0><0>
LDV 501U/001 <0><0><1> <0><0><0><0><0><0><0><0><0><0>
LDV 502L/001 <0><0><2> <0><0><0><0><0><0><0><0><0><0>
LDV 502U/001 <0><0><2> <0><0><0><0><0><0><0><0><0><0>

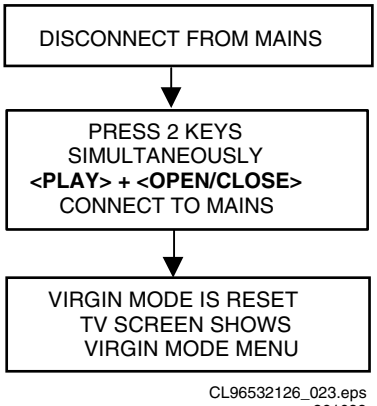
Press ***<PLAY>*** again.
The TV screen will become BLUE during a short time to confirm that the digital board has been reprogrammed, then the set goes to standby mode.

CL96532158_016.eps
170200

Figure 7-1

7.3 Reset of Virgin Mode

After the player has been powered up for test by the dealer, it would have gone through the Virgin Mode. It is possible to reset the settings made during that mode before the delivery of player to the customer. This can be done as shown in the following diagram:

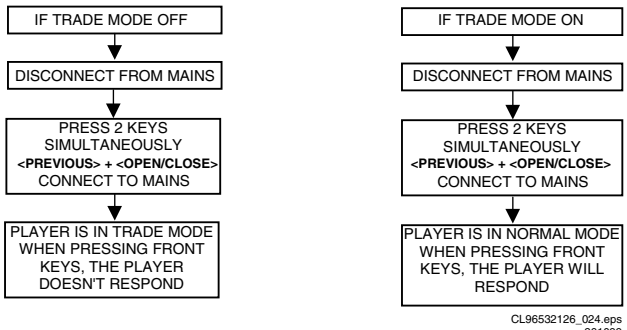


CL96532126_023.eps
261099

Figure 7-2

TRADE MODE

When the player is in Trade Mode, the player cannot be controlled by means of the front key buttons, but only by means of the remote control.



CL96532126_024.eps
261099

Figure 7-3

8. Test instructions Display board

8.1 Display board

8.1.1 Introduction

These test instructions are written for all versions of the display PCB 396-90348.973.
The contents of the PCB can be split up into next blocks:

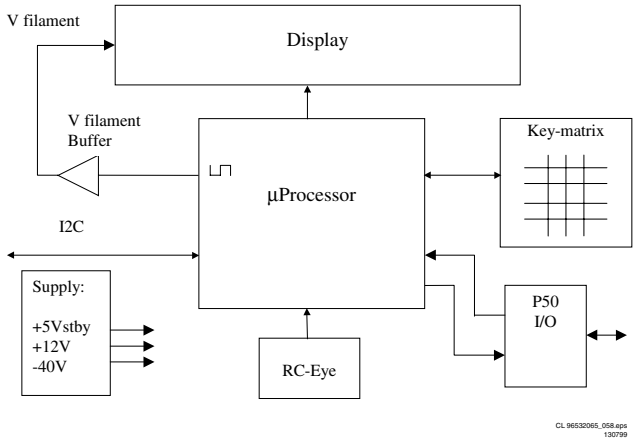


Figure 8-1

8.1.2 Functionality description:

The essential component of the display PCB is the uP (slave). This slave works on an 8MHz resonator and has a reset circuit that is triggered by the +5Vstby. After the reset pulse, the standby control line will release the reset of the host uP. This host uP will then initialise the slave. In addition, when going to stand-by, the slave will put the host uP in reset. When the slave receives the right IR or key code to leave the standby mode, the reset of the host uP will be released.
Other slave functions are:

- Square signal generator to generate the filament voltage, which is required for an AC FTD.
- Generates the grid and segment scanning for the FTD.
- Generates a scanning grid for the keys (separated from display scanning).
- Has inputs for RC (RC5 and RC6) and P50 (P50 controller is built in).

8.1.3 General

- Oscilloscope measurements have been carried out using a Philips PM3392A.
- Impedance of measuring-equipment should be > 1M(.
- To do correct measurements we recommend to use supply 396-90350.937, which is used in all "second generation B" DVD-players. Make sure that the main 3.3V has a 0.7A load.

8.1.4 Reset

Check next reset timing with an oscilloscope at pin 10 of the (processor.

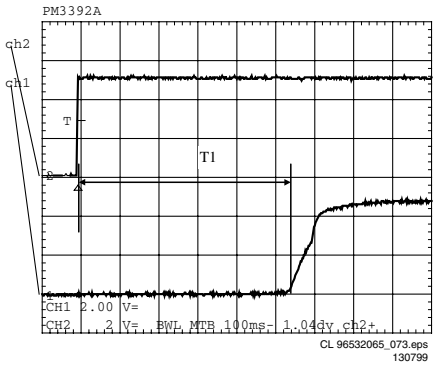


Figure 8-2

Timing: 400msec < T1 > 700msec.
CH1: +5Vstby voltage at power on.
CH2: Voltage at pin 10.

8.1.5 Display steering

Check next timing and level for all grid-lines (G1 r G14).

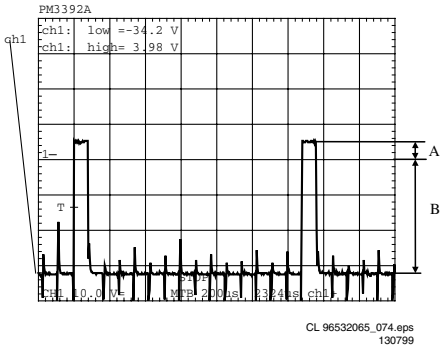


Figure 8-3

1. Check level A: +4V5 (10% for grid lines 1 => 11
2. Check level A: +4V0 (10% for grid lines 12 => 14
3. Check level B: -33V (10%
4. Check timing and levels of segment-lines P1 r P10:

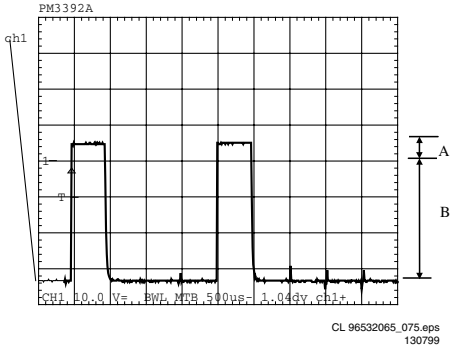


Figure 8-4

Level A:+4V5 (10%
Level B:-33V (10%
The data on these segment lines depend on the characters that are displayed.
The characters can be set by sending I2C commands to the display.
See the Slave URS how to send a display command.

8.1.6 Key-matrix

Connect a extra 10k(pull-up to pin 36 en 37 of the (P and check next matrix scanning at these pins.

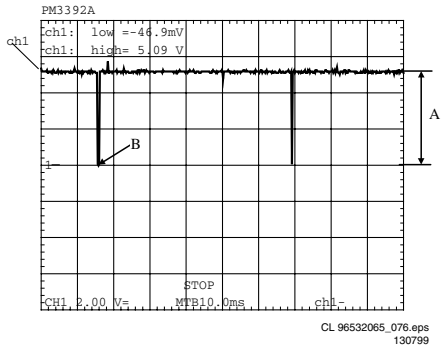


Figure 8-5

Level A: 5.0V (7%
Level B: 0V (200mV
Check matrix scanning from pin 26 until 33 of the (P.
The results should be the same as the diagram above.

8.1.7 I.R. receiver

Check at pin 23 of the (P if this line switches from low (< 0.3V) to high (> 4.5V), while pressing a key on a Loewe DVD remote control.

8.1.8 Karaoke interface

The karaoke interface (4 lines) is a single direction communication.
This means that it consists of four uP output lines.
The interface can be checked by setting or resetting these output-ports via the I2C bus.
Send next command via the I2C bus:

Address	:	0x70
Command byte	:	0x24
Data byte	:	xxxxabcd
Wherea	:	a = Karaoke reset.
	:	b = Karaoke data.
	:	c = Karaoke clock.
	:	d = Karaoke strobe.

8.1.9 P50 interface

P50 is a bi-directional serial interface, which is used for communication between video equipment. For European sets, this communication goes via pin 10 of the scart-bus. In other regions, it can be a cinch bus at the back of the set.

1. Keep the uP in reset by short-circuiting emitter and collector of transistor 7108, via resistor 3100 and 3104 transistor 7101 is switched on.
2. Check the voltage at the P50 output connector 1118-5: < 200mV.

When the reset is released the uP output-pin becomes low and transistor 7101 is switched off.

1. Check the voltage at the P50 output connector 1118-5: 4V9 (5%.
2. Check also the uP P50 input (uP pin 20): 5V (5%.
3. Connect the P50 line (connector 1118-5) to ground.
4. Check again the uP P50 input (uP pin 20): <0V3.

9. Current mode power supply

9.1 Blockdiagram

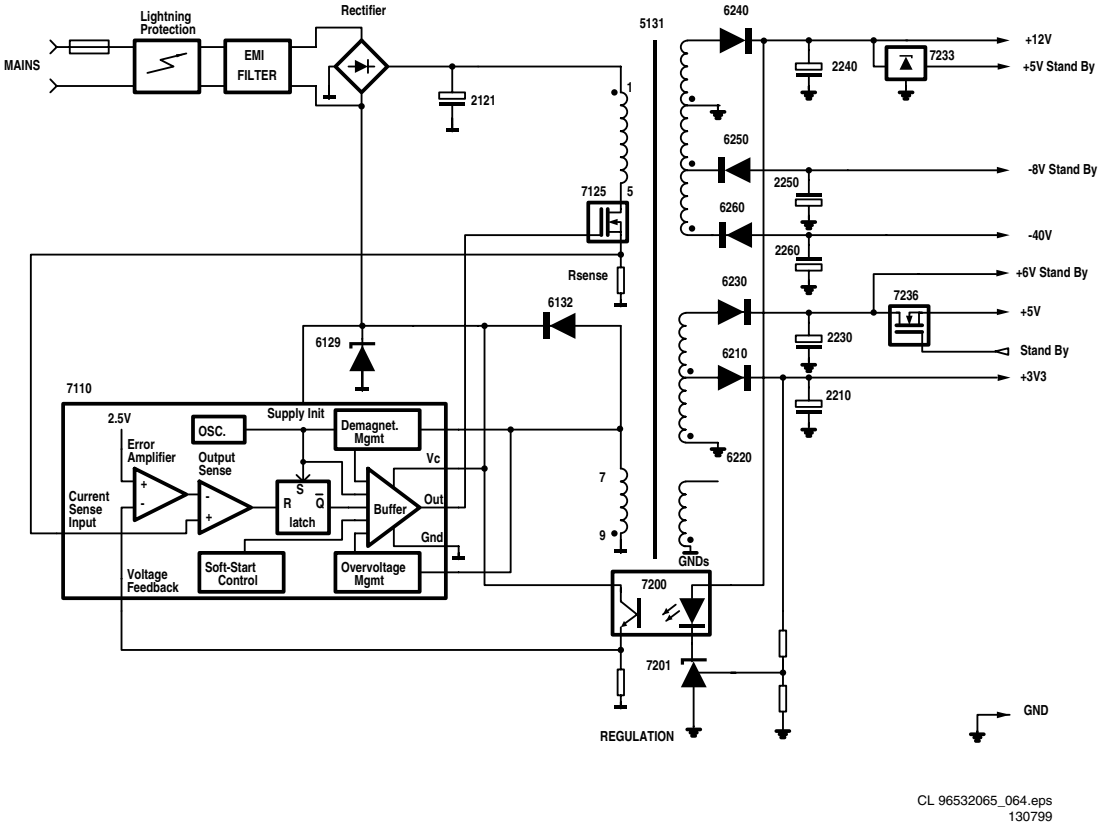


Figure 9-1

9.1.1 Function description of the current mode power supply

MOSFET 7125 is used as a power switch controlled by the controller IC 7110. When the switch is closed, energy is transferred from the mains into the transformer. This energy is then supplied to the load when the switch is opened. By control of the switched-on time, the energy transferred in each cycle is regulated so that the output voltages are independent of load or input voltage variations. The controlling device MC44603P is an integrated pulse width modulator. A clock signal initiates power pulses at a fixed frequency. The termination of each output pulse occurs when an analogue of the inductor current reaches a threshold established by the error signal. In this way the error signal actually controls the peak inductor current on cycle-by-cycle basis.

9.2 General description of MC44603

The MC44603 is an enhanced high performance controller that is specifically designed for Off-line and dc-to dc converter applications. This device has the unique ability of automatically changing operating modes if the converter output is overloaded., unloaded, or shorted. The MC44603 has several distinguishing features when compared to conventional SMPS controllers. These features consist of a foldback facility for overload protection, a standby mode when the converter output is slightly loaded, a demagnetisation detection for reduced switching stresses on transistor and diodes, and a high current totem pole output ideally suited for driving a power MOSFET. It can also be used for driving a bipolar transistor in low power converters. It is optimised to operate in discontinuous mode but can also operate in continuous mode. Its advanced design allows use in current mode or voltage mode control applications.

9.3 Pin connections

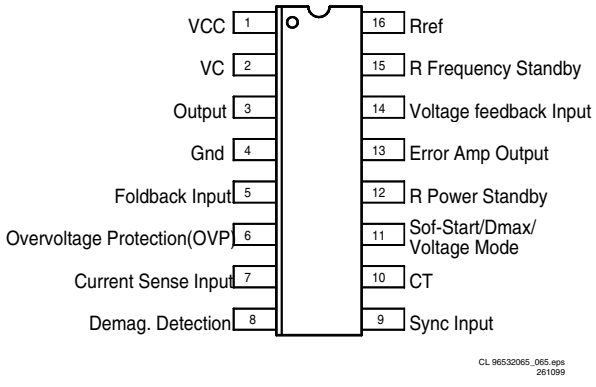


Figure 9-2

9.4 Blockdiagram of MC44603

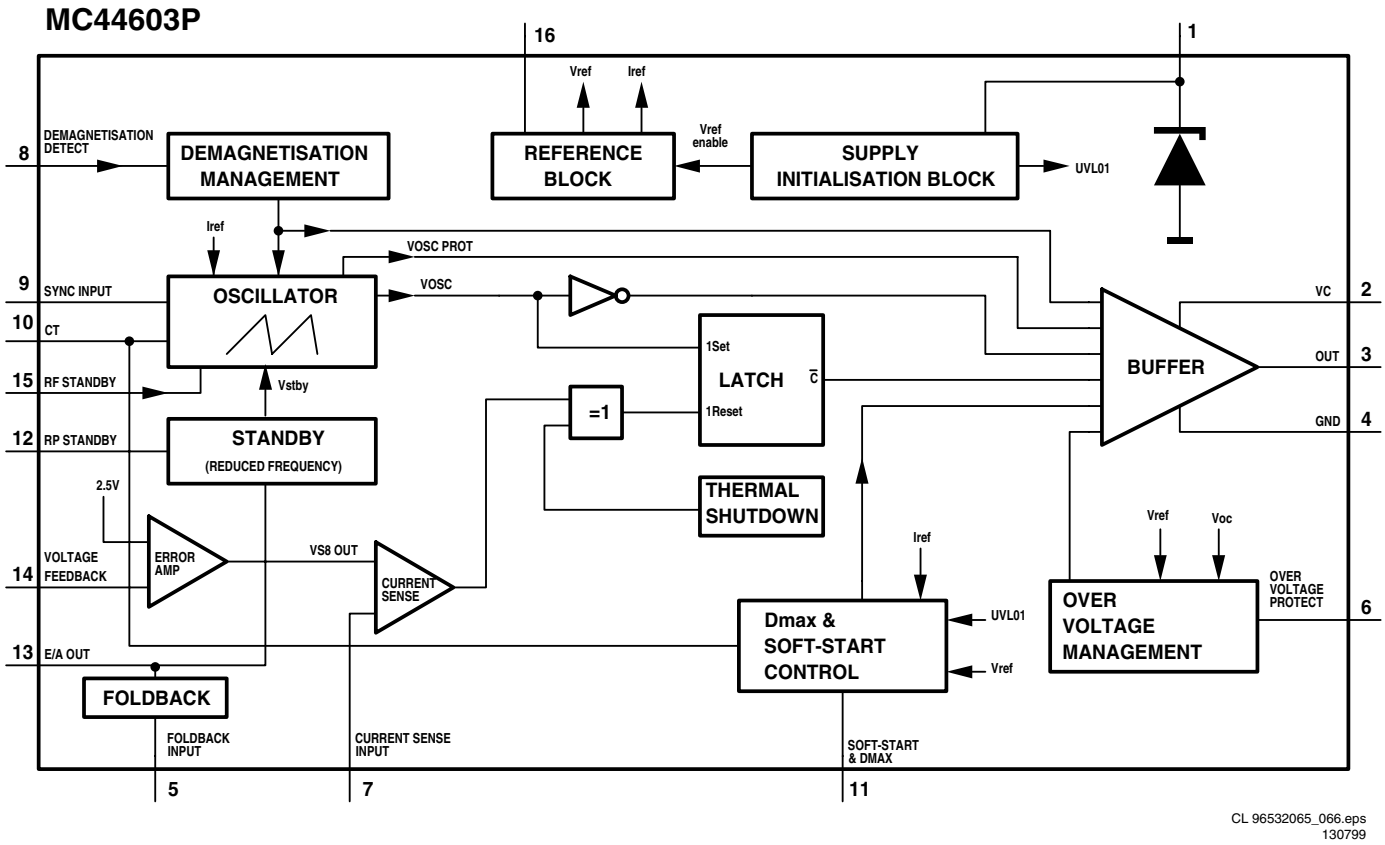


Figure 9-3

9.5 Pin function description

Pin function description

Pin	Name	Description
1	VCC	This pin is the positive supply of the IC. The operating voltage range after start-up is 9.0 to 14.5 V.
2	VC	The output high state (VOH) is set by the voltage applied to this pin.
3	Output	Peak currents up to 750 mA can be sourced or sunk, suitable for driving either MOSFET or Bipolar transistors.
4	Gnd	The groundpin is a single return, typically connected back to the power source.
5	Foldback Input	The foldback function provides overload protection.
6	Overvoltage Protection	When the overvoltage protection pin receives a voltage greater than 2.5V, the device is disabled and requires a complete restart sequence.
7	Current Sense Input	A voltage proportional to the current flowing into the power switch is connected to this input.
8	Demagnetisation Detection	A voltage delivered by an auxiliary transformer winding provides to the demagnetisation pin an indication of the magnetisation state of the flyback transformer. A zero voltage detection corresponds to complete core saturation.
9	Synchronisation Input	The synchronisation input pin can be activated with either a negative pulse going from a level between 0.7V and 3.7V to Gnd or a positive pulse going from a level between 0.7V and 3.7V up to a level higher than 3.7V. The oscillator runs free when Pin 9 is connected to Gnd.
10	C_T	The normal mode oscillator frequency is programmed by the capacitor CT choice together with the Rref resistance value. CT, connected between Pin 10 and Gnd, generates the oscillator sawtooth.
11	Soft-Start/Dmax/Voltage-Mode	A capacitor, resistor or a voltage source connected to this pin limits the switching duty-cycle. This pin can be used as a voltage mode control input. By connecting Pin 11 to Ground, the MC44603 can be shut down.
12	RP Standby	A voltage level applied to the RP Standby pin determines the output power level at which the oscillator will turn into the reduced frequency mode of operation(i.e. standby mode). An internal hysteresis comparator allows to return in the normal mode at a higher output power level.
13	E/A Out	The error amplifier output is made available for loop compensation.
14	Voltage Feedback	This is the inverting input of the Error Amplifier. It can be connected to the switching power supply output through an optical (or other) feedback loop.
15	RF Standby	The reduced frequency or standby frequency programming is made by the RF Standby resistance choice.

