Colour Television

Chassis

L04E

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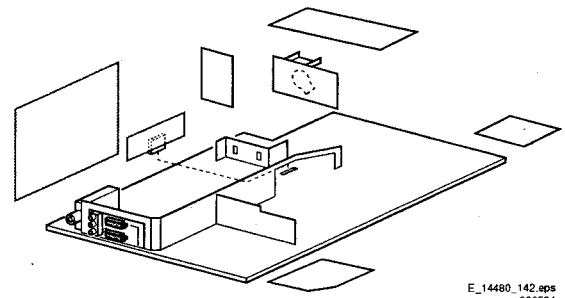
Service
Service
Service



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ServiceManual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Notes:
- Described specifications are valid for the *whole* product range.
- Figures below can deviate slightly from the actual situation, due to different set executions.

1.1 Technical Specifications

1.1.1 Vision

Display type	: DV-CRT-RF
	: DV-CRT-FSQ
	: DV-CRT-SF
Screen size	: 21" (55 cm), 4:3
	: 24" (61 cm), 16:9
	: 25" (63 cm), 4:3
	: 28" (70 cm), 4:3
	: 29" (72 cm), 4:3
	: 32" (82 cm), 16:9
Tuning system	: PLL
TV Colour systems	: PAL B/G, B/H, D/K, I
	: SECAM
	: SECAM B/G, D/K, L/L'
Video playback	: NTSC
Channel selections	: 100 presets
	: UVSH
Aerial input	: 75 ohm, Coax
	: IEC-type

1.1.2 Sound

Sound systems	: NICAM Stereo
Maximum power	: 2x10/ 2x5 W_rms (int.)

1.1.3 Miscellaneous

Power supply:	
- Mains voltage	: 220 - 240 V_ac
- Mains frequency	: 50/60 Hz
Ambient conditions:	
- Temperature range	: +5 to +40 deg. C
- Maximum humidity	: 90 % R.H.
Power consumption	
- Normal operation	: from 60 W (21")
	: to 91 W (32")
- Standby	: < 1 W

1.2 Connections

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

1.2.1 Side Connections

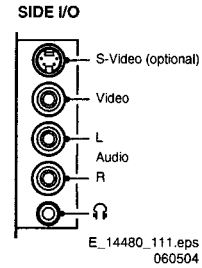


Figure 1-1 Side I/O

SVHS: Y/C - In (Hosiden) (optional)

1	- Ground	Gnd
2	- Ground	Gnd
3	- Y	1 V_pp / 75 ohm
4	- C	0.3 V_pp / 75 ohm

Audio / Video In

Ye	- Video (CVBS)	1 V_pp / 75 ohm
Wh	- Audio - L	0.5 V_rms / 10 kohm
Rd	- Audio - R	0.5 V_rms / 10 kohm
Bk	- Headphone	8 - 600 Ohm / 4 mW

1.2.2 Rear Connections

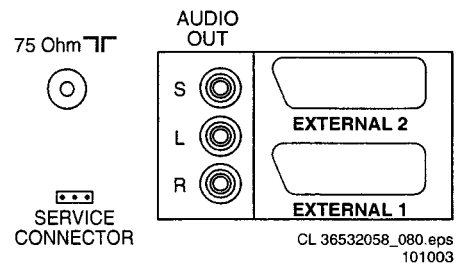


Figure 1-2 Rear connections

Aerial In

	- F-type	Coax, 75 ohm

Audio Out

1	- Subwoofer	Var. level (optional)
Wh	- Audio - L	0.5 V_rms / 1 kohm
Rd	- Audio - R	0.5 V_rms / 1 kohm

External 1: RGB/YUV - In and CVBS - In/Out

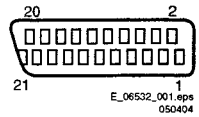


Figure 1-3 SCART connector

1	- Audio - R	0.5 V_rms / 1 kohm	⊖→
2	- Audio - R	0.5 V_rms / 10 kohm	⊖
3	- Audio - L	0.5 V_rms / 1 kohm	⊖→
4	- Audio - gnd	Ground	⏚
5	- Blue - gnd	Ground	⏚
6	- Audio - L	0.5 V_rms / 10 kohm	⊖
7	- Blue/U - in	0.7 V_pp / 75 ohm	⊖
8	- CVBS - status	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	- Green - gnd	Ground	⏚
10	- n.c.		
11	- Green/Y - in	0.7 V_pp / 75 ohm	⊖
12	- n.c.		
13	- Red - gnd	Ground	⏚
14	- FBL - gnd	Ground	⏚
15	- Red/V - in	0.7 V_pp / 75 ohm	⊖
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 ohm	⊖
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS - out	1 V_pp / 75 ohm	⊖→
20	- CVBS - in	1 V_pp / 75 ohm	⊖
21	- Shielding	Ground	⏚

External 2: CVBS- In and SVHS - In

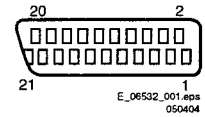


Figure 1-4 SCART connector

1	- Audio - R	0.5 V_rms / 1 kohm	⊖→
2	- Audio - R	0.5 V_rms / 10 kohm	⊖
3	- Audio - L	0.5 V_rms / 1 kohm	⊖→
4	- Audio - gnd	Ground	⏚
5	- Blue - gnd	Ground	⏚
6	- Audio - L	0.5 V_rms / 10 kohm	⊖
7	- n.c.		
8	- CVBS - status	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	- Green - gnd	Ground	⏚
10	- n.c.		
11	- n.c.		
12	- n.c.		
13	- Red - gnd	Ground	⏚
14	- FBL - gnd	Ground	⏚
15	- YC-C - in	0.7 V_pp / 75 ohm	⊖
16	- n.c.		
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS - out	1 V_pp / 75 ohm	⊖→
20	- Y/CVBS - in	1 V_pp / 75 ohm	⊖
21	- Shielding	Ground	⏚

1.3 Chassis Overview

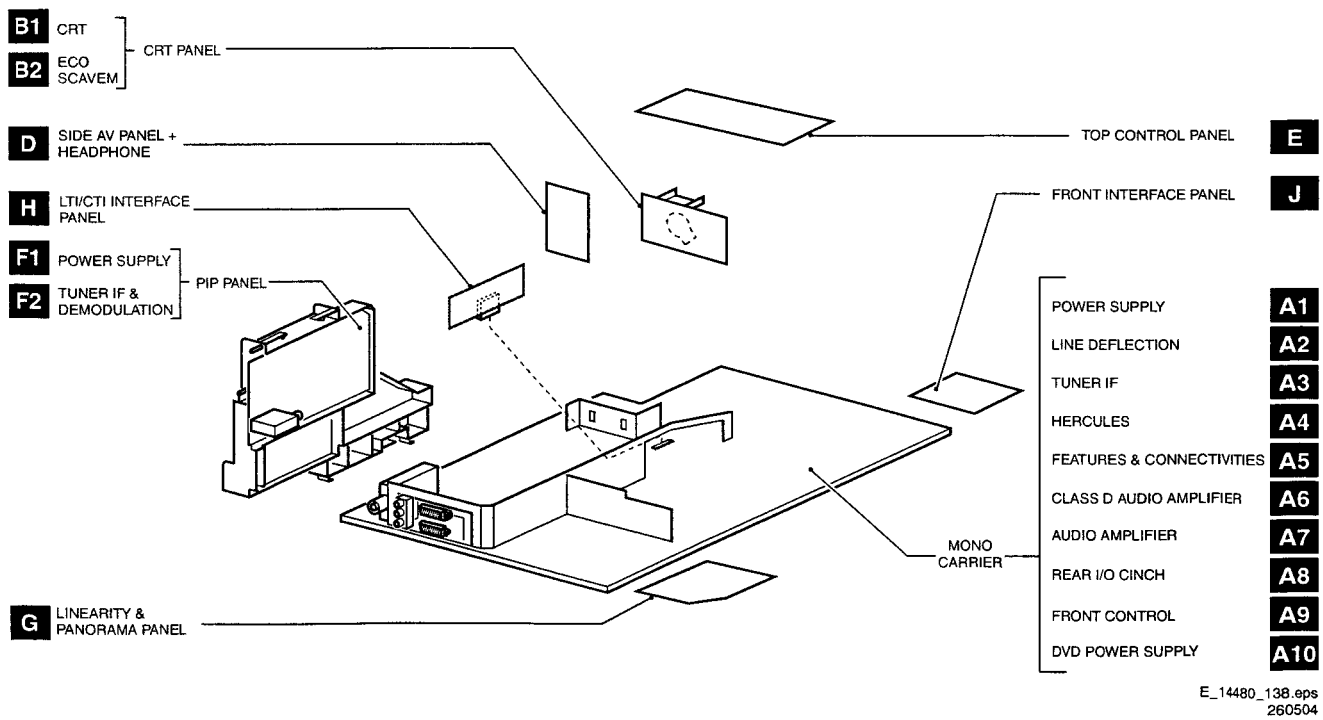


Figure 1-5 PWB location

2. Safety and Maintenance Instructions, Warnings, and Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Due to the chassis concept, a very large part of the circuitry (incl. deflection) is 'hot'. Therefore, connect the set to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, you must return the set 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 is flowing. 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 cord for external damage.
- Check the strain relief of the mains 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 plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the mains cord and connect a wire between the two pins of the mains plug.
  2. Turn on the main power switch (keep the mains cord unplugged!).
  3. Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch the TV 'off' and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

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 Fig. 2-1, 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).

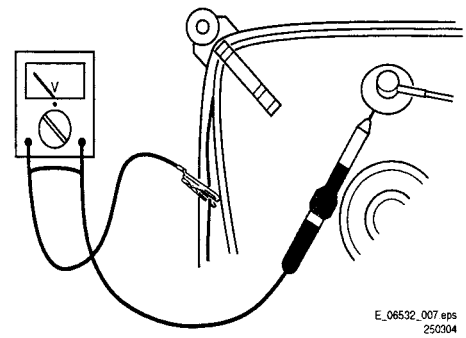


Figure 2-1 Discharge picture tube

- 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 potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and ground cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. We do not recommend adjusting this unit during repair.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is 'on'.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.

- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
- 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.

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 expressed in micro-farads (µ= x 10^-6), nano-farads (n= x 10^-9), or pico-farads (p= x 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 Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

2.4.3 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 - 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.
- **Before powering up the TV set with the back cover off** (or on a test fixture), attach a clip lead to the CRT DAG ground and to a screwdriver blade that has a well insulated handle. After the TV is powered "on" and high voltage has developed, probe the anode lead with the blade, starting at the case of the High Voltage Transformer (flyback - IFT). Move the blade to within two inches of the connector of the CRT. **If there is an arc, you found it the easy way, without getting a shock!** If there is an arc to the screwdriver blade, replace the part that is causing the problem: the High Voltage Transformer or the lead (if it is removable).

2.4.4 Lead Free Solder

This set is manufactured with lead-free production technology. This is also indicated on the PWB by the PHILIPS lead-free logo (either by a service-printing or by a sticker).

Figure 2-2 Lead-free logo

This set is produced with lead-free solder alloy as well as with lead-free sub-parts. It can be considered as lead-free.
Due to this fact, 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.
- Use only adequate solder tools applicable for lead-free soldering tin.
- Adjust your solder tool so that a temperature around 217 - 220 deg. C is reached at the solder joint.
- Do not mix lead-free soldering tin with leaded soldering tin; this will lead to unreliable solder joints!
- Use only original spare parts listed in this manual. These are lead-free parts!
- On the website *www.atyourservice.ce.philips.com* you can find more information on:
  - Aspects of lead-free technology.
  - BGA (de-)soldering, heating-profiles of BGAs used in Philips sets, and others

3. Directions for Use

You can download this information from the following website:
http://www.philips.com/support

1. Click on "Downloads and Troubleshooting" [1].
2. Fill in the TV model/type number in the field "Which Model/ Type?" [2] and click on "Search" [3].
   Note: The correct model/typenumber can be found on the rear cover of the set. If you do not have the complete model/typenumber, just fill in e.g. "32PW95" or "PW95" (do not use wildcards).
3. When results are returned, click on the desired model/ typenumber under "Model" [4].
4. Now, click on the "Owner's manual" [5] in the desired language. To read/open the PDF files you can download and install the free Acrobat Reader
   http://www.adobe.com/products/acrobat/readstep2.html

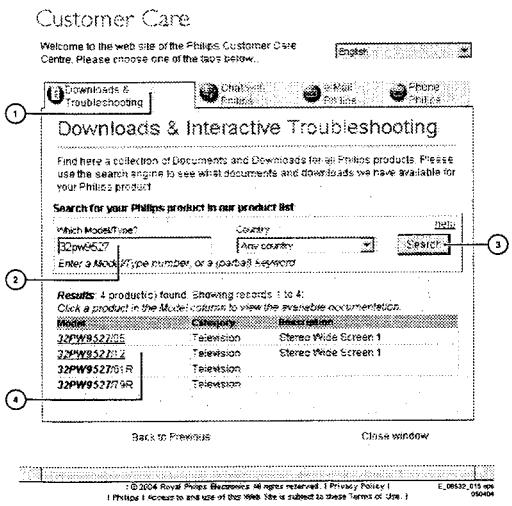


Figure 3-1 Screenshot DFU website (1)

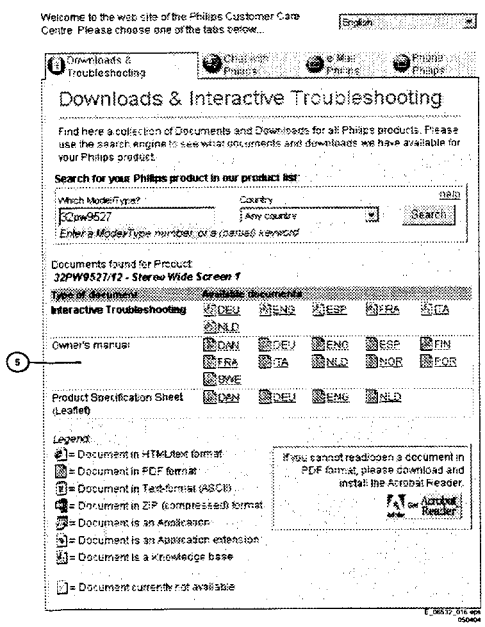


Figure 3-2 Screenshot DFU website (2)

4. Mechanical Instructions

Index of this chapter:

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

4.1 Set Disassembly

Warning: Be sure to disconnect the AC power from the set before opening it.

4.1.1 Rear Cover

1. Remove all fixation screws of the rear cover (do not forget the screws that hold the rear connection panel).
2. Pull the rear cover backwards to remove it.

4.2 Service Position

Before placing the Mono Carrier in its service position, remove the Front Interface assy/panel (see paragraph "Front Interface Assy/Panel removal"), the Side AV assy/panel (see paragraph "Side AV Assy/Panel removal") and the PIP assy/panel (if exists) (see paragraph "PIP Assy/Panel removal").

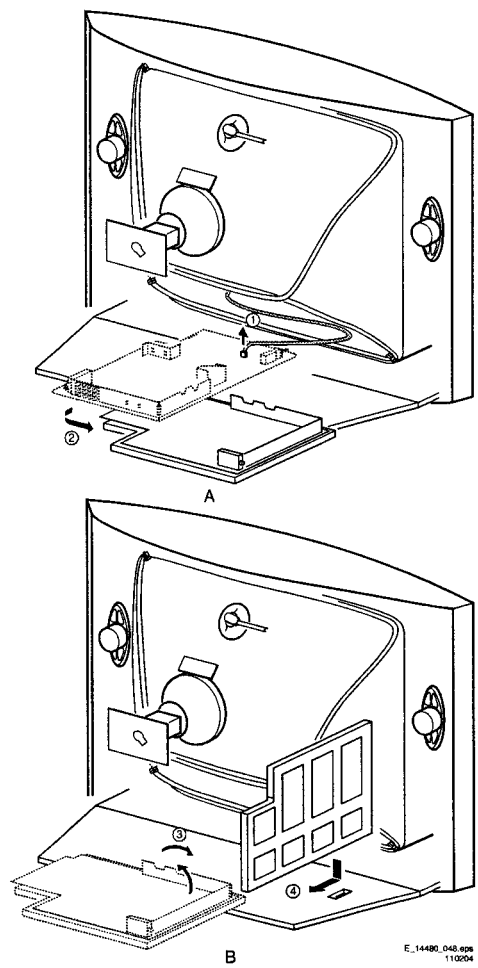


Figure 4-1 Service position Mono Carrier

1. Disconnect the degaussing coil [1].
2. Release the two fixation clamps (at the mid left and mid right side of the bracket), and remove the bracket from the bottom tray, by pulling it backwards [2].
3. Turn the chassis tray 90 degrees counter clockwise.
4. Move the panel bracket somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.
5. Turn the panel bracket with the rear I/O toward the CRT.
6. Place the hook of the tray in the fixation hole of the cabinet bottom [4] and secure it.

4.3 Assies/Panels Removal

4.3.1 Front Interface Assy/Panel Removal

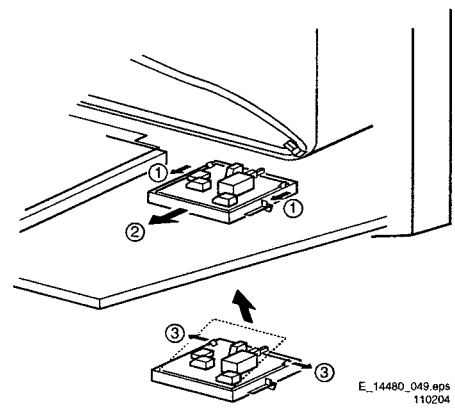


Figure 4-2 Front interface assy/panel removal

1. Remove the complete module from the bottom plate, by pulling the two fixation clamps upward [1], while sliding the module away from the CRT [2].
   Note: these clamps are difficult to access.
2. Release the two fixation clamps [3] at the side of the bracket, and lift the panel out of the bracket (it hinges at one side).

4.3.2 Side AV Assy/Panel Removal

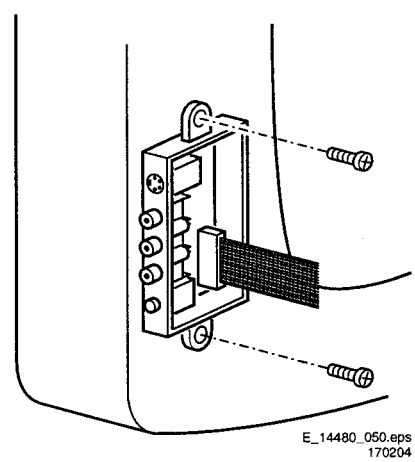


Figure 4-3 Side AV assy/panel removal

1. Remove the two fixation screws, and remove the complete Side AV assembly.
2. Release the two fixation clamps, and lift the panel out of the bracket.

4.3.3 LTI/CTI Interface Panel Removal

Remove the LTI/CTI Interface panel from the Mono Carrier, by disconnecting it from connector 1212.

4.3.4 Top Control Assy/Panel Removal

Notes:
- PV02 styling: assy is mounted in the front cabinet;
- FL13B styling: assy is mounted in the rear cover.

1. Remove the two fixation screws.
2. Push the assy a little bit upwards, and then pull it backwards to release it from the front hinge.
3. Lift the panel from its bracket, while releasing the four fixation clamps.

4.3.5 Linearity Assy/Panel Removal

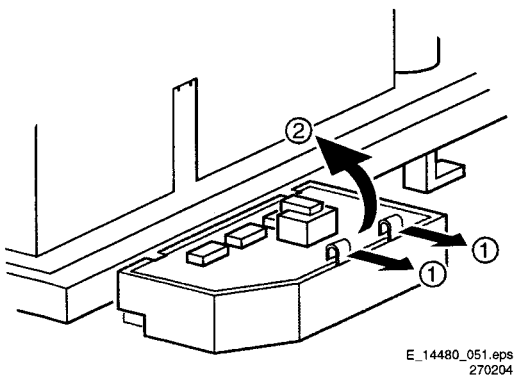


Figure 4-4 Linearity assy/panel removal

1. Release the two fixation clamps [1] to lift the panel out of the bracket [2].

4.3.6 PIP Assy/Panel Removal

1. Release the two fixation clamps to lift the panel out of the bracket.

4.4 Set Re-assembly

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

Note: before you mount the rear cover, perform the following checks:
1. Check whether the AC power cord is mounted correctly in its guiding brackets.
2. Check whether all cables are replaced in their original position

5. Service Modes, Error Codes, and Fault Finding

Index:
1. Test Points.
2. Service Modes.
3. Problems and Solving Tips (related to CSM).
4. ComPair.
5. Error Codes.
6. The Blinking LED Procedure.
7. Protections.
8. Repair Tips.

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. These test points refer to the functional blocks:

Table 5-1 Test point overview

Test point	Circuit	Diagram
F508, F535, F536, F537, F552, F561, F563, F573, F664,I513, I518, I519, I524, I531, I533, I546	Power supply	A1
F401, F412, F413, F414, F418, F452, F453, F455, F456, F458, F459, F460, F461, I408, I416, I417, I420, I462, I468	Line + Frame Deflection	A2
F003, F004, I001, I002	Tuner IF	A3
F201, F203, F205, F206	Hercules	A4
F240, F241, F242	Features & Connectivities	A5
F952, F955, I951, I952	Audio Amplifier	A7
F692	Front Control	A9
F331, F332, F333, F338, F339, F341, F351, F353, F354	CRT Panel	B1
F361, F362, F381, F382	ECO Scavem	B2

Perform measurements under the following conditions:
- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

5.2 Service Modes

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

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version readout for all these chassis. *Minimum requirements for ComPair:* a Pentium processor, a Windows OS, and a CD-ROM drive (see "ComPair" section).

Table 5-2 Software cluster overview

SW Clusters	SW Version	First Mask	Remarks
L4LEF1	L04EF11.0	TDA12020H1/N1B11	Western Europe
		TDA12021H1/N1B11	Radio 4:3 set only.
L4LEF2	L04EF21.0	TDA12020H1/N1B11	Eastern Europe
		TDA12021H1/N1B11	Radio 4:3 set only.
L4LEF3	L04EF31.0	TDA12020H1/N1B11	Western Europe
		TDA12021H1/N1B11	PIP
L4LEF4	L04EF41.0	TDA12020H1/N1B11	Eastern Europe
		TDA12021H1/N1B11	PIP
L4LEF5	L04EF51.0	TDA12020H1/N1B11	Western Europe
		TDA12021H1/N1B11	Radio & PIP.
L4LEF6	L04EF61.0	TDA12020H1/N1B11	Eastern Europe
		TDA12021H1/N1B11	Radio & PIP.
L4LEF7	L04EF71.0	TDA12020H1/N1B11	ICON UI

5.2.1 Service Default Mode (SDM)

Purpose
- To create a predefined setting for measurements to be made.
- To override software protections.
- To start the blinking LED procedure.

Specifications
- Tuning frequency: 475.25 MHz.
- Colour system: PAL/SECAM.
- All picture settings at 50% (brightness, colour contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
  - Timer / Sleep timer.
  - Child / parental lock.
  - Blue mute.
  - Hotel / hospital mode.
  - Auto shut off (when no 'IDENT' video signal is received for 15 minutes).
  - Skipping of non-favourite presets / channels.
  - Auto-storage of personal presets.
  - Auto user menu time-out.
  - Auto Volume Levelling (AVL).

How to enter

To enter SDM, use one of the following methods:
- Press 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).
- Short jumper wires 9252 and 9275 on the family board (see Fig. 8-1) and apply mains. Then press the power button (remove the short after start-up).
  Caution: Entering SDM by shorting wires 9252 and 9275 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 damage the television set.
- Or via ComPair (with the ComPair 'Tools', it should be possible to enter SDM via the ComPair interface).

After entering SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Alignment Mode.

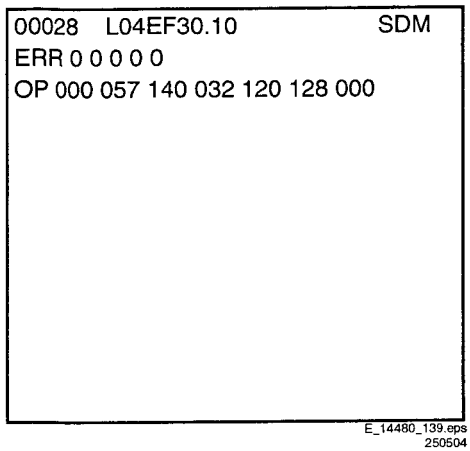


Figure 5-1 SDM menu

How to navigate

Use one of the following methods:

- When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.
- On the TV, press and hold the 'VOLUME down' and press the 'CHANNEL down' for a few seconds, to switch from SDM to SAM and reverse.

How to exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter or the television set.
If you turn the television set off by removing the Mains (i.e., unplugging the television) without using the POWER button, the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

Specifications

- Run timer (maximum five digits displayed)
- Software version, Error & Option Bytes display
- Clear error buffer.
- Option settings
- AKB switching
- Software alignments (Tuner, 2 Tuner PIP, White Tone, Geometry & Audio)
- NVM Editor
- ComPair Mode switching

How to enter

To enter SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: **'0 6 2 5 9 6'** directly followed by the "On Screen Display icon "i +" button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.

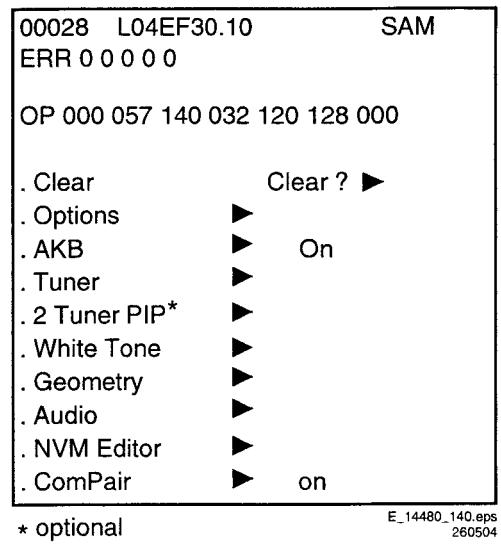


Figure 5-2 SAM menu

Menu explanation

1. **LLLLL.** This represents the run timer. The run timer counts normal operation hours, but does not count standby hours (maximum four digits displayed).
2. **AAABCD-X.Y.** This is the software identification of the main microprocessor:
   - **A** = the project name (L04).
   - **B** = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
   - **C** = the software diversity:
     - **Europe:** T = 1 page TXT, F = Full TXT, V = Voice control.
     - **LATAM and NAFTA:** N = Stereo non-dBx, S = Stereo dBx.
     - **Asian Pacific:** F = Full TXT, N = non TXT, C = NTSC.
     - **ALL regions:** M = mono, D = DVD, Q = Mk2.
   - **D** = the language cluster number.
   - **X** = the main software version number (updated with a major change that is incompatible with previous versions).
   - **Y** = the sub software version number (updated with a minor change that is compatible with previous versions).
3. **SAM.** Indication of the Service Alignment Mode.
4. **Error Buffer.** Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **Option Bytes.** Used to set the option bytes. See 'Options' in the Alignments section for a detailed description. Seven codes are possible.
6. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
7. **Options.** Used to set the option bits. See 'Options' in the Alignments section for a detailed description.
8. **AKB.** Used to disable (Off) or enable (On) the 'black current loop' (AKB = Auto Kine Bias).
9. **Tuner.** Used to align the tuner. See 'Tuner' in the Alignments section for a detailed description.
10. **2 Tuner PIP.** Used to align the tuner PIP (optional)
11. **White Tone.** Used to align the white tone. See 'White Tone' in the Alignments section for a detailed description.
12. **Geometry.** Used to align the geometry settings of the television. See 'Geometry' in the Alignments section for a detailed description.
13. **Audio.** No audio alignment is necessary for this television set.

14. **NVM Editor.** Used to change the NVM data in the television set.
15. **ComPair Mode.** Used to switch on the television to ISP mode (for uploading software)

How to navigate

- In SAM, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU or STATUS/EXIT button.
- When you press the MENU key in while in an SDAM submenu, you will return to the previous menu.

How to store SAM settings

To store settings changed in SAM leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

How to exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter or the television set.
If you turn the television set off by removing the mains (i.e., unplugging the television) without using the POWER button, the television set will remain in SAM when mains is re-applied, and the error buffer is not cleared.

5.2.3 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TV operation settings. The call centre can instruct the customer to enter CSM by telephone and read off the information displayed. This helps the call centre to diagnose problems and failures in the TV set before making a service call.
The CSM is a read-only mode; therefore, modifications are not possible in this mode.

How to enter

To enter CSM, press the following key sequence on the remote control transmitter: '**1 2 3 6 5 4**' (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

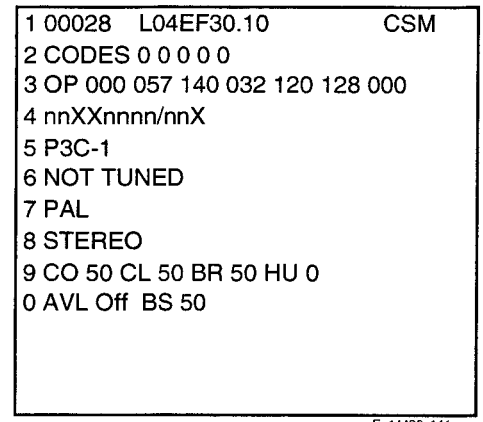


Figure 5-3 CSM menu

Menu explanation

1. Indication of the service mode (CSM = Customer Service Mode).
2. Reserved item.
3. Software identification of the main microprocessor (see 'Service Default Alignment Mode' for an explanation)
4. Reserved item for P3C call centres (AKBS stands for Advanced Knowledge Base System).
5. Indicates the type of TV system or whether or not the television is receiving an 'IDENT' signal on the selected source. If no 'IDENT' signal is detected, the display will read 'NOT TUNED'
6. Displays the last five errors detected in the error code buffer.

How to exit

To exit CSM, use one of the following methods:

- Press the MENU, STATUS/EXIT, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Problems and Solving Tips Related to CSM

5.3.1 Picture Problems

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

Picture too dark or too bright

If:

- The picture improves when you have press the AUTO PICTURE button on the remote control transmitter, or
- The picture improves when you enter the Customer Service Mode

Then:

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys (if necessary) to select BRIGHTNESS.
6. Press the MENU LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the MENU UP/DOWN keys to select PICTURE.

8. Press the MENU LEFT/RIGHT keys to increase or decrease the PICTURE value.
9. Press the MENU button on the remote control transmitter twice to exit the user menu.
10. The new PERSONAL preference values are automatically stored.

White line around picture elements and text

If:
The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select SHARPNESS.
6. Press the MENU LEFT key to decrease the SHARPNESS value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

Snowy picture

To enter CSM, press the following key sequence on the remote control transmitter: '**123654**' (do not allow the display to time out between entries while keying the sequence).

Check CSM line 5. If this line reads 'Not Tuned,' check the following:
- Antenna not connected. Connect the antenna.
- No antenna signal or bad antenna signal. Connect a proper antenna signal.
- The tuner is faulty (in this case line 6, the Error Buffer line, will contain error number 10). Check the tuner and replace/ repair the tuner if necessary.

Black and white picture

If:
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select COLOR.
6. Press the MENU RIGHT key to increase the COLOR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

Menu text not sharp enough

If:
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter.

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select PICTURE.
6. Press the MENU LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

5.4 ComPair

5.4.1 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:
- 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.
- 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 SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector.

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding 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 waveform 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 faultfinding 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.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  - Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 How To Connect ComPair

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with 'POWER 9V DC') of the ComPair interface.
4. Switch the ComPair interface "off".
5. Switch the television set "off" with the mains switch.
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I2C') and the ComPair (or *Service*) connector at the rear side of the TV (for its location see figure 8-1 in chapter "Alignments").
7. Plug the mains adapter in a mains outlet, and switch the interface "on". The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'Introduction' chapter.

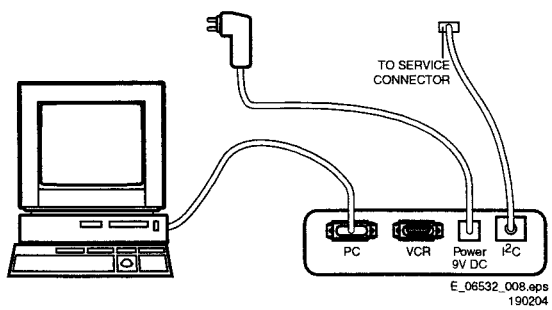


Figure 5-4 ComPair connection

5.4.4 How To Order

ComPair order codes:

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070 (year 2002, 3122 785 60110 (year 2003).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003).
- ComPair interface cable: 3122 785 90004.
- Transformer (non-UK): 4822 727 21632.
- Transformer UK: 4822 727 21633.

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

5.5 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

5.5.1 How To Read The Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SDAM (if you have a picture).
  Examples:
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See 'The Blinking LED Procedure'.
- Via ComPair.

5.5.2 How To Clear The Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SDAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: '062596' directly followed by the "OSD" icon button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the 'CLEAR' line will change from 'CLEAR?' to 'CLEARED'
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

Note: If you exit SAM by disconnecting the Mains from the television set, the error buffer is not reset.

5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures 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 and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-3 Error codes overview

Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error		
1	Not applicable	X-Ray / over-voltage protection (US only)	2411, 2412, 2413, 6404, 6411, 6412.	A2
2	Not applicable	High beam (BCI) protection	3404, 7405	A2
3	Not applicable	Vertical guard protection	3466, 7451, 7452, 7453, 7454	A2
4	Tuner UA1316/A	I2C error while communicating with 2nd tuner	1000, 5010 (PIP Module)	F2
5	Not applicable	+5v protection	7604, 7605	A5
6	I2C bus	General I2C error	7200, 3207, 3214	A4
7	Not applicable	-	-	-
8	Not applicable	-	-	-
9	24C16	I2C error while communicating with the EEPROM	7601, 3604, 3605	A5
10	Tuner	= I2C error while communicating with the PLL tuner	1000, 5001	A3
11	TDA6107/A	Black current loop instability protection	7330, 3351, CRT	B1
12	SDA9488X	I2C error while communicating with the PIP processor	7242 (PIP Module)	F1
13	Not applicable	-	-	-
14	DVD Loader	I2C error while communicating with the DVD Interface module	DVD Interface module	DVD Loader
15	TDA9178T/N1	I2C error while communicating with LTI module	7610	H
16	TDA9887	I2C error while communicating with PIP_Demodulator	7201	F2
17	Not applicable	-	-	-
18	Not applicable	-	-	-
19	TDA1200	I2C error while communicating with SSD stereo sound decoder	7200	A4
20	TDA1200	I2C error while communicating with video cosmic in Hercules IC	7200	A4

Note: Errors 7, 8, 13, 17, 18 are not applicable.

5.6 The Blinking LED Procedure

Using this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the LED will blink the contents of the error-buffer:

- When all the error-codes are displayed, the sequence finishes with an 'on' LED blink of 1.5 seconds,
- The sequence starts again.

Example of error buffer: **12 9 6 0 0**
After entering SDM, the following occurs:

- 1 long 'on' blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long 'on' blink of 1.5 seconds to finish the sequence,
- The sequence starts again at 12 short blinks.

5.7 Protections

If a fault situation is detected, an error code will be generated; and, if necessary, the television set will go into 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 protection mode. The error codes of the error buffer and the blinking LED procedure can be read via the Service Default Menu (SDM), or via ComPair.
To get a quick diagnosis the chassis has three service modes implemented:

- The Customer Service Mode (CSM).
- The Service Default Mode (SDM).
- The Service Alignment Mode (SAM).

For a detailed description, see the "Customer Service Mode, Service Default mode" and "Service Alignment Mode" sections.

5.8 Fault Finding and Repair Tips

Notes:

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

5.8.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. In the next table, the default NVM values are given.

Table 5-4 NVM default values

	Address (dec)	Value (hex)
EW (EW width)	19	25
PW (EW parabola width)	20	0A
HS (Horizontal shift)	21	1A
HP (Horizontal parallelogram)	22	1F
HB (Horizontal Bow)	23	1F
UCP (EW upper corner parabola)	24	1E
LCP (EW lower corner parabola)	25	28
TC (EW trapezium)	26	1A
VS (Vertical slope)	27	25
VA (Vertical amplitude)	28	1E
SC (S-Correction)	29	1C
VSH (Vertical Shift)	30	1A
VX (Vertical Zoom)	31	19
VSL (Vertical scroll)	32	20
VL (Vertical linearity)	33	20
AGC (AGC Takeover)	36	1E
OIF (IF-PLL Offset)	37	20
AGC10 (AGC 10)	38	1
H60 (60 Hz Horizontal Shift)	39	9
PF_SC_PWL (Peaking Frequency, Soft Clipper, Peak White Limit)	40	0A
COR (Phase 1 time constant, Video Dependant Coring, Ratio & White stretch)	41	0F
60 Hz Vertical amplitude	42	40
YD & CL	43	2
RGB amplitude for full teletext mode	46	0C
NVM_TABLE_VERSION	60	26
OPTION_TABLE_VERSION	61	11
CVI_BLOR	62	1E
CVI_BLOG	63	1C
TXT Brightness	64	0F
V60 offset (60Hz Vertical Amplitude)	66	FE
FOAB, CHSE	139	3
SPR, WS	140	0
VMA, SVM	141	31
NVM_SOC_SMD	142	33
CCC_Preset_Gain_Red	143	1F
CCC_Preset_Gain_Green	144	1F
CCC_Preset_Gain_Blue	145	1F
NVM_FMWS	149	2
NVM_ASD_SC1_THR	150	10
NVM_CRYSTAL_ALIGN	208	4F
Last Brightness (VID PP others)	264	34
Last Color (VID PP others)	265	2C
Last Contrast (VID PP others)	266	4B
Last Sharpness (VID PP others)	267	37
Last Hue (VID PP others)	268	32
Last Colour Temperature (VID PP others)	269	0D
White-D Cool Red	294	FD
White-D Cool Blue	296	8
White-D Normal Red	297	22
White-D Normal Green	298	20
White-D Normal Blue	299	1B
White-D Warm Red	300	2
White-D Warm Blue	302	FA
Last Volume	343	19
Last Balance	344	32
Last Treble (AUD PP others)	345	32
Last Bass (AUD PP others)	346	32

5.8.2 Power Supply

Set Not Working

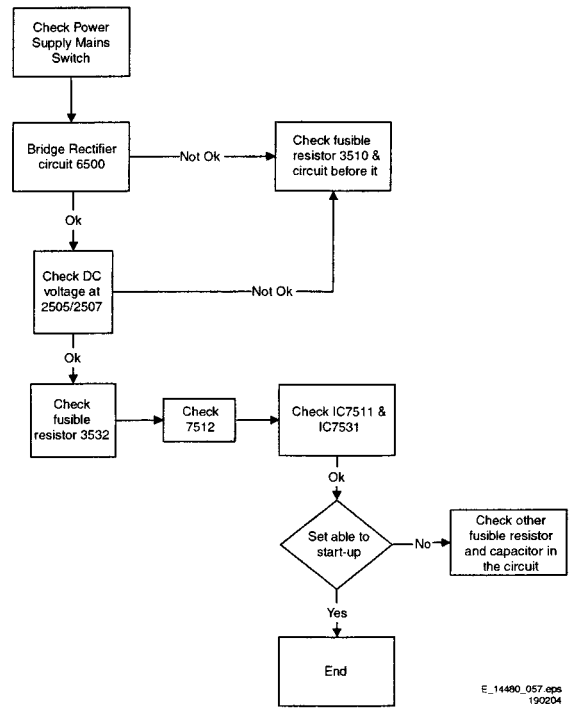


Figure 5-5 Fault finding tree "Set not working"

Set Does Not Start Up

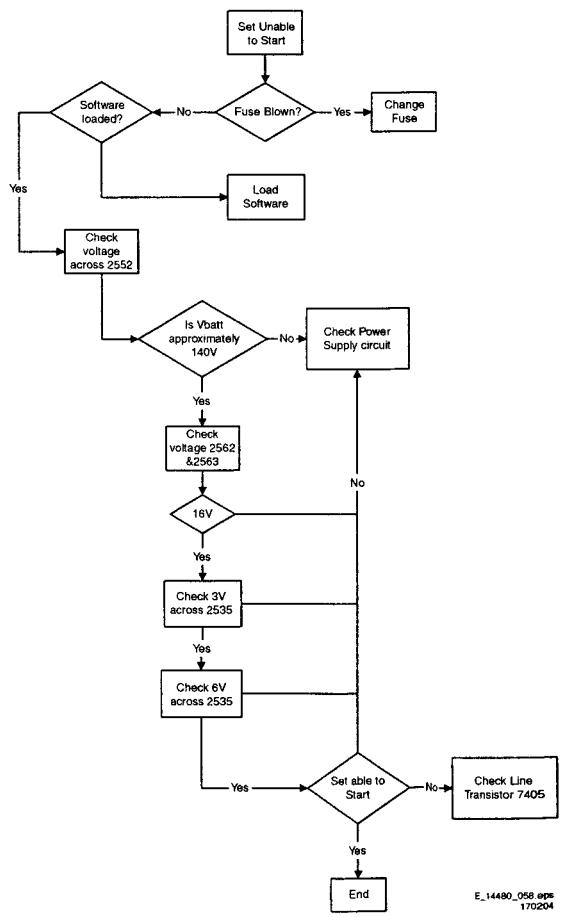


Figure 5-6 Fault finding tree "Set does not start up"

5.8.3 Deflection

One Thin Vertical Line

Quick check:

- Set in protection mode.
- LED blinking with error "3".

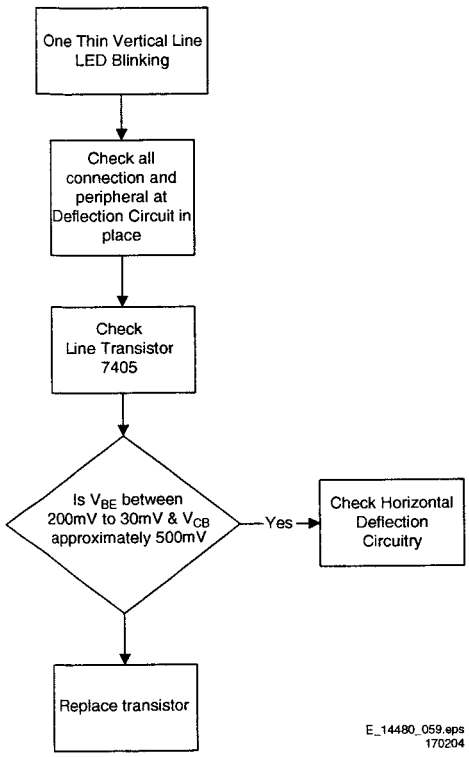


Figure 5-7 Fault finding tree "One thin vertical line"

One Thin Horizontal Line

Quick check:

- Set in protection mode.
- LED blinking with error "2".

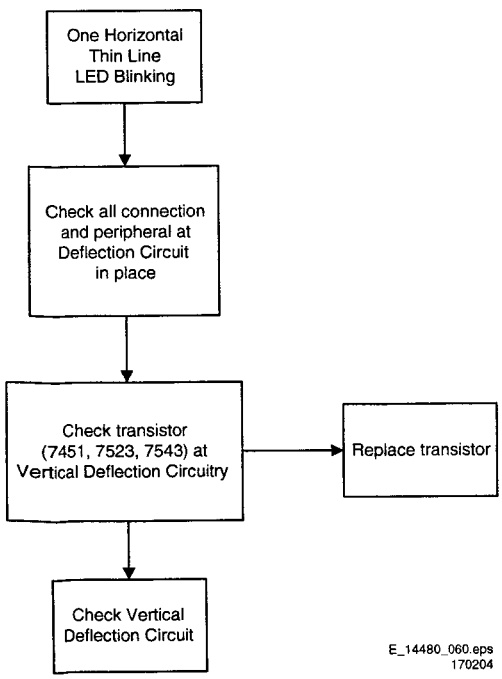


Figure 5-8 Fault finding tree "One thin horizontal line"

Blank Screen

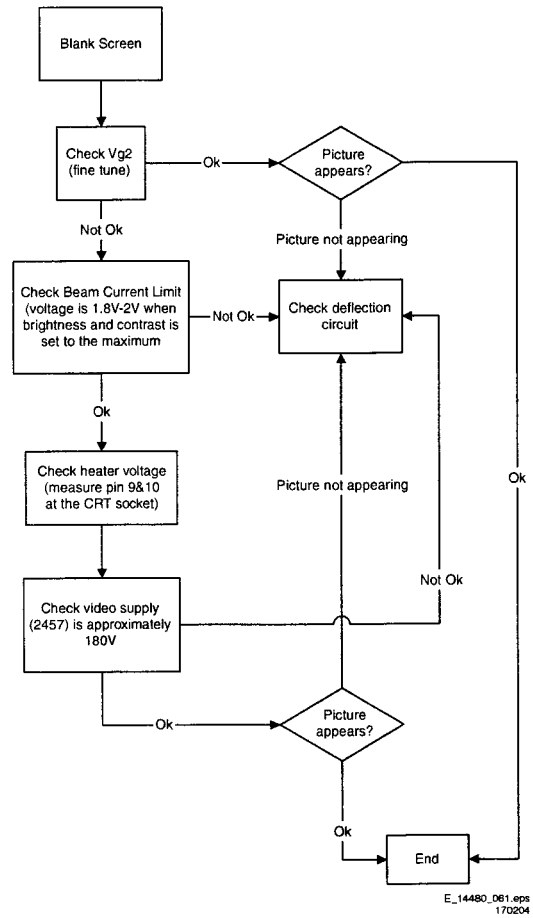


Figure 5-9 Fault finding tree "Blank screen"

5.8.4 Source Selection

Set is not able to go into AV or any missing AV is encountered

E.g. AV1 is available but not able to enter to AV1: Check if the option setting is correct.

Set is able to go to AV, but no audio is heard.

1. Check that continuity of signal is there from the SCART/ Cinch input to the input of the Hercules.
2. If continuity is there and still no audio, check that option settings are correct.
3. If logic setting is correct and still no audio, proceed to Audio Decoder/Processor troubleshooting section.

Set is able to go into AV but no video is available:

1. Check continuity from AV input to HERCULES depending on the input.
2. If continuity is available and yet no video, proceed to Video Processor troubleshooting section.

5.8.5 Tuner and IF

No Picture

1. Check that the Option settings are correct.
2. If correct, check that supply voltages are there.
3. If supply voltages are present, check whether picture is present in AV.
4. If picture is present in AV, check with the scope the Tuner IF output signal by manual storage to a known channel.

5. If IF output is present, Tuner is working fine. If no IF output, I2C data lines may be open, check continuity of I2C lines. If I2C lines are ok, Tuner may be defect, replaced Tuner.
6. If Tuner IF is present and yet still no picture in RF mode, go to Video Processing troubleshooting section.

No Picture, No Sound

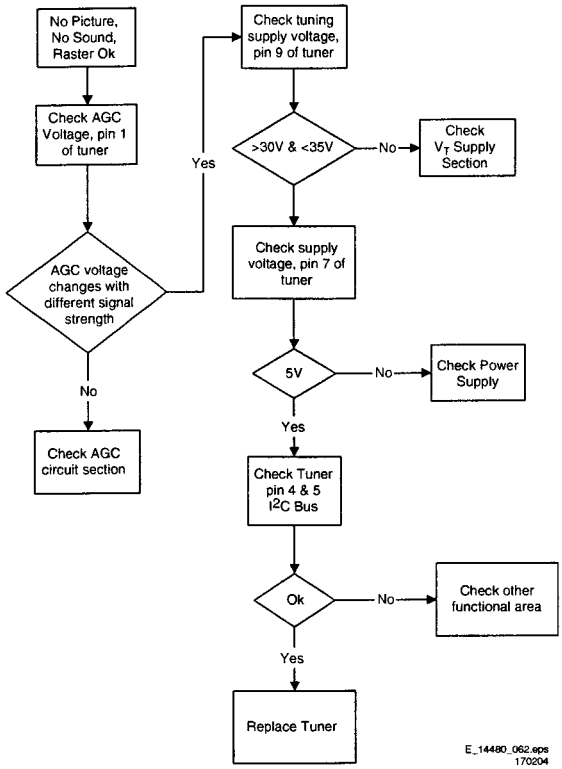


Figure 5-10 Fault finding tree "No picture, no sound"

Picture Ok, No Sound

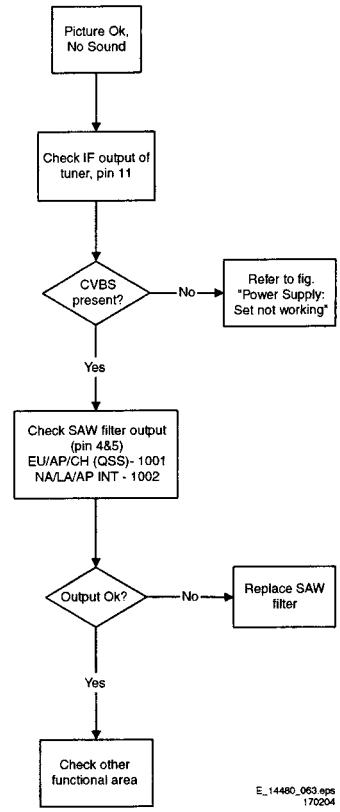


Figure 5-11 Fault finding tree "Picture ok, no sound"

Unable To Perform Tuning

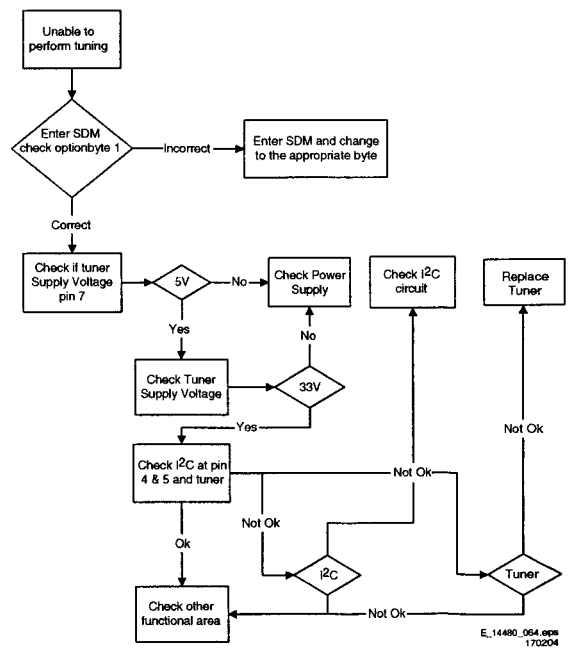


Figure 5-12 Fault finding tree "Unable to perform tuning"

5.8.6 Controller

Below are some guidelines for troubleshooting of the Micro Controller function. Normally Micro Controller should be checked when there is a problem of startup.

1. Check that both +3.3 V_dc and +1.8 V_dc are present.
2. Check that crystal oscillator is working.

3. Check that Power Good signal is at "high" logic, normal operation.
4. Check that HERCULES is not in standby mode. Pin 15 of HERCULES should be 0 V_dc.
5. Make sure H-drive pulse is there. This can be checked at resistor R3239. If H-drive does not exist, remove resistor R3239 to check if there is loading.

Note: When the set shuts down after a few second after power "on", the main cause is that Vg2 not aligned properly, try adjusting Vg2 during the few seconds of power "on".

5.8.7 Video Processing

No Picture

When "no picture in RF", first check if the microprocessor is functioning ok in section "Controller". If that is ok, follow the next steps.
When "no picture in AV", first check if the video source selection is functioning ok in section "Source Selection". If that is ok, follow the next steps.

1. Check that normal operating conditions are met.
2. Check that there is video signal at pin 81. If no video, demodulator part of the HERCULES is faulty, replace with new HERCULES.
3. If video signal is available at pin 81, check pin 56, 57, and 58 for the RGB signal.
4. If signal is not available, try checking the BRIGHTNESS and/or CONTRAST control, and make sure it is not at zero.
5. If still with the correct settings and no video is available, proceed to the CRT/RGB amplifier diagram.

For sets with TDA9178, follow steps below:
1. Put Option Byte 2 bit 4 to "0"; if video signal is not available, then check fault finding section "Controller", Section "Source Selection", and steps above.
2. If video is available but not correct, put Option Byte 2 bit 4 to "1", then check if LTI panel is present. If not, put LTI panel in the main chassis (connector 1221).
3. If LTI panel is in main chassis, check cable between LTI panel and main chassis (position is 1206). If it is connected, then the LTI panel is faulty, replace it.

For sets with Scavem, and Scavem does not work, follow steps below:
1. Check Scavem coil connector (position is 1361) if connected; if not, connect it.
2. If connected, check NVM "bit storage" byte 1 bit 7; if it is not "1", set it to "1".
3. If it is "1", then check the data of the NVM addresses as in the next table. If the data is not correct, then set these addresses to diagram values.
4. If it still not works, track Scavem output from pin64 of HERCULES to CRT panel.

Table 5-5 NVM default values for Scavem

Description	Address (dec)	Address (hex)	Value (hex)
SPR, WS	140	8C	00
VMA, SVM	141	8D	31
NVM_SOC_SMD	142	8E	33

5.8.8 Audio Processing

No Sound

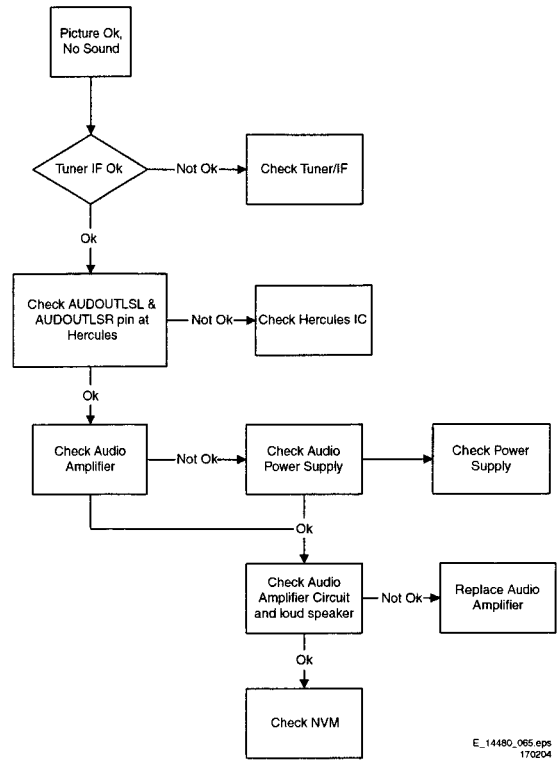


Figure 5-13 Fault finding tree "No sound"

No RF audio for QSS/Inter-Carrier stereo sets.
1. Check pin 99 and 100 for SIF signal (for QSS) or pin 104 and 105 for video with SIF (for Inter-Carrier)
2. If signal is not present, check for the QSS/FMI bit settings. Check also the NVM data.
3. If signals are present and still no audio, check the audio supply voltage +8V are present.
4. If still no audio signal at Hercules output, Hercules is faulty.

No AV audio.
1. Check troubleshooting methods in section "Source Selection".
2. Check the output of the Hercules to see if there is signal available. If no, check the normal operating condition and also the NVM data.
3. If still no audio signal at Hercules output, Hercules is faulty.

