

Service
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Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- **Chapter 1:** Added full Connection overview.
- **Chapter 5:** Corrected text and mentioned part numbers.
- **Chapter 6:** Updated Factory Alignment Menu.
- **Chapter 8:** Updated data sheets.

2. Technical Specifications and Connections

Index of this chapter:

- [2.1 Technical Specifications](#)
- [2.2 Directions for Use](#)
- [2.3 Connection Overview](#)
- [2.4 Chassis Overview](#)

Note: Data below can deviate slightly from the actual situation, due to the different set executions.

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:
21PT9470/44	21SL9	3122 785 18960
21PT9470/55		3122 785 18960

2.2 Directions for Use

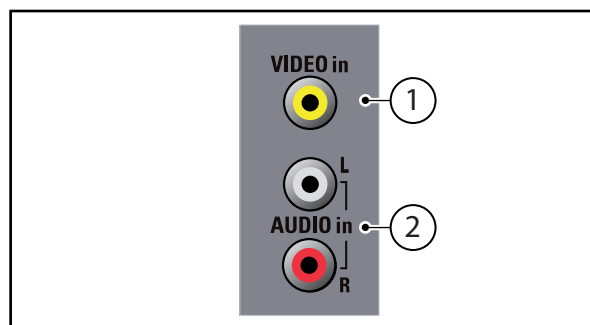
You can download this information from the following websites:

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

2.3 Connection Overview

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

2.3.1 Side Connections



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Figure 2-1 Front Connections

1 - Cinch: Video CVBS - In, Audio - In

Ye. - Video CVBS. 1 V_{PP} / 75 Ω.



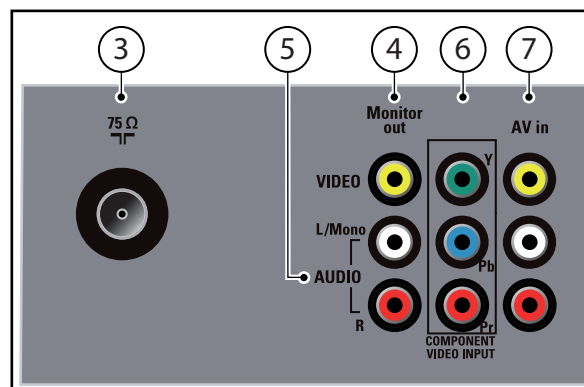
2 - Cinch: Video CVBS - In, Audio - In

Wh. - Audio L. 0.5 V_{RMS} / 10 kΩ.

Rd. - Audio R. 0.5 V_{RMS} / 10 kΩ.



2.3.2 Rear Connections



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Figure 2-2 Rear Connections

3 - Aerial - In

. - F-connector. Coax, 75 Ω.



4 - Monitor out Cinch: Video CVBS - Out

Ye. - Video CVBS. 1 V_{PP} / 75 Ω.



5 - Audio out Cinch: Audio - Out

Wh. - Audio L. 0.5 V_{RMS} / 10 kΩ.

Rd. - Audio R. 0.5 V_{RMS} / 10 kΩ.



6 - CVI in Cinch: Video YPbPr - In (21" only)

Gn. - Video Y. 1 V_{PP} / 75 Ω.

Bu. - Video Pb. 0.7 V_{PP} / 75 Ω.

Rd. - Video Pr. 0.7 V_{PP} / 75 Ω.



7 - AV in Cinch: Video CVBS - In, Audio - In

Ye. - Video CVBS. 1 V_{PP} / 75 Ω.

Wh. - Audio L. 0.5 V_{RMS} / 10 kΩ.

Rd. - Audio R. 0.5 V_{RMS} / 10 kΩ.



2.4 Chassis Overview

Refer to chapter 9. Block Diagrams for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

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[3.1 Safety Instructions](#)

[3.2 Maintenance Instructions](#)

[3.3 Warnings](#)

[3.4 Notes](#)

[3.5 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.
- Wear safety goggles when you replace the CRT.

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

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current flows. In particular this is valid for the:
 1. Pins of the line output transformer (LOT).
 2. Fly-back capacitor(s).
 3. S-correction capacitor(s).
 4. Line output transistor.
 5. Pins of the connector with wires to the deflection coil.
 6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure 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, to prevent the cord from touching the CRT, hot components, or heat sinks.
- 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 Maintenance Instructions

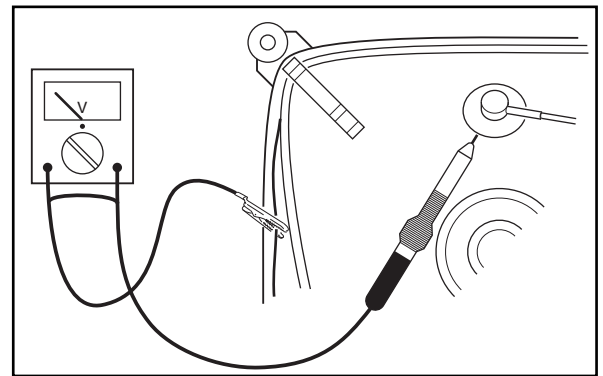
We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.

- The maintenance inspection includes the following actions:
 1. Perform the "general repair instruction" noted above.
 2. Clean the power supply and deflection circuitry on the chassis.
 3. Clean the picture tube panel and the neck of the picture tube.

3.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in figure "Discharge picture tube", to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_{DC}). Discharge until the meter reading is 0 V (after approx. 30 s).



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Figure 3-1 Discharge picture tube

- 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 prevents circuits from becoming unstable.

3.4 Notes

3.4.1 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 (see chapter 5) with a color 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.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

3.4.2 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 k Ω).
- 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 (μ = $\times 10^{-6}$), 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 in the Spare Parts List. Therefore, always check this list when there is any doubt.

3.4.3 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 Philips SAC305 with order code 0622 149 00106. 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.

3.4.4 Alternative BOM identification

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 center (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 3-2 Serial number (example)

3.4.5 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!

3.4.6 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.

3.5 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	FM.	Field Memory or Frequency Modulation
AV.	External Audio Video	FPGA.	Field-Programmable Gate Array
AVC.	Audio Video Controller	FTV.	Flat TeleVision
AVIP.	Audio Video Input Processor	Gb/s.	Giga bits per second
B/G.	Monochrome TV system. Sound carrier distance is 5.5 MHz	G-TXT.	Green TeleteXT
BLR.	Board-Level Repair	H.	H_sync to the module
BTSC.	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries	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.
B-TXT.	Blue TeleteXT		High Definition Multimedia Interface
C.	Centre channel (audio)	HDMI.	HeadPhone
CEC.	Consumer Electronics Control bus: remote control bus on HDMI connections	HP.	Monochrome TV system. Sound carrier distance is 6.0 MHz
CL.	Constant Level: audio output to connect with an external amplifier	I.	Inter IC bus
CLR.	Component Level Repair	I ² C.	Inter IC Data bus
ComPair.	Computer aided rePair	I ² D.	Inter IC Sound bus
CP.	Connected Planet / Copy Protection	I ² S.	Intermediate Frequency
CSM.	Customer Service Mode	IF.	Infra Red
CTI.	Color Transient Improvement: manipulates steepness of chroma transients	IR.	Interrupt Request
		IRQ.	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. Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, 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.
CVBS.	Composite Video Blanking and Synchronization	ITU-656.	
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		
DRAM.	Dynamic RAM		
DRM.	Digital Rights Management		
DSP.	Digital Signal Processing		
DST.	Dealer Service Tool: special remote control designed for service technicians	ITV.	Institutional TeleVision; TV sets for hotels, hospitals etc.
		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		Latin America
DVB-C.	Digital Video Broadcast - Cable	LATAM.	Liquid Crystal Display
DVB-T.	Digital Video Broadcast - Terrestrial	LCD.	Light Emitting Diode
DVD.	Digital Versatile Disc	LED.	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)	L/L'.	LG.Philips LCD (supplier)
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.		Loudspeaker
		LPL.	Low Voltage Differential Signalling
EDID.	Extended Display Identification Data (VESA standard)	LS.	Mega bits per second
		LVDS.	Monochrome TV system. Sound carrier distance is 4.5 MHz
EEPROM.	Electrically Erasable and Programmable Read Only Memory	Mbps.	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
EMI.	Electro Magnetic Interference	M/N.	Matrix Output Processor
EPLD.	Erasable Programmable Logic Device		Metal Oxide Silicon Field Effect Transistor, switching device
EU.	Europe	MIPS.	Motion Pictures Experts Group
EXT.	EXternal (source), entering the set by SCART or by cinches (jacks)		Multi Platform InterFace
		MOP.	MUTE Line
FDS.	Full Dual Screen (same as FDW)	MOSFET.	Not Connected
FDW.	Full Dual Window (same as FDS)		
FLASH.	FLASH memory	MPEG.	
		MPIF.	
		MUTE.	
		NC.	

NICAM.	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.	SMPS.	Switched Mode Power Supply
NTC.	Negative Temperature Coefficient, non-linear resistor	SoC.	System on Chip
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)	SOG.	Sync On Green
NVM.	Non-Volatile Memory: IC containing TV related data such as alignments	SOPS.	Self Oscillating Power Supply
O/C.	Open Circuit	SPI.	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard
OSD.	On Screen Display	S/PDIF.	Sony Philips Digital InterFace
OTC.	On screen display Teletext and Control; also called Artistic (SAA5800)	SRAM.	Static RAM
P50.	Project 50: communication protocol between TV and peripherals	SRP.	Service Reference Protocol
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)	SSB.	Small Signal Board
PCB.	Printed Circuit Board (same as "PWB")	STBY.	STand-BY
PCM.	Pulse Code Modulation	SVGA.	800 × 600 (4:3)
PDP.	Plasma Display Panel	SVHS.	Super Video Home System
PFC.	Power Factor Corrector (or Pre-conditioner)	SW.	Software
PIP.	Picture In Picture	SWAN.	Spatial temporal Weighted Averaging Noise reduction
PLL.	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency	SXGA.	1280 × 1024
POD.	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)	TFT.	Thin Film Transistor
POR.	Power On Reset, signal to reset the uP	THD.	Total Harmonic Distortion
PTC.	Positive Temperature Coefficient, non-linear resistor	TMDs.	Transmission Minimized Differential Signalling
PWB.	Printed Wiring Board (same as "PCB")	TXT.	TeleteXT
PWM.	Pulse Width Modulation	TXT-DW.	Dual Window with TeleteXT
QRC.	Quasi Resonant Converter	UI.	User Interface
QTNr.	Quality Temporal Noise Reduction	uP.	Microprocessor
QVCP.	Quality Video Composition Processor	UXGA.	1600 × 1200 (4:3)
RAM.	Random Access Memory	V.	V-sync to the module
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.	VESA.	Video Electronics Standards Association
RC.	Remote Control	VGA.	640 × 480 (4:3)
RC5 / RC6.	Signal protocol from the remote control receiver	VL.	Variable Level out: processed audio output toward external amplifier
RESET.	RESET signal	VSb.	Vestigial Side Band; modulation method
ROM.	Read Only Memory	WYSIWYR.	What You See Is What You Record: record selection that follows main picture and sound
RSDS.	Reduced Swing Differential Signalling data interface	WXGA.	1280 × 768 (15:9)
R-TXT.	Red TeleteXT	XTAL.	Quartz crystal
SAM.	Service Alignment Mode	XGA.	1024 × 768 (4:3)
S/C.	Short Circuit	Y.	Luminance signal
SCART.	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs	Y/C.	Luminance (Y) and Chrominance (C) signal
SCL.	Serial Clock I ² C	YPbPr.	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
SCL-F.	CLock Signal on Fast I ² C bus	YUV.	Component video
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		

4. Mechanical Instructions

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[4.1 Set Disassembly](#)

[4.2 Set Re-assembly](#)

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

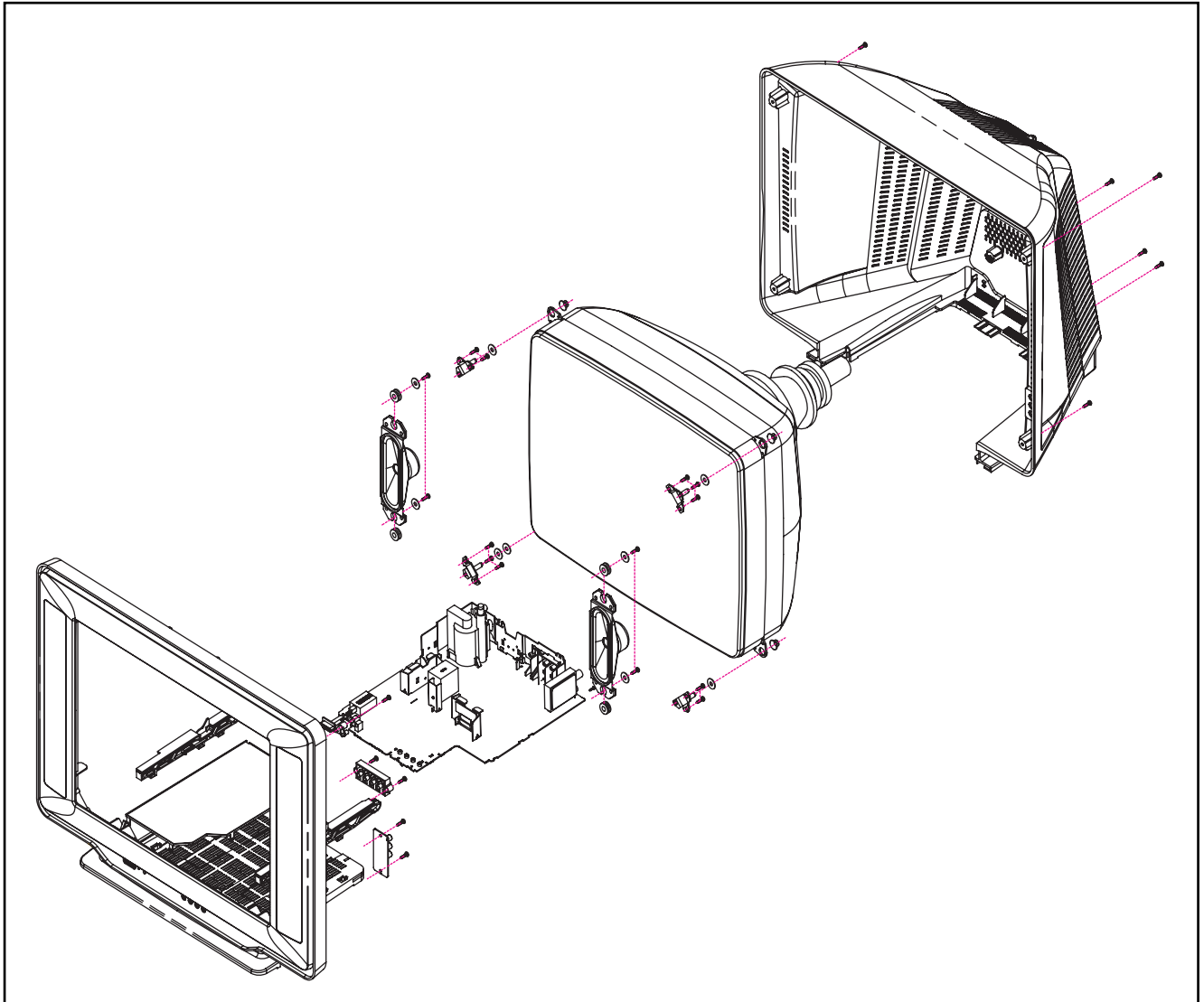
4.1 Set Disassembly

Follow the disassemble instructions in described order.