Figure 9-4

9.6 Operating description

The input voltage Vcc(pin 1) is monitored by a comparator with hysteresis, enabling the circuit at 14.5V and disabling the circuit below 7.5V. The error amplifier compares a voltage Vfb(pin 14) related to the output voltage of the power supply, with an internal 2.5V reference. The current sense comparator compares the output of the error amplifier with the switch current Isense(pin 7) of the power supply. The output of the current sense comparator resets a latch, which is set every cycle by the oscillator. The output stage is a totem pole, capable of driving a MOSFET directly.

9.6.1 Start-up sequence

t1: Charging the capacitor at Vcc
C2129 will be charged via R3123 and R3134, C2133 and C2111 via R3129. The output is switched off during t1.

t2: Charging of output capacitors
When the input voltage of the IC exceeds 14.5V, the circuit is enabled and starts to produce output pulses. The current consumption of the circuit increases to about 17mA, depending on the external loads of the IC. At first, the capacitor at the Vcc pin will discharge because the primary auxiliary voltage, coming from winding 7-9 is below the Vcc voltage. At some moment during t2, the primary auxiliary voltage reaches the same level as Vcc. The Vcc voltage is now determinated by this primary auxiliary voltage.

t3: regulation
The output voltage of the power supply is in regulation

t4: overload
When the output is shortened, the supply voltage of the circuit will decrease and after some time drop below the lower threshold voltage. At that moment, the output will be disabled and the process of charging the Vcc capacitor starts again. If the output is still shorted at the next t2 phase, the complete start-and stop sequence will repeat. The power supply comes in a hiccup mode

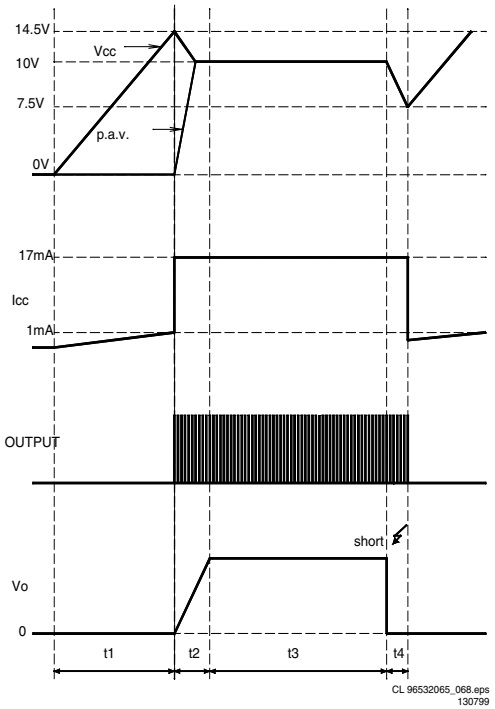


Figure 9-5 Start-up sequence

9.7 Regulation

Figure B shows the most relevant signals during the regulation phase of the power supply.
The oscillator voltage ramps up and down between V1 and V2. The voltage at the current sense terminal is compared every cycle with the output of the error amplifier Vcomp. The output is switched off when the current sense level exceeds the level at the output of the error amplifier.

1. TimeON phase : A drain current will flow from the positive supply at pin 1 of the transformer through the transformer's primary winding, the MOSFET and Rsense to ground. As the positive voltage at pin 1 of the transformer is constant, the current will increase linearly and create a ramp dependent on the mains voltage and the inductance of the primary winding. A certain amount of energy is stored in the transformer in the form of a magnetic field. The polarity of the voltages at the secundary windings is such that the diodes are non-conducting.
2. TimeDIODE phase : When the MOSFET is switched off, energy is no longer supplied to the tranformer. The inductance of the tranformer now tries to maintain the current which has been flowing through it at a constant level. The polarity of the voltage from the transformer therefore becomes reversed. This results in a current flow through the tranformer's secondary winding via the diodes, electrolytic capacitors and the load. This current is also ramp shaped but decreasing.
3. TimeDEAD phase : when the stored energy has been supplied to the load, the current in the secondary windings stops flowing. At this point the drain voltage of the MOSFET will drop to the voltage of C2121 with a ringing caused by the Drain-Source capacitance with the primary inductance.

The oscillator will start a next cyclus which consists of the described three phases. The time of the different phases depends on the mains voltage and the load.
TimeDEAD is maximum at an input of 400VDC and minimum load, it will be zero at an input of 100VDC and overload.

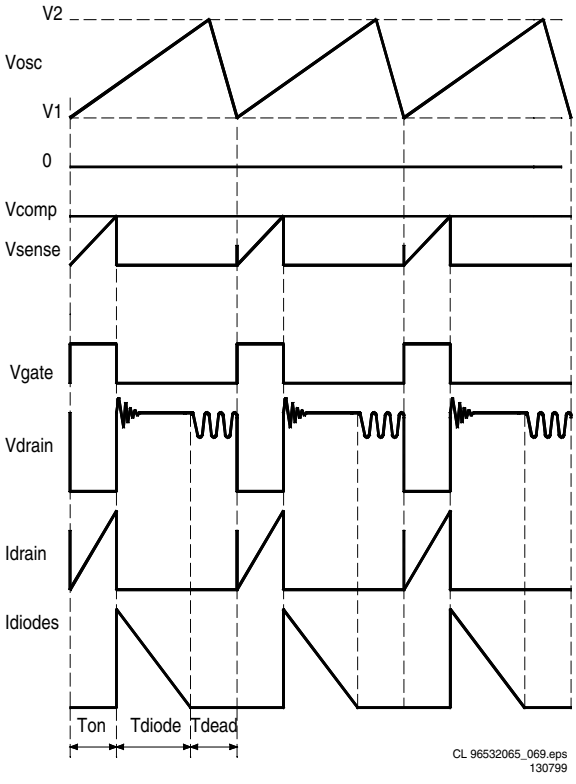
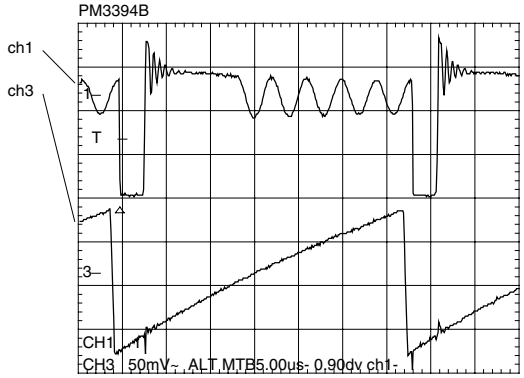


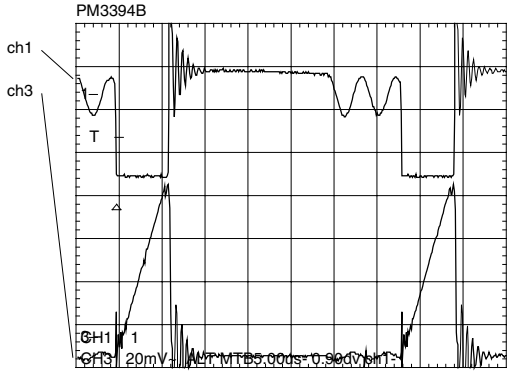
Figure 9-6 Regulation

9.8 Oscillograms

ch1 : Drain voltage
ch2 : Drain current
ch3 : Gate voltage



ch1 : Drain voltage
ch2 : Oscillator voltage



ch1 : Drain voltage
ch3 : Sense voltage

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130799

Figure 9-7

9.9 Circuit description

9.9.1 Input circuit

The input circuit consists of a lightning protection circuit and an EMI filter.
The lightning protection comprises R3120, gasarrestor 1125 and R3124. The EMI filter is formed by C2120, L5120, C2125 and C2126. It prevents inflow of noises into the mains.

9.9.2 Primary rectifier/smoothing circuit

The AC input is rectified by rectifier bridge 6120 and smoothed into C2121. The voltage over C2121 is approximately 300V. It can vary from 100V to 390V.

9.9.3 Start circuit and Vcc supply

This circuit is formed by R3123, R3134, C2129, D6129, R3129, R3111, C2133 and C2111.
When the power plug is connected to the mains voltage, the stabilised voltage over D6129(24V) will charge C2133 via R3129. When the voltage reaches 14.5V across C2111, the control circuit of IC7110 is turned on and the regulation starts. During regulation, Vcc of IC7110 will be supplied by the rectified voltage from winding 7-9 via R3135, D6132 and C2133.

9.9.4 Control circuit

The control circuit exists of IC7110, C2102, 2104, 2107, 2109, 2110, R3102, 3103, 3104, 3107, 3108, 3109 and 3110. The frequency of the oscillator is defined by C2102 and R3110.
Power switch circuit
This circuit comprises MOSFET 7125, Rsense 3126, 3127 and 3128, R3125 , C2127, L5125, R3112 and R3113. R3125 is a pull-down resistor to remove static charges from the gate of the MOSFET.

9.9.5 Regulation circuit

The regulation circuit comprises opto-coupler 7200 which isolates the error signal from the control IC on the primary side and a reference component 7201. The TL431(7201) can be represented by two components:

- a very stable and accurate reference diode
- a high gain amplifier

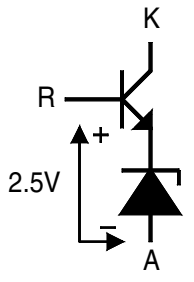


Figure 9-8

TL431 will conduct from cathode to anode when the reference is higher than the internal reference voltage of about 2.5V. If the reference voltage is lower, the cathode current is almost zero. The cathode current flows through the LED of the opto-coupler. The collector current of the opto-coupler flows through R3106, producing an error voltage, connected to voltage feedback pin 14 of IC7110.

9.9.6 Demagnetisation

The auxiliary winding (7-9) voltage is used to detect magnetic saturation of the transformer core and connected via R3101 to pin 8 of IC7110. During the demagnetisation phase, the output will be disabled.

9.9.7 Overvoltage protection circuit

This circuit consist of D6114, C2114, R3115 and R3116.
When the regulation circuit is interrupted due to an error in the control loop, the regulated output voltage will increase (overvoltage). This overvoltage is sensed on the primary winding 7-9.
When an overvoltage longer than 2.0 (s is detected, the output is disabled until VCC is removed and then re-applied. The power supply will come in a hiccup mode as long as the error in the control loop is present.

9.9.8 Secondary rectifier/smoothing circuit

There are 5 rectifier/smoothing circuits on the secondary side. Each voltage depends on the number of windings of the transformer.
The +5Vstby power supply is derived from the +12Vstby by voltage regulator 7233, C2233 and L5233.
The -5V voltage is regulated by voltage regulator 7259 and will be switched off via D6256, T7256 and T7255 during standby (control signal STAND BY is high). When jumper 4250 is mounted instead of this circuit, a supply voltage -8Vstby will be present at pin 9 of connector 0205.
The +5V power supply is derived from +6Vstby by the loader-up circuit formed by MOSFET 7236, reference component 7237, R3236, R3237 and C2239. This voltage will be switched off during STAND BY via T7235.
The 3V3 power supply is regulated by the control loop (7201, 7200, 7110) of the switched mode PSU.

10. List of abbreviations

SIGNAL NAME	DESCRIPTION
0/6/12	Scart switch control signal A/V board. 0V : loop through (AUX to TV), 6V : play 16:9 format, 12V : play 4:3 format
B	Buffered Video input Blue from DVD monoboard
B/C SWITCHING	Circuit for bi-directional switching of Blue and Chroma on dual scart. Switches between virtual ground (75 ohm) and video output buffer.
BC_AUX	Blue or Chroma input from AUX-scart
BC_TV	Blue or Chroma output to TV-scart
BO	Blue output from RGB video processor
BOUT_TV	Blue output to TV-scart
C_ENC	Buffered Chroma input from DVD monoboard
C_OUT	Chroma output to S-Video output buffer
CENTER	Control signal from monoboard to switch STEREO OUTPUT cinch to mono.
CVBS	Buffered Composite video input from DVD monoboard
DC_OFF	Control signal to switch off -8Vstby and +12Vstby during standby
DIG_OUT	Digital out
FBIN_AUX	Fast blanking input from AUX-scart
FBOUT_TV	Fast blanking output to TV-scart
G	Buffered Video input Green from DVD monoboard
GIN_AUX	Video input Green from AUX-scart
GO	Green output from RGB video processor
GOUT_TV	Video output Green to TV-scart
HP_L	Headphone left output
HP_R	Headphone right output
HSYNC	Horizontal synchronization for RGB video processor.
KILL	Kill control signal for audio outputs and for soft mute of DAC
LIN_AUX	Audio input left from AUX-scart
LIN_TV	Audio input left from TV-scart
LOUT_AUX	Audio output left to AUX-scart
LOUT_TV	Audio output left to TV-scart
LRCLK	Left/Right clock
P50	Bi-directional interface used for communication between video equipment
PCM_CLK	Audio system clock for DAC
PCM_OUT[0:2]	Audio serial output data
R	Buffered Video input Red from DVD monoboard
RCIN_TV	Red or Chroma input from TV-scart
RCOUT_TV	Red or Chroma output to TV-scart
RIN_AUX	Audio input right from AUX-scart
RIN_TV	Audio input right from TV-scart
RO	Red output from RGB video processor
ROUT_AUX	Audio output right to AUX-scart
ROUT_TV	Audio output right to TV-scart
SCL	I2C bus clock
SCLK	Audio serial bit clock
SDA	I2C bus data
ST_L	Stereo left output (not used)
ST_R	Stereo right output (not used)
STEREO_L	Audio cinch output left
STEREO_MUTE	Control signal from monoboard to switch on stereo mute circuit (option)
STEREO_R	Audio cinch output right
Y_ENC	Buffered Luma input from DVD monoboard
Y_OUT	Luma output to S-Video output buffer
YCVBSIN_AUX	Luma or CVBS input from AUX-scart
YCVBSIN_TV	Luma or CVBS input from TV-scart
YCVBSOUT_AUX	Luma or CVBS output to AUX-scart
YCVBSOUT_TV	Luma or CVBS output to TV-scart

11. IC-descriptions

SGS-THOMSON MICROELECTRONICS

STV6410

AUDIO/VIDEO SWITCH MATRIX

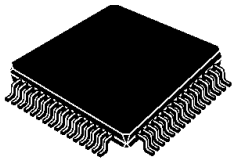
- I^2C BUS CONTROL
- STANDBY MODE

VIDEO SECTION

- 5 CVBS INPUTS, 4 CVBS OUTPUTS (ONE WITH SELECTABLE CHROMA TRAP FILTER)
- 5 Y/C INPUTS, 3 Y/C OUTPUTS
- 6dB GAIN ON ALL CVBS/Y AND C OUTPUTS
- 1 Y/C ADDER
- 2 RGB/FB INPUTS, 1 RGB/FB OUTPUT WITH 6dB ADJUSTABLE GAIN
- VIDEO MUTING ON ALL THE OUTPUTS
- 3 SLOW BLANKING INPUTS/OUTPUTS
- SYNC BOTTOM CLAMP ON ALL CVBS/Y AND RGB INPUTS, AVERAGE ON C INPUTS
- BANDWIDTH : 15MHz
- CROSSTALK : 60dB Typ.

AUDIO SECTION

- 5 STEREO INPUTS, 4 STEREO OUTPUTS (TWO WITH LEVEL ADJUSTMENT)
- MONO SOUND OUTPUT
- MONO SOUND CAPABILITY ON TV OUTPUTS
- AUDIO MUTING ON ALL THE OUTPUTS



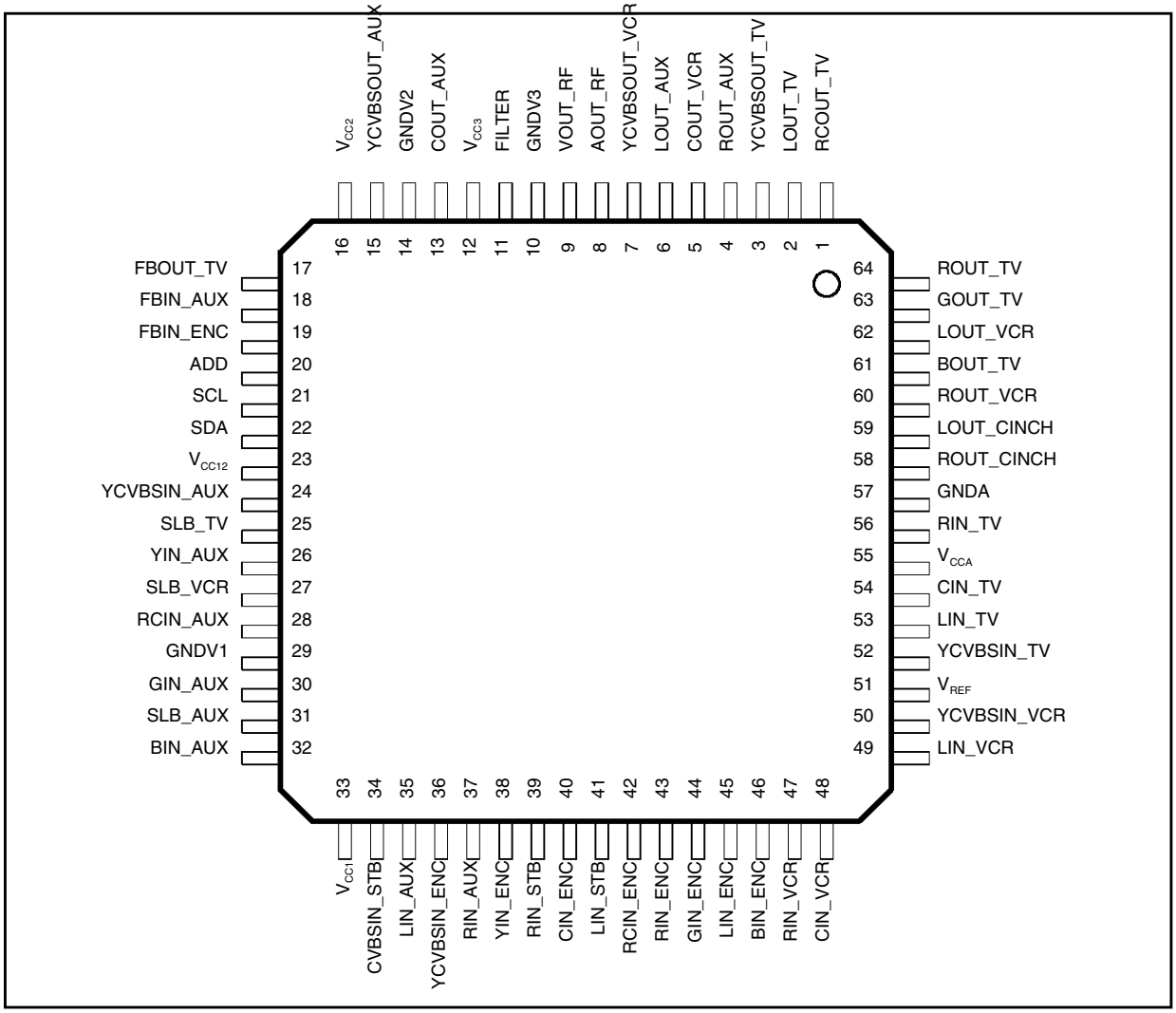
TQFP64
(Plastic Quad Flat Pack)

ORDER CODE : STV6410D

DESCRIPTION

The STV6410 is a highly integrated I^2C bus-controlled audio and video switch matrix, optimized for use in digital set-top box applications. It provides all the audio and video routings required in a full three scart set-top box design. It is also fully pin compatible with STV6411, the two scart version.