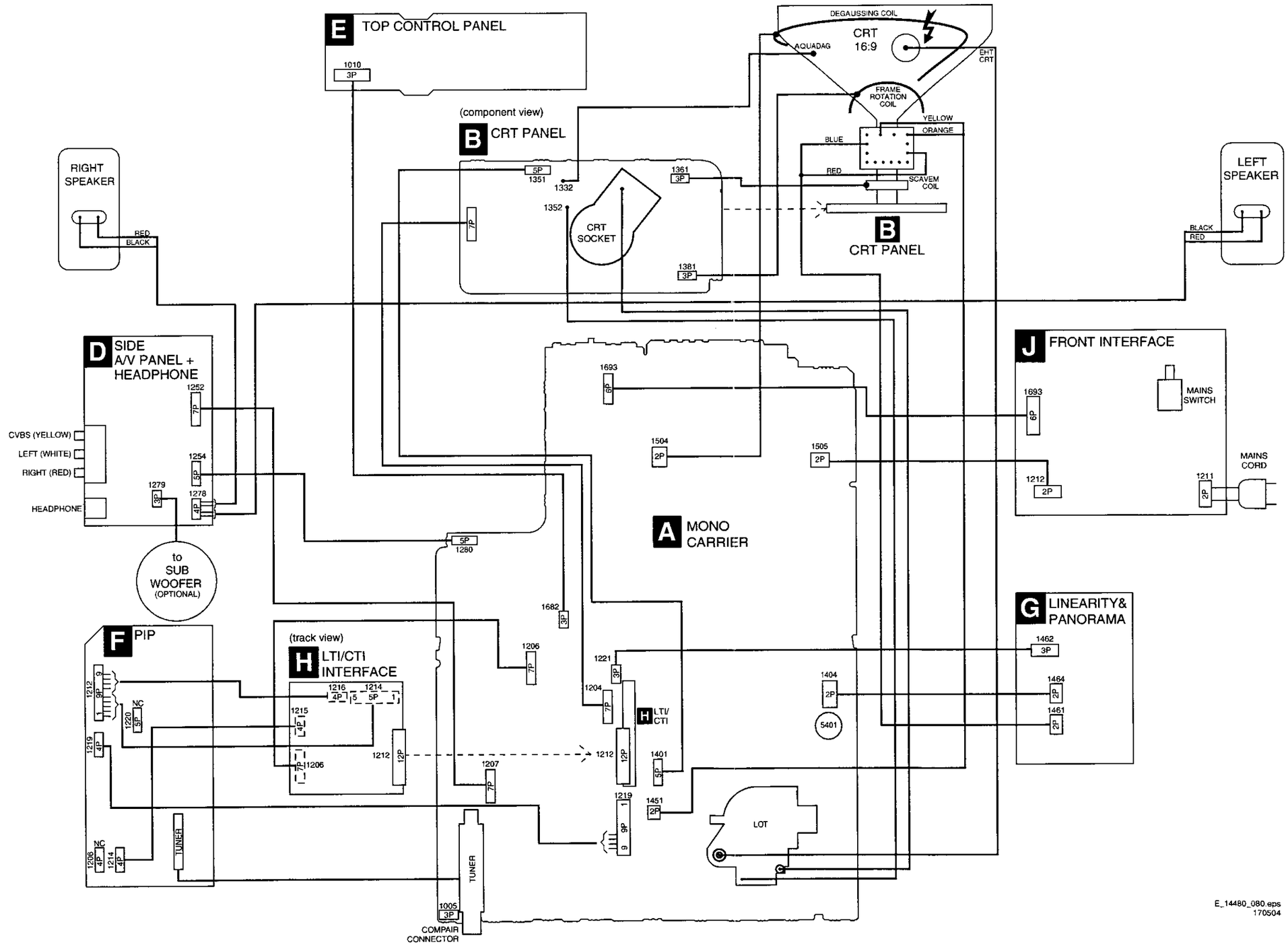
Note: If there is audio signal at Hercules output and no audio at loudspeaker, proceed to Audio Amplifier troubleshooting methods.

5.8.9 Audio Amplifier

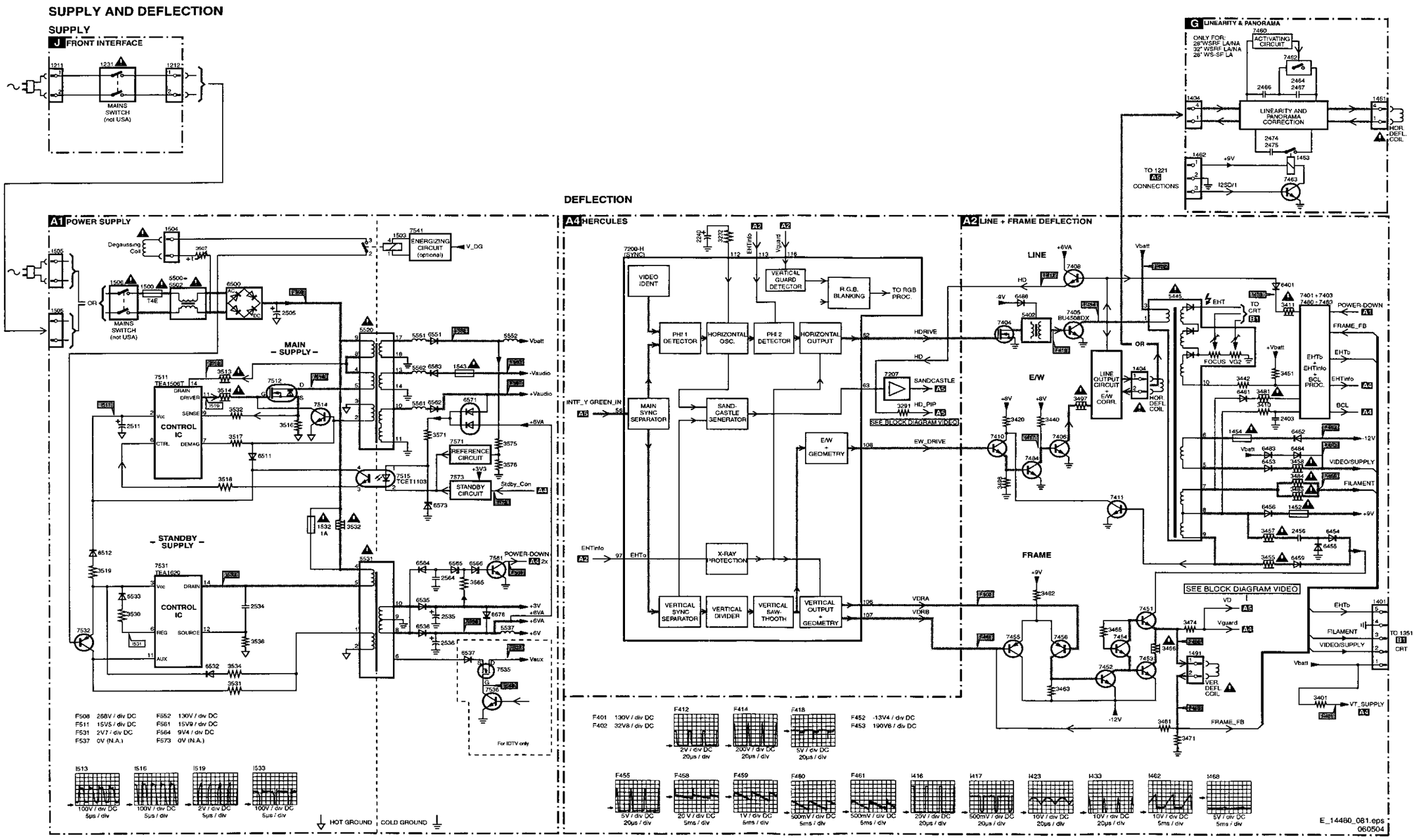
No RF as well as AV audio at the loudspeaker:
1. Check that the normal operation condition of the amplifier is met.
2. If normal operation conditions are met, check the continuity from Hercules output to input of the amplifier.
3. If continuity is there and still no audio, check speaker wire connections. If still no audio, amplifier IC might be faulty.

6. Block Diagrams, Testpoint Overviews, and Waveforms

Wiring Diagram



Block Diagram Supply and Deflection



Testpoint Overview Mono Carrier

F001	A8	F010	A7	F207	B5	F216	C6	F225	C6	F238	B4	F248	A6	F412	C6	F452	C7	F461	C7	F503	E2	F536	C5	F564	C5	F692	D1	F702	C8	F711	C8
F002	A7	F011	A8	F208	B6	F217	C6	F226	B6	F239	B5	F249	A7	F414	E7	F453	D7	F462	E7	F504	E2	F537	C3	F573	C5	F693	E1	F703	C8	F712	B8
F003	A7	F200	B4	F209	A5	F218	C6	F227	A4	F240	C5	F250	C6	F415	E6	F454	C7	F463	D8	F505	E2	F541	C3	F581	B3	F694	C1	F704	C8	F713	B8
F004	A7	F201	C5	F210	A4	F219	B7	F228	C5	F241	C6	F251	B5	F416	E6	F455	D7	F464	E5	F506	E2	F542	C3	F582	B4	F695	C1	F705	B8	F714	B8
F005	A8	F202	B5	F211	A4	F220	B7	F229	C5	F242	B6	F270	B5	F417	E5	F456	E7	F465	E5	F507	E2	F551	C5	F583	C4	F696	D1	F706	C8	F715	B7
F006	A6	F203	B5	F212	A5	F221	B7	F230	B5	F243	C6	F401	C4	F418	D6	F457	E7	F466	E8	F508	E3	F552	D5	F682	B1	F697	E1	F707	B8	F716	A8
F007	A8	F204	C5	F213	A5	F222	C7	F232	B5	F244	B5	F402	D6	F419	D6	F458	C7	F500	C2	F509	E4	F561	C4	F683	B1	F698	C1	F708	B8	F717	A8
F008	A8	F205	C5	F214	B5	F223	B7	F233	B5	F245	C6	F404	D6	F420	D7	F459	C7	F501	D2	F510	D5	F562	D4	F685	B1	F699	D1	F709	B8	F718	A8
F009	B4	F206	C6	F215	B6	F224	C6	F237	B5	F247	A6	F407	D6	F451	C8	F460	C7	F502	D2	F535	C4	F563	C4	F691	C1	F701	C8	F710	B8	F719	B8

F721	B8	F731	C8	F751	A7	F951	B3	I006	A5	I015	A8	I208	C5	I217	B7	I228	B5	I240	A4	I409	E8	I419	C6	I574	D5						
F722	B8	F732	C8	F752	A7	F952	A3	I007	A7	I016	A7	I209	B6	I218	B6	I229	C5	I241	A4	I410	E6	I421	D7	I575	D5						
F723	B8	F733	C8	F901	B3	F953	A3	I008	A5	I017	B5	I210	B6	I219	B6	I230	B5	I401	E7	I412	E6	I422	D7	I576	D5						
F724	B8	F734	C8	F903	B2	F955	A3	I009	A5	I201	A5	I211	B6	I222	B5	I231	B5	I402	E6	I413	C6	I423	D5	I577	D5						
F725	B7	F735	B8	F904	B1	I001	A8	I010	A5	I203	A5	I212	B6	I223	B5	I232	A7	I403	E7	I414	D6	I424	E8	I578	D5						
F726	B8	F736	B7	F905	B2	I002	A8	I011	A7	I204	A5	I213	A5	I224	B4	I233	B7	I404	E7	I415	C6	I425	C6	I579	D4						
F727	B8	F737	B8	F910	B3	I003	A7	I012	A7	I205	A5	I214	A5	I225	B5	I234	A4	I405	E7	I416	C5	I426	D7	I582	B4						
F728	B8	F738	B7	F911	B3	I004	A7	I013	A6	I206	A5	I215	A6	I226	B6	I235	B5	I406	E7	I417	D5	I427	D5	I583	B4						
F729	B8	F739	B8	F950	B3	I005	A5	I014	A8	I207	B6	I216	B6	I227	A5	I236	B5	I407	E8	I418	D6	I428	D6	I584	B4						
																						I429	E8	I585	B4						
																						I430	E6	I587	C4						
																						I431	C7	I588	B4						
																						I432	D6	I681	E1						
																						I433	E6	I682	B1						
																						I434	C5	I683	B1						
																						I443	E7	I686	C1						
																						I444	E7	I687	D1						
																						I445	E7	I688	C1						
																						I446	C5	I689	D1						
																						I448	E7	I691	E1						
																						I449	D8	I693	D1						
																						I451	D7	I701	C7						
																						I452	E8	I702	C8						
																						I453	D7	I704	C8						
																						I455	D7	I705	B8						
																						I456	D8	I707	C8						
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																						I475	D8	I732	B7						
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																						I536	D3	I936	B2						
																						I537	C4	I937	C2						
																						I538	C3	I938	B2						
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																						I540	D4	I940	B2						
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																						I542	C3	I942	C3						
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																						I546	C3	I946	B3						
																						I547	C3	I948	B3						
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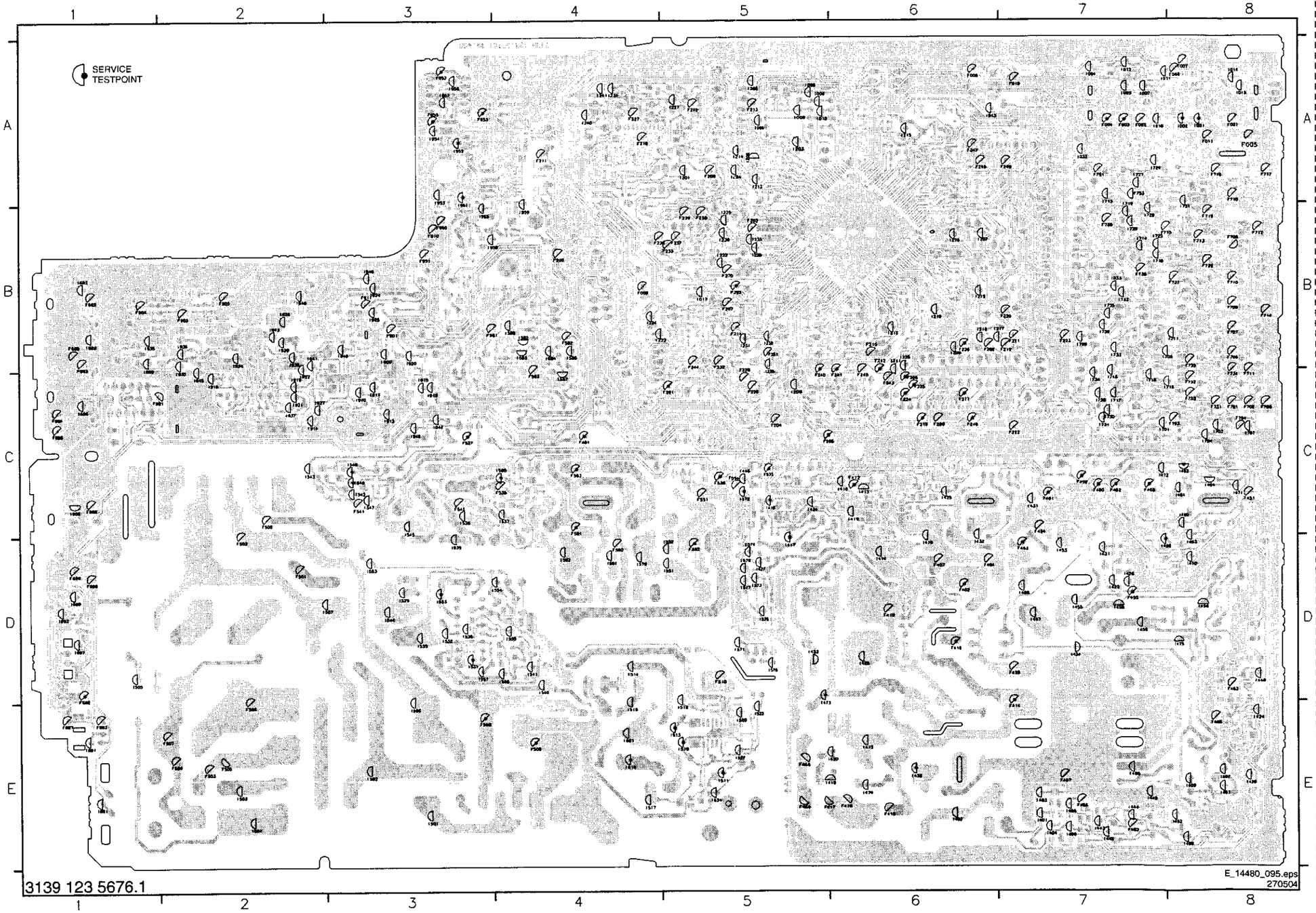
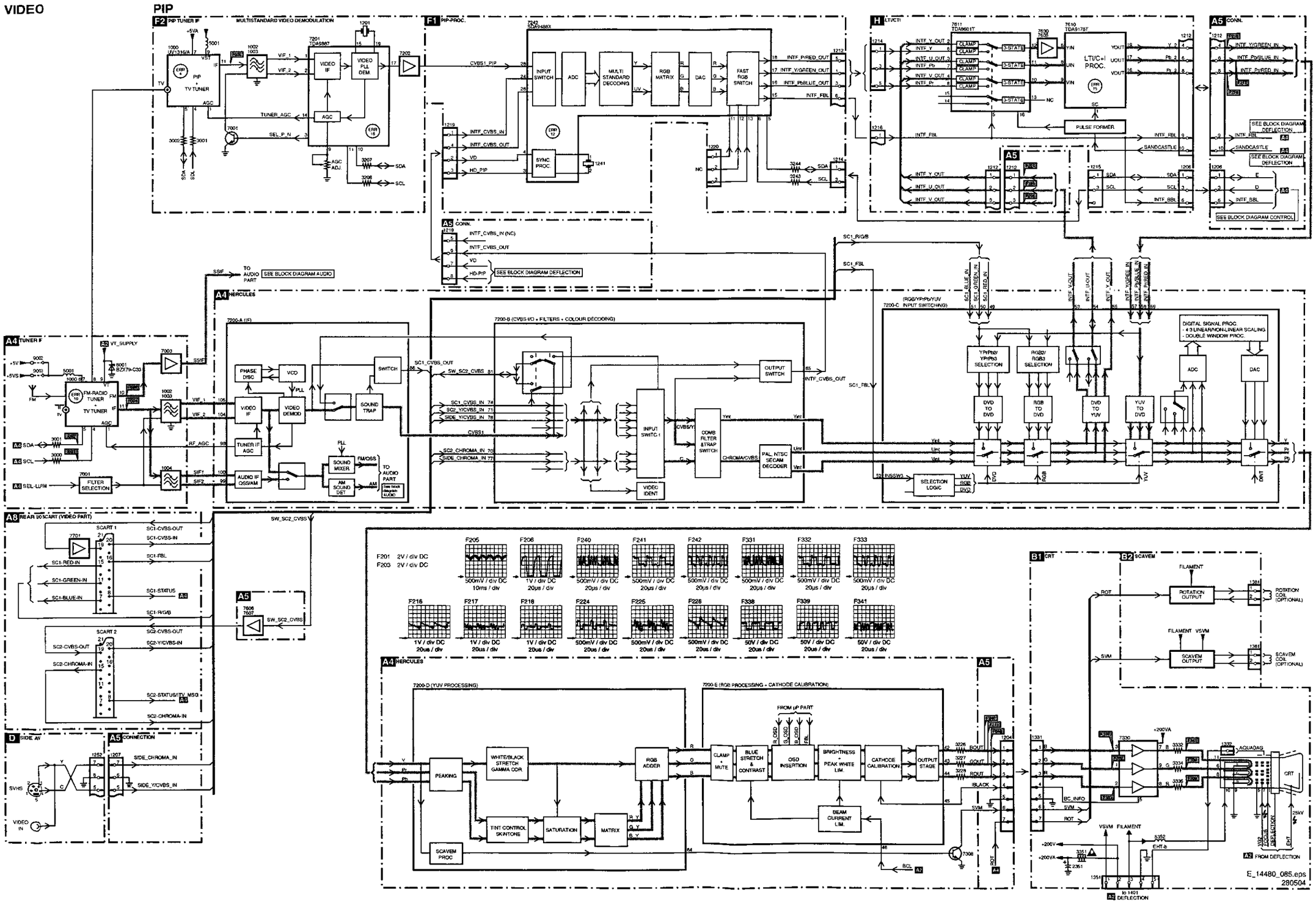
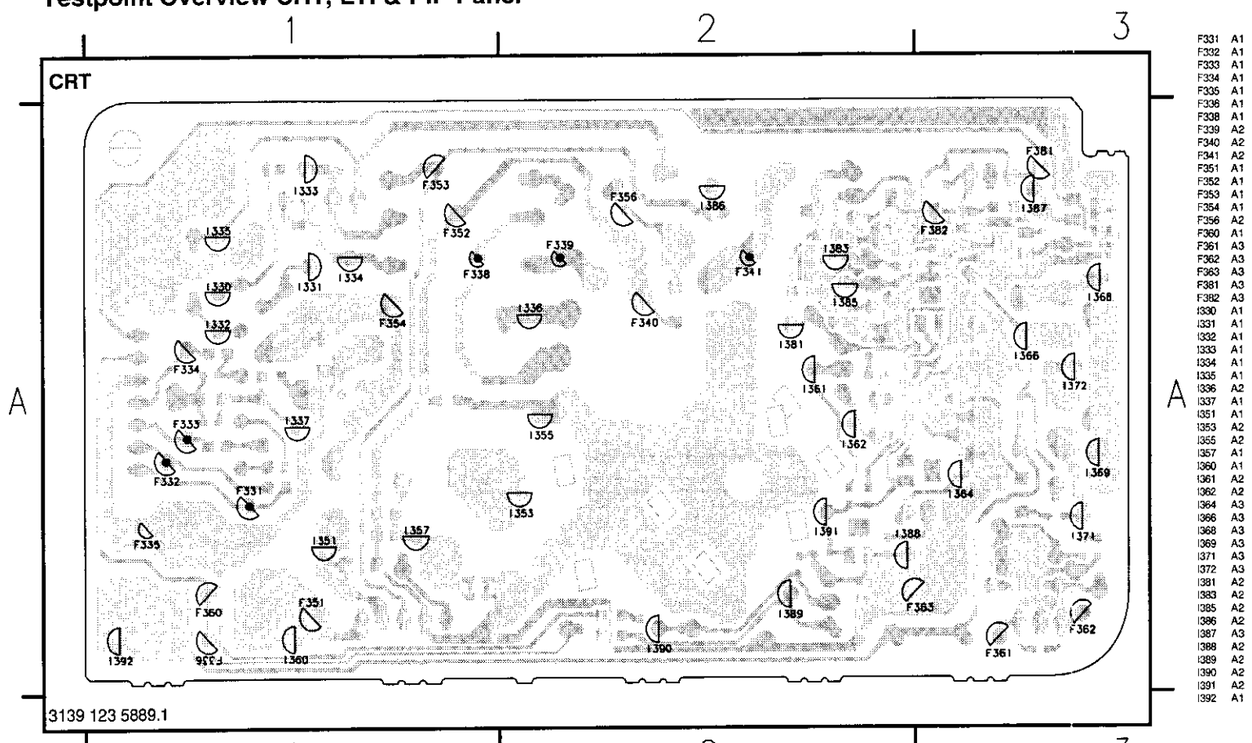


Block Diagram Video



Testpoint Overview CRT, LTI & PIP Panel



F331 A1
F332 A1
F333 A1
F334 A1
F335 A1
F336 A1
F338 A1
F339 A2
F340 A2
F341 A2
F351 A1
F352 A1
F353 A1
F354 A1
F356 A2
F360 A1
F361 A3
F362 A3
F363 A3
F381 A3
F382 A3
I330 A1
I331 A1
I332 A1
I333 A1
I334 A1
I335 A1
I336 A2
I337 A1
I351 A1
I353 A2
I355 A2
I357 A1
I360 A1
I361 A2
I362 A2
I364 A3
I366 A3
I368 A3
I369 A3
I371 A3
I372 A3
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I389 A2
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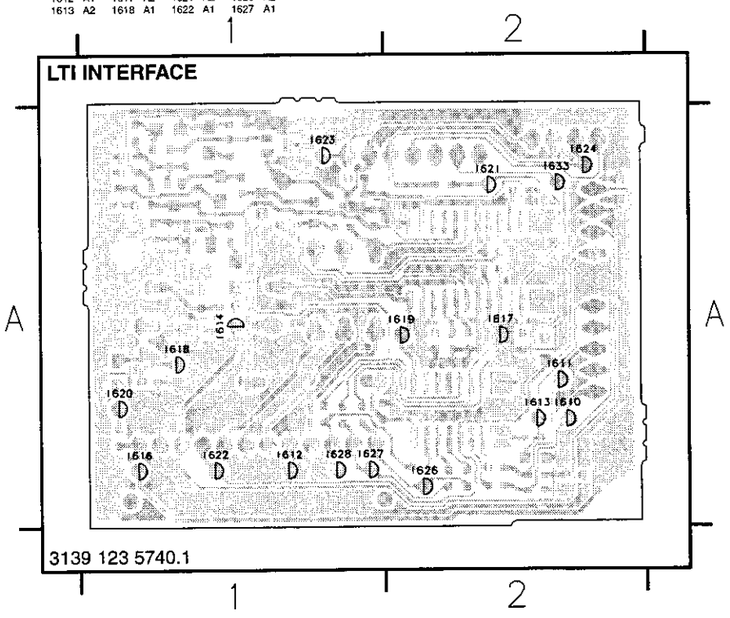
I391 A2
I392 A1



I610 A2 I614 A1 I619 A2 I623 A1 I628 A1
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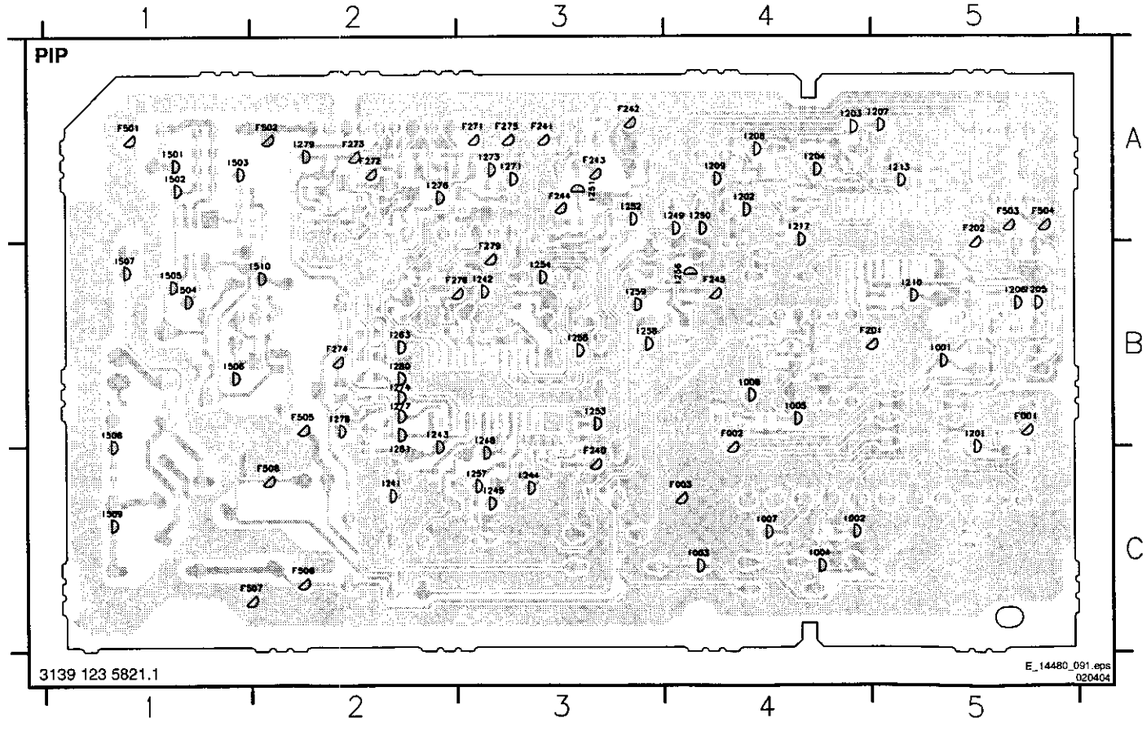

F001 B5
F002 B4
F003 C4
F201 B4
F202 A5
F240 C3
F241 A3
F242 A3
F243 A3
F244 A3
F245 B4
F271 A3
F272 A2
F273 A2
F274 B2
F275 A3
F276 B2
F279 B3
F501 A1
F502 A2
F503 A5
F504 A5
F505 B2
F506 C2
F507 C1
F508 C2
I001 B5
I002 C4
I003 C4
I004 C4
I005 B4
I006 B4
I007 C4
I201 B5
I202 A4
I203 A4
I204 A4
I205 B5
I206 B5
I207 A5
I208 A4
I209 A4
I210 B5
I213 A5
I217 A4
I241 C2
I242 B3
I243 B2
I244 C3
I245 C3
I248 B3
I249 A4
I250 A4
I251 A3
I252 A3
I253 B3
I254 B3
I255 B3
I256 B4
I257 C3
I258 B3
I259 B3
I263 B2
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I273 A3
I274 B2
I276 A2
I277 B2
I278 B2
I279 A2
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I281 C2
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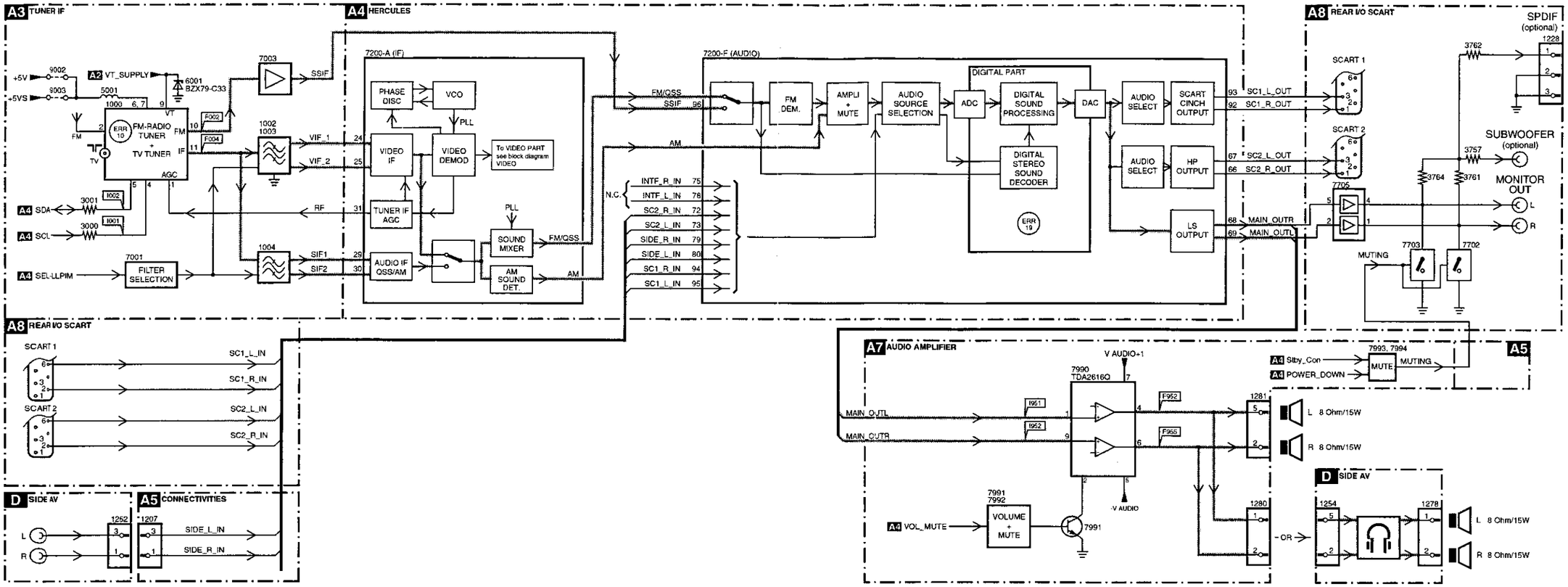
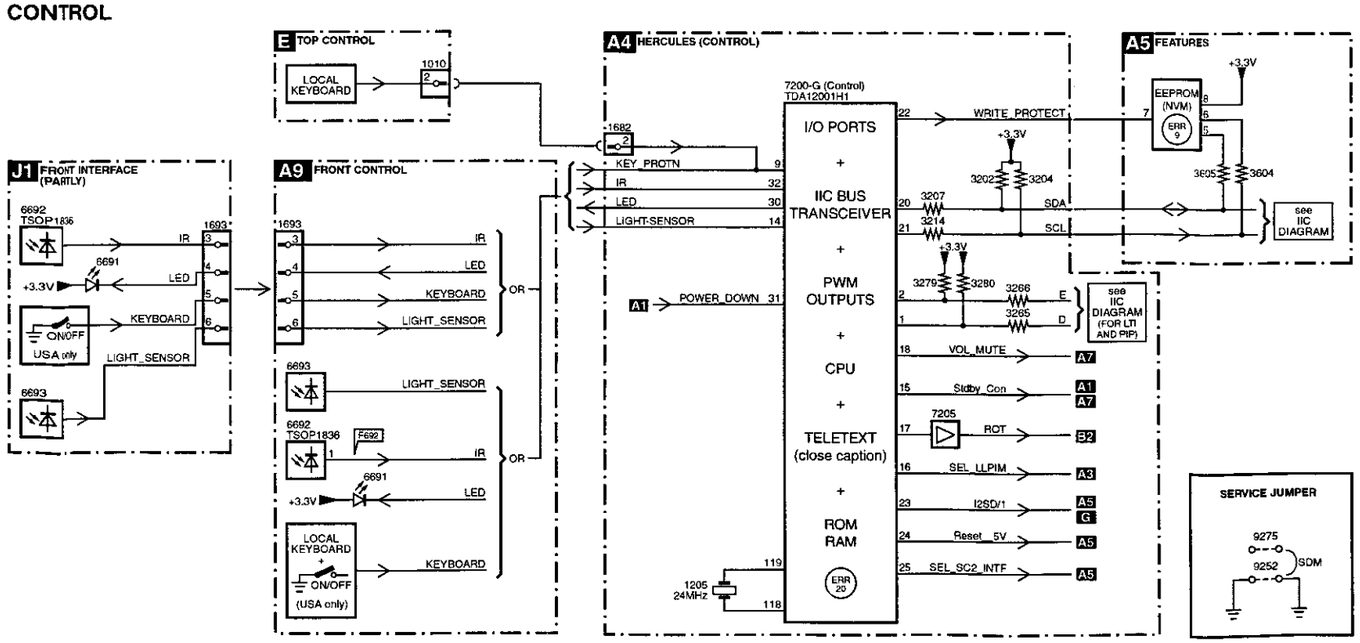
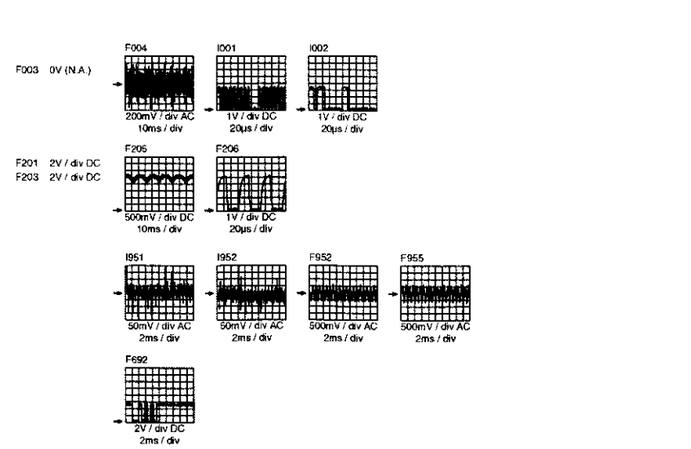
Block Diagram Audio/Control

AUDIO



CONTROL





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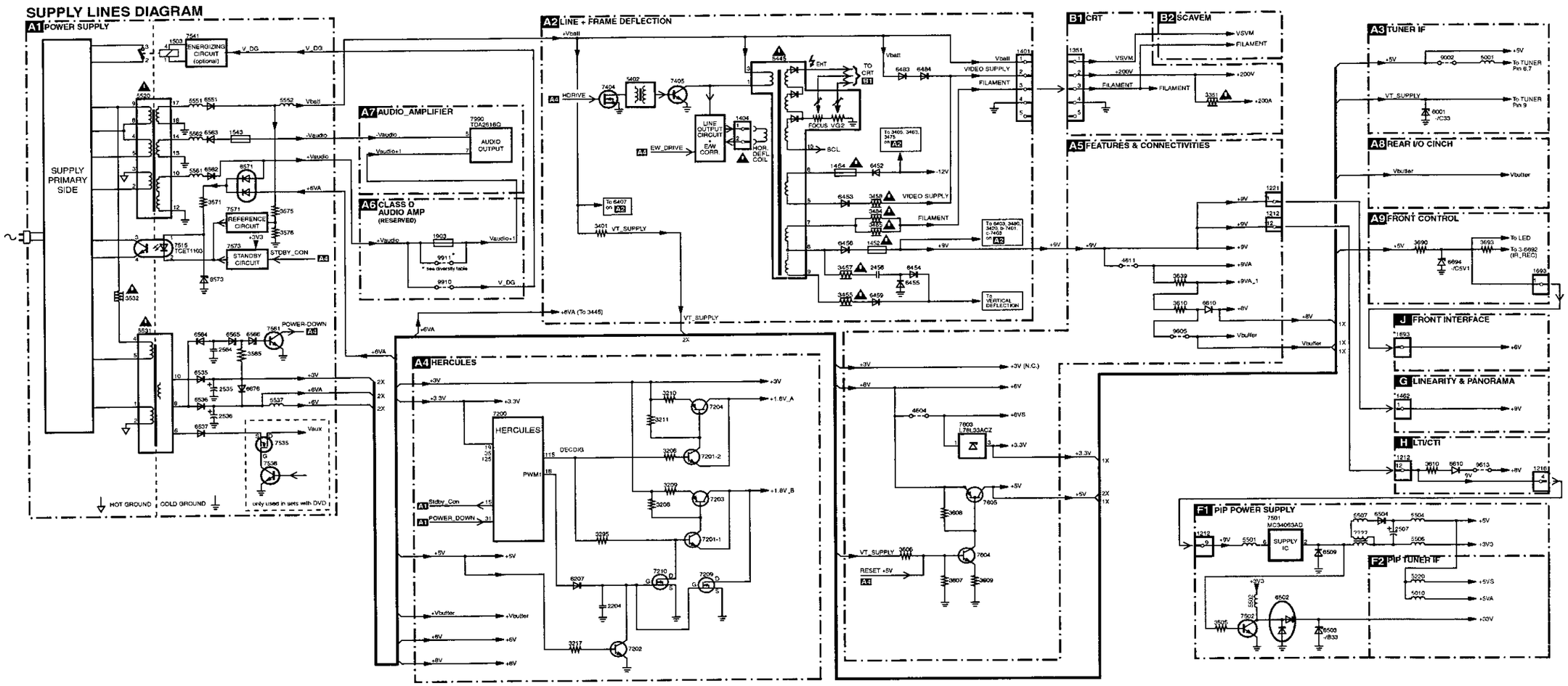
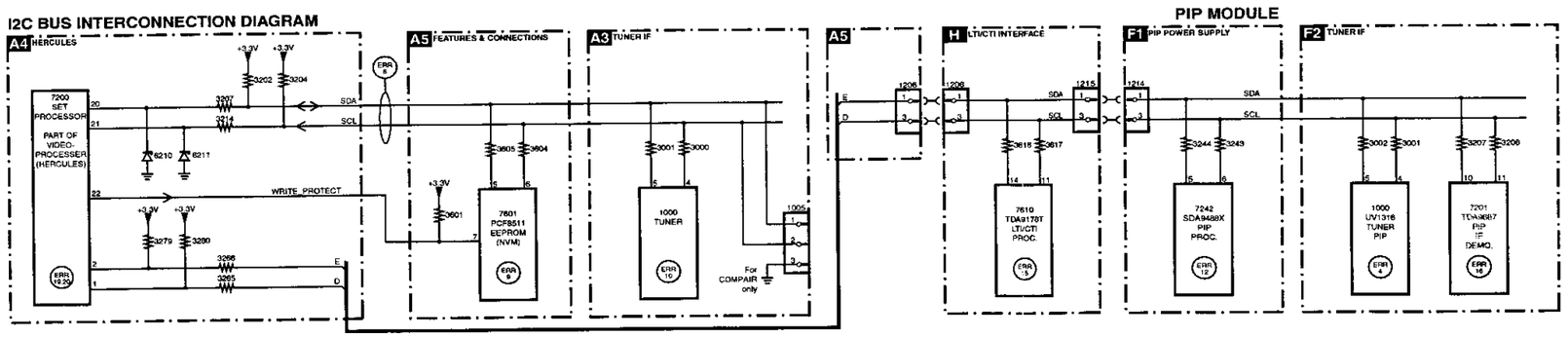
280504

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 / over-voltage protection (US only)	2411, 2412, 2413, 6404, 6411, 6412,	A2
2	Not applicable	High beam (BCI) protection	3404, 7405	A2
3	Not applicable	Vertical guard protection	3466, 7451, 7452, 7453, 7454	A2
4	Tuner UA1316/A	I²C error while communicating with 2nd tuner	1000, 5010 (PIP Module)	F2
5	Not applicable	+5v protection	7604, 7605	A5
6	I2C bus	General I²C error	7200, 3507, 3214	A4
7	Not applicable	-	-	-
8	Not applicable	-	-	-
9	24C16	I²C error while communicating with the EEPROM	7601, 3604, 3605	A5
10	Tuner	= I²C error while communicating with the PLL tuner	1000, 5001	A3
11	TDA6107/A	Black current loop instability protection	7330, 3351, CRT	B1
12	SDA9488X	I²C error while communicating with the PIP processor	7242 (PIP Module)	F1
13	Not applicable	-	-	-
14	DVD Loader	I2C error while communicating with the DVD interface module	DVD interface module	DVD Loader
15	TDA9178T/N1	I2C error while communicating with LTI module	7610	H
16	TDA9887	I2C error while communicating with PIP_Demodulator	7201	F2
17	Not applicable	-	-	-
18	Not applicable	-	-	-
19	TDA1200	I2C error while communicating with SSD stereo sound decoder	7200	A4
20	TDA1200	I2C error while communicating with video cosmic in Hercules IC	7200	A4

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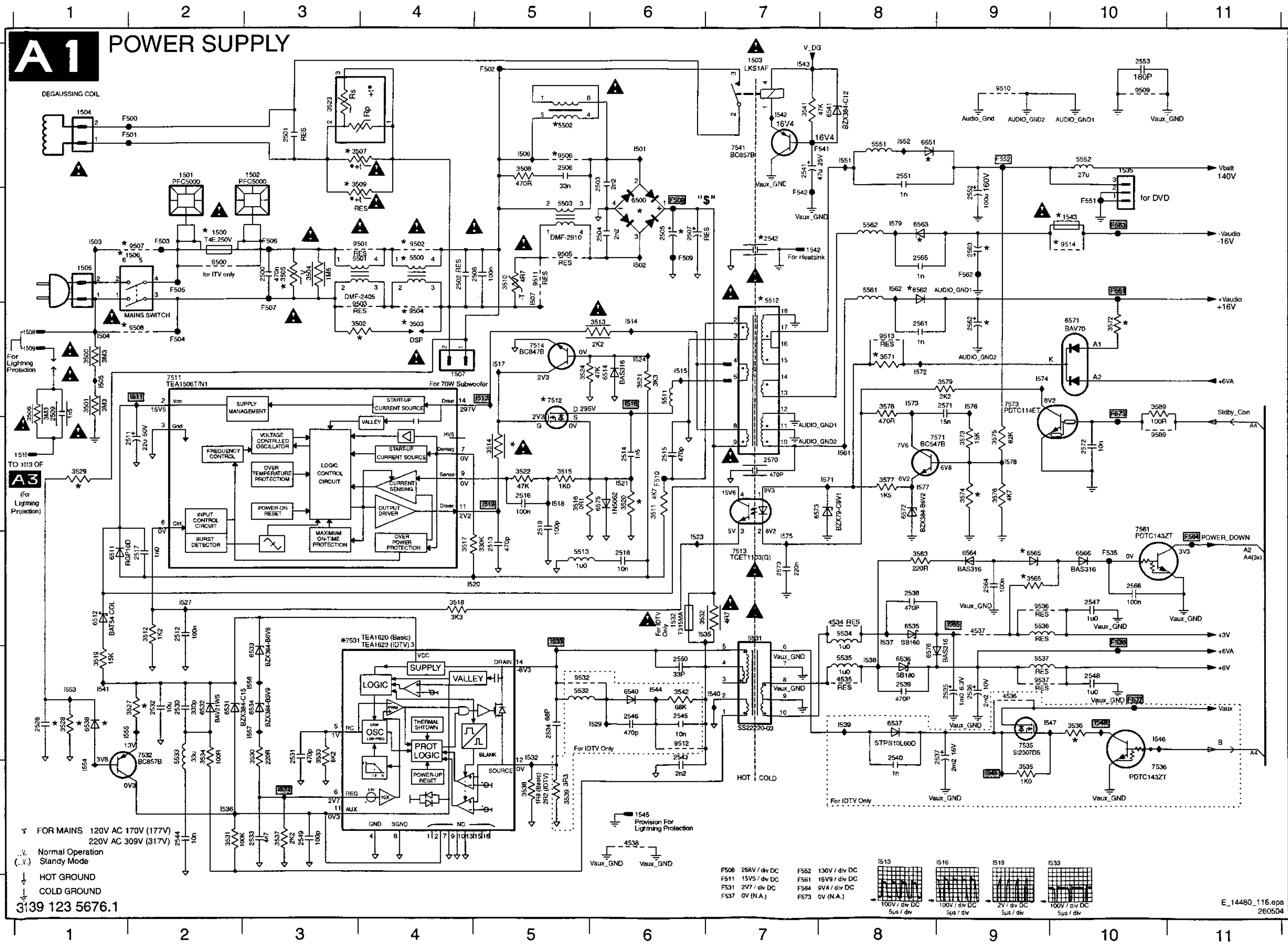
7. Circuit Diagrams and PWB Layouts

Mono Carrier: Power Supply



1500	B2
1501	A2
1502	A3
1503	A7
1504	A1
1505	B1
1506	B1
1507	C4
1508	C1
1509	C1
1510	D1
1532	E6
1535	A10
1542	B8
1543	B10
1545	G6
2500	B3
2501	A3
2502	B4
2503	A6
2504	B6
2505	B6
2506	A5
2507	B6
2508	B5
2509	C1
2511	D2
2512	E2
2513	E5
2514	D6
2515	D6
2516	D5
2517	E2
2518	E6
2519	D5
2528	F1
2530	F2
2531	F3
2532	F2
2533	G3
2534	F5
2535	F9
2536	F9
2537	F9
2538	E8
2539	F8
2540	G8
2541	A7
2542	B7
2543	F6
2544	G2
2545	F6
2546	F6
2547	E10
2548	F10
2549	G3
2550	F6
2551	A8
2552	B9
2553	A10
2561	C8
2562	C9
2563	B9
2564	E9
2565	B8
2566	E10
2570	D7
2571	C9
2572	D10
2573	E7
3500	C1
3501	C1
3502	C4
3503	C4
3504	B3
3505	B3
3506	C1
3507	A4
3508	A5
3509	A4
3510	B5
3511	D6
3512	E2
3513	C6
3514	D5
3515	D5
3516	D5
3517	E4
3518	E4
3519	F1
3520	D6
3521	C6
3522	D5
3523	A3
3524	C5
3527	F2
3528	F1
3529	D1
3530	F3
3531	G2
3532	E6
3533	F3
3534	F2
3535	G9
3536	F10
3537	G3
3538	G5
3539	G5
3541	A7
3542	F6
3563	E8
3565	E9
3571	C8
3572	C10
3573	D9
3574	D9
3575	D9
3576	D9
3577	D8
3578	C8
3579	C9
3589	C10
4534	E8
4535	F8
4536	F9
4537	E9
4538	G6
5500	B4
5501	B4
5502	A5
5503	B5
5511	C6
5512	C7
5513	E5
5531	E7
5532	F5
5533	F2
5534	E8
5535	F8
5536	E9
5537	F9
5551	A8
5552	A10
5561	B8
5562	B8
6500	B6
6511	E1
6512	E1
6514	C6
6531	F2
6532	F2
6533	F3
6534	F3
6535	E8
6536	F8
6537	F8
6538	F1
6540	F6
6541	A8
6551	A8
6562	B8
6563	B8
6564	E9
6565	E9
6566	E10
6571	C10
6572	D8
6573	D8
6575	D6
6576	F8
7511	C2
7512	C5
7513	E7
7514	C5
7531	E3
7532	F2
7535	F9
7536	G10
7541	A7
7561	E10
7571	D9
7573	C9
9500	B2
9501	B4
9502	B4
9503	C4
9504	C4
9505	B5
9506	A5
9507	B2
9508	C2
9509	A10
9510	A9
9511	B5
9512	F6
9513	C8
9514	B10
9532	F5
9536	E9
9537	F9
9589	D10
F500	A2
F501	A2
F502	A5
F503	B2
F504	C2
F505	B2
F506	B3
F507	C3
F508	B6
F509	B6
F510	D6
F535	E10
F536	E10
F537	F10
F541	A8
F542	B7
F551	B10
F552	A9
F561	B10
F562	B9
F563	B10
F564	E11
F573	C10
I501	A6
I502	B6
I503	B1
I504	C1
I505	C1
I506	A5
I507	B5
I511	C2
I513	C5
I514	C6
I515	C6
I516	C6
I517	C5
I518	D5
I519	D5
I520	E5
I521	D6
I523	E6
I524	C6
I527	E2
I529	F6
I531	G3
I532	F5
I533	E5
I535	E6
I536	G2
I537	E8
I538	F8
I539	F8
I540	F7
I541	F1
I542	A7
I543	A7
I544	F6
I545	G9
I546	F10
I547	F10
I548	F10
I551	A8
I552	A8
I553	F1
I554	G1
I555	F1
I556	F3
I557	F3
I561	D8
I562	B8
I565	E9
I571	D8
I572	C8
I573	C8
I574	C9
I575	E7
I576	C9
I577	D8
I578	D9
I579	B8

Mono Carrier: Diversity Table for A1 (Power Supply)

DIVERSITY TABLE FOR A1 POWER SUPPLY

REGION	NAFTA			LATAM / AP						CHINA			INDIA		EUROPE					
MAIN RANGE	LR			FR						HR			HR		HR					
SET	27RF 27FSQ	32RF	26WSRF 30WSRF 32FSQ	21RF	25RF 29FSQ	29RF	29RF	28WSSF	28WSRF 32WSRF	21/25RF	29RF	34RF	21/29RF	21/29RF 29FSQ	21RF	29RF 28WSSF	29RF	24WR 25/28BLD	28WSRF	32WSRF
VBATT	130V	130V	143V	130V	130V	130V	130V	143V	143V	130V	130V	130V	130V	130V	130V	130V	130V	143V	143V	143V
AUDIO OUTPUT	2X5W 2X10W	2X5W 2X10W	2X5W 2X10W	2X10W	2X5W 2X10W	2X5W	2X10W	2X5W	2X10W	2X10W	2X5W 2X10W	2X10W	2X5W 2X10+20W	2X15W	2X5W 2X10W	2X5W	2X10W	2X5W 2X10W	2X5W 2X10W	2X5W 2X10W
1508	---	---	---	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK
1510	---	---	---	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK
2505	200V 470U	200V 470U	200V 470U	400V 330U	400V 330U	---	400V 330U	---	---	450V 220U	450V 220U 400V 33N	450V 220U 400V 33N	450V 220U	---	400V 220U	---	400V 220U	---	400V 220U 400V 33N	400V 220U 400V 33N
2506	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2508	---	---	---	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	---	---	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N
2509	---	---	---	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5
2528	---	---	---	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N
2542	250V 1N5	250V 1N5	250V 1N5	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N
2570	---	---	---	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P
3505	1MA/423V	1MA/423V	1MA/423V	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3	1MA/612V 3M3
3506	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3507	---	144V 3R	144V 3R	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3508	---	---	---	---	---	---	---	---	---	---	470R	470R	---	---	---	---	470R	---	470R	470R
3514	100R	100R	100R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R
3520	0R18	0R18	0R18	0R33	0R33	0R33	0R22	0R33	0R22	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33
3527	---	---	---	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K
3528	---	---	---	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M
3529	---	---	---	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2
3523	145V 1R5	---	---	276V 4R5	276V 4R5	276V4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5
3565	15K	15K	15K	18K	18K	18K	18K	18K	33K	15K	15K	15K	15K	15K	15K	15K	15K	15K	33K	15K
3574	150K	150K	33K	150K	150K	150K	150K	33K	150K	150K	150K	150K	150K	150K	150K	150K	150K	33K	33K	33K
5500	---	---	---	10MH 2A	10MH 2A	---	---	10MH 2A	10MH 2A	20MH 1A5	20MH 1A5 65MH	20MH 1A5 65MH	---	---	20MH 1A5 ---	20MH 1A5 ---	20MH 1A5 65MH	---	20MH 1A5 65MH	20MH 1A5 38MH
5502	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5512	SS40310-01	SS40310-01	SS40312-01	SS42315-01	SS42315-01	SS42315-01	SS49309-01	SS42316-01	SS49308-01	SS42315-01	SS42315-01	SS42315-01	SS42315-01	SS42317-01	SS42315-01	SS42315-01	SS42315-01	SS42316-01	SS42316-01	SS42316-01
6500	GBU4JL	GBU6JL	GBU6JL	GBU4JL	GBU4JL	GBU6JL	GBU6JL	GBU6JL	GBU6JL	GBU4JL	GBU4JL	BYV29X-500	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	BYV29X-500
6538	---	---	---	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316
6551	STTH8L06D	BYV29X-500	BYV29X-500	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	BYV29X-500	STTH8L06D	STTH8L06D	GBU4JL	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	UDZS10B
6565	UDZS9.1B	UDZS9.1B	UDZS9.1B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS10B	UDZS10B	UDZS10B	STTH8L06D	STTH8L06D	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	FQPF7N80
7512	FQPF9N50	FQPF9N50	FQPF9N50	FQPF7N80	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	FQPF7N80	FQPF7N80	FQPF7N80	UDZS10B	UDZS10B	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	BC857B
7532	---	---	---	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	FQPF7N80	FQPF7N80	BC857B	BC857B	BC857B	BC857B	BC857B	---
9502	JMP	JMP	JMP	---	---	---	---	---	---	---	---	---	BC857B	BC857B	---	---	---	---	---	---
9504	JMP	JMP	JMP	---	---	---	---	---	---	---	---	---	JMP	JMP	---	---	---	---	---	---
9506	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	---	---	JMP	JMP	JMP	JMP	---	JMP	---	---

