

Service Service Service



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Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

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

1.1 Technical Specifications

1.1.1 Vision

Display type	: DV-LCD-IPS
Screen size	: 30" (76 cm)
Resolution (HxV pixels)	: 1280x768 (WXGA)
Contrast ratio	: 350:1
Light output (cd/m ²)	: 450
Viewing angle (HxV deg.)	: 176x176
Tuning system	: PLL
Colour systems	: PAL B/G, D/K, I
	: SECAM B/G, D/K, L/L'
Video playback	: NTSC 4.43/3.58,
	: NTSC Play Back,
	: PAL 60,
	: PAL B/G Play Back,
	: SECAM Play Back
Channel selections	: 100 presets
	: UVSH
Supported formats	: VGA (640x480)
	: VGA (720x400)
	: VGA (640x350)
	: MAC (640x480)
	: MAC (832x624)
	: SVGA (800x600)
	: XWGA (1024x768)
	: WXGA (1280x768)

1.1.2 Sound

Sound systems	: BI NICAM B/G
	: 2CS B/G
	: NICAM B/G (5.5-5.85)
	: NICAM D/K (6.5-5.85)
	: NICAM I (6.0-6.52)
	: NICAM L (6.5-5.85)
	: FM/FM (5.5-5.74 B/G)
Maximum power (W _{RMS})	: 2 x 10

1.1.3 Miscellaneous

Power supply:	
- Mains voltage (V _{AC})	: 220 - 240
- Mains frequency (Hz)	: 50 / 60

Ambient conditions:	
- Ambient temperature (°C)	: +5 to +40
- Maximum humidity	: 90% R.H.

Power consumption	
- Normal operation (W)	: 185
- Stand-by (W)	: < 2

1.2 Connection Overview

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

1.2.1 Rear Connections

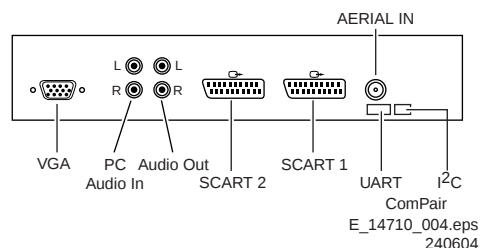


Figure 1-1 Rear connections

VGA: Video RGB - In

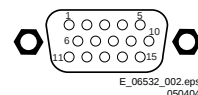


Figure 1-2 VGA Connector

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

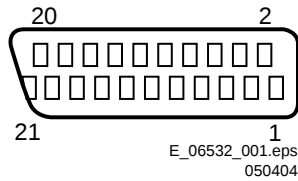
Cinch: PC Audio - In

Rd - Audio - R	0.5 V _{RMS} / 10 kohm	⊕
Wh - Audio - L	0.5 V _{RMS} / 10 kohm	⊕

Cinch: Audio - Out

Rd - Audio - R	0.5 V _{RMS} / 10 kohm	⊕
Wh - Audio - L	0.5 V _{RMS} / 10 kohm	⊕

SCART 1: Video RGB/YUV-In, CVBS-In/Out, Audio-In/Out



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Figure 1-3 SCART connector

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

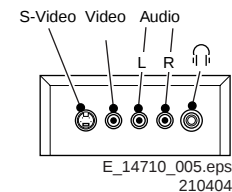
SCART 2: Video CVBS/YC - In/Out, Audio - In/Out

1	- Audio R	0.5 V _{RMS} / 1 kohm	⊕
2	- Audio L	0.5 V _{RMS} / 10 kohm	⊕
3	- Audio L	0.5 V _{RMS} / 1 kohm	⊕
4	- Ground Audio	Gnd	⊕
5	- Ground Blue	Gnd	⊕
6	- Audio L	0.5 V _{RMS} / 10 kohm	⊕
7	- Video C	0.7 V _{PP} / 75 ohm	⊕

8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Ground Green	Gnd	⊕
10	- Easylink P50	0 - 5 V / 4.7 kohm	⊕
11	- n.c.		⊕
12	- n.c.		⊕
13	- Ground Red	Gnd	⊕
14	- Ground P50	Gnd	⊕
15	- Video C	0.7 V _{PP} / 75 ohm	⊕
16	- n.c.		⊕
17	- Ground Video	Gnd	⊕
18	- n.c.		⊕
19	- Video CVBS	1 V _{PP} / 75 ohm	⊕
20	- Video Y/CVBS	1 V _{PP} / 75 ohm	⊕
21	- Shield	Gnd	⊕

Aerial - In
- IEC-type Coax, 75 ohm

1.2.2 Side I/O connections



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Figure 1-4 Side I/O connections

SVHS (Hosiden): Video Y/C - In

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

Cinch: Video CVBS - In, Audio - In

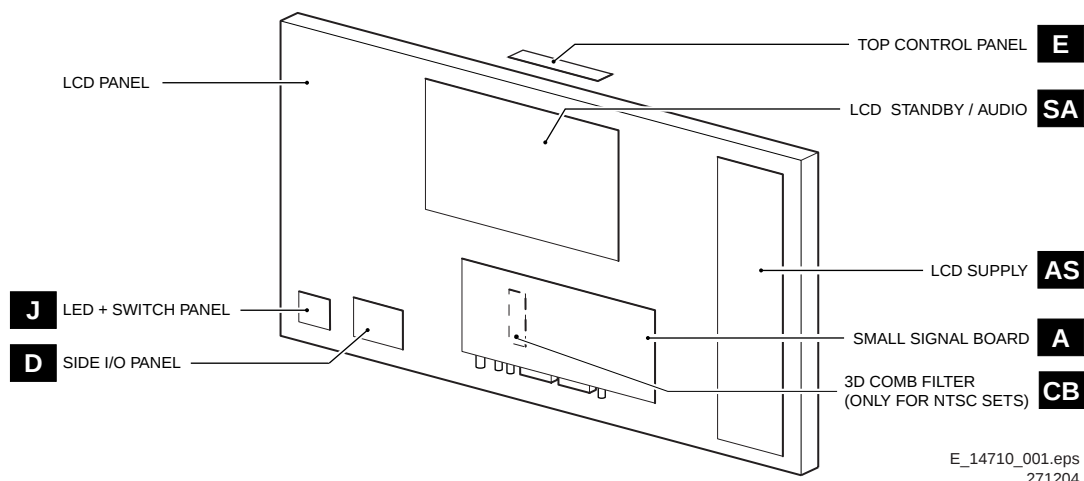
Ye	- Video CVBS	1 V _{PP} / 75 ohm	⊕
Wh	- Audio L	0.5 V _{RMS} / 10 kohm	⊕
Rd	- Audio R	0.5 V _{RMS} / 10 kohm	⊕

Mini Jack: Audio Head phone - Out

Bk	- Head phone	32 - 600 ohm / 10 mW	⊕
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3.5mm / 4 pin

1.3 Chassis Overview



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Figure 1-5 Chassis Overview

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions

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

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

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

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the strain relief of the mains cord for proper function.
- Check the electrical DC resistance between the mains plug and the secondary side (only for sets which have a mains isolated power supply):
 1. Unplug the mains cord and connect a wire between the two pins of the mains plug.
 2. Set the mains switch to the "on" position (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 on the set. The reading should be between 4.5 Mohm and 12 Mohm.
 4. Switch "off" the set, and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (⤵), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar

signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with (⏏) and without (⏏) aerial signal. Measure the voltages in the power supply section both in normal operation (⏏) and in stand-by (⏏). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads (μ = $\times 10^{-6}$), nano-farads (n= $\times 10^{-9}$), or pico-farads (p= $\times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

2.3.3 Rework on BGA (Ball Grid Array) ICs

General

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

Device Removal

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

Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA. Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.

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

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

Device Replacement

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

More Information

For more information on how to handle BGA devices, visit this URL: <http://www.atyourservice.ce.philips.com> (needs subscription). After login, select "Magazine", then go to "Workshop Information". Here you will find Information on how to deal with BGA-ICs.

2.3.4 Lead Free Solder

Philips CE is going to produce lead-free sets (PBF) from 1.1.2005 onwards.



Figure 2-1 Lead-free logo

This sign normally has a diameter of 6 mm, but if there is less space on a board also 3 mm is possible.

Regardless of this logo (is not always present), one must treat all sets from this date onwards according to the following rules.

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

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able
 - To reach at least a solder-tip temperature of 400°C.
 - To stabilise the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature around 360°C - 380°C is reached and stabilised at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of

tips will rise drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.

- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to avoid mixed regimes. If not to avoid, clean carefully the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened short before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-)pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
Do not re-use BGAs at all!
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

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

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

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions) You will find this and more technical information within the "Magazine", chapter "Workshop information".

For additional questions please contact your local repair help desk.

2.3.5 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.

3. Directions for Use

You can download this information from the following websites:

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

4. Mechanical Instructions

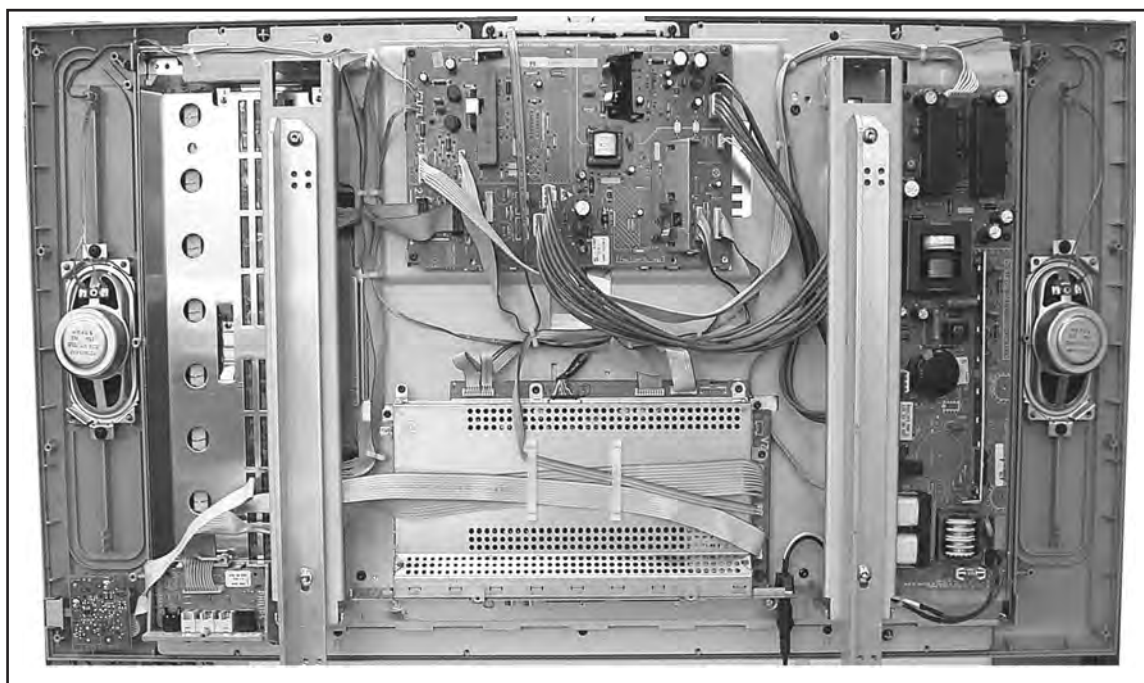
Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Position
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order.

4.1 Cable Dressing



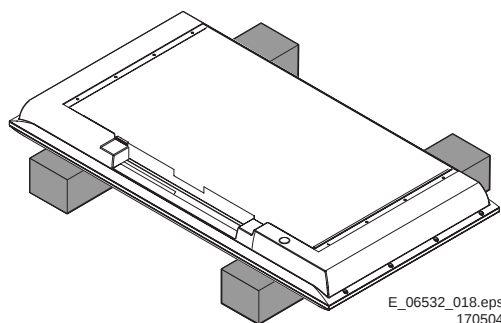
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Figure 4-1 Cable dressing

4.2 Service Position

First, put the TV set in its service position. Therefore, place it upside down on a table top (use a protection sheet or foam bars).

4.2.1 The Foam Bars

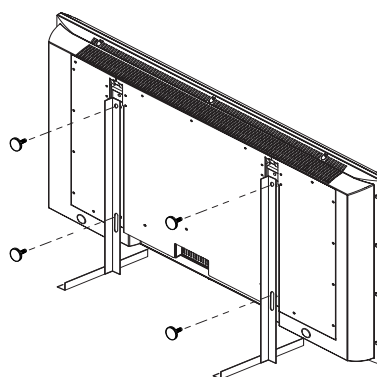


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Figure 4-2 Foam bars

The foam bars (order code 3122 785 90580) can be used for all types and sizes of Flat TVs. By laying the plasma or LCD TV flat on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By first placing a mirror flat on the table under the TV you can easily see if something is happening on the screen.

4.2.2 The Aluminium Stands



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Figure 4-3 Aluminium stands

The aluminium stands (order code 3122 785 90480) can also be used to do measurements and alignments. The stands are also very suitable to perform duration tests. With this stands the set does not take much space, has no risk of over heating, and/or falling. The stands can be mounted and removed quickly and easily with use of the provided screws, which can be tightened and loosened manually without the use of tools.

Caution: Only use the screws provided, otherwise it is possible to damage the monitor inside.

4.3 Assy/Panel Removal

4.3.1 Rear Cover

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

1. Remove the screws, which secure the rear cover. The screws are located at the top, bottom, left and right sides; next to the Side/IO connections and SCART connection. There are also three deeper located screws next to the stands.
2. Lift the rear cover from the cabinet. Make sure that wires and flat foils are not damaged during cover removal.

4.3.2 Side I/O Panel

1. Disconnect the cable from the panel.
2. To replace the complete bracket, remove the two fixation screws on either side of the panel.
3. Release the two fixation clamps and lift the panel out of the bracket.

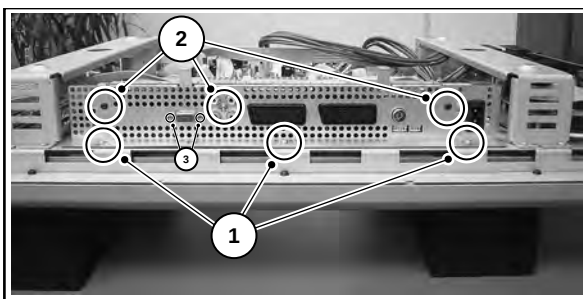
4.3.3 LED + Switch Panel

1. Remove the two fixation screws.
2. Disconnect the cable from the rear of the panel.

4.3.4 Top Control Panel

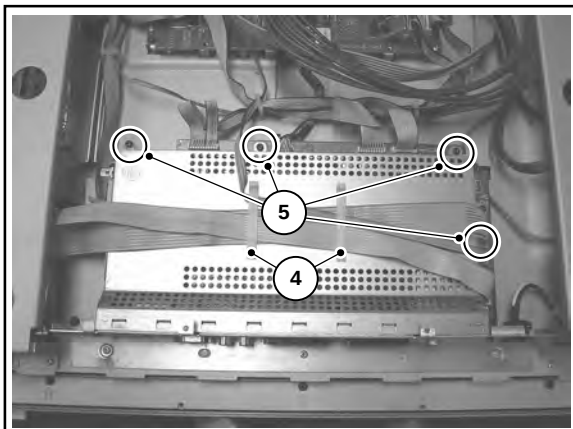
1. Remove the two fixation screws.
2. Release the two fixation clamps and lift the panel out of the bracket.

4.3.5 Small Signal Board (SSB)



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Figure 4-4 SSB Connector plate



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Figure 4-5 Cover shield of the SSB

1. Remove the middle fixation screw (1) from the bottom side of the connector plate (as this holds the SSB bracket).
Note: Sometimes it is easier to loosen the complete connector plate and remove it together with the SSB.
2. Remove all connector fixation screws (2) from the front side of the connector plate.
3. Remove the two female screw locks (3) of the VGA connector.
4. Release the plastic cable clips (4) on the shielding and disconnect all cables from the SSB.
Note: Be careful with the fragile LVDS connector on the SSB.
5. Now, completely remove the SSB (together with all the shieldings) from the set.
6. Once the SSB is out, remove the fixation screws (5) from the shielding.
7. Remove the shielding, it hinges at the left side (acc. photo).
8. Remove the fixation screws that hold the panel, and take out the panel.

Notes:

- Pay special attention to the EMC foam on the SSB shielding. These must be replaced in their initial positions during set re-assembly.
- Insulate the tuner pins, so they cannot touch the shielding (see also figure "SDM Service jumper" in Chapter 5).

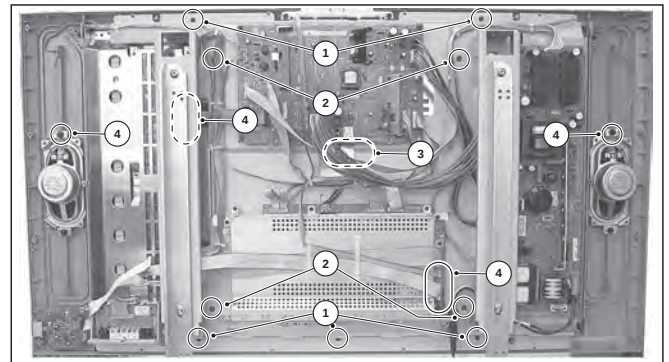
4.3.6 LCD Supply Panel

1. Disconnect all cables from the panel.
2. Remove the fixation screws from the panel.

4.3.7 LCD Stand-by/Audio Panel

1. Disconnect all cables from the panel.
2. Remove the fixation screws from the panel.

4.3.8 LCD Panel



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Figure 4-6 LCD panel disassembly

1. Remove the T10 screws (1) from the mounting frame.
2. Remove all mounting LCD panel T20 screws (2).
3. **Important:** Unplug the LVDS connector (3) at the LCD panel. **Be careful**, as this is a very fragile connector!
4. Unplug the following connectors (4).
 - LCD back light (disconnect at the LCD side)
 - Loudspeaker (easiest to disconnect at the speaker and to release the cable holders a little).
 - Top Control cable (disconnect at SSB side).
 - Cable between LED/Switch panel and SSB.
5. Lift the metal frame (together with all PWBs) from the LCD panel.
6. After removal of the frame, you can lift the LCD display from the set.

4.4 Set Re-assembly

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

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams at the SSB shielding. Make sure that the EMC foams are put correctly in place.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Problems and Solving Tips Related to CSM
- 5.4 ComPair
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Fault Finding and Repair Tips

5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or lxxx. These test points are specifically mentioned in the service manual as "half moons" with a dot in the centre.

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

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

Minimum requirements for ComPair: a Pentium processor, a Windows OS, and a CD-ROM drive (see also paragraph "ComPair").

5.2.1 Service Default Mode (SDM)

Purpose

- To create a predefined setting for measurements.
- To override software protections.
- To start the blinking LED procedure.
- To inspect the error buffer.
- To check the life timer.

Specifications

Table 5-1 SDM default settings

Region	Freq. (MHz)	Default system
Europe, AP-PAL/Multi	475.25	PAL B/G
NAFTA, AP-NTSC, LATAM	61.25 (ch. 3)	NTSC M

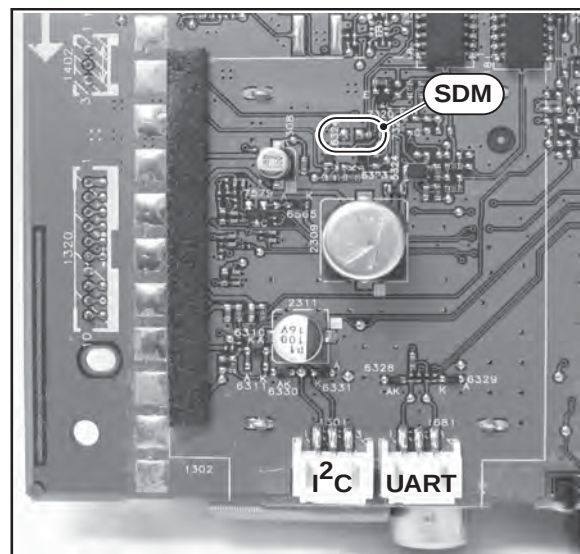
- All picture settings at 50% (brightness, colour contrast, hue).
- Bass, treble and balance at 50%; volume at 25%.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
 - Timer / Sleep timer.
 - Child / parental lock.
 - Blue mute.
 - Hotel / hospital mode.
 - 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: "062596" directly followed by the MENU button (do not allow the OSD display to time out between entries while keying the sequence).
- Short SDM jumper (item 4022, see Figure "Service jumper") on the TV board and apply AC Power. Remove the short after start-up.

Caution: Entering SDM by shorting "Service" jumpers will override the software protections. 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.**



E_14710_062.eps
260804

Figure 5-1 SDM Service jumper

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.

```
00022 LC42EP1 2.03/S42GV1 2.02  SDM
ERR 0 0 0 0 0
OP 000 057 140 032 120 128 000
```

E_14710_006.eps
240604

Figure 5-2 SDM menu (example from LC4.2E)

How to navigate

When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.

How to exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter.

If you turn the television set off by removing the mains (i.e., unplugging the television) or by using the POWER button on the TV set, 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

- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (Tuner, White Tone, Geometry, and Audio).
- NVM Editor.
- ComPair Mode switching.

How to enter

Press the following key sequence on the remote control transmitter: **"062596"** directly followed by the OSD/STATUS/INFO button (do not allow the OSD display to time out between entries while keying the sequence).

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.

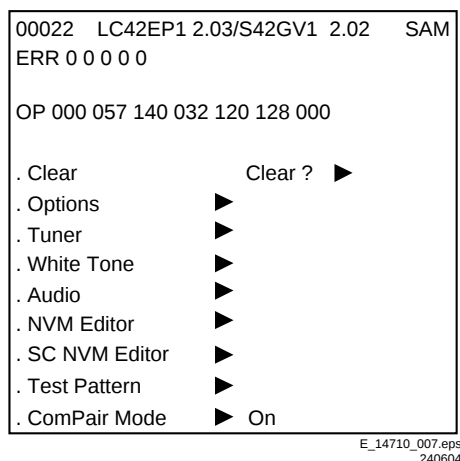


Figure 5-3 SAM menu (example from LC4.2E)

Menu explanation

1. **LLLLL**. This represents the run timer. The run timer counts normal operation hours (including "on/off" switching), but does not count stand-by hours.
2. **AAAABCD-X.YY/EEEEEE_F.GG**. This is the software identification of the Main/Scaler microprocessor:
 - **A**= the chassis name.
 - **B**= the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
 - **C**= the software diversity:
 - **Europe:** T= 1 pg TXT, F= Full TXT, V= Voice ctrl.
 - **LATAM and NAFTA:** N= Stereo non-dBx, S= Stereo dBx.
 - **Asian Pacific:** T= TXT, N= non-TXT, C= NTSC.
 - **ALL regions:** M= mono, D= DVD, P= Pixel Plus, Q= Mk2.
 - **D**= the language cluster number.
 - **X**= the Main software version number (updated with a major change that is incompatible with previous versions).

- **YY**= the sub software version number (updated with a minor change that is compatible with previous versions).
 - **EEEEEE**= the Scaler SW cluster
 - **F**= the Scaler SW version no.
 - **GG**= the sub-version no.
3. **SAM**. Indication of the Service Alignment Mode.
 4. **Error Buffer (ERR)**. Shows all errors detected since the last time the buffer was erased. Five errors possible.
 5. **Option Bytes (OP)**. Shows all option settings. See "Options" in the Alignments section for a detailed description. Seven codes are available.
 6. **Clear**. Erases the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
 7. **Options**. Used to set the option bits. See "Options" in the Alignments section for a detailed description.
 8. **Tuner**. Used to align the tuner. See "Tuner" in the Alignments section for a detailed description.
 9. **White Tone**. Used to align the white tone. See "White Tone" in the Alignments section for a detailed description.
 10. **Audio**. No audio alignment is necessary for this television set.
 11. **NVM Editor**. Can be used to change the NVM data in the television set.
 12. **SC NVM Editor**. Can be used to edit Scaler NVM.
 13. **Test Pattern**. For future use.
 14. **ComPair**. Can be used to switch the television to "In System Programming" (ISP) mode, for software uploading via ComPair.
Caution: When this mode is selected without ComPair connected, the TV will be blocked. Remove the AC power to reset the TV.

How to navigate

- In SAM, select menu items with the CURSOR 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 CURSOR UP/DOWN keys to display the next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
 - Activate the selected menu item.
 - Change the value of the selected menu item.
 - Activate the selected submenu.
- 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 button again.
- When you press the MENU key in while in a submenu, you will return to the previous menu.

How to store SAM settings

To store the settings changed in SAM mode, 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 on the television set.

5.2.3 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TV's operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. 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: "123654" (do not allow the OSD display to time out between entries while keying the sequence).

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

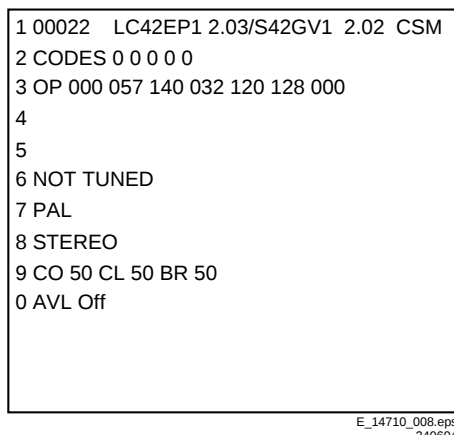


Figure 5-4 CSM menu (example from LC4.2E)

Menu explanation

1. Indication of the decimal value of the operation hours counter, Main/Scaler software version (see "Service Alignment Mode" for an explanation), and service mode (CSM= Customer Service Mode).
2. Displays the last five errors detected in the error code buffer.
3. Displays the option bytes.
4. Displays the type number version of the set (option).
5. Reserved.
6. Indicates the television is receiving an "IDENT" signal on the selected source. If no "IDENT" signal is detected, the display will read "NOT TUNED"
7. Displays the detected Colour system (e.g. PAL/NTSC).
8. Displays the detected Audio (e.g. stereo/mono).
9. Displays the picture setting information.
10. Displays the sound setting information.

How to exit

To exit CSM, use one of the following methods:

- Press the MENU, STATUS (or EXIT/INFO/[i+]), 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 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 CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys (if necessary) to select BRIGHTNESS.
6. Press the CURSOR LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the CURSOR UP/DOWN keys to select PICTURE.
8. Press the CURSOR 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 CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select SHARPNESS.
6. Press the CURSOR 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

Check CSM line 6. 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 2, 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 CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select COLOUR.
6. Press the CURSOR RIGHT key to increase the COLOUR 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 CURSOR UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the CURSOR LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the CURSOR UP/DOWN keys to select PICTURE.
6. Press the CURSOR 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 Force/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 fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS232) cable.

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

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

- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I²C/UART level. ComPair can access the I²C/UART bus of the television. ComPair can send and receive I²C/UART commands to the micro controller of the television. In this way, it is possible for

ComPair to communicate (read and write) to devices on the I²C/UART buses of the TV-set.

- Manually (by asking questions to you): Automatic diagnosis is only possible if the 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 fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the fault finding process.

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

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

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the (European) Dealer Service Tool (DST).
- If both ComPair and Force/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

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

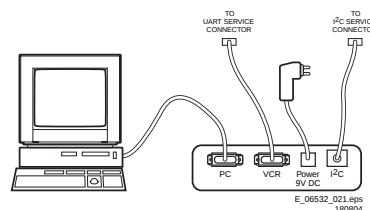


Figure 5-5 ComPair interface connection

5.4.4 How To Order

ComPair order codes (EU/AP/LATAM):

- 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 onwards).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003), 3122 785 60130 (year 2004).
- ComPair firmware upgrade IC: 3122 785 90510.
- Transformer (non-UK): 4822 727 21632.
- Transformer UK: 4822 727 21633.
- ComPair interface cable: 3122 785 90004.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630

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

5.5 Error Codes

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 SAM (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 SAM menu:
 - To enter SAM, press the following key sequence on the remote control transmitter: "**062596**" directly followed by the OSD/STATUS button (do not allow the OSD display to time out between entries while keying the sequence).
 - Make sure the menu item CLEAR is highlighted. Use the CURSOR UP/DOWN buttons, if necessary.
 - Press the CURSOR RIGHT button to clear the error buffer. The text on the right side of the "CLEAR" line will change from "CLEAR?" to "CLEARED"
- If an error does not re-occur within 50 hours it is deleted from the error buffer.

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 5-2 Error code overview

Error	Device	Error description	Check item	Diagram
0	Not applicable	-	-	-
1	Not applicable	-	-	-
2	Not applicable	-	-	-
3	Not applicable	-	-	-
4	GM1501 Scaler Flash-ROM	I ² C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/empty	7401 7530	A7 A11
5	Not applicable	+5V protection	7930	A6
6	I ² C bus	General I ² C error	7011, 3088, 3096	A2
7	Not applicable	-	-	-
8	M24C32	I ² C error while communicating with the Scaler EEPROM	7531	A11
9	M24C16	I ² C error while communicating with the EEPROM	7099	A2
10	Tuner	I ² C error while communicating with the PLL tuner	1302, 3302, 3303, 3327	A1
11	Not applicable	-	-	-
12	Not applicable	-	-	-
13	Not applicable	-	-	-
14	K4D263238M	Read-write error with the Scaler SDRAM	7501	A10
15	TDA9178T/N1	I ² C error while communicating with Histogram	7560	A3

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 front LED will blink the contents of the error-buffer:

- The LED blinks with as many pulses as the error code number, followed by a time period of 1.5 seconds, in which the LED is "off".
- Then this sequence starts is repeated.

Any RC5 command terminates this sequence.

Example of error buffer: **12 9 6 0 0**

After entering SDM, the following occurs:

- 1 long 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 blink of 1.5 seconds to finish the sequence,
- The sequence starts again at 12 short blinks.

5.7 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.

5.7.1 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. With this option, single bytes can be changed.

Table 5-3 NVM editor overview

	Hex	Dec	Description
.ADR	0x000A	10	Existing value
.VAL	0x0000	0	New value
.Store	Store?		

5.7.2 Load default NVM values

In case a blank NVM is placed or when the NVM content is corrupted, default values can be downloaded into the NVM. After the default values are downloaded it will be possible to start up and to start aligning the TV set. This is no longer initiated automatically; to initiate the download the following action has to be performed:

- Switch "off" the TV set via the AC Power switch.
- Short circuit the SDM jumpers (keep short-circuited).
- Press P+ or Ch+ on the local keyboard (and keep it pressed).
- Switch on the TV set via the AC Power switch.
- When the set has started, the P+/Ch+ button can be released and the short circuit of the SDM jumpers can be removed.
- The red LED will be on continuously to indicate that the download is initiated (normally when SDM is activated the red LED will start with the Blinking LED sequence).
- Wait +/- 30 s (time needed to download default values to the NVM).

5.7.3 Tuner and IF

No Picture in RF mode

- Check whether picture is present in AV. If not, go to Video processing troubleshooting section.
- If present, check that the Option settings are correct.
- Check that all supply voltages are present.
- Check if I²C lines are working correctly (3.3V).
- Manually store a known channel and check if there is IF output at Tuner pin 11.
- Feed in 105 dBuV at Tuner pin 11 and check whether there is RGB output from Video Processing IC. If yes, Tuner may be defect. Replace Tuner.

Required system is not selected correctly

- Check whether a Service jumper (#4022, 0805 size) is present. If yes, remove it.

5.7.4 Video Processing

No power

- Check +12 V and 3V3 at position 1910.
- If no supply, check the connector 1910.
- If it is correct, check the power supply board.

Power supply is correct but no green LED

- Check if connectors 1005 and 1601 are properly inserted.
- If yes, check if the 3V3 is present.

No picture display

- Check the RGB signal.
- If it is present, check 3-IC7016 (NE555).
- If it has output, the problem is in SCALER part.
- Otherwise, check H-out on pin 2 of NE555. If the input signal of pin 2 is present, but no output, the IC is defect.

Note:

- If the H-out (pin 67) doesn't have signal or the level is low, check the output of NE555 (pin 3) during start up.
- If the H-out (pin 67) has a signal (or has a signal for a very short time), change IC7016 (NE555).

No TV but PC is present

- Check if HSYNC and VSYNC are present at pin 3 of 7017 and 7015.
- If they are present, check RGB output.
- If there is no RGB output, the IC TDA120xx can be defect.

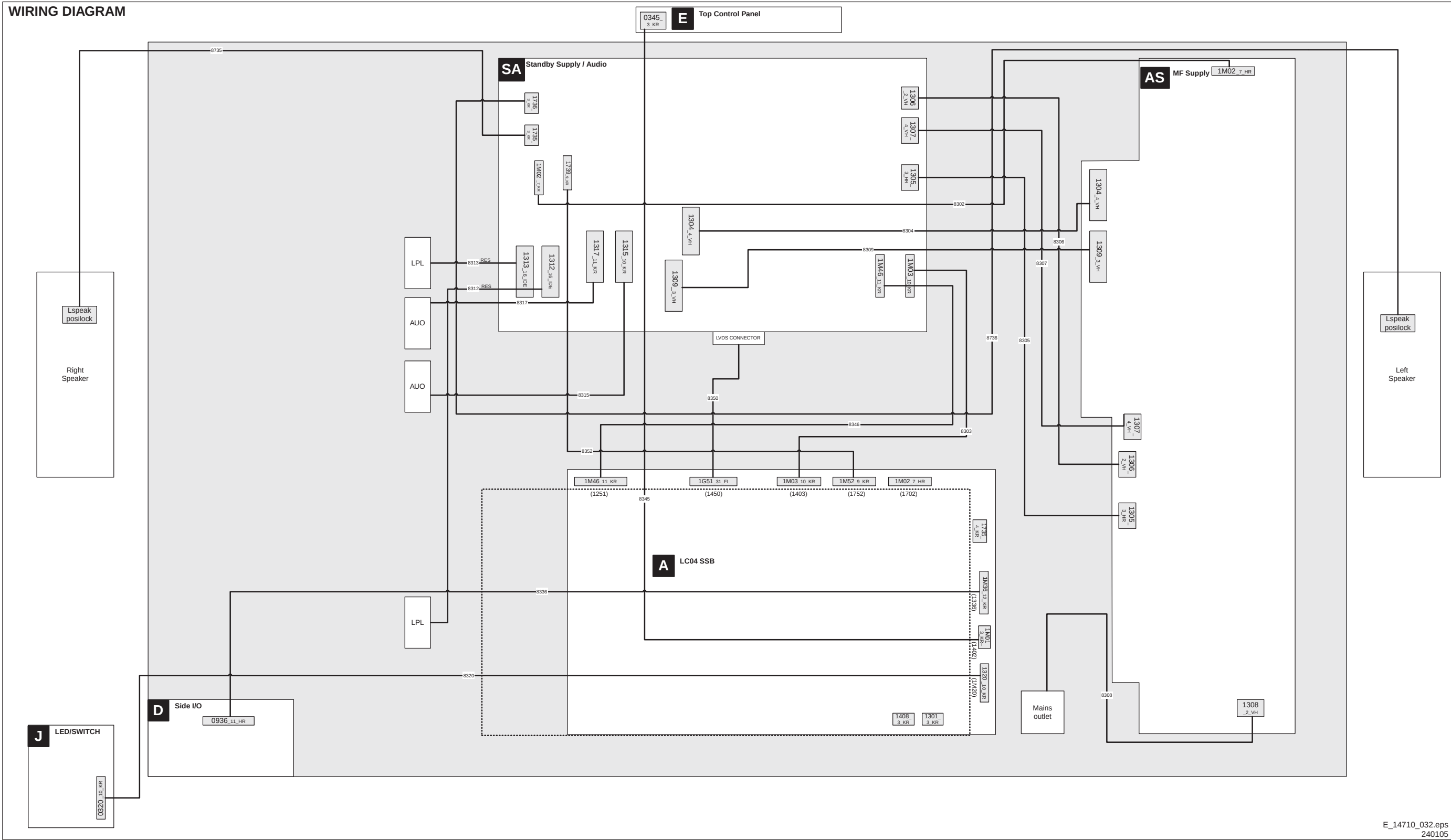
5.7.5 Power Supply

This power supply contains two fuses. One is near the AC Power (or mains) inlet connector 1308 and the other is near connector 1307.

