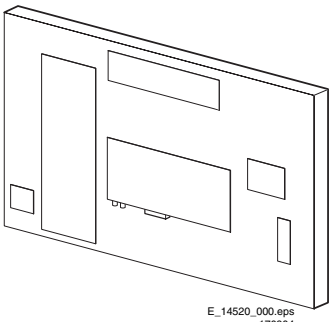
Colour Television **Chassis**

LC4.1E

AB

Service
Service
Service



E_14520_000.eps
170904

Service Manual

Published by BB 0566 TV Service | Printed in the Netherlands | Subject to modification | EN 3122 785 15310

PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

Notes:

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

1.1 Technical Specifications

1.1.1 Vision

Display type	:	LCD, IPS / LCD, TN
Screen size	:	15” (38 cm), 4:3
	:	17” (43 cm), 16:9
	:	20” (51 cm), 4:3
	:	20” (51 cm), 16:9
	:	23” (58 cm), 16:9
Resolution (HxV pixels)	:	640x480
	:	1024x768
	:	1280x768
	:	1366x768
Contrast ratio	:	350/500/600:1
Light output (cd/m^2)	:	450
Response time (ms)	:	16/25
Viewing angle (HxV degrees)	:	130x100
	:	140x120
	:	176x176
Tuning system	:	PLL
TV Colour systems	:	PAL B/G, D/K, I
	:	SECAM B/G, D/K, L/L’
	:	NTSC M/N 3.58
Video playback	:	NTSC M/N 3.58, 4.43
	:	PAL B/G
	:	SECAM L/L’
Supported computer formats	:	VGA (640x480)
	:	VGA (720x400)
	:	VGA (640x350)
	:	MAC (640x480)
	:	MAC (832x624)
	:	SVGA (800x600)
	:	XVGA (1024x768)
	:	WXGA (1280x768)
Supported video formats	:	640x480i - 1fH
	:	720x576i - 1fH
	:	1920x1080i - 2fH
	:	1280x720p - 3fH
Presets/channels	:	100 presets
Tuner bands	:	VHF
	:	UHF
	:	S-band
	:	Hyper-band
	:	FM-radio (depending on model)

1.1.2 Sound

Sound systems	:	FM-mono
	:	AM-mono
	:	FM-stereo B/G
	:	NICAM B/G, D/K, I, L
	:	AV Stereo
Maximum power (W_{RMS})	:	2 x 2 / 2 x 5

1.1.3 Miscellaneous

Power supply:		
- Mains voltage (V_{AC})	:	90 - 240
- Mains frequency (Hz)	:	50 / 60
Ambient conditions:		
- Temperature range (°C)	:	+5 to +45
- Maximum humidity	:	90% R.H.
Power consumption (values are indicative)		
- Normal operation (W)	:	≈ 42/53/55/80/92
- Stand-by (W)	:	< 1/1.5/3
Dimensions (WxHxD cm)	:	46.7x30.7x6.9
	:	47.2x30.8x7.65
	:	51.7x30.2x8
	:	58.3x38.6x8.7
	:	61.8x32.5x9
	:	71.6x37.5x9.8
Weight (kg)	:	5.8/6/8.8/10.2

1.2 Connection Overview

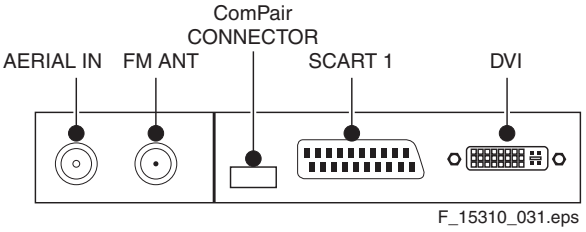
Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.2.1 Front / Side Connections

F_15310_032.eps
270605

Figure 1-1 Side I/O

1.2.2 Rear Connections



F_15310_031.eps
270605

Figure 1-2 Rear I/O

Aerial - In

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

Aerial: FM Radio

-	- IEC-type	Coax, 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

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

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

Mini Jack: Audio Head phone - Out

Bk	- Head phone	32 - 600 ohm / 10 mW	

Service Connector (ComPair)

1	- SDA-S	I^2C Data (0 - 5 V)	
2	- SCL-S	I^2C Clock (0 - 5 V)	
3	- Ground	Gnd	

Service Connector (UART)

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

Mini jack: DVI Audio - In

1	- Audio - R		
2	- Audio - L		
3	- Ground	Gnd	

EXT1: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out

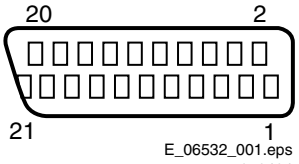


Figure 1-3 SCART connector

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

DVI-D: Digital Video - In (depending on model)

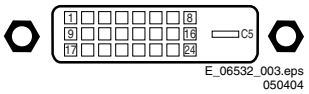


Figure 1-4 DVI-D connector

1	- D2-		
2	- D2+		
3	- Shield	Gnd	
4	- D4-		
5	- D4+		
6	- DDC_SCL	DDC clock	
7	- DDC_SDA	DDC data	
8	- n.c.		
9	- D1-		
10	- D1+		
11	- Shield	Gnd	
12	- D3-		
13	- D3+		
14	- +5V		
15	- Ground	Gnd	
16	- HPD	Hot Plug Detect	
17	- D0-		
18	- D0+		
19	- Shield	Gnd	
20	- D5-		
21	- D5+		
22	- Shield	Gnd	
23	- CLK+		
24	- CLK-		

DVI-I: Digital/Analogue Video - In (depending on model)

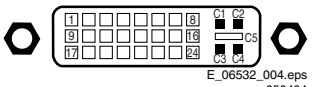


Figure 1-5 DVI-I connector

1	- D2-		
2	- D2+		
3	- Shield	Gnd	
4	- D4-		
5	- D4+		
6	- DDC_SCL	DDC clock	
7	- DDC_SDA	DDC data	
8	- V-sync	0 - 5 V	
9	- D1-		
10	- D1+		
11	- Shield	Gnd	
12	- D3-		
13	- D3+		
14	- +5V		
15	- Ground	Gnd	
16	- HPD	Hot Plug Detect	
17	- D0-		
18	- D0+		
19	- Shield	Gnd	
20	- D5-		
21	- D5+		
22	- Shield	Gnd	
23	- CLK+		
24	- CLK-		
C1	- Video Red	0.7 V_{PP} / 75 ohm	
C2	- Video Green	0.7 V_{PP} / 75 ohm	
C3	- Video Blue	0.7 V_{PP} / 75 ohm	
C4	- H-sync	0 - 5 V	
C5	- Ground	Gnd	

1.3 Chassis Overview

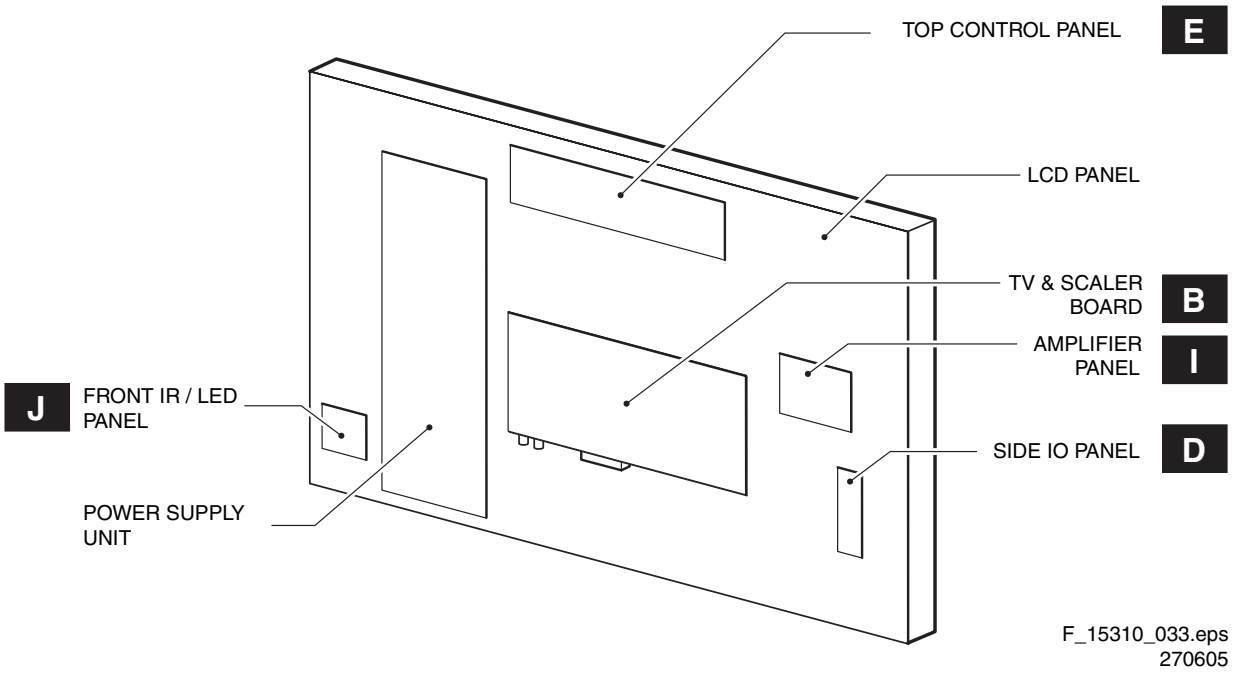


Figure 1-6 PWB locations (depending on model)

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

2.1 Safety Instructions

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

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

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

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

2.2 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.