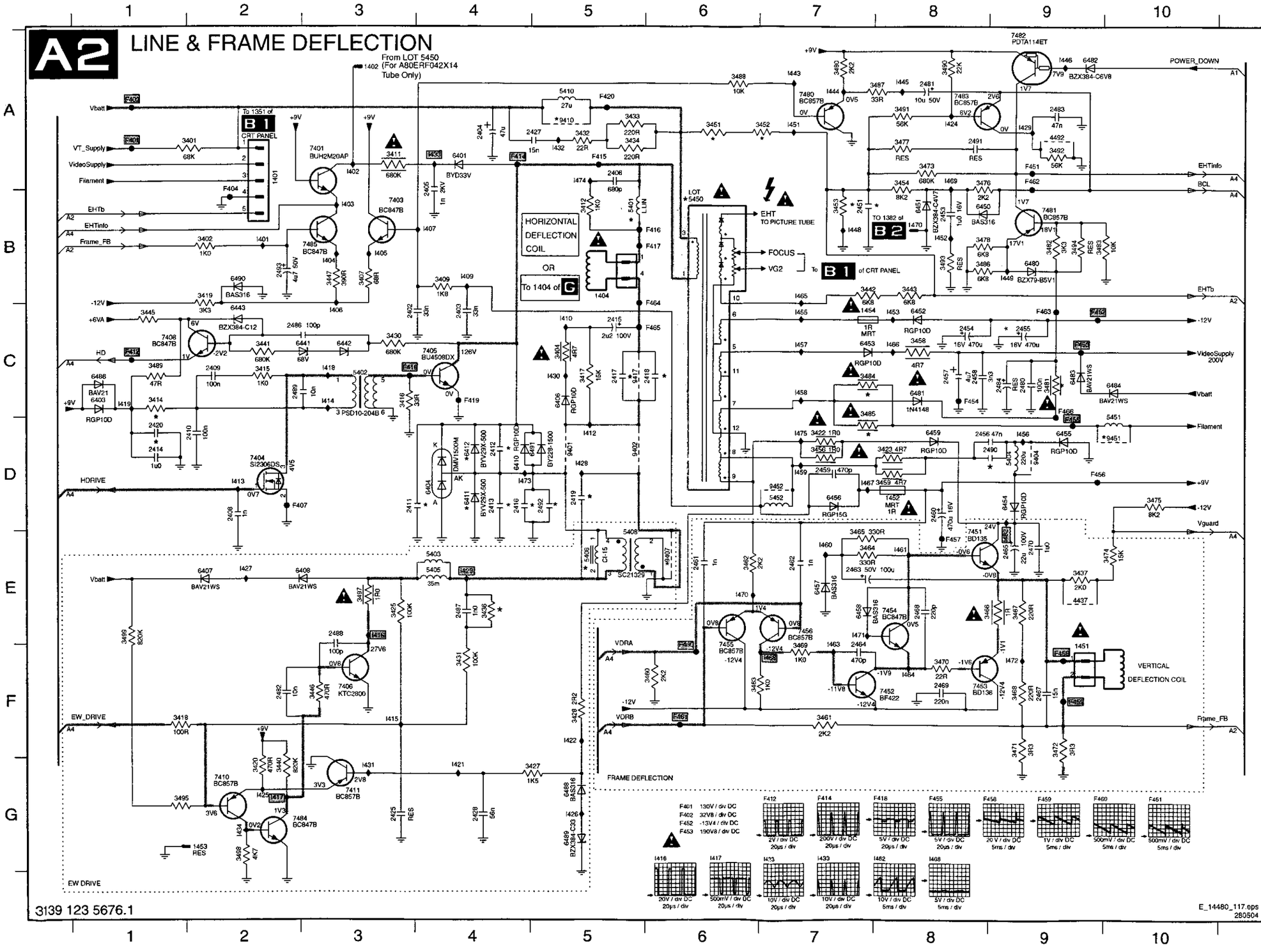
AUDIO OUTPUT	2X5W	2X10W	2X10+20W	2X15W
1543	---	---	2A 250V	2A250V
2562	25V 1000uF	25V 2200uF	25V 2200uF	25V 2200uF
2563	25V 1000uF	25V 2200uF	25V 2200uF	25V 2200uF
3571	220R	220R	220R	680R
3572	220R	220R	220R	470R
6562	SB360	SB360	SB360	SB380
6563	SB360	SB360	SB360	SB380
9514	JMP	JMP	---	---

REGION	NAFTA	ROW
1506	---	Main Switch
9507	JMP	---
9508	JMP	---

3139 123 5676.1

E_14480_126.eps 100504

Mono Carrier: Deflection



Mono Carrier: Diversity Table for A2 (Deflection)

DIVERSITY TABLE FOR A2 DEFLECTION

Region	NAFTA							LATAM						AP					CHINA				INDIA		
Tube	LPD	LPD	LPD	LPD	LPD	LPD	SMGK	LPD	LPD	LPD	LPD	LPD	SMGK	CPT	LPD	LPD	LPD	LPD	LPD	LPD	LPD	LPD	CPD	LPD	SMGK
Size	27 V	28 WR	29 RF	32 V	32 V RF	32 WR	25 RF	25 RF	27V	28WS	28WR	32WR	29RF	21RF	25RF	29RF	32WR	34RF	25RF	21RF	29RF	34RF	21RF	29RF	29FSQ
2411	470pF	1.2nF	1.5nF	2.2nF	680pF	330pF	1.2nF	680nF	470pF	1.2nF	1.2nF	330pF	1.5nF	220pF	680nF	1.2nF	330pF	1nF	680nF	220pF	1.2nF	1nF	220pF	1.2nF	680pF
2412	12nF	13nF	15nF	15nF	12nF	13nF	15nF	15nF	12nF	15nF	13nF	13nF	15nF	8n2	15nF	15nF	13nF	12nF	15nF	8n2	15nF	12nF	8n2	15nF	13nF
2413	120nF	15nF	39nF	33nF	33nF	18nF	33nF	33nF	120nF	18nF	15nF	18nF	39nF	68nF	33nF	33nF	-	33nF	33nF	68nF	33nF	33nF	68nF	33nF	39nF
2416	-	3n3	-	-	4n7	-	-	-	-	2n2	3n3	-	-	-	-	3n3	-	-	-	-	3n3	-	-	3n3	-
2418	390nF	-	330nF	470nF	270nF	-	390nF	360nF	390nF	-	-	-	330nF	220nF	360nF	330nF	-	300nF	360nF	270nF	330nF	300nF	220nF	330nF	390nF
2419	-	390nF	2u2	2u2	2u2	430nF	2u2	2u2	-	470nF	390nF	430nF	2u2	-	2u2	2u2	430nF	2u2	2u2	-	2u2	2u2	-	2u2	2u2
2425	-	33nF	33nF	33nF	10nF	33nF	33nF	33nF	-	33nF	33nF	33nF	33nF	-	33nF	33nF	33nF	10nF	33nF	-	33nF	10nF	-	33nF	33nF
2451	150nF	150nF	180nF	180nF	150nF	180nF	100nF	100nF	150nF	120nF	150nF	180nF	100nF	120nF	120nF	220nF	180nF	270nF	120nF	220nF	220nF	270nF	120nF	220nF	220nF
2457	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7
2487	-	1n5	1n5	1n5	2n2	1n5	1n5	1n5	-	1n5	1n5	1n5	3n3	1nF	1n5	1nF	1n5	3n3	1n5	1nF	1nF	3n3	1nF	1nF	1nF
2490	47n	-	-	-	-	-	47n	-	47n	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3224	680K 5%	680K 5%	680K 5%	680K 5%	560K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	1M 5%	680K 5%	680K 5%	680K 5%	1M 5%	680K 5%	1M 5%	680K 5%	1M 5%	1M 5%	680K 5%	1M 5%
3295	8K2 5%	10K 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	4R7 1W 5%	10K 5%	8K2 5%	2K7 5%	8K2 5%	10K 5%	8K2 5%	7K5 1%	8K2 5%	8K2 5%	10K 5%	7K5 1%	2K7 5%	10K 5%	8K2 5%
3414	1R 1W 5%	2R2 1W 5%	1R 1W 5%	0R33 1W 5%	1R 1W 5%	6R8 1W 5%	3R3 1W 5%	1R 1W 5%	1R 1W 5%	4R7 1W 5%	2R2 1W 5%	6R8 1W 5%	0R33 1W 5%	10R 1W 5%	1R 1W 5%	1R 1W 5%	6R8 1W 5%	6R8 1W 5%	1R 1W 5%	4R7 1W 5%	1R 1W 5%	6R8 1W 5%	10R 1W 5%	1R 1W 5%	4R7 1W 5%
3431	82K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%
3451	68K 1%	82K 1%	68K 1%	75K 1%	68K 1%	82K 1%	68K 1%	68K 1%	68K 1%	120K 1%	68K 1%	82K 1%	68K 1%	82K 1%	68K 1%	68K 1%	82K 1%	68K 1%	68K 1%	68K 1%	68K 1%	68K 1%	82K 1%	68K 1%	56K 1%
3452	18K 5%	15K 5%	15K 5%	6K8 5%	6K8 5%	6K8 5%	18K 5%	18K 5%	18K 5%	27K 5%	15K 5%	6K8 5%	15K 5%	18K 5%	18K 5%	15K 5%	6K8 5%	18K 5%	18K 5%	18K 5%	15K 5%	18K 5%	18K 5%	15K 5%	18K 5%
3453	33K 5%	22K 5%	33K 5%	22K 5%	33K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	22K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%
3467	120R 5%	120R 5%	120R 5%	220R 5%	150R 5%	220R 5%	120R 5%	120R 5%	120R 5%	220R 5%	120R 5%	220R 5%	120R 5%	220R 5%	120R 5%	120R 5%	220R 5%	150R 5%	120R 5%	220R 5%	120R 5%	150R 5%	220R 5%	120R 5%	220R 5%
3468	220R 5%	150R 5%	150R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	220R 5%	150R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	220R 5%
3471	-	2R7 1%	2R4 1%	2R4 1%	2R2 1%	1R8 1%	2R2 1%	2R4 1%	-	2R2 1%	1R8 1%	1R8 1%	2R2 1%	2R2 1%	2R4 1%	2R4 1%	1R8 1%	2R2 1%	2R4 1%	3R9 1%	2R4 1%	2R2 1%	2R2 1%	2R4 1%	2R2 1%
3472	3R3 1%	2R4 1%	2R4 1%	2R7 1%	2R2 1%	3R3 1%	2R 1%	2R4 1%	3R3 1%	3R3 1%	2R4 1%	3R3 1%	2R2 1%	3R9 1%	2R4 1%	2R4 1%	3R3 1%	2R2 1%	2R4 1%	4R7 1%	2R4 1%	2R2 1%	3R9 1%	2R4 1%	2R2 1%
3473	390K 5%	680K 5%	820K 5%	820K 5%	820K 5%	820K 5%	680K 5%	820K 5%	390K 5%	1M 5%	680K 5%	820K 5%	1M 5%	390K 5%	820K 5%	680K 5%	820K 5%	430K 5%	820K 5%	680K 5%	680K 5%	430K 5%	390K 5%	680K 5%	680K 5%
3474	15K 5%	12K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%
3481	-	5R6 5%	10R 5%	2R7 5%	5R6 5%	4R7 5%	-	-	-	-	-	-	-	-	-	-	-	4R7 5%	-	-	-	-	-	-	-
3482	-	22K 1%	2K4 1%	22K 1%	22K 1%	22K 1%	-	-	22K 1%	-	-	-	-	-	-	-	-	22K 1%	-	-	-	-	-	-	-
3483	-	56K 1%	5K6 1%	56K 1%	56K 1%	56K 1%	-	-	56K 1%	-	-	56K 1%	-	-	-	-	-	56K 1%	-	-	-	-	-	-	-
3491	100K 5%	100K 5%	100K 5%	82K 5%	68K 5%	82K 5%	100K 5%	100K 5%	100K 5%	82K 5%	100K 5%	82K 5%	82K 5%	82K 5%	100K 5%	82K 5%	82K 5%	82K 5%	100K 5%	56K 5%	82K 5%	82K 5%	82K 5%	82K 5%	56K 5%
3494	180K 5%	-	100K 5%	150K 5%	680K 5%	680K 5%	-	-	180K 5%	-	-	680K 5%	-	-	-	-	680K 5%	-	-	-	-	-	-	-	-
3499	680K 5%	680K 5%	680K 5%	330K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	-	680K 5%	680K 5%	56K 5%	56K 5%	56K 5%
5401	50uH	42uH	33uH	33uH	25uH	42uH	33uH	37uH	50uH	16uH	42uH	42uH	25uH	82uH	37uH	33uH	42uH	42uH	CU15	82uH	33uH	CU15	82uH	33uH	33uH
5408	-	SC2132 9-00B	CU15	CU15	CU15	SC2132 9-00B	CU15	CU15	-	SC2132 9-00B	SC2132 9-00B	SC2132 9-00B	CU15	-	CU15	CU15	SC2132 9-00B	CU15	-	-	CU15	CU15	-	CU15	CU15
5450	JF0501-21835B	JF0501-85021B	JF0501-21836B	JF0501-21140B	JF0101-85020B	JF0101-85021B	JF0501-21835B	JF0501-2153B	JF0501-21835B	JF0501-21133B	JF0501-85021B	JF0101-85021B	JF0501-2136B	JF0501-2135B	JF0501-2135B	JF0501-2136B	0.58mm COL	JF0501-2601B	JF0501uH35B	JF0501-2135B	JF0501-2136B	JF0501-2601B	JF0501-2135B	JF0501-2136B	JF0501-2133B
5451	27uH 10%	JMP	33uH 10%	27uH 10%	JMP	JMP	33uH 10%	27uH 10%	27uH 10%	39uH 10%	JMP	JMP	27uH 10%	68uH 5%	27uH 10%	27uH 10%	-	22uH	27uH 10%	68uH 5%	27uH 10%	22uH	68uH 5%	27uH 10%	22uH 10%
6404	DVM1500M	-	DVM1500M	DVM1500M	DVM1500M	-	DVM1500M	DVM1500M	DVM1500M	-	-	-	DVM1500M	DVM1500M	DVM1500M	DVM1500M	-	DVM1500M	-	DVM1500M	-	-	DVM1500M	DVM1500M	DVM1500M
6411	-	BY229X-800	-	-	-	BY229X-800	-	-	-	BY229X-80	BY229X-80	BY229X-80	BY229X-800	-	-	-	BY229X-800	-	-	-	-	-	-	-	-
6412	-	BY359X-1500	-	-	-	BY359X-1500	-	-	-	BU4508DX	BY359X-1500	BY359X-1500	BY359X-1500	-	-	-	BY359X-1500	-	-	-	-	-	-	-	-
7405	BU4508DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	-	BU2725DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX
9407	-	-	JMP	JMP	JMP	-	JMP	-	-	JMP	-	-	-	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP
9417	-	JMP	-	-	-	-	-	-	-	-	JMP	JMP	-	-	-	-	JMP	-	-	-	-	-	-	-	-

Region	EUROPE							
Tube	LPD	LPD	LPD	LPD	LPD	LPD	LPD	LPD
Size	21RF	24 WR	25 I	28 I	29 RF	28 WR	28 WS	32 WR
2411	470pF	1n2	470pF	470pF	1nF	680pF	680pF	680pF
2412	8n2	13nF	9n1	9n1	13nF	11nF	11nF	11nF
2413	33nF	15nF	18nF	18nF	33nF	15nF	15nF	15nF
2416	-	2n2	-	-	-	4n7	2n2	4n7
2418	470nF	-	390nF	390nF	360nF	-	-	-
2419	2u2	470nF	470nF	470nF	2u2	430nF	470nF	430nF
2425	33nF	33nF	33nF	33nF	33nF	33nF	33nF	33nF
2451	220nF	220nF	220nF	220nF	220nF	220nF	220nF	220nF
2457	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7
2487	1nF	1nF	1nF	1nF	1nF	1nF	1nF	1nF
2490	47n	-	-	-	-	-	-	-
3224	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%
3295	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%
3414	4R7 1W	4R7 1W	10R 1W 5%	10R 1W 5%	8K2 5%	3R3 1W	4R7 1W	3R3 1W
3431	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	68K 1%
3451	68K 1%	56K 1%	120K 5%	120K 5%	68K 1%	68K 1%	68K 1%	18K 5%
3452	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	220R 5%
3453	22K 5%	22K 5%	33K 5%	33K 5%	33K 5%	22K 5%	22K 5%	220R 5%
3467	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	1R5 1%
3468	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	6R8 1%
3471	3R3 1%	3R3 5%	1R5 1%	1R5 1%	2R2 1%	1R5 1%	3R3 1%	470K 5%
3472	3R3 1%	3R3 1%	2R2 1%	2R2 1%	2R2 1%	6R8 1%	3R3 1%	15K 5%
3473	470K 5%	470K 5%	680K 5%	680K 5%	680K 5%	470K 5%	470K 5%	-
3474	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	-
3481	-	-	-	-	-	-	-	-
3482	-	-	-	-	-	-	-	56K 5%
3483	-	-	-	-	-	-	-	56K 5%
3491	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	-
3494	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	680K 5%
3499	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%
5401	82uH	37uH	50uH	50uH	25uH	50uH	25uH	25uH
5408	CU15	SC21329-00B	SC21329-00B	SC21329-00B	CU15	SC21329-00B	SC21329-00B	SC21329-00B
5450	1342.0033CY	1342.0048B	1342.0048B	1342.0048B	1362.0016AB	1362-0015AB	1342.0042CY	1362-0015AB
5451	22uH 10%	22uH 10%	27uH 10%	27uH 10%	39uH 10%	0.588 COL	22uH 10%	33uH 10%
6404	DVM1500M	-	-	-	DVM1500M	-	-	-
6411	-	BY229X-800	BY229X-800	BY229X-800	-	BY229X-800	BY229X-800	BY229X-800
6412	-	BY359X-1500	BY359X-1500	BY359X-1500	-	BY359X-1500	BY359X-1500	BY359X-1500
7405	BU4508DX	BU2725DX	BU2725DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU2725DX
9407	JMP	-	-	-	JMP	-	JMP	-
9417	-	JMP	-	-	-	JMP	JMP	JMP

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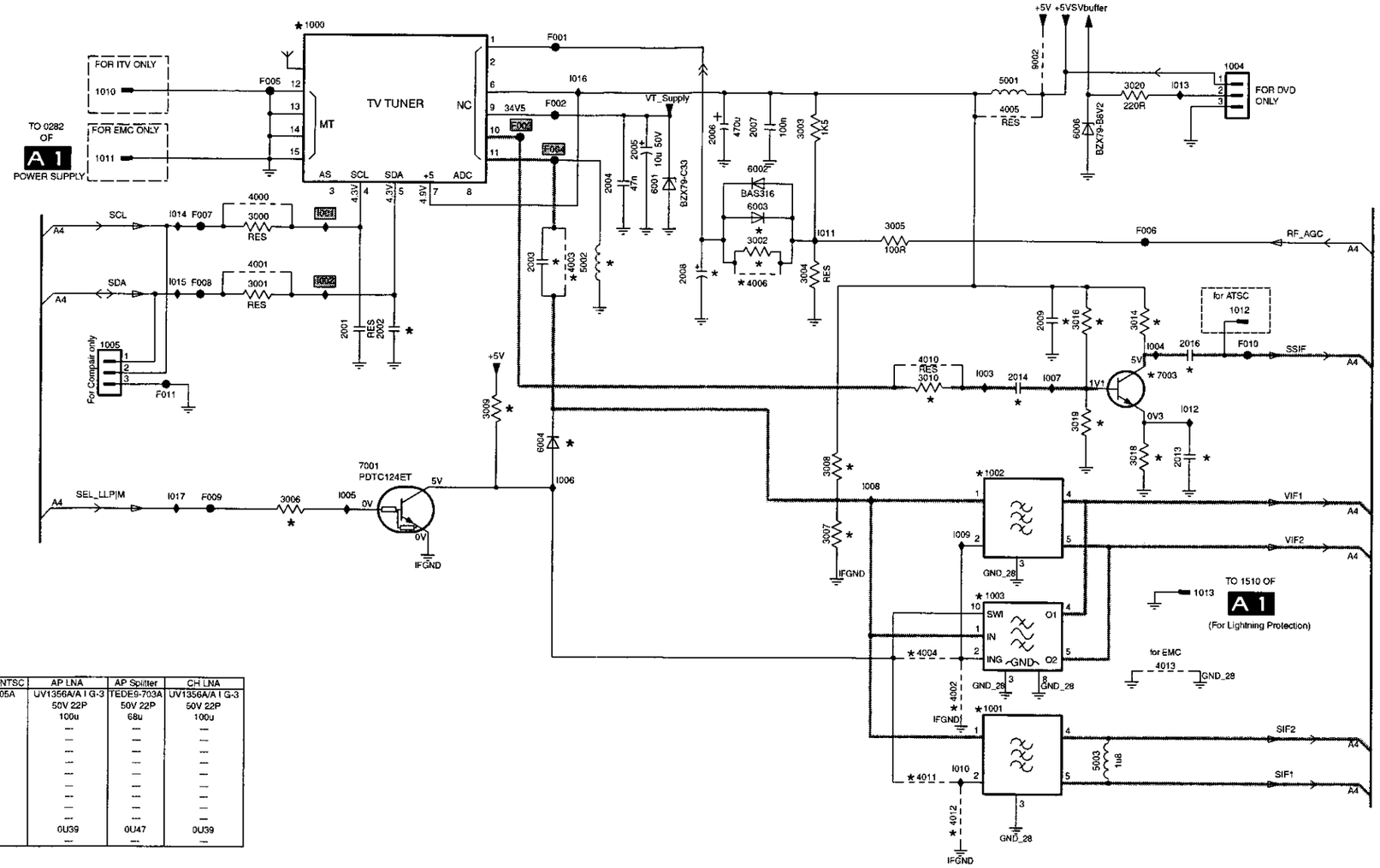
Mono Carrier: Tuner IF

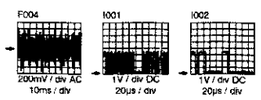
A3 TUNER IF



ITEM	EU Normal	EU FM Radio	EU Splitter	NA/LA/AP NTSC	AP LNA	AP Splitter	CH LNA
1000	UV1316E/A I-4	UR1316/A I-3	TEDE9-703A	TEDH9-305A	UV1356A/A I G-3	TEDE9-703A	UV1356A/A I G-3
2002	50V 22P	50V 22P	50V 22P	---	50V 22P	50V 22P	50V 22P
2008	68u	68u	68u	100u	100u	68u	100u
2009	---	16V 100N	---	---	---	---	---
2013	---	25V 1N	---	---	---	---	---
2014	---	25V 1N	---	---	---	---	---
2016	---	25V 1N	---	---	---	---	---
3010	---	330R	---	---	---	---	---
3014	---	820R	---	---	---	---	---
3016	---	100K	---	---	---	---	---
3018	---	560R	---	---	---	---	---
3019	---	150K	---	---	---	---	---
5002	0U47	0U47	0U47	0U39	0U39	0U47	0U39
7003	---	BFS20	---	---	---	---	---

ITEM	EU-QSS	NA/LA/AP INT	AP QSS	CH QSS
1001	K9656M	---	K9362M	K9352M
1002	K3953M	M1971M	K7257M	---
1003	---	---	---	K6274M
2003	50V 10N	---	50V 10N	50V 10N
3002	10K	---	---	---
3006	10K	---	10K	10K
3007	2K2	---	2K2	2K2
3008	6K8	---	6K8	6K8
3009	2K2	---	2K2	2K2
4002	JMP	JMP	---	JMP
4003	---	JMP	---	---
4004	---	---	JMP	---
4006	---	JMP	JMP	JMP
4011	JMP	---	---	---
4012	---	---	JMP	JMP
6002	BAS316	---	---	---
6004	1SS356	---	1SS356	1SS356
7001	PDTC124ET	---	PDTC124ET	PDTC124ET

F003 0V (N.A.)



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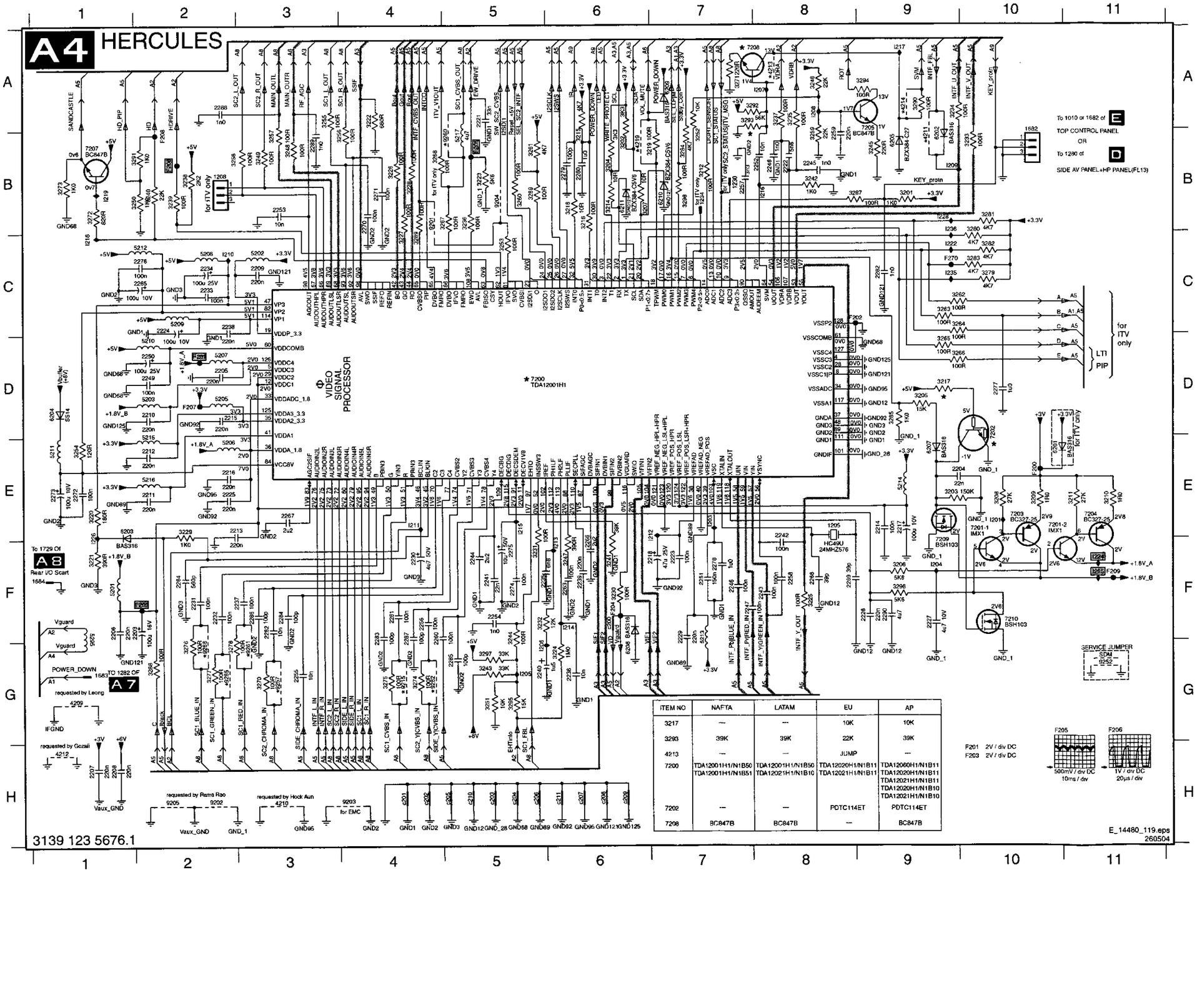
1000 A4
1001 E8
1002 D8
1003 D8
1004 A10
1005 C3
1010 A3
1011 B3
1012 C10
1013 D10
2001 C4
2002 C4
2003 B5
2004 B6
2005 A6
2006 A6
2007 A7
2008 B6
2009 C9
2013 C9
2014 C8
2016 C9
3000 B4
3001 B4
3002 B7
3003 A7
3004 B7
3005 B8
3006 D4
3007 D7
3008 C7
3009 C5
3010 C8
3014 C9
3016 C9
3018 C9
3019 C9
3020 A9
4000 B4
4001 B4
4002 E8
4003 B6
4004 E8
4005 A8
4006 B7
4010 C8
4011 E8
4012 F8
4013 E9
5001 A8
5002 B6
5003 E9
6001 B6
6002 B7
6003 B7
6004 C5
6006 A9
7001 D4
7003 C9
9002 A9
F001 A5
F002 A5
F003 A5
F004 B5
F005 A4
F006 B9
F007 B3
F008 B3
F009 D3
F010 C10
F011 C3
I001 B4
I002 B4
I003 C8
I004 C9
I005 D4
I006 D6
I007 C9
I008 D7
I009 D8
I010 E8
I011 B7
I012 C9
I013 A9
I014 B3
I015 B3
I016 A6
I017 D3

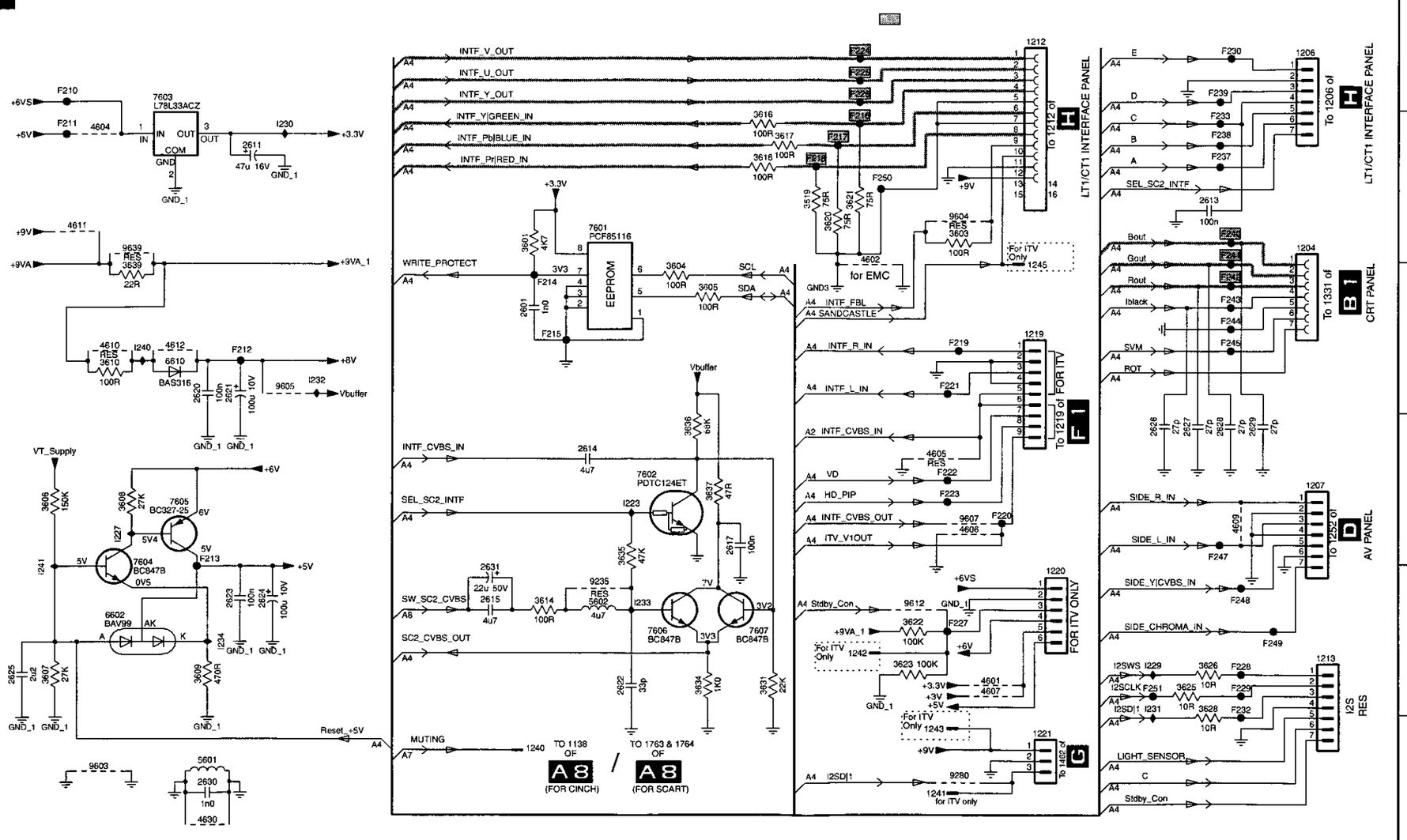
Mono Carrier: Hercules



ITEM NO	NAFTA	LATAM	EU	AP
3217	---	---	10K	10K
3293	39K	39K	22K	39K
4213	---	---	JUMP	---
7200	TDA12001H1/N1B50 TDA12001H1/N1B51	TDA12001H1/N1B50 TDA12021H1/N1B10	TDA12020H1/N1B11 TDA12021H1/N1B11	TDA12060H1/N1B11 TDA12020H1/N1B11 TDA12021H1/N1B11 TDA12020H1/N1B10 TDA12021H1/N1B10
7202	---	---	PDTC114ET	PDTC114ET
7208	BC847B	BC847B	---	BC847B

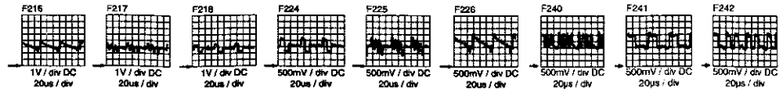
Mono Carrier: Features & Connectivities

A5 FEATURES & CONNECTIVITIES



1213	MTV	ITV
1	I2SWS	ITV DATA OUT/SDA
2	I2SCLK	ITV DATAIN
3	I2SDI1	ITV CLOCK
4	GND	GND
5	Light sensor	ITV SCL
6	C	ITV POR 1
7	Stdby-con	Stdby-con

1206	DVD	iDTV	USB	PCMCIA
A	-	-	-	-
B	Power On	Power On	Power On	Power On
C	Bus Request	Bus Request	Bus Request	Bus Request
D	Rx	-	Rx	Rx
E	Tx	-	Tx	Tx



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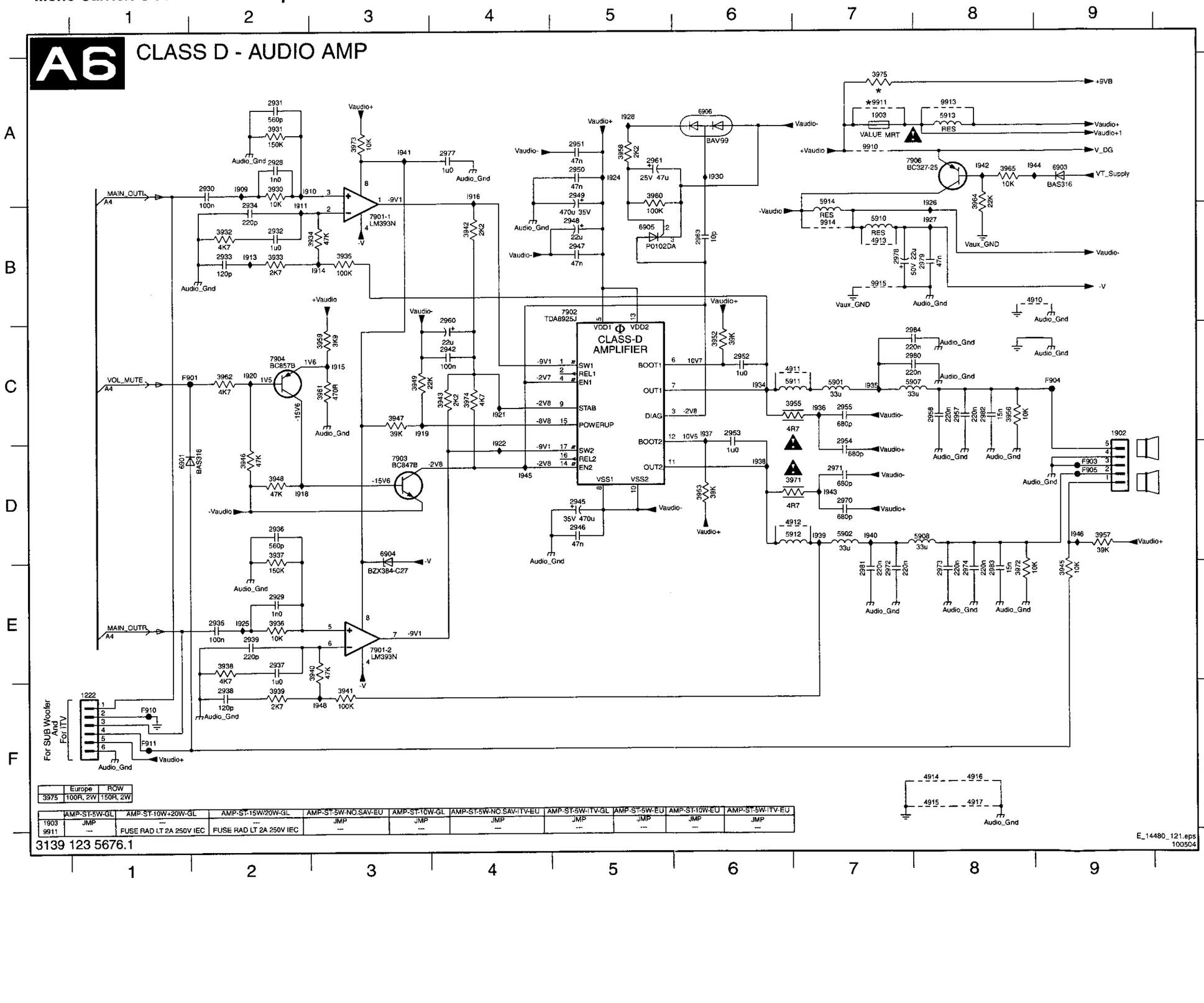
Mono Carrier: Class D - Audio Amplifier

A6 CLASS D - AUDIO AMP



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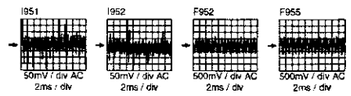
1222 F1	4911 C7
1902 C9	4912 D7
1903 A7	4913 B7
2928 A2	4914 F8
2929 E2	4915 F8
2930 A2	4916 F8
2931 A2	4917 F8
2932 B2	5901 C7
2933 B2	5902 D7
2934 B2	5907 C8
2935 E2	5908 D8
2936 D2	5910 B7
2937 E2	5911 C7
2938 F2	5912 D7
2939 E2	5913 A8
2942 C4	5914 B7
2945 D5	6901 D1
2946 D5	6903 A9
2947 B5	6904 D3
2948 B5	6905 B5
2949 A5	6906 A6
2950 A5	7901-1 B3
2951 A5	7901-2 E3
2952 C6	7902 B5
2953 C6	7903 D3
2954 D7	7904 C2
2955 C7	7906 A8
2957 C8	9910 A7
2958 C8	9911 A7
2960 B4	9913 A8
2961 A5	9914 B7
2963 B6	9915 B7
2970 D7	F901 C2
2971 D7	F903 D9
2972 E7	F904 C9
2973 E8	F905 D9
2974 E8	F910 F1
2977 A4	F911 F1
2978 B7	I909 A2
2979 B8	I910 A3
2980 C8	I911 B2
2981 E7	I913 B2
2982 C8	I914 B3
2983 E8	I915 C3
2984 C8	I916 A4
3930 A2	I918 D2
3931 A2	I919 C3
3932 B2	I920 C2
3933 B2	I921 C4
3934 B3	I922 D4
3935 B3	I924 A5
3936 E2	I925 E2
3937 D2	I926 B8
3938 E2	I927 B8
3939 F2	I928 A5
3940 E3	I930 A6
3941 F3	I934 C6
3942 B4	I935 C7
3943 C4	I936 C7
3945 E9	I937 C6
3946 D2	I938 D6
3947 C3	I939 D7
3948 D2	I940 D7
3949 C3	I941 A3
3952 C6	I942 A8
3953 D6	I943 D7
3955 C7	I944 A9
3956 C8	I945 D4
3957 D9	I946 D9
3958 A5	I948 F3
3959 C3	
3960 A5	
3961 C3	
3962 C2	
3964 A8	
3965 A8	
3971 D7	
3972 E8	
3973 A3	
3974 C4	
3975 A7	
4910 B9	

Mono Carrier: Audio Amplifier

A7 AUDIO AMPLIFIER

MAIN_OUTL
MAIN_OUTR
VOL_MUTE
Stdby_Con
MUTING
TO 1683 OF A4
POWER_DOWN 6990
BAS316
7990 TDA2616Q
+16V
-16V
Vaudio+1
-Vaudio
VP+
VP-
INV1-
INV2-
MUTE
VGND
INV12
OUT1
OUT2
AmpOutL
AmpOutR
Audio_Gnd
8 ohm / 15W
7991 BC847B
7992 BC847B
7993 BC847B
7994 BC847B
0V7
16V



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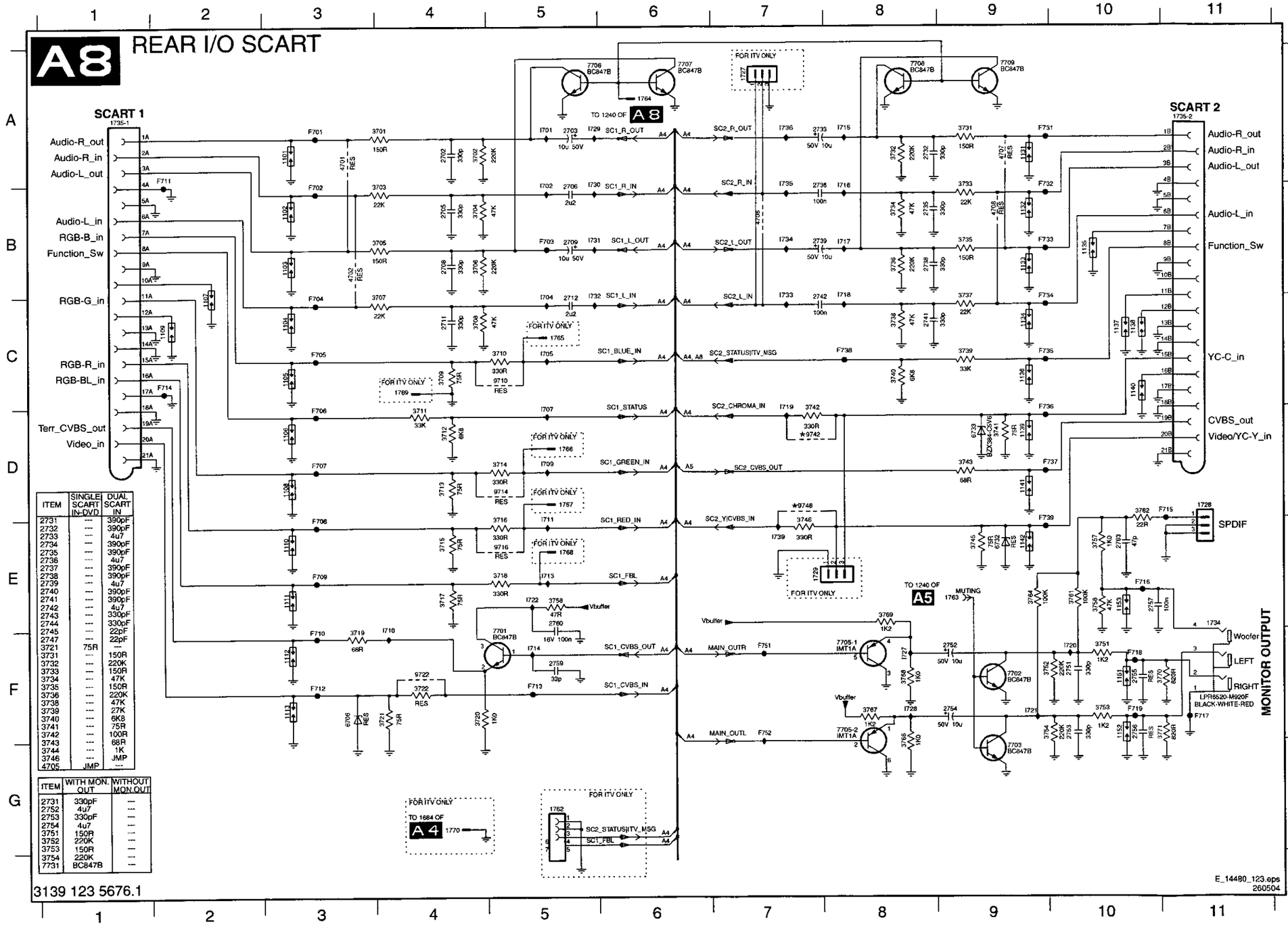
Mono Carrier: Rear I/O Scart



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2732	---	390pF
2733	---	4u7
2734	---	390pF
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2736	---	4u7
2737	---	390pF
2738	---	390pF
2739	---	4u7
2740	---	390pF
2741	---	390pF
2742	---	4u7
2743	---	330pF
2744	---	330pF
2745	---	22pF
2747	---	22pF
3721	75R	---
3731	---	150R
3732	---	220K
3733	---	150R
3734	---	47K
3735	---	150R
3736	---	220K
3738	---	47K
3739	---	27K
3740	---	6K8
3741	---	75R
3742	---	100R
3743	---	68R
3744	---	1K
3746	---	JMP
4705	JMP	---

ITEM	WITH MON. OUT	WITHOUT MON.OUT
2731	330pF	---
2752	4u7	---
2753	330pF	---
2754	4u7	---
3751	150R	---
3752	220K	---
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1105 C3	3737 C9	I720 F10
1106 D3	3738 C8	I721 F9
1107 C2	3739 C9	I722 E5
1108 D3	3740 C8	I727 F8
1109 C2	3741 D9	I728 F8
1110 E3	3742 D7	I729 A5
1111 E3	3743 D9	I730 A5
1112 F3	3745 E9	I731 B5
1113 F3	3746 E7	I732 B5
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1140 C10	3764 E9	
1141 D9	3766 G8	
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1727 A7	3771 F11	
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1770 G4	7706 A6	
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2708 B4	9714 D5	
2709 B5	9716 E5	
2711 C4	9722 F4	
2712 C5	9742 D7	
2732 A8	9746 D7	
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2754 F9	F711 A2	
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2756 F10	F713 F5	
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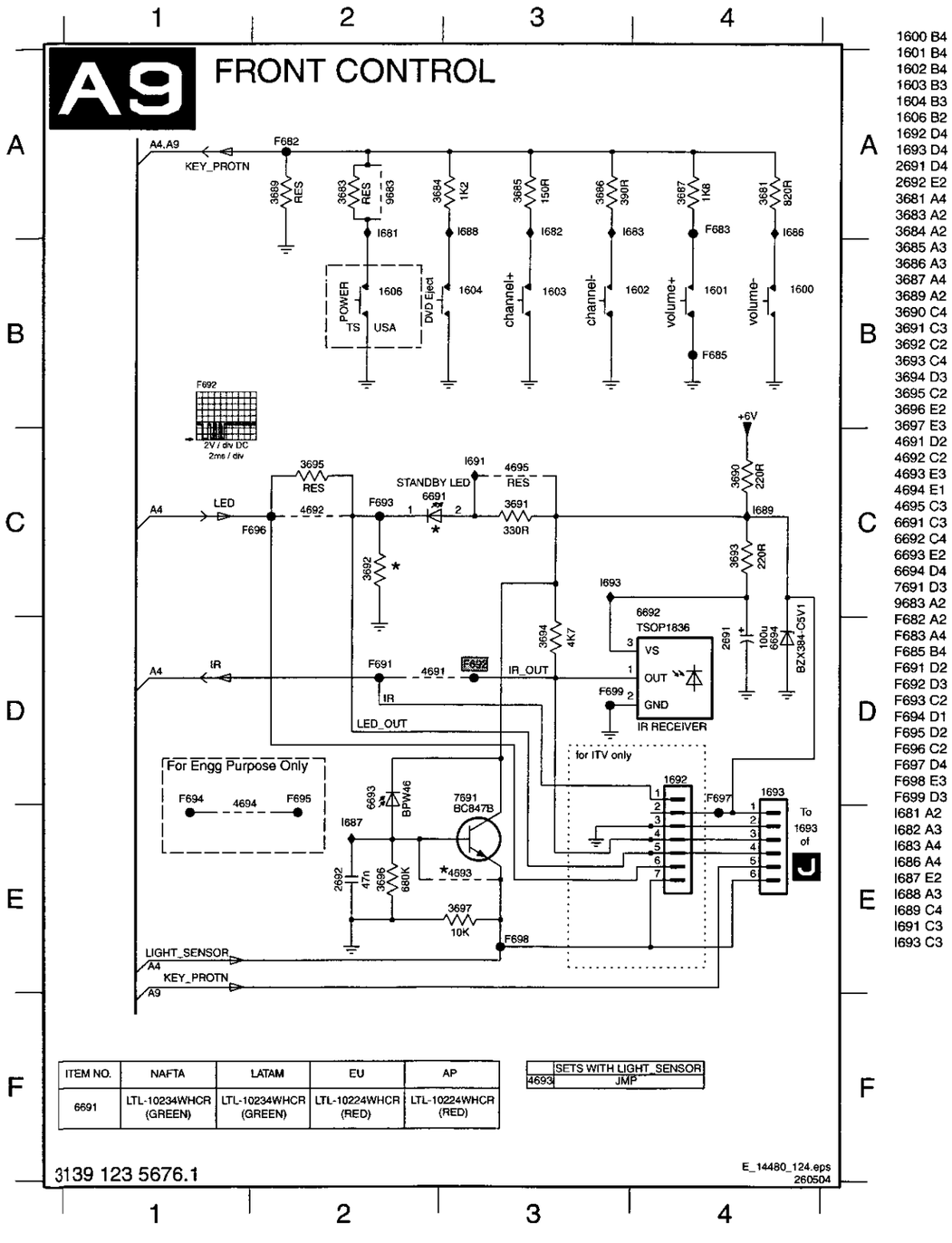
Mono Carrier: Front Control



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Personal Notes:

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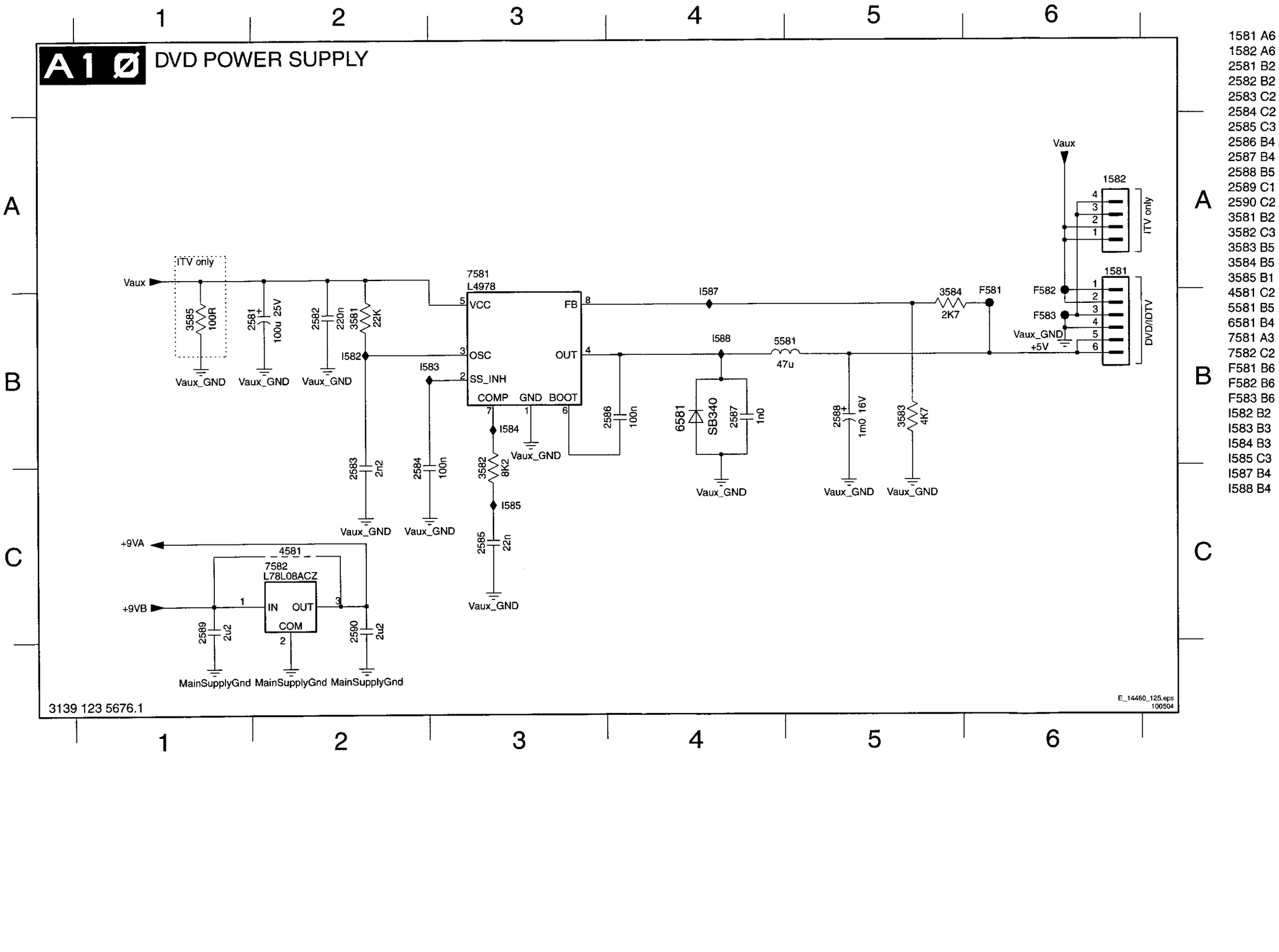
Mono Carrier: DVD Power Supply



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I588 B4

Layout Mono Carrier: (Top Side)

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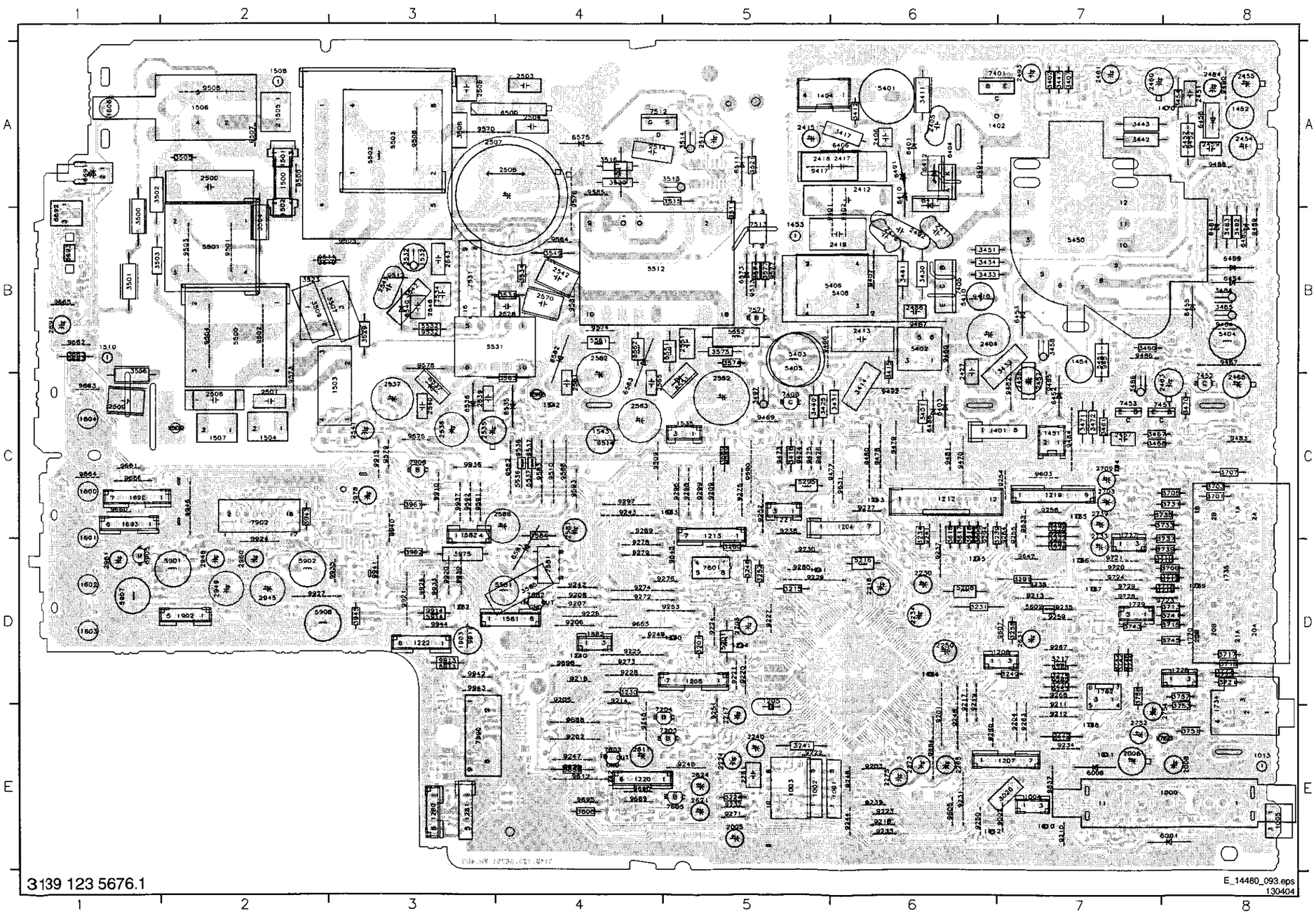