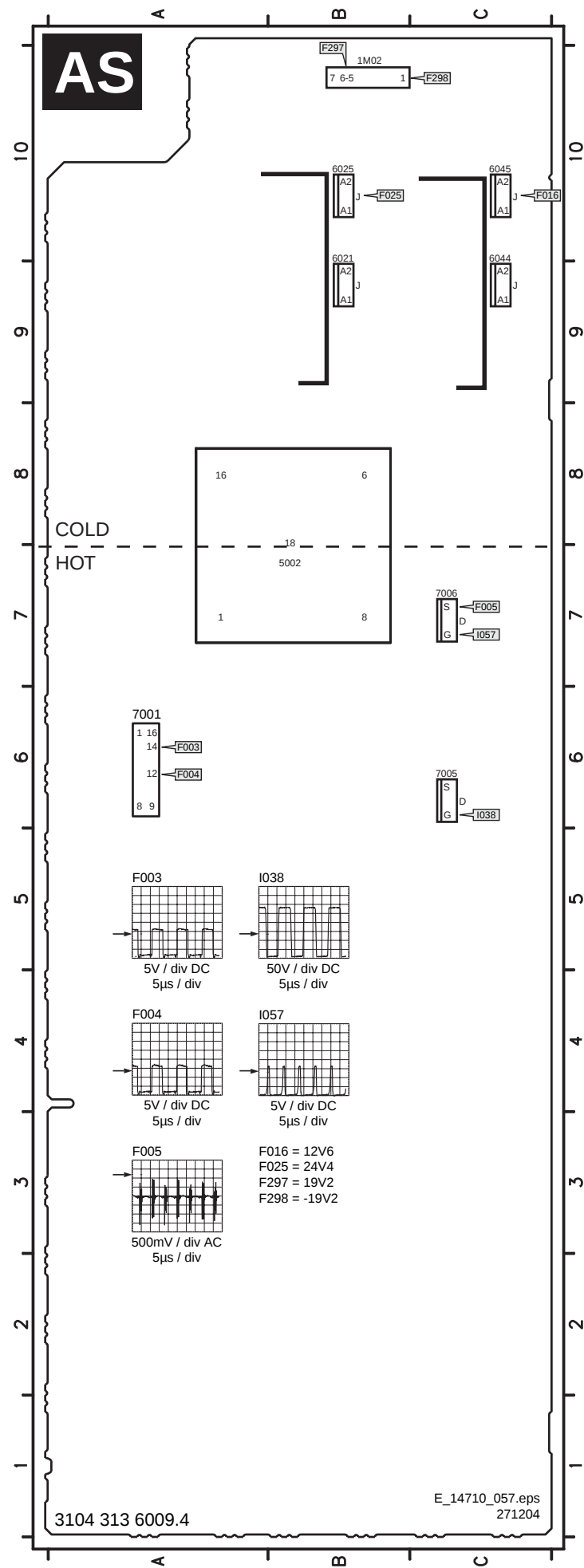
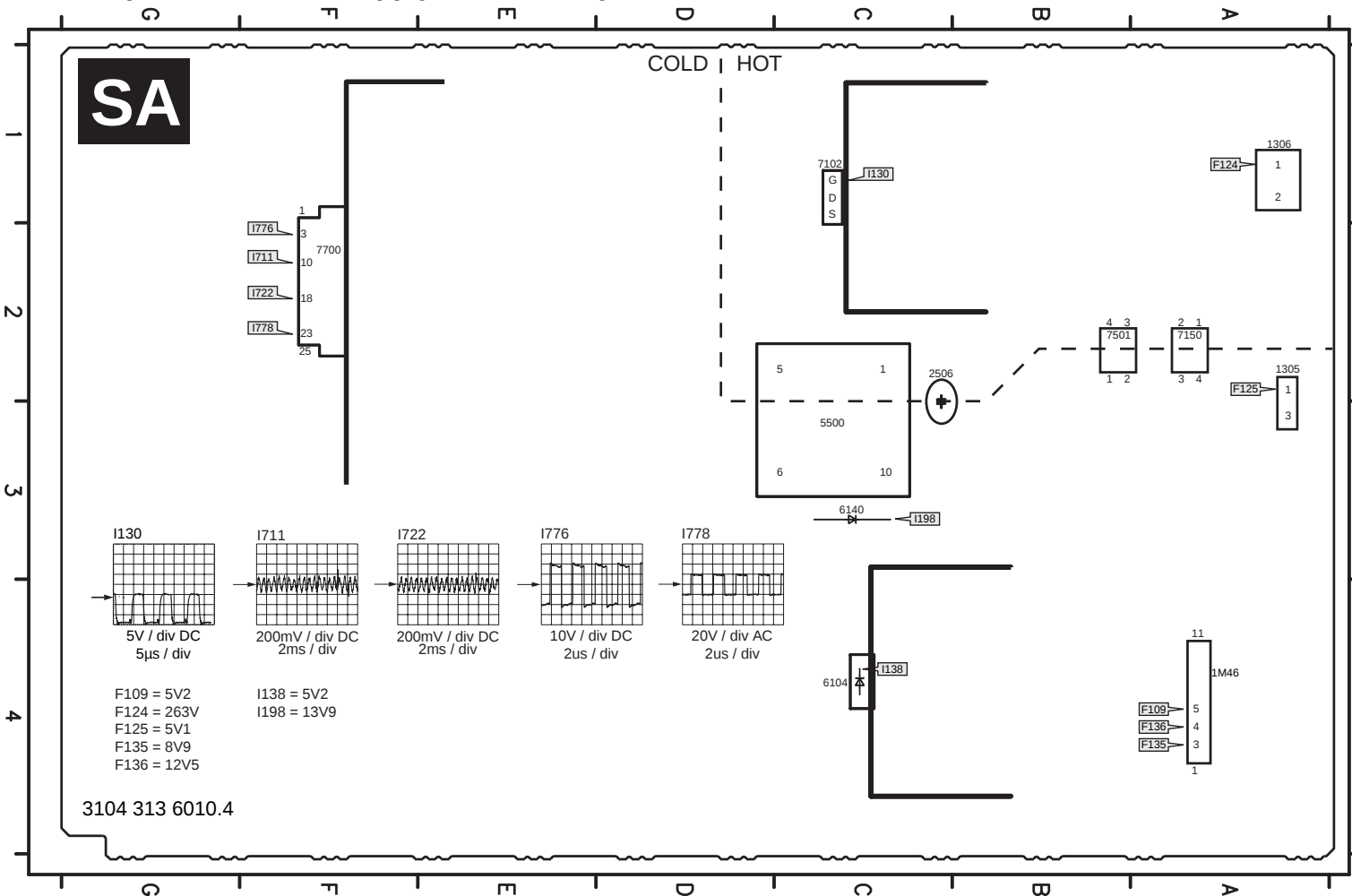
- Check with power supply in "off" state by means of ohmic measurement.
- Fuse 1400 may open in case of severe lightning strikes and/or failures in the power supply.
- Fuses 1401 may open in case of a problem with the Stand-by Supply. Replacement of the fuse is needed, but not before the cause of the overload conditions is resolved.

6. Block Diagrams, Testpoint Overviews, and Waveforms

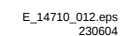
Wiring Diagram



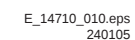
Testpoint Overview Supply and Standby



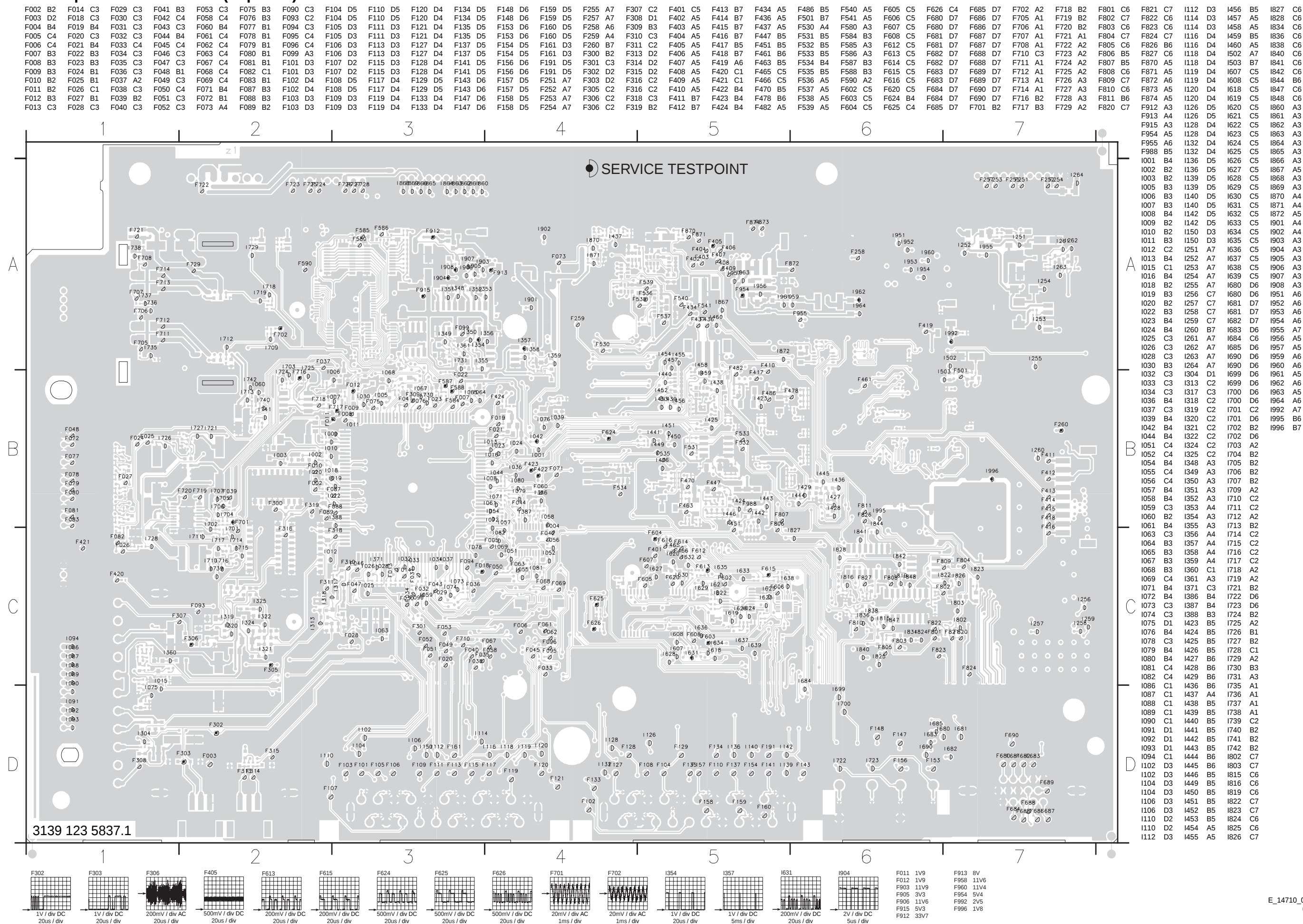
Block Diagram Audio and Video



Block Diagram Audio and Video

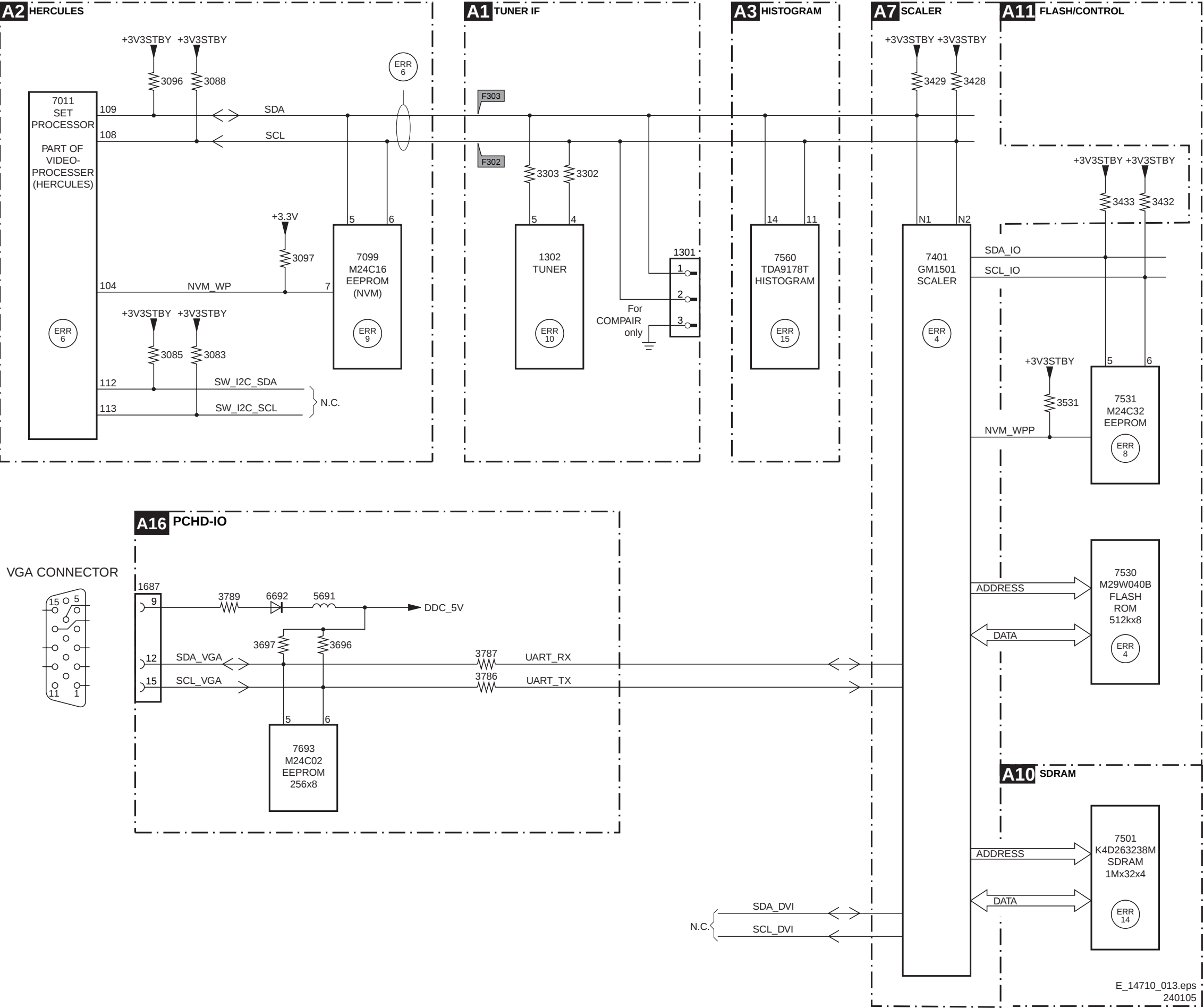


Testpoint Overview SSB (Top Side)

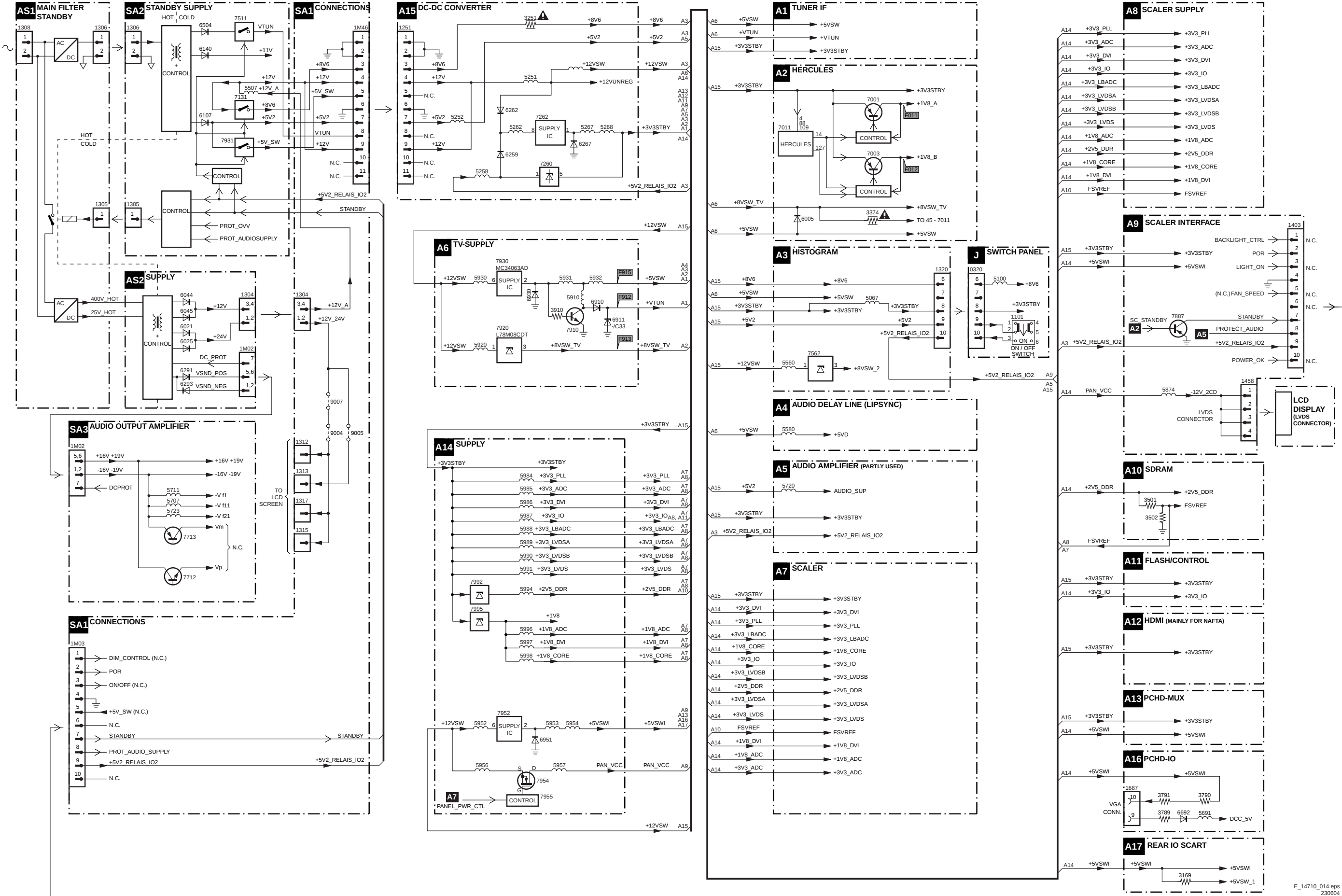


I2C IC Overview

I2C BUS INTERCONNECTION DIAGRAM

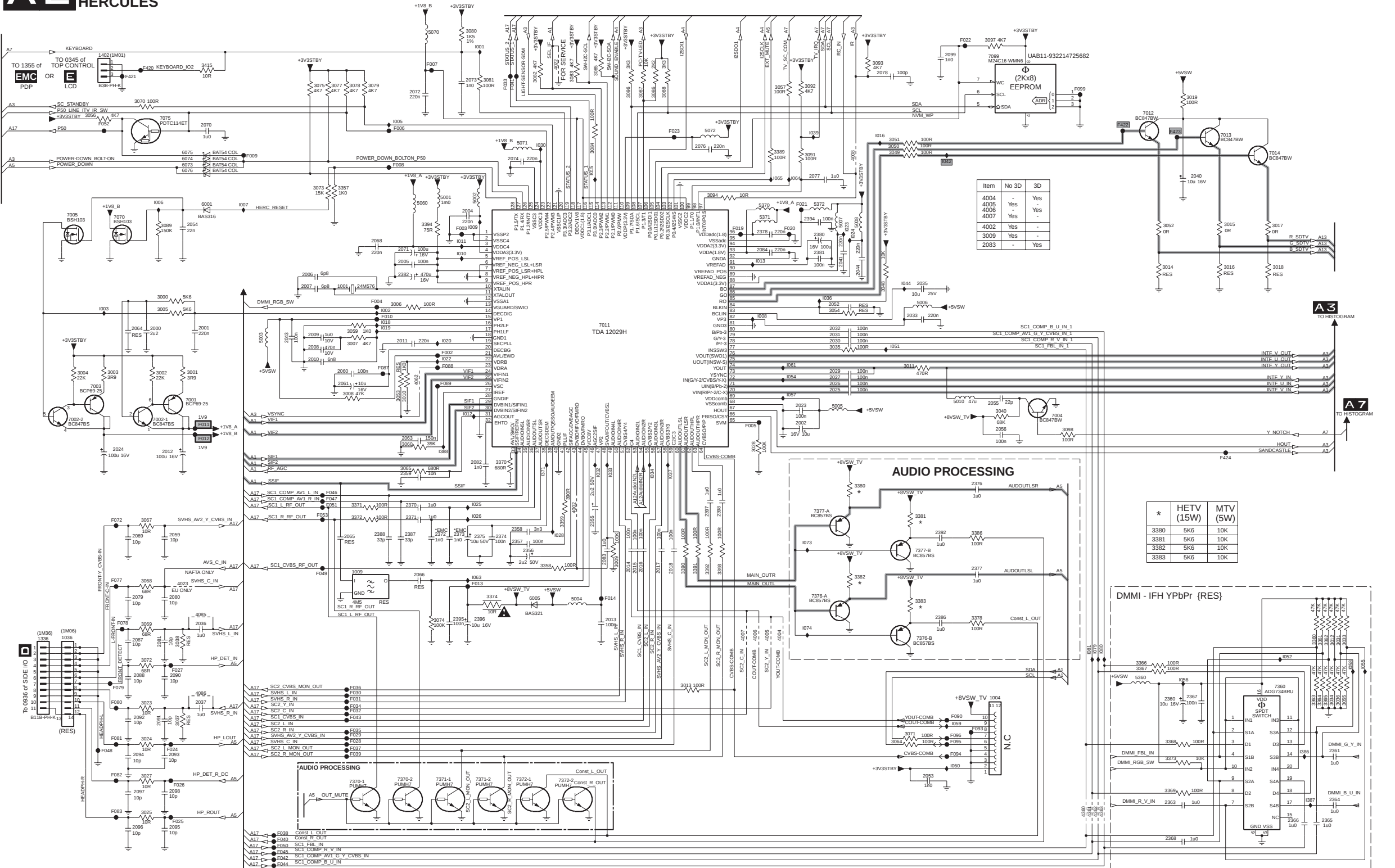


Supply Voltage Overview



SSB: Histogram and Hercules

A2 HISTOGRAM & HERCULES



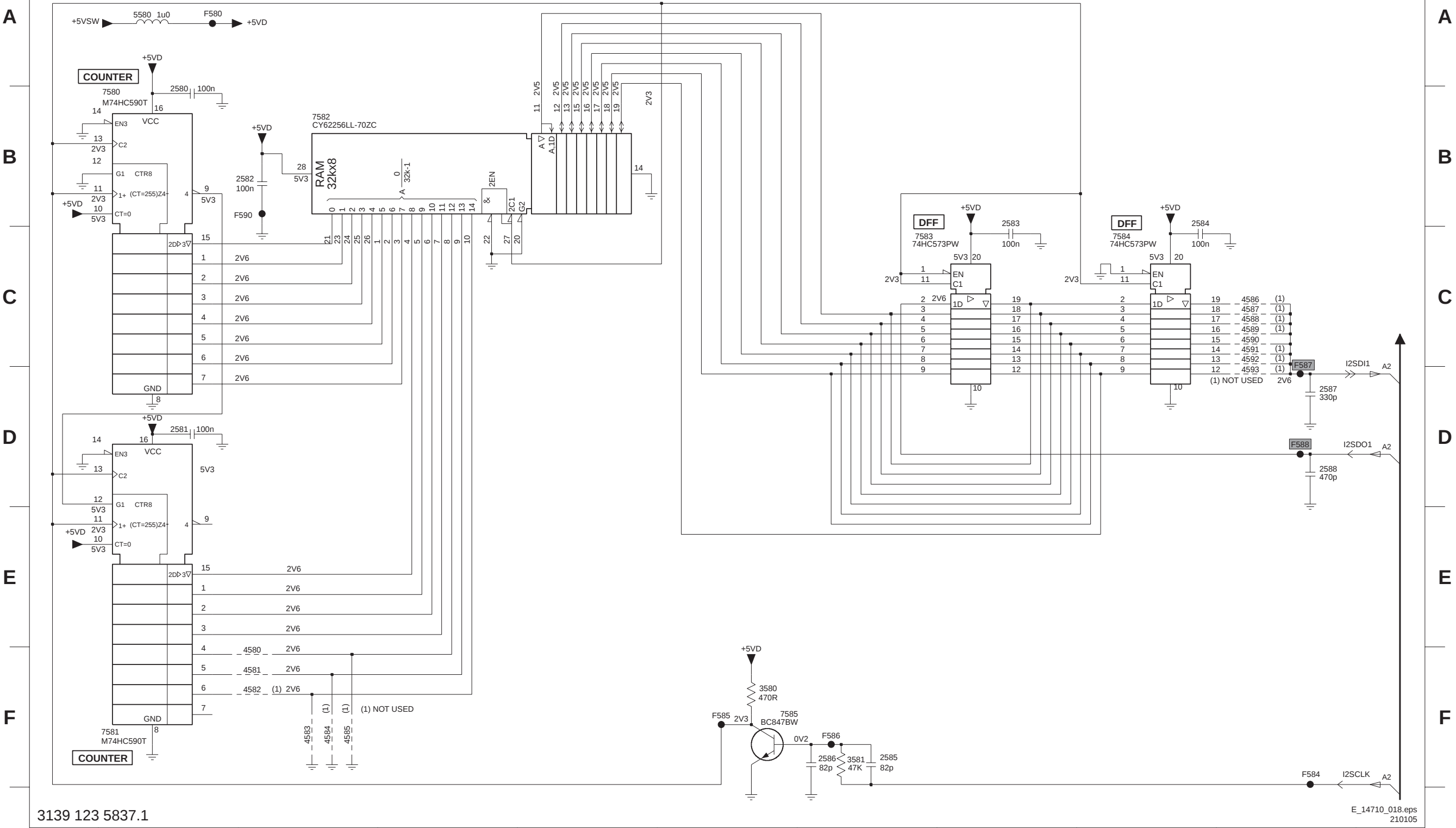
3139 123 5837.1

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020904

1001 D4	3050 C11	F022 A12
1004 I12	F023 B8	F023 B8
1009 H4	3052 C14	F024 J2
1036 H1	3053 F5	F025 K2
1336 H1	3054 E10	F026 J2
1402 B1	3055 I16	F027 I2
2000 E2	3056 B1	F028 J4
2001 E3	3057 B9	F029 J4
2002 F10	3059 E4	F030 I4
2004 C6	3060 F5	F031 I4
2005 D5	3061 J11	F032 I4
2006 D4	3065 F5	F033 B6
2007 D4	3067 G2	F034 I4
2008 E4	3068 H2	F035 I4
2009 E4	3069 H2	F036 I4
2010 E4	3070 B2	F037 J4
2011 E5	3071 J11	F038 K4
2012 F3	3072 I2	F039 J4
2013 H7	3073 C4	F040 K4
2014 H8	3074 H5	F041 B6
2015 H8	3075 B4	F042 K4
2016 H8	3077 B4	F043 I4
2017 H8	3078 B4	F044 K4
2018 H8	3079 B5	F045 K4
2023 F10	3080 A6	F046 G4
2024 F2	3081 B6	F047 G4
2025 E10	3082 B7	F048 J2
2026 E10	3083 B7	F049 H4
2027 E10	3084 C7	F050 K4
2029 E10	3085 B7	F051 G4
2030 E10	3086 B8	F052 B1
2031 E10	3087 B8	F053 G4
2032 E10	3088 B8	F072 G2
2033 E11	3089 D2	F077 H2
2035 D11	3091 C10	F078 H2
2036 H3	3092 B10	F079 I2
2037 I3	3093 B11	F080 I2
2040 C14	3094 C14	F081 J2
2041 D10	3096 B8	F082 J2
2043 E4	3097 A12	F083 J2
2044 D10	3098 H12	F087 E5
2052 D10	3357 C4	F088 E6
2053 J11	3358 H7	F089 E6
2054 C3	3359 G2	F090 I12
2055 F12	3360 H16	F093 I12
2056 F12	3361 H16	F094 J12
2059 G2	3362 H16	F095 J12
2060 E4	3363 I16	F096 J12
2061 E4	3364 I16	F099 B13
2063 F5	3365 I16	F420 B2
2064 E2	3366 I14	F421 B2
2065 G4	3367 I14	F422 B14
2066 H5	3368 J14	F423 B14
2068 D5	3369 J14	F424 F15
2069 G2	3370 F5	I001 A6
2070 B3	3371 G4	I002 E5
2071 D5	3372 G4	I003 D1
2072 B5	3373 J14	I005 B5
2073 B6	3374 H6	I006 C2
2074 C6	3378 H12	I007 C3
2076 C9	3380 G10	I008 E9
2077 C10	3381 G11	I009 D6
2078 B11	3382 H10	I010 D6
2079 H2	3383 H11	I011 D6
2080 H2	3384 I12	I012 F6
2081 H2	3389 C9	I013 D9
2082 F5	3390 H8	I015 C7
2083 G7	3391 H8	I016 B11
2084 D9	3392 H9	I018 E5
2087 H2	3393 H9	I019 E5
2088 I2	3394 C5	I020 E6
2090 I2	3415 B3	I022 E6
2091 I2	4002 G7	I023 D10
2092 I2	4003 G7	I024 D10
2093 J2	4005 H9	I025 G6
2094 J2	4006 H9	I026 G6
2095 K2	4007 H9	I028 G7
2096 K2	4008 C10	I030 C7
2097 J2	4022 B7	I032 F7
2098 J2	4023 H2	I033 F7
2099 A11	4062 E5	I034 F8
2355 G7	4085 H3	I036 D10
2356 G6	4086 I3	I037 F8
2357 G6	4360 J13	I039 B10
2358 G6	4361 J13	I042 C11
2359 F5	4362 J13	I044 D11
2360 I14	4363 J13	I051 E11
2361 J16	5001 C6	I052 I15
2363 J14	5002 C6	I054 E10
2364 J16	5003 E3	I055 I16
2365 J16	5004 H7	I056 I14
2366 J16	5005 C6	I057 F10
2367 I14	5006 D11	I058 I16
2368 K14	5007 C10	I059 I12
2370 G5	5008 C10	I060 I12
2371 G5	5010 F12	I061 E10
2372 G5	5060 C5	I063 H6
2373 G6	5070 A5	I064 C10
2374 G6	5071 C6	I065 C9
2375 G6	5072 B9	I073 G10
2376 G12	5360 I14	I074 H10
2377 H12	5370 C9	I079 H13
2378 D9	5371 C9	I080 H13
2380 D10	5372 C10	I081 I13
2381 D10	6001 C3	I371 F7
2382 D5	6005 H7	I386 J16
2386 H11	6073 C2	I387 I16
2387 G5	6074 C2	I388 F5
2388 G5	6075 C2	
2392 G11	6076 C2	
2394 C10	7001 F2	
2395 H6	7002-1 F2	
2396 H6	7002-2 F1	
2397 G9	7003 E1	
2398 G9	7004 F13	
3000 D2	7005 C1	
3001 E3	7011 E7	
3002 E2	7012 B14	
3003 E2	7013 B15	
3004 E1	7014 C15	
3005 D2	7070 C2	
3006 D5	7071 C2	
3007 E4	7099 B12	
3008 F4	7360 I15	
3009 G8	7370-1 J4	
3010 F5	7370-2 J5	
3011 E11	7371-1 J5	
3012 H16	7371-2 J6	
3013 I8	7372-1 J6	
3014 D14	7372-2 J7	
3015 C15	7376-A H10	
3016 D15	7376-B H11	
3017 C15	7377-A G10	
3018 D15	7377-B G11	
3019 B14	F002 E6	
3023 I2	F003 E6	
3024 J2	F004 D5	
3025 J2	F005 F9	
3027 J2	F006 B5	
3028 F9	F007 B5	
3031 H16	F008 C5	
3033 H16	F009 C3	
3034 I16	F010 E5	
3035 E10	F011 F3	
3036 I16	F012 F3	
3037 I2	F013 H6	
3038 H2	F014 H7	
3040 F12	F019 D9	
3048 D11	F020 D10	
3049 C11	F021 C10	

SSB: Audio Delay line (Lip sync)

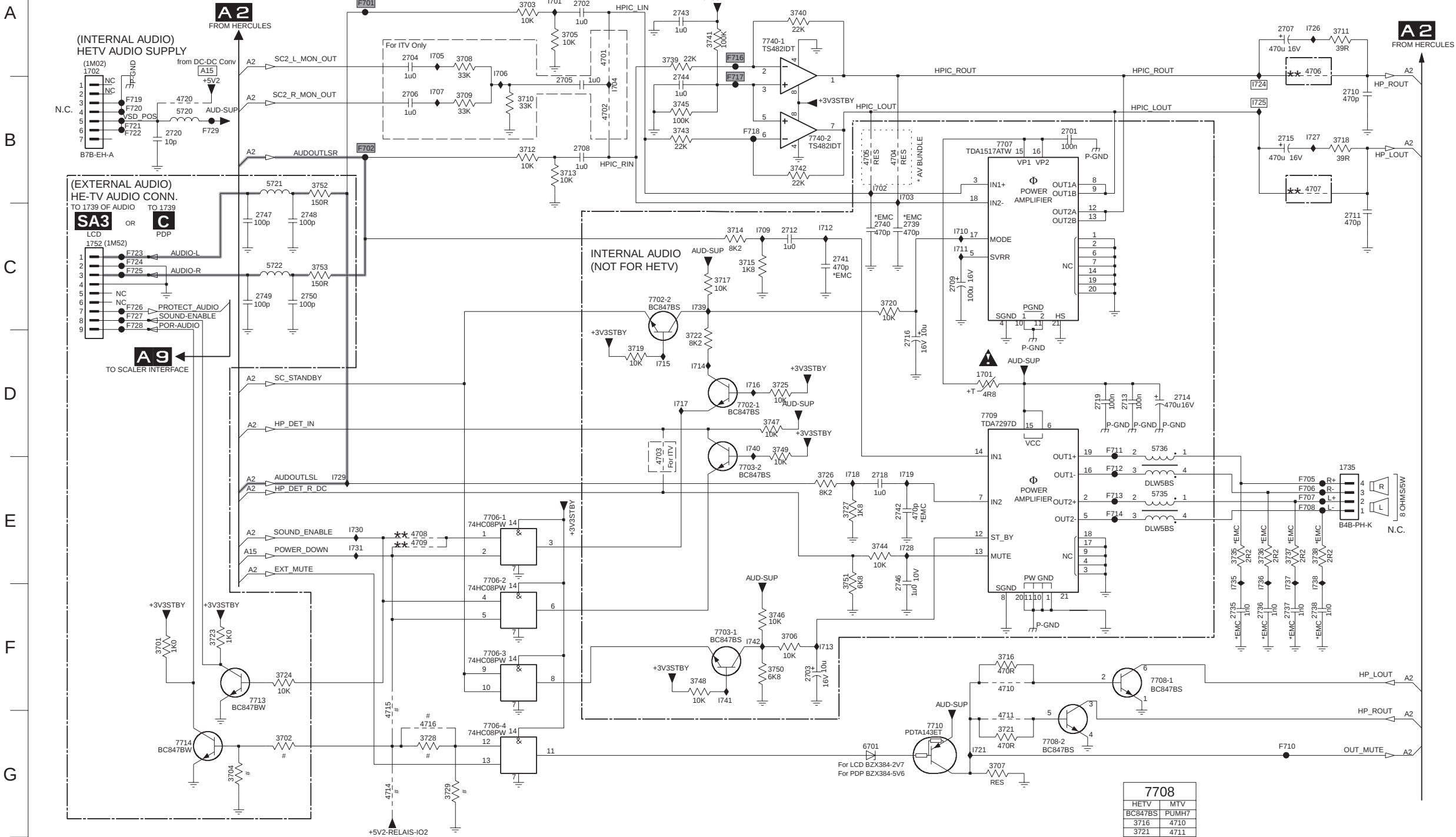
A 4 AUDIO DELAY LINE (Lip sync)