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= x10^{-6}), nano-farads (n= x10^{-9}), or pico-farads (p= x10^{-12}).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

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

Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.
Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.
After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.
Note: Do not apply solder paste, as this has been shown to result in problems during re-soldering.

Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be

aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage 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: *www.atyourservice.ce.philips.com* (needs subscription, not available for all regions). 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 producing lead-free sets (PBF) from 1.1.2005 onwards.

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

E_06532_024.eps
230205

Figure 2-1 Serial number example

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

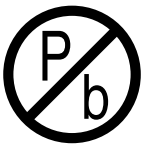


Figure 2-2 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:
- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilise the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and 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 increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch “off” unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-) pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
  Do not re-use BGAs at all!
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:
- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

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

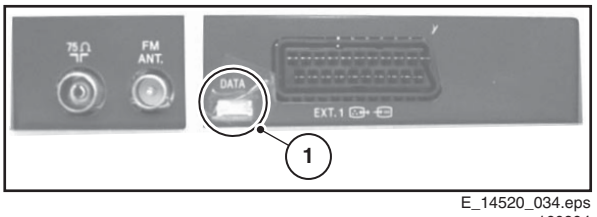
4. Mechanical Instructions

Index of this chapter:

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

Note: To diagnose the set with ComPair it is **not** needed to open the set entirely.
To access the ComPair connector, proceed with the following:
1. Manually unlock and remove the cover cap.
2. Remove the tape shielding that covers the ComPair connector (1).

Note: Make sure that both the ComPair connector and the UART connector are shielded off with a piece of insulating tape after repair for ESD reasons. Place this tape over the holes in the rear cover of the set.

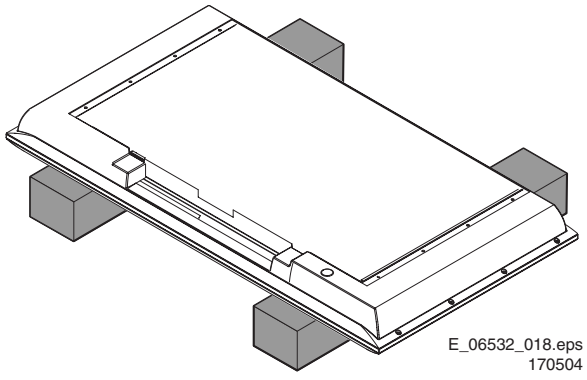


E_14520_034.eps
160904

Figure 4-1 ComPair connector

4.1 Service Position

4.1.1 Foam Bars

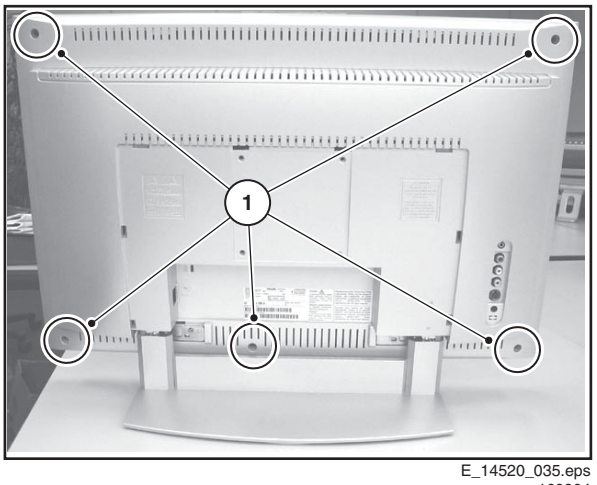


E_06532_018.eps
170504

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 placing a mirror under the TV, you can easily monitor the screen.

4.2 Rear Cover Removal

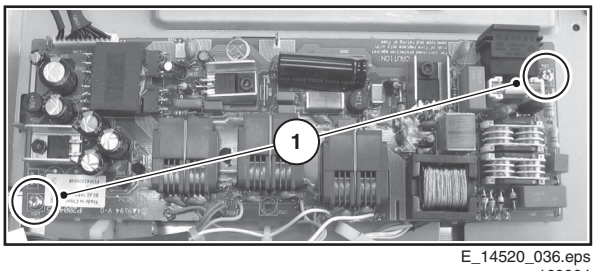


E_14520_035.eps
160904

Figure 4-3 Rear cover removal

1. Make sure all power-, audio-, video- and coax- cables are unplugged.
2. Remove all Torx screws (1) around the edges of the rear cover.
3. Remove the rear cover and store it in a safe place.

4.3 Power Supply Unit Removal

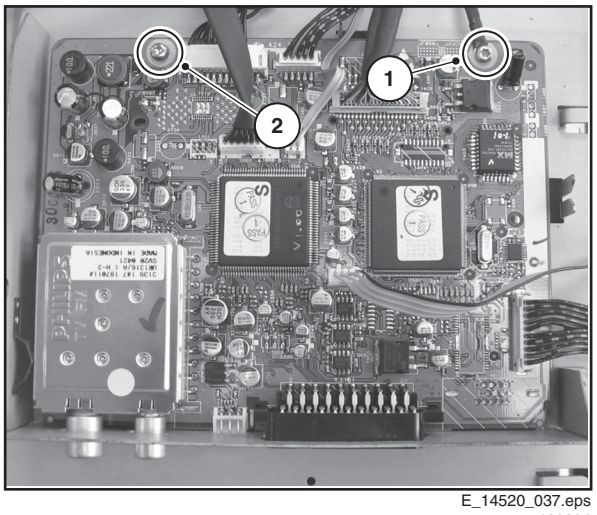


E_14520_036.eps
160904

Figure 4-4 Power supply unit (depending on model)

1. Disconnect all cables from the Power supply unit.
2. Remove all mounting screws (1) from the Power supply unit.
3. Take out the Power supply unit.

4.4 Small Signal Board Removal

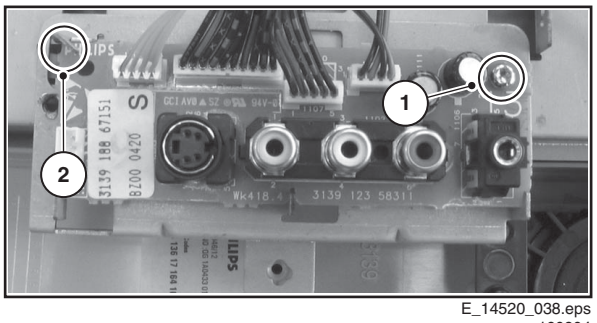


E_14520_037.eps
160904

Figure 4-5 Small signal board removal

1. Disconnect all cables from the Smal signal board.
2. Remove the screw from the grounding cable (1).
3. Remove the two fixation screws from the DVI connector.
4. Remove the mounting screw (2) and remove the board.

4.5 Side I/O Panel Removal



E_14520_038.eps
160904

Figure 4-6 Side I/O panel removal

1. Disconnect all cables from the Side I/O panel.
2. Remove the mounting screw (1).
3. Unlock the panel by twisting back the clamp at the bottom (2).
4. Take out the Side I/O panel from the bracket.

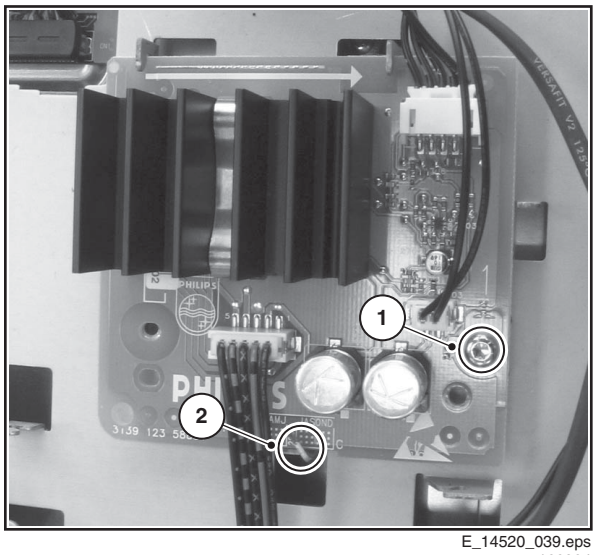
4.6 Top Control Panel Removal

1. Disconnect the cable from the top control panel.
2. Remove the two mounting screws from the top control panel.
3. Take out the top control panel.

4.7 LED/IR Panel Removal

1. Unlock the panel by pushing against one of the fixation clamps and remove the panel.
2. Disconnect the cable from the LED/IR panel.