PIN CONNECTIONS



PIN LIST

Pin Number	Symbol	Description
1	RCOUT_TV	Red/chroma Output, to TV Scart
2	LOUT_TV	Audio Left Output, to TV Scart
3	YCVBSOUT_TV	Y/CVBS Output, to TV scart
4	ROUT_AUX	Audio Right Output, to AUX Scart
5	COUT_VCR	Chroma Output, to VCR Scart
6	LOUT_AUX	Audio Left Output, to AUX Scart
7	YCVBSOUT_VCR	Y/CVBS Output, to VCR Scart
8	AOUT_RF	Audio (L+R) Output to RF Modulator
9	VOUT_RF	Video (CVBS) Output to RF Modulator
10	GNDV3	Video Switches Ground 3
11	FILTER	Chroma Trap Filter
12	V_{CCV3}	Video Switches Supply 3 (8V)
13	COUT_AUX	Chroma Output, to AUX Scart
14	GNDV2	Video Switches Ground 2
15	YCVBSOUT_AUX	Y/CVBS Output, to AUX Scart

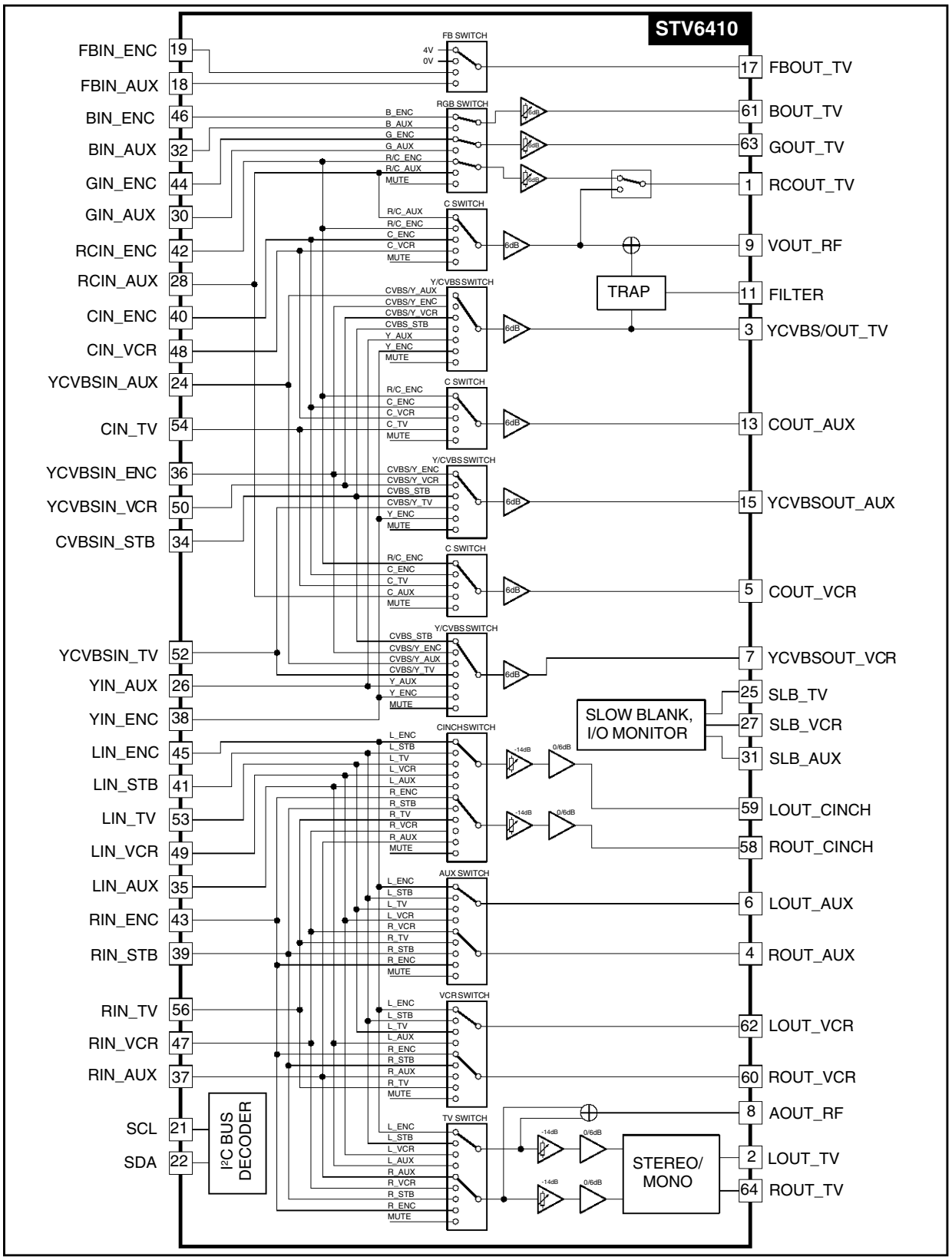
6410-01.TBL

PIN LIST (continued)

Pin Number	Symbol	Description
16	V_{CCV2}	Video Switches Supply 2 (8V)
17	FBOUT_TV	Fast Blanking Output, to TV Scart
18	FBIN_AUX	Fast Blanking Input, from AUX Scart
19	FBIN_ENC	Fast Blanking Input, from Encoder
20	ADD	I^2C Bus IC Address Programmation
21	SCL	I^2C Bus Clock
22	SDA	I^2C Bus Data
23	V_{CC12}	Slow Blanking Power Supply (12V)
24	YCVBSIN_AUX	Y/CVBS Input from AUX Scart
25	SLB_TV	Slow Blanking Input/Ouput from TV
26	YIN_AUX	Y Input, from AUX Scart
27	SLB_VCR	Slow Blanking Input/Ouput from VCR
28	RCIN_AUX	Red/Chroma Input, from AUX Scart
29	GNDV1	Video Switches Ground 1
30	GIN_AUX	Green Input, from AUX Scart
31	SLB_AUX	Slow Blanking Input/Ouput from AUX
32	BIN_AUX	Blue Input, from AUX Scart
33	V_{CCV1}	Video Switches Supply 1 (8V)
34	CVBSIN_STB	CVBS Input from STB
35	LIN_AUX	Audio Left Input, from AUX Scart
36	YCVBSIN_ENC	Y/CVBS Input from Encoder
37	RIN_AUX	Audio Right Input, from AUX Scart
38	YIN_ENC	Y Input, from Encoder
39	RIN_STB	Audio Right Input, from STB
40	CIN_ENC	Chroma Input, from Encoder
41	LIN_STB	Audio Left Input, from STB
42	RCIN_ENC	Red/Chroma Input, from Encoder
43	RIN_ENC	Audio Right Input, from Encoder
44	GIN_ENC	Green Input, from Encoder
45	LIN_ENC	Audio Left Input, from Encoder
46	BIN_ENC	Blue Input, from Encoder
47	RIN_VCR	Audio Right Input, from VCR Scart
48	CIN_VCR	Chroma Input, from VCR Scart
49	LIN_VCR	Audio Left Input, from VCR
50	YCVBSIN_VCR	Y/CVBS Input from VCR Scart
51	V_{REF}	Voltage Reference Decoupling
52	YCVBSIN_TV	Y/CVBS Input, from TV Scart
53	LIN_TV	Audio Left Input, from TV Scart
54	CIN_TV	Chroma Input, from TV Scart
55	V_{CCA}	Audio Switches Supply (8V)
56	RIN_TV	Audio right input, from TV Scart
57	GNDA	Audio Switches Ground
58	ROUT_CINCH	Audio Right Output, to CINCH
59	LOUT_CINCH	Audio Left Output, to CINCH
60	ROUT_VCR	Audio Right Output, to VCR sCart
61	BOUT_TV	Blue Output, to TV Scart
62	LOUT_VCR	Audio Left Output, to VCR Scart
63	GOUT_TV	Green Output, to TV Scart
64	ROUT_TV	Audio Right Output, to TV Scart

6410-01.TBL

BLOCK DIAGRAM



RGB video processor with automatic cut-off control and gamma adjust

TDA4780

FEATURES

- Gamma adjust
- Dynamic black control (adaptive black)
- All input signals clamped on black-levels
- Automatic cut-off control, alternative: output clamping on fixed levels
- Three adjustable reference voltage levels via I²C-bus for automatic cut-off control
- Luminance/colour difference interface
- Two luminance input levels allowed
- Two RGB interfaces controlled by either fast switches or by I²C-bus
- Two peak drive limiters, selection via I²C-bus
- Blue stretch, selection via I²C-bus
- Luminance output for scan velocity modulation (SCAVEM)
- Extra luminance output; same pin can be used as hue control output e.g. for the TDA4650 and TDA4655
- Non standard operations like 50 Hz/32 kHz are also possible
- Either 2 or 3 level sandcastle pulse applicable
- High bandwidth for 32 kHz application
- White point adjusts via I²C-bus
- Average beam current and improved peak drive limiting
- Two switch-on delays to prevent discoloration during start-up
- All functions and features programmable via I²C-bus
- PAL/SECAM or NTSC matrix selection.

GENERAL DESCRIPTION

The TDA4780 is a monolithic integrated circuit with a luminance and a colour difference interface for video processing in TV receivers. Its primary function is to process the luminance and colour difference signals from a colour decoder which is equipped e.g. with the multistandard decoder TDA4655 or TDA9160 plus delay line TDA4661 or TDA4665 and the Picture Signal Improvement (PSI) IC TDA467X or from a feature module.

The required input signals are:

- Luminance and negative colour difference signals
- 2 or 3-level sandcastle pulse for internal timing pulse generation
- I²C-bus data and clock signals.

Two sets of analog RGB colour signals can also be inserted, e.g. one from a peritelevision connector (SCART plug) and the other one from an On-Screen Display (OSD) generator. The TDA4780 has I²C-bus control of all parameters and functions with automatic cut-off control of the picture tube cathode currents.
It provides RGB output signals for the video output stages. In clamped output mode it can also be used as an RGB source.

The main differences with the sister type TDA4680 are:

- Additional features, namely gamma adjust, adaptive black, blue stretch and two different peak drive limiters
- The measurement lines are triggered by the trailing edge of the vertical component of the sandcastle pulse
- I²C-bus receiver only. Automatic white level control is not provided; the white levels are determined directly by the I²C-bus data.
- The TDA4780 is pin compatible (except pin 18) with the TDA4680. The I²C-bus slave address can be used for both ICs. When a function of the TDA4780 is not included in the TDA4680, the I²C-bus command is not executed. Special commands (except control bit FSWL) for the TDA4680 will be ignored by the TDA4780.

RGB video processor with automatic cut-off control and gamma adjust

TDA4780

BLOCK DIAGRAM

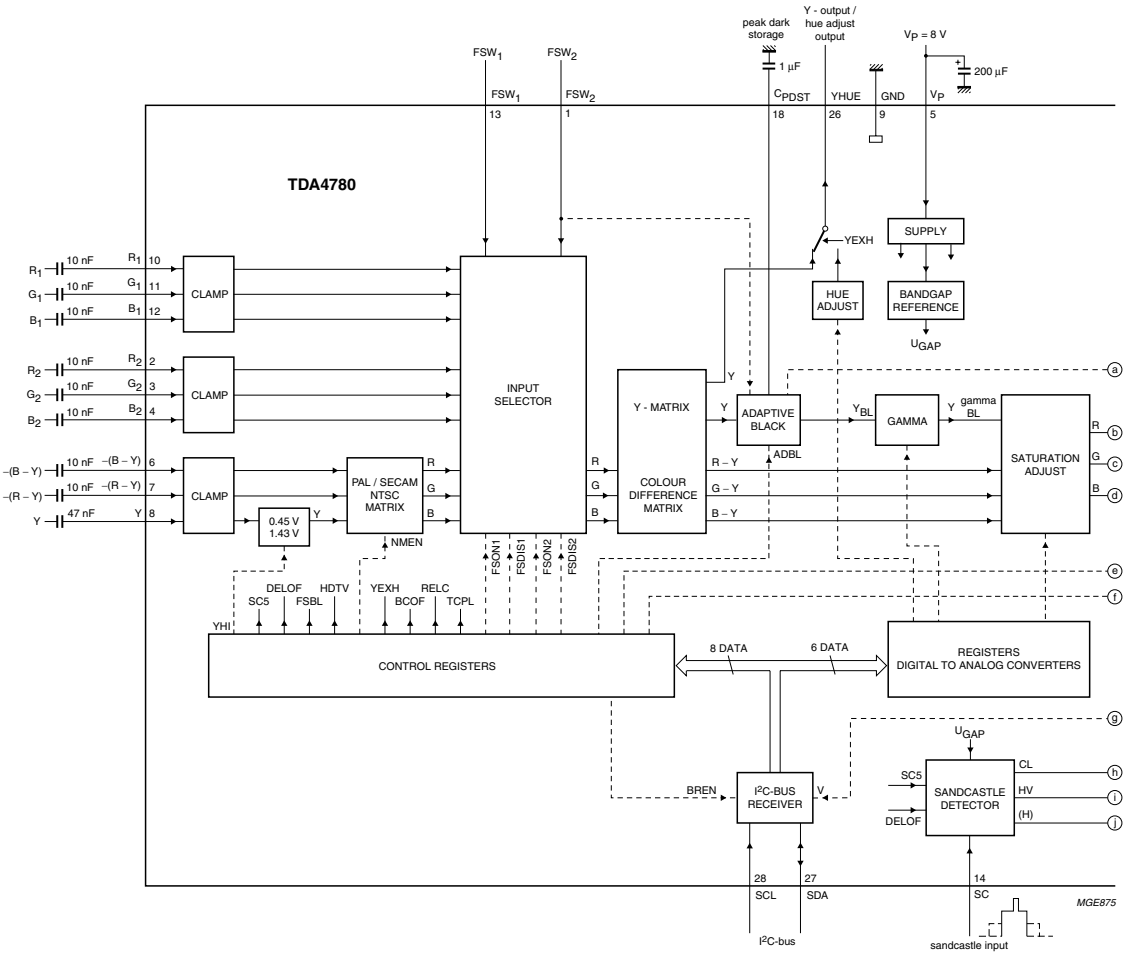


Fig.1 Block diagram (continued in Fig.2).

RGB video processor with automatic cut-off control and gamma adjust

TDA4780

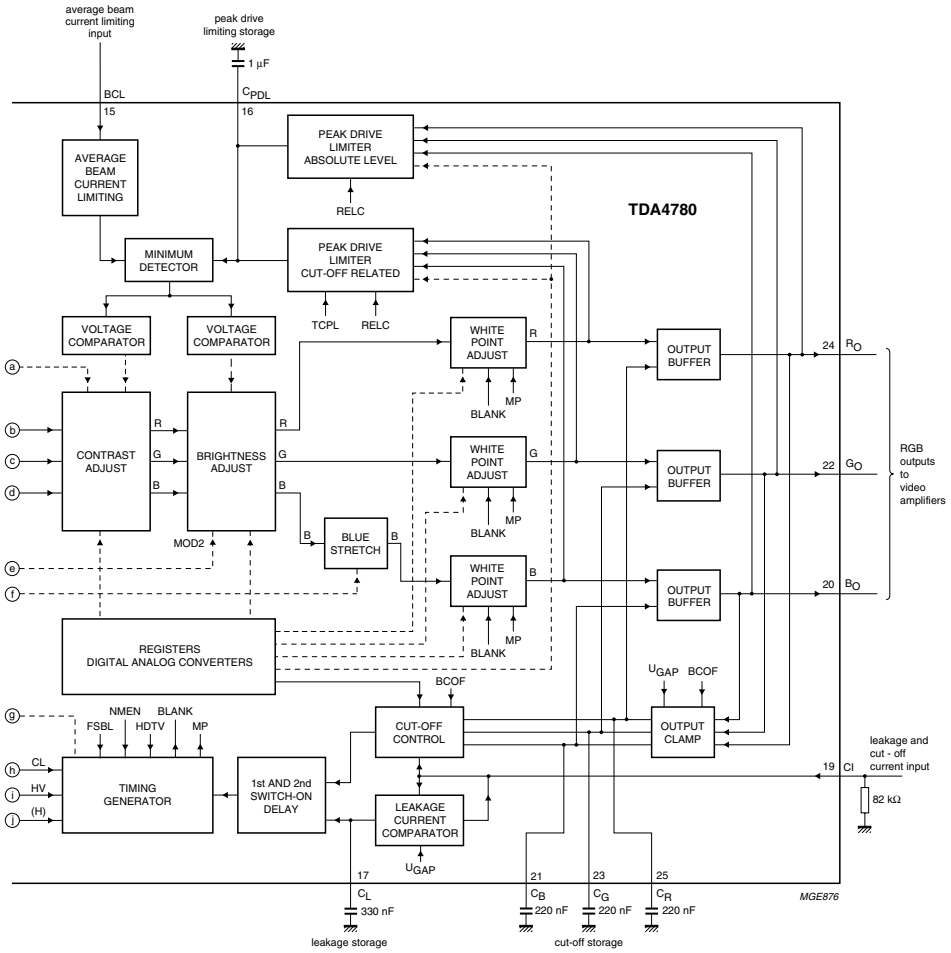


Fig.2 Block diagram (continued from Fig.1).

RGB video processor with automatic cut-off control and gamma adjust — TDA4780

PINNING

SYMBOL	PIN	DESCRIPTION
FSW2	1	Fast switch 2 input
R2	2	Red input 2
G2	3	Green input 2
B2	4	Blue input 2
VP	5	Supply voltage
-(B – Y)	6	Colour difference input –(B – Y)
-(R – Y)	7	Colour difference input –(R – Y)
Y	8	Luminance input
GND	9	Ground
R1	10	Red input 1
G1	11	Green input 1
B1	12	Blue input 1
FSW1	13	Fast switch 1 input
SC	14	Sandcastle pulse input
BCL	15	Average beam current limiting input
CPDL	16	Storage capacitor for peak limiting
CL	17	Storage capacitor for leakage current compensation
CPDST	18	Storage capacitor for peak dark
CI	19	Cut-off measurement input
BO	20	Blue output
CB	21	Blue cut-off storage capacitor
GO	22	Green output
CG	23	Green cut-off storage capacitor
RO	24	Red output
CR	25	Red cut-off storage capacitor
YHUE	26	Y-output/hue adjust output
SDA	27	I2C-bus serial data input/acknowledge output
SCL	28	I2C-bus serial clock input

RGB video processor with automatic cut-off control and gamma adjust

TDA4780

FUNCTIONAL DESCRIPTION

Signal input stages

The TDA4780 contains 3 sets of input signal stages for:

1. Luminance/colour-difference signals:
   a) Y: 0.45 V (p-p) VBS or 1.43 V (p-p) VBS, selectable via I^2C-bus.
   b) –(R – Y): 1.05 V (p-p).
   c) –(B – Y): 1.33 V (p-p).

   The capacitively coupled signals are matrixed to RGB signals by either a PAL/SECAM or NTSC matrix (selected via I^2C-bus).
2. $(RGB)_1$ signals (0.7 V (p-p) VB), capacitively coupled (e.g. from external source).
3. $(RGB)_2$ signals (0.7 V (p-p) VB), capacitively coupled (e.g. videotext, OSD).

All input signals are clamped in order to have the same black levels at the signal switch input. Displayed signals must be synchronous with the sandcastle pulse.

Signal switches

Both fast signal switches can be operated by switching pins (e.g. SCART facilities) or set via the I^2C-bus. With the pin FSW_1 the Y-CD signals or the $(RGB)_1$ signals can be selected, with pin FSW_2 the above selected signals or the $(RGB)_2$ signals are enabled. During the vertical and horizontal blanking time an artificial black level equal to the clamped black level is inserted in order to clip off the sync pulse of the luminance signal and to suppress hum during the cut-off measurement time and eliminate noise during these intervals.

