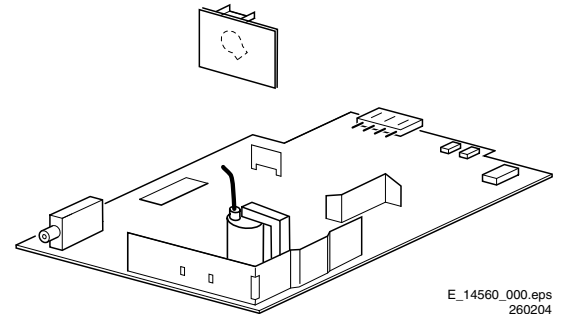


Service
Service
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260204

Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connections
- 1.3 Chassis Overview

1.2.2 Rear Connections

1.1 Technical Specifications

1.1.1 Reception

Tuning system	: PLL
Color systems	: NTSC M
Sound systems	: Mono, or
	: BTSC with SAP
A/V connections	: NTSC M
Channel selections	: 181 Presets/ Channels
	: Full-Cable
IF frequency	: 45.75 MHz
Aerial input	: 75 ohm (F type), Coax

1.1.2 Miscellaneous

Audio output	: Mono: 1 Wrms
	: Stereo: 2 x 1 Wrms
Mains voltage	: 105 - 132 V (± 10 %)
Mains frequency	: 50 / 60 Hz (± 5 %)
Ambient temperature	: + 5 to + 45 deg. C
Minimum air pressure	: 60 kPa (=600 mBar)
Maximum humidity	: 90 %
Power consumption	: 36 W (13") to
	: 50 W (20")
Standby Power consumption	: < 3 W

1.2 Connections

1.2.1 Front Connections

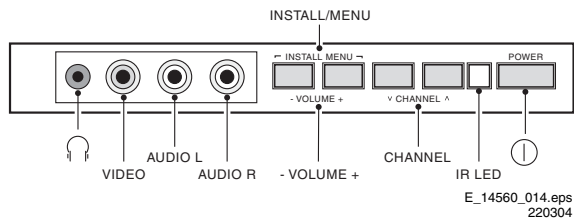


Figure 1-1 Front Connections

Headphone

Bk - Headphone,
3.5 mm 8 - 600 Ω / 4 mW



Audio / Video In

Ye - Video 1 Vpp / 75 ohm
Wh - Audio L 0.2 Vrms / 10 kohm
Rd - Audio R 0.2 Vrms / 10 kohm



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260204

Figure 1-2 Rear Connections

FM Ant

1 - F type 75 ohm, coax



1.3 Chassis Overview

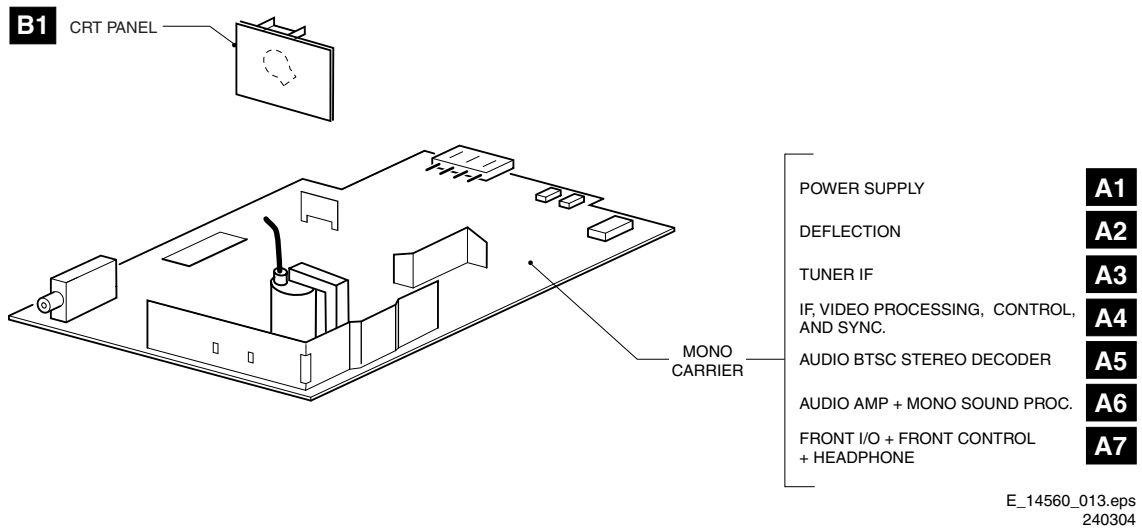


Figure 1-3 Chassis overview

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Maintenance Instructions
- 2.3 Warnings
- 2.4 Notes

2.1 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 Mohm and 12 Mohm.
 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.

2.2 Maintenance Instructions

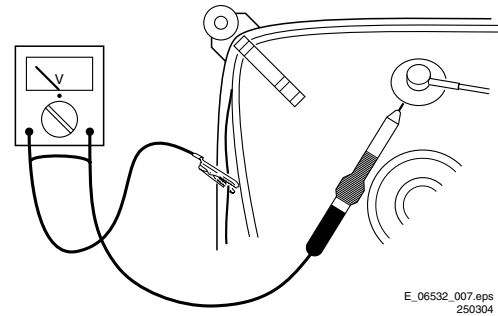
We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- 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.

2.3 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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250304

Figure 2-1 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. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the 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.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (\perp), or hot ground (\downarrow), 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 \square and without ∇ aerial signal. Measure the voltages in the power supply section both in normal operation ($\textcircled{1}$) and in stand-by ($\textcircled{2}$). 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.

2.4.2 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 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- 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 in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Rework on BGA (Ball Grid Array) ICs

General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device Removal

As is the case with any component that is being removed, it is essential when removing an (LF)BGA, that the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the risk of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.

Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.

After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.

Note: Do not apply solder paste, as this has been shown to result in problems during re-soldering.

Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage neighboring components, it may be necessary to reduce some temperatures and times.

More Information

For more information on how to handle BGA devices, visit this URL: www.atyourservice.ce.philips.com (needs subscription, not available for all regions). After login, select "Magazine", then go to "Repair downloads". Here you will find Information on how to deal with BGA-ICs.

2.4.4 Lead-free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).



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Figure 2-2 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.

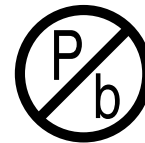


Figure 2-3 Lead-free logo

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 clean the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-) pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
Do not re-use BGAs at all!

- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:

- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions)

You will find this and more technical information within the "Magazine", chapter "Repair downloads".

For additional questions please contact your local repair help desk.

2.4.5 Alternative BOM identification

In September 2003, Philips CE introduced a change in the way the serial number (or production number, see Figure 2-2) is composed. From this date on, the **third digit** in the serial number (example: AG2B033500001) indicates the number of the alternative BOM (Bill of Materials used for producing the specific model of TV set). 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 O.E.M.s.

By looking at the third digit of the serial number, the service technician can see if there is more than one type of B.O.M. used in the production of the TV set he is working with. He can then consult the At Your Service Web site, where he can type in the Commercial Type Version Number of the TV set (e.g. 28PW9515/12), after which a screen will appear that gives information about the number of alternative B.O.M.s used. If the third digit of the serial number contains the number 1 (example: AG1B033500001), then there is only one B.O.M. version of the TV set on the market. If the third digit is a 2 (example: AG2B033500001), then there are two different B.O.M.s. **Information about 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.

2.4.6 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. Directions for Use

You can download this information from the following websites:

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

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

4. Mechanical Instructions

Index of this chapter:

- 4.1 Rear Cover Removal
- 4.2 Service Position Main Panel
- 4.3 Rear Cover Mounting

4.1 Rear Cover Removal

1. Remove all fixation screws of the rear cover.
2. Now pull the rear cover in backward direction to remove it.

4.2 Service Position Main Panel

1. Disconnect the strain relief of the AC power cord.
2. Remove the main panel, by pushing the two center clips outward [1]. At the same time pull the panel away from the CRT [2].
3. If necessary, disconnect the degaussing coil by removing the cable from the (red) connector 0212.
4. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.

4.3 Rear Cover Mounting

Before you mount the rear cover, perform the following checks:

1. Check whether the mains cord is mounted correctly in its guiding brackets.
2. Re-place the strain relief of the AC power cord into the cabinet.
3. Check whether all cables are replaced in their original position

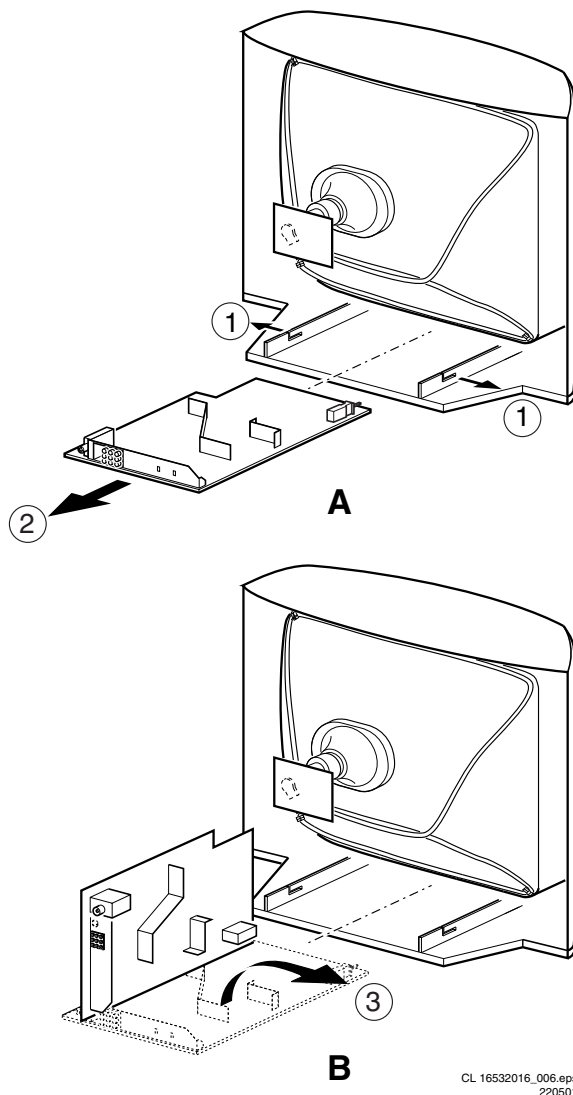


Figure 4-1 Service Position

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Problems and Solving Tips
- 5.4 Service Tools
- 5.5 Error Codes
- 5.6 Protections
- 5.7 Repair Tips

5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or lxxx. On the PCB, test points are specifically mentioned in the service manual as “half moons” with a dot in the center.

Table 5-1 Test Point Overview

TEST POINT	CIRCUIT	DIAGRAM
P1,P2,P3,P4,P5	POWER SUPPLY	A1
D1,D2,D3,D4,D5,D6,D7,D8,D9,D10	Deflection	A2
T1	TUNER & IF	A3
V1,V2,V3,V4,V5,V6,V7,V8,V9,V10,V11	VIDEO PROCESSING	A4
A1,A2,A3,A4,A5	AUDIO PROCESSING	A5
A7,A8,A9,A10,A11	AUDIO AMPLIFIER + MONO SOUND PROCESSING	A6
F1	FRONT IO + FRONT CONTROL + HEADPHONE	A7
V12,V13,V14,V15,V16,V17	CRT PANEL	B1

Perform measurements under the following conditions:

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

5.2 Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all chassis.

Requirements: To run ComPair on a computer (laptop or desktop) requires, as a minimum, a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are however preferred (see also paragraph 5.4).

Table 5-2 SW Cluster

SW Cluster	Software name	UOC type	UOC Diversity	Special Features
L3SUM1	L03UM1 x.y	TDA9377	55K ROM Size	Mono
L3SUN1	L03UN1 x.y	TDA9377	55K ROM Size	Stereo (non DBX)

Abbreviations in Software name:
U = Nafta, M = Mono, N = Stereo.

5.2.1 Service Default Alignment Mode (SDAM)

Purpose

- To change option settings.
- To create a predefined setting to get the same measurement results as given in this manual.
- To display / clear the error code buffer.
- To override SW protections.
- To perform alignments.

Specifications

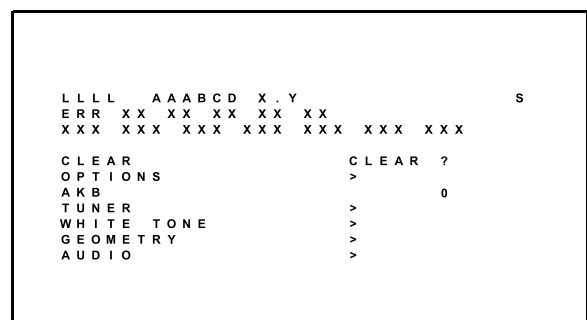
- Tuning frequency: 61.25 MHz (channel 3) for NTSC-sets (Nafta).
- Color system: NTSC-M.
- All picture settings at 50 % (brightness, color contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
 - (Sleep) timer,
 - Child/parental lock,
 - Blue mute,
 - Hotel/hospitality mode
 - Auto switch-off (when no “IDENT” video signal is received for 15 minutes),
 - Skip / blank of non-favorite presets / channels,
 - Auto store of personal presets,
 - Auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to Enter SDAM

Use one of the following methods:

- Use a standard customer RC-transmitter and key in the code 062596 directly followed by the “M” (menu) button or
- Short jumper wires 9625 and pin 4 of 7200 on the mono carrier (see Fig. 8-1) and apply AC power. Then press the power button (remove the short after start-up).
- Caution: Entering SDAM by shorten wires 9625 and pin 4 of 7200 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could lead to damaging the set.
- Or via ComPair.

After entering SDAM, the following screen is visible, with S at the upper right side for recognition.



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130603

Figure 5-1 SDAM Menu

- **LLLL.** This is the operation hours counter. It counts the normal operation hours, not the standby hours.

- **AAABCD-X.Y.** This is the software identification of the main micro controller:
 - A = the project name (L03).
 - B = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
 - C = the feature of software diversity: N = stereo non-DBX, S = stereo dBx, M = mono, D = DVD
 - D = the language cluster number:
 - X = the main software version number.
 - Y = the sub software version number.
- **S.** Indication of the actual mode. S= SDAM= Service Default Alignment mode.
- **Error buffers.** Five errors possible.
- **Option bytes.** Seven codes possible.
- **Clear.** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
- **Options.** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
- **AKB.** Disable (0) or enable (1) the “black current loop” (AKB = Auto Kine Bias).
- **Tuner.** To align the Tuner. See chapter 8.3.2 for a detailed description.
- **White Tone.** To align the White Tone. See chapter 8.3.3 for a detailed description.
- **Geometry.** To align the set geometry. See chapter 8.3.4 for a detailed description.
- **Audio. Use default value (Stereo set only),** align when necessary. See chapter 8.3.x for a detailed description.

How to Navigate

- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control 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:
 - Activate the selected menu item.
 - Change the value of the selected menu item.
 - Activate the selected submenu.
- When you press the MENU button twice, the set will switch to the normal user menus (with the SDAM mode still active in the background). To return to the SDAM menu press the OSD / STATUS button.
- When you press the MENU key in a submenu, you will return to the previous menu.

How to Store Settings

To store settings, leave the SDAM mode with the Standby button on the remote.

How to Exit

Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied). The error buffer is **not** cleared.

5.3 Problems and Solving Tips

5.3.1 Picture Problems

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described.

No Colors / Noise in Picture

1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Colors not Correct / Unstable Picture

1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Picture too Dark or too Bright

Increase / decrease the BRIGHTNESS and / or the CONTRAST value when:

- The picture improves after you have pressed the “Smart Picture” button on the remote control.
 - The picture improves after you have switched on the Customer Service Mode
- The new “Personal” preference value is automatically stored.

White Line around Picture Elements and Text

Decrease the SHARPNESS value when:

- The picture improves after you have pressed the “Smart Picture” button on the remote control.
- The new “Personal” preference value is automatically stored.

Snowy Picture

- No or bad antenna signal. Connect a proper antenna signal.
- Antenna not connected. Connect the antenna.
- No channel / pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace / repair if necessary.

Snowy Picture And/or Unstable Picture

- A scrambled or decoded signal is received.

Black and White Picture

Increase the COLOR value when:

- The picture improves after you have pressed the “Smart Picture” button on the remote control.
- The new “Personal” preference value is automatically stored.

Menu Text not Sharp Enough

Decrease the CONTRAST value when:

- The picture improves after you have pressed the “Smart Picture” button on the remote control.
- The new “Personal” preference value is automatically stored.

5.3.2 Sound Problems

No Sound or Sound too Loud (after Channel Change / Switching On)

Increase / decrease the VOLUME level.

Press the Smart Sound button repeatedly to access 4 different types of sound settings and choose your desired setting.

5.4 Service Tools

5.4.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
2. ComPair allows very detailed diagnostics (on I²C level) and is therefore capable of accurately indicating problem areas.

You do not have to know anything about I²C commands yourself because ComPair takes care of this.

- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS-232) cable.

For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- Automatically (by communicating with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I²C/UART level. ComPair can access the I²C/UART bus of the television. ComPair can send and receive I²C/UART commands to the microcontroller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I²C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the microcontroller of the television is working correctly and only to a certain extent. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. *text or a waveform picture*) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

How to Connect

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

Caution: It is compulsory to connect the TV to the PC as shown in the picture below (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!

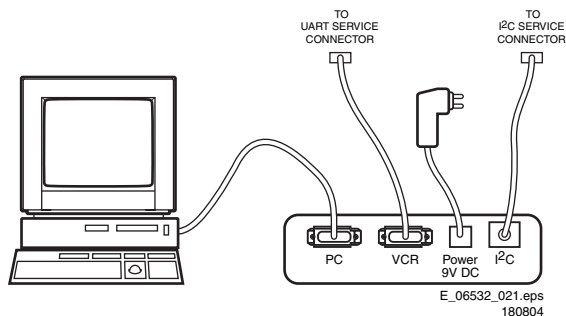


Figure 5-2 ComPair interface connection

How to Order

ComPair order codes (US):

- ComPair Software: ST4191.

- ComPair Interface Box: 4822 727 21631.
- AC Adapter: T405-ND.
- ComPair Quick Start Guide: ST4190.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

Note: If you encounter any problems, contact your local support desk.

5.5 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. These 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).

Table 5-3 Error Code Table

ERROR	Device	Error description	Check item	Diagram
0	Not applicable	No Error	-	-
1	Not applicable	X-Ray Protection (USA)	7421, 2423, 6421, 6422	A2
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	TDA9853H	Tone control & Audio processor I2C identification error	7861 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	-	-
9	M24C16	NVM I2C identification error	7641, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7318, CRT	B1
12	Not applicable	MAP I2C identification error (USA)	-	-
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-

5.6 Protections

If a fault situation is detected an error code will be generated and if necessary the set will be put in the protection mode.

Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SDAM) or via ComPair.

To get a quick diagnosis the chassis has one service modes implemented:

- The Service Default Alignment Mode (SDAM). Start-up of the set in a predefined way and adjustment of the set via a menu and with the help of test patterns.

5.7 Repair Tips

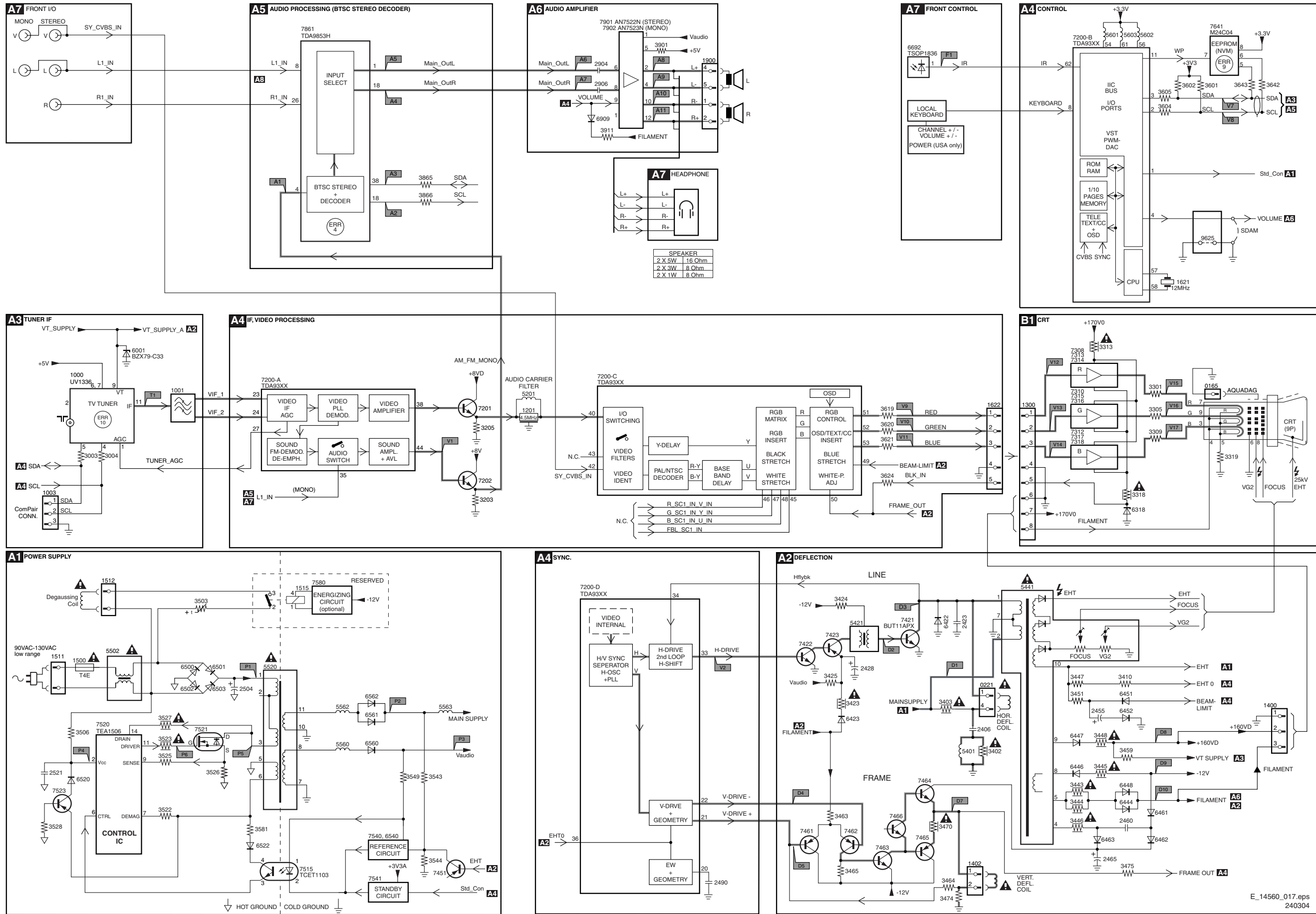
Below some failure symptoms are given, followed by a repair tip.