4.8 Audio Amplifier Panel Removal

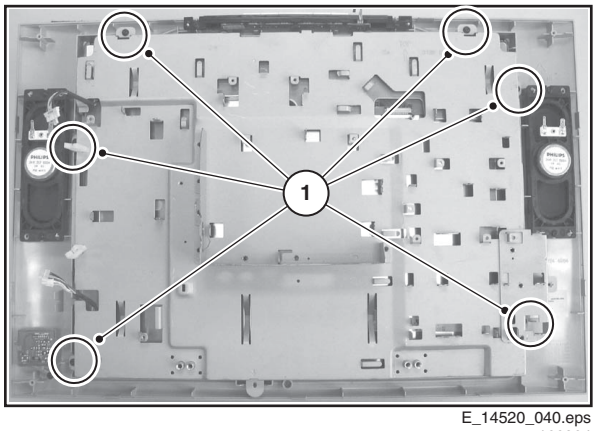


E_14520_039.eps
160904

Figure 4-7 Audio amplifier panel removal (depending on model)

1. Disconnect all cables from the audio amplifier panel.
2. Remove all mounting screws from the audio amplifier panel (1).
3. Unlock the panel by twisting back the clamp at the bottom (2).
4. Take out the audio amplifier panel.

4.9 Exchanging the LCD Panel



E_14520_040.eps
160904

Figure 4-8 Exchanging the LCD panel

1. Disconnect all cables from the LCD Panel.
2. Remove all mounting screws (1) from the metal cover.
3. Lift and take off the metal cover.
4. Now you can exchange the LCD panel.

4.10 Re-Assembly

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

Notes:
Do **not** forget to replace the ground cable of the smal signal board, while mounting the screw at the board topside. See figure “Smal signal board removal”.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

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 Ixxx. 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 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 readout 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 be made.
- To override software protections.
- To start the blinking LED procedure.
- To inspect the error buffer.
- To check the life timer.

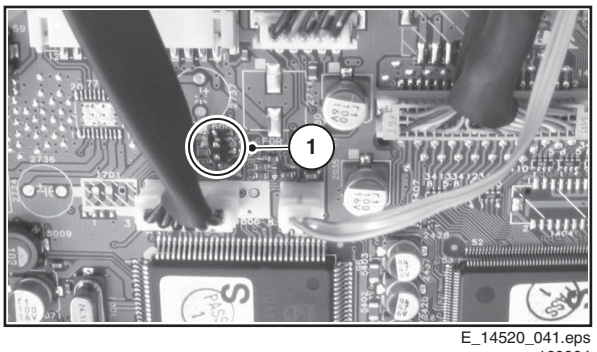
Specifications

- Tuning frequency: 475.25 MHz.
- Colour system: PAL-BG.
- 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:

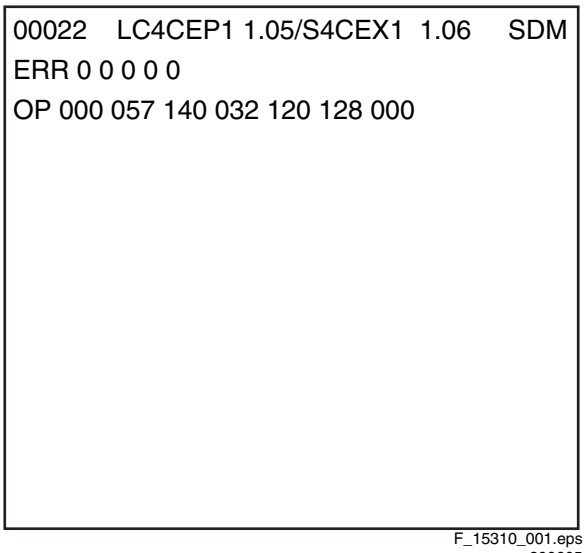
- Press the following key sequence on the remote control transmitter: “062596” directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
- Short "Service" jumpers on the small signal board during cold start and apply mains (see Figure "Service jumpers"). Then press the mains button (remove the short after start-up).
  Caution: Entering SDM by shorting "Service" jumpers will override the +5V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.
- Or via ComPair.



E_14520_041.eps
160904

Figure 5-1 Service jumpers

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 Mode.



F_15310_001.eps
200605

Figure 5-2 SDM menu

How to Navigate

Use one of the following methods:

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

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

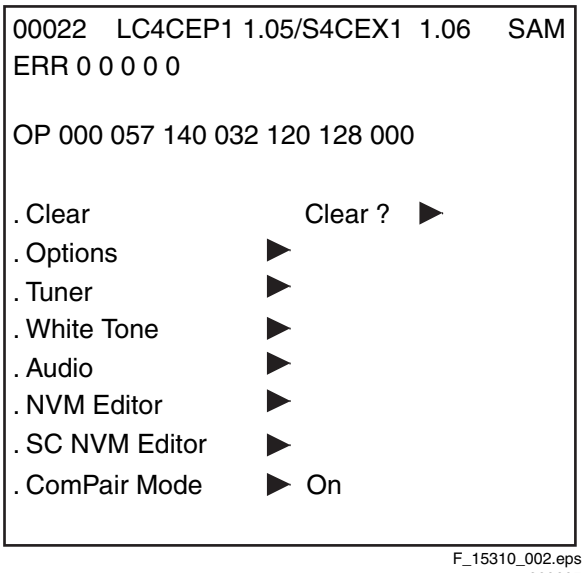
5.2.2 Service Alignment Mode (SAM)

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

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

How to Enter
To enter SAM, use one of the following methods:
- Press the following key sequence on the remote control transmitter: "**062596**" directly followed by the **OSD/ STATUS** button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

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



F_15310_002.eps
200605

Figure 5-3 SAM menu

Menu Explanation
1. **LLLLL.** This represents the run timer. The run timer counts normal operation hours, but does not count standby hours.
2. **AAABCD-X.Y.** This is the software identification of the main microprocessor:
   – **A**= the project name (LC41).
   – **B**= the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
   – **C**= the software diversity:
     - **Europe:** T= 1 page TXT, F= Full TXT, V= Voice control.
     - **LATAM and NAFTA:** N= Stereo non-dBx, S= Stereo dBx.
     - **Asian Pacific:** T= TXT, N= non-TXT, C= NTSC.
     - **ALL regions:** M= mono, D= DVD, Q= Mk2.
   – **D**= the language cluster number.
   – **X**= the main software version number (updated with a major change that is incompatible with previous versions).
   – **Y**= the sub software version number (updated with a minor change that is compatible with previous versions).
   – **EEEEEE**= the scaler sw cluster
   – **F**= the main sw version no.
   – **GG**= the sub-version no.
3. **SAM.** Indication of the Service Alignment Mode.
4. **Error Buffer.** Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **Option Bytes.** Used to set the option bytes. See "Options" in the Alignments section for a detailed description. Seven codes are possible.
6. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
7. **Options.** Used to set the option bits. See "Options" in the Alignments section for a detailed description.
8. **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. See table "NVM data" further on.
12. **SC NVM Editor.** Can be used to edit Scaler NVM.
13. **ComPalr.** Can be used to switch on 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 MENU UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  – Activate the selected menu item.
  – Change the value of the selected menu item.
  – Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU or STATUS/EXIT button.
- When you press the MENU key in while in 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.

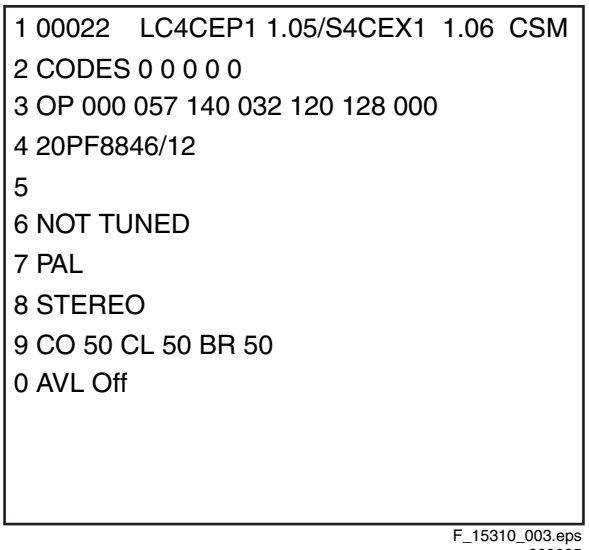
How to Exit
Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.
If you turn the television set "off" by removing the mains (i.e., unplugging the television) without using the mains button, the television set will remain in SAM when mains is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

5.2.3 Customer Service Mode (CSM)

Purpose
The Customer Service Mode shows error codes and information on the TV'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 display to time out between entries while keying the sequence).

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



F_15310_003.eps
200605

Figure 5-4 CSM menu

Menu Explanation
1. Indication of the decimal value of the operation hours counter, Software identification of the main microprocessor (see "Service Default or Alignment Mode" for an explanation), and the 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.
5. Reserved item for P3C call centres (AKBS stands for Advanced Knowledge Base System).
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/EXIT, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Problems and Solving Tips Related to CSM

5.3.1 Picture Problems

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

Picture too Dark or too Bright

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

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

White Line around Picture Elements and Text

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

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

Snowy Picture
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 MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select COLOUR.
6. Press the MENU 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 MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select PICTURE.
6. Press the MENU LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

5.4 Service Tools

5.4.1 ComPair

Introduction

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

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
2. ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS-232) cable.
For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

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

- Automatically (by communicating with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I^2C/UART level. ComPair can access the I^2C/UART bus of the television. ComPair can send and receive I^2C/UART commands to the microcontroller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I^2C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the microcontroller of the television is working correctly and only to a certain extent. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions *(e.g. Does the screen give a picture? Click on the correct answer: YES / NO)* and showing you examples *(e.g. Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope)*. You can answer by clicking on a link *(e.g. text or a waveform picture)* that will bring you to the next step in the fault finding process.