- 2580 B1
- 2581 D1
- 2582 B2
- 2583 B7
- 2584 B8
- 2585 F6
- 2586 F6
- 2587 D9
- 2588 D9
- 3580 F5
- 3581 F6
- 4580 F2
- 4581 F2
- 4582 F2
- 4583 F2
- 4584 F2
- 4585 F2
- 4586 C9
- 4587 C9
- 4588 C9
- 4589 C9
- 4590 C9
- 4591 C9
- 4592 C9
- 4593 D9
- 5580 A1
- 7580 B1
- 7581 F1
- 7582 B2
- 7583 C6
- 7584 C8
- 7585 F6
- F580 A1
- F584 F9
- F585 F5
- F586 F6
- F587 D9
- F588 D9
- F590 B2

SSB: Audio Amplifier

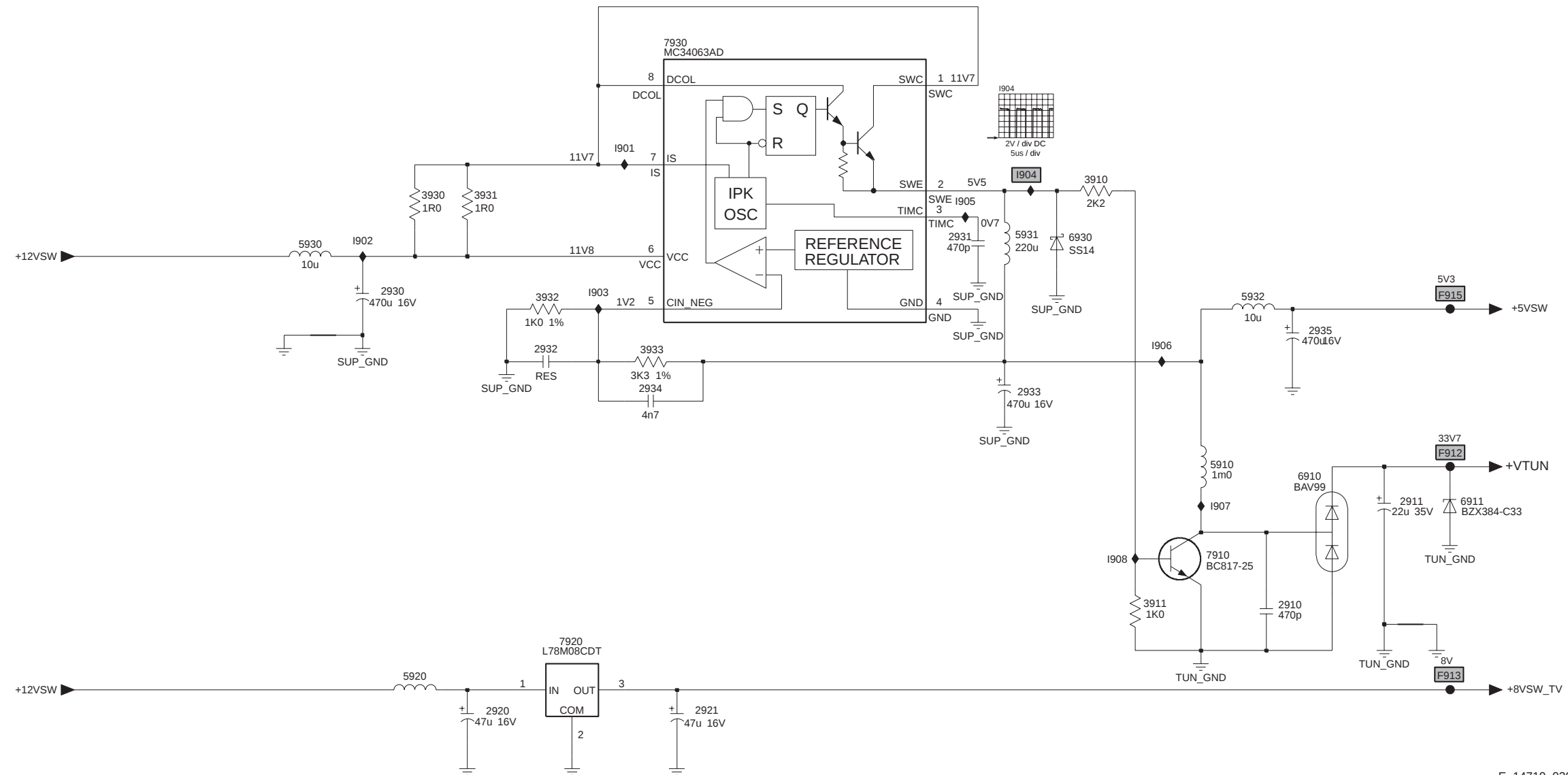
A5 AUDIO AMPLIFIER



- 1701 D8
- 1702 A1
- 1735 E11
- 1752 C1
- 2701 B8
- 2702 A5
- 2703 F6
- 2704 A3
- 2705 B5
- 2706 B3
- 2707 A10
- 2708 B5
- 2709 C8
- 2710 B11
- 2711 C11
- 2712 C6
- 2713 D9
- 2714 D9
- 2715 B10
- 2716 D7
- 2718 E7
- 2719 D9
- 2720 B1
- 2735 F10
- 2736 F10
- 2737 F10
- 2738 F10
- 2739 C7
- 2740 C7
- 2741 C7
- 2742 E7
- 2743 A5
- 2744 B5
- 2746 E7
- 2747 C2
- 2748 C2
- 2749 C2
- 2750 C2
- 3701 F1
- 3702 G2
- 3703 A4
- 3704 G2
- 3705 A5
- 3706 F6
- 3707 G8
- 3708 A4
- 3709 B4
- 3710 B4
- 3711 A11
- 3712 B4
- 3713 B4
- 3714 C6
- 3715 C6
- 3716 F8
- 3717 C6
- 3718 B11
- 3719 D5
- 3720 C7
- 3721 G8
- 3722 D6
- 3723 F2
- 3724 F2
- 3725 D6
- 3726 E7
- 3727 E7
- 3728 G3
- 3729 G4
- 3735 E10
- 3736 E10
- 3737 E10
- 3738 E10
- 3739 A5
- 3740 A6
- 3741 A6
- 3742 B6
- 3743 B5
- 3744 E7
- 3745 B5
- 3746 F6
- 3747 D6
- 3748 F6
- 3749 D6
- 3750 F6
- 3751 F7
- 3752 B3
- 3753 C3
- 4701 A5
- 4702 B5
- 4703 D5
- 4704 B7
- 4705 B7
- 4706 A10
- 4707 B10
- 4708 E3
- 4709 E3
- 4710 F8
- 4711 G8
- 4714 G3
- 4715 F3
- 4716 G3
- 4720 B1
- 5720 B1
- 5721 B2
- 5722 C2
- 5735 E9
- 5736 D9
- 7702-1 D6
- 7702-2 C5
- 7703-1 F6
- 7703-2 E6
- 7706-1 E5
- 7706-2 E4
- 7706-3 F4
- 7706-4 G4
- 7707 B8
- 7708-1 F9
- 7708-2 G8

SSB: TV Supply

A6 TV-SUPPLY



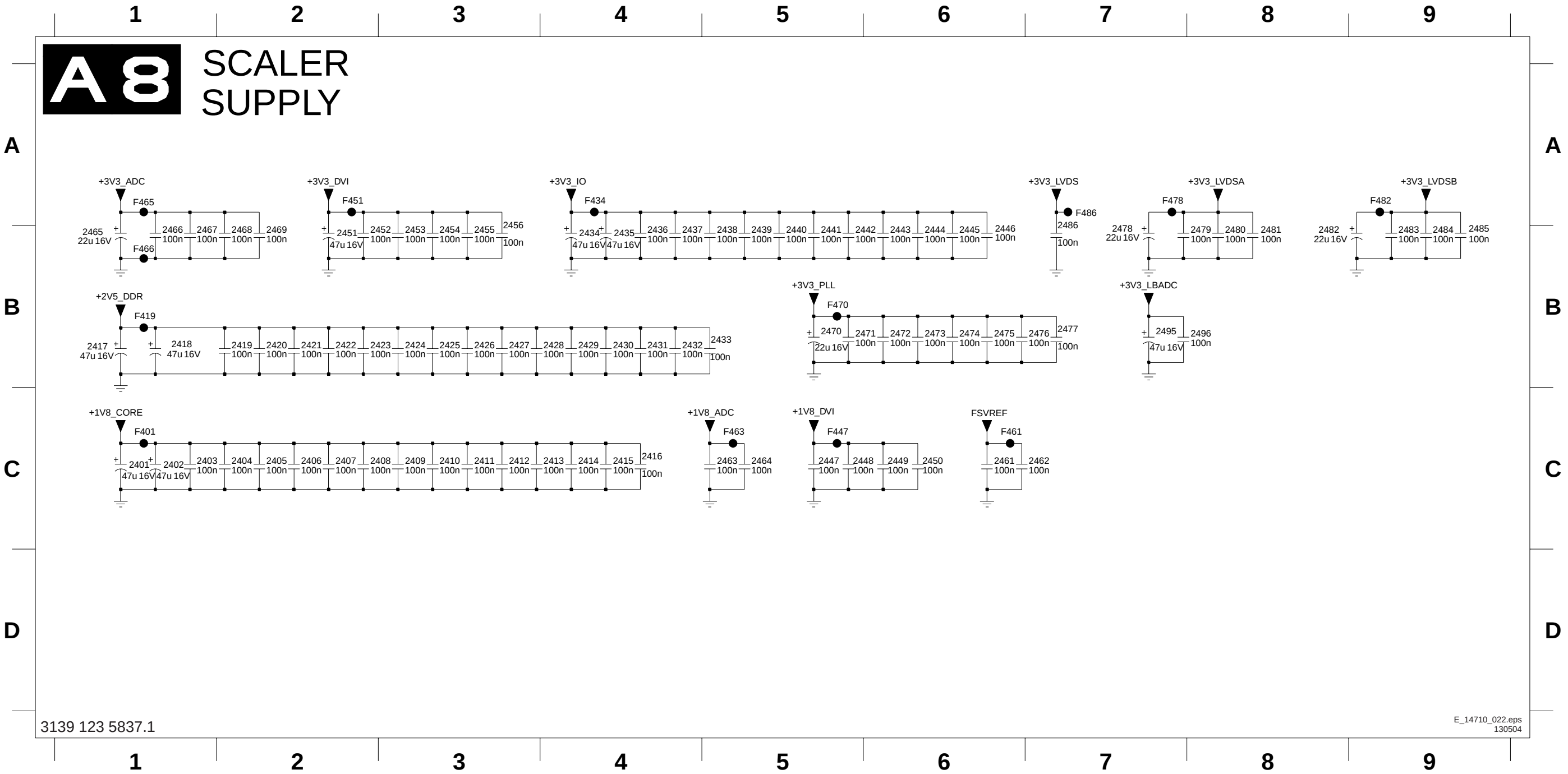
2910 D8
2911 D9
2920 E4
2921 E5
2930 C3
2931 B6
2932 C4
2933 C7
2934 C4
2935 C8
3910 B7
3911 D7
3930 B3
3931 B4
3932 C4
3933 C4
5910 D8
5920 E3
5930 C3
5931 B7
5932 C8
6910 D8
6911 D9
6930 C7
7910 D7
7920 E4
7930 A5
F912 D9
F913 E9
F915 C9
I901 B4
I902 C3
I903 C4
I904 B7
I905 B6
I906 C7
I907 D8
I908 D7

3139 123 5837.1

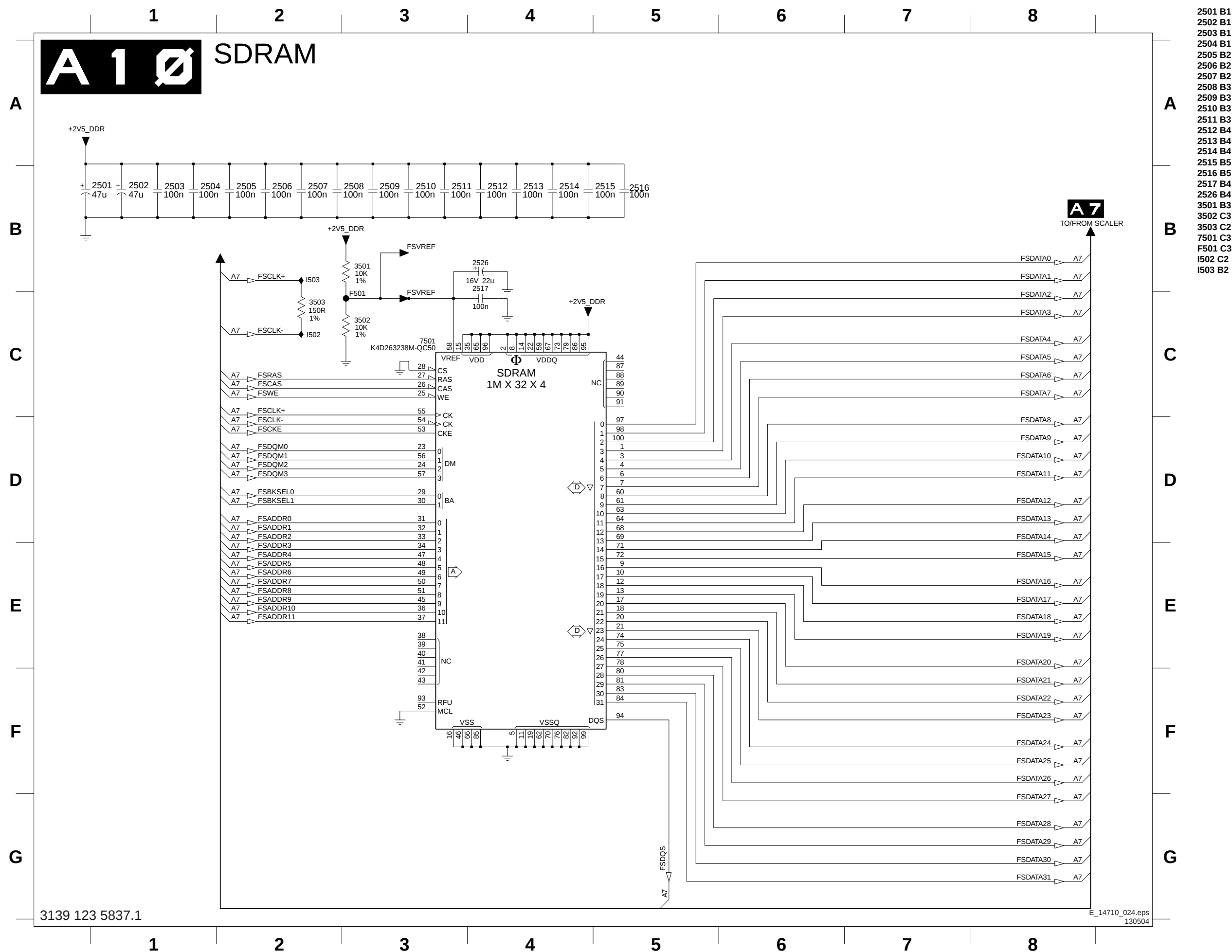
E_14710_020.eps
230504

SSB: Scaler Supply

2401 C1	2405 C2	2409 C3	2413 C4	2417 B1	2421 B2	2425 B3	2429 B4	2433 B5	2437 B4	2441 B5	2445 B6	2449 C6	2453 B3	2461 C6	2465 B1	2469 B2	2473 B6	2477 B7	2481 B8	2485 A9	F401 C1	F451 A2	F466 B1	F486 A7
2402 C1	2406 C2	2410 C3	2414 C4	2418 B1	2422 B2	2426 B3	2430 B4	2434 B4	2438 B5	2442 B6	2446 A6	2450 C6	2454 B3	2462 C7	2466 B1	2470 B5	2474 B6	2478 A7	2482 B8	2486 A7	F419 B1	F461 C6	F470 B5	
2403 C1	2407 C2	2411 C3	2415 C4	2419 B2	2423 B3	2427 B3	2431 B4	2435 B4	2439 B5	2443 B6	2447 C5	2451 B2	2455 B3	2463 C5	2467 B1	2471 B6	2475 B6	2479 B8	2483 B9	2495 B7	F434 A4	F463 C5	F478 A7	
2404 C2	2408 C3	2412 C3	2416 C4	2420 B2	2424 B3	2428 B4	2432 B4	2436 B4	2440 B5	2444 B6	2448 C5	2452 B3	2456 A3	2464 C5	2468 B2	2472 B6	2476 B7	2480 B8	2484 B9	2496 B8	F447 C5	F465 A1	F482 A9	

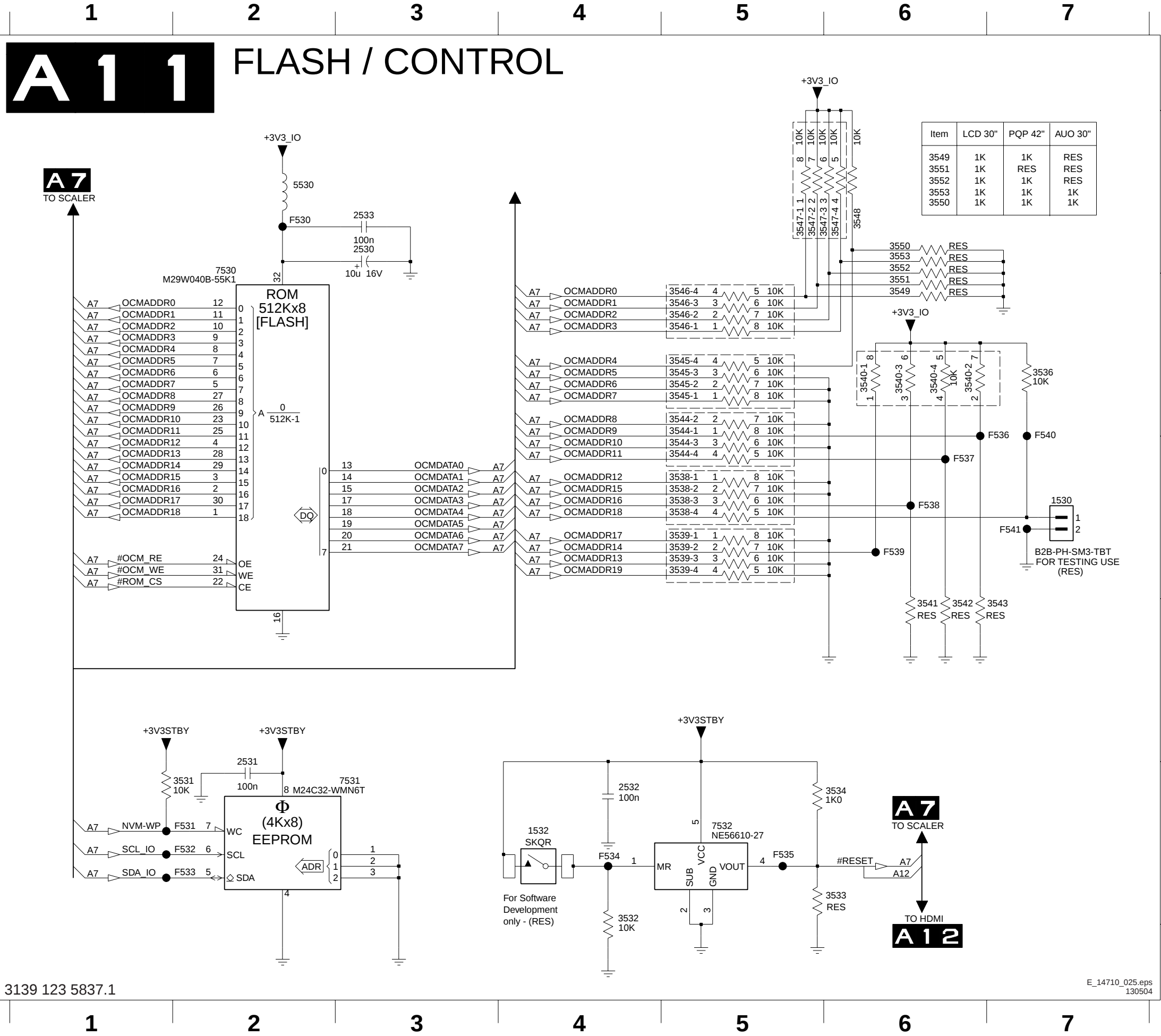


SSB: SDRAM

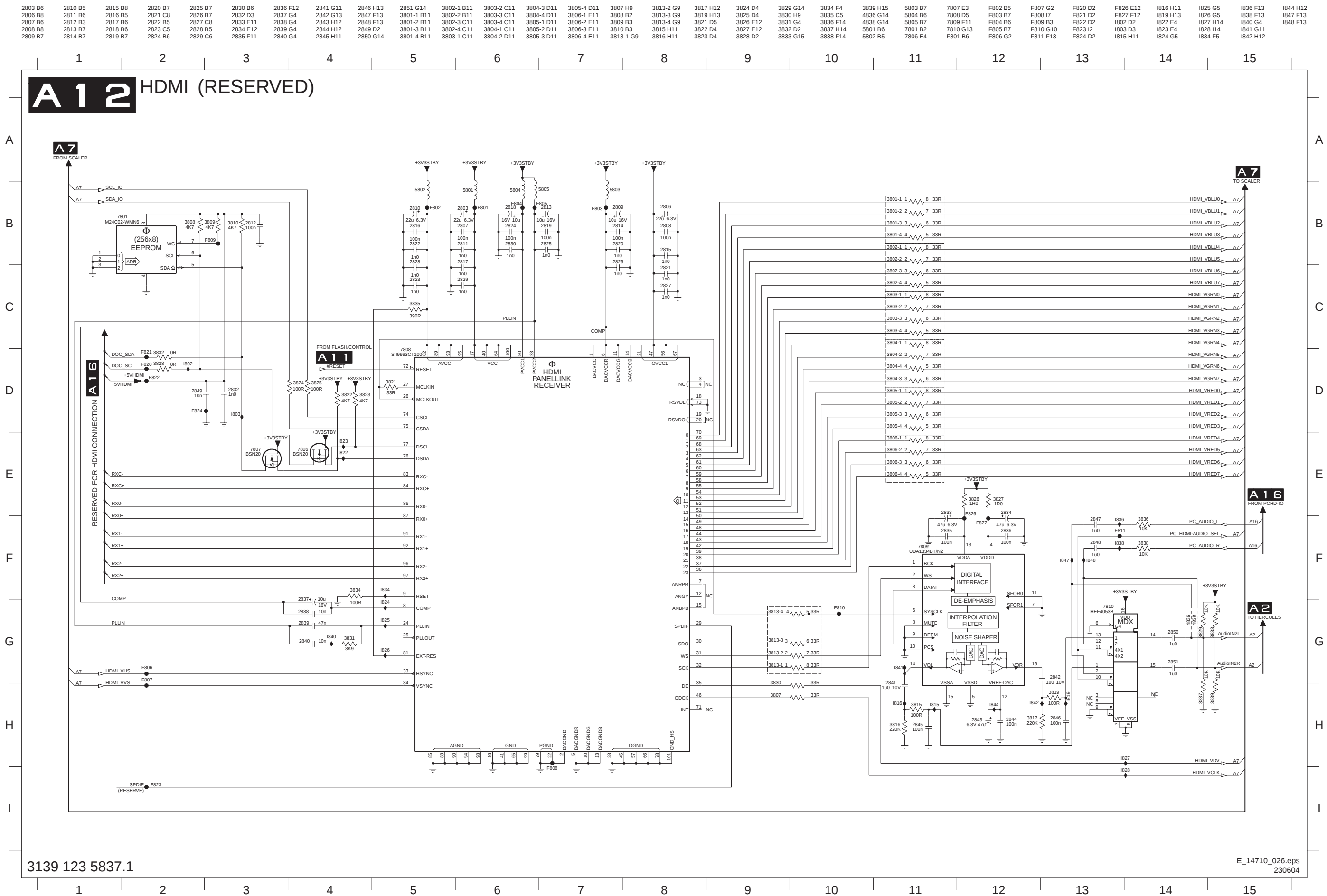


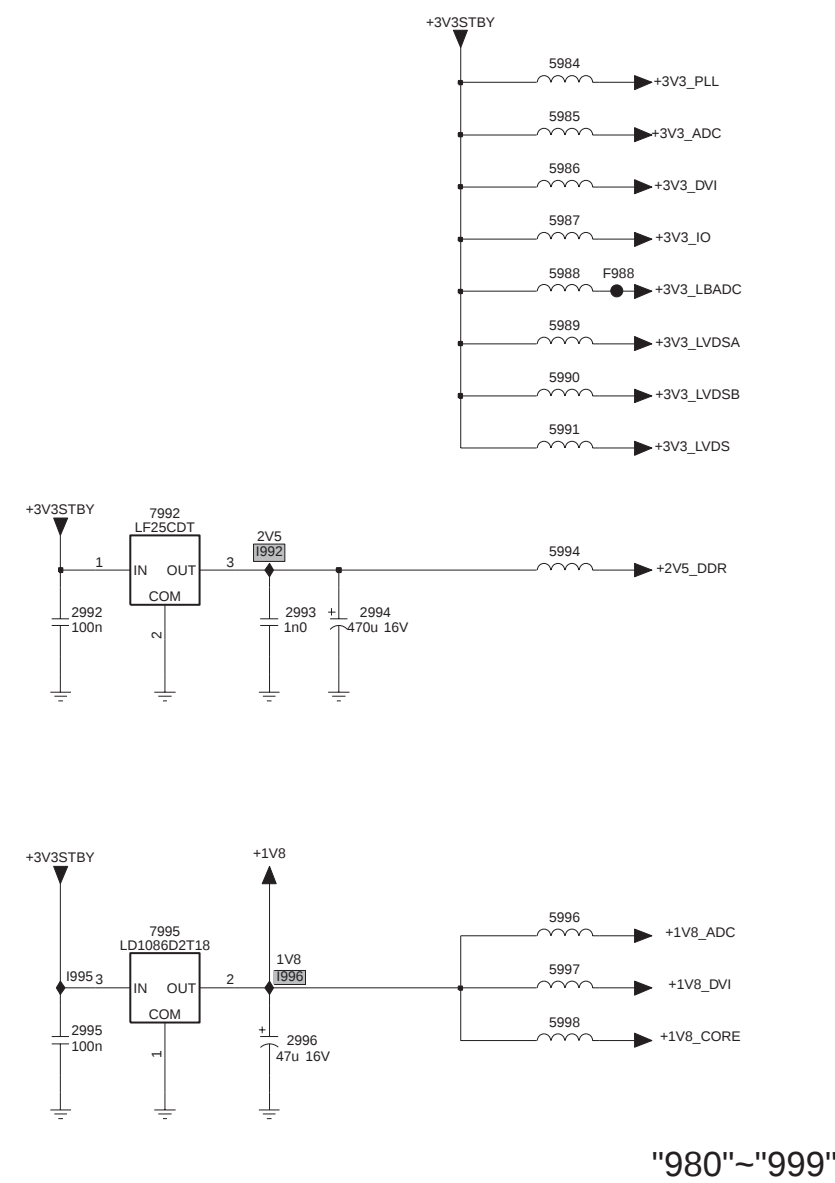
2501 B1
2502 B1
2503 B1
2504 B1
2505 B2
2506 B2
2507 B2
2508 B3
2509 B3
2510 B3
2511 B3
2512 B4
2513 B4
2514 B4
2515 B5
2516 B5
2517 B4
2526 B4
3501 B3
3502 C3
3503 C2
7501 C3
F501 C3
I502 B2