- **Set is dead and makes hiccupping sound.** "Main Supply" is available. Hiccupping stops when de-soldering L5563, meaning that problem is in the "Main Supply" line. No output voltages at LOT, no horizontal deflection. Reason: line transistor 7421 is defective.
- **Set is dead, and makes no sound.** Check power supply IC 7520. Result: voltage at pins 2, 6, 7, 9 and 11 are about 180 V and pin 14 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 11) has an open load. That is why MOSFET 7521 is not able to switch. Reason: feedback resistor 3523 is defective. **Caution:** be careful measuring on the gate of 7521; circuitry is very high ohmic and can easily be damaged!
- **Set is in hiccup mode and shuts down after 8 s.** **Blinking LED (set in SDM mode) indicates error 5.** As it is unlikely that the "POR" and "+8V protection" happen at the same time, measure the "+8V". If this voltage is missing, check transistor 7491 & 7496.

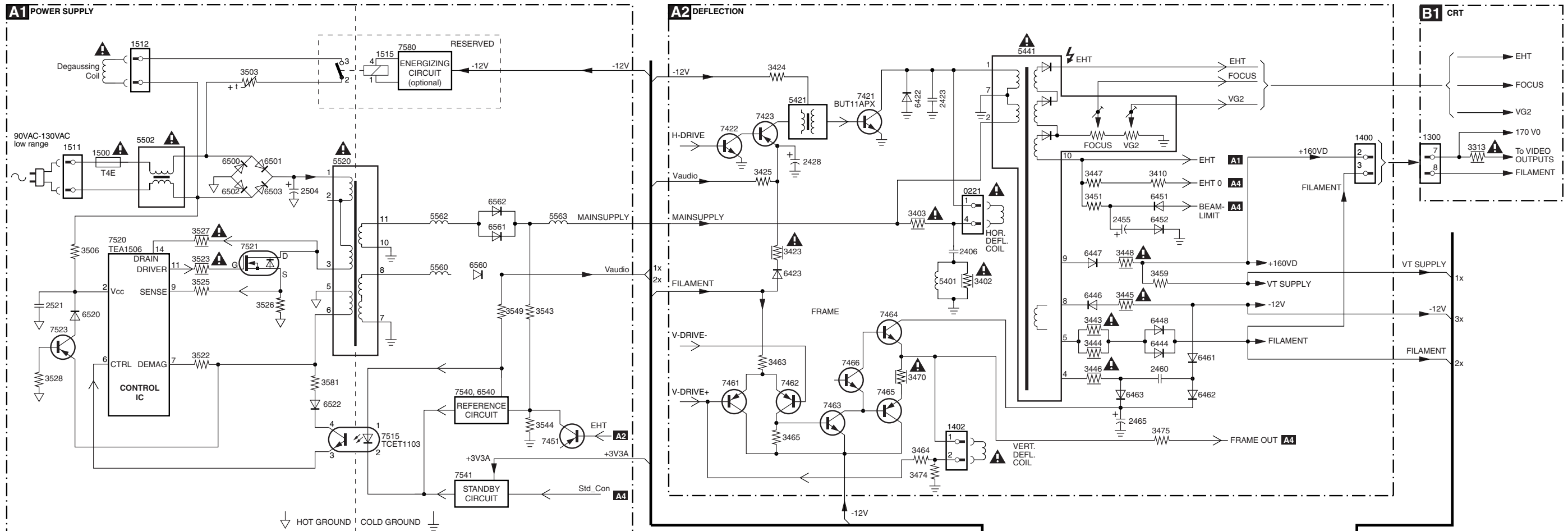
- **Set is non-stop in hiccup mode.** Set is in over current mode; check the secondary sensing (opto coupler 7515) and the "Main Supply" voltage. Signal "Stdby_con" must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound.** The screen shows snow, but OSD and other menus are okay. **Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000).** Check presence of supply voltages. As "Vlotaux+5V" at pin 5 and 7 are okay, "VT_supply" at pin 9 is missing. Conclusion: resistor 3449 & 3450 are defective

6. Block Diagrams, Test Point Overviews, and Waveforms

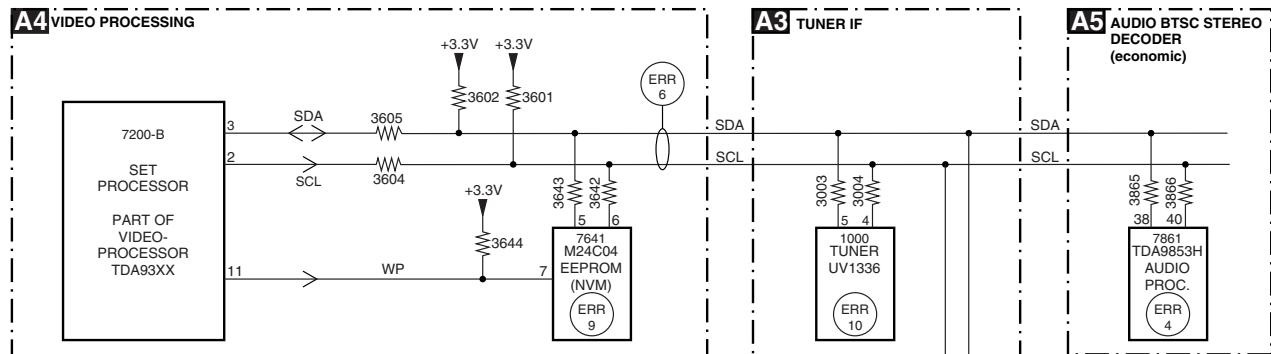
Block Diagram



I²C and Supply Voltage Overview

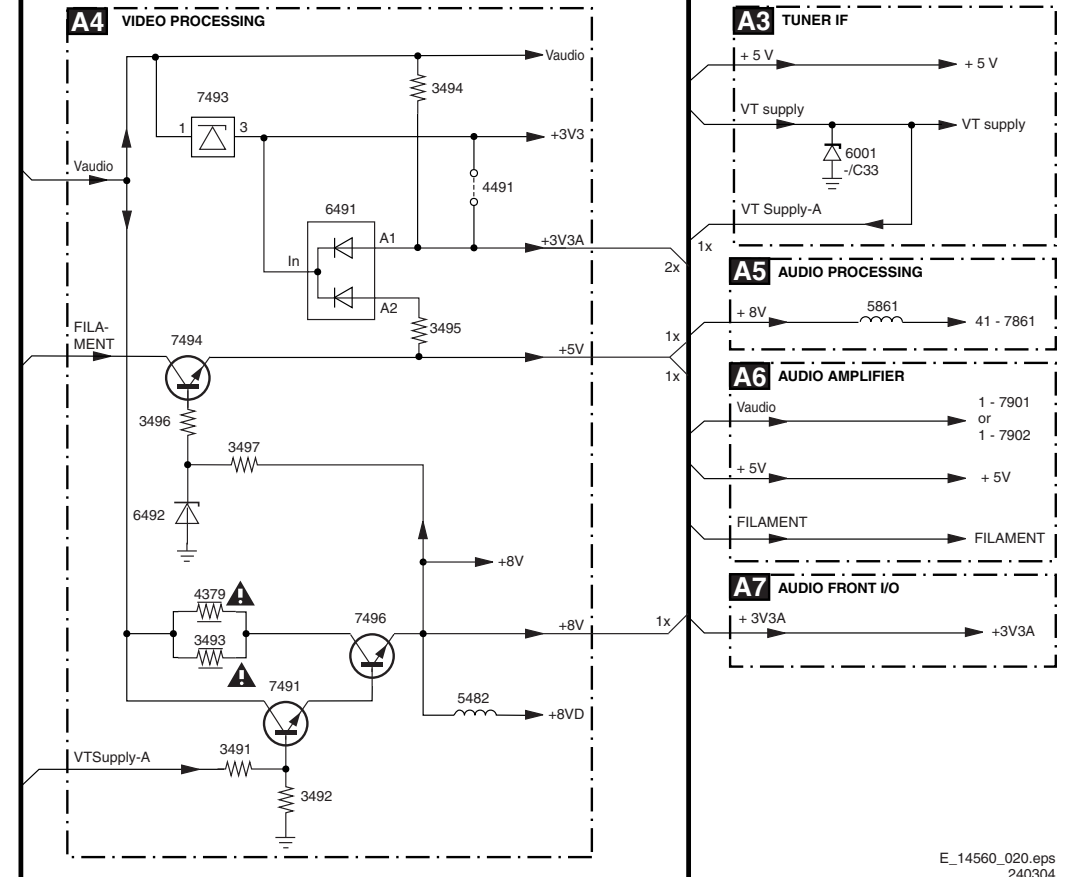


I²C BUS INTERCONNECTION DIAGRAM



ERROR CODE LIST

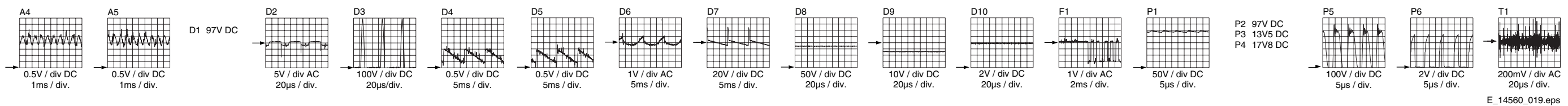
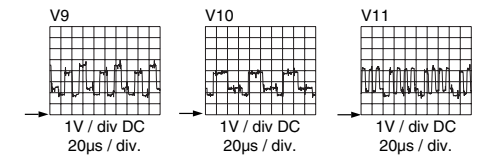
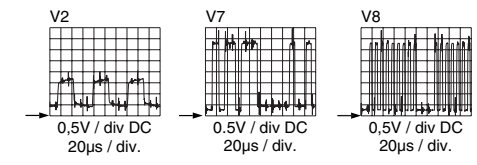
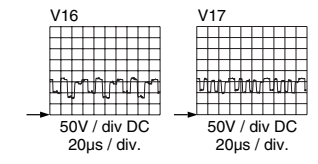
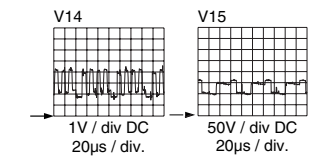
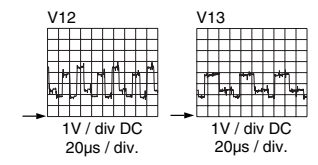
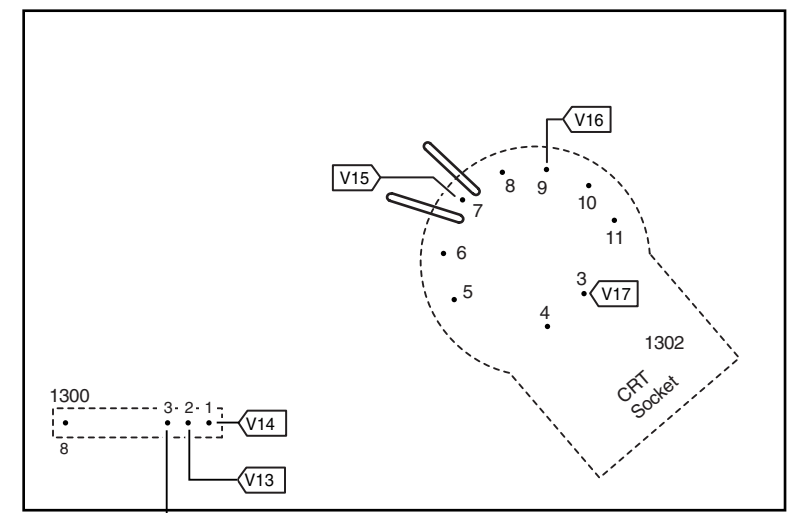
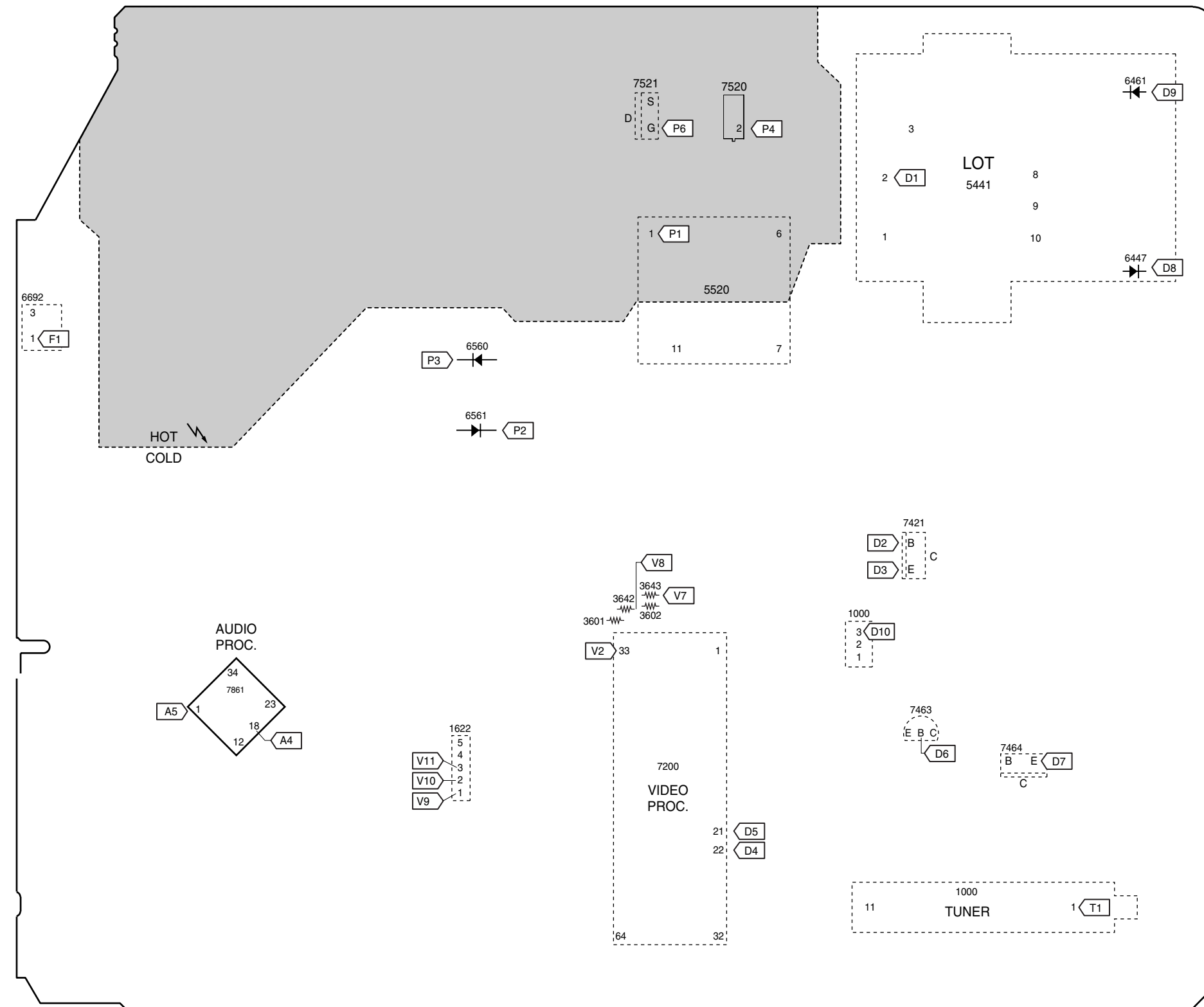
Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error	-	-
1	Not applicable	X-Ray Protection (USA)	7421, 2423, 6421, 6422	A2
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	TDA9853H	Tone control & Audio processor I2C identification error	7861 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	-	-
9	M24C16	NVM I2C identification error	7641, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7318, CRT	B1
12	Not applicable	MAP I2C identification error (USA)	-	-
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-



