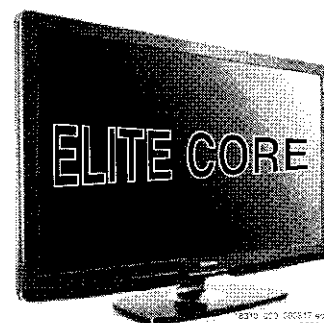


Service Service Service



Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- **All Chapters:** the following sets to the manual: see [Table 2-1 Described Model numbers](#).
- **Chapter 5:** paragraph 5.8.10 PCI bus added.
- **Chapter 6:** paragraph 6.6 Service SSB delivered without main software loaded added.

2. Technical Specifications and, Connections

Index of this chapter:

[2.1 Technical Specifications](#)

[2.2 Directions for Use](#)

[2.3 Connections](#)

[2.4 Chassis Overview](#)

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

2.1 Technical Specifications

For on-line product support please use the links in [Table 2-1](#). Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model numbers

CTN	Styling	Published in:
32PFL9604H/12	Elite Core	3122 785 18310
32PFL9604H/60		3122 785 18310
37PFL9604H/12		3122 785 18310
37PFL9604H/60		3122 785 18311
56PFL9954H/12		3122 785 18311

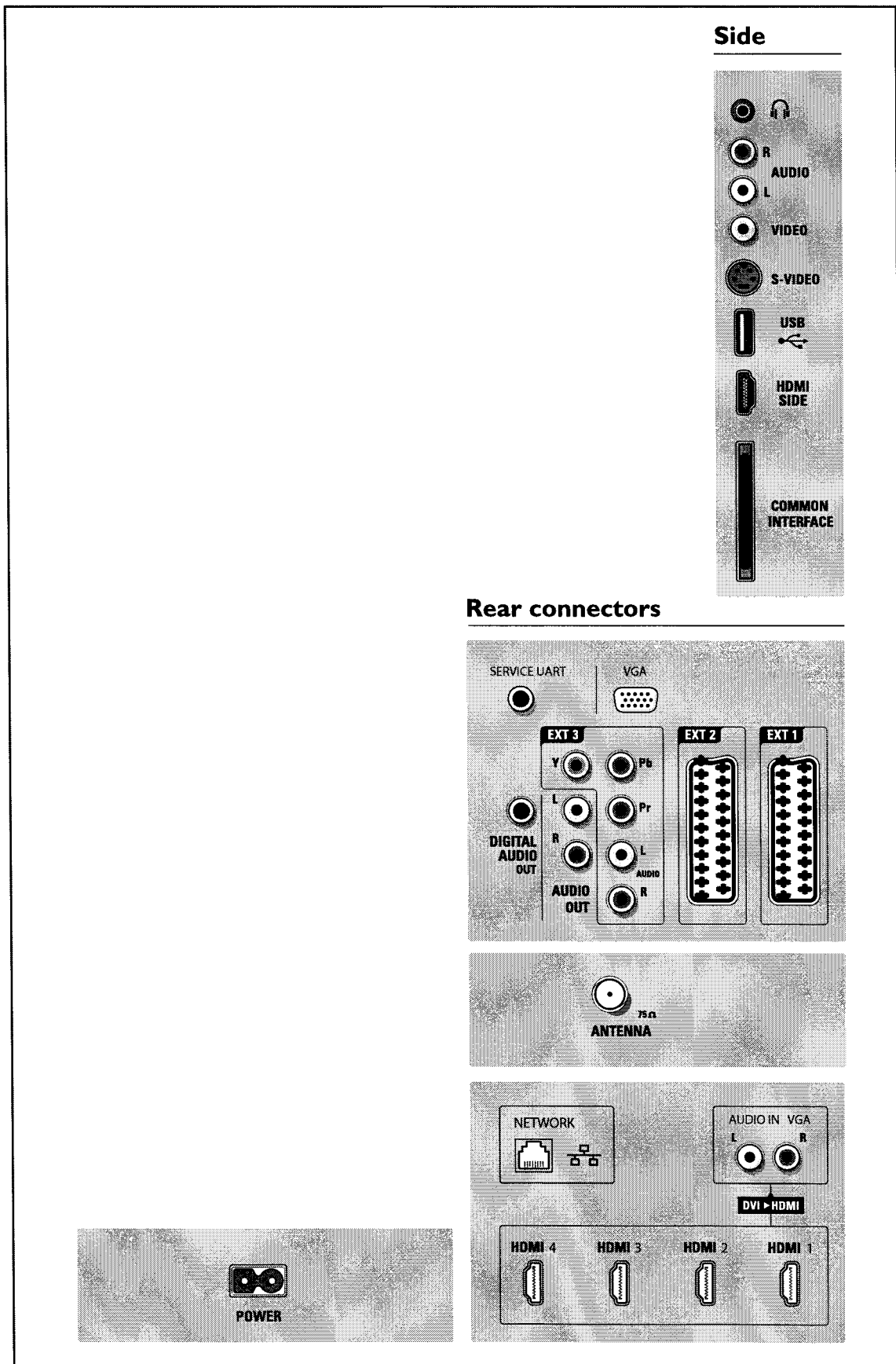
2.2 Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

2.3 Connections



18310_001_090317.eps
090317

Figure 2-1 Connection overview

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, Ye= Yellow.

2.3.1 Side Connections

Head phone (Output)

Bk - Head phone 32 - 600 ohm / 10 mW



Cinch: Video CVBS - In, Audio - In

Rd - Audio R 0.5 V_{RMS} / 10 kohm
Wh - Audio L 0.5 V_{RMS} / 10 kohm
Ye - Video CVBS 1 V_{PP} / 75 ohm



S-Video (Hosiden): Video Y/C - In

1 - Ground Y Gnd
2 - Ground C Gnd
3 - Video Y 1 V_{PP} / 75 ohm
4 - Video C 0.3 V_{PP} / 75 ohm



USB2.0

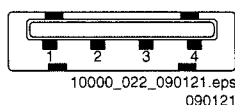
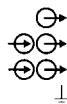


Figure 2-2 USB (type A)

1 - +5V
2 - Data (-)
3 - Data (+)
4 - Ground Gnd



HDMI: Digital Video, Digital Audio - In
(see HDMI 1, 2, 3 & 4 - Rear Connections)

Common Interface

68p- See diagram B07A SSB: CI: PCMCIA Connector



2.3.2 Rear Connections

Service Connector (UART)

1 - Ground Gnd
2 - UART_TX Transmit
3 - UART_RX Receive



VGA: Video RGB - In

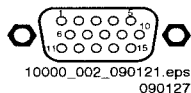


Figure 2-3 VGA Connector

1 - Video Red 0.7 V_{PP} / 75 ohm
2 - Video Green 0.7 V_{PP} / 75 ohm
3 - Video Blue 0.7 V_{PP} / 75 ohm
4 - n.c.
5 - Ground Gnd
6 - Ground Red Gnd
7 - Ground Green Gnd
8 - Ground Blue Gnd
9 - +5V_{DC} +5 V
10 - Ground Sync Gnd
11 - n.c.
12 - DDC_SDA DDC data
13 - H-sync 0 - 5 V
14 - V-sync 0 - 5 V
15 - DDC_SCL DDC clock



Cinch: S/PDIF - Out

Bk - Coaxial 0.4 - 0.6V_{PP} / 75 ohm



Cinch: Audio - Out

Rd - Audio - R 0.5 V_{RMS} / 10 kohm
Wh - Audio - L 0.5 V_{RMS} / 10 kohm



EXT3: Cinch: Video YPbPr - In, Audio - In

Gn - Video Y 1 V_{PP} / 75 ohm
Bu - Video Pb 0.7 V_{PP} / 75 ohm
Rd - Video Pr 0.7 V_{PP} / 75 ohm
Rd - Audio - R 0.5 V_{RMS} / 10 kohm
Wh - Audio - L 0.5 V_{RMS} / 10 kohm



EXT1 & 2: Video RGB - In, CVBS - In/Out, Audio - In/Out

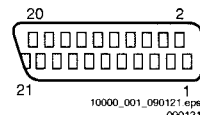
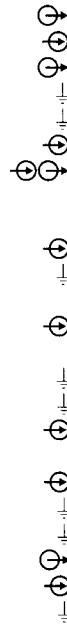


Figure 2-4 SCART connector

1 - Audio R 0.5 V_{RMS} / 1 kohm
2 - Audio R 0.5 V_{RMS} / 10 kohm
3 - Audio L 0.5 V_{RMS} / 1 kohm
4 - Ground Audio Gnd
5 - Ground Blue Gnd
6 - Audio L 0.5 V_{RMS} / 10 kohm
7 - Video Blue 0.7 V_{PP} / 75 ohm
8 - Function Select 0 - 2 V: INT
4.5 - 7 V: EXT 16:9
9.5 - 12 V: EXT 4:3
9 - Ground Green Gnd
10 - n.c.
11 - Video Green 0.7 V_{PP} / 75 ohm
12 - n.c.
13 - Ground Red Gnd
14 - Ground P50 Gnd
15 - Video Red 0.7 V_{PP} / 75 ohm
16 - Status/FBL 0 - 0.4 V: INT
1 - 3 V: EXT / 75 ohm
17 - Ground Video Gnd
18 - Ground FBL Gnd
19 - Video CVBS/Y 1 V_{PP} / 75 ohm
20 - Video CVBS 1 V_{PP} / 75 ohm
21 - Shield Gnd



Aerial - In

- - IEC-type (EU) Coax, 75 ohm



RJ45: Ethernet (if present)

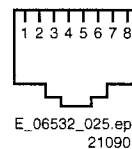


Figure 2-5 Ethernet connector

1 - TD+ Transmit signal
2 - TD- Transmit signal
3 - RD+ Receive signal
4 - CT Centre Tap: DC level fixation
5 - CT Centre Tap: DC level fixation
6 - RD- Receive signal
7 - GND Gnd
8 - GND Gnd



Cinch: Audio - In (VGA/DVI)

Rd - Audio R 0.5 V_{RMS} / 10 kohm
Wh - Audio L 0.5 V_{RMS} / 10 kohm



HDMI 1, 2, 3 & 4: Digital Video, Digital Audio - In

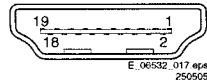
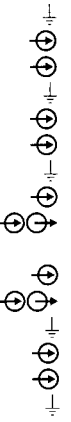


Figure 2-6 HDMI (type A) connector

1 - D2+ Data channel
2 - Shield Gnd
3 - D2- Data channel
4 - D1+ Data channel



5 - Shield Gnd
6 - D1- Data channel
7 - D0+ Data channel
8 - Shield Gnd
9 - D0- Data channel
10 - CLK+ Data channel
11 - Shield Gnd
12 - CLK- Data channel
13 - Easylink/CEC Control channel
14 - n.c.
15 - DDC_SCL DDC clock
16 - DDC_SDA DDC data
17 - Ground Gnd
18 - +5V
19 - HPD Hot Plug Detect
20 - Ground Gnd



2.4 Chassis Overview

Refer to chapter [Block Diagrams](#) for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

[3.1 Safety Instructions](#)

[3.2 Warnings](#)

[3.3 Notes](#)

[3.4 Abbreviation List](#)

3.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard. Of de set ontplot!

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
 1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
 2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ.
 4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

3.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

3.3 Notes

3.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏏), or hot ground (⏏), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and

picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with (⏏) and without (⏏) aerial signal. Measure the voltages in the power supply section both in normal operation (⏏) and in stand-by (⏏). These values are indicated by means of the appropriate symbols.

3.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kΩ).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 Ω).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

For the latest spare part overview, consult your Philips Spare Part web portal.

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: <http://www.atyourservice-magazine.com>. Select "Magazine", then go to "Repair downloads". Here you will find information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile. Where applicable and available, this profile is added to the IC Data Sheet information section in this manual.

3.3.5 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
 - To reach a solder-tip temperature of at least 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to **avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

3.3.6 Alternative BOM identification

It should be noted that on the European Service website, "Alternative BOM" is referred to as "Design variant".

The **third digit** in the serial number (example: AG2B0335000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.

By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number "1" (example: AG1B0335000001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a "2" (example: AG2B0335000001), then the set has been produced according to B.O.M. no. 2. This is important for ordering the correct spare parts!

For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.

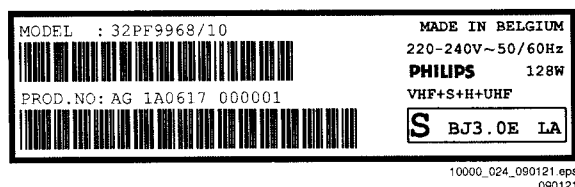


Figure 3-1 Serial number (example)

3.3.7 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide if the board has to be exchanged or if it should be repaired on component level.

If your repair procedure says the board should be exchanged completely, do not solder on the defective board. Otherwise, it cannot be returned to the O.E.M. supplier for back charging!

3.3.8 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3.4 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLR	Board-Level Repair
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue TeleteXT
C	Centre channel (audio)
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections
CL	Constant Level: audio output to connect with an external amplifier
CLR	Component Level Repair
ComPair	Computer aided rePair
CP	Connected Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DDC	See "E-DDC"
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFI	Dynamic Frame Insertion
DFU	Directions For Use: owner's manual
DMR	Digital Media Reader: card reader
DMSD	Digital Multi Standard Decoding
DNM	Digital Natural Motion

DNR	Digital Noise Reduction: noise reduction feature of the set		uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
DRAM	Dynamic RAM		
DRM	Digital Rights Management		
DSP	Digital Signal Processing	ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.
DST	Dealer Service Tool: special remote control designed for service technicians	LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394	LATAM	Latin America
DVB-C	Digital Video Broadcast - Cable	LCD	Liquid Crystal Display
DVB-T	Digital Video Broadcast - Terrestrial	LED	Light Emitting Diode
DVD	Digital Versatile Disc	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
DVI(-d)	Digital Visual Interface (d= digital only)		
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.	LPL	LG.Philips LCD (supplier)
EDID	Extended Display Identification Data (VESA standard)	LS	Loudspeaker
EEPROM	Electrically Erasable and Programmable Read Only Memory	LVDS	Low Voltage Differential Signalling
EMI	Electro Magnetic Interference	Mbps	Mega bits per second
EPLD	Erasable Programmable Logic Device	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
EU	Europe	MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
EXT	EXternal (source), entering the set by SCART or by cinches (jacks)	MOP	Matrix Output Processor
FDS	Full Dual Screen (same as FDW)	MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device
FDW	Full Dual Window (same as FDS)	MPEG	Motion Pictures Experts Group
FLASH	FLASH memory	MPIF	Multi Platform InterFace
FM	Field Memory or Frequency Modulation	MUTE	MUTE Line
FPGA	Field-Programmable Gate Array	NC	Not Connected
FTV	Flat TeleVision	NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
Gb/s	Giga bits per second	NTC	Negative Temperature Coefficient, non-linear resistor
G-TXT	Green TeleteXT	NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
H	H_sync to the module		
HD	High Definition		
HDD	Hard Disk Drive		
HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.	NVM	Non-Volatile Memory: IC containing TV related data such as alignments
HDMI	High Definition Multimedia Interface	O/C	Open Circuit
HP	HeadPhone	OSD	On Screen Display
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
I ² C	Inter IC bus	P50	Project 50: communication protocol between TV and peripherals
I ² D	Inter IC Data bus	PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)
I ² S	Inter IC Sound bus	PCB	Printed Circuit Board (same as "PWB")
IF	Intermediate Frequency	PCM	Pulse Code Modulation
IR	Infra Red	PDP	Plasma Display Panel
IRQ	Interrupt Request	PFC	Power Factor Corrector (or Pre-conditioner)
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video.	PIP	Picture In Picture
	Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing,	PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
		POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)
		POR	Power On Reset, signal to reset the uP
		PTC	Positive Temperature Coefficient, non-linear resistor
		PWB	Printed Wiring Board (same as "PCB")

PWM	Pulse Width Modulation	Y	Luminance signal
QRC	Quasi Resonant Converter	Y/C	Luminance (Y) and Chrominance (C) signal
QTNr	Quality Temporal Noise Reduction		
QVCP	Quality Video Composition Processor	YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
RAM	Random Access Memory		
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.	YUV	Component video
RC	Remote Control		
RC5 / RC6	Signal protocol from the remote control receiver		
RESET	RESET signal		
ROM	Read Only Memory		
RSDS	Reduced Swing Differential Signalling data interface		
R-TXT	Red Teletext		
SAM	Service Alignment Mode		
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs		
SCL	Serial Clock I ² C		
SCL-F	CLock Signal on Fast I ² C bus		
SD	Standard Definition		
SDA	Serial Data I ² C		
SDA-F	DAta Signal on Fast I ² C bus		
SDI	Serial Digital Interface, see "ITU-656"		
SDRAM	Synchronous DRAM		
SECAM	SEquence Couleur Avec Mémoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz		
SIF	Sound Intermediate Frequency		
SMPS	Switched Mode Power Supply		
SoC	System on Chip		
SOG	Sync On Green		
SOPS	Self Oscillating Power Supply		
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
SRP	Service Reference Protocol		
SSB	Small Signal Board		
STBY	STand-BY		
SVGA	800 × 600 (4:3)		
SVHS	Super Video Home System		
SW	Software		
SWAN	Spatial temporal Weighted Averaging Noise reduction		
SXGA	1280 × 1024		
TFT	Thin Film Transistor		
THD	Total Harmonic Distortion		
TMDs	Transmission Minimized Differential Signalling		
TXT	Teletext		
TXT-DW	Dual Window with Teletext		
UI	User Interface		
uP	Microprocessor		
UXGA	1600 × 1200 (4:3)		
V	V-sync to the module		
VESA	Video Electronics Standards Association		
VGA	640 × 480 (4:3)		
VL	Variable Level out: processed audio output toward external amplifier		
VSb	Vestigial Side Band; modulation method		
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound		
WXGA	1280 × 768 (15:9)		
XTAL	Quartz crystal		
XGA	1024 × 768 (4:3)		

4. Mechanical Instructions

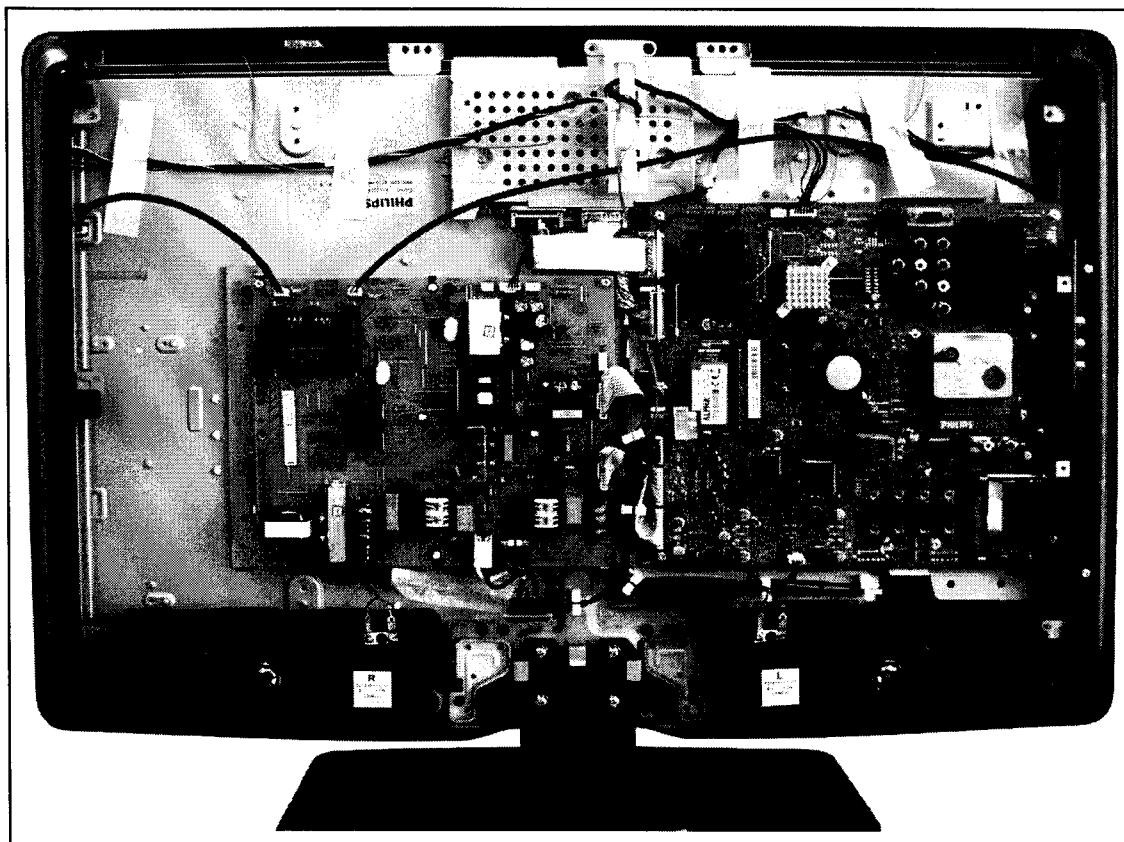
Index of this chapter:

- 4.1 Cable Dressing and Taping
- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing and Taping



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Figure 4-1 Cable dressing 32"

4. Mechanical Instructions

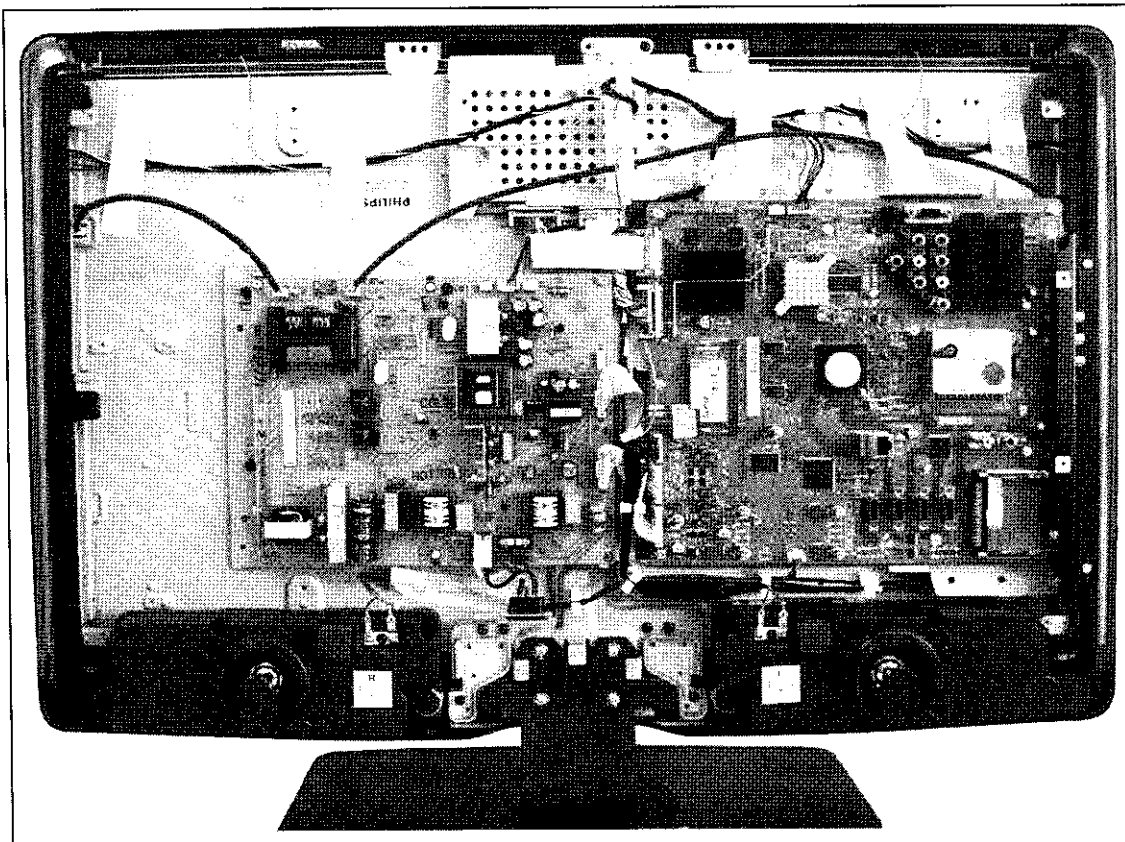
Index of this chapter:

- 4.1 Cable Dressing and Taping
- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

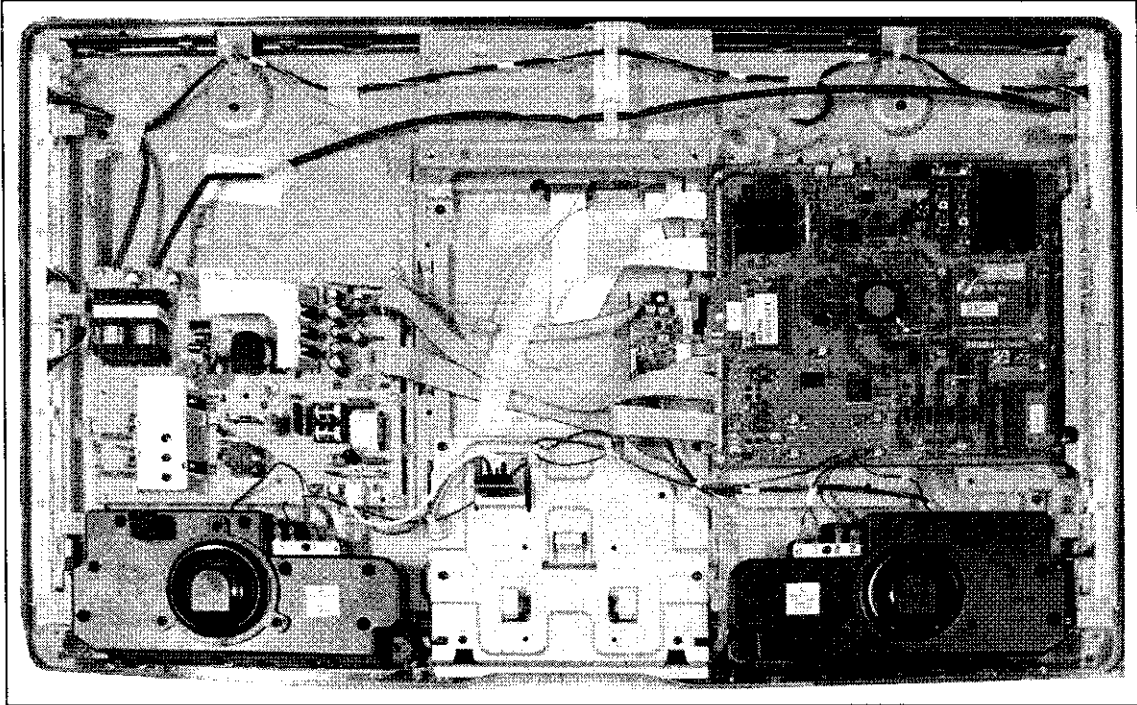
- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing and Taping



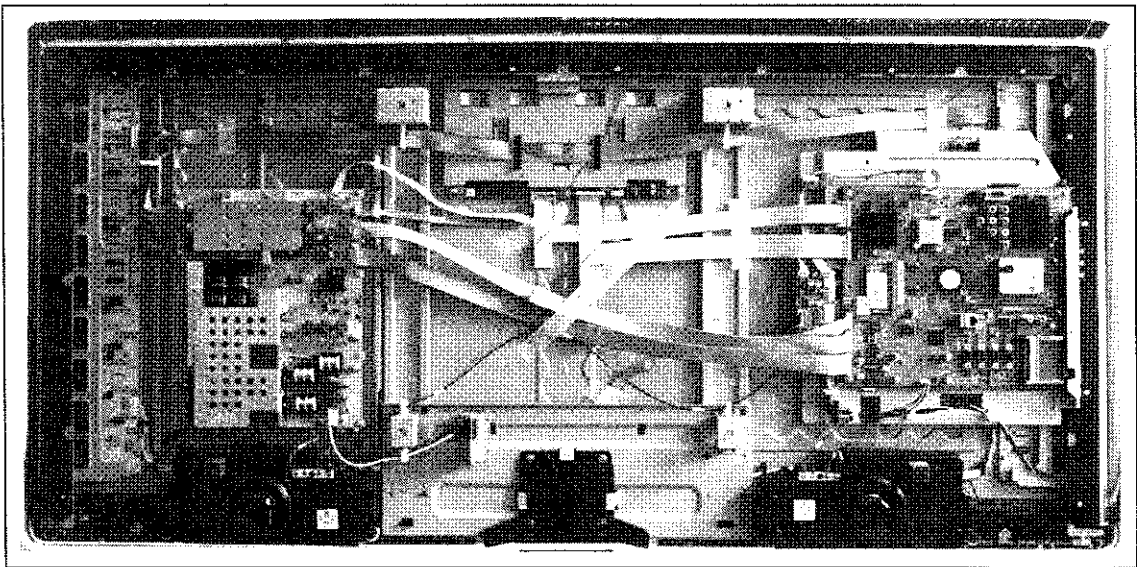
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Figure 4-1 Cable dressing 32"



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Figure 4-2 Cable dressing 37"



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Figure 4-3 Cable dressing 56" (21:9)

4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for Service).

4.2.1 Foam Bars

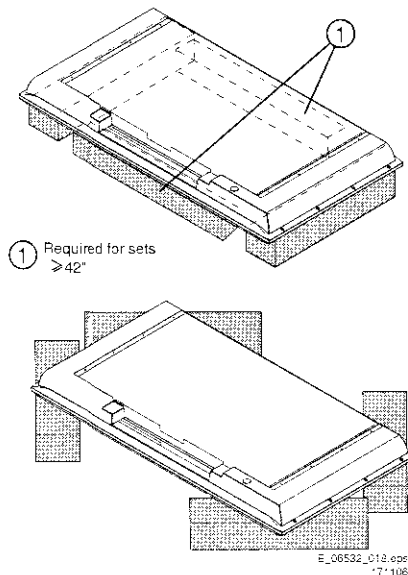


Figure 4-4 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs.

See Figure 4-4 for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display.

Caution: Failure to follow these guidelines can seriously damage the display!

By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.

4.3 Assy/Panel Removal

4.3.1 Rear Cover

Warning: Disconnect the mains power cord before you remove the rear cover.

Note: it is **not** necessary to remove the stand while removing the rear cover.

Removing the Piezo Touch Control Panel PWB requires special attention. Refer to Piezo Touch Control Panel for details.

1. Remove all screws of the rear cover.
2. Lift the rear cover from the TV. Make sure that wires and flat coils are not damaged while lifting the rear cover from the set.

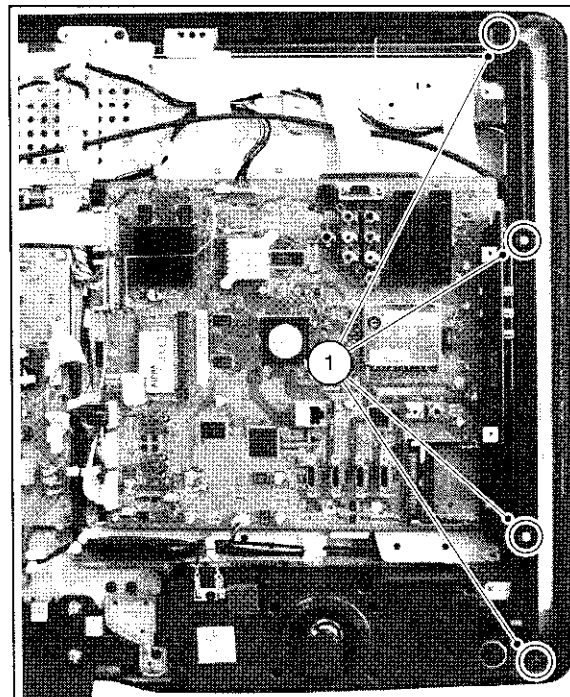
4.3.2 Speakers

Each speaker unit is mounted with two screws. A sticker on the the unit indicates if it is the right ("R") or left ("L") box, seen from the front side of the set.

When defective, replace the whole unit.

4.3.3 Ambi Light

Each Ambi Light unit is mounted on a subframe. Refer to Figure 4-5 for details.



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Figure 4-5 Ambi Light unit

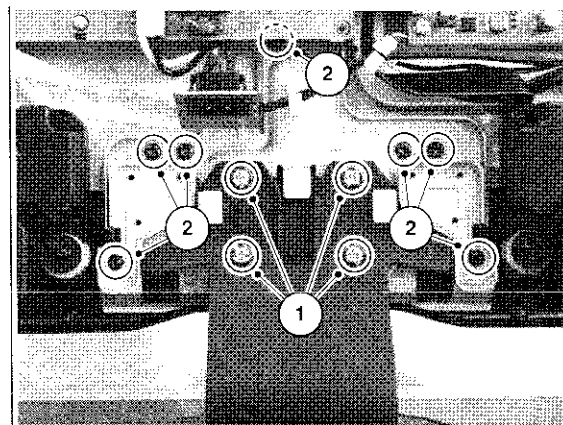
1. Remove the Ambi Light cover [1].
 2. Unplug the connector(s).
 3. The PWB can now be taken from the subframe. When defective, replace the whole unit.
- Note:** the screws that secure the AmbiLight units are longer than the other screws.

4.3.4 Main Supply Panel

1. Unplug all connectors.
 2. Remove the fixation screws.
 3. Take the board out.
- When defective, replace the whole unit.

4.3.5 IR & LED Board

Refer to Figure 4-6 for details.



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Figure 4-6 IR & LED Board

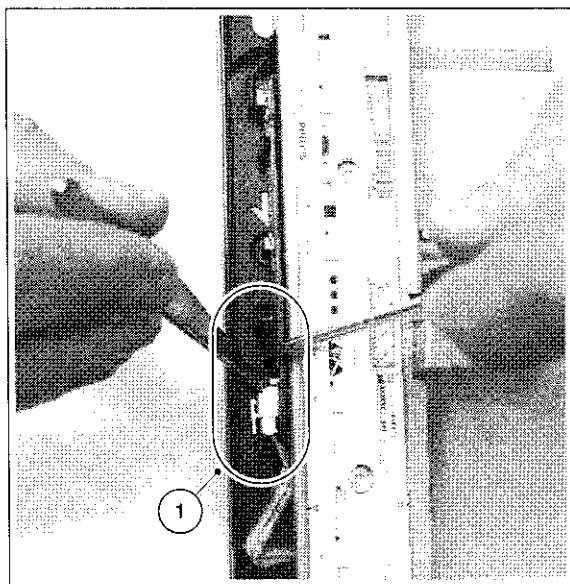
1. Remove the Main Supply Panel as earlier described.
2. Remove the stand [1] and its subframe [2].
3. Now you gain access the IR & LED board.
When defective, replace the whole unit.

4.3.6 Piezo Touch Control Panel

The flexfoil between Piezo Flexfoil Assy (mounted on the plastic rim of the set), and the PWB as described below, is extremely vulnerable. Do not pull hard at the PWB or flexfoil.

Once the flexfoil has been damaged, the entire plastic rim of the set (with the touch-control pads) has to be swapped!

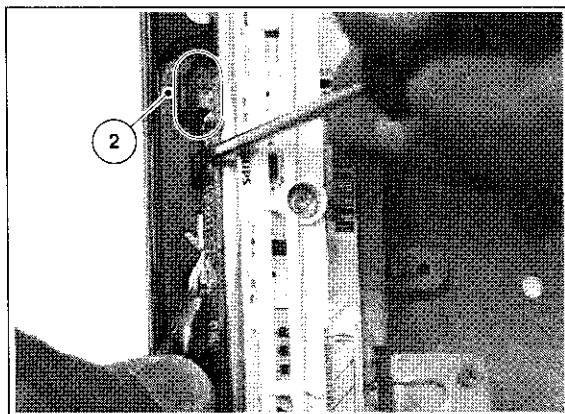
The Piezo Touch Control Panel PWB contains ESD sensitive components, implying that necessary industrial ESD precautions must be taken during removing or remounting. Refer to Figure 4-7, Figure 4-8 and Figure 4-9 for details.



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Figure 4-7 Piezo Touch Control Panel -1-

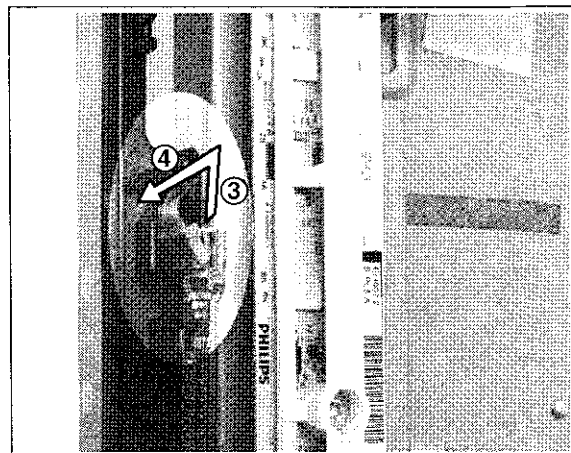
1. Gently pull the bottom side of the PWB out of the cabinet until you can unplug the connector [1].



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Figure 4-8 Piezo Touch Control Panel -2-

1. Now gently pull the top side of the PWB out of the cabinet **without damaging the flexfoil** until you can unplug the connector [2].



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Figure 4-9 Piezo Touch Control Panel -3-

1. To unplug the flexfoil connector, first the outer part of the connector has to be moved upwards [3], before this part can be turned sideways [4] as shown in the picture. Now the flexfoil can be removed from the connector and the PWB can be taken out of the set.

When defective, replace the whole unit.

4.3.7 Small Signal Board (SSB)

Caution: It is mandatory to remount screws at their original position during re-assembly. Failure to do so may result in damaging the SSB.

1. Remove the Wi-Fi module that is mounted on the SSB.
2. Unplug all connectors.
3. Remove the screws that secure the board.
4. The SSB can now be taken out of the set.

4.3.8 LCD Panel

Refer to Figure 4-10 and Figure 4-11 for details.

1. Remove the Piezo Touch Control Panel PWB as earlier described.
2. Remove the AL covers as earlier described.
3. Remove both Main Supply Panel and SSB as earlier described.
4. Remove the subframes of Main Power Supply and SSB [1].
5. Remove both AL subframes (with the AL unit still mounted on it) by unplugging the connector [2] and removing the screws [3].
6. Remove all remaining adhesive tapes and remove all cables from their clamps.
7. Carefully remove the conducting tape [4], it must be re-used during re-assembly!
8. Remove the remaining screws (indicated with an arrow) that hold the plastic rim and remove the rim.
9. Now the LCD Panel can be lifted from the front cabinet.
The panel has to be slid downwards once it has been lifted, because the brackets on the top cannot be removed from the cabinet. You will see a conducting foam between metal front and panel, near the location of the Piezo Touch Control Panel.

When mounting a new LCD Panel:

1. Check if this conducting foam between panel and metal front is in place !
2. Re-attach the conducting tape between LCD Panel and metal rim [4] !

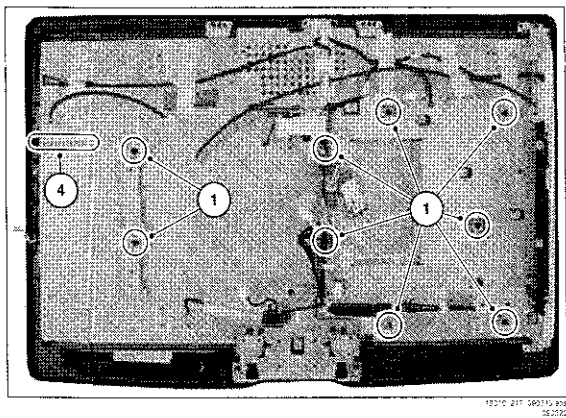


Figure 4-10 LCD Panel -1-

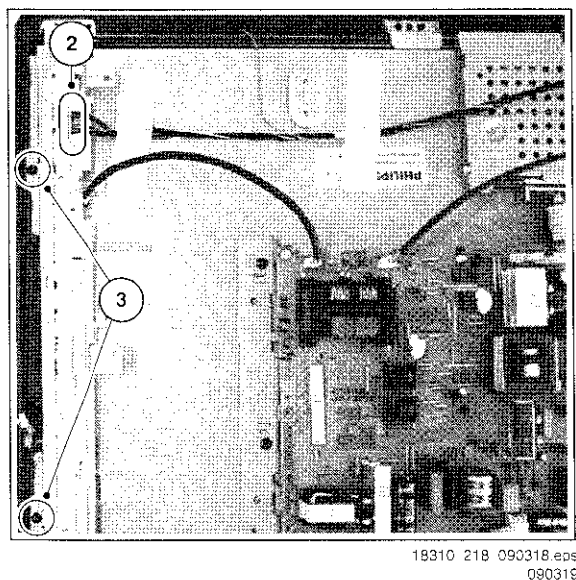


Figure 4-11 LCD Panel -2-

4.3.9 Wi-Fi antenna

Follow the instructions for [LCD Panel](#) until "remove plastic rim". After removal of this rim, you gain access to the Wi-Fi antennas.

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position.
- Pay special attention not to damage the EMC foams in the set. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Stepwise Start-up
- 5.4 Service Tools
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Protections
- 5.8 Fault Finding and Repair Tips
- 5.9 Software Upgrading

5.1 Test Points

As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. However, several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default mode (SDM) and Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version read-out for all chassis. (see also section "5.4.1 ComPair").

Note: For the new model range, a new remote control (RC) is used with some renamed buttons. This has an impact on the activation of the Service modes. For instance the old "MENU" button is now called "HOME" (or is indicated by a "house" icon).

5.2.1 Service Default Mode (SDM)

Purpose

- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections detected by stand-by processor and make the TV start up to the step just before protection (a sort of automatic stepwise start-up). See section "5.3 Stepwise Start-up".
- To start the blinking LED procedure where only LAYER 2 errors are displayed. (see also section "5.5 Error Codes").

Specifications

Table 5-1 SDM default settings

Region	Freq. (MHz)	Default system
Europe, AP(PAL/Multi)	475.25	PAL B/G
Europe, AP DVB-T	546.00 PID Video: 0B 06 PID PCR: 0B 06 PID Audio: 0B 07	DVB-T

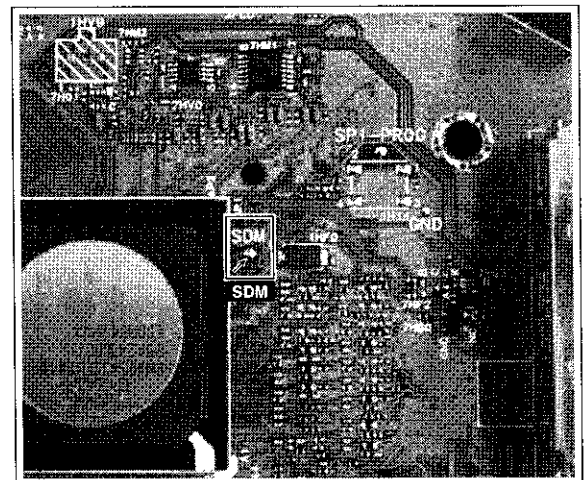
- All picture settings at 50% (brightness, colour, contrast).
- All sound settings at 50%, except volume at 25%.

- All service-unfriendly modes (if present) are disabled, like:
 - (Sleep) timer.
 - Child/parental lock.
 - Picture mute (blue mute or black mute).
 - Automatic volume levelling (AVL).
 - Skip/blank of non-favourite pre-sets.

How to Activate SDM

For this chassis there are two kinds of SDM: an **analog SDM** and a **digital SDM**. Tuning will happen according Table 5-1.

- **Analog SDM:** use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" (or HOME) button.
Note: It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" (or HOME) button again.
- **Digital SDM:** use the standard RC-transmitter and key in the code "062593", directly followed by the "MENU" (or HOME) button.
Note: It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" (or HOME) button again.
- **Analog SDM** can also be activated by grounding for a moment the solder pad on the SSB, with the indication "SDM" (see Service mode pad).



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Figure 5-1 Service mode pad

After activating this mode, "SDM" will appear in the upper right corner of the screen (when a picture is available).

How to Navigate

When the "MENU" (or HOME) button is pressed on the RC transmitter, the TV set will toggle between the SDM and the normal user menu.

How to Exit SDM

Use one of the following methods:

- Switch the set to STAND-BY via the RC-transmitter.
- Via a standard customer RC-transmitter: key in "00"-sequence.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.

- To view operation hours.
- To display (or clear) the error code buffer.

How to Activate SAM

Via a standard RC transmitter: Key in the code "062596" directly followed by the "INFO" button. After activating SAM with this method a service warning will appear on the screen, continue by pressing the "OK" button on the RC.

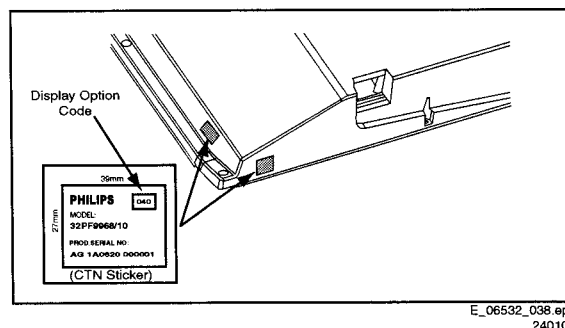
Contents of SAM (see also Table 6-4)

- **Hardware Info.**
 - **A. SW Version.** Displays the software version of the main software (**example:** Q5492-1.2.3.4 = AAAAB_X.Y.W.Z).
 - **AAAA**= the chassis name.
 - **B**= the SW branch version. This is a sequential number (this is no longer the region indication, as the software is now multi-region).
 - **X.Y.W.Z**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y.W.Z is the sub version number (a higher number is always compatible with a lower number).
 - **B. STBY PROC Version.** Displays the software version of the stand-by processor.
 - **C. Production Code.** Displays the production code of the TV, this is the serial number as printed on the back of the TV set. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Operation Hours.** Displays the accumulated total of operation hours (not the stand-by hours). Every time the TV is switched "on/off", 0.5 hours is added to this number.
- **Errors** (followed by maximum 10 errors). The most recent error is displayed at the upper left (for an error explanation see section "5.5 Error Codes").
- **Reset Error Buffer.** When "cursor right" (or the "OK" button) is pressed and then the "OK" button is pressed, the error buffer is reset.
- **Alignments.** This will activate the "ALIGNMENTS" sub-menu. See Chapter 6. Alignments.
- **Dealer Options.** Extra features for the dealers.
- **Options.** Extra features for Service. For more info regarding option codes, 6. Alignments.
Note that if the option code numbers are changed, these have to be confirmed with pressing the "OK" button before the options are stored. Otherwise changes will be lost.
- **Initialize NVM.** The moment the processor recognizes a corrupted NVM, the "initialize NVM" line will be highlighted. Now, two things can be done (dependent of the service instructions at that moment):
 - Save the content of the NVM via ComPair for development analysis, **before** initializing. This will give the Service department an extra possibility for diagnosis (e.g. when Development asks for this).
 - Initialize the NVM.

Note: When the NVM is corrupted, or replaced, there is a high possibility that no picture appears because the display code is not correct. So, before initializing the NVM via the SAM, a picture is necessary and therefore the correct display option has to be entered. Refer to Chapter 6. Alignments for details. To adapt this option, it's advised to use ComPair (the correct HEX values for the options can be found in Chapter 6. Alignments) or a method via a standard RC (described below).

Changing the display option via a standard RC: Key in the code "062598" directly followed by the "MENU" (or HOME) button and "XXX" (where XXX is the 3 digit decimal display code as mentioned in Table 6-3). Make sure to key in all three digits, also the leading zero's. If the above action is successful, the front LED will go out as an indication that the RC sequence was correct. After the display option is changed in the NVM, the

TV will go to the Stand-by mode. If the NVM was corrupted or empty before this action, it will be initialized first (loaded with default values). This initializing can take up to 20 seconds.



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Figure 5-2 Location of Display Option Code sticker

- **Store - go right.** All options and alignments are stored when pressing "cursor right" (or the "OK" button) and then the "OK"-button.
- **SW Maintenance.**
 - **SW Events.** Not useful for Service purposes. In case of specific software problems, the development department can ask for this info.
 - **HW Events.** Not useful for Service purposes. In case of specific software problems, the development department can ask for this info.
- **Operation hours display.** Displays the accumulated total of display operation hours. So, this one keeps up the lifetime of the display itself, mainly to compensate the degeneration behaviour.
- **Test settings.** For development purposes only.
- **Development file versions.** Not useful for Service purposes, this information is only used by the development department.
- **Upload to USB.** To upload several settings from the TV to an USB stick, which is connected to the SSB. The items are "Channel list", "Personal settings", "Option codes", "Display-related alignments" and "History list". **First a directory "repair" has to be created in the root of the USB stick.** To upload the settings select each item separately, press "cursor right" (or the "OK" button), confirm with "OK" and wait until "Done" appears. In case the download to the USB stick was not successful "Failure" will appear. In this case, check if the USB stick is connected properly and if the directory "repair" is present in the root of the USB stick. Now the settings are stored onto the USB stick and can be used to download onto another TV or other SSB. Uploading is of course only possible if the software is running and if a picture is available. This method is created to be able to save the customer's TV settings and to store them into another SSB.
- **Download to USB.** To download several settings from the USB stick to the TV, same way of working needs to be followed as with uploading. To make sure that the download of the channel list from USB to the TV is executed properly, it is necessary to restart the TV and tune to a valid preset if necessary.
Note: The "History list item" can not be downloaded from USB to the TV. This is a "read-only" item. In case of specific problems, the development department can ask for this info.

How to Navigate

- In SAM, the menu items can be selected with the "CURSOR UP/DOWN" key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the "CURSOR UP/DOWN" key to display the next/previous menu items.
- With the "CURSOR LEFT/RIGHT" keys, it is possible to:
 - (De) activate the selected menu item.
 - (De) activate the selected sub menu.

- With the “OK” key, it is possible to activate the selected action.

How to Exit SAM

Use one of the following methods:

- Switch the TV set to STAND-BY via the RC-transmitter.
- Via a standard RC-transmitter, key in “00” sequence, or select the “BACK” key.

5.2.3 Customer Service Mode (CSM)

Purpose

When a customer is having problems with his TV-set, he can call his dealer or the Customer Helpdesk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer. The CSM is a read only mode; therefore, modifications in this mode are not possible.