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

How to Connect

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

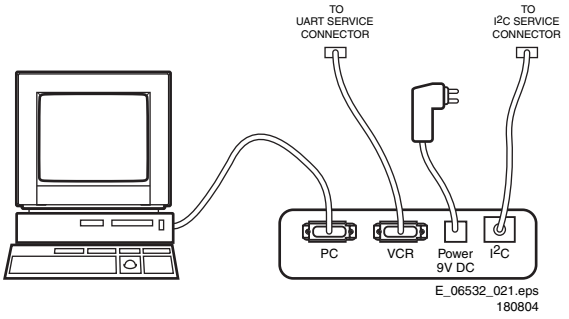


Figure 5-5 ComPair interface connection

How to Order

- ComPair order codes (EU/AP/LATAM):
- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excl. 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.

5.4.2 LVDS Tool

Introduction
This service tool (also called "ComPair Assistant 1") may help you to identify, in case the TV does not show any picture, whether the Small Signal Board (SSB) **or** the display of a Flat TV is defective.
Furthermore it is possible to program EPLDs with this tool (Byte blaster). Read the user manual for an explanation of this feature.

Since 2004, the LVDS output connectors in our Flat TV models are standardised (with some exceptions). With the two delivered LVDS interface cables (31p and 20p) you can cover most chassis (in special cases, an extra cable will be offered).

When operating, the tool will show a small (scaled) picture on a VGA monitor. Due to a limited memory capacity, it is not possible to increase the size when processing high-resolution LVDS signals (> 1280x960). Below this resolution, or when a DVI monitor is used, the displayed picture will be full size.

Generally this tool is intended to determine if the SSB is working or not. Thus to determine if LVDS, RGB, and sync signals are okay.

How to Connect
Connections are explained in the user manual, which is packed with the tool.

Note: To use the LVDS tool, you must have ComPair release 2004-1 (or later) on your PC (engine version >= 2.2.05).
For every TV type number and screen size, one must choose the proper settings via ComPair. The ComPair file will be updated regularly with new introduced chassis information.

How to Order
- LVDS tool (incl. two LVDS cables: 31p and 20p): 3122 785 90671.
- LVDS tool Service Manual: 3122 785 00810.
- LVDS cable 30p (for LC4.3): 3122 785 90820 (available soon).
- LVDS cable 41p -> 31p for HD PDPs (dual -> single LVDS): 3122 785 90830 (available soon).

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 display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the "CLEAR" line will change from "CLEAR?" to "CLEARED"
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

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

5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-1 Error code overview

Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error		
1	Not applicable	-	-	-
2	Not applicable	-	-	-
3	Not applicable	-	-	-
4	GM5221	I2C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/ empty	7401 7403	A6
5	Not applicable	+5v protection	7930	A6
6	I2C bus	General I2C error	7011, 3083, 3084	A2
7	Not applicable	-	-	-
8	M24C32	I2C error while communicating with the Scaler EEPROM	7402	A7
9	M24C16	I2C error while communicating with the EEPROM	7099	A2
10	Tuner	I2C error while communicating with the PLL tuner	1302, 3302, 3303, 3327	A1
11	Not applicable	-	-	-
12	Not applicable	-	-	-
13	Not applicable	-	-	-

5.6 The Blinking LED Procedure

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

When the SDM is entered, the 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.

5.7.2 Tuner and IF

No Picture in RF Mode
1. Check whether picture is present in AV. If not, go to Video processing troubleshooting section.
2. If present, check that the Option settings are correct.
3. Check that all supply voltages are present.
4. Check if I2C lines are working correctly (3.3V).
5. Manually store a known channel and check if there is IF output at Tuner pin 11.
6. Feed in 105 dBuV at Tuner pin 11 and check whether there is RGB output from Video Processing IC. If yes, Tuner may be defected. Change Tuner.

Sound in Picture Problem for L' System (Rolling Horizontal Lines)
1. Check whether AGC L' in Sam mode is set to 0.
2. If yes, align the set to correct value.

Required System is not Selected Correctly
1. Check whether the Service jumper (#4022, 08 05 size) is present. If yes, remove it.
2. Check whether SEL_IF pin is according to what is specified.

5.7.3 Video Processing

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

Power Supply is Correct But no Green Light
1. Check the two connectors 1007 and 1008, if they are properly inserted.
2. If they are inserted correctly, check if the 3V3 is present.

No Picture Display
1. Check the RGB signal.
2. If it is present, check pin 3 of IC7006 (NE555).
3. If it has output, the problem is in SCALER part.
4. Otherwise, check H-out on pin 2 of NE555. If the input signal of pin2 is present, but no output, the IC is failed.

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 IC7006 (NE555).

No TV but PC is Present
1. Check if HSYNC and VSYNC are present at PIN 3 of 7007 and 7005.
2. If they are present, check RGB output.
3. If there is no RGB output, the IC TDA120xx can be failed.

Comb Filter not Working
1. Check the option bit 5 in SAM.

5.7.4 Power Supply

Check Fuses

This power supply contains three fuses. One is near the mains inlet (marked on the board as 1102) and two other are near the output connectors (marked 1610 and 1660).

1. Check with power supply in off state by means of ohmic measurement.
2. Fuse 1102 may open in case of severe lightning strikes and/or failures in the power supply. Despite the fact, that this fuse is mounted in a fuse holder and the marking text on the board, it is not meant to be field replaceable.
3. Fuses 1610 and 1660 may open in case a severe overload of the 12 V outputs. Replacement of the power supply is needed, but not before the cause of the overload conditions is resolved.

Standby Mode
1. Apply a 12 ohm load resistor of sufficient power rating to all outputs (+3 V3, +12 VAL, +12 VL and +24 V). Connect the STBY pin to GND.
2. Over an input voltage range of 90 V_ac to 264 V_ac only the +3 V3 output shall be up and within regulation (±5%). The voltage on the POWER DOWN pin shall be < 0.3 V at an input voltage below 160 V_ac, and 3.3 V ±10% at an input voltage higher than 240 V_ac.

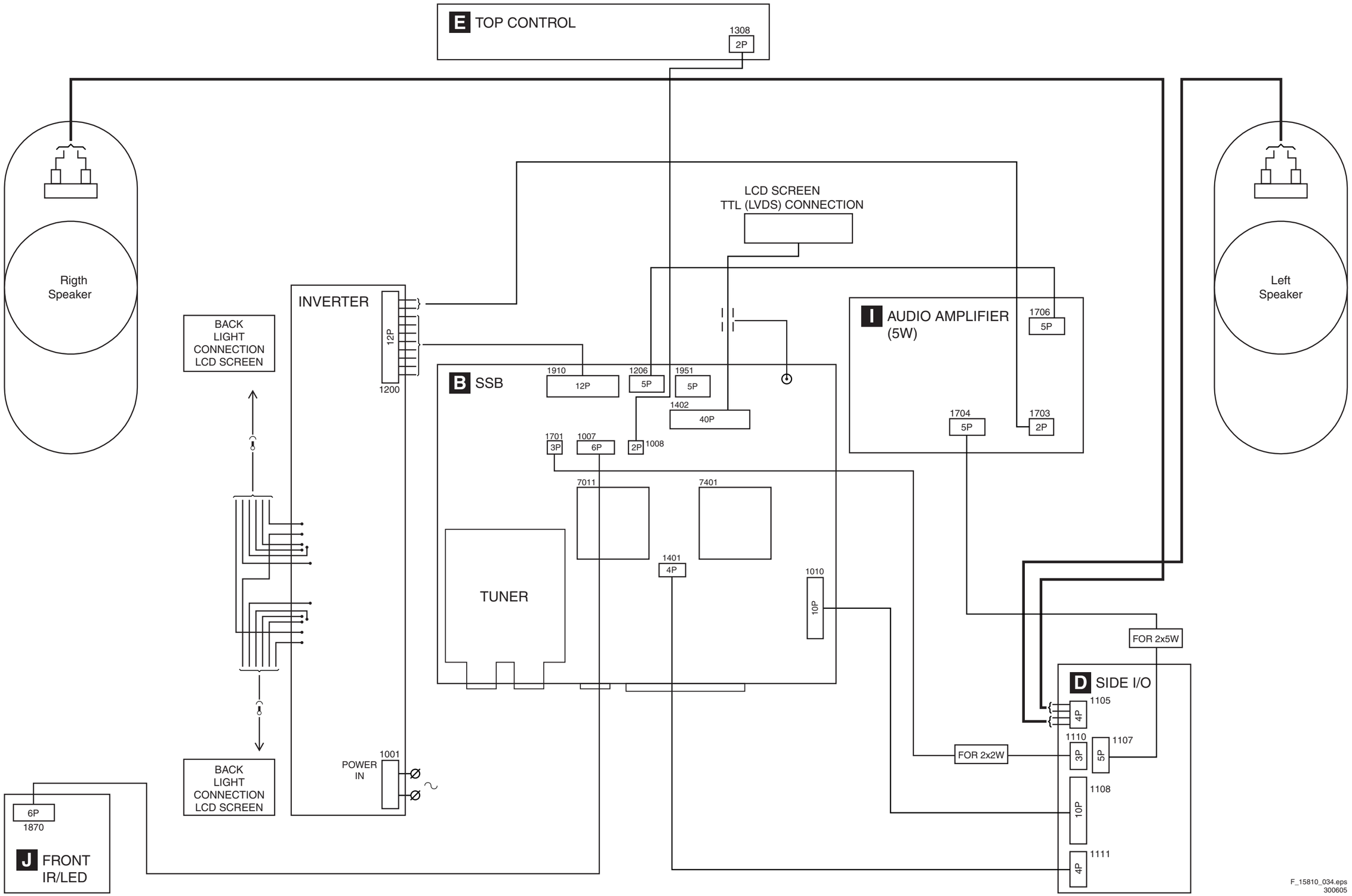
Normal Mode:
1. Apply a 12 ohm load resistor of sufficient power rating to all outputs (+3 V3, +12 VAL, +12 VL and +24 V). Connect the STBY pin to the +3 V3 output.
2. Over an input voltage range of 90 V _ac to 264 V_ac all outputs shall be up and within regulation (±5%). The voltage on the POWER DOWN pin shall be 3.3 V ±10% over the entire input voltage range. Additionally, the voltage on the big capacitor mounted flat on the PCB shall be 400 V ±10%