Testpoint Overview Mono Carrier and CRT Panel

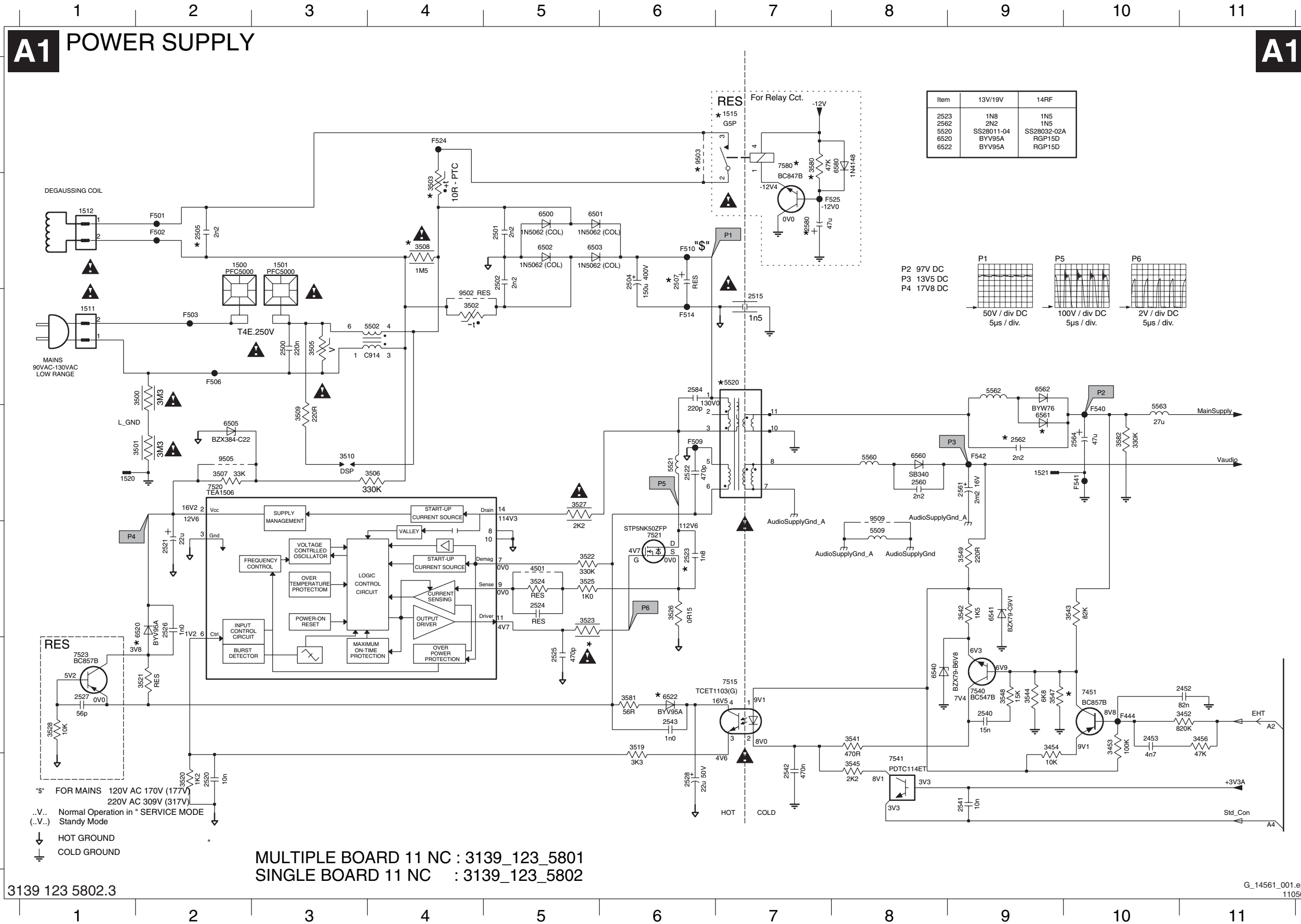
MONO CARRIER TRACK SIDE VIEW

CRT TRACK SIDE VIEW



7. Circuit Diagrams and PWB Layouts

Mono Carrier: Power Supply



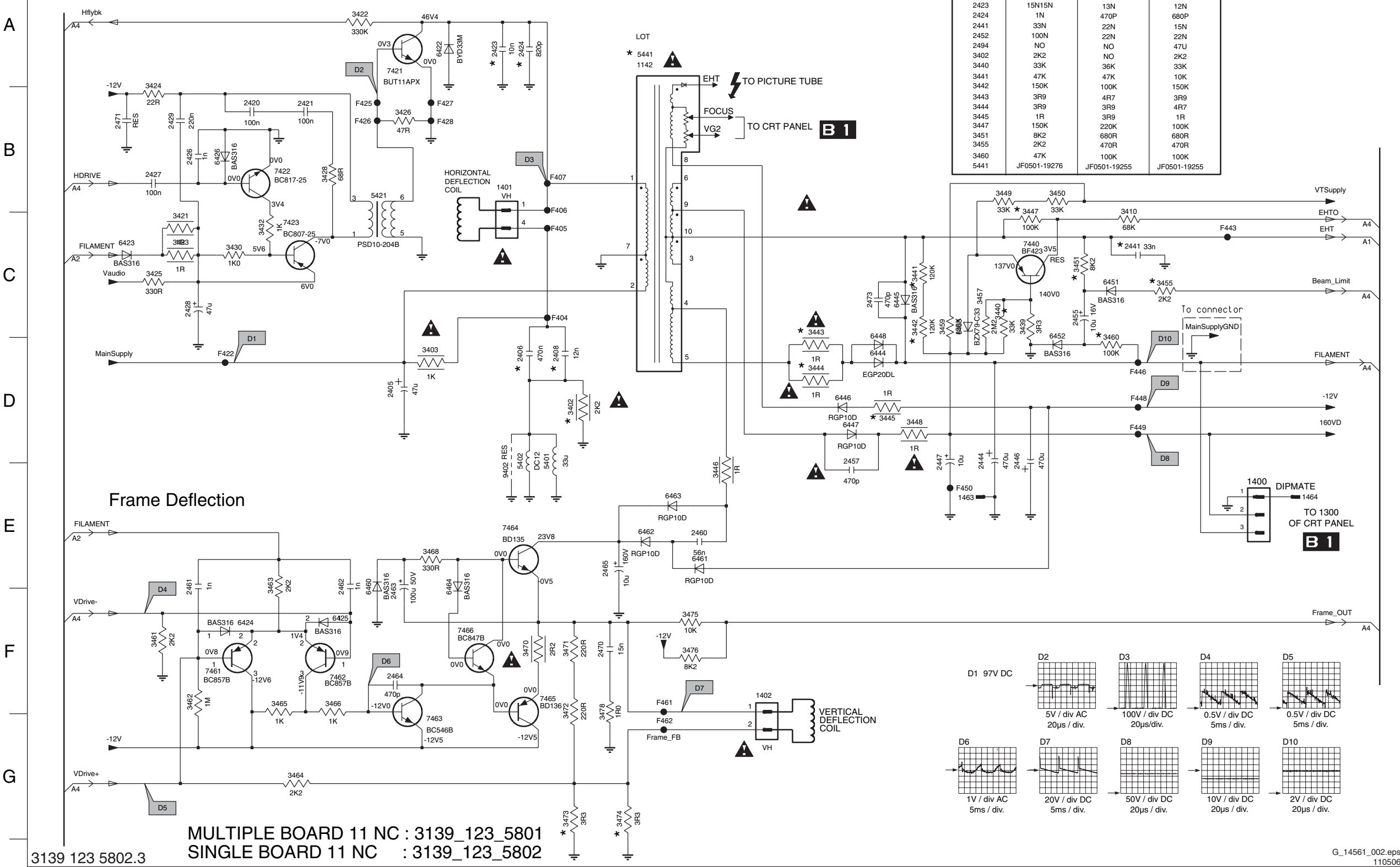
- 1500 B2
- 1501 B3
- 1511 C1
- 1512 B1
- 1515 A7
- 1520 D1
- 1521 D9
- 2452 F11
- 2453 F10
- 2500 C3
- 2501 B5
- 2502 B5
- 2504 B6
- 2505 B2
- 2507 B6
- 2515 C7
- 2520 G2
- 2521 E2
- 2522 D6
- 2523 E6
- 2524 E5
- 2525 F5
- 2526 E2
- 2527 F1
- 2528 G6
- 2540 F9
- 2541 G9
- 2542 G7
- 2543 F6
- 2560 D8
- 2561 D9
- 2562 D9
- 2564 D10
- 2580 B7
- 2584 C6
- 3452 F11
- 3453 F10
- 3454 F9
- 3456 F11
- 3500 C2
- 3501 D2
- 3502 C4
- 3503 B4
- 3505 C3
- 3506 D4
- 3507 D2
- 3508 B4
- 3509 D3
- 3510 D3
- 3519 F6
- 3520 G2
- 3521 F2
- 3522 E5
- 3523 E5
- 3524 E5
- 3525 E5
- 3526 E6
- 3527 D5
- 3528 F1
- 3541 F8
- 3542 E9
- 3543 E10
- 3544 F9
- 3545 G8
- 3547 F9
- 3548 F9
- 3549 E9
- 3580 A7
- 3581 F6
- 3582 D10
- 4501 E5
- 5502 C4
- 5509 E8
- 5520 C7
- 5521 D6
- 5560 D8
- 5562 C9
- 5563 D10
- 6500 B5
- 6501 B5
- 6502 B5
- 6503 B5
- 6505 D2
- 6520 E1
- 6522 F6
- 6540 F8
- 6541 E9
- 6560 D8
- 6561 D9
- 6562 C9
- 6580 A8
- 7451 F10
- 7515 F7
- 7520 D2
- 7521 E6
- 7523 F1
- 7540 F9
- 7541 G8
- 7580 A7
- 9502 C4
- 9503 A6
- 9505 D2
- 9509 D8
- F444 F10
- F501 B2
- F502 B2
- F503 C2
- F506 C2
- F509 D6
- F510 B6
- F514 C6
- F524 A4
- F525 B8
- F540 D10
- F541 D10
- F542 D9

Mono Carrier: Deflection

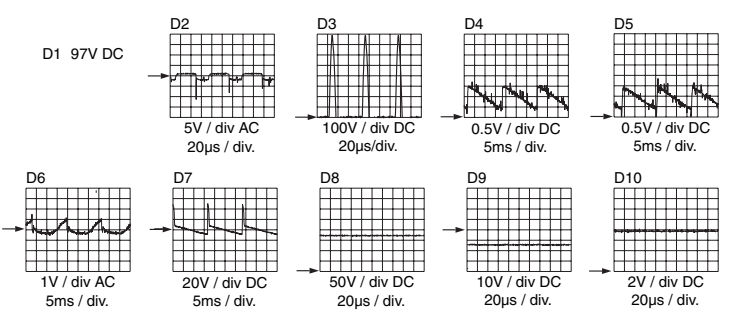
A2 DEFLECTION
Line Deflection

A2

Item	19V	13V	14RF
3473	3R3	4R7	3R3
3474	3R3	4R7	3R3
2406	NO	NO	360N
2408	560N	560N	NO
2423	15N15N	13N	12N
2424	1N	470P	680P
2441	33N	22N	15N
2452	100N	22N	22N
2494	NO	NO	47U
3402	2K2	NO	2K2
3440	33K	36K	33K
3441	47K	47K	10K
3442	150K	100K	150K
3443	3R9	4R7	3R9
3444	3R9	3R9	4R7
3445	1R	3R9	1R
3447	150K	220K	100K
3451	8K2	680R	680R
3455	2K2	470R	470R
3460	47K	100K	100K
5441	JF0501-19276	JF0501-19255	JF0501-19255

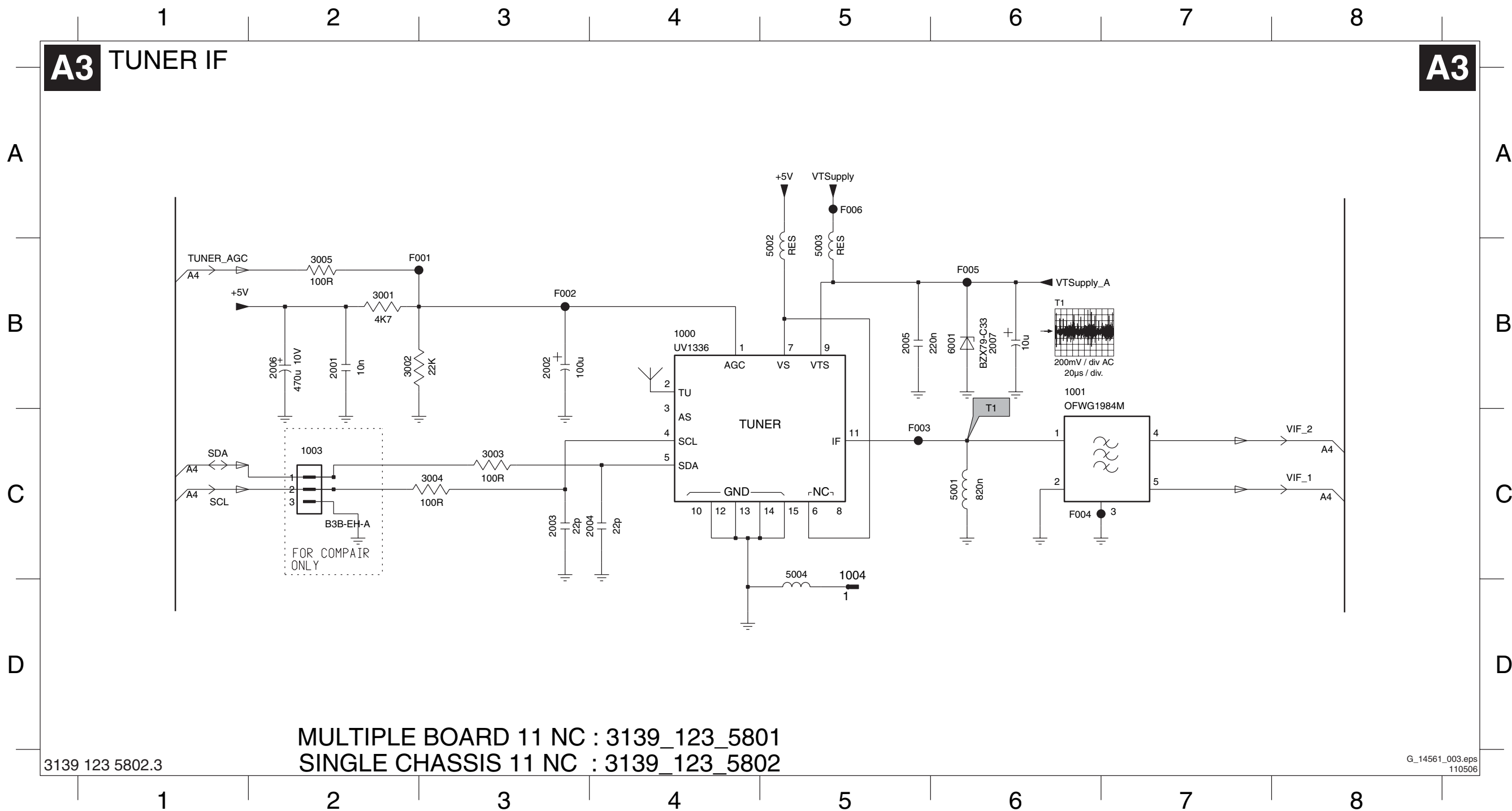


MULTIPLE BOARD 11 NC : 3139_123_5801
SINGLE BOARD 11 NC : 3139_123_5802



- 1400 E10
- 1401 B4
- 1402 F6
- 1463 E7
- 1464 E10
- 2405 D3
- 2406 D4
- 2408 D4
- 2420 B2
- 2421 B2
- 2423 A4
- 2424 A4
- 2426 B1
- 2427 B1
- 2428 C1
- 2429 B1
- 2441 C9
- 2444 D8
- 2446 D8
- 2447 D7
- 2455 C8
- 2457 E7
- 2460 E5
- 2462 E3
- 2463 F3
- 2464 F3
- 2465 E5
- 2470 F5
- 2471 B1
- 2473 C7
- 3402 D4
- 3403 D3
- 3410 C9
- 3421 C1
- 3422 A3
- 3424 B1
- 3425 C1
- 3426 B3
- 3428 B2
- 3430 C2
- 3432 C2
- 3439 C8
- 3440 C8
- 3441 C7
- 3442 C7
- 3443 C6
- 3444 D6
- 3445 D7
- 3446 E6
- 3447 C8
- 3448 D7
- 3449 B8
- 3450 B8
- 3451 C8
- 3455 C9
- 3457 C8
- 3459 C7
- 3460 D9
- 3461 F1
- 3462 F1
- 3463 E2
- 3464 G2
- 3465 F2
- 3466 F2
- 3468 E3
- 3470 F4
- 3471 F4
- 3472 F4
- 3473 G4
- 3474 G5
- 3475 F5
- 3476 F5
- 3478 F5
- 5401 D4
- 5402 D4
- 5421 B3
- 5441 A5
- 6422 A3
- 6423 C1
- 6424 F2
- 6425 F3
- 6426 B2
- 6444 D7
- 6445 C7
- 6446 D7
- 6447 D7
- 6448 D7
- 6451 C9
- 6452 D8
- 6453 C7
- 6461 E5
- 6462 E5
- 6463 E5
- 6464 E3
- 6465 E5
- 6466 E5
- 6467 E5
- 6468 E5
- 6469 E5
- 6470 E5
- 6471 E5
- 6472 E5
- 6473 E5
- 6474 E5
- 6475 E5
- 6476 E5
- 6477 E5
- 6478 E5
- 6479 E5
- 6480 E5
- 6481 E5
- 6482 E5
- 6483 E5
- 6484 E5
- 6485 E5
- 6486 E5
- 6487 E5
- 6488 E5
- 6489 E5
- 6490 E5
- 6491 E5
- 6492 E5
- 6493 E5
- 6494 E5
- 6495 E5
- 6496 E5
- 6497 E5
- 6498 E5
- 6499 E5
- 6500 E5

Mono Carrier: Tuner IF



- 1000 B4
- 1001 B6
- 1003 C2
- 1004 D5
- 2001 B2
- 2002 B3
- 2003 C3
- 2004 C4
- 2005 B5
- 2006 B2
- 2007 B6
- 3001 B2
- 3002 B2
- 3003 C3
- 3004 C3
- 3005 B2
- 5001 C6
- 5002 B5
- 5003 B5
- 5004 C5
- 6001 B6
- F001 B3
- F002 B3
- F003 C5
- F004 C6
- F005 B6
- F006 A5

MULTIPLE BOARD 11 NC : 3139_123_5801
 SINGLE CHASSIS 11 NC : 3139_123_5802

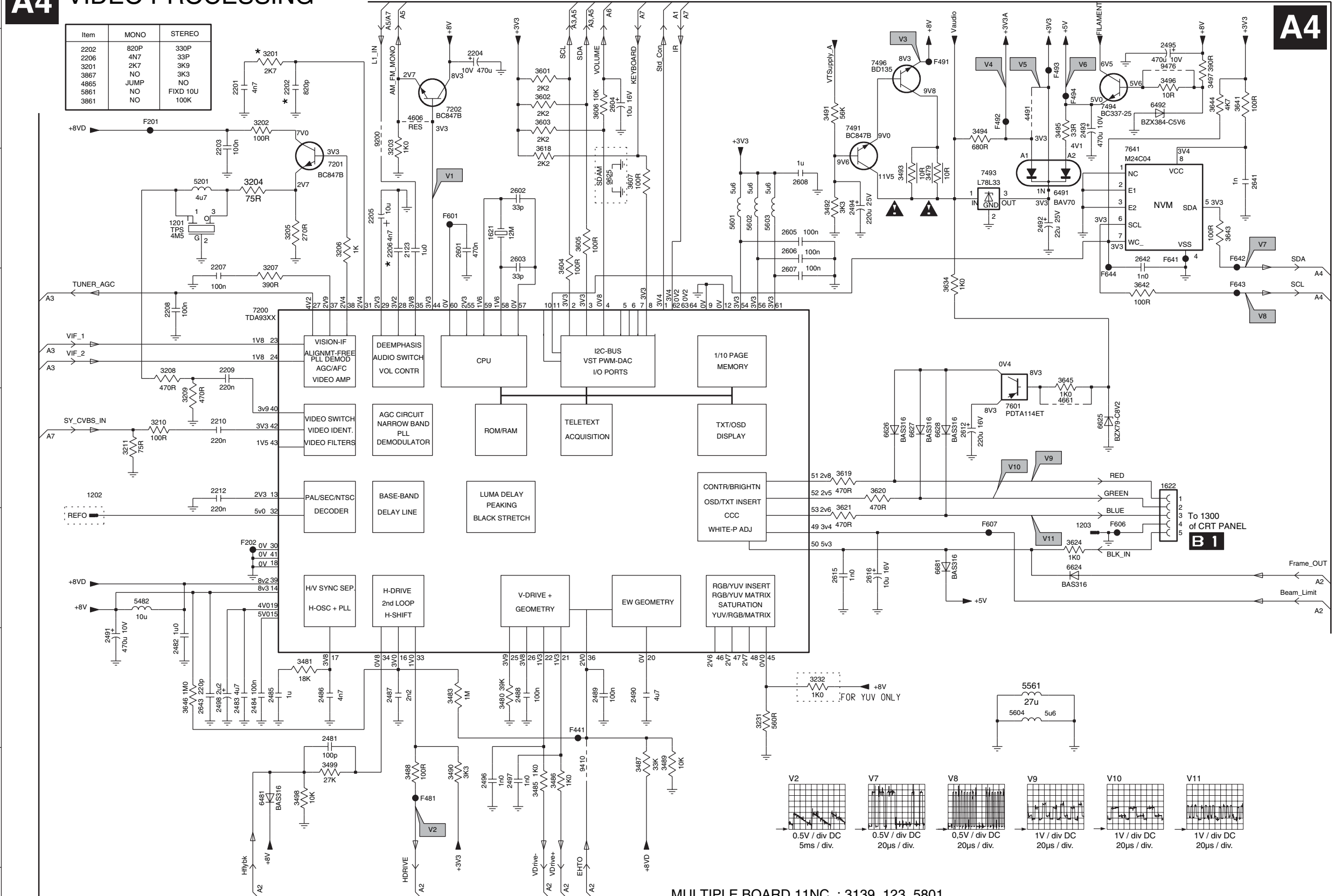
3139 123 5802.3

G_14561_003.eps
110506

Mono Carrier: Video Processing

A4 VIDEO PROCESSING

Item	MONO	STEREO
2202	820P	330P
2206	4N7	33P
3201	2K7	3K9
3867	NO	3K3
4865	JUMP	NO
5861	NO	FIXD 10U
3861	NO	100K

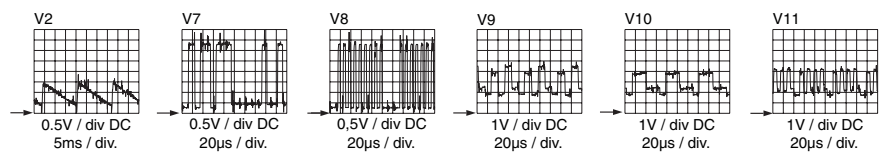


3139 123 5802.3

MULTIPLE BOARD 11NC : 3139_123_5801
SINGLE BOARD 11NC : 3139_123_5802

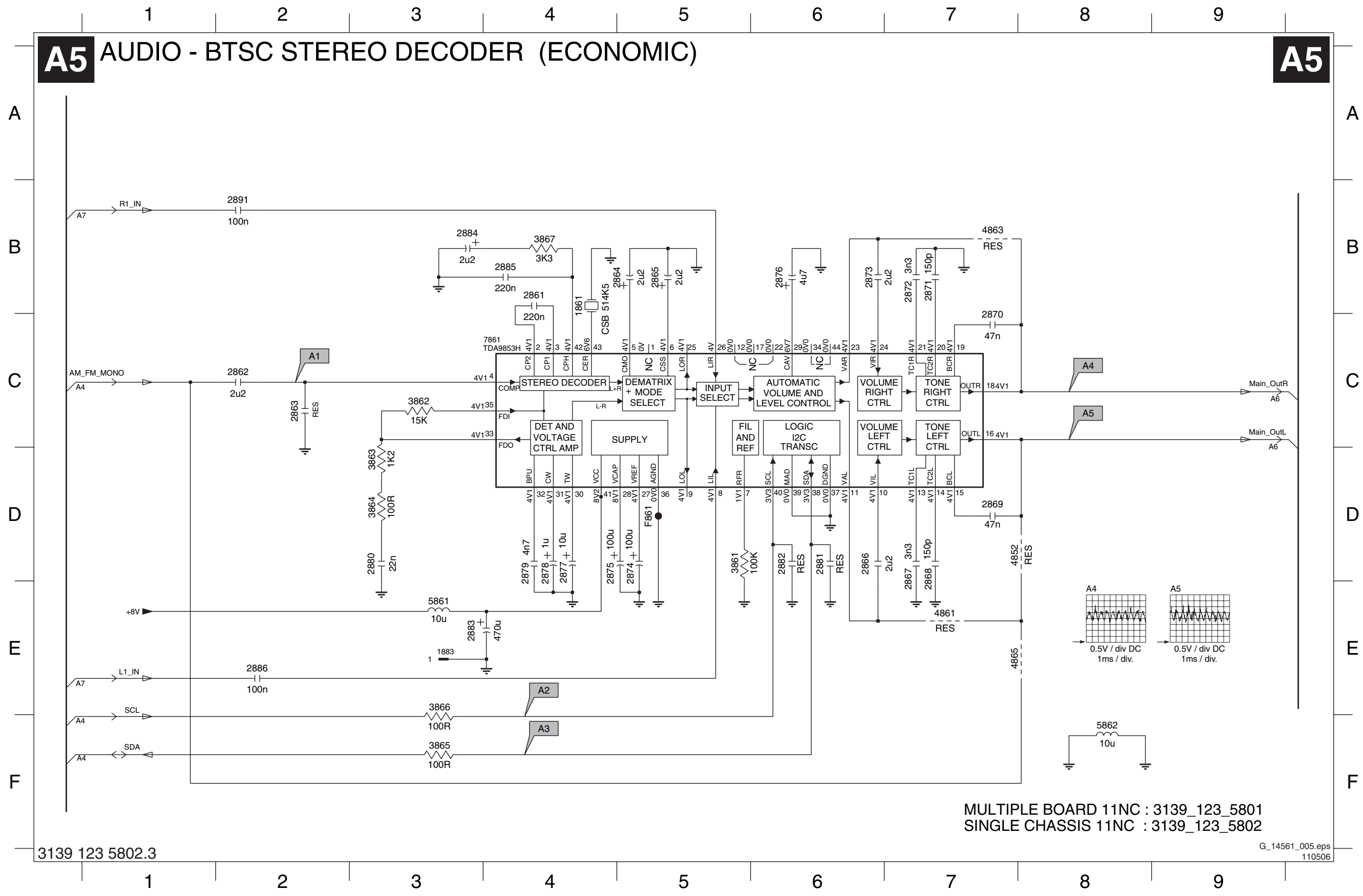
G_14561_004.eps
110506

- 1201 B2
- 1202 D1
- 1203 E9
- 1621 B4
- 1622 D10
- 2123 B4
- 2201 A2
- 2202 A3
- 2203 A2
- 2204 A4
- 2205 B3
- 2206 B4
- 2207 C2
- 2208 C2
- 2209 C2
- 2210 D2
- 2212 D2
- 2481 F3
- 2482 F2
- 2483 F2
- 2484 F2
- 2485 F3
- 2486 F3
- 2487 F4
- 2488 F5
- 2489 F5
- 2490 F6
- 2491 F1
- 2492 B9
- 2493 A9
- 2494 B7
- 2495 A10
- 2496 G4
- 2497 F5
- 2498 F2
- 2601 B4
- 2602 B5
- 2603 B5
- 2604 A5
- 2605 B7
- 2606 B7
- 2607 B7
- 2608 B7
- 2612 D8
- 2615 E7
- 2616 E8
- 2641 B11
- 2642 B10
- 2643 F2
- 3201 A3
- 3202 A3
- 3203 A4
- 3204 B2
- 3205 B3
- 3206 B3
- 3207 C3
- 3208 C2
- 3209 D2
- 3210 D2
- 3211 D1
- 3231 F7
- 3232 F7
- 3479 B8
- 3480 F5
- 3481 F3
- 3483 F4
- 3485 G5
- 3486 G5
- 3487 G6
- 3488 G4
- 3489 G4
- 3490 G6
- 3491 A7
- 3492 B7
- 3493 B8
- 3494 A9
- 3495 A9
- 3496 A10
- 3497 A10
- 3498 G3
- 3499 G3
- 3601 A5
- 3602 A5
- 3603 A5
- 3604 B5
- 3605 B5
- 3606 A5
- 3607 B6
- 3618 B5
- 3619 D7
- 3620 D8
- 3621 E7
- 3624 E9
- 3634 C8
- 3641 A11
- 3642 C10
- 3643 B11
- 3644 A10
- 3645 C9
- 3646 F2
- 4491 A9
- 4606 A4
- 4661 D9
- 5201 B2
- 5482 E2
- 5561 F9
- 5601 B6
- 5602 B7
- 5604 F9
- 6481 G3
- 6491 B9
- 6492 F2
- 6493 A10
- 6494 A10
- 7496 A8
- 7601 D9
- 7641 B10
- 9200 A3
- 9410 G5
- 9476 A10
- F201 A2
- F202 E2
- F441 F5
- F481 G4
- F491 A8
- F492 A9
- F493 A9
- F494 A9
- F601 B4
- F606 E10
- F607 E9
- F641 B10
- F642 B11
- F643 C11
- F644 C10