When in this chassis CSM is activated, a testpattern will be displayed during 5 seconds (1 second Blue, 1 second Green and 1 second Red, then again 1 second Blue and 1 second Green). This test pattern is generated by the PNX5100. So if this test pattern is shown, it could be determined that the back end video chain (PNX5100, LVDS, and display) of the SSB is working.

When CSM is activated and there is a USB stick connected to the TV, the software will dump the complete CSM content to the USB stick. The file (Csm.txt) will be saved in the root of the USB stick. This info can be handy if no information is displayed.

Also when CSM is activated, the LAYER 1 error is displayed via blinking LED. Only the latest error is displayed. (see also section 5.5 Error Codes).

How to Activate CSM

Key in the code “123654” via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to Navigate

By means of the “CURSOR-DOWN/UP” knob on the RC-transmitter, can be navigated through the menus.

Contents of CSM

The contents are reduced to 3 pages: General, Software versions and Quality items. The group names itself are not shown anywhere in the CSM menu.

General

- **Set Type.** This information is very helpful for a helpdesk/ workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Production Code.** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee a in possibility to do this.
- **Installed date.** Indicates the date of the first installation of the TV. This date is acquired via time extraction.
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).
- **12NC SSB.** Gives an identification of the SSB as stored in NVM. Note that if an NVM is replaced or is initialized after corruption, this identification number has to be re-written to

NVM. ComPair will foresee in a possibility to do this. This identification number is the 12nc number of the SSB.

- **12NC display.** Shows the 12NC of the display.
- **12NC supply.** Shows the 12NC of the supply.
- **12NC “fan board”.** Shows the 12NC of the “fan board”-module (for sets with LED backlight)
- **12NC “LED Dimming Panel”.** Shows the 12NC of the LED dimming Panel (for sets with LED backlight).

Software versions

- **Current main SW.** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradeable, it will also be published on the Internet. Example: Q5492_1.2.3.4
- **Standby SW.** Displays the built-in stand-by processor software version. Upgrading this software will be possible via ComPair or via USB (see section 5.9 Software Upgrading). Example: STDBY_88.68.1.2.
- **MOP ambient light SW.** Displays the MOP ambient light EPLD SW.
- **LED Dimming SW.** Displays the LED Dimming EPLD SW-version (for sets with LED backlight).
- **Local contrast SW.** Displays the MOP local contrast SW-version.

Quality items

- **Signal quality.** Poor / average / good
- **Child lock.** Not active / active. This is a combined item for locks. If any lock (Preset lock, child lock, lock after or parental lock) is active, the item shall show “active”.
- **HDMI HDCP key.** Indicates if the HDMI keys (or HDCP keys) are valid or not. In case these keys are not valid and the customer wants to make use of the HDMI functionality, the SSB has to be replaced.
- **Ethernet MAC address.** Displays the MAC address present in the SSB.
- **Wireless MAC address.** Displays the wireless MAC address to support the Wi-Fi functionality.
- **BDS key.** Indicates if the “BDS level 1” key is valid or not.
- **CI slot present.** If the common interface module is detected the result will be “YES” or “NO”.
- **HDMI input format.** The detected input format of the HDMI.
- **HDMI audio input stream.** The HDMI audio input stream is displayed: present / not present.
- **HDMI video input stream.** The HDMI video input stream is displayed: present / not present.

How to Exit CSM

Press “MENU” (or HOME) / “Back” key on the RC-transmitter.

5.3 Stepwise Start-up

When the TV is in a protection state due to an error detected by stand-by software (error blinking is displayed) and SDM is activated via shortcutting the pins on the SSB, the TV starts up until it reaches the situation just before protection. So, this is a kind of automatic stepwise start-up. In combination with the start-up diagrams below, you can see which supplies are present at a certain moment. Important to know is, that if e.g. the 3V3 detection fails and thus error layer 2 = 18 is blinking while the TV is restarted via SDM, the Stand-by Processor will enable the 3V3, but the TV set will not go to protection now. The TV will stay in this situation until it is reset (Mains/AC Power supply interrupted). **Caution:** in case the start-up in this

mode with a faulty FET 7U08 is done, you can destroy all IC's supplied by the +3V3, due to overvoltage (12V on 3V3-line). It is recommended to measure first the FET 7U08 or others FET's on shortcircuit before activating SDM via the service pads.

The abbreviations "SP" and "MP" in the figures stand for:

- SP: protection or error detected by the Stand-by Processor.
- MP: protection or error detected by the MIPS Main Processor.

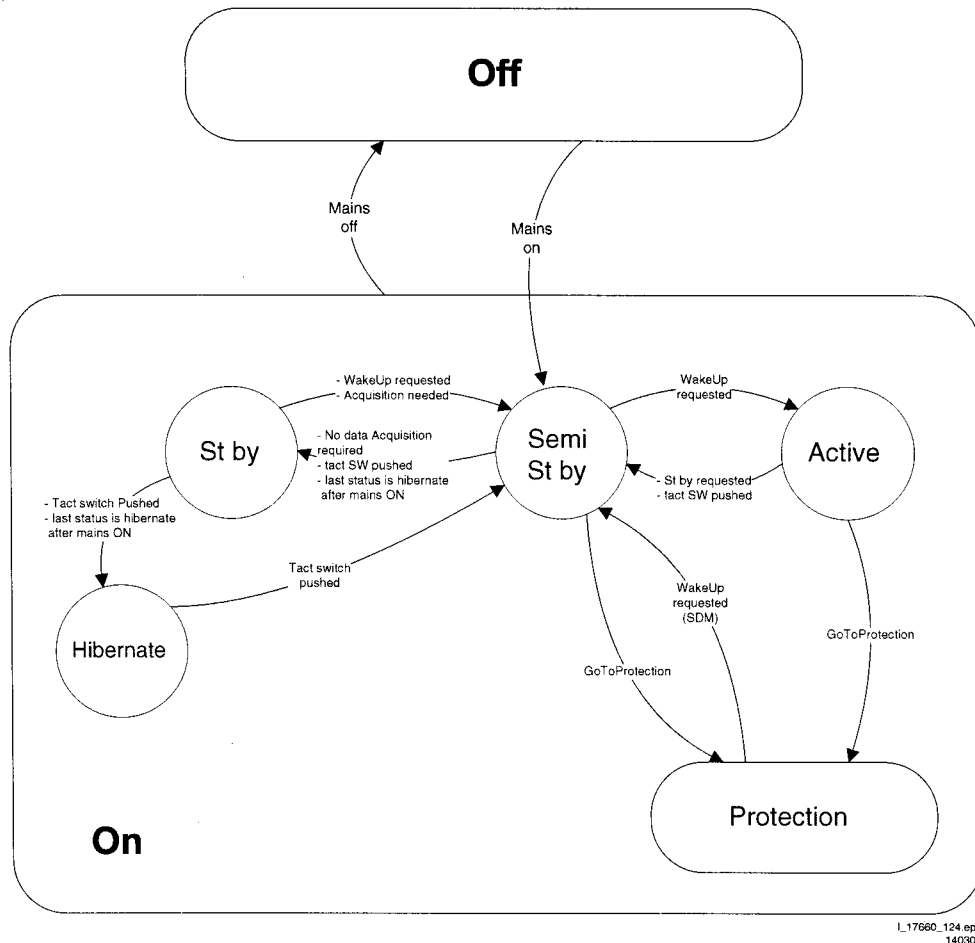


Figure 5-3 Transition diagram

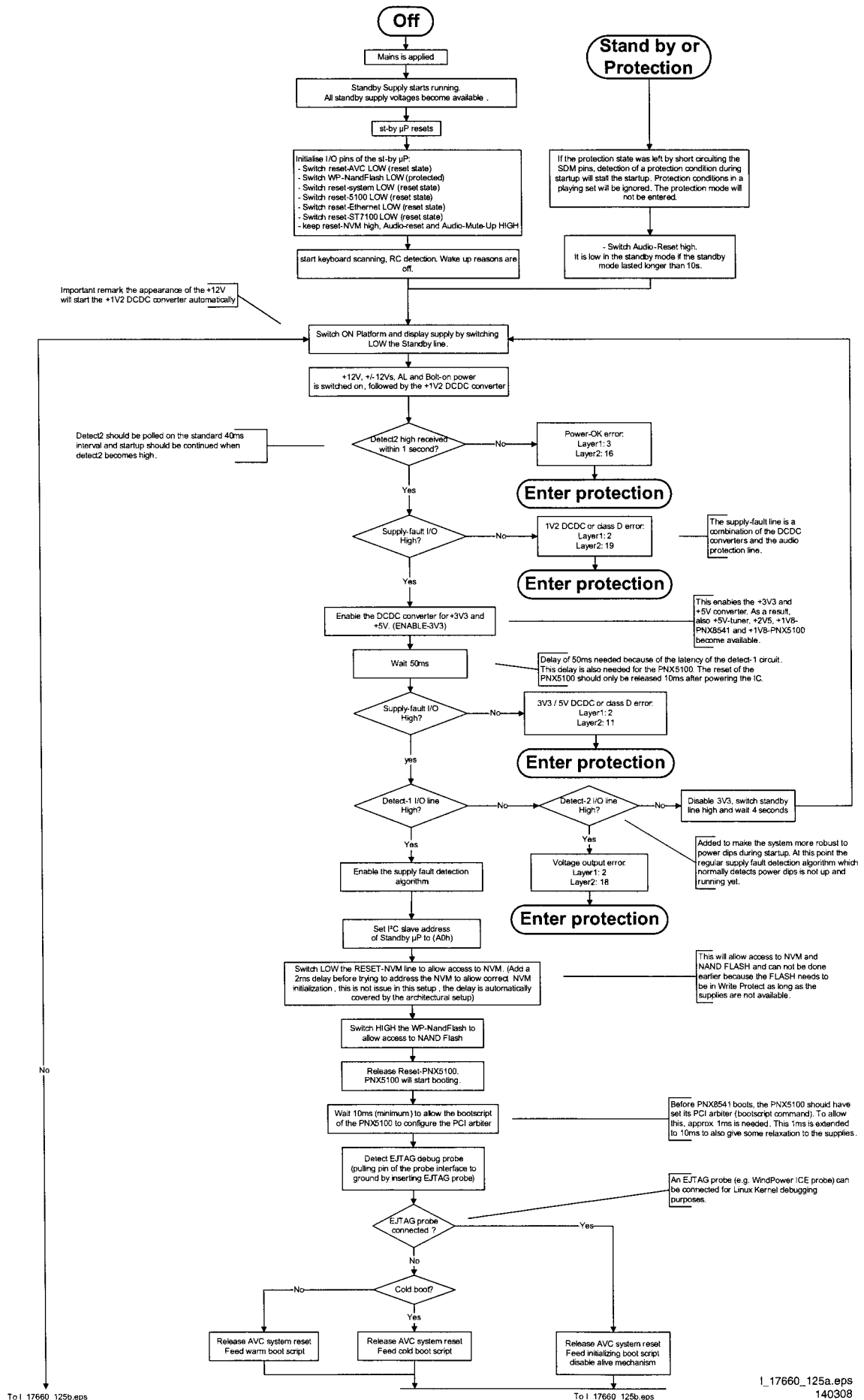


Figure 5-4 "Off" to "Semi Stand-by" flowchart (part 1)

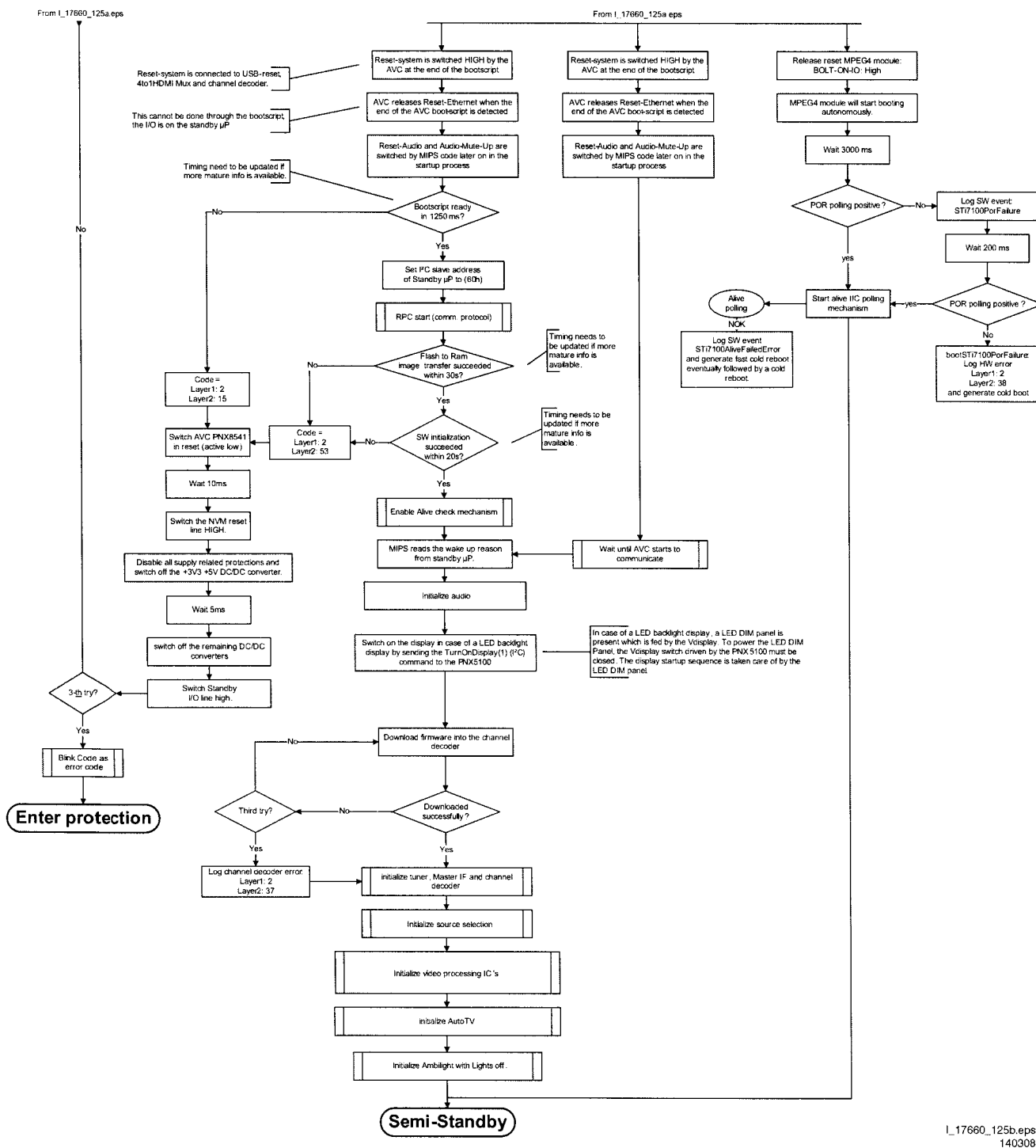


Figure 5-5 "Off" to "Semi Stand-by" flowchart (part 2)

Constraints taken into account:

- Display may only be started when valid LVDS output clock can be delivered by the AVC.
- Between 5 and 50 ms after power is supplied, display should receive valid lvs clock.
- minimum wait time to switch on the lamp after power up is 200ms.

action holder: AVC

action holder: St-by

autonomous action

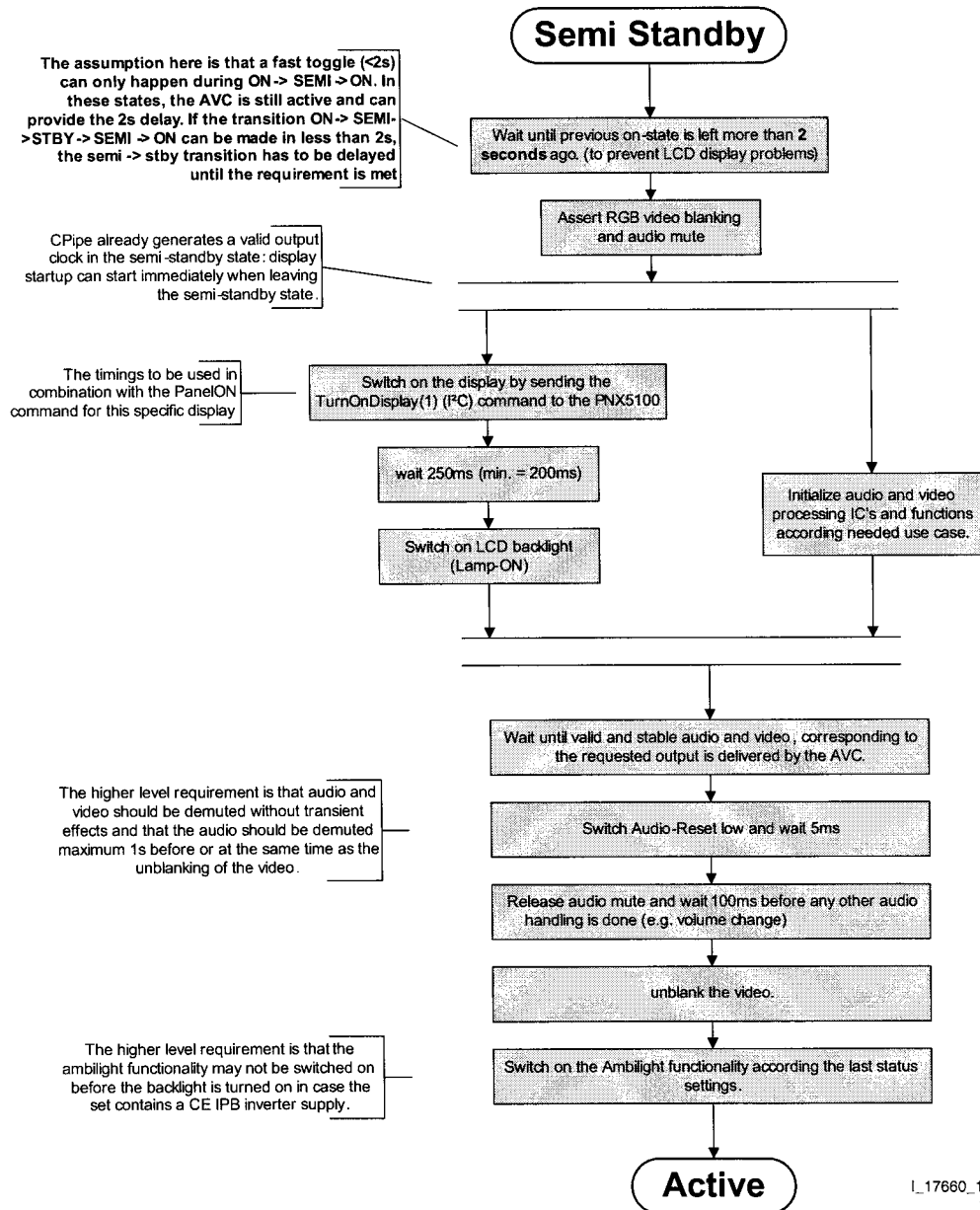


Figure 5-6 "Semi Stand-by" to "Active" flowchart

Constraints taken into account:

- Display may only be started when valid LVDS output clock can be delivered by the AVC.
- Between 5 and 50 ms after power is supplied, display should receive valid lvds clock.
- minimum wait time to switch on the lamp after power up is 200ms.
- To have a reliable operation of the backlight, the backlight should be driven with a PWM duty cycle of 100% during the first second. Only after this first one or two seconds, the PWM may be set to the required output level (Note that the PWM output should be present before the backlight is switched on). To minimize the artefacts, the picture should only be unblanked after these first seconds.

action holder: AVC

action holder: St-by

autonomous action

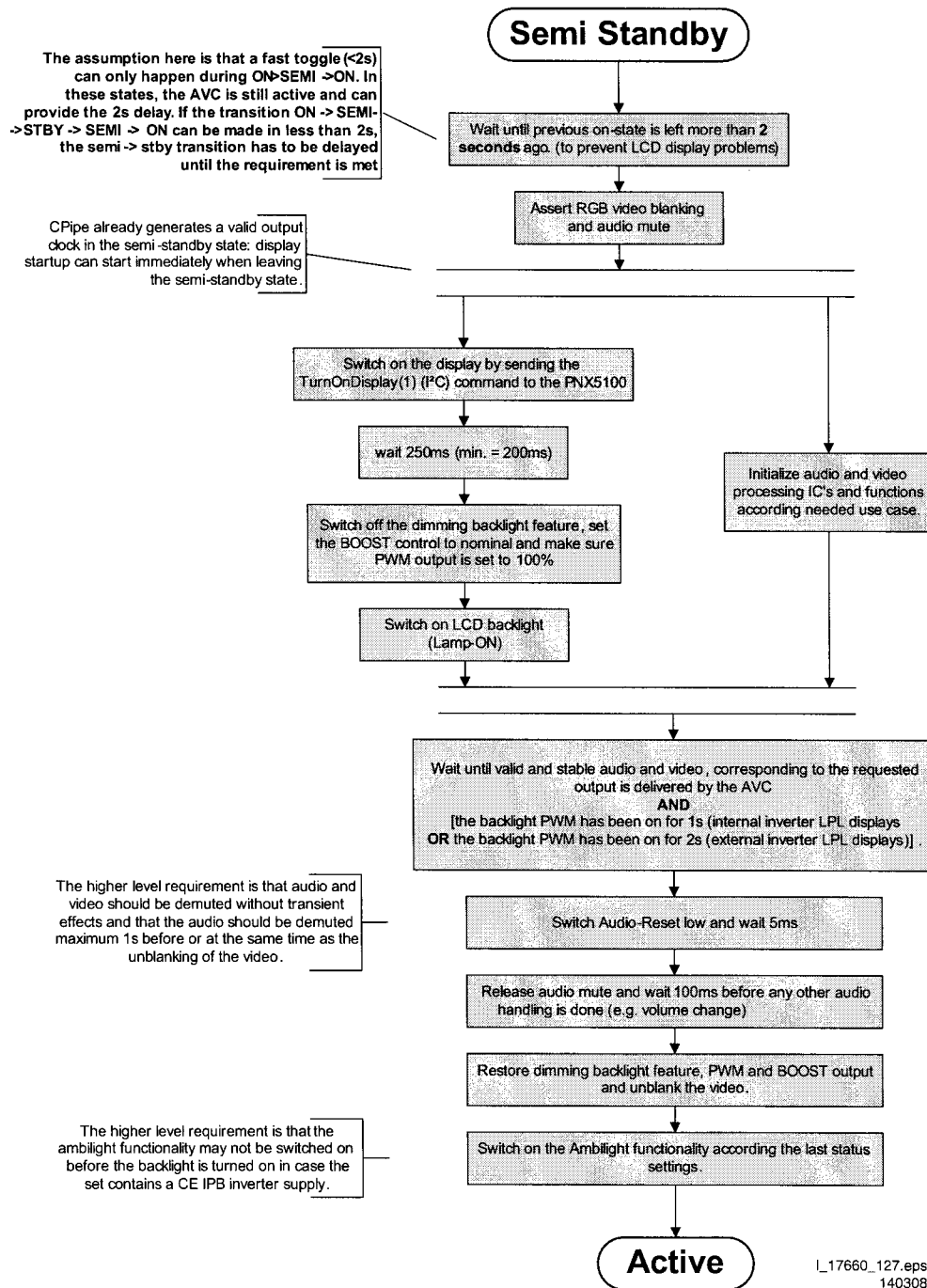


Figure 5-7 "Semi Stand-by" to "Active" flowchart LCD with preheat

Constraints taken into account:

- Display may only be started when valid LVDS output clock can be delivered by the AVC.
- Between 5 and 50 ms after power is supplied, display should receive valid lvds clock.
- minimum wait time to switch on the lamp after power up is 200ms.

action holder: AVC

action holder: St-by

autonomous action

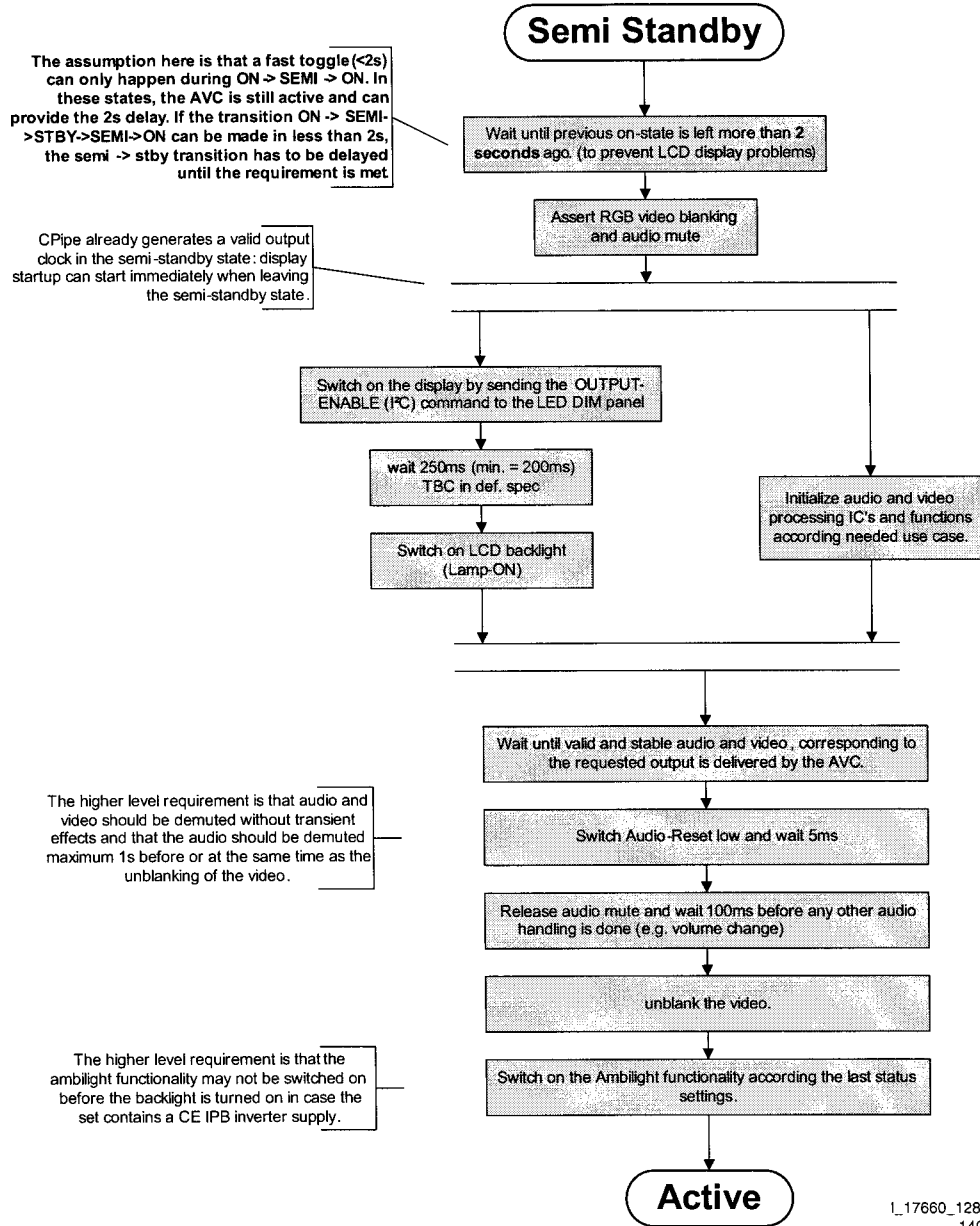


Figure 5-8 “Semi Stand-by” to “Active” flowchart (LED backlight)

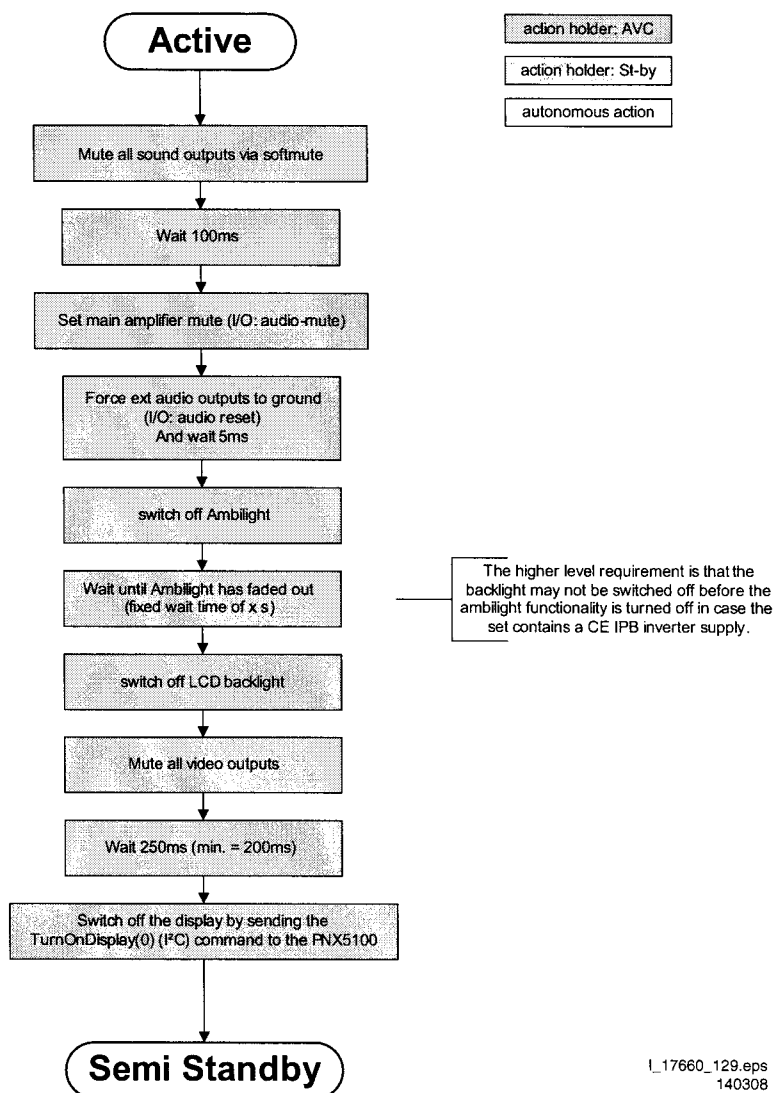


Figure 5-9 "Active" to "Semi Stand-by" flowchart (LCD non DFI)

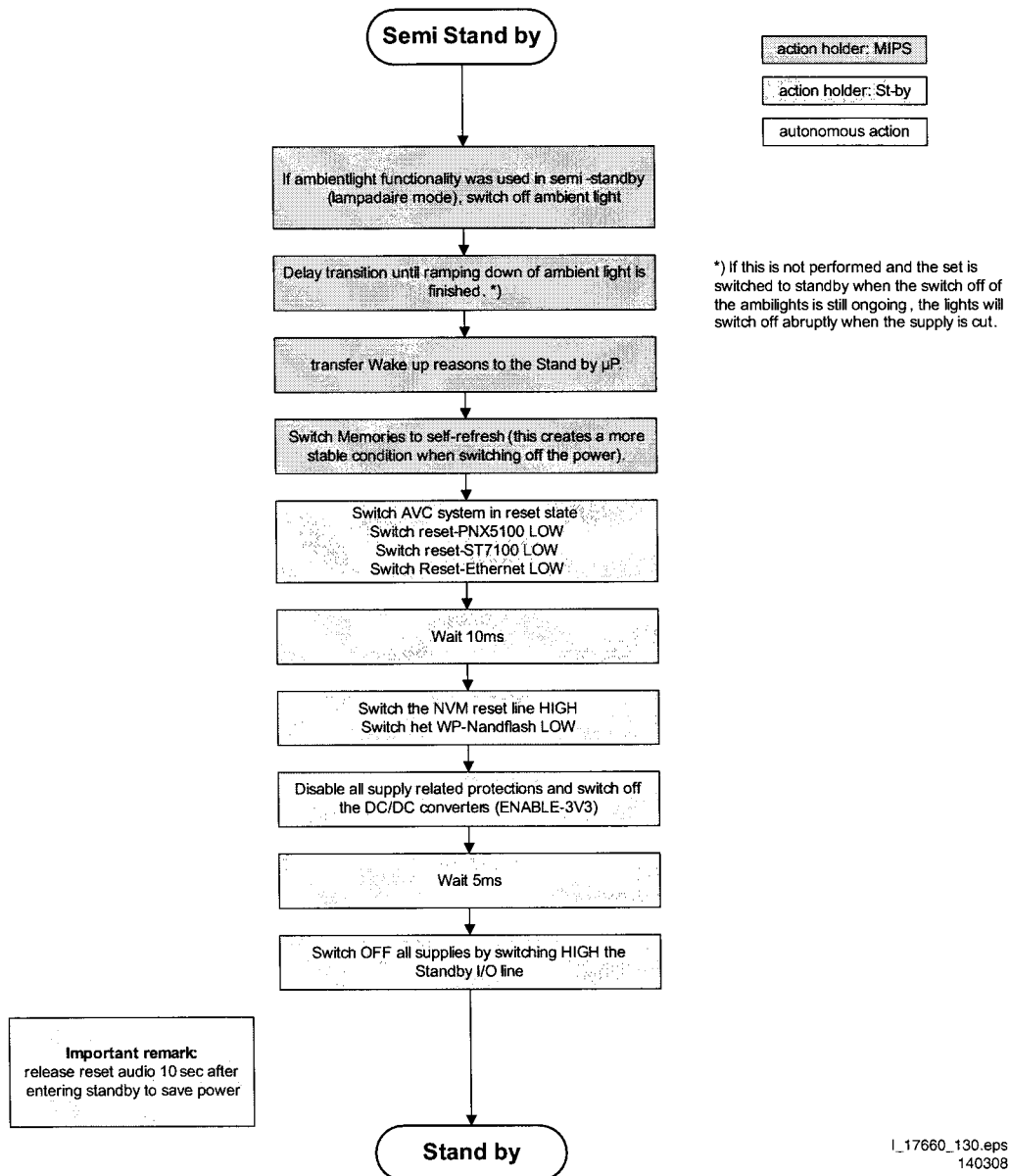


Figure 5-10 "Semi Stand-by" to "Stand-by" flowchart

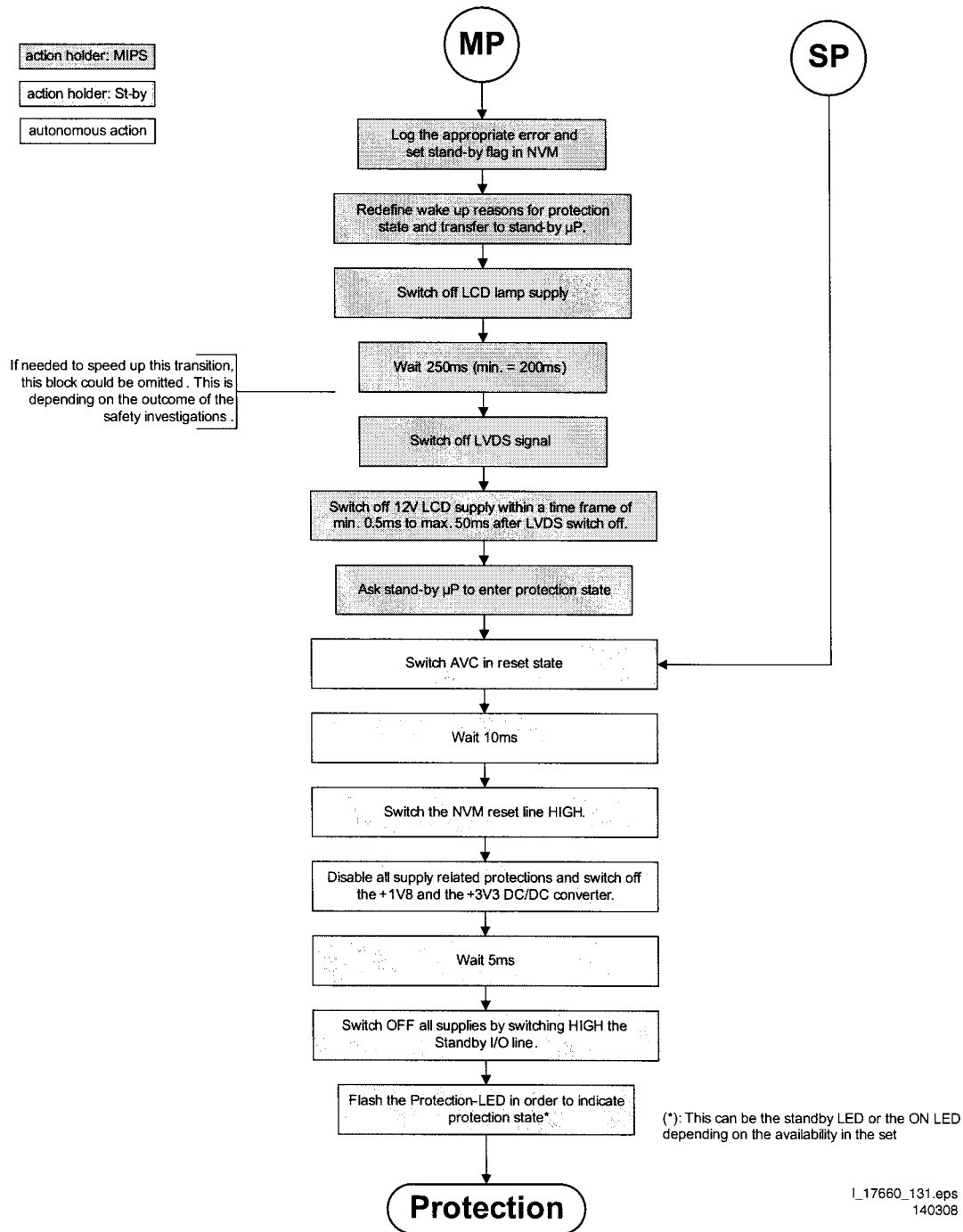


Figure 5-11 "To Protection State" flowchart

5.4 Service Tools

5.4.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Electronics products. and offers the following:

1. ComPair helps to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. No knowledge on I²C or UART commands is necessary, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the uP is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair II interface box is connected to the PC via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television, by a combination of automatic diagnostics and an interactive question/answer procedure.

How to Connect

This is described in the chassis fault finding database in ComPair.

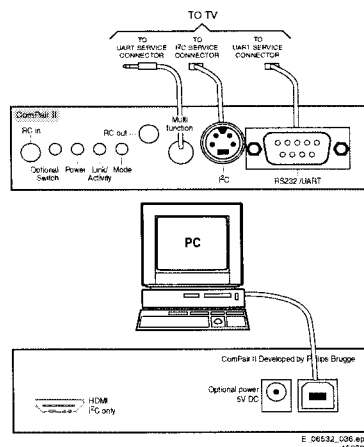


Figure 5-12 ComPair II interface connection

Caution: It is compulsory to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- Software is available via the Philips Service web portal.
- ComPair UART interface cable for Q54x.x.
(using 3.5 mm Mini Jack connector): 3138 188 75051.

Note: While encountering problems, contact the local support desk.

5.4.2 Memory and Audio Test

With this tool you can test the memory of the PNX8543, as well if the PNX5100 is enabled and audio-testing.

What is needed?

- An USB-stick
- "TESTSCRIPT Q549". Downloadable from the Philips Service website from the section "Software for Service only"
- A ComPair/service cable (3138 188 75051).

Procedure

Create a directory "JETTFILES" under the root of the USB-stick

- Place "MemTestTV543.bin" and "autojett.bin" (available in "TESTSCRIPT Q549") under the directory "JETTFILES"
- Install the computer program "BOARDTESTLOGGER" (available in "TESTSCRIPT Q549") on the PC
- Connect a "ComPair/service"-cable from the service-connector in the set, into the "multi function" jack at the front of the ComPair II box :
Required settings in ComPair :
 - start up the ComPair application.
 - Select the correct database (open file "Q549.2E LA", this will set the ComPair interface in the appropriate mode).
 - Close ComPair
- Start up the program "BOARDTESTLOGGER" and select "COMx"
- Put the USB stick into the TV and start up the TV while pressing the "i+"-button on a Philips DVD RC6 remote control (it's also possible to use a TV remote in "DVD"-mode)
- On the PC the memory test is shown now. This is also visible on the TV screen.
- In "BOARDTESTLOGGER" an option "Send extra UART command" can be found where you can select "AUD1". This command generates hear test tones of 200, 400, 1000, 2000, 3000, 5000, 8000 and 12500Hz.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.

When an error occurs, it is added to the list of errors, provided the list is not full. When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained).

To prevent that an occasional error stays in the list forever, the error is removed from the list after more than 50 hrs. of operation.

When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

New in this chassis is the way errors can be displayed:

- There is a simple blinking LED procedure for board level repair (home repair) so called LAYER 1 errors next to the existing errors which are LAYER 2 errors (see [Table 5-2](#)).
 - LAYER 1 errors are one digit errors.
 - LAYER 2 errors are 2 digit errors.
 - In protection mode.
 - From consumer mode: **LAYER 1**.
 - From SDM mode: **LAYER 2**.
 - Fatal errors, if I2C bus is blocked and the set reboots, CSM and SAM are not selectable.
 - From consumer mode: **LAYER 1**.
 - From SDM mode: **LAYER 2**.
- Important remark:

For all errors detected by MIPS which are fatal => rebooting of the TV set (reboot starts after LAYER 1 error blinking), one should short the solder paths (SDM) at start-up from the power OFF state by mains interruption and not via the power button to trigger the SDM via the hardware pins.

- In CSM mode
 - When entering CSM: error **LAYER 1** will be displayed by blinking LED. Only the latest error is shown.
- In SDM mode
 - When SDM is entered via Remote Control code or the hardware pins, **LAYER 2** is displayed via blinking LED.
- In the ON state
 - In “Display error mode”, set with the RC commands “mute_06250X_OK” **LAYER 2** errors are displayed via blinking LED.
- Error display on screen.
 - In CSM no error codes are displayed on screen.
 - In SAM the complete error list is shown.

Basically there are three kinds of errors:

- **Errors detected by the Stand-by software which lead to protection.** These errors will always lead to protection and an automatic start of the blinking LED LAYER 1 error. (see section “[5.6 The Blinking LED Procedure](#)”).
- **Errors detected by the Stand-by software which not lead to protection.** In this case the front LED should blink the involved error. See also section “[5.5 Error Codes](#), [5.5.4 Error Buffer](#), [Extra Info](#)”. Note that it can take up several minutes before the TV starts blinking the error (e.g. LAYER 1 error = 2, LAYER 2 error = 15 or 53).
- **Errors detected by main software (MIPS).** In this case the error will be logged into the error buffer and can be read out via ComPair, via blinking LED method LAYER 1-2 error, or in case picture is visible, via SAM.

5.5.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SAM (only when a picture is visible).
E.g.:
 - **00 00 00 00 00**: No errors detected
 - **23 00 00 00 00**: Error code 23 is the last and only detected error.
 - **37 23 00 00 00**: Error code 23 was first detected and error code 37 is the last detected error.
 - Note that no protection errors can be logged in the error buffer.
- Via the blinking LED procedure. See section [5.5.3 How to Clear the Error Buffer](#).
- Via ComPair.

5.5.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the “RESET ERROR BUFFER” command in the SAM menu.
- With a normal RC, key in sequence “MUTE” followed by “062599” and “OK”.
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Buffer

In case of non-intermittent faults, clear the error buffer before starting to repair (**before** clearing the buffer, write down the content, as this history can give significant information). This to ensure that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g. a fault in the protection detection circuitry can also lead to a protection).

There are several mechanisms of error detection:

- Via error bits in the status registers of ICs.

- Via polling on I/O pins going to the stand-by processor.
- Via sensing of analog values on the stand-by processor or the PNX8543.
- Via a “not acknowledge” of an I²C communication.

Take notice that some errors need several minutes before they start blinking or before they will be logged. So in case of problems wait 2 minutes from start-up onwards, and then check if the front LED is blinking or if an error is logged.

Table 5-2 Error code overview

Description	Layer 1	Layer 2	Monitored by	Error/Prot	Error Buffer/ Blinking LED	Device	Defective Board
I ² C3	2	13	MIPS	E	BL / EB	SSB	SSB
I ² C2	2	14	MIPS	E	BL / EB	SSB/Display	SSB/display
PNX doesn't boot (HW cause) PNX 5100 doesn't boot	2	15	Stby μ P	P	BL	PNX8543/PNX51XX I ² C blocked	SSB
12V	3	16	Stby μ P	P	BL	/	Supply
Inverter or display supply	3	17	MIPS	E	EB	/	
1V2, 3V3, 5V to low	2	18	Stby μ P	P	BL	/	SSB
Temp protection	3	12	MIPS	E	EB	/	Display
PNX 5100	2	21	MIPS	E	EB	PNX5100	SSB
HDMI mux	2	23	MIPS	E	EB	TDA9996	SSB
I ² C switch	2	24	MIPS	E	EB	PCA9540	SSB
Boot-NVM PNX5100	2	25	MIPS	E	EB	STM24C08	SSB
Multi Standard demodulator (Micronas IF)	2	27	MIPS	E	EB	DRX3616K DRX3626K	SSB
ARM (ambilight)	8	28	MIPS	E	EB	NXP LPC2103	AL module or DC/DC
FPGA (Local contrast)	2	29	MIPS	E	EB	Altera	SSB
Tuner	2	34	MIPS	E	EB	UV1783S/HD1816	SSB
Fan I2C expander	7	41	MIPS	E	EB	PCA9533	FAN module
T° sensor	7	42	MIPS	E	EB	LM 75	T° sensor
FAN 1	7	43	MIPS	E	EB		FAN
FAN 2	7	44	MIPS	E	EB		FAN
Main NVM	2	/	MIPS	E	X	STM24C128	SSB
PNX doesn't boot (SW cause)	2	53	Stby μ P	E	BL	PNX8543	SSB
Display (only 56PFL9954H)	5	64	MIPS	E	BL / EB	Altera	Display

Extra Info

- **Rebooting.** When a TV is constantly rebooting due to internal problems, most of the time no errors will be logged or blinked. This rebooting can be recognized via a ComPair interface and Hyperterminal (for Hyperterminal settings, see section "5.8 Fault Finding and Repair Tips, 5.8.6 Logging"). It's shown that the loggings which are generated by the main software keep continuing. In this case diagnose has to be done via ComPair.
- **Error 13 (I²C bus 3 blocked).** At the time of release of this manual, this error was not working as expected. Current situation: when this error occurs, the TV will constantly reboot due to the blocked bus. The best way for further diagnosis here, is to use ComPair.
- **Error 15 (PNX8543,PNX5100 doesn't boot).** Indicates that the main processor/PNX5100 was not able to read his bootscript. This error will point to a hardware problem around the PNX8543 (supplies not OK, PNX 8543 completely dead, I²C link between PNX and Stand-by Processor broken, etc...). When error 15 occurs it is also possible that I²C1 bus is blocked (NVM). I²C1 can be indicated in the schematics as follows: SCL-UP-MIPS, SDA-UP-MIPS, SCL-1, SDA-1, SCL-2 or SDA-2. Other root causes for this error can be due to hardware problems from the NVM PNX5100, DDR's and the bootscript reading from the PNX5100.
- **Error 16 (12V).** This voltage is made in the power supply and results in protection (LAYER 1 error = 3) in case of absence. When SDM is activated we see blinking LED LAYER 2 error = 16.
- **Error 17 (Invertor or Display Supply).** Here the status of the "Power OK" is checked by software, no protection will occur during failure of the invertor or display supply (no picture), only error logging. LED blinking of LAYER 1 error = 3 in CSM, in SDM this gives LAYER 2 error = 17.
- **Error 18 (1V2-3V3-5V too low).** All these supplies are generated by the DC/DC supply on the SSB. If one of these supplies is too low, protection occurs and blinking LED LAYER 1 error = 2 will be displayed automatically. In SDM this gives LAYER 2 error = 18.
- **Error 21 (PNX 5100).** When there is no I²C communication towards the PNX5100, the TV set will start rebooting and display LAYER 1 error = 2. Disconnect the mains cord now and start up the TV set with the solder path (SDM) short to ground during start-up to activate the LAYER 2 error blinking. Error "21" will be logged and displayed via the blinking LED procedure after a few moments from start-up. Remark : the rebooting can be recognized via a ComPair interface and Hyperterminal (for Hyperterminal settings, see section "5.8 Fault Finding and Repair Tips, 5.8.6 Logging"). It is shown that the loggings which are generated by the main software keep continuing. Check in the logging for keywords like e.g. "Device error 21".
- **Error 23 (HDMI).** When there is no I²C communication towards the HDMI mux after start-up, LAYER 2 error = 23 will be logged and displayed via the blinking LED procedure if SDM is switched on. It should be noted that in case a new spare EDID MUX device is used for repair, the initial default address must be changed from "C0" to "CE", to be done via ComPair.
- **Error 24 (I²C switch).** When there is no I²C communication towards the I²C switch, LAYER 2 error = 24 will be logged and displayed via the blinking LED procedure when SDM is switched on. Remark : this only works for TV sets with an I²C controlled screen included.
- **Error 25 (Boot-NVM PNX5100).** Same behaviour as described in "Error 21 (PNX5100)".
- **Error 27 (Micronas IF).** When there is no I²C communication towards the multi standard demodulator, LAYER 2 error = 27 will be logged and displayed via the blinking LED procedure if SDM is switched on.
- **Error 28 (ARM ambilight).** When there is no I²C communication towards the ARM processor, LAYER 2 error = 28 will be logged and displayed via the blinking LED procedure if SDM is switched on.
- **Error 29 (FPGA local contrast).** When there is no I²C communication towards this FPGA, LAYER 2 error = 29 will be logged and displayed via the blinking LED procedure if SDM is activated.
- **Error 34 (Tuner).** When there is no I²C communication towards the tuner after start-up, LAYER 2 error = 34 will be

logged and displayed via the blinking LED procedure when SDM is switched on.

- **Error 42 (Temp sensor).** Only applicable for TV sets with an I²C controlled screen.
- **Main NVM.** When there is no I²C communication towards the main NVM, LAYER 1 error = 2 will be displayed via the blinking LED procedure. In SDM, LAYER 2 error will be blinked as "15". Errors here can not be logged due to inaccessibility of the NVM device.
- **Error 53.** This error will indicate that the PNX8543 has read his bootscript (when this would have failed, error 15 would blink) but initialization was never completed because of hardware problems (NAND flash, ...) or software initialization problems. Possible cause could be that there is no valid software loaded (try to upgrade to the latest main software version). Note that it can take a few minutes before the TV starts blinking LAYER 1 error = 2 or in SDM, LAYER 2 error = 53.
- **Error 64.** Only applicable for TV sets with an I²C controlled screen.