Personal Notes:

E_06532_012.eps
131004

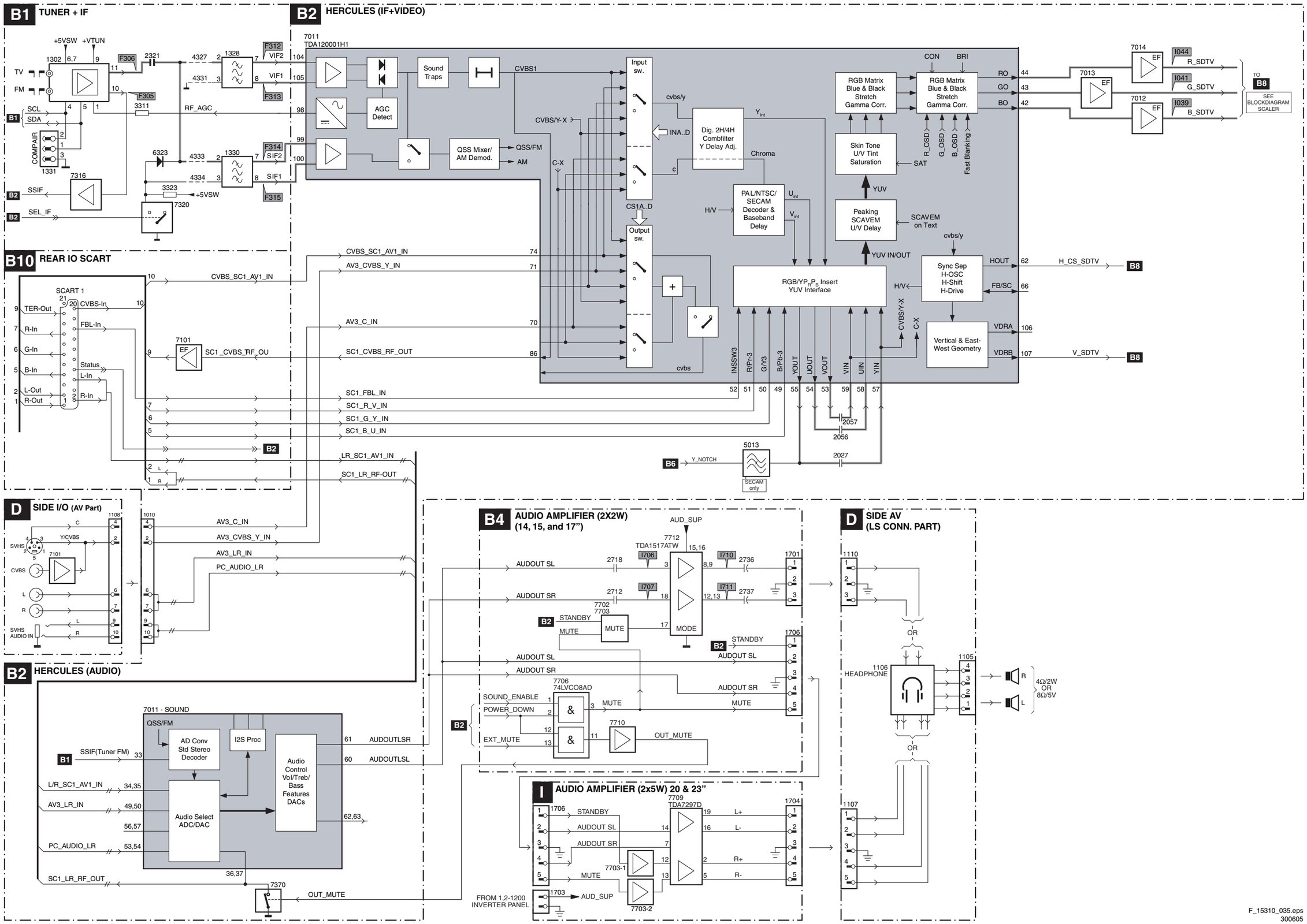
6. Block Diagrams, Testpoint Overviews, and Waveforms