Mono Carrier: Audio BTSC Stereo Decoder

A5 AUDIO - BTSC STEREO DECODER (ECONOMIC)

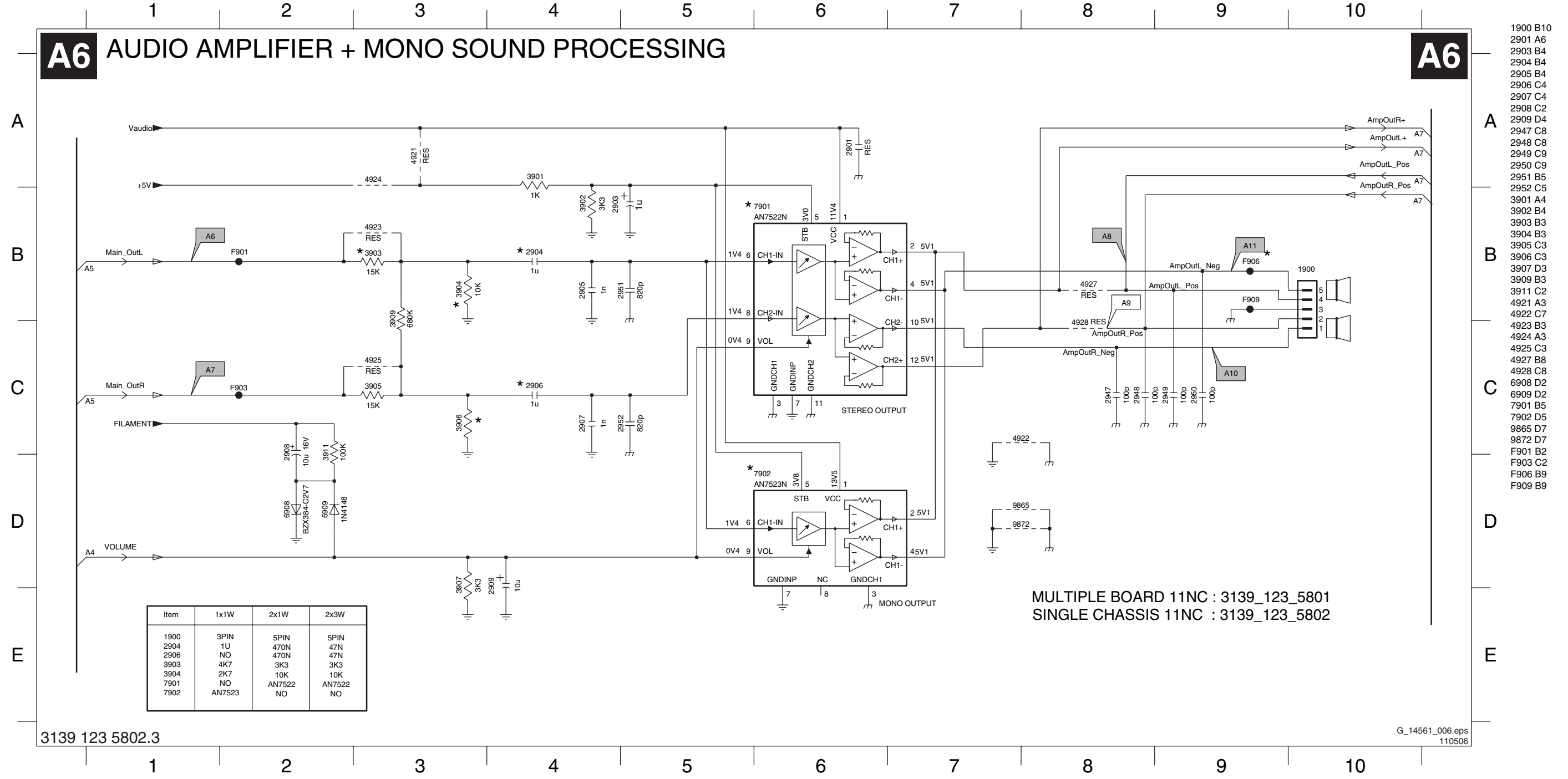


- 1861 B4
- 1883 E3
- 2861 B4
- 2862 C2
- 2863 C2
- 2864 B5
- 2865 B5
- 2866 D6
- 2867 D7
- 2868 D7
- 2869 D7
- 2870 C7
- 2871 B7
- 2872 B7
- 2873 B6
- 2874 D5
- 2875 D4
- 2876 B6
- 2877 D4
- 2878 D4
- 2879 D4
- 2880 D3
- 2881 D6
- 2882 D6
- 2883 E3
- 2884 B3
- 2885 B4
- 2886 E2
- 2891 B2
- 3861 D5
- 3862 C3
- 3863 D3
- 3864 D3
- 3865 F3
- 3866 E3
- 3867 B4
- 4852 D7
- 4861 E7
- 4863 B7
- 4865 E7
- 5861 E3
- 5862 F8
- 7861 C4
- F861 D5

MULTIPLE BOARD 11NC : 3139_123_5801
 SINGLE CHASSIS 11NC : 3139_123_5802

Mono Carrier: Audio Ampli & Sound Proc.

A6 AUDIO AMPLIFIER + MONO SOUND PROCESSING



Item	1x1W	2x1W	2x3W
1900	3PIN	5PIN	5PIN
2904	1U	470N	47N
2906	NO	470N	47N
3903	4K7	3K3	3K3
3904	2K7	10K	10K
7901	NO	AN7522	AN7522
7902	AN7523	NO	NO

MULTIPLE BOARD 11NC : 3139_123_5801
 SINGLE CHASSIS 11NC : 3139_123_5802

3139 123 5802.3

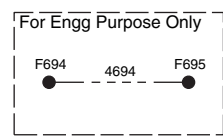
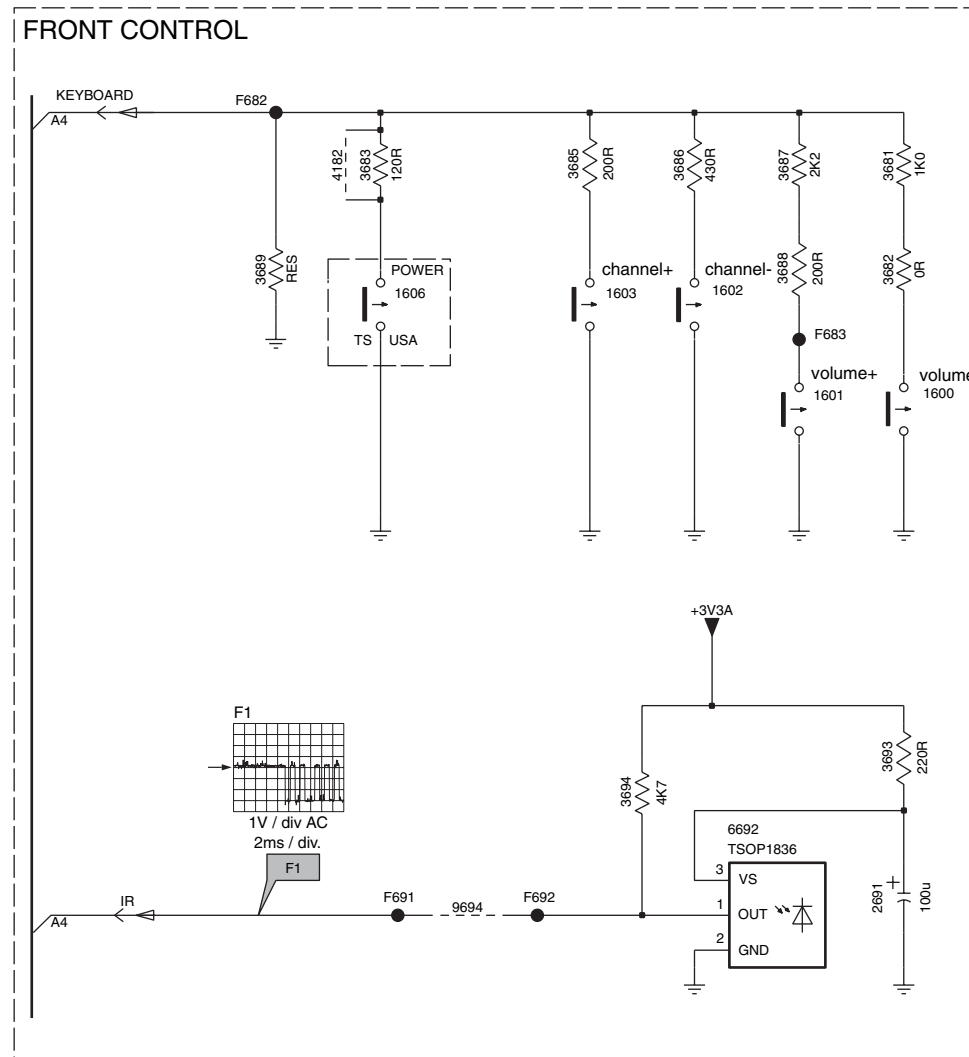
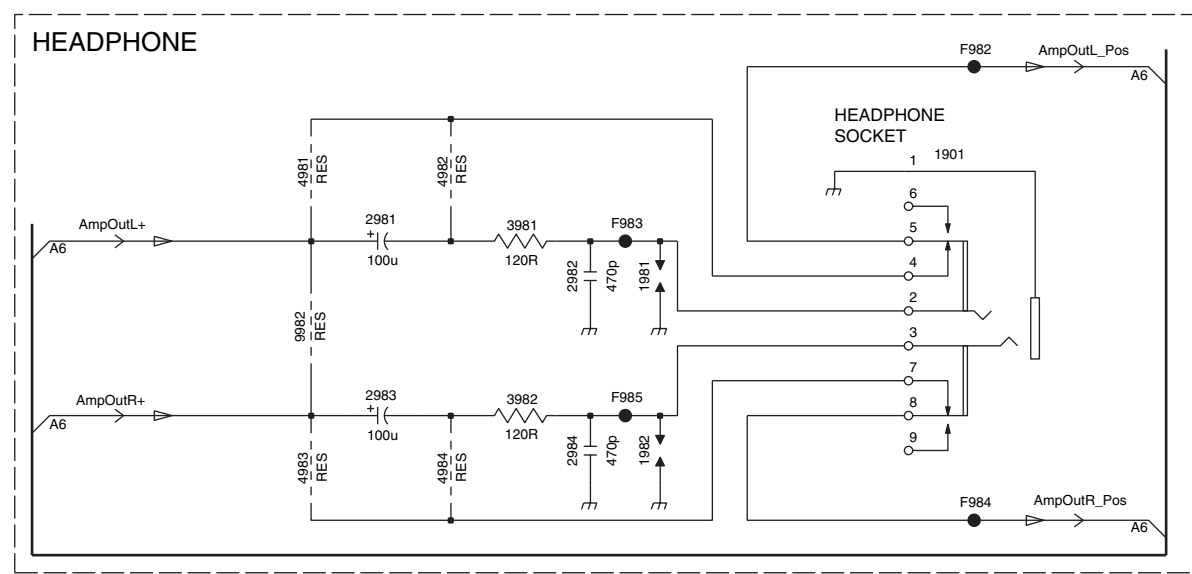
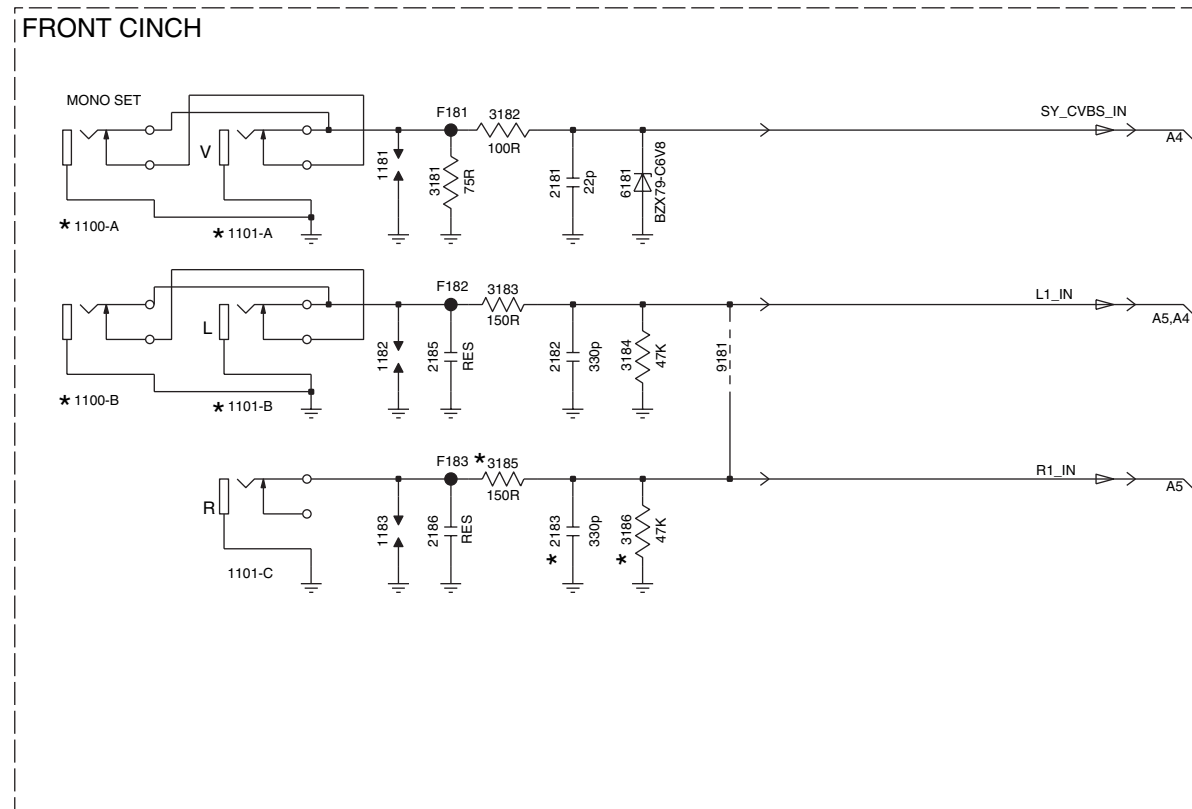
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 110506

- 1900 B10
- 2901 A6
- 2903 B4
- 2904 B4
- 2905 B4
- 2906 C4
- 2907 C4
- 2908 C2
- 2909 D4
- 2947 C8
- 2948 C8
- 2949 C9
- 2950 C9
- 2951 B5
- 2952 C5
- 3901 A4
- 3902 B4
- 3903 B3
- 3904 B3
- 3905 C3
- 3906 C3
- 3907 D3
- 3909 B3
- 3911 C2
- 4921 A3
- 4922 C7
- 4923 B3
- 4924 A3
- 4925 C3
- 4927 B8
- 4928 C8
- 6908 D2
- 6909 D2
- 7901 B5
- 7902 D5
- 9865 D7
- 9872 D7
- F901 B2
- F903 C2
- F906 B9
- F909 B9