5.6 The Blinking LED Procedure

5.6.1 Introduction

The blinking LED procedure can be split up into two situations:

- Blinking LED procedure LAYER 1 error. In this case the error is automatically blinked when the TV is put in CSM. This will be only one digit error, namely the one that is referring to the defective board (see table "[5-2 Error code overview](#)") which causes the failure of the TV. This approach will especially be used for home repair and call centres. The aim here is to have service diagnosis from a distance.
- Blinking LED procedure LAYER 2 error. Via this procedure, the contents of the error buffer can be made visible via the front LED. In this case the error contains 2 digits (see table "[5-2 Error code overview](#)") and will be displayed when SDM (hardware pins) is activated. This is especially useful for fault finding and gives more details regarding the failure of the defective board.

Important remark:

For all errors detected by MIPS which are fatal => rebooting of the TV set (reboot starts after LAYER 1 error blinking), one should short the solder paths at start-up from the power OFF state by mains interruption and not via the power button to trigger the SDM via the hardware pins.

When one of the blinking LED procedures is activated, the front LED will show (blink) the contents of the error buffer. Error codes greater than 10 are shown as follows:

1. "n" long blinks (where "n" = 1 to 9) indicating decimal digit
2. A pause of 1.5 s
3. "n" short blinks (where "n" = 1 to 9)
4. A pause of approximately 3 s,
5. When all the error codes are displayed, the sequence finishes with a LED blink of 3 s
6. The sequence starts again.

Example: Error 12 8 6 0 0.

After activation of the SDM, the front LED will show:

1. One long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s
2. Two short blinks of 250 ms followed by a pause of 3 s
3. Eight short blinks followed by a pause of 3 s
4. Six short blinks followed by a pause of 3 s
5. One long blink of 3 s to finish the sequence
6. The sequence starts again.

5.6.2 How to Activate

Use one of the following methods:

- **Activate the CSM.** The blinking front LED will show only the latest layer 1 error, this works in "normal operation" mode or automatically when the error/protection is monitored by the standby processor.
In case no picture is shown and there is no LED blinking, read the logging to detect whether "error devices" are mentioned. (see section "[5.8 Fault Finding and Repair Tips, 5.8.6 Logging](#)").
- **Activate the SDM.** The blinking front LED will show the entire content of the LAYER 2 error buffer, this works in "normal operation" mode or when SDM (via hardware pins) is activated when the tv set is in protection.
Important remark:
For all errors detected by MIPS which are fatal => rebooting of the TV set (reboot starts after LAYER 1 error blinking), one should short the solder paths at start-up from the power OFF state by mains interruption and not via the power button to trigger the SDM via the hardware pins.
- **Transmit the commands "MUTE" - "062500" - "OK" with a normal RC.** The complete error buffer is shown. Take notice that it takes some seconds before the blinking LED starts.
- **Transmit the commands "MUTE" - "06250x" - "OK" with a normal RC** (where "x" is a number between 1 and 5). When x = 1 the last detected error is shown, x = 2 the second last error, etc.... Take notice that it takes some seconds before the blinking LED starts.

5.7 Protections

5.7.1 Software Protections

Most of the protections and errors use either the stand-by microprocessor or the MIPS controller as detection device. Since in these cases, checking of observers, polling of ADCs, and filtering of input values are all heavily software based, these protections are referred to as software protections. There are several types of software related protections, solving a variety of fault conditions:

- **Protections related to supplies:** check of the 12V, +5V, +3V3 and 1V2.
- **Protections related to breakdown of the safety check mechanism.** E.g. since the protection detections are done by means of software, failing of the software will have to initiate a protection mode since safety cannot be guaranteed any more.

Remark on the Supply Errors

The detection of a supply dip or supply loss during the normal playing of the set does not lead to a protection, but to a cold reboot of the set. If the supply is still missing after the reboot, the TV will go to protection.

Protections during Start-up

During TV start-up, some voltages and IC observers are actively monitored to be able to optimise the start-up speed, and to assure good operation of all components. If these monitors do not respond in a defined way, this indicates a malfunction of the system and leads to a protection. As the observers are only used during start-up, they are described in the start-up flow in detail (see section "[5.3 Stepwise Start-up](#)").

5.7.2 Hardware Protections

The only real hardware protection in this chassis appears in case of an audio problem e.g. DC voltage on the speakers. This protection will only affect the Class D (7D10) and puts the amplifier in a continuous burst mode (cyclus approximately 2 seconds).

Repair Tip

- There will be still picture available but no sound. While the Class D amplifier tries to start-up again, the cone of the

loudspeakers will move slowly in one or the other direction until the initial failure shuts the amplifier down, this cyclis starts over and over again.

5.7.3 Important remark regarding the blinking LED indication

As for the blinking LED indication, the blinking led of LAYER 1 error displaying can be switched off by pushing the power button on the keyboard.

This condition is not valid after the set was unpowered (via mains interruption). The blinking LED starts again and can only be switched off by unplugging the mains connection.

This can be explained by the fact that the MIPS can not load the keyboard functionality from software during the start-up and doesn't recognizes the keyboard commands at this time.

5.8 Fault Finding and Repair Tips

Read also section "[5.5 Error Codes](#), [5.5.4 Error Buffer](#), [Extra Info](#)".

5.8.1 Ambilight

Due to degeneration process of the AmbiLights, there can be a difference in the colour and/or light output of the spare ambilight module in comparison with the originals ones contained in the TV set. Via ComPair the light output can be adjusted.

5.8.2 Audio Amplifier

The Class D-IC 7D10 has a powerpad for cooling. When the IC is replaced it must be ensured that the powerpad is very well pushed to the PWB while the solder is still liquid. This is needed to insure that the cooling is guaranteed, otherwise the Class D-IC could break down in short time.

5.8.3 CSM

When CSM is activated and there is a USB stick connected to the TV, the software will dump the complete CSM content to the USB stick. The file (Csm.txt) will be saved in the root of the USB stick. If this mechanism works it can be concluded that a large part of the operating system is already working (MIPS, USB...)

5.8.4 DC/DC Converter

Description

The onboard supply consists of 5 DC/DC converters and 4 linear stabilizers. All DC/DC converters have +12V input voltage and deliver :

- +1V2-PNX85XX supply voltage (1.24V nominal), stabilized close to PNX8543 chip.
- +1V2-PNX5120 supply voltage (1.26V nominal), stabilized close to PNX5120 chip.
- +3V3 (3.34V nominal, overall 3.3 V for onboard IC's).
- +5V (5.15V nominal) for USB and Conditional Access Interface and +5V5-TUN for +5V-TUN tuner stabilizer.
- +33VTUN (34V nominal) for analog-only tuners.

The linear stabilizers are providing:

- +1V2-STANDBY (out of +3V3-STANDBY), 1.24V nominal.
- +1V8-PNX85XX and +1V8PNX5100 (connected via CFH1), 1.84V nominal.
- +2V5 (WOW FPGA diversity only), 2.5V nominal.
- +5V-TUN (out of +5V5-TUN), 5V nominal.

+3V3-STANDY and +1V2-STANDBY are permanent voltages. Supply voltages +1V2-PNX85XX and +1V2-PNX5100 are

started immediately when +12V incoming voltage is available (+12V is enabled by STANDBY signal, active low). Supply voltages +3V3, 2V5, +1V8-PNX5100, +1V8-PNX85XX, +5V and +5V-TUN are switched-on directly by signal ENABLE-3V3 (active low), provided that +12V (detected via 7U40 & 7U41) is available. +12V is considered OK ($\Rightarrow$ DETECT -12V signal becomes high and 12V/3V3 and 12V/5V DC-DC converter can be started up) if it rises above 10V5 (typical) and doesn't drop below 10V (typical).

Debugging

The best way to find a failure in the DC/DC converters is to check their start-up sequence at power-on via the mains cord, presuming that the standby microprocessor and the external supply are operational. Take STANDBY signal high-to-low transition as time reference.

When +12V becomes available (maximum 1 second after STANDBY signal goes low) then +1V2-PNX85XX and +1V2-PNX5100 are started immediately. Then, after ENABLE-3V3 goes low, all the other supply voltages should rise within 2ms.

Tips

- When an output supply voltage is short-circuited to GND the corresponding DC-DC converter is not making any audible noise, the converter switches-off immediately and will attempt a re-start only after +12V drops and rises again.
- Check the integrity (at least no short-circuit between drain and source) of power MOS-FETs, especially the high-side ones: 7U05, 7U08, 7U0D-1 and 7U0H-1 before starting the platform in SDM mode, otherwise it can be easily damaged.
- Switching frequency of DC-DC converters should be around 290KHz for 12V to 1V2 DC-DC converters and around 370KHz for 12V to 3V3 and 12V to 5V DC-DC converters.

5.8.5 Exit "Factory Mode"

When an "F" is displayed in the screen's right corner, this means the set is in "Factory" mode, and it normally happens after a new SSB is mounted. To exit this mode, push the "VOLUME minus" button on the TV's local keyboard for 10 seconds (this disables the continuous mode). Then push the "SOURCE" button for 10 seconds until the "F" disappears from the screen.

5.8.6 Logging

When something is wrong with the TV set (f.i. the set is rebooting) you can check for more information via the logging in Hyperterminal. The Hyperterminal is available in every Windows application via Programs, Accessories, Communications, Hyperterminal. Connect a "ComPair UART"-cable (3138 188 75051) from the service connector in the TV to the "multi function" jack at the front of ComPair II box. Required settings in ComPair before starting to log :

- Start up the ComPair application.
- Select the correct database (open file "Q549.2E LA", this will set the ComPair interface in the appropriate mode).
- Close ComPair

After start-up of the Hyperterminal, fill in a name (f.i. "logging") in the "Connection Description" box, then apply the following settings:

1. COMx
2. Bits per second = 115200
3. Data bits = 8
4. Parity = none
5. Stop bits = 1
6. Flow control = none

During the start-up of the TV set, the logging will be displayed. This is also the case during rebooting of the TV set (the same logging appears time after time). Also available in the logging is the "Display Option Code" (useful when there is no picture),

look for item "DisplayRawNumber" in the beginning of the logging. Tip: when there is no picture available during rebooting you are able to check for "error devices" in the logging (LAYER 2 error) which can be very helpful to determine the failure cause of the reboot. For protection state, there is no logging.

5.8.7 Loudspeakers

Make sure that the volume is set to minimum during disconnecting the speakers in the ON-state of the TV. The audio amplifier can be damaged by disconnecting the speakers during ON-state of the set!

5.8.8 IPB

In case of no picture when CSM-test pattern from PNX5100 is activated and backlight doesn't light up, it's recommended first to check the inverter on the IPB + wiring (LAYER 2 error = 17 is displayed in SDM).

5.8.9 Tuner

Attention: In case the tuner is replaced, always check the tuner options!

5.8.10 PCI bus

The splash screen image is not distributed via the regular YUV signal path from the PNX8543 to the PNX51XX, but loaded one time via the PCI bus. Once the splash screen image is loaded into the PNX51XX, it will be continuously generated by the PNX51XX until the first incoming video disables the splash screen. So when teletext and/or general UI is available, but no splash screen (option "ON") is visible during start-up, check the PCI bus as possible root cause.

5.8.11 Display option code

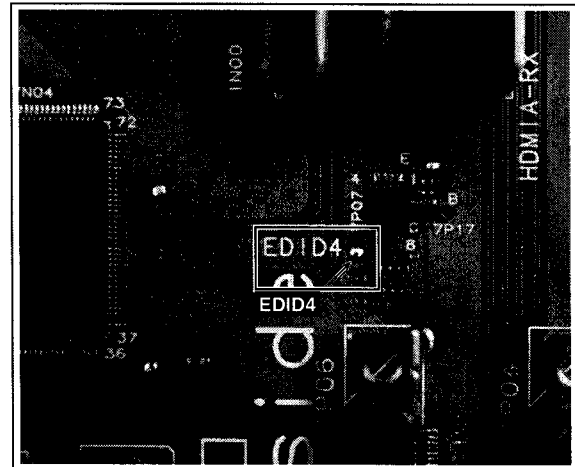
Attention: In case the SSB is replaced, always check the display option code in SAM, even when picture is available. Performance with the incorrect display option code can lead to unwanted side-effects for certain conditions.

5.8.12 Upgrade HDMI EDID NVM

The EDID MUX device (including all HDMI NVM except the 4th) is upgradeable via USB, see ComPair for further instructions. It should be noted that in case a new spare EDID MUX device is used for repair, the initial default address must be changed from "C0" to "CE", to be done via ComPair.

5.8.13 Upgrade VGA/4th HDMI EDID NVM

The EDID for VGA connector or the 4th HDMI can only be upgraded via external I²C. To upgrade the EDID for the VGA connector or 4th HDMI, pin 7 of the EDID NVM has to be short circuited to ground. Therefore a test point is foreseen (see [Figure 5-13](#)). For the VGA EDID NVM it's most suitable to connect pin 7 to ground on the NVM device itself. See ComPair for further instructions.



18310_220_090318.eps
090319

Figure 5-13 4th HDMI EDID NVM pin

5.8.14 Wi-Fi module

To prevent damage on the coax wires, especially the female core of the coax wires (can be bend over during dis- and reconnecting), this should be carried out by use of pliers.

5.8.15 SSB Replacement

Follow the instructions in the flowchart in case a SSB has to be exchanged. See figure "SSB replacement flowchart".

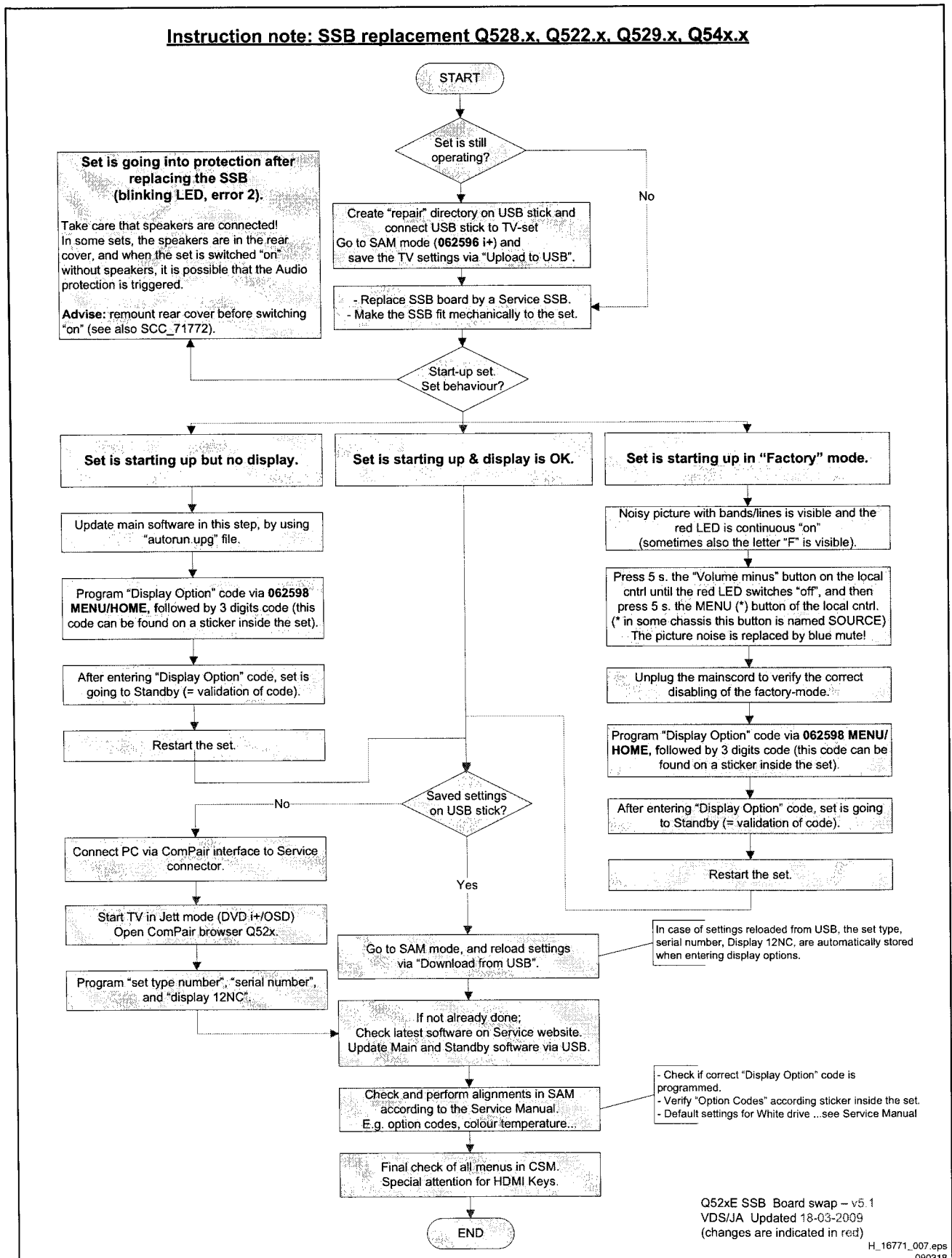


Figure 5-14 SSB replacement flowchart

5.9 Software Upgrading

5.9.1 Introduction

The set software and security keys are stored in a NAND-Flash, which is connected to the PNX8543 via the PCI bus.

It is possible **for the user** to upgrade the **main** software via the USB port. This allows replacement of a software image in a stand alone set, without the need of an E-JTAG debugger. A description on how to upgrade the main software can be found in the DFU.

Important: When the NAND-Flash must be replaced, a new SSB must be ordered, due to the presence of the security keys! (copy protection keys, MAC address, ...).

Perform the following actions after SSB replacement:

1. Set the correct option codes (see sticker inside the TV).
2. Update the TV software => see the eUM (electronic User Manual) for instructions.
3. Perform the alignments as described in chapter 6 (section [6.5 Reset of Repaired SSB](#)).
4. Check in CSM if the HDMI key, MAC address.. are valid. For the correct order number of a new SSB, always refer to the Spare Parts list!

5.9.2 Main Software Upgrade

- The "UpgradeAll.upg" file is only used in the factory.
- The "FlashUtils.upg" file is only used by service centra which are allowed to do component level repair on the SSB.

Automatic Software Upgrade

In "normal" conditions, so when there is no major problem with the TV, the main software and the default software upgrade application can be upgraded with the "AUTORUN.UPG" (FUS part of the one-zip file: e.g. 3104 337 05661 _FUS_Q5492_1.26.15.0_commercial.zip). This can also be done by the consumers themselves, but they will have to get their software from the commercial Philips website or via the Software Update Assistant in the user menu (see eUM). The "autorun.upg" file must be placed in the root of the USB stick.

How to upgrade:

1. Copy "AUTORUN.UPG" to the root of the USB stick.
2. Insert USB stick in the set while the set is in ON MODE. The set will restart and the upgrading will start automatically. As soon as the programming is finished, a message is shown to remove the USB stick and restart the set.

Manual Software Upgrade

In case that the software upgrade application does not start automatically, it can also be started manually.

How to start the software upgrade application manually:

1. Disconnect the TV from the Mains/AC Power.
2. Press the "OK" button on a Philips TV remote control or a Philips DVD RC-6 remote control (it is also possible to use a TV remote in "DVD" mode). Keep the "OK" button pressed while reconnecting the TV to the Mains/AC Power.
3. The software upgrade application will start.

Attention!

In case the download application has been started **manually**, the "autorun.upg" will maybe not be recognized.

What to do in this case:

1. Create a directory "UPGRADES" on the USB stick.
2. Rename the "autorun.upg" to something else, e.g. to "software.upg". Do not use long or complicated names, keep it simple. Make sure that "AUTORUN.UPG" is no longer present in the root of the USB stick.
3. Copy the renamed "upg" file into this directory.
4. Insert USB stick into the TV.

5. The renamed "upg" file will be visible and selectable in the upgrade application.

Back-up Software Upgrade Application

If the default software upgrade application does not start (could be due to a corrupted boot 2 sector) via the above described method, try activating the "back-up software upgrade application".

How to start the "back-up software upgrade application" manually:

1. Disconnect the TV from the Mains/AC Power.
2. Press the "INFO"-button on a Philips remote control or "CURSOR DOWN" button on a Philips DVD RC-6 remote control (it is also possible to use a TV remote in "DVD" mode). Keep the "INFO"-button (or "cursor down" button) pressed while reconnecting the TV to the Mains/AC Power.
3. The software upgrade application will start.

5.9.3 Stand-by Software Upgrade via USB

In this chassis it is possible to upgrade the Stand-by software via a USB stick. The method is similar to upgrading the main software via USB.

Use the following steps:

1. Create a directory "UPGRADES" on the USB stick.
2. Copy the Stand-by software (part of the one-zip file, e.g. StandbySW_CFT72_88.0.0.0.upg) into this directory.
3. Insert the USB stick into the TV.
4. Start the download application manually (see section [Manual Software Upgrade](#)).
5. Select the appropriate file and press the "OK" button to upgrade.

5.9.4 Content and Usage of the One-Zip Software File

Below the content of the One-Zip file is explained, and instructions on how and when to use it.

- **BootProm_PNX5120_Q5492_x.x.x.x.zip.** A programmed device can be ordered via the regional Service organization.
- **Ceisp2padII_P2PAD_x.x.x.x.zip.** Not to be used by Service technicians. For ComPair development only.
- **DDC_Q5492_x.x.x.x.zip.** Contains the content of the VGA NVM. See ComPair for further instruction.
- **EDID_Q5492_x.x.x.x.zip.** Contains the EDID content of the different EDID NVM's. See ComPair for further instructions.
- **EJTAGDownload_Q5492_x.x.x.x.zip.** Only used by service centra which are allowed to do component level repair.
- **FUS_Q5492_x.x.x.x_commercial.zip.** Contains the "autorun.upg" which is needed to upgrade the TV main software and the software download application.
- **Factory_Q5492_x.x.x.x_commercial.zip.** Only for production purposes, not to be used by Service technicians.
- **FlashUtils_Q5492_x.x.x.x_commercial.zip.** Not to be used by Service technicians.
- **MOP_RAC3_x.x.x.x.zip.** Contains the MOP local contrast software and is upgradeable via USB (UPG). This SW is not part of the FUS autorun.upg!
- **OAD_Q5492_x.x.x.x.zip.** Not to be used by Service Technicians.
- **OpenSourceFile_Q5492_x.x.x.x.zip.** Not to be used by Service technicians.
- **PQPrivate_Q5492_x.x.x.x.zip.** Not to be used by Service technicians.
- **StandbySW_CFTxx_x.x.x.x_commercial.zip.** Contains the Stand-by software in "upg" and "hex" format.
 - The "StandbySW_XXXXX_prod.upg" file can be used to upgrade the Stand-by software via USB.
 - The "StandbySW_XXXXX.hex" file can be used to upgrade the Stand-by software via ComPair.

- The files “StandbySW_XXXXX_exhex.hex” and “StandbySW_XXXXX_dev.upg” may not be used by Service technicians (only for development purposes).
- **UpgradeAll_Q5492_x.x.x.x_commercial.zip.** Only for production purposes, not to be used by Service technicians.
Caution: Never try to use this file, because it will overwrite the HDCP keys !!!
- **UpgradeExe_Q5492X_x.x.x.x.zip.** Not to be used by Service Technicians.
- **Ambilight_Q5492_x.x.x.x.zip.** Not to be used by Service technicians.
- **Cabinet_Q5492_x.x.x.x.zip.** Not to be used by Service technicians.
- **Display_Q5492_x.x.x.x.zip.** Not to be used by Service technicians.
- **LightGuide_TV522_x.x.x.x_.zip.** Not to be used by Service Technicians.
- **ProcessNVM_Q5492_x.x.x.x.zip.** Default NVM content. Must be programmed via ComPair or can be loaded via USB, be aware that all alignments stored in NVM are overwritten here.

5.9.5 Content of the MOP Ambilight ARM SW File

- MOP_AMBILIGHT_V1-2_UPG_jettsigned.zip. Contains the MOP ambientlight software (ARM processor on the DC-DC AL interface board) and is upgradeable via USB (UPG). This SW is not part of the FUS autorun.upg! and is not available in the One-Zip software file but provided separately via the commercial Philips website (software for servicers only). Instructions for upgrading are included in the zip file.

5.9.6 UART logging 2K9 (see section “5.8 Fault Finding and Repair Tips, 5.8.6 Logging)

6. Alignments

Index of this chapter:

- [6.1 General Alignment Conditions](#)
- [6.2 Hardware Alignments](#)
- [6.3 Software Alignments](#)
- [6.4 Option Settings](#)
- [6.5 Reset of Repaired SSB](#)
- [6.7 Total Overview SAM modes](#)

6.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
 - **AP-NTSC:** 120 V_{AC} or 230 V_{AC} / 50 Hz (± 10%).
 - **AP-PAL-multi:** 120 - 230 V_{AC} / 50 Hz (± 10%).
 - **EU:** 230 V_{AC} / 50 Hz (± 10%).
 - **LATAM-NTSC:** 120 - 230 V_{AC} / 50 Hz (± 10%).
 - **US:** 120 V_{AC} / 60 Hz (± 10%).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
- **Caution:** It is not allowed to use heat sinks as ground.
- Test probe: R_i > 10 MΩ, C_i < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

6.1.1 Alignment Sequence

- First, set the correct options:
 - In SAM, select "Options", and then "Option numbers".
 - Fill in the option settings for "Group 1" and "Group 2" according to the set sticker (see also paragraph [6.4 Option Settings](#)).
 - Press OK on the remote control before the cursor is moved to the left.
 - In submenu "Option numbers" select "Store" and press OK on the RC.
- OR:
 - In main menu, select "Store" again and press OK on the RC.
 - Switch the set to Stand-by.
- Warming up (>15 minutes).

6.2 Hardware Alignments

Not applicable.

6.3 Software Alignments

Put the set in SAM mode (see Chapter [5. Service Modes, Error Codes, and Fault Finding](#)). The SAM menu will now appear on the screen. Select ALIGNMENTS and go to one of the sub menus. The alignments are explained below.

The following items can be aligned:

- Tuner AGC.
- White point.

To store the data:

- Press OK on the RC **before the cursor is moved to the left**.
- In main menu select "Store" and press OK on the RC.
- Press MENU on the RC to switch back to the main menu.
- Switch the set to stand-by mode.

For the next alignments, supply the following test signals via a video generator to the RF input:

- **EU/AP-PAL models:** a PAL B/G TV-signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz
- **US/AP-NTSC models:** an NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **LATAM models:** an NTSC M TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

6.3.1 Tuner AGC (RF AGC Take Over Point Adjustment)

Purpose: To keep the tuner output signal constant as the input signal amplitude varies.

No alignment is necessary, for the AGC alignment you can use the default value : "80".

Store settings and exit SAM.

6.3.2 White Point

- Set "Active control" to "Off".
- Choose "TV menu", "TV Settings" and then "Picture" and set picture settings as follows:

Picture Setting	
Dynamic backlight	Off
Dynamic Contrast	Off
Colour Enhancement	Off
Picture Format	Unscaled
Light Sensor	Off
Brightness	50
Colour	0
Contrast	100

- Go to the SAM and select "Alignments"-> "White point".

White point alignment LCD screens:

- Use a 100% white screen as input signal and set the following values:
 - "Colour temperature": "Normal".
 - All "White point" values to: "127".
 - "Red BL offset" values to "8".
 - "Green BL offset" values to "8".

In case you have a colour analyser:

- Measure with a calibrated contactless colour analyser in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x,y coordinates (while holding one of the White point registers R, G or B on 127) by means of decreasing the value of one or two other white points to the correct x,y coordinates (see [Table 6-1 White D alignment values](#)). Tolerance: dx: ± 0.004, dy: ± 0.004.
- Repeat this step for the other colour temperatures that need to be aligned.
- When finished press OK on the RC and then press STORE (in the SAM root menu) to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-1 White D alignment values

Value	Cool (11000K)	Normal (9000K)	Warm (6500K)
x	0.270	0.279	0.309
y	0.279	0.287	0.328

If you do not have a colour analyser, you can use the default values. This is the next best solution. The default values are average values coming from production.

- Select a COLOUR TEMPERATURE (e.g. COOL, NORMAL, or WARM).

- Set the RED, GREEN and BLUE default values according to the values in [Table 6-2](#).
- When finished press OK on the RC, then press STORE (in the SAM root menu) to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-2 White tone default setting

White Tone	32"			37"			Black level offset	
Colour Temp	R	G	B	R	G	B	R	G
Normal	127	95	97	127	121	106	8	8
Cool	127	100	112	124	127	119	8	8
Warm	127	89	52	127	111	64	8	8

White Tone	56"			Black level offset	
Colour Temp	R	G	B	R	G
Normal	127	117	111	8	8
Cool	124	124	125	8	8
Warm	127	95	65	8	8

6.4 Option Settings

6.4.1 Introduction

The microprocessor communicates with a large number of I2C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these PNX5100 ICs (back-end advanced video picture improvement IC which offers motion estimation and compensation features (commercially called HDNM) plus integrated Ambilight control) is made known by the option codes.

Notes:

- After changing the option(s), save them by pressing the OK button on the RC before the cursor is moved to the left, select STORE in the SAM root menu and press OK on the RC.
- The new option setting is only active after the TV is switched "off" / "stand-by" and "on" again with the mains switch (the NVM is then read again).

6.4.2 Dealer Options

For dealer options, in SAM select "Dealer options".
See [Table 6-4 SAM mode overview](#).

6.4.3 (Service) Options

Select the sub menu's to set the initialisation codes (options) of the model number via text menus.
See [Table 6-4 SAM mode overview](#).

6.4.4 Opt. No. (Option numbers)

Select this sub menu to set all options at once (expressed in two long strings of numbers).
An option number (or "option byte") represents a number of different options. When you change these numbers directly, you can set all options very quickly. All options are controlled via eight option numbers.
When the NVM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a sticker inside the TV set and in [Table 6-3 Option and display code overview](#).

Example: The options sticker gives the following option numbers:

- 08192 00133 01387 45160
- 12232 04256 00164 00000

The first line (group 1) indicates hardware options 1 to 4, the second line (group 2) indicate software options 5 to 8. Every 5-digit number represents 16 bits (so the maximum value will be 65536 if all options are set).
When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number. See [Table 6-3 Option and display code overview](#) for the options.

Diversity

Not all sets with the same Commercial Type Number (CTN) necessarily have the same option code!

Use of Alternative BOM => an alternative BOM number usually indicates the use of an alternative display or power supply. This results in another display code thus in another Option code. For the power supply there is no difference. Refer to [Chapter 2. Technical Specifications and Connections](#).

6.4.5 Option Code Overview

Table 6-3 Option and display code overview

CTN	Options Group 1	Options Group 2	Disp. code
32PFL9604H/12	08211 35971 18431 45288	30645 47282 00184 00000	181
32PFL9604H/60	08211 35971 18431 45288	30645 47282 00184 00000	181
37PFL9604H/12	08227 35972 18431 45288	30625 47282 00176 00000	161
37PFL9604H/60	08227 35972 18431 45288	30625 47282 00176 00000	161
56PFL9954H/12	08275 33925 18431 45288	30644 47282 00161 00000	180

Important: after having edited the option numbers as described above, you **must press OK** on the remote control **before the cursor is moved to the left!**

6.5 Reset of Repaired SSB

A very important issue towards a repaired SSB from a service repair shop implies the reset of the NVM on the SSB.

A repaired SSB in service should get the service Set type "00PF0000000000" and Production code "00000000000000". Also the virgin bit is to be set. To set all this, you can use the ComPair tool.

In case of a display replacement, reset the "Operation hours display" to "0", or to the operation hours of the replacement display.

New here in this chassis is the "Net TV" functionality. Therefore the CTN ("set type" item in CSM1) must be filled into the spare SSB to ensure access to the Net TV portals.

The loading of the CTN can be done via ComPair (Model number programming).

The reset item (Clear NET TV memory) can be selected via MENU (or HOME) => Setup => Installation => Clear NET TV memory (customer preferences stored at provider side will be reset now).

6.5.1 SSB identification

Whenever ordering a new SSB, it should be noted that the correct ordering number (12nc) of a SSB is located on a sticker on the SSB. The format is <12nc SSB><serial number>. The ordering number of a "Service" SSB is the same as the ordering number of an initial "factory" SSB.

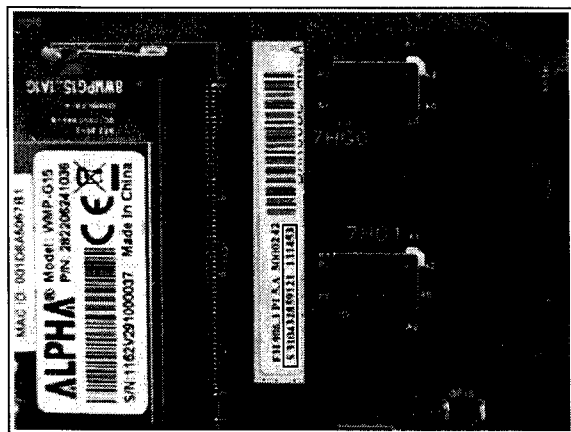


Figure 6-1 SSB identification

6.6 Service SSB delivered without main software loaded

Due to a changed manufacturing process, new **Service SSB's** can be delivered to the warehouse **without main TV software** loaded. Below you find the steps to follow when such an SSB is received.

6.6.1 When a picture is available

1. Mount the Service SSB into the TV set. After start-up, normally the download application will appear on the screen.
2. Download the latest main software (FUS) from the www.p4c.philips.com website.

6.7 Total Overview SAM modes

Table 6-4 SAM mode overview

Main Menu	Sub-menu 1	Sub-menu 2	Sub-menu 3	Description
Hardware Info	A. SW VERSION	e.g. "Q5492_1.26.15.0"		Display TV & Standby SW version and CTN serial number.
	B. Standby processor version	e.g. "STDBY_88.68.0.0"		
	C. Production code	e.g. "See type plate"		
Operation hours				Displays the accumulated total of operation hours. TV switched "on/off" & every 0.5 hours is increase one
Error				Displayed the most recent errors.
Reset error buffer				Clears all content in the error buffer.
Alignment	Tuner AGC			RF-AGC Take over point adjustment (AGC default value is 80)
	Whitepoint	Colour temperature	Normal	3 different modes of colour temperature can be selected
			Warn	
			Cool	
		White point red		LCD White Point Alignment. For values, see Table 6-1 White D alignment values.
		White point green		
		White point blue		
		Red black level offset		
		Green black level offset		

3. Create a folder "upgrades" in the root of a USB stick (size > 50 MB) and save the "autorun.upg" file in this "upgrades" folder. **Note:** it is possible to rename this file, e.g. "Q549_SW_version.upg", this in case there are more than one "autorun.upg" files on your USB stick
4. Plug the prepared USB stick into the TV set, and select the "autorun" file in the displayed browser on the screen
5. Now the main TV software will be loaded automatically, supported by a progress bar
6. Set the correct "display code" via "062598-HOME-xxx", where "xxx" is the 3-digit display panel code (see sticker on the side/bottom of the cabinet).

6.6.2 When no picture is available

Due to a possible wrong display option code in the received Service SSB (NVM), no picture can be available at start-up and thus no download application will be visible. Here you can proceed and finalize step by step to load the main TV software via the UART logging on the PC (for visual feedback).

1. Start-up the TV set, equipped with the Service SSB, and enable the UART logging on the PC (see for settings [5.8 Fault Finding and Repair Tips 5.8.6 Logging](#))
2. The TV set will start-up automatically in the download application if main TV software is not loaded
3. Plug the prepared USB stick into the TV set, press cursor "Right" to enter the list, and navigate to the "autorun" file in the UART logging printout via the cursor keys on the remote control. When the correct file is selected, press "OK"
4. Press cursor "Down" and "OK" to start the flashing of the main TV software. Printouts like: "L: 1-100% , V: 1-100% and P: 1-100%" should be visible now in the UART logging
5. Wait until the message "Operation successful" is displayed and remove all inserted media. Restart the TV set
6. Set the correct "display code" via "062598-HOME-xxx", where "xxx" is the 3-digit display panel code (see sticker on the side/bottom of the cabinet).

6.6.3 Use of repaired SSBs instead of new

Repaired SSBs on stock will obviously already contain main TV software. This implies that only a main software upgrade is required if you use a "repaired" SSB for board swap instead of a "new" SSB.

Main Menu	Sub-menu 1	Sub-menu 2	Sub-menu 3	Description
Dealer options	Picture mute	Off/On		Select Picture mute On/Off. Picture is muted / not muted in case no input signal is detected at input connectors.
	Virgin mode	Off/On		Select Virgin mode On/Off. TV starts up / does not start up (once) with a language selection menu after the mains switch is turned "on" for the first time (virgin mode)
	E-sticker	Off/On		Select E-sticker On/Off (USP's on-screen)
	Auto store mode	None		
		PDC/VPS		
		TXT page		
		PDC/VPS/TXT		
Options	Digital broadcast	DVB	Off/On	Select DVB On/Off
		DVB - T installation	Off/On or Country dependent	Select DVB T installation On/Off or by country
		DVB - T light	Off/On	Select DVB T light On/Off
		DVB - C	Off/On	Select DVB C On/Off
		DVB - C installation	Off/On or Country dependent	Select DVB C installation On/Off or by country
		Over the air download	Off/On or Country dependent	Select Over the air download On/Off or by country
		8 days EPG	Off/On	Select 8 day EPG On/Off
	Digital features	USB	Off/On	Select USB On/Off
		Ethernet	Off/On	Select Ethernet On/Off
		Wi-Fi	Off/On	Select Wi-Fi On/Off
		DLNA	Off/On	Select DLNA On/Off
		Online service	Off	Online service is Off
		PTP (Picture Transfer Protocol)	Off/On	Select PTP On/Off
		Update assistant	Off/On	Select Update assistant On/Off
		Internet software update	Off	Internet software update is Off
	Display	Screen	180 / LCD Sharp Z3LA13 56"	Displayed the panel code & type model.
		LightGuide	Off/On	Select LightGuide On/Off
		Display fans	Not present/Present	Select Display fans Present/Not present.
		Temperature sensor	Sensor present in display (only for 21:9)	N.A.
		Temperature LUT	0	N.A.
		E-box & monitor	Off/On	Select E-box & monitor On/Off
	Video reproduction	Picture processing	None/PNX5100	Select Picture processing None/PNX5100 (Q549.xE chassis).
		MOP local contrast	Off/On	Select MOP local contrast On/Off
		Light sensor	Off/On	Select Light sensor On/Off
		Light sensor type	0/1/2/3	Select Light sensor type form 0 to 3 (for difference styling).
		Pixel Plus type	Pixel Plus HD	Select type of picture improvement.
			Perfect Pixel HD	
			Pixel Precise HD	
		Ambilight	None,	Select type of Ambilight modules use.
			2 sided 2/2	For 8400 series only
			2 sided 4/4	
			3 sided 2/3/2	
			3 sided 4/3/4	
			3 sided 4/5/4	
			4 sided 4/3/4/3	
		Ambilight technology	LED/Future use	Ambilight technology LED is in use.
		MOP ambilight	Off/On	Select MOP ambilight On/Off

Main Menu	Sub-menu 1	Sub-menu 2	Sub-menu 3	Description
	Audio reproduction	Acoustic system		Cabinet design used for setting dynamic audio parameters.
	Source selection	EXT1/AV1 type	SCART CVBS RGB LR	Select input source when connected with external equipment.
			CVBS Y/C YPbPr LR	
			CVBS Y/C YPbPr HV LR	
			(CVBS) YPbPr LR	
		EXT2/AV2 type	SCART CVBS RGB LR	Select input source when connected with external equipment.
			CVBS Y/C LR	
			(CVBS) YPbPr LR	
			CVBS Y/C LR	
		EXT3/AV3 type	None	Select input source when connected with external equipment.
			CVBS	
			CVBS LR	
			YPbPr	
			YPbPr LR	
			YPbPr HV LR	
		VGA	Off/On	Select VGA On/Off
		SIDE I/O	Off/On	Select SIDE I/O On/Off
		HDMI 1	Off/On	Select HDMI 1 On/Off
		HDMI 2	Off/On	Select HDMI 2 On/Off
		HDMI 3	Off/On	Select HDMI 3 On/Off
		HDMI 4	Off/On	Select HDMI 4 On/Off
		HDMI side	Off/On	Select HDMI side On/Off
		HDMI CEC	Off/On	Select HDMI CEC On/Off
		HDMI CEC RC passthrough	Off/On	Select HDMI CEC RC passthrough On/Off
		HDMI CEC Pixel Plus link	Off/On	Select Pixel Plus link On/Off
	Miscellaneous	Region	Europe/AP-PAL-MULTI/Australia	Select Region/country.
		Tuner type	HD1816-MK1/TD1716-MK4/ TD1716-MK3/HD1816-MK2	Select type of Tuner used.
		System RC support	Off/On	Select System RC support On/Off.
		Embedded user manual	Off/On	Select Embedded user manual On/Off.
		Start-up screen	Off/On	Select Start-up screen On/Off.
		Wallpaper	Off/On	Select Wallpaper On/Off.
		Hotel mode	Off	Hotel mode is Off.
Option number	Group 1	e.g. "08192.02181.01387.45160"		The first line (group 1) indicates hardware options 1 to 4.
	Group 2	e.g. "10185.12448.00164.00000"		The second line (group 2) indicates software options 5 to 8.
	Store			Store after changing.
Initialise NVM				N.A
Store				Select Store in the SAM root menu after making any changes.
Software maintenance	Software events	Display		Display information is for development purposes.
		Clear		
		Test reboot		
	Hardware events	Display		Display information is for development purposes.
		Clear		
Operation hours display		0003		In case the display must be swapped for repair, you can reset the "Display operation hours" to "0". So, this one does keeps up the lifetime of the display itself (mainly to compensate the degeneration behaviour).
Test setting	Digital info	QAM modulation: 64-QAM		Display information is for development purposes.
		Symbol rate: 23:29		
		Original network ID: 12817		
		Network ID: 12817		
		Transportstream ID: 2		
		Service ID: 3		
		Hierarchical modulation: 0		
		Selected video PID: 35		
		Selected main audio PID: 99		
		Selected 2nd audio PID: -1		
	Install start frequency	000		Install start frequency from "0" MHz
	Install end frequency	999		Install end frequency as 999 MHz
	Default install frequency			
	Installation	Digital only		Select Digital only or Digital + Analogue before installation.
		Digital + Analogue		

Main Menu	Sub-menu 1	Sub-menu 2	Sub-menu 3	Description
Development file versions	Development 1 file version	Display parameters DISPT 3.26.8.7		Display information is for development purposes.
		Acoustics parameters ACSTS 3.6.6.5		
		PQ - PRFPP 1.26.10.4		
		Ambilight parameters PRFAM 2.6.1.3		
	Development 2 file version	12NC one zip software		Display information is for development purposes.
		Initial main software		
		NVM version Q5492_0.4.0.0		
		Flash units SW Q5492_0.26.15.0		
Upload to USB	Channel list			To upload several settings from the TV to an USB stick
	Personal settings			
	Option codes			
	Display-related alignment			
	History list			
Download from USB	Channel list			To download several settings from the USB stick to the TV.
	Personal settings			
	Option codes			
	Display-related alignment			

7. Circuit Descriptions

Index of this chapter:

- [7.1 Introduction](#)
- [7.2 Power Architecture](#)
- [7.3 Front-End](#)
- [7.4 HDMI](#)
- [7.5 Video and Audio Processing - PNX8543](#)
- [7.6 Common Interface CI+](#)
- [7.7 Net TV](#)
- [7.8 Ambi Light](#)

Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block (see chapter 9. Block Diagrams) and circuit diagrams (see chapter 10. Circuit Diagrams and PWB Layouts). Where necessary, you will find a separate drawing for clarification.

Main difference with the previous platform is the introduction of "Net TV" and "CI+".

7.1.1 Implementation

Key components of this chassis are:

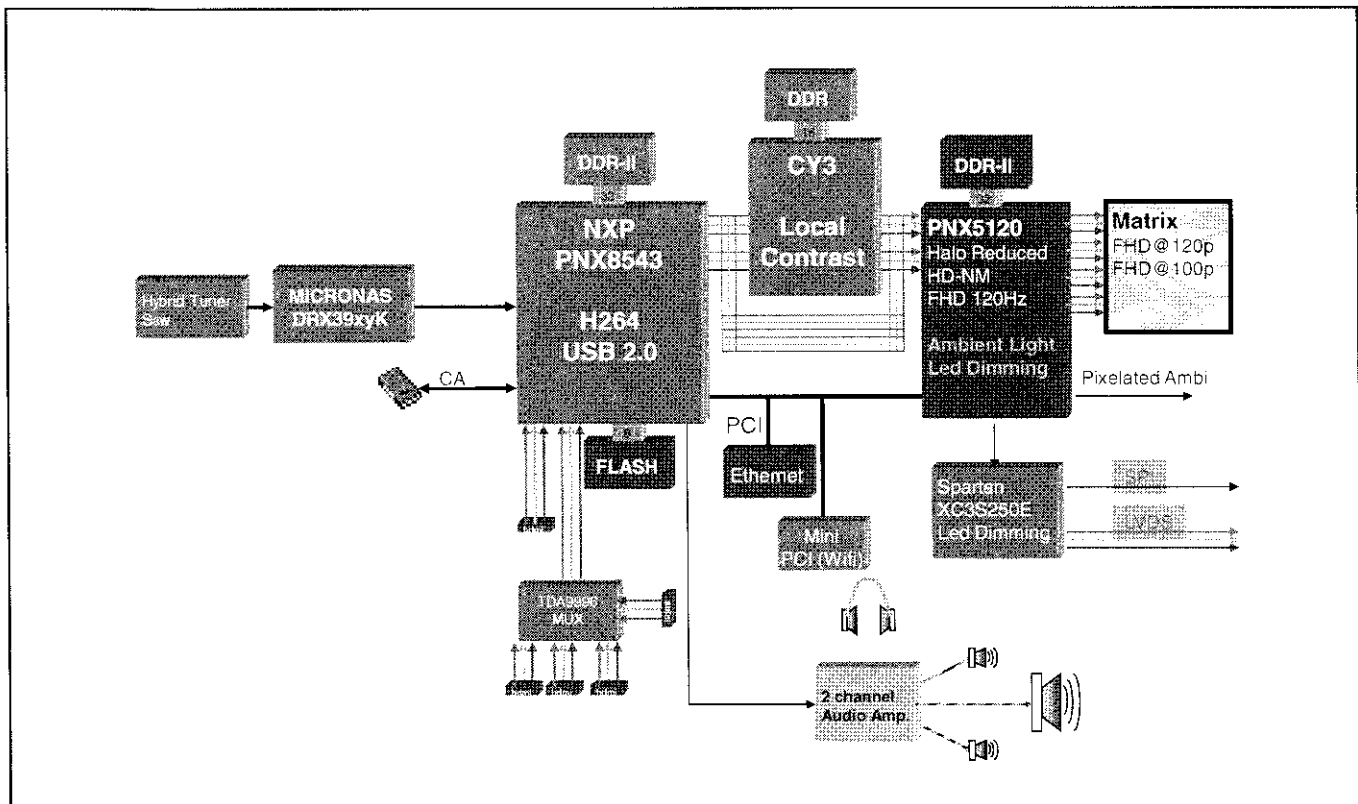
- PNX8543 Digital Colour Decoder
- EP3C25F324C7N FPGA ("Local Contrast")
- HD1816AF Hybrid Tuner
- DRX3926K Demodulator
- TDA9996 HDMI Switch
- TPA3123D2PWP Class D Power Amplifier
- DP83816AVNG PCI ethernet media access controller and physical layer (MacPhyter-II).

7.1.2 TV543 Architecture Overview

- For details about the chassis block diagrams refer to chapter 9. Block Diagrams. An overview of the TV543 architecture can be found in [Figure 7-1](#).

7.1 Introduction

The Q549.2E LA chassis (platform name TV543/92) is the successor of the Q529.1E LA chassis (platform TV522/92).



18310_200_090317.eps
09C317

Figure 7-1 Architecture of TV543/92 Elite Core platform

7.1.3 SSB Cell Layout

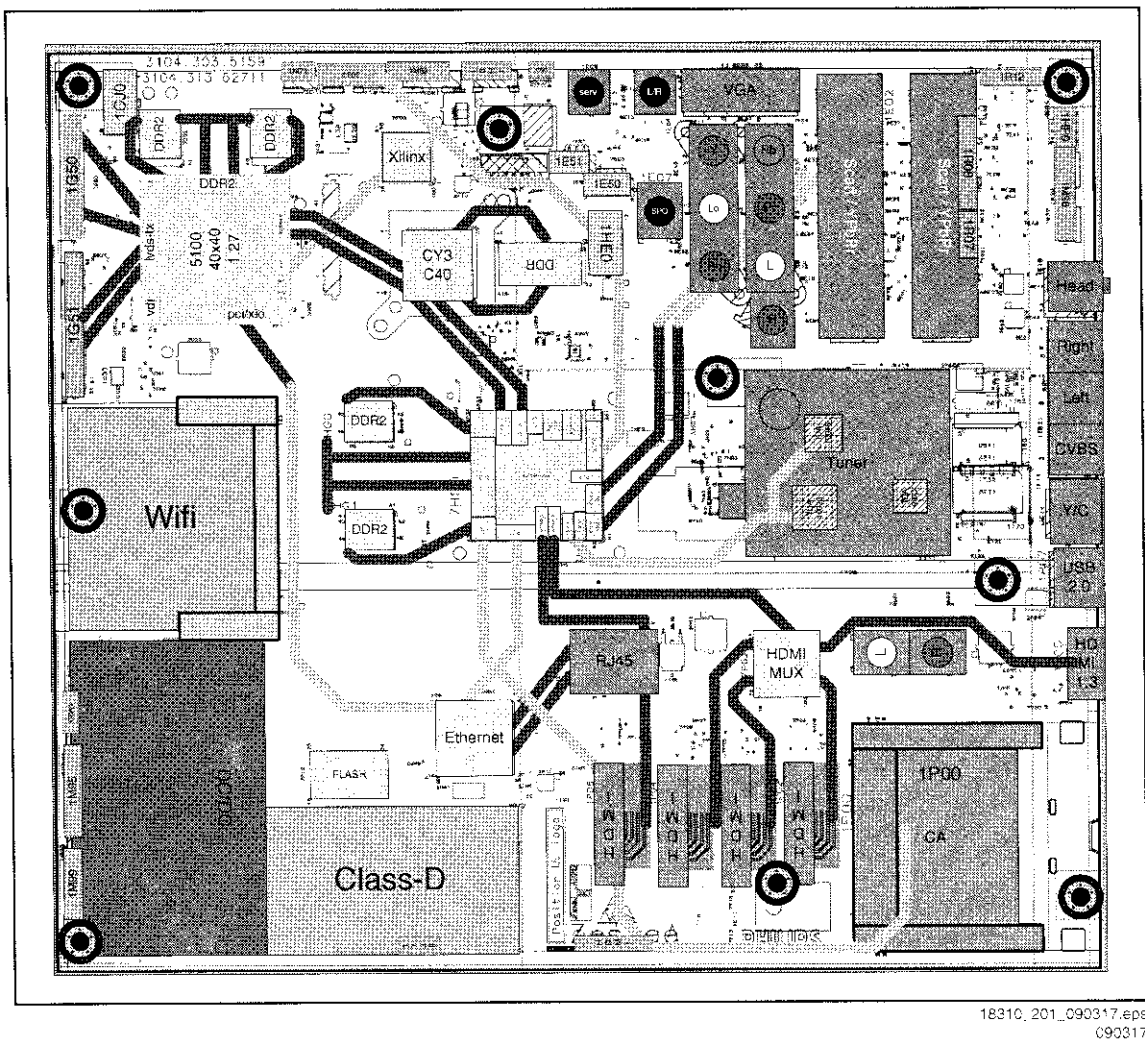


Figure 7-2 SSB layout cells (top view)

7.3 Front-End

The Front-End consist of the following key components:

- Tuner HD1816AF
- SAW filter 36M125
- IF demodulator DRX3926K
- AGC amplifier UPC3221GV.