Saturation, contrast and brightness adjust

Saturation, contrast and brightness adjusts are controlled via the I^2C-bus and act on Y, CD as well as on RGB input signals. Gamma acts on the luminance content of the input signals.

Gamma adjust

The gamma adjust stage has a non-linear transmission characteristic according to the formula $y = x^{gamma}$, where x represents the input and y the output signal. If gamma is smaller than unity, the lower parts of the signal are amplified with higher gain.

Adaptive black (ADBL)

The adaptive black stage detects the lowest voltage of the luminance component of the internal RGB signals during the scanning time and shifts it to the nominal black level. In order to keep the nominal white level the contrast is increased simultaneously.

Blue stretch (BLST)

The blue stretch channel gets additional amplification if the blue signal is greater than 80% of the nominal signal amplitude. In the event the white point is shifted towards higher colour temperature so that white parts of a picture seem to be brighter.

Measurement pulse and blanking stage

During the vertical and horizontal blanking time and the measurement period the signals are blanked to an ultra black level, so the leakage current of the picture tube can be measured and automatically compensated for.

During the cut-off measurement lines (one line period for each R, G or B) the output signal levels are at cut-off measurement level.

The vertical blanking period is timed by the sandcastle pulse. The measurement pulses (leakage, R, G and B) are triggered by the negative going edge of the vertical pulse of the sandcastle pulse and start after the following horizontal pulse.

The IC is prepared for $2f_H$ (32 kHz) application.

Output ampli?er and white adjust potentiometer

The RGB signals are amplified to nominal 2 V (p-p), the DC-levels are shifted according to cut-off control.
The nominal signal amplitude can be varied by ±50% by the white point adjustment via the I^2C-bus (individually for RGB respect).

RGB video processor with automatic cut-off control and gamma adjust

TDA4780

Automatic cut-off control

During leakage measurement time the leakage current is compensated in order to get a reference voltage at the cut-off measurement info pin. This compensation value is stored in an external capacitor. During cut-off current measurement times for the R, G and B channels, the voltage at this pin is compared with the reference voltage, which is individually adjustable via I^2C-bus for each colour channel. The control voltages that are derived in this way are stored in the external feedback capacitors. Shift stages add these voltages to the corresponding output signals. The automatic cut-off control may be disabled via the I^2C-bus. In this mode the output voltage is clamped to 2.5 V. Clamping periods are the same as the cut-off measurement periods.

Signal limiting

The TDA4780 provides two kinds of signal limiting. First, an average beam limiting, that reduces signal level if a certain average is exceeded. Second, a peak drive limiting, that is activated if one of the RGB signals even shortly exceeds a via I^2C-bus adjusted threshold. The latter can be either referred to the cut-off measurement level of the outputs or to ground.

When signal limiting occurs, contrast is reduced, and at minimum contrast brightness is reduced additionally.

Sandcastle decoder and timer

A 3-level detector separates the sandcastle pulse into combined line and field pulses, line pulses, and clamping pulses. The timer contains a line counter and controls the cut-off control measurement.

Application with a 2-level 5 V sandcastle pulse is possible.

Switch on delay circuit

After switch on all signals are blanked and a warm up test pulse is fed to the outputs during the cut-off measurement lines. If the voltage at the cut-off measurement input exceeds an internal level the cut-off control is enabled but the signal remains still blanked. In the event of output clamping, the cut-off control is disabled and the switch on procedure will be skipped.

Y output and hue adjust

The TDA4780 contains a D/A converter for hue adjust. The analog information can be fed, e.g. to the multistandard decoder TDA4650 or TDA4655. This output pin may be switched to a Y output signal, which can be used for scan velocity modulation (SCAVEM). The Y output is the Y input signal or the matrixed (RGB) input signal according to the switch position of the fast switch.

I^2C-bus

The TDA4780 contains an I^2C-bus receiver for control function.

ESD protection

The Pins are provided with protection diodes against ground and supply voltage (see Chapter “Internal pin configurations”). I^2C-bus input pins do not shunt the I^2C-bus signals in the event of missing supply voltage.

EMC

The pins are protected against electromagnetic radiation.

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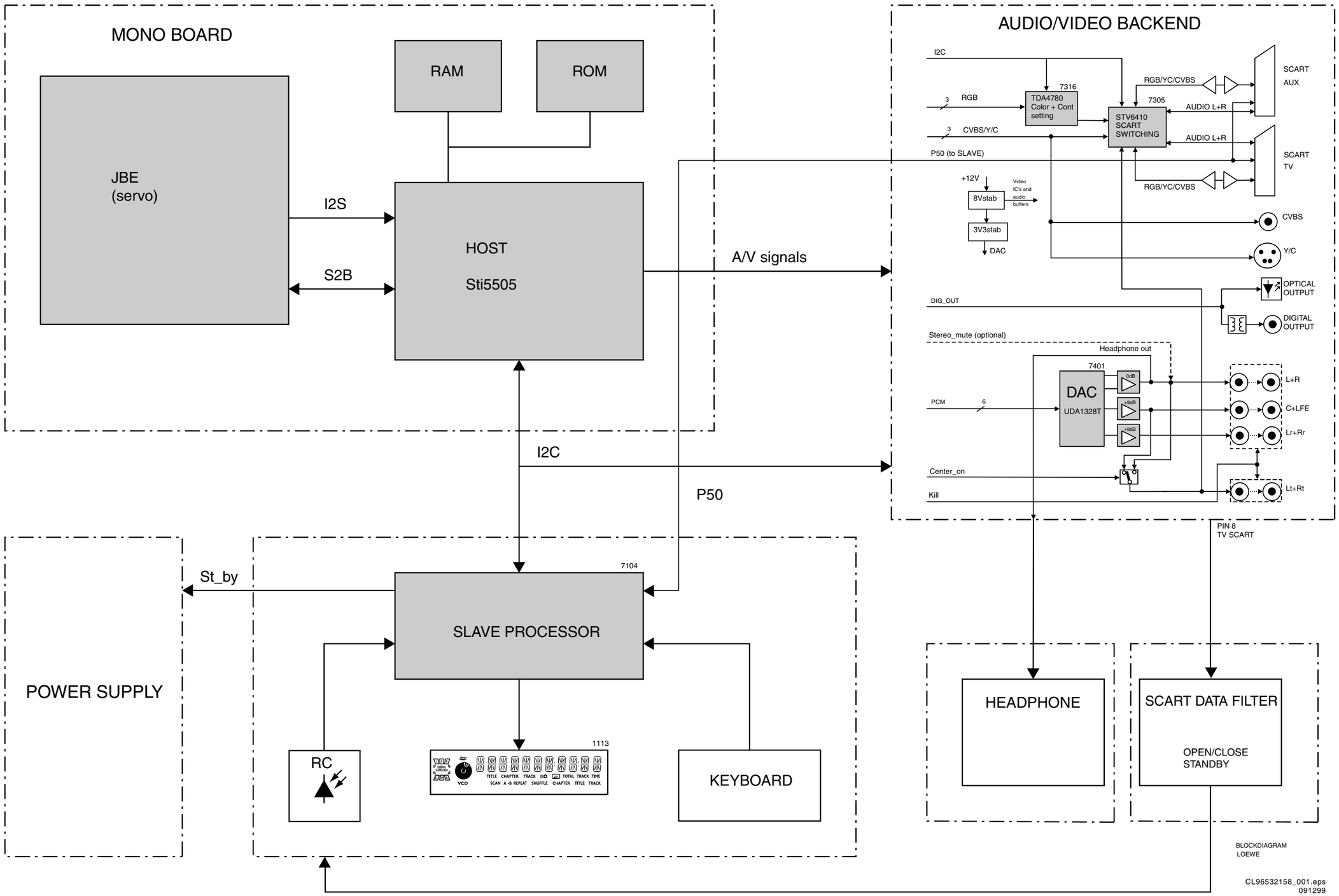
4. Block and wiringdiagram, dismantling, exploded view and oscillograms

Blockdiagram



Dismantling instructions

DISMANTLING INSTRUCTIONS

See exploded view for item numbers

Cover 151
⇒ Remove 7 screws 174→177 at sides 171→173 at rearside
⇒ Lift cover at rearside to remove

mounting ↑ ↓ demounting

Front assy 1
⇒ remove 2 screws 75→ 76 (front 1 →frame 181)
⇒ unlock front from frame by releasing successively 3 snaps(on the left, in the middle and on the right)
⇒ put front assy in front of the set(service position)

Display board 1002
⇒ Remove 7 screws 27 → 33(board→ front), pay attention to earth spring 24.
⇒ demount board

Headphone board 1003
⇒ Remove volume knob by pulling it forward
⇒ remove 2 screws 34→35(board →front)
⇒ demount board

Standby board 1003
⇒ Remove 2 screws 25 → 26(board→ front)
⇒ demount board

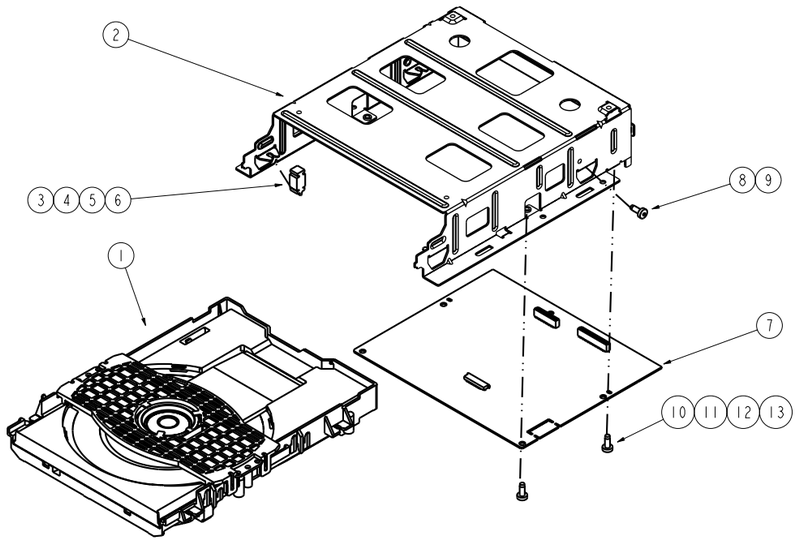
DVD MODULE 82
⇒ Remove connections to Mono board
⇒ remove 4 screws 200→ 203(loader bracket 2 → frame 181)
⇒ demount module

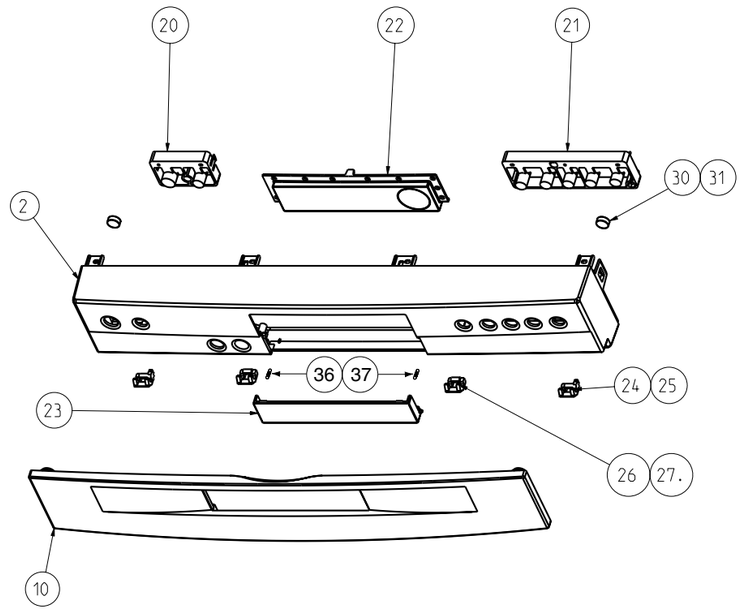
DVD MONO Board 7
⇒ See also exploded view of DVD module
⇒ Remove flex connections to turntabel motor and sledge motor.
⇒ remove 4 screws 10 → 13(mono board 7 → loader bracket 2)
⇒ remove carefully flex connection to OPU and wire connection to tray motor.
⇒ demount board.

LOADER VAL3000 1
⇒ Remove 2 screws 8, 9
⇒ Remove 4 suspensions 3 → 6 from loader bracket

A/V board 1001
⇒ remove flex connections to Mono board
⇒ remove 1 screw 268 (scart→backplate 266)
⇒ remove 2 screws 271 and 274 (cinches→backplate)
⇒ remove 2 screws 272 and 273 (digital and optical out)
⇒ release snaps of 2 spacers 208 and 209 (board → frame)
⇒ demount board

Power supply unit 1005
⇒ remove connections
⇒ remove 2 screws 204 and 215 (board→frame)
⇒ remove screw 276 (mains inled→backplate)
⇒ release snaps of spacers 206 and 207 (board→frame)
⇒ demount board





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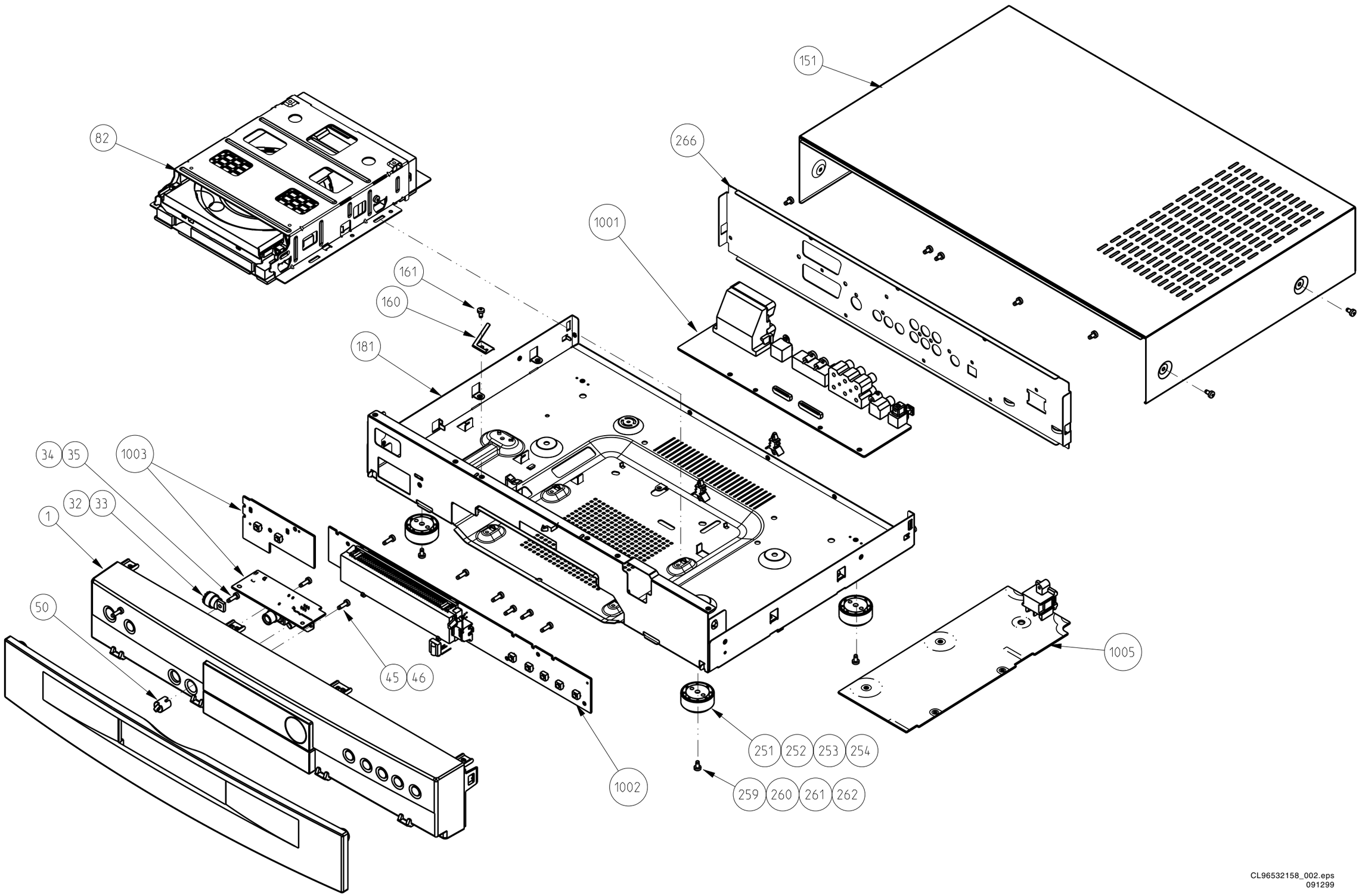
Exploded view



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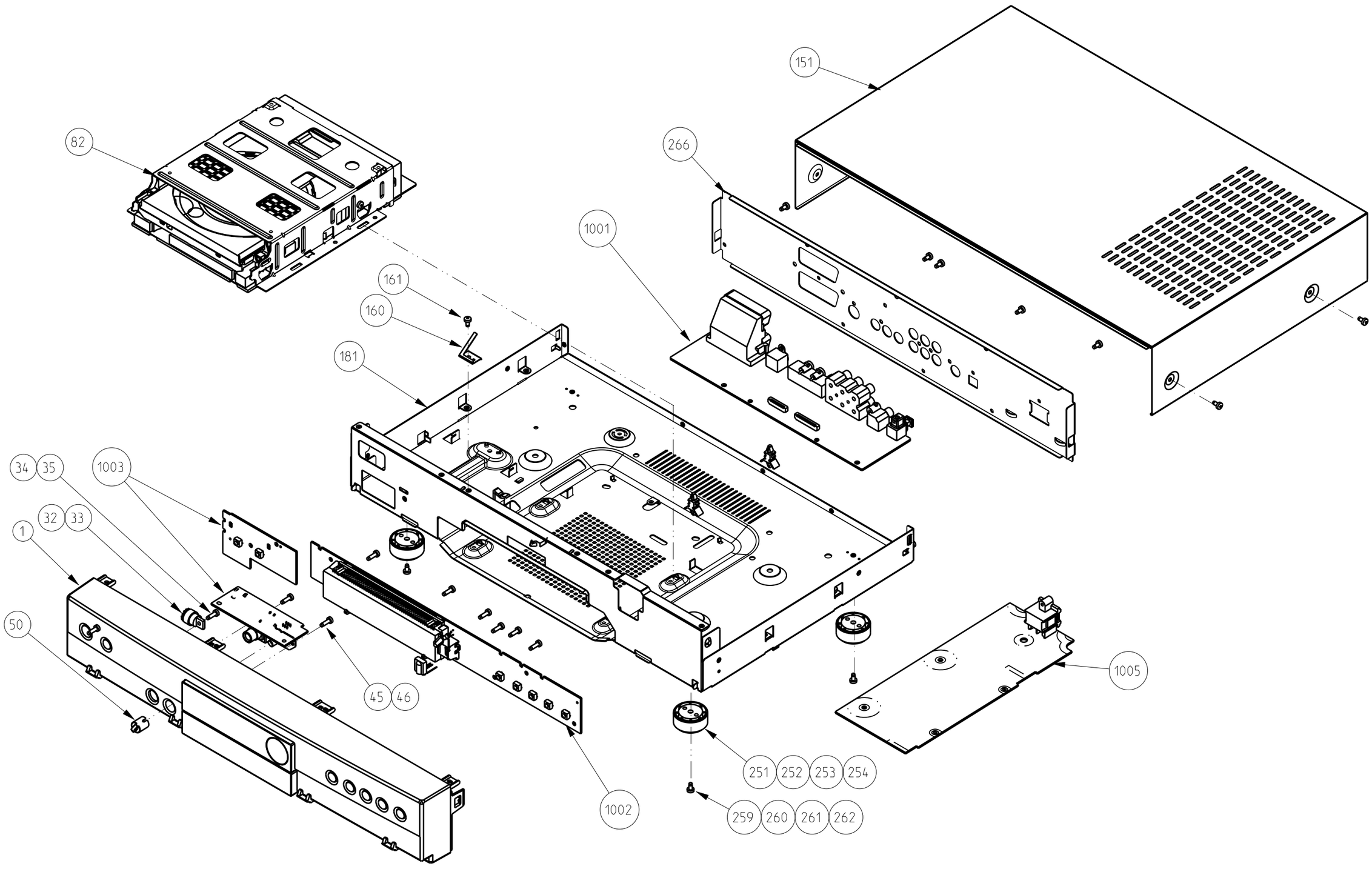
Exploded view