4.1.1 Rear Cover Removal

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

1. Remove all the fixation screws of the rear cover.
2. Now, pull the rear cover backwards and remove it.



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Figure 4-1 Set Disassembly SL8 styling

4.2 Set Re-assembly

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

Be sure that, before the rear cover is mounted:

- The mains cord is positioned correctly in its guiding brackets (make sure that the strain reliefs are replaced in its correct position and that it will function correctly!).
- All wires/cables are returned in their original positions.

5. Service Modes, Error Codes, and Fault Finding

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5.1 Test Points

See chapter [9. Block Diagrams](#).

Perform measurements under the following conditions:

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

5.2 Service Modes

This chassis does not contain a specific Service Mode. Service and Alignment of the TV set can be done via the Factory Mode by the service technician, see section [6.3 Software Alignments](#)

5.3 Error Codes

Not applicable.

5.4 Fault Finding

5.4.1 Power on Failure

Check whether the power supply is working properly and whether the values of voltages normal. If those are correct, check line transistor and transformer are working properly or check fore or back line for defects.

5.4.2 Horizontal Deflection Transistor Defective: No Picture, No Sound.

To find the fault for a defect horizontal deflection transistor please check the following items:

- Over voltage to breakdown.
- Over current to burn.
- Horizontal frequency too low.
- Horizontal drive inefficient.

5.4.3 Picture Interference

- Check if the signal line contact is good.
- Change Tuner if is necessary.

5.4.4 Cannot find any TV program

Checking method: Check the closed circuit from tuner to picture decoder IC to detect whether there are defective components. Or check whether the resistance of R217, R213, C208 and R209 has increased which also could cause the problem.

5.4.5 No Good Picture or Double Image

Check the correctness of the signal from IF to Q202 and relevant circuit. In this case the problem can be Q202 and/or SAW101.

5.4.6 Picture not or incorrect Colored

- Check the circuit from IC101 to R.G.B. three gun circuit.

- Check the IC soldering and relevant circuitry on physical damage or check for defective capacitors.

5.4.7 Picture with Horizontal Bright Line and Sound

Check both supply voltages of vertical IC301 and relevant circuitry on correctness. Also check the vertical synchronizing signal from IC101.

5.4.8 Remote Control Malfunction

Check the voltage on pin 39 of IC101. The normal value should be 5.15 V. If this is correct check front control panels soldering connections. If can't be solved, check the remote control, crystal or transmitting diode of the remote control are in good condition.

5.4.9 No Sound

Check power supply of sound IC (IC401) and relevant circuitry. Do not exclude IC401 to be defective. If needed replace the speakers.

5.4.10 Poor Sound Quality

Check the sound system after searching the channel which should set at NTSC or AUTO. If still has problem, check accompany board circuit on chassis good or not.

6. Alignments

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[6.3 Software Alignments](#)

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6.1 General Alignment Conditions

6.1.1 Default Alignment Settings

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 230 V_{AC} / 50 Hz (± 10%).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 20 to 30 minutes.
- Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).

Caution: never use heatsinks as ground.

- Test probe: 100 : 1, R_i > 10 MΩ, C_i < 3.5 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

6.2 Hardware Alignments

Note: The only hardware alignment in this TV set is the adjustment of the main voltage (B+), see below.

6.2.1 Main Voltage Adjustment

In order to adjust the main voltage, connect a voltage meter to TP312 or TP637 and adjust R636 to a voltage of 115 V ±1.0 V.

6.3 Software Alignments

Put the set in its MENU mode (factory mode) as follows (see also figure "Factory Mode" on the next page):

- Press the keys [i+], "smart sound" and "smart picture" to enter the factory menu.
- Press the keys [i+] again and "ADJUST" appear on screen.
- Press the number keys to enter the adjust page, press ▲/▼ to choose the items that to be adjusted, Press ◀/▶ to adjust its value.
- Press [i+] to quit factory mode.

The different alignment parameters are described further on.

6.3.1 RF AGC Voltage Adjust

1. Provide a 571.25 MHz, 60 dB half color bar signal.
2. Enter factory mode and press key 1.
3. Measure tuner AGC point voltage, adjust AGC item till the voltage is 2.4 V, or till picture noise just disappears. (typical value is at 27).

6.3.2 Focus Fine Adjust

1. Provide a cross-hatch pattern signal.
2. Set state to "Rich" mode.
3. Adjust flyback transformers Focus knob till picture is clear.

6.3.3 Screen Voltage Adjust (Key 0)

1. Set picture to "AV Standard" mode, without signal input.

2. Press the keys [i+], "Smart sound" and "Smart picture" to enter the factory menu. When in "B/W BALANCE" page, press "0" on the RC.
3. Adjust flyback transformers Screen knob till OK is displayed on screen, press "0" to exit.

Table 6-1 To increase/decrease CUT R/G

Function	CUT R+	CUT R-	CUT G+	CUT G-
RC key	1	4	2	5

6.3.4 Horizontal Adjustment

1. Provide a 50 Hz monoscope pattern.
 - Press the keys [i+], "Smart sound" and "Smart picture" to enter the factory menu.
 - Press the keys [i+] again and "ADJUST" appear on screen.
2. Press key "0" and adjust "HPH" to set picture horizontal centre to CRT horizontal centre.

6.3.5 Vertical & YUV/RGB Horizontal Adjust (Key 0)

1. Provide a 50 Hz cross hatch signal, set TV to standard mode. Adjust VSL so that half picture of the pane cross appears. The picture's vertical line is just at the bottom of the half picture. Adjust VSL to make the centre of the picture's vertical line and the kinescope are in superposition.
2. Adjust VSI to obtain picture's vertical re-display ratio more than 90%.
3. Provide a 60 Hz cross hatch signal, do step 1 and 2 again to adjust.
4. If necessary, fine adjust above items.

6.4 Factory mode Settings

How to enter and exit service modes

1.

Enter “FACTORY MODE”: press “Display”, ”Sound mode” and “PP” on the Remote Control.

Enter “DESIGN SERVICE MODE”: after entering “FACTORY SERVICE MODE”, select “SC”, then press “8” and “9” on the Remote Control.

Normally “DESIGN SERVICE MODE” is not needed for production line. Exit service mode: press “DISPLAY” key to exit service mode.
2.

In service mode, pressing digital keys directly can enter the corresponding page, pressing “MENU” key can enter the next page. Pressing “UP” and “DOWN”
3.

BUS OPEN mode: In service mode, pressing “MUTE” key can enter “BUS OPEN” mode, which is useful for white balance adjustment using AUTO WHITE BALANCE EQUIPMENT or mass data written into the EEPROM IC. Pressing “MUTE” can exit “BUS OPEN” mode.
4.

FACTORY mode: In service mode, pressing “A/CH” key can enter “FACTORY MODE”, which is useful for aging in production lines. Pressing “8” and “9” on the Remote Control again can exit “FACTORY MODE”.

Table 6-2 Factory Alignments Menu

Description of the factory menu	Display string	Range (Index value)	Default
Horizontal shift	HSH	0 to 63	32
EW width	EWV	0 to 63	32
Vertical slope. This will switch screen to half blank.	VSL	0 to 63	32
Vertical shift	VSH	0 to 63	32
Vertical amplitude	VAM	0 to 63	32
S-correction	SC	0 to 63	32
East West Parabola Width	PW	0 to 63	32
East West Trapezium	TC	0 to 63	32
East West Upper Corner Parabola	UCP	0 to 63	32
East West lower Corner Parabola	LCP	0 to 63	32
Horizontal parallelogram	HPAR	0 to 63	32
Horizontal bow	HBOW	0 to 63	32
Black level offset Course	BLOC	0 to 63	7
Black level offset Red	BLOR	0 to 63	32
Black level offset Green	BLOG	0 to 63	32
Black level offset Blue	BLOB	0 to 63	32
White point Red	WPR	0 to 63	32
White point Green	WPG	0 to 63	32
White point Blue	WPB	0 to 63	32
AGC Take over. Also used as TOP when an internal AGC tuner is used.	AGC	0 to 63	32
Sub brightness	SUB-BRI	0 to 63	0
In TV or YUV, brightness of white balance	WBT	0 to 63	32
In TV or YUV, brightness of white contrast	WCT	0 to 63	32
VG2 Adjustment	VG2	0 to 63	32
Out of factory	BOX	0, 1	0
Speech treble	S-TR	0 to 63	24
Speech bass	S-BA	0 to 63	42
Music treble	M-TR	0 to 63	42
Music bass	M-BA	0 to 63	48
Theatre treble	T-TR	0 to 63	32
Theatre bass	T-BA	0 to 63	48
AV curve offset compare to TV	AV-OF	-31 to 32	0
The volume setting for OSD 5	V-05	0 to 81	5
The volume setting for OSD 10	V-10		15
The volume setting for OSD 20	V-20		25
The volume setting for OSD 30	V-30		35
The volume setting for OSD 40	V-40		55
The volume setting for OSD 50	V-50		65
The volume setting for OSD 63	V-63		81
Soft brightness	S-BRI	0 to 63	32
Soft colour	S-COL	0 to 63	32
Soft contrast	S-CON	0 to 63	20
Soft sharpness	S-SHA	0 to 63	25
Natural brightness	N-BRI	0 to 63	32
Natural colour	N-COL	0 to 63	25
Natural contrast	N-CON	0 to 63	21
Natural sharpness	N-SHA	0 to 63	32
Rich brightness	R-BRI	0 to 63	38
Rich colour	R-COL	0 to 63	30
Rich contrast	R-CON	0 to 63	50
Rich sharpness	R-SHA	0 to 63	20

Description of the factory menu	Display string	Range (Index value)	Default
IF select; IFA, IFB, IFC	IF	0: 58.75 MHz 1: 45.75 MHz 2: 38.90 MHz 3: 38.00 MHz 4: 33.40 MHz 5: 33.90 MHz	1
AGC speed adjust	A SPD	0 to 3	1
Blue screen	B B	0: No signal is snowflake 1: No signal is blue screen	1
Video mute; switch source whether blanking	V-M	0: No black blanking 1: blanking	1
Mute pin type	M-MODE	0: MUTE low; DEMUTE high 1: MUTE high; DEMUTE low	0
AV POC SETTING	A-POC	0: POC=0 1: POC by IFI setting	1
TV POC SETTING	T-POC	0: POC by LOCK or SL setting 1: POC by LOCK or IFI setting 2: POC by LOCK or IFI or SL setting	1
Blue screen condition	BLUE	0: AV by IFI setting, TV by IFI or SL setting 1: Program setting	1
Switch off condition	OFF	0: Program setting 1: AV by IFI setting, TV by IFI and SL setting	1
VG2 mode	VG2-MODE	0: Light line adjust mode 1: Character adjust mode	
VG2 brightness adjust	VSD-Bri	0 to 63	32
CCD delay	DELAY	0 to 127	2
BTSC mode select	MODE	0 to 2	0
SAP send LOW or HIGH	SAP-LH	0: SAP low 1: SAP high	0
Stereo Sense LOW or HIGH	STEREO-LH	0: Stereo low 1: Stereo high	0
SAP Level 1 or 2	SAP1-2	0: SAP level 1 1: SAP level 2	0
SIF or BASE BAND mode	SIF-BASE	0: SIF mode 1: BASE BAND mode	1
BTSC detect time for switch source	DETECT		50
Bass and treble present in sound menu	BAS-TRE	0: Off, 1: On	0
DSK register, Dynamic skin control on/off	DSK	0: Off, 1: On	0
Disco Gain, register DISG 0x4a bit 6	DISG	0: Off, 1: On	0
Coring of SVM output single; register COFF 0x48 bit 7	COF	0: Off, 1: On	0
Cap bank switch; NTSC next DCXO_CAP setting	DCXO	0 to 3	2
PAL-M Cap bank switch for DCXO; PAL-M next DCXO_CAP setting	PM-DCXO	0 to 3	2
PAL-N Cap bank switch for DCXO; PAL-N next DCXO_CAP setting	PN-DCXO	0 to 3	2
AKB register setting	AKB	0: AKB setting 0, CCC function 1: AKB setting 1	1
OSD vertical position for 50 Hz	O-V50	0 to 63	35
OSD vertical position for 60 Hz	O-V60	0 to 63	35
OSD Horizontal position	O-HOR	10 to 50	36
PCB Logic	LOGIC	0: 3P67SN, 1: 5P67SN, 2: 3P69SN	1
Init NVM	INIT	0: Off, 1: On	0
AV1 present for AV status	AV1	0: Off, 1: On	1
SIDE present for AV status	SIDE	0: Off, 1: On	1
AV2 present for AV status	AV2	0: Off, 1: On	0
S-VIDEO present for AV status	S-V	0: Off, 1: On	0
YUV present for AV status	YUV	0: Off, 1: On	0
TV MONO select, Left sound output	MONO	0: Stereo, 1: Mono	0
Stand-by remember	R-POWER	0: power on, 1: power off, 2: power remember	0
Vertical linearity for 50 Hz	5VLIN	0 to 63	32
Vertical linearity for 60 Hz	6VLIN	0 to 63	32
Vertical scroll for 50 Hz	5VSCR	0 to 63	32
Vertical scroll for 60 Hz	6VSCR	0 to 63	32
VX or VA setting in 16 : 9 mode, VX-VAM = 0, Setting VX register VX-VAM = 1, Setting VA register	ZOOM 16	0 to 63	0
VX or VA setting in 4 : 3 mode, VX-VAM = 0, Setting VX register VX-VAM = 1, Setting VA register	ZOOM N	0 to 63	25
VX or VA setting in 4 : 3 expand mode, VX-VAM = 0, Setting VX register VX-VAM = 1, Setting VA register	ZOOM EX	0 to 63	51
Max-brightness	MAX-BRI	0 to 63	63
Sub-contrast	SUB-CON	0 to 63	0
Max-contrast	MAX-CON	0 to 63	63
Max-colour	MAX-COL	0 to 63	63
No signal EWW	N-EWW	-32 to +31	0
Black stretch depth	DEP	0: 15 IRE, 1: 30 IRE	0
Colour temperature of soft	S-C	0: normal, 1: cold, 2: warm	2
Colour temperature of natural	N-C	0: normal, 1: cold, 2: warm	0
Colour temperature of rich	R-C	0: normal, 1: cold, 2: warm	1