Below find a block diagram of the front-end application.

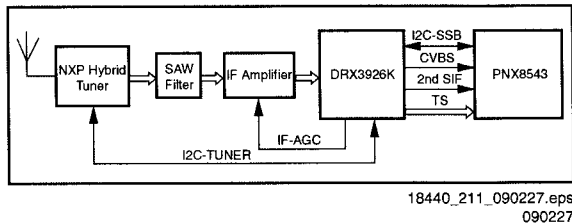


Figure 7-4 Front-End block diagram

The DRX3926K is a multi-standard demodulator supporting DVB-C, DVB-T and analogue standards. The demodulated digital stream is fed into the parallel transport stream data ports of the PNX8543. The demodulated analogue signal in the form of CVBS is connected to the analogue video CVBS/Y input channel, while the SIF is connected via the SSIF2 positive input port.

7.4 HDMI

In this platform, the TDA9996 HDMI multiplexer is implemented. Only for one HDMI input, a separate EEPROM is implemented to store the EDID values. For the other HDMI inputs, the EDID contents are no longer stored in a separate EEPROM, but directly in the multiplexer. Each input has its own physical subaddress: the first 253 bytes are common, where the last 3 bytes define the specific input. The EDID contents are, at +5V power-up, downloaded to RAM. The following figures show the HDMI input configuration and EDID control.

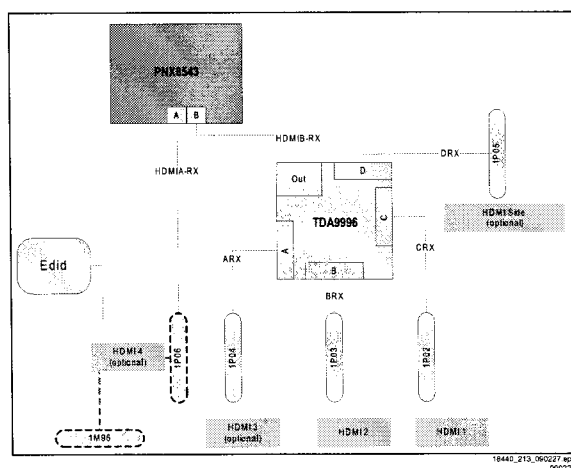


Figure 7-5 HDMI input configuration

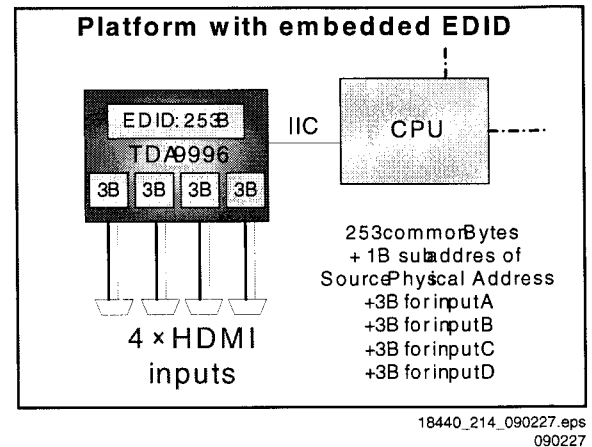


Figure 7-6 EDID control (embedded EDID)

The delta's with respect to the use of the TDA9996 as HDMI multiplexer compared with earlier chassis/platforms are:

- +5V detection mechanism
- Stable clock detection mechanism
- Integrated EDID
- RT control
- HPD control
- TMDS output control
- CEC control
- New hotplug control for PNX8543 for 5th HDMI input
- New EDID structure: EDID stored in TDA9996, therefore there are no EDID pins on the SSB. Only in the event of a 5th HDMI input, an additional EEPROM is foreseen, as was implemented in previous platforms.

After replacement of the TDA9996 HDMI mux, the default I²C address should be reprogrammed from C0 to CE, and the HDMI EDIDs should be reprogrammed as well. Both actions should be executed via ComPair.

7.5 Video and Audio Processing - PNX8543

The PNX8543 is the main audio and video processor (or System-on-Chip) for this platform. It is a member of the PNX85xx SoC family (described in earlier chassis) with the addition of the MPEG4 functionality; the separate STi710x MPEG4 decoder is no longer implemented in this platform.

Some more delta's compared to the previous PNX85xx are:

- 2 HDMI inputs (A & B)
- HDMI deep colour RGB/YCbCr 4:4:1 10/12 bit detection.

The PNX8543 handles the digital and analogue audio- and video decoding and processing. The processor is a MIPS32 general purpose CPU and a 8051-based TV controller for power management and user event handling.

- For a functional diagram of the PNX8543, refer to [Figure 7-7](#).

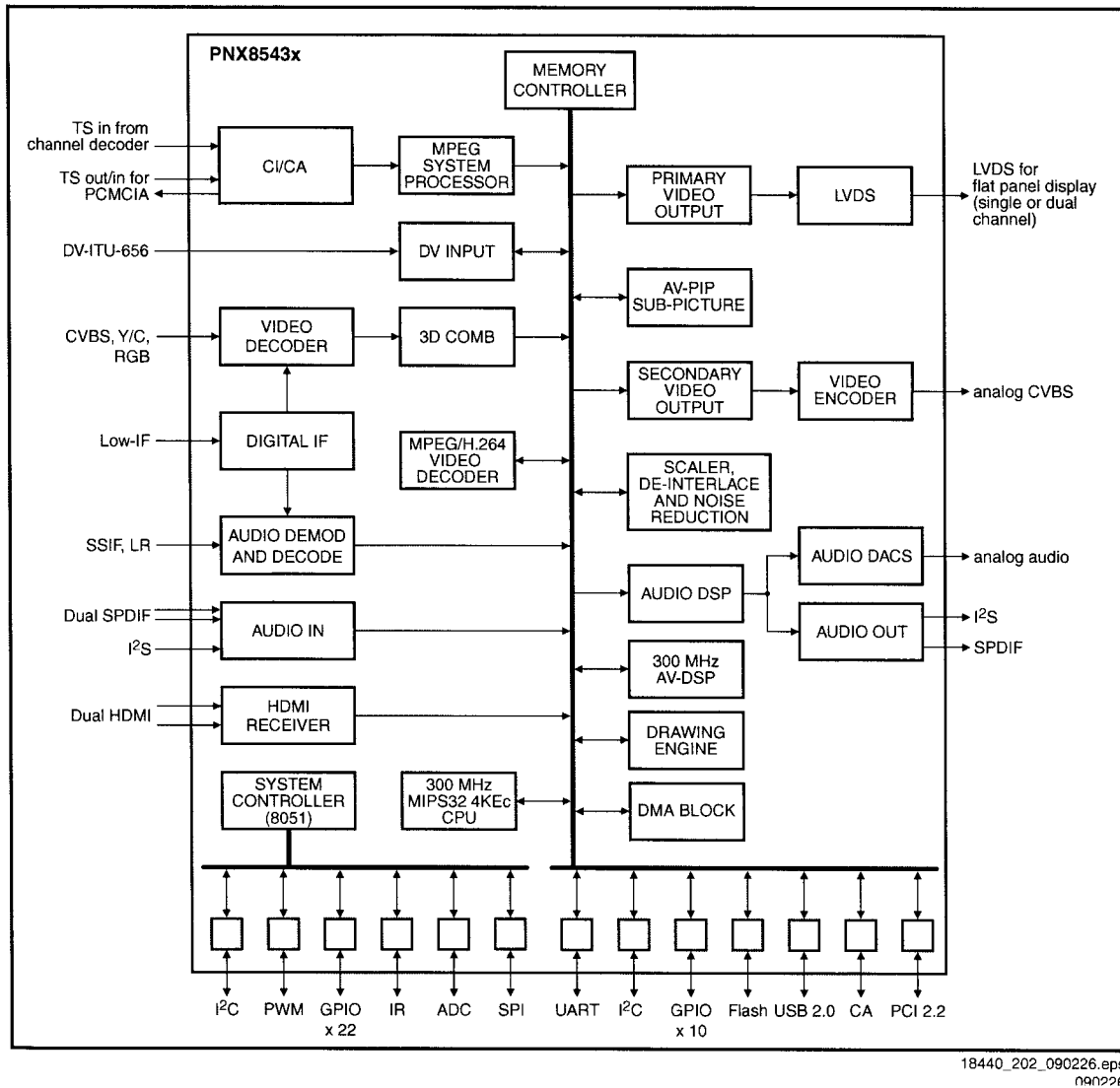


Figure 7-7 PNX8543 functional diagram

7.5.1 Video Subsystem

Refer to [Figure 7-8](#) for the main video interfaces for the PNX8543 and the video signal flow between blocks and memory.

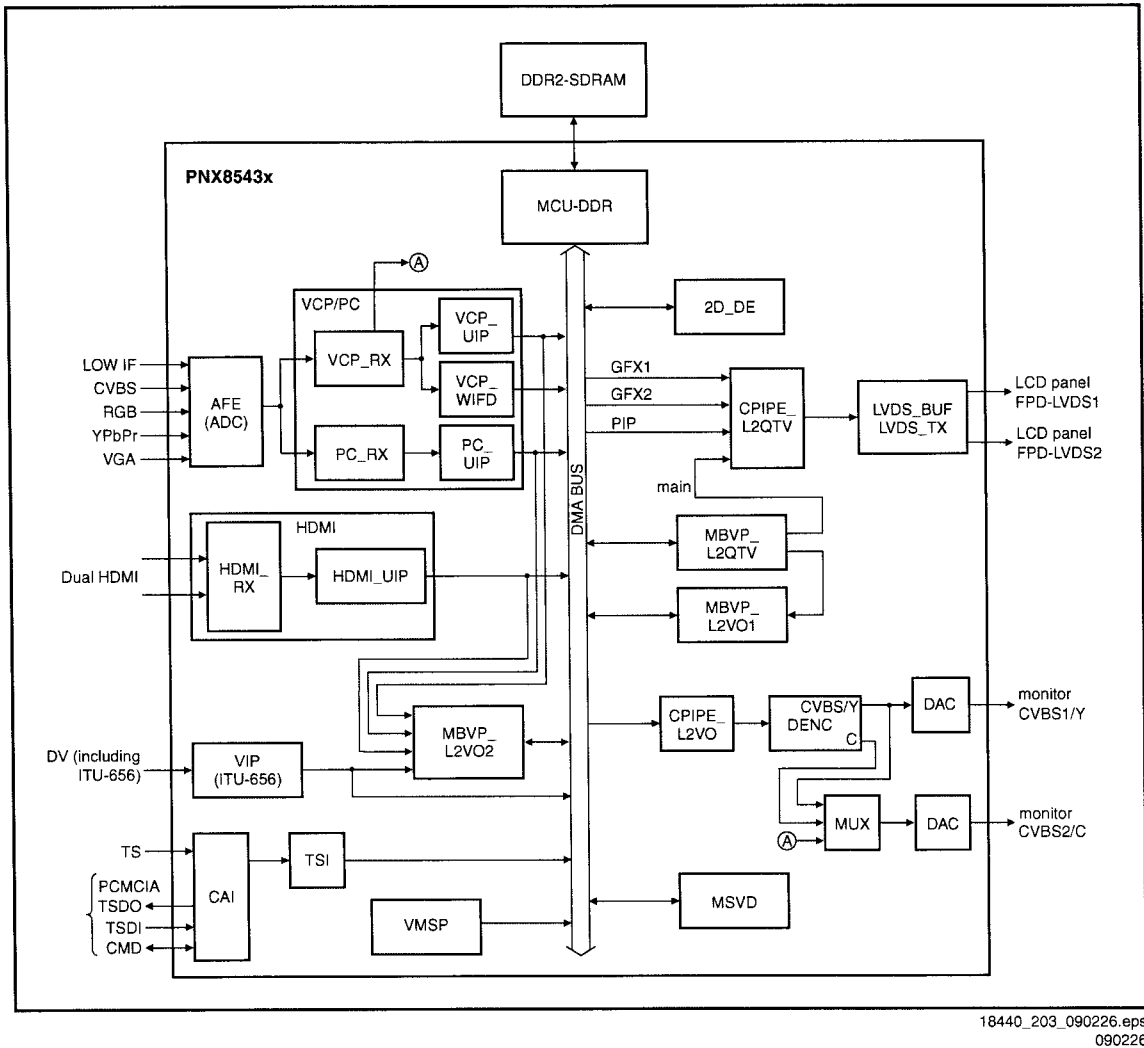


Figure 7-8 PNX8543 video flow diagram

The Video Subsystem consist of the following blocks:

- Analogue Front-End (AFE) block
- Video and PC Capture (VPC/PC) pipe
- HDMI Receiver interface
- Memory-Based Video Processor (MBVP)
- Video Composition Pipe (CPIPE)
- Memory Based Video Processor (MBVP) VO-1
- Memory Based Video Processor (MBVP) VO-2
- Video Composition Pipe (CPIPE)
- Dual Flat Panel Display-LVDS (FPD-LVDS)
- Digital Encoder (DENC)
- Digital Video VIP
- 2D graphics block.

7.5.2 Audio Subsystem

Refer to [Figure 7-9](#) for the main audio interfaces for the PNX8543 and the audio signal flow between blocks and memory.

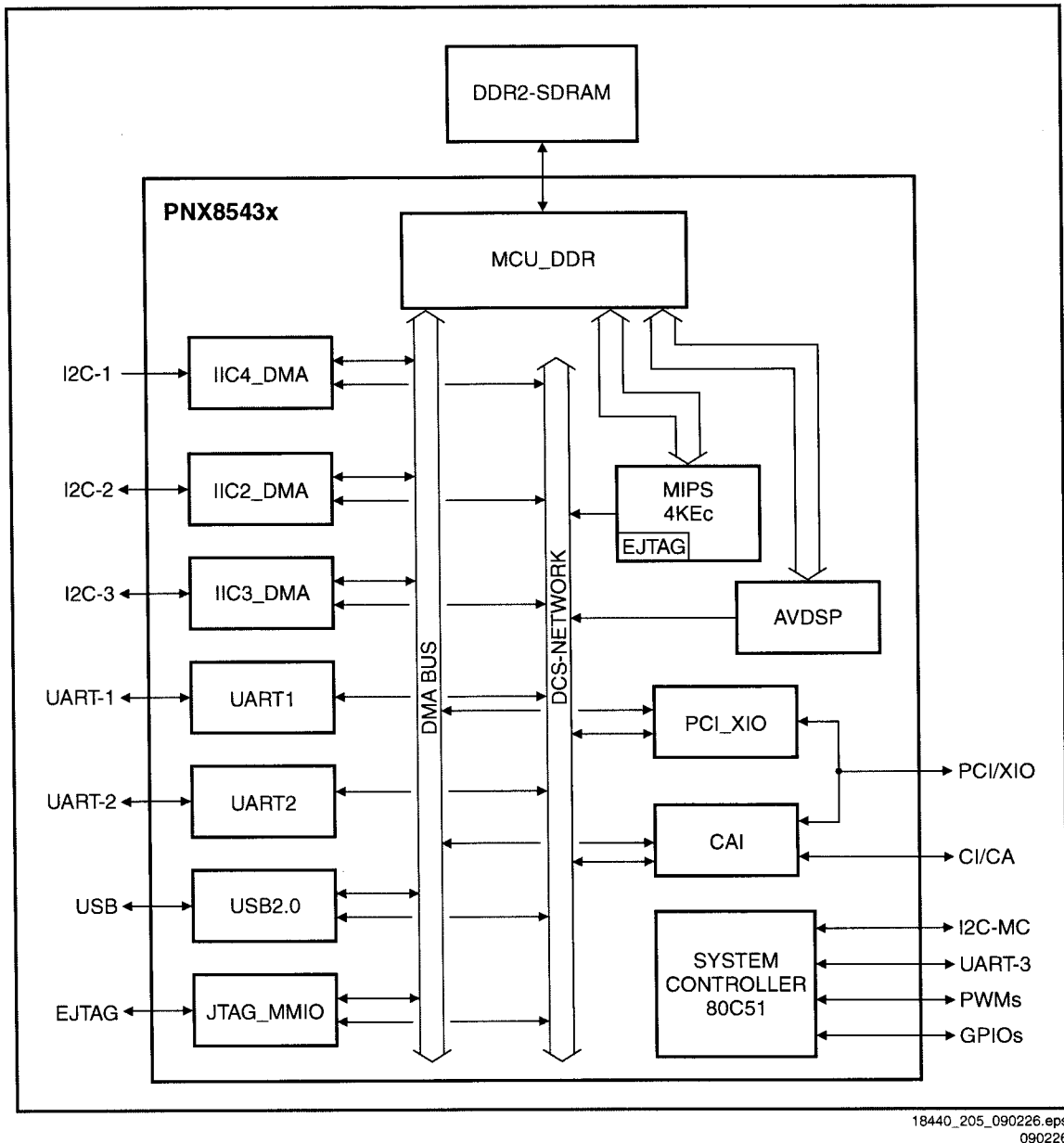


Figure 7-10 PNX8543 connectivity and compute subsystem

The Connectivity Subsystem consists of:

- PCI/XIO interface
- USB2.0 interface
- Three 2-wire UARTs
- Four Master/Slave I²C interfaces
- Common Interface/Conditional Access Interface.

The Computing Subsystem consists of:

- 32-bit MIPS RISC core
- Enhanced JTAG (EJTAG) block inside the MIPS
- JTAG_MMIO blocks
- TV controller
- Audio/Video DSP (AV_DSP)
- Memory Control Unit (MCU).

keys in the components, **unauthorised exchange of these components will always result in a defective board.**

7.5.4 Service Notice - FLASH RAM / PNX8543 exchange

The FLASH RAM (item 7P10) and/or PNX8543 (item 7H00) can only be exchanged by an authorised central workshop with dedicated programming tools. Due to the presence of (CI+)

7.6 Common Interface CI+

Together with this platform, an extension to the Common Interface (CI) Conditional Access system is added, called CI+.

CI+ or Common Interface Plus is a specification that extends the Common Interface (DVB-CI) as described in the digital broadcasting standard DVB.

The weakness of the conventional CI module as Conditional Access system was the absence of a Copy Protection mechanism, as decrypted content could be sent over the PCMCIA interface unscrambled. With the CI+ extension, a form of copy protection is established between the Conditional

Access Module (CAM) and the Integrated Digital Television (IDTV). The security mechanisms in CI+ are derived/copied from POD (with the exception of Out Of Band (OOB) used in US CA systems). For more information about conventional CA systems using a CI module, refer to the BJ3.0E L/PA or BL2.xU Service Manual.

The CI+ standard is downwards compatible with the existing CI standard.

The following figure shows the implementation of the CI+ Conditional Access system in the TV543 platform.

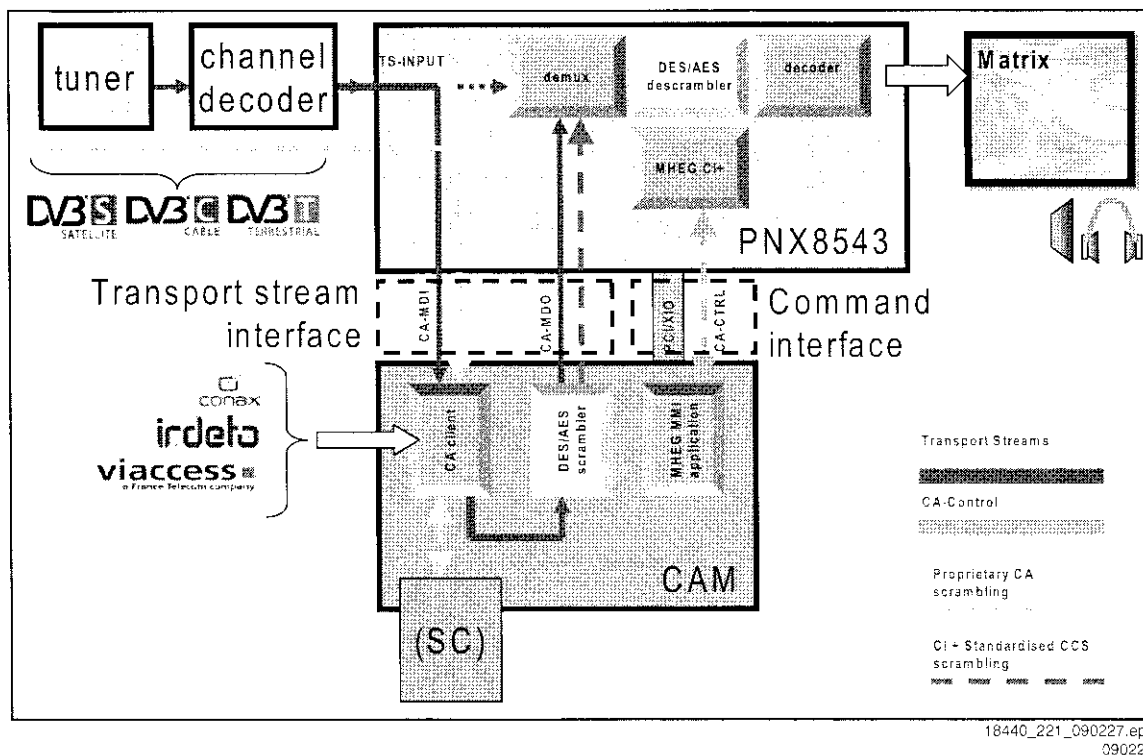


Figure 7-11 CI+ Conditional Access implementation

7.7 Net TV

In this chassis, a feature that enables access to dedicated internet pages from a limited group of information suppliers,

called "Net TV", is introduced. A separate Wi-Fi module enables wireless communication with a local network.

7.8 Ambi Light

The Ambi Light architecture in this platform has been entirely renewed. The characteristics are:

- Additional DC/DC board generating 12/16/24 V (optional)
- ARM processor (on DC/DC panel or AL board)
- Low-power LEDs
- SPI interface from ARM to LED drivers
- I²C upgradeable via USB
- Each AL module has a temperature sensor.

The use of the DC/DC board is optional. In case no DC/DC board is implemented, the ARM processor is located on one of the AL boards.

Refer to [Figure 7-12](#) for the Ambi Light architecture.



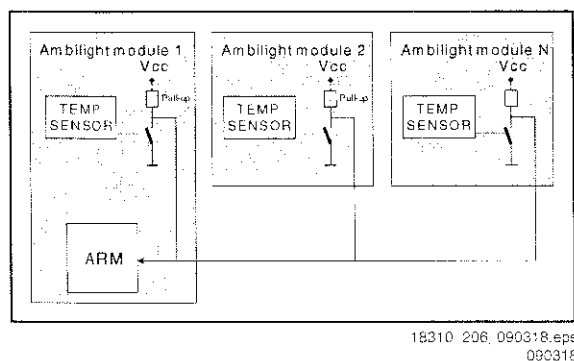
Figure 7-14 SPI communication between ARM controller and LED drivers

The ARM controller communicates with the LED drivers (on each AL module) via an SPI bus. For debugging purposes, the working principle is given below:

- Data from the ARM controller is linked through the drivers, which are connected in cascade
- SPI CLK, SPI LATCH, PROG, BLANK and PWM CLOCK are going directly from the controller to each driver
- SPI DATA RETURN is linked from the last driver to the controller: controller decides which driver returns data.

7.8.3 Temperature Control

Refer to [Figure 7-15](#) for signal interfacing between the ARM controller and the temperature sensor on the AL boards.

**Figure 7-15 Communication between ARM controller and temperature sensor**

Each AL board is equipped with a temperature sensor. If one of the sensors detects a temperature over the threshold, the TEMP line is pulled LOW which results in brightness reduction.

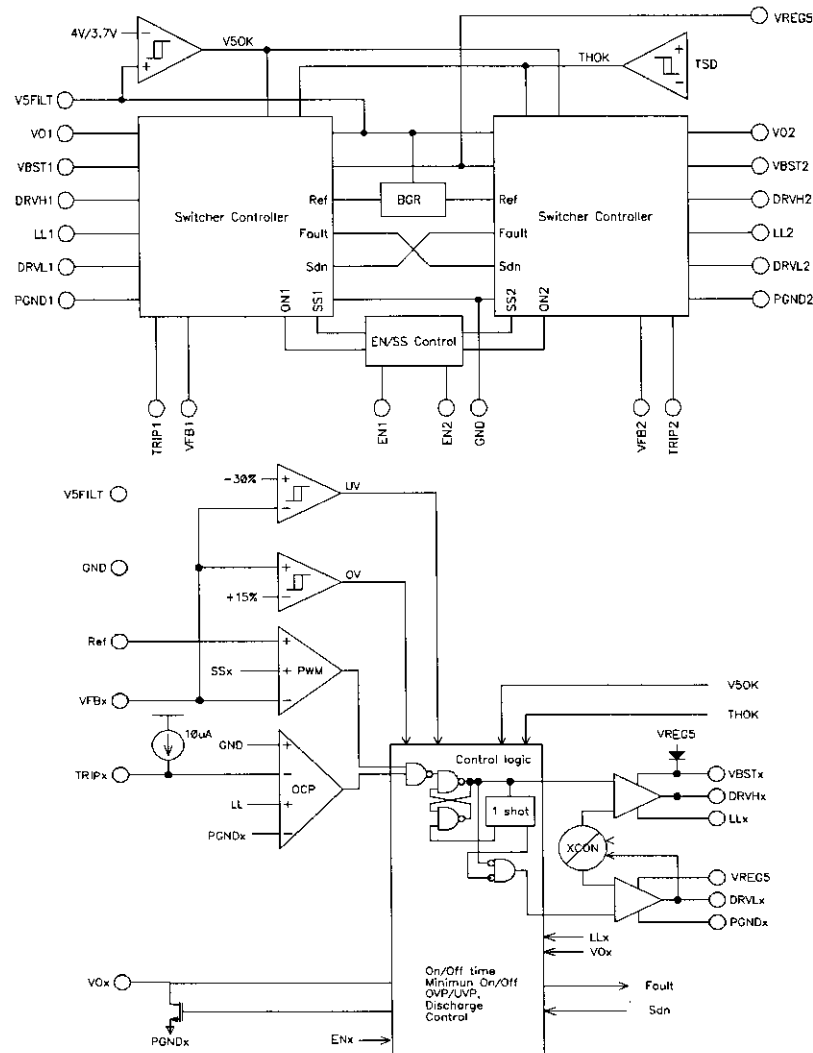
8. IC Data Sheets

This chapter shows the internal block diagrams and pin configurations of ICs that are drawn as "black boxes" in the

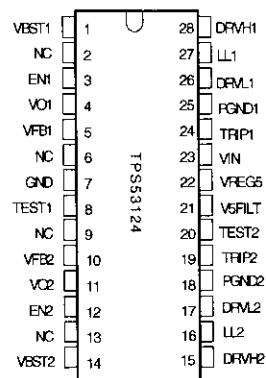
electrical diagrams (with the exception of "memory" and "logic" ICs).

8.1 Diagram SSB: DC/DC B01A, TPS53124PW (IC 7U03)

Block Diagram



Pin Configuration

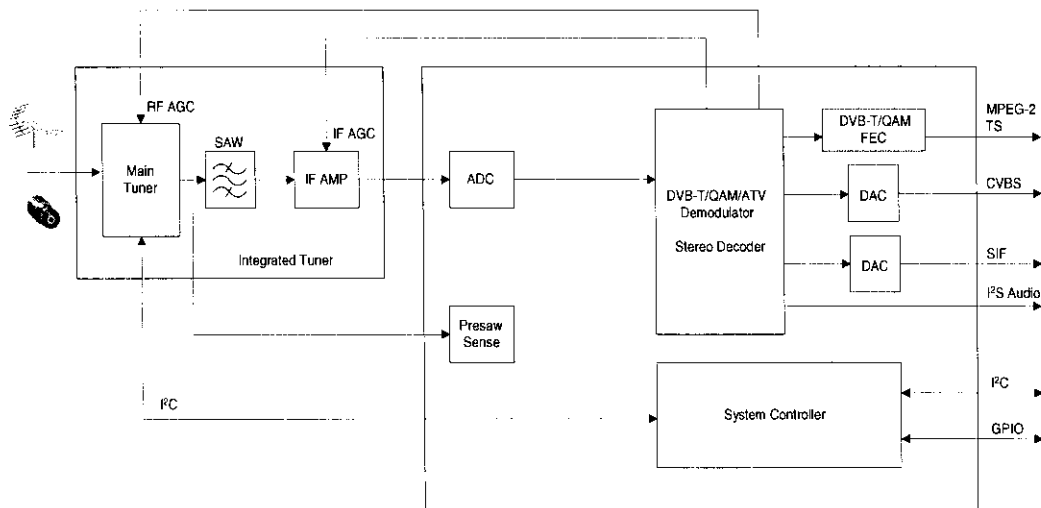


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090319

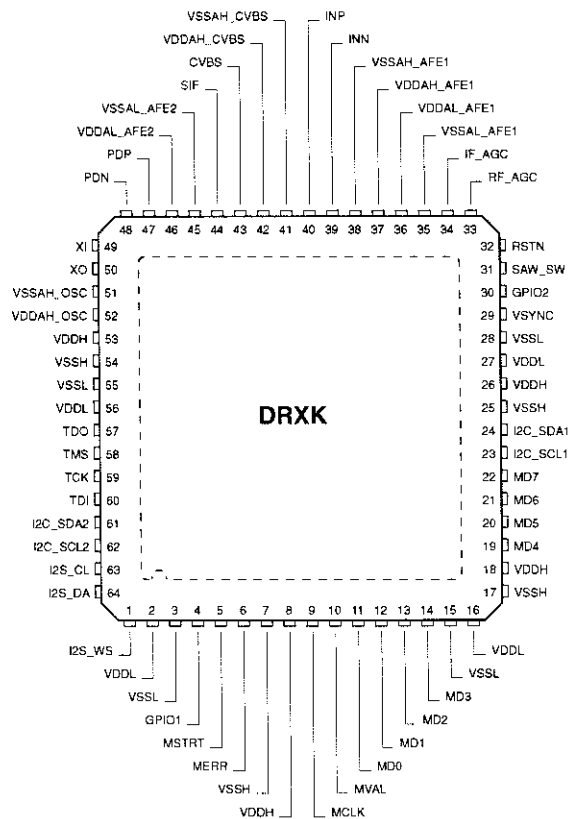
Figure 8-1 Internal block diagram and pin configuration

8.2 Diagram SSB: Front End B02B, DRX3926K (IC 7T50)

Block Diagram



Pin Configuration

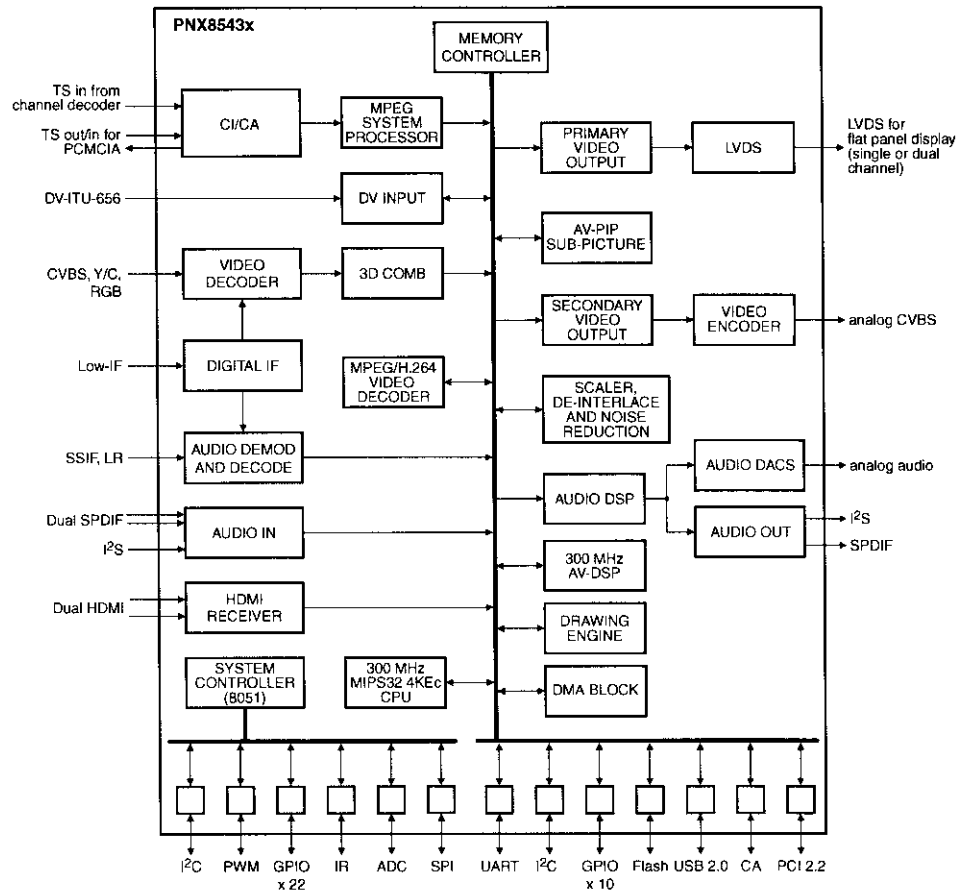


18440_300_090303.eps
090303

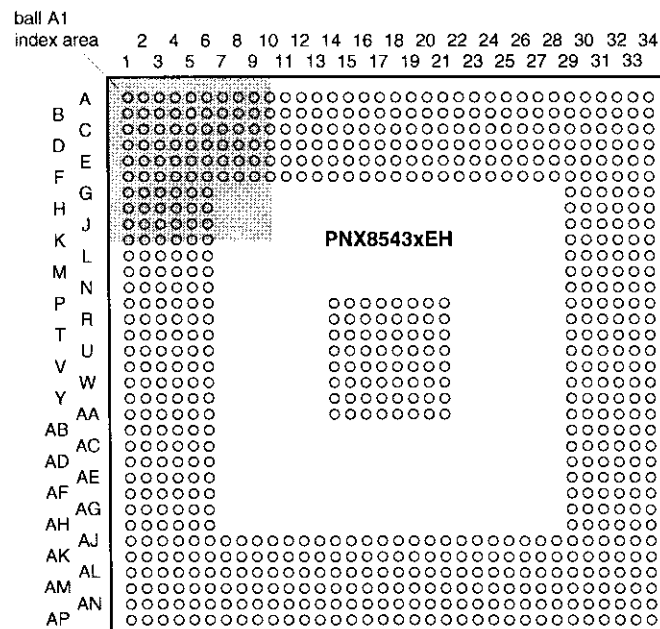
Figure 8-2 Pin configuration

8.3 Diagram SSB: PNX8543 - Stand-by Controller B04A, PNX8543 (IC7H00)

Block Diagram



Pin Configuration



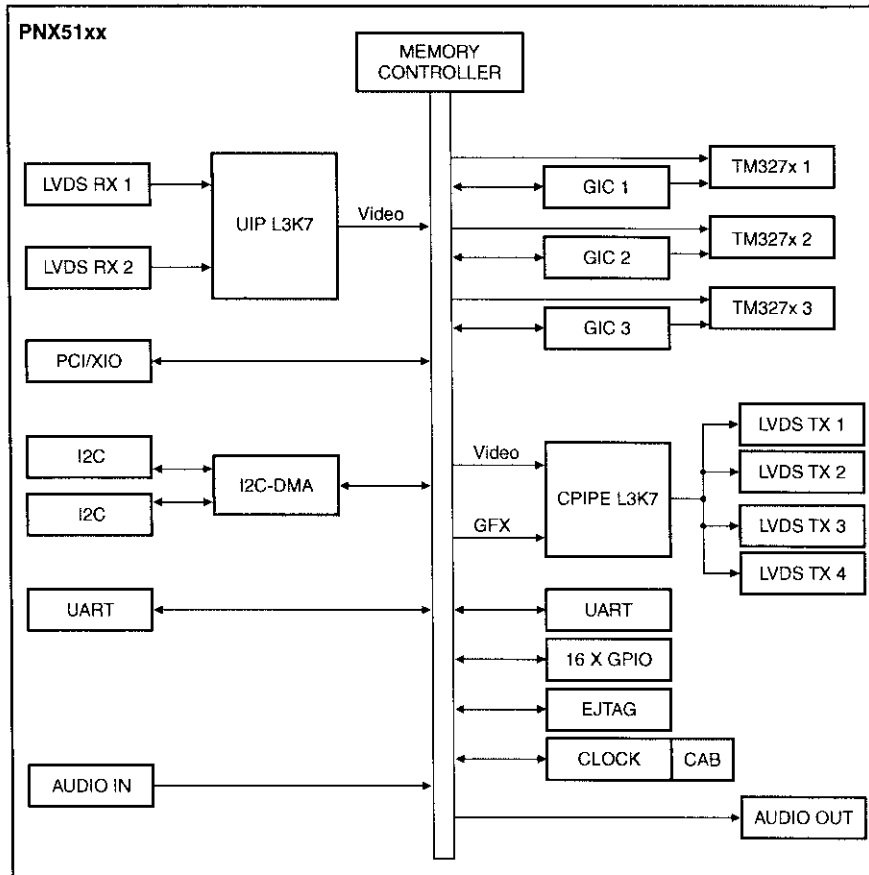
Transparent top view

18440_301_090303.eps
090303

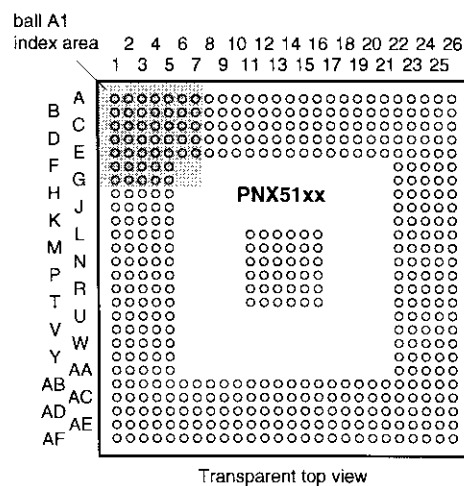
Figure 8-3 Internal block diagram and pin configuration

8.4 Diagram SSB: Ethernet B05A, PNX5120 (IC7C00)

Block Diagram



Pin Configuration



Transparent top view

18560_300_090403.eps
090403

Figure 8-4 Internal block diagram and pin configuration

8.5 Diagram SSB: Ethernet B07G, DP83816 (IC7N04)

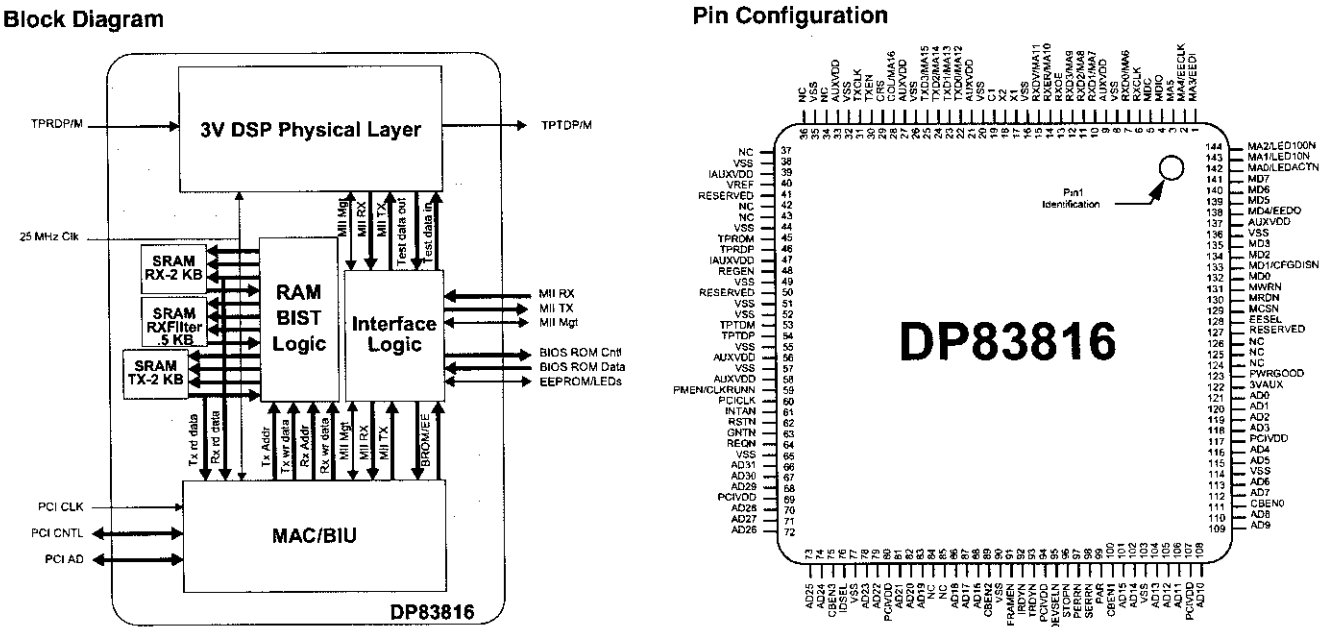
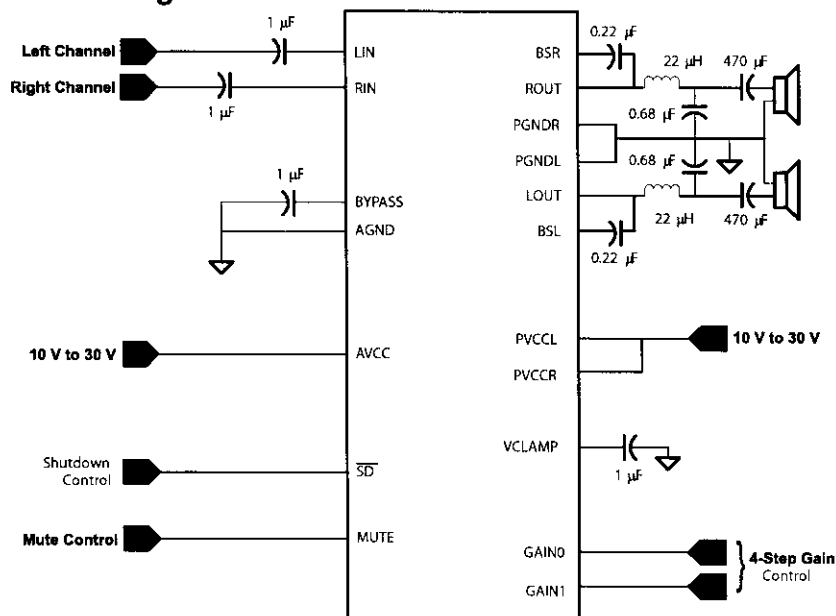


Figure 8-5 Internal block diagram and pin configuration

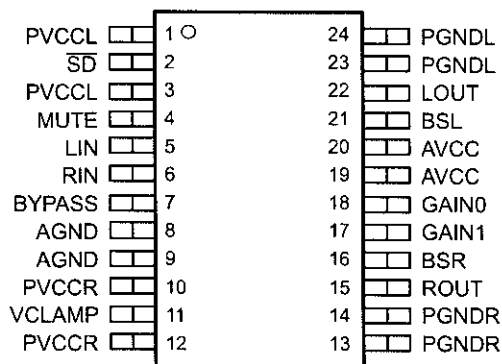
F_15710_167.eps
230905

8.6 Diagram SSB: Audio B10A, TPA3123D (IC 7D10)

Block Diagram



Pin Configuration



TERMINAL		I/O/P	DESCRIPTION
NAME	24-PIN (PWP)		
SD	2	I	Shutdown signal for IC (low = disabled, high = operational). TTL logic levels with compliance to AVCC
RIN	6	I	Audio input for right channel
LIN	5	I	Audio input for left channel
GAIN0	18	I	Gain select least-significant bit. TTL logic levels with compliance to AVCC
GAIN1	17	I	Gain select most-significant bit. TTL logic levels with compliance to AVCC
MUTE	4	I	Mute signal for quick disable/enable of outputs (high = outputs switch at 50% duty cycle, low = outputs enabled). TTL logic levels with compliance to AVCC
BSL	21	I/O	Bootstrap I/O for left channel
PVCCCL	1, 3	P	Power supply for left-channel H-bridge, not internally connected to PVCCR or AVCC
LOUT	22	O	Class-D 1/2-H-bridge positive output for left channel
PGNDL	23, 24	P	Power ground for left-channel H-bridge
VCLAMP	11	P	Internally generated voltage supply for bootstrap capacitors
BSR	16	I/O	Bootstrap I/O for right channel
ROUT	15	O	Class-D 1/2-H-bridge negative output for right channel
PGNDR	13, 14	P	Power ground for right-channel H-bridge.
PVCCR	10, 12	P	Power supply for right-channel H-bridge, not connected to PVCCCL or AVCC
AGND	9	P	Analog ground for digital/analog cells in core
AGND	8	P	Analog ground for analog cells in core
BYPASS	7	O	Reference for preamplifier inputs. Nominally equal to AVCC/8. Also controls start-up time via external capacitor sizing.
AVCC	19, 20	P	High-voltage analog power supply. Not internally connected to PVCCR or PVCCCL
Thermal pad	Die pad	P	Connect to ground. Thermal pad should be soldered down on all applications to properly secure device to printed wiring board.