Layout Mono Carrier (Overview Bottom Side)

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2003 A7 2209 B5 2226 A5 2242 B6 2256 A6 2269 A5 2284 A6 2414 C6 2480 E8 2517 E5 2550 D3 2587 B4 2626 C6 2732 C7 2760 B8 2932 C3 2951 C2 2974 B2 2989 B3 3003 A7 3202 B5 3216 B6 3229 B6 3247 A6 3263 B5 3281 B5 3295 A5 3428 D7 3465 C8 3488 E7
2004 A7 2210 B5 2227 A5 2243 B6 2257 A6 2270 A6 2285 A6 2420 C6 2482 C5 2518 E5 2553 D4 2589 B4 2627 B6 2735 C7 2763 A8 2933 C3 2952 C2 2977 C2 2990 A3 3004 A8 3203 A5 3217 A5 3232 A5 3248 B7 3264 B5 3282 B5 3296 A5 3436 D5 3469 C8 3489 C6
2007 A7 2211 B6 2229 B6 2244 A5 2258 B6 2271 A6 2286 B6 2425 C6 2483 E8 2519 E5 2564 C4 2590 B4 2628 B6 2736 B7 2911 A4 2934 C3 2953 C2 2979 C3 2991 A3 3005 A7 3204 B5 3218 B5 3233 C6 3250 B7 3265 B5 3283 B5 3297 A6 3437 C7 3473 E8 3490 E8
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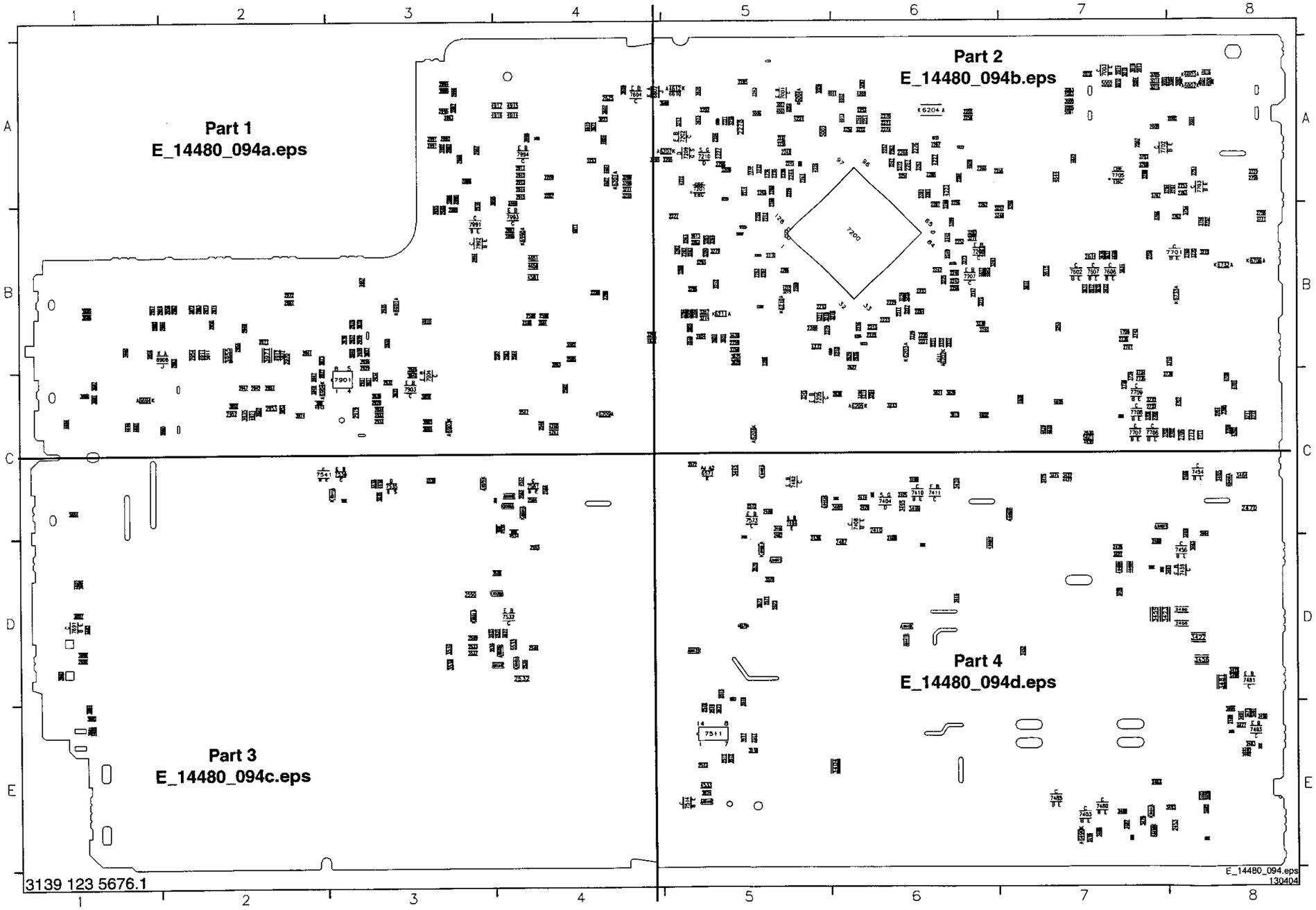

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3685 B1 4219 B5 6207 A5
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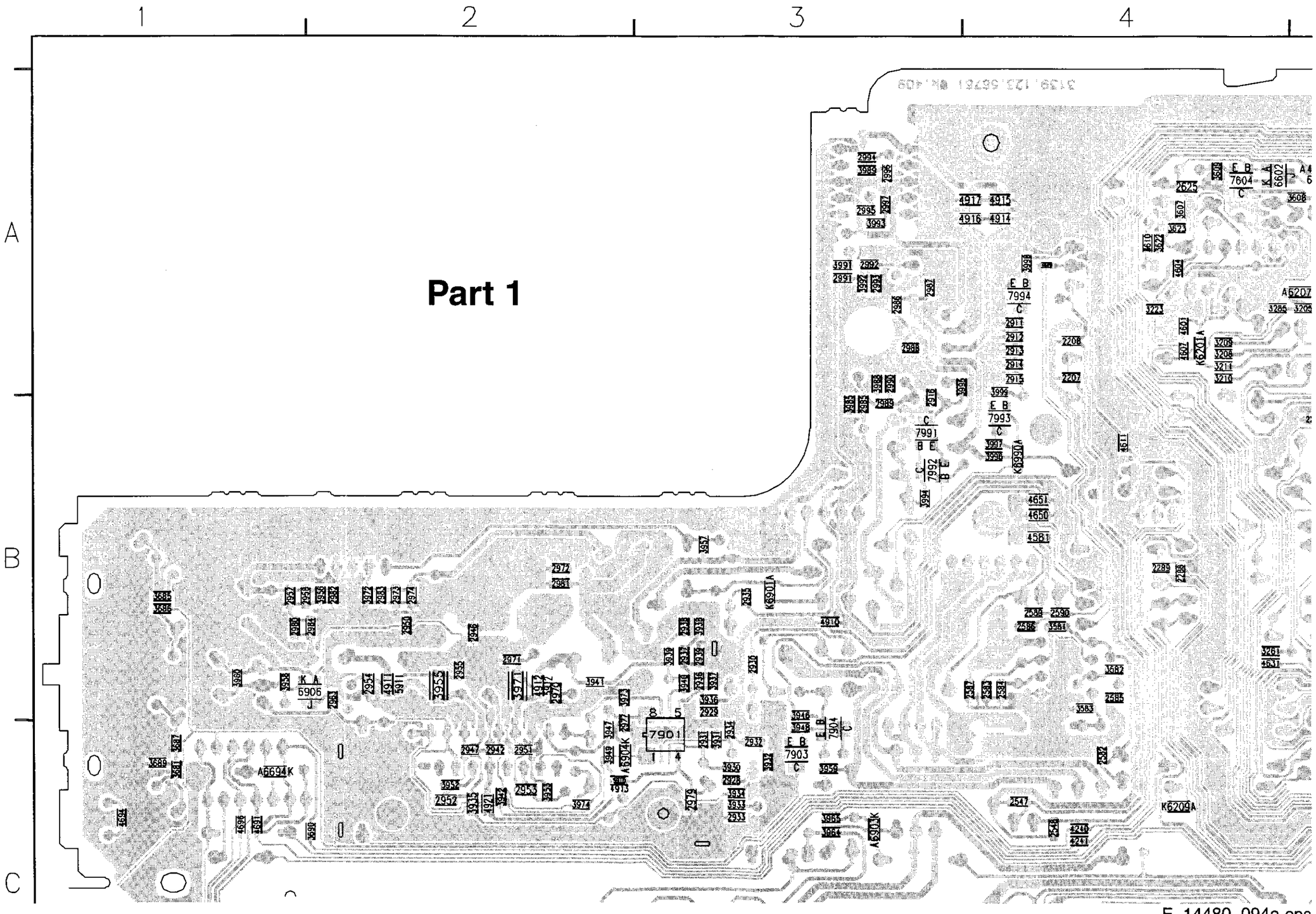
3689 C1 4223 A6 6210 B5
3690 C2 4224 A5 6211 B5
3691 E1 4226 A5 6407 D5
3692 E1 4227 A6 6408 D5
3693 D1 4240 C4 6441 D6
3694 E1 4241 C4 6442 D6
3695 D1 4437 C7 6443 C5
3696 D1 4470 E8 6450 E7
3697 D1 4471 E8 6451 E7
3702 C7 4472 E7 6457 C7
3704 C8 4473 E8 6458 C8
3706 C7 4474 C6 6482 C5
3708 C8 4492 E8 6483 C7
3711 C8 4533 E5 6484 D6
3712 C8 4534 C4 6488 D7
3719 B8 4535 C4 6489 D7
3720 B8 4536 C3 6490 E7
3732 C7 4537 C4 6512 D5
3734 C7 4538 C3 6514 E5
3736 C7 4581 B4 6531 D3
3738 C8 4601 A4 6532 D4
3740 B8 4602 C6 6533 D4
3752 A7 4604 A4 6534 D4
3754 B8 4605 C7 6538 D4
3756 B8 4606 C7 6541 C3
3761 A8 4607 A4 6564 C4
3762 B8 4609 A6 6565 C4
3764 A7 4610 A4 6566 C4
3766 B7 4611 B4 6571 C5
3767 A7 4612 A5 6572 D5
3768 A7 4620 C7 6576 C3
3769 A7 4630 C7 6602 A4
3770 A8 4631 B4 6610 A5
3771 B8 4635 C7 6694 C1
3930 C3 4637 B6 6706 B8
3931 C3 4642 A7 6732 B8
3932 C3 4644 A7 6733 B8
3933 C3 4645 B6 6901 B3
3934 C3 4646 B5 6903 C3
3935 C2 4648 B7 6904 C2
3936 B3 4649 A4 6906 B2
3937 B3 4650 B4 6990 B4
3938 B3 4651 B4 7001 A5
3939 B3 4691 C1 7003 A7
3940 B3 4692 D1 7200 B6
3941 B2 4693 D1 7201 A5
3942 C2 4694 C1 7202 A5
3946 B3 4695 E1 7205 C5

Layout Mono Carrier (Part 1 Bottom Side)



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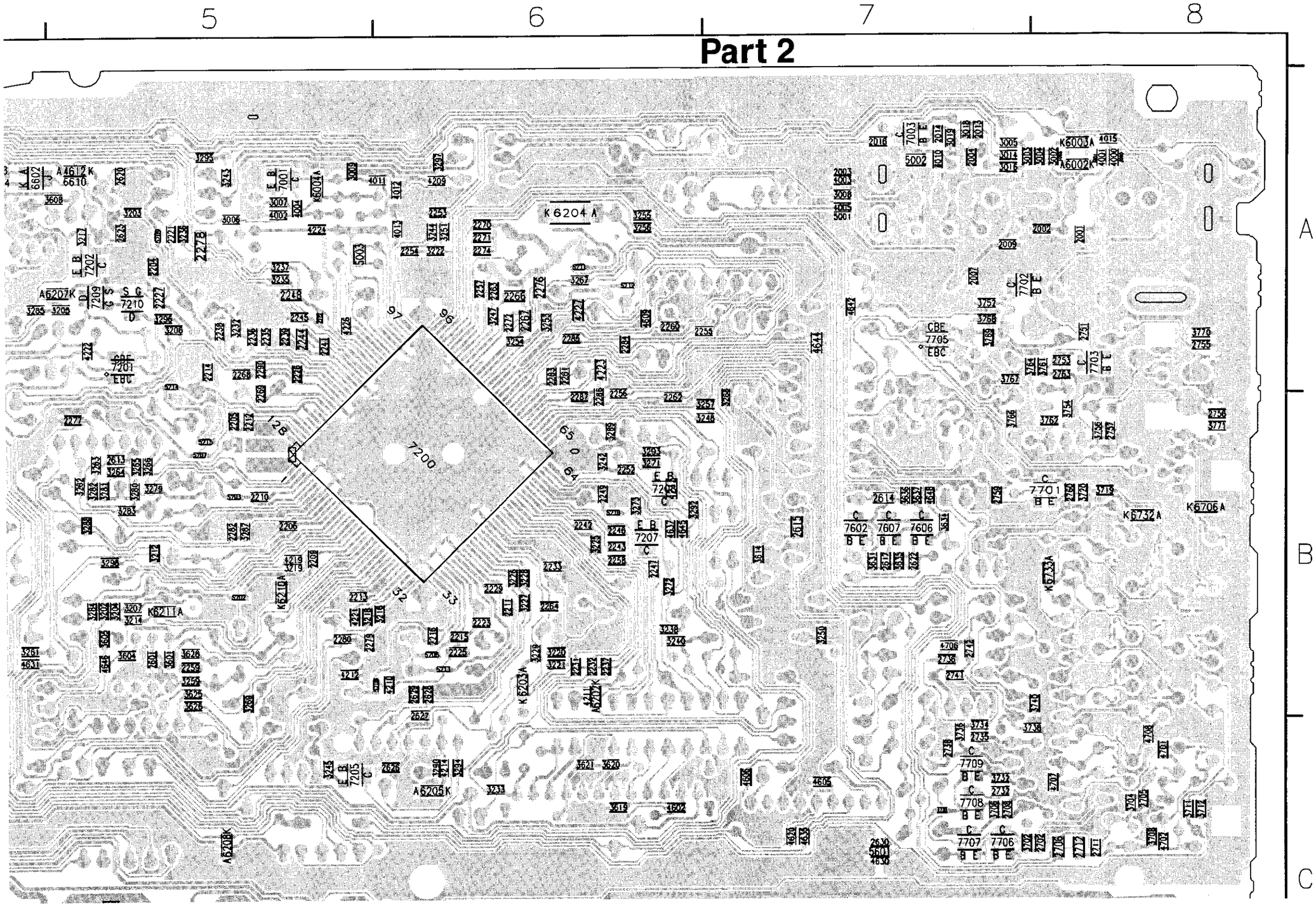
Layout Mono Carrier (Part 2 Bottom Side)



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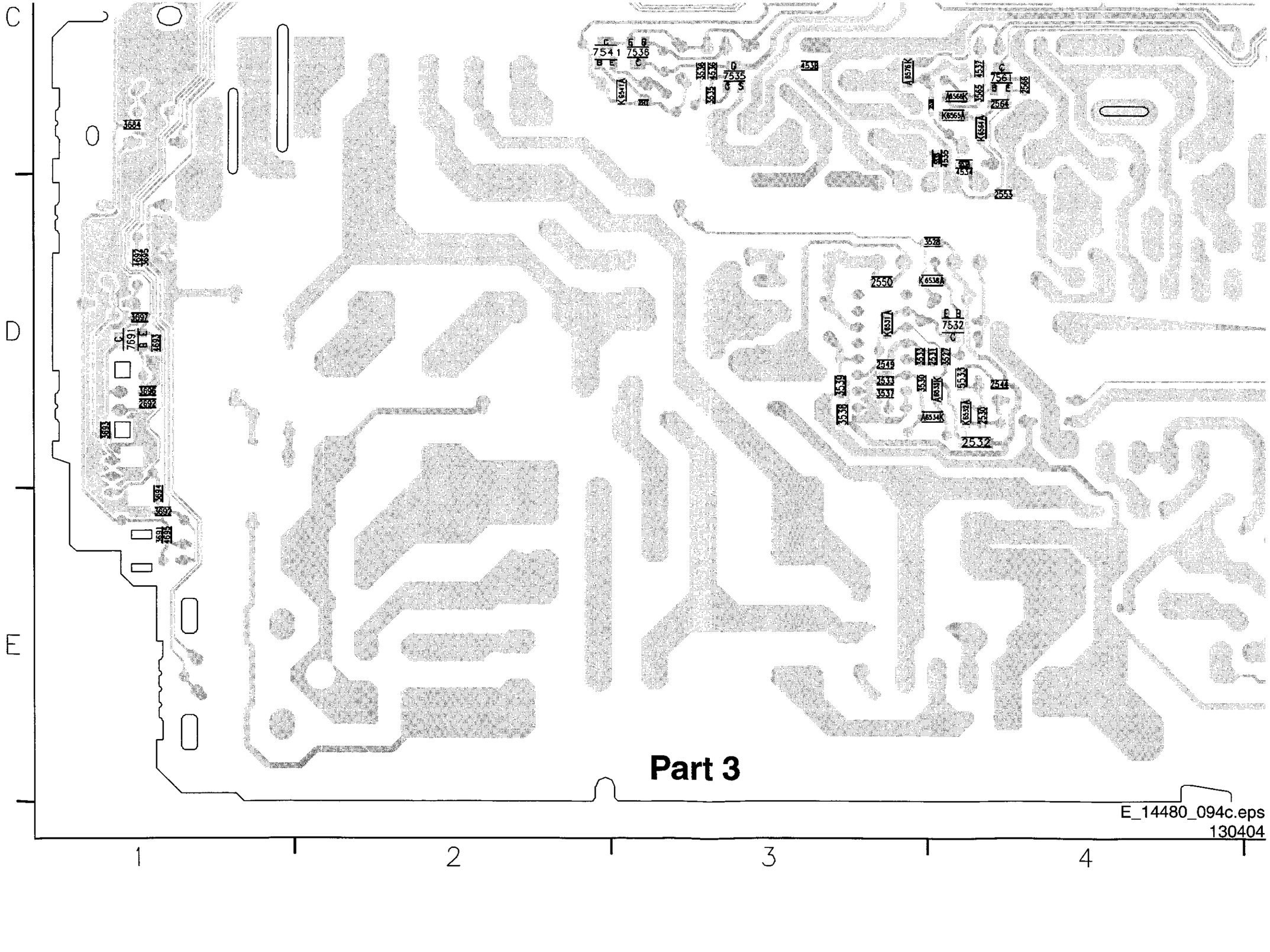
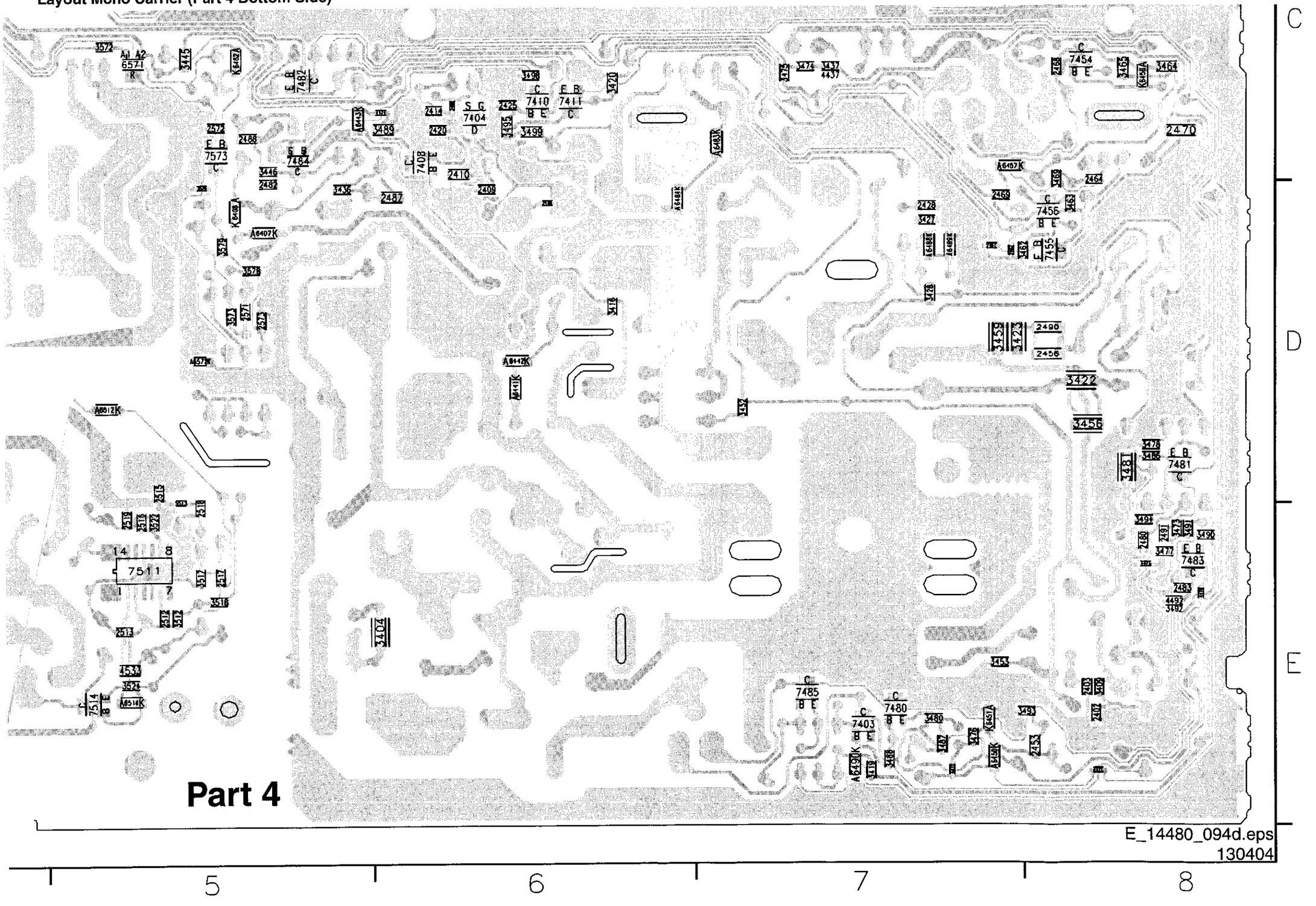
Layout Mono Carrier (Part 3 Bottom Side)



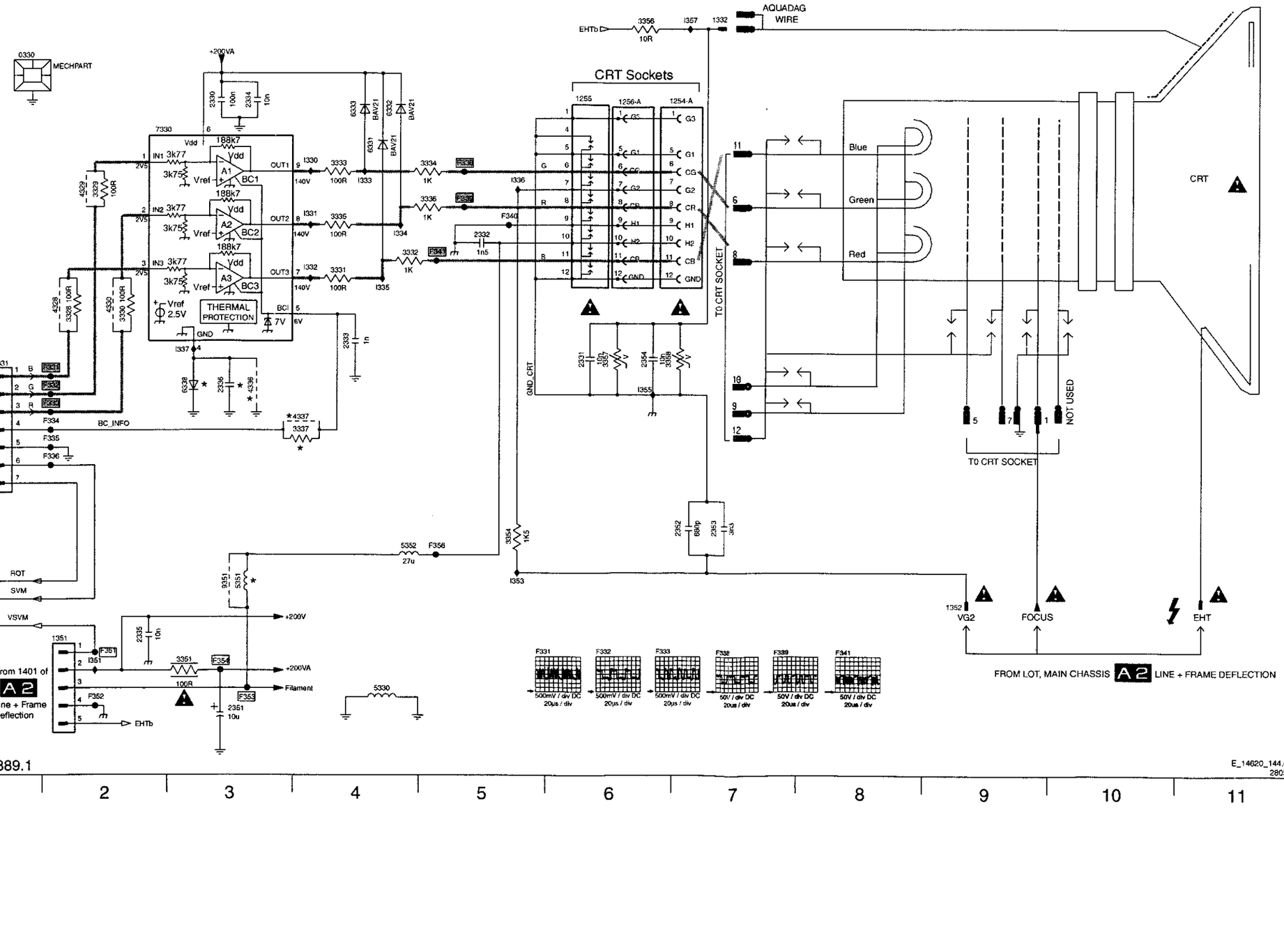
Layout Mono Carrier (Part 4 Bottom Side)



CRT Panel

B 1 CRT PANEL

ITEM	EUROPE	
	RGB+DISPL-21RF28WS-EU & RGB+DISPL-24WR.25.28SLD-EU	RGB+DISPL-29RF-EU & RGB+DISPL-24WR.28.32WR-EU
3328	---	---
3329	---	---
3330	---	---
3337	---	---
4328	JMP	JMP
4329	JMP	JMP
4330	JMP	JMP
4337	---	---
5351	---	IND FXD LAL04 A 22U PM10
9351	JMP	---



0330 B1
1254-A B7
1255 B6
1256-A B6
1331 D1
1332 B7
1351 G2
1352 F9
2330 B3
2331 D6
2332 C5
2333 D4
2334 B3
2335 G2
2336 E3
2351 G3
2352 F7
2353 F7
2354 D6
3328 D2
3329 C2
3330 D2
3331 D4
3332 C4
3333 C4
3334 C5
3335 C4
3336 C5
3337 E4
3351 G3
3354 F5
3356 B6
3357 D6
3358 D6
4328 D2
4329 C2
4330 D2
4336 E3
4337 E4
5330 G4
5351 F3
5352 F4
6331 C4
6332 B4
6333 B4
6338 E3
7330 C2
9351 F3
F331 D2
F332 E2
F333 E2
F334 E2
F335 E2
F336 E2
F338 C5
F339 C5
F340 C5
F341 C5
F351 G2
F352 G2
F353 G3
F354 G3
F356 F5
I330 C4
I331 C4
I332 D4
I333 C4
I334 C4
I335 D4
I336 C5
I337 D3
I351 G2
I353 F5
I355 E6
I357 B7

CRT Panel: Eco Scavem

B2 ECO SCAVEM

VSVM
I360
3373 4K7
I392
2353 22u 100V
2388 22n 100V
To 1470 of A2
I382
3363 820R
3364 *
2390 100N
3397 4K7
6363 BAV99
6362 BAV99
3381 2K7
I391
4361 RES
2387 RES
6361 BAV99
7361 BC547B
3398 220R
I361
I366
I368
7363 2SA1358
I364
I362
3388 10R
2364 22n
SVM F360
9365
3365 1K0
4382
I388
I390
7365 BC547B
3394 220R
I389
7362 BC557B
* 9362
3362 *
3389 10R
2365 22n
3391 220R
2389 100n
2367 100nF 100V
3367 56K
3368 820R
I371
I372
3372 *
5361 RES 9361
7364 2SC3421
3371 150R
2388 330p
F361
F363
F362
I361
TO SCAVEM COIL
Filament
I386
6383 RGP10D
I381
2381 100u 25V
2382 100n
3390 1K0
3383 1K2
I383
7381 BC337-40
7331 BC847B
I387
7332 BC857B
7366 BC857B
F381
F382
1381
ROT
3381 100R
2386 100n
2382 100n
3386 82K
3384 10K
I385
7382 BC337-40
3385 1K0
3374 *
2383 1u0

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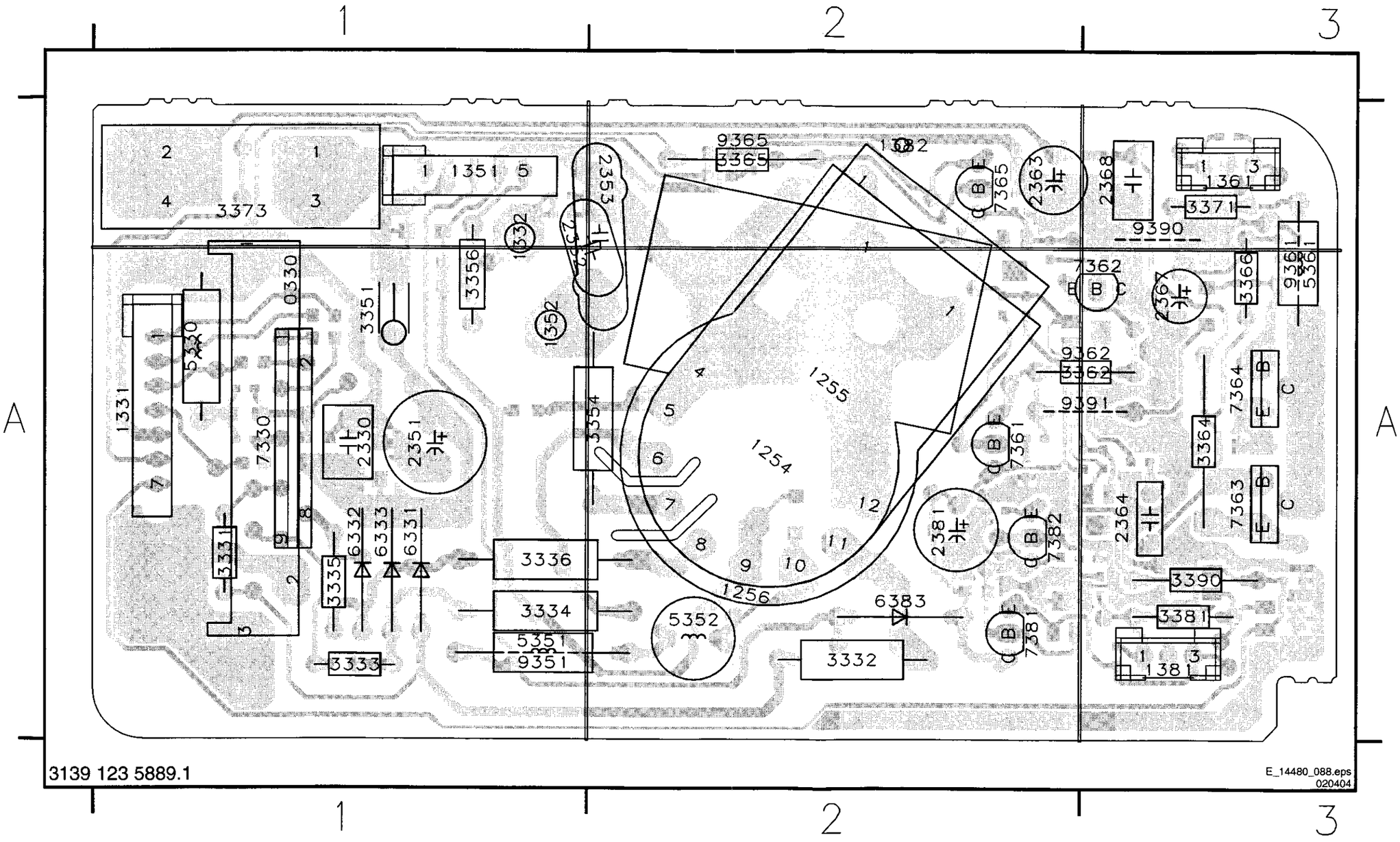
3139 123 5889.1

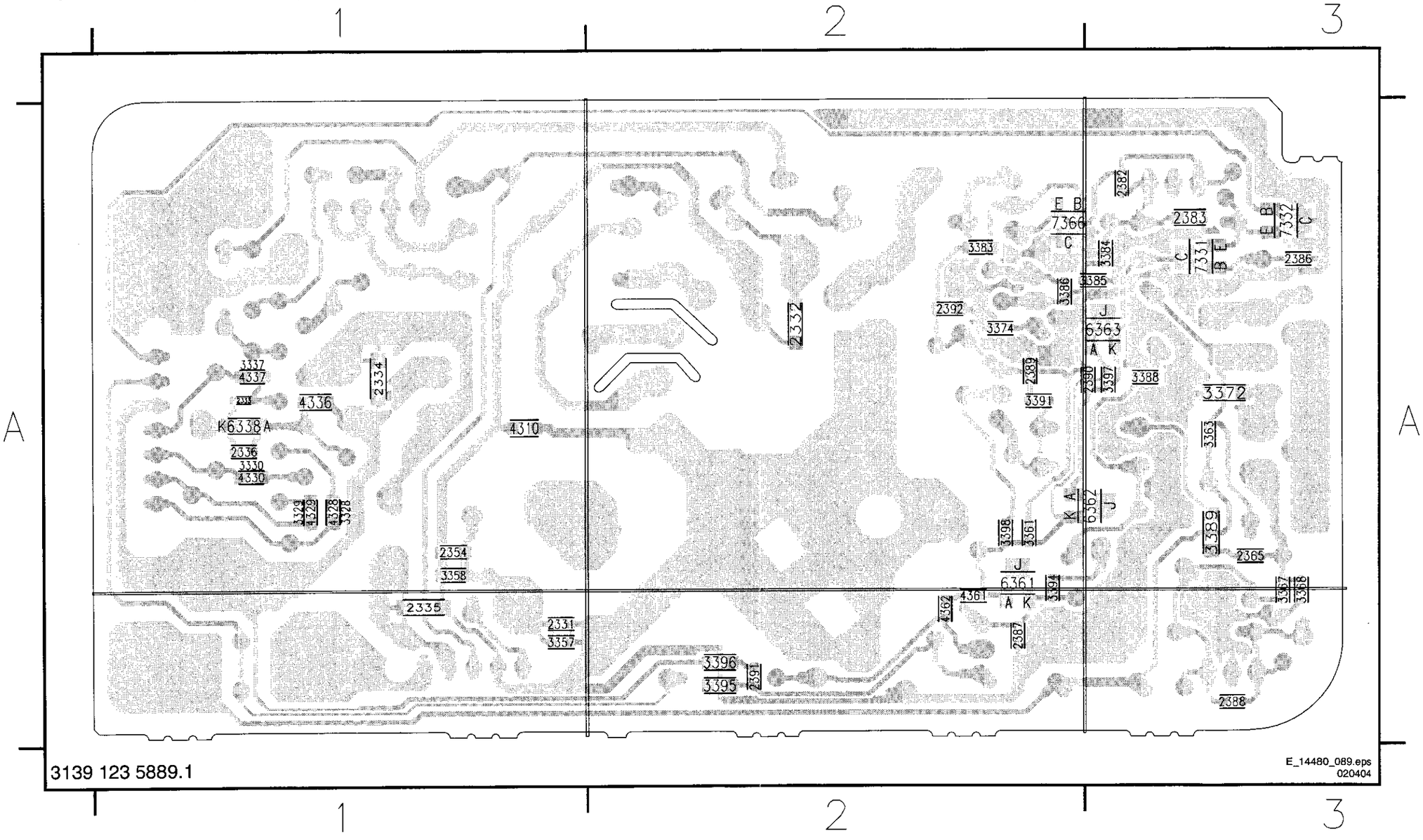
1361 C10 I388 C3
1381 F7 I389 D3
1382 B8 I390 C2
2363 A7 I391 B4
2364 C6 I392 A7
2365 D6
2367 D6
2368 A7
2381 E2
2382 F6
2383 G6
2386 G2
2387 C2
2388 D9
2389 E5
2390 B3
2391 D2
2392 E2
3361 B4
3362 D4
3363 B7
3364 B8
3365 C2
3366 C7
3367 D7
3368 E7
3371 D9
3372 E8
3373 A5
3374 G4
3381 F3
3383 E4
3384 G4
3385 G4
3386 G4
3388 C5
3389 D6
3390 E3
3391 D5
3394 C3
3395 D3
3396 D2
3397 B3
3398 C4
4361 C3
4362 C2
5361 D9
6361 C3
6362 B3
6363 B3
6383 E2
7331 F3
7332 F3
7361 C4
7362 D4
7363 C8
7364 D8
7365 C3
7366 F5
7381 F4
7382 G4
9361 D9
9362 D4
9365 C2
F360 C1
F361 C9
F362 D9
F363 C9
F381 F6
F382 F6
I360 A4
I361 C4
I362 C5
I364 C4
I366 C7
I368 C8
I369 C8
I371 D7
I372 D8
I381 E2
I383 F4
I385 G4
I386 E1
I387 F3

Layout CRT Panel (Top Side)



0330 A1
1254 A2
1255 A2
1256 A2
1331 A1
1332 A1
1351 A1
1352 A1
1361 A3
1381 A3
1382 A2
2330 A1
2351 A1
2352 A2
2353 A2
2363 A2
2364 A3
2367 A3
2368 A3
2381 A2
3331 A1
3332 A2
3333 A1
3334 A1
3335 A1
3336 A1
3351 A1
3354 A2
3356 A1
3362 A3
3364 A3
3365 A2
3366 A3
3371 A3
3373 A1
3381 A3
3390 A3
5330 A1
5351 A1
5352 A2
5361 A3
6331 A1
6332 A1
6333 A1
6383 A2
7330 A1
7361 A2
7362 A3
7363 A3
7364 A3
7365 A2
7381 A2
7382 A2
9351 A1
9361 A3
9362 A3
9365 A2
9390 A3
9391 A3

Layout CRT Panel (Bottom Side)



2331	A1
2332	A2
2333	A1
2334	A1
2335	A1
2336	A1
2354	A1
2365	A3
2382	A3
2383	A3
2386	A3
2387	A2
2388	A3
2389	A2
2390	A3
2391	A2
2392	A2
3328	A1
3329	A1
3330	A1
3337	A1
3357	A1
3358	A1
3361	A2
3363	A3
3367	A3
3368	A3
3372	A3
3374	A2
3383	A2
3384	A3
3385	A3
3386	A2
3388	A3
3389	A3
3391	A2
3394	A2
3395	A2
3396	A2
3397	A3
3398	A2
4310	A1
4328	A1
4329	A1
4330	A1
4336	A1
4337	A1
4361	A2
4362	A2
6338	A1
6361	A2
6362	A3
6363	A3
7331	A3
7332	A3
7366	A2

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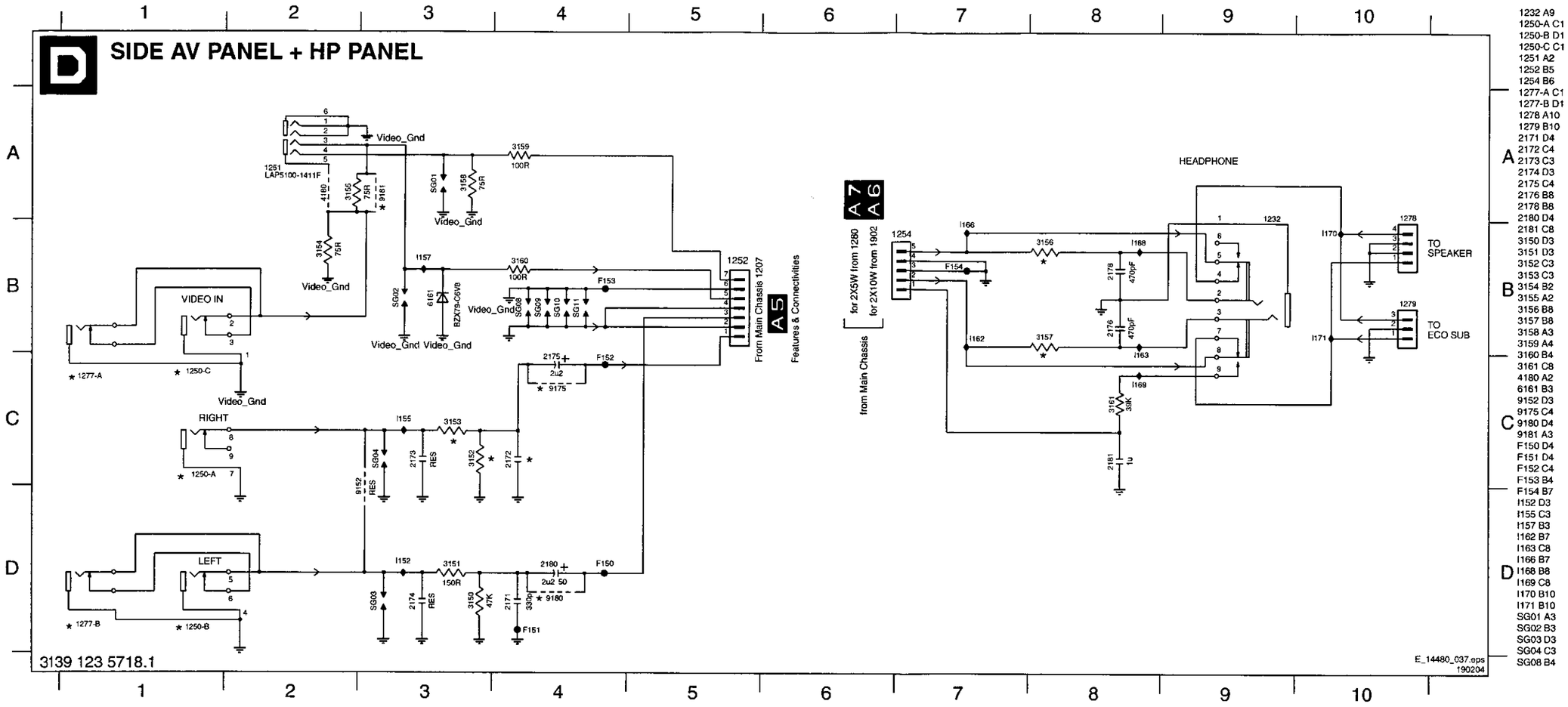
Side AV + Headphone Panel (PV-2)

SIDE AV PANEL + HP PANEL



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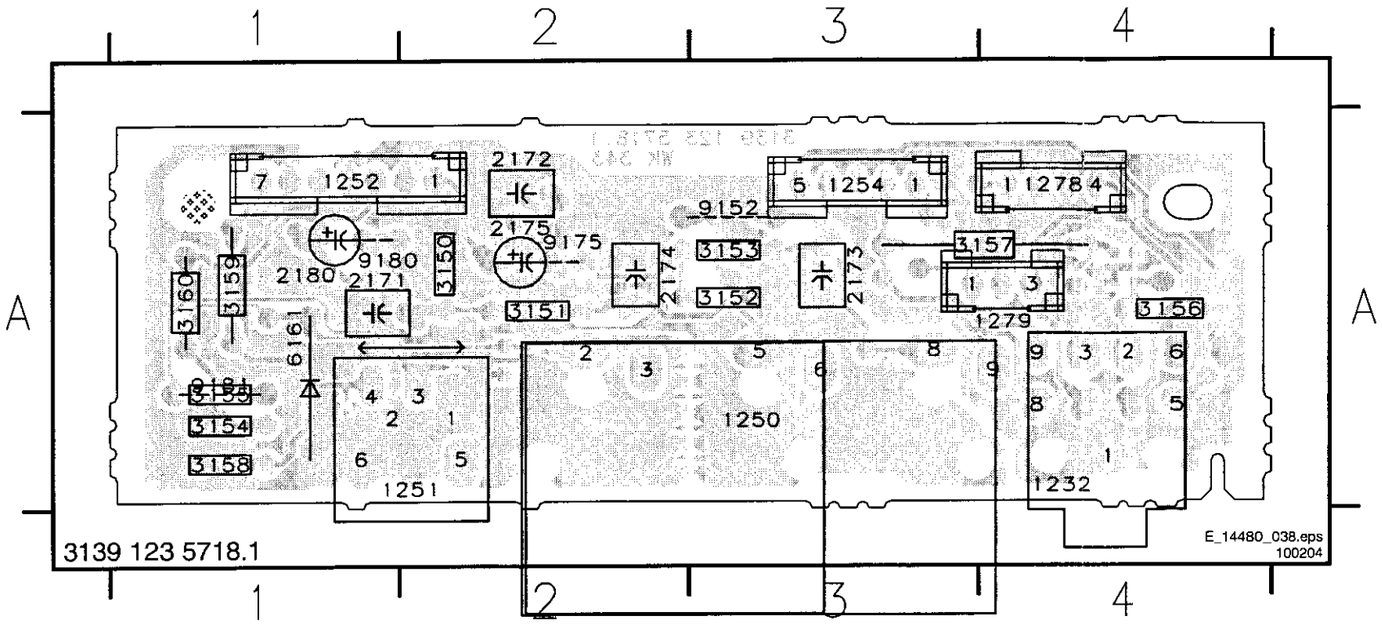
1232 A9 SG09 B4
1250-A C1 SG10 B4
1250-B D1 SG11 B4
1250-C C1
1251 A2
1252 B5
1254 B6
1277-A C1
1277-B D1
1278 A10
1279 B10
2171 D4
2172 C4
2173 C3
2174 D3
2175 C4
2176 B8
2178 B8
2180 D4
2181 C8
3150 D3
3151 D3
3152 C3
3153 C3
3154 B2
3155 A2
3156 B8
3157 B8
3158 A3
3159 A4
3160 B4
3161 C8
4180 A2
6161 B3
9152 D3
9175 C4
9180 D4
9181 A3
F150 D4
F151 D4
F152 C4
F153 B4
F154 B7
I152 D3
I155 C3
I157 B3
I162 B7
I163 C8
I166 B7
I168 B8
I169 C8
I170 B10
I171 B10
SG01 A3
SG02 B3
SG03 D3
SG04 C3
SG08 B4

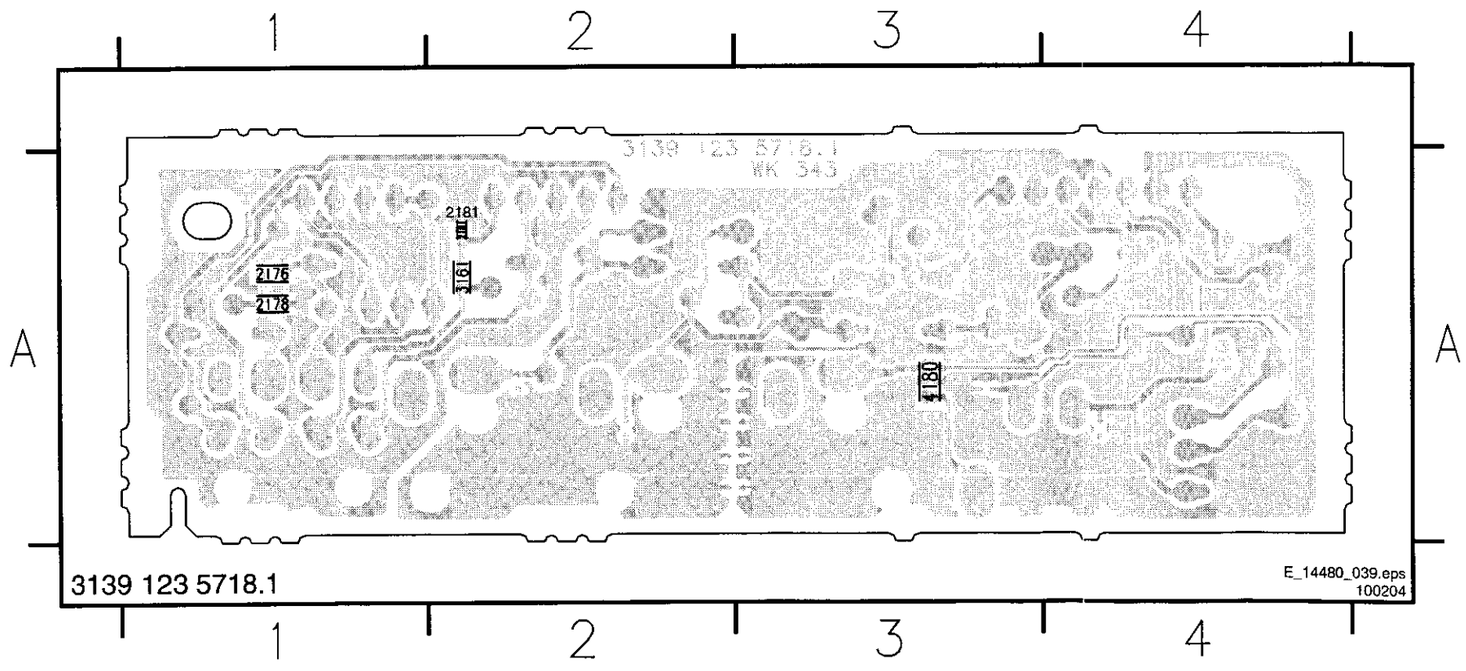
Layout Side AV + Headphone Panel (PV-2) (Top Side)

1232 A4	1254 A3	2171 A1	2175 A2	3152 A3	3156 A4	3160 A1	9180 A1
1250 A3	1277 A2	2172 A2	2180 A1	3153 A3	3157 A4	6161 A1	9181 A1
1251 A2	1278 A4	2173 A3	3150 A2	3154 A1	3158 A1	9152 A3	
1252 A1	1279 A4	2174 A2	3151 A2	3155 A1	3159 A1	9175 A2	



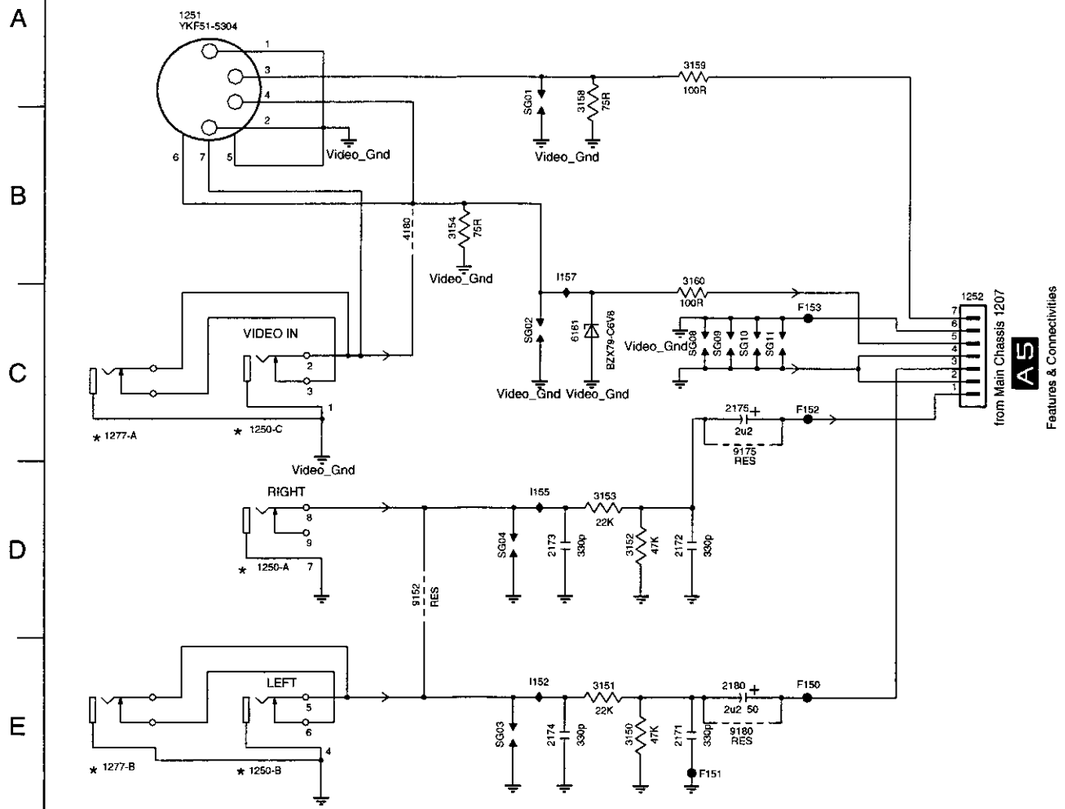
Layout Side AV + Headphone Panel (PV-2) (Bottom Side)