SSB: Flash / Control



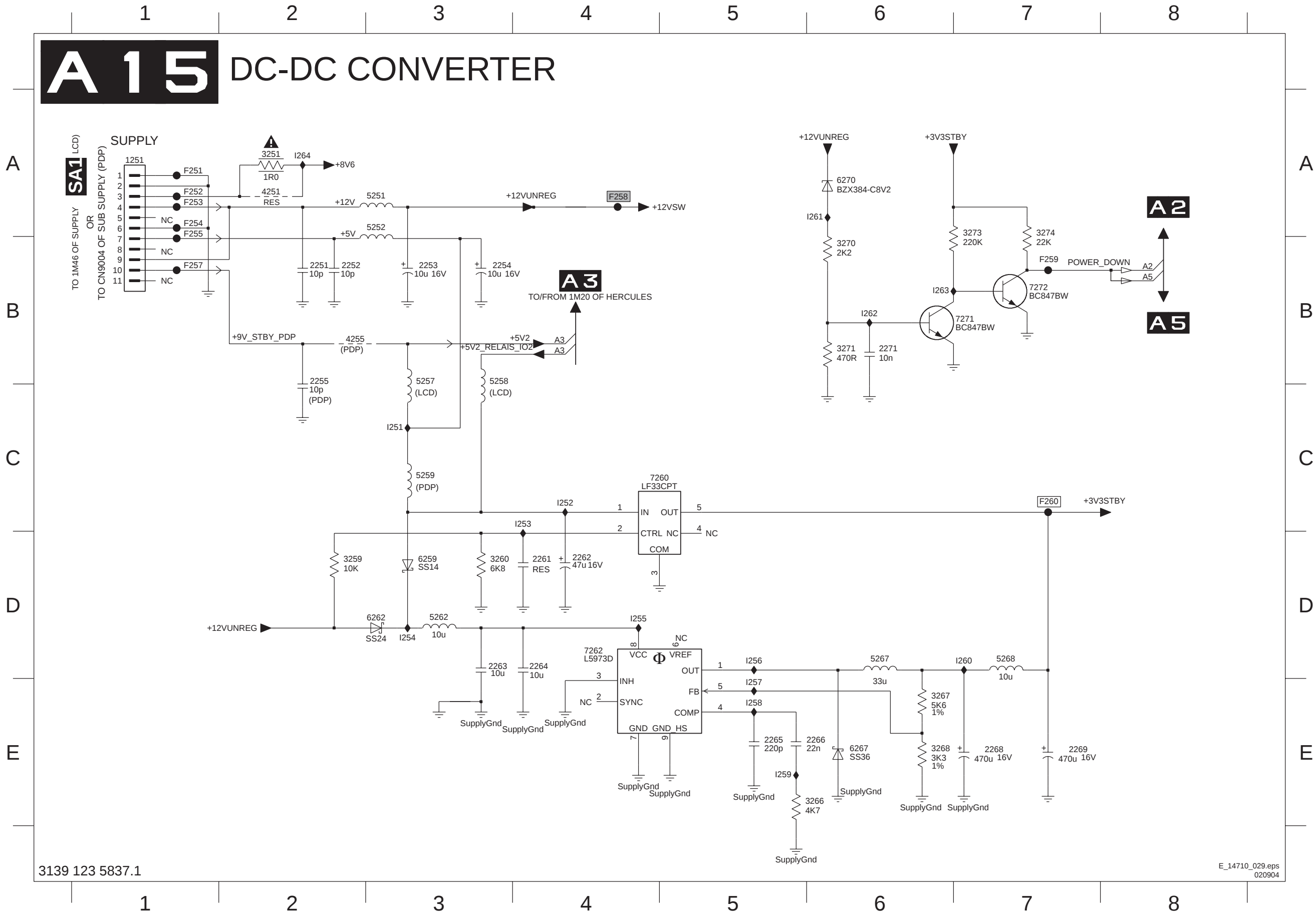
SSB: HDMI





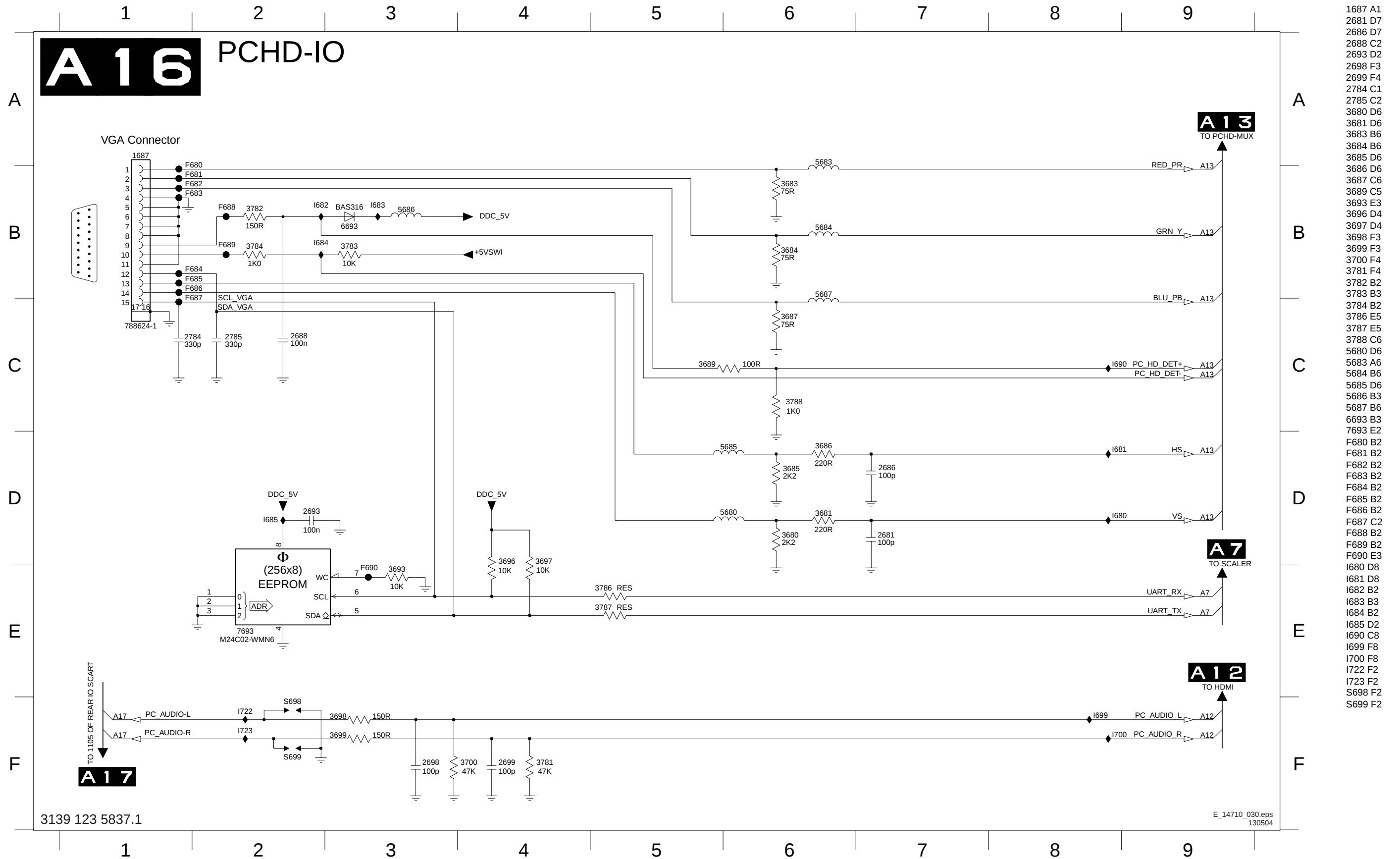
SSB: DC-DC Converter

A 15 DC-DC CONVERTER

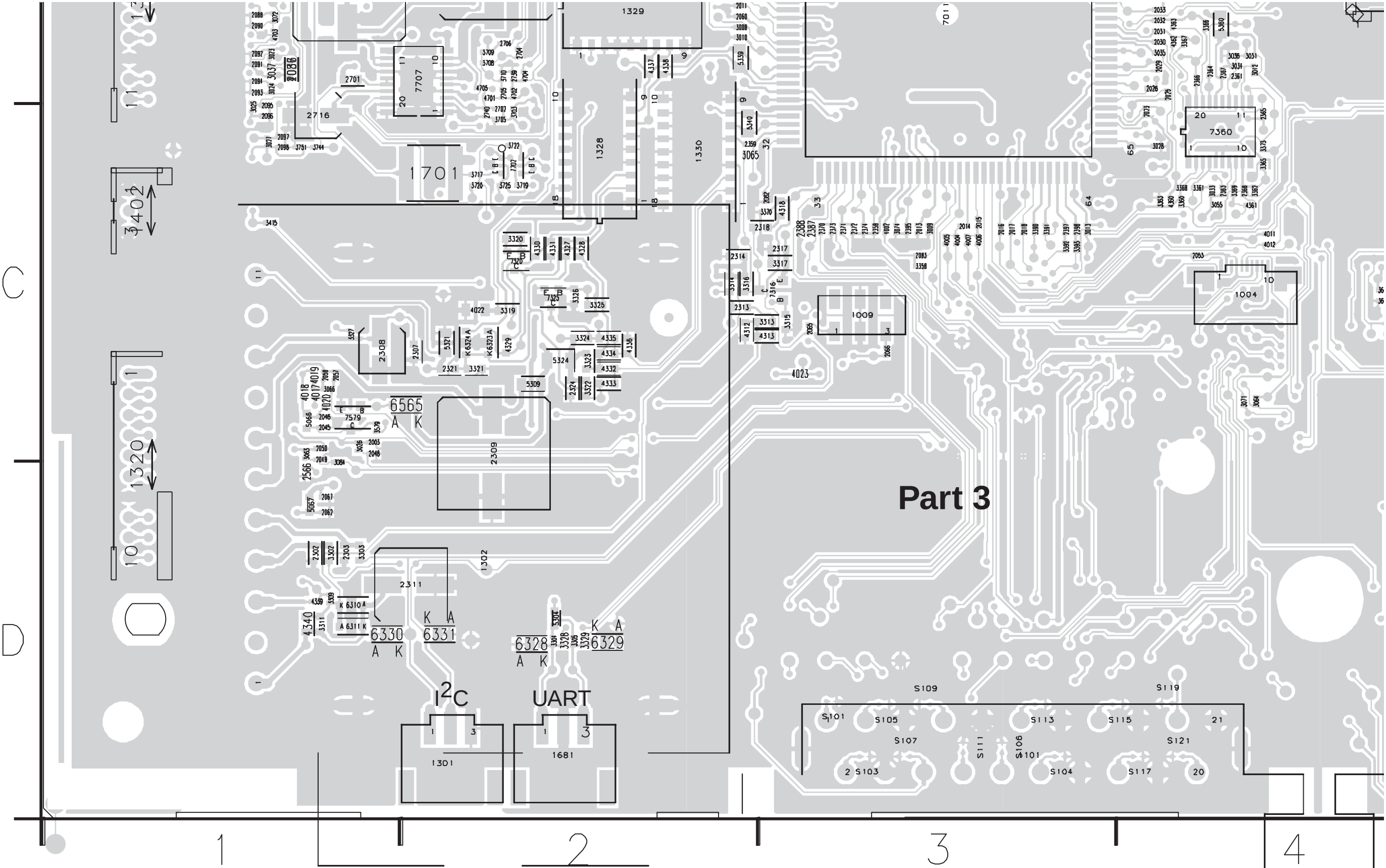


- 1251 A1
- 2251 B2
- 2252 B2
- 2253 B3
- 2254 B3
- 2255 B2
- 2261 D4
- 2262 D4
- 2263 D3
- 2264 D4
- 2265 E5
- 2266 E5
- 2268 E7
- 2269 E7
- 2271 B6
- 3251 A2
- 3259 D2
- 3260 D3
- 3266 E5
- 3267 E6
- 3268 E6
- 3270 B6
- 3271 B6
- 3273 A7
- 3274 A7
- 4251 A2
- 4255 B2
- 5251 A3
- 5252 A3
- 5257 B3
- 5258 B3
- 5259 C3
- 5262 D3
- 5267 D6
- 5268 D7
- 6259 D3
- 6262 D3
- 6267 E6
- 6270 A6
- 7260 C4
- 7262 D4
- 7271 B7
- 7272 B7
- F251 A1
- F252 A1
- F253 A1
- F254 A1
- F255 A1
- F257 B1
- F258 A4
- F259 B7
- F260 C7
- I251 C3
- I252 C4
- I253 C4
- I254 D3
- I255 D4
- I256 D5
- I257 E5
- I258 E5
- I259 E5
- I260 D7
- I261 A6
- I262 B6
- I263 B6
- I264 A2

SSB: PCHD IO



Layout Small Signal Panel (Bottom Side Part 3)



PSU (30-32") : Mains Filter and Standby

AS1

MAINS FILTER + STANDBY

AS1

MAINS INPUT
95-264Vac

MAINS FILTER

COLD GROUND

1011
HEAT SINK

HOT

COLD

TO 1305

AUDIO-STANDBY

COLD

TO 1307

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

TO 1305

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

TO 1305

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

TO 1305

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

TO 1305

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

TO 1305

AUDIO-STANDBY

SA2

TO 1306

AUDIO-STANDBY

SA2

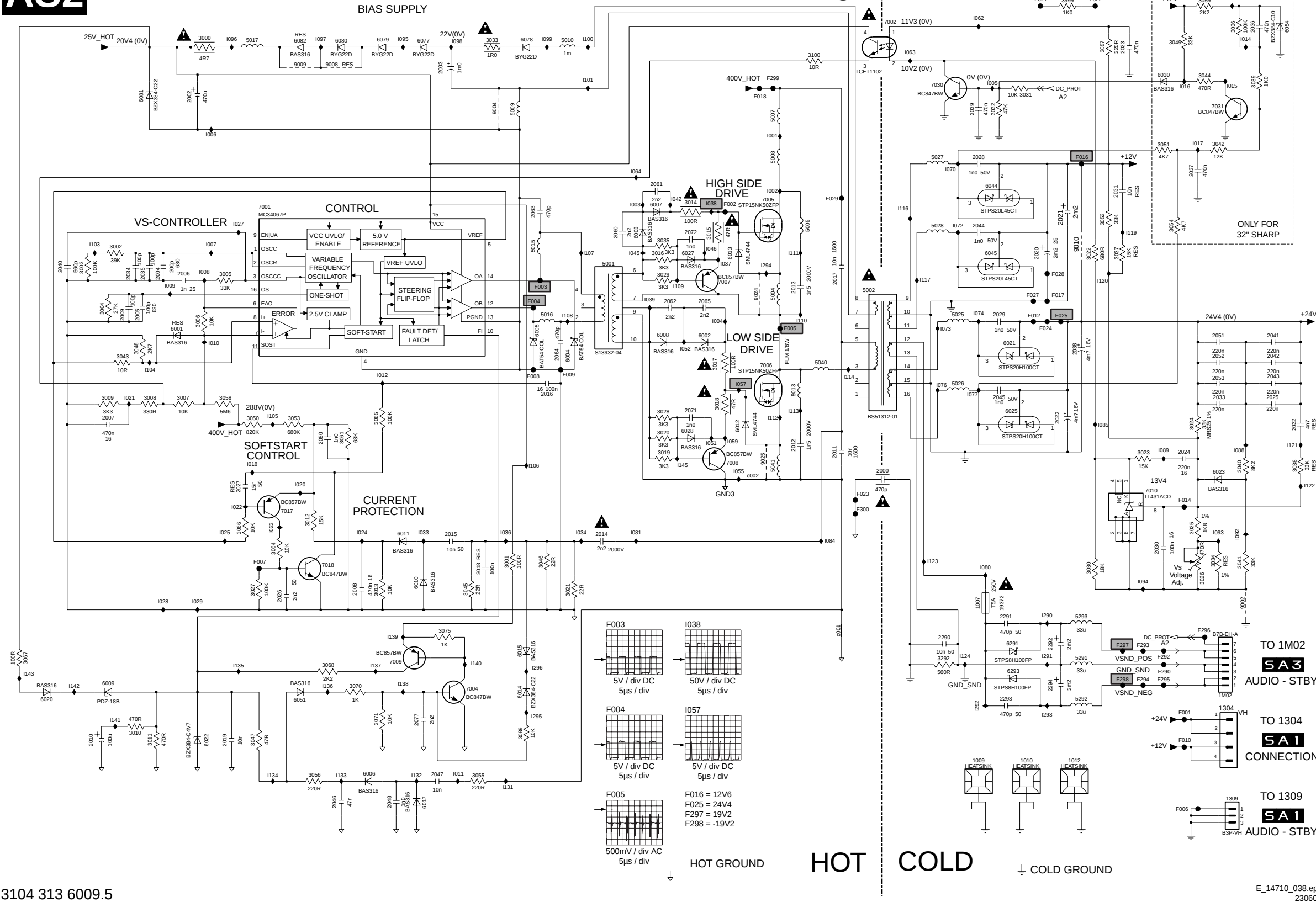
TO 1305

PSU (30-32") : Supply

AS2 SUPPLY

HOT COLD

HOT COLD



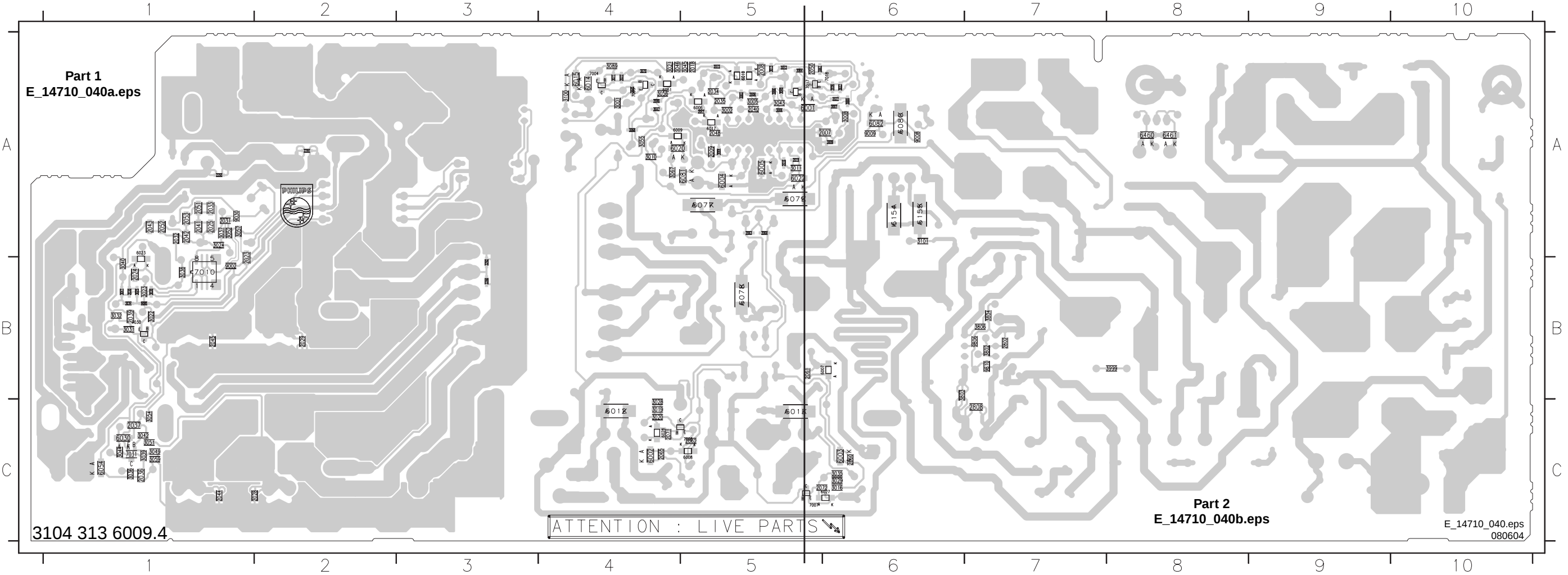
- | | | | |
|----------|----------|----------|----------|
| 1007 G10 | 3043 D1 | F010 H12 | I137 G4 |
| 1009 H10 | 3044 A13 | F012 D11 | I138 H4 |
| 1010 H11 | 3045 G5 | F014 F12 | I139 G4 |
| 1012 H11 | 3046 F6 | F016 B11 | I140 G5 |
| 1304 H13 | 3047 H3 | F017 D11 | I141 H1 |
| 1309 I13 | 3048 D2 | F018 A8 | I142 H1 |
| 1M02 H13 | 3049 A12 | F021 A11 | I143 G1 |
| 2000 E9 | 3050 E3 | F022 A12 | I145 E7 |
| 2002 A2 | 3051 B12 | F023 F9 | I290 G11 |
| 2003 A5 | 3052 C12 | F024 D11 | I291 G11 |
| 2004 C2 | 3053 E3 | F025 D11 | I292 H10 |
| 2006 C2 | 3054 C12 | F027 D11 | I293 H11 |
| 2007 E1 | 3055 I5 | F028 C11 | I294 C8 |
| 2008 G4 | 3057 A12 | F290 G12 | I296 G6 |
| 2009 D1 | 3058 E2 | F292 G12 | C001 G9 |
| 2010 H1 | 3059 A13 | F293 G12 | C002 E8 |
| 2011 E9 | 3061 E4 | F294 H12 | |
| 2012 E8 | 3064 F3 | F295 H12 | |
| 2013 C8 | 3065 E4 | F296 G13 | |
| 2014 F6 | 3066 F3 | F297 G12 | |
| 2015 F9 | 3067 G1 | F298 H12 | |
| 2016 E6 | 3068 G4 | F299 A8 | |
| 2017 C9 | 3070 H4 | F300 F9 | |
| 2018 F5 | 3071 H4 | I001 B8 | |
| 2019 H2 | 3075 G5 | I002 B8 | |
| 2020 C11 | 3089 H6 | I003 C7 | |
| 2021 C11 | 3100 A9 | I004 D8 | |
| 2022 E11 | 3292 G10 | I005 A10 | |
| 2023 A12 | 3999 A11 | I006 B2 | |
| 2024 E12 | 5001 C6 | I007 C2 | |
| 2025 E13 | 5002 D9 | I008 C2 | |
| 2026 G3 | 5004 D8 | I009 C2 | |
| 2027 F3 | 5005 C9 | I010 D2 | |
| 2028 B10 | 5007 B8 | I011 I5 | |
| 2029 D11 | 5008 B8 | I012 D4 | |
| 2030 F12 | 5009 B5 | I013 A3 | |
| 2031 B12 | 5010 A6 | I014 A3 | |
| 2032 E13 | 5013 E8 | I015 A3 | |
| 2033 E13 | 5015 C6 | I016 A12 | |
| 2034 C1 | 5016 D6 | I017 B13 | |
| 2035 C2 | 5017 A3 | I018 E3 | |
| 2036 A13 | 5025 D10 | I020 F3 | |
| 2037 B13 | 5026 D10 | I021 E1 | |
| 2038 D11 | 5027 B10 | I022 F3 | |
| 2039 B10 | 5028 C10 | I023 F3 | |
| 2040 C1 | 5040 D9 | I024 F4 | |
| 2041 D13 | 5041 E8 | I025 F2 | |
| 2042 D13 | 5291 G11 | I027 C3 | |
| 2043 D13 | 5292 H11 | I028 G2 | |
| 2044 C10 | 5293 G11 | I029 G2 | |
| 2045 E11 | 6001 D2 | I033 F5 | |
| 2046 I4 | 6002 D7 | I034 F6 | |
| 2047 I5 | 6003 C7 | I036 F5 | |
| 2048 I4 | 6004 D6 | I037 C8 | |
| 2050 E3 | 6005 D6 | I038 C8 | |
| 2051 D13 | 6006 I4 | I039 D7 | |
| 2052 D13 | 6007 C7 | I042 C7 | |
| 2053 D13 | 6008 D7 | I045 C7 | |
| 2060 C7 | 6009 H1 | I046 C8 | |
| 2061 B7 | 6010 G4 | I051 E8 | |
| 2062 D7 | 6011 F4 | I052 D7 | |
| 2063 C6 | 6012 E8 | I055 E8 | |
| 2064 D6 | 6013 C8 | I057 D8 | |
| 2065 D7 | 6014 H6 | I059 E8 | |
| 2071 E7 | 6015 G6 | I062 A10 | |
| 2072 C7 | 6017 I5 | I063 A10 | |
| 2077 H4 | 6020 H1 | I064 B7 | |
| 2290 G10 | 6021 D11 | I070 B10 | |
| 2291 G11 | 6022 H2 | I072 C10 | |
| 2292 G11 | 6023 E13 | I073 D10 | |
| 2293 H11 | 6025 E11 | I074 D10 | |
| 2294 H11 | 6027 C7 | I076 D10 | |
| 3000 A2 | 6028 E7 | I077 E10 | |
| 3001 F5 | 6030 A12 | I080 F10 | |
| 3002 C1 | 6044 B10 | I081 F7 | |
| 3003 C1 | 6045 C10 | I084 F9 | |
| 3004 D1 | 6051 H3 | I085 E12 | |
| 3005 C2 | 6054 A13 | I088 E13 | |
| 3006 D2 | 6077 A5 | I089 E12 | |
| 3007 E2 | 6078 A6 | I092 F13 | |
| 3008 E1 | 6079 A4 | I093 F13 | |
| 3009 E1 | 6080 A4 | I094 G12 | |
| 3010 H2 | 6081 A2 | I095 A4 | |
| 3011 H2 | 6082 A3 | I096 A3 | |
| 3012 F3 | 6291 G11 | I097 A3 | |
| 3013 G4 | 6293 G11 | I098 A5 | |
| 3014 C7 | 7001 C3 | I099 A6 | |
| 3015 C8 | 7002 A9 | I100 A6 | |
| 3016 C7 | 7004 H5 | I101 A6 | |
| 3017 D8 | 7005 C8 | I103 C1 | |
| 3018 E8 | 7006 D8 | I104 D2 | |
| 3019 E7 | 7007 C8 | I105 E3 | |
| 3020 E7 | 7008 E8 | I106 E6 | |
| 3021 G6 | 7009 G4 | I107 C6 | |
| 3022 C11 | 7010 F12 | I108 D6 | |
| 3023 E12 | 7017 F3 | I109 C7 | |
| 3024 E13 | 7018 F3 | I110 D8 | |
| 3025 F13 | 7030 A10 | I111 C8 | |
| 3026 G13 | 7031 B13 | I112 E8 | |
| 3027 G3 | 9002 G13 | I113 E8 | |
| 3028 E7 | 9004 B5 | I114 D9 | |
| 3029 C7 | 9008 A4 | I116 C10 | |
| 3030 F11 | 9009 A3 | I117 C10 | |
| 3031 A11 | 9010 C11 | I119 C12 | |
| 3032 B10 | 9024 D8 | I120 C12 | |
| 3033 A5 | 9025 E8 | I121 E13 | |
| 3034 F13 | F001 H12 | I122 F13 | |
| 3035 C7 | F002 C8 | I123 F10 | |
| 3036 A13 | F003 C6 | I124 G10 | |
| 3037 C12 | F004 D6 | I131 I5 | |
| 3038 E13 | F005 D8 | I132 I4 | |
| 3039 A13 | F006 I12 | I133 I4 | |
| 3040 E13 | F007 F3 | I134 I3 | |
| 3041 F13 | F008 D6 | I135 G3 | |
| 3042 B13 | F009 D6 | I136 H4 | |

3104 313 6009.5

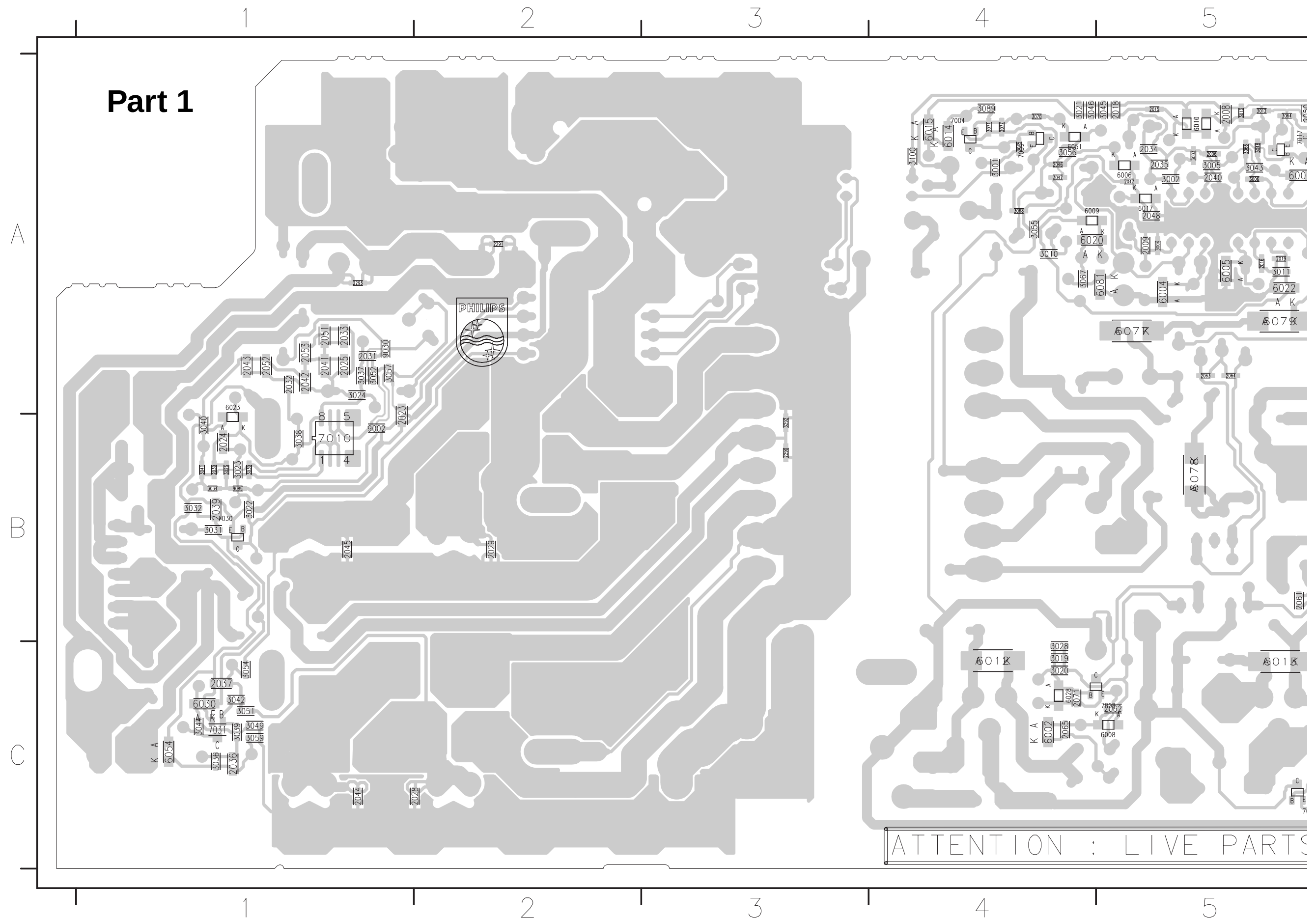
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230604

Layout PSU (30-32") (Overview Bottom Side)

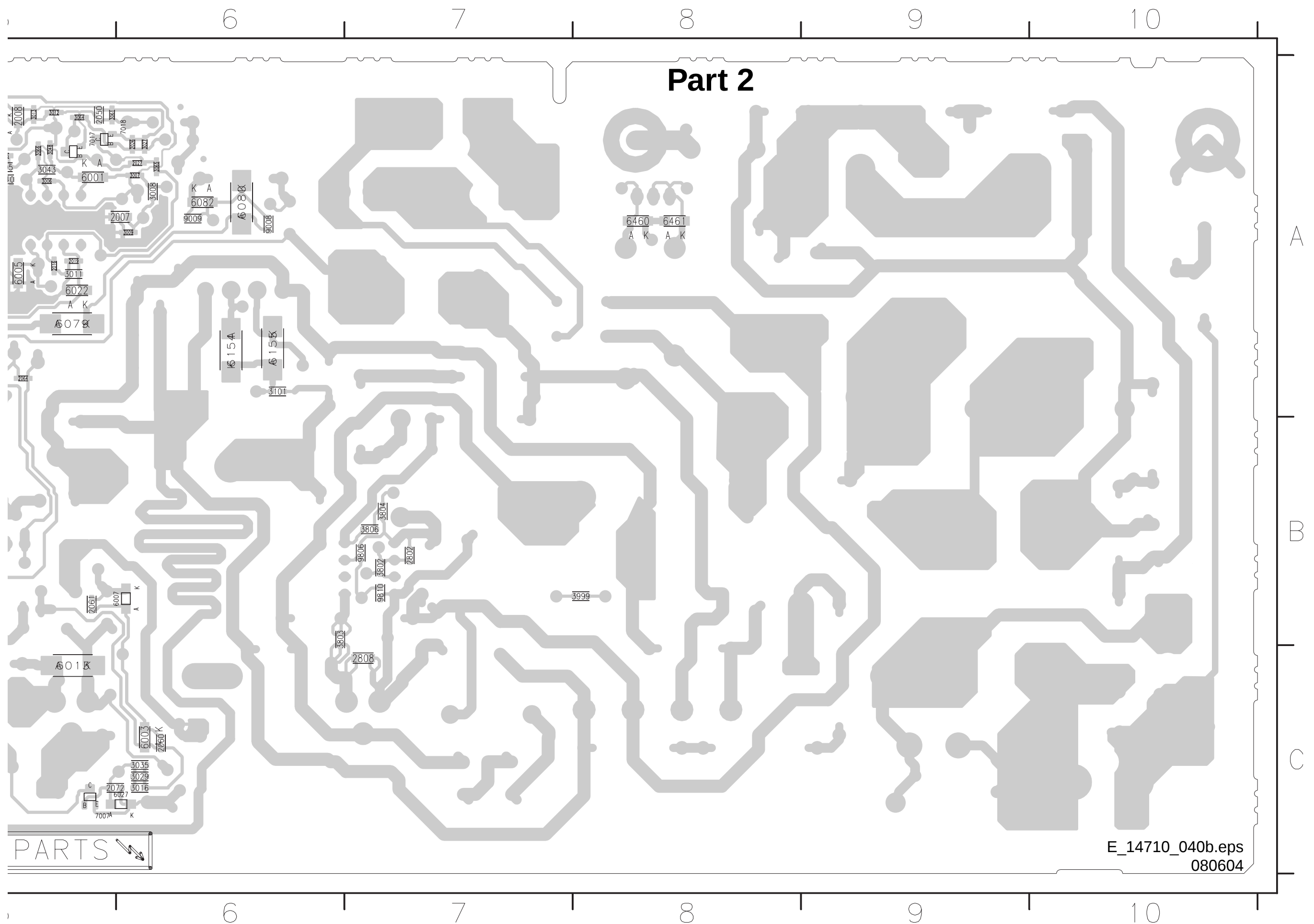
2006 A5	2018 A5	2027 A6	2033 A1	2040 A5	2046 A4	2053 A1	2065 C4	2293 A1	3004 A5	3010 A4	3020 C4	3027 A6	3034 B1	3040 B1	3046 A4	3054 C1	3064 A5	3071 A4	3802 B7	6002 C4	6008 C5	6014 A4	6027 C6	6078 B5	6155 A6	7009 A4	9002 B1	9810 B7
2007 A6	2019 A5	2028 C2	2034 A5	2041 A1	2047 A5	2060 C6	2071 C4	2802 B7	3005 A5	3011 A5	3021 A4	3028 C4	3035 C6	3041 B1	3047 A4	3055 A4	3065 A6	3075 A4	3803 B6	6003 C6	6009 A4	6015 A4	6028 C4	6079 A5	6460 A8	7010 A1	9008 A6	
2008 A5	2023 B1	2029 B2	2035 A5	2042 A1	2048 A5	2061 B5	2072 C5	2808 C7	3006 A5	3012 A5	3022 B1	3029 C6	3036 C1	3042 C1	3048 A5	3056 A4	3066 A5	3089 A4	3804 B7	6004 A5	6010 A5	6017 A5	6030 C1	6080 A6	6461 A8	7017 A5	9009 A6	
2009 A5	2024 B1	2030 B1	2036 C1	2043 A1	2050 A5	2062 C5	2077 A4	3001 A4	3007 A6	3013 A5	3023 B1	3030 B1	3037 A1	3043 A5	3049 C1	3057 A1	3067 A4	3100 A4	3806 B7	6005 A5	6011 A5	6020 A4	6051 A4	6081 A4	7004 A4	7018 A6	9030 A1	
2015 A5	2025 A1	2031 A1	2037 C1	2044 C1	2051 A1	2063 A5	2290 B3	3002 A5	3008 A6	3016 C6	3024 A1	3031 B1	3038 B1	3044 C1	3051 C1	3059 C1	3068 A4	3101 A6	3999 B8	6006 A5	6012 B4	6022 A5	6054 C1	6082 A6	7007 C5	7030 B1	9085 B1	
2016 A5	2026 A6	2032 A1	2039 B1	2045 B1	2052 A1	2064 A5	2291 A2	3003 A5	3009 A6	3019 C4	3025 B1	3032 B1	3039 C1	3045 A5	3052 A1	3061 A5	3070 A4	3292 B3	6001 A5	6007 B6	6013 C5	6023 A1	6077 A5	6154 A6	7008 C5	7031 C1	9806 B7	



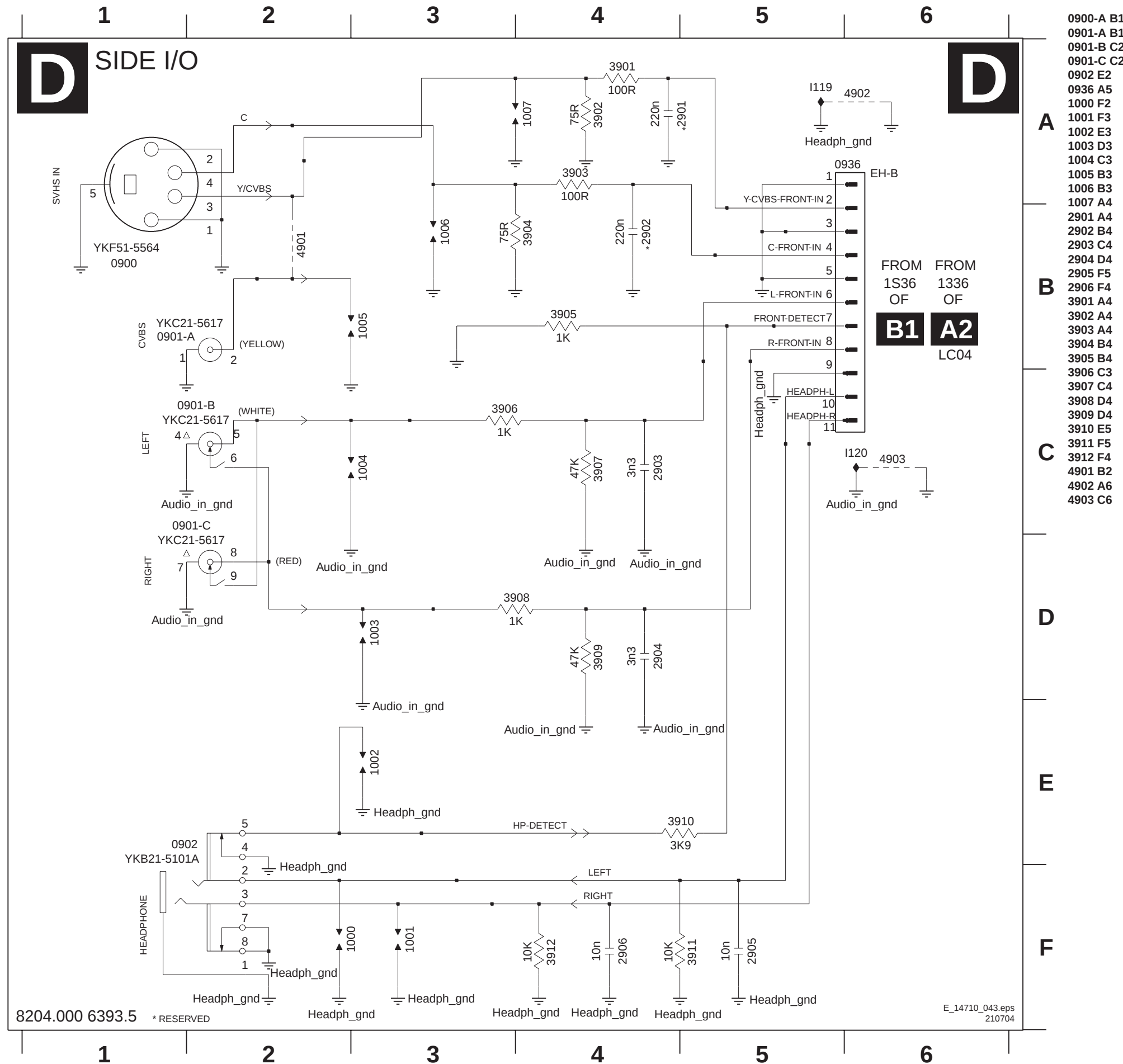
Layout PSU (30-32") (Part 1 Bottom Side)