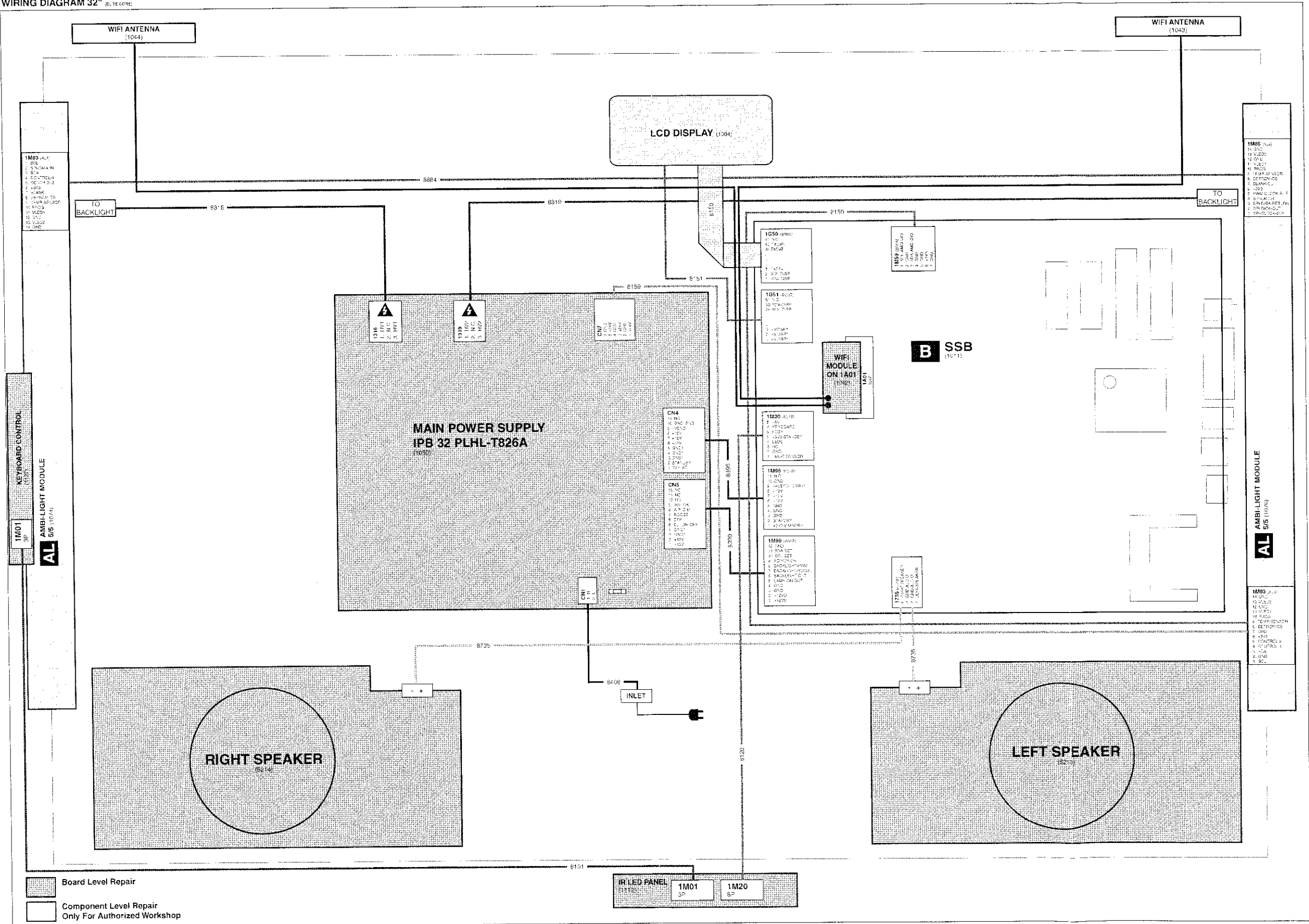
18440_302_090303.eps
090303

Figure 8-6 Internal block diagram and pin configuration

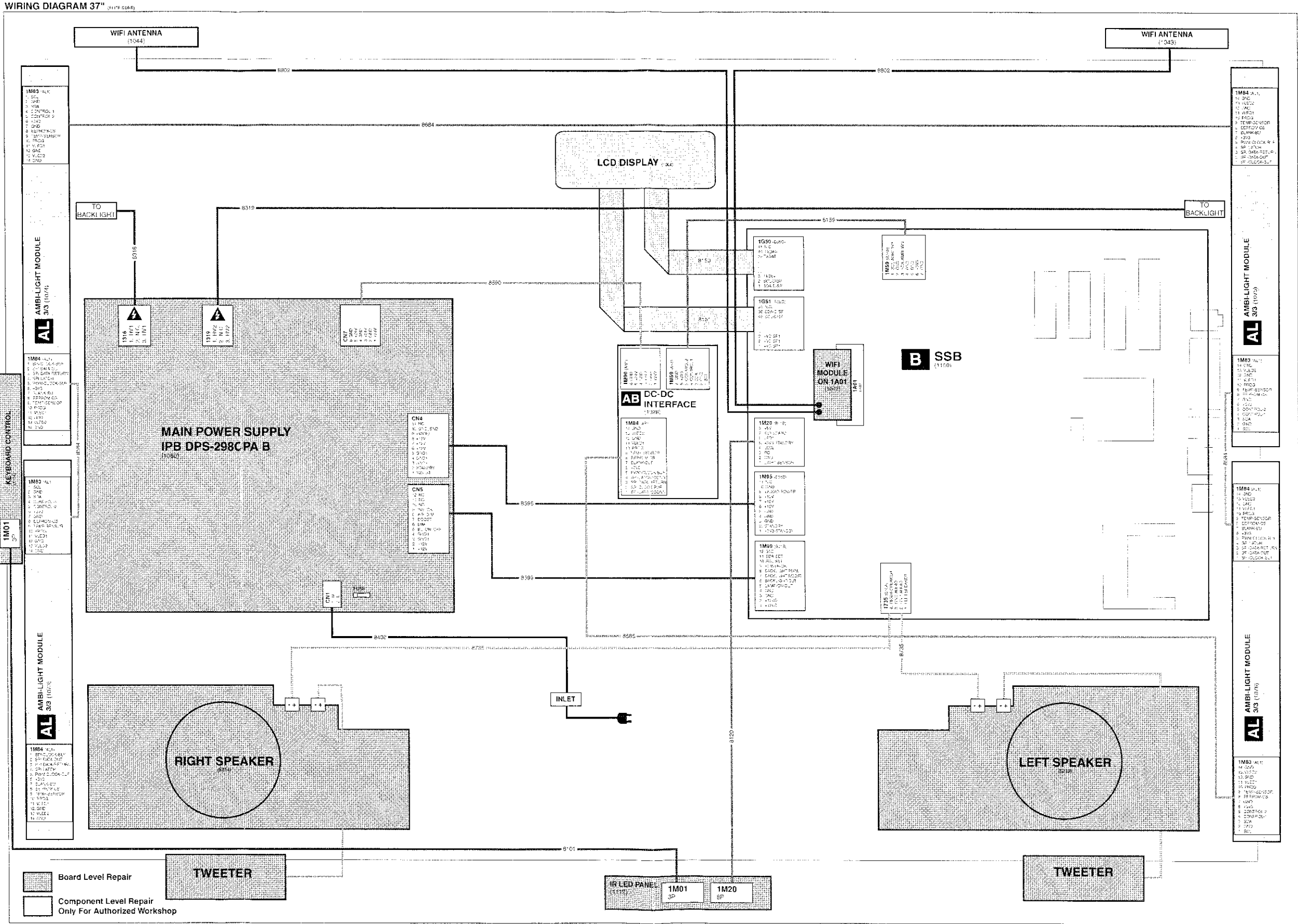
9. Block Diagrams

Wiring Diagram 32" (Elite Core)

WIRING DIAGRAM 32" (ELITE CORE)



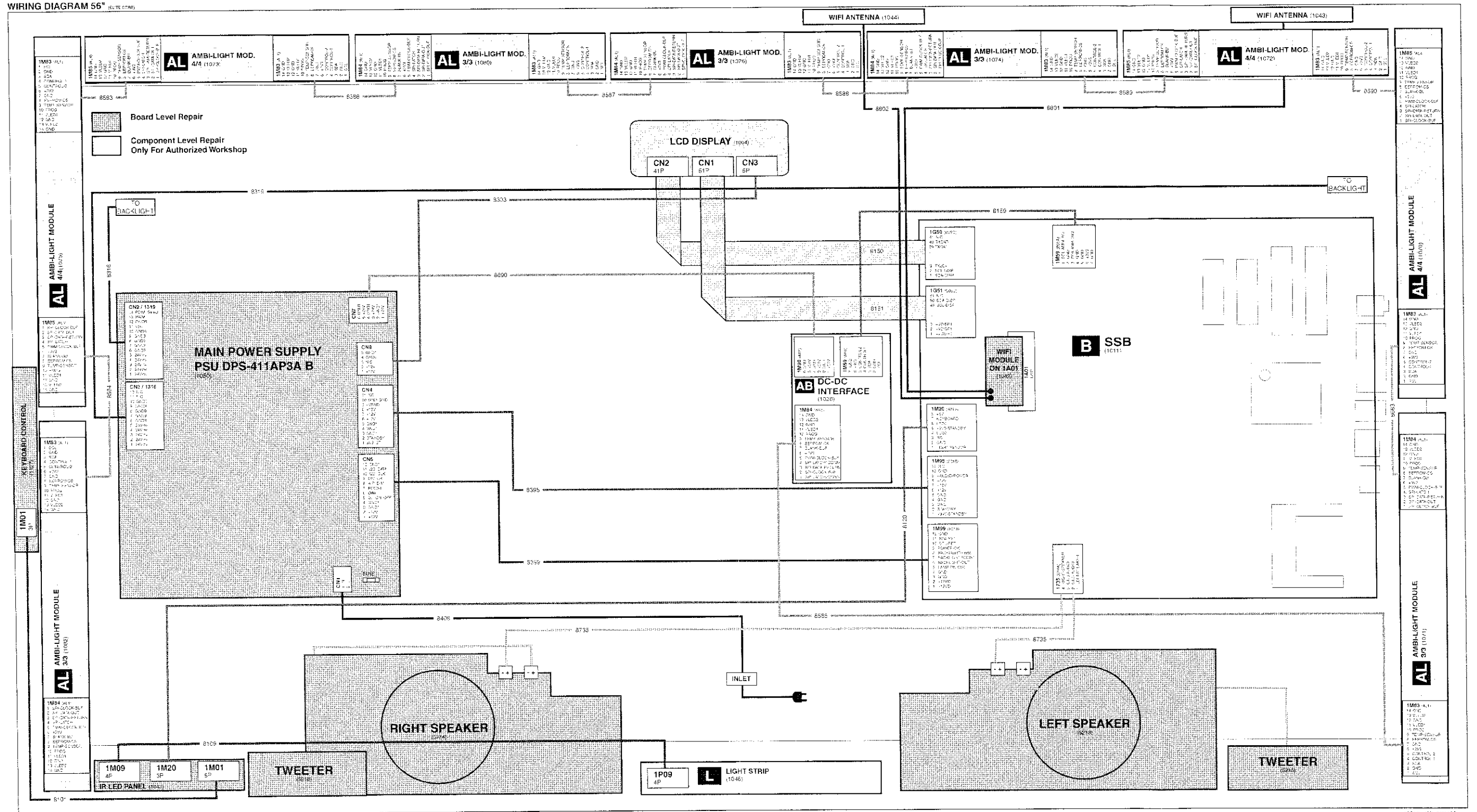
Wiring Diagram 37" (Elite Core)



*B310_491_080305.apx
090420

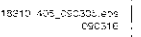
Wiring Diagram 56" (Elite Core)

WIRING DIAGRAM 56" (ELITE CORE)



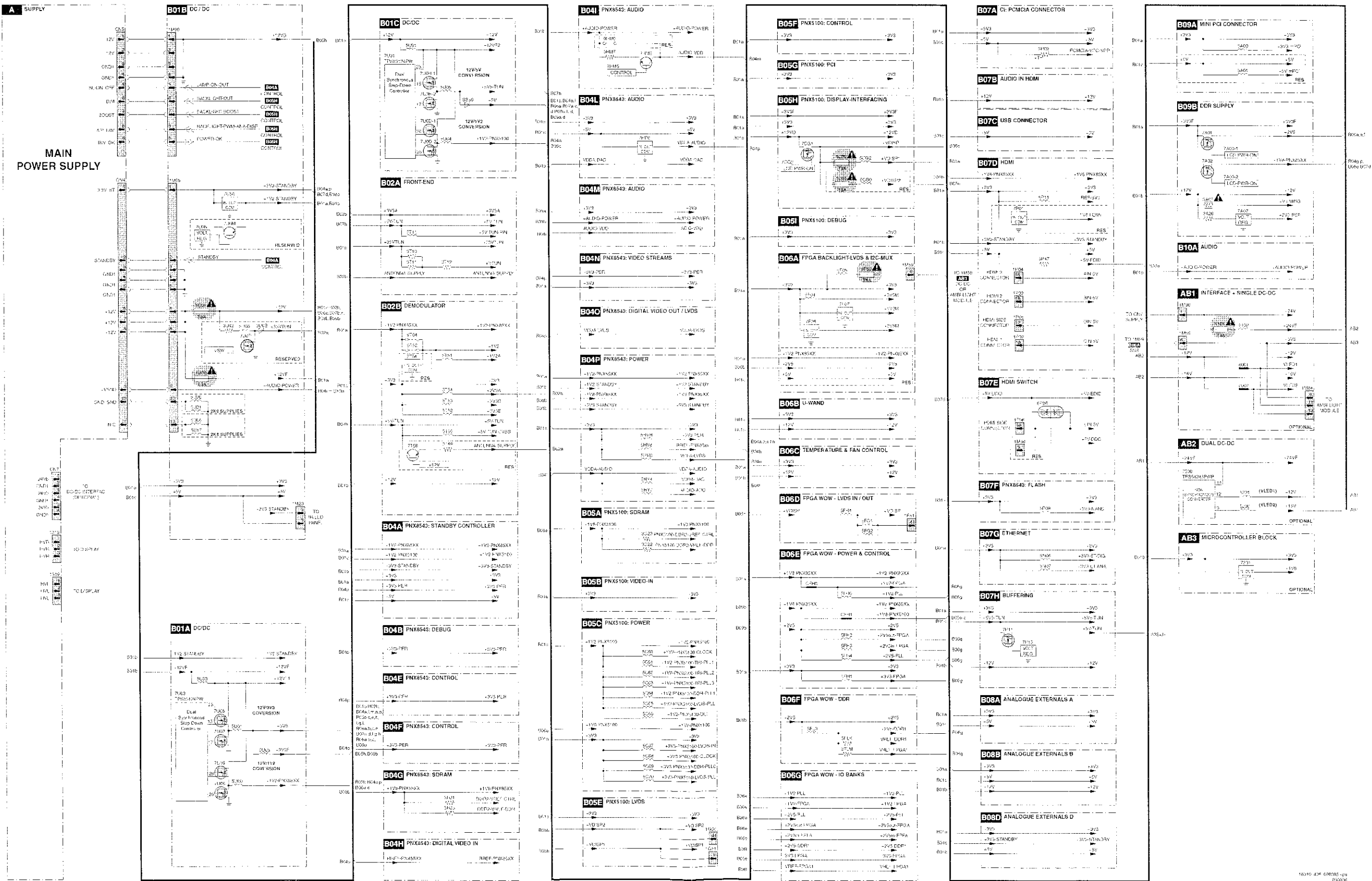
16310 4C7_090420 enb
109-008

Block Diagram I²C



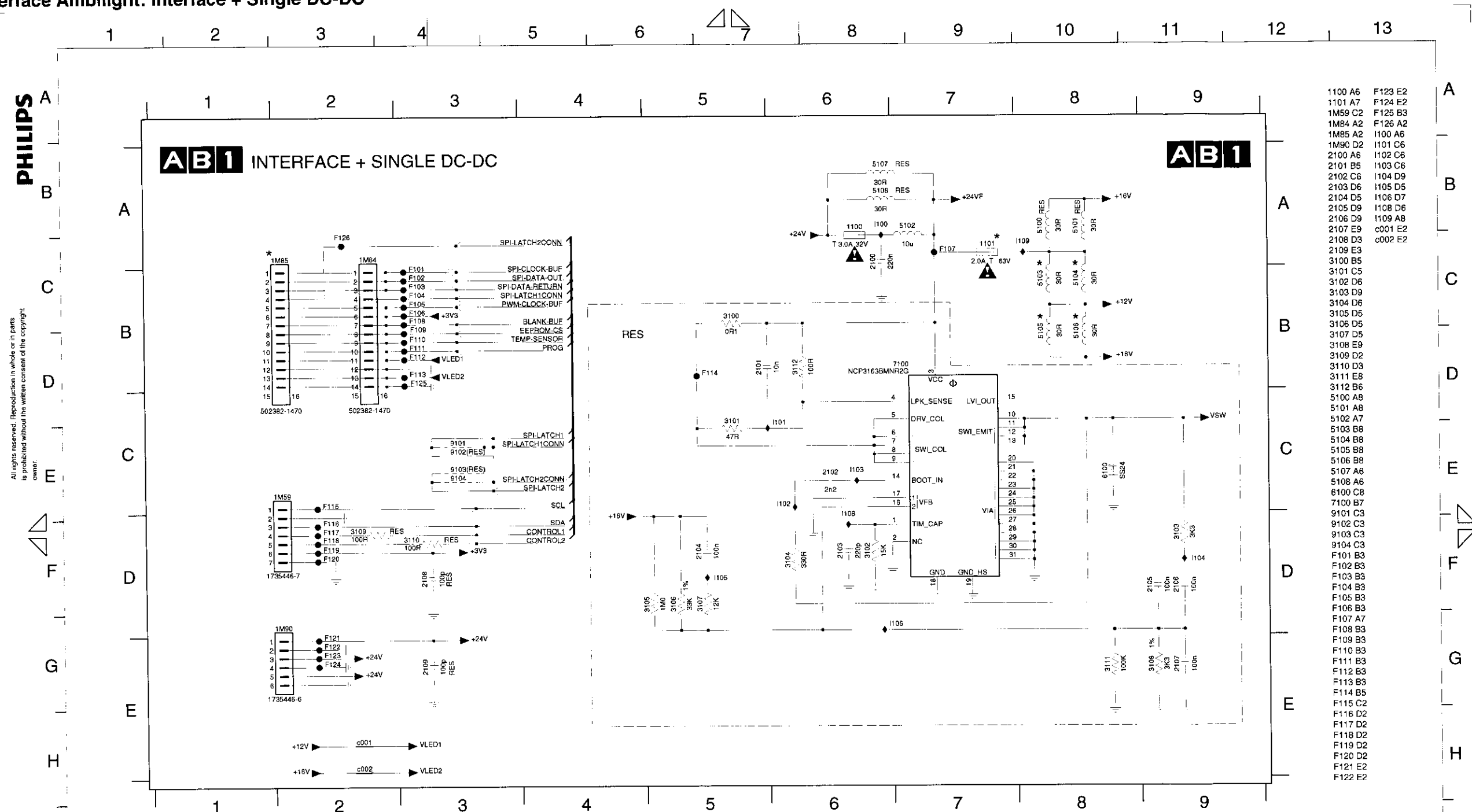
Supply Lines Overview

SUPPLY LINES OVERVIEW



10. Circuit Diagrams and PWB Layouts

Interface Ambilight: Interface + Single DC-DC



STUFFING DIVERSITIES FOR DC/DC INTERFACE AMBI 2K9

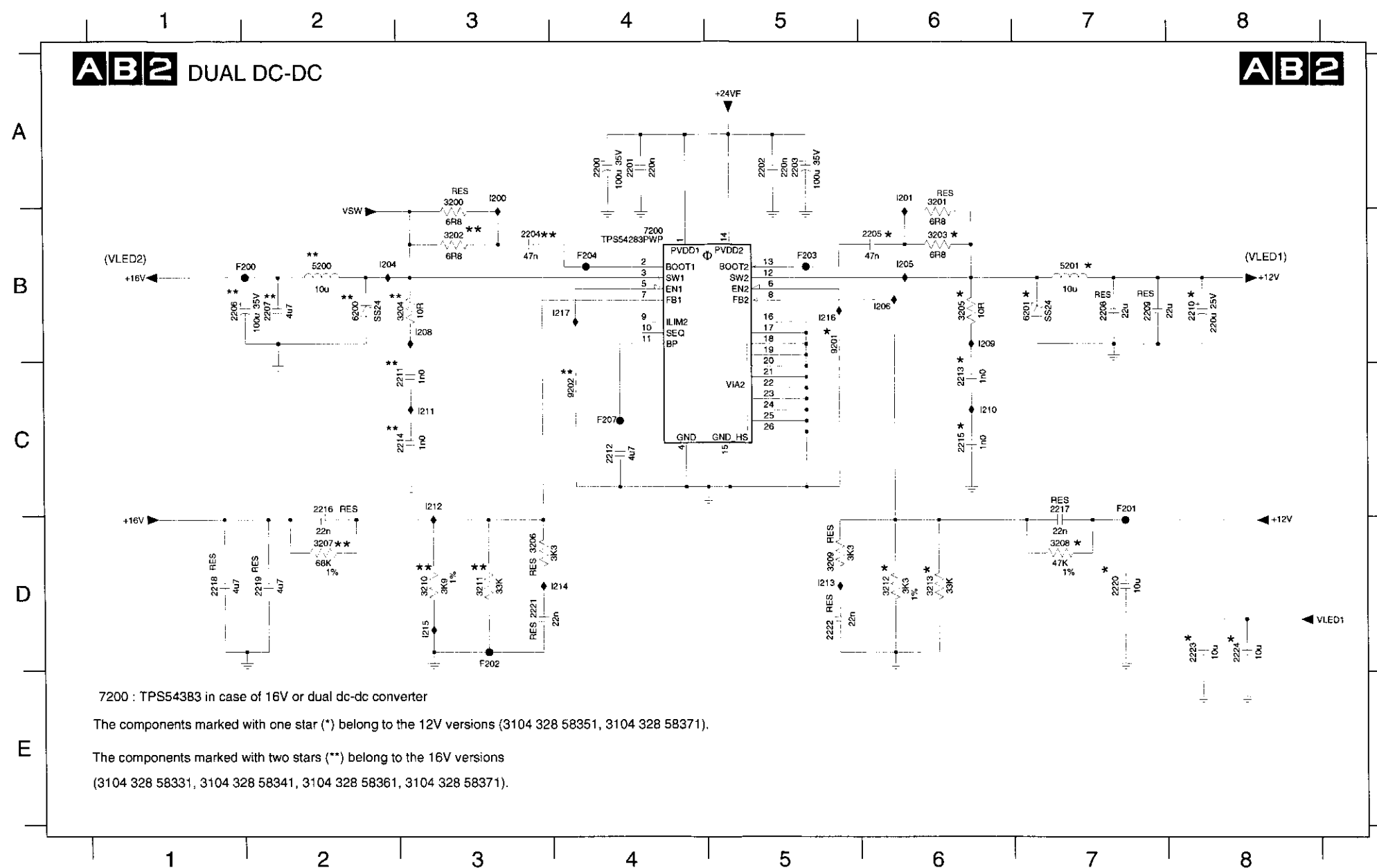
DC/DC INTERFACE	1101	1M85	5103/5104	5105/5106	VLED1	VLED2
3104 328 58341	in	in	in	out	24V	16V
3104 328 58351	out	out	out	in	12V	12V
3104 328 58361	out	out	out	in	16V	16V
3104 328 58371	out	out	out	out	12V	16V

See the stuffing diversities table in the case of components marked with one star (*)

CHN	SETNAME
CLASS_NO	
DC-DC INTERFACE	
AMBI 2K9	
3104 313 6325	
NAME Peter Van Hove	SUPERS.
CT	DATE 08-06-06
MG	CHECK
ROYAL PHILIPS ELECTRONICS N.V. 2008	

Interface Ambilight: Dual DC-DC

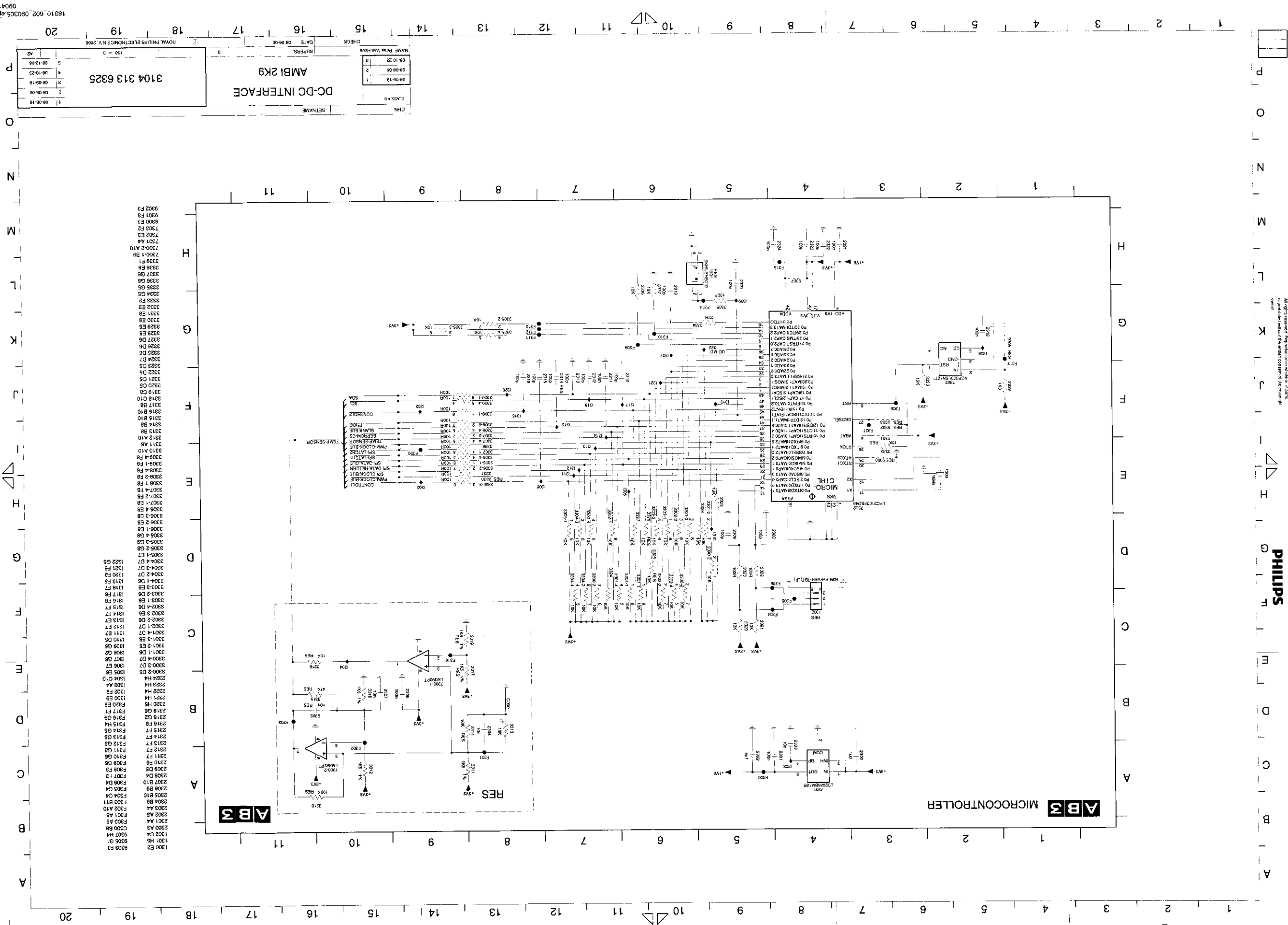
PHILIPS

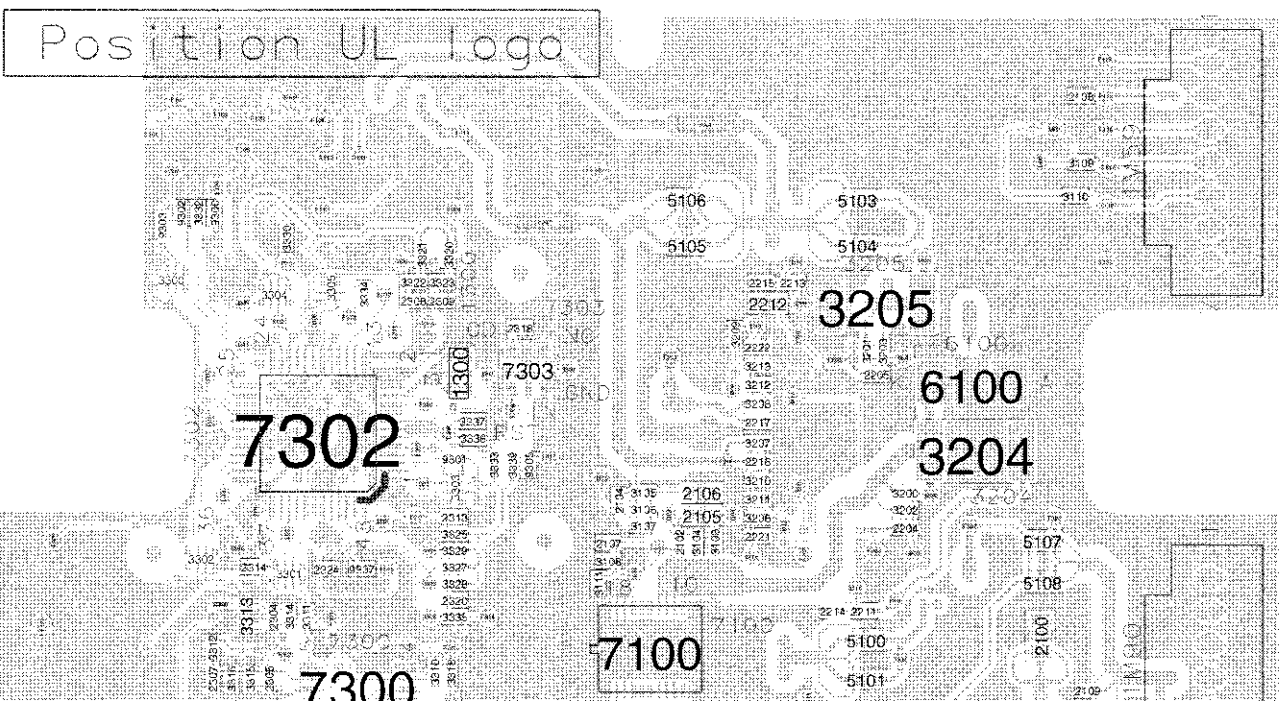
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owner.

2200 A4 I213 D5
2201 A4 I214 D4
2202 A5 I215 D3
2203 A5 I216 B5
2204 B3 I217 B4
2205 B6
2206 B1
2207 B2
2208 B7
2209 B7
2210 B8
2211 C3
2212 C4
2213 C6
2214 C3
2215 C6
2216 C2
2217 C7
2218 D1
2219 D2
2220 D7
2221 D3
2222 D5
2223 D8
2224 D8
3200 A3
3201 A6
3202 B3
3203 B6
3204 B3
3205 B6
3206 D3
3207 D2
3208 D7
3209 D5
3210 D3
3211 D3
3212 D6
3213 D6
5200 B2
5201 B7
6200 B2
6201 B7
7200 B4
9201 B5
9202 C4
F200 B2
F201 C7
F202 D3
F203 B5
F204 B4
F207 C4
I200 A3
I201 A6
I204 B2
I205 B6
I206 B6
I208 B3
I209 B6
I210 C6
I211 C3
I212 C3

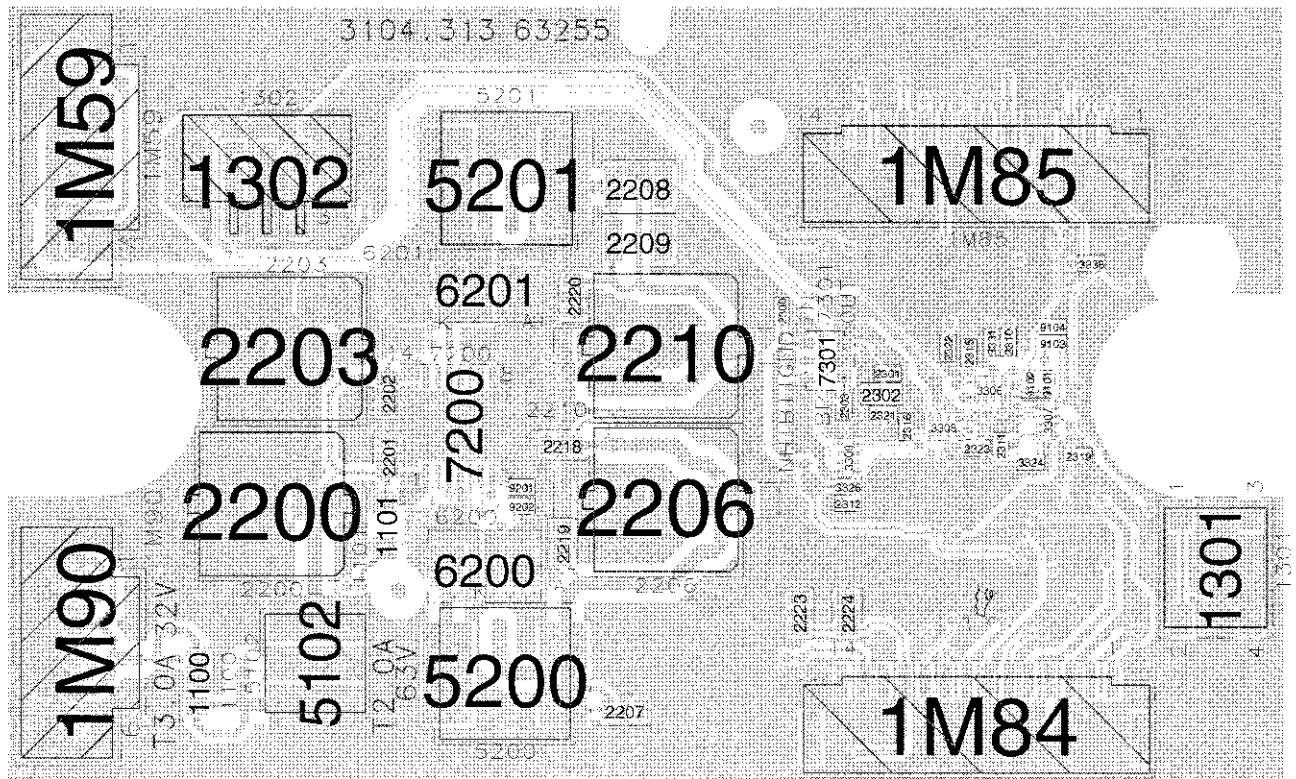
CHN		SETNAME	
CLASS_NO		DC-DC INTERFACE	
		AMBI 2K9	
		3104 313 6325	
		130 - 2	
		A3	
NAME Peter Van Hove		SUPERS.	
		3	
CHECK		DATE 08-06-09	
		ROYAL PHILIPS ELECTRONICS N.V. 2008	

Interface Ambilight: Microcontrollerblock

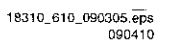




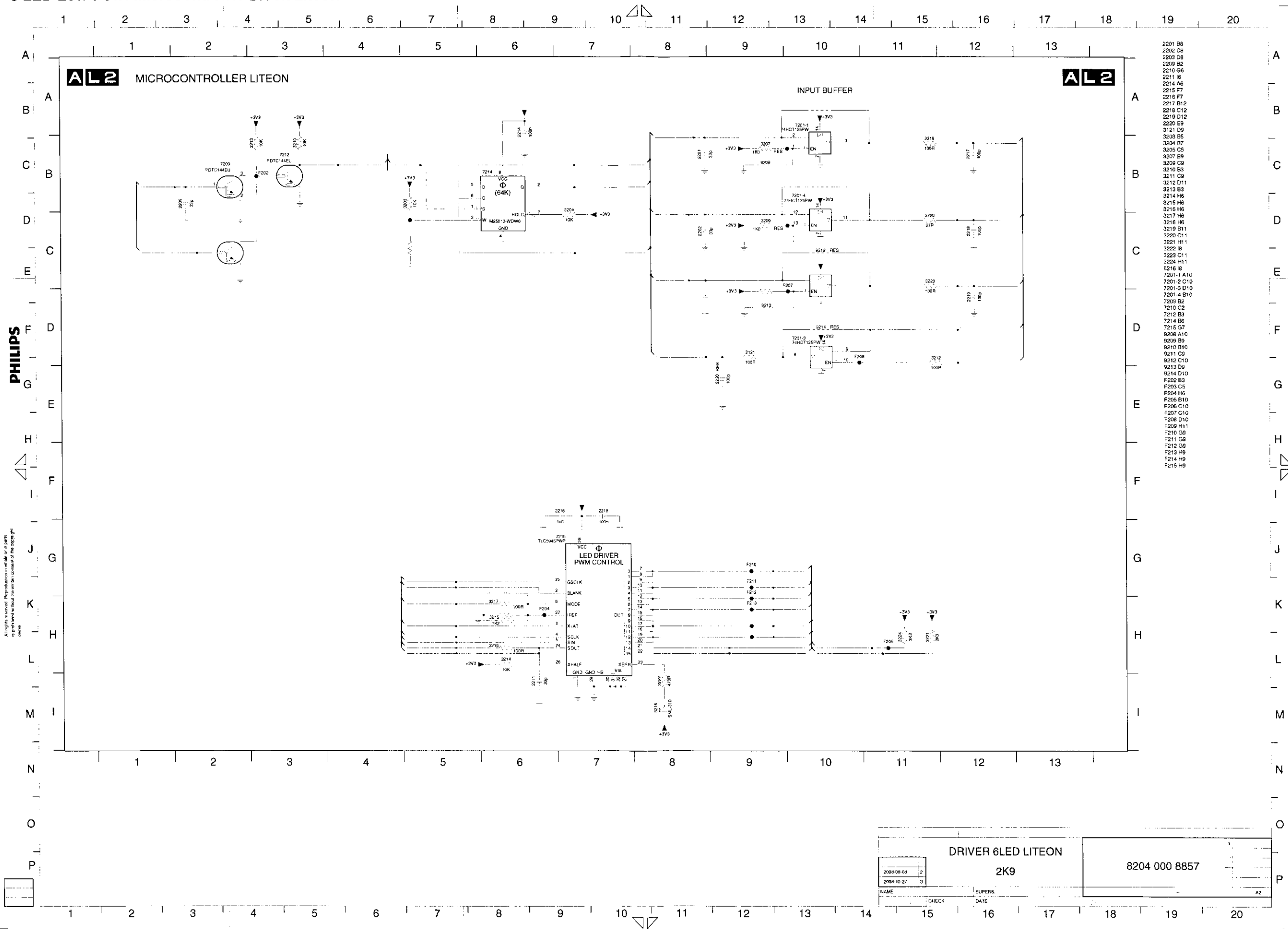
Layout DC/DC Interface Ambilight



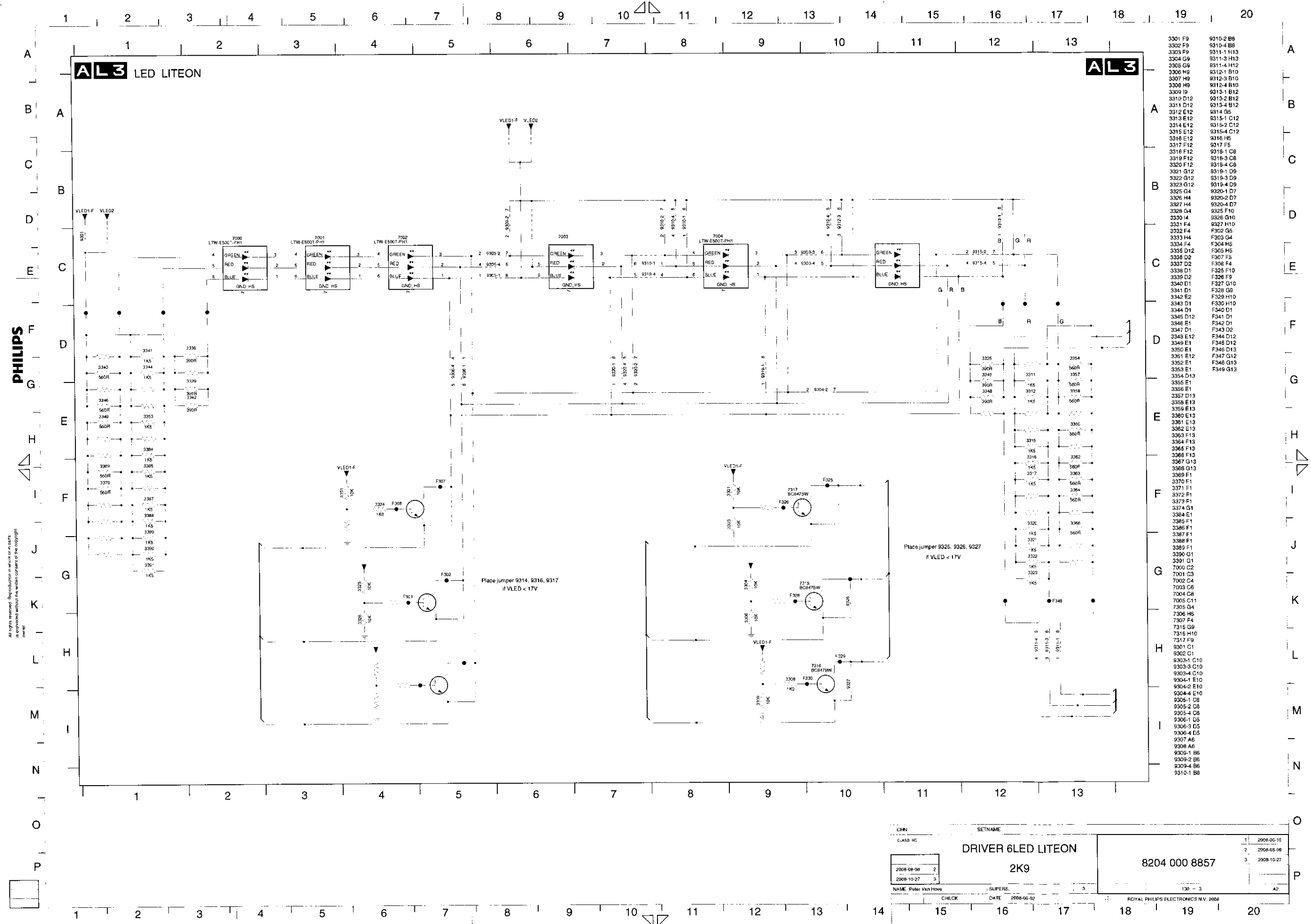
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----



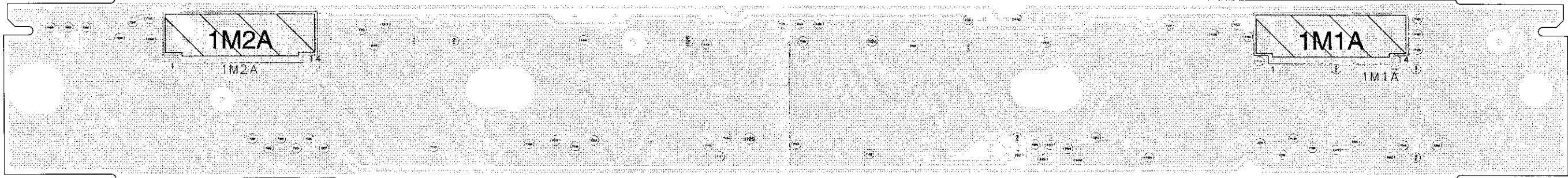
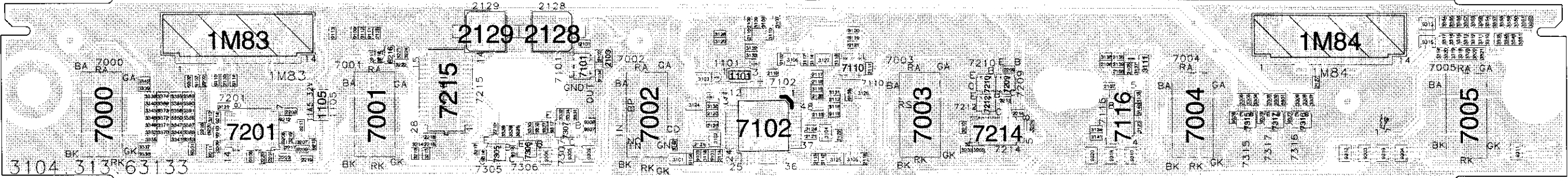
6 LED Low-Pow: Microcontroller Block Liteon



6 LED Low-Pow: LED Liteon



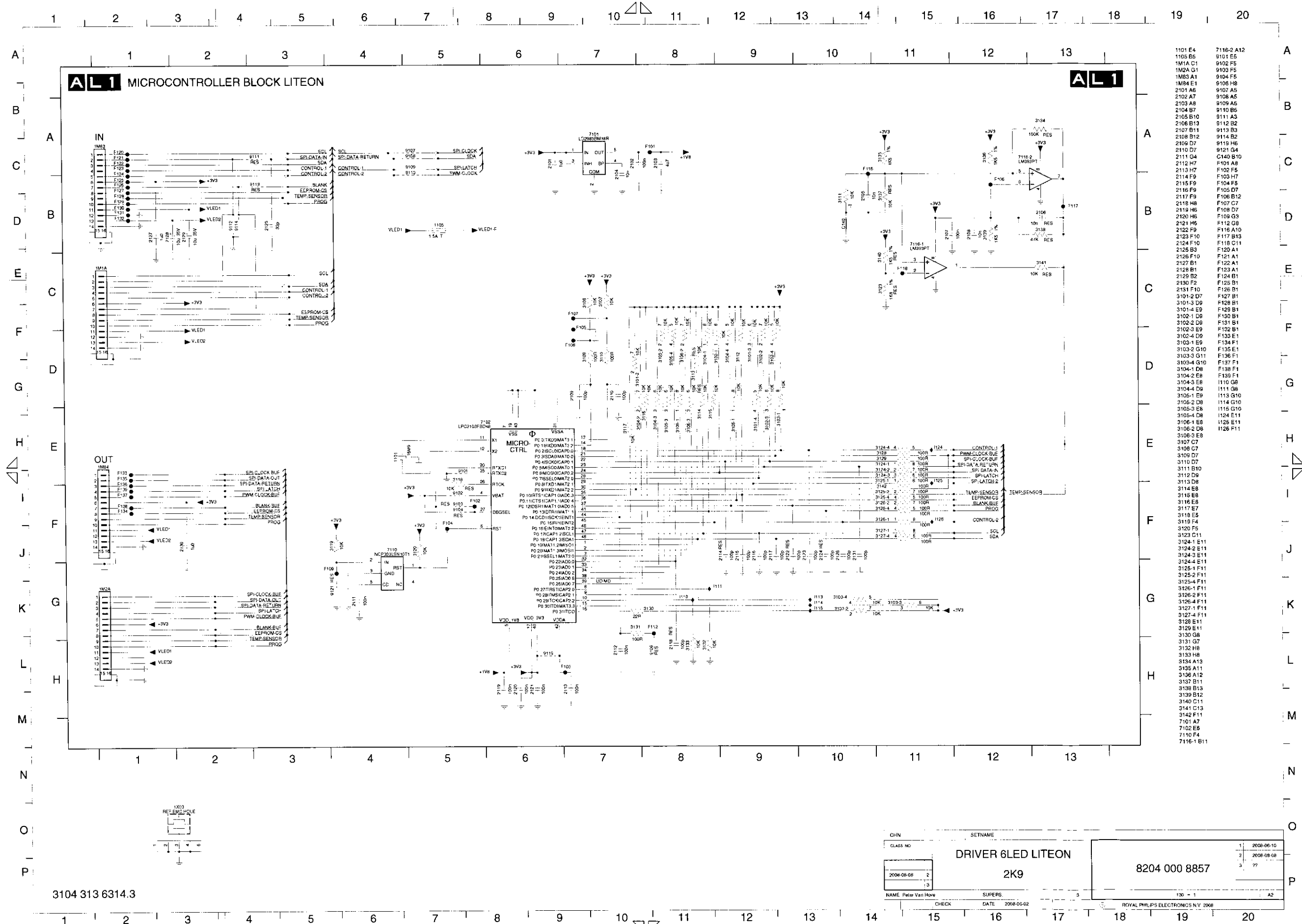
Layout 6 LED Low-Pow



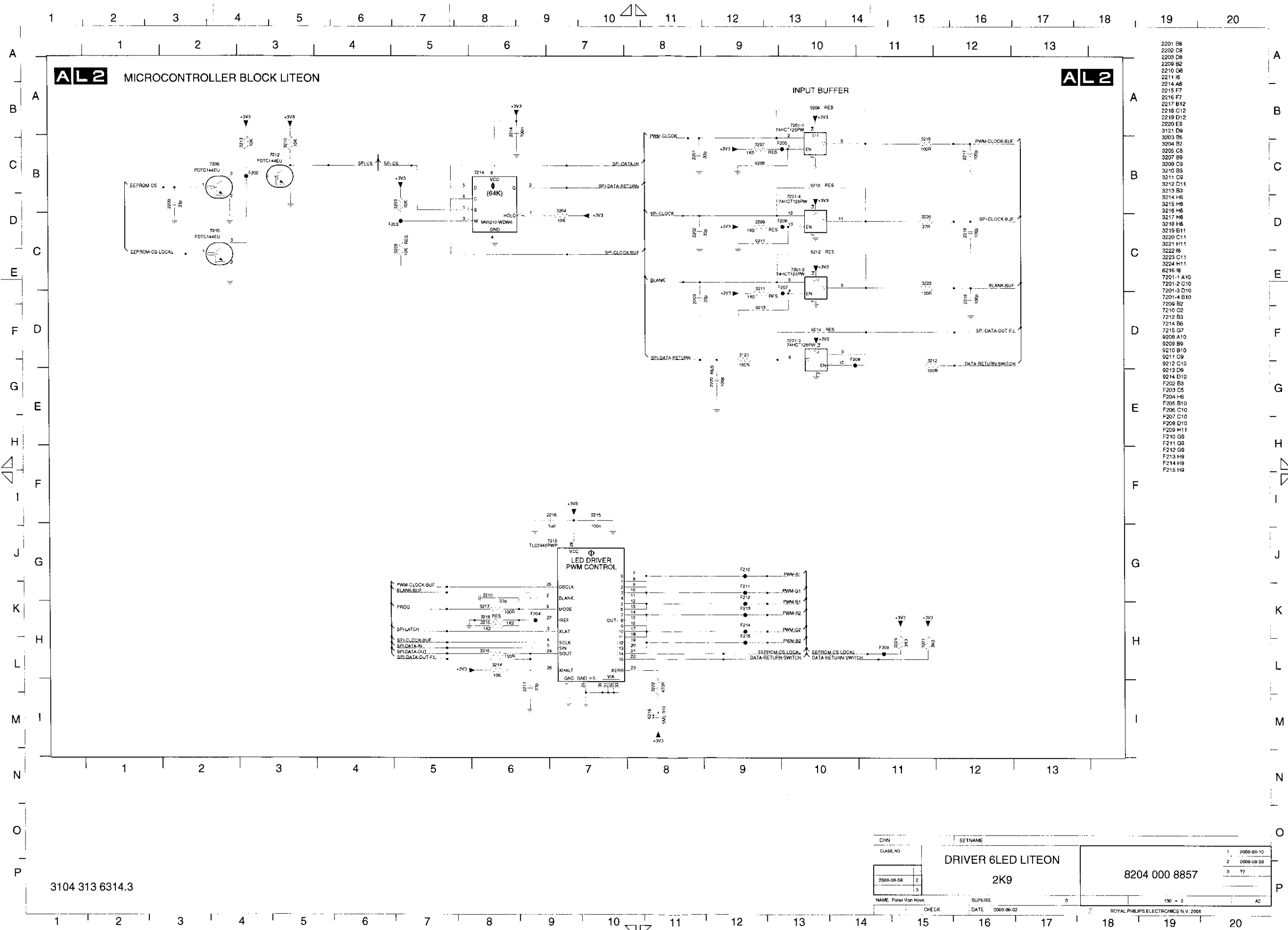
3104 313 6313.3

18310_551_090309
090309

8 LED Low-Pow: Microcontroller Block Liteon



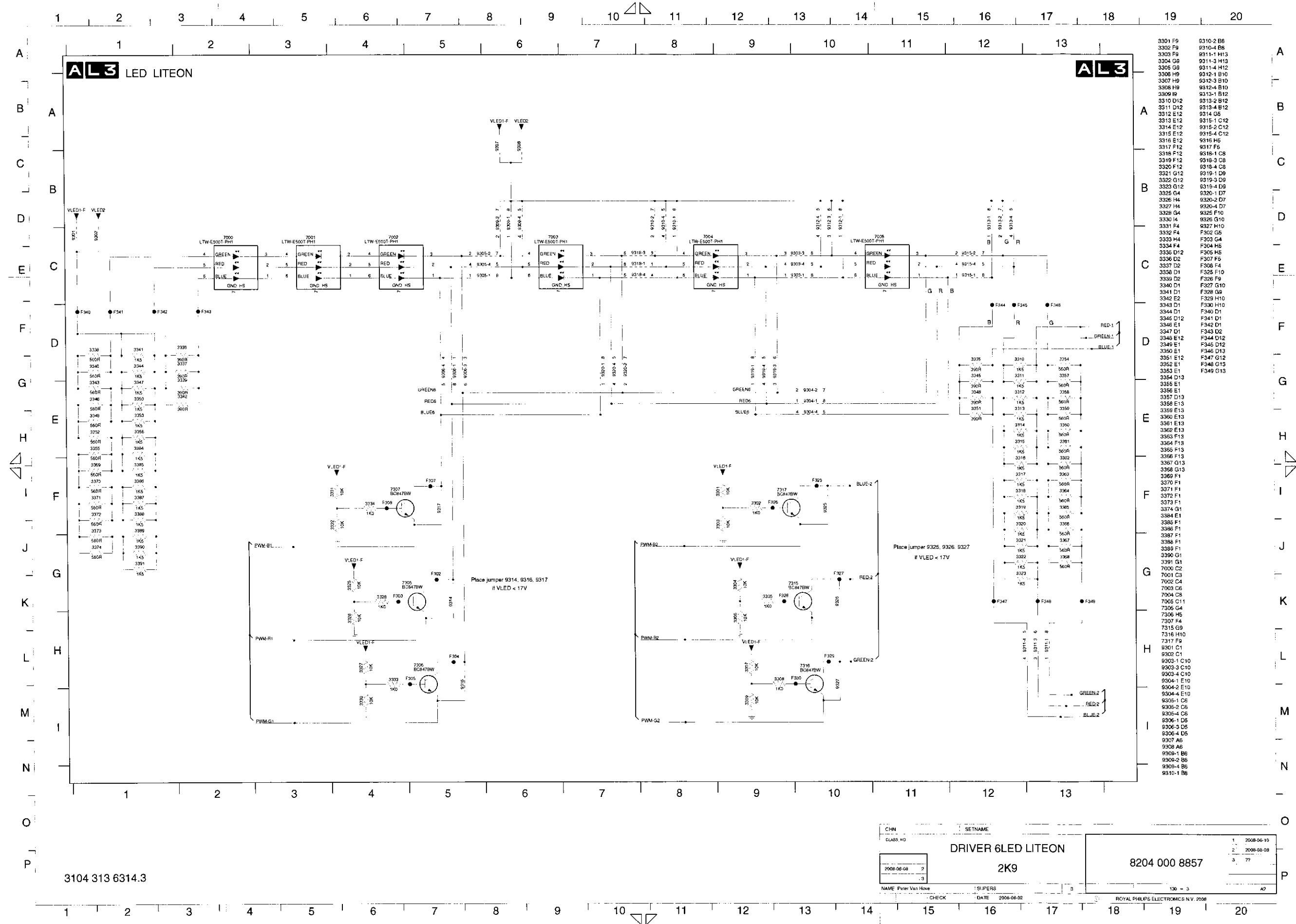
8 LED Low-Pow: Microcontroller Block Liteon