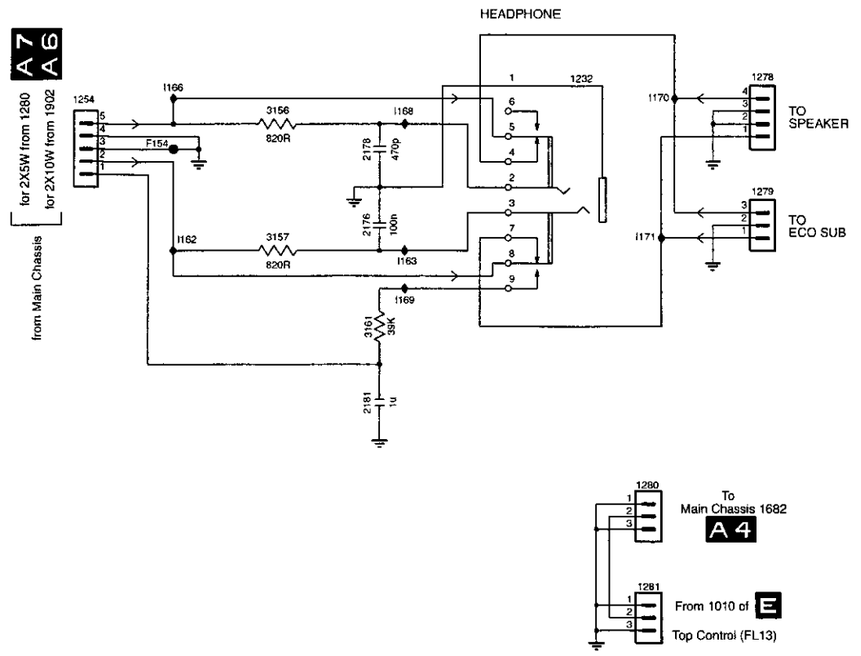
2176 A1	2178 A1	2181 A2	3161 A2	4180 A3	



Side AV + Headphone Panel (FL-13)

SIDE AV PANEL + HP PANEL (FL13)





1232 B9
1250-A D1
1250-B E1
1250-C C1
1251 A1
1252 C5
1254 B6
1277-A C1
1277-B E1
1278 B10
1279 B10
1280 D10
1281 E10
2171 E4
2172 D4
2173 D3
2174 E3
2175 C4
2176 C8
2178 B8
2180 E4
2181 D8
3150 E3
3151 E3
3152 D3
3153 D3
3154 B2
3156 B8
3157 C8
3158 A3
3159 A4
3160 C4
3161 C8
4180 B2
6161 C3
9152 D2
9175 C4
9180 E4
F150 E4
F151 E4
F152 C4
F153 C4
F154 B7
I152 E3
I155 D3
I157 B3
I162 C7
I163 C8
I166 B7
I168 B8
I169 C8
I170 B10
I171 C10
SG01 A3
SG02 C3
SG03 E3
SG04 D3
SG08 C4
SG09 C4
SG10 C4
SG11 C4

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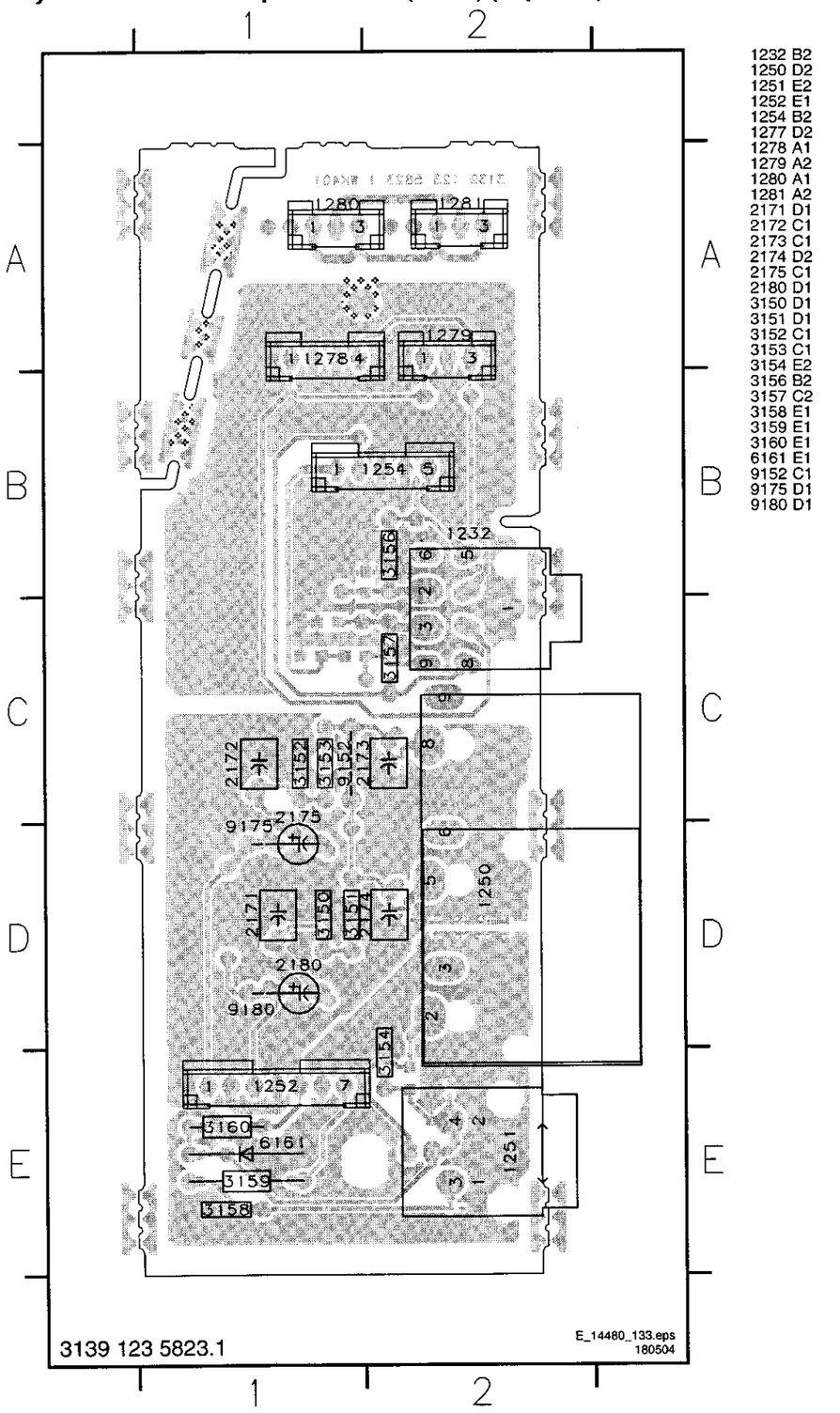
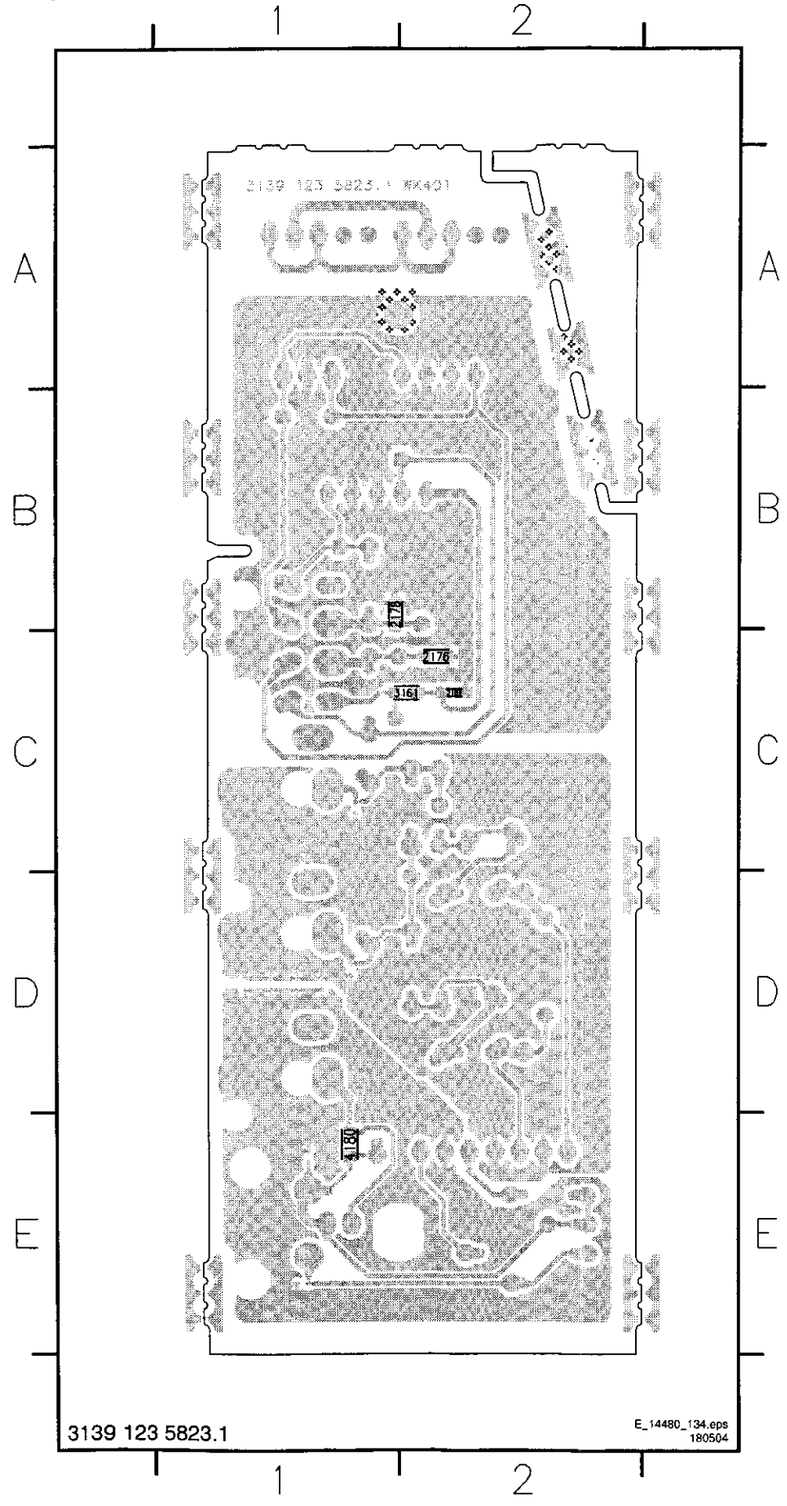
Layout Side AV + Headphone Panel (FL-13) (Top Side)

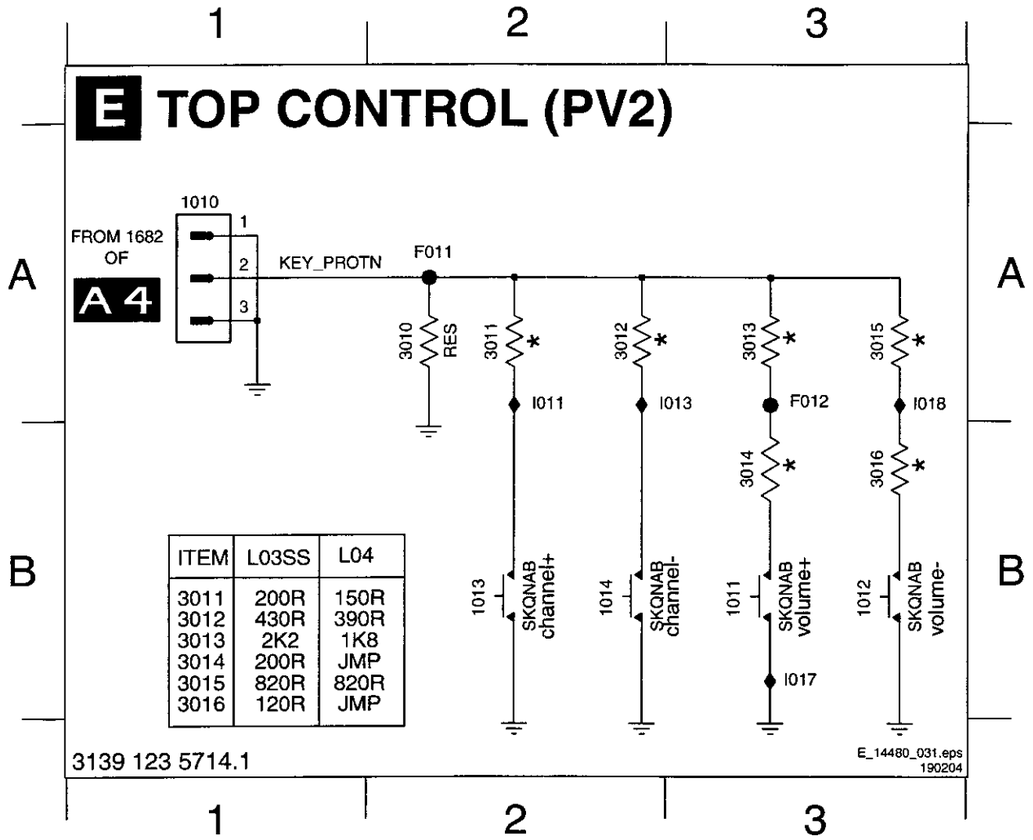


Layout Side AV + Headphone Panel (FL-13) (Bottom Side)

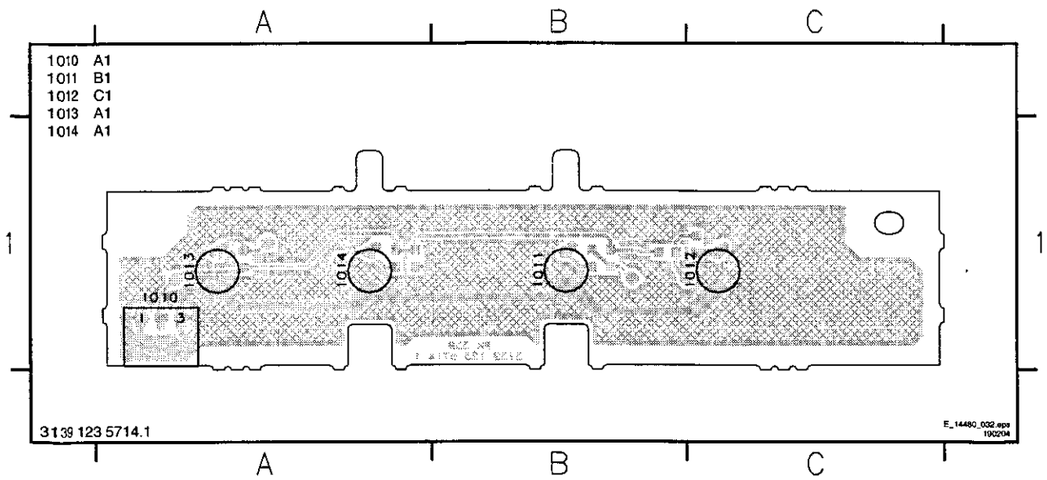


Top Control Panel (PV2)

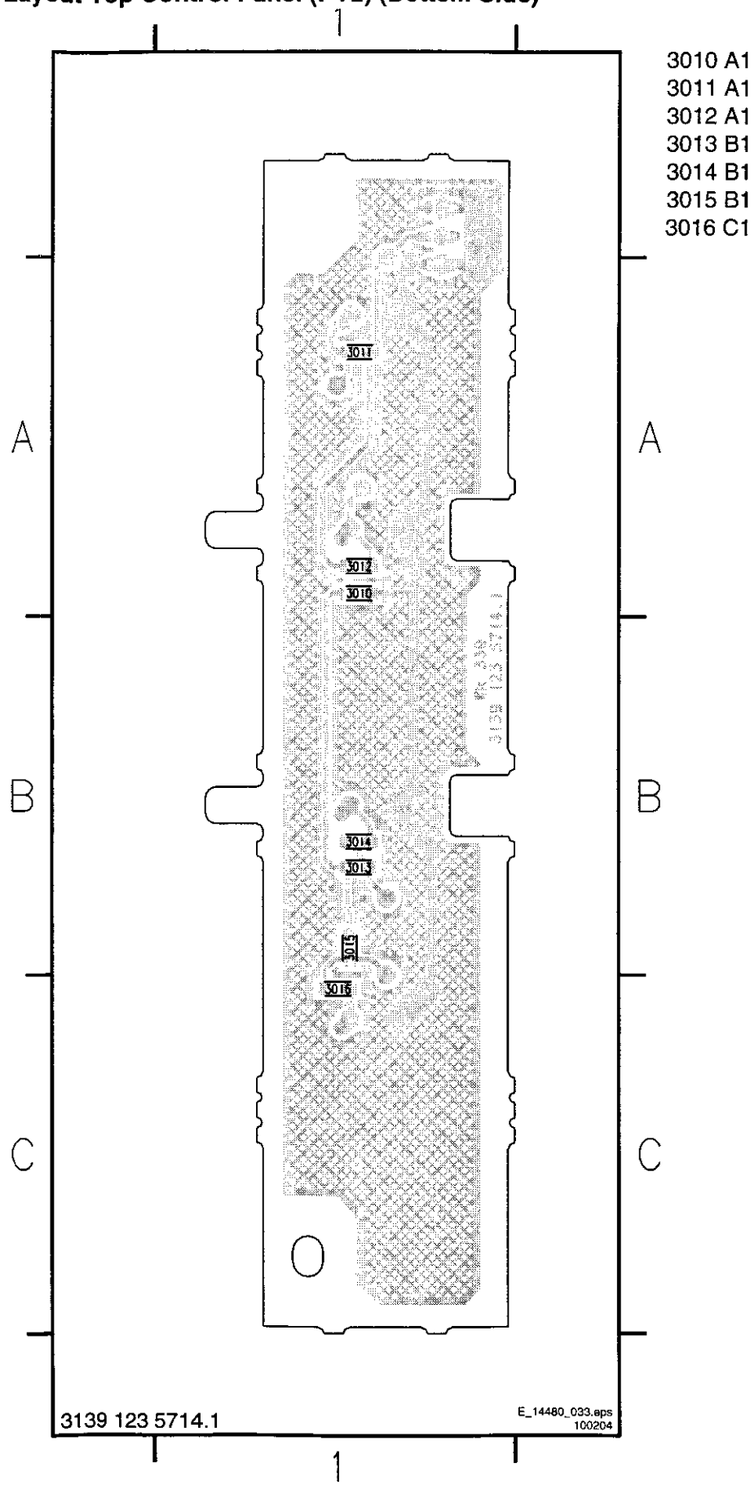
1010 A1 1012 B3 1014 B2 3011 A2 3013 A3 3015 A3 F011 A2 I011 A2 I017 B3
1011 B3 1013 B2 3010 A2 3012 A2 3014 B3 3016 B3 F012 A3 I013 A3 I018 A3



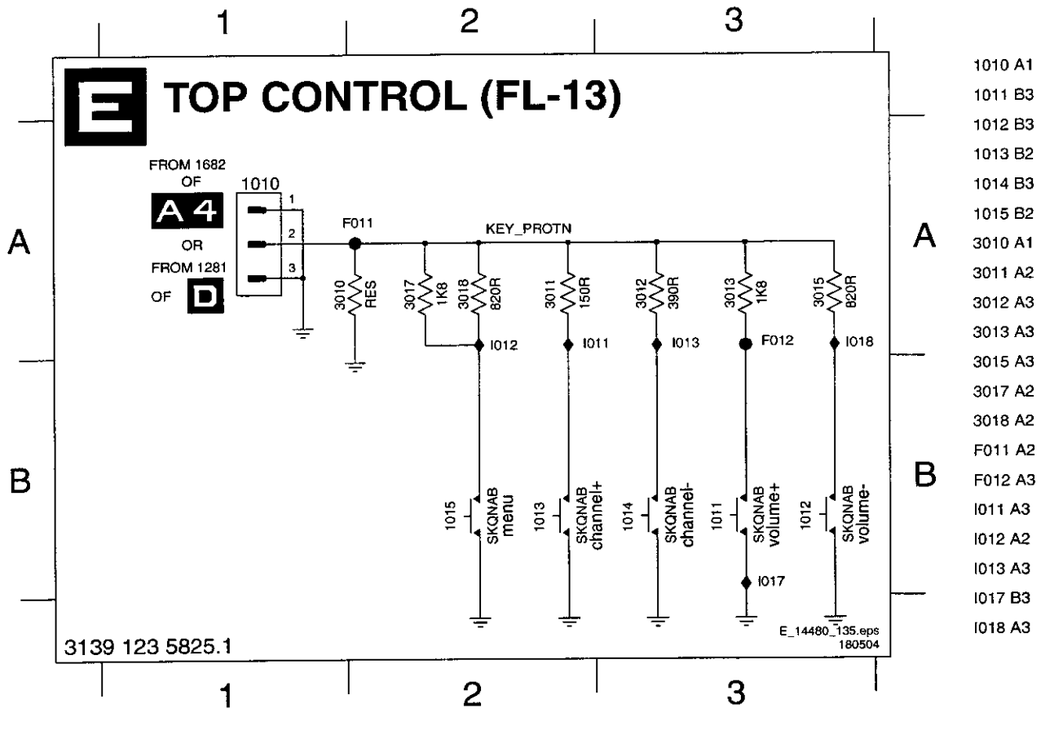
Layout Top Control Panel (PV2) (Top Side)



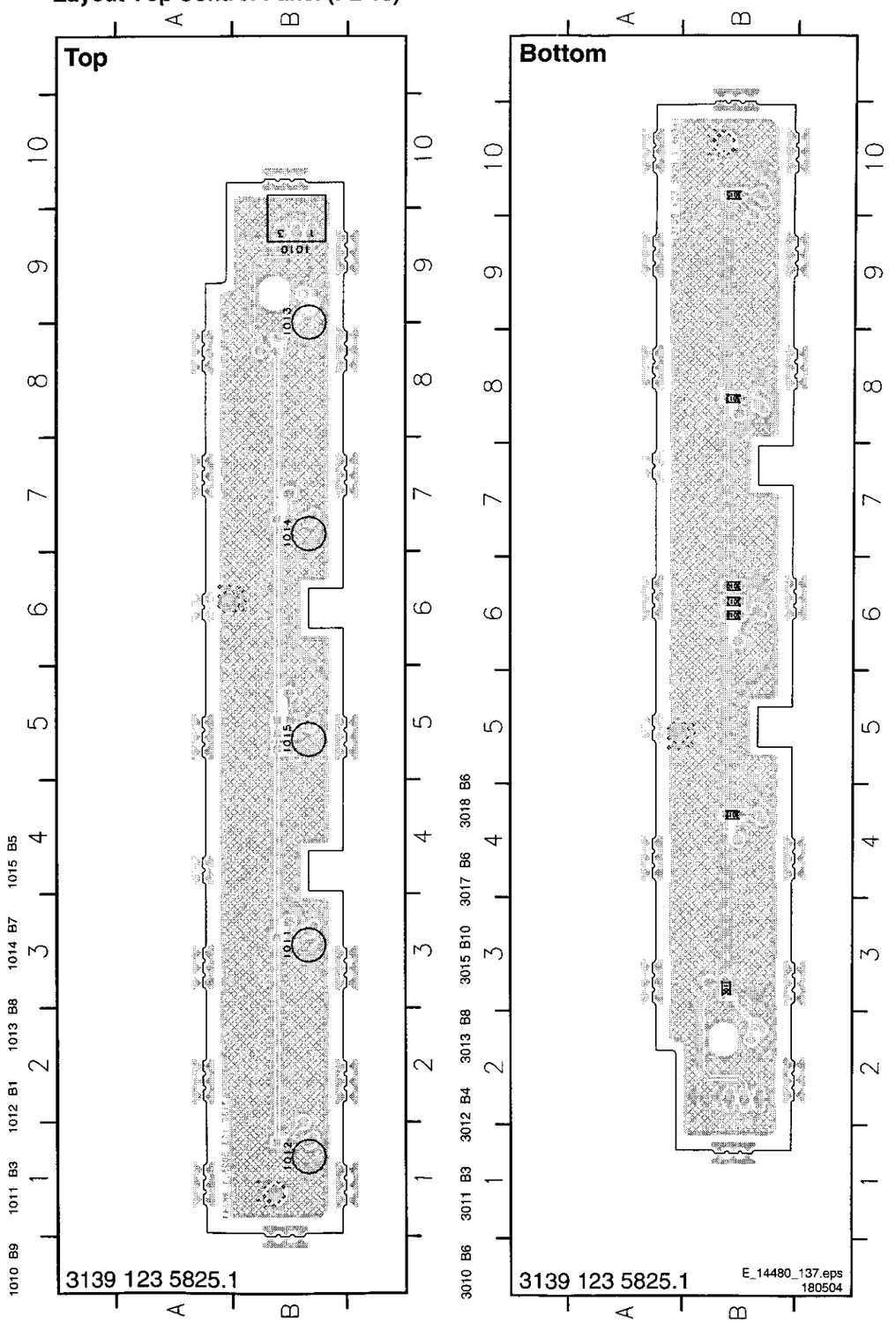
Layout Top Control Panel (PV2) (Bottom Side)



Top Control Panel (FL-13)



Layout Top Control Panel (FL-13)



Power Supply PIP Panel

F 1 POWER SUPPLY PIP

ITEM	PIP-EU	PIP-RD+DVD-EU	PIP-AP	PIP+DVD-AP
1206	---	CON BM V 4P M 2.50	---	CON BM V 4P M 2.50
1220	---	CON BM V 5P M 2.5	---	CON BM V 5P M 2.5
2007	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
2242	---	CER2 0603 X7R 10V 220N	---	CER2 0603 X7R 10V 220N
2262	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
2263	---	CER2 0603 X7R 10V 2U2	---	CER2 0603 X7R 10V 2U2
2280	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
3010	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3252	---	---	---	---
3253	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3254	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3255	---	RST SM 0603 2K2 PM5	---	RST SM 0603 2K2 PM5
3282	---	RST CRB 1/6W A 2K2 PM5	---	RST CRB 1/6W A 2K2 PM5
3283	---	RST SM 0603 15K PM5	---	RST SM 0603 15K PM5
3284	---	RST SM 0603 5K6 PM5	---	RST SM 0603 5K6 PM5
3285	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3286	---	RST SM 0603 390R PM5	---	RST SM 0603 390R PM5
5245	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
7243	---	FXDIND SM 0805 5U6 PM10	---	FXDIND SM 0805 5U6 PM10

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Tuner IF and Demodulator PIP Panel

F 2 TUNER IF & DEMODULATOR PIP

TUNER / IF

DEMODULATOR

ITEM	PIP-EU	PIP-RD+DVD-EU	PIP-AP	PIP+DVD-AP
1000	TUNER UV1316E/A I-4	TUNER UV1316T/A I X-3	TUNER UV1316T/A I-4	TUNER UV1316T/A I-4
1003	FIL SAW 38MHZ9 OFWK3953	FIL SAW 38MHZ9 OFWK3953	FIL SAW 38MHZ9 OFWK7257	FIL SAW 38MHZ9 OFWK7257
2005	---	---	CER2 0603 X7R 50V 10N	CER2 0603 X7R 50V 10N
3004	RST SM 0603 10K PM5	RST SM 0603 10K PM5	---	---
3007	---	---	RST SM 0603 6K8 PM5	RST SM 0603 6K8 PM5
3008	---	---	RST SM 0603 2K2 PM5	RST SM 0603 2K2 PM5
3009	---	---	RST SM 0603 2K2 PM5	RST SM 0603 2K2 PM5
3203	---	---	RST CRB 1/8W A 4K7 PM5	RST CRB 1/8W A 4K7 PM5
4001	---	---	RST SM 0603 JUMP 0R05	RST SM 0603 JUMP 0R05
4002	RST SM 0603 JUMP 0R05	RST SM 0603 JUMP 0R05	---	---
4004	---	---	RST SM 0603 JUMP 0R05	RST SM 0603 JUMP 0R05
6001	DIO SIG SM 1SS356 (RH)	DIO SIG SM 1SS356 (RH)	---	---
6002	---	---	DIO SIG SM 1SS356 (RH)	DIO SIG SM 1SS356 (RH)
7001	---	---	TRA SIG SM PDTC124ET (C)	TRA SIG SM PDTC124ET (C)

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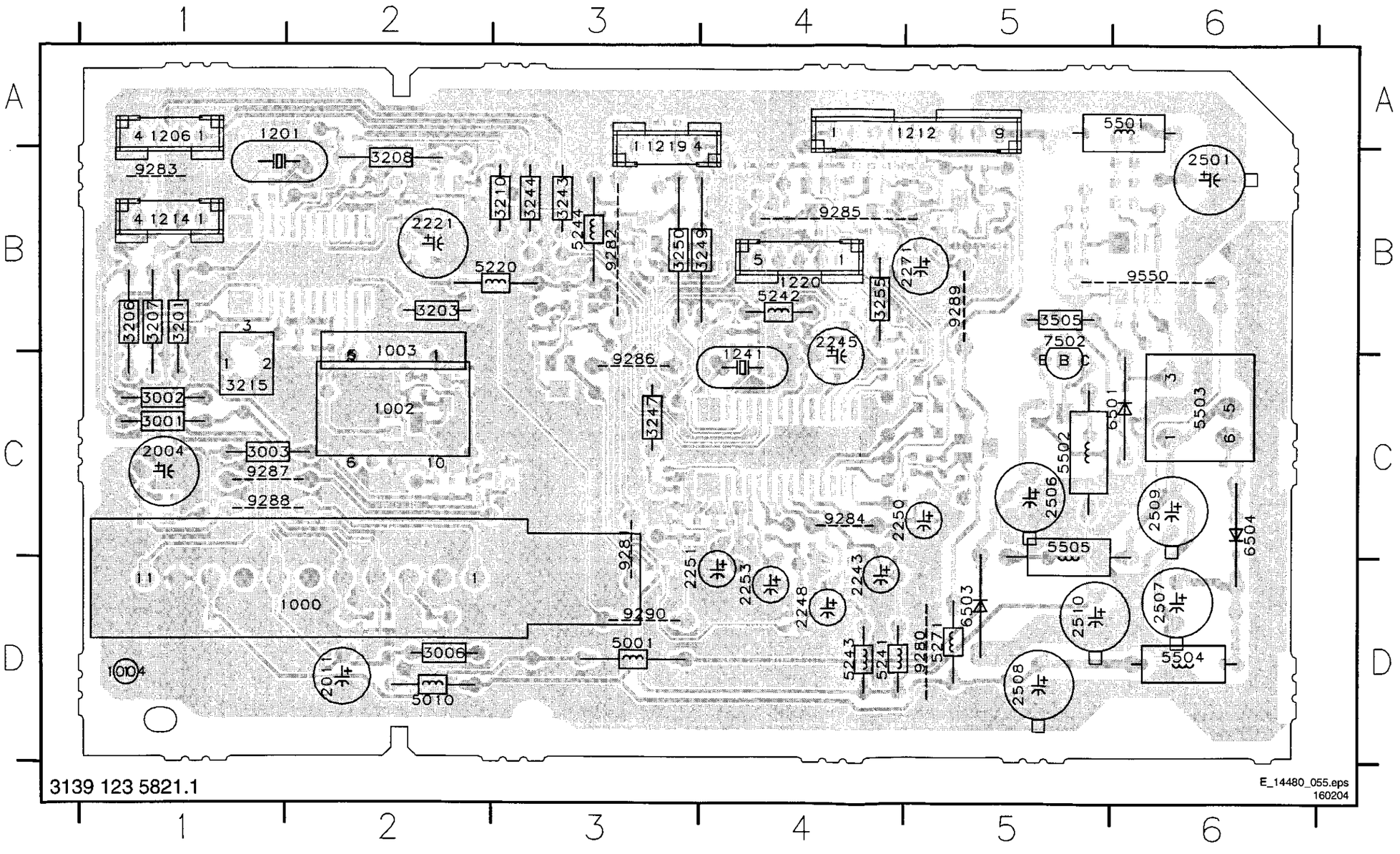
3139 123 5821.1

1000 D3
1002 D5
1003 D5
1004 D3
1201 C7
2001 C1
2002 C2
2003 C2
2004 C3
2005 D4
2006 D4
2010 B4
2011 B4
2201 E7
2202 C7
2203 C7
2204 C7
2205 C8
2206 C8
2207 C8
2208 C9
2209 F7
2210 F8
2211 F8
2220 B7
2221 B7
3001 C2
3002 C2
3003 B3
3004 C3
3005 E2
3006 E2
3007 D4
3008 D4
3009 E4
3201 E7
3202 E6
3203 E6
3204 C7
3205 D7
3206 C8
3207 C8
3208 D9
3210 D9
3211 D9
3212 F9
3215 F7
3216 D10
4001 E5
4002 E5
4004 C3
4208 D9
5001 C2
5002 E3
5010 A4
5220 A7
6001 C3
6002 D4
7001 E5
7201 E8
7202 C9
F001 C3
F002 D4
F003 E4
F201 E6
F202 E7
I001 C2
I002 C2
I003 C2
I004 A4
I005 D5
I006 E4
I007 E2
I201 E6
I202 C7
I203 C7
I204 D7
I205 C8
I206 C8
I207 D9
I208 D8
I209 D9
I210 F7
I213 F7
I217 A7

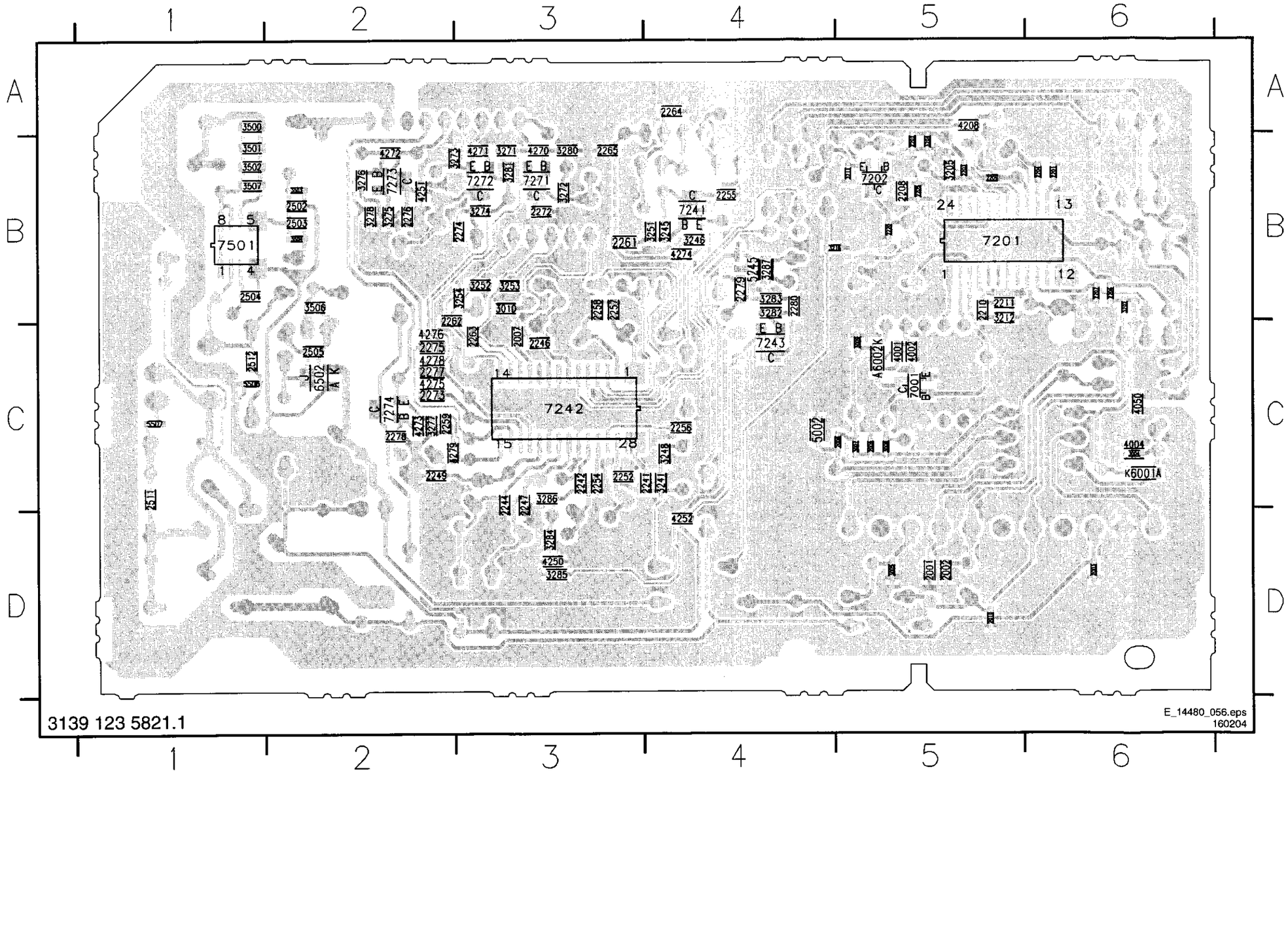
Layout PIP Panel (Top Side)

1000	D2	1206	A1	1241	C4	2245	B4	2271	B5	2509	C6	3006	D2	3208	B2	3247	C3	5001	D3	5243	D4	5503	C6	6504	C6	9283	B1	9288	C1
1002	C2	1212	A5	2004	C1	2248	D4	2501	B6	2510	D5	3201	B1	3210	B3	3249	B4	5010	D2	5244	B3	5504	D6	7502	B5	9284	C4	9289	B5
1003	C2	1214	B1	2011	D2	2250	C4	2506	C5	3001	C1	3203	B2	3215	C1	3250	B3	5220	B3	5271	D5	5505	C5	9280	D5	9285	B4	9290	D3
1004	D1	1219	A3	2221	B2	2251	D3	2507	D6	3002	C1	3206	B1	3243	B3	3255	B4	5241	D4	5501	A6	6501	C6	9281	C3	9286	C3	9550	B6
1201	A1	1220	B4	2243	D4	2253	D4	2508	D5	3003	C1	3207	B1	3244	B3	3505	B5	5242	B4	5502	C5	6503	D5	9282	B3	9287	C1		

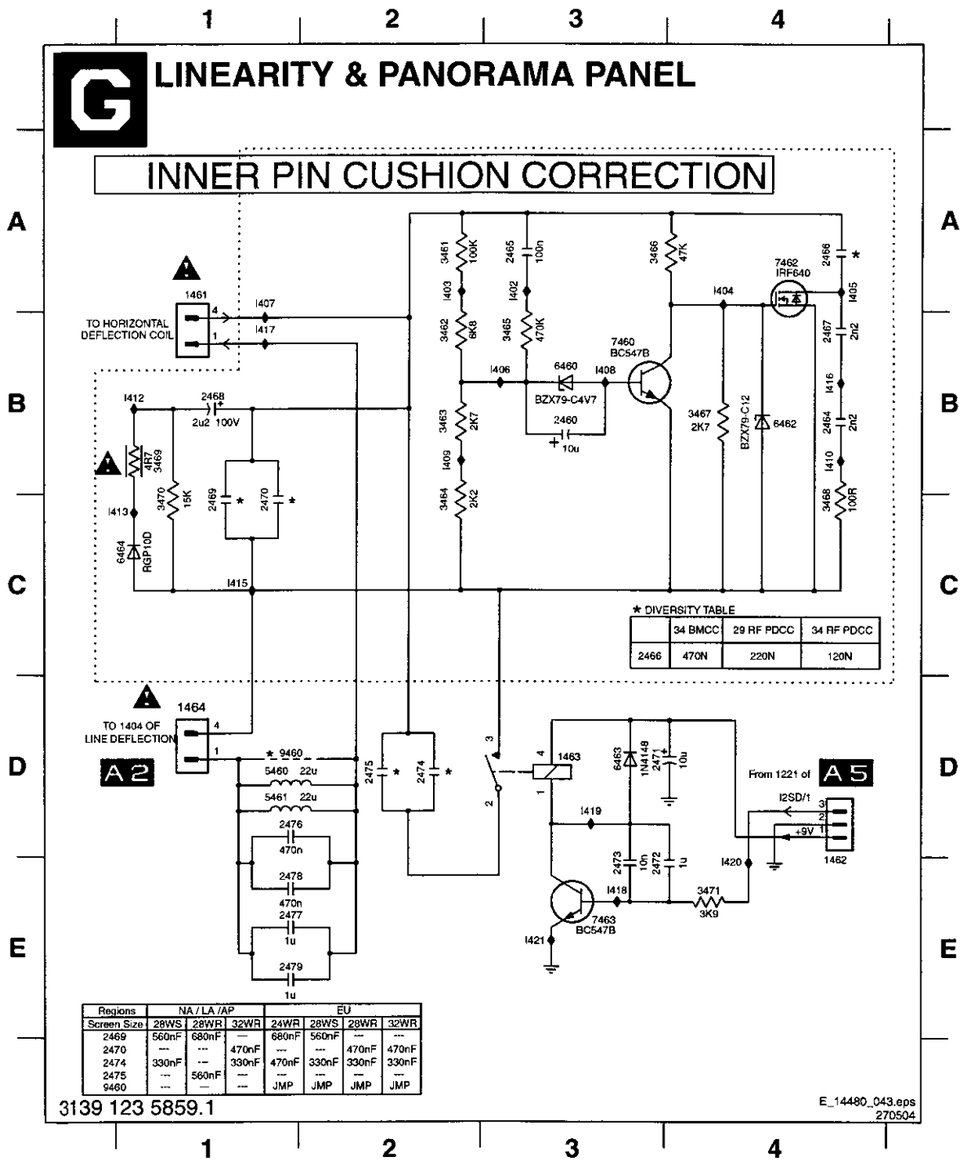


Layout PIP Panel (Bottom Side)

2001	D5	2201	B6	2208	B5	2244	C3	2256	C4	2264	A4	2277	C2	2505	C2	3009	C5	3216	B4	3253	B3	3276	B2	3283	B4	3502	B1	4004	C6	4271	B3	4279	C2	6502	C2	7271	B3
2002	D5	2202	B5	2209	B5	2246	C3	2257	B3	2265	B3	2278	C2	2511	C1	3010	B3	3241	C4	3254	B3	3277	C2	3284	D3	3503	B2	4050	C6	4272	B2	5002	C4	7001	C5	7272	B3
2003	D6	2203	B5	2210	B5	2247	C3	2258	B3	2272	B3	2279	B4	2512	C1	3202	B6	3245	B4	3271	B3	3278	B2	3285	D3	3504	B2	4208	A5	4273	C2	5245	B4	7201	B5	7273	B2
2005	C5	2204	B6	2211	B5	2249	C2	2259	C2	2273	C2	2280	B4	3004	C6	3204	B5	3246	B4	3272	B3	3279	C2	3286	C3	3506	B2	4250	D3	4274	B4	5506	C1	7202	B5	7274	C2
2006	C5	2205	B5	2220	B5	2252	C3	2261	B3	2274	B3	2502	B2	3005	D5	3205	B5	3248	C4	3273	B2	3280	B3	3287	B4	3507	B1	4251	B2	4275	C2	5507	C1	7241	B4	7501	B1
2007	C3	2206	B6	2241	C4	2254	C3	2262	B2	2275	C2	2503	B2	3007	C5	3211	B5	3251	B4	3274	B3	3281	B3	3500	A1	4001	C5	4252	D4	4276	C2	6001	C6	7242	C3		
2010	D5	2207	B6	2242	C3	2255	B4	2263	C3	2276	B2	2504	B1	3008	C5	3212	B5	3252	B3	3275	B2	3282	B4	3501	B1	4002	C5	4270	B3	4278	C2	6002	C5	7243	C4		



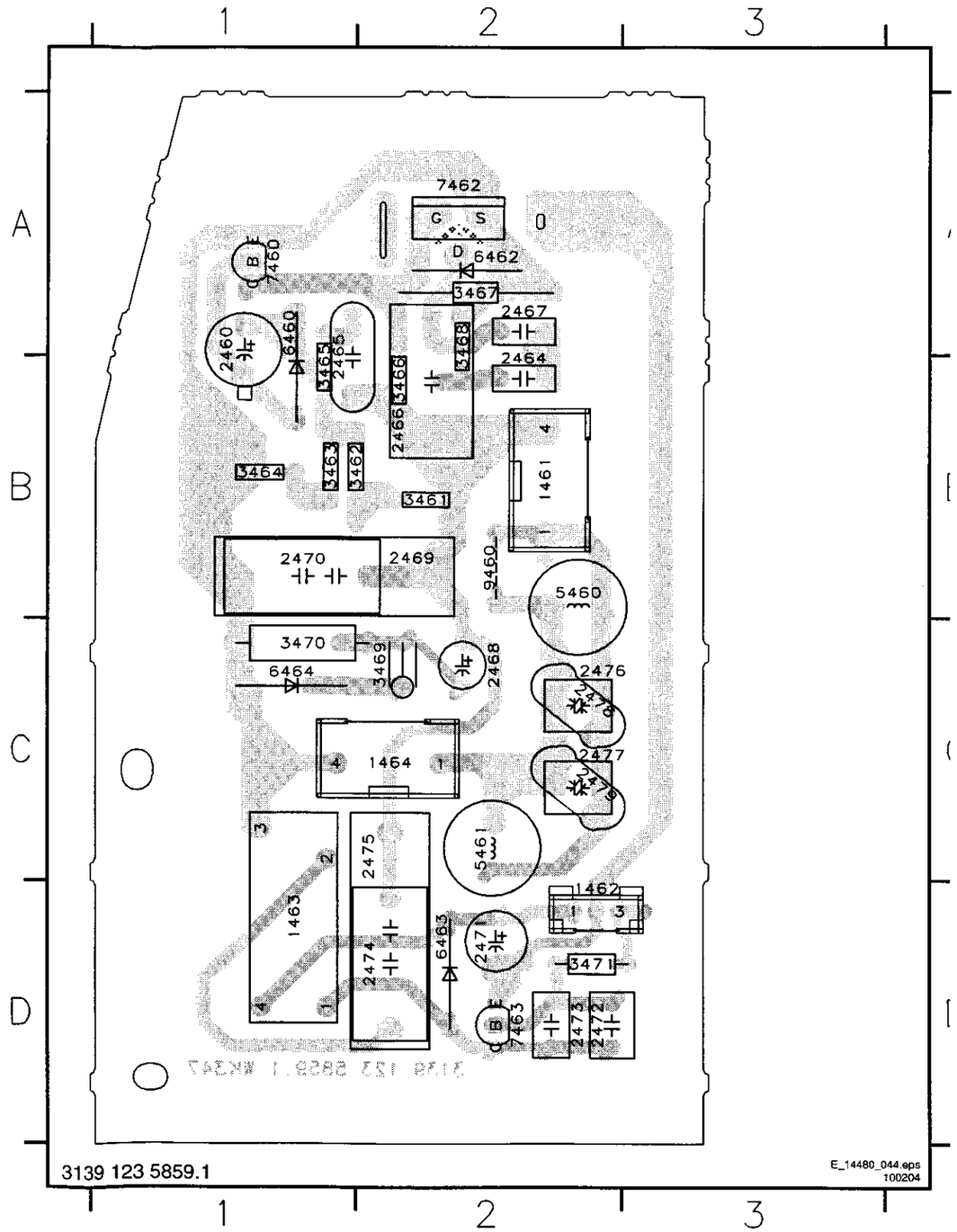
Linearity & Panorama Panel



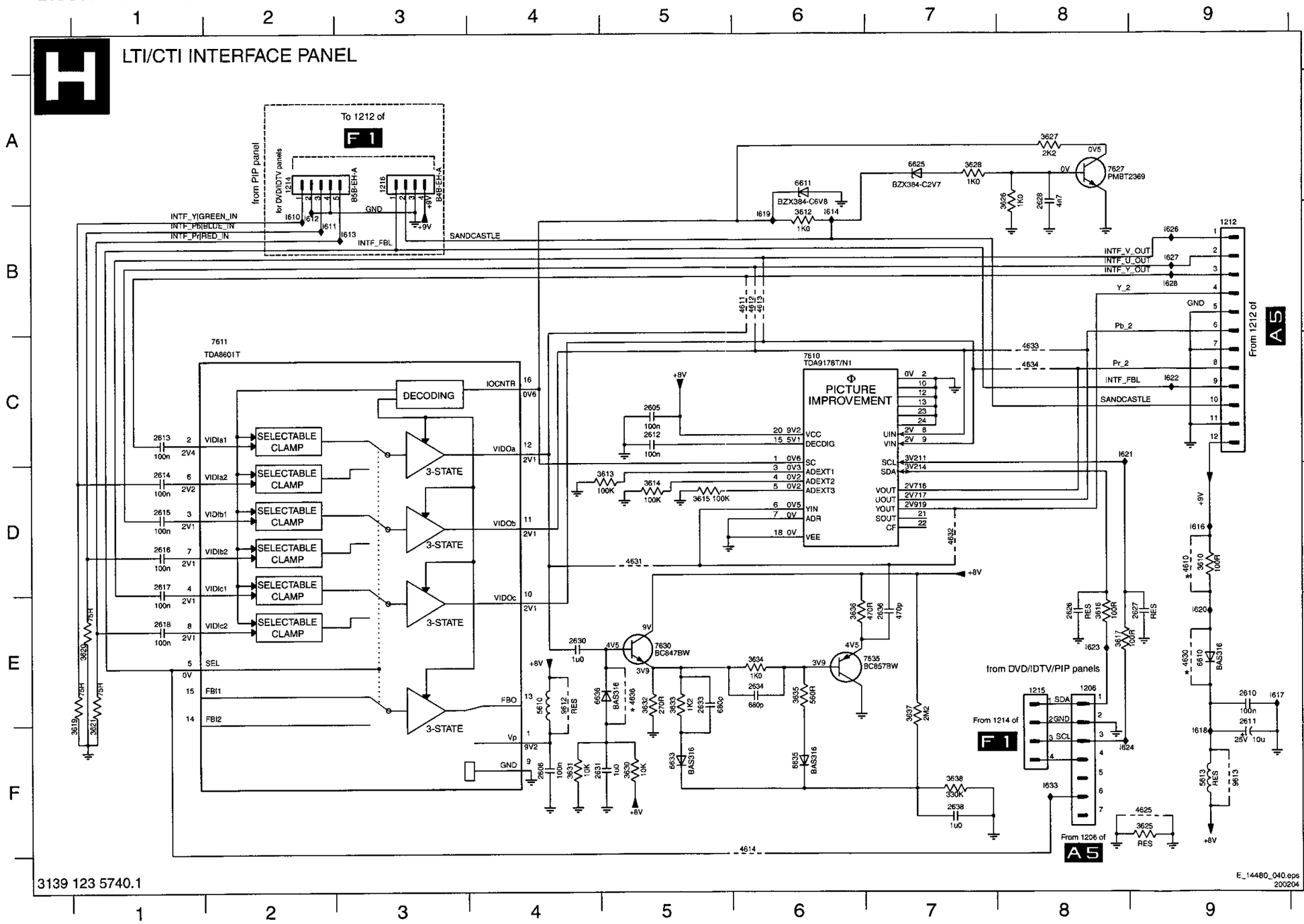
1461 A1
1462 D4
1463 D3
1464 D1
2460 B3
2464 B4
2465 A3
2466 A4
2467 B4
2468 B1
2469 C1
2470 C1
2471 D3
2472 E3
2473 E3
2474 D2
2475 D2
2476 D1
2477 E1
2478 E1
2479 E1
3461 A2
3462 B2
3463 B2
3464 C2
3465 B3
3466 A3
3467 B4
3468 C4
3469 B1
3470 C1
3471 E4
5460 D1
5461 D1
6460 B3
6462 B4
6463 D3
6464 C1
7460 B3
7462 A4
7463 E3
9460 D1
I402 A3
I403 A2
I404 A4
I405 A4
I406 B3
I407 A1
I408 B3
I409 B2
I410 B4
I412 B1
I413 C1
I415 C1
I416 B4
I417 B1
I418 E3
I419 D3
I420 E4
I421 E3

Layout Linearity & Panorama Panel (Top Side)

1461 B2 2464 B2 2469 B2 2474 D2 2479 C2 3465 B1 3470 C1 6461 A2 7462 D2
1462 D2 2465 B1 2470 B1 2475 C2 3461 B2 3466 B2 3471 D2 6462 D2 9460 B2
1463 D1 2466 B2 2471 D2 2476 C2 3462 B1 3467 A2 5460 B2 6463 C1
1464 C2 2467 A2 2472 D2 2477 C2 3463 B1 3468 A2 5461 C2 7460 A1
2460 A1 2468 C2 2473 D2 2478 C2 3464 B1 3469 C2 6460 A1 7461 A2



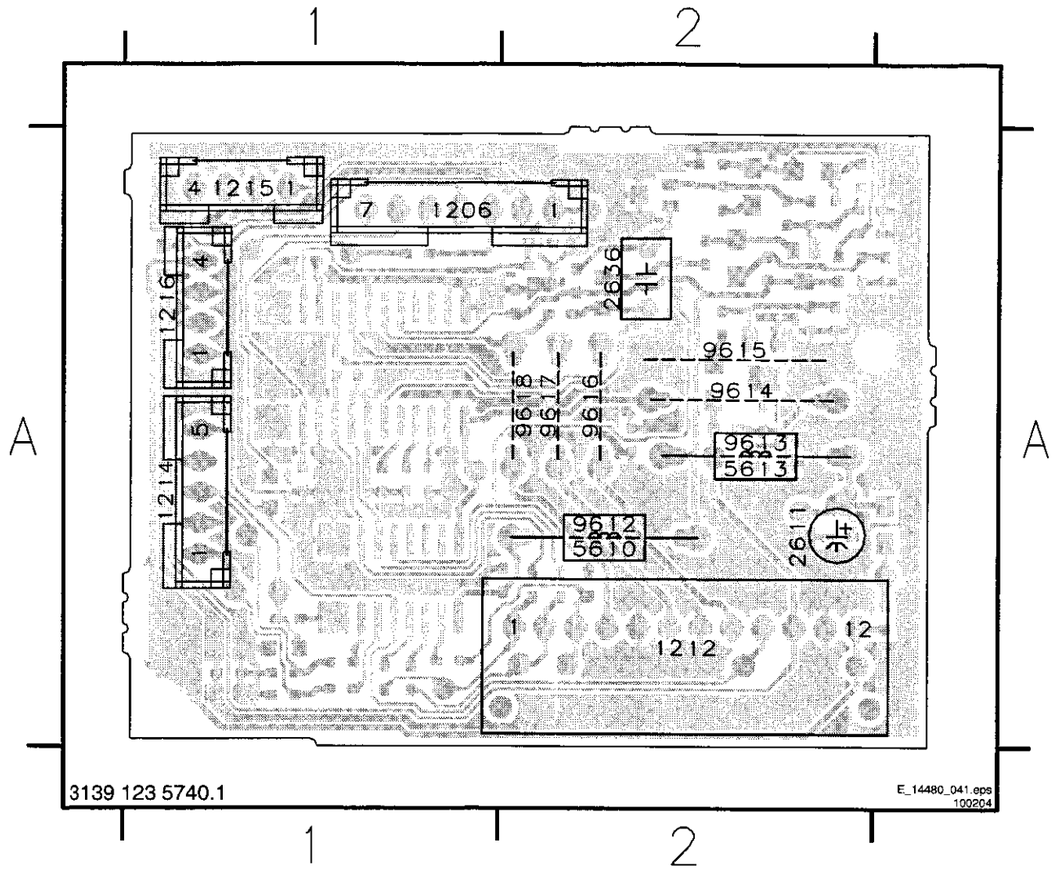
LTI/CTI Interface Panel



1206 E8 I614 B6
1212 B9 I616 D9
1214 A2 I617 E9
1215 E8 I618 F9
1216 A3 I619 B6
2605 C5 I620 E9
2606 F4 I621 C8
2610 E9 I622 C9
2611 E9 I623 E8
2612 C5 I624 F8
2613 C1 I626 B9
2614 D1 I627 B9
2615 D1 I628 B9
2616 D1 I633 F8
2617 D1
2618 E1
2626 E8
2627 E9
2628 A8
2630 E4
2631 F4
2633 E5
2634 E6
2636 E7
2638 F7
3610 D9
3612 B6
3613 D5
3614 D5
3615 D5
3616 E8
3617 E8
3619 E1
3620 E1
3621 E1
3625 F9
3626 A8
3627 A8
3628 A7
3630 F5
3631 F4
3632 E5
3633 E5
3634 E6
3635 E6
3636 E6
3637 E7
3638 F7
4610 D9
4611 B6
4612 B6
4613 B6
4614 F6
4625 F9
4630 E9
4631 D5
4632 D7
4633 C8
4634 C8
4636 E5
5610 E4
5613 F9
6610 E9
6611 A6
6625 A7
6633 F5
6635 F6
6636 E4
7610 C6
7611 C2
7627 A8
7630 E5
7635 E6
9612 E4
9613 F9
I610 B2
I611 B2
I612 B2
I613 B3