Wiring Diagram



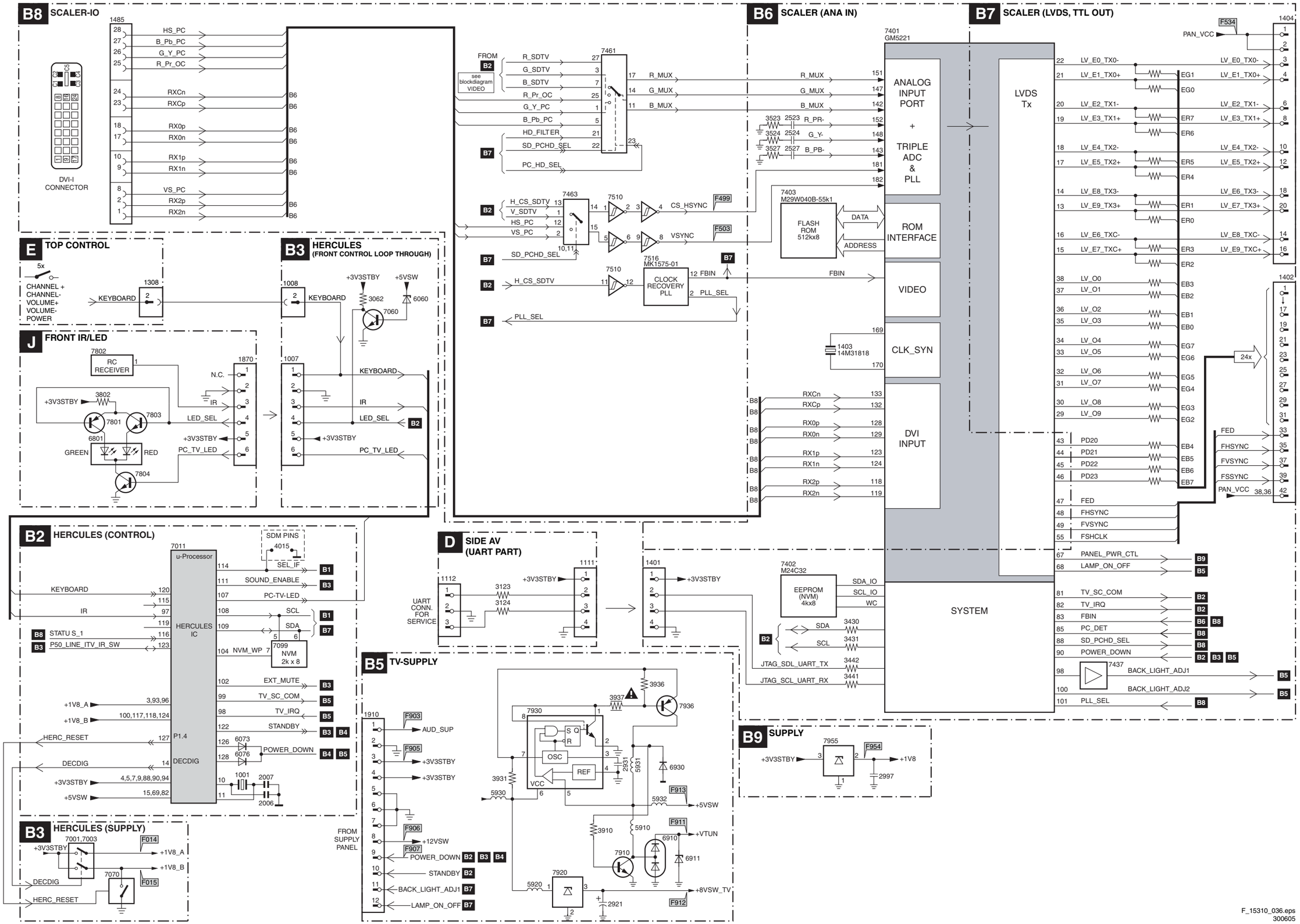
F_15810_034.eps
300605

Block Diagram Audio & Video



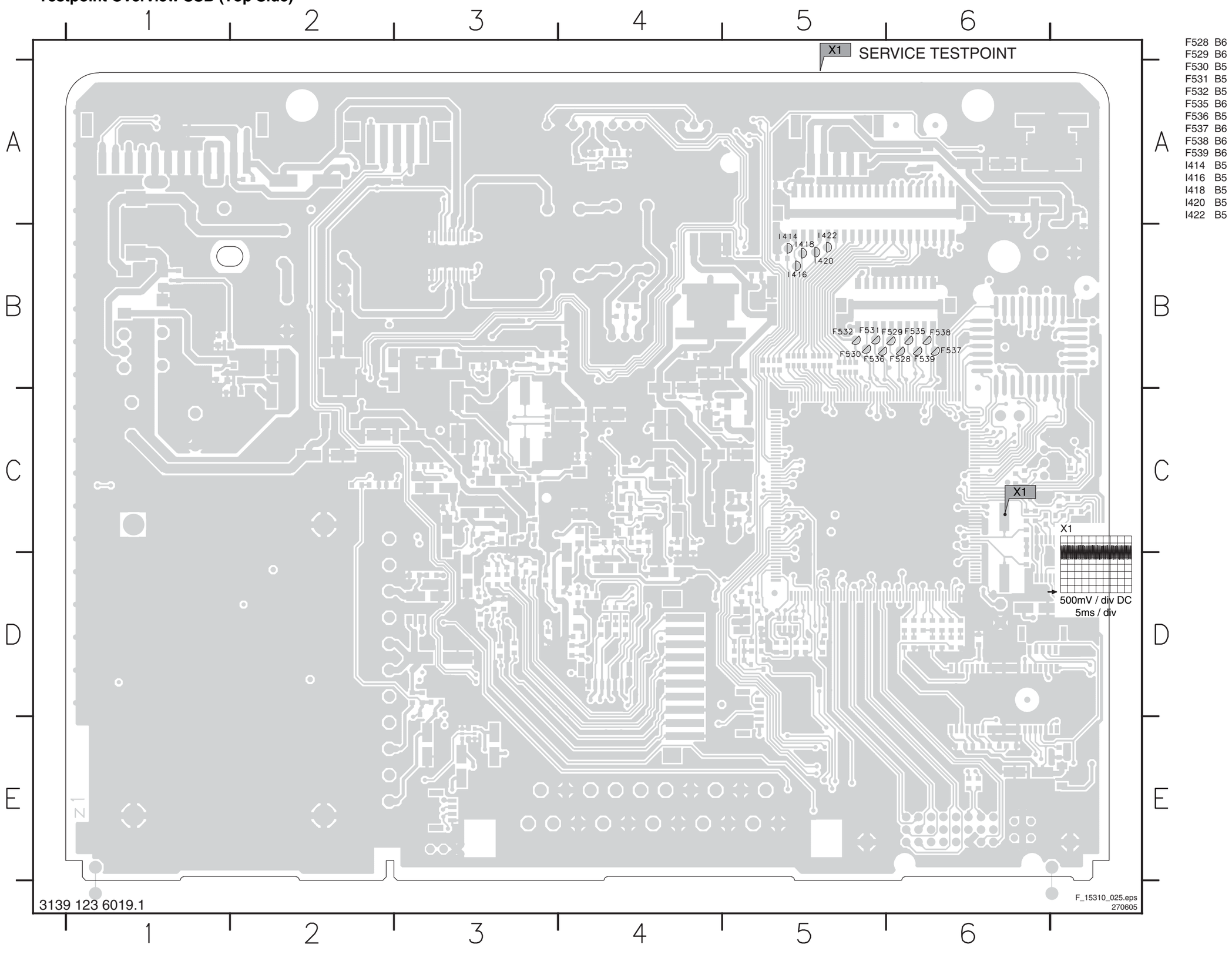
F_15310_035.eps
300605

Block Diagram Scaler & Supply



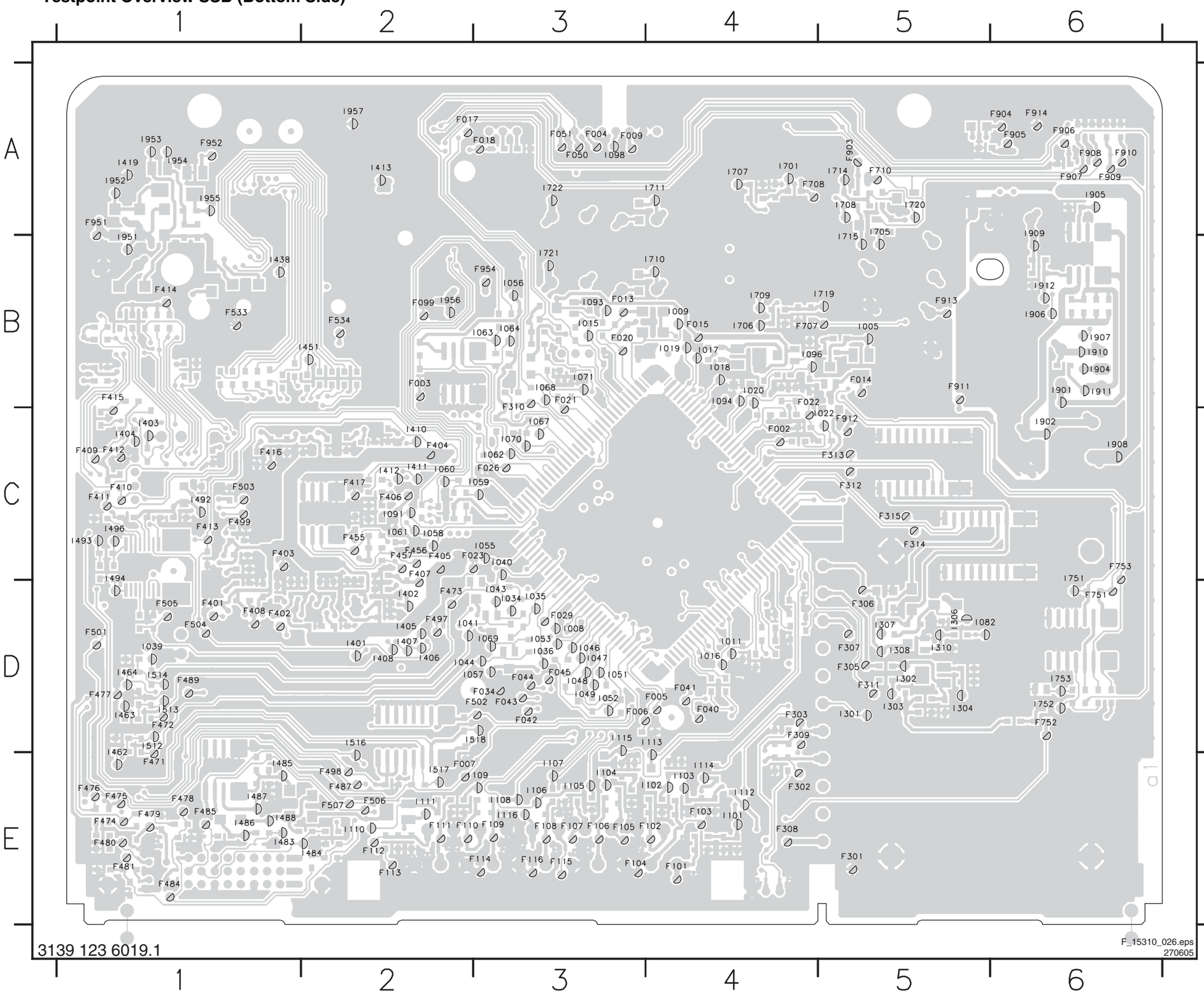
F_15310_036.eps
300605

Testpoint Overview SSB (Top Side)