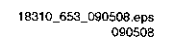


3104 313 6314.3

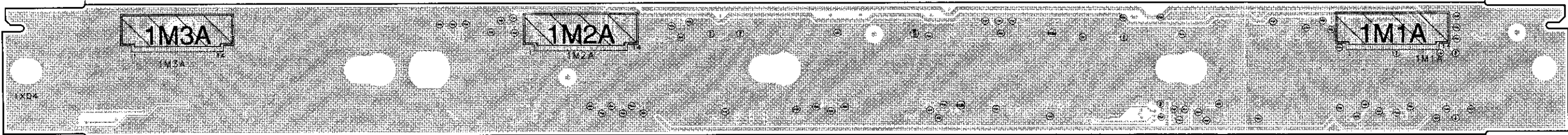
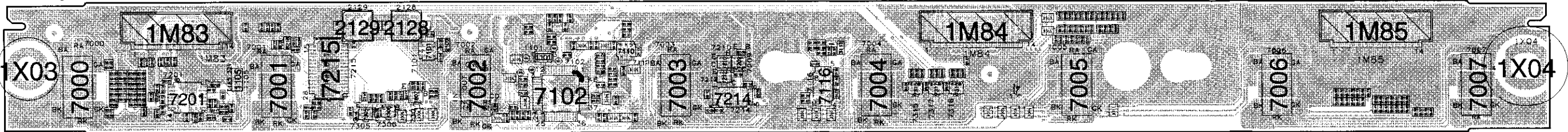
CHN	SETNAME	1	2008-06-10
CLASS NO		2	2008-08-08
2008-08-08	2	3	??
NAME: Peter Van Hove	SUPERS:	3	130 - 2
CHECK	DATE: 2008-06-02	ROYAL PHILIPS ELECTRONICS N.V. 2008	A2

8 LED Low-Pow: LED Liteon





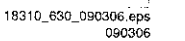
Layout 8 LED Low-Pow



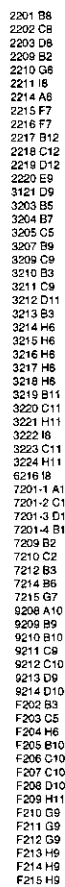
31043136314.3

18490_550_090326.eps
090326

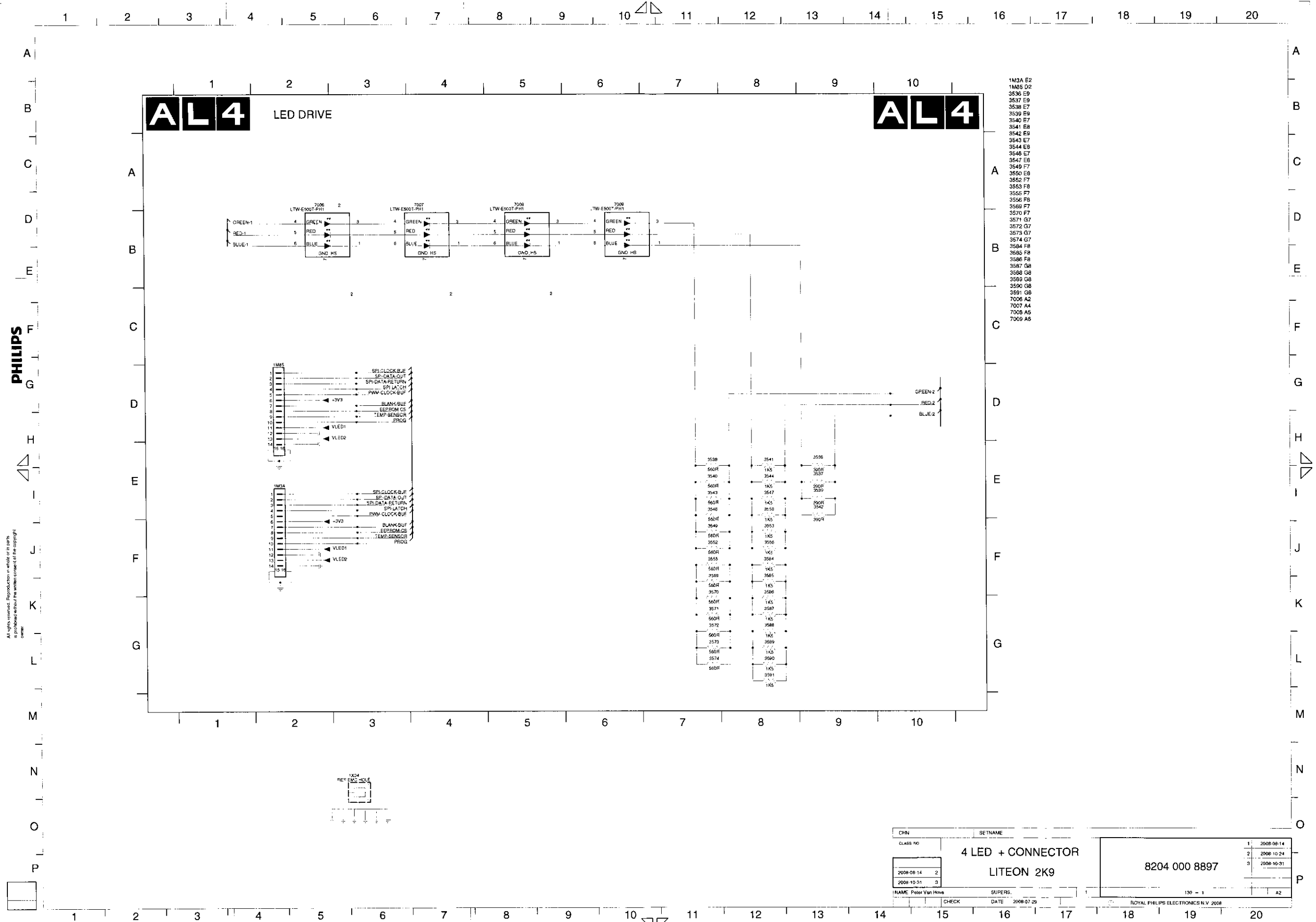
PHILIPS



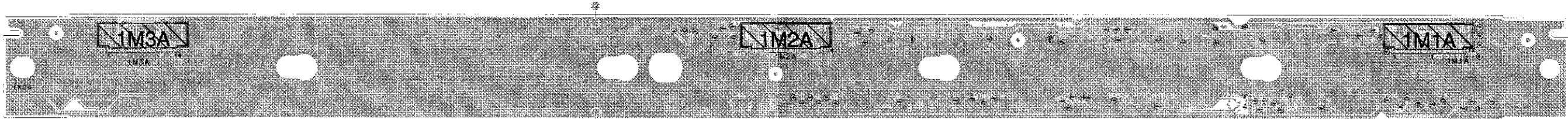
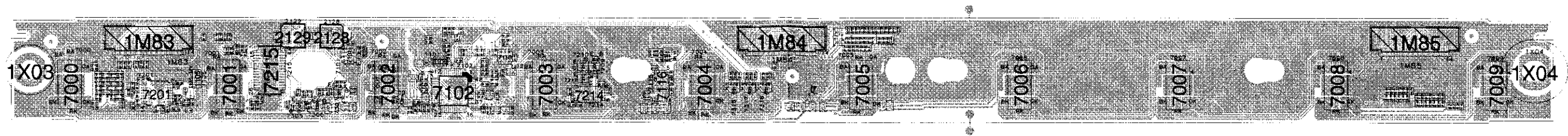
PHILIPS



10 LED Low-Pow: LED Drive Liteon



Layout 10 LED Low-Pow



3104 313 6315.2

18310_553_090309
090309

PHILIPS

DC/DC

B01A

B01A

12V/3V3 CONVERSION

12V/1V2 CONVERSION

ENABLE-3V3.5V

+1V2-STANDBY

1X04 REF. EMC HOLE

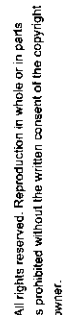
DC/DC
TV543 R2 LDI/PNX
8204 000 8932

2008-10-10

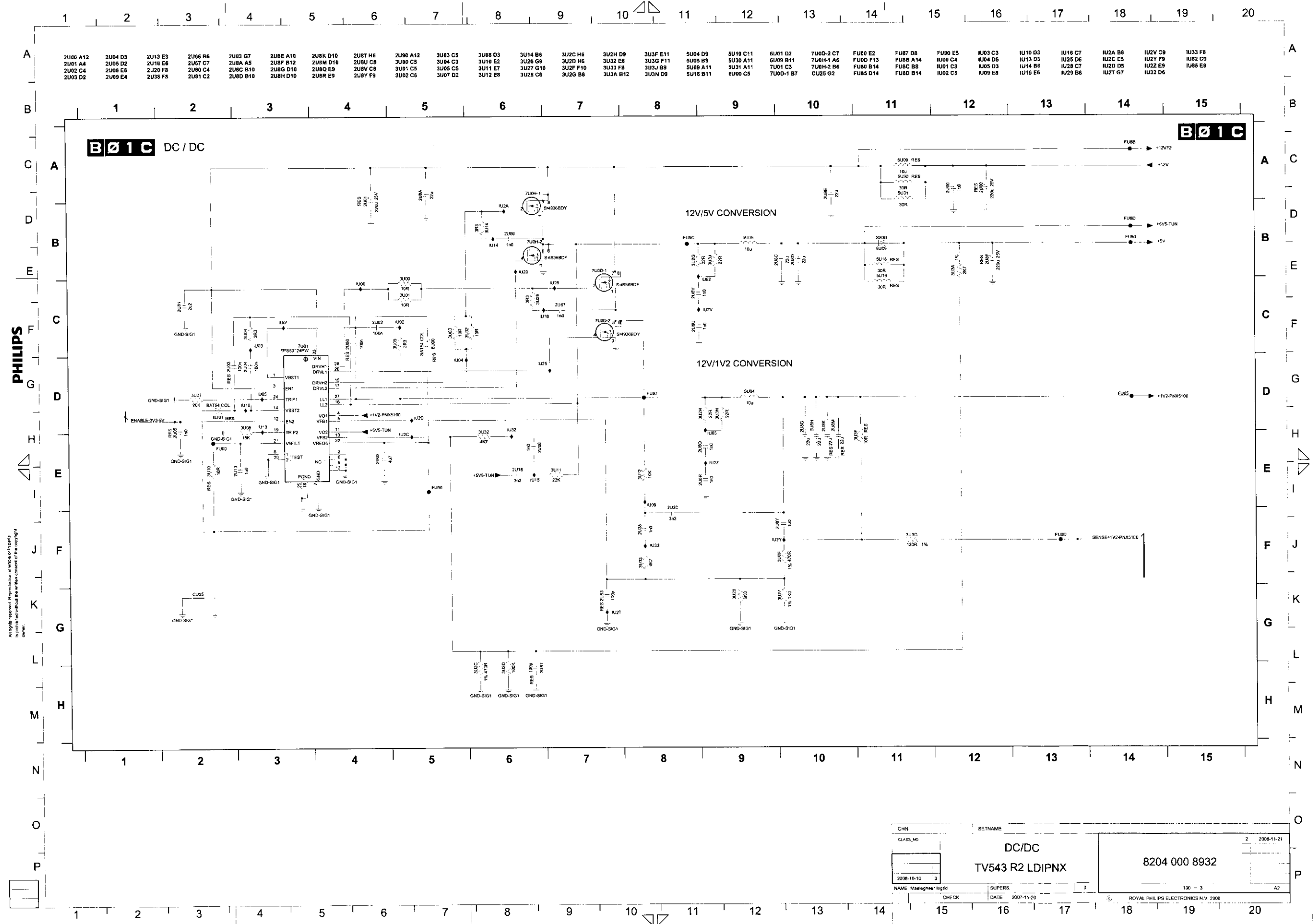
2008-11-20

ROYAL PHILIPS ELECTRONICS N.V. 2008

PHILIPS



SSB: DC/DC



PHILIPS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

A B C D E F G H I J K L M N O P

B02A FRONT-END

B02A

RESERVED

IF IT11 IS USED THEN 2T25 AND 9T11 ARE ALSO STUFFED

IF IT21 IS USED THEN 2T23, 2T25, 3T14, 3T15, 9T13, 9T11 AND 9T21 ARE ALSO STUFFED

CHN SETNAME FRONT-END TV543 R2 LDPINX

NAME: Randal De Keyser SUPERS. 3

CHECK DATE 2008-06-03

8204 000 8929

2: 2008-11-21

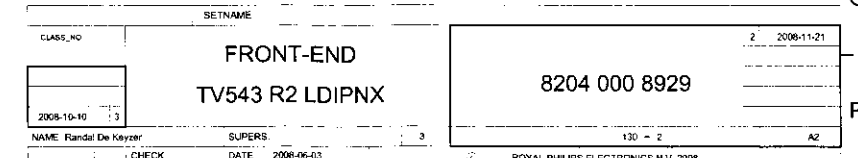
130 - 1

ROYAL PHILIPS ELECTRONICS N.V. 2008

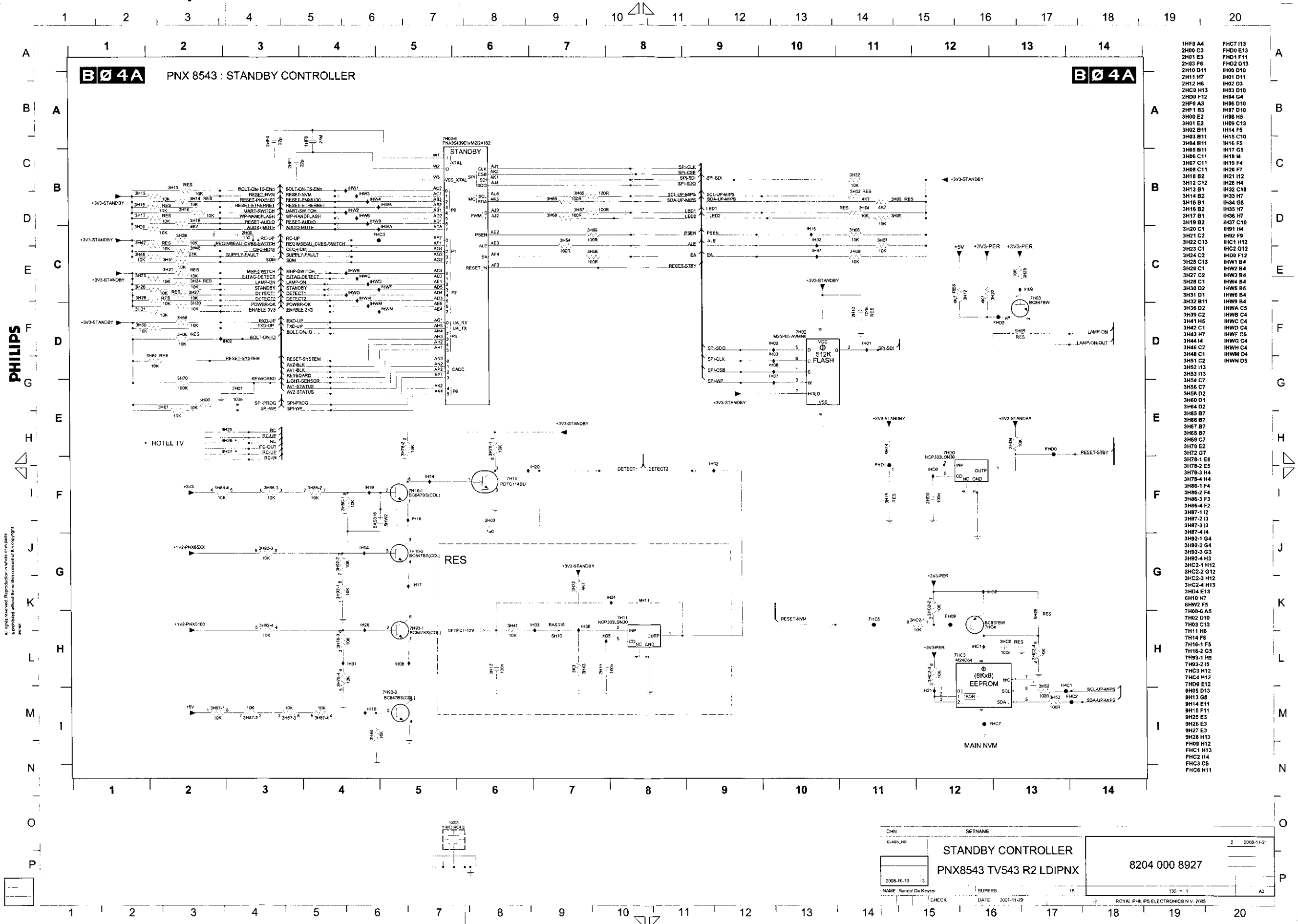
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

A B C D E F G H I J K L M N O P

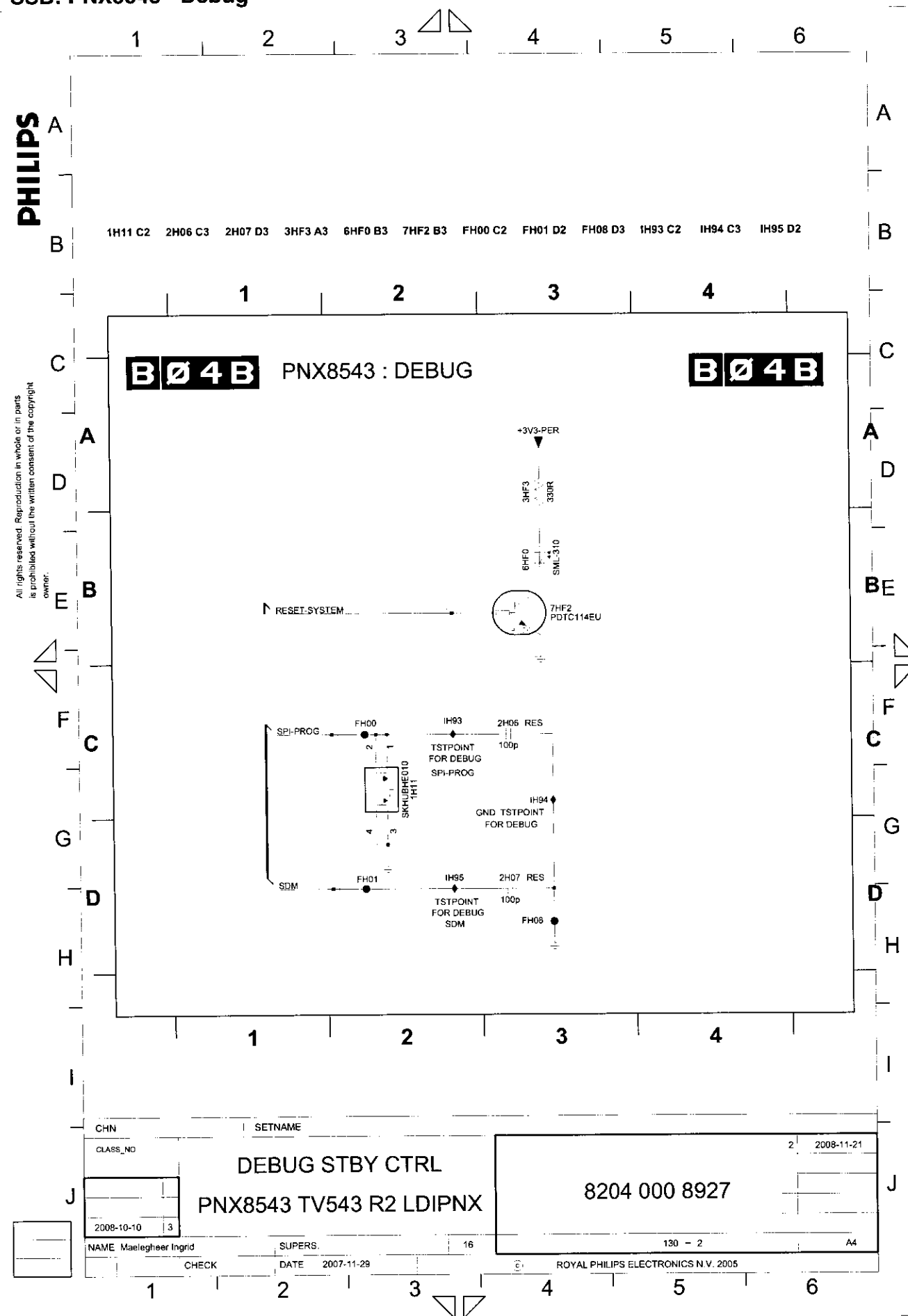
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----



SSB: PN8543 - Stand-by Controller



SSB: PNx8543 - Debug

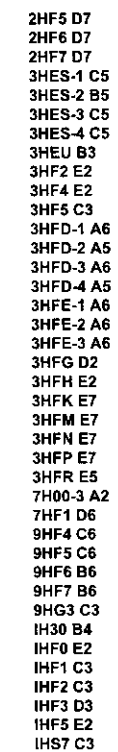
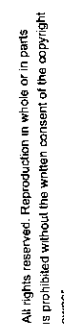


Personal Notes:

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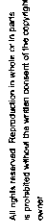


PHILIPS

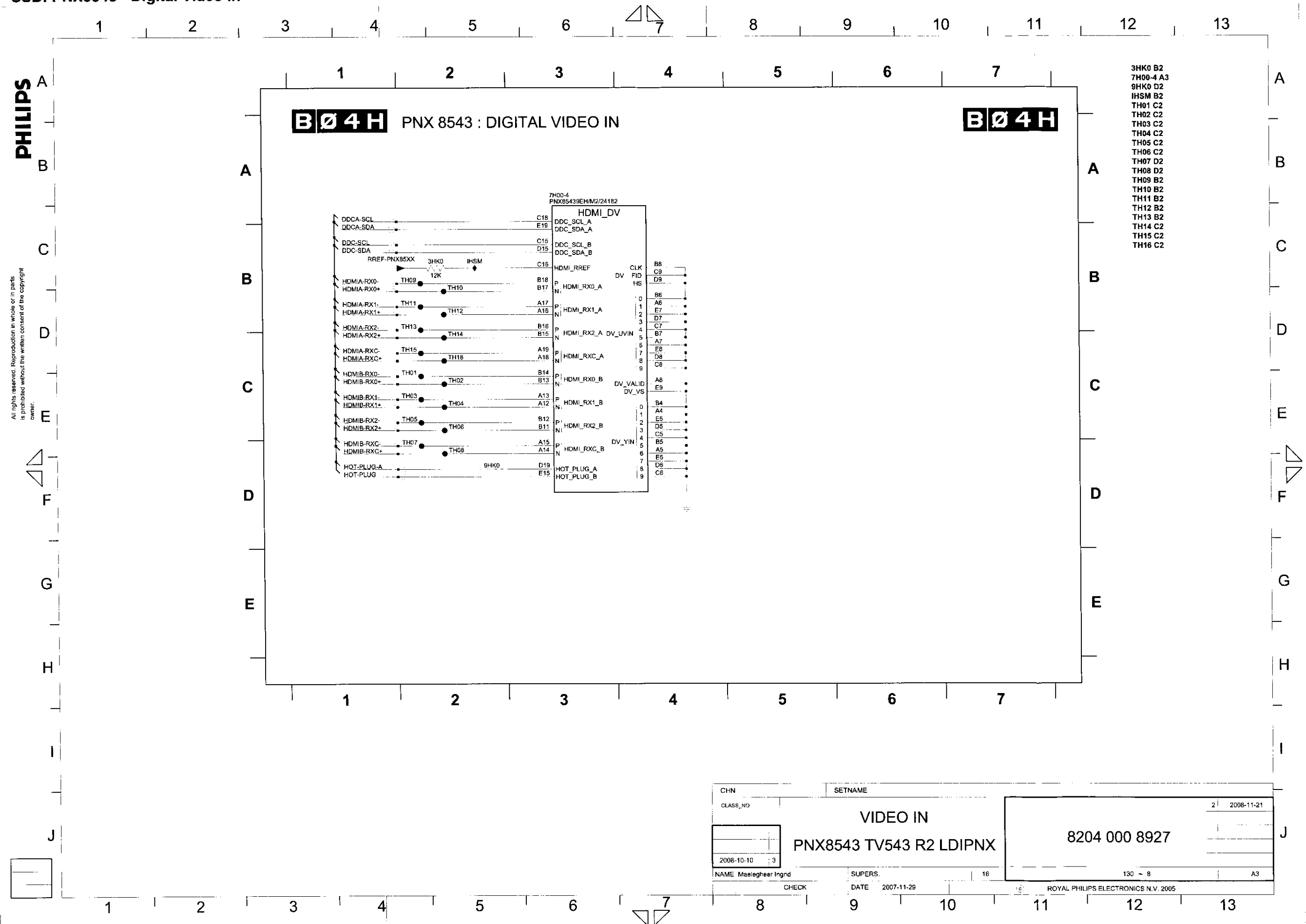


18310_508_090302.eps
090302

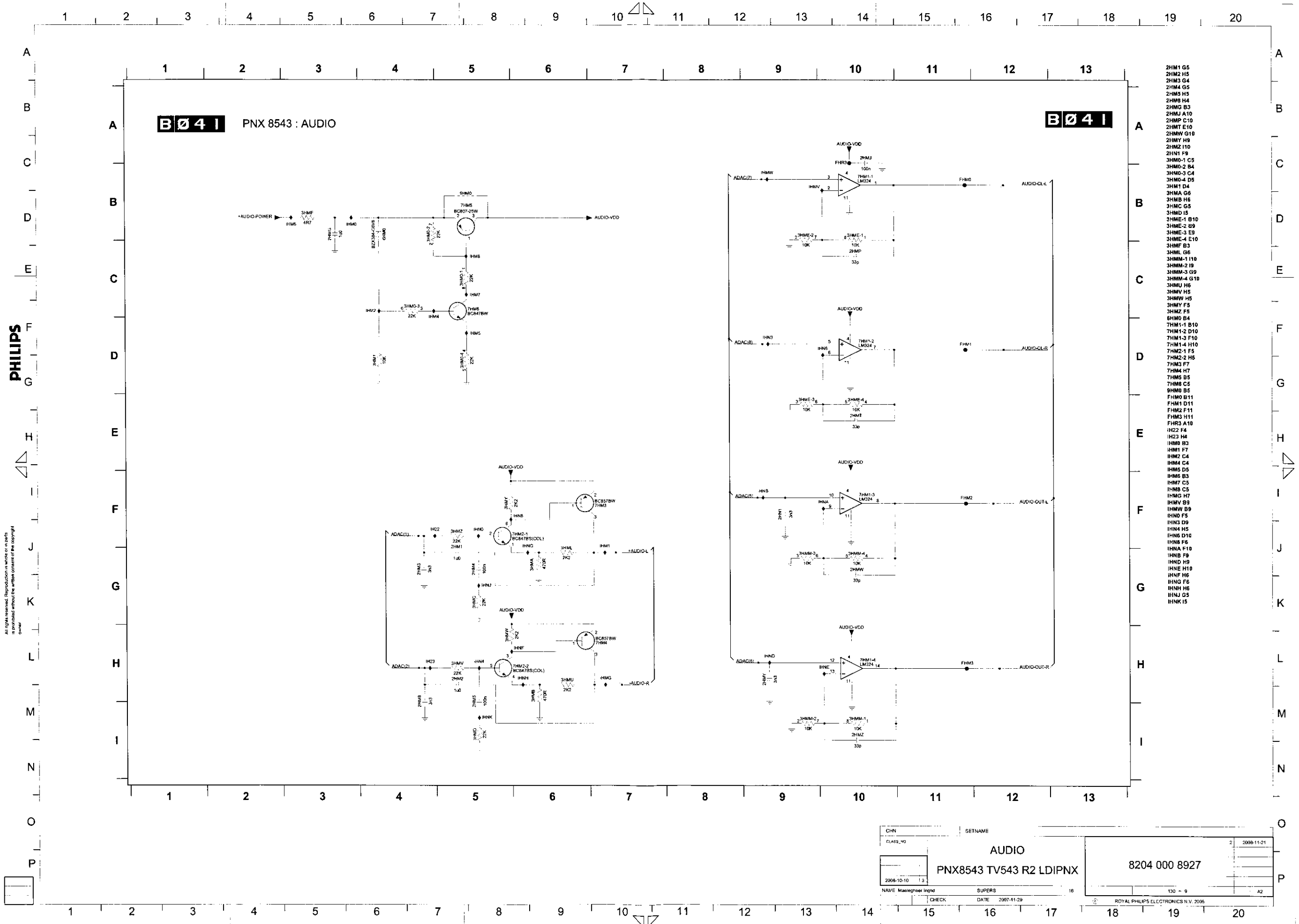
PHILIPS



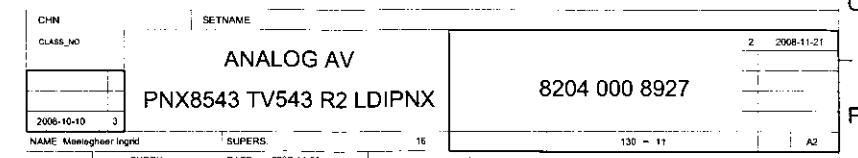
SSB: PN8543 - Digital Video In



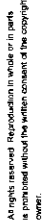
SSB: PNx8543 - Audio



BØ4K PNX 8543 : ANALOGUE AV

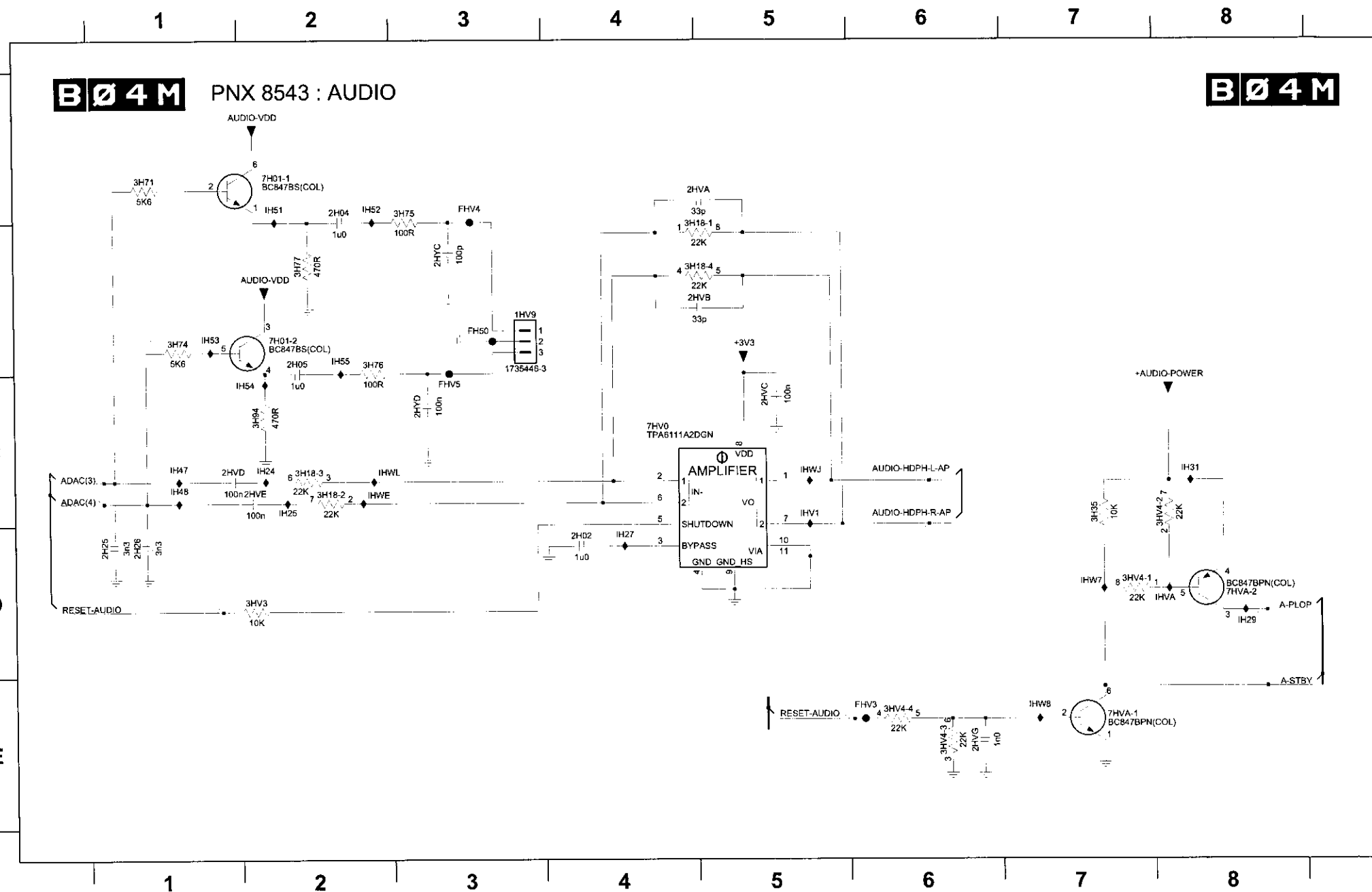


PHILIPS



SSB: PNx8543 - Audio

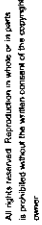
PHILIPS

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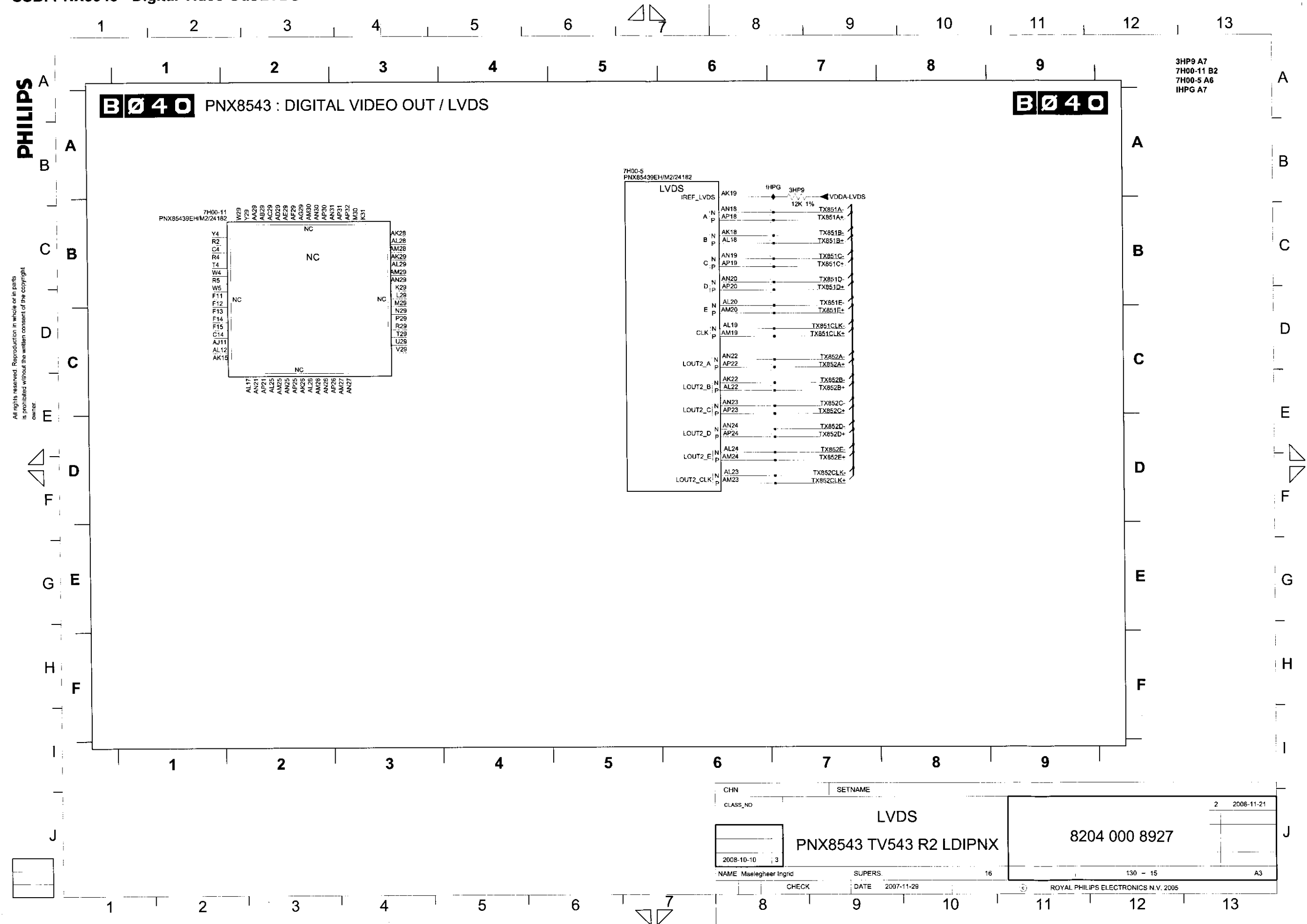
1HV9 B3
2H02 D4
2H04 A2
2H05 B2
2H25 D1
2H26 D1
2HVA A5
2HV8 B5
2HVC C5
2HVD C1
2HVE C2
2HVG E6
2HYC B3
2HYD C3
3H18-1 B5
3H18-2 C2
3H18-3 C2
3H18-4 B5
3H35 C7
3H71 A1
3H74 B1
3H75 A3
3H76 B2
3H77 B2
3H94 C2
3HV3 D2
3HV4-1 D7
3HV4-2 C8
3HV4-3 E6
3HV4-4 E6
7H01-1 A2
7H01-2 B2
7HV0 C4
7HVA-1 E7
7HVA-2 D8
FH50 B3
FHV3 E6
FHV4 A3
FHV5 C3
IH24 C2
IH25 C2
IH27 D4
IH29 D8
IH31 C8
IH47 C1
IH48 C1
IH51 A2
IH52 A2
IH53 B1
IH54 C2
IH55 B2
IHV1 C5
IHVA D8
IHW7 D7
IHW8 E7
IHW9 C2
IHWJ C5
IHWL C2

CHN	SETNAME
CLASS_NO	AUDIO
2008-10-10	3
NAME	Maelegheer Ingrid
CHECK	DATE
2007-11-29	16
8204 000 8927	130 - 13
ROYAL PHILIPS ELECTRONICS N.V. 2005	A3

PHILIPS

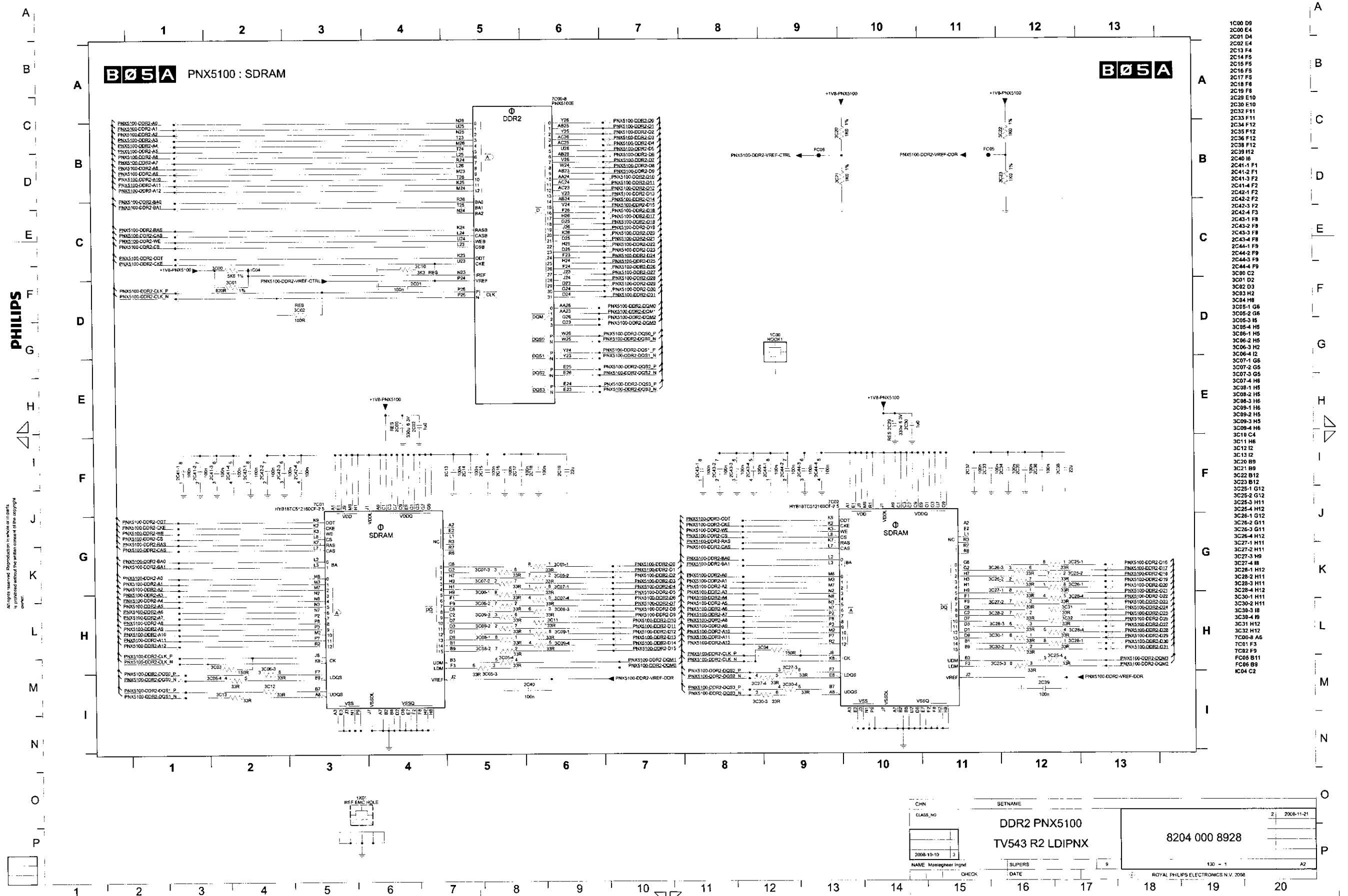


SSB: PNx8543 - Digital Video Out/LVDS

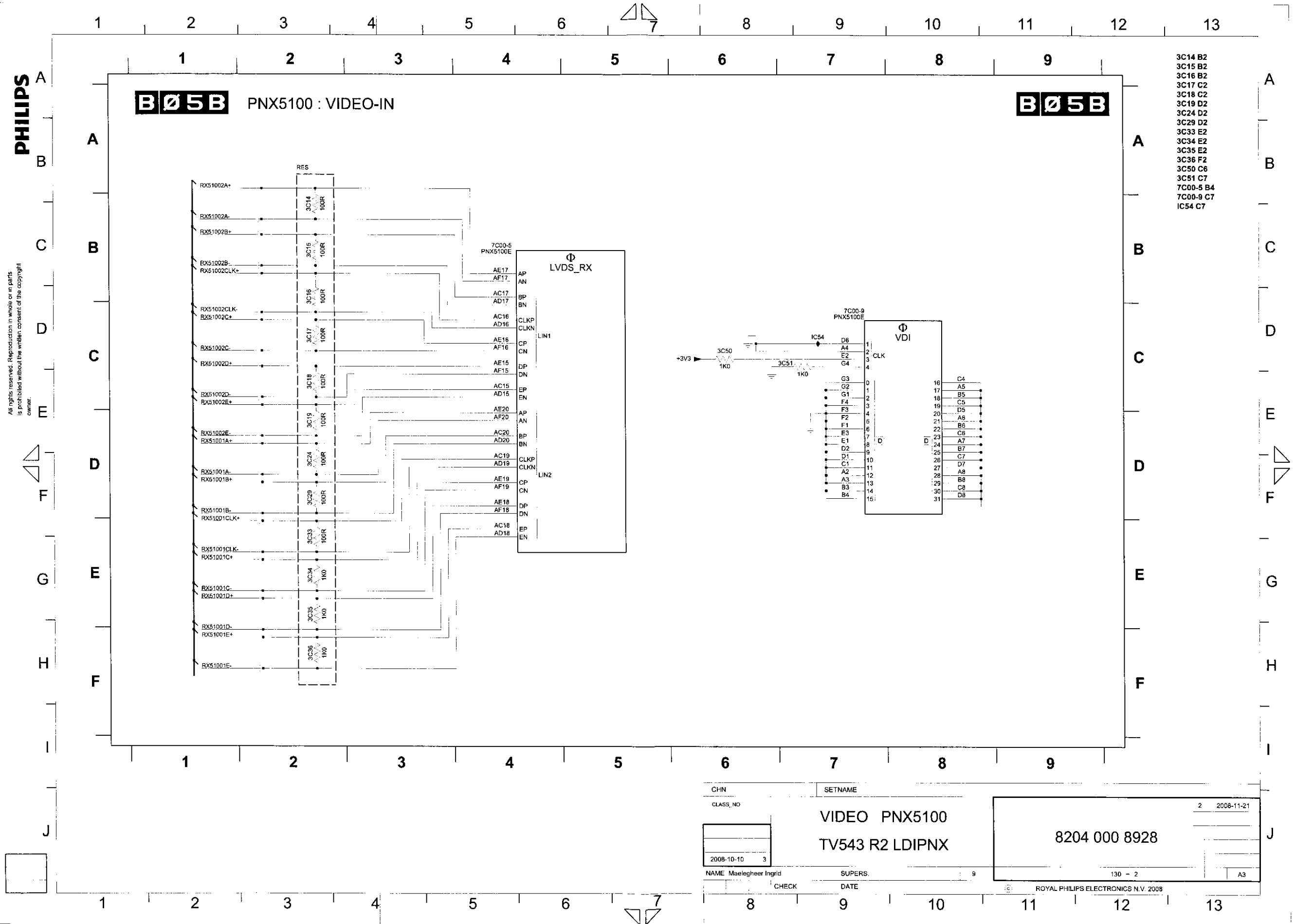


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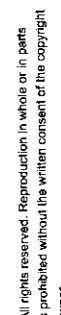
1 2 3 4 5 6 77 8 9 10 11 12 13 14 15 16 17 18 19 20