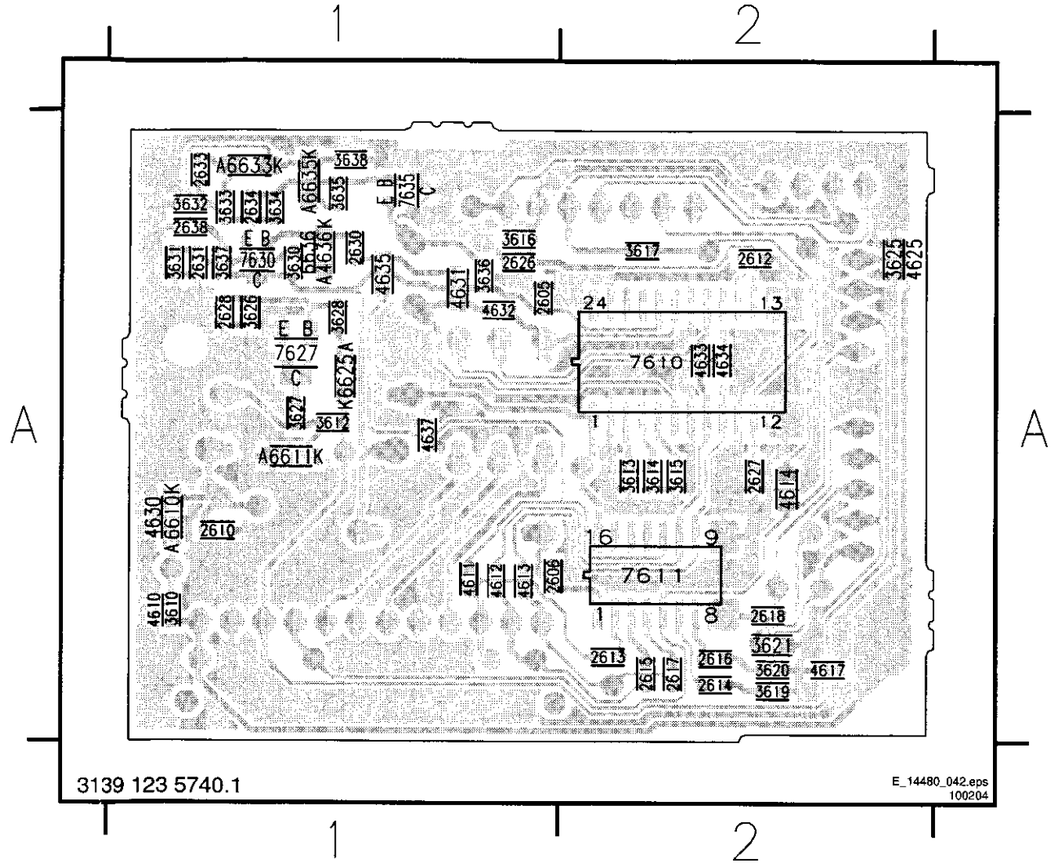
Layout LTI/CTI Interface Panel (Top Side)

1206 A1	1216 A1	5613 A2	9615 A2
1212 A2	2611 A2	9612 A2	9616 A2
1214 A1	2636 A2	9613 A2	9617 A2
1215 A1	5610 A2	9614 A2	9618 A2

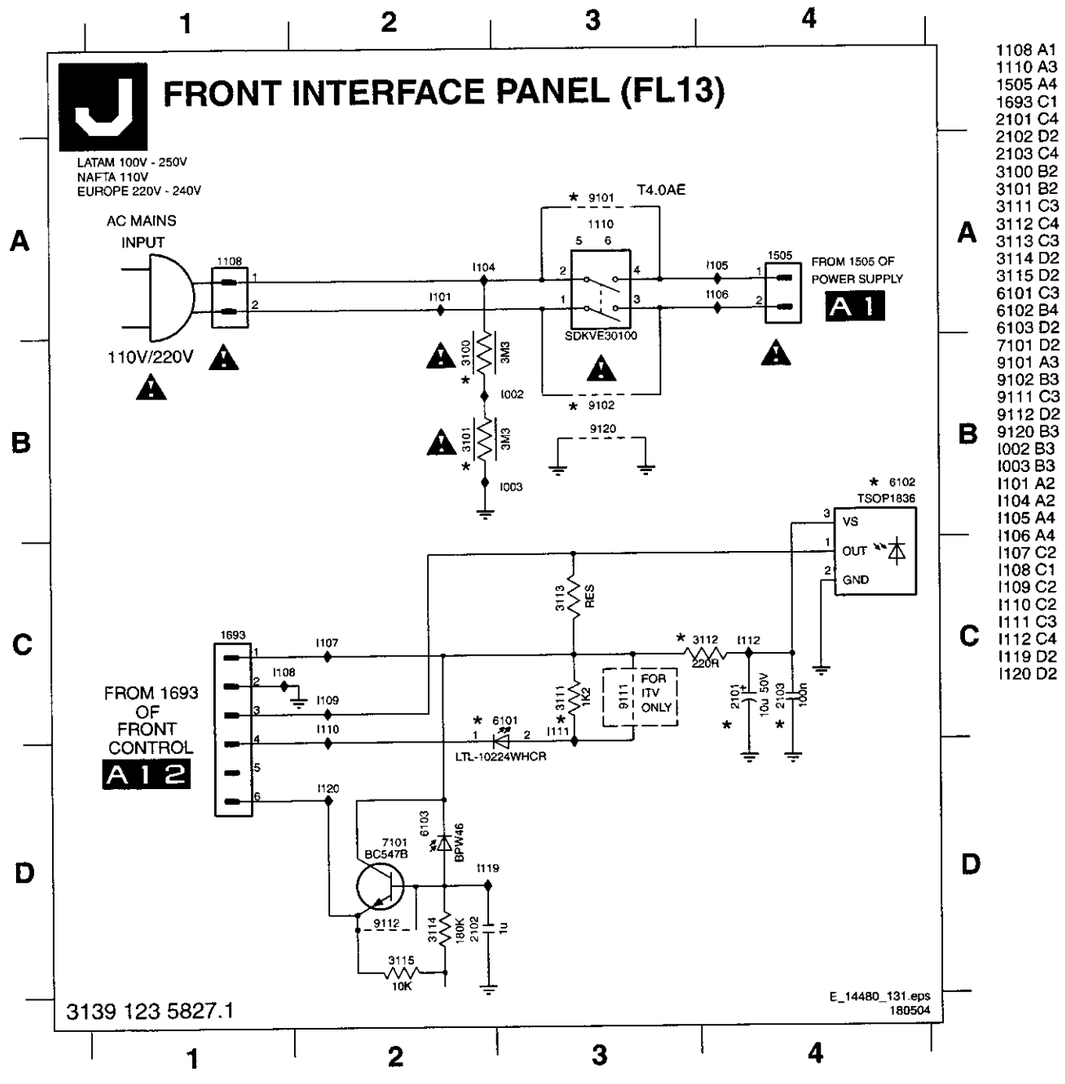


Layout LTI/CTI Interface Panel (Bottom Side)

2605 A1	2616 A2	2631 A1	3614 A2	3625 A2	3633 A1	4611 A1	4631 A1	6610 A1	7611 A2
2606 A1	2617 A2	2633 A1	3615 A2	3626 A1	3634 A1	4612 A1	4632 A1	6611 A1	7627 A1
2610 A1	2618 A2	2634 A1	3616 A1	3627 A1	3635 A1	4613 A1	4633 A2	6625 A1	7630 A1
2612 A2	2626 A1	2638 A1	3617 A2	3628 A1	3636 A1	4614 A2	4634 A2	6633 A1	7635 A1
2613 A2	2627 A2	3610 A1	3619 A2	3630 A1	3637 A1	4617 A2	4635 A1	6635 A1	
2614 A2	2628 A1	3612 A1	3620 A2	3631 A1	3638 A1	4625 A2	4636 A1	6636 A1	
2615 A2	2630 A1	3613 A2	3621 A2	3632 A1	4610 A1	4630 A1	4637 A1	7610 A2	

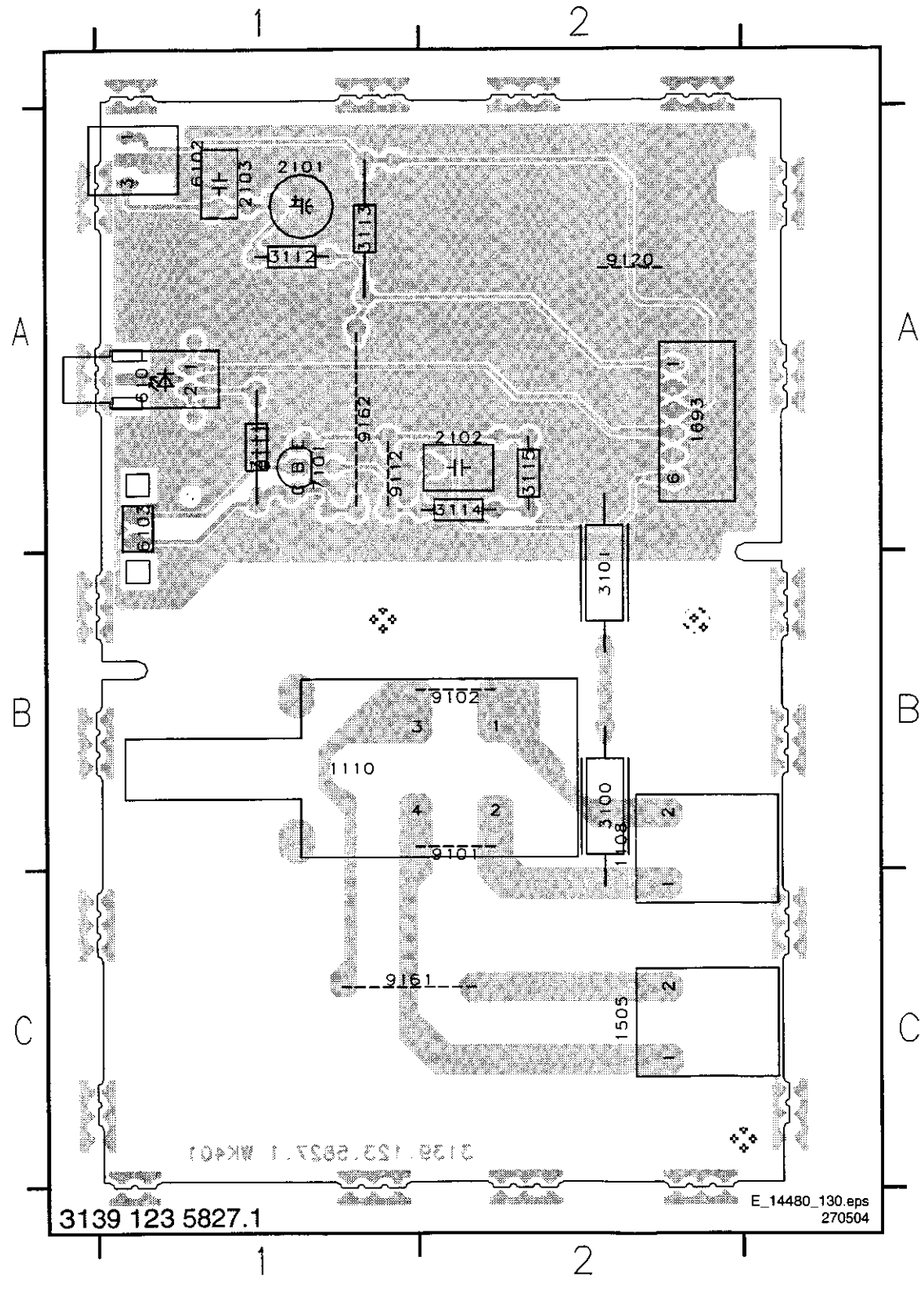


Front Interface Panel (FL-13)



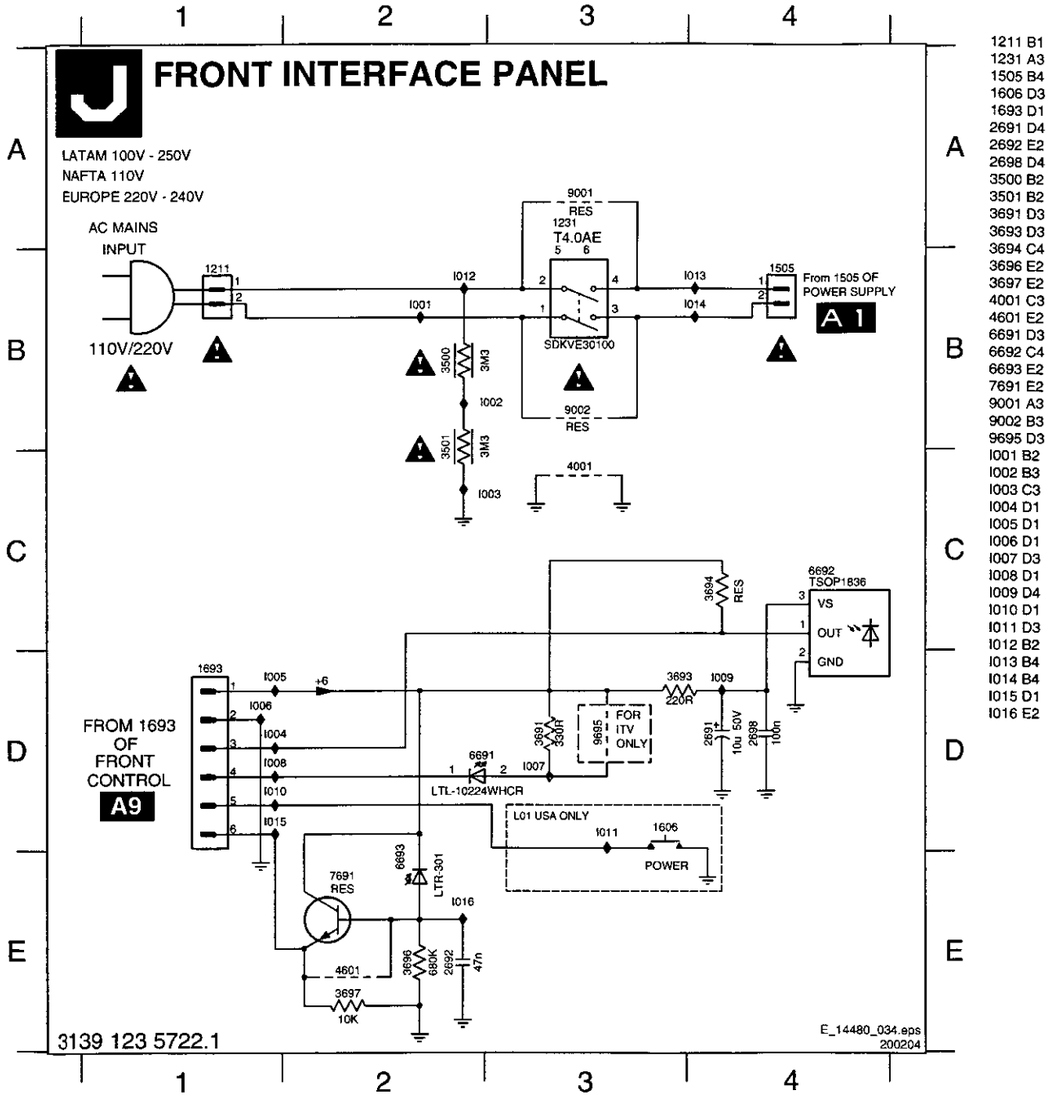
1108 A1
1110 A3
1505 A4
1693 C1
2101 C4
2102 D2
2103 C4
3100 B2
3101 B2
3111 C3
3112 C4
3113 C3
3114 D2
3115 D2
6101 C3
6102 B4
6103 D2
7101 D2
9101 A3
9102 B3
9111 C3
9112 D2
9120 B3
I002 B3
I003 B3
I101 A2
I104 A2
I105 A4
I106 A4
I107 C2
I108 C1
I109 C2
I110 C2
I111 C3
I112 C4
I119 D2
I120 D2

Layout Front Interface Panel (FL-13) (Top Side)



1108 B2
1110 B1
1505 C2
1693 A2
2101 A1
2102 A2
2103 A1
3100 B2
3101 B2
3111 A1
3112 A1
3113 A1
3114 A2
3115 A2
6101 A1
6102 A1
6103 A1
7101 A1
9101 B2
9102 B2
9111 A1
9112 A1
9120 A2
9161 C1
9162 A1

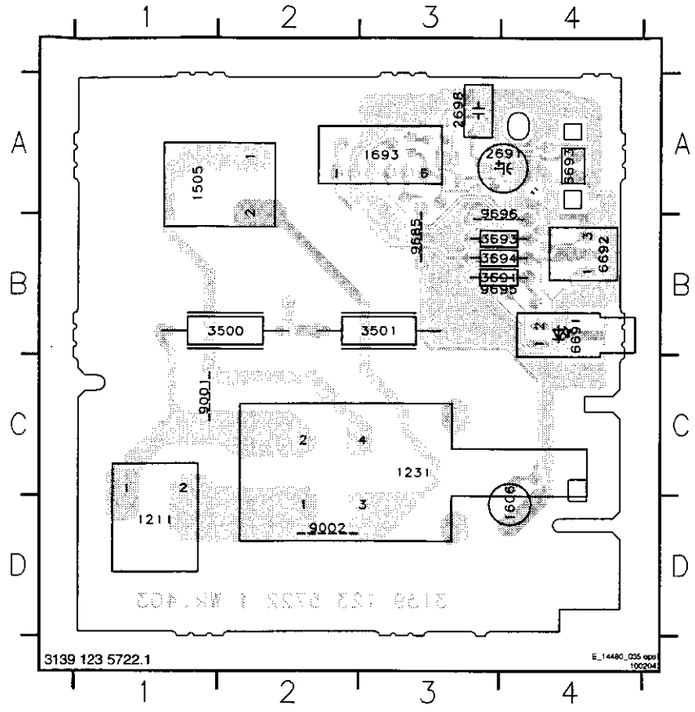
Front Interface Panel (PV-2)



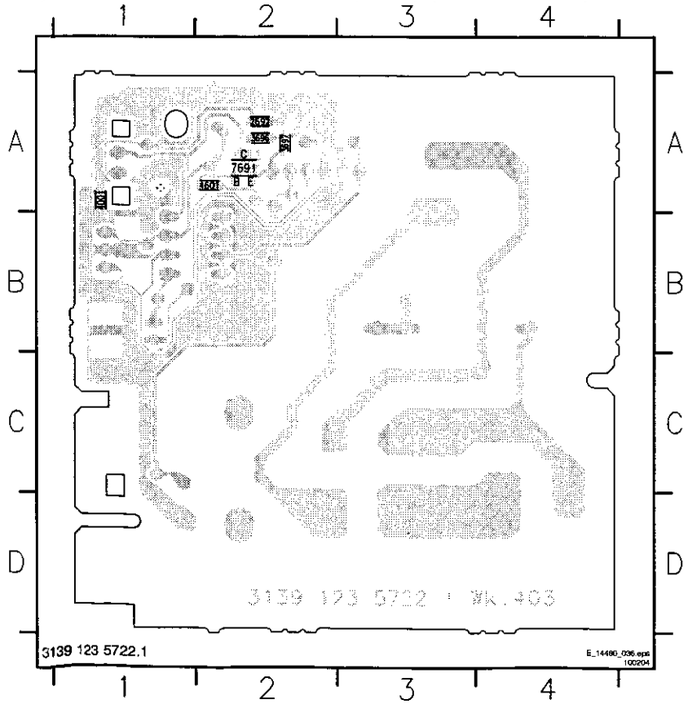
1211 B1
1231 A3
1505 B4
1606 D3
1693 D1
2691 D4
2692 E2
2698 D4
3500 B2
3501 B2
3691 D3
3693 D3
3694 C4
3696 E2
3697 E2
4001 C3
4601 E2
6691 D3
6692 C4
6693 E2
7691 E2
9001 A3
9002 B3
9695 D3
I001 B2
I002 B3
I003 C3
I004 D1
I005 D1
I006 D1
I007 D3
I008 D1
I009 D4
I010 D1
I011 D3
I012 B2
I013 B4
I014 B4
I015 D1
I016 E2

Layout Front Interface Panel (PV-2) (Top Side)

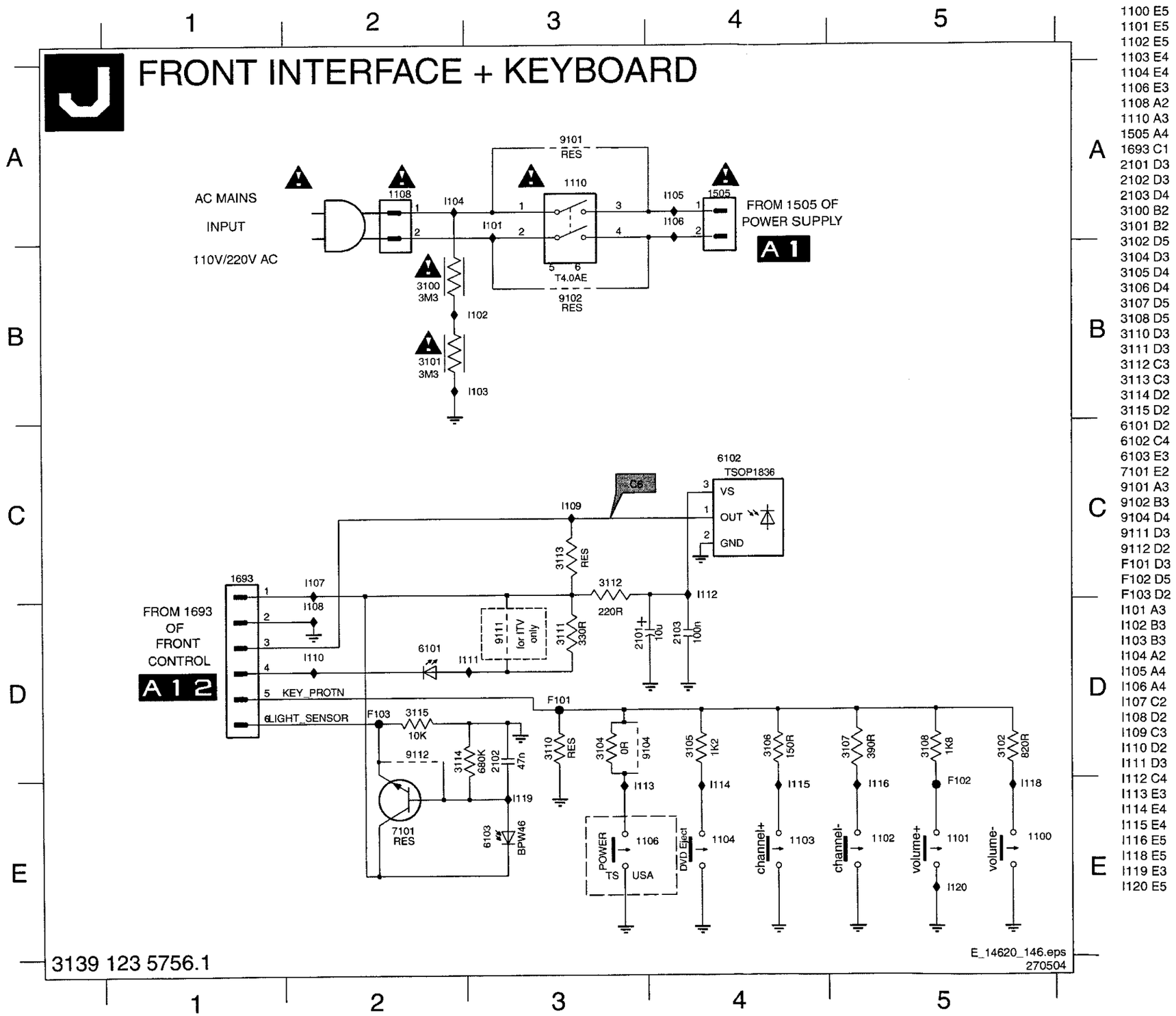
1211 D1 1606 D4 2698 A3 3691 B3 6691 B4 9001 C1 9695 B3
1231 C3 1693 A3 3500 B2 3693 B3 6692 B4 9002 D2 9696 A3
1505 A1 2691 A4 3501 B3 3694 B3 6693 A4 9685 B3



Layout Front Interface Panel (PV-2) (Bottom Side)

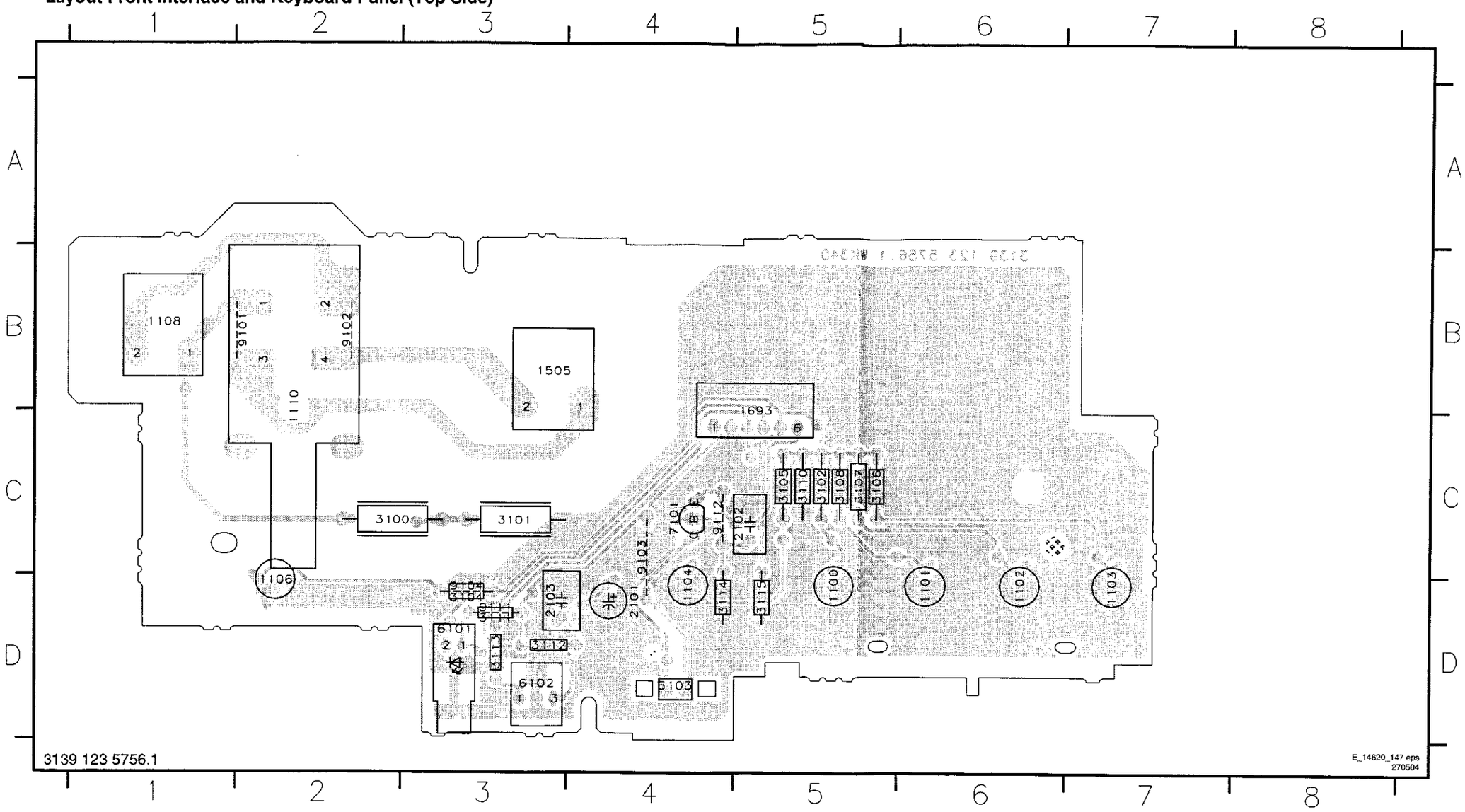


Front Interface and Keyboard Panel



1100 E5
1101 E5
1102 E5
1103 E4
1104 E4
1106 E3
1108 A2
1110 A3
1505 A4
1693 C1
2101 D3
2102 D3
2103 D4
3100 B2
3101 B2
3102 D5
3104 D3
3105 D4
3106 D4
3107 D5
3108 D5
3110 D3
3111 D3
3112 C3
3113 C3
3114 D2
3115 D2
6101 D2
6102 C4
6103 E3
7101 E2
9101 A3
9102 B3
9104 D4
9111 D3
9112 D2
F101 D3
F102 D5
F103 D2
I101 A3
I102 B3
I103 B3
I104 A2
I105 A4
I106 A4
I107 C2
I108 D2
I109 C3
I110 D2
I111 D3
I112 C4
I113 E3
I114 E4
I115 E4
I116 E5
I118 E5
I119 E3
I120 E5

Layout Front Interface and Keyboard Panel (Top Side)



1100	D5
1101	D6
1102	D6
1103	D7
1104	D4
1106	D2
1108	B1
1110	B2
1505	B3
1693	B5
2101	D4
2102	C5
2103	D3
3100	C2
3101	C3
3102	C5
3104	D3
3105	C5
3106	C5
3107	C5
3108	C5
3110	C5
3111	D3
3112	D3
3113	D3
3114	D4
3115	D5
6101	D3
6102	D3
6103	D4
7101	C4
9101	B2
9102	B2
9103	C4
9104	D3
9111	D3
9112	C4

8. Alignments

Index of this chapter:

Note:
- The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 "Service Modes, ...".
- Menu navigation is done with the CURSOR UP, DOWN, LEFT, or RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
- AC voltage and frequency: 120 V_ac / 60 Hz or 240 V_ac / 50 Hz (region dependent).
- Connect the set to the Mains voltage via an isolation transformer with a low internal resistance.
- Allow the 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 the cooling fins / plates as ground.
- Test probe: Ri > 10 Mohm; Ci < 2.5 pF.
- Use an isolated trimmer / screwdriver to perform the alignments.

8.2 Hardware Alignments

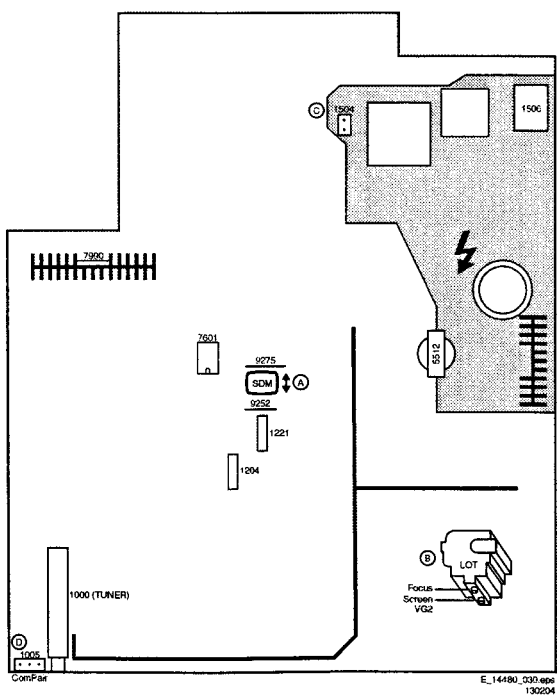


Figure 8-1 Top view family board

8.2.1 Vg2 Adjustment

1. Activate the SAM.
2. Go to the WHITE TONE sub menu.
3. Set the values of NORMAL RED, GREEN and BLUE to "32".
4. Go, via the MENU key, to the normal user menu and set
5. SATURATION/COLOR to "0".
6. CONTRAST to "0".
7. BRIGHTNESS to minimum (OSD just visible).
8. Return to the SAM via the MENU key.
9. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info) with a signal strength of 1 V_pp.
10. Set the channel of the oscilloscope to 50 V/div and the time base to 0.2 ms (external triggering on the vertical pulse). Ground the scope at the CRT panel and connect a 10:1 probe to one of the cathodes of the picture tube socket (see diagram B).
11. Measure the cut off pulse during first full line after the frame blanking (see figure "V_cutoff waveform"). You will see two pulses, one being the "cut off" pulse and the other being the "white drive" pulse. Choose the one with the lowest value; this is the "cut off" pulse.
12. Select the cathode with the highest V_dc value for the alignment. Adjust the V_cutoff of this gun with the SCREEN potentiometer (see figure "Top view family board") on the LOT to 160 V_dc, except for the 25/28BLD picture tube (Black Line Display, for EU only); this tube must be aligned to 140 V_dc.
13. Restore BRIGHTNESS and CONTRAST to normal (= 31).

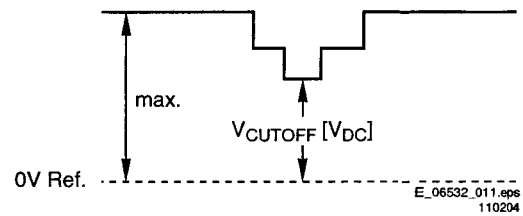
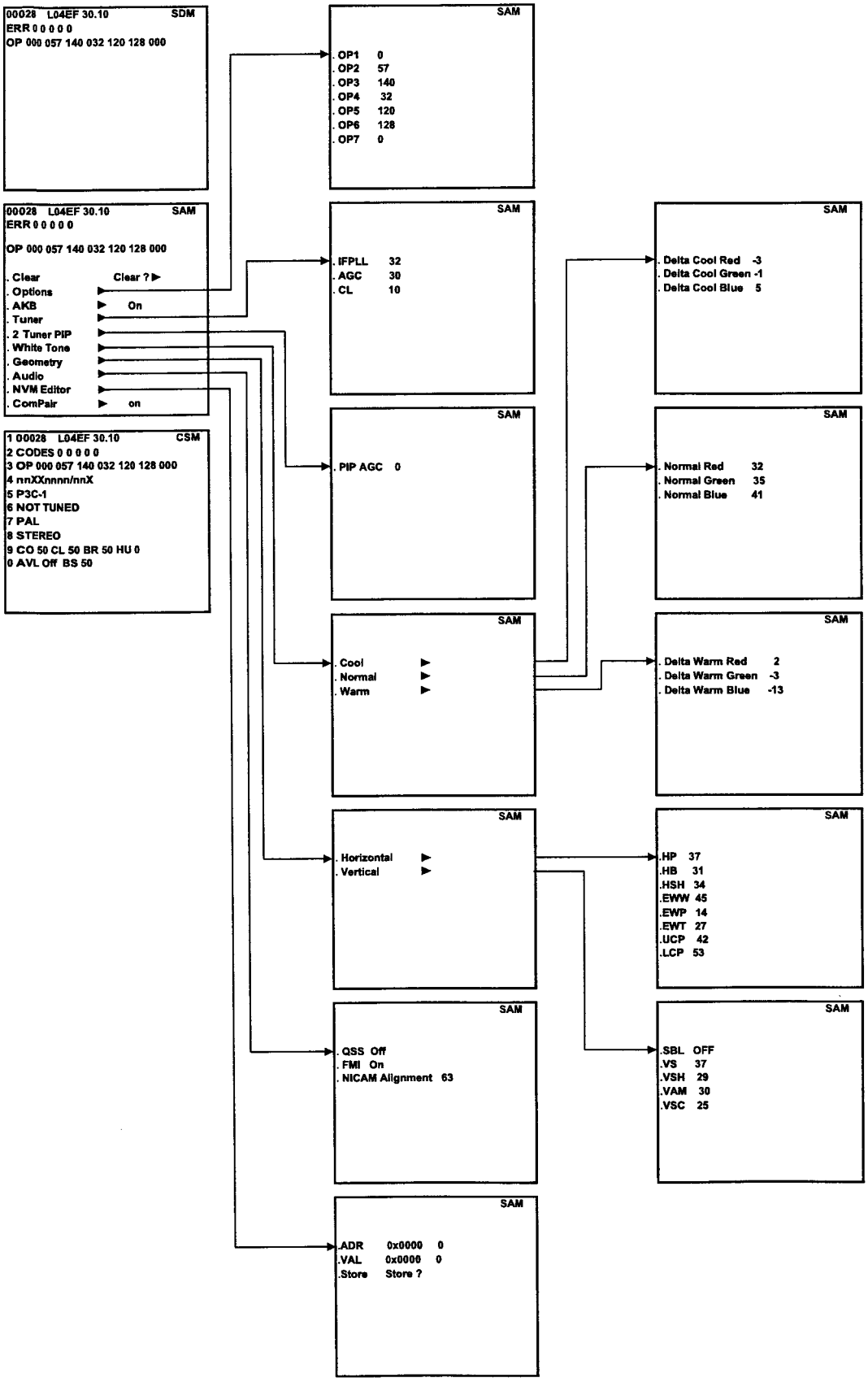


Figure 8-2 V_cutoff waveform

8.2.2 Focusing

1. Tune the set to a circle or crosshatch test pattern (use an external video pattern generator).
2. Choose picture mode NATURAL (or MOVIES) with the SMART PICTURE button on the remote control transmitter.
3. Adjust the FOCUS potentiometer (see figure "Top view family board") until the vertical lines at 2/3 from east and west, at the height of the centreline, are of minimum width without visible haze.

8.3 Software Alignments and Settings



E_14480_143.eps
260504

Figure 8-3 Service Mode overview

Enter the Service Alignment Mode (see also chapter 5 "Service Modes, ..."). The SAM menu will now appear on the screen. Select one of the following alignments:

- Options
- Tuner
- White Tone
- Geometry
- Audio

8.3.1 Options

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

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 (OP1.. OP7) with the MENU UP/ DOWN keys, and enter the new value.

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 AC power switch (cold start).

How to calculate the value of an Option Byte

- Calculate an Option Byte value (OP1 .. OP7) in the following way:
- Check the status of the single option bits (OB): are they enabled (1) or disabled (0).
- When an option bit is enabled (1) it represents a certain value (see column "Bit value" in table below). When an option bit is disabled, its value is 0.
- The total value of an Option Byte (decimal) is formed by the sum of its eight option bits. The factory values are printed on a sticker on the CRT.

Table 8-1 Option Byte calculation

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**

Option Bit Assignment

Following are the option bit assignments for all software clusters.

Table 8-2 Option code overview per model

Bit	Byte_0	Description	21PT5458/01	21PT5509/01	21PT5518/01	21PT5518/05	21PT5518/58	21PT5618/01	21PT5618/05	21PT5618/58	25PT4458/01	25PT4458/05	28PT4458/01	28PT4458/05	28PT5008/01	28PT5008/05	28PT4408/01	28PT4418/01	29PT5408/01	29PT5408/58	29PT5458/01	29PT5509/01	29PT5518/01	29PT5518/05	29PT5518/58	29PT5618/01	29PT5618/05	29PT5618/58	24PW6518/01	24PW6518/05	28PW5408/01	28PW6008/01	28PW6008/05	28PW6008/58	28PW6408/01	28PW6408/05	28PW6408/58	28PW6509/01	28PW6518/01	28PW6518/05	28PW6518/58	28PW6558/01	28PW6618/01	28PW6618/05	28PW6618/58	32PW6408/01	32PW6408/05	32PW6518/01	32PW6518/05	32PW6618/01	32PW6618/05
7	MVK		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	OSVE	Black current measuring in overscan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	TFR	DC transfer ratio of luminance signal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	FSL	Forced slicing level for vertical sync	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	HP2	Synchronization of OSD/Text display	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	HCO	EHT tracking mode	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	FMI	Connection of output of QSS amplifier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	QSS	Mode of quasi split sound amplifier	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Decimal		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bit	Byte_1	Description																																																
7	SVMA	Scavem On / Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	SAM Mode	Service Align mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	SDM Mode	Service default mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	White Pattern On	Last colour pattern status in factory mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Continuous Factory	Continuous factory mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	Byte_2	Description																																															
7	PSNS	For PAL colour enhancement in ES4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Factory Mode	Factory mode on	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Surf Mode	Surf mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Child Lock Mode	Child lock enabled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Last Power Mode	Last power status of the set	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Cable Mode	Cable/Antenna mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	Byte_0	Description	21PT5458/01	21PT5509/01	21PT5518/01	21PT5518/05	21PT5518/58	21PT5618/01	21PT5618/05	21PT5618/58	25PT4458/01	25PT4458/05	28PT4458/01	28PT4458/05	28PT5008/01	28PT5008/05	28PT4408/01	28PT4418/01	29PT5408/01	29PT5408/58	29PT5458/01	29PT5509/01	29PT5519/01	29PT5519/05	29PT5518/58	29PT5618/01	29PT5618/05	29PT5618/58	24PW6518/01	24PW6518/05	28PW5408/01	28PW6008/01	28PW6008/05	28PW6008/58	28PW6408/01	28PW6408/05	28PW6408/58	28PW6508/01	28PW6518/01	28PW6518/05	28PW6518/58	28PW6558/01	28PW6618/01	28PW6618/05	28PW6618/58	32PW6408/01	32PW6408/05	32PW6518/01	32PW6518/05	32PW6618/01	32PW6618/05
1	Tuner Auto Mode	Auto mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	Mute Status	Mute status	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Bit	Byte_3	Description																																																
7	CFA0	Comb filter On/Off	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0
6	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	BLS	Blue stretch mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	LNA Last Status		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Hotel KBD Lock	Keyboard locked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Hotel Mode	TV in Hotel mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	Wake Up Mode		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	Radio/TV Mode	Radio mode or TV mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		128	128	128	128	128				128	128	128	128	128	128	128	128	128	128									128	128	128	128	128	128	128	128								128	128				
	Hex		8	8	8	8	8	0	0	0	8	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	8	8	8	8	8	8	8	0	0	0	0	0	0	0	8	8	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	Byte_4	Description																																															
7	PIP QSS	PIP QSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1
6	CRA0	Coring on SVM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	BSD	Black Stretch Depth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	BKS	Black Stretch Mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	SCRSAVER Mode	Screen saver mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	DVD Tray Lock	Lock/Unlock DVD tray	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	LPG		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	Signal Strength	Signal Strength Switch in MK2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	128	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	128	128	0	0	0	128	128	128
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	0	0	0	8	8	8
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	Byte_5	Description																																														
7	DSK	Dynamic Skin Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	DSA	Dynamic skin tone angle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	LLB	Low level of beam current limiter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	CBS	Control sequence of beam current limiting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	GAM	Gamma control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	MUS	NTSC matrix	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	NRR	No red reduction during blue stretch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	FFI	Fast Filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Bit	Byte_6	Description																																														
7	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	Reserved		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	LTI Status	LTI last status	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Decimal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hex		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- Option Byte 1 (OP1)
  - OB17: PHILIPS TUNER
  - OB16: FM RADIO
  - OB15: LNA
  - OB14: ATS (EU)
  - OB13: ACI
  - OB12: UK PNP
  - OB11: VIRGIN MODE
  - OB10: CHINA
- Option Byte 2 (OP2)
  - OB27: SC
  - OB26: GREEN UI
  - OB25: CHANNEL NAMING
  - OB24: LTI
  - OB23: TILT
  - OB22: FINE TUNING
  - OB21: PIP PHILIPS TUNER
  - OB20: HUE
- Option Byte 3 (OP3)
  - OB37: EW FUNCTION
  - OB36: 2 TUNER PIP
  - OB35: PIP SPLITTER
  - OB34: SPLITTER
  - OB33: VIRTUAL DOLBY
  - OB32: WIDE SCREEN
  - OB31: WSSB (EU)
  - OB30: ECO SUBWOOFER
- Option Byte 4 (OP4)
  - OB47: Reserved (value= 0)
  - OB46: Reserved (value= 0)
  - OB45: ULTRA BASS
  - OB44: DELTA VOLUME
  - OB43: Reserved (value= 0)
  - OB42: VOLUME LIMITER
  - OB41: Reserved (value= 0)
  - OB40: STEREO NICAM 2CS
- Option Byte 5 (OP5)
  - OB57: AV1
  - OB56: AV2
  - OB55: AV3
  - OB54: CVI
  - OB53: SVHS2
  - OB52: SVHS3
  - OB51: HOTEL MODE
  - OB50: Reserved (value= 0)
- Option Byte 6 (OP6)
  - OB67: PERSONAL ZAPPING
  - OB66: Reserved (value= 0)
  - OB65: FM TRAP
  - OB64: COMB FILTER
  - OB63: ACTIVE CONTROL
  - OB62: VIDEO TEXT
  - OB61: LIGHT SENSOR
  - OB60: DUAL TEXT
- Option Byte 7 (OP7)
  - OB77: TIME WIN1
  - OB76: Reserved (value= 0)
  - OB75: Reserved (value= 0)
  - OB74: Reserved (value= 0)
  - OB73: Reserved (value= 0)
  - OB72: Reserved (value= 0)
  - OB71: Reserved (value= 0)
  - OB70: Reserved (value= 0)

Option bit definition

Option Byte 1 (OP1)

- OB17: PHILIPS TUNER
  - 0 : ALPS / MASCO compatible tuner is in use.
  - 1 : Philips compatible tuner is in use.
- OB16: FM RADIO
  - 0 : FM radio feature is disabled or not applicable.
  - 1 : FM radio feature is enabled.
- OB15: LNA
  - 0 : Auto Picture Booster is not available or not applicable.
  - 1 : Auto Picture Booster is available.
- OB14: ATS
  - 0 : Automatic Tuning System (ATS) feature is disabled or not applicable.
  - 1 : ATS feature is enabled. When ATS is enabled, it sorts the program in an ascending order starting from program "1".
- OB13: ACI
  - 0 : Automatic Channel Installation (ACI) feature is disabled or not applicable.
  - 1 : ACI feature is enabled.
- OB12: UK PNP
  - 0 : UK's default Plug and Play setting is not available or not applicable.
  - 1 : UK's default Plug and Play setting is available.
  - When UK PNP and VIRGIN MODE are set to "1" at the initial setup and after exiting from menu, VIRGIN MODE will be set automatically to "0" while UK PNP remains "1".
- OB11: VIRGIN MODE
  - 0 : Virgin mode is disabled or not applicable.
  - 1 : Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial startup of the TV when VIRGIN MODE is set to "1". After installation is finished, this option bit will be automatically set to "0".
- OB10: CHINA
  - 0 : Tuning is not for China set, or this option bit is not applicable.
  - 1 : Tuning is for China set.

Option Byte 2 (OP2)

- OB27: SC
  - 0 : Soft clipping is disabled.
  - 1 : Soft clipping is enabled.
- OB26: GREEN UI
  - 0 : Green UI is disabled (for Philips brand).
  - 1 : Green UI is enabled (for Magnavox brand).
  - Note: only for NAFTA region.
- OB25: CHANNEL NAMING
  - 0 : Name FM Channel is disabled or not applicable.
  - 1 : Name FM Channel is enabled.
  - Note : Name FM channel can be enabled only when FM RADIO= "1".
- OB24: LTI
  - 0 : Luminance Transient Improvement (LTI) is disabled or not applicable.
  - 1 : LTI is enabled.
- OB23: TILT
  - 0 : Rotate Picture is disabled or not applicable.
  - 1 : Rotate Picture is enabled.
- OB22: FINE TUNING
  - 0 : Fine Tuning for Channel Offset is disabled or not applicable.
  - 1 : Fine Tuning for Channel Offset is enabled.
- OB21: PIP PHILIPS TUNER
  - 0 : ALPS / MASCO compatible tuner is in use for PIP module.
  - 1 : Philips compatible tuner is in use for PIP module.
- OB20: HUE
  - 0 : Hue/Tint Level is disabled or not applicable.
  - 1 : Hue/Tint Level is enabled.

Option Byte 3 (OP3)

- OB37: EW FUNCTION
  - 0 : EW function is disabled. In this case, only Expand 4:3 is allowed, Compress 16:9 is not applicable.
  - 1 : EW function is enabled. In this case, both Expand 4:3 and Compress 16:9 are applicable.
- OB36: 2 TUNER PIP
  - 0 : Software selection no PIP
  - 1 : Software selection with PIP

  - Note: Only for EU/AP region for sets with PIP.
- OB35: PIP SPLITTER
  - 0 : Normal Tuner in PIP
  - 1 : Splitter in PIP
  - Note: Only for EU/AP region. For PIP sets and build in with Splitter in PIP tuner.
- OB34: SPLITTER
  - 0 : Normal Tuner for main chassis
  - 1 : Splitter Tuner for main chassis
  - Note: Only for EU/AP region.
- OB33: VIRTUAL DOLBY
  - 0 : Virtual Dolby is not applicable.
  - 1 : Virtual Dolby is applicable.
- OB32: WIDE SCREEN
  - 0 : Software is used for 4:3 sets or not applicable.
  - 1 : Software is used for 16:9 sets.
- OB31: WSSB (EU)
  - 0 : WSSB is disabled or not applicable.
  - 1 : WSSB is enabled.
  - Note : This option bit can be set to "1" only when WIDE SCREEN= "1".
- OB30: ECO SUBWOOFER
  - 0 : Feature is disabled or not applicable.
  - 1 : Feature is enabled.

Option Byte 4 (OP4)
- OB47: Reserved
  - Default setting is "0".
- OB46: Reserved
  - Default setting is "0".
- OB45: ULTRA BASS
  - 0 : Ultra Bass is disabled or not applicable.
  - 1 : Ultra Bass is enabled.
  - Default setting is "0".
- OB44: DELTA VOLUME
  - 0 : Delta Volume Level is disabled or not applicable.
  - 1 : Delta Volume Level is enabled.
- OB43: Reserved
  - Default setting is "0".
- OB42: VOLUME LIMITER
  - 0 : Volume Limiter Level is disabled or not applicable.
  - 1 : Toggle Volume Limiter Level is enabled.
- OB41: Reserved
  - Default setting is "0".
- OB40: STEREO NICAM 2CS
  - 0 : For AV Stereo.
  - 1 : For NICAM Stereo 2CS.

Option Byte 5 (OP5)
- OB57: AV1
  - 0 : AV1 source is not present.
  - 1 : AV1 source is present.
- OB56: AV2
  - 0 : AV2 source is not present.
  - 1 : AV2 source is present.
  - Note : For EU, when AV2="1", both EXT2 and SVHS2 should be included in the OSD loop.
- OB55: AV3
  - 0 : Side/Front AV3 source is not present.
  - 1 : Side/Front AV3 source is present.
- OB54: CVI
  - 0 : CVI source is not available.
  - 1 : CVI source is available.
- OB53: SVHS2
  - 0 : SVHS2 source is not available.
  - 1 : SVHS2 source is available.
  - Note : This option bit is not applicable for EU.
- OB52: SVHS3
  - 0 : SVHS3 source is not available.
  - 1 : SVHS3 source is available.
  - Note : This option bit is not applicable for EU.
- OB51: HOTEL MODE
  - 0 : Hotel mode is disabled or not applicable.
  - 1 : Hotel mode is enabled.
- OB50: Reserved
  - Default setting is "0".

Option Byte 6 (OP6)
- OB67: PERSONAL ZAPPING
  - 0 : Personal Zapping feature is disabled or not applicable.
  - 1 : Personal Zapping feature is enabled.
- OB66: Reserved
  - Default setting is "0".
- OB65: FM TRAP
  - 0 : FM Trap is not present.
  - 1 : FM Trap is present.
  - Note: Only for LATAM region.
- OB64: COMBFILTER
  - 0 : 3D-combfilter is not present.
  - 1 : 3D-combfilter is present.
- OB63: ACTIVE CONTROL
  - 0 : Active Control feature is disabled or not applicable.
  - 1 : Active Control feature is enabled.
- OB62: VIDEO TEXT
  - 0 : Video Text (DW with TXT) is disabled or not applicable.
  - 1 : Video Text (DW with TXT) is enabled.
  - Note: For EU only.
- OB61: LIGHT SENSOR
  - 0 : Light sensor feature is disabled or not applicable.
  - 1 : Light sensor feature is enabled.
- OB60: DUAL TEXT
  - 0 : Dual Text and Text Dual Screen are disabled or not applicable.
  - 1: Dual Text and Text Dual Screen are enabled.

Option Byte 7 (OP7)
- OB77: TIME WIN1
  - 00 : The time window is set to 1.2 s.
  - 01 : The time window is set to 2 s.
  - Note :The time-out for all digit entries depends on this setting.
- OB76: Reserved
  - Default setting is "0".
- OB75: Reserved
  - Default setting is "0".
- OB74: Reserved
  - Default setting is "0".
- OB73: Reserved
  - Default setting is "0".
- OB72 Reserved
  - Default setting is "0".
- OB71 Reserved
  - Default setting is "0".
- OB70: Reserved
  - Default setting is "0".

8.3.2 Tuner

Note: Described alignments are only necessary when the NVM (item 7601) is replaced.

IF PLL

This adjustment is auto-aligned. Therefore, no action is required.

AGC (AGC take over point)

1. Set the external pattern generator to a colour bar video signal and connect the RF output to aerial input. Set amplitude to 10 mV and set frequency to 475 MHz.
2. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main panel).
3. Activate the SAM.
4. Go to the TUNER sub menu.
5. Select AGC with the UP/DOWN cursor keys.

6. Adjust the AGC-value with the LEFT/ RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V (default value is "20").
7. Switch the set to STANDBY, in order to store the alignments.

CL (Cathode drive level)
Always set to "5".

8.3.3 White Tone

In the WHITE TONE sub menu, the values of the black cut off level can be adjusted. Normally, no alignment is needed, and you can use the given default values.
The colour temperature mode (NORMAL, COOL and WARM) and the colour (R, G, and B) can be selected with the UP/ DOWN RIGHT/LEFT cursor keys. The value can be changed with the LEFT/RIGHT cursor keys. First, select the values for the NORMAL colour temperature. Then select the values for the COOL and WARM mode. After alignment, switch the set to STANDBY, in order to store the alignments.

Default settings:
- NORMAL:
  - NORMAL R= "26"
  - NORMAL G= "32"
  - NORMAL B= "27"
- COOL:
  - DELTA COOL R= "-3"
  - DELTA COOL G= "0"
  - DELTA COOL B= "5"
- WARM:
  - DELTA WARM R= "2"
  - DELTA WARM G= "0"
  - DELTA WARM B= "-6"

8.3.4 Geometry

The geometry alignments menu contains several items to align the set, in order to obtain correct picture geometry.