Description of the factory menu	Display string	Range (Index value)	Default
4 : 3 expand present state	4:3	0: Off, 1: On	0
16 : 9 present state	16:9	0: Off, 1: On	1
VX or VAM active for VX 16 : 9 VX, Normal and VX Expand	VX-VAM	0: VX, 1: VAM	0
Peak white limiting	PWL	0 to 63	15
Cathode	HDOL	0 to 15	12
Correction for DC offset in the IF-PLL	OIF	0 to 63	32
Blue stretch	BLUE-S	0: Off, 1: On	0
FBC and FBC1 register	FBC-FBC1	0: FBC = 0, FBC1 = 0 1: FBC = 1, FBC1 = 0 2: FBC = 0, FBC1 = 1 3: FBC = 1, FBC1 = 1	0
YD0-YD3 register, using PAL, Lightness delay	P-YD	0 to 15	9
YD0-YD3 register, using NTSC, Lightness delay	N-YD	0 to 15	8
YD0-YD3 register, using AV, Lightness delay	A-YD	0 to 15	10
DMPH register	DMPH	0: Off, 1: On	0
CBAF0 and CBAF1 register, Frequency select of BASS	CBAF0-1	0 to 3	0
CBAF0 and CBAF1 register, Frequency select of TREBLE	CTRF0-1	0 to 3	0
CB register	CB	0: Fsc, 1: 1.1 × Fsc	0
MAT, MUS, MTXF register,	MATRIX	0: MAT = 0, MUS = 0, MTXF = 0 1: MAT = 1, MUS = 0, MTXF = 0 2: MAT = 0, MUS = 1, MTXF = 0 3: MAT = 1, MUS = 1, MTXF = 0 4: MAT = 0, MUS = 0, MTXF = 1 5: MAT = 1, MUS = 0, MTXF = 1 6: MAT = 0, MUS = 1, MTXF = 1 7: MAT = 1, MUS = 1, MTXF = 1	0
FMWB register	FMWB	0 to 3	3
HCO register, 0: HCO = 0, 1: HCO = 1	HCO	0, 1	0
AGN, Gain for FM demodulator, AGN = 0 (normal), AGN = 1 (+6 db)	AGN	0: PAL AGN = 0, NTSC AGN = 0 1: PAL AGN = 0, NTSC AGN = 1 2: PAL AGN = 1, NTSC AGN = 0 3: PAL AGN = 1, NTSC AGN = 1	1
AGNE1; AGNE0, Extra gain setting for FM	AGNE	0: normal 1: +3.8 db 2: -6.0 db 3: -3.0 db	1
FMWS1; FMWS0, Window selection for FM demodulator	FMWS	0: 100 kHz 1: 225 kHz 2: 450 kHz 3: 900 kHz	1
BPB2, bypass sound bandpass filter section 2	BPB2	0: activated, 1: bypassed	1
Fast filter IF-PLL	FFI	0: normal, 1: increased	0
AV COR1, COR2 register setting	A-COR	0: off 1: 0 to 20 2: 0 to 40 3: 0 to 100	1
TV COR1, COR2 register setting	T-COR	0: off 1: 0 to 20 2: 0 to 40 3: 0 to 100	1
FOA and FOB setting	FOA-FOB	0: In AV, FOA = 1, FOB = 1, In TV, FOA = 0, FOB = 0. 1: FOA = 0, FOB = 1 2: FOA = 1, FOB = 0	0
DSG register, TV mode	TV-DSG	0, 1	1
DSG register, AV mode	AV-DSG	0, 1	1
menu position adjustment	MENU-H	0 to 63	32
DSGL S register	DSGLS	0: +0 db, 1: +6 db	1
Slicing level horizontal sync separator	SSL	0: 50%, 1: 30%	0
Force slicing level for vertical sync	FSL	0: dependent on noise detector 1: fixed slicing level of 60%	0
AAS1;AAS0, Black area to switch of the black strength	AAS	0: 10%, 1: 12%, 2: 6%, 3: 8%	2
SOC0, SOC1, Soft clipping level	SOC	0: 0%, 1: 5%, 2: 10%, 3: off	2
HBL, RGB blank mode	HBL	0: normal, 1: wide	1
WBF, Timing of wide blanking	WBF	0: 3.5 μs, 1: 5.9 μs	0
WBR, Timing of wide blanking	WBR	0: 7.8 μs, 1: 10.2 μs	0
In TV or YUV, Brightness of black balance	BT	0 to 63	32
In TV or YUV, Contrast of black balance	CT	0 to 63	32
NVM C0, Character 0	C0	48 to 255	
NVM C1, Character 1	C1	48 to 255	
NVM C2, Character 2	C2	48 to 255	
NVM Year	Y	8 to 10	8
NVM Month	M	1 to 12	7
NVM Day	D	1 to 31	8
XDT, X-ray protect	XDT	0: Hardware protect, 1: Software protect	0
XDT SW active, XDT protect available	XDT-OFFON	0: Off, 1: On	1
SW detect times, XDT protect detect times	XDT-TIME	0 to 255	10
In power off, STB register setting	STB	0: STB Off, 1: STB On	1
EVG register, Field protect function	EVG	0: EVG Off, 1: EVG On	0

Description of the factory menu	Display string	Range (Index value)	Default
CHSE1 CHSE0 register, If CHSE ON setting on, CHSE value of strong signal	CHSE	0: colour sensitivity -34 dB 1: colour sensitivity -37 dB 2: colour sensitivity -41 dB 3: colour sensitivity -46 dB	0
Auto low signal identification	CHSE ON	0: Off, 1: On low signal according to CHSE setting	0
OSD error protect	PRO	0: Off, 1: On	0
OSD error times	PRO1	0 to 255	0
Black level offset Red of YUV normal	Y-BR	-32 to +31	0
Black level offset Green of YUV normal	Y-BG	-32 to +31	0
Black level offset Blue of YUV normal	Y-BB	-32 to +31	0
White point Red of YUV normal	Y-WR	-32 to +31	0
White point Green of YUV normal	Y-WG	-32 to +31	0
White point Blue of YUV normal	Y-WB	-32 to +31	0
Black level offset Red of YUV cool	Y-C-BR	-32 to +31	0
Black level offset Green of YUV cool	Y-C-BG	-32 to +31	0
Black level offset Blue of YUV cool	Y-C-BB	-32 to +31	0
White point Red of YUV cool	Y-C-WR	-32 to +31	0
White point Green of YUV cool	Y-C-WG	-32 to +31	0
White point Blue of YUV cool	Y-C-WB	-32 to +31	0
Black level offset Red of YUV warm	Y-W-BR	-32 to +31	0
Black level offset Green of YUV warm	Y-W-BG	-32 to +31	0
Black level offset Blue of YUV warm	Y-W-BB	-32 to +31	0
White point Red of YUV warm	Y-W-WR	-32 to +31	0
White point Green of YUV warm	Y-W-WG	-32 to +31	0
White point Blue of YUV warm	Y-W-WB	-32 to +31	0
Black level offset Red of TV normal	T-BR	-32 to +31	0
Black level offset Green of TV normal	T-BG	-32 to +31	0
Black level offset Blue of TV normal	T-BB	-32 to +31	0
White point Red of TV normal	T-WR	-32 to +31	0
White point Green of TV normal	T-WG	-32 to +31	0
White point Blue of TV normal	T-WB	-32 to +31	0
Black level offset Red of TV cool	T-C-BR	-32 to +31	0
Black level offset Green of TV cool	T-C-BG	-32 to +31	0
Black level offset Blue of TV cool	T-C-BB	-32 to +31	0
White point Red of TV cool	T-C-WR	-32 to +31	0
White point Green of TV cool	T-C-WG	-32 to +31	0
White point Blue of TV cool	T-C-WB	-32 to +31	0
Black level offset Red of TV warm	T-W-BR	-32 to +31	0
Black level offset Green of TV warm	T-W-BG	-32 to +31	0
Black level offset Blue of TV warm	T-W-BB	-32 to +31	0
White point Red of TV warm	T-W-WR	-32 to +31	0
White point Green of TV warm	T-W-WG	-32 to +31	0
White point Blue of TV warm	T-W-WB	-32 to +31	0

7. Circuit Descriptions

Index of this chapter:

[7.1 Introduction](#)

[7.2 The various circuits](#)

7.1 Introduction

The SK8.0L CA is a CRT TV based on the 3P69 platform. In this chapter, only a general description of the various circuits is given. For more detailed information, see the circuit diagrams in this manual.

7.2 The various circuits

7.2.1 Tuner

The function of the tuner is to select the channel to be received and suppress the interference of neighboring channels, to amplify the high frequency signal, to improve the receiving sensitivity and SNR, and to generate a PIF signal through frequency conversion.

7.2.2 IF Channel

The IF Channel mainly ensures the sensitivity and selectivity of the complete TV set. The IF AMP integrated in the UOCIII is made up of a three-stage dual-differential amplifier with a gain value above 70 dB, a SNR of 55 dB and a bandwidth of 7 MHz. The video demodulation circuit is made from the built-in PLL Sync Detector. The spectrum of the demodulation carrier is unitary and it is not affected by the content of the video signal. The tuner features stable receptivity while the signal output from the video detector features high fidelity. The built-in PLL circuit of the UOCIII generates a 38.0 MHz or 38.9 MHz demodulation reference signal for the sync detector to demodulate the video signal; this is called "PLL sync demodulation".

7.2.3 Sound Channel

An external ceramic filter is used to select the second SIF signal for the sound channel of UOCIII from the signal output of the video detector. The audio signal is obtained after limiting amplification and demodulation by the intermediate frequency detector for the SIF signal, and then the audio signal is fed to the BTSC stereo/SAP decoder TDA9850. From that it is output to the audio amplifier TFA9842, which drives the speakers to provide the sound. The intermediate frequency detector and volume-control attenuator that are built in the UOCIII are set and adjusted via the CPU.

7.2.4 BTSC stereo/SAP decoder

Input Level Adjustment

The composite input signal is fed to the input level adjustment stage. The control range is from -3.5 to +4.0 dB in steps of 0.5 dB. The maximum input signal voltage is 2 V (RMS).

Stereo Decoder

The output signal of the level adjustment stage is coupled to a low-pass filter which suppresses the baseband noise above 125 kHz. The composite signal is then fed into a pilot detector/pilot cancellation circuit and into the MPX demodulator. The main L + R signal passes a 75 ms fixed de-emphasis filter and is fed into the dematrix circuit. The decoded sub-signal L - R is sent to the stereo/SAP switch. To generate the pilot signal the stereo demodulator uses a PLL circuit including a ceramic resonator. The stereo channel separation is adjusted by an automatic procedure to be performed during set production.

The stereo identification can be read by the I²C-bus. Two different pilot thresholds (data STS = 1; STS = 0) can be selected via the I²C-bus.

SAP Demodulator

The composite signal is fed from the output of the input level adjustment stage to the SAP demodulator circuit through a 5fH band-pass filter. The demodulator level is automatically controlled. The SAP demodulator includes an internal field strength detector that mutes the SAP output in the event of insufficient signal conditions. The SAP identification signal can be read by the I²C-bus.

Noise Detector

The composite input noise increases with decreasing antenna signal. This makes it necessary to switch stereo or SAP off at certain thresholds. These thresholds can be set via the I²C-bus. With ST0 to ST3 the stereo threshold can be selected and with SP0 to SP3 the SAP threshold. A hysteresis can be achieved via software by making the threshold dependent of the identification bits STP and SAPP.

Mode Selection

The stereo/SAP switch feeds either the L - R signal or the SAP demodulator output signal via the internal dbx noise reduction circuit to the dematrix/switching circuit. Different switch modes provided at the output pins OUTR and OUTL are available.

dbx Decoder

The dbx circuit includes all blocks required for the noise reduction system in accordance with the BTSC system specification. The output signal is fed through a 73 ms fixed de-emphasis circuit to the dematrix block.

SAP Output

Independent of the stereo/SAP switch, the SAP signal is also available at pin SAP. At SAP, the SAP signal is not dbx decoded. The capacitor at SDE provides a recommended de-emphasis (150 ms) at SAP.

Integrated Filters

The filter functions necessary for stereo and SAP demodulation and part of the dbx filter circuits are provided on-chip using transistor circuits. The required filter accuracy is attained by an automatic filter alignment circuit.

7.2.5 CRT Drive Circuit

In the driver circuit, both the voltage and current of the R/G/B signal are amplified, after which the CRT drive circuit modulates the cathode beam current of the CRT. The R/G/B signal input into the driver circuit is of negative polarity.