Mono Carrier: Front I/O, Control & HP

A7 FRONT IO / CONTROL + HEADPHONE

A7

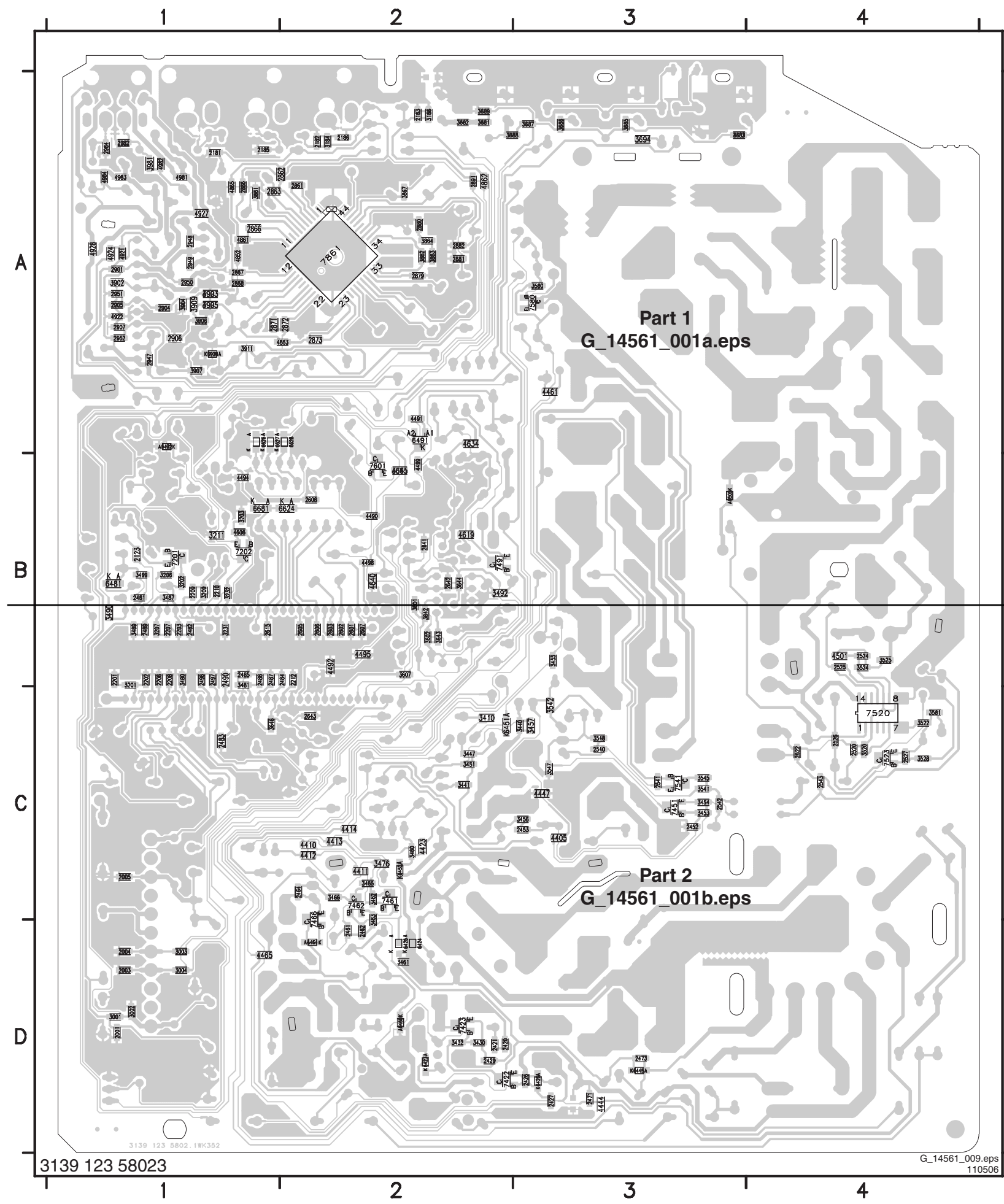


Item	Stereo	Mono
1100	3PIN	2PIN
2123	NO	1U
2183	33P	NO
3185	150R	NO
3186	47R	NO

MULTIPLE BOARD 11 NC : 3139_123_5801
 SINGLE BOARD 11 NC : 3139_123_5802

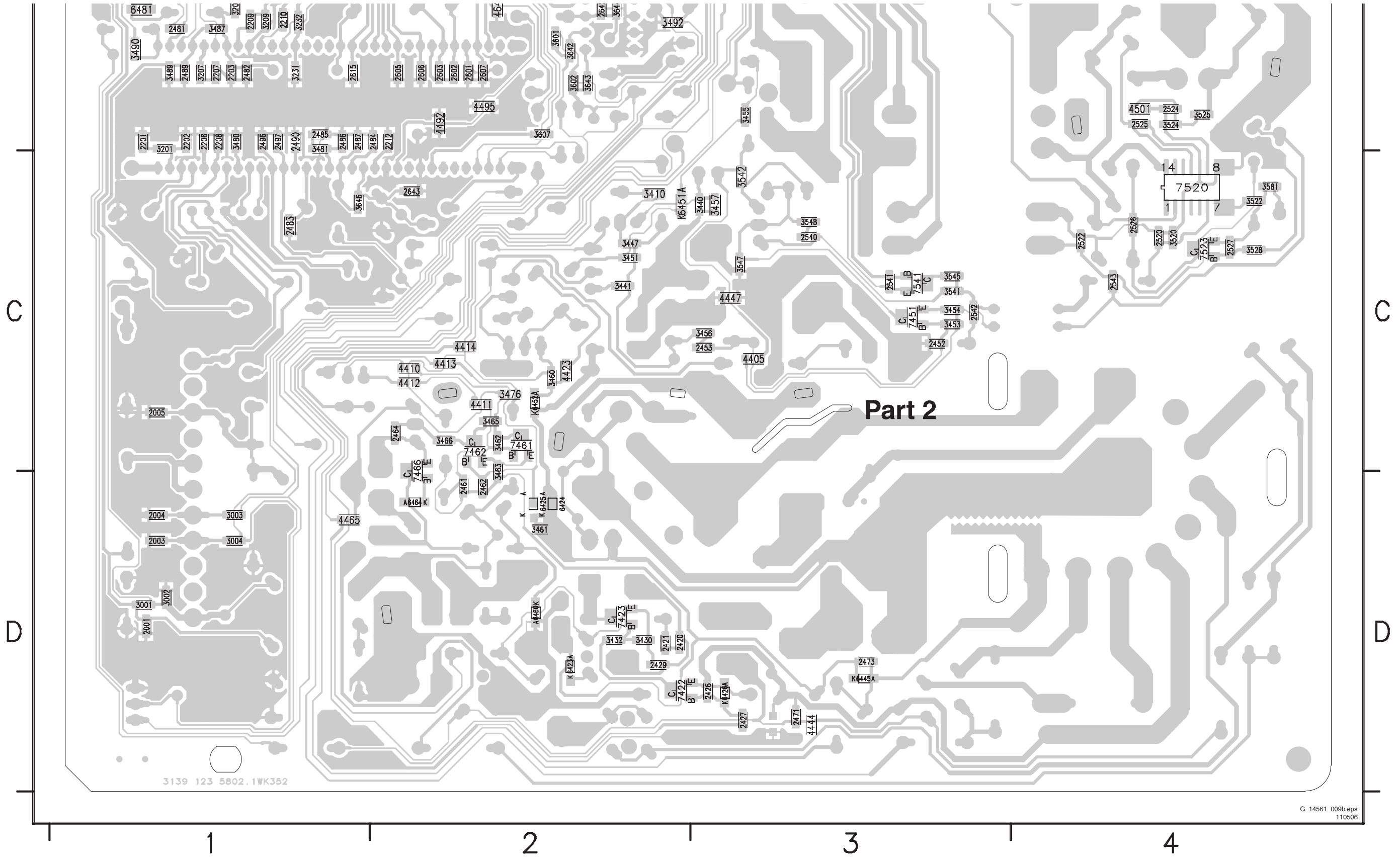
- 1100-A B1
- 1100-B B1
- 1101-A B2
- 1101-B C2
- 1101-C C2
- 1181 B2
- 1182 B2
- 1183 C2
- 1600 B10
- 1601 B9
- 1602 B9
- 1603 B8
- 1606 B8
- 1901 E5
- 1981 E3
- 1982 F3
- 2181 B3
- 2182 B3
- 2183 C3
- 2185 B3
- 2186 C3
- 2691 E10
- 2981 E2
- 2982 E3
- 2983 F2
- 2984 F3
- 3181 B3
- 3182 A3
- 3183 B3
- 3184 B3
- 3185 C3
- 3186 C3
- 3681 B10
- 3682 B10
- 3683 B7
- 3685 B8
- 3686 B9
- 3687 B9
- 3688 B9
- 3689 B7
- 3693 D10
- 3694 D8
- 3981 E3
- 3982 F3
- 4182 B7
- 4694 F6
- 4981 E2
- 4982 E3
- 4983 F2
- 4984 F3
- 6181 B3
- 6692 D9
- 9181 B4
- 9694 E8
- 9982 F2
- F181 A3
- F182 B3
- F183 C3
- F682 A7
- F683 B9
- F691 E8
- F692 E8
- F694 F6
- F695 F7
- F982 D5
- F983 E3
- F984 F5
- F985 F3

Layout Mono Carrier (Overview Bottom Side)

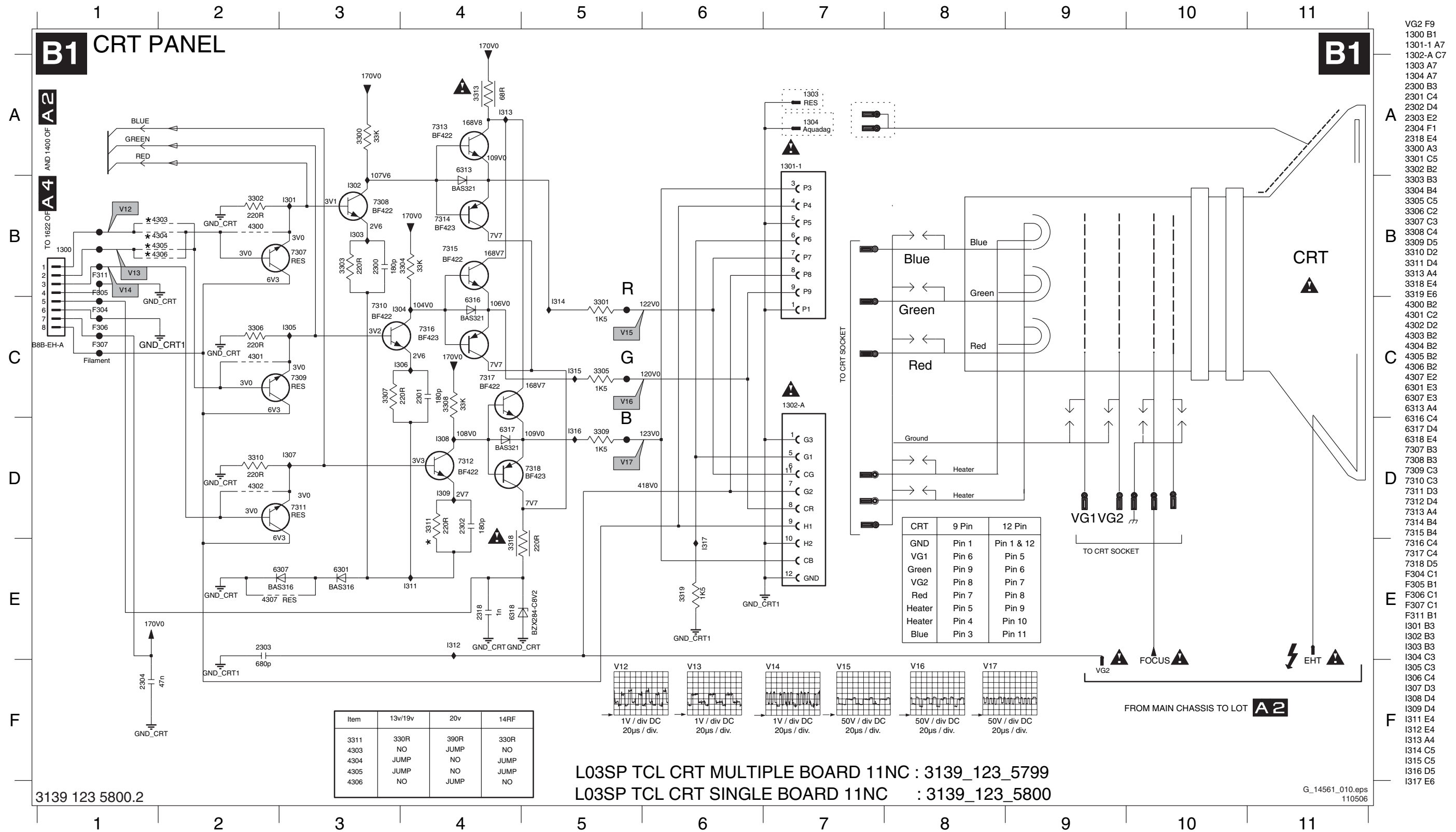


- 2001 D1 3462 C2 7461 C2
- 2003 D1 3463 D2 7462 C2
- 2004 D1 3465 C2 7466 C2
- 2005 C1 3466 C2 7491 B2
- 2123 B1 3476 C2 7520 C4
- 2181 A1 3480 B1 7523 C4
- 2182 A2 3481 B1 7541 C3
- 2183 A2 3487 B1 7580 A3
- 2185 A1 3489 B1 7601 B2
- 2186 A2 3490 B1 7861 A2
- 2201 B1 3492 B2
- 2202 B1 3499 B1
- 2203 B1 3520 C4
- 2206 B1 3522 C4
- 2207 B1 3524 B4
- 2208 B1 3525 B4
- 2209 B1 3528 C4
- 2210 B1 3541 C3
- 2212 B2 3542 C3
- 2420 D2 3545 C3
- 2421 D2 3547 C3
- 2426 D3 3548 C3
- 2427 D3 3580 A3
- 2429 D2 3581 C4
- 2452 C3 3601 B2
- 2453 C3 3602 B2
- 2461 D2 3607 B2
- 2462 D2 3642 B2
- 2464 C2 3643 B2
- 2471 D3 3644 B2
- 2473 D3 3645 B2
- 2481 B1 3646 C1
- 2482 B1 3681 A2
- 2483 C1 3682 A2
- 2484 B2 3683 A3
- 2485 B1 3685 A3
- 2486 B1 3686 A3
- 2487 B1 3687 A3
- 2489 B1 3688 A2
- 2490 B1 3689 A2
- 2496 B1 3694 A3
- 2497 B1 3861 A1
- 2520 C4 3862 A2
- 2522 C4 3863 A2
- 2524 B4 3864 A2
- 2525 B4 3867 A2
- 2526 C4 3902 A1
- 2527 C4 3903 A1
- 2540 C3 3904 A1
- 2541 C3 3905 A1
- 2542 C3 3906 A1
- 2543 C4 3907 A1
- 2601 B2 3909 A1
- 2602 B2 3911 A1
- 2603 B2 3981 A1
- 2605 B2 4182 A3
- 2606 B2 4405 C3
- 2607 B2 4410 C2
- 2608 B2 4411 C2
- 2615 B1 4412 C2
- 2641 B2 4413 C2
- 2642 B2 4414 C2
- 2643 C2 4423 C2
- 2861 A2 4444 D3
- 2862 A2 4447 C3
- 2863 A1 4461 A3
- 2866 A1 4465 D1
- 2867 A1 4490 B2
- 2868 A1 4491 A2
- 2871 A1 4492 B2
- 2872 A2 4494 B1
- 2873 A2 4495 B2
- 2879 A2 4498 B2
- 2880 A2 4499 B2
- 2881 A2 4501 B4
- 2882 A2 4606 B1
- 2886 A1 4619 B2
- 2891 A2 4634 A2
- 2901 A1 4640 B2
- 2904 A1 4661 B2
- 2905 A1 4852 A1
- 2906 A1 4861 A1
- 2907 A1 4862 A2
- 2947 A1 4863 A2
- 2948 A1 4865 A1
- 2949 A1 4921 A1
- 2950 A1 4922 A1
- 2951 A1 4923 A1
- 2952 A1 4924 A1
- 2982 A1 4925 A1
- 2984 A1 4927 A1
- 3001 D1 4928 A1
- 3002 D1 4981 A1
- 3003 D1 4982 A1
- 3004 D1 4983 A1
- 3184 A2 4984 A1
- 3186 A2 6423 D2
- 3201 B1 6424 D2
- 3202 B1 6425 D2
- 3203 B1 6426 D3
- 3206 B1 6445 D3
- 3207 B1 6451 C2
- 3209 B1 6452 C2
- 3211 B1 6460 D2
- 3231 B1 6464 D2
- 3232 B1 6481 B1
- 3410 C2 6491 A2
- 3430 D2 6492 A1
- 3432 D2 6505 B3
- 3440 C3 6624 B2
- 3441 C2 6626 A1
- 3447 C2 6627 A1
- 3451 C2 6628 A2
- 3453 C3 6681 B1
- 3454 C3 6908 A1
- 3455 B3 7201 B1
- 3456 C3 7202 B1
- 3457 C3 7422 D2
- 3460 C2 7423 D2
- 3461 D2 7451 C3

Layout Mono Carrier (Part 2 Bottom Side)



CRT Panel



B1 CRT PANEL

B1

A2

A4

A2

A2

A2

Item	13v/19v	20v	14RF
3311	330R	390R	330R
4303	NO	JUMP	NO
4304	JUMP	NO	JUMP
4305	JUMP	NO	JUMP
4306	NO	JUMP	NO

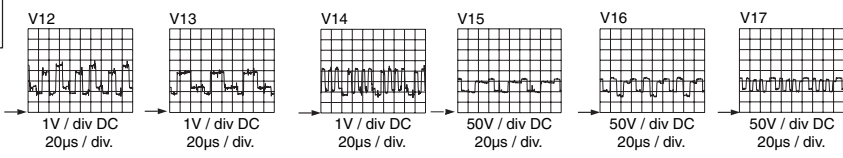
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 L03SP TCL CRT SINGLE BOARD 11NC : 3139_123_5800

3139 123 5800.2

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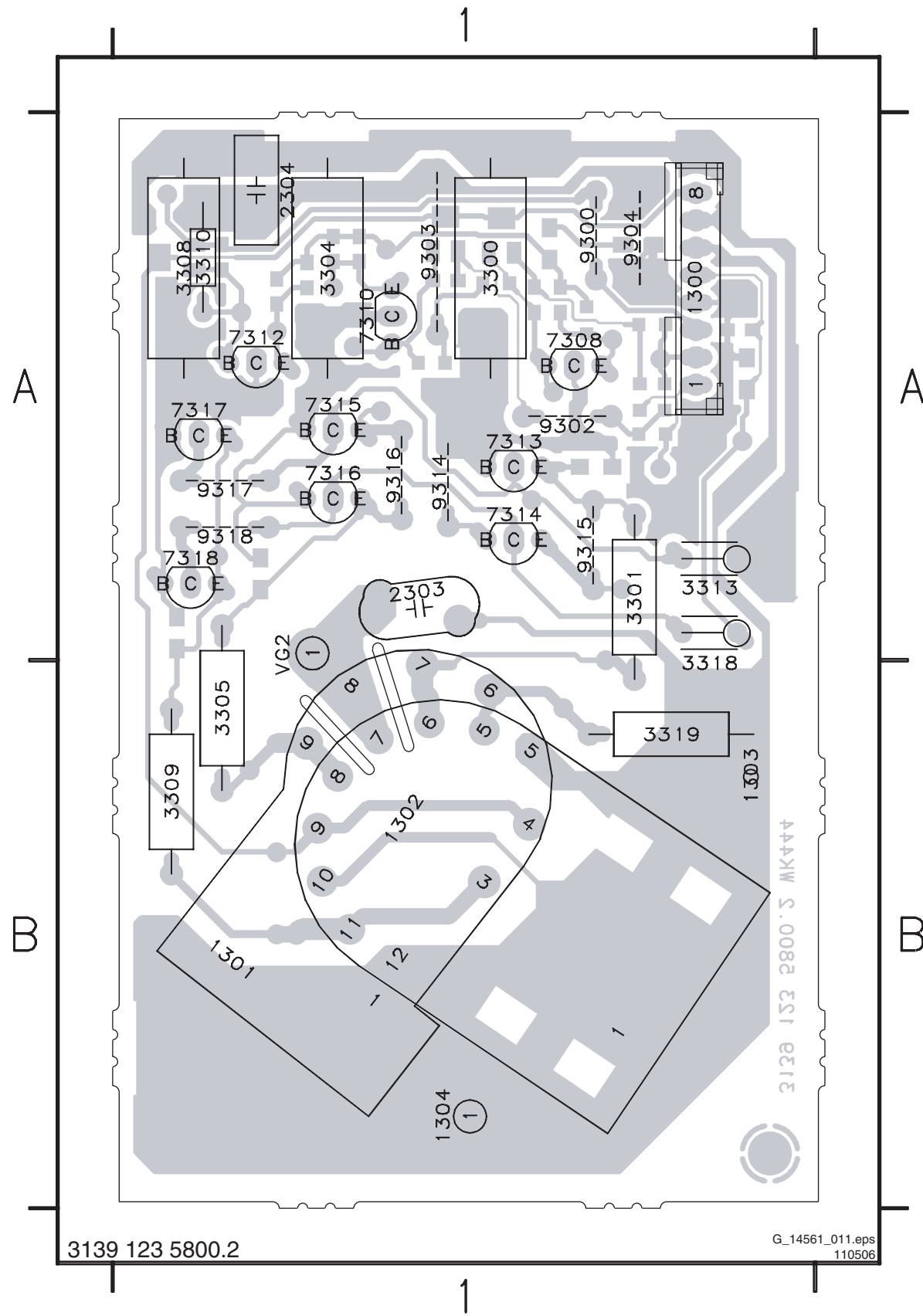
- VG2 F9
- 1300 B1
- 1301-1 A7
- 1302-A C7
- 1303 A7
- 1304 A7
- 2300 B3
- 2301 C4
- 2302 D4
- 2303 E2
- 2304 F1
- 2318 E4
- 3300 A3
- 3301 C5
- 3302 B2
- 3303 B3
- 3304 B4
- 3305 C5
- 3306 C2
- 3307 C3
- 3308 C4
- 3309 D5
- 3310 D2
- 3311 D4
- 3313 A4
- 3318 E4
- 3319 E6
- 4300 B2
- 4301 C2
- 4302 D2
- 4303 B2
- 4304 B2
- 4305 B2
- 4306 B2
- 4307 E2
- 6301 E3
- 6307 E3
- 6313 A4
- 6316 C4
- 6317 D4
- 6318 E4
- 7307 B3
- 7308 B3
- 7309 C3
- 7310 C3
- 7311 D3
- 7312 D4
- 7313 A4
- 7314 B4
- 7315 B4
- 7316 C4
- 7317 C4
- 7318 D5
- F304 C1
- F305 B1
- F306 C1
- F307 C1
- F311 B1
- I301 B3
- I302 B3
- I303 B3
- I304 C3
- I305 C3
- I306 C4
- I307 D3
- I308 D4
- I309 D4
- I311 E4
- I312 E4
- I314 C5
- I315 C5
- I316 D5
- I317 E6

CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11



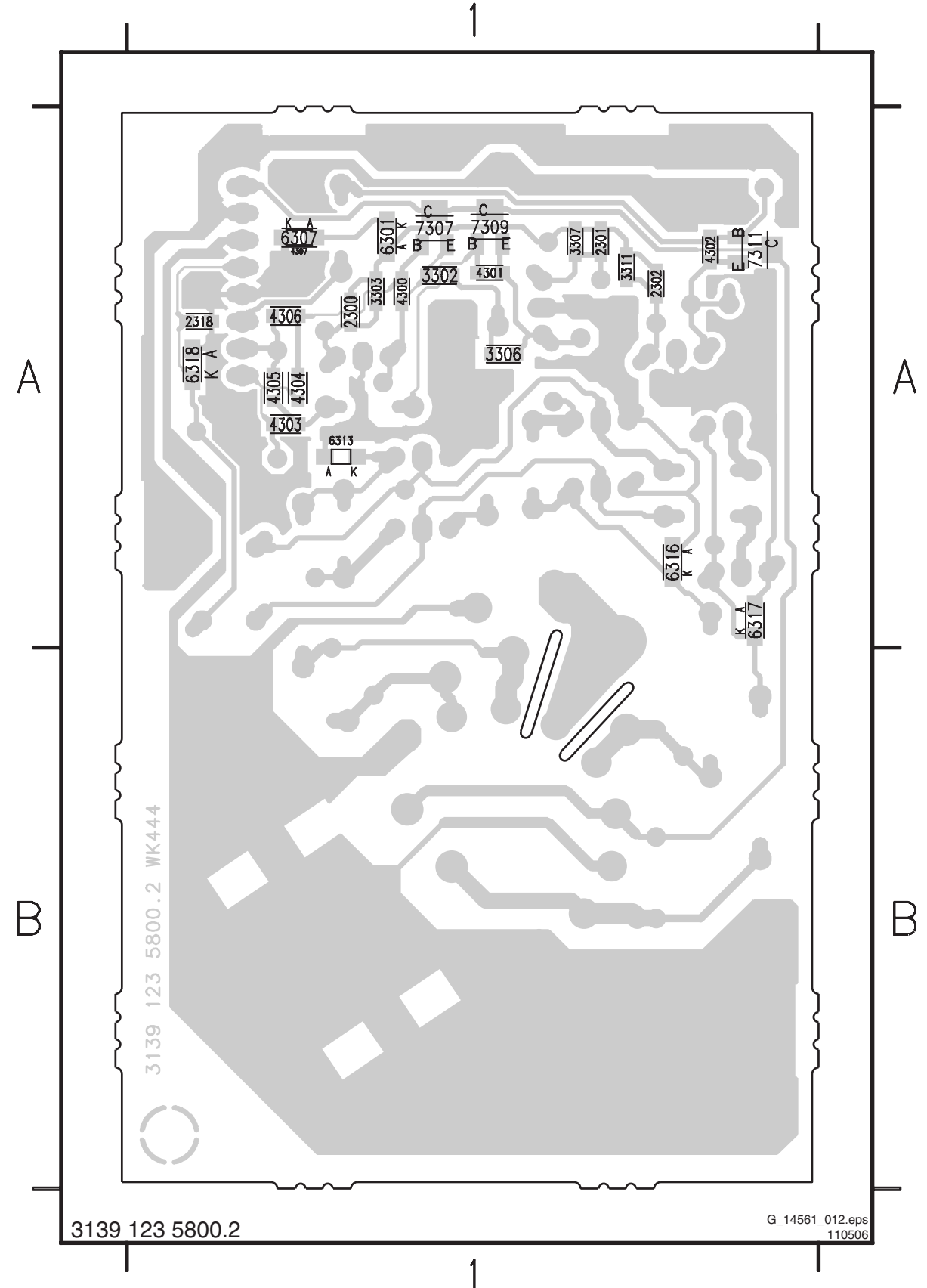
FROM MAIN CHASSIS TO LOT **A2**

Layout CRT Panel (Top Side)



- VG2 A1
- 1300 A1
- 1301 B1
- 1302 B1
- 1303 B1
- 1304 B1
- 2303 A1
- 2304 A1
- 3300 A1
- 3301 A1
- 3304 A1
- 3305 B1
- 3308 A1
- 3309 B1
- 3310 A1
- 3313 A1
- 3318 B1
- 3319 B1
- 7308 A1
- 7310 A1
- 7312 A1
- 7313 A1
- 7314 A1
- 7315 A1
- 7316 A1
- 7317 A1
- 7318 A1
- 9300 A1
- 9302 A1
- 9303 A1
- 9304 A1
- 9314 A1
- 9315 A1
- 9316 A1
- 9317 A1
- 9318 A1

Layout CRT Panel (Bottom Side)



- 2300 A1
- 2301 A1
- 2302 A1
- 2318 A1
- 3302 A1
- 3303 A1
- 3306 A1
- 3307 A1
- 3311 A1
- 4300 A1
- 4301 A1
- 4302 A1
- 4303 A1
- 4304 A1
- 4305 A1
- 4306 A1
- 4307 A1
- 6301 A1
- 6307 A1
- 6313 A1
- 6316 A1
- 6317 A1
- 6318 A1
- 7307 A1
- 7309 A1
- 7311 A1

8. Alignments

Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments and Settings

Note: The Service Default Alignment Mode (SDAM) is described in the "Service Modes, Error Codes and Fault Finding" section. SDAM menu navigation is performed by using the MENU UP, MENU DOWN, MENU LEFT, and MENU RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- AC voltage and frequency: according to country's standard.
- Connect the television set to the AC power via an isolation transformer.
- Allow the television set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use heatsinks as ground.
- Test probe: $R_i > 10 \text{ M ohm}$; $C_i < 2.5 \text{ pF}$.
- Use an isolated trimmer/screwdriver to perform the alignments.

8.2 Hardware Alignments

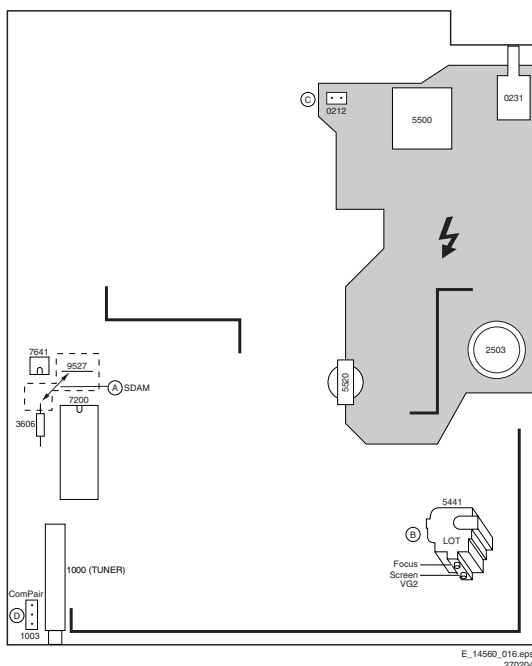


Figure 8-1 Top view Mono Carrier

8.2.1 Vg2 Adjustment

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
3. Press the MENU LEFT/RIGHT key to enter the WHITE TONE sub menu.
4. In the WHITE TONE sub menu, press the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
5. Use the MENU LEFT/RIGHT keys to set the values of NORMAL RED, NORMAL GREEN and NORMAL BLUE to '40'.
6. Press the MENU button twice to enter the normal user menu.
7. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
8. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
9. Use the MENU UP/DOWN keys to select CONTRAST. Be sure to record the current value of CONTRAST.
10. Use the MENU LEFT/RIGHT keys to set the value of CONTRAST to '0'.
11. Use the MENU UP/DOWN keys to select BRIGHTNESS. Be sure to record the current value of BRIGHTNESS.
12. Use the MENU LEFT/RIGHT keys to set the value of BRIGHTNESS to minimum (OSD just visible in a dark room).
13. Press the MENU button twice to return to the top level SDAM menu.
14. Press the OSD/STATUS button to hide the SDAM onscreen display ("S" indication remains visible). This, to avoid interferences during the waveform measurements
15. Connect the RF output of a video pattern generator to the antenna input, and input a 'black picture' test pattern to the television set.
16. Set the oscilloscope to 50 V/div and the time base to 0.2 milliseconds (external triggering on the positive vertical pulse with a 10:1 probe).
17. Ground the scope at the CRT panel and connect a 100:1 probe to one of the cathodes of the picture tube socket (pin 7= Red, pin 9= Green, and pin 3= Blue, see also schematic diagram B1). Measure the level of the black current measuring pulses. These are the second line (Red), third line (Green), and fourth line (Blue) directly after the frame blanking (see figure "V_cut-off"). Remark: This chassis is using a TDA93XX UOC series. These use two different measuring pulses at each of the R, G, and B outputs. The above-mentioned level applies to the pulse with the lowest level of each gun.
18. Select the cathode with the highest V_{dc} value for the alignment. Adjust the $V_{cut-off}$ of this gun with the SCREEN potentiometer (see figure "Top view family board") on the LOT to the correct value (see table "Vg2 alignment values").
19. Press the OSD/STATUS button to display the SDAM onscreen display.
20. Press the MENU button to enter the normal user menu.
21. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
22. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
23. Use the MENU UP/DOWN keys to select CONTRAST.
24. Use the MENU LEFT/RIGHT keys to reset the value of CONTRAST to the original value.
25. Use the MENU UP/DOWN keys to select BRIGHTNESS.
26. Use the MENU LEFT/RIGHT keys to reset the value of BRIGHTNESS to the original value.
27. Press the MENU button twice to return to the top level SDAM menu.
28. Use the POWER button on the remote control transmitter or the POWER button on the television set to turn off the television set. This will save the changes made in SDAM.

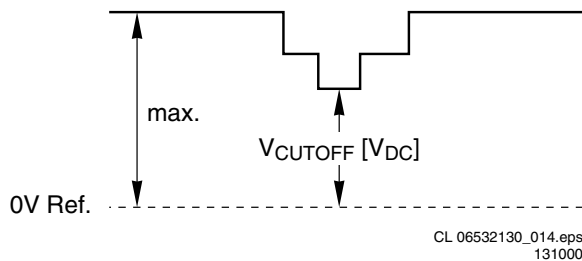


Figure 8-2 V_cutoff

Table 8-1 Vg2 alignment values

Screen Size	Cut-off point (V)
13V	+135 V ± 4 V
14RF	+135 V ± 4 V
20V	+140 V ± 4 V
20RF	+140 V ± 4 V

8.2.2 Focusing

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a circle or crosshatch test pattern to the television set.
3. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose NATURAL (or MOVIES) picture mode.
4. Adjust the FOCUS potentiometer (see figure "Top view family board") until the vertical lines near the left and right sides of the screen, and near the horizontal center of the screen, are at minimum width without visible haze.

8.3 Software Alignments and Settings

The following options are performed in the Service Default Alignment Mode (SDAM). SDAM is described in the "Service Modes, Error Codes and Fault Finding" section.

The following alignments are explained:

1. OPTIONS
2. TUNER
3. WHITE TONE
4. GEOMETRY
5. AUDIO

8.3.1 OPTIONS

Options are used to control the presence or absence of certain features and hardware.

Note: Each option byte controls several features of the television set; therefore, before changing option byte information, it is important to record the current option byte values. This ensures that the television features can be restored to the original settings, if necessary.

How to Change an Option Byte

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP 1.. OP 7) with the MENU UP/ DOWN keys, and enter the new value.

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the OPTIONS sub menu.

3. Press the MENU LEFT or MENU RIGHT key to enter the OPTIONS sub menu.
4. In the OPTIONS sub menu, press the MENU UP/DOWN keys to select 'OP 1' through 'OP 7'.
5. Use the number keys on the remote control transmitter to enter a new value for the selected option byte. The value must be entered as a three-digit value (for example, '4' would be entered as '0 0 4').
6. The selected value must be between '0' and '255'.
7. When all desired changes to the option bytes are made, press the MENU button to return to the top level SDAM menu. This will save changes to the option byte settings.
8. To ensure the option byte changes take effect:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

Leaving the OPTION submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the mains switch (cold start).

How to Calculate the Value of an Option Byte

Calculate an Option Byte value (OP 1 .. OP 7) in the following way:

1. Check the status of the single option bits (OB): are they enabled (1) or disabled (0).
2. When an option bit is enabled (1), it represents a certain value (see first column "value between brackets" in table below). When an option bit is disabled, its value is 0.
3. The total value of an Option Byte is formed by the sum of its eight option bits. See second table below for the correct Option Bytes per type number.

Bit (value)	OP1	OP2	OP3	OP4	OP5	OP6	OP7
0 (1)	OB10	OB20	OB30	OB40	OB50	OB60	OB70
1 (2)	OB11	OB21	OB31	OB41	OB51	OB61	OB71
2 (4)	OB12	OB22	OB32	OB42	OB52	OB62	OB72
3 (8)	OB13	OB23	OB33	OB43	OB53	OB63	OB73
4 (16)	OB14	OB24	OB34	OB44	OB54	OB64	OB74
5 (32)	OB15	OB25	OB35	OB45	OB55	OB65	OB75
6 (64)	OB16	OB26	OB36	OB46	OB56	OB66	OB76
7 (128)	OB17	OB27	OB37	OB47	OB57	OB67	OB77
Total:	Sum	Sum	Sum	Sum	Sum	Sum	Sum

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160603

Figure 8-3 Option Byte calculation

Table 8-2 Options settings

Type number	OP1	OP2	OP3	OP4	OP5	OP6	OP7
13MT1431/17	01	215	67	160	192	201	64
13MT1532/17	01	215	67	160	192	201	64
13MT1533/17	01	215	67	160	192	201	64
14MS2331/17	01	215	67	161	192	201	64
20MS2331/17	01	215	67	161	192	201	64
20MT1331/17	01	215	67	160	192	201	64
20MS1336/37	65	215	67	160	192	201	64

Option Bit Assignment

Following are the option bit assignments for all L03 software clusters.

Option bit description:

Option Byte		Option Bit Definition			
OP #	Assignment	Bit = [0]	Bit = [1]	Default setting	
1	OBx0	CHINA or NTSC_ONLY	Tuning is not for China set or NTSC only set, or this option bit is not applicable	Tuning is for China set or NTSC only set	LATAM & NAFTA: 0 for other sets, 1
	OBx1	VIRGIN_MODE	Virgin mode is disabled or not applicable	Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial start-up of the TV when VIRGIN_MODE is set to 1. After installation is finished, this option bit will be automatically set to 0	LATAM & NAFTA: 0
	OBx2	UK_PNP	UK's default Plug and Play setting is not available or not applicable	UK's default Plug and Play setting is available. When UK_PNP and VIRGIN_MODE are set to 1 at the initial setup, LANGUAGE = ENGLISH, COUNTRY = GREAT BRITAIN and after exiting from menu, VIRGIN_MODE will be set automatically to 0 while UK_PNP remains 1	LATAM & NAFTA: 0
	OBx3	ACI	ACI feature is disabled or not applicable	ACI feature is enabled	LATAM & NAFTA: 0.
	OBx4	ATS (EU), or FINE_TUNING (NAFTA), or LANGUAGE_MALAY (AP)	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx5	LNA	Auto Picture Booster is not available or not applicable	Auto Picture Booster is available	LATAM & NAFTA: 0
	OBx6	FM_RADIO	FM radio feature is disabled or not applicable	FM radio feature is enabled	LATAM & NAFTA: 0
	OBx7	PHILIPS_TUNER	ALPS / MASCO compatible tuner is in use	Philips compatible tuner is in use	LATAM & NAFTA: 0
2	OBx0	HUE	Hue/Tint Level is disabled or not applicable	Hue/Tint Level is enabled	LATAM & NAFTA: 0
	OBx1	COLOR_TEMP	Colour Temperature is disabled or not applicable	Colour Temperature is enabled	LATAM & NAFTA: 0
	OBx2	CONTRAST_PLUS	Contrast+ is disabled or not applicable	Contrast+ is enabled	LATAM & NAFTA: 0
	OBx3	TILT	Rotate Picture is disabled or not applicable	Rotate Picture is enabled	LATAM & NAFTA: 0
	OBx4	NOISE_REDUCTION	Noise Reduction (NR) is disabled or not applicable	Noise Reduction (NR) is enabled	LATAM & NAFTA: 0
	OBx5	CHANNEL_NAMING	Name FM Channel is disabled or not applicable	Name FM Channel is enabled	LATAM & NAFTA: 0. (Note: Name FM channel can be enabled only when FM_RADIO=1)
	OBx6	SMART_PICTURE	Smart Picture is disabled or not applicable	Smart Picture is enabled	LATAM & NAFTA: 1
	OBx7	SMART_SOUND	Smart Sound is disabled or not applicable	Smart Sound is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
3	OBx0	AVL	AVL is disabled or not applicable	AVL is enabled	LATAM & NAFTA: 0
	OBx1	WSSB or HOME_CINEMA	WSSB is disabled or not applicable	WSSB is enabled	LATAM & NAFTA: 0. (Note: This option bit can be set to 1 only when WIDE_SCREEN=1)
	OBx2	WIDE_SCREEN	Software is used for 4:3 set or not applicable	Software is used for 16:9 set	LATAM & NAFTA: 0
	OBx3	Virtual Dolby			LATAM & NAFTA: 1
	OBx4	MSP34X5_VOL_CTRL	Not applicable	applicable	LATAM & NAFTA: 1
	OBx5	COMPRESS_16_9	COMPRESS 16:9 selection is not applicable. Item should not be in the FORMAT menu list	COMPRESS 16:9 selection is applicable. Item should not be in the FORMAT menu list	LATAM & NAFTA: 0
	OBx6	EXPAND_4_3	Expand 4:3 selection is not applicable. Item should not be in the FORMAT menu list,	Expand 4:3 selection is applicable. Item should be in the FORMAT menu list	LATAM & NAFTA: 0
	OBx7	EW_FUNCTION	EW function is disabled. In this case, only Expand 4:3 is allowed, Compress 16:9 is not applicable	EW function is enabled. In this case, both Expand 4:3 and Compress 16:9 are applicable.	LATAM & NAFTA: 0
4	OBx0	STEREO_NON_DBX	For AP_NTSC, chip TDA 9853 is not present	For AP_NTSC, chip TDA 9853 is present	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
	OBx1	STEREO_DBX	For AP_NTSC, chip MSP 3445 is not present	For AP_NTSC, chip MSP 3445 is present	LATAM & NAFTA: 0
	OBx2	STEREO_PB or KOREAN_2CS	For AP_PAL, chip MSP3465 is not present	For AP_PAL, chip MSP3465 is present	LATAM & NAFTA: 0
	OBx3	STEREO_NICAM_2CS	For EU and AP_PAL, chip MSP 3415 is not present	For EU and AP_PAL, chip MSP 3415 is present	LATAM & NAFTA: 0
	OBx4	DELTA_VOLUME	Delta Volume Level is disabled or not applicable	Delta Volume Level is enabled	LATAM & NAFTA: 0
	OBx5	ULTRA_BASS	Ultra Bass is disabled or not applicable	Ultra Bass is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets
	OBx6	VOLUME_LIMITER	Volume Limiter Level is disabled or not applicable	Volume Limiter Level is enabled	LATAM & NAFTA: 0
	OBx7	INCR_SUR	Incredible Surround feature is disabled	Incredible Surround feature is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.

Option Byte		Option Bit Definition			
OP #	Assignment	Bit = [0]	Bit = [1]	Default setting	
5	OBx0	PIP or CLOCK	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx1	HOTEL_MODE	Hotel mode is disabled or not applicable	Hotel mode is enabled	LATAM & NAFTA: 0 for stereo sets, 1 for mono sets.
	OBx2	SVHS	SVHS source is not available	SVHS source is available	LATAM & NAFTA: 0. (Note: This option bit is not applicable for EU)
	OBx3	CVI	CVI source is not available	CVI source is available	
	OBx4	AV3	Side/Front AV3 source is not present	Side/Front AV3 source is present	LATAM & NAFTA: 0.
	OBx5	AV2	AV2 source is not present	AV2 source is present	LATAM & NAFTA: 0. (Note: For EU, when AV2=1, both EXT2 and SVHS2 should be included in the OSD loop)
	OBx6	AV1	AV1 source is not present	AV1 source is present	LATAM & NAFTA: 0
	OBx7	NTSC_PLAYBACK	NTSC playback feature is not available	NTSC playback feature is available	LATAM & NAFTA: 0
6	OBx0	BASS_TREBLE	Feature is not available	Feature is available	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets
	OBx1	SMART_TEXT	Smart Text Mode and Favourite Page are disabled or not applicable	Smart Text Mode and Favourite Page are enabled	LATAM & NAFTA: 1
	OBx2	SMART_LOCK	Child Lock and Lock Channel are disabled or not applicable for EU	Child Lock and Lock Channel are enabled for EU	LATAM & NAFTA: 1
	OBx3	VCHIP (LATAM & NAFTA & NAFTA) / TXT_1PG (EU)	Feature is disabled	Feature is enabled	LATAM & NAFTA: 1
	OBx4	WAKEUP_CLOCK	Wake up clock feature is disabled or not applicable	Wake up clock feature is enabled	LATAM & NAFTA: 1
	OBx5	SMART_CLOCK	Smart Clock Using Teletext and Smart Clock Using PBS is disabled or not applicable	Smart Clock Using Teletext and Smart Clock Using PBS is enabled. For NAFTA, menu item AUTOCHRON is present in the INSTALL submenu	LATAM & NAFTA: 0
	OBx6	SMART_SURF	Smart Surf feature is disabled or not applicable	Smart Surf feature is enabled	LATAM & NAFTA: 1
	OBx7	PERSONAL_ZAPPING	Personal Zapping feature is disabled or not applicable	Personal Zapping feature is enabled	LATAM & NAFTA: 0
7	OBx0	SYSTEM_LT_1 and SYSTEM_LT_2	These two option bits are allocated for LATAM system selection. (00: NTSC-M; 01: NTSC-M, PAL-M; 10: NTSC-M, PAL-M, and PAL-N; 11: NTSC-M, PAL-M, PAL-N, and PAL-BG)	LATAM & NAFTA: 0	
	OBx1			LATAM & NAFTA: 0	
	OBx2	SOUND_SYSTEM_AP	OB70,OB71,OB72;These three option bits are allocated for AP_PAL sound system selection. (000: BG; 001: BG / DK; 010: I / DK; 011: BG / I / DK; 100: BG / I / DK / M)	LATAM & NAFTA: 0	
	OBx3	COLOR_SYSTEM_AP (This option bit is allocated for AP-PAL colour system selection)	Auto, PAL 4.43, NTSC 4.43, and NTSC 3.58	Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, and SECAM	LATAM & NAFTA: 0
	OBx4	SIGNAL_STRENGTH / DVD WAKEUP TIMER (DVD COMBI), 3D_COMBFILTER (NAFTA)		LATAM & NAFTA: 1	
	OBx5	LNA_PP (for L01 AP cluster), VOICE_CONTROL		LATAM & NAFTA: 0	
	OBx6	ACTIVE_CONTROL		LATAM & NAFTA: 1	
	OBx7	TIME_WIN1	The time window is set t 1.2 s.	The time window is set to 2 s	LATAM & NAFTA: 0 (Note: The time-out for all digit entries depends on this setting)
8	OBx0	MALAY_TEXT	disable	enable	LATAM & NAFTA: 1
	OBx1	HINDI	disable	enable	LATAM & NAFTA: 1
	OBx2	HANGUL	disable	enable	LATAM & NAFTA: 0
	OBx3	THAI	disable	enable	LATAM & NAFTA: 0
	OBx4	AENGLISH	disable	enable	LATAM & NAFTA: 0
	OBx5	ARABIC	disable	enable	LATAM & NAFTA: 0
	OBx6	CHINESE_TRAD	disable	enable	LATAM & NAFTA: 0
	OBx7	CHINESE_SIMP_TEXT	disable	enable	LATAM & NAFTA: 0

8.3.2 TUNER

Note: Described alignments are only necessary when the NVM (part reference number 7641) is replaced.