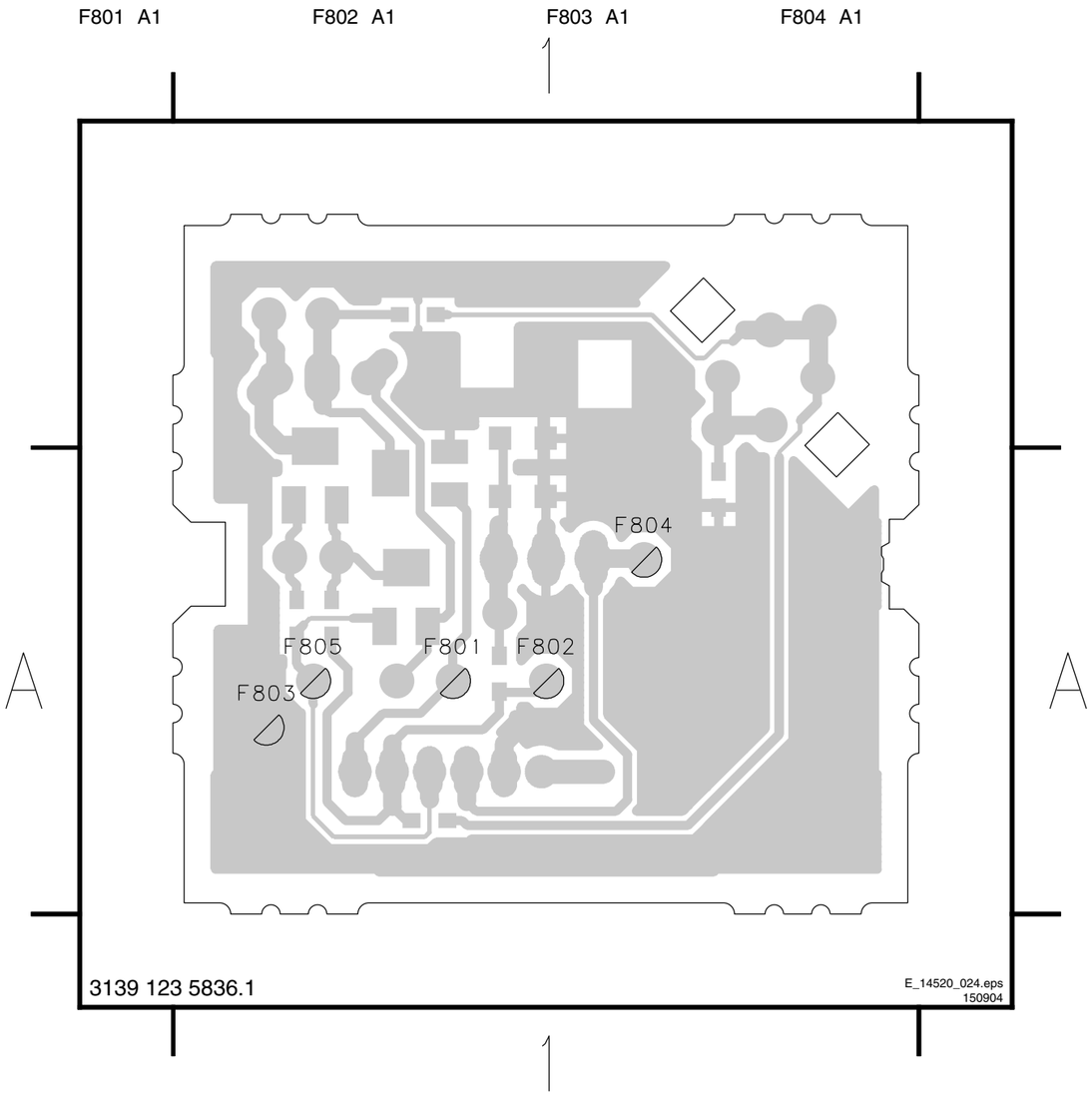
F528 B6
F529 B6
F530 B5
F531 B5
F532 B5
F535 B6
F536 B5
F537 B6
F538 B6
F539 B6
I414 B5
I416 B5
I418 B5
I420 B5
I422 B5

Testpoint Overview SSB (Bottom Side)



F002	C4	F478	E1	I094	B4	I909	A6
F003	B2	F479	E1	I096	B4	I910	B6
F004	A3	F480	E1	I098	A3	I911	B6
F005	D4	F481	E1	I101	E4	I912	B6
F006	D3	F484	E1	I102	E4	I951	B1
F007	E2	F485	E1	I103	E4	I952	A1
F009	A3	F487	E2	I104	E3	I953	A1
F013	B3	F489	D1	I105	E3	I954	A1
F014	B5	F497	D2	I106	E3	I955	A1
F015	B4	F498	E2	I107	E3	I956	B2
F017	A2	F499	C1	I108	E3	I957	A2
F018	A3	F501	D1	I109	E3		
F020	B3	F502	D3	I110	E2		
F021	B3	F503	C1	I111	E2		
F022	B4	F504	D1	I112	E4		
F023	C2	F505	D1	I113	D4		
F026	C3	F506	E2	I114	E4		
F029	D3	F507	E2	I115	D3		
F034	D3	F533	B1	I116	E3		
F040	D4	F534	B2	I301	D5		
F041	D4	F707	B4	I302	D5		
F042	D3	F708	A4	I303	D5		
F043	D3	F710	A5	I304	D5		
F044	D3	F751	D6	I306	D5		
F045	D3	F752	D6	I307	D5		
F050	A3	F753	C6	I308	D5		
F051	A3	F903	A5	I310	D5		
F099	B2	F904	A6	I401	D2		
F101	E4	F905	A6	I402	D2		
F102	E4	F906	A6	I403	C1		
F103	E4	F907	A6	I404	C1		
F104	E3	F908	A6	I405	D2		
F105	E3	F909	A6	I406	D2		
F106	E3	F910	A6	I407	D2		
F107	E3	F911	B5	I408	D2		
F108	E3	F912	C5	I410	C2		
F109	E3	F913	B5	I411	C2		
F110	E2	F914	A6	I412	C2		
F111	E2	F951	A1	I413	A2		
F112	E2	F952	A1	I419	A1		
F113	E2	F954	B3	I438	B1		
F114	E3	I005	B5	I451	B2		
F115	E3	I008	D3	I462	D1		
F116	E3	I009	B4	I463	D1		
F301	E5	I011	D4	I464	D1		
F302	E4	I015	B3	I483	E1		
F303	D4	I016	D4	I484	E2		
F305	D5	I017	B4	I485	E1		
F306	D5	I018	B4	I486	E1		
F307	D5	I019	B4	I487	E1		
F308	E4	I020	B4	I488	E1		
F309	D4	I022	C5	I492	C1		
F310	B3	I034	D3	I493	C1		
F311	D5	I035	D3	I494	C1		
F312	C5	I036	D3	I496	C1		
F313	C5	I039	D1	I512	D1		
F314	C5	I040	C3	I513	D1		
F315	C5	I041	D2	I514	D1		
F401	D1	I043	D3	I516	D2		
F402	D1	I044	D2	I517	E2		
F403	C1	I046	D3	I518	D3		
F404	C2	I047	D3	I701	A4		
F405	C2	I048	D3	I705	A5		
F406	C2	I049	D3	I706	B4		
F407	C2	I051	D3	I707	A4		
F408	D1	I052	D3	I708	A5		
F409	C1	I053	D3	I709	B4		
F410	C1	I055	C3	I710	B4		
F411	C1	I056	B3	I711	A4		
F412	C1	I057	D2	I714	A5		
F413	C1	I058	C2	I715	B5		
F414	B1	I059	C3	I719	B5		
F415	B1	I060	C2	I720	A5		
F416	C1	I061	C2	I721	B3		
F417	C2	I062	C3	I722	A3		
F455	C2	I063	B3	I751	C6		
F456	C2	I064	B3	I752	D6		
F457	C2	I067	C3	I753	D6		
F471	E1	I068	B3	I901	B6		
F472	D1	I069	D3	I902	C6		
F473	D2	I070	C3	I904	B6		
F474	E1	I071	B3	I905	A6		
F475	E1	I082	D5	I906	B6		
F476	E1	I091	C2	I907	B6		
F477	D1	I093	B3	I908	C6		