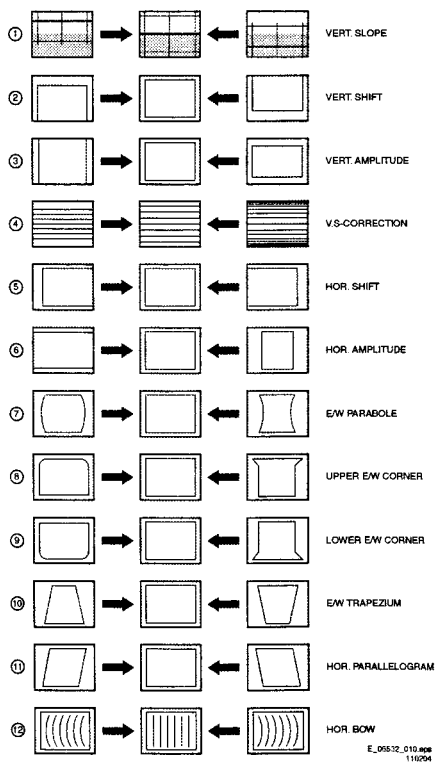


Figure 8-4 Geometry alignments

1. Connect an external video pattern generator to the aerial input of the TV-set and input a crosshatch test pattern. Set the generator amplitude to at least 1 mV and set frequency to 475 MHz.
2. Set 'Smart Picture' to NATURAL (or MOVIES).
3. Activate the SAM menu (see chapter 5 "Service Modes, ...").
4. Go to the GEOMETRY sub menu.
5. Choose HORIZONTAL or VERTICAL alignment.

Now the following alignments can be performed:

Horizontal
- **Horizontal Parallelogram (HP).** Align straight vertical lines in the top and the bottom; vertical rotation around the centre.
- **Horizontal Bow (HB).** Align straight horizontal lines in the top and the bottom; horizontal rotation around the centre.
- **Horizontal Shift (HSH).** Align the horizontal centre of the picture to the horizontal centre of the CRT.
- **East West Width (EWW).** Align the picture width until the complete test pattern is visible.
- **East West Parabola (EWP).** Align straight vertical lines at the sides of the screen.
- **Upper Corner Parabola (UCP).** Align straight vertical lines in the upper corners of the screen.
- **Lower Corner Parabola (LCP).** Align straight vertical lines in the lower corners of the screen.
- **East West Trapezium (EWT).** Align straight vertical lines in the middle of the screen.
- **H60 (Delta HSH for 60Hz, if present).** Align straight horizontal lines if NTSC system is used (60 Hz) i.s.o. PAL (50 Hz). Default value is "9".

Vertical
- **Service blanking (SBL).** Switch the blanking of the lower half of the screen "on" or "off" (to be used in combination with the vertical slope alignment).
- **Vertical Shift (VSH).** Align the vertical centring so that the test pattern is located vertically in the middle. Repeat the 'vertical amplitude' alignment if necessary.
- **Vertical slope (VS).** Align the vertical centre of the picture to the vertical centre of the CRT. This is the first of the vertical alignments to perform. For an easy alignment, set SBL to "on".
- **Vertical Amplitude (VAM).** Align the vertical amplitude so that the complete test pattern is visible.
- **Vertical S-Correction (VSC).** Align the vertical linearity, meaning that vertical intervals of a grid pattern must be equal over the entire screen height.
- **Vertical Zoom (VX, if present).** The vertical zoom is added in for the purpose of development. It helps the designer to set proper values for the movie expand or movie (16x9) compress. Default value is "25".
- **V60 (Delta VAM for 60Hz, if present).** Align straight vertical lines if NTSC system (60 Hz) is used i.s.o. PAL (50 Hz). Default value is "-2".

In the next table, you will find the GEOMETRY default values for the different sets.

Table 8-3 Default geometry values

Alignment	Default values (hex)	Default values (dec)
HP (Horizontal parallelogram)	1F	31
HB (Horizontal Bow)	1F	31
HS (Horizontal shift)	1A	26
EWW (EW width)	25	37
EWP (EW parabola width)	0A	10
EWT (EW trapezium)	1A	26
UCP (EW upper corner parabola)	1E	30
LCP (EW lower corner parabola)	28	40
VSH (Vertical Shift)	1A	26
VS (Vertical slope)	25	37
VAM (Vertical amplitude)	1E	30
VSC (Vertical S-Correction)	19	25

8.3.5 Audio

No alignments are needed for the audio sub menu. Use the given default values.

QSS (Quasi Split Sound)
- For NICAM/2CS sound system (EU/AP, except for APNTSC), set to "On".
- For AV-Stereo sound system (sets without NICAM), set to "On".
- For all other sets (NAFTA/LATAM/AP-NTSC), set to "Off".

FMI (Freq. Modulation Intercarrier)
- For NICAM/2CS sound system (EU/AP, except for APNTSC), set to "On".
- For AV-Stereo sound system (sets without NICAM), set to "Off".
- For dBx/non-dBx sound systems, set to "On".

NICAM Alignment
- For sets with NICAM/2CS (EU/AP, except for AP-NTSC) sound system, set to "79".
- For all other sets (NAFTA/LATAM/AP-NTSC), set to "63" (= don't care).

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

Index of this chapter:

Notes:
- Only **new** (not recently published) circuits are described in this chapter. For the other circuit descriptions, see the L01.1/M8 Service Manual.
- The descriptions below are a copy from the L04U manual, therefore sometimes a reference is made to region specific terminology or chassis (like the M8). Only the PIP description is new.
- 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 diagrams in sections "Block Diagrams, ...", and/or "Electrical Diagrams". Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The "L04" chassis is a global TV chassis for the model year 2004 and is used for TV sets with large screen sizes (from 21 to 36 inch), in Super Flat and Real Flat executions (both in 4:3 and 16:9 variants).
There are three types of CRT namely the 100 degrees, 110 degrees and Wide Screen CRT.
- **The 100 deg. 4:3 CRT** is raster-correction-free and does not need East/West Correction (except when used in AP regions), therefore the corrections needed are Horizontal Shift, Vertical Slope, Vertical Amplitude, Vertical S-Correction, Vertical Shift, and Vertical Zoom for geometry corrections.
- **The 110 deg. 4:3 CRT** comes with East/West Correction. In addition to the parameter mentioned above, it also needs the Horizontal Parallelogram, Horizontal Bow, Horizontal Shift, East/West Width, East/West Parabola, East/West Upper and Lower Corners, and East/West Trapezium correction.
- **The Wide Screen TV sets** have all the correction of the 110 deg. 4:3 CRTs and also have additional picture format like the 4:3 format, 16:9, 14:9, 16:9 zoom, subtitle zoom, and the Super-Wide picture format.

In comparison to its predecessor (the L01.1/M8), this chassis is has the following (new) features:
- **Audio:** The sound processor is part of the UOC processor (called "Hercules").
- **Video:** Enhanced video features, video drivers, and Active Control.
- **Control:** Comparable to L01.1/M8 (e.g. Dual clock, I/O mapping, I/O switching).
- **Power Supply:** Adapted to supply the Hercules IC, and to enable 0.5 W Standby power dissipation. Also provisions are made for future extensions like DVD and iDTV.

The standard architecture consists of a Main panel (called "family board"), a Picture Tube panel, a Side I/O panel, and a Top Control 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/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA1200x, item 7200), the so-called third generation Ultimate One Chip (UOC-III) or "Hercules". This chip is mounted on the "solder" side of the main panel, and has the following features:
- Control, small signal, mono/stereo, and extensive Audio/ Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF, including SECAM-L/L1 and AM.
- FM sound 4.5/5.5/6.0/6.5, no traps/bandpass filters.
- Full multi-standard color decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, color decoder, and stereo sound processor).

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 Power Supply

9.2.1 Block Diagram

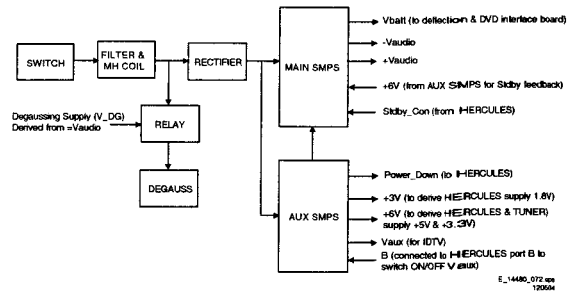


Figure 9-1 Block diagram power supply

Stdby_con signal
The Hercules generates this signal. This line is logic "low" (0 V) under normal operation and in semi-Standby of the TV, and is "high" (3.3 V) during Standby.

Power_down signal
The AUX SMPS generates this signal. It is logic "high" (3 .3 V) under normal operation of the TV and goes "low" (0 V) when the AC power (or Mains) input voltage supply goes below 70 V_ac.

B (Hercules port)
This port is used to switch the AUX SMPS output V_aux "On/ Off". This is required for DVD and iDTV (for future extensions).

9.2.2 Timing Diagrams

Power ON - To Standby - Out of Standby - Power OFF

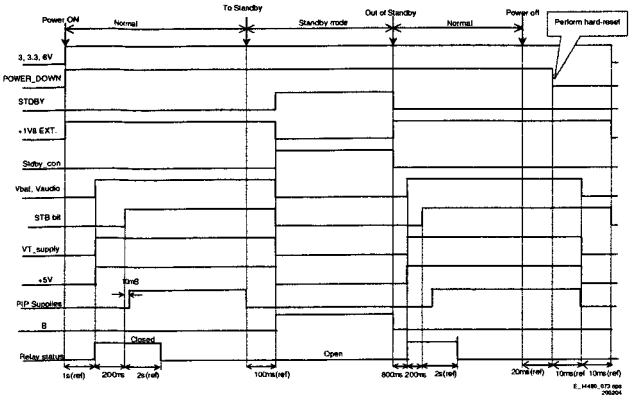


Figure 9-2 Timing diagram Standby

Power ON - To Semi Standby - Out of Semi Standby - Power OFF

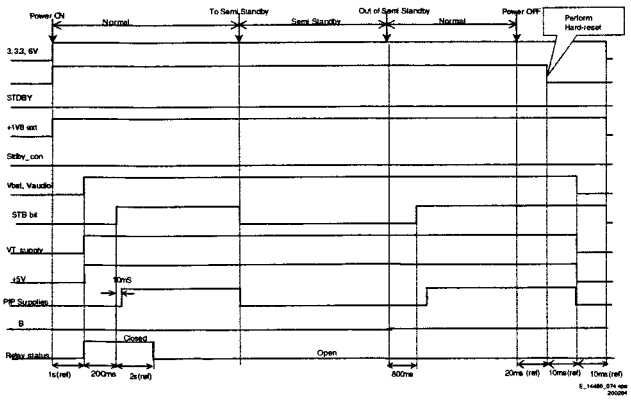


Figure 9-3 Timing diagram Semi Standby

9.2.3 Startup Sequence

When the set is connected to the AC power, the rectified line voltage (via winding 4-5 of L5531 connected to pin 14 of IC7531) will start the internal voltage source to charge the V_cc capacitor (C2532). The IC starts to switch as soon as the V_cc reaches the V_cc start level of 9.5 V. This supply is automatically taken over by winding 1-2, as soon as the V_cc is high enough, and the internal supply source will stop (for high efficiency switching).

Table 9-1 Pinning overview TEA1523

Pin	Symbol	Description
2	Gnd	This pin is Ground of the IC.
3	V_cc	This pin is connected to the supply voltage. An internal current charges the V_cc capacitor (2532), and the start-up sequence is initiated when this voltage reaches a level of 9.5 V. Note: The output power is disabled when the voltage gets below 9 V (UVLO). Operating range is between 0 to 40 V.
5	RC	Frequency setting
6	REG	This pin is connected to the feedback loop. The pin contains two functions: 1) Between 1 to 1.425 V it controls the "on" time. 2) Above the threshold of 3.5 V, it is possible to initiate "burst mode" standby.
11	Demag	This pin is connected to the V_cc winding of 5531. It has three functions: 1) During Magnetisation, the input voltage is sensed to compensate OCP level for OPP. 2) During demagnetisation, the output voltage is sensed for OVP and 3) A comparator is used to prevent continuous conduction when output is overloaded.
12	Sense	This pin contains three different functions.: 1) Dectection of soft start, protection levels of 2) OCP, and 3) SWP.
14	Drain	This pin is connected to the drain of the switch or center tap of the transformer. It contains three functions: 1) M-level (mains-dependent operation-enabling level), 2) Supply for start-up current, and 3) Valley detection.

As C2532 of IC7531 is charged, it will also start to charge the V_cc capacitor (C2511) of IC7511. Via resistor R3519 and C2511, the TEA1506 starts to switch as soon as the V_cc voltage reaches the V_cc start level of is about 11 V. The V_cc voltage is automatically taken over by the main transformer L5512 (winding 2-3) when the V_cc is high enough (when this voltage is even higher than the voltage on C2511, there is no current flow from C2532 to C2511 due to diode D6512).

Table 9-2 Pinning overview TEA1506

Pin	Symbol	Description
2	Vcc	This pin is connected to the supply voltage. When this voltage is high (Vcc_start level, about 11 V), the IC will start switching. When the voltage is lower than Vcc_uvlo (about 8.7 V), the IC will stop switching.Note: This pin is not self supplied by internal source like in TEA1507
3	Gnd	This pin is Ground of the IC.
6	Ctrl	This pin is connected to the feedback loop. The pin will control the "on" time between 1 V to 1.5 V.
7	Demag	This pin is connected to the Vcc winding of 5512. It contains three functions: 1) During magnetisation, the input voltage is sensed to compensate OCP level for OPP, 2) During demagnetisation, the output voltage is sensed for OVP and 3) a comparator is used to prevent continuous conduction when the output is overloaded.
9	Sense	This pin contains three different functions: 1) dectection of soft start, protection levels of 2) OCP, and 3) SWP.
11	Driver	This pin will drive the (MOSFET) switch.
12	HVS	This is High Volt Spacer (n.a.)
14	Drain	Connected to the Drain of the external MOSFET switch, this is the input for valley sensing and initial internal supply.

9.2.4 Standby Mode

In this mode, IC7511 (TEA1506) will be totally disabled. So there is no voltage on the main transformer output. But IC7531 (TEA1523) will still work and will provide the necessary output voltages (6V -> 5V, 3.3V, 3V -> 1.8V) to the Hercules (IC7200).

Table 9-3 PSU voltage overview

Voltage	Normal operation	Stdby mode
V_batt	130 - 143 V	0 V
V_audio	+/- 15.5 V	0 V
+6V	6 V	6 V
+3V	3 V	3 V
Stdby_con	0 V	3.3 V

9.3 Deflection

9.3.1 Synchronization

Before the Hercules (IC7200) can generate horizontal drive pulses, the +3.3V supply voltages must be present. After the start up command of the microprocessor (via I2C), the Hercules outputs the horizontal pulses. These horizontal pulses begin "initially" with double line frequency and then change "gradually" to line frequency in order to limit the current in the line stage (slow-start).

The VDRA and VDRB signals are the balanced output currents (sawtooth shaped) of the frame oscillator (pins 106 and 107 of the Hercules). These output signals are balanced, so they are less sensitive to disturbances.

There is a current source inside the UOC at pin 102. This pumps energy in the capacitor connected to this pin producing a pure saw tooth. The vertical drive signals and the E/W correction signal are derived.

Pin 108 is the East-West drive (or AVL), and it is a single ended current output. The correction for "horizontal width for changed EHT" from this pin is available by setting the HCO bit to "1".

The Phase-2 Compensation available at pin 113 gives frame correction for high beam currents. The phase compensation signal is used to correct the phase of the picture from the horizontal drive signal.

Pin 63 is the SANDCASTLE output (contains all sync info) and also HORIZONTAL FLYBACK (HFB) input.
Pin 97 is the EHT tracking/over-voltage protection pin. The HCO bit can switch on the tracking on EW. If the voltage at pin 97 exceeds 3.9 V, the over-voltage protection will be activated and the horizontal drive is switched "off" via a slow stop.

9.3.2 Horizontal Deflection

There are several executions (depending on the CRT):

- **Sets with no East-West correction.** The principle of the horizontal deflection is based on the quasi-diode modulation circuit. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.
- **Sets with East-West correction.** The principle of the horizontal deflection is based on a diode modulator with east-west correction. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.
- **Sets with dynamic East-West correction.** The principle of the horizontal deflection is based on a diode modulator with dynamic east-west correction for picture tubes with inner pincushion. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.

Basic Principle
During a scan period, either the Line Transistor or diode(s) conduct to ensure a constant voltage over the deflection coil (that results in a linear current). During the flyback period, the Line Transistor stops conducting, and the flyback capacitor(s) together with the inductance of the deflection coil creates oscillation.

First Part of Scan
Pin 62 of the UOC delivers the horizontal drive signal for the Line Output stage. This signal is a square pulse of line frequency. L5402 is the flyback drive transformer. This transformer de-couples the line output stage from the UOC. It has a direct polarization. The flyback drive circuit works with the start-up supply taken from +6V of the Aux supply (and subsequently taking from VlotAux+9V). When the H-drive is high, TS7404 conducts, and transformer L5402 starts to store energy. The base of the line transistor TS7405 is low and therefore blocks. The current in the deflection coil returns from diode D6404.

Second Part of Scan
When the H-drive is low, TS7404 does not conduct, and the energy that is stored in the transformer will transfer to the secondary, making the base of the Line Transistor high. Then the Line Transistor starts to conduct. The current in the deflection coil returns from the transistor in another direction.

Flyback
At the moment the H-drive becomes high, the base of the Line Transistor becomes low. Both the Line Transistor and the Flyback Diode will block. There is an oscillation between the flyback capacitor C2412 and the deflection coil. Because of the inductance of the LOT, the Line Transistor cannot stop conducting immediately. After the Line Transistor is out of conduction, the flyback pulse is created. The flyback capacitor charges until the current in the deflection coil reduce to zero. Then it discharges through the deflection coil and the deflection current increases from the other direction. The flyback diode conducts and is back to the first part of the scan.

Linearity Correction
Because the deflection coil has a certain resistance, a picture without any linearity issues cannot be expected. L5401 is the linearity coil to compensate for this resistance. It is a coil with a pre-magnetized core. This correction is called linearity correction.

Horizontal S-Correction
Because the electronic beam needs to travel a longer distance to both sides of the screen than the center, the middle of the screen would become narrower than both sides. To prevent this, a parabolic voltage is applied across the deflection coil during scan. To create this parabolic voltage, a capacitor called S-cap (C2417/C2418) is used as a voltage source during scan. The sawtooth current of the deflection through this capacitor creates the required parabolic voltage. This correction is called S-Correction.

Mannheim-Circuit
When the EHT is heavily loaded with a bright line, the flyback time can be increased a bit in this situation. As a result, the scan delays a bit causing a DC-shift to the right in the next line, which would create a small spike on the S-cap. This spike oscillates with the inductance of the deflection coil and the primary of LOT. The result is visible in vertical lines under horizontal white line. This is called the Mannheim-effect.

To prevent this from happening, a circuit called Mannheim-circuit is added. This consists of C2415, R3404, R3417 and D6406. During the scan, C2415 is charged via R3417. During the flyback, the S-correction parabola across the S-Cap C2417/C2418 is in its most negative, and D6406 conducts. Thus, C2415 is switched in parallel to C2417/C2418 during flyback. As C2415 is much larger than C2417/C2418, the voltage across C2415 reduces the Mannheim-effect oscillation.

Class D East-West Driver
To reduce the power loss of the normal used linear East-West amplifier, a class-D East-West circuit is used. To achieve this, the East-West parabola waveform EW_DRIVE from the Hercules (frame frequency) is sampled with a saw tooth (line frequency) taken from the line aux output. Then a series of width-modulated pulses is formed via two inverted phase amplifiers, filtered by an inductor, which then directly drive the diode modulated line circuit.

East-West Correction
To achieve a good geometry, **dynamic** S-correction is needed. The design is such that the tube/yoke needs East-West correction. Besides that, an inner pincushion is present after East-West correction. The line deflection is modulated with a parabolic voltage (frame frequency). In this way it is not so much at top and bottom, and much more in the middle.

Upon entering the picture geometry menu in the SAM mode, the following corrections will be displayed.

- EWW: East West Width.
- EWP: East West Parabola.
- UCP: Upper Corner Parabola.
- LCP: Lower Corner Parabola.
- EWT: East West Trapezium.

The East-West drive circuit realizes them all. The settings can be changed by a remote control. All changed data will be stored into the NVM after the geometry alignment.

Panorama

For Wide Screen sets, the S-correction of the picture has to adapt between the different picture modes. In particular, between 16:9 Wide Screen and 4:3 picture modes. This is achieved with the (separate) Panorama circuit (see diagram "G"). A signal (I2SDI1) from the UOC controls the state of TS7463. When in the normal 16:9 Wide Screen mode, the signal is "low" and therefore TS7463 is switched "off". When the 4:3 mode is selected, this signal from the UOC is pulled "high", switching TS7463 "on". The relay 1463 on the Panorama panel is subsequently turned "on" and, in effect, paralleling capacitor C2475/C2474 to the S-Cap C2469/ C2470. This changes the overall effective S-correction. The relay is switched "on" in 4:3 and Superwide picture modes.

9.3.3 Auxiliary Voltages

The horizontal deflection provides various auxiliary voltages derived either directly or indirectly from the secondary pins of the LOT:

- +9V: This supplies the Hercules's flyback driver.
- +11V: This supplies the frame amplifier.
- -12V: This supplies the frame amplifier.
- 50V: This supplies the frame amplifier.
- Filament: This supplies the heater pins of the picture tube.
- VideoSupply (+200V from primary side of LOT): This supplies the RGB amplifier and Scavem circuit at the CRT panel.

Notes:

- The V_T voltage (to tuner) is drawn from V_batt.
- The EHT voltage is generated by the Line Output Transformer (LOT). The Focus and Vg2 voltages are created with two potentiometers integrated in the transformer.

9.3.4 Beam Current

The beam current is adjusted with R3451 and R3452. The components R3473, R3453 and C2451 determine the EHT_info characteristic. The voltage across C2412 varies when the beam current changes. This EHT_info is used to compensate the picture geometry via pin 97 of the Hercules when the picture changes rapidly, and compensate the phase 2 loop via pin 113 of the Hercules. Also from the EHT_info line, a BCL signal is derived and sent to the Hercules for controlling the picture's contrast and brightness.

When the picture content becomes brighter, it will introduce:

- Geometry distortion due to the impedance of the LOT causing the EHT to drop.
- Picture blooming due to the picture characteristics

Because of the above mentioned, we will need a circuit for Beam Current Limiter (BCL) and EHT compensation (EHT_info). These two circuits derive the signal from the picture tube current info through LOT pin 10.

BCL

- When the BCL pin voltage goes to 2.8 V, the Hercules will start to limit CONTRAST gain.
- When it reaches 1.7 V, then the BRIGHTNESS gain limit will start to react.
- When BCL pin voltage goes to 0.8 V, the RGB will be blanked.

Components TS7483, R3490, R3491, R3492, and C2483 are for fast beam current limiting (e.g. with a Black-to-White pattern).

Components R3454, D6451, D6450, C2453, R3493, and C2230 are for average beam current limiting. C2453 and R3493 also control the timing where average beam current limiting is more active or less active.

EHT_info

The "PHI2 correction" is to correct the storage time deviation of the Line Output Transistor, which is causing geometry distortion due to brightness change.
Line EHT_info is to correct the geometry distortion due to EHT deviation.
Both of them feedback through the EHTO and PH2LF pin, and correct the geometry through the East-West circuit.

Power Down

The power down connection is for EHT discharge during AC Power "Off" state. In the Hercules, if EHT_info > 3.9 V, it will trigger the X-ray protection circuit via a 2fH soft stop sequence. The Hercules bits OSO (Switch Off in Vertical Over scan) and FBC (Fixed Beam Current Switch Off) will discharge the EHT with 1mA cathode current at over-scan position.
During switch-off, the H_out frequency is doubled immediately and the duty cycle is set to 25% fixed, during 43 ms. The RGB outputs are driven "high" to get a controlled discharge of the picture tube with 1 mA during 38 ms. This will decrease the EHT to about half the nominal value (= safety requirement). When bit OSO is set, the white spot/flash during switch-off will be written in overscan and thus will not be visible on the screen. Careful application must guarantee that the vertical deflection stays operational until the end of the discharge period.

9.3.5 DAF

The Dynamic Astigmatic Focus (DAF) circuit is required by 34RF sets only. It provides vertical DAF and horizontal DAF. Both of the parabola signals are derived through integration by using chassis available signals:

- The vertical parabola is using RC integration (via R3403 and C2401) on the Frame sensing resistor saw tooth (Frame_FB).
- The horizontal parabola is obtained by 2 RC integration (R3409, R3410, C2402, C2403) on the +9V LOT output.

Both of the parabolas are added on the output stage through adder TS7402 and TS7403. The collector of TS7402 emitter-drives TS7401 and is amplified by pull up resistor R3411. D6401 and C2405 provide the rectified supply voltage.

9.3.6 X-ray Protection

The X-ray protection circuit rectifies the filament voltage and uses it to trigger TS7481 when the EHT is too high. TS7481 is biased at "off" condition by D6480, R3482, and R3483 during normal operation. When the EHT goes too high, the voltage across R3482 will tend to increase as well, while the voltage across D6481 is fixed. Up to certain level (triggering point), TS7481 will be "on" and will force the EHT_info > 3.9 V. The chassis will be shut down through a soft stop sequence.

9.3.7 Vertical Deflection

The Frame stage consists fully of discrete components. This has the advantage for better flash behavior than when an IC was used.

The Frame differential drive signal from the Hercules comes from a current source. Resistors R3460 and R3461 convert them into a voltage, and feed them into the differential amplifier TS7455 and TS7456. The output of TS7456 is input to the next amplification stage of TS7452. Finally, TS7451 and TS7453 deliver the Vertical yoke current to the coil and feedback through the sensing resistors R3471 and R3472.
D6458 and TS7454 are used to bias TS7451 and TS7453, to get rid of zero crossovers, which can cause horizontal lines at the screen center.
The negative supply is from -12V and the positive scanning supply is from +12V through D6459. The flyback supply is derived from D6455, D6456 and C2456. This circuit is a voltage doubler, which stores energy in C2456 during the Line flyback

period and delivers the energy to C2465 during the Line scanning period. Throughout the Frame period, the charging and discharging of C2456 works alternatively. However, at the first half of the Frame scanning, TS7451 is "on" and consumes all the charge from C2456. When entering 2nd half Frame period, TS7451 is "off", so C2456 will gradually charge up to the required flyback supply.

C2463, R3464 and D6457 are for boosting the base voltage of TS7451 during the flyback period and the 1st half Frame period as well. C2463 is charged by D6457 during the 2nd half scanning. R3467 and R3468 are for oscillation damping.

The V_guard protection is to protect the Frame stage if a fault condition happens. The V_guard will sense the pulse with voltage > 3.8 V and period < 900 us. Any signal out of this range will be considered as fault, and the chassis will be shut down.

9.3.8 Tilt and Rotation

The rotation control signal is a PWM output from the UOC. It is filtered by R3252, R3246, R3259 and C2259. The DC voltage after filtering at C2259 will be amplified by R3245 (Main Board) and R3390 (CRT panel).
The output stage functions similarly as in L01.1/M8 with rotation IC TDA8941P. TS7331/TS7382 and TS7332/TS7381 will function alternatively corresponding to the rotation setting.

9.3.9 CRT panel

The RGB amplifier stage is exactly the same as in L01.1/M8. However, the RGB amplifier IC has been changed to TDA6107AJF or TDA6108AJF. The "A" indication is with gain of "80" rather than "50" in L01.1/M8. The diode D6332 used in the former chassis, to solve the bright screen during start up, is not required because this IC has the error correction implemented.

Scavem
In certain versions, the Scavem feature is used to enhance the sharpness of the picture. The RGB signals are first differentiated and subsequently amplified before feeding to an auxiliary coil known as the SVM coil. The current, flowing through the SVM coil during the picture intensity transients, modulates the deflection field and thus the scan velocity.

During the first half of the intensity increase, the scan velocity is increased (thus decreasing the current density by spreading it on a wider area). During the second half of the intensity increase, the scan velocity is decreased (increasing the current density by concentrating it on a smaller area). The increasing current density transition is sharpened. A decreasing current density transition is processed in a similar way and is also sharpened.

In this chassis the SCAVEM signal is different from its predecessor because the Hercules generates the differential SCAVEM signal inside the IC.
The supply of the SCAVEM is taken from V_bat through a 1k5 / 5 W resistor. Compared with the L01.1/M8, this has the advantage of getting better performance for the pattern with tremendous SCAVEM current (like V_sweep). In this former chassis, because the supply was taken from the 200 V through a 8k2 / 5 W resistor, the supply dropped significantly during a large SCAVEM current. In this chassis, the drop due to the pattern will be less because of the lower supply voltage impedance.
In the Main Board, 1st stage amplification is taken care by 7208 with the pull up resistors (3361, 3387) located in the CRT panel.

TS7361 and TS7362 is the current buffer delivering the current to the output stage. The diode D6361 is to lightly bias these transistors, to get rid of the zero crossover of the stage.

After that, the signal is ac-coupled to TS7363 and TS7364 where the emitter resistors (R3364 and R3370) will determine the final SCAVEM current. TS7363 and TS7364 are biased by R3363, R3366, R3367 and R3368.
C2387, R3388, R3389, R3365, R3369, C2384, and C2385 are used for suppressing unwanted oscillations.
The function of TS7376 is to limit the SCAVEM current from going too high. It basically senses the voltage after R3373 and clamps the SCAVEM signal through D6367 and C2376.

9.4 Control

The Micro Controller is integrated with the Video Processor, and is called the Hercules. For dynamic data storage, such as SMART PICTURE and SMART SOUND settings, an external NVM IC is being used.
Another feature includes an optional Teletext/Closed Caption decoder with the possibility of different page storage depending on the Hercules type number.

The Micro Controller ranges in ROM from 128 kB with no TXT-decoder to 128 kB with a 10 page Teletext or with Closed Caption.

9.4.1 Block Diagram

The block diagram of the Micro Controller application is shown below.

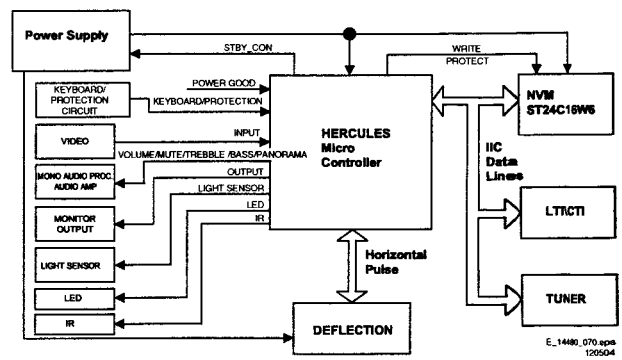


Figure 9-4 Micro Controller block diagram

9.4.2 Basic Specification

The Micro Controller operates at the following supply voltages:
- +3.3 V_dc at pins 33, 125, and 19.
- +1.8 V_dc at pins 126, 36, and 33.
- I2C pull up supply: +3.3V_dc.

9.4.3 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:
- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

The following table shows the ports used for the L04 control:

Table 9-4 Micro Controller ports overview

Pin	Name	Description	Configuration
32	INT0/ P0.5	IR	INT0
31	P1.0/ INT1	PWRDOWN	INT1
30	P1.1/ T0	LED	P1.1
27	P0.4/ I2SWS	(for future use)	-
26	P0.3/ I2SCLK	(for future use)	-
25	P0.2/ I2SDO2	SEL_SC2_INTERFACE/ SDM	P0.2
24	P0.1/ I2SDO1	(for future use)	P0.1
23	P0.0/ I2SDI/O	Panorama	P0.0
22	P1.3/ T1	Write Protect	P1.3
21	P1.6/ SCL	SCL	SCL
20	P1.7/ SDA	SDA	SDA
18	P2.0/ TPWM	VOL_MUTE	P2.0
17	P2.1/ PWM0	ROTATION	PWM0
16	P2.2/ PWM1	SEL_LL'/M	P2.2
15	P2.3/ PWM2	STANDBY_CON	P2.3
14	P3.0/ ADC0	Light Sensor	ADC0
13	P3.1/ ADC1	(for future use)	-
10	P3.2/ ADC2	(for future use)	-
9	P3.3/ ADC3	KEYBOARD	ADC3
7	P2.4/ PWM3	A (for future use)	P2.4
6	P2.5/ PWM4	B (for future use)	P2.5
3	P1.2/ INT2	C (for future use)	INT2
2	P1.4/ RX	E (for future use)	-
1	P1.5/ TX	D (for future use)	-

The description of each functional pin is explained below:

- **LED.** This signal is used as an indication for the Standby, Remote and Error Indicator. Region diversity:
  - During protection mode, the LED blinks and the set is in standby mode.
  - During error conditions it blinks at a predefined rate.
  - After receiving a valid RC-5 or local keyboard command it flashes once.
  - For sets with error message indication, the LED blinks when message is active and the set is in standby mode.

Table 9-5 LED signal diversity

LED	Europe		AP/ LATAM		NAFTA	
0	LED brighter	Standby	LED lighted	Standby	LED lighted	Normal
1	LED dimmer	Normal	LED "off"	Normal	LED "off"	Standby

- **SCL.** This is the clock wire of the two-wire single master bi-directional I2C bus.
- **SDA.** This is the data wire of the two-wire single master bi-directional I2C bus.
- **STDBY_CON.** The Hercules generates this signal. This can enable the MAIN SMPS in normal operation and disable it during Standby. It is of logic "low" (0 V) under normal operation and "high" (3.3 V) during Standby.
- **IR.** This input pin is connected to an RC5 remote control receiver.
- **SEL-IF-LL'/ M-TRAP.** For AP: All L04 AP sets are Multi System QSS set. This is an output pin to switch the Video SAW filter between M system and other systems.
  - 0: NTSC M (default)
  - 1: PAL B/G, DK, I, L
- **Write Protect.** The global protection line is used to enable and disable write protection to the NVM. When write to the NVM is required, pin 7 of the NVM must be pulled to logic '0' first (via Write_Protect of the micro-controller pin) before a write is performed. Otherwise pin 7 of NVM must always be at logic "1"
  - 0: Disabled
  - 1: Enabled (default)
- **Mute.** This pin is use to MUTE the audio amplifier. It is configured as push pull.
- **Rotation.** This pin is configured as PWM for the Rotation feature. The output of the PWM is proportional to the feature control.
- **Light Sensor.** This pin is configured as ADC input for the Light Sensor.
- **Sel_SC2_Interface.** This pin is use to switch between the SC2_CVBS_OUT and the INTF_CVBS_OUT for the SCART_2_CVBS_OUT/ MONITOR_OUT signal.
  - 0: Hercules CVBS Output (default)
  - 1: Interface CVBS Output
- **PWRDOWN.** The AUX SMPS generates this signal. Logic "high" (3.3 V) under normal operation of the TV and goes "low" (0 V) when the Mains input voltage supply goes below 70 V_ac.
- **Keyboard.** Following are the Keyboard functions and the step values (8 bit) for it.

Table 9-6 Local keyboard values

Function	Voltage (V_dc)	Step values (8 bit)
NAFTA Standby	0	0 - 6
Ch +	0.43	7 - 33
Exit Factory (Ch- and Vol-)	0.69	34 - 53
Ch -	0.93	54 - 73
Menu (Vol - and Vol +)	1.19	74 - 96
Vol -	1.49	97 - 121
DVD Eject	1.8	122 - 147
Vol +	2.12	148 - 169

- **SDM.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during cold start, it will enter the SDM mode (for Service use).
- **ISP.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during cold start, it will enter the ISP mode (for Service use).
- **PANEL.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during that, then it will enter to the PANEL mode.
- **ResetEnabled.** This is an output pin to switch the control transistor (pos. TS7202) "high" or "low" for the reset of 1.8 V in case there is a corruption in the Hercules.

9.5 Tuner and IF

The tuner used in this chassis comes from two sources, from Philips and from Alps. Both tuner sources have the same pin configuration so they are 1 to 1 compatible except for the software, which will be selected by means of Option Settings.

Some features:

- Multi-Standard alignment free PLL-IF, including SECAM L/ L'.
- Integrated IF-AGC time constant.
- Integrated sound band-passes and traps (4.5 / 5.5 / 6.0 / 6.5 MHz).
- Group delay compensation (for NTSC and for PAL).
- QSS versions with digital Second-Sound-IF SSIF (AM demodulator for free).
- FM mono operation possible: Inter-Carrier or QSS.

9.5.1 Diversity

The following Tuners can be present (depending on the region and the set execution):

- Normal tuner without PIP.
- FM radio tuner without PIP.
- Normal tuner with PIP (main tuner with splitter).
- FM radio set with PIP (PIP tuner with splitter).

The SAW filter used, depends on the application concept (whether it is a QSS concept or an Intercarrier):

- OFWM3953M for QSS Video.
- OFWK9656M for QSS Audio.
- OFWM1971M for Intercarrier.

9.5.2 Pin Assignments and Functionality

Pin assignment of the Tuner:

Table 9-7 Pinning Tuner

Pin	Pin Description	DC Voltages
1	RF-AGC	4V for Maximum Gain < 4V for Strong Signal Condition
2	FM Radio Input or N.C	-
3	NC (Address Pin)	-
4	SCL	0 to 3.3 V_dc
5	SDA	0 to 3.3 V_dc
6/7	Supply Voltage	5 V_dc +/- 0.25 V
8	N.C	-
9	Tuning Supply Voltage	30 to 35 V_dc
10	FM Radio IF Output/Ground	-
11	TV IF Output	-

Pin assignment of the several SAW filters (depends on region/ execution):

Table 9-8 Pinning SAW filters

Pin	QSS Video (item 1002)	QSS Video (item 1003)	QSS Audio (item 1001)	Intercarrier (item 1002)
1	Input	Input	Input	Input
2	Input Ground	Input Ground	Switching Input	Input Ground
3	Ground	Ground	Ground	Ground
4	Output	Output	Output	Output
5	Output	Output	Output	Output
6	-	n.c.	-	-
7	-	n.c.	-	-
8	-	Ground	-	-
9	-	Free	-	-
10	-	Switching input	-	-

The table below shows the switching behavior of SAW filter.

Table 9-9 Switching behavior SAW filter

	Condition	
	High	Low
System	M	BG/DK/I/L

Note: The logic level is measured at the base of transistor 7001.

9.5.3 Option Settings

The option settings for the Tuner type can be found in Option setting 1 of the SAM mode. The Option settings for Option 1 are as follows:

- Option Byte 1
  - Bit 7: OP_PHILIPS_TUNER
  - Bit 6: OP_FM_RADIO
  - Bit 5: OP_LNA
  - Bit 4: OP_ATS
  - Bit 3: OP_ACI
  - Bit 2: OP_UK_PNP
  - Bit 1: OP_VIRGIN_MODE
  - Bit 0: OP_CHINA

For more details on the option settings, please refer to the chapter 8 "Alignments".

9.6 Source Select

For this chassis, the audio/video source selection is controlled via the Hercules.

The Audio/Video Source Select is one of the more complex functions due to its diversity and complex switching. The Audio/ Video Source Select comprises of the following components:

- The Hercules itself for Mono Audio and Video Source Selection.
- The HEF switch for Stereo Audio as well as Video Selection.

9.6.1 Options

The option settings for the Source Selection can be found in Option settings of the SAM mode. The Option settings for Option 5 are as follows:

- Option Byte 5
  - Bit 7: AV1
  - Bit 6: AV2
  - Bit 5: AV3
  - Bit 4: CVI
  - Bit 3: SVHS2
  - Bit 2: SVHS3
  - Bit 1: HOTEL MODE
  - Bit 0:

For more detail on the option settings, please refer to the chapter 8 "Alignments".

9.6.2 Diversity

The basic diversity of the Audio/Video Source Select is between the Mono and the Stereo sets and the number of Cinch/SCART's as specified in the product specification. The table below shows the Audio/Video Source Select diversity for all regions:

Table 9-10 AV Source Select diversity

Pin	Symbol	Remark
51	R/Pr IN3	AV1 (CVI)
50	G/Y IN3	
49	B/Pb IN3	
52	INSSW3	
74	CVBS2/Y2	
95	AUDIO IN5 L	
94	AUDIO IN5 R	
73	AUDIO IN3 L	AV2 (SVHS)
72	AUDIO IN3 R	
71	CVBS3/Y3	
70	C2/C3	
80	AUDIO IN4 L	Side (SHVS)
79	AUDIO IN4 R	
78	CVBS4/Y4	
77	C4	
81	IFVO/SVO/CVBSI	Monitor Out
67	AUD OUT HP L	
66	AUD OUT HP R	
69	AUD OUT LS L (AUD OUT/AM OUT)	HP/ LS Out
68	AUD OUT LS R	
59	V IN (R/Pr IN2/CX)	Interface
58	U IN (B/Pb IN2)	
57	Y IN (G/Y IN2/CVBS-Yx)	
54	U OUT (INSSW2)	
76	AUDIO IN2 L	
75	AUDIO IN2 R	
86	DVBO/IFVO/FMRO	N.C.
65	CVBSO/PIP	PIP application
56	Y SYNC	100 nF
55	Y OUT	100 nF
53	V OUT (SWO)	N.C.
93	AUD OUT S L	N.C.
92	AUD OUT S R	N.C.

Table 9-11 SCART Source Select diversity

Pin	Symbol	Remark
51	R/Pr IN3	SCART 1
50	G/Y IN3	
49	B/Pb IN3	
52	INSSW3	
74	CVBS2/Y2	
86	DVBO/IFVO/FMRO	
95	AUDIO IN5 L	
94	AUDIO IN5 R	
93	AUD OUT S L	
92	AUD OUT S R	
71	CVBS3/Y3	SCART 2
70	C2/C3	
81	IFVO/SVO/CVBSI	
73	AUDIO IN3 L	
72	AUDIO IN3 R	
67	AUD OUT HP L	
66	AUD OUT HP R	
80	AUDIO IN4 L	Side I/O
79	AUDIO IN4 R	
78	CVBS4/Y4	
77	C4	
69	AUD OUT LS L (AUD OUT/AM OUT)	LS/ HP/ MON OUT
68	AUD OUT LS R	
59	V IN (R/Pr IN2/CX)	Interface
58	U IN (B/Pb IN2)	
57	Y IN (G/Y IN2/CVBS-Yx)	
54	U OUT(INSSW2)	
76	AUDIO IN2 L	
75	AUDIO IN2 R	
65	CVBSO/PIP	for PIP
56	YSYNC	100 nF
55	YOUT	100 nF
53	VOUT(SWO)	N.C.

9.6.3 Audio Source Selection

The signals coming out of the DEMDEC (internal demodulator/ decoder block of the Hercules) are selectable and consist of the following (depending on the transmission):

- DEC L/R (Can be NICAM, FM 2CS, or BTSC Stereo).
- Mono (Refers to fallback/forced Mono in Stereo Transmission).
- SAP.

For L04, the assigned I/O with respect to the Hercules is as follows:

- SCART1 or AV1 Input assigned to **Audio In 5**.
- SCART2 or AV2 Input assigned to **Audio In 3**.
- Side AV Input assigned to **Audio In 4**.
- External Interface Input assigned **to Audio In 2.**
- SCART1 Output assigned to **SCART Output**.
- SCART2 Output (EU) or Monitor Output (LA/NA/AP) assigned to **Headphone Output.**
- Constant Level Output assigned to **Loudspeaker Output**.

9.6.4 Video Source Selection

Video source selection is done inside the Hercules. Therefore it provides a video switch with 3 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has 2 chroma inputs.
All input signals are converted to YUV, and looped through an external interface. This to enable picture improvement features (like LTI/CTI) or PIP.

9.7 Video Processing

The Video Processor is basically the Hercules and the TDA9178 (CTI/LTI). Video processing is done in these two chips such as the Brightness Control, Contrast Control and so on.

Some features:

- Full YUV-loop interface (alternative functions: DVD, RGB or Y/C).
- Internal OSD insertion (not Saturation or Contrast controlled).
- Double window implementation.
- Linear / non linear scaling for 16:9 sets.
- Tint (hue) on UV signals (including DVD).
- Peaking, Coring, Black \ Blue \ White-stretch.
- Transfer-Ratio and Scavem (also on TXT).

9.7.1 Features

The features included in the Hercules are as follows:

- Brightness Control.
- Contrast Control.
- Saturation Control.
- Sharpness Control.
- Peak White Limiter.
- Beam Current Limiter.
- Black Stretch (Contrast Plus).

For sets with the TDA9178, there are two extra features:

- Luminance Transient Improvement (LTI).
- Color Transient Improvement (CTI).

9.7.2 Block Diagram

Following diagram is the block diagram of the video processing part:

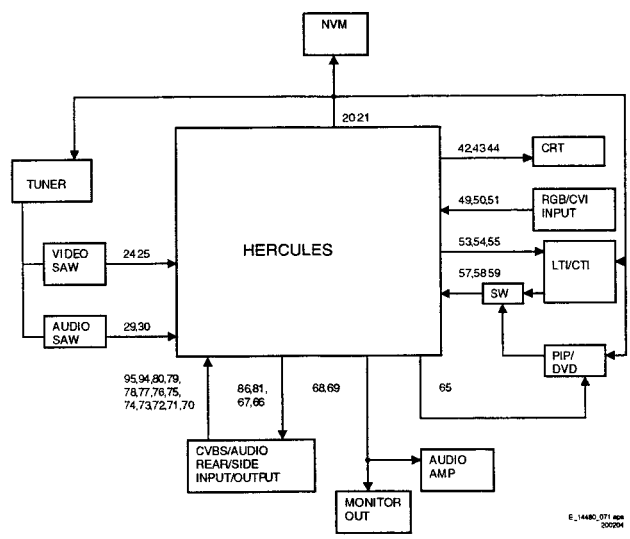


Figure 9-5 Video processing block diagram

9.7.3 LTI/CTI

The TDA9178 is an I2C-bus controlled IC (INCREDIBLE chip) with YUV interface. This IC can do mainly histogram processing, color transient improvement (CTI) and line transient improvement (LTI).

- Luminance Vector Processing involves histogram function, which provides scene dependent contrast improvement, adaptive black and white point stretching.
- Color Vector Processing involves skin tone correction, green enhancement and blue stretch.

- Spectral Processor involves step improvement processing, contour processing, smart sharpness control, color dependant sharpness and Color Transient Improvement.
- Noise detector, feature mode detector and cue flash functions.
- Demonstration mode shows all the improvement features in one picture.

Table 9-12 Pinning overview TDA9178

Pin	Symbol	Description
1	SC	Sandcastle input pin
2	n.c.	Not connected pin
3	ADEXT1	External AD-conversion #1 input pin
4	ADEXT2	External AD-conversion #2 input pin
5	ADEXT3	External AD-conversion #3 input pin
6	Y in	Luminance input pin
7	ADR	Address selection input pin
8	U in	-(B-Y) signal input pin
9	V in	-(R-Y) signal input pin
10	TP	Testpin, connected to ground
11	SCL	I2C-bus: clock input pin
12	n.c.	Not connected pin
13	n.c.	Not connected pin
14	SDA	I2C-bus: data input pin
15	DECDIG	Decoupling digital supply
16	V out	-(R-Y) signal output pin
17	U out	-(B-Y) signal output pin
18	V ee	Ground pin
19	Y out	Luminance output pin
20	V cc	Supply-voltage pin
21	S out	Luminance output for SCAVEM
22	CF	Cue-flash output pin
23	n.c.	Not connected pin
24	n.c.	Not connected pin

9.7.4 Options

The option settings allow for process of the video as per set specification. The option settings can be found in "Option 2" and "Option 6" in the SAM mode. The option settings are as follows:

- Option Byte 2
  - Bit 7:
  - Bit 6 :OP_GREEN_UI
  - Bit 5: OP_CHANNEL_NAMING,
  - Bit 4: OP_LTI,
  - Bit 3: OP_TILT,
  - Bit 2: OP_FINE_TUNING
  - Bit 1: OP_PIP_PHILIPS_TUNER,
  - Bit 0: OP_HUE,
- Option Byte 6
  - Bit 7: OP_PERSONAL_ZAPPING,
  - Bit 6:
  - Bit 5: OP_FMTRAP
  - Bit 4: OP_COMBFILTER
  - Bit 3: OP_ACTIVE_CONTROL
  - Bit 2: OP_VIDEO_TEXT
  - Bit 1 :OP_LIGHT_SENSOR,
  - Bit 0: OP_DUAL_TEXT

For more details on the option settings, please refer to the chapter 8 "Alignments".

9.8 Audio Processing

The audio decoding is done entirely via the Hercules. The IF output from the Tuner is fed directly to either the Video-IF or the Sound-IF input depending on the type of concept chosen. There are mainly two types of decoder in the Hercules, an analog decoder that decodes only Mono, regardless of any standards, and a digital decoder (or DEMDEC) that can decode both Mono as well as Stereo, again regardless of any standards.

In this chassis, the analog decoder is used in two cases:

- It is used for AM Sound demodulation in the Europe SECAM LL' transmission.
- It is used for all FM demodulation in AP AV-Stereo sets.

9.8.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:

- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM.

The UOC-III family makes no difference anymore between QSS- and Intercarrier IF, nearly all types are software-switchable between the two SAW-filter constructions.

Simple data settings are required for the set to determine whether it is using the Inter Carrier or the QSS concept. These settings are done via the "QSS" and "FMI" bit found in SAM mode. Due to the diversity involved, the data for the 2 bits are being placed in the NVM location and it is required to write once during startup.

On top of that, it can be further broken down into various systems depending on the region. The systems or region chosen, will in turn affect the type of sound standard that is/are allowed to be decoded.

- For the case of **Europe**, the standard consists of BG/DK/I/LL' for a Multi-System set. There are also versions of Eastern Europe and Western Europe set and the standard for decoding will be BG/DK and I/DK respectively. FM Radio is a feature diversity for the Europe sets. The same version can have either FM Radio or not, independent of the system (e.g. sets with BG/DK/I/LL' can have or not have FM radio).
- For the case of **NAFTA** and **LATAM**, there is only one transmission standard, which is the M standard. The diversity then will be based on whether it has a dBx noise reduction or a Non-dBx (no dBx noise reduction).
- For the case of **AP**, the standard consists of BG/DK/I/M for a Multi-System set. The diversity here will then depends on the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

9.8.2 Functionality

The features available in the Hercules are as follows:

- Treble and Bass Control.
- Surround Sound Effect that includes:
  - Incredible Stereo.
  - Incredible Mono.
  - 3D Sound (not for AV Stereo).
  - TruSurround (not for AV Stereo).
  - Virtual Dolby Surround, VDS422 (not for AV Stereo).
  - Virtual Dolby Surround, VDS423 (not for AV Stereo).
  - Dolby Pro-Logic (not for AV Stereo).
- Bass Feature that includes:
  - Dynamic Ultra-Bass.
  - Dynamic Bass Enhancement.
  - BBE (not for AV Stereo).
- Auto-Volume Leveler.
- 5 Band Equalizer.
- Loudness Control.

All the features stated are available for the Full Stereo versions and limited features for the AV Stereo

9.8.3 Audio Amplifier

The audio amplifier part is very straightforward.It uses the integrated power amplifier TDA2616Q, and delivers a maximum output of 2 x 10 W_rms.
The maximum operating condition for this amplifier is 21 V unloaded. Normal operating supply is from 7.5 V to 16 V.

Muting is done via the VOLUME_MUTE line connected to pin 2 of the amplifier-IC and coming from the UOC.

The following table shows pin functionality of the Audio Amplifier:

Table 9-13 Pinning overview TDA2616

Pin	Pin Name	Normal Operation
1	Input Left	Input AC signal
2	Mute	16 V_dc
3	Ground	0 V
4	Output L Channel	AC waveform
5	Supply Voltage (negative)	-16 V_dc
6	Output R Channel	AC waveform
7	Supply Voltage (positive)	+ 16 V_dc
8	Inverting inputs L and R	0 V
9	Input Right	Input AC signal

9.9 Picture in Picture (PIP)

The PIP application has two tuners, one with a splitter on the main chassis and another with "phono" input on the PIP panel. The same signal is injected to both tuners, so that it does not need separate auto tuning for the PIP tuner.

The TDA9887TS (item 7201) is an alignment free multi-standard vision and sound IF signal PLL demodulator for positive and negative modulation, including sound AM and FM processing.

The SDA9489 (item 7242) is a multi system color decoder with many features such as: half screen size PIP, selectable YUV or YPbPr, 16:9 application, WSS detection, Closed Caption, and OSD display for PIP window etc.

The PIP power supply is based on the step down converter principle. The +9V input voltage is converted to +5V and +3.3V via the regulator (item 7501).