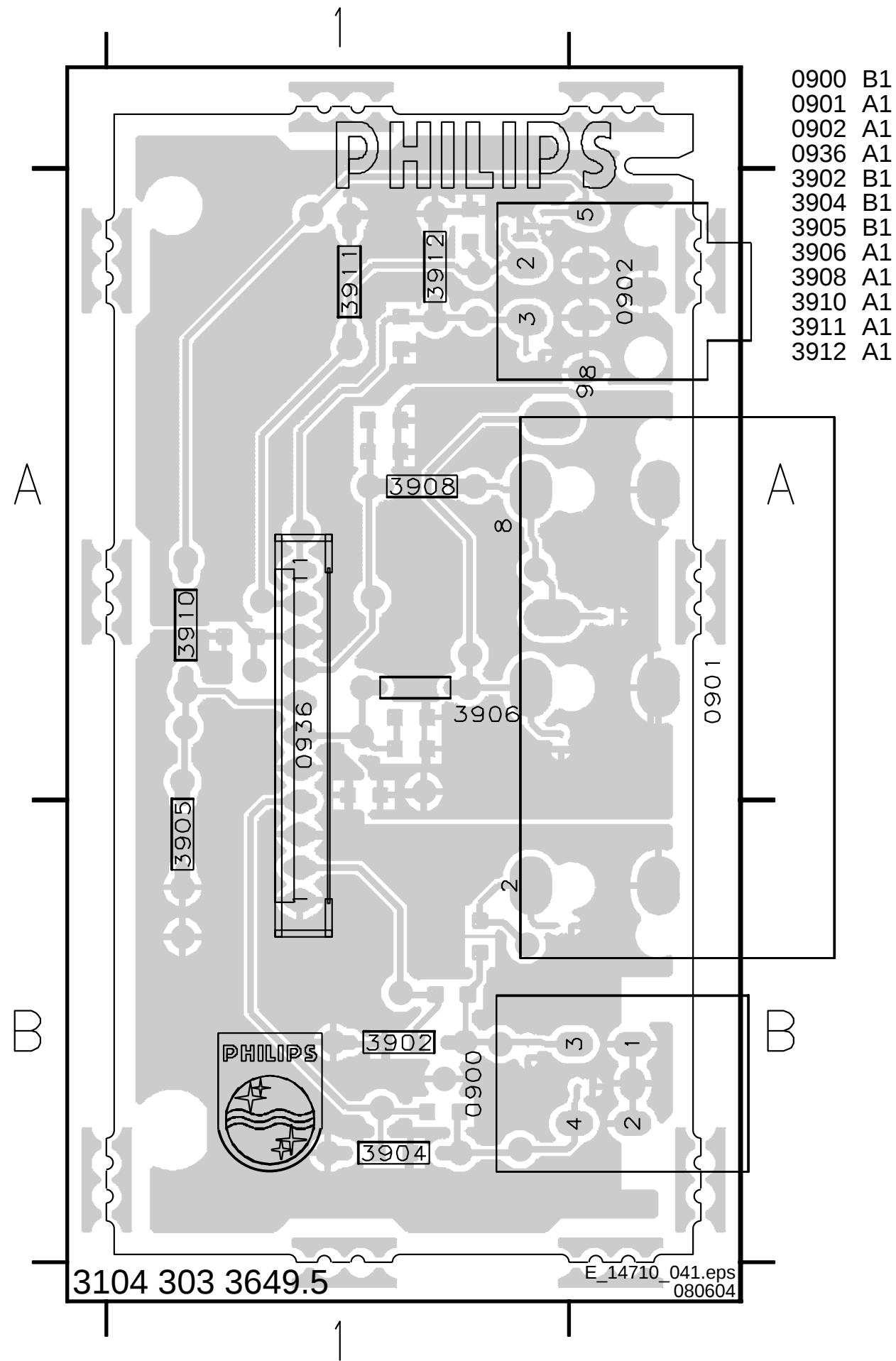
Layout PSU (30-32") (Part 2 Bottom Side)



Side I/O Panel

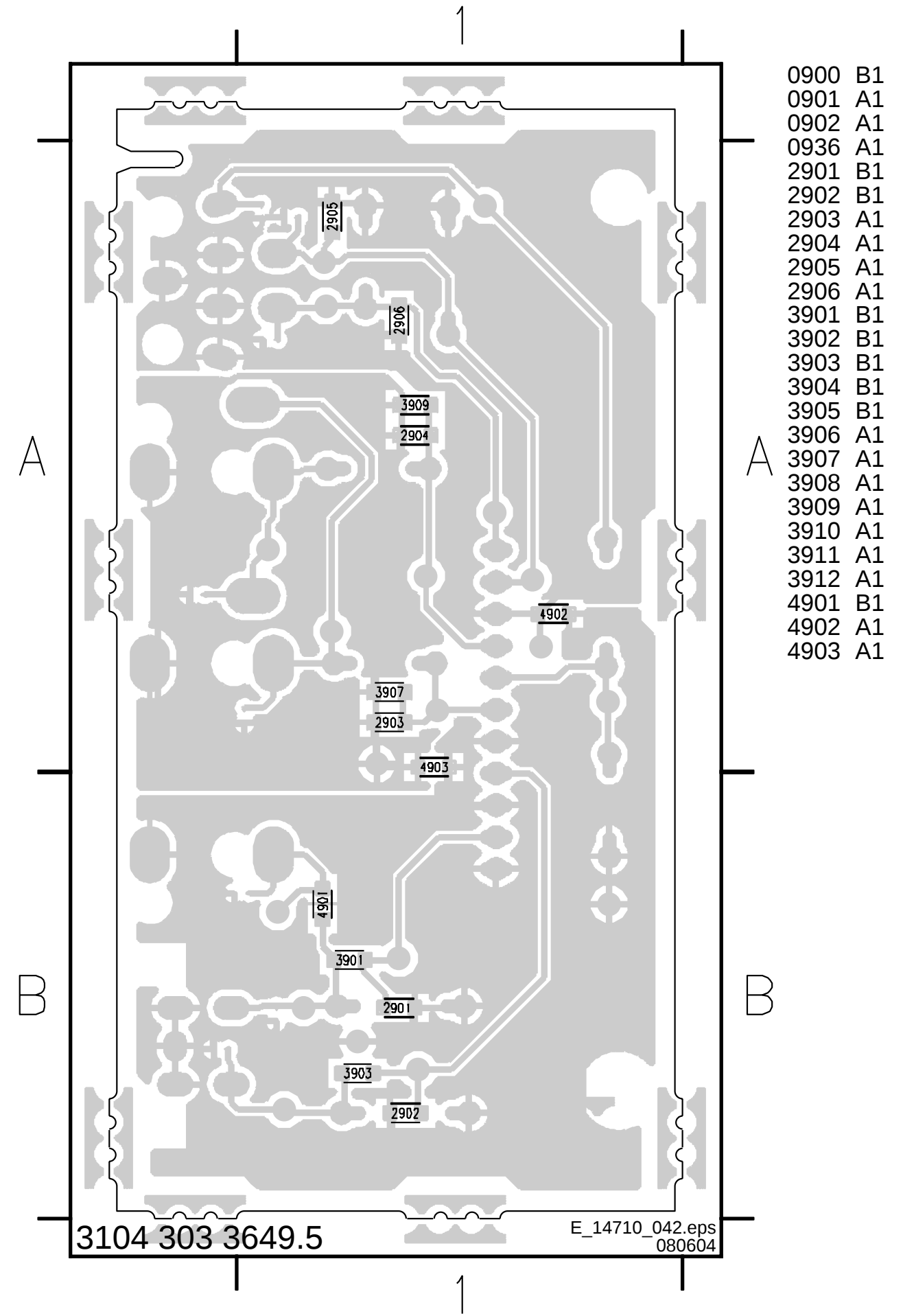


Layout Side I/O Panel (Top Side)



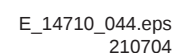
0900 B1
0901 A1
0902 A1
0936 A1
3902 B1
3904 B1
3905 B1
3906 A1
3908 A1
3910 A1
3911 A1
3912 A1

Layout Side I/O Panel (Bottom Side)



0900 B1
0901 A1
0902 A1
0936 A1
2901 B1
2902 B1
2903 A1
2904 A1
2905 A1
2906 A1
3901 B1
3902 B1
3903 B1
3904 B1
3905 B1
3906 A1
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3910 A1
3911 A1
3912 A1
4901 B1
4902 A1
4903 A1

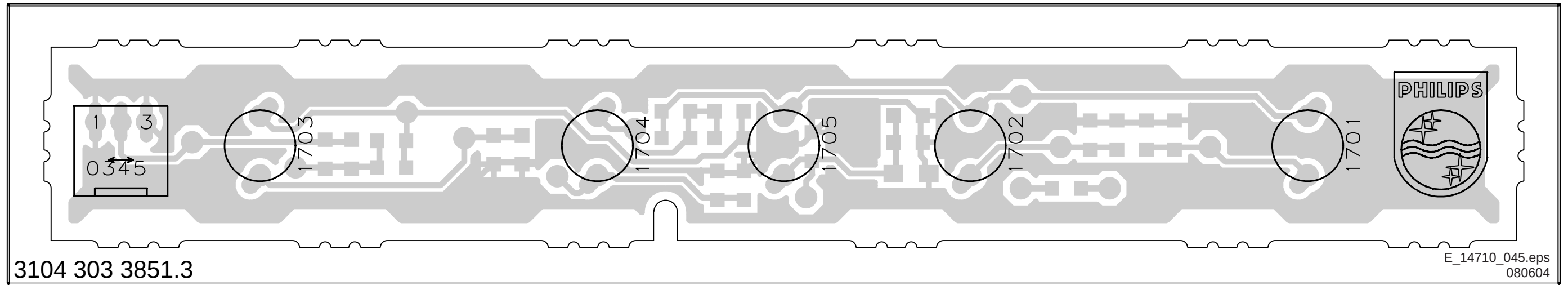
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1701 D1	1705 D2	3004 E1	3008 D2	3012 C3	9001 D2	9005 C3	I701 C3	I705 E3	I709 E1
1702 D1	3001 E1	3005 E2	3009 E3	3013 C3	9002 E3	9006 C3	I702 D3	I706 E3	I710 A3
1703 D3	3002 E1	3006 E2	3010 D3	3999 D4	9003 D3	F701 D4	I703 D3	I707 E2	



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131004

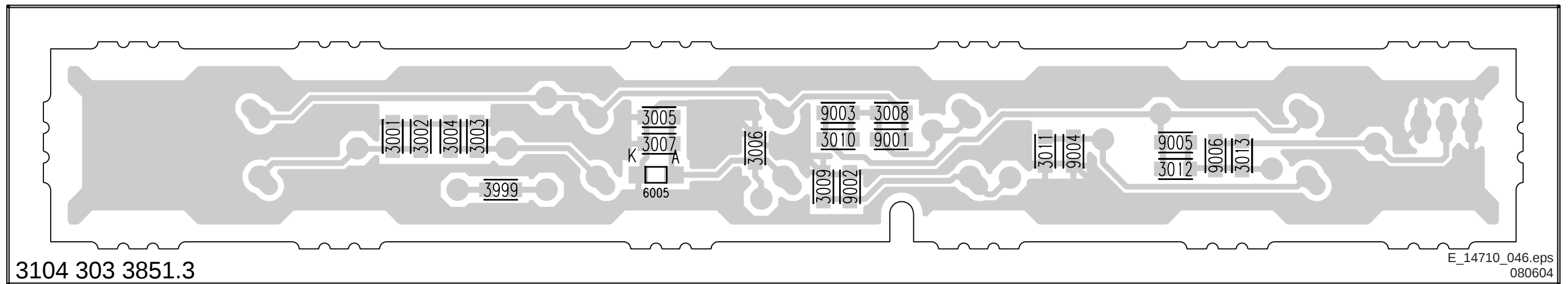
Layout Top Control Panel (Top Side)

0345 1701 1702 1703 1704 1705

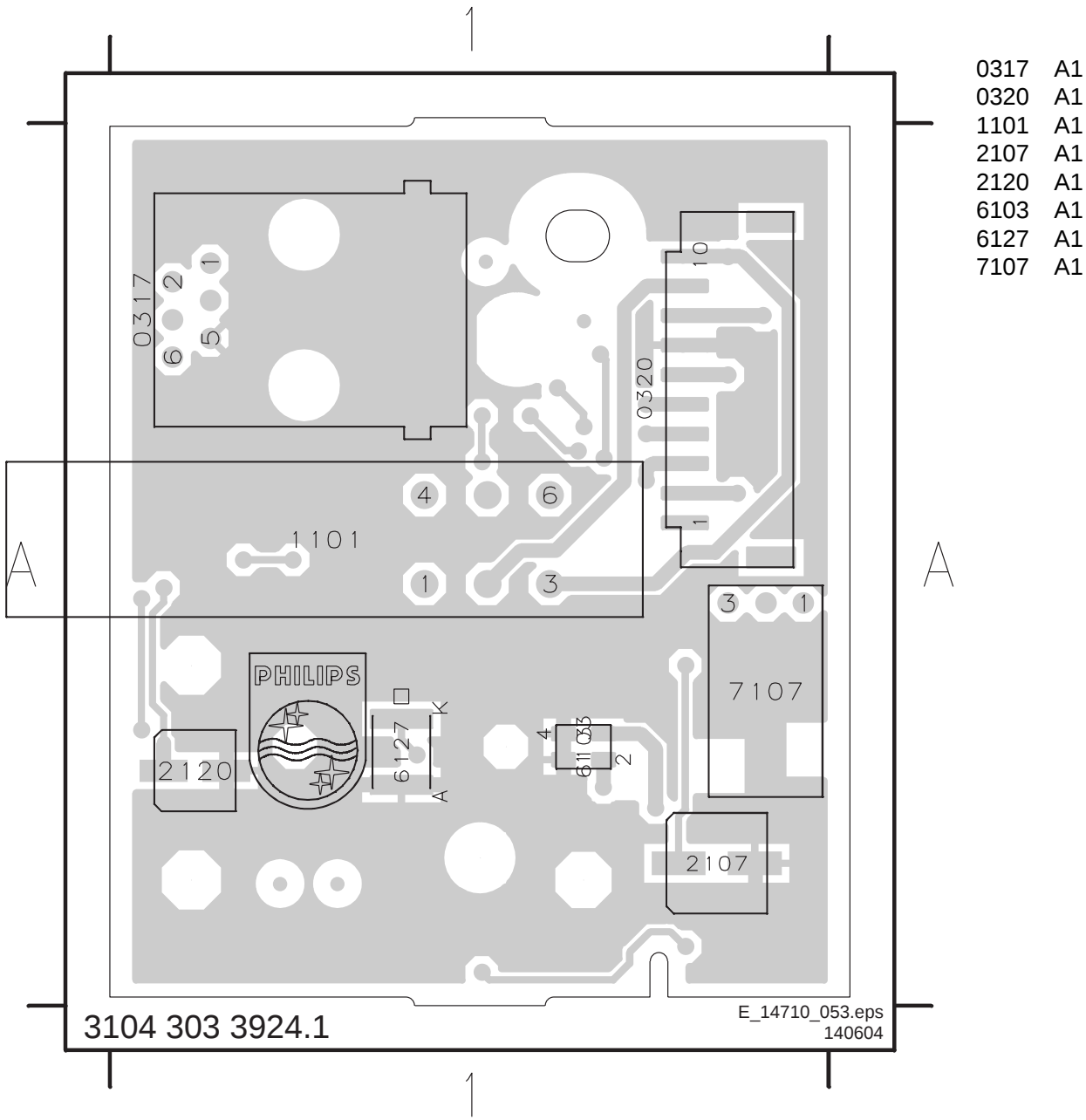


Layout Top Control Panel (Top Side)

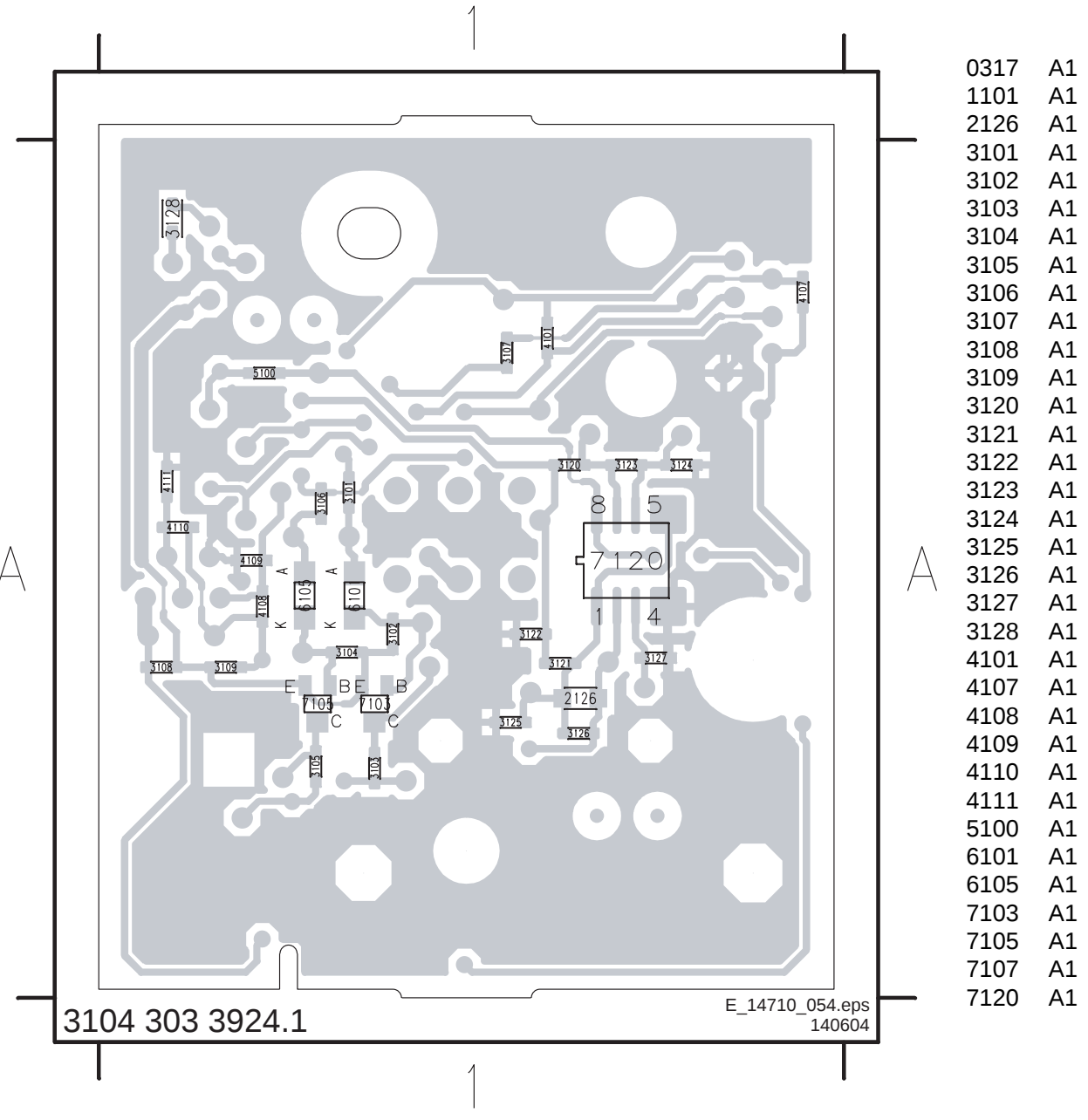
3001 3003 3005 3007 3009 3011 3013 6005 9002 9004 9006
3002 3004 3006 3008 3010 3012 3999 9001 9003 9005



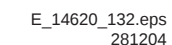
Layout LED and Switch Panel (Top Side)



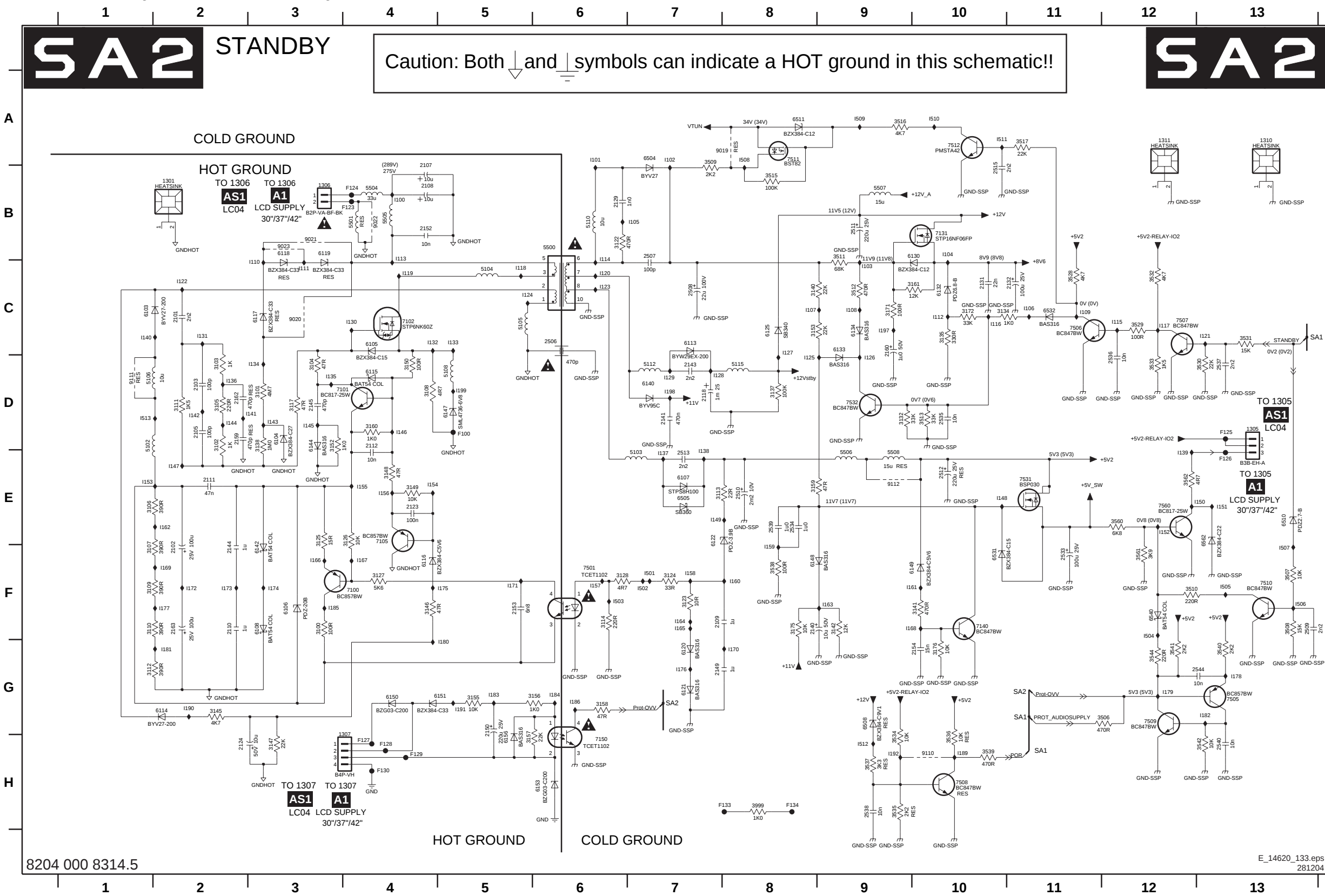
Layout LED and Switch Panel (Bottom Side)



SA 1 CONNECTIONS



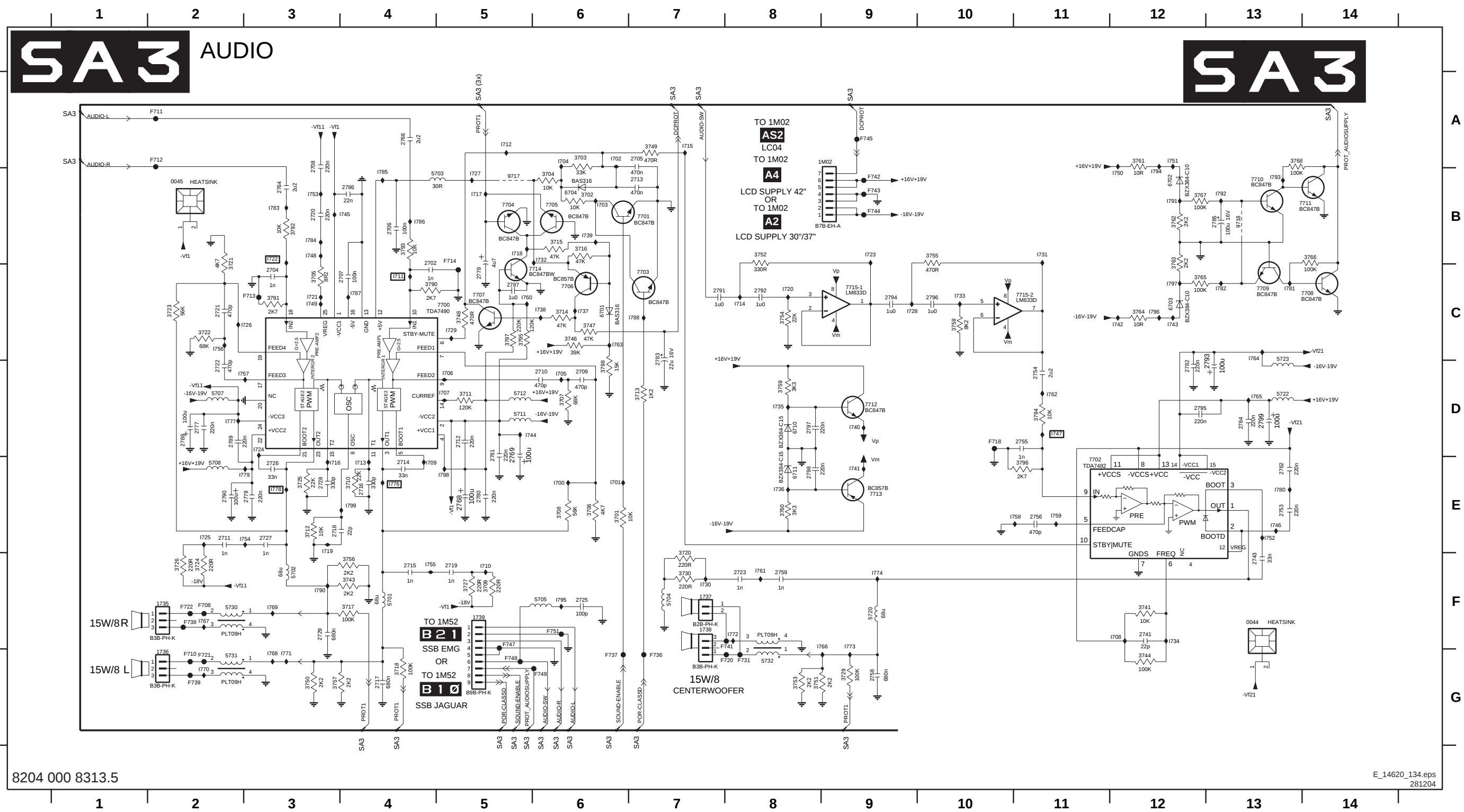
LCD Standby Audio Panel: Standby



1301 B2	3508 F13	9021 B3	I191 G5
1305 D13	3509 A7	9022 B4	I192 H9
1306 B3	3510 F12	9023 B3	I197 C9
1307 H4	3511 B9	9110 H10	I198 D7
1310 A13	3512 C9	9111 D1	I199 D5
1311 A12	3513 D10	9112 E9	I501 F7
2101 C2	3515 B8	F100 D5	I502 F7
2102 F2	3516 A9	F123 B4	I503 F6
2103 D2	3517 A11	F124 B4	I504 F12
2105 D2	3528 C11	F125 D13	I505 F13
2107 A4	3529 C12	F126 E13	I506 F13
2108 B4	3530 D13	F127 H4	I507 F13
2109 F7	3531 C13	F128 H4	I508 A8
2110 F2	3532 C12	F129 H4	I509 A9
2111 E2	3533 D12	F130 H4	I510 A10
2112 D4	3534 H9	F133 H8	I511 A10
2118 D7	3535 H9	F134 H8	I512 H9
2123 E4	3536 H10	I100 B4	I513 D1
2124 H2	3537 H9	I101 A6	
2129 B6	3538 F8	I102 A7	
2131 C10	3539 H10	I103 C9	
2132 C11	3540 G13	I104 B10	
2140 F8	3541 G12	I105 B7	
2141 D7	3542 H13	I106 C11	
2143 D7	3544 G12	I107 C8	
2144 F2	3560 E12	I108 C9	
2145 D3	3561 F12	I109 C11	
2149 G7	3562 E12	I110 C3	
2150 G5	3999 H8	I111 C3	
2152 B4	5102 D1	I112 C10	
2153 F5	5103 E7	I113 B4	
2154 G10	5104 C5	I114 B6	
2159 D2	5105 C5	I115 C12	
2160 C9	5106 D1	I116 C10	
2162 D2	5108 D5	I117 C	

LCD Standby Audio Panel: Audio

0044 F13	2705 A7	2715 F4	2726 E3	2758 G9	2780 E5	2790 E2	3701 E6	3711 D5	3722 C2	3744 G12	3755 B10	3765 C12	3796 E11	5711 D5	6703 C12	7706 C6	7715-2 C11	F720 G8	F743 B9	I703 B6	I713 E4	I723 B9	I733 C10	I743 C12	I753 B3	I763 C6	I773 F9	I784 B3	I795 F6
0045 B2	2706 B4	2716 E4	2727 E3	2759 F8	2781 D5	2791 C7	3702 B6	3712 D3	3723 C2	3746 C6	3756 F4	3766 B14	3797 C5	5712 D5	6704 B6	7707 C5	9717 B5	F721 G2	F744 B9	I704 A6	I714 C8	I724 D3	I734 F12	I744 D5	I754 E3	I764 C13	I774 F9	I785 B4	I796 C12
1735 F2	2707 C4	2717 G4	2728 E3	2762 E13	2782 D12	2792 C8	3703 A6	3713 D7	3724 F2	3747 C6	3757 C3	3767 B13	3798 D6	5720 F9	6710 D8	7708 C13	9718 B13	F722 F2	F745 A9	I705 D6	I715 A7	I725 E2	I735 D8	I745 B4	I755 F4	I765 D13	I776 E4	I786 B4	I797 C12
1736 G2	2708 A3	2718 E3	2729 F3	2764 B3	2783 C7	2793 D13	3704 B6	3714 C6	3725 E3	3748 C5	3758 C10	3768 A13	3799 D5	5721 F4	6711 E8	7709 C13	9719 F2	F723 G8	F746 B9	I706 D5	I716 E3	I726 C3	I736 E8	I746 E13	I756 C2	I766 F9	I777 D2	I787 C4	I798 E5
1737 F7	2709 D6	2719 F5	2741 F12	2766 A4	2784 D13	2794 C9	3705 C3	3715 B6	3726 F2	3749 A7	3759 D8	3790 C4	3792 F3	5722 D13	6712 C5	7710 B13	F710 G2	F736 F7	F748 G5	I707 D5	I717 B5	I727 B5	I737 C6	I747 D11	I757 D2	I767 F2	I778 E3	I788 C7	I799 E4
1738 F7	2710 D6	2720 B3	2743 F13	2768 E5	2785 B13	2795 D12	3706 E6	3716 B6	3727 F5	3750 G3	3760 E8	3791 C3	3793 B5	5730 F2	6713 B13	7711 B13	F711 A2	F737 G6	F749 G6	I708 E4	I718 B5	I728 C9	I738 C6	I748 B3	I758 E11	I768 G3	I779 E3	I790 F3	
1739 F5	2711 E2	2721 C2	2753 E13	2769 D5	2786 B4	2796 C10	3707 D6	3717 F4	3729 G9	3751 G8	3761 A12	3792 B3	3794 F7	5731 G2	6714 D9	7712 D9	F712 A2	F738 F2	F751 F6	I709 E4	I719 E3	I729 C5	I739 B6	I749 C3	I759 E11	I769 F3	I780 E13	I791 B12	
1M02 A9	2712 D5	2722 D2	2754 D11	2777 D2	2787 C5	2797 D8	3708 E6	3718 G4	3730 F7	3752 B8	3762 B12	3793 B4	3795 F6	5732 G8	6715 C9	7713 E9	F713 C3	F739 G2	I700 E6	I710 F5	I720 C8	I730 F7	I740 D9	I750 B12	I760 C5	I770 G2	I781 C13	I792 B13	
2702 C4	2713 B7	2723 F8	2755 D11	2778 C5	2788 D2	2798 E8	3709 F5	3720 F7	3741 F12	3753 G8	3763 B12	3794 D11	3797 D2	5733 G8	6716 C6	7714 B5	F714 B5	F741 F8	I701 E6	I711 C4	I721 C3	I731 B11	I741 E9	I751 A12	I761 F8	I771 G3	I782 C13	I793 B13	
2704 C3	2714 E4	2725 F6	2756 E11	2779 E3	2789 D2	2799 D13	3710 E4	3721 B2	3743 F4	3754 C8	3764 C12	3795 C5	5708 E2	6702 B12	7705 B6	7715-1 C9	F718 D10	F742 B9	I702 A6	I712 A5	I722 B3	I732 B6	I742 C12	I752 E13	I762 D11	I772 F8	I783 B3	I794 B12	



Personal Notes:

8. Alignments

Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings

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

8.1 General Alignment Conditions

8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
 - AP-NTSC: 120 V_{AC} or 230 V_{AC} / 50 Hz (± 10%).
 - AP-PAL-multi: 120 - 230 V_{AC} / 50 Hz (± 10%).
 - EU: 230 V_{AC} / 50 Hz (± 10%).
 - LATAM-NTSC: 120 - 230 V_{AC} / 50 Hz (± 10%).
 - US: 120 V_{AC} / 60 Hz (± 10%).
 - Connect the set to the mains via an isolation transformer with low internal resistance.
 - Allow the set to warm up for approximately 15 minutes.
 - Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).
- Caution:** never use heatsinks as ground.
- Test probe: R_i > 10 Mohm, C_i < 20 pF.
 - Use an isolated trimmer/screwdriver to perform alignments.

8.1.2 Initial Settings

Perform all electrical adjustments with the following initial settings:

- To avoid the working of the lightsensor, set "Active Control" to "Off" (via the "Active Control" button on the RC).
- Set "Smart Picture" to "Natural" or "Soft" (via the "Smart Picture" button on the RC).

8.1.3 Alignment Sequence

- First, set the correct options:
 - In SAM, select OPTIONS,
 - Fill in the option settings according to the set sticker (see also paragraph "Option Settings"),
 - Store the OPTIONS by switching the set to STAND-BY.
- Warming up (>15 minutes).
- White-D alignment.

8.2 Hardware Alignments

8.2.1 Backlight Voltage Alignment

Switch the set "on" and measure the voltage between pin 3 (or 4) of connector 1304 (on MF panel) and ground. Align R3026 until this voltage is 12.2 V_{DC} +/- 0.1 V.

Caution: This voltage must be aligned very precisely (within 1%): when it is too high, it can destroy the inverters. When it is too low, the backlight will not start up.

8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the geometry, white tone and tuner (IF) can be aligned. To store the data: Use the RC button Menu to switch to the main menu and next, switch to 'Stand-by' mode.