IFPLL

This adjustment is auto-aligned. Therefore, no action is required (default= "30").

AGC (AGC take over point)

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a color bar test pattern to the television set.
3. Set the amplitude of the video pattern generator to 10 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main chassis).
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
8. Use the MENU UP/DOWN keys to select AGC.
9. Use the MENU LEFT/RIGHT keys to adjust the AGC value (default value is "32") until the DC-voltage at pin 1 of the tuner lies is 3.3 V.
10. Press the MENU button to return to the top level SDAM menu.
11. To ensure the AGC change takes effect:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

SL (Slicing Level)

This adjustment sets the sync slicing level for non-standard signals. You must turn it 'on' to have no picture instability in premium decoded cable channels.

- OFF: slicing level dependent on noise level.
- ON: fixed slicing level of 70 %.

To adjust SL:

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
4. Use the MENU UP/DOWN keys to select SL.
5. Use the MENU LEFT/RIGHT keys to toggle SL 'Off' and 'On'.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the SL setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

CL (Cathode Drive Level)

Fixed value is "7".

8.3.3 WHITE TONE

The values of the 'black cut-off level' can be adjusted in the 'WHITE TONE' sub menu. Normally, no alignment is needed for 'WHITE TONE', and the given default values are used.

Default settings for **NORMAL** (color temperature= 11500 K):
 NORMAL RED = 22
 NORMAL GREEN = 21
 NORMAL BLUE = 26

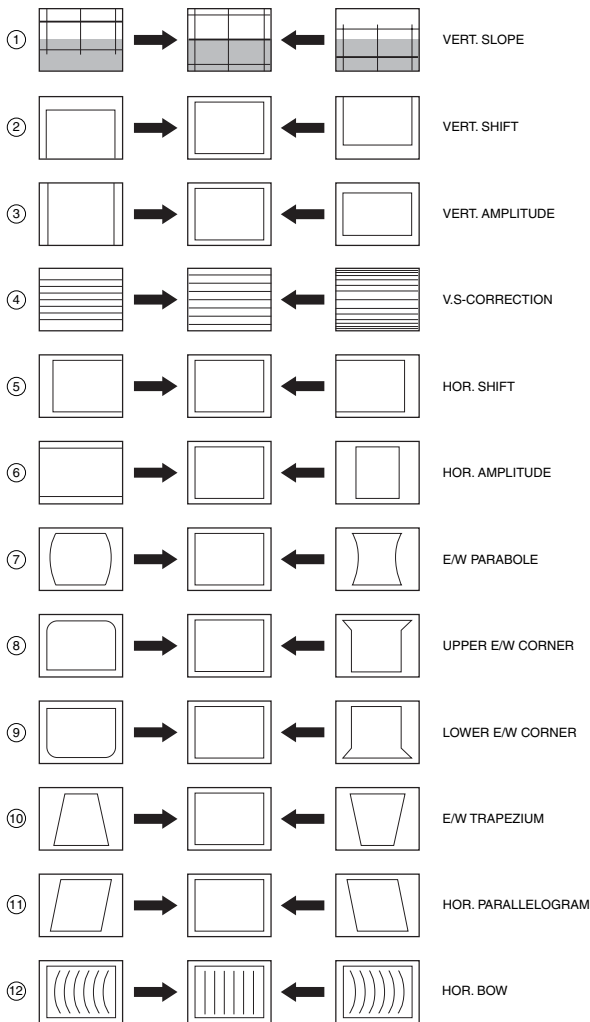
To adjust NORMAL RED, NORMAL GREEN, and NORMAL BLUE:

1. Connect the RF output of a video pattern generator (e.g. PM5418) to the antenna input.
2. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
3. Input a "100 IRE white" pattern to the television set.
4. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
5. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
6. Press the MENU LEFT/RIGHT keys to enter the WHITE TONE sub menu.
7. Use the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
8. Set the Minolta CA100 color analyzer (or equivalent) in RGB mode, and set all color temperature settings to their default values.
9. Place the color sensor of the meter in the middle of the screen.
10. Set the meter in "T-dUV-Y" mode, and set CONTRAST to make the light output "Y" on the meter 90 nit \pm 15%
11. Use the MENU LEFT/RIGHT keys to adjust the value of NORMAL GREEN and/or NORMAL BLUE.
12. When all desired changes to the WHITE TONE sub menu values are made, press the MENU button to return to the top level SDAM menu.
13. To ensure the WHITE TONE settings are saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

8.3.4 GEOMETRY

Introduction

The geometry alignment menu contains several items for correct picture geometry alignment.



CL 16532044_022.eps
140501

Figure 8-4 Geometry alignments

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a crosshatch test pattern to the television set.
3. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose PERSONAL or MOVIES picture mode.
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the GEOMETRY sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the GEOMETRY sub menu.
8. Use the MENU UP/DOWN keys to highlight either the HORIZONTAL sub menu or the VERTICAL sub menu.
9. Press the MENU LEFT/RIGHT keys to enter either the HORIZONTAL sub menu or the VERTICAL sub menu.
10. Use the MENU UP/DOWN keys to select items in the HORIZONTAL sub menu or the VERTICAL sub menu.
11. Use the MENU LEFT/RIGHT keys to adjust the values of items in the HORIZONTAL and VERTICAL sub menus.

12. When all desired changes to the HORIZONTAL and VERTICAL sub menu values are made, press the MENU button twice to return to the top level SDAM menu.
13. To ensure the GEOMETRY settings are saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

The following alignments can be performed in the GEOMETRY sub menu:

Horizontal Alignments:

- Horizontal Shift (HSH). Select Horizontal Shift to center the picture on the screen.
- Picture Width (PW). Aligns the width of the picture.

Vertical Alignments:

- Vertical slope (VSL). Aligns the picture so the proportions are the same at the top and bottom of the screen. This alignment must be performed first, before all other vertical alignments. Turning SBL, 'on' will assist in performing this alignment.
- Vertical Amplitude (VAM). Aligns the height of the picture (other vertical alignments are NOT compensated).
- Vertical S-Correction (VSC). Aligns the vertical linearity, so that the vertical intervals of the grid-patterns are the same over the entire height of the screen.
- Vertical Shift (VSH). Aligns the vertical center of the picture to the vertical center of the CRT. After performing this alignment, it may be necessary to perform the VAM alignment again.
- Service blanking (SBL). Turns the blanking of the lower half of the screen 'on' or 'off' (to be used in combination with the vertical slope alignment).

Methods of Adjustment**Vertical Amplitude and Position**

1. Select SERVICE BLANKING (SBL) and set it to 1. The lower half of the picture will be blanked.
2. Press the MENU UP/DOWN buttons to select VERTICAL SLOPE (VSL).
3. Align VSL to start the blanking exactly at the horizontal white line at the center of the test circle (align the bottom of the screen so that castellations just disappear).
4. Press the MENU UP/DOWN buttons to select SBL and set it back to 0. The full picture reappears.
5. Select VERTICAL AMPLITUDE (VAM) and align the picture height to approximately 13.0 - 13.1 blocks (align the top of the screen so that castellations just disappear).
6. Select VERTICAL SHIFT (VSH) and align for vertical centering of the picture on the screen.
7. Repeat the last two steps if necessary.

Horizontal Phase

1. Set PW to "0".
2. Select Horizontal Shift (HSH) to center the picture on the screen.

Horizontal and Vertical Shift Offset for NTSC (TRINOMA and PAL chassis)

1. Align the set for VSH and HSH (according to above mentioned procedures) with a PAL system signal.
2. Change the signal to NTSC system and adjust HORIZONTAL SHIFT OFFSET (H60) and VERTICAL SHIFT OFFSET (V60) to center the picture on the screen.
3. Repeat if necessary.

The table below lists the default GEOMETRY values for the different television sets.

Table 8-3 Default geometry values

Alignment	Description	13V	14RF	20V	20RF
PW 31	Picture Width	-	-	-	-
HSH	Horizontal Shift	35	35	35	35
VSL	Vertical Slope	35	35	35	35
VAM	Vertical Amplitude	26	26	26	26
VSC	Vertical S correction	23	23	23	23
VSH	Vertical Shift	35	35	35	35

8.3.5 AUDIO

Necessary measuring equipment:

- MTS (Multi-channel Television Sound) generator (e.g. Fluke 54200).
- AC millivolt meter.

ILA (Input Level Alignment)

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select ILA.
5. Apply a BTSC sound signal with a signal strength of 60 dBuV (1 mV_{rms}) to the aerial input. Measure the output on pin 16 (Main_outL) of IC7861 with an AC millivolt meter via a Low Pass Filter (R= 10 kohm, C= 1.5 nF, measure on the capacitor).
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to 106 mV_{rms} ± 2 mV_{rms} (default ILA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the ILA setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

LSA (Low Separation Alignment)

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select LSA.
5. Apply a 300 Hz BTSC sound signal with a signal strength of 60 dBuV (1 mV_{rms}) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivolt meter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default LSA value is "7" for stereo sets, and "0" for mono sets).
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the LSA setting is saved:

- Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
- Disconnect the television set from AC power for at least ten seconds.
- Reconnect the television set to AC power.
- Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

HSA (High Separation Alignment)

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select HSA.
5. Apply a 3 kHz BTSC sound signal with a signal strength of 60 dBuV (1 mV_{rms}) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivolt meter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default HSA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the HSA setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

9. Circuit Descriptions, List of Abbreviations, and IC Data Sheets

Index of this chapter:

- 9.1 Introduction
- 9.2 Source Selection
- 9.3 Audio
- 9.4 Video
- 9.5 Synchronization
- 9.6 Deflection
- 9.7 Power Supply
- 9.8 Control
- 9.9 Abbreviation List
- 9.10 IC Data Sheets

Notes:

- Only **new** circuits (compared to the L01.2 chassis) are described in this chapter. For the other circuit descriptions, see the manual of the L01.2L AA. This manual is available in different languages:
 - 3122 785 11800 = Spanish.
 - 3122 785 11820 = Portuguese.
- 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 block diagram in chapter 6, and/or the electrical diagrams in chapter 7. Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The "L03" chassis is a global TV chassis and is used for TV sets with screen sizes from 14 inch to 21 inch, in Super Flat and Real Flat executions. In comparison to its predecessor (the "L01"), this chassis is further simplified: it contains economized executions of the power supply, the video processing (microprocessor), and the audio processing. Due to a cost down action this chassis has some more simplified circuitry like the audio processing and some parts are fully omitted like top-control.

The standard architecture consists of a Main panel (called "family board") and a Picture Tube panel. The Main panel consists primarily of conventional components with some surface mounted devices in the audio and video processing part.

The functions for video processing, microprocessor (P), and CC/Teletext (TXT) decoder are combined in one IC (TDA937x), the so-called Ultimate One Chip (UOC). This chip is mounted on the component side of the main panel.

The L03 can be divided into two basic systems, i.e. mono and stereo sound. While the audio processing for the mono sound is done in the audio block of the UOC, external audio processing ICs are used for stereo sets.

The tuning system features 181 channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I2C bus. The memory IC retains the settings for favorite stations, customer-preferred settings, and service / factory data.

The on-screen graphics and closed caption decoding are done within the microprocessor where they are added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

9.2 Source Selection

The Source Select is divided mainly into two types, the "Mono Source Select" and the "Stereo Source Select".

- The Mono Source Select, both audio and video, will be done entirely by the UOC and will only be able to select one external audio source.
- As for the Stereo Source Select, the Panasonic IC, which is for BTSC decoding also, has 2 audio source inputs used for source selection, whereas the UOC will take care of the video selection.

9.2.1 Switching Function for Stereo I/O

Audio / Video Source Selection

The video source selection is done by the UOC. The video setting for LATAM / NAFTA is rather straightforward: a so-called "WYSIWYG" (what you see on the screen, is what you get from the video output).

There is only a front input available therefore the source selection is basically limited to the UOC.

9.2.2 Switching Function for Mono I/O

For the Mono configuration, only one input pin is available for the UOC.

Video Source Selection

The video switching is similar to the section above.

Audio Source Selection

The audio input (L1_IN) is connected to pin 35 of the UOC.

9.3 Audio

This chassis is targeted for the NAFTA market with Mono, Stereo, or SAP sound system.

For the "basic" Mono and Stereo sets, sound processing includes Volume control and AVL.

For stereo sets, IC TDA9853H is the BTSC audio signal decoder and audio processing.

9.3.1 Processing

This chassis uses the Intercarrier demodulation concept (one SAW filter for both video and audio). The base band (full bandwidth) BTSC audio signal from the UOC is fed to pin 14 of the stereo decoder. The Pilot detection and SAP detection registers indicate the type of transmitted audio signal such as Mono, Stereo, and/or SAP. Based on this indication, the software controls will help to output the appropriate audio signal at pins 21 and 22. The controls are done by the I2C bus connected to pins 18 and 19.

Internal or External audio (pins 2, 3, 23, and 24) can also be selected by the source selection register. For the selected audio source, the AGC function can be applied. The output is a fixed level output. The volume control function is available via the power amplifier (AN7522/23).

9.3.2 Amplifier

The output is fed to the audio amplifier (IC7901 for stereo sets or IC7902 for mono sets). This is a BTL amplifier (Bridge Tied Load), which is actually a class AB amplifier with four transistors for each channel. The advantage of BTL over the standard Class AB amplifier is that it requires a lower supply voltage to deliver a higher output.

The volume level is controlled at this IC (pin 9) by the "VOLUME" control line coming from the microprocessor. After amplification, the audio signal is sent to the speaker / headphone output connector.

9.3.3 AVL (Automatic Volume Limiting)

The "Mono AVL" function operates via the UOC. During channel change and source selection, the AVL bit is to be switched "off" and then can resume to the previous state ("on/off") as shown in the timing diagram below.

The "Stereo AVL" function operates via the AGC control of IC TDA9853H. During channel change and source selection, the AGC function is to be switched "off" and then can resume to the previous state ("on/off") as shown in timing diagram below.

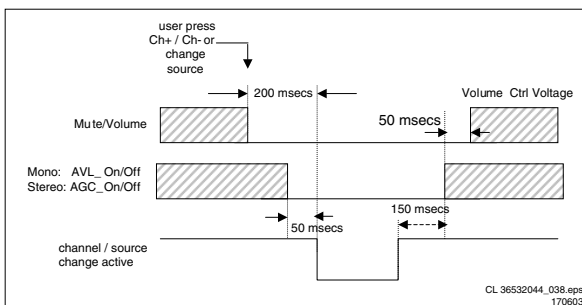


Figure 9-1 AVL timing diagram

9.3.4 Mute

The TV set must mute:

- Whenever a "User Mute" is activated.
- Whenever there is a channel change, RF to RF, RF to AV, AV to RF, and AV to AV (if any). In channel change, MUTE must be activated first before any other activity and UNMUTE must be done after every other activity has been completed.
- Whenever there is a loss in the signal.
- During cold or warm start, MUTE must be activated until all initialization processes are finished.
- When the set is going to STANDBY, MUTE must be activated first before any other activities.

Note:

1. MUTE mentioned above applies for the audio amplifier mute (= PWM volume control mute).
2. The first condition does not apply for the UOC, IC TDA9853H.
3. Above conditions refers to both mono and stereo sets.

9.4 Video

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

This chassis uses the TDA937x family Ultimate One Chip TV processor (UOC), which is mounted in an SDIP 64 envelope. The various versions of the UOC series combine the function of a video processor together with a microcontroller and US Closed Caption/TXT decoder.

9.5 Synchronization

Inside IC7200 (part D) the vertical and horizontal sync pulses are separated. These "H" and "V" signals are synchronized

with the incoming CVBS signal. They are then fed to the H- and V-drive circuits and to the OSD/TXT circuit for synchronization of the On Screen Display and Teletext (CC) information.

9.6 Deflection

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

The L03 range consists of TV sets spanning from 14 to 21 inch using the same chassis architecture. For the chassis architecture, the CRTs used do not need East/West Correction. Therefore the geometry correction needed is horizontal shift, vertical slope, vertical amplitude, vertical S-correction, vertical shift and vertical zoom for geometry corrections (with the appropriate offsets required for NTSC channels on PAL sets).

9.7 Power Supply

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

9.7.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behavior has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover, the supply runs cooler and safety is enhanced.

The control IC in this power supply is the TEA1506 (L01=TEA1507). Unlike the TEA1507 control IC, the TEA1506 has no internal high voltage start-up source, and therefore needs to be started by means of an external bleeder resistor (R3506 and R3507). The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.

The switching regulator IC 7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.

The "MainSupply" line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540 / 6540. This regulator drives the feedback opto coupler 7515 to set the feedback control voltage on pin 6 of 7520.

The power supply in the set is "on" any time AC power is connected to the set.

9.7.2 Derived Voltages

The voltages supplied by the secondary windings of T5520 are:

- "MainSupply" for the horizontal output.
- "V_aux/V_audio" for the audio circuit.
- An optional "DVD_Supply" for future extensions.

Other voltages are provided by the LOT. It supplies -12 V, the tuner voltage, the filament voltage, and the +160 V source for the video drive. These secondary voltages of the LOT are monitored by the "EHT" lines.

9.8 Control

The microprocessor part of the UOC has the complete control and CC/Teletext processing on board. The User menu's and Service Default / Alignment Mode's are generated by the uP. Communication to other ICs is done via the I2C-bus.

9.8.1 I2C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (Tuner, NVM, Audio ICs, etc.) by means of the I2C-bus. An internal I2C-bus is used to control other signal processing functions, like video processing, sound IF, vision IF, synchronization, etc.

9.8.2 User Interface

The chassis uses a remote control with RC5 protocol. The incoming signal is connected to pin 67 of the UOC. The keyboard, connected to UOC pin 8, can also control the set. Button recognition is done via a voltage divider. The front LED (6691) is connected to an output control line of the microprocessor (pin 11). It is activated to provide the user information about whether or not the set is working correctly (e.g., responding to the remote control, normal operation (USA only) or fault condition)

9.8.3 I/O Selection

For the control of the input and output selections, there are three lines:

STATUS1

This signal provides information to the microprocessor on whether a video signal is available on the SCART1 AV input and output port (only for Europe). This signal is not connected in LATAM/NAFTA sets.

STATUS2

This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (only for Europe). For sets with an SVHS input it provides the additional information if a Y/C or CVBS source is present. The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.

SEL_AV1_AV2

This is the source select control signal from the microprocessor. This control line is under user control or can be activated by the other two control lines.

9.8.4 Power Supply Control

The Power Supply is interfaced with the microcontroller (UOC) to provide the power supply with the control signals required for burst mode operation in standby and to vary the picture width by adjusting V_BAT.

The microprocessor part is supplied with 3.3 V and 8 V. The 3.3 V is derived from the "V_aux/V_audio" voltage via a 3V3 stabilizer (7493). The 8 V is derived from the 33V tuner voltage via TS7491 and TS7496.

Two signals are used to control the power supply: STD_CON and PW_ADJ.

STD_CON

This signal is generated by the microprocessor when over-current takes place at the "Main" line. This is done to enable the power supply into standby burst mode, and to enable this mode during a protection.

This is of logic "high" (3.3 V) under normal operation of the TV. When the TV set is in Standby (or fault) condition, this signal is a continuous pulse of 5 ms "low" (0 V) and 5 ms "high".

Note: In the L01 chassis this was inverted.

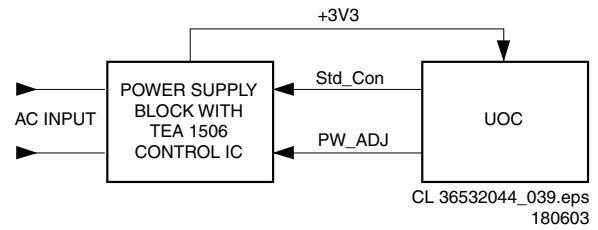


Figure 9-2 Block diagram of power supply interface with UOC

PW_ADJ

This signal is generated by the UOC through a PWM port. This PWM port is configured in Push Pull mode to generate a square wave signal of 0 to 100% duty cycle with a default value of 50% duty cycle.

PW_ADJ will eliminate tolerance and can adjust the picture wide slightly.

9.8.5 Protection Events

Several protection events are controlled by the UOC. In case one of these protections is activated, the set will go to "Standby" mode.

Deflection protections

The main protections for deflection are X-ray protection, frame amplifier failure detection, black current loop stability protection, and +8V auxiliary supply protection. For X-ray protection, the X-ray detection bit, XDT, must always be set to "1" (detection mode). High EHT protection must be triggered via software upon detection of the XPR bit switching to "1". A suitable number of checks are done before putting the set into protection mode in order to prevent false triggering. For service requirements, the Enable Vertical Guard (RGB blanking), EVG, can be disabled (set to "0") although this is not necessary.

The following bits are monitored:

- SUP (Supply voltage indication)
- XPR (X-ray protection)
- EVG (Enable Vertical Guard)
- NDF (Output Vertical Guard)
- BCF (Black Current Failure)

I2C protection

To check whether all I2C ICs are functioning.