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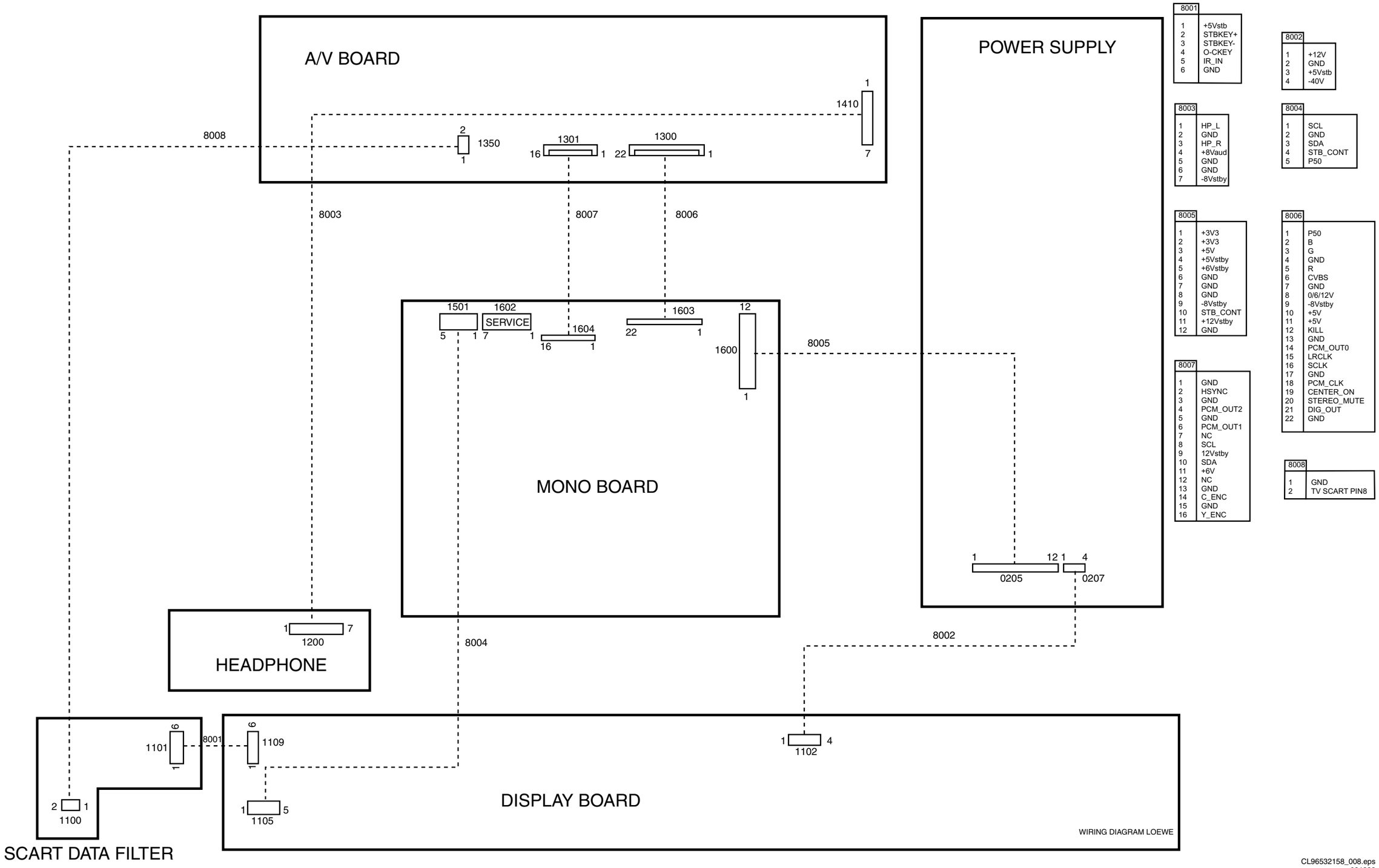
Wiringdiagram



8001	
1	+5Vstb
2	STBKEY+
3	STBKEY-
4	O-CKEY
5	IR_IN
6	GND

8002	
1	+12V
2	GND
3	+5Vstb
4	-40V

8003	
1	HP_L
2	GND
3	HP_R
4	+8Vaud
5	GND
6	GND
7	-8Vstby

8004	
1	SCL
2	GND
3	SDA
4	STB_CONT
5	P50

8005	
1	+3V3
2	+3V3
3	+5V
4	+5Vstby
5	+6Vstby
6	GND
7	GND
8	GND
9	-8Vstby
10	STB_CONT
11	+12Vstby
12	GND

8006	
1	P50
2	B
3	G
4	GND
5	R
6	CVBS
7	GND
8	0/6/12V
9	-8Vstby
10	+5V
11	+5V
12	KILL
13	GND
14	PCM_OUT0
15	LRCLK
16	SCLK
17	GND
18	PCM_CLK
19	CENTER_ON
20	STEREO_MUTE
21	DIG_OUT
22	GND

8007	
1	GND
2	HSYNC
3	GND
4	PCM_OUT2
5	GND
6	PCM_OUT1
7	NC
8	SCL
9	12Vstby
10	SDA
11	+6V
12	NC
13	GND
14	C_ENC
15	GND
16	Y_ENC

8008	
1	GND
2	TV SCART PIN8

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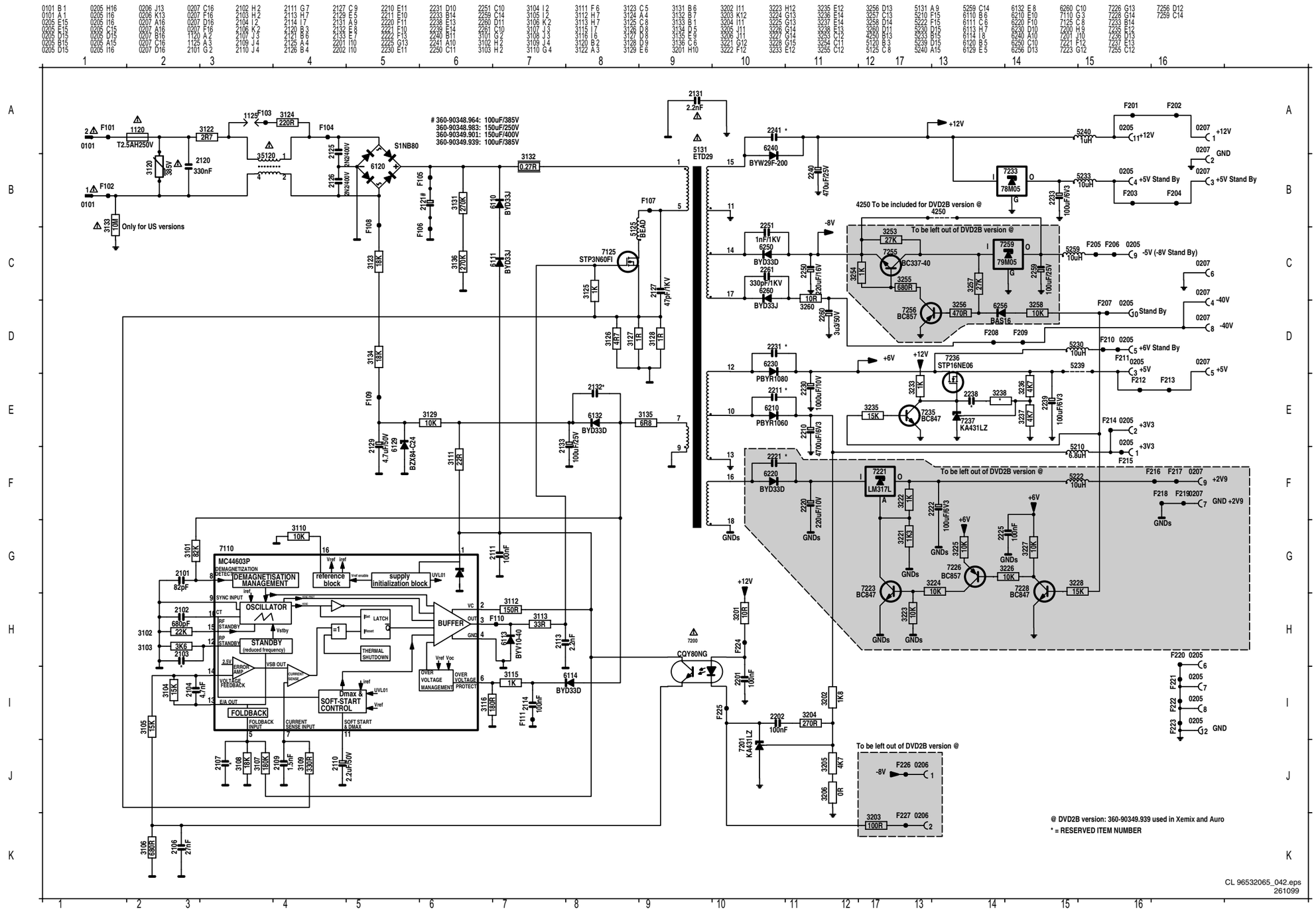
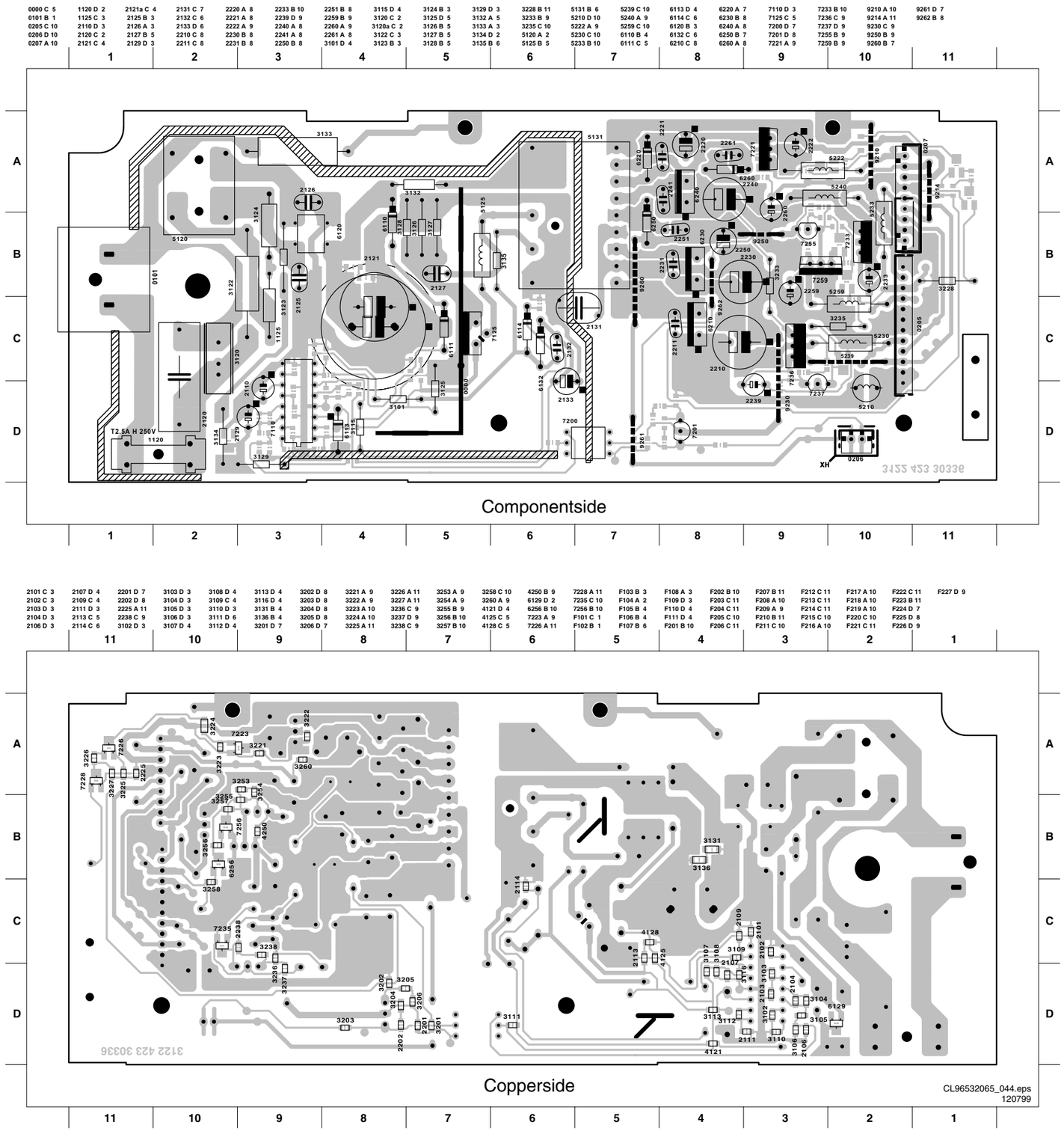
5. Electrical diagrams and Print-layouts

Power supply

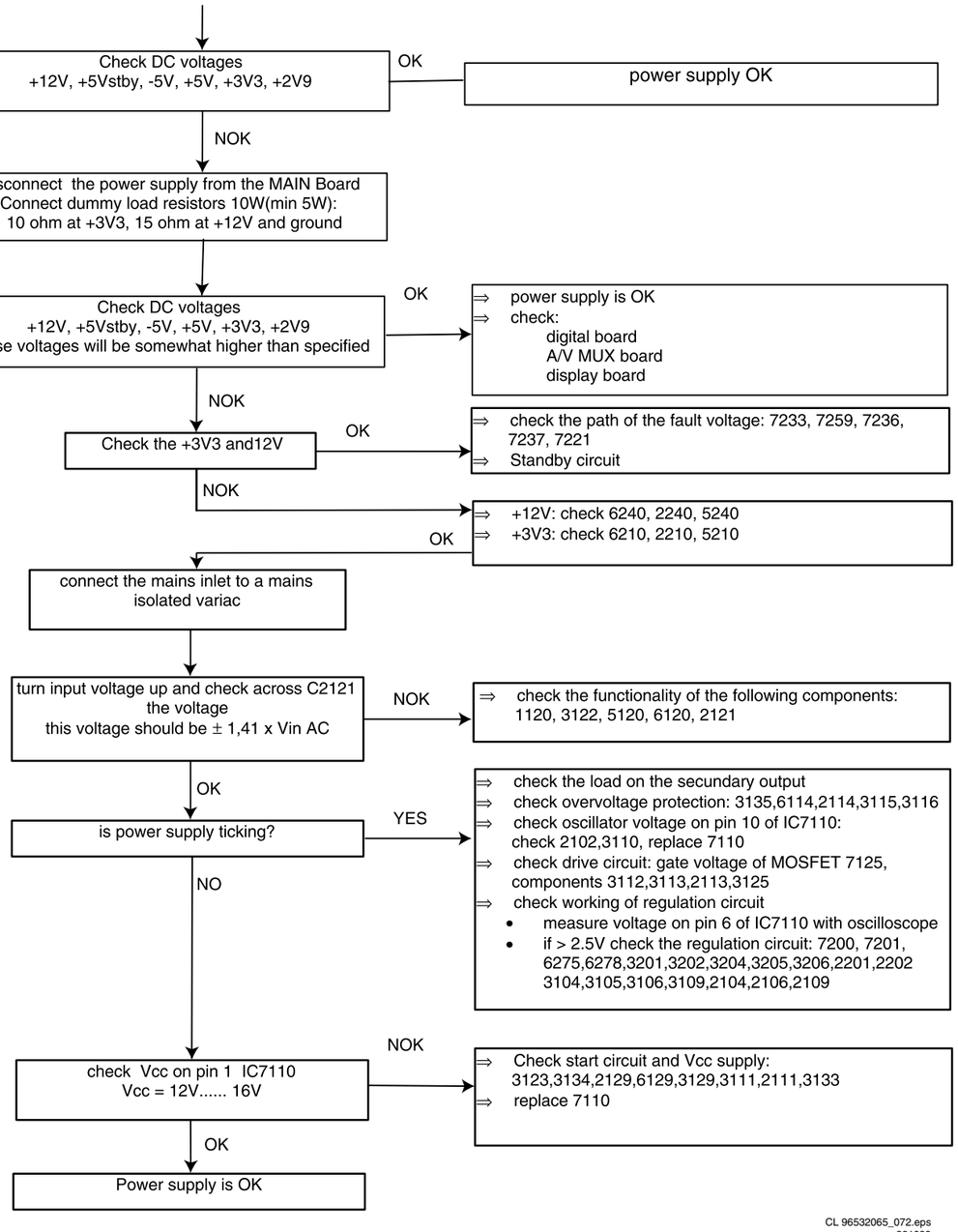
POWER SUPPLY



Power supply



TROUBLESHOOTING POWER SUPPLY UNIT



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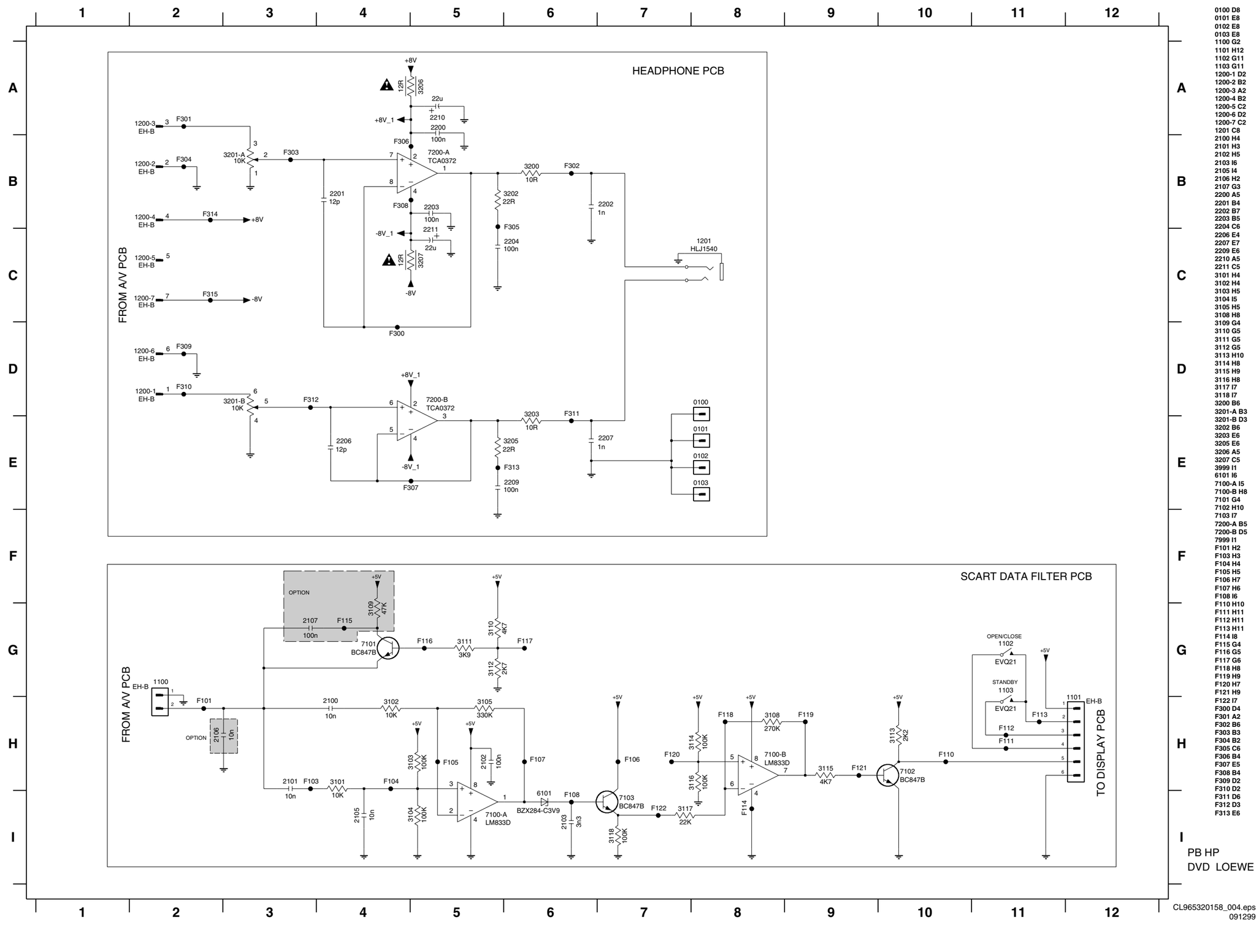
Personal notes:

Headphone panel and standby PWB



0100 D8
0101 E8
0102 E8
0103 E8
1100 G2
1101 H12
1102 G11
1103 G11
1200-1 D2
1200-2 B2
1200-3 A2
1200-4 B2
1200-5 C2
1200-6 D2
1200-7 C2
1201 C8
2100 H4
2101 H3
2102 H5
2103 I6
2105 I4
2106 H2
2107 G3
2200 A5
2201 B4
2202 B7
2203 B5
2204 C6
2206 E4
2207 E7
2209 E6
2210 A5
2211 C5
3101 H4
3102 H4
3103 H5
3104 I5
3105 H5
3108 H8
3109 G4
3110 G5
3111 G5
3112 G5
3113 H10
3114 H8
3115 H9
3116 H8
3117 I7
3118 I7
3200 B6
3201-A B3
3201-B D3
3202 B6
3203 E6
3205 E6
3206 A5
3207 C5
3999 I1
6101 I6
7100-A I5
7100-B H8
7101 G4
7102 H10
7103 I7
7200-A B5
7200-B D5
7999 I1
F101 H2
F103 H3
F104 H4
F105 H5
F106 H7
F107 H6
F108 I6
F110 H10
F111 H11
F112 H11
F113 H11
F114 I8
F115 G4
F116 G5
F117 G6
F118 H8
F119 H9
F120 H7
F121 H9
F122 I7
F300 D4
F301 A2
F302 B6
F303 B3
F304 B2
F305 C6
F306 B4
F307 E5
F308 B4
F309 D2
F310 D2
F311 D6
F312 D3
F313 E6

PB HP
DVD LOEWE

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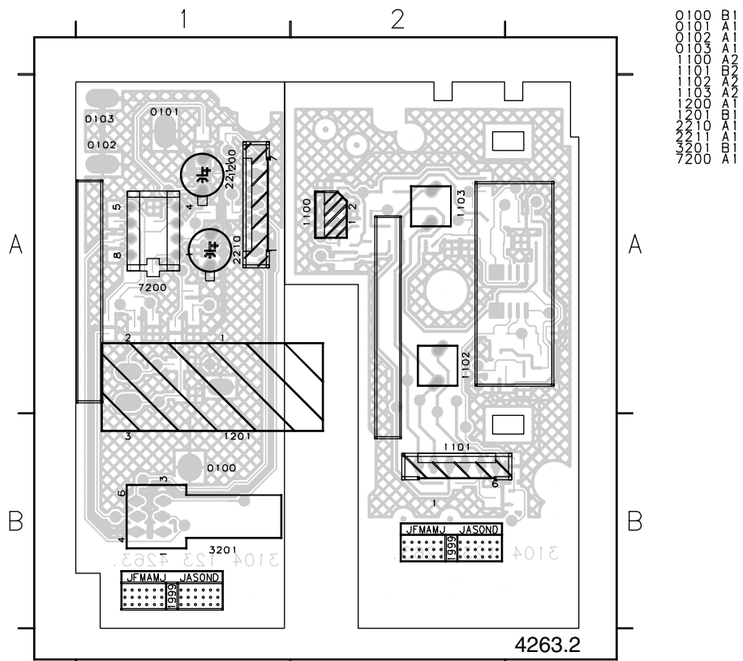
Headphone PWB



0100 B1
0101 A1
0102 A1
0103 A1
1100 A2
1101 B2
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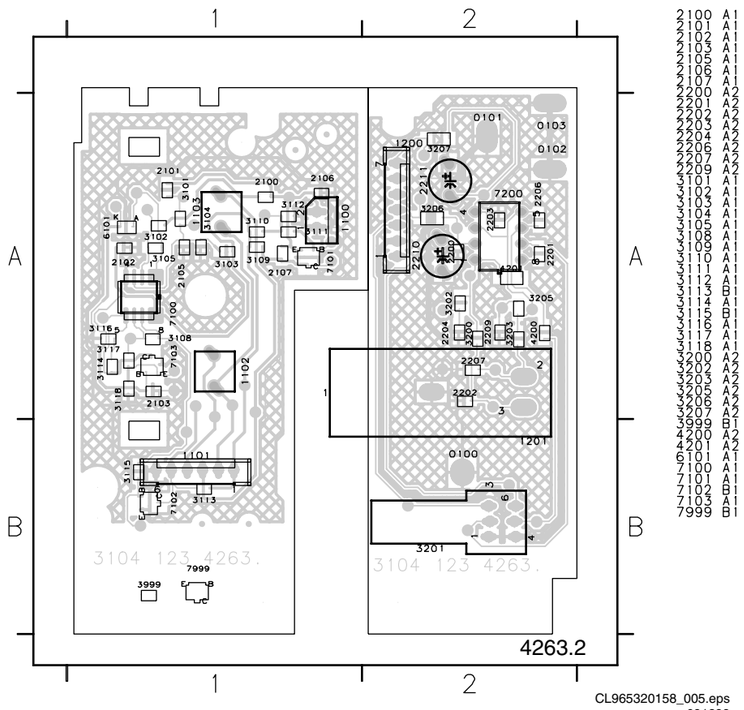
1103 A2
1200 A1
1201 B1
2210 A1
2211 A1
3201 B1
7200 A1



2100 A1
2101 A1
2102 A1
2103 A1
2105 A1
2106 A1
2107 A1
2200 A2
2201 A2
2202 A2
2203 A2
2204 A2
2206 A2
2207 A2
2209 A2
3101 A1
3102 A1
3103 A1
3104 A1
3105 A1
3108 A1
3109 A1
3110 A1
3111 A1
3112 A1
3113 B1
3114 A1
3115 B1
3116 A1
3117 A1
3118 A1
3200 A2
3202 A2
3205 A2
3206 A2
3207 A2
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4200 A2
4201 A2
6101 A1
7100 A1
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7103 A1
7999 B1

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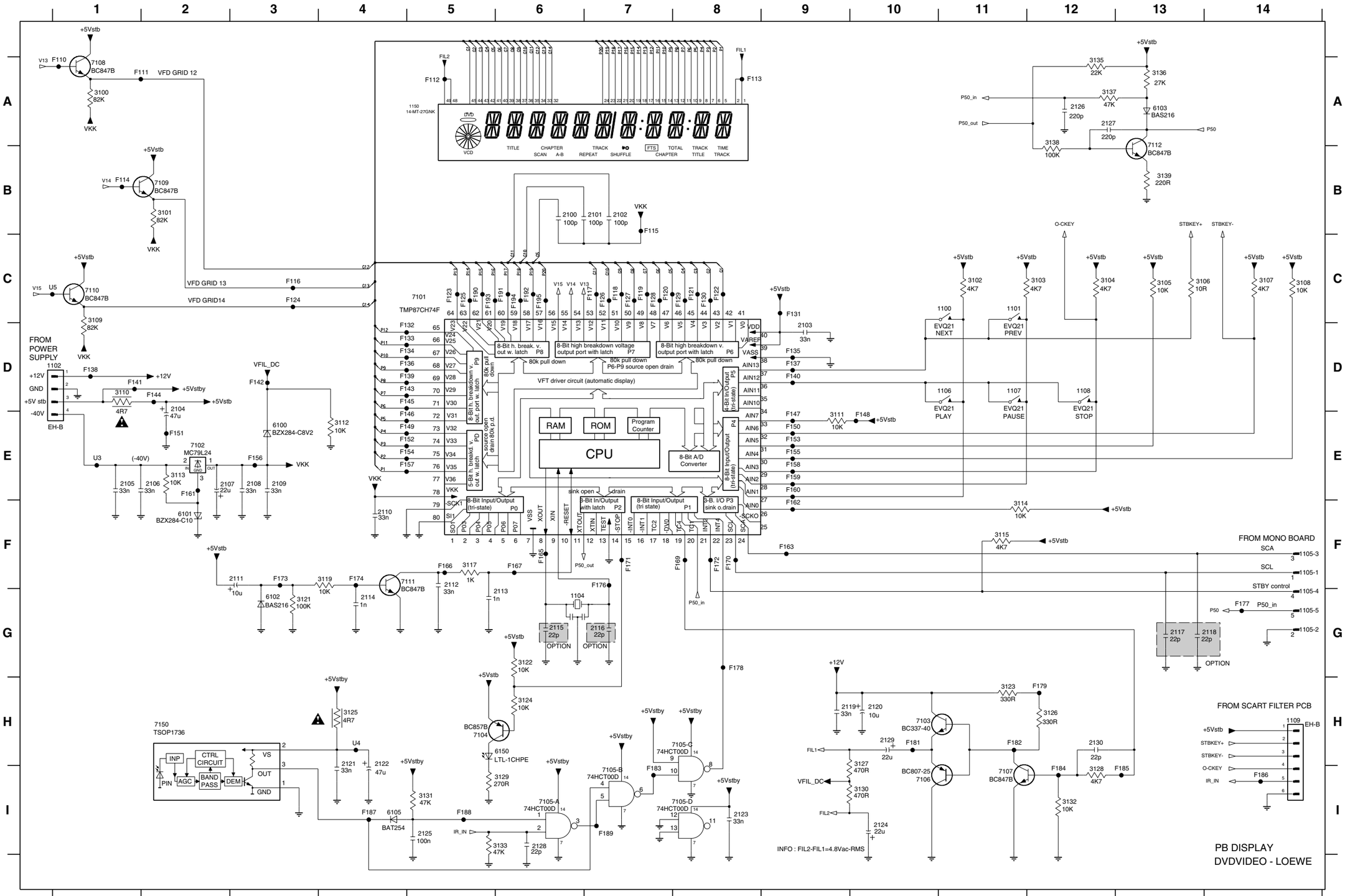
Personal notes:

Display



1100 C11
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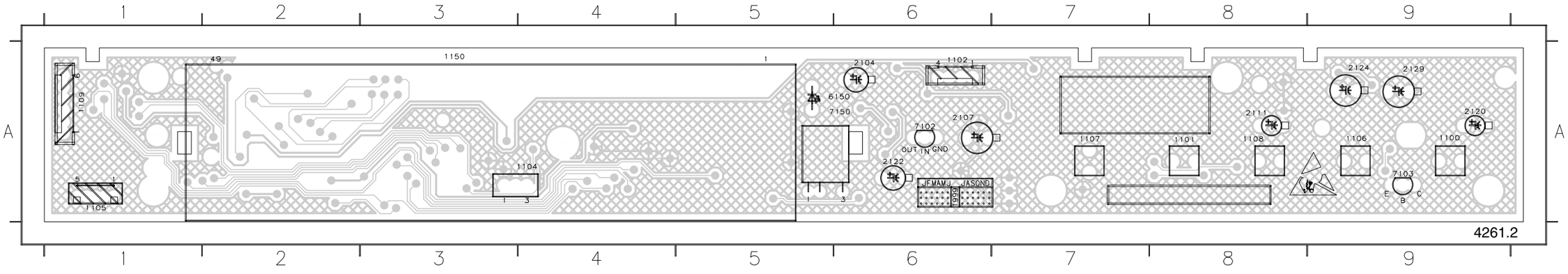
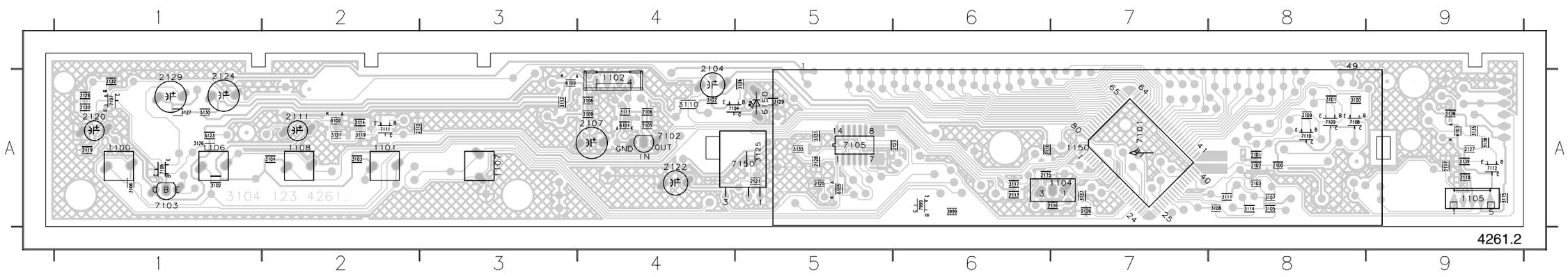
1102 D1
1104 G6
1105-1 F14
1105-2 G14
1105-3 F14
1105-4 G14
1105-5 G14
1106 D11
1107 D11
1108 D12
1109 H14
1150 A5
2100 B6
2101 B7
2102 B7
2103 D9
2104 D2
2105 E1
2106 E2
2107 E2
2108 E3
2109 E3
2110 F4
2111 F3
2112 F5
2113 F6
2114 G4
2115 G6
2116 G7
2117 G13
2118 G14
2119 H9
2120 H10
2121 H4
2122 H4
2123 I8
2124 I10
2125 I5
2126 A12
2127 A12
2128 I6
2129 H10
2130 H12
3100 A1
3101 B2
3102 C11
3103 C12
3104 C12
3105 C13
3106 C13
3107 C14
3108 C14
3109 C1
3110 D1
3111 E9
3112 E4
3113 E2
3114 F11
3115 F11
3117 F5
3119 F4
3121 G3
3122 G6
3123 H11
3124 H6
3125 H4
3126 H12
3127 H10
3128 I12
3129 I6
3130 I10
3131 I5
3132 I12
3133 I6
3135 A12
3136 A13
3137 A12
3138 B13
3139 B13
6100 E3
6101 F2
6102 G3
6103 A13
6105 I4
6150 H6
7101 C5
7102 E2
7103 H10
7104 H5
7105-A I6
7105-B I7
7105-C H7
7105-D I7
7106 I10
7107 I11
7108 A1
7109 B2
7110 C1
7111 F4
7112 B13
7150 H2

Display PWB

1100 A9 1101 A8 1102 A6 1104 A4 1105 A1 1106 A9 1107 A7 1108 A8 1109 A1 1150 A3 2104 A6 2107 A6 2111 A8 2120 A9 2122 A6 2124 A9 2129 A9 6150 A6 7102 A6 7103 A9 7150 A6



2100 A8 2101 A8 2102 A8 2103 A8 2105 A4 2106 A4 2108 A4 2109 A4 2110 A6 2112 A2 2113 A6 2114 A2 2115 A6 2116 A7 2117 A9 2118 A9 2119 A6 2121 A5 2123 A6 2125 A5 2126 A7 2127 A9 2128 A5 2130 A1 3100 A8 3101 A8 3102 A1 3103 A2 3104 A2 3105 A8 3106 A1 3107 A8 3108 A8 3109 A8 3110 A4 3111 A8 3112 A3 3113 A4 3114 A8 3115 A9 3117 A6 3119 A2 3121 A2 3122 A4 3123 A1 3124 A5 3125 A5 3126 A1 3127 A1 3128 A1 3129 A5 3130 A1 3131 A5 3132 A1 3133 A5 3135 A9 3136 A9 3137 A7 3138 A9 3139 A9 3999 A6 6100 A3 6101 A4 6102 A2 6103 A9 6105 A7 7101 A7 7104 A4 7105 A5 7106 A1 7107 A1 7108 A8 7109 A8 7110 A8 7111 A2 7112 A9 7999 A6



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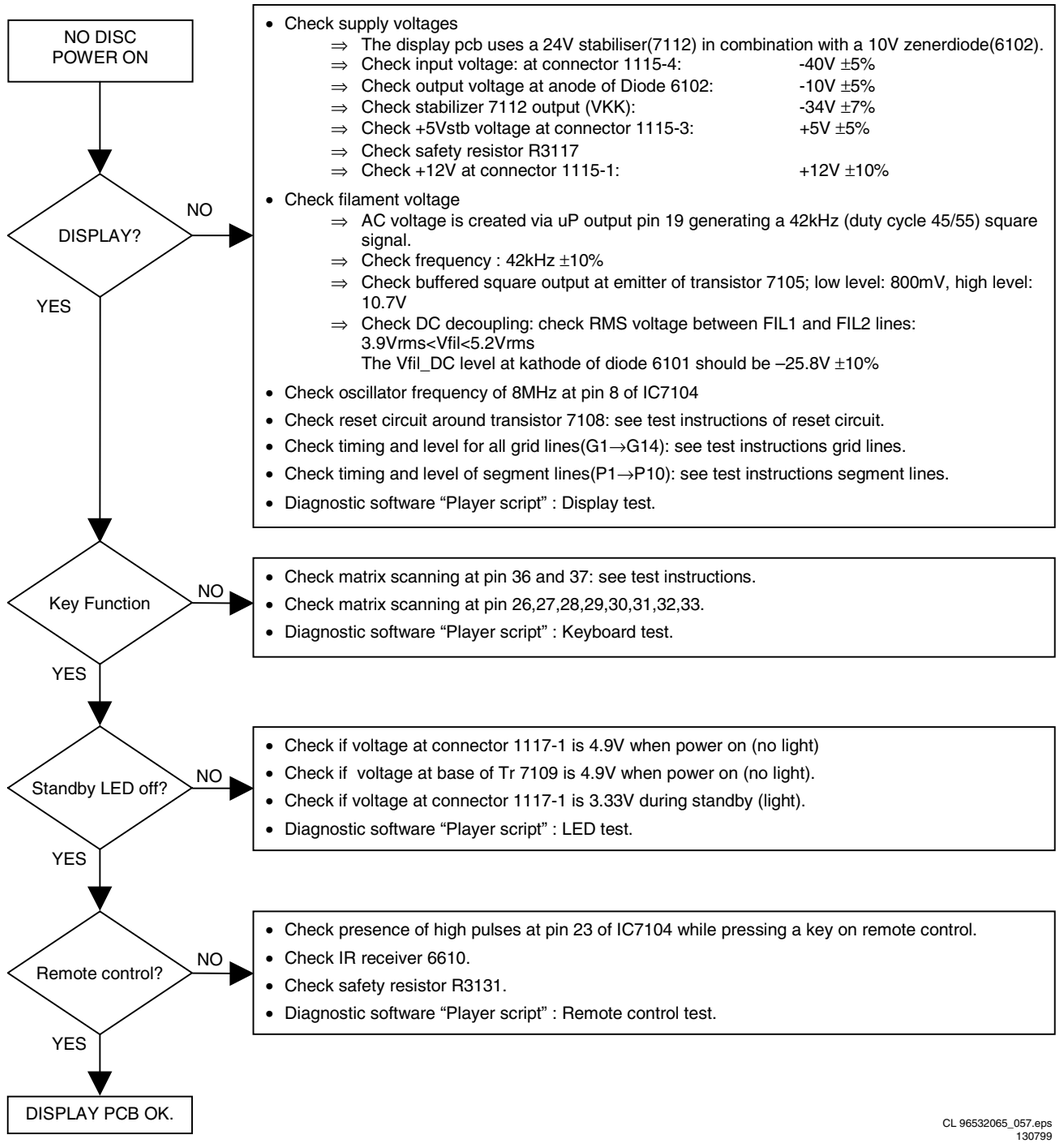
TROUBLESHOOTING DISPLAY BOARD