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

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

8.3.1 SAM Menu

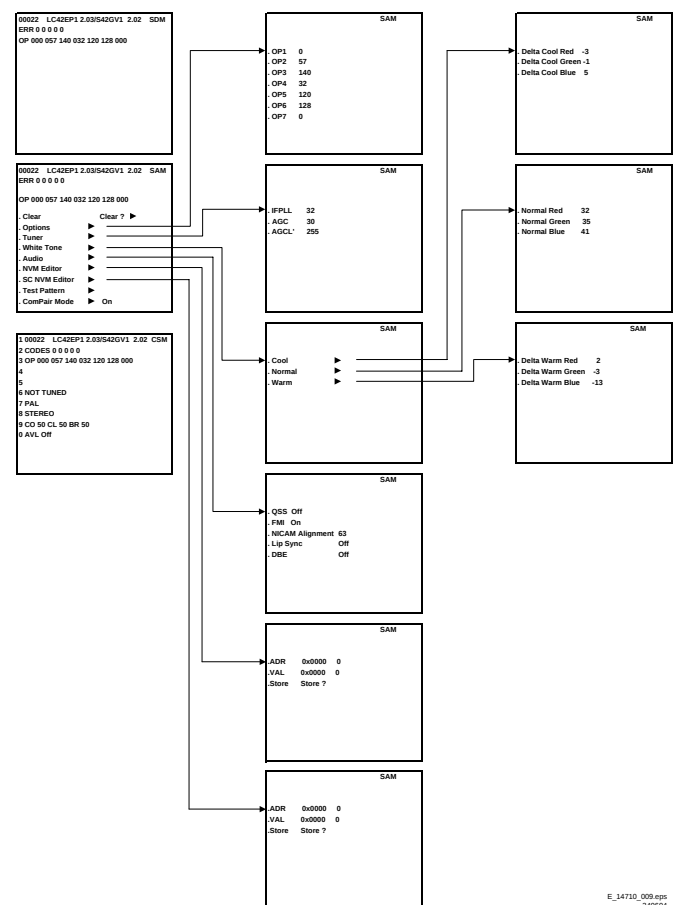


Figure 8-1 Overview SAM menu (example from EU set).

8.3.2 White Tone

Method 1 (with colour analyser):

- Supply a 100% white uniformity test signal (100 IRE white) to the tuner.
- Enter SAM menu (colour features are switched "off" automatically).
- Do NOT change the SMART PICTURE, ACTIVE CONTROL, and CONTRAST+ settings to prevent activating of Green Enhancement, Blue Stretch, and Black Stretch.

Offset values in NVM are used for HD-, HDMI-, and VGA mode, therefore only the settings in TV mode need to be set.

Make the following settings in the normal **user menu**, when the television is in TV Mode:

Table 8-1 User menu settings for White Tone alignment

	LCD (AUO)	LCD (LPL)	Plasma (SDI)
CONTRAST	99		
BRIGHTNESS	42 (EU) 44 (US)	46	46 (AP+EU) 48 (US+LA)
COLOR/SAT.	50 (AP+LA+US) 60 (EU)		

Go to WHITE TONE in SAM and set NORMAL GREEN to:

Table 8-2 Service menu settings for White Tone alignment

	LCD (AUO)	LCD (LPL)	Plasma (SDI)
NORM. GREEN	200		180

1. Measure with a calibrated (phosphor- independent) colour analyser (e.g. Minolta CA-200) in the centre of the screen (use a contact less analyser, e.g. Minolta CA-210, to align the LCD TV). The analyser may not touch the screen, and the measurement must be done in a dark environment.
Note: The colour analyser must be calibrated for the LCD or Plasma panel in question. See the manual of the colour analyser for the procedure on how to perform this calibration.
2. Leave the value with the lowest output on the initial value.
3. Align the NORMAL white points, by lowering the other two colours, to the right x-y coordinates (see table "White Tone alignment values").
Note: To prevent clipping of the colour, these values must only be lowered!

Table 8-3 White Tone alignment values

	NORMAL colour temp. (all regions)
X	0.289
Y	0.299

Only the values for NORMAL are aligned with X, Y values. The delta values for COOL and WARM are given below.

Table 8-4 Fixed delta values

Screen Type	Colour temp.	RED	GREEN	BLUE
LCD (AUO)	DELTA COOL	-3	-12	+10
	DELTA WARM	+5	-5	-20
LCD (LPL)	DELTA COOL	-8	-12	+3
	DELTA WARM	+2	-10	-21
Plasma (SDI)	DELTA COOL	-6	-10	+5
	DELTA WARM	+4	-5	-19

After the alignment is finished, switch the set to STANDBY, in order to store the alignments.

Note: When disconnecting the power before doing this, the settings will not be stored.

Method 2 (without colour analyser):

If you do not have a colour analyser, you can use the default values. These values are based on the average values in production.

- Set the values for the NORMAL colour temperature. Given in the table "Average statistical values for NORMAL" from production.

- Set the delta values for the COOL and WARM mode. See table: "Fixed delta values."

After the alignment is finished, switch the set to STANDBY, in order to store the alignments.

Note: When disconnecting the power before doing this, the settings will not be stored.

Table 8-5 Average statistical values for "NORMAL"

Display type	Colour Temp.	RED	GREEN	BLUE
LCD (AUO)	NORMAL	165	182	200
LCD (LPL)	NORMAL	200	195	190
Plasma 37" (SDI)	NORMAL	174	180	178
Plasma 42" (SDI)	NORMAL	173	180	172
Note: Values are valid for all regions				

8.3.3 Tuner Adjustment

AGC (RF AGC Take Over Point)

Set pattern generator (e.g. PM5580) with colour bar pattern and connect to aerial input with RF signal amplitude -10 mV and set frequency for NTSC to 61.25 MHz (channel 3).

- Activate the SAM-menu. Go to the sub-menu TUNER, select the sub-menu option AFC WINDOW and adjust the value to "100 kHz".
- Select the AGC sub-menu.
- Connect a DC multi-meter to test point F306 or pin 1 of the tuner.
- Adjust the AGC until the voltage at pin 1 of the tuner is 3.3 V +0.5 / -1.0.
- The value can be increased or decreased by pressing the RIGHT/LEFT cursor button on the RC.
- Switch the set to STAND-BY to store the data.

8.3.4 Grey Scale Adjustment

SDTV Grey Scale Adjustment

Equipment and setting

- E.g. Fluke 54200 or Philips PM5580.
- 100% "8-step grey scale" pattern.

Alignment Method

- Switch with the RC to TV mode,
- Press the MUTE button on RC,
- Set SMART PICTURE to SOFT mode,
- Activate the auto colour function by pressing key-sequence:
INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO.

Expected Results

- Visual check if the 8 Grey levels are correct.

Analog PC Grey Scale Adjustment

Equipment and setting

- Quantum Data 802B.
- PC input signal, with 64 levels Grey scale pattern, 1024x768 @ 60 Hz (Format= 81:DMT1060, Pattern= 123:Grey 64).
- PC input at D-sub VGA connector.

Alignment Method

- Switch with the RC to PC mode.
- Press the MUTE button on RC.
- Set BRIGHTNESS and CONTRAST to nominal "50".
- Activate the auto colour function by pressing key-sequence:
INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO.

Expected Results

- Visual check if the 64 Grey levels are correct.

HD Grey Scale Adjustment

Equipment and setting

- Quantum Data 802B.
- HD input signal, Top half 100% colour bar and bottom half Grey scale pattern, 1920x1080i @ 60 Hz YPbPr (Format=1080i30, Pattern= HDBar100).
- HD input at D-sub VGA connector.

Alignment Method

- Switch with the RC to HD mode.
- Press the MUTE button on RC.
- Activate the auto colour function by pressing key-sequence:
INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO.

Expected Results

- Visual check if Colour bar tint and Grey scale is correct.

8.3.5 Sound

No adjustments needed for sound.

8.4 Option Settings

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

See for an overview, the table on the next page.

8.4.1 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 cursor UP/DOWN keys, and enter the new value.

Leaving the OPTION sub menu 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).

Table 8-6 Option codes (general overview for all regions and displays)

Bit (DEC)	Option	Description	/78 (LATAM)	/61 (AP- NTSC)	/69,79,98 (AP-PAL)	/93 (China)	/10, /12 (Europe)	/17, /37 (NAFTA)	Remarks
7 (128)	OP_PHILIPS_TUNER	Philips Tuner available	1	1	1	0	1	1	
6 (64)	OP_FM_RADIO	FM Radio available	0	0	0	0	0	0	
5 (32)	OP_LNA	Low Noise Amplifier available	0	0	0	0	0	0	
4 (16)	OP_ATS	Auto Tuning System	0	0	0	0	1	0	
3 (8)	OP_ACI	ACI	0	0	0	0	1	0	
2 (4)	OP_UK_PNP	After virgin = English + Great Britain	0	0	0	0	0	0	
1 (2)	OP_VIRGIN_MODE	Activate Plug & Play menu at start-up	0	0	0	0	0	0	
0 (1)	OP_CHINA	AP-PAL tuning algorithm for China	0	0	0	1	0	0	
OP1:			128	128	128	1	152	128	
7 (128)	OP_SMART_SOUND	Four smart sound settings	1	1	1	1	1	1	
6 (64)	OP_UI_GREEN	UI for Magnavox sets (NAFTA)	0	0	0	0	0	0	
5 (32)	OP_CHANNEL_NAMING	Naming of channel feature available	1	1	1	1	0	1	
4 (16)	OP_LTI	Histogr. algorithm available (TDA9178)	1	1	1	1	1	1	
3 (8)	OP_TILT	Picture Rotation available	0	0	0	0	0	0	
2 (4)	OP_FINE_TUNING	Fine Tuning algorithm available	1	1	1	1	1	1	
1 (2)	OP_PIP_PHILIPS_TUNER	PIP Philips tuner	0	0	0	0	0	0	
0 (1)	OP_HUE	Tint for NTSC transmission	1	1	1	1	0	1	
OP2:			181	181	181	181	148	181	
7 (128)	OP_EW_FUNCTION	Geometry adj. for Large screen sets	0	0	0	0	0	0	
6 (64)	OP_2TUNER_PIP	Double Tuner for PIP available	0	0	0	0	0	0	
5 (32)	OP_PIP_SPLITTER	Not used	0	0	0	0	0	0	
4 (16)	OP_SPLITTER	Not used	0	0	0	0	0	0	
3 (8)	OP_VIRTUAL_DOLBY	Virtual Dolby Effect	1	1	1	1	1	1	
2 (4)	OP_WIDE_SCREEN	16:9 sets	1	1	1	1	1	1	
1 (2)	OP_WSSB	Wide Screen Signalling Bit detection	0	0	1	0	1	0	
0 (1)	OP_ECO_SUBWOOFER	Sub woofer available	0	0	0	0	0	0	
OP3:			12	12	14	12	14	12	
7 (128)	OP_LIP_SYNC	Lip Synchronisation Circuit available	0	0	0	0	1	0	
6 (64)	OP_NOTUSED2	Not used	0	0	0	0	0	0	
5 (32)	OP_ULTRA_BASS	Ultra Bass Boost available	0	0	0	0	0	0	
4 (16)	OP_DELTA_VOLUME	Delta Volume feature available	0	0	0	0	1	0	EU only
3 (8)	OP_NOTUSED3	Not used	0	0	0	0	0	0	
2 (4)	OP_NOTUSED4	Not used	0	0	0	0	0	0	
1 (2)	OP_STEREO_DBX	Stereo DBX for NTSC available	1	0	0	0	0	1	NTSC only
0 (1)	OP_STEREO_NICAM_2CS	Stereo NICAM 2CS available	0	0	1	0	1	0	
OP4:			2	0	1	0	145	2	
7 (128)	OP_AV1	External Source 1 available	1	1	1	1	1	1	
6 (64)	OP_AV2	External Source 2 available	1	1	1	1	1	1	
5 (32)	OP_AV3	External Source 3 (Side AV) available	1	1	1	1	1	1	
4 (16)	OP_CVI	Component Video In available	1	1	1	1	0	1	Not for EU
3 (8)	OP_SVHS2	Super Video Home System 2 available	1	1	1	1	1	1	
2 (4)	OP_SVHS3	Super Video Home System 3 available	1	1	1	1	1	1	
1 (2)	OP_HOTEL_MODE	LATAM specific simplified Hotel Mode	0	0	0	0	0	0	
0 (1)	OP_NOTUSED	Not used	0	0	0	0	0	0	
OP5:			252	252	252	252	236	252	
7 (128)	OP_PERSONAL_ZAPPING	Zapping of channels feature available	0	0	0	0	0	0	
6 (64)	OP_SMART_SURF	Surf List available	1	0	0	0	0	1	
5 (32)	OP_FMTRAP	FM trap available	0	0	0	0	0	0	
4 (16)	OP_COMBFILTER	comb filter available	1	1	1	1	1	1	In Hercules
3 (8)	OP_ACTIVE_CONTROL	Auto Picture Impr. feature available	1	1	1	1	1	1	
2 (4)	OP_SMART_LOCK	Toggle Child Lock & Lock Chan. enabled	1	1	1	1	1	1	
1 (2)	OP_LIGHT_SENSOR	Light Sensor enabled	1	1	1	1	1	1	
0 (1)	OP_TWIN_TEXT	2 txt pages on screen available	0	0	1	1	1	0	
OP6:			94	30	31	31	31	94	
7 (128)	OP_TIME_WIN1	1= 5 s, 0= 2 s (Europe fixed 1.2 s)	1	1	0	1	0	1	
5, 6	not used		0	0	0	0	0	0	
4 (16)	OP_3DCOMB	3D comb filter available	0	1	0	0	0	1	NTSC only
<AP-PAL>									
3 (8)	OP_COLOR_SYSTEM_AP	1: Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, SECAM 0: OFF- Auto, PAL 4.43, NTSC 4.43, NTSC 3.58	0	0	1	0	0	0	
2 (4)	OP_SOUND_SYSTEM_AP_1	000: BG 001: BG / DK 010: I / DK 011: BG / I / DK	0	1	1	1	0	0	
1 (2)	OP_SOUND_SYSTEM_AP_2	100: BG / I / DK / M	0	0	0	0	0	0	
0 (1)	OP_SOUND_SYSTEM_AP_3		0	0	0	0	0	0	
<EUROPE>									
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	0	
2 (4)	OP_DUMMY7	Not used	0	0	0	0	0	0	
1 (2)	OP_WEST_EU	West Europe Set (0 - East Europe Set) by default "on"	0	0	0	0	1	0	
0 (1)	OP_MULTI_STANDARD_EUR	For Europe multi standard set	0	0	0	0	1	0	
<LATAM>									
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	0	
2 (4)	OP_DUMMY7		0	0	0	0	0	0	
1 (2)	OP_SYSTEM_LT_1	00: NTSC-M, 01: NTSC-M, PAL-M, 10: NTSC-M, PAL-	0	0	0	0	0	0	
0 (1)	OP_SYSTEM_LT_2	M, PAL-N, 11: NTSC-M, PAL-M, PAL-N, PAL-BG	0	0	0	0	0	0	
<NAFTA & AP-NTSC>									
3 (8)	OP_DUMMY6	Not used	0	0	0	0	0	0	
2 (4)	OP_DUMMY7	Not used	0	0	0	0	0	0	
1 (2)	OP_DUMMY8	Not used	0	0	0	0	0	0	
0 (1)	OP_DUMMY9	Not used	0	0	0	0	0	0	
OP7:			128	148	12	132	3	144	

The Hercules has one input for the internal CVBS signal and 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. It is possible to add an additional CVBS(Y)/C input (CVBS/YX and CX) when the YUV interface and the RGB/YPRPB input are not needed. Two SCART-connectors are used: SCART1 is fully equipped and SCART2 is meant for VCR. Pin 10 of SCART2 is used for Easylink (P50) and there is a possibility for Y/C in. The CVBS-out on pin 19 can be used for WYSIWYR (What You See Is What You Record).

The video part delivers the RGB signals to the Scaler IC.

The Genesis GM1501 Malibu Scaler IC can receive two video input signals: SDTV (from Hercules), DVI (from external DVI source), or PC (from external computer).

After the video processing, the digital data is send via a Low Voltage Differential Signalling bus to the LCD panel. LVDS is used to improve data speed and to reduce EMI significantly. There are two I²C lines and two interrupt and communication lines (TV_IRQ and TV_SC_COM) for the Scaler control. The Scaler communicates with the Hercules as a slave device. To avoid buffer overflow at the Scaler side, the TV_SC_COM line provides the necessary hardware flow control. To allow bi-directional communication, the Scaler can initiate a service interrupt-request to the Hercules via the TV_IRQ line.

The Hercules, and EEPROM are supplied with 3.3 V, which is also present during STANDBY.

The EEPROM, or NVM (Non Volatile Memory) is used to store the settings.

The sound part is built up around the Hercules. The Source Selection, Decoding and Processing are all done by the Hercules.

Power supply input are several DC voltages coming from a supply panel.

picture deforms with perfect signal; the IF-amplifier amplifies too much.

9.3 Power Supply LCD

See the FTL2.1 manual for a detailed description.

9.4 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs, a PC (VGA) input, a DVI input, and an Audio input. The side has a CVBS and Y/C (SVHS) input.

EXT1: The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (SC1_CVBS_RF_OUT).

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS_SC2_MON_OUT (+ sound).

SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C_in: Y_in on pin 20 and Chroma_in on pin 15.

The selection of the external I/O's is controlled by the Hercules.

PC (VGA) in: This input is directly going to the Scaler IC. See paragraph "Video: Scaler Part".

9.5 Tuner and IF

A Philips UR13xx Tuner with second input (for FM Radio) is used in the TV board. The SIF and FM signals are decoded by the Hercules. Tuning is done via I²C.

9.5.1 Video IF amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1328) and one for IF-audio (1330). The type of these filters is depending of the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 31 of the Hercules to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode "Tuner" -"AGC". If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the

The video processing is completely handled by the Hercules

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

9.6.1 Histogram (YUV picture improvement) IC

The demodulated video-signal can be checked on pins 74, 75, and 76 of IC7011 and is fed to pins 70, 71, and 72. In this path, the Histogram IC TDA9171 is inserted.

This TDA9178 can control various picture improvements:

- Histogram processing.
- Colour transient improvement.
- Luminance transient improvement.
- Black and white stretch.
- Skin tone correction.
- Green enhancement.
- Blue stretch.
- Smart peaking.
- Video dependent coring.
- Colour dependent stretching.

Since the TDA9171 is connected to the Hercules, picture improvement works only for signals that are routed trough the Hercules and not for signals directly connected to the Scaler.

9.7 Video: Scaler Part (diagram A7 and A13)

The Genesis gm1501 Scaler is a dual channel graphics and video processing IC for LCD monitors and televisions incorporating Picture in Picture, up to SXGA output resolutions. The Scaler controls the display processing in an LCD TV, e.g. like the deflection circuit in a CRT-based TV. It controls all the view modes (e.g. like "zooming" and "shifting"). Features like PC (VGA) or HD inputs, are also handled by this part.

9.7.1 Features

The Scaler provides several key IC functions:

- Scaling.
- Auto-configuration/ Auto-Detection.
- Various Input Ports:
 - Analog RGB.
 - Video Graphics.
- Integrated LVDS Transmitter.
- On-chip Micro-controller

9.7.2 Inputs

Analog RGB

The RGB input is fed to pins B2, C2 and D2. This input consists of either the Hercules RGB output or the RGB/YpbPr input of the VGA connector. The Scaler can switch between the two signals via the PC_HD_SEL signal and selection IC SM5301.

PC (VGA) input

The VGA input is processed by the VGA block of the Scaler. The Scaler supports pixel frequencies up to 165MHz. YpbPr format is also supported via the VGA interface and covers a resolution of 480p/560p/720p/1080i.

9.7.3 Output

The Display Output Port provides data and control signals that permit the Scaler to connect to a variety of display devices using a TTL or LVDS interface. The output interface is configurable for single or dual wide TTL/LVDS in 18, 24 or 30-bit RGB pixels format. All display data and timing signals are synchronous with the DCLK output clock. The integrated LVDS transmitter is programmable to allow the data and control signals to be mapped into any sequence depending on the specified receiver format.

9.8 Audio Processing

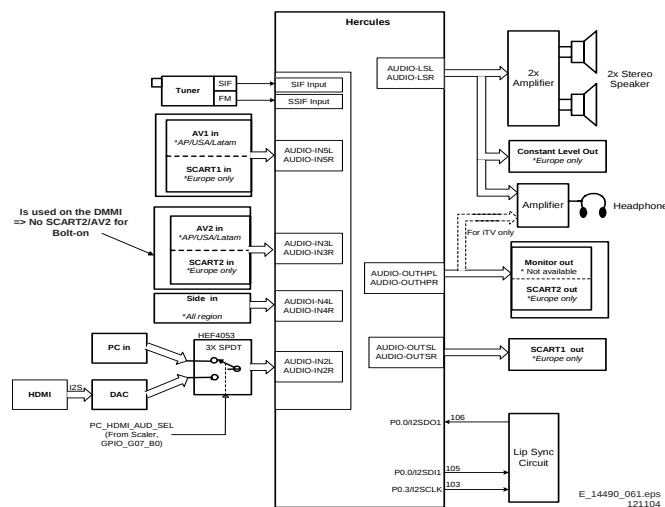


Figure 9-4 Block diagram audio processing

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 analogue 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 analogue 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 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 any more 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 start-up.

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 Leveller.
- 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 TDA7297D, and delivers a maximum output of $2 \times 15 W_{RMS}$.

The maximum operating condition for this amplifier is 20 V unloaded. Normal operating supply is from 6.5 V to 18 V. Muting is done via the SOUND_ENABLE line connected to pin 13 of the amplifier-IC and coming from the Hercules.

9.8.4 Audio: Lip Sync (Optional)

A "lip sync" circuit with an audio delay can be added (not for all models/regions), in order to synchronise with video delay due to the complexity of the display processing. This video delay is significant, due to memory based processing. For instance, the "frame rate conversion" cause a delay of two frames, while the LCD panel response also cause a delay.

The circuit is a (16 bit) FIFO based digital delay. E.g.: the memory size required for a 80 ms delay (with a data clock of 1.024 MHz) can be calculated with: Memory size = delay time * f_clk. This gives: 80 ms * 1.024 MHz = 81920 bits.

To calculate the memory size for a 16 bits mode I2S digital audio stream we must use the following data:

- f_s = 32 kHz, 16 bits, stereo
- Data clock = 32 kHz * 16 * 2 = 1.024 MHz
- Memory size for 1 ms delay = 1 ms * 1.024 MHz = 1024 bits = 1 kbit

So, the delay time of 80 ms can be built with five steps of 16 ms, which is close to the frame rate. Therefore, a 128 kbit SRAM (16 x 8) is chosen.

Note that above described calculation is just an example, values in the set can deviate.

9.9 Control

9.9.1 Hercules

The System Board has two main micro-controllers on board. These are:

- On-chip x86 micro-controller (OCM) from Genesis LCD TV/Monitor Controller.
- On-chip 80C51 micro-controller from Philips Semiconductor UOCIII (Hercules) series.

Each micro-controller has its own I²C bus which host its own internal devices.

The Hercules is integrated with the Video and Audio Processor. 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.

9.9.2 Block Diagram

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

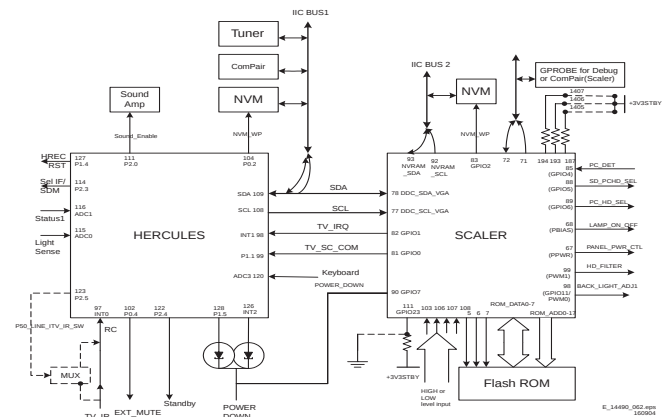


Figure 9-5 Micro Controller block diagram

9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:

- +3.3 V_{DC} at pins 4, 88, 94, and 109.
- +1.8 V_{DC} at pins 93, 96, and 117.
- I²C pull up supply: +3.3V_{DC}.

9.9.4 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 9-1 Micro Controller ports overview

Pin	Name	Description	Configuration
97	INT0/ P0.5	IR	INT0
98	P1.0/ INT1	TV_IRQ	INT2
99	P1.1/ T0	TV_SC_COM	P1.1
102	P0.4/ I ² SWS	EXT_MUTE	P0.4
103	P0.3/ I ² SCLK	Lip Sync	I ² SCLK
104	P0.2/ I ² SDO2	NVM_WP	P0.2
105	P0.1/ I ² SDO1	Lip Sync	I ² SDO1
106	P0.0/ I ² SDI/O	Lip Sync	I ² SDI/O
107	P1.3/ T1	PC-TV_LED	P1.3
108	P1.6/ SCL	SCL	SCL
109	P1.7/ SDA	SDA	SDA
111	P2.0/ TPWM	SOUND_ENABLE	P2.0
112	P2.1/ PWM0	(for future use)	-
113	P2.2/ PWM1	(for future use)	-
114	P2.3/ PWM2	SEL_IF	P2.3
115	P3.0/ ADC0	Light Sensor - SDM	ADC0
116	P3.1/ ADC1	STATUS_1	ADC1
119	P3.2/ ADC2	STATUS_2	ADC2
120	P3.3/ ADC3	KEYBOARD	ADC3
122	P2.4/ PWM3	STANDBY	P2.4
123	P2.5/ PWM4	(for future use)	-
126	P1.2/ INT2	(for future use)	-
127	P1.4/ RX	HERC_RESET	-
128	P1.5/ TX	POWER_DOWN	P1.5

The description of each functional pin is explained below:

- **LED.** This signal is used as an indication for the Stand-by, Remote and Error Indicator. Region diversity:
 - During protection mode, the LED blinks and the set is in stand-by 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 stand-by mode.
- **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.
- **STANDBY.** The Hercules generates this signal. This can enable the power supply in normal operation and disable it during Stand-by. It is of logic "high" (3.3 V) under normal operation and "low" (0 V) during Stand-by.
- **IR.** This input pin is connected to an RC5 remote control receiver.
- **SEL-IF.** 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
- **NVM_WP.** 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)
- **SOUND_ENABLE.** This pin is use to MUTE the audio amplifier. It is configured as push pull.
- **STATUS_1.** This signal is used to read the status of the SCART 1 input.
- **STATUS_2.** This signal is used to read the status of the SCART 2 input.
- **HERC_RESET.** This pin is use to switch the +1.8V supply.
- **POWER_DOWN.** The power supply 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 9-2 Local keyboard values

Function	Voltage (V _{DC})	Step values (8 bit)
NAFTA Stand-by	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

- **TV_IRQ.** This signal is the interrupt from the Scaler IC.
- **TV_SC_COM.** This signal is used for the communication with the Scaler IC.
- **EXT_MUTE.** This signal is used to reduce the Switch-off plop.

9.10 Abbreviation list

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format
1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
2CS	2 Carrier Stereo
480i	480 visible lines, interlaced
480p	480 visible lines, progressive scan
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASD	Automatic Standard Detection
AV	Audio Video
B-SC1-IN	Blue SCART1 in
B-SC2-IN	Blue SCART2 in
B-TXT	Blue teletext
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BOCMA	Bimos one Chip Mid-end Architecture: video and chroma decoder
C-FRONT	Chrominance front input
CBA	Circuit Board Assembly (or PWB)
CL	Constant Level: audio output to connect with an external amplifier
CLUT	Colour Look Up Table
ComPair	Computer aided rePair
CSM	Customer Service Mode
CVBS	Composite Video Blanking and Synchronisation
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)
CVBS-INT	CVBS signal from Tuner
CVBS-MON	CVBS monitor signal
CVBS-TER-OUT	CVBS terrestrial out
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DFU	Directions For Use: owner's manual
DNR	Dynamic Noise Reduction
DRAM	Dynamic RAM
DSP	Digital Signal Processing
DST	Dealer Service Tool: special (European) remote control designed for service technicians
DTS	Digital Theatre Sound
DVD	Digital Video Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)
EU	EUrope
EXT	EXTERNAL (source), entering the set by SCART or by cinches (jacks)
FBL	Fast Blanking: DC signal accompanying RGB signals
FBL-SC1-IN	Fast blanking signal for SCART1 in
FBL-SC2-IN	Fast blanking signal for SCART2 in
FBL-TXT	Fast Blanking Teletext
FLASH	FLASH memory

FM	Field Memory / Frequency Modulation		South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
FMR	FM Radio		
FRC	Frame Rate Converter		
FRONT-C	Front input chrominance (SVHS)	PC	Personal Computer
FRONT-DETECT	Front input detection	PCB	Printed Circuit Board (or PWB)
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)	PIG	Picture In Graphic
		PIP	Picture In Picture
G-SC1-IN	Green SCART1 in	PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency
G-SC2-IN	Green SCART2 in		
G-TXT	Green teletext		
H	H_sync to the module		
HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
HD	High Definition		
HP	Head Phone		
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	PWB	Printed Wiring Board (or PCB)
I ² C	Integrated IC bus	RAM	Random Access Memory
I ² S	Integrated IC Sound bus	RC	Remote Control transmitter
IC	Integrated Circuit	RC5	Remote Control system 5, the signal from the remote control receiver
IF	Intermediate Frequency	RGB	Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced.
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.	RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
IR	Infra Red	ROM	Read Only Memory
IRQ	Interrupt ReQuest	SAM	Service Alignment Mode
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customers wishes	SIF	Sound Intermediate Frequency
		SC	SandCastle: two-level pulse derived from sync signals
LATAM	LATin America	SC1-OUT	SCART output of the MSP audio IC
LC04	Philips chassis name for LCD TV 2004 project	SC2-B-IN	SCART2 Blue in
		SC2-C-IN	SCART2 chrominance in
LCD	Liquid Crystal Display	SC2-OUT	SCART output of the MSP audio IC
LED	Light Emitting Diode	S/C	Short Circuit
LINE-DRIVE	Line drive signal	SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	SCL	CLock Signal on I ² C bus
		SD	Standard Definition
LS	Loud Speaker	SDA	DATA Signal on I ² C bus
LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.	SDRAM	Synchronous DRAM
		SECAM	SEquence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz	SIF	Sound Intermediate Frequency
MOSFET	Metal Oxide Semiconductor Field Effect Transistor	SMPS	Switch Mode Power Supply
MPEG	Motion Pictures Experts Group	SND	Sound
MSP	Multi-standard Sound Processor: ITT sound decoder	SNDL-SC1-IN	Sound left SCART1 in
		SNDL-SC1-OUT	Sound left SCART1 out
MUTE	MUTE Line	SNDL-SC2-IN	Sound left SCART2 in
NC	Not Connected	SNDL-SC2-OUT	Sound left SCART2 out
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe.	SNDL-SC1-IN	Sound right SCART1 in
		SNDL-SC1-OUT	Sound right SCART1 out
		SNDL-SC2-IN	Sound right SCART2 in
		SNDL-SC2-OUT	Sound right SCART2 out
NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	SNDL-VL-OUT	Surround sound left variable level out
		SNDL-VR-OUT	Surround sound right variable level out
		SOPS	Self Oscillating Power Supply
		S/PDIF	Sony Philips Digital InterFace
		SRAM	Static RAM
		STBY	Stand-by
		SVHS	Super Video Home System
NVM	Non Volatile Memory: IC containing TV related data (for example, options)	SW	Sub Woofer / SoftWare
O/C	Open Circuit	THD	Total Harmonic Distortion
ON/OFF LED	On/Off control signal for the LED	TXT	TeleteXT
OSD	On Screen Display	uP	Microprocessor
P50	Project 50 communication: protocol between TV and peripherals	VA	Vertical Acquisition
		VL	Variable Level out: processed audio output toward external amplifier
PAL	Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and	VCR	Video Cassette Recorder
		VGA	Video Graphics Array
		WD	Watch Dog

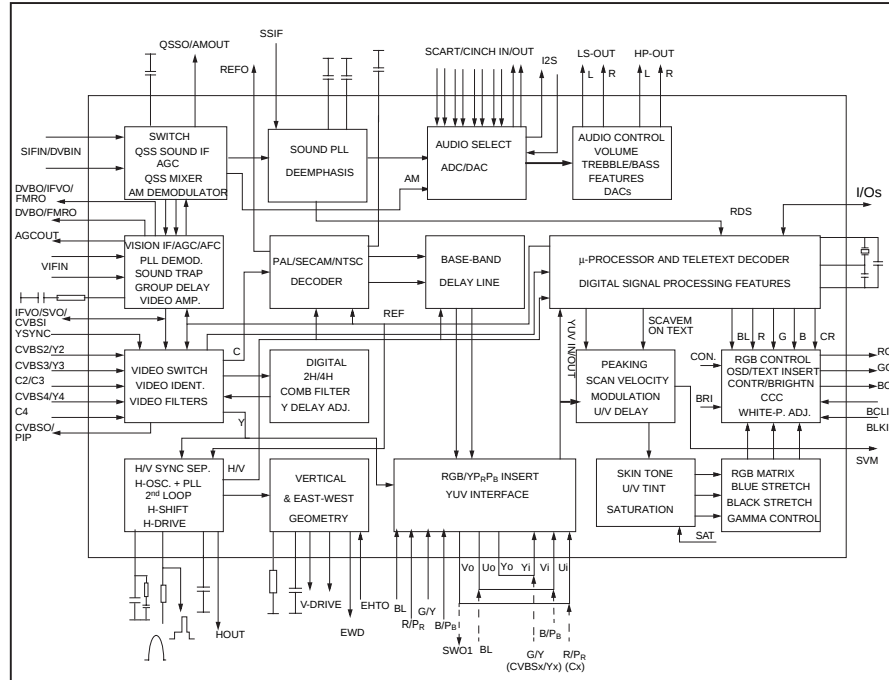
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YPbPr	Component video (Y= Luminance, Pb/ Pr= Colour difference signals)
Y/C	Luminance (Y) and Chrominance (C) signal
Y-OUT	Luminance-signal
YUV	Component video

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).