7.2.6 Power Supply Circuit

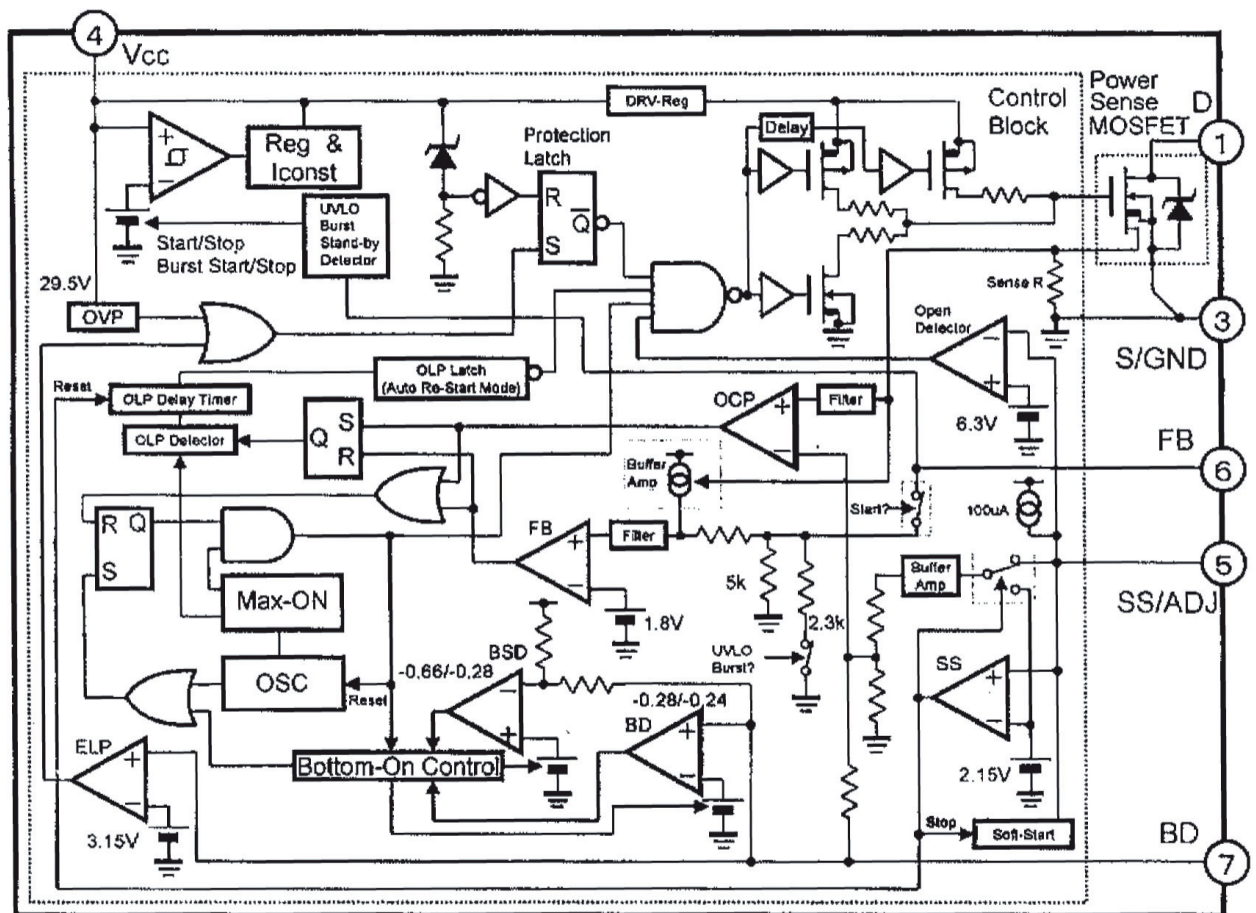
The function of the power supply circuit is to supply various stabilized operating voltages and to provide protections against excessive voltages and currents.

8. IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams.

8.1 Diagram A1, STR6554, (IC601)

Block diagram



Pinning information

Terminal No.	Symbols	Descriptions	Functions
1	D	Drain terminal	MOSFET drain
3	S/GND	Source and Ground terminal	MOSFET Source and Ground
4	VCC	Power supply terminal	Input of power supply for control circuit
5	SS/ADJ	Soft Start and Over-current protection adjustment Terminal	Adjustment of over-current protection and Soft Start Operation Time set up
6	FB	Feedback terminal	Constant Voltage Control Signal Input and Burst(intermittent) mode Oscillation Control
7	BD	Bottom Detection Terminal	Bottom Detection Signal Input and External Latch Signal Input

Figure 8-1 Block Diagram and Pin Configuration

8.2 Diagram A1, PC817, (IC602)

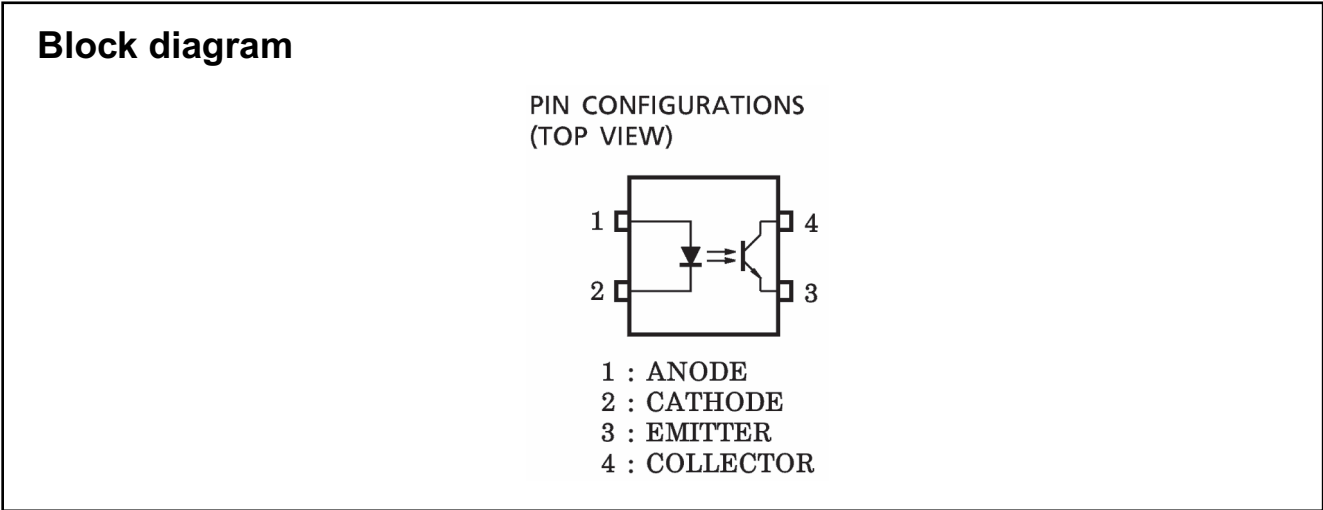


Figure 8-2 Block Diagram and Pin Configuration

8.3 Diagram A2, LA78141, (IC301)

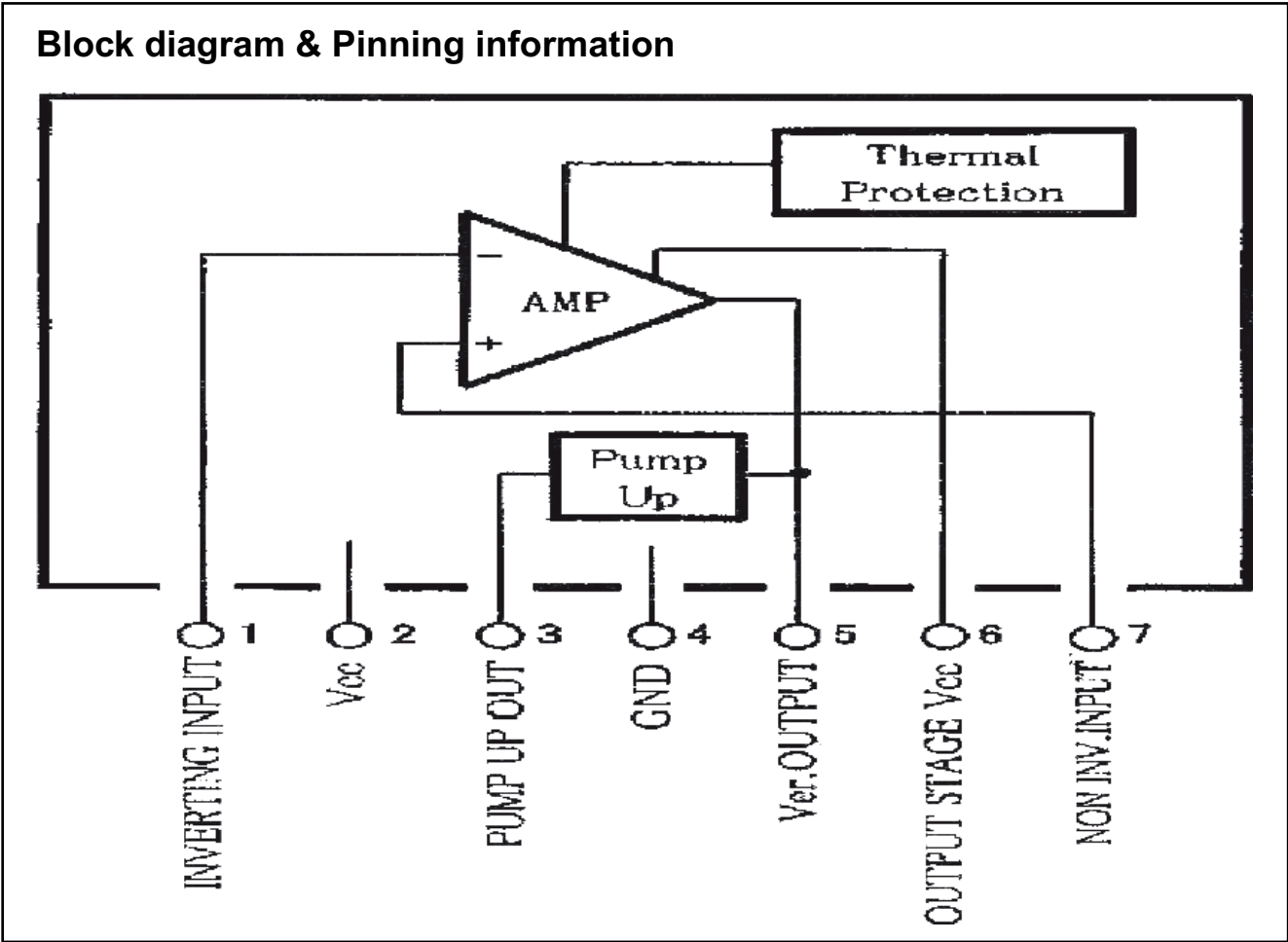
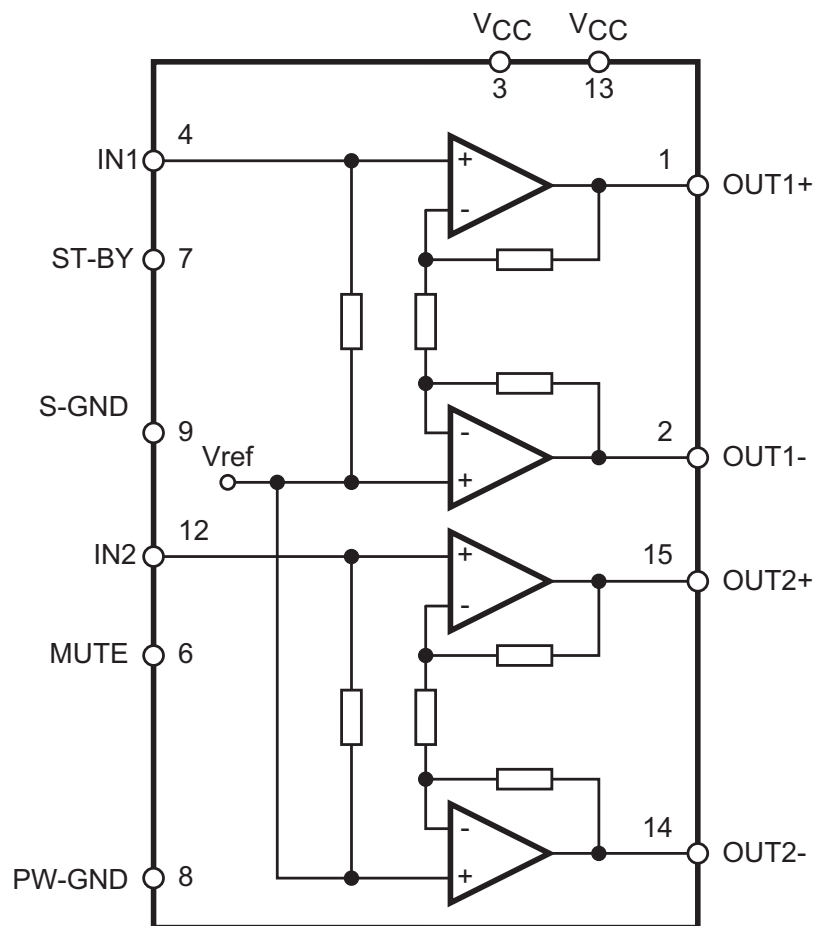