9.9 Abbreviation List

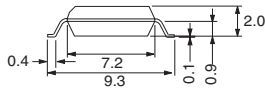
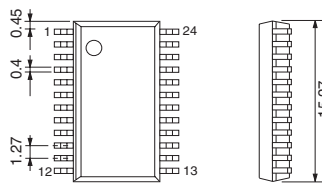
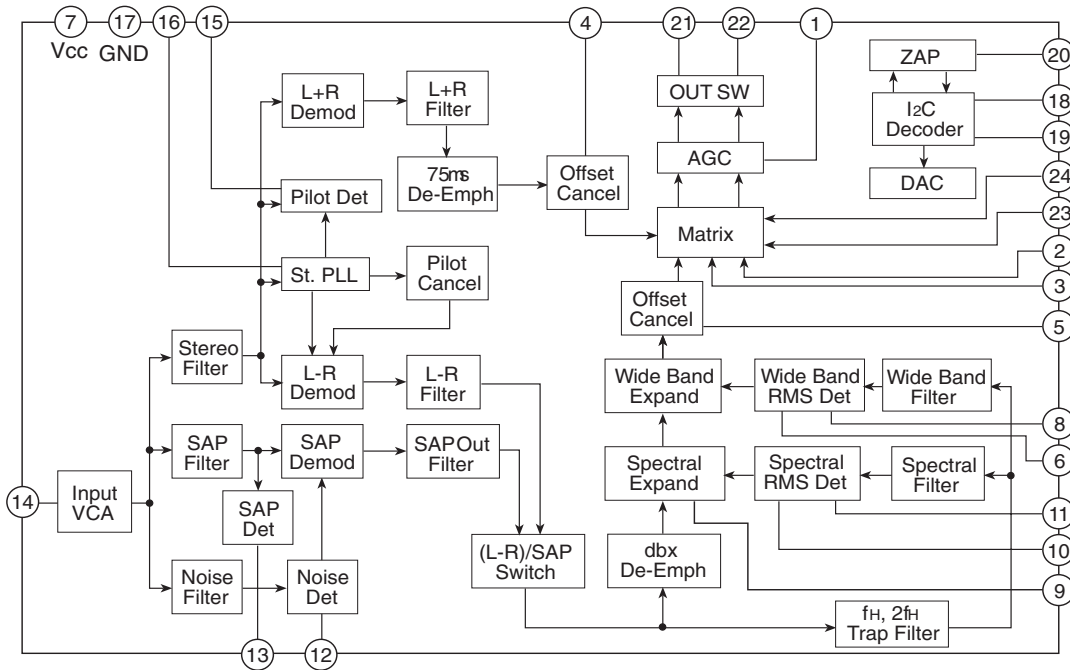
		iTV	Institutional TV
		LATAM	Latin American countries like Brazil, Argentina, etc.
2CS	2 Carrier (or Channel) Stereo	LED	Light Emitting Diode
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
ADC	Analogue to Digital Converter	LS	Large Screen or Loudspeaker
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
AFT	Automatic Fine Tuning	NC	Not Connected
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box	NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
AM	Amplitude Modulation	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)
AP	Asia Pacific		
AR	Aspect Ratio: 4 by 3 or 16 by 9		
ATS	Automatic Tuning System		
AV	External Audio Video		
AVL	Automatic Volume Leveler	NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
BCL	Beam Current Limitation	OB	Option Bit
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz	OC	Open Circuit
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries	OP	Option Byte
		OSD	On Screen Display
		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)
CC	Closed Caption		
ComPair	Computer aided rePair	PCB	Printed Circuit board
CRT	Cathode Ray Tube or picture tube	PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
CSM	Customer Service Mode		
CTI	Color Transient Improvement: manipulates steepness of chroma transients	POR	Power-On Reset
CVBS	Composite Video Blanking and Synchronization	PTP	Picture Tube Panel (or CRT-panel)
CVI	Component Video Input	RAM	Random Access Memory
DAC	Digital to Analogue Converter	RC	Remote Control handset
DBX	Dynamic Bass Expander or noise reduction system in BTSC	RGB	Red, Green, and Blue video signals
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz	ROM	Read Only Memory
DFU	Direction For Use: description for the end user	SDAM	Service Default / Alignment Mode
		SAP	Second Audio Program
		SC	Sandcastle: pulse derived from sync signals
DNR	Dynamic Noise Reduction	S/C	Short Circuit
DSP	Digital Signal Processing	SCL	Serial Clock
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode	SDA	Serial Data
		SECAM	SEquence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers = 4.406250 MHz and 4.250000 MHz
DVD	Digital Versatile Disc	SIF	Sound Intermediate Frequency
EEPROM	Electrically Erasable and Programmable Read Only Memory	SS	Small Screen
EHT	Extra High Tension	STBY	Standby
EHT-INFO	Extra High Tension information	SVHS	Super Video Home System
EPG	Electronic Programming Guide	SW	Software
EU	Europe	THD	Total Harmonic Distortion
EW	East West, related to horizontal deflection of the set	TXT	Teletext
EXT	External (source), entering the set via SCART or Cinch	uP	Microprocessor
		UOC	Ultimate One Chip
FBL	Fast Blanking: DC signal accompanying RGB signals	V	Vertical sync signal
		V_BAT	Main supply voltage for the deflection stage (mostly 141 V)
FILAMENT	Filament of CRT	V-chip	Violence Chip
FM	Field Memory or Frequency Modulation	VCR	Video Cassette Recorder
H	Horizontal sync signal	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
HP	Headphone		
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	XTAL	Quartz crystal
I2C	Integrated IC bus	YC	Luminance (Y) and Chrominance (C) signal
IF	Intermediate Frequency		
IIC	Integrated IC bus		

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

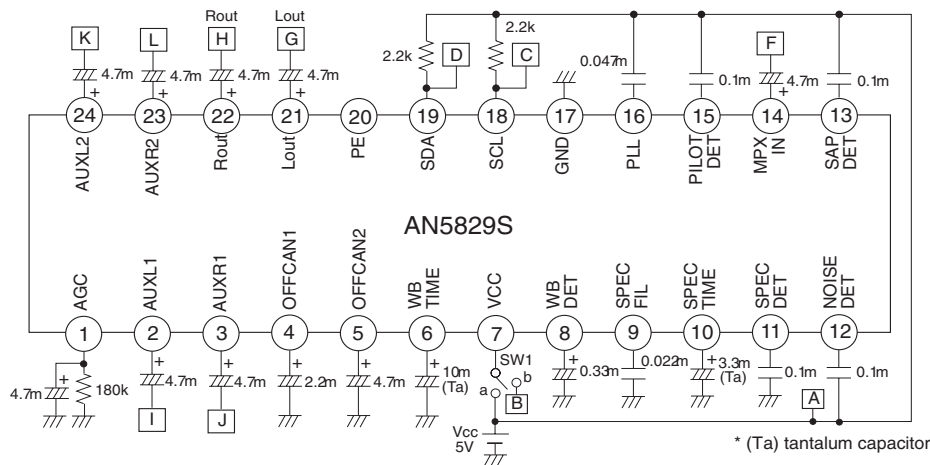
9.10.1 Diagram A5, AN5829S (IC7841)

Block Diagram



24-Lead PANAFLAT Package (SO-24D)

Test Circuit



* (Ta) tantalum capacitor

CL 36532044_040.eps
171203

Figure 9-3 Internal Block Diagram and Pin Configuration

10. Spare Parts List

Sets Listed

8670 000 20382	13MT1431/17
8670 000 21995	13MT1532/17
8670 000 20383	20MS2331/17
8670 000 20384	20MT1331/17
8670 000 23681	20MT1336/37
8670 000 23677	20MT2336/37

Set Level

Various

9965 000 34600	HS 2P 1015-22 450/10
9965 000 34601	HS 2P 1015-22 450/10
1099▲ 9965 000 23337	A51JFC82X200
1099▲ 9965 000 34954	21" CRT A51MAE88X18
1099▲ 9301 843 10329	A51EHW135X47
1099▲ 9322 207 01682	A51AEZ90X45
1099▲ 9965 000 34956	CRT A51CFAA00X02

5203	9965 000 27688	Degaussing Coil
5213	9965 000 26025	Loudsp. 25Ω 1.5W

Software (See Product Survey)

13MT1431/17

7200	9352 814 55112	TDA9377PS/N3/A/1906
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13MT1532/17

7200	9352 814 55112	TDA9377PS/N3/A/1906
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20MS2331/17

7200	9352 814 54112	TDA9377PS/N3/A/1905
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20MT1331/17

7200	9352 814 55112	TDA9377PS/N3/A/1906
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20MT1336/37

7200	9352 814 55112	TDA9377PS/N3/A/1906
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20MT2336/37

7200	9352 814 54112	TDA9377PS/N3/A/1905
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Mono Carrier [A]

Various

9965 000 27648	220nF 10% 16V
9965 000 27657	NTC 4.7Ω 20%
9965 000 34581	HS 8P 2468-24 450mm
1000 9965 000 23791	Tuner TEDH9-251A
1001 9965 000 23794	SAW M1971M
1101 9965 000 27369	RCA Socket
1102 9965 000 27637	RCA Socket
1201 9965 000 23325	Crystall 4.5MB
1402 9965 000 32105	Connector VH-2A 2p
1500 9965 000 23784	Fuse holder
1501 9965 000 23784	Fuse holder
1504 9965 000 27655	1μF 20% 16V
1511 9965 000 27274	PIN BASE *3 VH-3A
1512 9965 000 27274	PIN BASE *3 VH-3A
1515 9965 000 23783	Relay 112DM 12V
1600 9965 000 17540	Switch
1601 9965 000 17540	Switch
1602 9965 000 17540	Switch
1603 9965 000 17540	Switch
1606 9965 000 17540	Switch
1621 9965 000 23770	Crystal 12MHZ
1861 9965 000 28013	Resonator 514.5kHz
1901 9965 000 17468	Socket Ear Phone

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2001	9965 000 23749	100nF 10% 16V 0805
2002	9965 000 14069	100μF 20% 16V
2003	9965 000 17525	22pF 5% 50V
2004	9965 000 17525	22pF 5% 50V
2005	9965 000 23792	47nF 10% 16V 08
2006	9965 000 17508	470μF 20% 10V
2007	9965 000 14075	10μF 20% 50V
2123	9965 000 17528	1μF +80/-20% 16V 0805
2181	9965 000 17525	22pF 5% 50V
2182	9965 000 17527	330pF 5% 50V
2183	9965 000 17527	330pF 5% 50V
2201	9965 000 27870	4700pF 10% 50V
2202	9965 000 17527	330pF 5% 50V
2202	9965 000 23739	820pF 5% 50V 0805
2203	9965 000 17529	470nF 10% 16V 0805
2205	9965 000 27660	10μF 20% 25V
2205	9965 000 33082	10μF 10% 25V
2206	9965 000 23766	33pF 50V 0805
2206	9965 000 27870	4700pF 10% 50V
2207	9965 000 23749	100nF 10% 16V 0805
2208	9965 000 23749	100nF 10% 16V 0805
2209	9965 000 23749	100nF 10% 16V 0805
2210	9965 000 23742	220nF 10% 16V 0805
2212	9965 000 23742	220nF 10% 16V 0805
2405	9965 000 17512	47μF 20% 160V
2408	9965 000 17516	0.56μF 5% 250V
2408	9965 000 30716	0.47μF 5% 250V
2408	9965 000 35636	FET STP5NK50ZFP
2420	9965 000 23749	100nF 10% 16V 0805
2421	9965 000 23749	100nF 10% 16V 0805
2423	9965 000 23824	15nF 5% 1.6kV
2423	9965 000 35637	15nF 5% 1.6kV
2423	9965 000 37633	13nF 5% 1.6kV
2424	9965 000 17514	470pF 10% 2kV
2424	9965 000 22813	10nF 10% 2kV
2424	9965 000 25698	1800pF 10% 2kV
2424	9965 000 27868	1800pF 10% 2kV
2426	9965 000 17522	1nF 50V 0805
2427	9965 000 23749	100nF 10% 16V 0805
2428	9965 000 23748	47μF 20% 16V
2429	9965 000 23742	220nF 10% 16V 0805
2441	9965 000 14080	33nF 5% 50V
2441	9965 000 17521	22nF 5% 63V
2444	9965 000 14599	470μF 20% 16V
2446	9965 000 14599	470μF 20% 16V
2447	9965 000 24628	22μF 250V +/-20%
2452	9965 000 17686	22nF +80%-20% 50V
2452	9965 000 23749	100nF 10% 16V 0805
2455	9965 000 27860	10μF +/-20% 16V
2457	9965 000 17562	470pF 10% 500V
2460	9965 000 34579	CAP.PE 250V 68NF /5%
2461	9965 000 23799	10nF 5% 50V
2462	9965 000 23799	10nF 5% 50V
2463	9965 000 14076	47μF 20% 50V
2464	9965 000 23743	470pF 50V 0805
2465	9965 000 23797	10μF 20% 160V
2470	9965 000 14080	33nF 5% 50V
2473	9965 000 23743	470pF 50V 0805
2481	4822 126 13221	100pF 2% 63V
2482	9965 000 17528	1μF +80/-20% 16V 0805
2483	9965 000 23767	4.7μF +80/-20% 16V
2484	9965 000 23749	100nF 10% 16V 0805
2485	9965 000 17528	1μF +80/-20% 16V 0805
2486	9965 000 27870	4700pF 10% 50V
2487	9965 000 23765	22nF 10% 50V
2488	9965 000 27872	0.1μF 5% 100V
2489	9965 000 17522	1nF 50V 0805
2490	9965 000 23767	4.7μF +80/-20% 16V
2491	9965 000 17508	470μF 20% 10V
2492	9965 000 23763	22μF 20% 50V
2493	9965 000 17508	470μF 20% 10V
2494	9965 000 27871	33μF 20% 16V
2494	9965 000 34610	33μF 20% 16V
2496	9965 000 17522	1nF 50V 0805
2497	9965 000 17522	1nF 50V 0805
2500	9965 000 23317	0.22μF 20% 250V
2501	9965 000 24631	2200pF 10% 1kV
2502	9965 000 24631	2200pF 10% 1kV
2504	9965 000 15785	220μF 20% 200V
2515	9965 000 23777	1.5pF 20% 250V
2520	9965 000 17523	10nF +80%-20% 50V
2521	4822 124 81151	22μF 50V
2521	9965 000 33958	22μF 20% 50V
2522	9965 000 17522	1nF 50V 0805
2523	9965 000 27868	1800pF 10% 2kV
2523	9965 000 27928	CAP CER 1800PF/ /-10%

2525	9965 000 23779	680pF 5% 50V 0805
2527	9965 000 23778	56pF 5% 50V
2528	4822 124 81151	22μF 50V
2540	9965 000 27869	15nF 10% 50V 0805
2541	9965 000 27870	4700pF 10% 50V
2542	9965 000 17530	470nF +80/-20% 16V
2543	9965 000 17522	1nF 50V 0805
2560	9965 000 30713	2.2nF 10% 50V
2561	4822 124 40196	220μF 20% 16V
2562	9965 000 24631	2200pF 10% 1kV
2564	9965 000 17512	47μF 20% 160V
2580	9965 000 15182	47μF 20% 25V
2584	9965 000 23786	220pF 10% 1kV
2602	9965 000 23766	33pF 50V 0805
2603	9965 000 23766	33pF 50V 0805
2604	9965 000 27860	10μF /-20% 16V
2605	9965 000 23749	100nF 10% 16V 0805
2607	9965 000 23764	0.1μF 10% 50V 0805
2608	9965 000 17528	1μF +80/-20% 16V 0805
2612	9965 000 14070	220μF 20% 16V
2615	9965 000 23739	820pF 5% 50V 0805
2616	9965 000 27860	10μF /-20% 16V
2641	9965 000 17522	1nF 50V 0805
2642	9965 000 17522	1nF 50V 0805
2643	9965 000 17526	220pF 5% 50V
2691	9965 000 15805	100μF 20% 10V
2861	9965 000 28014	220nF 80/-20% 25V
2862	9965 000 23838	2.2μF 20% 16V
2864	9965 000 28015	22μF 20% 50V
2865	9965 000 28015	22μF 20% 50V
2866	9965 000 23838	2.2μF 20% 16V
2867	9965 000 23839	1.8nF 10% 50V
2868	9965 000 23836	150pF 5% 50V
2869	9965 000 17541	0.068μF 5% 63V
2870	9965 000 17541	0.068μF 5% 63V
2871	9965 000 23836	150pF 5% 50V
2872	9965 000 23839	1.8nF 10% 50V
2873	9965 000 23838	2.2μF 20% 16V
2874	9965 000 14036	100μF 20% 25V
2875	9965 000 14036	100μF 20% 25V
2876	9965 000 14039	4.7μF 20% 50V
2877	9965 000 14075	10μF 20% 50V
2878	9965 000 14037	1μF 20% 50V
2879	9965 000 27870	4700pF 10% 50V
2880	9965 000 22456	22nF 10% 50V
2883	9965 000 14599	470μF 20% 16V
2884	9965 000 28015	22μF 20% 50V
2885	9965 000 15113	220nF 5% 50V
2886	9965 000 23749	100nF 10% 16V 0805
2891	9965 000 23749	100nF 10% 16V 0805
2903	9965 000 14037	1μF 20% 50V
2904	9965 000 17528	1μF +80/-20% 16V 0805
2904	9965 000 17530	470nF +80/-20% 16V
2906	9965 000 17530	470nF +80/-20% 16V
2908	9965 000 14039	4.7μF 20% 50V
2909	9965 000 14075	10μF 20% 50V
2950	9965 000 17567	1.5nF 10% 50V
2951	9965 000 23739	820pF 5% 50V 0805
2952	9965 000 23739	820pF 5% 50V 0805
2981	9965 000 14075	10μF 20% 50V
2982	9965 000 23743	470pF 50V 0805
2983	9965 000 14075	10μF 20% 50V
2984	9965 000 23743	470pF 50V 0805

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3001	4822 117 11139	1.5kΩ 1% 0.1W
3002	9965 000 17481	8.2kΩ 5% 0.1W
3003	4822 117 11373	100Ω 1% 0805
3004	4822 117 11373	100Ω 1% 0805
3005	9965 000 14049	100Ω 5% 0.16W
3181	4822 111 31025	75Ω 5% 0.16W
3182	9965 000 14049	100Ω 5% 0.16W
3183	9965 000 12485	150Ω 5% 0.16W
3184	9965 000 13180	47kΩ 5% 0.1W
3185	9965 000 12485	150Ω 5% 0.16W
3186	9965 000 13180	47kΩ 5% 0.1W
3201	4822 051 20392	2.9kΩ 5% 0.1W
3201	4822 117 12955	2.7kΩ 1% 0.1W 0805
3202	4822 117 11373	100Ω 1% 0805
3203	4822 051 20102	1kΩ 5% 0.1W
3204	9965 000 12623	82Ω 5% 0.16W
3205	9965 000 15050	270Ω 5% 0.16W
3206	4822 051 20102	1kΩ 5% 0.1W
3207	4822 051 20391	390Ω 5% 0.1W
3208	4822 053 10561	560Ω 5% 1W
3209	9965 000 17480	470Ω 5% 0.1W
3210	9965 000 14049	100Ω 5% 0.16W
3231	4822 051 20561	560Ω 5% 0.1W

7521	9322 194 20687	STP5NK50ZFP
7523	4822 130 60373	BC856B
7540	4822 130 40959	BC547B
7541	4822 130 11155	PDTC114ET
7580	5322 130 60159	BC846B
7601	3198 010 44010	PDTA114ET
7641	9965 000 27875	EEPROM M24C16
7861	9965 000 23835	TDA9853H
7901	9322 181 41682	AN7522N
7902	9322 181 42682	AN7523N

CRT Panel [B]

Various

1302	9965 000 34599	SOCKET CRT
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2300	9965 000 17527	330pF 5% 50V
2300	9965 000 23806	390pF 5% 50V
2301	9965 000 23806	390pF 5% 50V
2302	9965 000 23806	390pF 5% 50V
2303	9965 000 22813	10nF 10% 2kV
2304	9965 000 34598	220nF 5% 250V

—W—

3300	9965 000 23309	18k Ω 5% 3W
3301	9965 000 32119	1.5k Ω 20% 1/2W
3303	4822 117 13577	330 Ω 1% 1.25W 0805
3304	9965 000 23309	18k Ω 5% 3W
3305	9965 000 32119	1.5k Ω 20% 1/2W
3307	4822 117 13577	330 Ω 1% 1.25W 0805
3308	9965 000 23309	18k Ω 5% 3W
3309	9965 000 32119	1.5k Ω 20% 1/2W
3311	4822 051 20391	390 Ω 5% 0.1W
3311	4822 117 13577	330 Ω 1% 1.25W 0805
3313	9965 000 27252	Fuse 68 Ω 5% 1/3W
3318	9965 000 27639	Fuse 220 Ω 5% 1/2W
3319	9965 000 32119	1.5k Ω 20% 1/2W
4300	9965 000 17478	0 Ω 5% 0.1W
4301	9965 000 17478	0 Ω 5% 0.1W
4302	9965 000 17478	0 Ω 5% 0.1W
4303	9965 000 17478	0 Ω 5% 0.1W
4304	9965 000 17478	0 Ω 5% 0.1W
4305	9965 000 17478	0 Ω 5% 0.1W
4306	9965 000 17478	0 Ω 5% 0.1W

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6301	9340 255 30135	BAS216
6307	9340 255 30135	BAS216
6318	9965 000 32235	BZX384-C8V2



7308	4822 130 41782	BF422
7310	4822 130 41782	BF422
7312	4822 130 41782	BF422
7313	4822 130 41782	BF422
7314	9965 000 27851	BF423 (PNP)
7315	4822 130 41782	BF422
7316	9965 000 27851	BF423 (PNP)
7317	4822 130 41782	BF422
7318	9965 000 27851	BF423 (PNP)

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- New models added.
- Information about 'Blinking LED' removed.
- Information about how to enter SDAM mode changed.
- Option Codes updated.
- Block Diagrams and Panel Layouts updated.
- Some small text changes made.
- New Spare Parts List added.