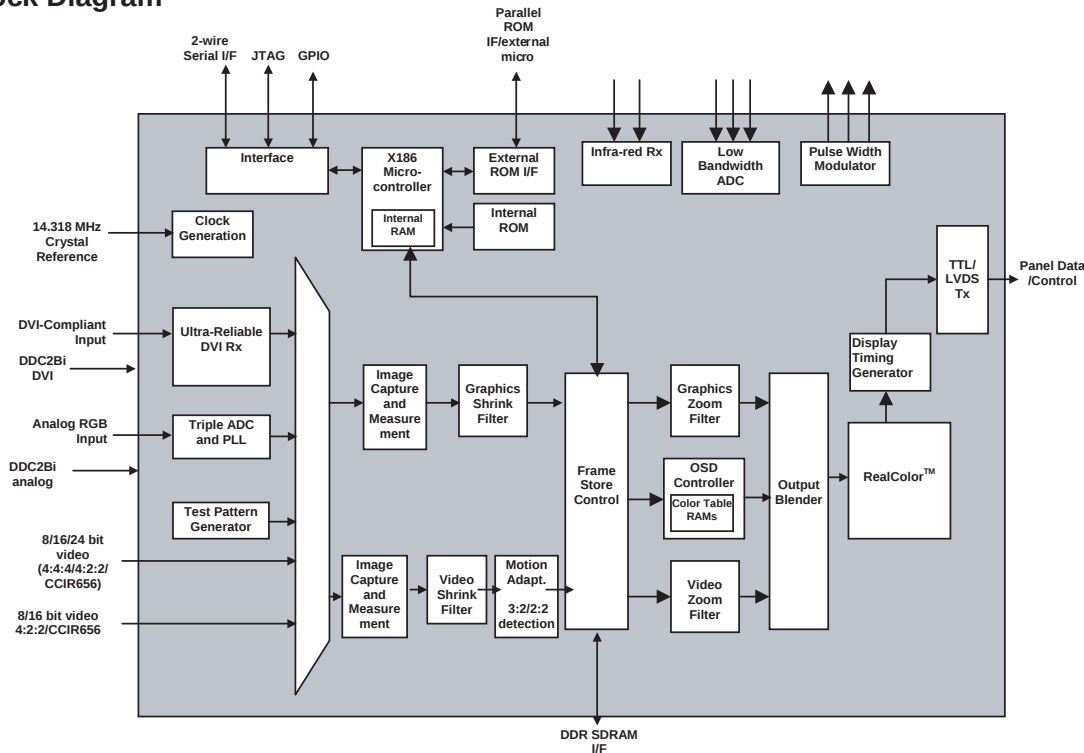
9.11.1 Diagram A2, Type TDA12029H (IC7011)

Block diagram of the "AV-stereo" TV processor with audio DSP



9.11.2 Diagram A7, Type GM1501 (IC7401)

Block Diagram



Pin Configuration

A	NC	ADC_3.3	ADC_1.8	ADC_1.8	ADC_DGND	RXC+	DVI_GND	RX0+	RX1+	RX2+	DVI_GND	LBADC_N3	D_GND
B	BLUE-	BLUE+	ADC_3.3	ADC_DGND	DVI_GND	RXC-	DVI_GND	RX0-	RX1-	RX2-	REXT	LBADC_N2	D_GND
C	GREEN-	GREEN+	SOG	ADC_AGND	NC	DVI_3.3	DVI_GND	DVI_3.3	DVI_3.3	DVI_3.3	DVI_3.3	LBADC_N1	LBADC_33
D	RED-	RED+	ADC_3.3	ADC_AGND	NC	DVI_1.8	DVI_GND	DVI_1.8	DVI_1.8	DVI_1.8	DVI_GND	LBADC_RETURN	LBADC_GND
E	ADC_AGND	ADC_AGND	ADC_3.3	ADC_AGND									
F	NC	VDD33_PLL	VSSA33_RPLL	VDDA33_RPLL									
G	VDDA33_FPLL	VSSD33_PLL	TCLK	XTAL									
H	VDD33_SDDS	VSSA33_SDDS	VDDA33_SDDS	VSSA33_FPLL									
J	VDD33-DDDS	VSSA33-DDDS	VDDA33-DDDS	VSSD33-DDDS									
K	RESETn	ACS_RSET_HD	NC	VSSD33-DDDS						CORE_1.8	CORE_1.8	D_GND	D_GND
L	OCM_INT2	OCM_INT1	AVSYNC	AHSYNC						D_GND	CORE_1.8	D_GND	D_GND
M	OCM_UD0	OCM_UD1	IR0	IR1						D_GND	D_GND	D_GND	D_GND
N	VGA_SDA	VGA_SCL	DVI_SDA	DVI_SCL						D_GND	D_GND	D_GND	D_GND
P	OCM_CS1n	OCM_CS2n	MSTR_SDA	MSTR_SCL						D_GND	D_GND	D_GND	D_GND
R	ROM_CSn	OCM_REn	OCM_WEn	EXTCLK						D_GND	D_GND	D_GND	D_GND
T	OCMADDR_17	OCMADDR_18	OCMADDR_19	OCM_CS0n						D_GND	CORE_1.8	D_GND	D_GND
U	OCMADDR_13	OCMADDR_14	OCMADDR_15	OCMADDR_16						CORE_1.8	CORE_1.8	D_GND	D_GND
V	OCMADDR_9	OCMADDR_10	OCMADDR_11	OCMADDR_12									
W	OCMADDR_6	OCMADDR_7	OCMADDR_8	IO_3.3									
Y	OCMADDR_3	OCMADDR_4	OCMADDR_5	IO_3.3									
AA	OCMADDR_0	OCMADDR_1	OCMADDR_2	IO_3.3									
AB	OCMDATA13	OCMDATA14	OCMDATA15	IO_3.3									
AC	OCMDATA10	OCMDATA11	OCMDATA12	IO_3.3	GPIO_G09_B2 (DEGRN0)	IO_3.3	DCLK	IO_3.3	GPIO_G07_B2 (DERED4)	IO_3.3	SHIELD[1] (DEGRN3)	LVDSB_3.3	LVDSB_GND
AD	OCMDATA8	OCMDATA6	OCMDATA3	OCMDATA0	GPIO_G09_B3 (DEGRN1)	GPIO_G08_B0 (DORED0)	DEN	GPIO_G08_B5 (DOBLU1)	GPIO_G07_B3 (DERED5)	GPIO_G07_B6 (DERED6)	SHIELD[2] (DEGRN4)	LVDSB_3.3	LVDSB_3.3
AE	OCMDATA8	OCMDATA5	OCMDATA2	GPIO_G09_B0 (DERED0)	GPIO_G09_B4 (DEBLU0)	GPIO_G08_B1 (DOGRN1)	GPIO_G08_B3 (DERED2)	GPIO_G07_B0 (DERED2)	GPIO_G07_B4 (DERED6)	GPIO_G07_B7 (DERED9)	SHIELD[3] (DEGRN5)	BC+ (DEGRN8)	SHIELD[4] (DEBLU2)
AF	OCMDATA7	OCMDATA4	OCMDATA1	GPIO_G09_B1 (DERED1)	GPIO_G09_B5 (DEBLU1)	GPIO_G08_B2 (DOGRN0)	GPIO_G08_B4 (DOBLU0)	GPIO_G07_B1 (DERED3)	GPIO_G07_B5 (DERED7)	SHIELD[0] (DEGRN2)	B3+ (DEGRN6)	B3- (DEGRN7)	BC- (DEGRN9)
	1	2	3	4	5	6	7	8	9	10	11	12	13

Figure 9-7 Internal Block Diagram and Pin Configuration

10. Spare Parts List

Set Level					
Various					
1004▲	9322 199 94682	LCD LC300W01A5 (LPL)	2034	2020 552 00002	3.3nF 2% 50V 0805
1004▲	9322 206 53682	LCD LC300W01C5 (LPL)	2035	2020 552 96656	10μF 20% 25V 1210
1004▲	9322 213 33682	LCD T296XW01V3(AUO)	2036	2020 552 96807	1μF 10% 10V 0603
1116	3104 328 26371	Side I/O assy LCD	2037	2020 552 96807	1μF 10% 10V 0603
8302	3104 311 04731	Cable 7p/560/7p	2040	4822 124 23002	10μF 16V
8303	3104 311 06511	Cable 10p/280/10p	2041	2020 552 96718	220nF 10% 6.3V 0402
8304	3104 311 08271	Cable 4p/340/4p	2042	2020 552 00002	3.3nF 2% 50V 0805
8305	3104 311 08411	Cable 3P/340/3P	2043	3198 035 71040	100nF 10% 16V 0402
8306	3104 311 01431	Cable 2P3/340/2P3	2044	2020 552 96718	220nF 10% 6.3V 0402
8307	3104 311 08371	Cable 4p/340/4p	2045	2238 869 15109	10pF 5% 50V 0402
8309	3104 311 08301	Cable 3p/340/3p	2046	2238 869 15109	10pF 5% 50V 0402
8312	3104 311 06361	Cable 15p/340/16p (LPL)	2047	2020 552 96628	10nF 10% 16V 0402
8313	3104 311 08791	Cable 15p/120/16p (LPL)	2048	2238 869 15109	10pF 5% 50V 0402
8315	3104 311 06511	Cble 10p/280/10p (AUO)	2049	2238 869 15109	10pF 5% 50V 0402
8317	3104 311 03611	Cble 12p/280/12p (AUO)	2050	2238 869 15109	10pF 5% 50V 0402
8346	3104 311 07001	Cable 11p/400/11p	2051	2020 552 00002	3.3nF 2% 50V 0805
8350	3104 311 08611	Cable 31p/120/20p DF19	2053	2020 552 96618	1nF 10% 50V 0402
8352	3104 311 06811	Cable 9p340/9p	2054	2020 552 96632	22nF 10% 16V 0402
			2055	4822 126 14519	22pF 5% 50V 0402
			2056	3198 035 71040	100nF 10% 16V 0402
			2057	2238 869 15109	10pF 5% 50V 0402
			2058	2238 869 15109	10pF 5% 50V 0402
			2059	2238 869 15109	10pF 5% 50V 0402
			2060	3198 035 71040	100nF 10% 16V 0402
			2061	4822 124 23002	10μF 16V
			2062	2238 869 15109	10pF 5% 50V 0402
			2063	3198 017 31540	150nF 10V 0603
			2064	3198 017 41050	1μF 10V 0603
			2067	2238 869 15109	10pF 5% 50V 0402
			2068	2020 552 96718	220nF 10% 6.3V 0402
			2069	2238 869 15109	10pF 5% 50V 0402
			2070	2020 552 96834	1μF 20% 6.3V 0402
			2071	4822 124 12095	100μF 20% 16V
			2072	4822 126 14076	220nF +80/-20% 25V
			2073	2020 552 96618	1nF 10% 50V 0402
			2074	2020 552 96718	220nF 10% 6.3V 0402
			2075	2020 552 96718	220nF 10% 6.3V 0402
			2077	2020 552 96834	1μF 20% 6.3V 0402
			2078	2238 869 15101	100pF 5% 50V 0402
			2079	2238 869 15109	10pF 5% 50V 0402
			2080	2238 869 15109	10pF 5% 50V 0402
			2081	2238 869 15109	10pF 5% 50V 0402
			2082	2020 552 96618	1nF 10% 50V 0402
			2084	2020 552 96718	220nF 10% 6.3V 0402
			2085	2020 552 96618	1nF 10% 50V 0402
			2086	2020 552 96618	1nF 10% 50V 0402
			2087	2238 869 15109	10pF 5% 50V 0402
			2088	2238 869 15109	10pF 5% 50V 0402
			2089	2020 552 96618	1nF 10% 50V 0402
			2090	2238 869 15109	10pF 5% 50V 0402
			2091	2238 869 15109	10pF 5% 50V 0402
			2092	2238 869 15109	10pF 5% 50V 0402
			2093	2238 869 15109	10pF 5% 50V 0402
			2094	2238 869 15109	10pF 5% 50V 0402
			2095	2238 869 15109	10pF 5% 50V 0402
			2096	2238 869 15109	10pF 5% 50V 0402
			2097	2238 869 15109	10pF 5% 50V 0402
			2098	2238 869 15109	10pF 5% 50V 0402
			2099	2020 552 96618	1nF 10% 50V 0402
			2101	4822 126 14241	330pF 0603 50V
			2103	4822 126 14241	330pF 0603 50V
			2104	2020 552 96807	1μF 10% 10V 0603
			2105	4822 126 14241	330pF 0603 50V
			2107	4822 126 14241	330pF 0603 50V
			2108	2020 552 96807	1μF 10% 10V 0603
			2109	4822 126 13881	470pF 5% 50V
			2110	4822 126 13881	470pF 5% 50V
			2111	4822 126 13881	470pF 5% 50V
			2112	4822 126 13881	470pF 5% 50V
			2127	4822 126 14241	330pF 0603 50V
			2128	2020 552 96807	1μF 10% 10V 0603
			2129	4822 126 14241	330pF 0603 50V
			2131	4822 126 14241	330pF 0603 50V
			2132	2020 552 96807	1μF 10% 10V 0603
			2133	4822 126 14241	330pF 0603 50V
			2134	4822 126 13881	470pF 5% 50V
			2135	4822 126 13881	470pF 5% 50V
			2136	4822 126 13881	470pF 5% 50V
			2137	4822 126 13881	470pF 5% 50V
			2138	3198 017 41050	1μF 10V 0603
			2152	4822 126 14241	330pF 0603 50V
			2155	4822 126 14241	330pF 0603 50V
			2169	4822 124 23002	10μF 16V
			2251	2238 869 15109	10pF 5% 50V 0402
			2252	2238 869 15109	10pF 5% 50V 0402
			2253	4822 124 23002	10μF 16V
			2254	4822 124 23002	10μF 16V
			2262	4822 124 80151	47μF 16V
			2263	2020 552 96656	10μF 20% 25V 1210
			2264	2020 552 96656	10μF 20% 25V 1210
			2265	3198 035 02210	220pF 5% 50V 0402
			2266	2020 552 96632	22nF 10% 16V 0402
			2268	2020 012 93795	470μF 20% 16V
			2269	2020 012 93795	470μF 20% 16V
			2271	2020 552 96628	10nF 10% 16V 0402
			2302	4822 122 33761	22pF 5% 50V
			2303	4822 122 33761	22pF 5% 50V
			2307	3198 024 44730	47nF 50V 0603
			2308	3198 030 82280	2.2μF 20% 50V
			2309	2020 021 91871	470μF 20% 16V
			2311	4822 124 12095	100μF 20% 16V
			2321	5322 126 11583	10nF 10% 50V 0603
			2324	5322 126 11583	10nF 10% 50V 0603
			2355	3198 030 82280	2.2μF 20% 50V
			2356	3198 030 82280	2.2μF 20% 50V
			2357	3198 035 71040	100nF 10% 16V 0402
			2358	2020 552 96625	3.3nF 10% 50V 0402
			2359	2020 552 96628	10nF 10% 16V 0402
			2370	2020 552 96834	1μF 20% 6.3V 0402
			2371	2020 552 96834	1μF 20% 6.3V 0402
			2372	2020 552 96618	1nF 10% 50V 0402
			2373	2020 552 96618	1nF 10% 50V 0402
			2374	3198 035 71040	100nF 10% 16V 0402
			2375	4822 124 12082	10μF 20% 50V

EN 87 10. LC4.6E AA

2450	3198 035 71040	100nF 10% 16V 0402	2622	2020 552 96834	1µF 20% 6.3V 0402	3010	4822 117 13548	1kΩ 5% 0402
2451	4822 124 80151	47µF 16V	2623	2020 552 96834	1µF 20% 6.3V 0402	3011	4822 117 13543	470Ω 5% 0402
2452	3198 035 71040	100nF 10% 16V 0402	2624	3198 017 44740	470nF 10V 0603	3013	4822 117 13545	100Ω 1% 0402
2453	3198 035 71040	100nF 10% 16V 0402	2625	3198 017 44740	470nF 10V 0603	3015	4822 117 13605	Jumper 0402
2454	3198 035 71040	100nF 10% 16V 0402	2626	3198 017 44740	470nF 10V 0603	3017	4822 117 13605	Jumper 0402
2455	3198 035 71040	100nF 10% 16V 0402	2630	2020 552 96834	1µF 20% 6.3V 0402	3019	4822 117 13545	100Ω 1% 0402
2456	3198 035 71040	100nF 10% 16V 0402	2631	2020 552 96834	1µF 20% 6.3V 0402	3020	4822 117 13548	1kΩ 5% 0402
2461	3198 035 71040	100nF 10% 16V 0402	2632	2020 552 96834	1µF 20% 6.3V 0402	3021	2322 706 72702	2.7kΩ 1% 0402
2462	3198 035 71040	100nF 10% 16V 0402	2633	2020 552 96834	1µF 20% 6.3V 0402	3022	4822 117 13606	10kΩ 5% 0.01W 0402
2463	3198 035 71040	100nF 10% 16V 0402	2634	2020 552 96834	1µF 20% 6.3V 0402	3023	3198 031 01090	10Ω 5% 0.01W 0402
2464	3198 035 71040	100nF 10% 16V 0402	2635	2020 552 96834	1µF 20% 6.3V 0402	3024	3198 031 01090	10Ω 5% 0.01W 0402
2465	5322 124 41945	22µF 20% 35V	2636	3198 035 71040	100nF 10% 16V 0402	3025	3198 031 01090	10Ω 5% 0.01W 0402
2466	3198 035 71040	100nF 10% 16V 0402	2681	2020 552 94427	100pF 5% 50V	3026	3198 031 06890	68Ω 5% 0402
2467	3198 035 71040	100nF 10% 16V 0402	2686	2020 552 94427	100pF 5% 50V	3027	3198 031 01090	10Ω 5% 0.01W 0402
2468	3198 035 71040	100nF 10% 16V 0402	2688	2238 586 59812	100nF 20% 50V 0603	3028	4822 117 11297	100kΩ 5% 0.1W
2469	3198 035 71040	100nF 10% 16V 0402	2693	2238 586 59812	100nF 20% 50V 0603	3029	4822 117 13548	1kΩ 5% 0402
2470	5322 124 41945	22µF 20% 35V	2698	2020 552 94427	100pF 5% 50V	3030	4822 117 11297	100kΩ 5% 0.1W
2471	3198 035 71040	100nF 10% 16V 0402	2699	2020 552 94427	100pF 5% 50V	3032	3198 031 02240	220kΩ 5% 0.1W 0402
2472	3198 035 71040	100nF 10% 16V 0402	2702	2020 552 96834	1µF 20% 6.3V 0402	3035	4822 117 13545	100Ω 1% 0402
2473	3198 035 71040	100nF 10% 16V 0402	2707	2020 021 91871	470µF 20% 16V	3040	3198 031 06830	68kΩ 5% 0.01W 0402
2474	3198 035 71040	100nF 10% 16V 0402	2708	2020 552 96834	1µF 20% 6.3V 0402	3048	4822 117 13606	10kΩ 5% 0.01W 0402
2475	3198 035 71040	100nF 10% 16V 0402	2710	3198 035 04710	470pF 50V 0402	3049	4822 117 13545	100Ω 1% 0402
2476	3198 035 71040	100nF 10% 16V 0402	2711	3198 035 04710	470pF 50V 0402	3050	4822 117 13545	100Ω 1% 0402
2477	3198 035 71040	100nF 10% 16V 0402	2713	2238 586 59812	100nF 20% 50V 0603	3051	4822 117 13545	100Ω 1% 0402
2478	5322 124 41945	22µF 20% 35V	2714	2020 021 91871	470µF 20% 16V	3052	4822 117 13605	Jumper 0402
2479	3198 035 71040	100nF 10% 16V 0402	2715	2020 021 91871	470µF 20% 16V	3056	3198 031 04720	4.7kΩ 5% 0402
2480	3198 035 71040	100nF 10% 16V 0402	2719	2238 586 59812	100nF 20% 50V 0603	3057	4822 117 13545	100Ω 1% 0402
2481	3198 035 71040	100nF 10% 16V 0402	2720	2238 869 15109	10pF 5% 50V 0402	3058	4822 117 13543	470Ω 5% 0402
2482	5322 124 41945	22µF 20% 35V	2743	2020 552 96834	1µF 20% 6.3V 0402	3059	4822 117 13548	1kΩ 5% 0402
2483	3198 035 71040	100nF 10% 16V 0402	2744	2020 552 96834	1µF 20% 6.3V 0402	3060	3198 031 03930	39kΩ 5% 0402
2484	3198 035 71040	100nF 10% 16V 0402	2747	2238 869 15101	100pF 5% 50V 0402	3063	3198 031 06890	68Ω 5% 0402
2485	3198 035 71040	100nF 10% 16V 0402	2748	2238 869 15101	100pF 5% 50V 0402	3065	3198 031 06810	680Ω 5% 0.01W 0402
2486	3198 035 71040	100nF 10% 16V 0402	2749	2238 869 15101	100pF 5% 50V 0402	3066	3198 031 06890	68Ω 5% 0402
2487	4822 126 14519	22pF 5% 50V 0402	2750	2238 869 15101	100pF 5% 50V 0402	3067	3198 031 01090	10Ω 5% 0.01W 0402
2488	4822 126 14519	22pF 5% 50V 0402	2784	4822 126 14241	330pF 0603 50V	3068	3198 031 06890	68Ω 5% 0402
2490	2238 586 59812	100nF 20% 50V 0603	2785	4822 126 14241	330pF 0603 50V	3069	3198 031 01090	10Ω 5% 0.01W 0402
2491	2238 586 59812	100nF 20% 50V 0603	2847	3198 017 41050	1µF 10V 0603	3070	4822 117 13545	100Ω 1% 0402
2492	2238 586 59812	100nF 20% 50V 0603	2848	3198 017 41050	1µF 10V 0603	3072	3198 031 06890	68Ω 5% 0402
2493	2020 552 96807	1µF 10% 10V 0603	2860	2238 869 15109	10pF 5% 50V 0402	3073	3198 031 01530	15kΩ 5% 0.01W 0402
2495	4822 124 80151	47µF 16V	2861	2238 869 15109	10pF 5% 50V 0402	3074	4822 117 11297	100kΩ 5% 0.1W
2496	3198 035 71040	100nF 10% 16V 0402	2862	2238 869 15109	10pF 5% 50V 0402	3075	3198 031 04720	4.7kΩ 5% 0402
2501	4822 124 80151	47µF 16V	2863	2238 869 15109	10pF 5% 50V 0402	3077	3198 031 04720	4.7kΩ 5% 0402
2502	4822 124 11131	47µF 6.3V	2864	2238 869 15109	10pF 5% 50V 0402	3078	3198 031 04720	4.7kΩ 5% 0402
2503	3198 035 71040	100nF 10% 16V 0402	2865	2238 869 15109	10pF 5% 50V 0402	3079	3198 031 04720	4.7kΩ 5% 0402
2504	3198 035 71040	100nF 10% 16V 0402	2866	2238 869 15109	10pF 5% 50V 0402	3080	5322 117 13034	1.5kΩ 1% 0.063W 0603
2505	3198 035 71040	100nF 10% 16V 0402	2867	2238 869 15109	10pF 5% 50V 0402	3081	4822 117 13545	100Ω 1% 0402
2506	3198 035 71040	100nF 10% 16V 0402	2868	2238 869 15109	10pF 5% 50V 0402	3082	3198 031 04720	4.7kΩ 5% 0402
2507	3198 035 71040	100nF 10% 16V 0402	2869	2238 869 15109	10pF 5% 50V 0402	3083	3198 031 04720	4.7kΩ 5% 0402
2508	3198 035 71040	100nF 10% 16V 0402	2874	2238 869 15109	10pF 5% 50V 0402	3084	4822 117 13545	100Ω 1% 0402
2509	3198 035 71040	100nF 10% 16V 0402	2875	2238 869 15109	10pF 5% 50V 0402	3085	3198 031 04720	4.7kΩ 5% 0402
2510	3198 035 71040	100nF 10% 16V 0402	2876	2020 552 96628	10nF 10% 16V 0402	3086	4822 117 13602	2.2kΩ 5% 0.01W 0402
2511	3198 035 71040	100nF 10% 16V 0402	2877	2238 869 15109	10pF 5% 50V 0402	3087	4822 117 13606	10kΩ 5% 0.01W 0402
2512	3198 035 71040	100nF 10% 16V 0402	2878	2020 552 96628	10nF 10% 16V 0402	3088	3198 031 03320	3.3kΩ 5% 0402
2513	3198 035 71040	100nF 10% 16V 0402	2879	2020 552 96628	10nF 10% 16V 0402	3089	3198 031 01540	150kΩ 5% 0402
2514	3198 035 71040	100nF 10% 16V 0402	2880	2238 869 15109	10pF 5% 50V 0402	3091	4822 117 13545	100Ω 1% 0402
2515	3198 035 71040	100nF 10% 16V 0402	2881	2020 552 96628	10nF 10% 16V 0402	3092	3198 031 04720	4.7kΩ 5% 0402
2516	3198 035 71040	100nF 10% 16V 0402	2883	2238 869 15109	10pF 5% 50V 0402	3093	3198 031 04720	4.7kΩ 5% 0402
2517	3198 035 71040	100nF 10% 16V 0402	2884	2020 552 96628	10nF 10% 16V 0402	3094	3198 031 01090	10Ω 5% 0.01W 0402
2526	5322 124 41945	22µF 20% 35V	2887	2238 869 15109	10pF 5% 50V 0402	3096	3198 031 03320	3.3kΩ 5% 0402
2530	4822 124 23002	10µF 16V	2910	3198 035 04710	470pF 50V 0402	3097	3198 031 04720	4.7kΩ 5% 0402
2531	3198 035 71040	100nF 10% 16V 0402	2911	3198 030 72290	22µF 20% 35V	3098	4822 117 13545	100Ω 1% 0402
2532	3198 035 71040	100nF 10% 16V 0402	2920	4822 124 80151	47µF 16V	3101	4822 051 30151	150Ω 5% 0.062W
2533	3198 035 71040	100nF 10% 16V 0402	2921	4822 124 80151	47µF 16V	3102	4822 117 12891	220kΩ 1%
2560	3198 035 71040	100nF 10% 16V 0402	2930	2020 021 91871	470µF 20% 16V	3103	4822 051 30151	150Ω 5% 0.062W
2561	4822 124 12095	100µF 20% 16V	2931	3198 035 04710	470pF 50V 0402	3104	4822 117 12925	47kΩ 1% 0.063W 0603
2562	3198 035 71040	100nF 10% 16V 0402	2933	2020 021 91871	470µF 20% 16V	3105	4822 051 30151	150Ω 5% 0.062W
2563	3198 035 14720	4.7nF 5% 25V 0402	2934	2020 552 96793	4.7nF 5% 25V 0402	3106	4822 117 12891	220kΩ 1%
2564	2020 552 96656	10µF 20% 25V 1210	2935	2020 021 91871	4			

3134	4822 051 30682	6.8Ω 5% 0.062W	3423	3198 031 03320	3.3kΩ 5% 0402	3697	4822 051 30103	10kΩ 5% 0.062W
3135	4822 051 30273	27kΩ 5% 0.062W	3424	2322 704 61501	150Ω 1% 0603	3698	4822 051 30151	150Ω 5% 0.062W
3136	4822 051 30331	330Ω 5% 0.062W	3425	4822 117 13606	10kΩ 5% 0.01W 0402	3699	4822 051 30151	150Ω 5% 0.062W
3137	4822 051 30759	75Ω 5% 0.062W	3426	3198 031 03320	3.3kΩ 5% 0402	3700	4822 117 12925	47kΩ 1% 0.063W 0603
3138	4822 117 13632	100kΩ 1% 0603 0.62W	3428	4822 117 13606	10kΩ 5% 0.01W 0402	3701	4822 117 13548	1kΩ 5% 0402
3139	4822 117 13632	100kΩ 1% 0603 0.62W	3429	4822 117 13606	10kΩ 5% 0.01W 0402	3702	4822 117 13606	10kΩ 5% 0.01W 0402
3140	4822 051 30689	68Ω 5% 0.063W 0603	3432	4822 117 13606	10kΩ 5% 0.01W 0402	3703	4822 117 13606	10kΩ 5% 0.01W 0402
3141	4822 051 30102	1kΩ 5% 0.062W	3433	4822 117 13606	10kΩ 5% 0.01W 0402	3705	4822 117 13606	10kΩ 5% 0.01W 0402
3142	4822 051 30331	330Ω 5% 0.062W	3436	4822 117 13606	10kΩ 5% 0.01W 0402	3711	4822 117 13605	Jumper 0402
3143	4822 051 30759	75Ω 5% 0.062W	3437	4822 117 13606	10kΩ 5% 0.01W 0402	3712	4822 117 13606	10kΩ 5% 0.01W 0402
3144	4822 051 30151	150Ω 5% 0.062W	3438	3198 031 11030	4 × 10kΩ 5% 1206	3713	4822 117 13606	10kΩ 5% 0.01W 0402
3145	4822 051 30151	150Ω 5% 0.062W	3439	3198 031 11030	4 × 10kΩ 5% 1206	3718	4822 117 13605	Jumper 0402
3146	4822 051 30151	150Ω 5% 0.062W	3440	3198 031 11030	4 × 10kΩ 5% 1206	3723	4822 117 13548	1kΩ 5% 0402
3147	4822 051 30151	150Ω 5% 0.062W	3441	3198 031 11030	4 × 10kΩ 5% 1206	3724	4822 117 13606	10kΩ 5% 0.01W 0402
3148	4822 051 30151	150Ω 5% 0.062W	3442	3198 031 11030	4 × 10kΩ 5% 1206	3729	3198 031 03320	3.3kΩ 5% 0402
3149	4822 051 30151	150Ω 5% 0.062W	3443	4822 117 13606	10kΩ 5% 0.01W 0402	3730	3198 031 03320	3.3kΩ 5% 0402
3150	4822 051 30151	150Ω 5% 0.062W	3444	4822 051 30103	10kΩ 5% 0.062W	3731	4822 117 13543	470Ω 5% 0402
3151	4822 051 30151	150Ω 5% 0.062W	3446	5322 117 13017	100Ω 1% 0.063W 0603	3732	4822 117 13548	1kΩ 5% 0402
3152	4822 117 12891	220kΩ 1%	3447	3198 031 02290	22Ω 5% 0.1W 0402	3733	4822 117 13543	470Ω 5% 0402
3153	4822 051 30151	150Ω 5% 0.062W	3448	3198 031 01090	10Ω 5% 0.01W 0402	3739	4822 117 13601	22kΩ 5% 0402
3155	4822 117 12891	220kΩ 1%	3501	4822 117 12706	10kΩ 1% 0.063W 0603	3740	4822 117 13601	22kΩ 5% 0402
3156	4822 051 30151	150Ω 5% 0.062W	3502	4822 117 12706	10kΩ 1% 0.063W 0603	3741	4822 117 11297	100kΩ 5% 0.1W
3169	4822 051 30479	47Ω 5% 0.062W	3503	2322 704 61501	150Ω 1% 0603	3742	4822 117 13601	22kΩ 5% 0402
3251	4822 117 11151	1Ω 5%	3531	4822 117 13606	10kΩ 5% 0.01W 0402	3743	4822 117 13601	22kΩ 5% 0402
3259	4822 117 13606	10kΩ 5% 0.01W 0402	3532	4822 117 13606	10kΩ 5% 0.01W 0402	3745	4822 117 11297	100kΩ 5% 0.1W
3260	3198 031 06820	6.8kΩ 5% 0.01W 0402	3534	4822 117 13548	1kΩ 5% 0402	3752	3198 031 01510	150Ω 5% 0.01W 0402
3266	3198 031 04720	4.7kΩ 5% 0402	3536	4822 117 13606	10kΩ 5% 0.01W 0402	3753	3198 031 01510	150Ω 5% 0.01W 0402
3267	5322 117 13031	5.6kΩ 1% 0.063W 0603	3538	3198 031 11030	4 × 10kΩ 5% 1206	3781	4822 117 12925	47kΩ 1% 0.063W 0603
3268	2322 704 63302	3.3kΩ 1% 0603	3539	3198 031 11030	4 × 10kΩ 5% 1206	3782	4822 051 30151	150Ω 5% 0.062W
3270	4822 117 13602	2.2kΩ 5% 0.01W 0402	3540	3198 031 11030	4 × 10kΩ 5% 1206	3783	4822 051 30103	10kΩ 5% 0.062W
3271	4822 117 13543	470Ω 5% 0402	3544	3198 031 11030	4 × 10kΩ 5% 1206	3784	4822 051 30102	1kΩ 5% 0.062W
3273	3198 031 02240	220kΩ 5% 0.1W 0402	3545	3198 031 11030	4 × 10kΩ 5% 1206	3788	4822 051 30102	1kΩ 5% 0.062W
3274	4822 117 13601	22kΩ 5% 0402	3546	3198 031 11030	4 × 10kΩ 5% 1206	3836	4822 117 13606	10kΩ 5% 0.01W 0402
3302	4822 051 30101	100Ω 5% 0.062W	3547	3198 031 11030	4 × 10kΩ 5% 1206	3838	4822 117 13606	10kΩ 5% 0.01W 0402
3303	4822 051 30101	100Ω 5% 0.062W	3548	4822 117 13606	10kΩ 5% 0.01W 0402	3876	3198 031 06890	68Ω 5% 0402
3304	4822 117 13606	10kΩ 5% 0.01W 0402	3549	4822 051 30102	1kΩ 5% 0.062W	3877	3198 031 06890	68Ω 5% 0402
3305	4822 117 13606	10kΩ 5% 0.01W 0402	3550	4822 051 30102	1kΩ 5% 0.062W	3879	3198 031 06890	68Ω 5% 0402
3309	4822 117 13606	10kΩ 5% 0.01W 0402	3551	4822 051 30102	1kΩ 5% 0.062W	3883	3198 031 06890	68Ω 5% 0402
3311	4822 051 30103	10kΩ 5% 0.062W	3552	4822 051 30102	1kΩ 5% 0.062W	3886	4822 117 13606	10kΩ 5% 0.01W 0402
3319	4822 051 30273	27kΩ 5% 0.062W	3553	4822 051 30102	1kΩ 5% 0.062W	3887	4822 117 13606	10kΩ 5% 0.01W 0402
3320	4822 051 30183	18kΩ 5% 0.062W	3560	4822 117 11297	100kΩ 5% 0.1W	3910	4822 117 13602	2.2kΩ 5% 0.01W 0402
3321	4822 051 30222	2.2kΩ 5% 0.062W	3561	4822 117 11297	100kΩ 5% 0.1W	3911	4822 117 13548	1kΩ 5% 0402
3322	4822 051 30682	6.8Ω 5% 0.062W	3562	4822 117 11297	100kΩ 5% 0.1W	3930	4822 117 12917	1Ω 5% 0.062W
3323	4822 051 30222	2.2kΩ 5% 0.062W	3563	4822 117 13548	1kΩ 5% 0402	3931	4822 117 12917	1Ω 5% 0.062W
3327	4822 117 13548	1kΩ 5% 0402	3564	3198 031 01220	1.2kΩ 5% 0.01W 0402	3932	2322 704 61002	1kΩ 1%
3328	4822 117 13545	100Ω 1% 0402	3565	4822 117 13548	1kΩ 5% 0402	3933	2322 704 63302	3.3kΩ 1% 0603
3329	4822 117 13545	100Ω 1% 0402	3566	4822 117 13548	1kΩ 5% 0402	3951	4822 117 12917	1Ω 5% 0.062W
3340	4822 117 13601	22kΩ 5% 0402	3567	4822 117 13548	1kΩ 5% 0402	3952	4822 117 12917	1Ω 5% 0.062W
3342	4822 117 13606	10kΩ 5% 0.01W 0402	3568	4822 117 13548	1kΩ 5% 0402	3953	2322 704 61002	1kΩ 1%
3343	3198 031 04720	4.7kΩ 5% 0402	3579	4822 117 13548	1kΩ 5% 0402	3954	2322 704 63302	3.3kΩ 1% 0603
3344	4822 117 13548	1kΩ 5% 0402	3580	4822 117 13543	470Ω 5% 0402	3955	4822 117 13606	10kΩ 5% 0.01W 0402
3345	3198 031 04720	4.7kΩ 5% 0402	3581	3198 031 04730	47Ω 5% 0402	3958	3198 031 01530	15kΩ 5% 0.01W 0402
3346	2322 706 75603	56kΩ 1% 0402	3605	4822 117 13545	100Ω 1% 0402	4002	4822 117 13605	Jumper 0402
3347	3198 031 08210	820Ω 5% 0.5W	3606	4822 117 13545	100Ω 1% 0402	4005	4822 117 13605	Jumper 0402
3348	3198 031 04720	4.7kΩ 5% 0402	3607	4822 117 13545	100Ω 1% 0402	4007	4822 117 13605	Jumper 0402
3349	3198 031 01820	1.8kΩ 5% 0.01W 0402	3608	4822 117 13545	100Ω 1% 0402	4008	4822 117 13605	Jumper 0402
3357	4822 117 13548	1kΩ 5% 0402	3609	4822 117 13545	100Ω 1% 0402	4017	4822 117 13605	Jumper 0402
3358	4822 117 13545	100Ω 1% 0402	3610	4822 117 13601	22kΩ 5% 0402	4018	4822 117 13605	Jumper 0402
3359	3198 031 03910	390Ω 1% 0402	3612	4822 117 13543	470Ω 5% 0402	4023	4822 117 13605	Jumper 0402
3370	3198 031 06810	680Ω 5% 0.01W 0402	3613	3198 031 02290	22Ω 5% 0.1W 0402	4062	4822 117 13605	Jumper 0402
3371	4822 117 13545	100Ω 1% 0402	3614	3198 031 02290	22Ω 5% 0.1W 0402	4327	4822 051 30008	Jumper 0603
3372	4822 117 13545	100Ω 1% 0402	3615	3198 031 02290	22Ω 5% 0.1W 0402	4331	4822 051 30008	Jumper 0603
3374	5322 117 11726	10Ω 5%	3616	3198 031 02290	22Ω 5% 0.1W 0402	4333	4822 051 30008	Jumper 0603
3378	4822 117 13545	100Ω 1% 0402	3617	3198 031 02290	22Ω 5% 0.1W 0402	4334	4822 051 30008	Jumper 0603
3380	4822 117 13606	10kΩ 5% 0.01W 0402	3618	3198 031 02290	22Ω 5% 0.1W 0402	4360	4822 117 13605	Jumper 0402
3381	4822 117 13606	10kΩ 5% 0.01W 0402	3619	3198 031 08210	820Ω 5% 0.5W	4361	4822 117 13605	Jumper 0402
3382	4822 117 13606	10kΩ 5% 0.01W 0402	3620	4822 117 13632	100kΩ 1% 0603 0.62W	4362	4822 117 13605	Jumper 0402
3383	4822 117 13606	10kΩ 5% 0.01W 0402	3621	4822 117 13601	22kΩ 5% 0402	4363	4822 117 13605	Jumper 0402
3386	4822							