9.10 Abbreviation list

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific region
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Leveler
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
CC	Closed Caption
CCC	Continuous Cathode Calibration
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
DAC	Digital to Analogue Converter
DBX	Dynamic Bass Expander or noise reduction system in BTSC
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFO	Extra High Tension information
EPG	Electronic Programming Guide
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FM	Field Memory or Frequency Modulation
H	Horizontal sync signal
HP	Headphone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency

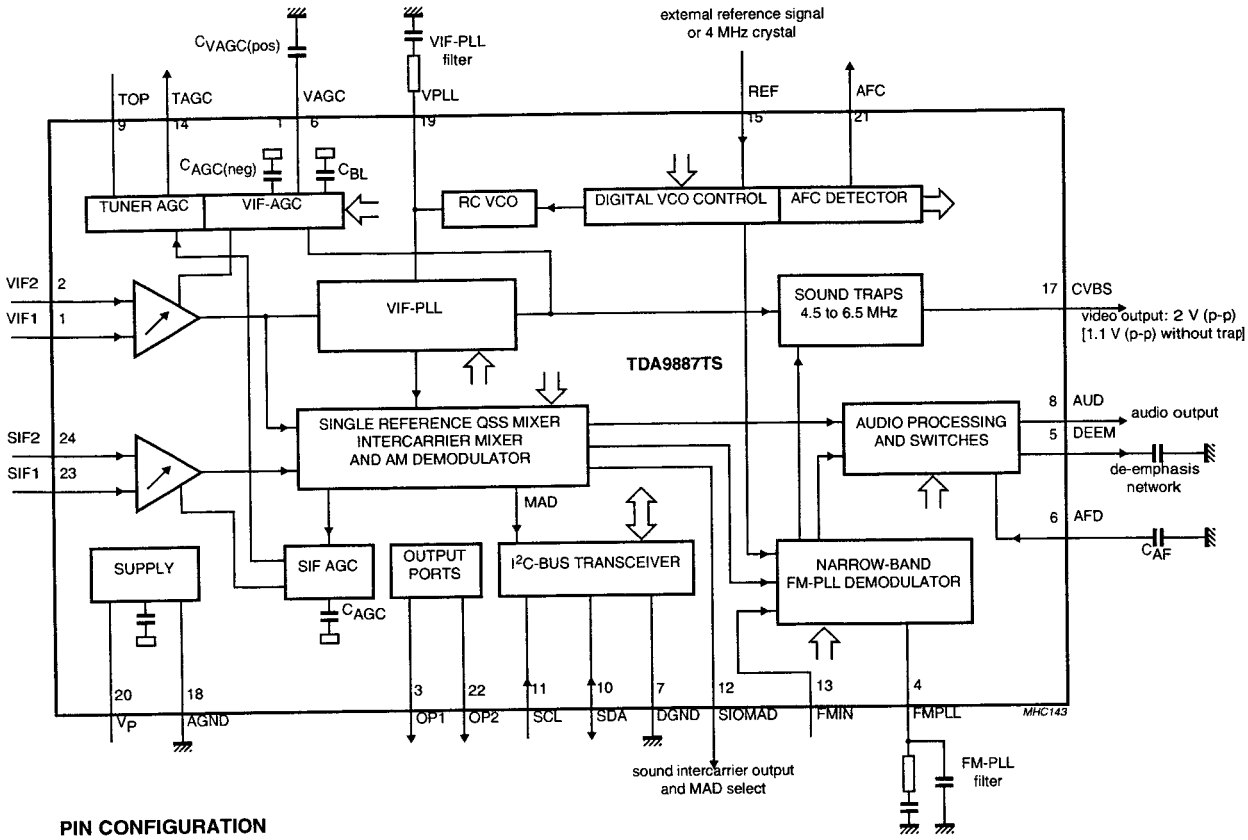
IIC	Integrated IC bus
ITV	Institutional TV
LATAM	Latin American countries like Brazil, Argentina, etc.
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LS	Large Screen or Loudspeaker
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
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)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Bit
OC	Open Circuit
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)
PCB	Printed Circuit board
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RGB	Red, Green, and Blue video signals
ROM	Read Only Memory
SDAM	Service Default / Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCL	Serial Clock
SDA	Serial Data
SECAM	SEequence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
uP	Microprocessor
UOC	Ultimate One Chip
V	Vertical sync signal
V_BAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminance (Y) and Chrominance (C) signal

9.11 IC Data Sheets

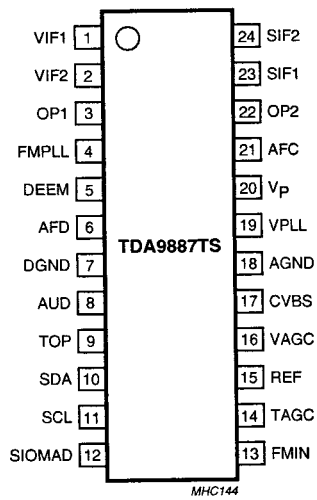
This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.11.1 Diagram F, TDA9887 (IC7201)

BLOCK DIAGRAM



PIN CONFIGURATION

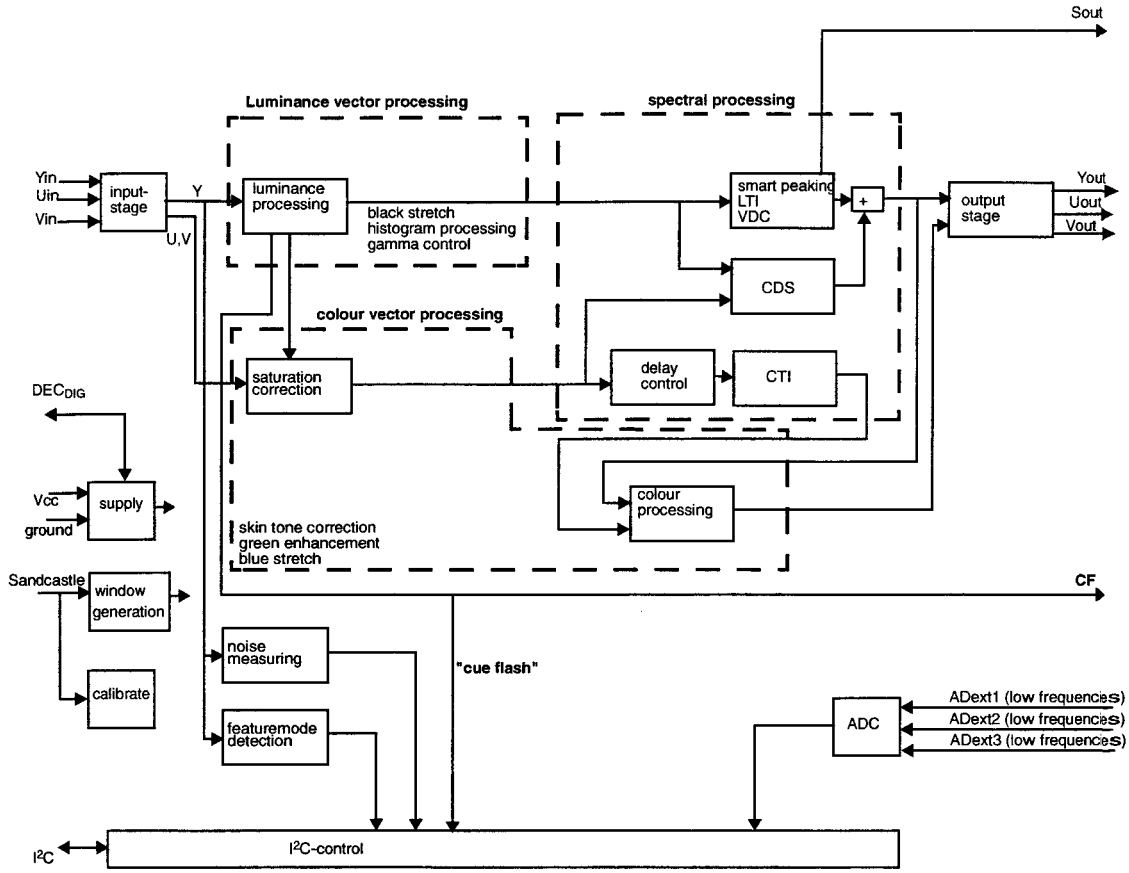


E_14480_129.eps
120504

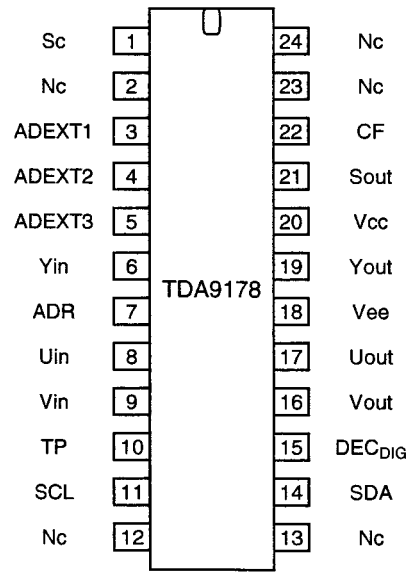
Figure 9-6 Internal Block Diagram and Pin Configuration

9.11.2 Diagram H, TDA9178 (IC7610)

BLOCK DIAGRAM



PIN CONFIGURATION



E_14480_075.eps
270200

Figure 9-7 Internal Block Diagram and Pin Configuration

10. Spare Parts List

Set Level

Various

0041	3139 124 32221	Lens
0291	3111 254 23481	Coil
8278	3104 311 03391	Cable 4P 1000mm
8278▲	3104 311 03841	Cable 4P

—~—

5203▲	2422 549 45514	S100245 CU B

Mono Carrier [A]

Various

0041	3139 124 41421	Lens
1001	2422 549 44341	38.9 MHz
1002	4822 242 81436	Filter OFWK3953M
1005	4822 267 10748	Connector 3p
1204	4822 265 41113	7P
1205	2422 543 01421	Crystal 24.576Mhz
1206	2422 025 11244	Connector 7p m
1207	2422 025 11244	Connector 7p m
1212	2422 025 16052	12P Female
1280	4822 267 10734	Connector 5p
1401	4822 265 30735	Connector 5p
1404▲	4822 267 10966	Connector 2p
1451▲	2422 025 10646	Connector 2p m
1452▲	4822 071 51252	Fuse 1.25A
1454▲	4822 071 51252	Fuse 1.25A
1500▲	2422 086 10914	Fuse 4A 250V
1501	2422 090 01101	Soc Fuse 1P Female
1502	2422 090 01101	Soc Fuse 1P Female
1503▲	2422 132 07467	Relay 1p 12V 5A LKS1AF
1504	4822 267 10774	Connector 2p male (red)
1505	4822 265 20723	Connector 2p
1506▲	2422 128 03111	Switch
1600	4822 276 13775	Switch
1601	4822 276 13775	Switch
1602	4822 276 13775	Switch
1603	4822 276 13775	Switch
1682	2422 025 16382	Connector 3p m
1684	3139 131 04162	Cable 3P 100mm
1693	2422 025 12482	Connector 6p m
1729	4822 267 10735	Connector 3p
1734	2422 026 05466	Soc cinch 2P
1763	3139 131 03952	CABLE SIN 280mm
8204	3139 131 03591	Cable 7p 560mm
8401	3139 121 09041	Cable 5p 560mm

—||—

2001	4822 122 33761	22pF 5% 50V
2002	4822 122 33761	22pF 5% 50V
2003	5322 126 11583	10nF 10% 50V 0603
2004	3198 024 44730	47nF 50V 0603
2005	4822 124 40769	4.7µF 20% 100V
2006	4822 124 80791	470µF 20% 16V
2007	2238 586 59812	100nF 20% 50V 0603
2008	2038 035 21307	68µ 25V
2008	4822 124 40433	47µF 20% 25V
2009	2238 586 59812	100nF 20% 50V 0603
2013	4822 122 33741	10pF 10% 50V
2014	3198 016 31020	1nF 25V 0603
2016	3198 016 31020	1nF 25V 0603
2203	4822 124 41584	100µF 20% 10V
2204	2238 916 15641	22nF 10% 25V 0603
2205	4822 126 13879	220nF +80-20% 16V
2206	4822 126 13879	220nF +80-20% 16V
2207	4822 126 13879	220nF +80-20% 16V
2208	4822 126 13879	220nF +80-20% 16V
2209	4822 126 13879	220nF +80-20% 16V
2210	4822 126 13879	220nF +80-20% 16V
2211	4822 126 13879	220nF +80-20% 16V
2212	4822 126 13879	220nF +80-20% 16V
2213	4822 126 13879	220nF +80-20% 16V
2214	2238 586 59812	100nF 20% 50V 0603
2215	4822 126 13879	220nF +80-20% 16V
2216	4822 126 13879	220nF +80-20% 16V
2217	4822 124 40207	100µF 20% 25V
2218	4822 124 40433	47µF 20% 25V
2222	2238 586 15633	5.6nF 50V
2223	2238 586 59812	100nF 20% 50V 0603
2224	4822 124 40207	100µF 20% 25V
2225	4822 126 13879	220nF +80-20% 16V
2226	4822 126 13879	220nF +80-20% 16V
2229	4822 126 13879	220nF +80-20% 16V
2230	4822 124 40769	4.7µF 20% 100V
2231	2238 586 59812	100nF 20% 50V 0603
2232	2238 586 59812	100nF 20% 50V 0603
2233	2238 586 59812	100nF 20% 50V 0603
2234	4822 124 40207	100µF 20% 25V
2235	5322 126 11582	6.8nF 10% 63V
2236	5322 126 11583	10nF 10% 50V 0603
2237	2238 586 59812	100nF 20% 50V 0603
2238	4822 126 13879	220nF +80-20% 16V
2239	4822 126 13879	220nF +80-20% 16V
2240	4822 124 41631	1.5µF 50V
2241	2238 916 15641	22nF 10% 25V 0603
2242	2238 586 59812	100nF 20% 50V 0603
2243	2238 586 59812	100nF 20% 50V 0603
2244	4822 126 14491	2.2µF 10V 0805
2245	3198 016 31020	1nF 25V 0603
2246	2238 586 59812	100nF 20% 50V 0603
2247	2238 586 59812	100nF 20% 50V 0603
2248	3198 016 31020	1nF 25V 0603
2249	2238 586 59812	100nF 20% 50V 0603
2250	4822 124 40207	100µF 20% 25V
2251	2022 318 00212	150nF 50V
2252	5322 126 11583	10nF 10% 50V 0603
2253	5322 126 11583	10nF 10% 50V 0603
2254	5322 126 11578	1nF 10% 50V 0603
2255	5322 126 11583	10nF 10% 50V 0603
2256	2238 586 59812	100nF 20% 50V 0603
2257	5322 126 11579	3.3nF 10% 63V
2260	2238 586 59812	100nF 20% 50V 0603
2261	2238 586 59812	100nF 20% 50V 0603
2262	5322 126 11583	10nF 10% 50V 0603
2263	2238 586 59812	100nF 20% 50V 0603
2264	4822 126 14249	560pF 10% 50V 0603
2265	4822 124 40207	100µF 20% 25V
2266	4822 126 14491	2.2µF 10V 0805
2267	4822 126 14491	2.2µF 10V 0805
2268	4822 122 33741	10pF 10% 50V
2269	4822 122 33741	10pF 10% 50V
2270	5322 126 11578	1nF 10% 50V 0603
2271	5322 126 11578	1nF 10% 50V 0603
2272	2238 586 59812	100nF 20% 50V 0603
2273	4822 124 40207	100µF 20% 25V
2274	2238 586 59812	100nF 20% 50V 0603
2275	4822 124 40248	10µF 20% 63V
2276	4822 126 14585	100nF 10% 0805 50V
2279	2020 552 94427	100pF 5% 50V
2280	3198 017 41050	1µF 10V 0603
2282	5322 126 11578	1nF 10% 50V 0603
2288	5322 126 11578	1nF 10% 50V 0603
2289	5322 126 11578	1nF 10% 50V 0603
2290	3198 017 41050	1µF 10V 0603
2404	4822 124 11936	47µF 20% 160V
2406▲	4822 126 13185	680pF 10% 500V
2408	2020 552 94427	100pF 5% 50V
2409	2238 586 59812	100nF 20% 50V 0603
2410	4822 126 14585	100nF 10% 0805 50V
2411▲	4822 126 12263	220pF 10% 2kV
2412▲	4822 121 70637	8.2nF 5% 1600V
2413▲	4822 121 70365	39nF 10% 400V
2414	3198 017 41050	1µF 10V 0603
2415	2022 031 00172	2.2µF 160V
2418▲	2222 479 90016	270nF 5% 250V
2419	2222 468 90324	2.2µF 100V
2420	3198 017 41050	1µF 10V 0603
2425	3198 017 33330	33nF 20% 16V 0603
2427	4822 121 51305	15nF 10% 50V
2428	3198 017 33330	33nF 20% 16V 0603
2451	2222 365 85154	150nF 10% 100V
2453	4822 126 14043	1µF +80-20% 16V 0805
2454	4822 124 80791	470µF 20% 16V
2456	4822 122 32542	47nF 10% 63V
2457	2022 031 00137	4.7µF 20% 250V
2459▲	4822 122 31177	470pF 10% 500V
2460	2022 031 00139	470µF 20% 16V
2461	3198 016 31020	1nF 25V 0603
2462	3198 016 31020	1nF 25V 0603
2463	2020 021 91677	100µF 20% 50V
2464	4822 126 13881	470pF 5% 50V
2465	5322 124 40641	10µF 20% 100V
2467	4822 121 70162	10nF 5% 400V
2468	4822 126 13883	220pF 5% 50V
2469	4822 126 13879	220nF +80-20% 16V
2470	2222 601 55649	100nF 10% 100V 1206
2486	2252 508 08255	27pF 500V
2487	5322 126 10465	3.9nF 10% 50V
2488	2020 557 00002	33pF 200V
2489	5322 126 11583	10nF 10% 50V 0603
2490	4822 122 32542	47nF 10% 63V
2493	4822 124 81151	22µF 50V
2500▲	2022 330 00053	470nF 275V
2503▲	4822 126 14153	2.2nF 10% 1kV
2504▲	4822 126 14153	2.2nF 10% 1kV
2505	2020 024 90771	220µF 20% 400V
2508▲	2022 330 00049	100nF 275V
2509▲	2252 811 95022	1.5nF 20% 250V
2511	4822 124 81151	22µF 50V
2512	2238 586 59812	100nF 20% 50V 0603
2513	4822 126 13881	470pF 5% 50V
2514▲	4822 126 13862	1.5nF 10% 2kV
2515	4822 126 13881	470pF 5% 50V
2516	2238 586 59812	100nF 20% 50V 0603
2517	5322 126 11578	1nF 10% 50V 0603
2528	4822 121 51252	470nF 5% 63V
2530	2020 557 00005	330pF 100V
2531	4822 126 13881	470pF 5% 50V
2532	2020 552 96823	10µF 16V
2533	4822 126 13193	4.7nF 10% 63V
2534	2020 558 90261	68pF 1kV
2535	4822 124 40184	1000µF 20% 10V
2536	2020 012 93728	2200µF 20% 10V
2538	4822 126 13881	470pF 5% 50V
2539▲	4822 122 31177	470pF 10% 500V
2541	4822 124 40433	47µF 20% 25V
2542▲	2252 811 95021	1nF 10% 250V
2543▲	4822 126 10206	2.2nF 10% 500V
2549	2020 552 94427	100pF 5% 50V
2550	2020 557 00002	33pF 200V
2551▲	4822 126 13449	1nF 10% 2kV
2552	2022 031 00165	100µF 160V
2553	4822 126 14508	180pF 5% 50V 0603
2561▲	4822 122 31175	1nF 10% 500V
2562	4822 124 12417	2200µF 20% 25V
2562	4822 124 80061	1000µF 20% 25V
2563	4822 124 12417	2200µF 20% 25V
2563	4822 124 80061	1000µF 20% 25V
2564	4822 126 14585	100nF 10% 0805 50V
2565▲	4822 122 31175	1nF 10% 500V
2570▲	2252 811 95017	470pF 10% 250V
2571	3198 017 31530	15nF 20% 50V 0603
2572	5322 126 11583	10nF 10% 50V 0603
2573	2020 552 96683	220nF 10% 50V
2601	3198 016 31020	1nF 25V 0603
2611	4822 124 40433	47µF 20% 25V
2617	2238 586 59812	100nF 20% 50V 0603
2620	2238 586 59812	100nF 20% 50V 0603
2621	4822 124 40207	100µF 20% 25V
2622	2222 867 15339	33pF 5% 50V 0603
2623	2238 586 59812	100nF 20% 50V 0603
2624	4822 124 40207	100µF 20% 25V
2625	2022 552 05615	2.2µF 10% 6.3V 0805
2630	4822 051 30008	Jumper 0603
2631	4822 124 41796	22µF 20% 16V
2691	4822 124 40196	220µF 20% 16V
2702	4822 126 14241	330pF 0603 50V
2703	4822 124 40248	10µF 20% 63V
2705	4822 126 14241	330pF 0603 50V
2706	4822 126 14491	2.2µF 10V 0805
2708	4822 126 14241	330pF 0603 50V
2709	4822 124 40248	10µF 20% 63V
2711	4822 126 14241	330pF 0603 50V
2712	4822 126 14491	2.2µF 10V 0805
2732	4822 126 14241	330pF 0603 50V
2733	4822 124 40248	10µF 20% 63V
2735	4822 126 14241	330pF 0603 50V
2736	3198 017 41050	1µF 10V 0603
2738	4822 126 14241	330pF 0603 50V
2739	4822 124 40248	10µF 20% 63V
2741	4822 126 14241	330pF 0603 50V
2742	3198 017 41050	1µF 10V 0603
2751	4822 126 14241	330pF 0603 50V
2752	4822 124 40248	10µF 20% 63V
2753	4822 126 14241	330pF 0603 50V
2754	4822 124 40248	10µF 20% 63V
2755	5322 126 11579	3.3nF 10% 63V
2756	5322 126 11579	3.3nF 10% 63V
2759	2222 867 15339	33pF 5% 50V 0603
2760	2238 586 59812	100nF 20% 50V 0603
2917	3198 032 27190	100µF 6.3V
2985	4822 126 14508	180pF 5% 50V 0603
2986	2238 586 59812	100nF 20% 50V 0603
2987	2238 586 59812	100nF 20% 50V 0603
2988	2238 586 59812	100nF 20% 50V 0603
2989	3198 017 41050	1µF 10V 0603
2990	4822 126 14241	330pF 0603 50V
2991	4822 126 14508	180pF 5% 50V 0603

2992	3198 017 41050	1µF 10V 0603
2993	4822 126 14241	330pF 0603 50V
2994	2238 916 15641	22nF 10% 25V 0603
2995	2238 916 15641	22nF 10% 25V 0603
2996	3198 024 44730	47nF 50V 0603
2997	3198 024 44730	47nF 50V 0603

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3002	4822 051 30103	10kΩ 5% 0.062W
3003	4822 051 30223	22kΩ 5% 0.062W
3005	4822 051 30101	100Ω 5% 0.062W
3006	4822 051 30103	10kΩ 5% 0.062W
3007	4822 051 30222	2.2kΩ 5% 0.062W
3008	4822 051 30682	6.8Ω 5% 0.062W
3009	4822 051 30222	2.2kΩ 5% 0.062W
3010	4822 051 30331	330Ω 5% 0.062W
3014	4822 051 30102	1kΩ 5% 0.062W
3016	4822 117 13632	100kΩ 1% 0603 0.62W
3018	4822 051 30221	220Ω 5% 0.062W
3019	4822 051 30154	150kΩ 5% 0.062W
3201	4822 050 11002	1kΩ 1% 0.4W
3202	4822 051 30332	3.3Ω 5% 0.062W
3203	4822 051 30154	150kΩ 5% 0.062W
3204	4822 051 30332	3.3Ω 5% 0.062W
3205	4822 051 30102	1kΩ 5% 0.062W
3206	4822 051 30562	5.6kΩ 5% 0.063W 0603
3207	4822 051 30109	10Ω 5% 0.062W
3208	4822 051 30273	27kΩ 5% 0.062W
3209	4822 117 12917	1Ω 5% 0.062W
3210	4822 117 12917	1Ω 5% 0.062W
3211	4822 051 30273	27kΩ 5% 0.062W
3212	4822 051 30101	100Ω 5% 0.062W
3214	4822 051 30109	10Ω 5% 0.062W
3215	4822 116 52283	4.7kΩ 5% 0.5W
3216	4822 051 30109	10Ω 5% 0.062W
3217	4822 051 30103	10kΩ 5% 0.062W
3218	4822 051 30101	100Ω 5% 0.062W
3219	4822 051 30103	10kΩ 5% 0.062W
3220	4822 051 30151	150Ω 5% 0.062W
3221	4822 051 30271	270Ω 5% 0.062W
3222	4822 051 30331	330Ω 5% 0.062W
3224	4822 116 52298	680k 5% 0.5W
3225	4822 051 30471	47Ω 5% 0.062W
3226	4822 051 30101	100Ω 5% 0.062W
3227	4822 051 30101	100Ω 5% 0.062W
3228	4822 051 30101	100Ω 5% 0.062W
3229	4822 051 30152	1.5Ω 5% 0.062W
3230	4822 116 52175	100Ω 5% 0.5W
3231	4822 116 52175	100Ω 5% 0.5W
3232	4822 051 30562	5.6kΩ 5% 0.063W 0603
3233	4822 051 30101	100Ω 5% 0.062W
3234	4822 116 52175	100Ω 5% 0.5W
3235	4822 051 30102	1kΩ 5% 0.062W
3236	4822 051 30101	100Ω 5% 0.062W
3237	4822 051 30102	1kΩ 5% 0.062W
3238	4822 051 30472	4.7Ω 5% 0.062W
3239	4822 116 52263	2.7kΩ 5% 0.5W
3240	4822 051 30223	22kΩ 5% 0.062W
3241	4822 050 23903	39k 1% 0.6W
3242	4822 117 12925	47kΩ 1% 0.063W 0603
3244	4822 051 30101	100Ω 5% 0.062W
3247	4822 051 30391	390Ω 5% 0.062W
3248	4822 051 30101	100Ω 5% 0.062W
3249	4822 116 52175	100Ω 5% 0.5W
3250	4822 051 30222	2.2kΩ 5% 0.062W
3251	4822 051 30123	12kΩ 5% 0.1W
3253	4822 051 30101	100Ω 5% 0.062W
3255	4822 051 30101	100Ω 5% 0.062W
3256	4822 051 30101	100Ω 5% 0.062W
3257	4822 051 30101	100Ω 5% 0.062W
3258	4822 116 52175	100Ω 5% 0.5W
3260	4822 116 52175	100Ω 5% 0.5W
3261	4822 051 30472	4.7Ω 5% 0.062W
3262	4822 051 30101	100Ω 5% 0.062W
3263	4822 051 30101	100Ω 5% 0.062W
3265	4822 051 30101	100Ω 5% 0.062W
3266	4822 051 30101	100Ω 5% 0.062W
3267	4822 051 30101	100Ω 5% 0.062W
3269	4822 051 30101	100Ω 5% 0.062W
3270	4822 116 52219	330Ω 5% 0.5W
3271	4822 051 30101	100Ω 5% 0.062W
3272	4822 117 12968	820Ω 5% 0.62W
3273	4822 051 30102	1kΩ 5% 0.062W
3274	4822 116 52175	100Ω 5% 0.5W
3275	4822 116 52175	100Ω 5% 0.5W
3276	4822 116 52175	100Ω 5% 0.5W
3277	4822 116 52175	100Ω 5% 0.5W
3278	4822 116 52175	100Ω 5% 0.5W
3279	4822 051 30472	4.7Ω 5% 0.062W
3280	4822 051 30472	4.7Ω 5% 0.062W
3282	4822 051 30472	4.7Ω 5% 0.062W
3283	4822 051 30472	4.7Ω 5% 0.062W
3284	4822 051 30472	4.7Ω 5% 0.062W
3285	4822 051 30102	1kΩ 5% 0.062W
3287	4822 051 30101	100Ω 5% 0.062W
3289	4822 051 30101	100Ω 5% 0.062W
3291	4822 050 11002	1kΩ 1% 0.4W
3292	4822 117 12925	47kΩ 1% 0.063W 0603
3293	4822 051 30273	27kΩ 5% 0.062W
3295	5322 117 13056	8.2kΩ 1% 0.063W 0603
3296	4822 051 30562	5.6kΩ 5% 0.063W 0603
3297	4822 051 30223	22kΩ 5% 0.062W
3298	4822 051 30101	100Ω 5% 0.062W
3401	4822 050 24703	47kΩ 1% 0.6W
3402	4822 050 11002	1kΩ 1% 0.4W
3404▲	4822 117 11151	1Ω 5%
3412	4822 050 11002	1kΩ 1% 0.4W
3414	2322 194 63109	10Ω 5% 2W
3415	4822 116 52175	100Ω 5% 0.5W
3416	4822 051 30479	47Ω 5% 0.062W
3417	4822 053 11153	15kΩ 5% 2W
3418	4822 116 52175	100Ω 5% 0.5W
3419	4822 051 30682	6.8Ω 5% 0.062W
3420	4822 117 10833	10kΩ 1% 0.1W
3422▲	4822 117 11151	1Ω 5%
3423▲	4822 117 11151	1Ω 5%
3425	4822 050 21004	100kΩ 1% 0.6W
3427	4822 117 11449	2.2kΩ 5% 0.1W 0805
3428	4822 051 20332	2.3kΩ 5% 0.1W
3430	4822 053 20334	330kΩ 5% 0.25W
3431	4822 050 28203	82kΩ 1% 0.6W
3432	4822 053 11159	15Ω 5% 2W
3433	4822 050 21008	1Ω 1% 0,6W
3434	4822 050 21008	1Ω 1% 0,6W
3440	4822 116 52226	560Ω 5% 0.5W
3441	4822 053 20334	330kΩ 5% 0.25W
3442	3198 013 04720	4.7kΩ 0.5W
3443	3198 013 04720	4.7kΩ 0.5W
3445	4822 051 20479	47kΩ 5% 0.1W
3446	4822 051 30101	100Ω 5% 0.062W
3447	4822 116 52269	3.3kΩ 5% 0.5W
3451	4822 050 21204	120kΩ 1% 0,6W
3452	4822 051 30183	18kΩ 5% 0.062W
3453	4822 051 30333	33kΩ 5% 0.062W
3454	4822 116 83884	47kΩ 5% 0.5W
3456▲	4822 117 11151	1Ω 5%
3458▲	4822 052 11478	4.7Ω 5% 0.5W
3459▲	4822 117 11151	1Ω 5%
3460	4822 116 52256	2.2kΩ 5% 0.5W
3461	4822 116 52256	2.2kΩ 5% 0.5W
3462	4822 051 30222	2.2kΩ 5% 0.062W
3463	4822 051 30102	1kΩ 5% 0.062W
3464	4822 051 30391	390Ω 5% 0.062W
3465	4822 051 30391	390Ω 5% 0.062W
3466▲	4822 052 11108	1Ω 5% 0.5W
3467	4822 116 83872	220Ω 5% 0.5W
3468	4822 116 83872	220Ω 5% 0.5W
3469	4822 051 30102	1kΩ 5% 0.062W
3470	4822 116 52186	22Ω 5% 0.5W
3471	4822 050 23308	3.3Ω 1% 0.6W
3472	4822 050 23908	3.9Ω 1% 0.6W
3473	4822 051 30474	470kΩ 5% 0.062W
3474	4822 051 30153	15kΩ 5% 0.062W
3475	5322 117 13056	8.2kΩ 1% 0.063W 0603
3484▲	4822 052 10108	1Ω 5% 0.33W
3485▲	4822 052 10108	1Ω 5% 0.33W
3489	4822 051 20479	47kΩ 5% 0.1W
3490	4822 051 30223	22kΩ 5% 0.062W
3491	4822 117 12864	82kΩ 5% 0.6W
3493	4822 051 30222	2.2kΩ 5% 0.062W
3495	4822 051 20334	330kΩ 5% 0.1W
3497▲	4822 052 11338	3.3Ω 5% 0,5W
3498	4822 051 30472	4.7Ω 5% 0.062W
3499	4822 051 20684	680kΩ 5% 0.1W
3500▲	4822 053 21335	3.3MΩ 5% 0.5W
3501▲	4822 053 21335	3.3MΩ 5% 0.5W
3502	4822 116 83872	220Ω 5% 0.5W
3503	4822 252 11215	DSP301N-A21F
3504▲	4822 053 21155	1.5MΩ 5% 0.5W
3505▲	2122 550 00171	1mΩ 612V
3506▲	4822 053 21335	3.3MΩ 5% 0.5W
3507▲	2122 663 00021	9Ω 265V
3510▲	2122 612 00055	4.7Ω 3W
3511	4822 050 24708	4.7Ω 1% 0.6W
3512	4822 117 11817	1.2kΩ 1% 0.0625W
3513▲	4822 052 10222	2.2kΩ 5% 0.33W
3514▲	4822 052 10479	47Ω 5% 0.33W
3515	4822 050 11002	1kΩ 1% 0.4W
3516	4822 116 83303	0.1Ω 2W
3517	2322 704 63004	300KΩ
3518	4822 051 30332	3.3Ω 5% 0.062W
3519	4822 116 52244	15kΩ 5% 0.5W
3520	4822 117 11342	0.33Ω 5% 2W
3521	4822 116 52269	3.3kΩ 5% 0.5W
3522	4822 051 30563	56kΩ 5% 0.062W
3524	4822 117 12925	47kΩ 1% 0.063W 0603
3527	4822 117 12925	47kΩ 1% 0.063W 0603
3528	4822 051 20105	1MΩ 5% 0.1W
3529	4822 053 20225	2.2MΩ 5% 0.25W
3530	4822 051 30221	220Ω 5% 0.062W
3531	4822 116 52234	100kΩ 5% 0.5W
3532▲	4822 052 10478	4.7Ω 5% 0.33W
3533	5322 117 13056	8.2kΩ 1% 0.063W 0603
3534	4822 116 52175	100Ω 5% 0.5W
3537	4822 051 30222	2.2kΩ 5% 0.062W
3538	4822 051 20188	1.8Ω 5% 0.1W
3541	4822 117 12925	47kΩ 1% 0.063W 0603
3563	4822 116 83872	220Ω 5% 0.5W
3565	4822 051 30153	15kΩ 5% 0.062W
3571	4822 116 83872	220Ω 5% 0.5W
3572	4822 051 30221	220Ω 5% 0.062W
3573	4822 051 30153	15kΩ 5% 0.062W
3574	4822 116 52245	150kΩ 5% 0.5W
3575	4822 050 28203	82kΩ 1% 0.6W
3576	5322 117 13026	4.7kΩ 1% 0.063W 0603
3577	4822 116 52243	1.5kΩ 5% 0.5W
3578	4822 051 30471	47Ω 5% 0.062W
3579	4822 051 30222	2.2kΩ 5% 0.062W
3601	4822 051 30472	4.7Ω 5% 0.062W
3604	4822 051 30101	100Ω 5% 0.062W
3605	4822 051 30101	100Ω 5% 0.062W
3606	4822 116 52291	56kΩ 5% 0.5W
3607	4822 051 30103	10kΩ 5% 0.062W
3608	4822 051 30273	27kΩ 5% 0.062W
3609	4822 051 30331	330Ω 5% 0.062W
3614	4822 051 30101	100Ω 5% 0.062W
3616	4822 116 52175	100Ω 5% 0.5W
3617	4822 116 52175	100Ω 5% 0.5W
3618	4822 116 52175	100Ω 5% 0.5W
3634	4822 051 30102	1kΩ 5% 0.062W
3635	4822 117 12925	47kΩ 1% 0.063W 0603
3637	4822 051 30479	47Ω 5% 0.062W
3639	4822 116 52186	22Ω 5% 0.5W
3681	5322 117 13057	820Ω 1% 0.063W 0603
3684	5322 117 13036	1.2kΩ 1% 0.063W 0603
3685	4822 051 30151	150Ω 5% 0.062W
3686	4822 051 30391	390Ω 5% 0.062W
3687	5322 117 13046	1.8kΩ 1% 0.063W 0603
3690	4822 051 30221	220Ω 5% 0.062W
3691	4822 117 11817	1.2kΩ 1% 0.0625W
3692	4822 051 30272	2.7kΩ 5% 0.062W
3693	4822 051 30221	220Ω 5% 0.062W
3694	4822 051 30472	4.7Ω 5% 0.062W
3701	4822 116 83868	150Ω 5% 0.5W
3702	4822 117 12891	220kΩ 1%
3703	4822 116 52257	22kΩ 5% 0.5W
3704	4822 117 12925	47kΩ 1% 0.063W 0603
3705	4822 116 83868	150Ω 5% 0.5W
3706	4822 117 12891	220kΩ 1%
3707	4822 116 52257	22kΩ 5% 0.5W
3708	4822 117 12925	47kΩ 1% 0.063W 0603
3709	4822 116 52201	75Ω 5% 0.5W
3711	4822 051 30333	33kΩ 5% 0.062W
3712	4822 051 30682	6.8Ω 5% 0.062W
3713	4822 116 52201	75Ω 5% 0.5W
3715	4822 116 52201	75Ω 5% 0.5W
3717	4822 116 52201	75Ω 5% 0.5W
3718	4822 116 52219	330Ω 5% 0.5W
3719	4822 051 30689	68Ω 5% 0.063W 0603
3720	4822 051 30102	1kΩ 5% 0.062W
3721	4822 116 52201	75Ω 5% 0.5W
3731	4822 116 83868	150Ω 5% 0.5W
3732	4822 117 12891	220kΩ 1%
3733	4822 116 52257	22kΩ 5% 0.5W
3734	4822 117 12925	47kΩ 1% 0.063W 0603
3735	4822 116 83868	150Ω 5% 0.5W
3736	4822 117 12891	220kΩ 1%
3737	4822 116 52257	22kΩ 5% 0.5W
3738	4822 117 12925	47kΩ 1% 0.063W 0603
3739	4822 050 23303	33kΩ 1% 0.6W
3740	4822 051 30682	6.8Ω 5% 0.062W
3741	4822 116 52201	75Ω 5% 0.5W
3743	4822 116 52199	68Ω 5% 0.5W
3745	4822 116 52201	75Ω 5% 0.5W
3751	4822 116 83868	150Ω 5% 0.5W
3752	4822 117 12891	220kΩ 1%
3753	4822 116 83868	150Ω 5% 0.5W
3754	4822 117 12891	220kΩ 1%
3758	4822 116 52195	47Ω 5% 0.5W
3767	4822 117 11817	1.2kΩ 1% 0.0625W
3769	4822 117 11817	1.2kΩ 1% 0.0625W
3975	4822 053 11101	100Ω 5% 2W
3985	4822 051 30563	56kΩ 5% 0.062W
3988	4822 051 30103	10kΩ 5% 0.062W
3989	4822 051 30109	10Ω 5% 0.062W
3991	4822 051 30563	56kΩ 5% 0.062W
3992	4822 051 30103	10kΩ 5% 0.062W
3993	4822 051 30109	10Ω 5% 0.062W
3994	4822 051 30683	68kΩ 5% 0.062W
3995	4822 051 30472	4.7Ω 5% 0.062W

3996	4822 051 30681	680Ω 5% 0.062W
3997	4822 117 13632	100kΩ 1% 0603 0.62W
3998	4822 051 30103	10kΩ 5% 0.062W
4000	4822 051 30008	Jumper 0603
4001	4822 051 30008	Jumper 0603
4002	4822 051 30008	Jumper 0603
4011	4822 051 30008	Jumper 0603
4013	4822 051 30008	Jumper 0603
4015	4822 051 30008	Jumper 0603
4209	4822 051 30008	Jumper 0603
4212	4822 051 30008	Jumper 0603
4214	4822 051 30008	Jumper 0603
4221	4822 051 30008	Jumper 0603
4222	4822 051 30008	Jumper 0603
4223	4822 051 20008	Jumper 0805
4226	4822 051 30008	Jumper 0603
4227	4822 051 30008	Jumper 0603
4240	4822 051 30008	Jumper 0603
4241	4822 051 30008	Jumper 0603
4437	4822 051 30008	Jumper 0603
4470	4822 051 30008	Jumper 0603
4471	4822 051 30008	Jumper 0603
4472	4822 051 30008	Jumper 0603
4473	4822 051 30008	Jumper 0603
4474	4822 051 30008	Jumper 0603
4492	4822 051 30008	Jumper 0603
4533	4822 051 20008	Jumper 0805
4534	4822 051 30008	Jumper 0603
4535	4822 051 30008	Jumper 0603
4537	4822 051 30008	Jumper 0603
4581	4822 051 20008	Jumper 0805
4602	4822 051 30008	Jumper 0603
4604	4822 051 30008	Jumper 0603
4610	4822 051 30008	Jumper 0603
4612	4822 051 20008	Jumper 0805
4620	4822 051 30008	Jumper 0603
4631	4822 051 30008	Jumper 0603
4635	4822 051 30008	Jumper 0603
4637	4822 051 30008	Jumper 0603
4642	4822 051 30008	Jumper 0603
4644	4822 051 20008	Jumper 0805
4645	4822 051 30008	Jumper 0603
4646	4822 051 30008	Jumper 0603
4648	4822 051 30008	Jumper 0603
4649	4822 051 30008	Jumper 0603
4691	4822 051 30008	Jumper 0603
4692	4822 051 30008	Jumper 0603
4694	4822 051 30008	Jumper 0603
4696	4822 051 30008	Jumper 0603
4730	4822 051 30008	Jumper 0603
4910	4822 051 30008	Jumper 0603
4914	4822 051 20008	Jumper 0805
4915	4822 051 20008	Jumper 0805
4916	4822 051 20008	Jumper 0805
4917	4822 051 20008	Jumper 0805
4921	4822 051 20008	Jumper 0805
4992	4822 051 20008	Jumper 0805

5001	2422 549 42896	Bead 120Ω 100MHz
5002	3198 018 34770	0.47µH 10% 0805
5201	4822 526 10704	Bead 100MHz
5202	2422 549 42896	Bead 120Ω 100MHz
5203	2422 549 42896	Bead 120Ω 100MHz
5205	2422 549 42896	Bead 120Ω 100MHz
5206	2422 549 42896	Bead 120Ω 100MHz
5207	2422 549 42896	Bead 120Ω 100MHz
5208	4822 526 10704	Bead 100MHz
5209	2422 549 42896	Bead 120Ω 100MHz
5210	2422 549 42896	Bead 120Ω 100MHz
5211	2422 549 42896	Bead 120Ω 100MHz
5212	2422 549 42896	Bead 120Ω 100MHz
5213	2422 549 42896	Bead 120Ω 100MHz
5214	2422 549 42896	Bead 120Ω 100MHz
5215	2422 549 42896	Bead 120Ω 100MHz
5216	4822 526 10704	Bead 100MHz
5217	4822 157 11835	4,7µH 5%
5295	4822 526 10704	Bead 100MHz
5401▲	2422 536 00425	Linearity coil 21"
5402	2422 531 02617	PSD12-205B B
5405	2422 536 00846	SC15334-00 B
5408	4822 157 11711	Choke coil
5410	4822 157 11737	22µH 10%
5500▲	4822 157 10476	DMF-2820H
5501▲	4822 157 11523	Line filter 5mH/2A
5511	4822 526 10704	Bead 100MHz
5512▲	2422 531 02634	SS42315-01 B
5531▲	2422 531 02631	SS22220-03 B
5551	4822 526 10704	Bead 100MHz
5552	4822 157 71401	27µH
5561	4822 526 10704	Bead 100MHz
5562	4822 526 10704	Bead 100MHz
5602	4822 157 11835	4,7µH 5%

6001	4822 130 34142	BZX79-B33
6003	4822 130 11397	BAS316
6004	4822 130 11525	1SS356
6006	4822 130 34382	BZX79-B8V2
6203	4822 130 11397	BAS316
6204	9322 128 70685	SMSS14
6205	9340 548 69115	PDZ27B
6207	4822 130 11397	BAS316
6209	4822 130 80622	BAT54
6403	4822 130 10871	SBYV27-200
6404	9322 169 61687	DMV1500M
6406	9334 939 60673	RGP10G
6407	9322 197 45703	BAV21WS
6408	9322 197 45703	BAV21WS
6410	5322 130 31559	BY448
6441	9322 150 20685	BZX384-C68
6442	9322 150 20685	BZX384-C68
6443	4822 130 11551	UDZS10B
6450	4822 130 11397	BAS316
6451	4822 130 11148	UDZ4.7B
6452	4822 130 10871	SBYV27-200
6453	9334 939 60673	RGP10G
6454	9334 939 60673	RGP10G
6455	9334 939 60673	RGP10G
6456	4822 130 11045	PBYR10100
6457	4822 130 11397	BAS316
6458	4822 130 11397	BAS316
6459	9334 939 60673	RGP10G
6482	4822 130 11416	PDZ6.8B
6483	9322 197 45703	BAV21WS
6484	9322 197 45703	BAV21WS
6486	4822 130 30842	BAV21
6488	4822 130 11397	BAS316
6489	9340 548 71115	PDZ33B
6490	4822 130 11397	BAS316
6511	4822 130 31607	RGP10D
6512	4822 130 80622	BAT54
6514	4822 130 11397	BAS316
6531	4822 130 11522	UDZ15B
6532	9322 197 45703	BAV21WS
6533	9322 171 80685	BZX384-B6V8
6534	9322 199 75685	BZX384-B3V9
6535	9965 000 01541	SB160
6536	9322 198 25673	SB180
6538	4822 130 11397	BAS316
6541	9340 548 61115	PDZ12B
6551	9322 198 41687	STTH8L06D
6562	9322 161 78682	SB360L-7024
6563	9322 161 78682	SB360L-7024
6564	4822 130 11397	BAS316
6565	4822 130 11551	UDZS10B
6566	4822 130 11397	BAS316
6571	5322 130 34331	BAV70
6572	9340 548 54115	PDZ6.2B
6573	4822 130 30862	BZX79-B9V1
6575	4822 130 31878	1N4003G
6602	5322 130 34337	BAV99
6691	9322 050 99682	LTL-10224WHCR
6694	9340 548 52115	PDZ5.1B
6733	3198 020 55680	BZX384-C5V6
6990	4822 130 11397	BAS316

7001	4822 130 63732	MMUN2212
7003	5322 130 42718	BFS20
7200	9352 747 92557	TDA12020H1/N1B10
7200	9352 747 93557	TDA12021H1/N1B10
7201	4822 130 62343	IMX1
7202	4822 130 11155	PDTC114ET
7203	4822 130 41246	BC327-25
7204	4822 130 41246	BC327-25
7207	5322 130 60159	BC846B
7208	5322 130 60159	BC846B
7209	9340 547 13215	BSH103
7210	9340 547 13215	BSH103
7404	9340 547 13215	BSH103
7405	9340 550 92127	BU4508DX
7406	9322 197 37676	KTC3228Y
7408	5322 130 60159	BC846B
7410	4822 130 60373	BC856B
7411	4822 130 60373	BC856B
7451	9322 195 14687	KTD600KY
7452	9322 197 37676	KTC3228Y
7453	9322 195 05687	KTB631KY
7454	5322 130 60159	BC846B
7455	4822 130 60373	BC856B
7456	4822 130 60373	BC856B
7482	3198 010 44010	PDTA114ET
7483	4822 130 60373	BC856B
7484	5322 130 60159	BC846B
7485	5322 130 60159	BC846B
7511	9352 720 43118	TEA1506T/N1
7512	9322 174 27687	FQPF7N80
7513▲	8238 274 02070	TCET1103G
7514	5322 130 60159	BC846B
7531	9352 739 52112	TEA1620P/N1
7532	4822 130 60373	BC856B
7541	4822 130 60373	BC856B
7561	9340 547 00215	PDTC143ZT
7571	4822 130 40959	BC547B
7573	4822 130 11155	PDTC114ET
7601	9322 147 25682	M24C16-WBN6
7603	4822 209 16978	LF33CV
7604	5322 130 60159	BC846B
7605	4822 130 41246	BC327-25
7606	5322 130 60159	BC846B
7701	5322 130 60159	BC846B
7702	5322 130 60159	BC846B
7703	5322 130 60159	BC846B
7705	9322 058 40685	SM IMT 1A
7706	5322 130 60159	BC846B
7707	5322 130 60159	BC846B
7708	5322 130 60159	BC846B
7709	5322 130 60159	BC846B
7990	4822 209 32641	TDA2616Q
7991	5322 130 60159	BC846B
7992	5322 130 60159	BC846B
7993	5322 130 60159	BC846B
7994	5322 130 60159	BC846B

CRT Panel [B]

Various

1254▲	2422 500 80086	Soc CRT 12P Female
1331	4822 265 41113	7P
1351	4822 265 30735	Connector 5p
1361	4822 267 10735	Connector 3p

2330	4822 121 40518	100nF 10% 250V
2331	5322 126 11583	10nF 10% 50V 0603
2332	2020 558 90621	10nF 630V
2333	5322 126 11578	1nF 10% 50V 0603
2335	4822 122 32542	47nF 10% 63V
2351▲	2022 031 00241	10µ 250V
2352▲	4822 126 14505	4.7nF 10% 2KV
2363	4822 124 40764	22µF 100V
2364	4822 121 41664	22nF 10% 400V
2365	2238 916 15641	22nF 10% 25V 0603
2367	5322 121 42578	100nF 5% 250V
2368	4822 121 41664	22nF 10% 400V
2381	4822 124 40207	100µF 20% 25V
2388	4822 126 14241	330pF 0603 50V
2390	2238 586 59812	100nF 20% 50V 0603
2392	2238 586 59812	100nF 20% 50V 0603

3331	4822 116 52175	100Ω 5% 0.5W
3332	3198 013 01020	1kΩ 20% 0.5W
3333	4822 116 52175	100Ω 5% 0.5W
3334	3198 013 01020	1kΩ 20% 0.5W
3335	4822 116 52175	100Ω 5% 0.5W
3336	3198 013 01020	1kΩ 20% 0.5W
3351▲	4822 052 10101	100Ω 5% 0.33W
3354	3198 013 01520	1.5kΩ 20% 0.5W
3356	4822 050 21009	10Ω 1% 0.6W
3357	2122 552 00004	1mA 18V 0603
3361	4822 117 11817	1.2kΩ 1% 0.0625W
3362	4822 050 24708	4.7Ω 1% 0.6W
3363	4822 117 12968	820Ω 5% 0.62W
3364	2122 101 02091	2.7Ω
3366	4822 116 52291	56kΩ 5% 0.5W
3367	4822 051 30563	56kΩ 5% 0.062W
3368	4822 117 12968	820Ω 5% 0.62W
3371	4822 116 52175	100Ω 5% 0.5W
3372	2322 750 62708	2.7Ω 1206
3373	4822 117 12473	4.7kΩ 5% 5W
3374	4822 051 30181	180Ω 5% 0.062W
3388	4822 051 30109	10Ω 5% 0.062W
3389	5322 117 11726	10Ω 5%
3394	4822 051 30221	220Ω 5% 0.062W
3397	4822 051 30472	4.7Ω 5% 0.062W
3398	4822 051 30221	220Ω 5% 0.062W
4328	4822 051 30008	Jumper 0603
4329	4822 051 30008	Jumper 0603

4330	4822 051 30008	Jumper 0603
4336	4822 051 20008	Jumper 0805
4337	4822 051 30008	Jumper 0603
4362	4822 051 30008	Jumper 0603

5330	4822 526 10704	Bead 100MHz
5351	4822 157 50961	22µH
5352	2422 535 94257	0.22 µF

6331	4822 130 30842	BAV21
6332	4822 130 30842	BAV21
6333	4822 130 30842	BAV21
6361	5322 130 34337	BAV99
6362	5322 130 34337	BAV99
6363	5322 130 34337	BAV99
6383	4822 130 31607	RGP10D

7330	9352 636 45112	TDA6108AJF/N1C
7361	4822 130 40959	BC547B
7362	4822 130 44568	BC557B
7363	9322 166 55682	2SA1358
7364	9322 166 56682	2SC3421

Side A/V Panel + Headphone [D]

Various

1232	4822 267 51391	Connector Phone
1250	2422 026 05538	Soc cinch 3P
1251	2422 026 05494	7P Female
1252	2422 025 11244	Connector 7p m
1254	4822 267 10734	Connector 5p
1278	4822 267 10565	Connector 4p
1280	4822 267 10735	Connector 3p
1281	2422 025 16382	Connector 3p m
8254	3139 110 38861	Cable 5p/680/5p

2171	4822 126 13512	330pF 10% 50V
2172	4822 126 13512	330pF 10% 50V
2173	4822 126 13512	330pF 10% 50V
2174	4822 126 13512	330pF 10% 50V
2175	4822 124 22652	2.2µF 20% 50V
2176	2238 586 59812	100nF 20% 50V 0603
2178	4822 126 13881	470pF 5% 50V
2180	4822 124 22652	2.2µF 20% 50V

3150	4822 116 83884	47kΩ 5% 0.5W
3151	4822 116 52257	22kΩ 5% 0.5W
3152	4822 116 83884	47kΩ 5% 0.5W
3153	4822 116 52257	22kΩ 5% 0.5W
3154	4822 116 52201	75Ω 5% 0.5W
3156	4822 116 52231	820Ω 5% 0.5W
3157	4822 116 52231	820Ω 5% 0.5W
3158	4822 116 52201	75Ω 5% 0.5W
3159	4822 116 52175	100Ω 5% 0.5W
3160	4822 116 52175	100Ω 5% 0.5W

Top Control [E]

Various

1010	2422 025 16601	Connector 3p m
1010	4822 267 10748	Connector 3p
1011	4822 276 13775	Switch
1012	4822 276 13775	Switch
1013	4822 276 13775	Switch
1014	4822 276 13775	Switch
1015	4822 276 13775	Switch
8010▲	3104 311 05101	Cable 3P 680mm
8010	3139 131 01771	Cable 3p 1000mm

3011	4822 051 30151	150Ω 5% 0.062W
3012	4822 051 30391	390Ω 5% 0.062W
3013	5322 117 13046	1.8kΩ 1% 0.063W 0603
3014	4822 051 30008	Jumper 0603
3015	5322 117 13057	820Ω 1% 0.063W 0603
3016	4822 051 30008	Jumper 0603
3017	5322 117 13046	1.8kΩ 1% 0.063W 0603
3018	5322 117 13057	820Ω 1% 0.063W 0603

LTI/CTI Interface [H]

Various

1206	2422 025 11244	Connector 7p m
1212	2422 025 16219	12P Male
8206	3139 110 39021	Cable 7P 180mm
8207	3104 311 07361	Cable 7P/560/7P
8207	3104 311 07801	Cable 7P 400mm
8280	3104 311 01241	Cable 5P 400mm
8280	4822 320 12669	Cable 5P 280mm
8361	3139 110 38531	Cable 3P 180mm
8682	3104 311 01111	Cable 3P 400mm

2605	2238 586 59812	100nF 20% 50V 0603
2610	2238 586 59812	100nF 20% 50V 0603
2611	4822 124 12379	220µF 25V
2612	2238 586 59812	100nF 20% 50V 0603
2628	5322 126 11582	6.8nF 10% 63V
2630	2020 552 96305	4.7µF 20-80% 10V
2631	3198 017 41050	1µF 10V 0603
2634	4822 126 14221	68pF 5% 50V 0603 NP0
2638	3198 017 41050	1µF 10V 0603
2639	4822 122 33761	22pF 5% 50V
2643	2238 586 59812	100nF 20% 50V 0603
2645	2238 586 59812	100nF 20% 50V 0603

3612	4822 050 11002	1kΩ 1% 0.4W
3613	4822 117 13632	100kΩ 1% 0603 0.62W
3614	4822 117 13632	100kΩ 1% 0603 0.62W
3615	4822 117 13632	100kΩ 1% 0603 0.62W
3616	4822 116 52175	100Ω 5% 0.5W
3617	4822 051 30101	100Ω 5% 0.062W
3626	4822 051 30102	1kΩ 5% 0.062W
3627	4822 051 30222	2.2kΩ 5% 0.062W
3628	4822 051 30102	1kΩ 5% 0.062W
3630	4822 051 30103	10kΩ 5% 0.062W
3631	4822 051 30103	10kΩ 5% 0.062W
3632	4822 051 30271	270Ω 5% 0.062W
3633	4822 117 11817	1.2kΩ 1% 0.0625W
3634	4822 051 30102	1kΩ 5% 0.062W
3635	4822 051 30101	100Ω 5% 0.062W
3637	4822 051 30105	1MΩ 5% 0.062W
3638	4822 051 30474	470kΩ 5% 0.062W
3639	4822 051 30479	47Ω 5% 0.062W
3640	4822 051 30102	1kΩ 5% 0.062W
3641	4822 051 30008	Jumper 0603
3642	4822 051 30102	1kΩ 5% 0.062W
3643	4822 051 30683	68kΩ 5% 0.062W
4610	4822 051 30008	Jumper 0603
4633	4822 051 20008	Jumper 0805
4634	4822 051 20008	Jumper 0805
4640	4822 051 30008	Jumper 0603
4641	4822 051 30008	Jumper 0603
4642	4822 051 30008	Jumper 0603
4680	4822 051 30008	Jumper 0603
4690	4822 051 30008	Jumper 0603

5614	4822 157 10477	47µH

6610	4822 130 11397	BAS316
6611	4822 130 11416	PDZ6.8B
6625	9322 102 64685	UDZ2.7B
6633	4822 130 11397	BAS316
6635	4822 130 11397	BAS316
6636	4822 130 11397	BAS316

7610	4822 209 17311	TDA9178T/N1
7627	4822 209 73852	PMBT2369
7630	5322 130 60159	BC846B
7636	4822 130 63732	MMUN2212
7637	5322 130 60159	BC846B

Front Interface [J]

Various

1211	2422 025 16268	Connector 2p m
1231	2422 128 03111	Switch
1505	2422 025 16268	Connector 2p m
1693	2422 025 10738	Connector 6p m
8505▲	3104 311 03011	Cable 2p/340/2p Bk
8693	3139 110 38940	Cable 6P 340mm

2691	4822 124 12379	220µF 25V
2698	5322 121 42386	100nF 5% 63V

3500	4822 053 21335	3.3MΩ 5% 0.5W
3501	4822 053 21335	3.3MΩ 5% 0.5W
3691	4822 116 52207	1.2kΩ 5% 0.5W
3693	4822 116 83872	220Ω 5% 0.5W
3694	4822 116 52283	4.7kΩ 5% 0.5W

6691	9322 050 99682	LTL-10224WHCR

11. Revision List

First release.