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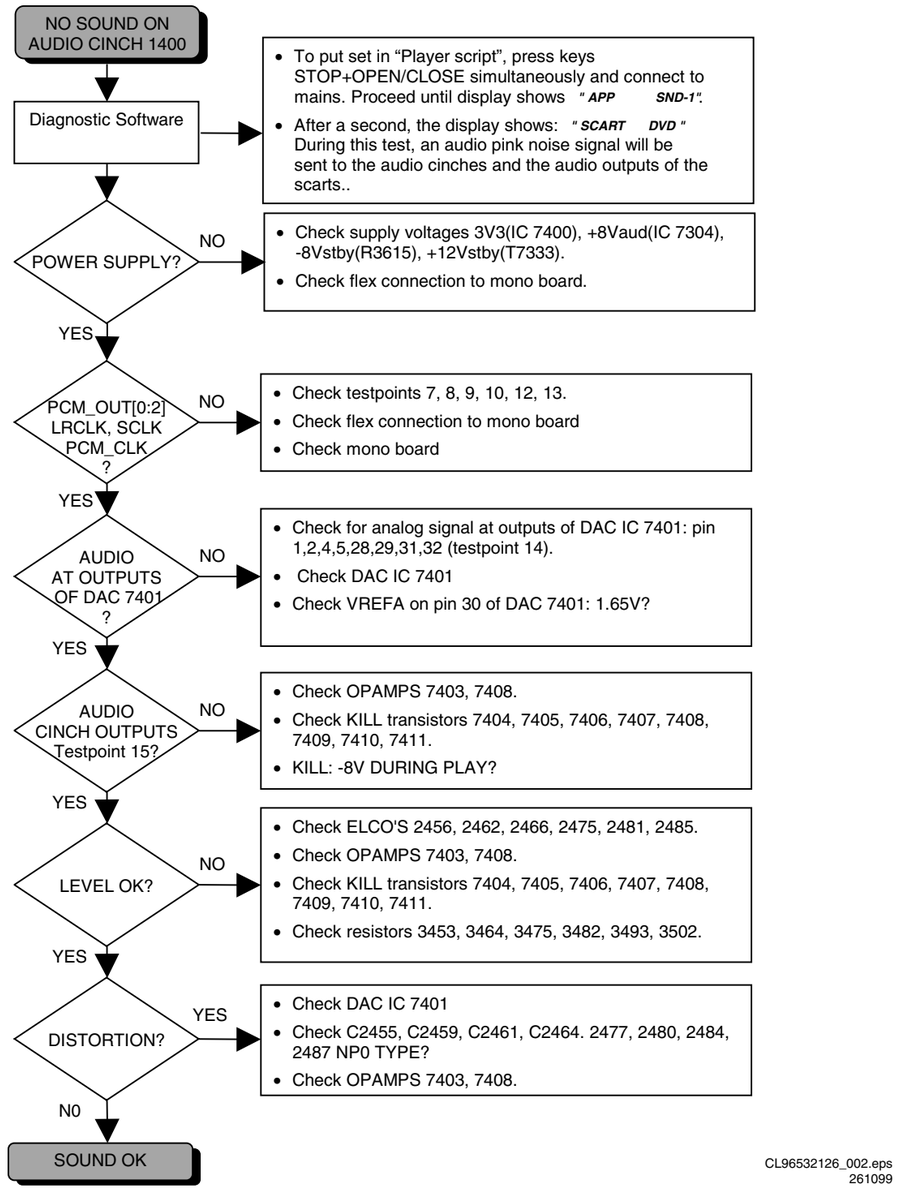
130799

TROUBLESHOOTING A/V BOARD

Testing of A/V board can be done using diagnostic software “Player script”.
Mono board is used to generate a sound with the sound tests SND-1 and SND-2 or a VIDEO signal with the picture test PIC-1. Functional control of scart switching and RGB video processing is also possible. See description in chapter “Diagnostic Software: Script Interfaces”

AUDIO PART



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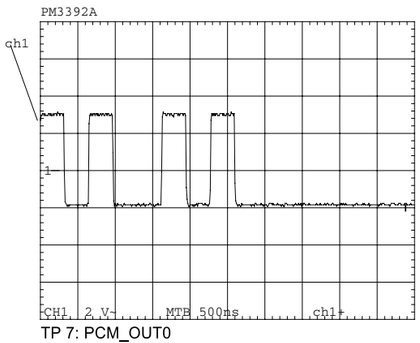
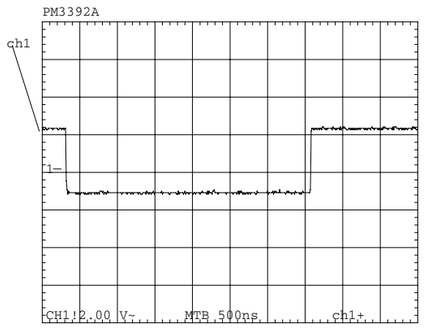
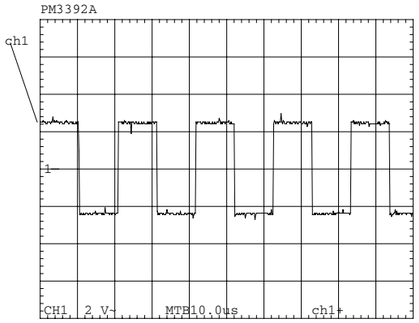
Audio-1



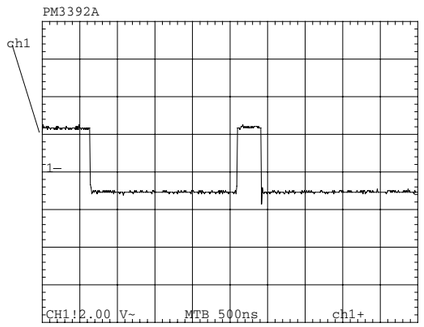
TP 7: PCM_OUT0



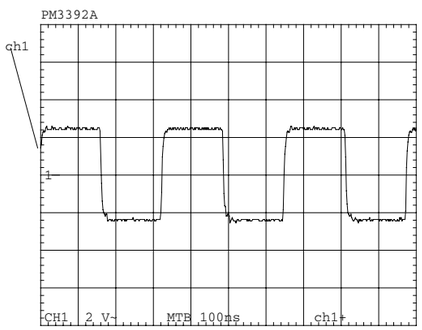
TP12: PCM_OUT2



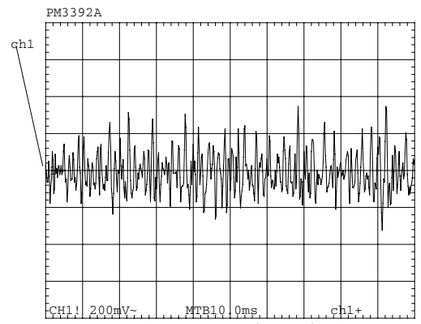
TP8: LRCLK



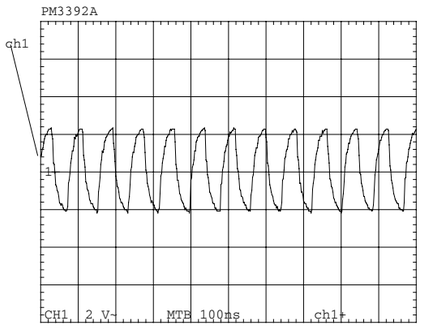
TP13: PCM_OUT1



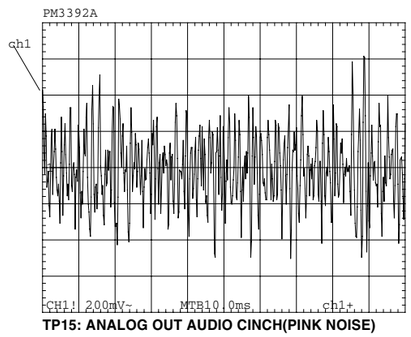
TP9: SCLK



TP14: ANALOG OUT DAC (PINK NOISE)



TP10: PCM_CLK



TP15: ANALOG OUT AUDIO CINCH(PINK NOISE)

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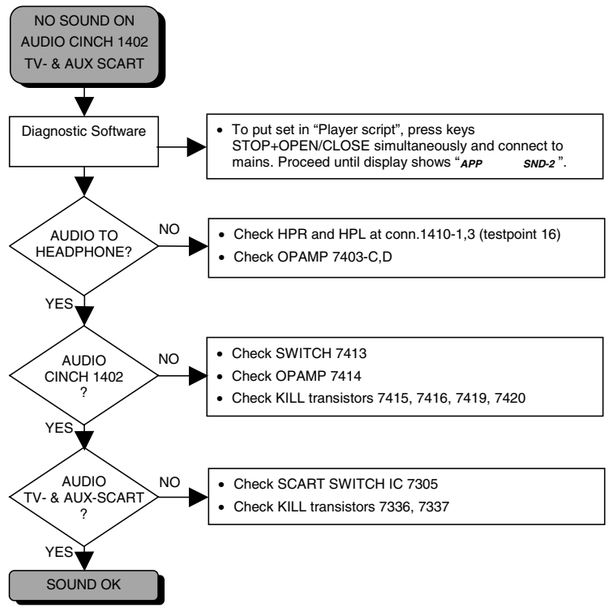
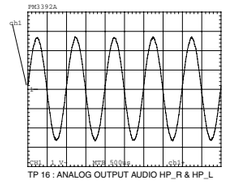
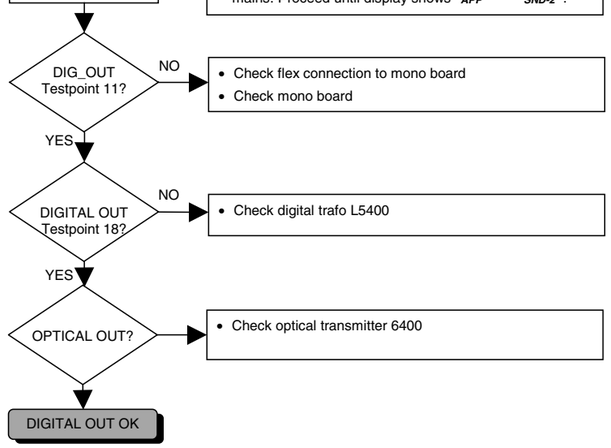
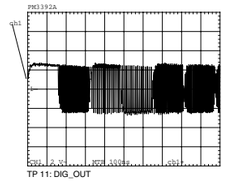
261099



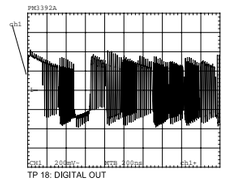


TP 16 : ANALOG OUTPUT AUDIO HP_R & HP_L





TP 11: DIG_OUT



TP 18: DIGITAL OUT

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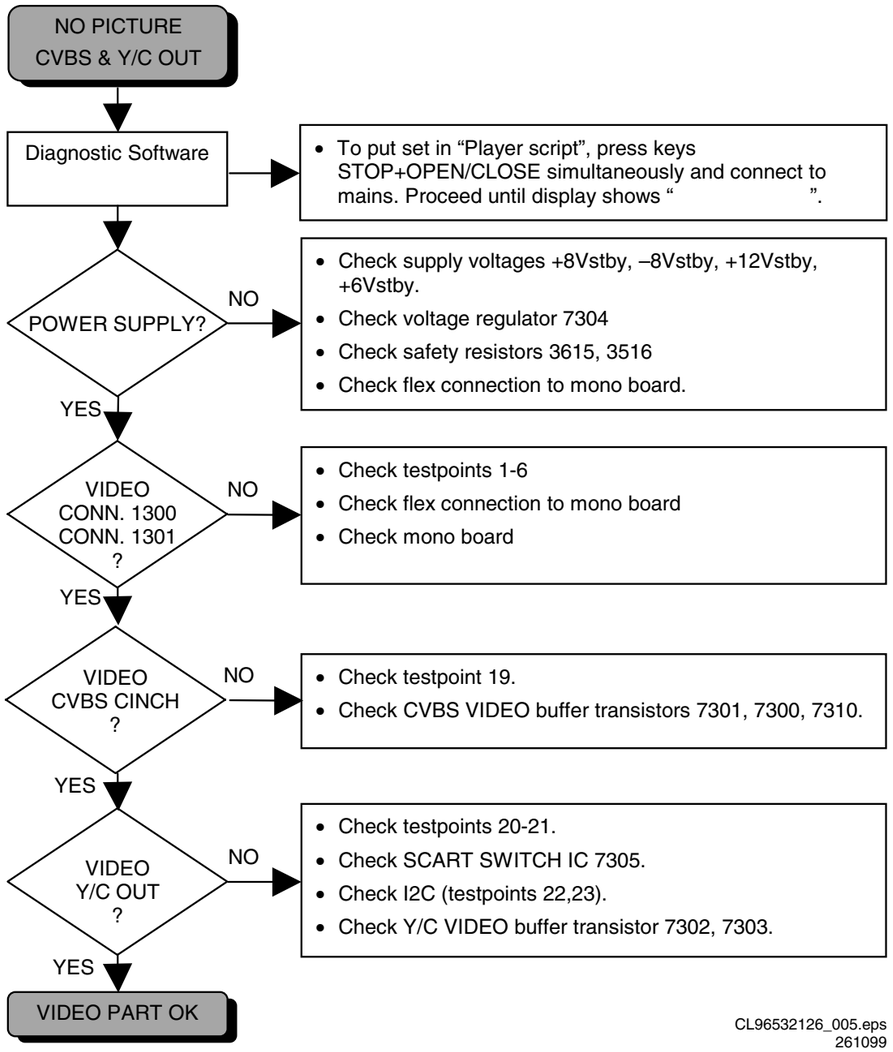
261099

VIDEO PART



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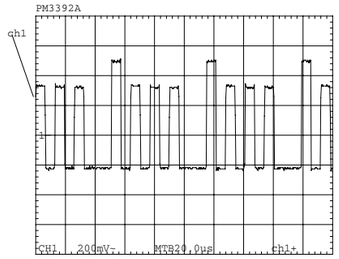
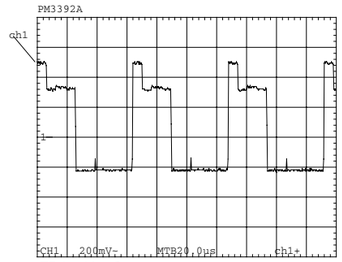
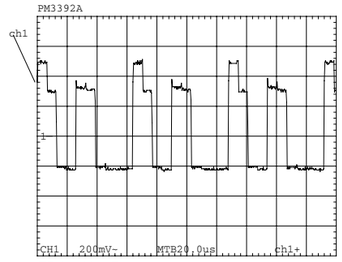
Video-1



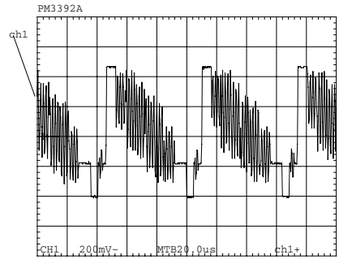
TP 1 : video B



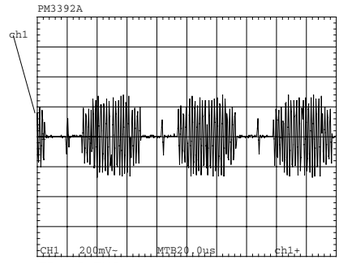
TP 2 : video G



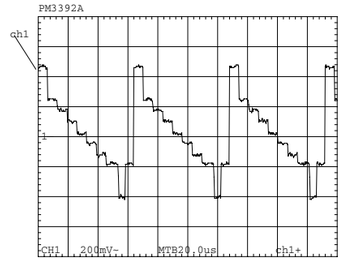
TP 3 : video R



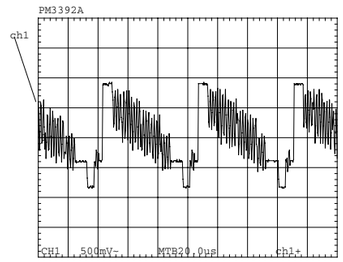
TP 4 : CVBS



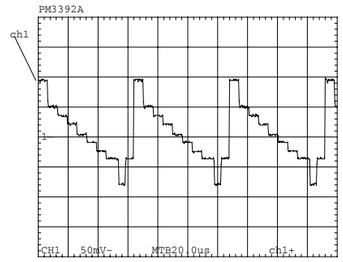
TP 5 : C_ENC



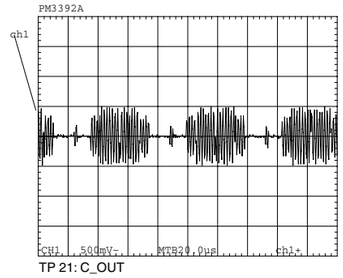
TP 6 : Y_ENC



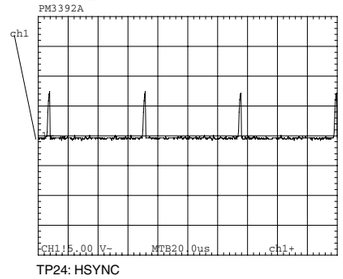
TP 19 : CVBS_OUT



TP20: Y_OUT



TP 21: C_OUT



TP24: HSYNC

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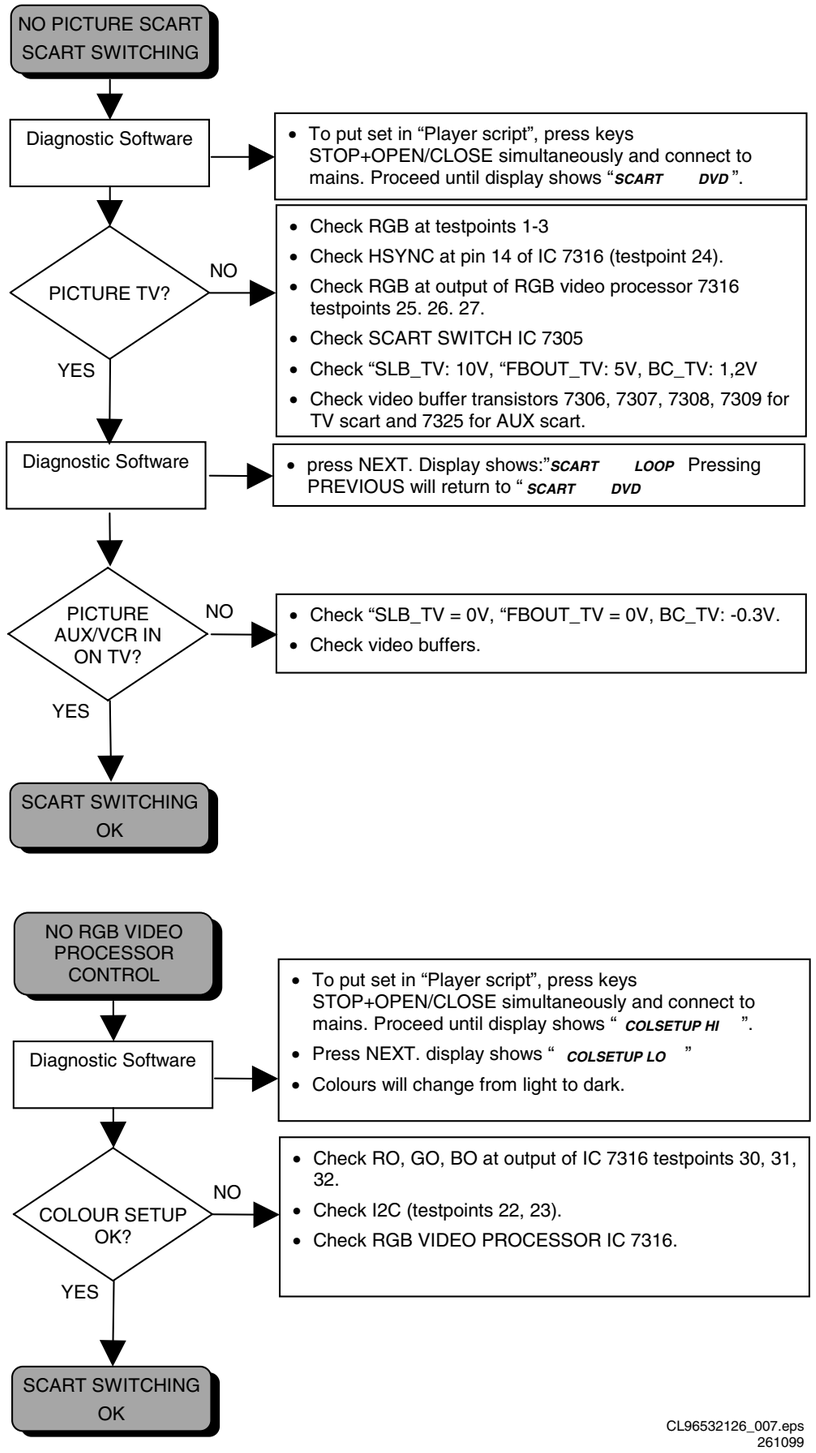
261099