Figure 8-3 Block Diagram and Pin Configuration

8.4 Diagram A5, TDA7266SA (IC401)

Block diagram



Pinning information

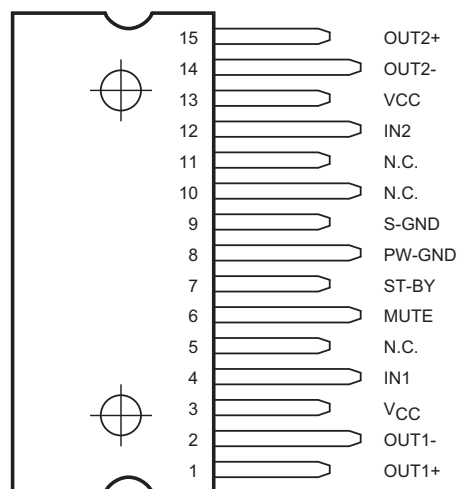
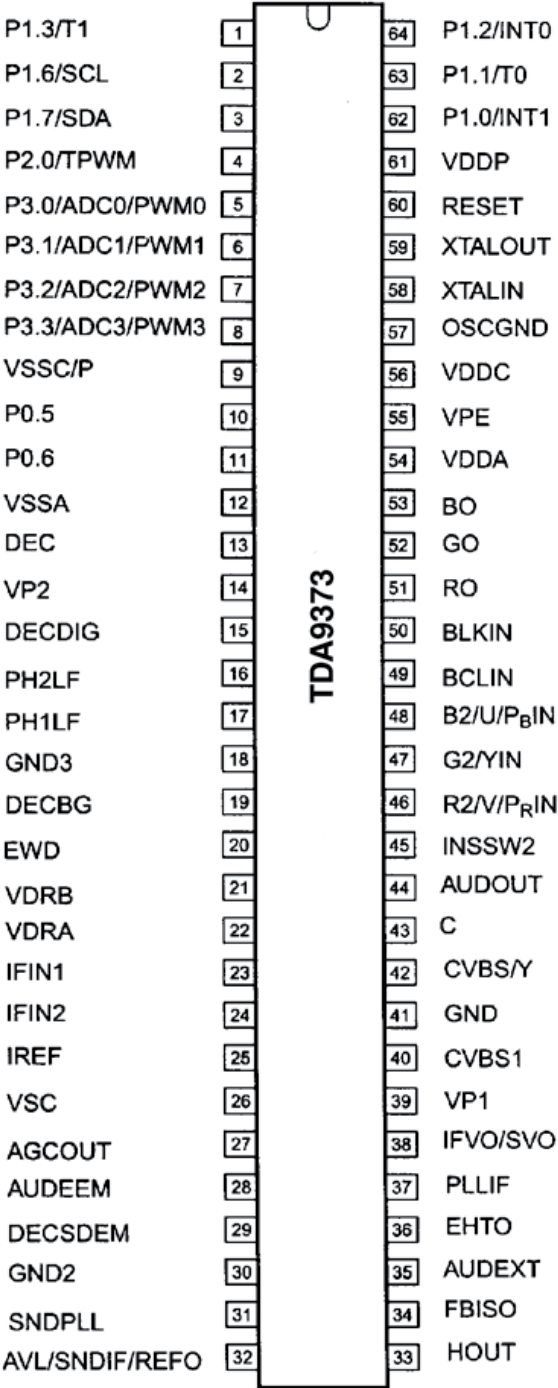
18961_300_100421.eps
100421

Figure 8-4 Block Diagram

Pinning information



L_17880_007.eps
100421

Figure 8-5 Pin Configuration

Pinning information

SYMBOL	PIN	DESCRIPTION
P1.3/T1	1	port 1.3 or Counter/Timer 1 input
P1.6/SCL	2	port 1.6 or I ² C-bus clock line
P1.7/SDA	3	port 1.7 or I ² C-bus data line
P2.0/TPWM	4	port 2.0 or Tuning PWM output
P3.0/ADC0/PWM0	5	port 3.0 or ADC0 input or PWM0 output
P3.1/ADC1/PWM1	6	port 3.1 or ADC1 input or PWM1 output
P3.2/ADC2/PWM2	7	port 3.2 or ADC2 input or PWM2 output
P3.3/ADC3/PWM3	8	port 3.3 or ADC3 input or PWM3 output
VSSC/P	9	digital ground for μ -Controller core and periphery
P0.5	10	port 0.5 (8 mA current sinking capability for direct drive of LEDs)
P0.6	11	port 0.6 (8 mA current sinking capability for direct drive of LEDs)
VSSA	12	digital ground of TV-processor
DEC	13	decoupling
VP2	14	2 nd supply voltage TV-processor (+8V)
DECDIG	15	supply voltage decoupling of digital circuit of TV-processor
PH2LF	16	phase-2 filter
PH1LF	17	phase-1 filter
GND3	18	ground 3 for TV-processor
DECBG	19	bandgap decoupling
EWD	20	E-W drive output
VDRB	21	vertical drive B output
VDRA	22	vertical drive A output
IFIN1	23	IF input 1
IFIN2	24	IF input 2
IREF	25	reference current input
VSC	26	vertical sawtooth capacitor
AGCOUT	27	tuner AGC output
AUDEEM	28	audio deemphasis
DECSDEM	29	decoupling sound demodulator
GND2	30	ground 2 for TV processor
SNDPLL	31	narrow band PLL filter
AVL/REFO/SNDIF ⁽¹⁾	32	Automatic Volume Levelling / subcarrier reference output / sound IF input
HOUT	33	horizontal output
FBISO	34	flyback input/sandcastle output
AUDEXT	35	external audio input
EHTO	36	EHT/overvoltage protection input
PLLIF	37	IF-PLL loop filter
IFVO/SVO	38	IF video output / selected video output

H_17210_030.eps
100421

Figure 8-6 Pin Configuration

Pinning information

SYMBOL	PIN	DESCRIPTION
VP1	39	main supply voltage TV processor
CVBS1	40	internal CVBS input
GND	41	ground for TV processor
CVBS3/Y	42	CVBS3/Y input
C	43	chroma input
AUDOUT	44	audio output
INSSW2	45	2 nd RGB / YUV insertion input
R2/V/P _R IN	46	2 nd R input / V (R-Y) input / P _R input
G2/YIN	47	2 nd G input / Y input
B2/U/P _B IN	48	2 nd B input / U (B-Y) input / P _B input
BCLIN	49	beam current limiter input
BLKIN	50	black current input / V-guard input
RO	51	Red output
GO	52	Green output
BO	53	Blue output
VDDA	54	analog supply of Teletext decoder and digital supply of TV-processor (3.3 V)
VPE	55	OTP Programming Voltage
VDDC	56	digital supply to core (3.3 V)
OSCGND	57	oscillator ground supply
XTALIN	58	crystal oscillator input
XTALOUT	59	crystal oscillator output
RESET	60	reset
VDDP	61	digital supply to periphery (+3.3 V)
P1.0/INT1	62	port 1.0 or external interrupt 1 input
P1.1/T0	63	port 1.1 or Counter/Timer 0 input
P1.2/INT0	64	port 1.2 or external interrupt 0 input

Note

1. The function of this pin is controlled by the CMB1/CMB0 bits in subaddress 22H and the SIF bit in subaddress 28H.

Figure 8-7 Pin Configuration

8.5 Diagram A6, TDA12165 (IC101)

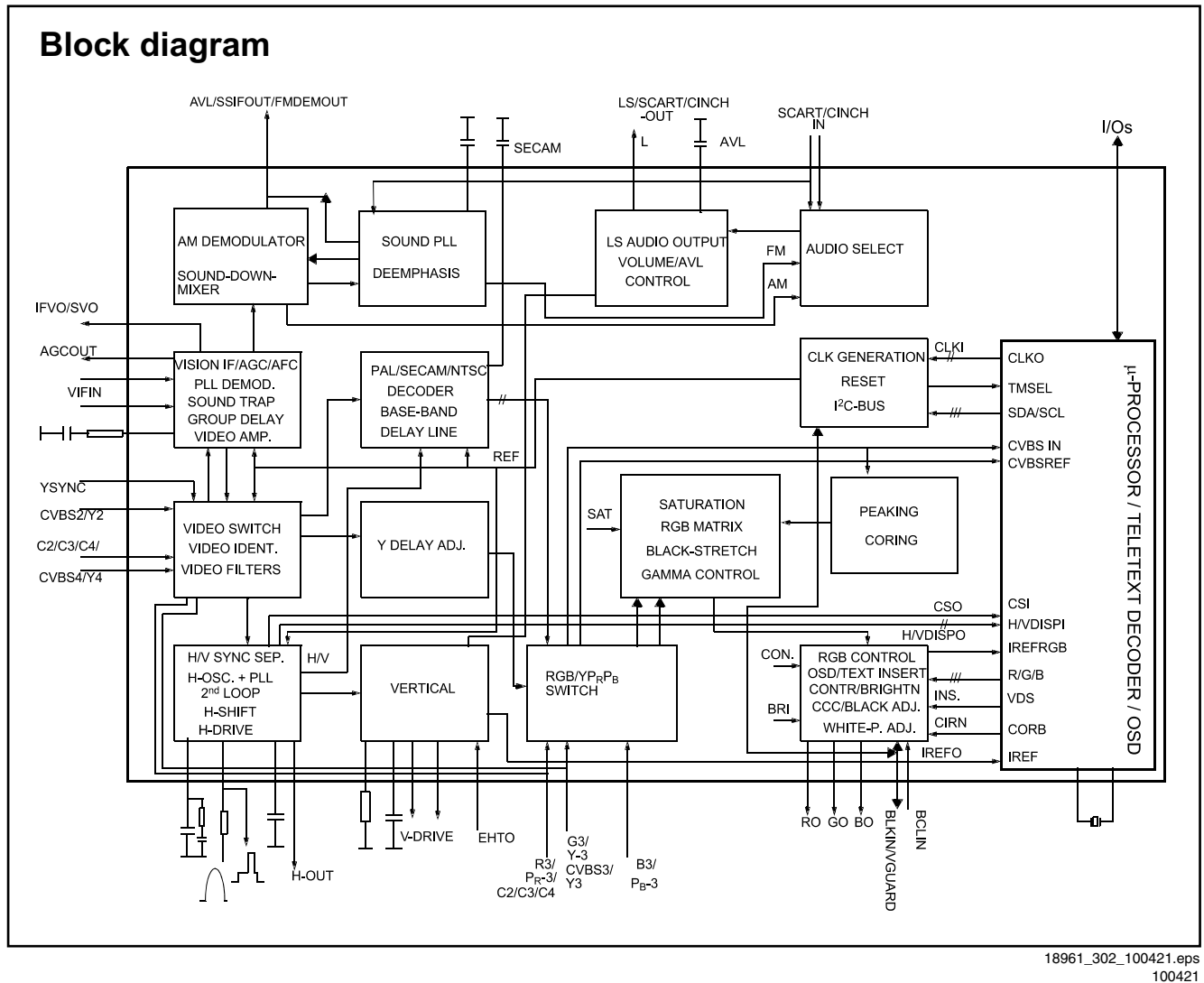
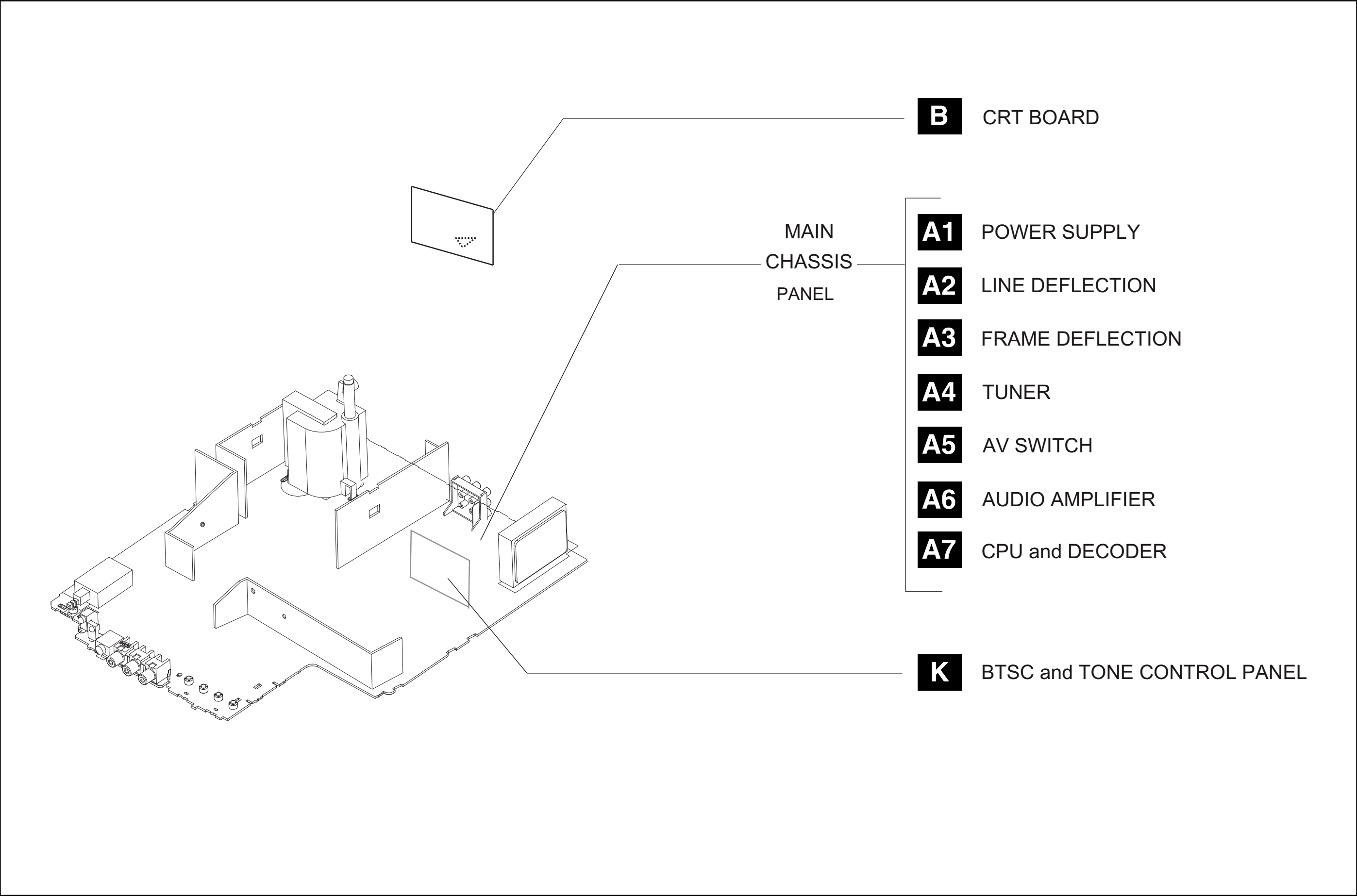