5008	4822 157 11716	Bead 30Ω at 100MHz
5010	3198 018 64790	47μF 5% 1008
5060	4822 157 11716	Bead 30Ω at 100MHz
5066	3198 018 51080	1μH 10% 0603
5067	3198 018 51080	1μH 10% 0603
5070	4822 157 11716	Bead 30Ω at 100MHz
5071	2422 549 42896	Bead 120Ω 100MHz
5072	2422 549 42896	Bead 120Ω 100MHz
5139	4822 051 20008	Jumper 0805
5251	2422 549 45333	Bead 120Ω 100MHz
5252	2422 549 45333	Bead 120Ω 100MHz
5257	2422 549 45333	Bead 120Ω 100MHz
5258	2422 549 45333	Bead 120Ω 100MHz
5262	2422 535 94134	10μH 20% 0805
5267	2422 536 00339	33μF 20%
5268	2422 535 94995	10μF 20% 10145
5304	4822 157 11499	Bead 60Ω 100MHz
5309	3198 018 31290	12μH 10%
5321	3198 018 33970	0.39μF 10% 0805
5324	4822 157 71334	0.68μH
5370	4822 157 11716	Bead 30Ω at 100MHz
5371	4822 157 11716	Bead 30Ω at 100MHz
5372	4822 157 11716	Bead 30Ω at 100MHz
5530	2422 549 45333	Bead 120Ω 100MHz
5560	4822 157 11716	Bead 30Ω at 100MHz
5580	4822 157 71304	1μH
5605	2422 549 45333	Bead 120Ω 100MHz
5607	2422 549 45333	Bead 120Ω 100MHz
5636	2422 549 45333	Bead 120Ω 100MHz
5680	2422 549 45333	Bead 120Ω 100MHz
5683	2422 549 45333	Bead 120Ω 100MHz
5684	2422 549 45333	Bead 120Ω 100MHz
5685	2422 549 45333	Bead 120Ω 100MHz
5686	2422 549 45333	Bead 120Ω 100MHz
5687	2422 549 45333	Bead 120Ω 100MHz
5720	4822 157 11716	Bead 30Ω at 100MHz
5721	4822 157 11716	Bead 30Ω at 100MHz
5722	4822 157 11716	Bead 30Ω at 100MHz
5874	2422 549 45333	Bead 120Ω 100MHz
5910	2422 536 00667	1000μF 20% 7032
5920	2422 549 45333	Bead 120Ω 100MHz
5930	2422 535 94134	10μH 20% 0805
5931	2422 536 00689	220μF 20%
5932	2422 535 94134	10μH 20% 0805
5952	2422 535 94134	10μH 20% 0805
5953	2422 536 00689	220μF 20%
5954	2422 535 94134	10μH 20% 0805
5956	2422 549 45333	Bead 120Ω 100MHz
5957	2422 549 45333	Bead 120Ω 100MHz
5984	2422 549 45333	Bead 120Ω 100MHz
5985	2422 549 45333	Bead 120Ω 100MHz
5986	2422 549 45333	Bead 120Ω 100MHz
5987	2422 549 45333	Bead 120Ω 100MHz
5988	2422 549 45333	Bead 120Ω 100MHz
5989	2422 549 45333	Bead 120Ω 100MHz
5990	2422 549 45333	Bead 120Ω 100MHz
5991	2422 549 45333	Bead 120Ω 100MHz
5994	2422 549 45333	Bead 120Ω 100MHz
5996	2422 549 45333	Bead 120Ω 100MHz
5997	2422 549 45333	Bead 120Ω 100MHz
5998	2422 549 45333	Bead 120Ω 100MHz



6001	4822 130 11397	BAS316
6002	4822 130 11397	BAS316
6005	9340 553 52115	BAS321
6020	4822 130 11397	BAS316
6021	4822 130 11397	BAS316
6075	4822 130 80622	BAT54
6076	4822 130 80622	BAT54
6121	4822 130 11416	PDZ6.8B
6143	4822 130 11416	PDZ6.8B
6259	9322 128 70685	SMSS14
6262	3198 010 10720	SS24
6267	3198 010 10730	SS36
6270	4822 130 10837	UDZS8.2B
6310	4822 130 11397	BAS316
6323	4822 130 11525	1SS356
6328	4822 130 11416	PDZ6.8B
6329	4822 130 11416	PDZ6.8B
6330	4822 130 11416	PDZ6.8B
6331	4822 130 11416	PDZ6.8B
6563	9322 102 64685	UDZ2.7B
6564	4822 130 11416	PDZ6.8B
6565	4822 130 10838	UDZ3.3B
6604	4822 130 11397	BAS316
6605	4822 130 11397	BAS316
6634	9322 102 64685	UDZ2.7B
6635	9322 102 64685	UDZ2.7B
6638	9322 102 64685	UDZ2.7B
6639	9322 102 64685	UDZ2.7B
6693	4822 130 11397	BAS316

6701	3198 020 55680	BZX384-C5V6
6910	5322 130 34337	BAV99
6911	9340 548 71115	PDZ33B
6930	9322 128 70685	SMSS14
6951	9322 128 70685	SMSS14



7001	9339 693 90135	BCP69-25
7002	9340 425 20115	BC847BS
7003	9339 693 90135	BCP69-25
7004	3198 010 42310	BC847BW
7005	9340 547 13215	BSH103
7011		For SW see item 0601
7012	3198 010 42310	BC847BW
7013	3198 010 42310	BC847BW
7014	3198 010 42310	BC847BW
7015	9322 208 05668	SM NE555D
7016	9322 208 05668	SM NE555D
7017	9322 208 05668	SM NE555D
7018	5322 130 60159	BC846B
7019	5322 130 60159	BC846B
7051	3104 317 07851	SW (check Prod. Survey)
7054	3104 317 06681	SW (check Prod. Survey)
7070	9340 547 13215	BSH103
7075	4822 130 11155	PDTC114ET
7099	4822 209 17226	M24C08-WMN6
7119	5322 130 60159	BC846B
7138	5322 130 60159	BC846B
7260	9322 139 16668	LF33CPT
7262	9322 202 34668	L5973D
7271	3198 010 42310	BC847BW
7272	3198 010 42310	BC847BW
7320	3198 010 42310	BC847BW
7370	9340 550 49115	PUMH7
7371	9340 550 49115	PUMH7
7372	9340 550 49115	PUMH7
7376	9340 425 10115	BC857BS
7377	9340 425 10115	BC857BS
7401	9322 206 86671	GM1501-BD
7416	9322 157 51685	SI12301DS
7501	9322 199 17671	K4D263238M-QC50
7530		For SW see item 7051
7532	9352 691 71115	NE56610-27GW
7560	9352 334 10118	TDA9178T/N1
7561	3198 010 42310	BC847BW
7562	9322 199 24668	L7808CD2T
7563	4822 209 73852	PMBT2369
7579	4822 130 11155	PDTC114ET
7580	9322 199 16668	M74HC590T
7581	9322 199 16668	M74HC590T
7582	9322 201 05671	CY62256LL-70ZC
7583	9351 870 00118	74HC573PW
7584	9351 870 00118	74HC573PW
7585	3198 010 42310	BC847BW
7604	9352 607 39118	74LVC14APW
7605	4822 209 60792	74HC4053D
7606	9322 199 56668	ADG781BCP
7607	9322 199 80668	SM5301BS-G
7693		For SW see item 7054
7706	9351 742 70118	74HC08PW
7708	9340 550 49115	PUMH7
7710	9340 310 50215	PDTA143ET
7713	3198 010 42310	BC847BW
7714	3198 010 42310	BC847BW
7740	9322 183 05668	TS482ID
7887	3198 010 42310	BC847BW
7910	4822 130 42804	BC817-25
7920	9322 163 24668	L78M08CDT
7930	5322 209 90529	MC34063AD
7952	5322 209 90529	MC34063AD
7954	9322 157 51685	SI12301DS
7955	4822 130 11155	PDTC114ET
7992	9322 142 88668	LF25CDT
7995	9322 189 19668	LD1086D2T18

LCD Supply 30"/32" [AS]

Various

1007▲	4822 071 55002	Fuse T5A 250V
1304	2422 025 10647	Connector 4p m
1304	2422 025 10648	Connector 8p m
1305	4822 267 10735	Connector 3p
1306	2422 025 16374	Connector 2p m
1307	2422 025 10647	Connector 4p m
1308	4822 265 20723	Connector 2p
1309	2422 025 11143	Connector 3p m
1400▲	4822 253 50145	Fuse 3.15A T
1401▲	4822 252 11224	191811(1,0A)
1402▲	4822 252 60151	DSP-501N-A21F

1410▲	4822 265 11253	Fuse holder
1411▲	4822 265 11253	Fuse holder
1450▲	2422 132 07411	Relay 1p 5V 5A G5PA-1
1M02	2422 025 11244	Connector 7p m



2000▲	2252 811 95022	1.5nF 20% 250V
2002	4822 124 11767	470μF 20% 25V
2003	4822 124 80061	1000μF 20% 25V
2007	4822 126 14583	470nF 10% 16V 0805
2008	4822 126 14583	470nF 10% 16V 0805
2009	2238 867 18101	100pF 1% 50V 0603
2010	4822 124 40207	100μF 20% 25V
2011	2022 333 00119	10nF 5% 1.6 KV
2012	4822 126 13862	1.5nF 10% 2kV
2013	4822 126 13862	1.5nF 10% 2kV
2014▲	2252 811 95018	2.2nF 20% 250V
2014▲	4822 126 13451	2.2nF 10% 2kV
2015	5322 126 11583	100nF 10% 50V 0603
2016	2238 586 59812	100nF 20% 50V 0603
2017	2022 333 00119	10nF 5% 1.6 KV
2019	5322 126 11583	10nF 10% 50

EN 90 10. LC4.6E AA

Spare Parts List

3011	4822 051 30471	47Ω 5% 0.062W
3012	4822 051 30153	15kΩ 5% 0.062W
3013	4822 051 30103	10kΩ 5% 0.062W
3014▲	4822 052 10101	100Ω 5% 0.33W
3015▲	4822 052 10479	47Ω 5% 0.33W
3016	4822 051 30332	3.3kΩ 5% 0.062W
3017▲	4822 052 10101	100Ω 5% 0.33W
3018▲	4822 052 10479	47Ω 5% 0.33W
3019	4822 051 30332	3.3kΩ 5% 0.062W
3020	4822 051 30332	3.3kΩ 5% 0.062W
3021	4822 117 12139	22Ω 5% 0.062W
3021	4822 117 12971	15Ω 5% 0.603 0.62W
3022	4822 051 30681	680Ω 5% 0.062W
3023	4822 051 30153	15kΩ 5% 0.062W
3024	2322 704 63303	33kΩ 1% 0.603
3025	4822 117 12903	1.8kΩ 1% 0.063W 0.603
3026	4822 101 11383	Trimmer 470Ω 30% linear
3027	4822 117 13632	100kΩ 1% 0.603 0.62W
3028	4822 051 30332	3.3kΩ 5% 0.062W
3029	4822 051 30332	3.3kΩ 5% 0.062W
3030	4822 051 30183	18kΩ 5% 0.062W
3031	4822 051 30103	10kΩ 5% 0.062W
3032	4822 051 30103	10kΩ 5% 0.062W
3033▲	4822 052 11108	1Ω 5% 0.5W
3034	4822 051 30102	1kΩ 5% 0.062W
3035	4822 051 30332	3.3kΩ 5% 0.062W
3036	4822 117 13632	100kΩ 1% 0.603 0.62W
3039	4822 051 30102	1kΩ 5% 0.062W
3040	5322 117 13056	8.2kΩ 1% 0.063W 0.603
3041	4822 051 30333	33kΩ 5% 0.062W
3042	4822 051 30123	12kΩ 5% 0.1W
3043	4822 051 30109	10Ω 5% 0.062W
3044	4822 051 30471	47Ω 5% 0.062W
3045	4822 117 12139	22Ω 5% 0.062W
3045	4822 117 12971	15Ω 5% 0.603 0.62W
3046	4822 117 12139	22Ω 5% 0.062W
3046	4822 117 12971	15Ω 5% 0.603 0.62W
3047	4822 051 30479	47Ω 5% 0.062W
3048	4822 051 30272	2.7kΩ 5% 0.062W
3049	4822 051 30333	33kΩ 5% 0.062W
3050	4822 050 28204	820kΩ 1% 0.6W
3051	4822 051 30472	4.7Ω 5% 0.062W
3052	2322 704 61603	16kΩ 1% 0.603
3053	4822 050 26804	680kΩ 1% 0.6W
3054	4822 051 30472	4.7Ω 5% 0.062W
3055	4822 051 30221	220Ω 5% 0.062W
3056	4822 051 30221	220Ω 5% 0.062W
3057	4822 051 30221	220Ω 5% 0.062W
3058	4822 053 20565	5.6MΩ 5% 0.25W
3059	4822 051 30222	2.2kΩ 5% 0.062W
3061	4822 051 30683	68kΩ 5% 0.062W
3064	4822 051 30103	10kΩ 5% 0.062W
3065	4822 117 13632	100kΩ 1% 0.603 0.62W
3066	4822 051 30103	10kΩ 5% 0.062W
3067	4822 051 30101	100Ω 5% 0.062W
3068	4822 051 30222	2.2kΩ 5% 0.062W
3070	4822 051 30102	1kΩ 5% 0.062W
3071	4822 051 30103	10kΩ 5% 0.062W
3075	4822 051 30102	1kΩ 5% 0.062W
3100	4822 051 30102	1kΩ 5% 0.062W
3100	4822 051 30109	10Ω 5% 0.062W
3292	4822 051 30561	560Ω 5% 0.062W
3400▲	2122 550 00158	VDR 1mA 612V
3401▲	4822 053 21475	4.7MΩ 5% 0.5W
3402▲	4822 053 21475	4.7MΩ 5% 0.5W
3403▲	4822 053 21475	4.7MΩ 5% 0.5W
3404	4822 116 83872	220Ω 5% 0.5W
3810	2322 257 41123	12kΩ 5% 5W
3999	4822 117 12925	47kΩ 1% 0.063W 0.603
9002	4822 051 30008	Jumper 0603
9009	4822 051 30008	Jumper 0603
9030	4822 051 30008	Jumper 0603
9047	4822 051 30008	Jumper 0603
9085	4822 051 30008	Jumper 0603



5001	2422 531 02444	Transf. S13932-04Y
5002▲	8204 000 77311	Transf. 2652.0001
5004	4822 526 10704	Bead 100MHz
5005	4822 157 11411	Bead 100MHz
5005	4822 526 10704	Bead 100MHz
5007	4822 157 11411	Bead 100MHz
5007	4822 526 10704	Bead 100MHz
5008	4822 157 11411	Bead 100MHz
5008	4822 526 10704	Bead 100MHz
5009	4822 157 11411	Bead 100MHz
5010	4822 157 11411	Bead 100MHz
5013	4822 157 11411	Bead 100MHz
5013	4822 526 10704	Bead 100MHz
5015	4822 157 11411	Bead 100MHz
5016	4822 157 11411	Bead 100MHz
5017	4822 526 10704	Bead 100MHz

5025	4822 526 10704	Bead 100MHz
5026	4822 526 10704	Bead 100MHz
5027	4822 526 10704	Bead 100MHz
5028	4822 526 10704	Bead 100MHz
5029	4822 526 10704	Bead 100MHz
5030	4822 526 10704	Bead 100MHz
5031	4822 526 10704	Bead 100MHz
5032	4822 526 10704	Bead 100MHz
5034	4822 526 10704	Bead 100MHz
5040	4822 157 11411	Bead 100MHz
5041	4822 526 10704	Bead 100MHz
5291	2422 536 00776	33μH 10%
5292	2422 536 00776	33μH 10%
5293	2422 536 00776	33μH 10%
5401▲	2422 549 43291	Filter 47mH 2A
5403	3104 308 21191	Coil DTH40323H65



6002	4822 130 11397	BAS316
6003	4822 130 11397	BAS316
6004	4822 130 11397	BAS316
6004	4822 130 80622	BAT54
6005	4822 130 11397	BAS316
6005	4822 130 80622	BAT54
6006	4822 130 11397	BAS316
6007	4822 130 11397	BAS316
6008	4822 130 11397	BAS316
6009	4822 130 11152	UDZ18B
6010	4822 130 11397	BAS316
6011	4822 130 11397	BAS316
6012	9322 197 30685	SML4744
6013	9322 197 30685	SML4744
6017	4822 130 11397	BAS316
6020	4822 130 11397	BAS316
6021	9322 206 26687	STPS20H100CT
6022	4822 130 11148	UDZ4.7B
6023	4822 130 11397	BAS316
6025	9322 206 26687	STPS20H100CT
6027	4822 130 11397	BAS316
6028	4822 130 11397	BAS316
6030	4822 130 11397	BAS316
6044	9322 207 11687	STPS20L45CT
6045	9322 207 11687	STPS20L45CT
6051	4822 130 11397	BAS316
6054	4822 130 11551	UDZS10B
6077	9322 202 55685	BYG22D
6078	9322 202 55685	BYG22D
6079	9322 202 55685	BYG22D
6080	9322 202 55685	BYG22D
6081	9340 548 67115	PDZ22B
6291	4822 130 11572	STPS8H100F
6293	4822 130 11572	STPS8H100F
6460	4822 130 11397	BAS316
6461	4822 130 11397	BAS316
6506▲	4822 130 83147	DF06M
6807▲	9322 199 74682	GBJ6J-B15



7001	9322 108 21682	MC34067P
7002▲	9322 149 04682	TCET1102
7004	3198 010 42310	BC847BW
7005	9322 192 18687	STP15NK50ZFP
7005	9322 205 26687	FQPF18N50V2
7006	9322 205 26687	FQPF18N50V2
7007	3198 010 42320	BC857BW
7008	3198 010 42320	BC857BW
7009	3198 010 42320	BC857BW
7010	4822 209 16406	TL431ACD
7010	9322 125 09668	TL431AID
7017	3198 010 42320	BC857BW
7018	3198 010 42310	BC847BW
7030	3198 010 42310	BC847BW
7031	3198 010 42310	BC847BW

Side I/O Panel [D]

Various

0900	2422 026 05133	Connector SVHS 4p f
0901	4822 267 10975	Connector 3p
0902	4822 267 31014	Socket head phone
0936	2422 025 12485	Connector 11p m
1900	2422 026 05133	Connector SVHS 4p f
1901	4822 267 10975	Connector 3p
1902	4822 267 31014	Socket head phone
1936	2422 025 12485	Connector 11p m
8936	3104 311 06121	Cable 11p560/11p

— —		
2903	5322 122 32531	100pF 5% 50V
2904	5322 122 32531	100pF 5% 50V
2905	4822 122 33177	10nF 20% 50V
2905	5322 122 32654	22nF 10% 63V 0805
2906	4822 122 33177	10nF 20% 50V
2906	5322 122 32654	22nF 10% 63V 0805



3901	4822 117 11373	100Ω 1% 0805
3902	4822 116 52201	75Ω 5% 0.5W
3903	4822 117 11373	100Ω 1% 0805
3904	4822 116 52201	75Ω 5% 0.5W
3905	4822 050 11002	1kΩ 1% 0.4W
3906	4822 050 11002	1kΩ 1% 0.4W
3908	4822 050 11002	1kΩ 1% 0.4W
3910	4822 116 52276	3.9Ω 5% 0.5W
3911	4822 050 21003	10kΩ 1% 0.6W
3912	4822 050 21003	10kΩ 1% 0.6W
4901	4822 051 20008	Jumper 0805
4903	4822 051 20008	Jumper 0805

Top Control Panel [E]

Various

0053	3104 308 10551	TC assy knob R LCD 30"
0055	3104 308 10561	TC assy knob L LCD 30"
0057	3104 304 25831	TC frame LCD 30"
0058	3104 308 10571	TC assy knob

			
5100	2422 549 43769	Bead 30Ω	100MHz
			
6101	4822 130 11564	UDZ3.9B	
6103	4822 130 83915	TLMV3100	
6105	4822 130 11564	UDZ3.9B	
6127	9322 140 63685	TEMD5000	
			
7103	3198 010 42320	BC857BW	
7105	3198 010 42320	BC857BW	
7107	9322 206 81667	TSOP34836YA1	
7120	5322 209 82941	LM358D	

Stand-by Audio Panel [SA]

Various

1304	2422 025 10647	Connector 4p m
1305	4822 267 10735	Connector 3p
1306	2422 025 16374	Connector 2p m
1307	2422 025 10647	Connector 4p m
1309	2422 025 11143	Connector 3p m
1312	2422 025 18166	Connector 16p m
1313	2422 025 18166	Connector 16p m
1317	2422 025 10772	Connector 12p m
1735	2422 025 10768	Connector 3p m
1735	4822 267 10918	Connector 3P
1736	2422 025 10768	Connector 3p m
1739	2422 025 10769	Connector 9p m
1M02	2422 025 11244	Connector 7p m
1M03	2422 025 10771	Connector 10p m
1M10	2422 025 09406	Connector 4p m
1M46	2422 025 10655	Connector 11p m



2101	4822 121 51598	2.2nF 5% 400V
2102	4822 124 40207	100μF 20% 25V
2103	2020 552 94427	100pF 5% 50V
2105	2020 552 94427	100pF 5% 50V
2107	2020 024 90718	10μF 20% 450V
2108	2020 024 90718	10μF 20% 450V
2109	2022 552 05679	1μF 10% 16V 0805
2110	2022 552 05679	1μF 10% 16V 0805
2111	4822 121 43526	47nF 5% 250V
2112	5322 126 11583	10nF 10% 50V 0603
2123	2238 586 15641	100nF 20% 50V 0603
2124	4822 124 40248	10μF 20% 63V
2129	5322 126 11578	1nF 10% 50V 0603
2131	2238 586 15641	22nF 10% 50V 0603
2132	4822 124 40207	100μF 20% 25V
2140	4822 124 40248	10μF 20% 63V
2141	4822 126 14583	470nF 10% 16V 0805
2144	2022 552 05679	1μF 10% 16V 0805
2145	4822 126 13881	470pF 5% 50V
2149	2022 552 05679	1μF 10% 16V 0805
2150	4822 124 12379	220μF 25V
2152	4822 121 70162	10nF 5% 400V
2153	5322 126 11582	6.8nF 10% 63V
2154	3198 017 31530	15nF 20% 50V 0603
2160	4822 124 21913	1μF 20% 63V
2163	4822 124 40207	100μF 20% 25V
2506▲	2252 811 95017	470pF 10% 250V
2507	4822 126 13682	100pF 5% 1kV
2508	4822 124 40764	22μF 100V
2510	2020 021 91668	2200μF 20% 10V
2511	4822 124 12379	220μF 25V
2513	4822 126 10206	2.2nF 10% 500V
2515	4822 126 14238	2.2nF 50V 0603
2533	4822 124 40207	100μF 20% 25V
2534	2022 552 05679	1μF 10% 16V 0805
2535	5322 126 11583	10nF 10% 50V 0603
2536	5322 126 11583	10nF 10% 50V 0603
2537	4822 126 14238	2.2nF 50V 0603
2538	5322 126 11583	10nF 10% 50V 0603
2539	2022 552 05679	1μF 10% 16V 0805
2540	5322 126 11583	10nF 10% 50V 0603
2544	5322 126 11583	10nF 10% 50V 0603
2701	4822 124 12379	220μF 25V
2702	5322 126 11578	1nF 10% 50V 0603
2704	5322 126 11578	1nF 10% 50V 0603
2705	2020 552 96684	470nF 10% 25V 0805
2706	2222 580 15649	100nF 10% 50V 0805
2707	4822 126 14585	100nF 10% 0805 50V

2708	2020 552 96326	220nF 10% 16V
2709	4822 126 13881	470pF 5% 50V
2710	4822 126 13881	470pF 5% 50V
2711	5322 126 11578	1nF 10% 50V 0603
2712	2020 552 96683	220nF 10% 50V
2713	2020 552 96684	470nF 10% 25V 0805
2714	3198 017 33330	33nF 20% 16V 0603
2715	5322 126 11578	1nF 10% 50V 0603
2716	4822 126 14241	330pF 0603 50V
2717	5322 121 42498	680nF 5% 63V
2718	4822 122 33761	22pF 5% 50V
2719	5322 126 11578	1nF 10% 50V 0603
2720	2020 552 96326	220nF 10% 16V
2721	4822 126 13881	470pF 5% 50V
2722	4822 126 13881	470pF 5% 50V
2725	2020 552 94427	100pF 5% 50V
2726	3198 017 33330	33nF 20% 16V 0603
2727	5322 126 11578	1nF 10% 50V 0603
2728	4822 126 14241	330pF 0603 50V
2729	5322 121 42498	680nF 5% 63V
2764	4822 126 14491	2.2μF 10V 0805
2766	4822 126 14491	2.2μF 10V 0805
2768	4822 124 40255	100μF 20% 63V
2769	4822 124 40255	100μF 20% 63V
2777	2020 552 96683	220nF 10% 50V
2778	4822 124 40769	4.7μF 20% 100V
2779	2020 552 96683	220nF 10% 50V
2780	2020 552 96683	220nF 10% 50V
2781	2020 552 96683	220nF 10% 50V
2783	4822 124 41751	47μF 20% 50V
2786	2238 586 15641	22nF 10% 50V 0603
2788	4822 124 40255	100μF 20% 63V
2789	2020 552 96683	220nF 10% 50V
2790	4822 124 40255	100μF 20% 63V



3100	4822 051 30101	100Ω 5% 0.062W
3101	4822 053 20475	4.7MΩ 5% 0.25W
3102	2312 915 11002	1kΩ 1% 0.5W
3103	2312 915 11002	1kΩ 1% 0.5W
3104	4822 051 30479	47Ω 5% 0.062W
3105	4822 051 30221	220Ω 5% 0.062W
3106	4822 051 30391	390Ω 5% 0.062W
3107	4822 051 30391	390Ω 5% 0.062W
3108	4822 053 10478	4.7Ω 5% 1W
3109	4822 051 30391	390Ω 5% 0.062W
3110	4822 051 30391	390Ω 5% 0.062W
3111	4822 053 10152	1.5kΩ 5% 1W
3112	4822 051 30391	390Ω 5% 0.062W
3113	4822 117 12139	22Ω 5% 0.062W
3114	4822 051 30221	220Ω 5% 0.062W
3117	4822 051 30479	47Ω 5% 0.062W
3122	4822 051 30471	47Ω 5% 0.062W
3123	4822 051 30109	10Ω 5% 0.062W
3124	4822 051 30339	33Ω 5% 0.062W
3125	4822 117 12971	15Ω 5% 0.0603 0.62W
3126	4822 051 30103	10kΩ 5% 0.062W
3127	4822 051 30562	5.6kΩ 5% 0.063W 0603
3128	4822 117 13608	4.7Ω 5% 0.0603 0.62W
3132	4822 051 30333	33kΩ 5% 0.062W
3134	4822 051 30102	1kΩ 5% 0.062W
3135	4822 051 30331	330Ω 5% 0.062W
3138	4822 051 30105	1MΩ 5% 0.062W
3140	4822 051 30223	22kΩ 5% 0.062W
3141	4822 051 30471	47Ω 5% 0.062W
3142	4822 051 30123	12kΩ 5% 0.1W
3145	4822 051 30472	4.7Ω 5% 0.062W
3146	4822 051 30479	47Ω 5% 0.062W
3147	4822 051 30223	22kΩ 5% 0.062W
3148	4822 051 30479	47Ω 5% 0.062W
3149	4822 051 30103	10kΩ 5% 0.062W
3150	4822 051 30101	100Ω 5% 0.062W
3152	4822 051 30102	1kΩ 5% 0.062W
3153	4822 051 30223	22kΩ 5% 0.062W
3155	4822 050 21003	10kΩ 1% 0.6V
3156	4822 051 30102	1kΩ 5% 0.062W
3157	4822 051 30223	22kΩ 5% 0.062W
3158	4822 051 30479	47Ω 5% 0.062W
3159	4822 051 30479	47Ω 5% 0.062W
3160	4822 051 30102	1kΩ 5% 0.062W
3161	4822 051 30123	12kΩ 5% 0.1W
3171	4822 051 30101	100Ω 5% 0.062W
3172	4822 051 30333	33kΩ 5% 0.062W
3175	4822 051 30103	10kΩ 5% 0.062W
3176	4822 051 30103	10kΩ 5% 0.062W
3509	4822 053 10222	2.2kΩ 5% 1W
3511	4822 051 30683	68kΩ 5% 0.062W
3512	4822 051 30471	47Ω 5% 0.062W
3513	4822 051 30333	33kΩ 5% 0.062W
3515	4822 117 13632	100kΩ 1% 0.0603 0.62W
3516	4822 051 30472	4.7Ω 5% 0.062W
3517	4822 051 30223	22kΩ 5% 0.062W

3528	4822 051 30472	4.7Ω 5% 0.062W
3529	4822 051 30101	100Ω 5% 0.062W
3530	4822 051 30223	22kΩ 5% 0.062W
3531	4822 051 30153	15kΩ 5% 0.062W
3532	4822 051 30472	4.7Ω 5% 0.062W
3533	4822 051 30152	1.5Ω 5% 0.062W
3534	4822 051 30103	10kΩ 5% 0.062W
3535	4822 051 30222	2.2kΩ 5% 0.062W
3536	4822 051	

5506	4822 157 11411	Bead 100MHz
5507	2422 536 00433	15μH 10%
5701	2422 536 00385	68μH 10%
5702	2422 536 00385	68μH 10%
5703	4822 157 11716	Bead 30Ω at 100MHz
5705	4822 157 11716	Bead 30Ω at 100MHz
5707	4822 157 11411	Bead 100MHz
5708	4822 157 11411	Bead 100MHz
5711	4822 157 11411	Bead 100MHz
5712	4822 157 11411	Bead 100MHz
5730	2422 549 00112	Line filt. 50V 3A
5731	2422 549 00112	Line filt. 50V 3A



6103	4822 130 10871	SBYV27-200
6104	9340 548 69115	PDZ27B
6105	4822 130 11522	UDZ15B
6106	9340 548 66115	PDZ20B
6108	4822 130 80622	BAT54
6114	4822 130 10871	SBYV27-200
6115	4822 130 80622	BAT54
6116	3198 020 55680	BZX384-C5V6
6120	4822 130 11397	BAS316
6121	4822 130 11397	BAS316
6122	9322 129 34685	BZM55-C3V9
6130	9340 548 61115	PDZ12B
6132	4822 130 11416	PDZ6.8B
6133	4822 130 11397	BAS316
6134	4822 130 11397	BAS316
6140	4822 130 41487	BYV95C
6142	4822 130 80622	BAT54
6144	4822 130 11397	BAS316
6147	9322 200 23685	SML4736
6148	4822 130 11397	BAS316
6149	3198 020 55680	BZX384-C5V6
6150	9340 292 50135	BZG03-C200
6151	9340 548 71115	PDZ33B
6153	9340 292 50135	BZG03-C200
6156	4822 130 11397	BAS316
6504	9340 418 70133	BYV27-600
6505	9322 161 78682	SB360L-7024
6511	9340 548 61115	PDZ12B
6531	4822 130 11522	UDZ15B
6532	4822 130 11397	BAS316
6540	4822 130 80622	BAT54
6562	9340 548 67115	PDZ22B
6701	4822 130 11397	BAS316
6702	4822 130 11551	UDZS10B
6703	4822 130 11551	UDZS10B



7100	3198 010 42320	BC857BW
7101	9340 219 30115	BC817-25W
7102	9322 160 34687	FQPF3N60
7102	9322 194 27687	STP3NK60ZFP
7105	3198 010 42320	BC857BW
7131	9340 557 69127	PHX9NQ20T
7140	3198 010 42310	BC847BW
7150▲	9322 149 04682	TCET1102
7501▲	9322 149 04682	TCET1102
7505	3198 010 42320	BC857BW
7506	3198 010 42310	BC847BW
7507	3198 010 42310	BC847BW
7508	3198 010 42310	BC847BW
7509	3198 010 42310	BC847BW
7511	9337 331 10215	BST82
7512	9340 422 80115	PMSTA42
7531	9340 436 50115	BSP030
7532	3198 010 42310	BC847BW
7560	9340 219 30115	BC817-25W
7700	9322 163 86682	TDA7490L
7701	3198 010 42310	BC847BW
7703	3198 010 42310	BC847BW
7704	3198 010 42310	BC847BW
7705	3198 010 42310	BC847BW
7706	3198 010 42320	BC857BW
7707	3198 010 42310	BC847BW
7708	3198 010 42310	BC847BW
7709	3198 010 42310	BC847BW
7710	3198 010 42310	BC847BW
7711	3198 010 42310	BC847BW

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- Chapter 7: To improve the readability, the PWB layout of the SA panel is splitted in two parts.
- Chapter 8:
 - Default values of White Tone Alignment added.
 - Backlight Voltage Alignment added.
- Chapter 9: Lip sync description added.
- Chapter 10: Correct software codenumbers listed.
- All chapters: small textual and graphical improvements.