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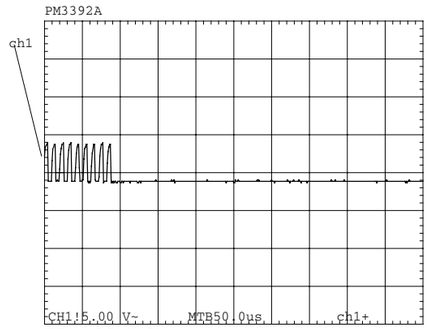
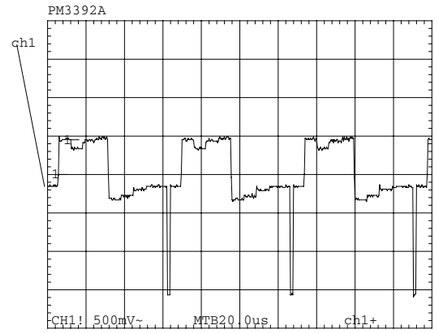
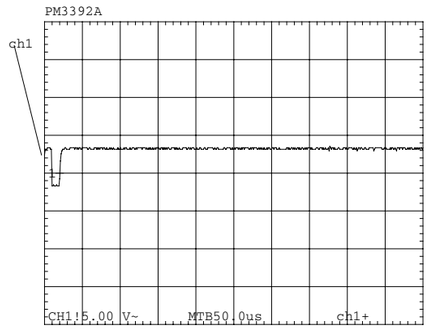
Video-2



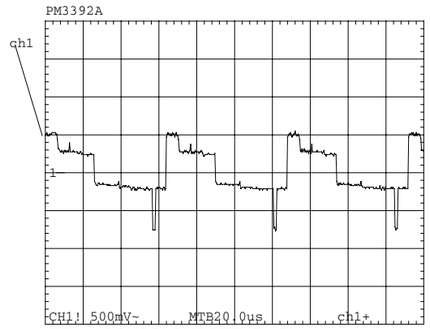
TP22: SCL(I2C)



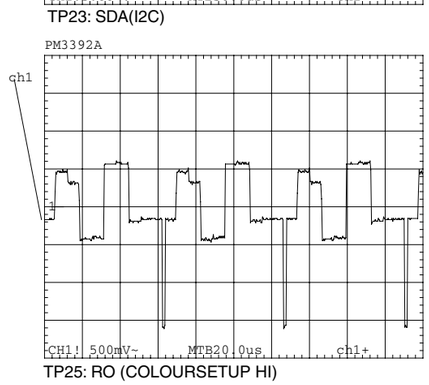
TP26: GO (COLOURSETUP HI)



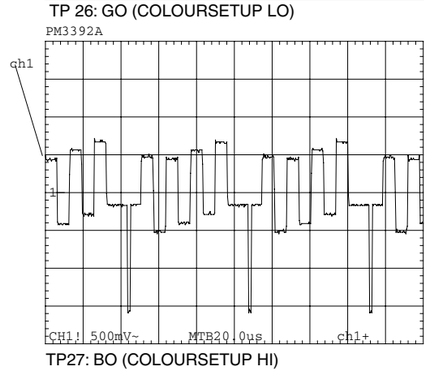
TP23: SDA(I2C)



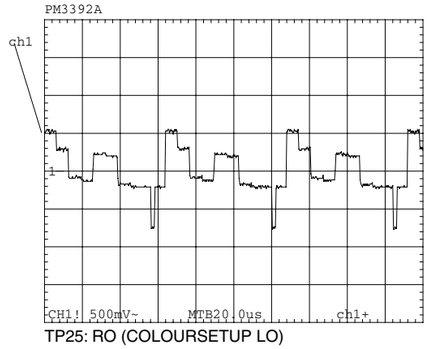
TP 26: GO (COLOURSETUP LO)



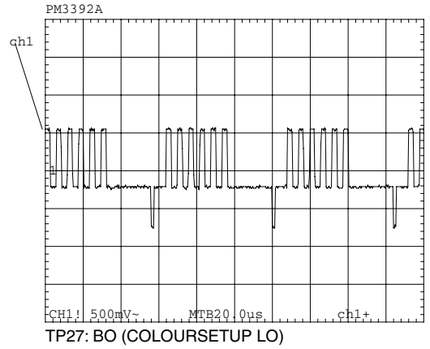
TP25: RO (COLOURSETUP HI)



TP27: BO (COLOURSETUP HI)



TP25: RO (COLOURSETUP LO)



TP27: BO (COLOURSETUP LO)

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261099

1300-1 A1 1300-2 C1 1300-3 C1 1300-5 C1 1300-6 G1 1300-8 A1 1300-9 A1 1301-10 D1 1301-13 D1
1301-14 G1 1301-15 E1 1301-16 E1 1301-2 D1 1301-8 D1 1301-9 E1 2351 C12 2352 C13 2354 H3
2360 D10 2361 D11 2362 D11 2363 E15 2364 E15 2365 E15 2367 F12 2370 G3 2372 G13
2373 G14 2374 G3 2379 C5 2380 C6 2381 C7 2384 C3 2386 C9 2387 C3 2388 D9
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2401 E9 2403 E9 2405 F6 2406 F7 2407 F8 2412 H4 2415 E1 2416 E11 2417 D15
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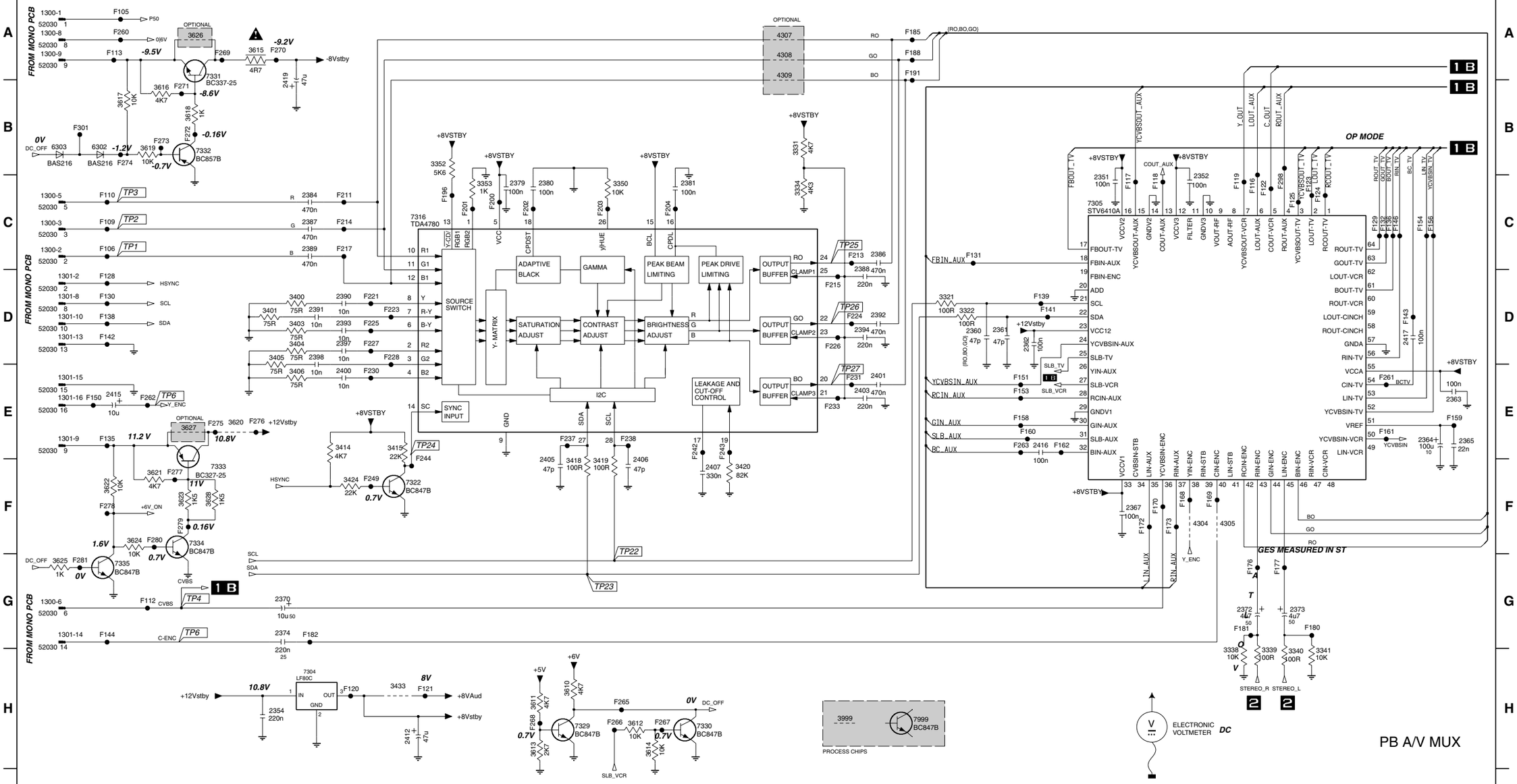
1 A VIDEO CONTROL & SCART SWITCH



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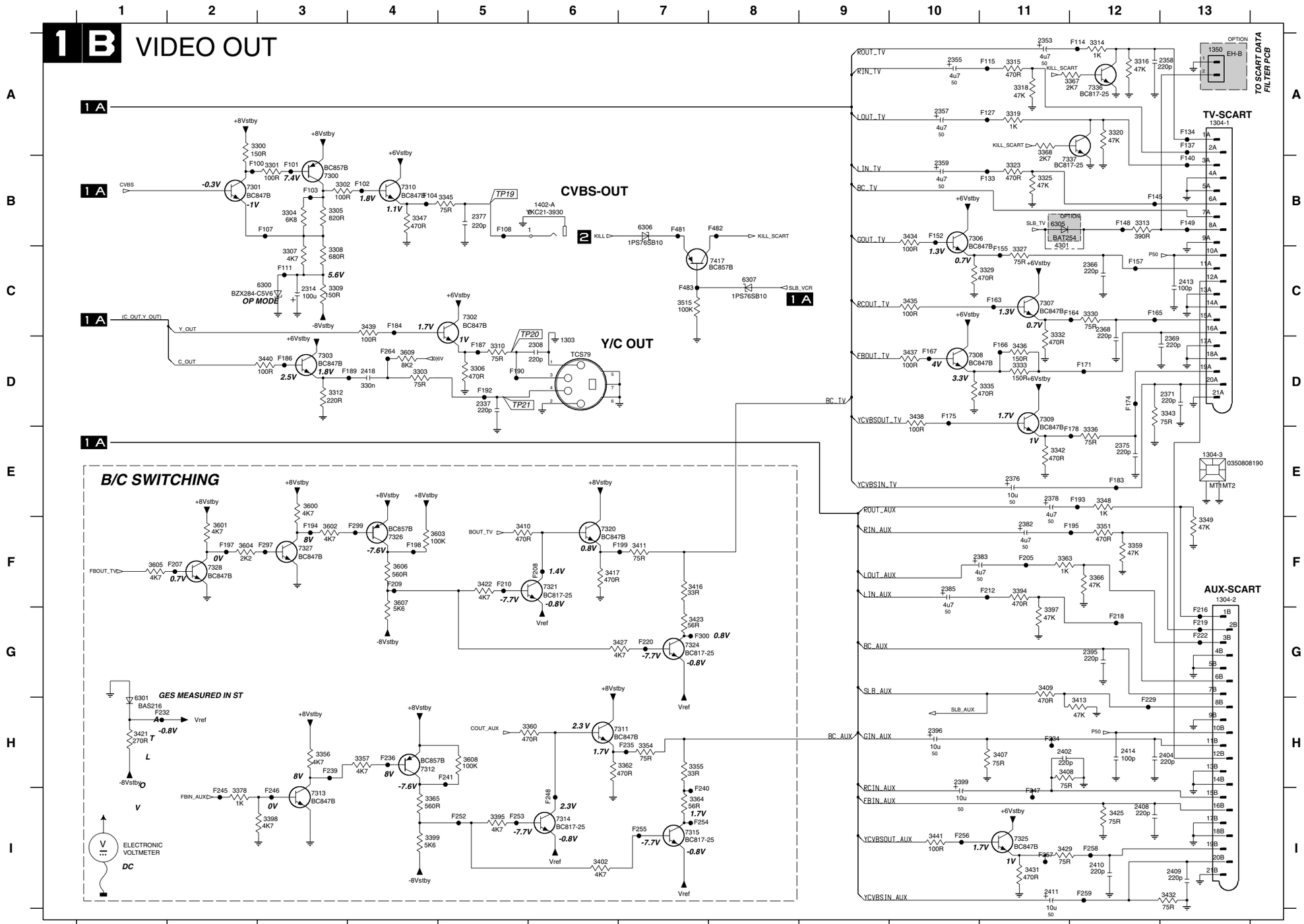

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1402-A B6	3607 F4		
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2314 C3	3609 D4		
2337 D5	4301 C11		
2353 A11	6300 C3		
2355 A10	6301 H1		
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2359 B10	6307 C8		
2366 C12	7300 B3		
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2369 C13	7302 C5		
2371 D13	7303 D3		
2375 E12	7306 B10		
2376 E11	7307 C11		
2377 B5	7308 D10		
2378 E11	7309 D11		
2382 F11	7310 B4		
2383 F11	7311 H6		
2385 F10	7312 H4		
2395 G12	7313 I3		
2396 H10	7314 I6		
2399 H10	7315 I7		
2402 H11	7320 F6		
2404 H13	7321 F6		
2408 I12	7324 G7		
2409 I13	7325 I11		
2410 I12	7326 F4		
2411 I11	7327 F3		
2413 C13	7328 F2		
2414 H12	7336 A12		
2418 D4	7337 B11		
3300 A3	7417 C8		
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3302 B3	F101 B3		
3303 D4	F102 B4		
3304 B3	F103 B3		
3305 B3	F104 B4		
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3307 C3	F108 B5		
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3312 D3	F127 A11		
3313 B12	F133 B11		
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3436 D11	F258 I12		
3437 D10	F259 I12		
3438 D10	F264 D4		
3439 C4	F297 F3		
3440 D3	F299 F4		
3441 I10	F300 G7		
3515 C7	F481 B7		
3600 E3	F482 B8		
3601 F2	F483 C7		

2 AUDIO

8V

3V3

OM MONO PCB

FR

-5V DURING PLA

KILL:

OP MODE

GES MEASURED IN ST

1.65V

5.5V

0.6V

0V

0.7V

OPTIONAL

TO HEADPHONE PCB

1 A

1 A

PB A/V MUX

CL96532158_010.eps
091299

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1300-11 E1	3495 H4	F460 F5
1300-12 E1	3496 H7	F461 F6
1300-13 E1	3497 H7	F462 F7
1300-14 F1	3498 H5	F463 G4
1300-15 F1	3499 H8	F464 G7
1300-16 F1	3502 H5	F465 F11
1300-17 F1	3505 I8	F466 F12
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1300-19 G1	3507 I8	F468 F13
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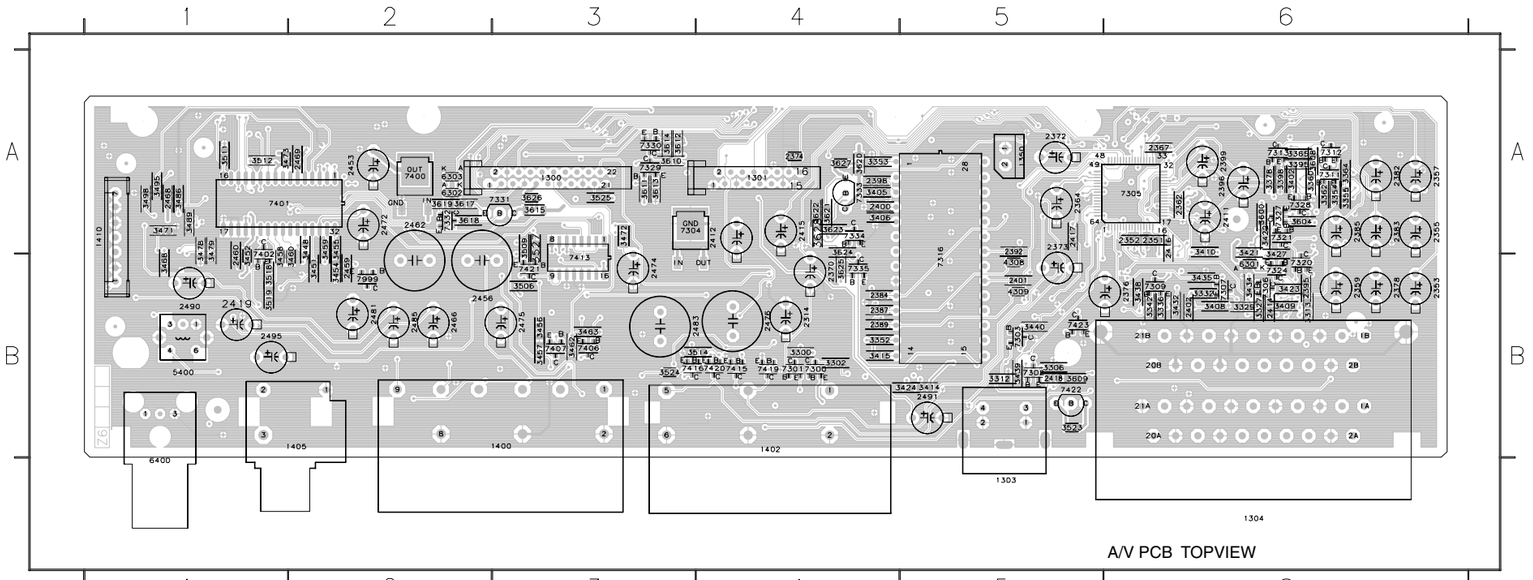

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