SSB: PNX5100 - Video-In



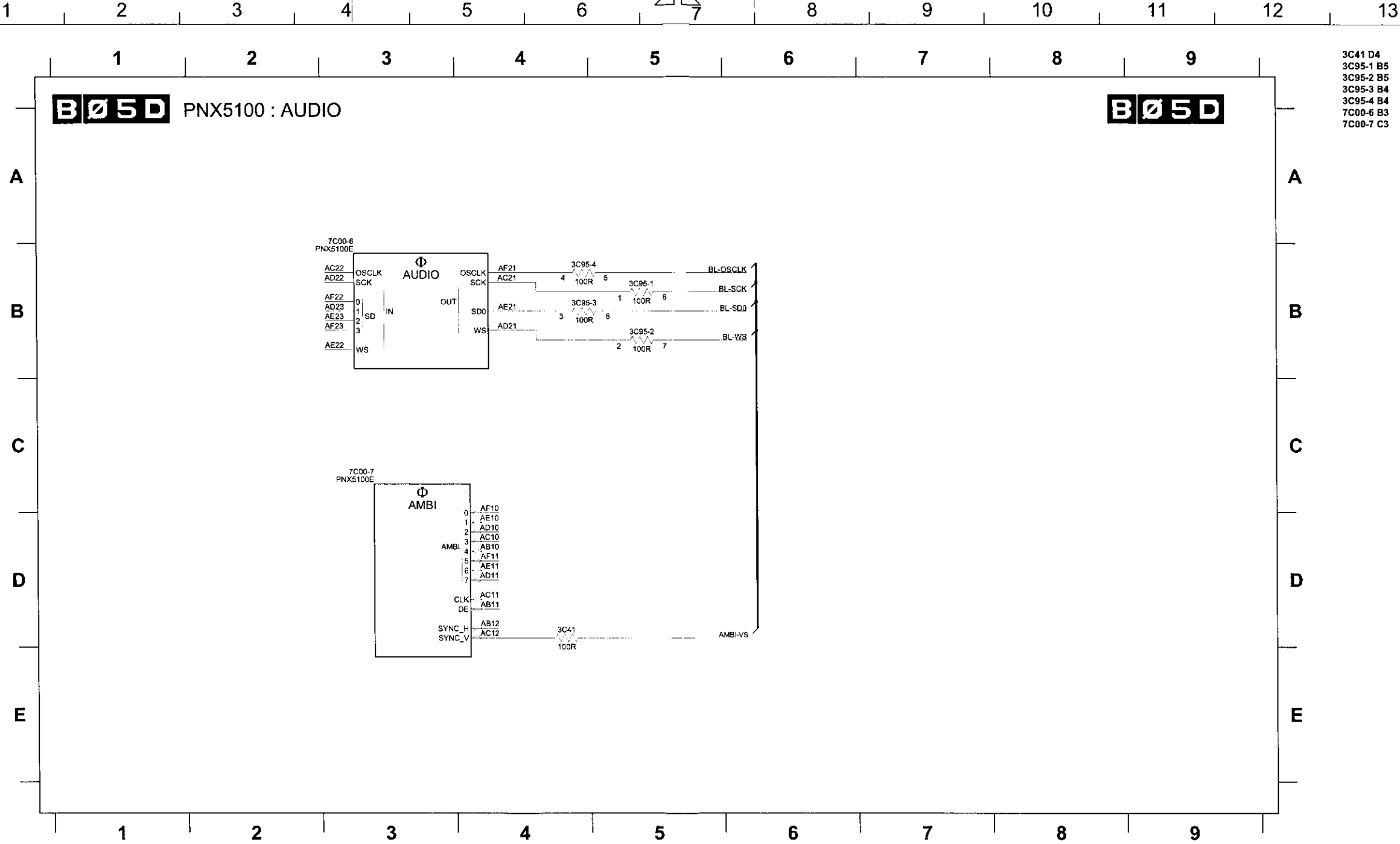
PHILIPS



SSB: PNX5100 - Audio

PHILIPS

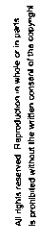
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3C41 D4
3C95-1 B5
3C95-2 B5
3C95-3 B4
3C95-4 B4
7C00-6 B3
7C00-7 C3

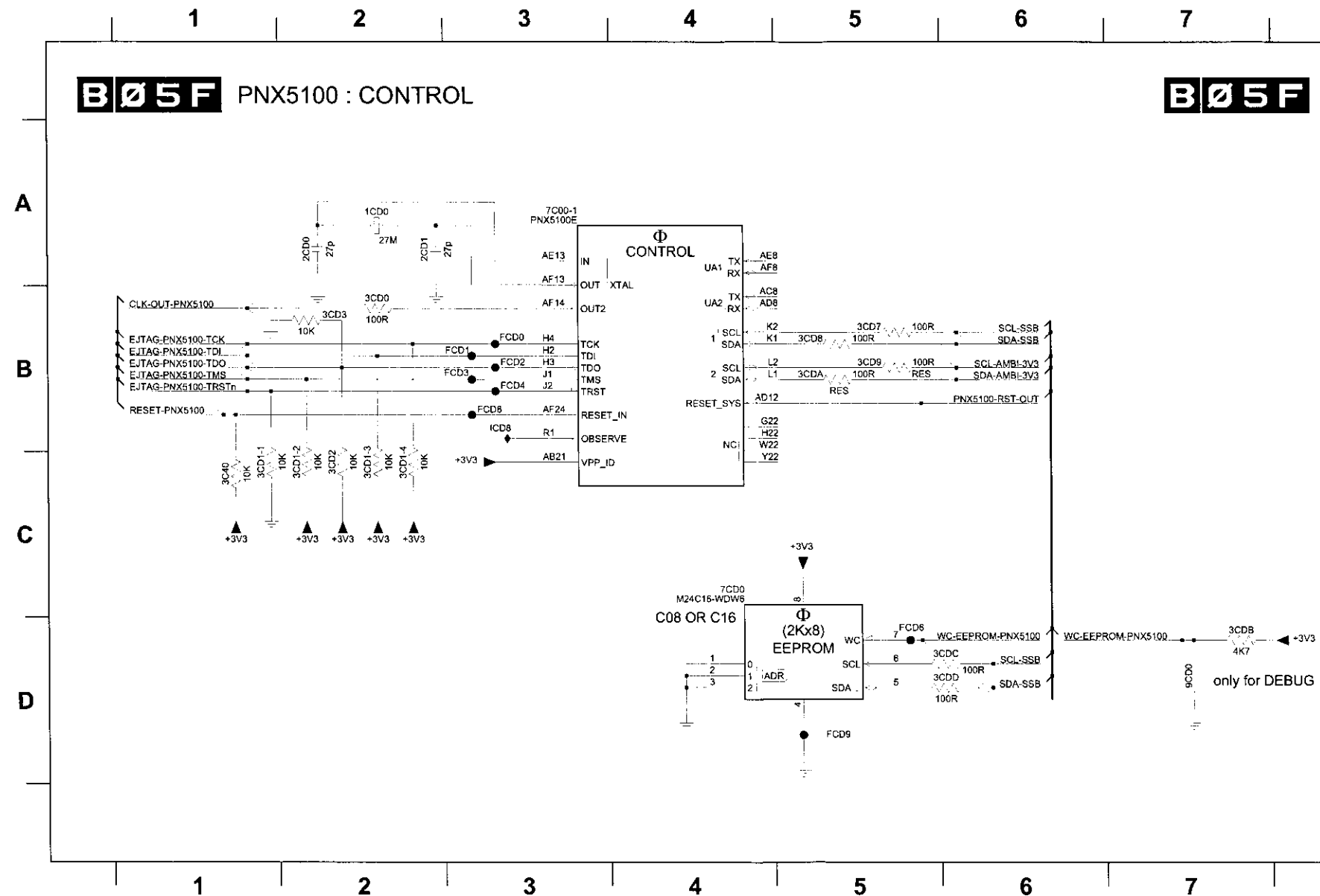
CHN	SETNAME
CLASS_NO	AUDIO PNX5100 TV543 R2 LDIPNX
2008-10-10	3
NAME: Maelegher Ingrid	SUPERS. 9
CHECK	DATE
8204 000 8928	
130 - 4	
A3	
ROYAL PHILIPS ELECTRONICS N.V. 2008	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



SSB: PNX5100 - Control

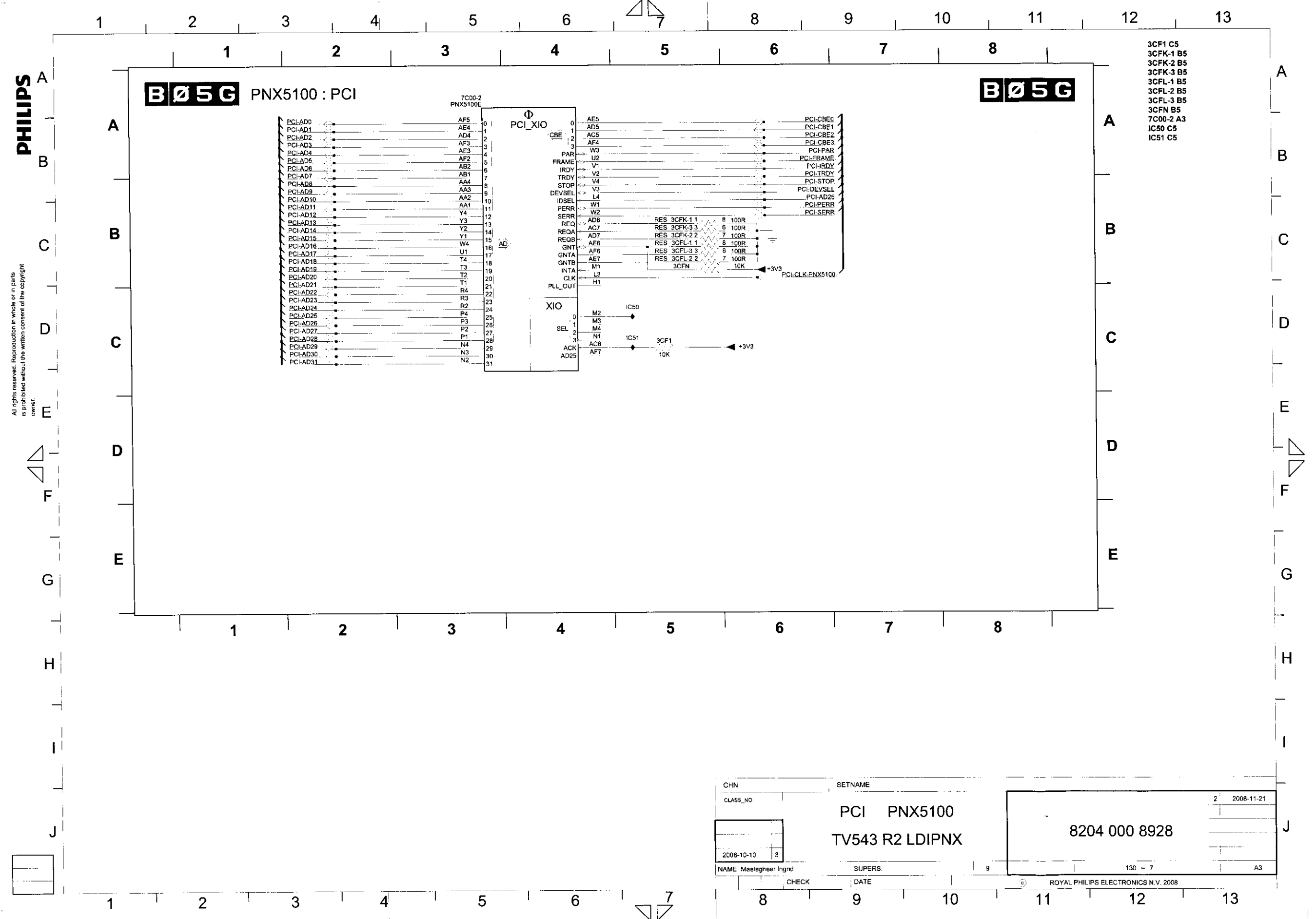
PHILIPS

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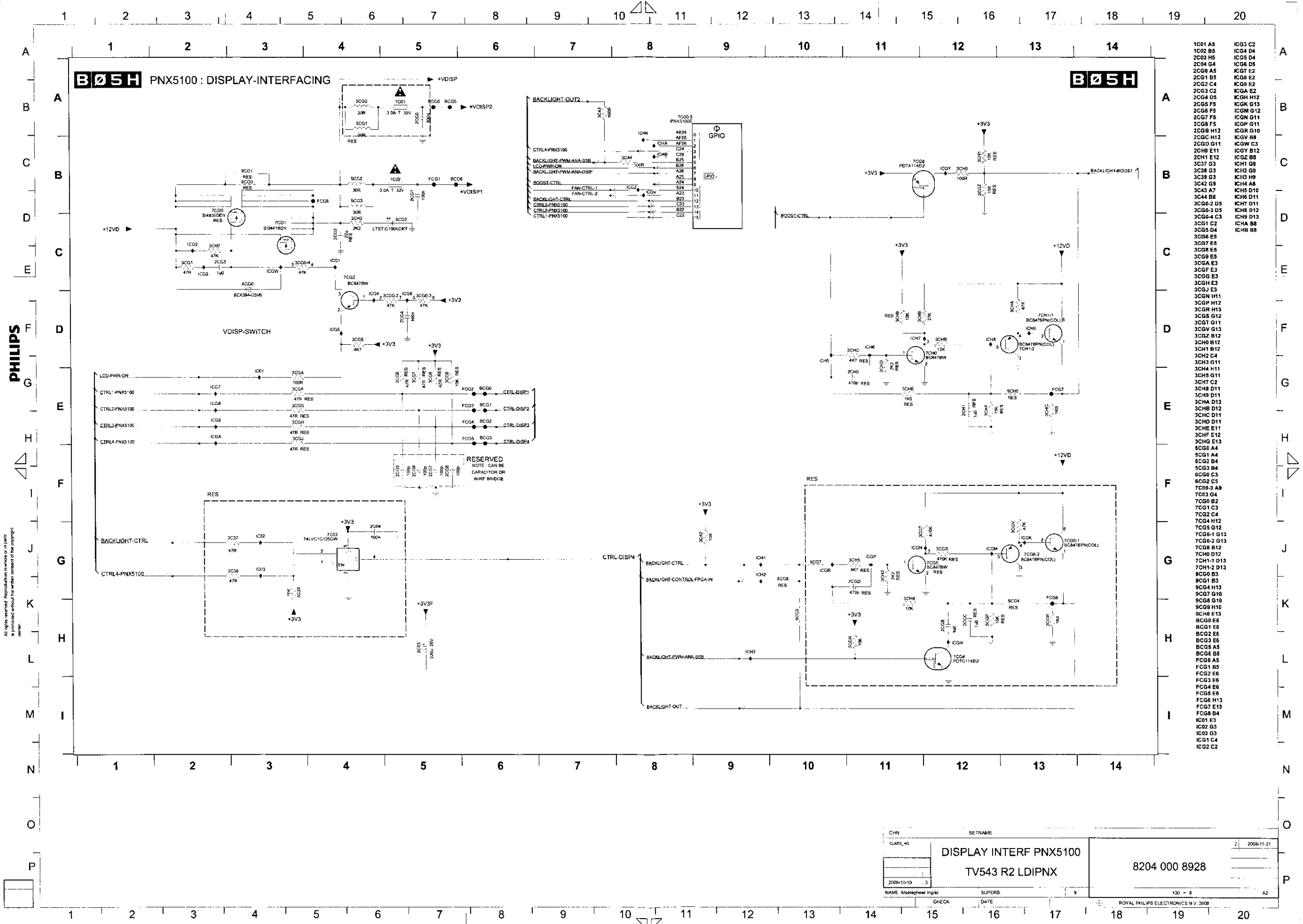
1CD0 A2
2CD0 A2
2CD1 A2
3C40 C1
3CD0 B2
3CD1-1 C2
3CD1-2 C2
3CD1-3 C2
3CD1-4 C1
3CD2 C2
3CD3 B2
3CD7 B5
3CD8 B5
3CD9 B5
3CDA B5
3CDB D7
3CDC D6
3CDD D6
7C00-1 A3
7C00 C4
9CD0 D7
FCD0 B3
FCD1 B3
FCD2 B3
FCD3 B3
FCD4 B3
FCD6 D5
FCD8 B3
FCD9 D5
ICD8 B3

CHN	SETNAME	2	2008-11-21
CLASS_NO	CONTROL PNX5100		
	TV543 R2 LDIPNX		
2008-10-10	3		
NAME Maelgheer Ingrid	SUPERS.	9	
CHECK	DATE		
ROYAL PHILIPS ELECTRONICS N.V. 2008		130 - 6	A3

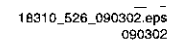
SSB: PNX5100 - PCI



SSB: PNX5100 - Display-Interfacing



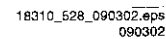
PHILIPS



10000_012_090121.eps
090121

[illegible]

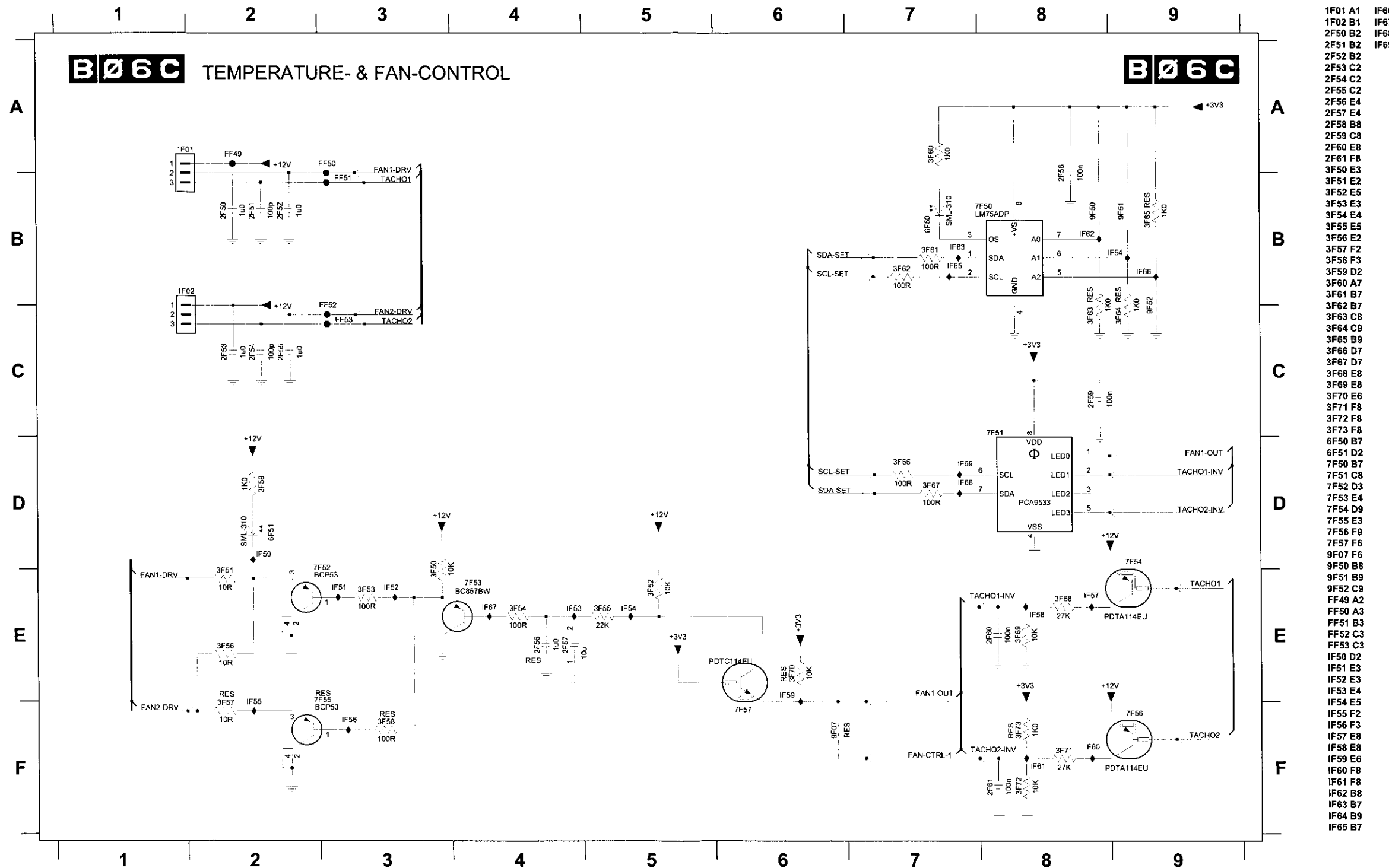
PHILIPS



This image shows a full page of white paper with horizontal blue or grey ruling lines, typical of notebook paper. The lines are evenly spaced and run across the width of the page. In the bottom right corner, there is small black text that reads "10000_012_090121.eps" and "090121".

SSB: Temperature & Fan control

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CHN

SETNAME

CLASS_NO

TEMPERATURE- & FAN-CONTROL

TV543 R2 LDIPNX

8204 000 8933

2008-10-10 3

NAME: Maelgheer Ingrid

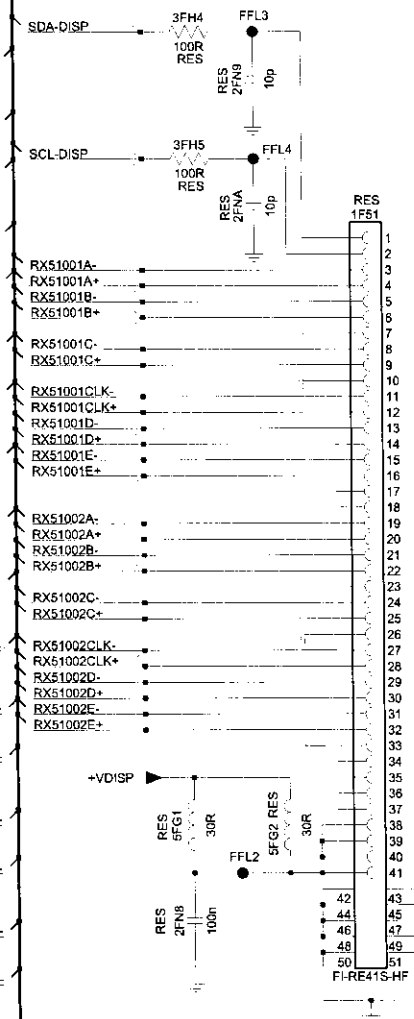
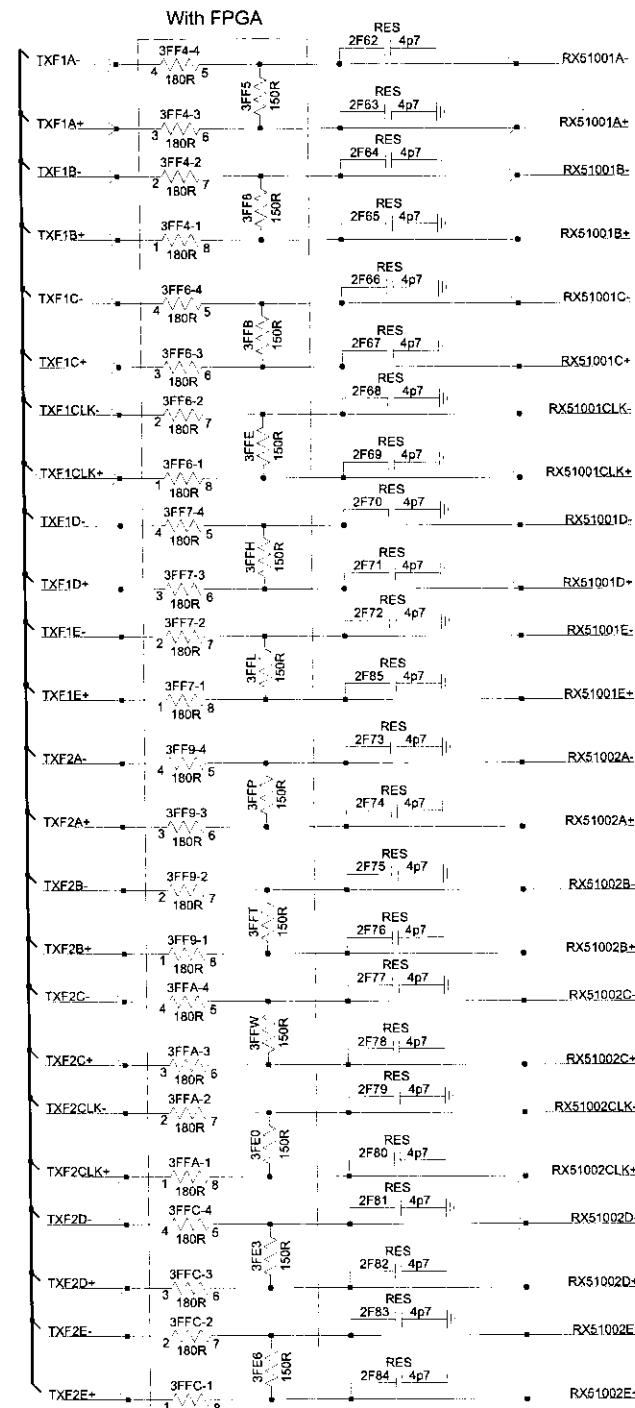
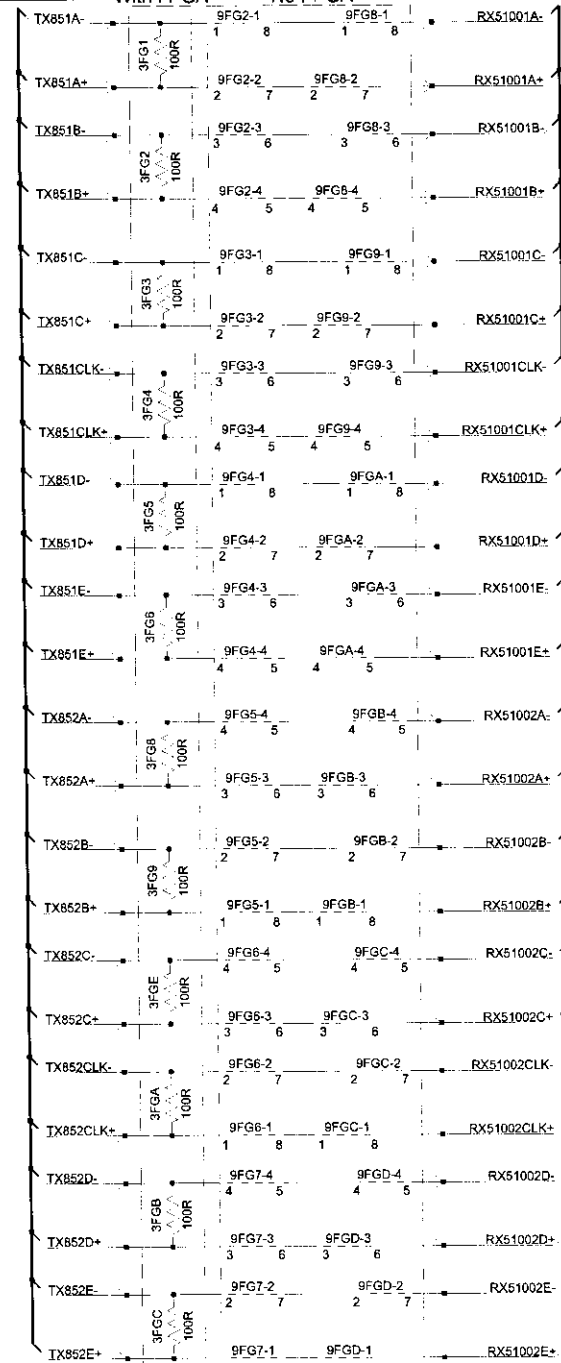
SUPERS.

DATE: 2007-12-04

130 - 3

ROYAL PHILIPS ELECTRONICS N.V. 2007

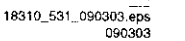
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CHIN	SETNAME	
CLASS_NO		2 2008-11-21
FPGA WOW - LVDS IN/OUT		
TV543 R2 LDIPNX		8204 000 8933
2008-10-10 3		
NAME Maelgheer Ingrid	SUPERS.	130 - 4 A3
CHECK	DATE 2007-12-04	ROYAL PHILIPS ELECTRONICS N.V. 2007

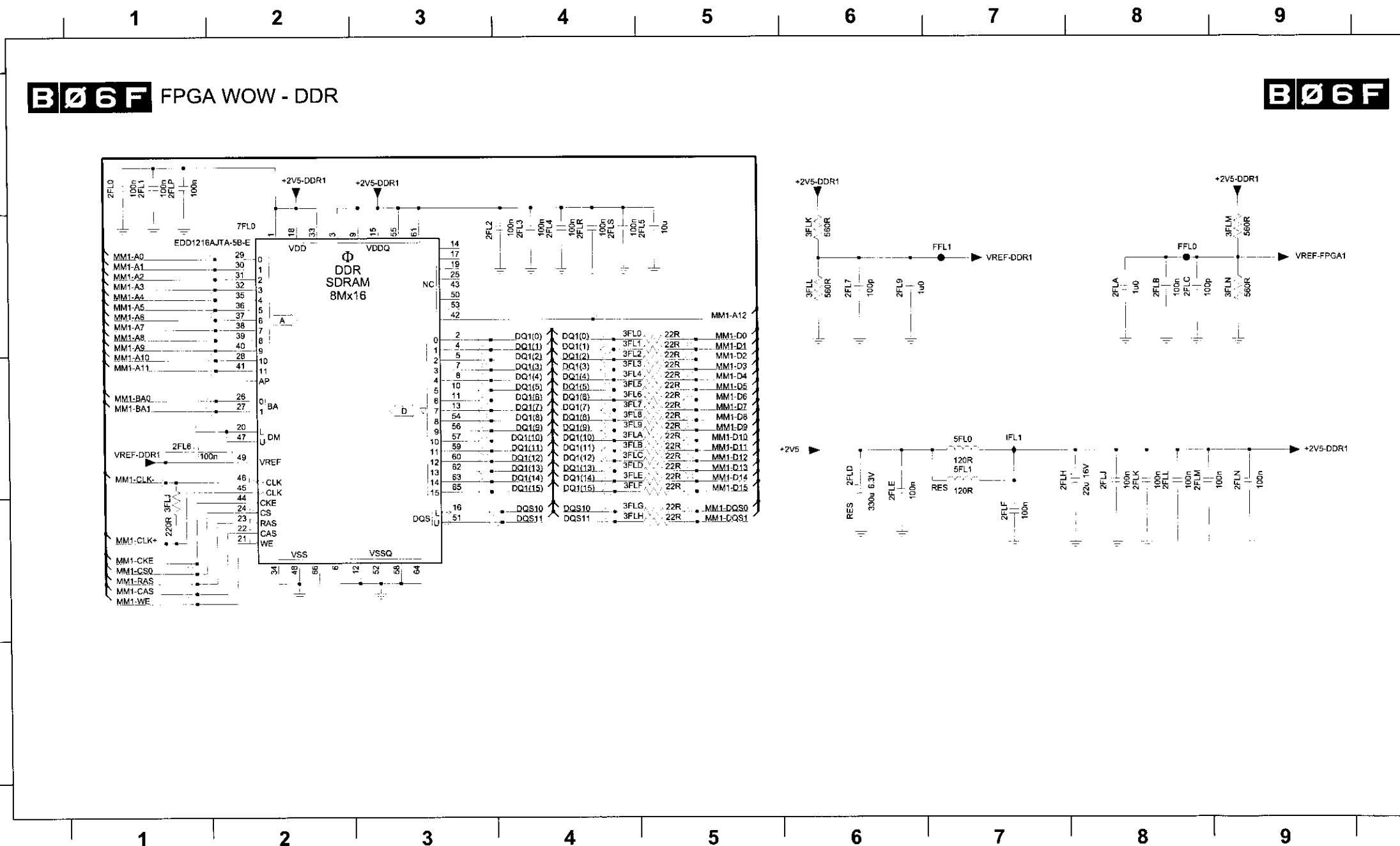
1F51 B9
2F62 A6
2F63 A6
2F64 A6
2F65 A6
2F66 B6
2F67 B6
2F68 B6
2F69 B6
2F70 C6
2F71 C6
2F72 C6
2F73 D6
2F74 D6
2F75 D6
2F76 E6
2F77 E6
2F78 E6
2F79 E6
2F80 F6
2F81 F6
2F82 F6
2F83 F6
2F84 F6
2F85 C6
2F8N F8
2F9N B8
2FNA B8
3FE0 E5
3FE3 F5
3FE6 F5
3FF4-1 A5
3FF4-2 A5
3FF4-3 A5
3FF4-4 A5
3FF5 A5
3FF6-1 B5
3FF6-2 B5
3FF6-3 B5
3FF6-4 B5
3FF7-1 C5
3FF7-2 C5
3FF7-3 C5
3FF7-4 C5
3FF8 A5
3FF9-1 E5
3FF9-2 D5
3FF9-3 D5
3FF9-4 D5
3FFA-1 F5
3FFA-2 E5
3FFA-3 E5
3FFA-4 E5
3FFB B5
3FFC-1 F5
3FFC-2 F5
3FFC-3 F5
3FFC-4 F5
3FFE B5
3FFH C5
3FFL C5
3FFP D5
3FFT D5
3FFW E5
3FG1 A2
3FG2 A2
3FG3 B2
3FG4 B2
3FG5 C2
3FG6 C2
3FG8 D2
3FGA E2
3FGB F2
3FGC F2
3FGE E2
3FH4 A8
3FH5 B8
5FG1 E8

PHILIPS



SSB: FPGA WOW - DDR

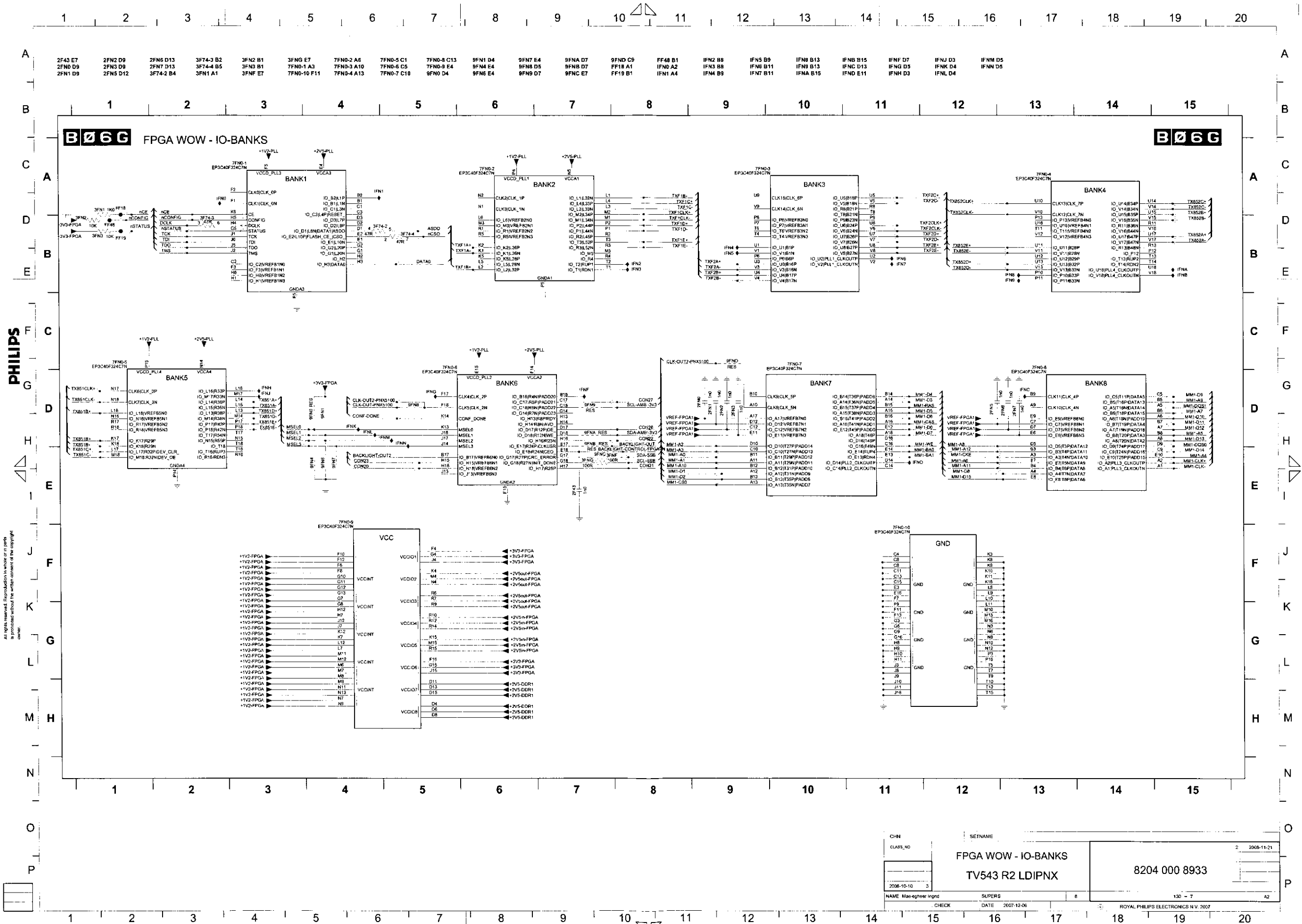
PHILIPS

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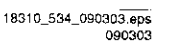
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- 2FL1 A1
- 2FL2 B3
- 2FL3 B4
- 2FL4 B4
- 2FL5 B5
- 2FL6 C1
- 2FL7 B6
- 2FL8 B6
- 2FL9 B8
- 2FLA B8
- 2FLB B8
- 2FLC B8
- 2FLD C6
- 2FLE C6
- 2FLF D7
- 2FLH C7
- 2FLJ C8
- 2FLK C8
- 2FLM C8
- 2FLN C9
- 2FLP A1
- 2FLR B4
- 2FLS B4
- 3FL0 B4
- 3FL1 B4
- 3FL2 C4
- 3FL3 C4
- 3FL4 C4
- 3FL5 C4
- 3FL6 C4
- 3FL7 C4
- 3FL8 C4
- 3FL9 C4
- 3FLA C4
- 3FLB C4
- 3FLC C4
- 3FLD C4
- 3FLE C4
- 3FLF C4
- 3FLG D4
- 3FLH D4
- 3FLJ D1
- 3FLK B6
- 3FLM B9
- 3FLN B9
- 5FL0 C7
- 5FL1 C7
- 7FL0 B2
- FFL0 B8
- FFL1 B7
- IFL1 C7

CHN	SETNAME
CLASS NO	FPGA WOW - DDR
	TV543 R2 LDIPNX
2008-10-10	8204 000 8933
NAME Maeleghaar Ingrid	SUPERS.
CHECK	DATE 2007-12-04
ROYAL PHILIPS ELECTRONICS N.V. 2007	

SSB: FPGA WOW - I/O Banks



PHILIPS



SSB: Audio In HDMI

PHILIPS

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F

G

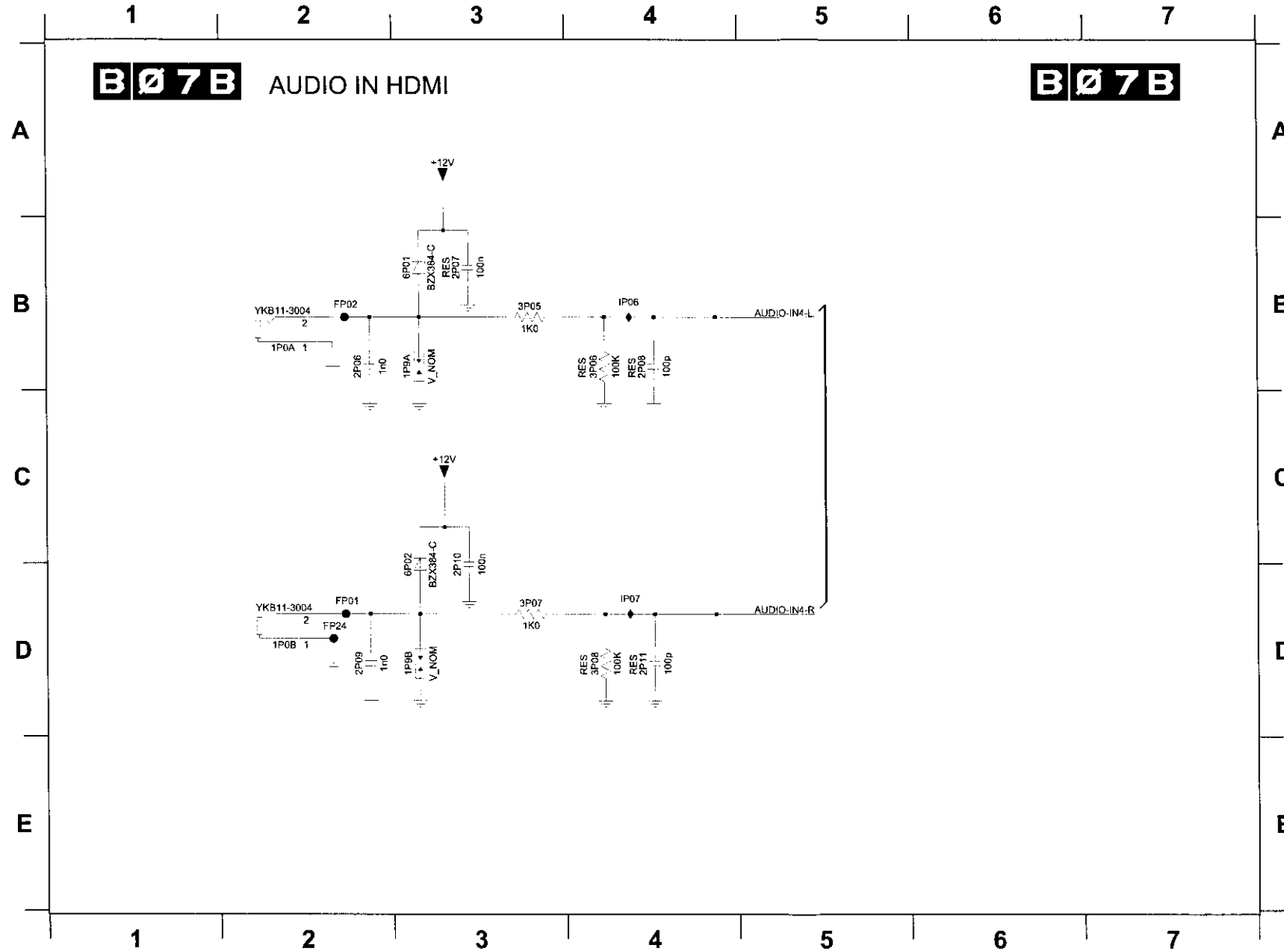
H

I

J



1 2 3 4 5 6 7 8 9 10 11 12 13

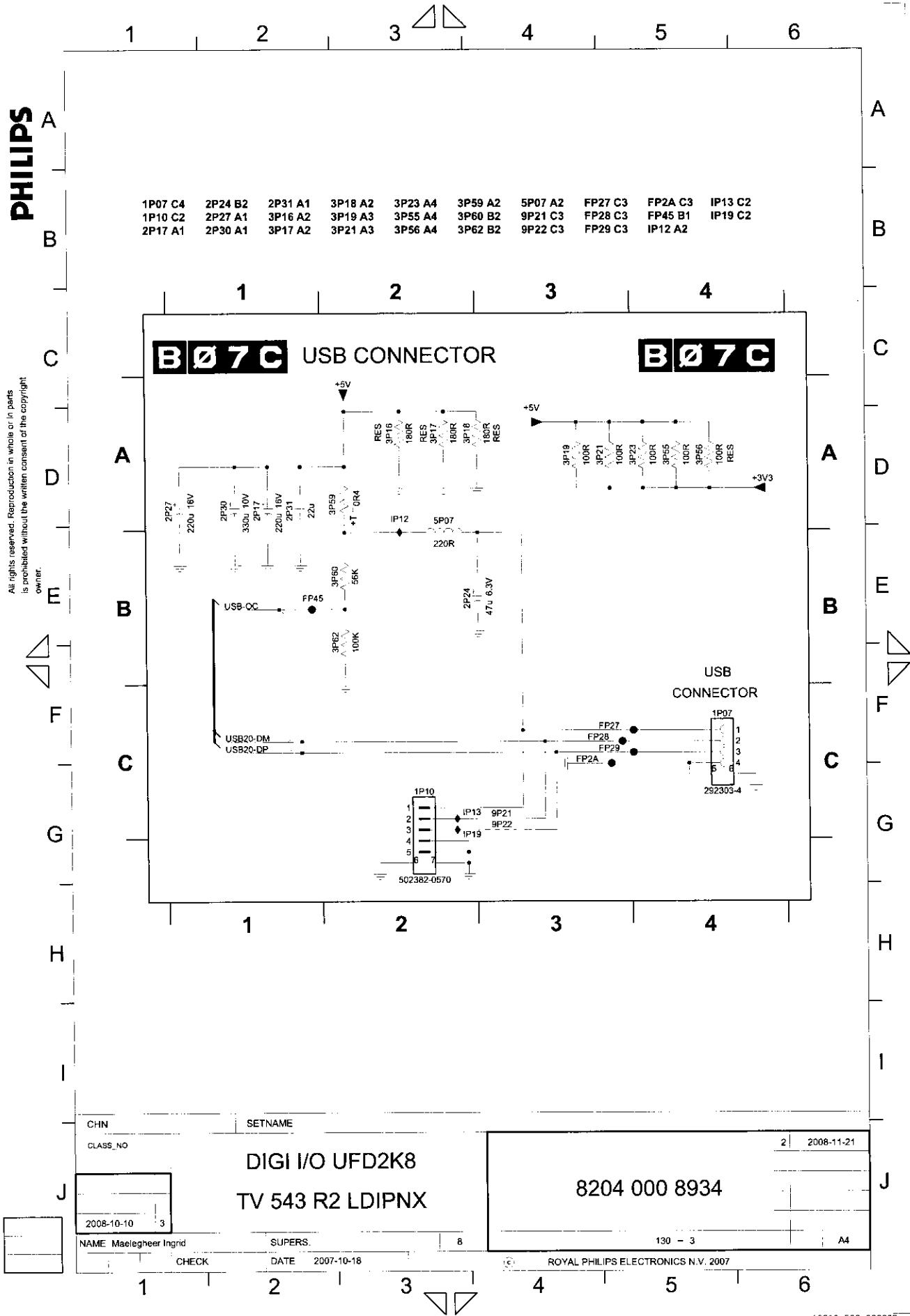


- 1P0A B2
- 1P0B D2
- 1P9A B3
- 1P9B D3
- 2P06 B2
- 2P07 B3
- 2P08 B4
- 2P09 D2
- 2P10 D3
- 2P11 D4
- 3P05 B3
- 3P06 B4
- 3P07 D3
- 3P08 D4
- 6P01 B3
- 6P02 D3
- FP01 D2
- FP02 B2
- FP24 D2
- IP06 B4
- IP07 D4

CHN	SETNAME		
CLASS_NO	UFD2K8	2	2008-11-21
	DIGI I/O TV543 R2 LDIPNX		8204 000 8934
2008-10-10	3		
NAME Maelegher Ingrid	SUPERS.	8	130 - 2
CHECK	DATE 2007-10-18		ROYAL PHILIPS ELECTRONICS N.V. 2005

1 2 3 4 5 6 7 8 9 10 11 12 13

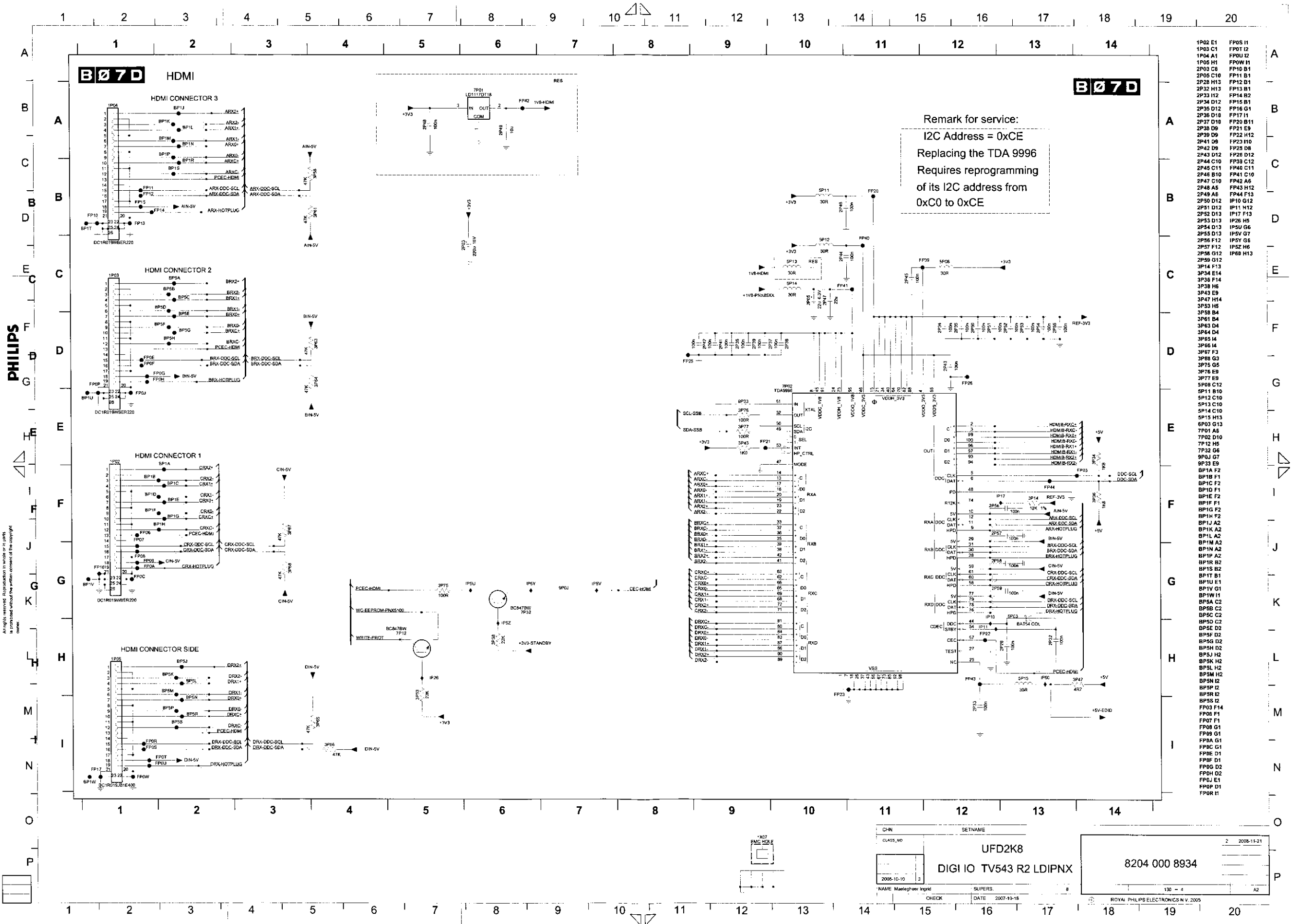
SSB: USB Connector



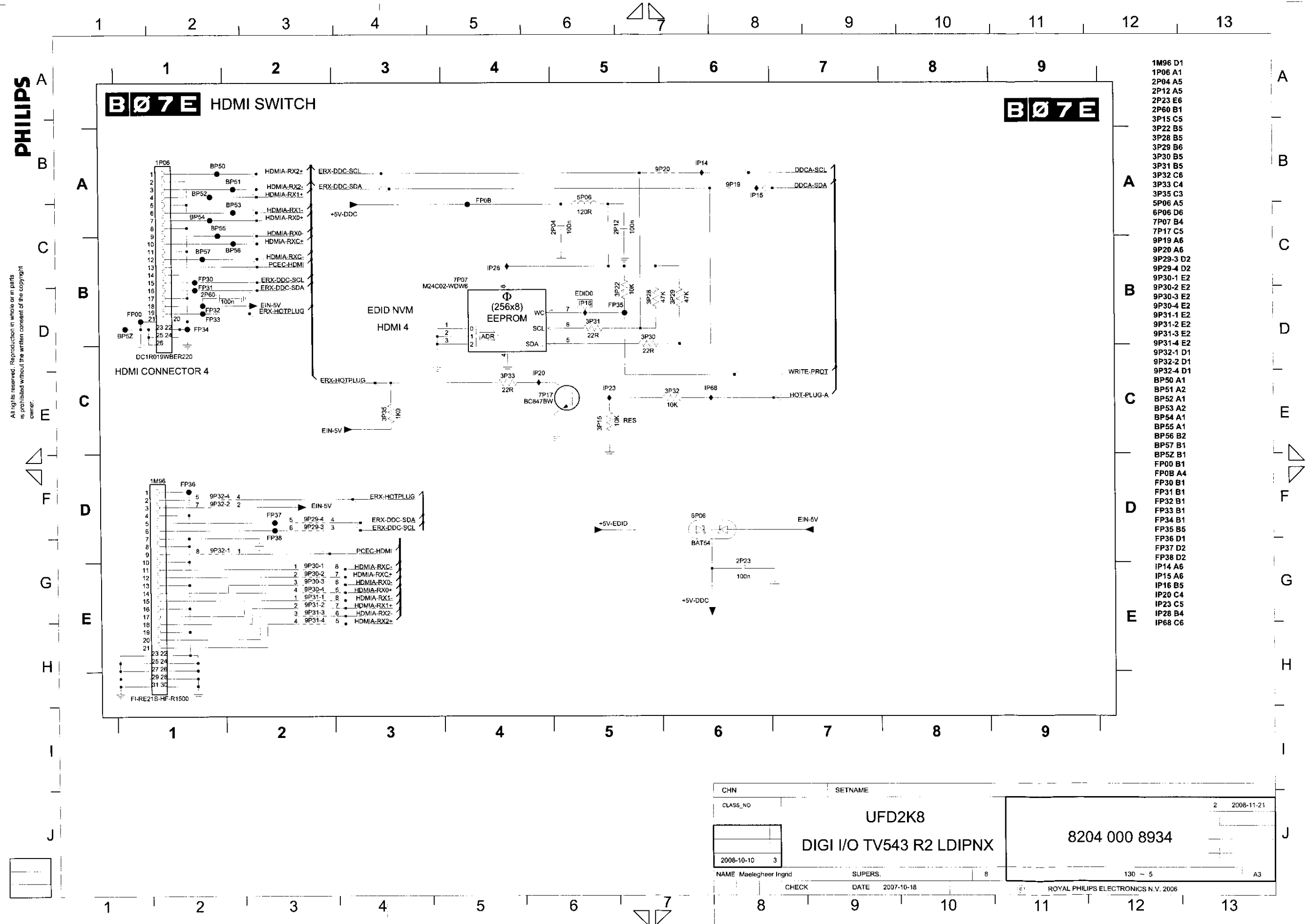
Personal Notes:

Handwritten notes area with horizontal lines.