Figure 8-8 Block Diagram

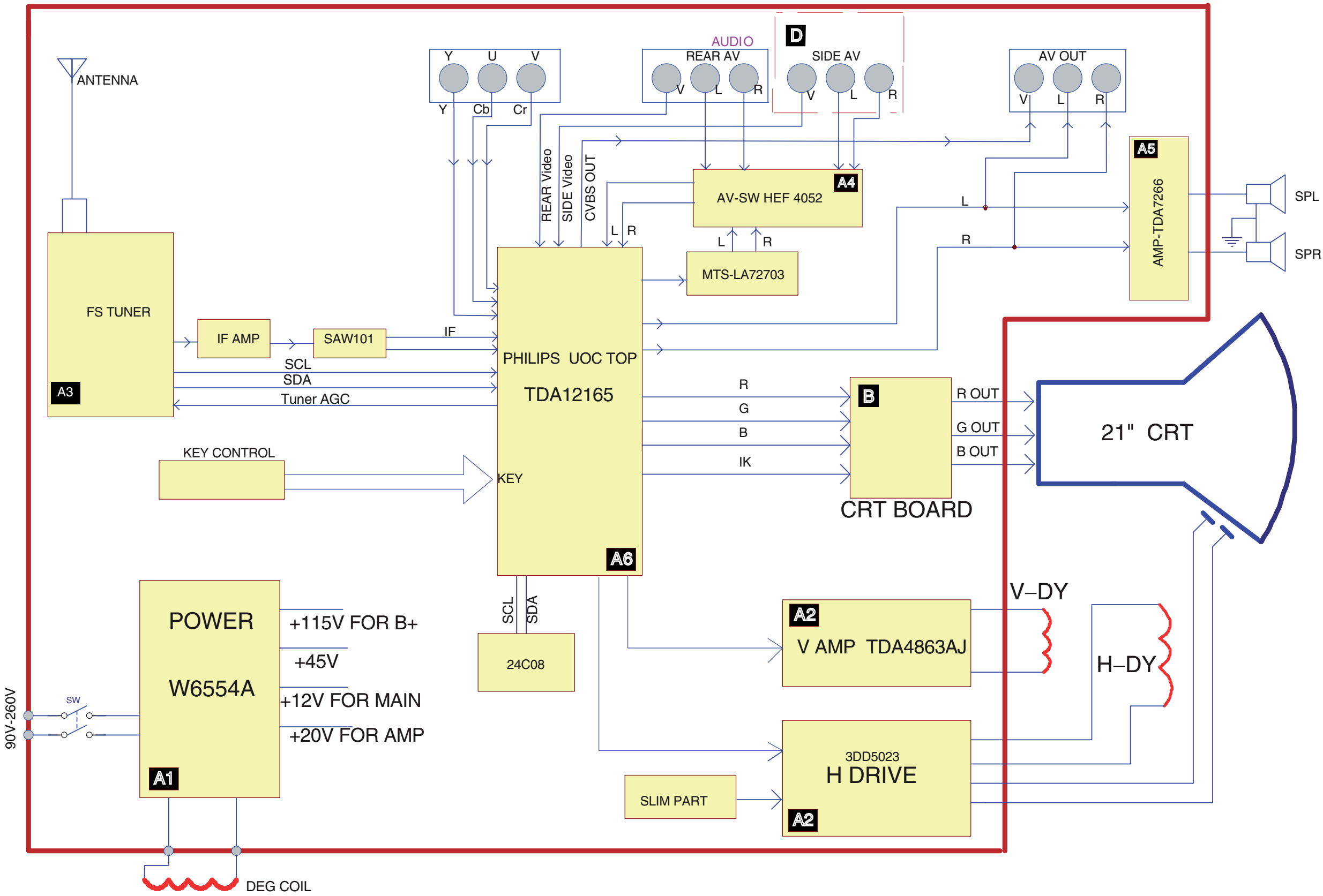
Personal Notes:

9. Block Diagrams

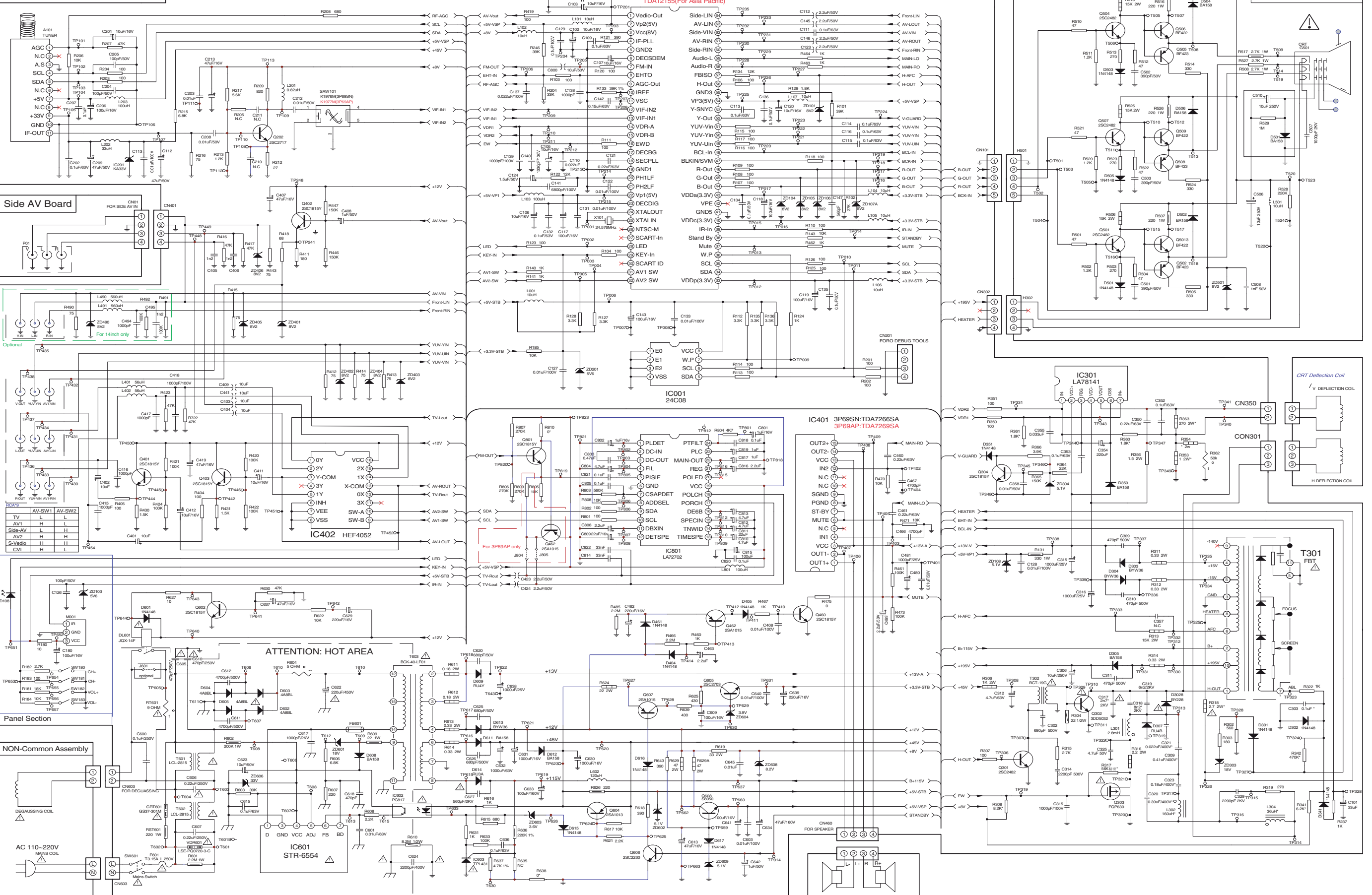
PWB locations



Block Diagram Chassis



Main Board Assembly



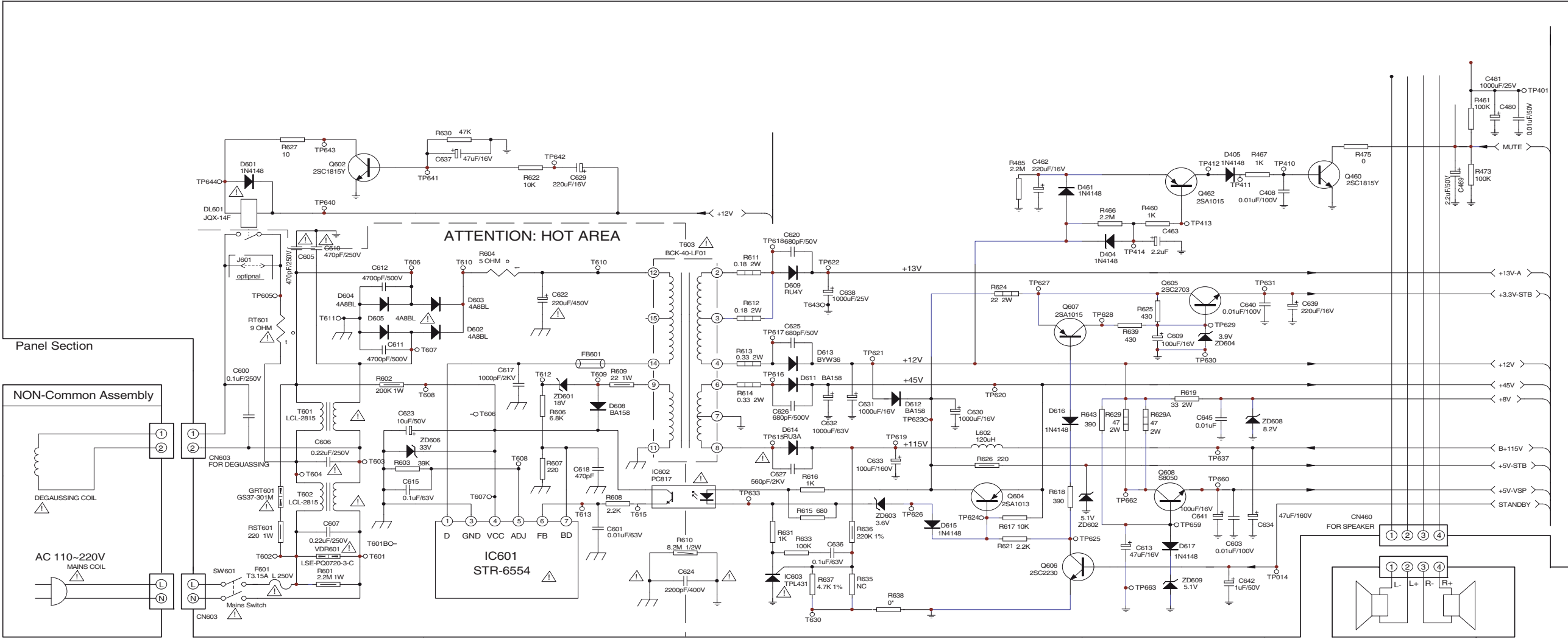
10. Circuit Diagrams and PWB Layouts

21SL9 Mono Carrier: Power Supply

A1

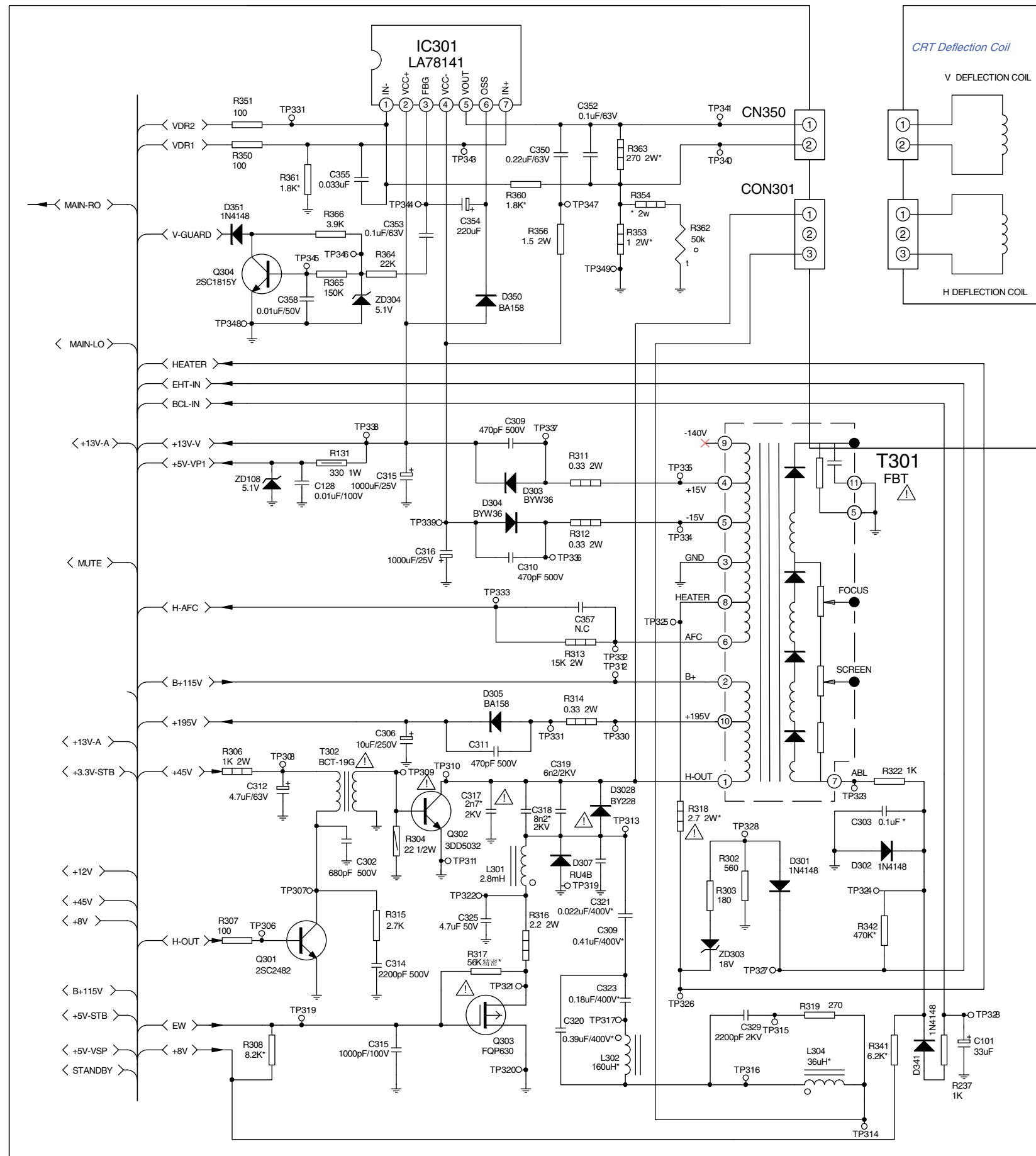
Power Supply

A1



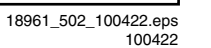
A2

A2



A3 Tuner

A3

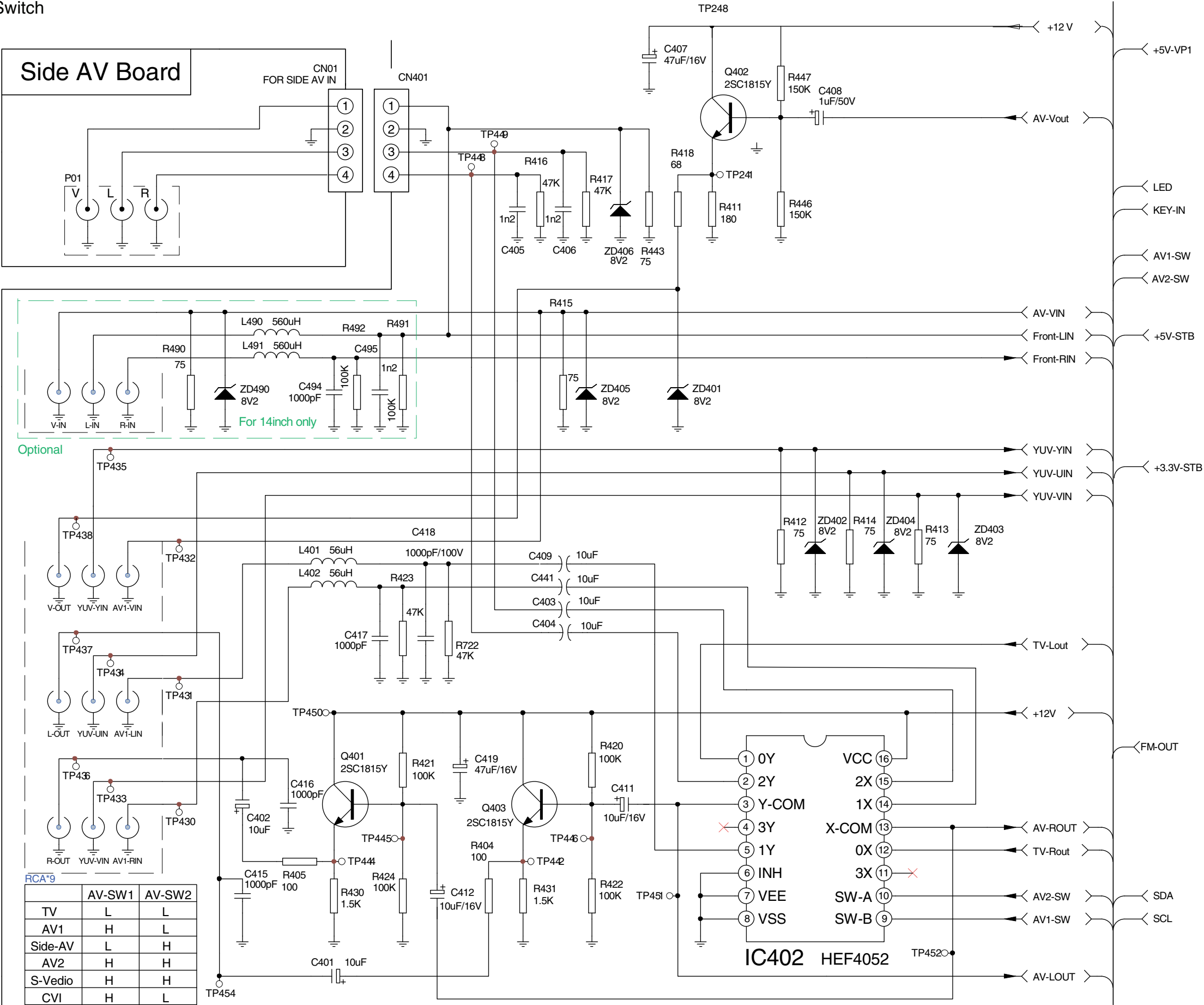


21SL9 Mono Carrier: AV Switch

A4

AV Switch

A4

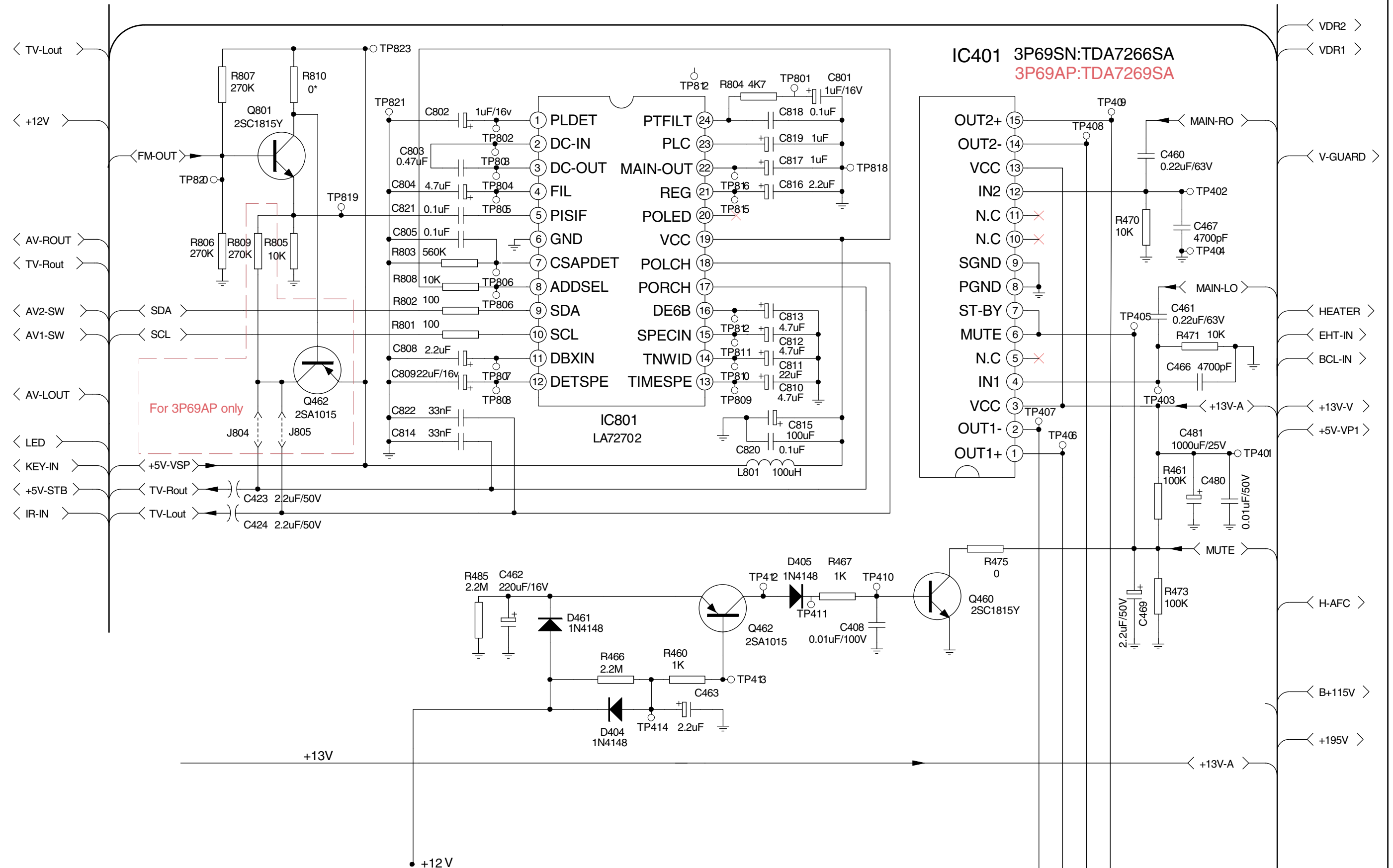


21SL9 Mono Carrier: Audio amplifier

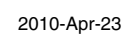
A5

Audio amplifier

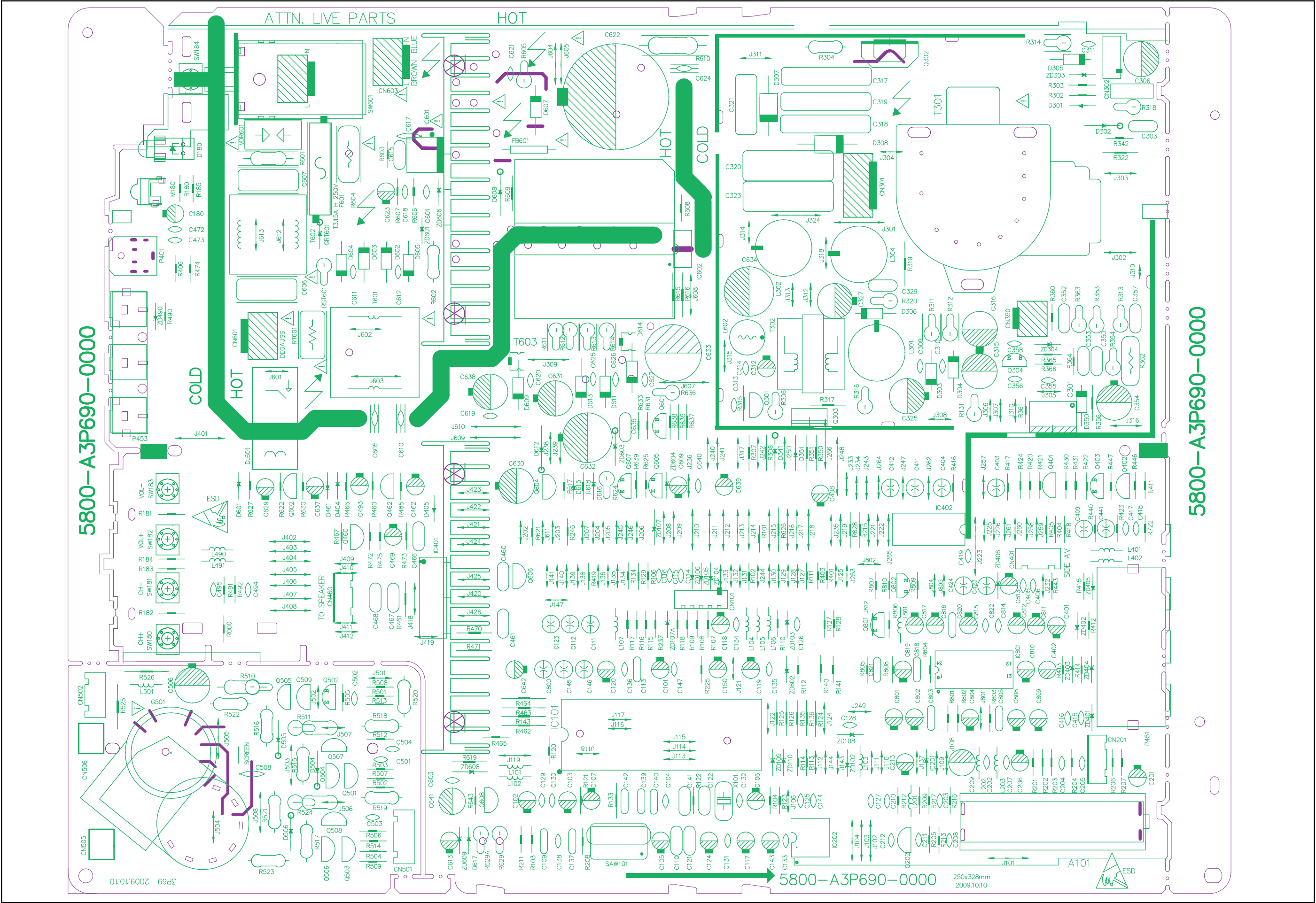
A5



A6



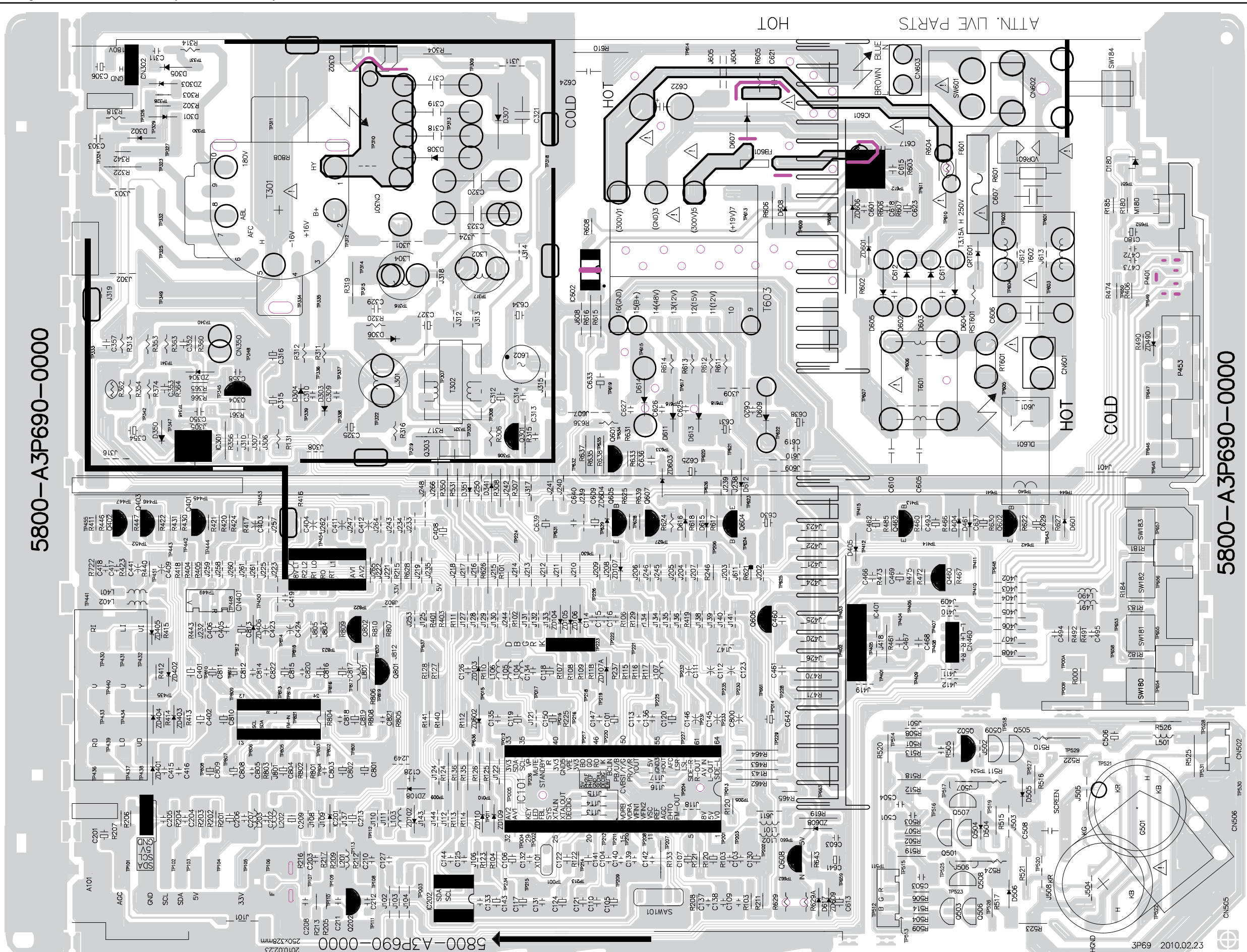
21SL9 Layout Mono Carrier (Top Side)



5800-A3P690-0000

21SL9 Layout Mono Carrier (Bottom Side)

5800-A3P690-0000



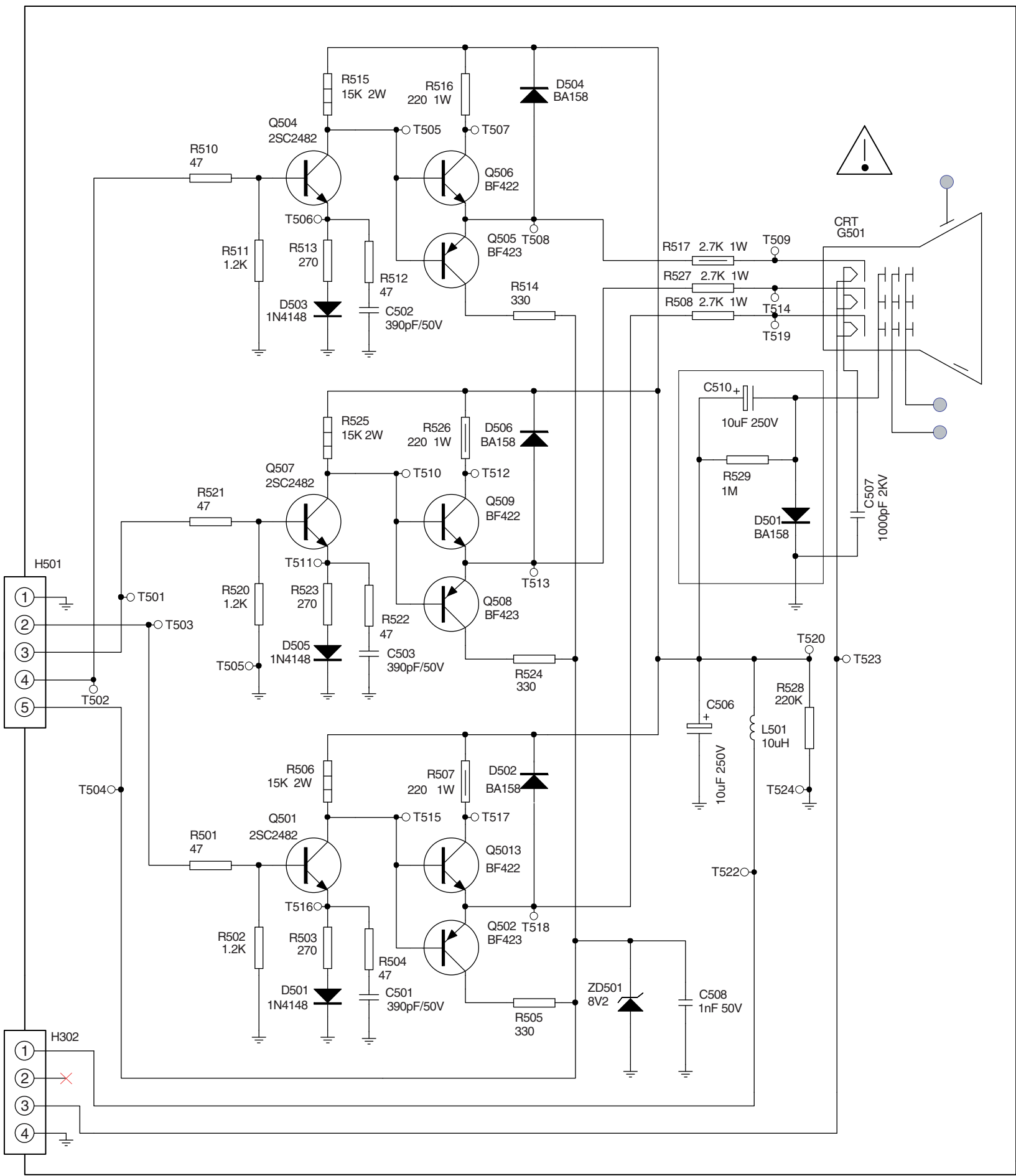
5800-A3P690-0000

CRT Board

B

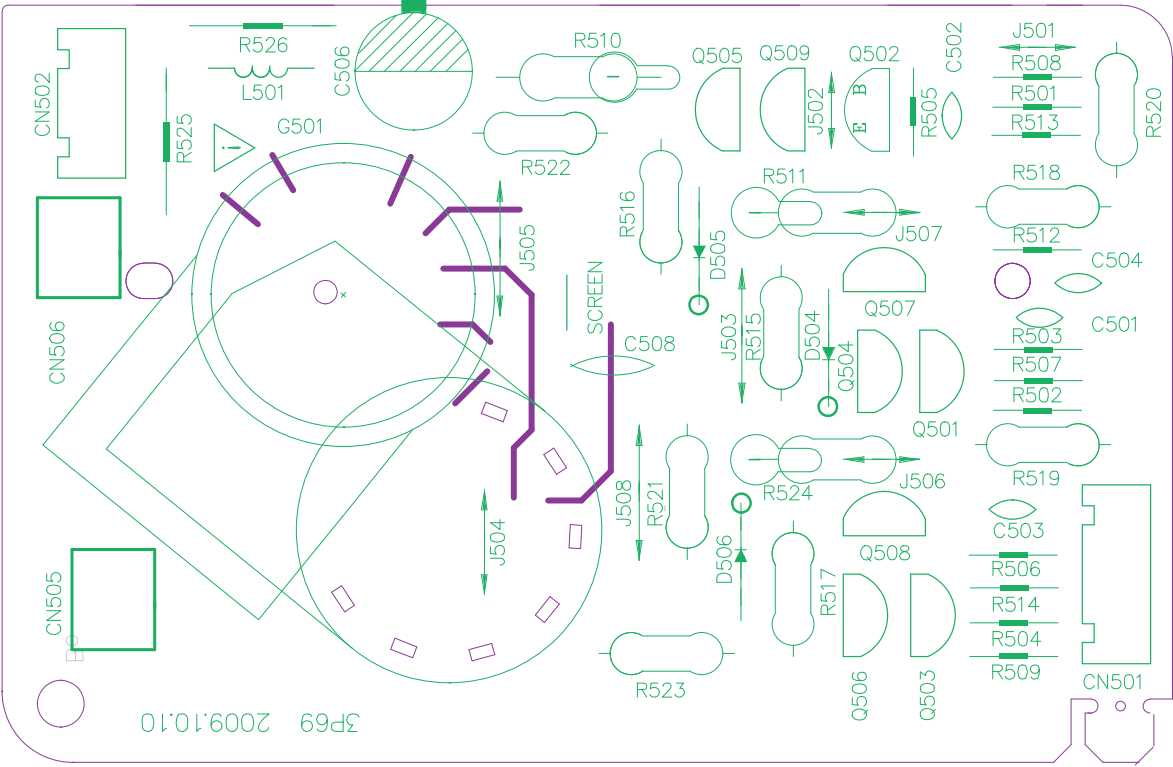
CRT Board

B

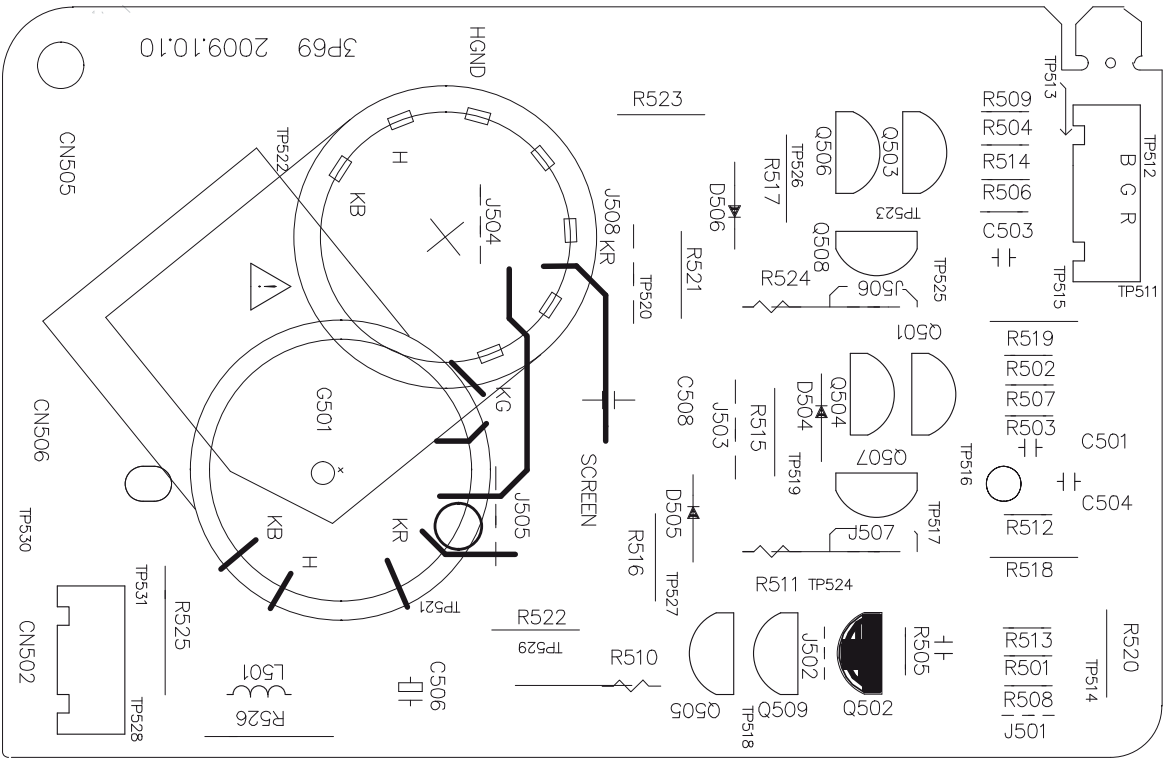


Layout CRT Board

Top Layer



Bottom Layer



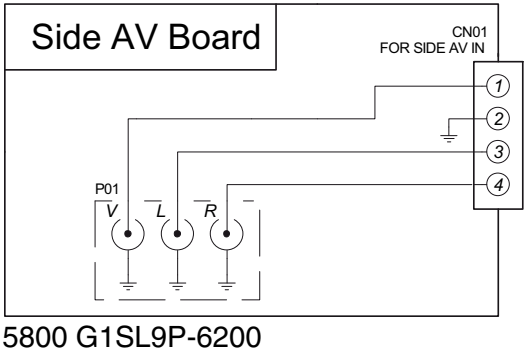
Side AV Panel

D

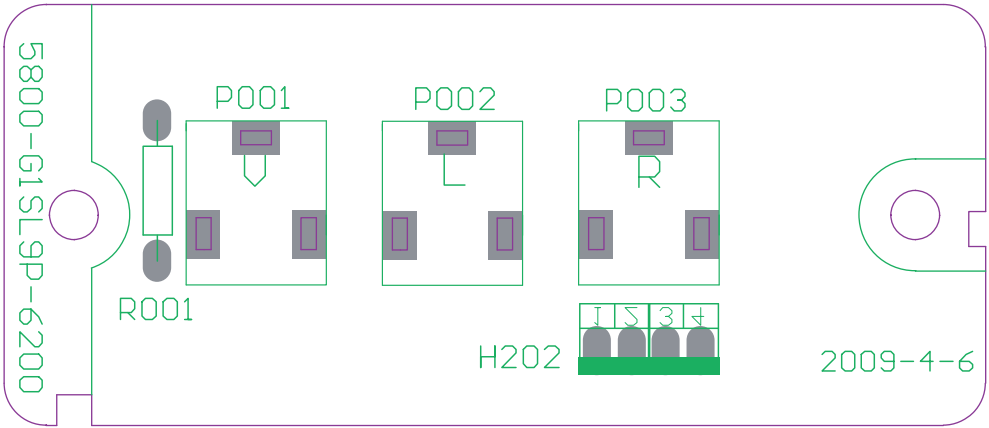
Side AV

D

Schematic



Side AV Panel (Top Layer)



Side AV Panel (Bottom Layer)