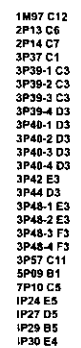
SSB: HDMI



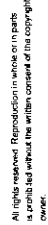
SSB: HDMI Switch



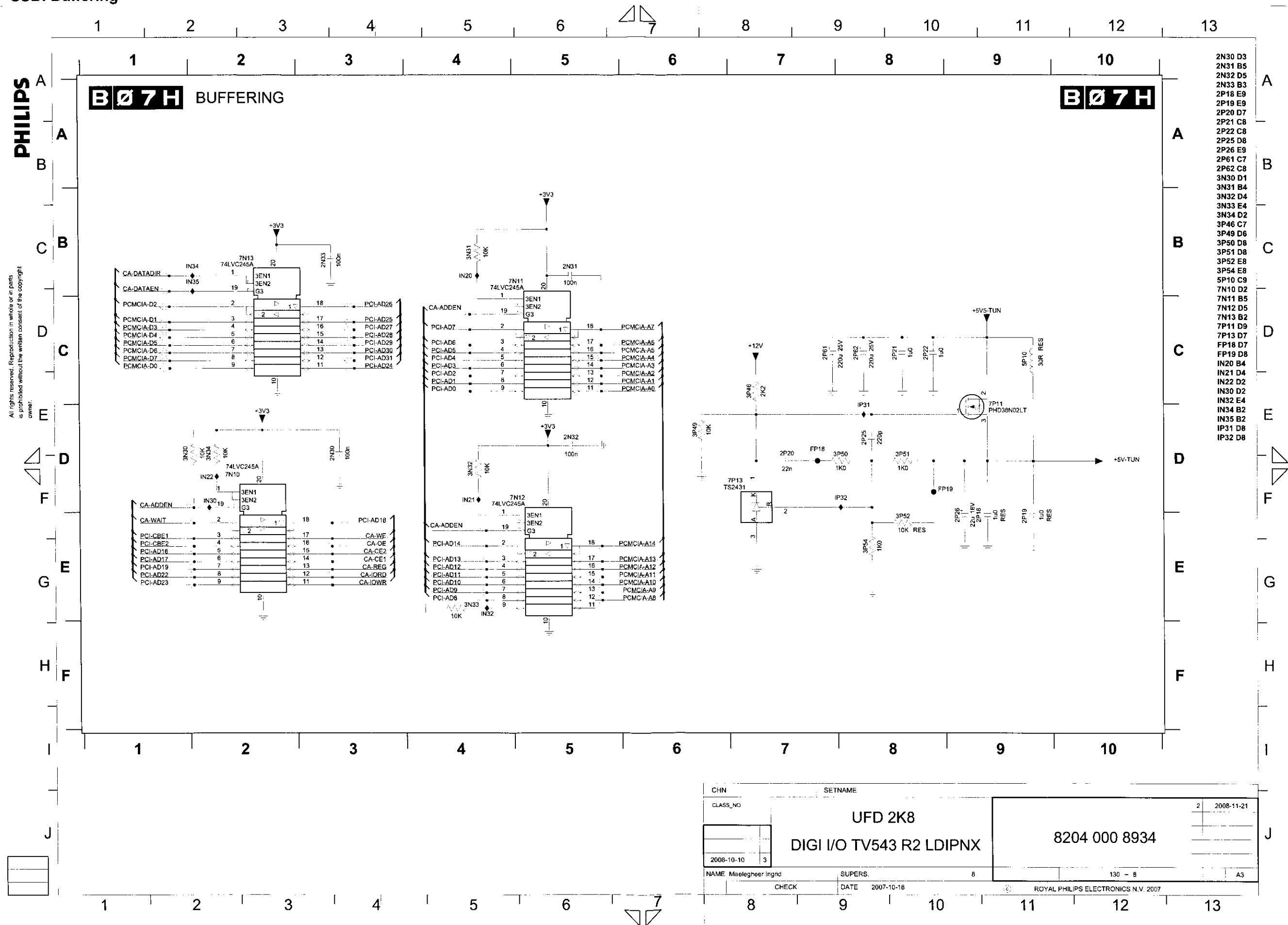
PHILIPS



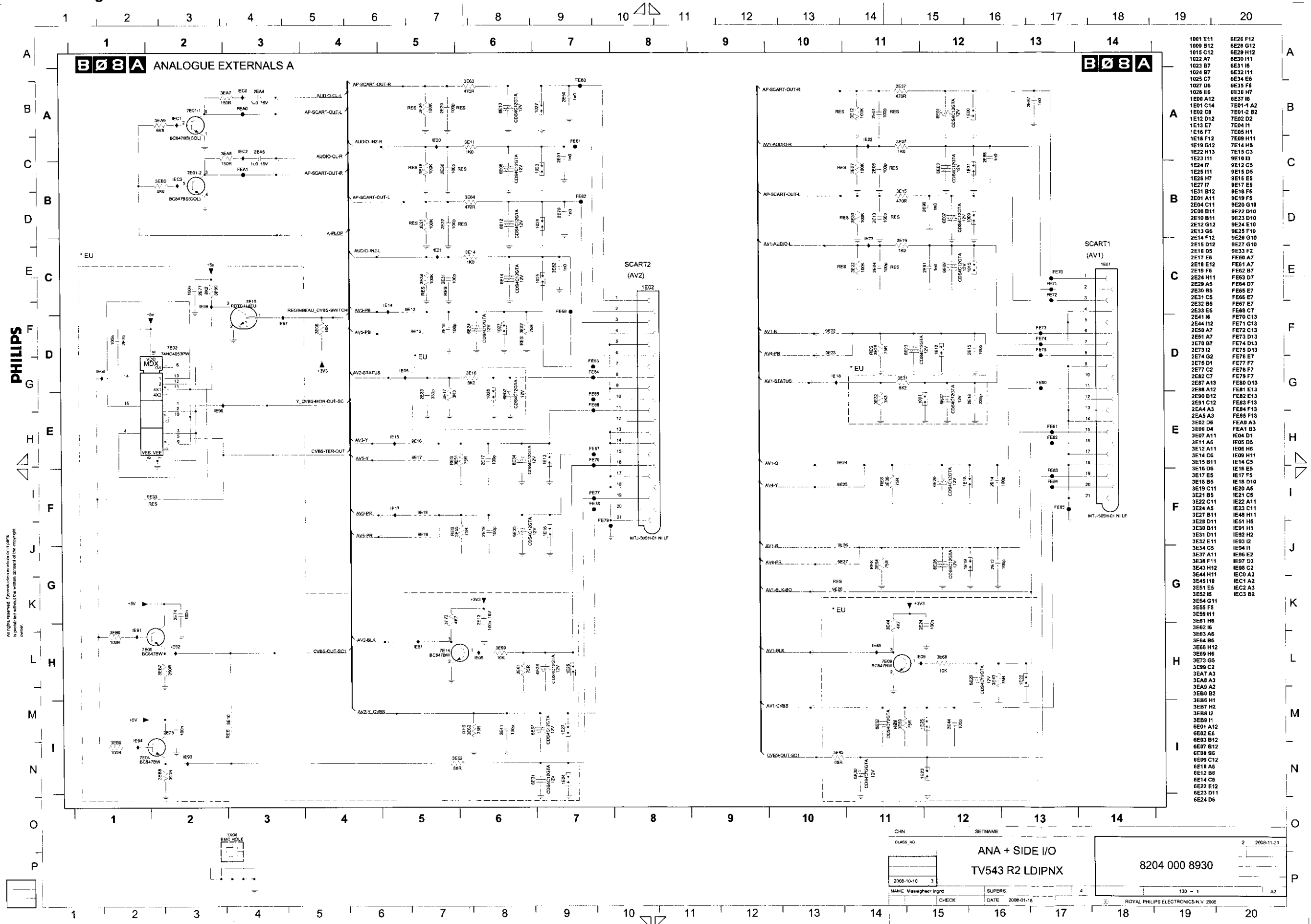
PHILIPS



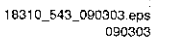
SSB: Buffering



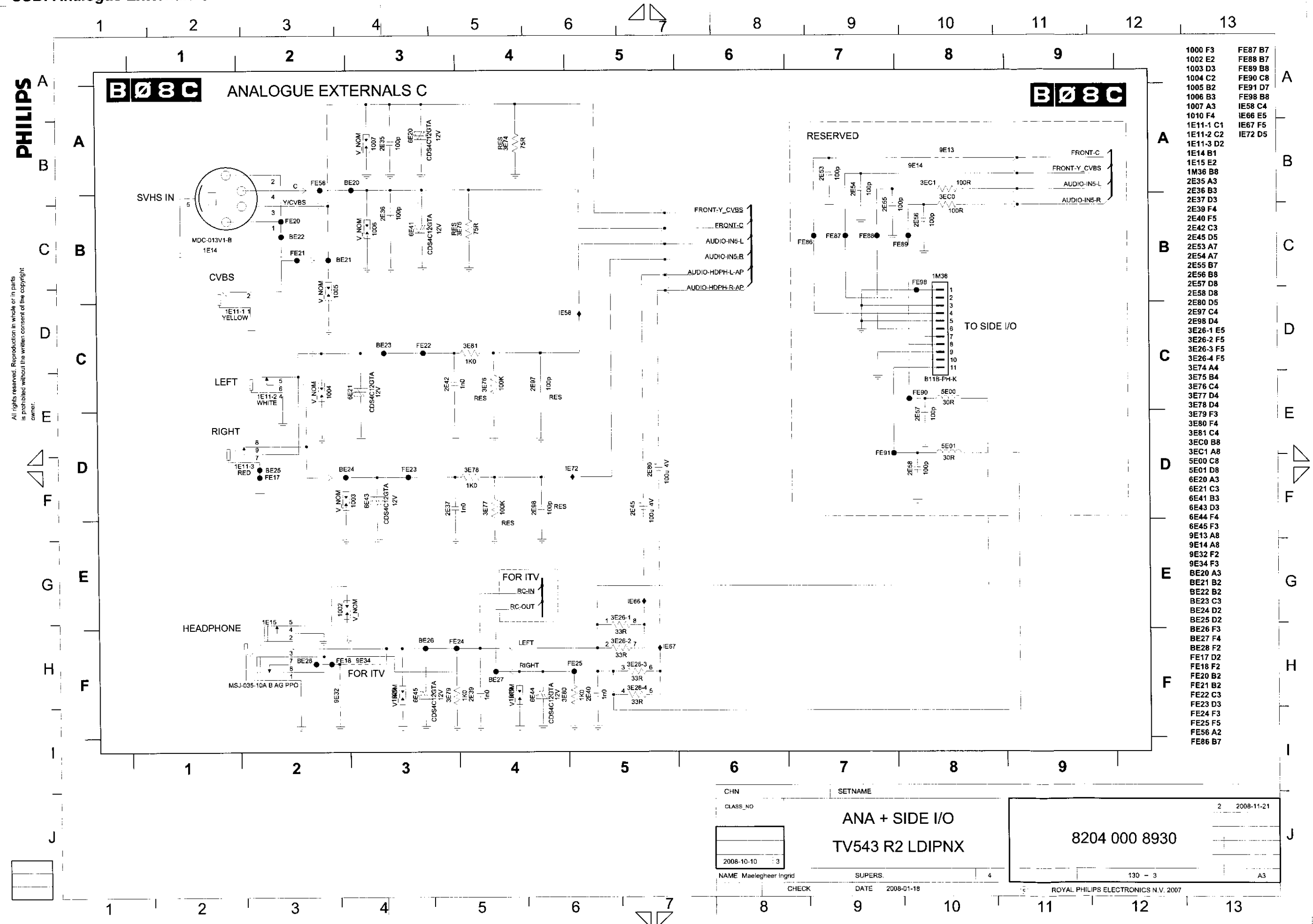
SSB: Analogue Externals A



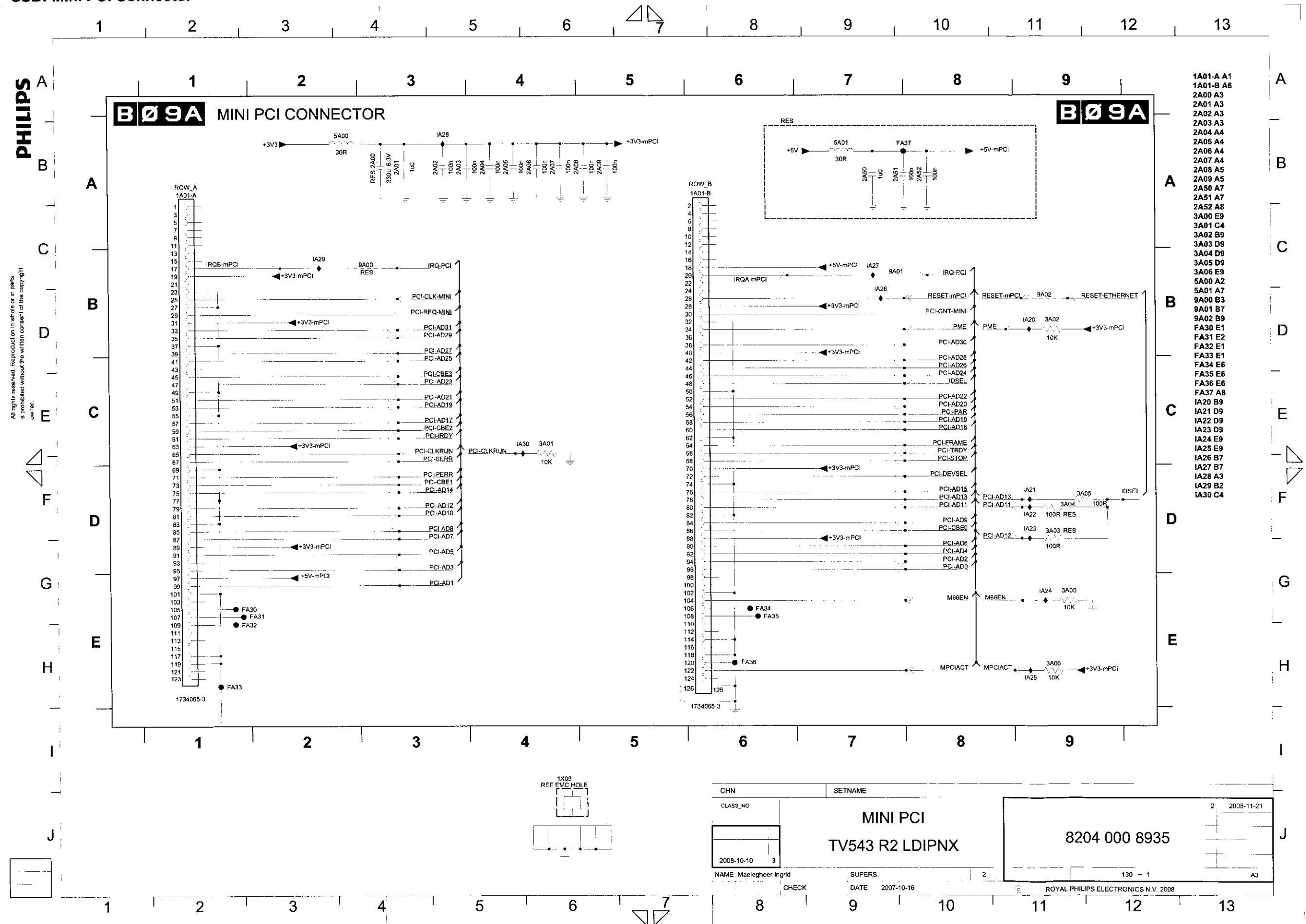
BØ8B ANALOGUE EXTERNALS B



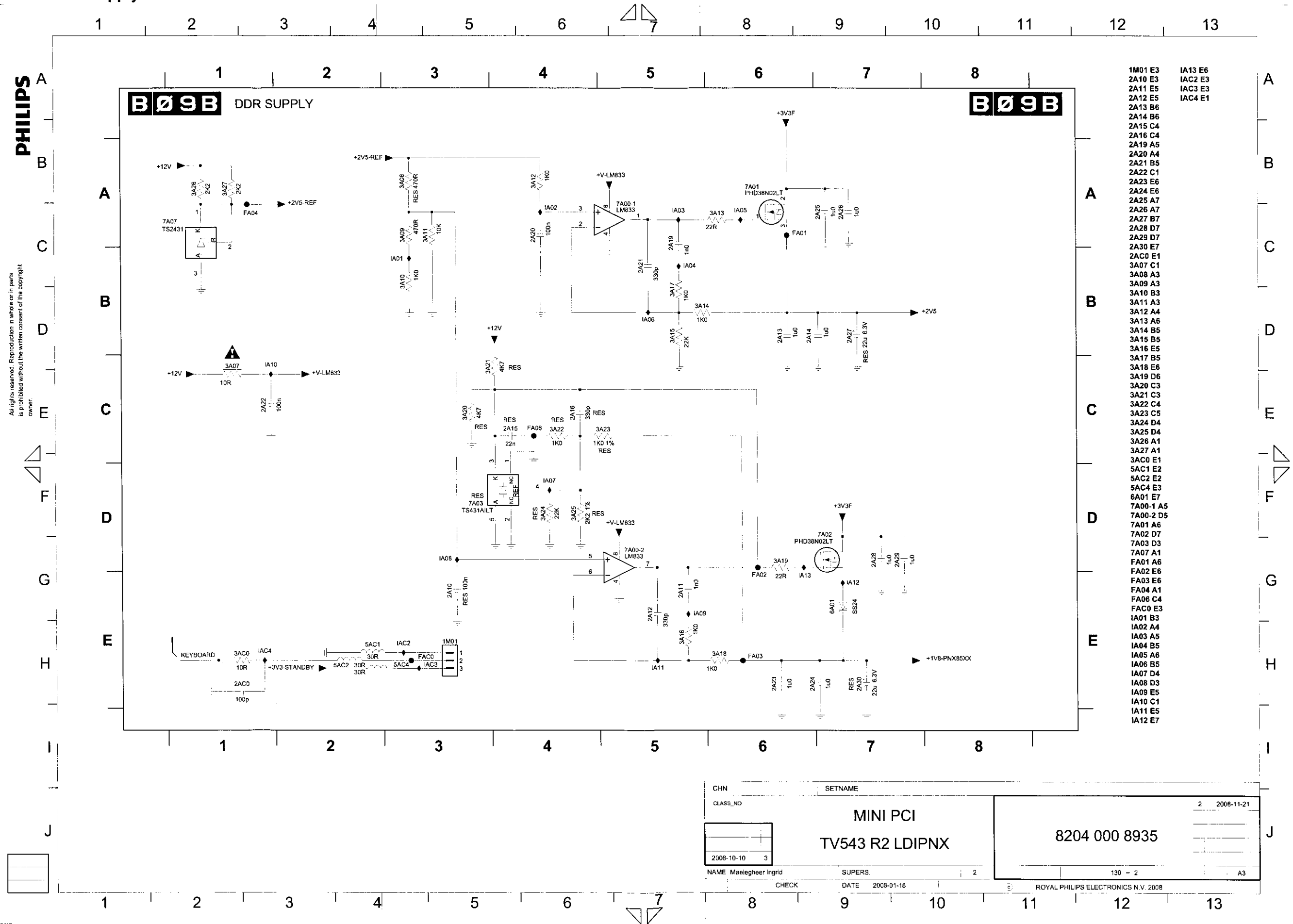
SSB: Analogue Externals C



SSB: Mini PCI Connector



SSB: DDR Supply



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SSB: SRP List Explanation
Example

Net Name	Diagram
+12-15V	AP1 (4x)
+12-15V	AP4 (4x)
+12-15V	AP5 (12x)
+12-15V	AP6 (4x)
+12-15V	AP7 (8x)
+12V	AP1 (4x)
+12V_NF	AP1 (2x)
+12VAL	AP1 (2x)
+25VLP	AP1 (4x)
+25VLP	AP2 (1x)
+3V3-STANDBY	AP5 (3x)
+400V-F	AP1 (2x)
+400V-F	AP2 (2x)
+400V-F	AP3 (2x)
+5V2	AP1 (6x)
+5V2	AP2 (1x)
+5V2-NF	AP1 (1x)
+5V2-NF	AP2 (1x)
+5V-SW	AP1 (6x)
+5V-SW	AP2 (1x)
+8V6	AP1 (3x)
+AUX	AP1 (2x)
+AUX	AP2 (1x)
+DC-F	AP1 (2x)
+DC-F	AP3 (2x)
+SUB-SPEAKER	AP5 (1x)
+SUB-SPEAKER	AP6 (2x)
-12-15V	AP1 (4x)
-12-15V	AP4 (6x)
-12-15V	AP5 (14x)
-12-15V	AP6 (6x)
-12-15V	AP7 (8x)
AL-OFF	AP1 (2x)
AUDIO-L	AP4 (1x)
AUDIO-L	AP5 (1x)
AUDIO-PROT	AP5 (3x)
AUDIO-R	AP4 (1x)
AUDIO-R	AP5 (1x)
AUDIO-SW	AP5 (1x)
AUDIO-SW	AP7 (1x)
BOOST	AP1 (2x)
C-PROT	AP4 (2x)
C-PROT	AP5 (1x)
C-PROT-SW	AP5 (1x)
C-PROT-SW	AP6 (2x)
-DC-F	AP1 (2x)
-DC-F	AP3 (2x)
DC-PROT	AP1 (1x)
DC-PROT	AP5 (2x)
DIM-CONTROL	AP1 (2x)
FEEDBACK-SW	AP6 (2x)
FEEDBACK-L	AP4 (2x)
FEEDBACK-R	AP4 (2x)
FEEDBACK-SW	AP6 (2x)
GND-AL	AP1 (40x)
GND-HA	AP2 (20x)
GND-HA	AP3 (2x)
GND-HA	AP3 (2x)
GND-HOT	AP1 (2x)
GND-L	AP4 (4x)
GND-L	AP5 (34x)
GND-LL	AP4 (7x)
GND-LL	AP5 (1x)
GND-LR	AP4 (7x)
GND-LR	AP5 (1x)
GND-LSW	AP5 (1x)
GND-LSW	AP6 (15x)
GND-S	AP1 (11x)
GND-SA	AP4 (8x)
GND-SA	AP5 (2x)
GND-SA	AP6 (8x)
GND-SA	AP7 (6x)
GNDscrew	AP3 (2x)
GNDscrew	AP5 (2x)
GND-SSB	AP5 (3x)
GND-SSP	AP1 (51x)
GND-SSP	AP2 (15x)
IN-SW	AP6 (2x)
IN-L	AP4 (2x)
IN-R	AP4 (2x)
IN-SW	AP6 (2x)
INV-MUTE	AP4 (1x)
INV-MUTE	AP5 (1x)
INV-MUTE	AP6 (1x)
LEFT-SPEAKER	AP4 (1x)
LEFT-SPEAKER	AP5 (1x)
MUTE	AP4 (2x)
MUTE	AP5 (1x)
MUTE	AP6 (2x)
ON-OFF	AP1 (3x)
OUT	AP6 (1x)
OUT	AP7 (2x)
OUTN	AP6 (1x)
OUTN	AP7 (1x)
POWER-GOOD	AP1 (2x)
POWER-OK-PLATFORM	AP1 (2x)
RIGHT-SPEAKER	AP4 (1x)
RIGHT-SPEAKER	AP5 (1x)
SOUND-ENABLE	AP5 (3x)
STANDBY	AP1 (5x)
STANDBY	AP2 (1x)
-SUB-SPEAKER	AP5 (1x)
-SUB-SPEAKER	AP6 (2x)
V-CLAMP	AP1 (1x)
V-CLAMP	AP3 (2x)

1.1. Introduction

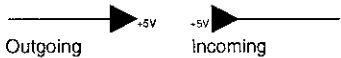
SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references are created manually and are therefore not guaranteed to be 100% correct. In addition, in the current crowded schematics there is often none or very little place for these references. Some of the PWB schematics will use SRP while others will still use the manual references. Either there will be an SRP reference list for a schematic, or there will be printed references in the schematic.

1.2. Non-SRP Schematics

There are several different signals available in a schematic:

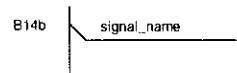
1.2.1. Power Supply Lines

All power supply lines are available in the supply line overview (see chapter 6). In the schematics (see chapter 7) is not indicated where supplies are coming from or going to. It is however indicated if a supply is incoming (created elsewhere), or outgoing (created or adapted in the current schematic).



1.2.2. Normal Signals

For normal signals, a schematic reference (e.g. B14b) is placed next to the signals.

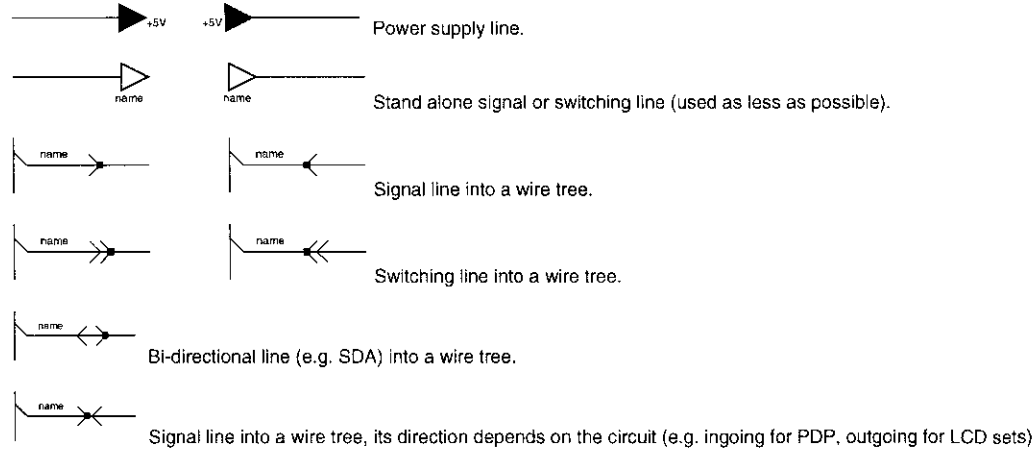


1.2.3. Grounds

For normal and special grounds (e.g. GNDHOT or GND3V3 etc.), nothing is indicated.

1.3. SRP Schematics

SRP is a tool, which automatically creates a list with signal references, indicating on which schematic the signals are used. A reference is created for all signals indicated with an SRP symbol, these symbols are:



Remarks:

- When there is a black dot on the "signal direction arrow" it is an SRP symbol, so there will be a reference to the signal name in the SRP list.
- All references to normal grounds (Ground symbols without additional text) are not listed in the reference list, this to keep it concise.
- Signals that are not used in multiple schematics, but only once or several times in the same schematic, are included in the SRP reference list, but only with one reference.

Additional Tip:

When using the PDF service manual file, you can very easily search for signal names and follow the signal over all the schematics. In Adobe PDF reader:

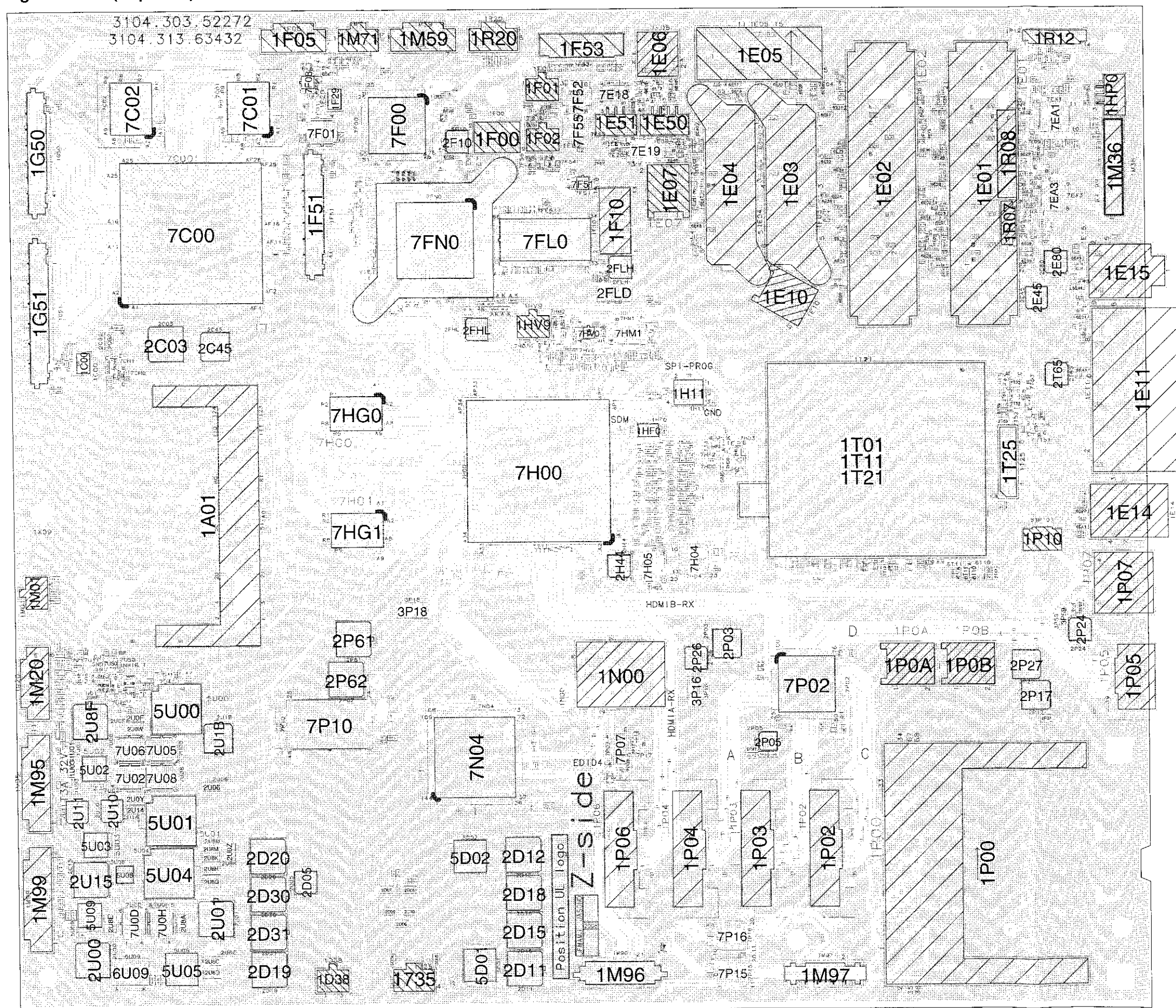
- Select the signal name you want to search for, with the "Select text" tool.
- Copy and paste the signal name in the "Search PDF" tool.
- Search for all occurrences of the signal name.
- Now you can quickly jump between the different occurrences and follow the signal over all schematics. It is advised to "zoom in" to e.g. 150% to see clearly, which text is selected. Then you can zoom out, to get an overview of the complete schematic.

PS. It is recommended to use at least Adobe PDF (reader) version 6.x, due to better search possibilities in this version.

Personal Notes:

Handwritten notes area with horizontal lines.

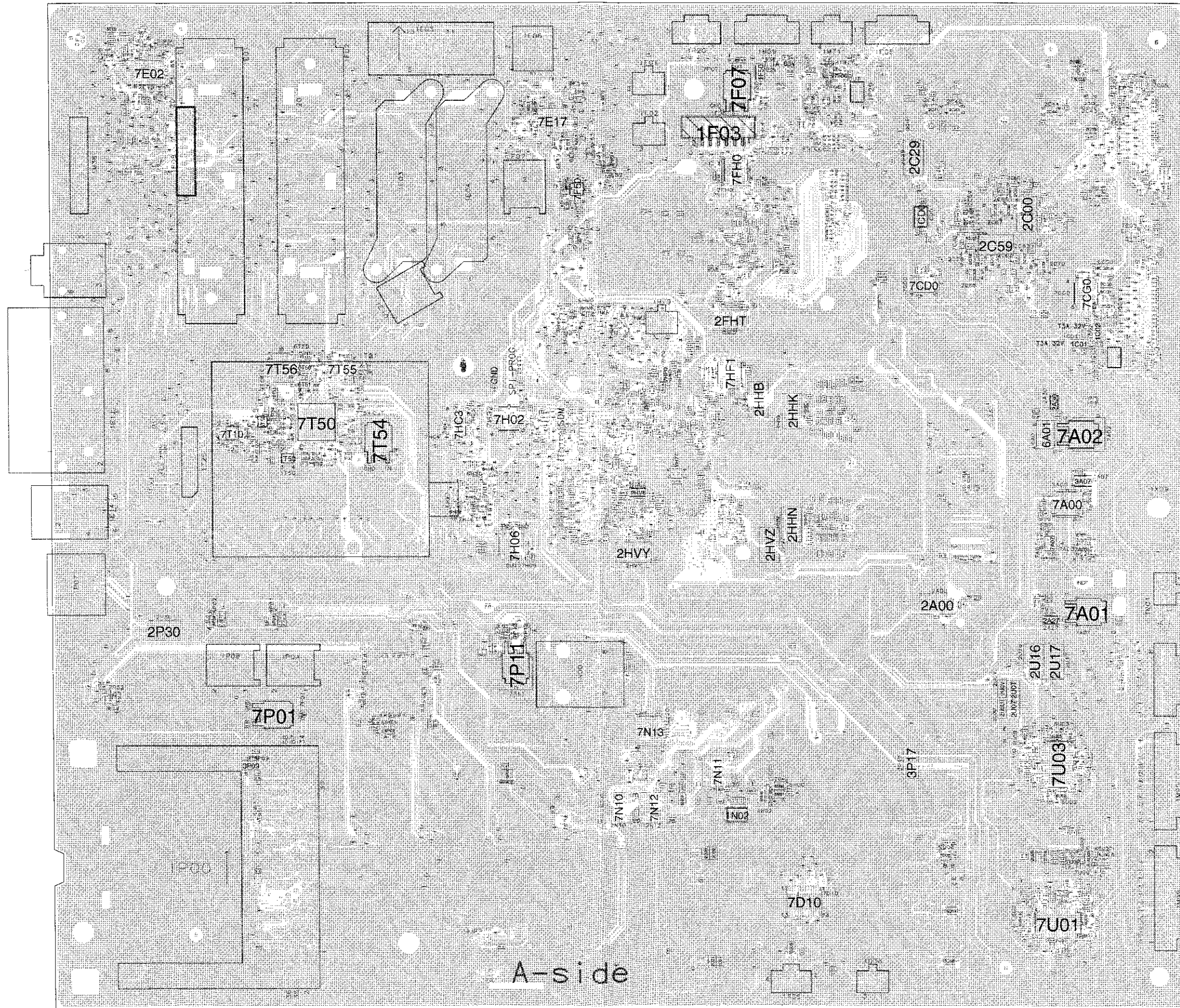
Layout Small Signal Board (Top Side)



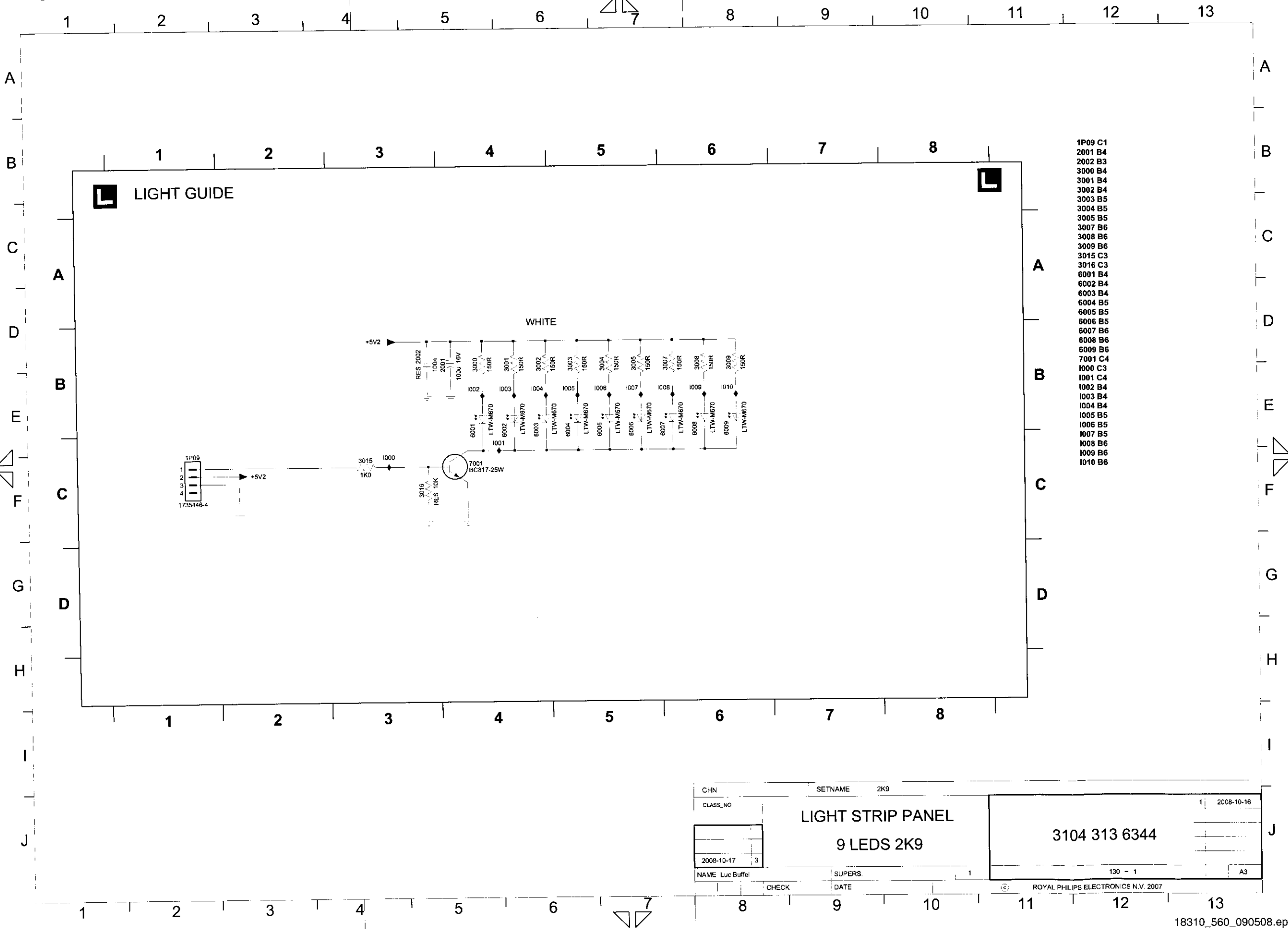
3104 313 6343.2

18310_554_0900309 eps
090309

Layout Small Signal Board (Bottom Side)



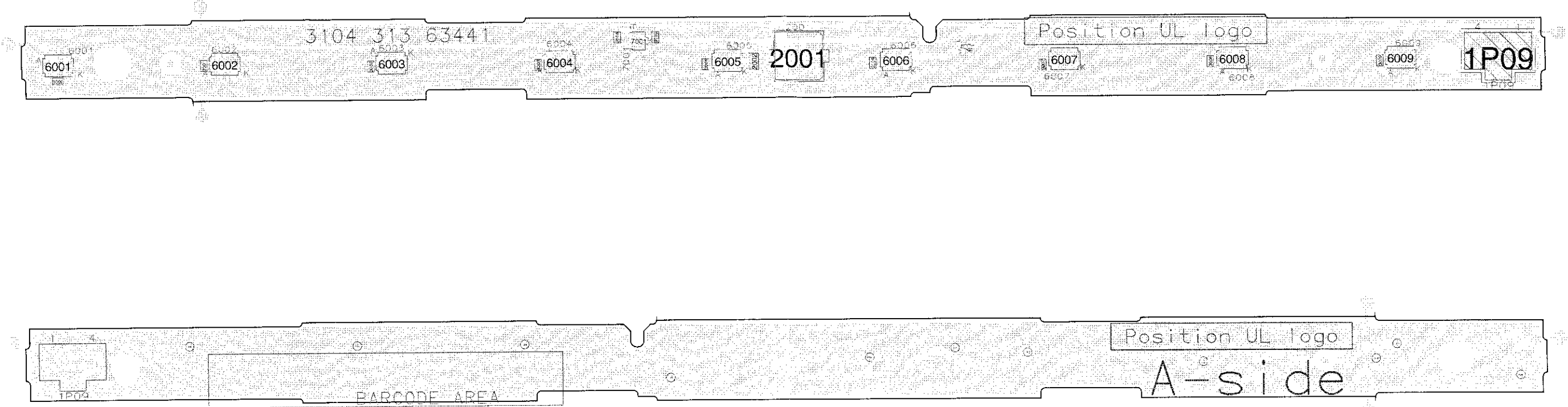
Light guide



CHN	SETNAME	2K9	
CLASS_NO			1 2008-10-16
	LIGHT STRIP PANEL		
	9 LEDS 2K9		
			3104 313 6344
2008-10-17	3		
NAME Luc Buffel	SUPERS.	1	130 - 1 A3
CHECK	DATE		

ROYAL PHILIPS ELECTRONICS N.V. 2007

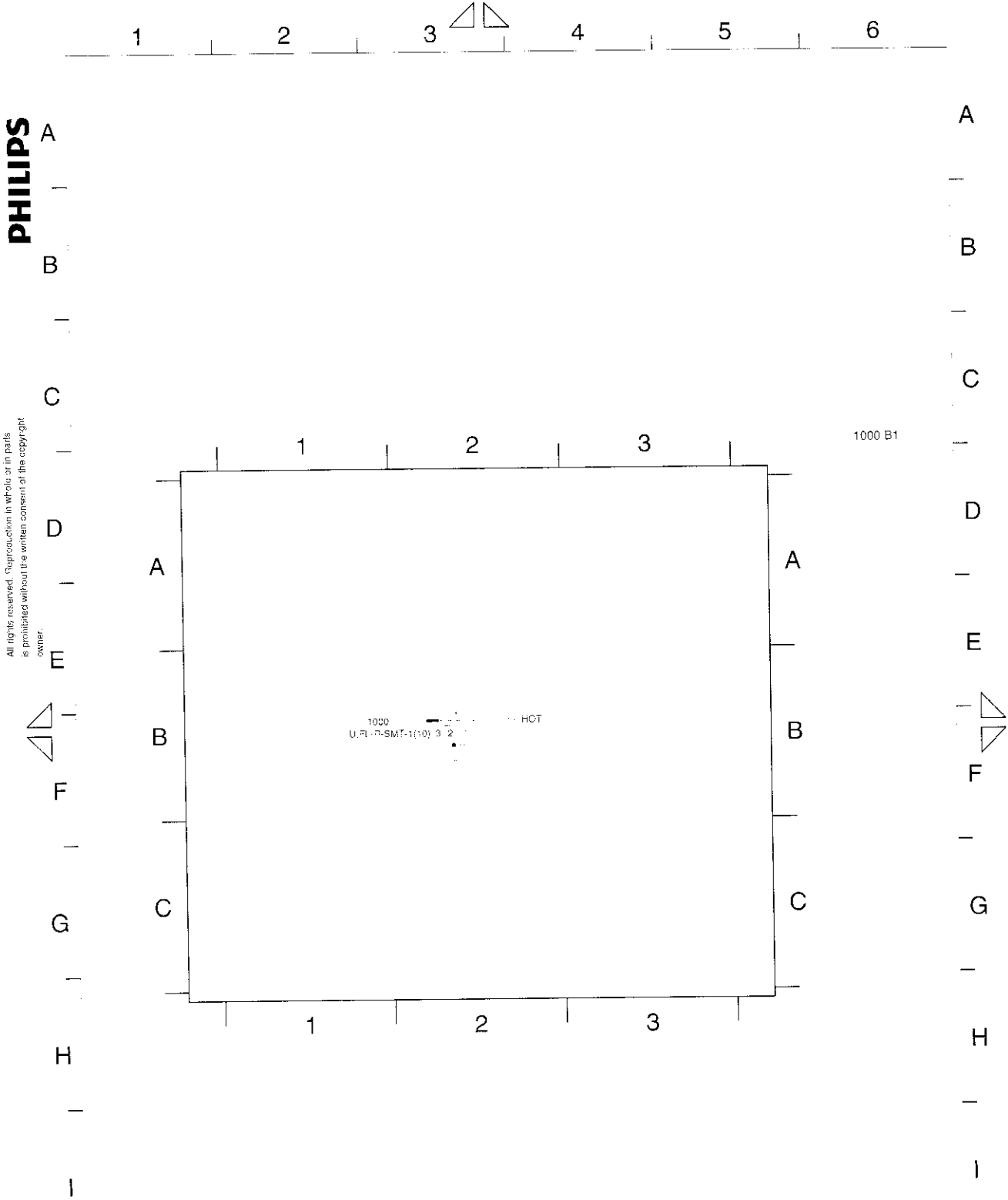
Layout guide panel



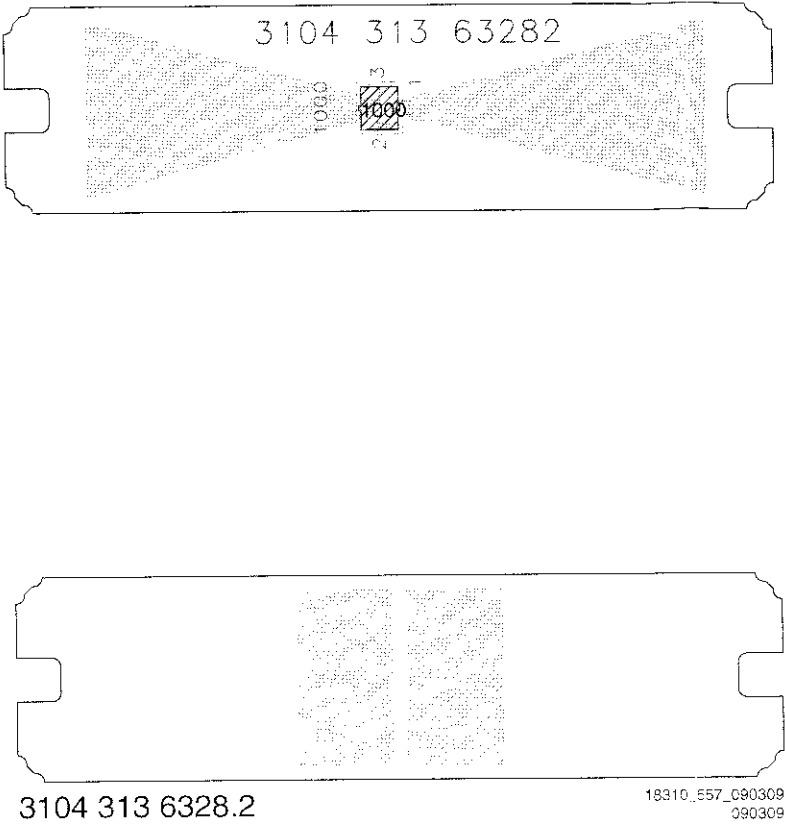
31043136344.1

16310_559_090420.eps
090508

Wi-Fi Antenna



Layout Wi-Fi Antenna



CHN	SETNAME	1 08-07-07
CLASS_NO		2 08-10-20
		3
NAME Maclegheer Ingrid	SUPERS.	1
CHECK	DATE	
1	2	3
WIFI antenna		
3104 303 5212		
130 - 1 A4		
ROYAL PHILIPS ELECTRONICS N.V. 2008		
1	2	3