Testpoint Overview Front IR / LED Panel

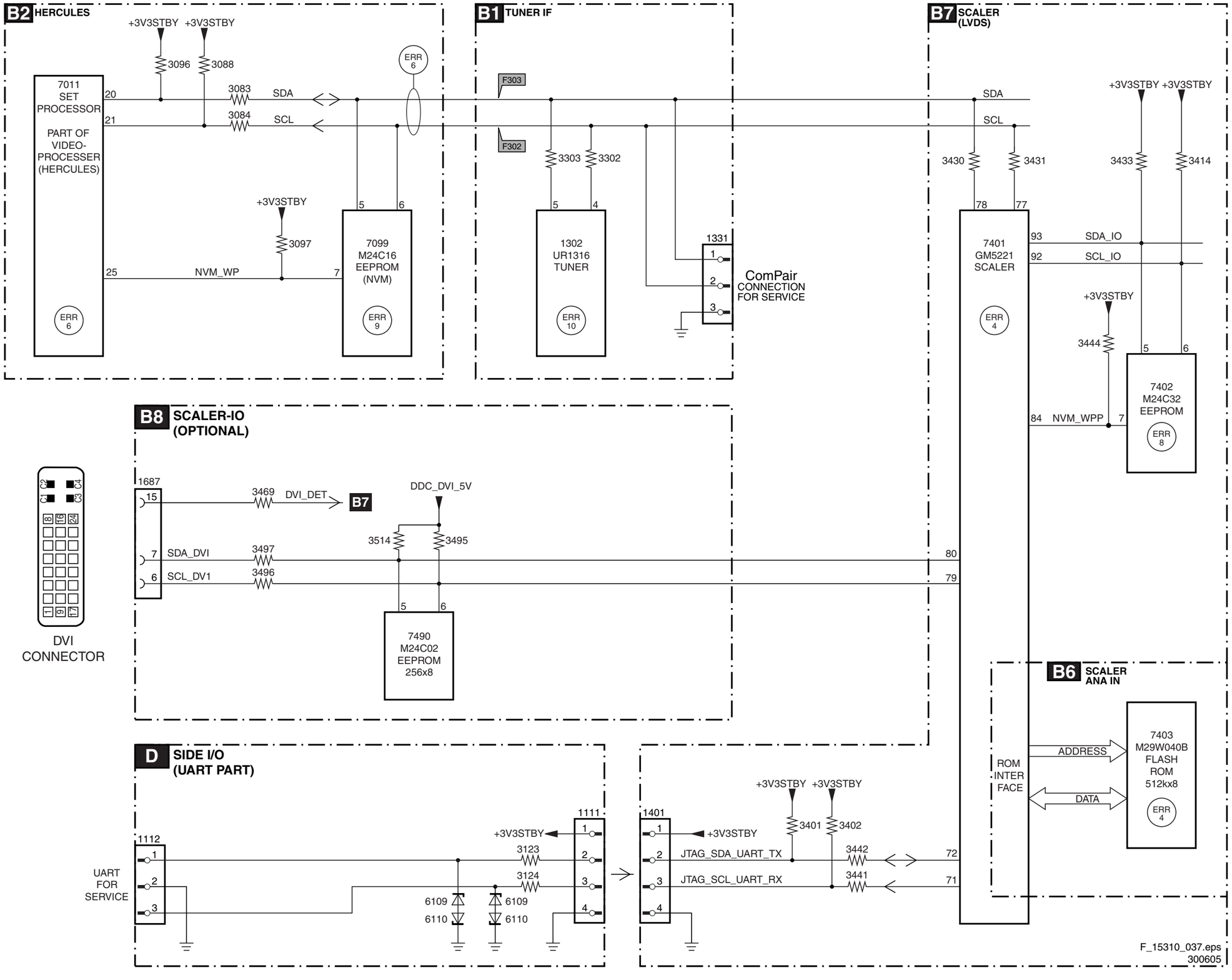


Personal Notes:

E_06532_012.eps
131004

I2C Overview

I2C BUS INTERCONNECTION DIAGRAM



Supply Voltage Overview

SUPPLY PANEL (INVERTER)
1200
1001
TO LCD DISPLAY

B5 TV SUPPLY
1910
AUD_SUP F903 AUD_SUP A4
+3V3STBY F905 +3V3STBY A8 A7 A6 A4 A3 A2 A1
+12VSW F906 +12VSW A9 A14
POWER_DOWN A2
STANDBY A2
BACK_LIGHT_ADJ1 A7
LAMP_ON_OFF A7
3936
3937
7936
7930 MC34063AD SUPPLY IC
3935
+12VSW 5930
5931 5932 F913 +5VSW A10 A8 A7 A5 A2 A1
6930
5910
6910 F911 +VTUN A1
3910
7910
6911 -/C33
7920 L78M08CDT
+12VSW 5920
+8VSW_TV F912 +8VSW_TV A2
+3V3STBY A5

B9 SUPPLY
7955
+1V8 +1V8 A6
+3V3STBY 5955 7954 5959 7953*
PANEL_PWR_CTL A7
CONTROL 7404
5957*
5961
*SEE DIVERSITY LIST

B1 TUNER + IF
A5 +5VSW → +5VSW
A5 +VTUN → +VTUN
A5 +3V3STBY → +3V3STBY (FOR ITV ONLY)

B2 HERCULES
A5 +3V3STBY → +3V3STBY
A5 +8VSW_TV → +8VSW_TV
6005
3374
A5 +5VSW → TO 45 - 7011 +5VSW
7011 HERCULES
14 +1V8_B
127 +1V8_A

B3 HERCULES
A5 +3V3STBY → +3V3STBY 1007 5
7001
+1V8_A
7004 CONTROL
7003
+1V8_B
7002 7061 7070 CONTROL
A5 +5VSW → +5VSW

B4 AUDIO AMPLIFIER + PROCESSING
A5 AUDIO_SUP → AUDIO_SUP
A5 +5VSW → +5VSW
A5 +3V3STBY → +3V3STBY

B6 SCALER (ANA IN)
1401
+3V3STBY
A5 +3V3STBY → +3V3STBY
5401 +3V3_AVDD → +3V3_AVDD
5404 +3V3_DVDD → +3V3_DVDD
A9 +1v8 → +1V8
5402 +1V8_AVDD
5403 +1V8_DVDD

B7 SCALER (LVDS OUT)
+3V3_DVDD
+3V3_AVDD
A5 +3V3STBY → +3V3STBY
A5 +5VSW → +5VSW
LVDS CONN. 1404
PAN_VCC
1402
TT4 CONN.
-OR-
LCD DISPLAY

B8 SCALER IO
A5 +3V3STBY → +3V3STBY
5520 VDD
A5 +5VSW → +5VSW
6485
DVI CONNECTOR 1485 14
5520 DCC_DVI_5V

B10 REAR IO SCART
A5 +5VSW → +5VSW

J FRONT IR/LED
1870 5 → +3V3STBY

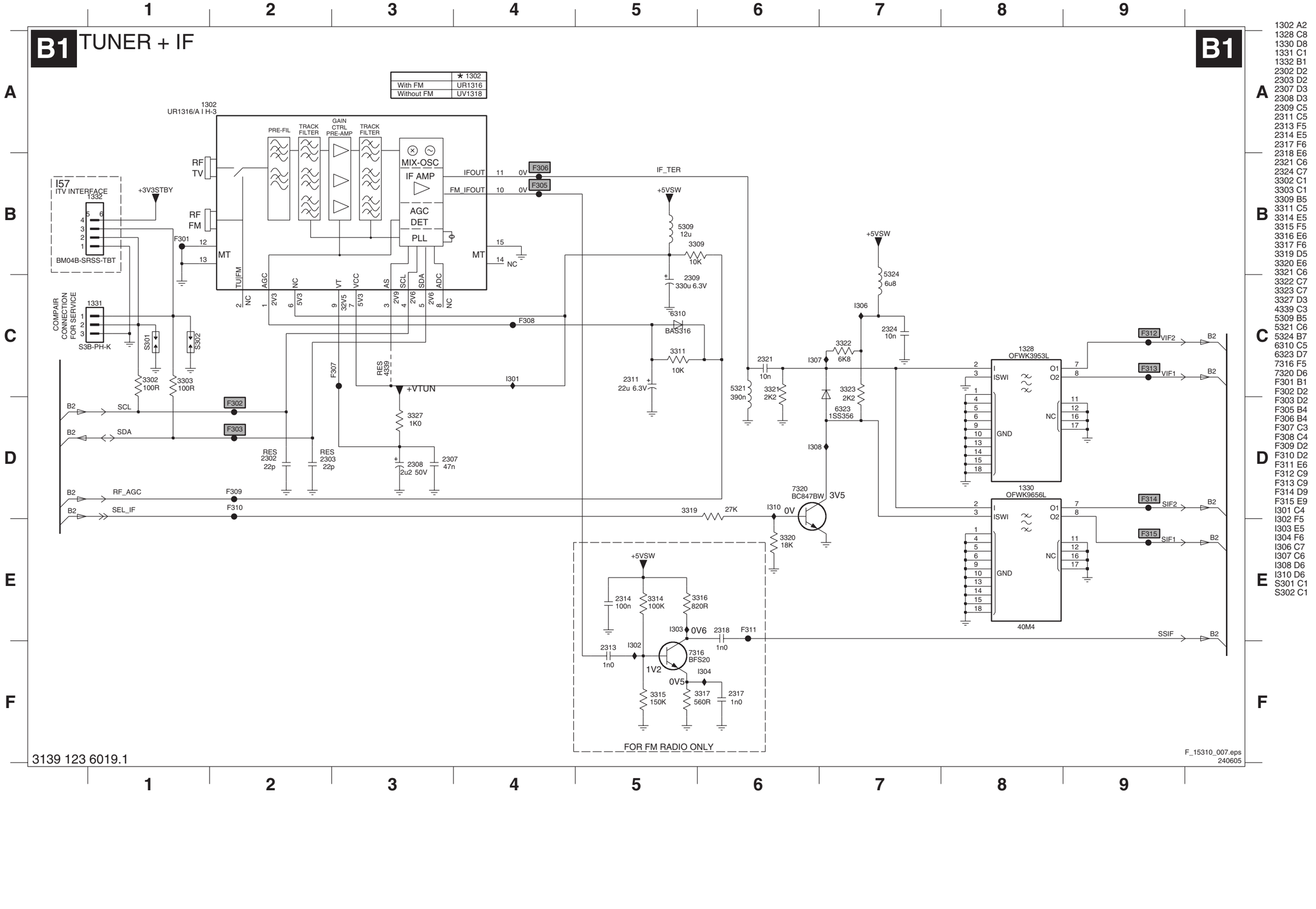
D SIDE I/O
1111 1 N.C.

I AUDIO AMPLIFIER (2x5W) (20" & 23")
1703 1 2 AUD_SUP

F_15310_038.eps
300605

7. Circuit Diagrams and PWB Layouts

SSB: Tuner + VIF



SSB: Hercules

B2 HERCULES

B2

Φ VIDEO SIGNAL PROCESSOR HERCULES

AUDIO PROCESSING

TO SIDE I/O

FROM 1108 OF SIDE AV BD

7011 TDA12001H1/N1B504

7099 M24C16-WMN6

(2Kx8) EEPROM

24M576

FOR SECAM ONLY

FOR SERVICE SDM

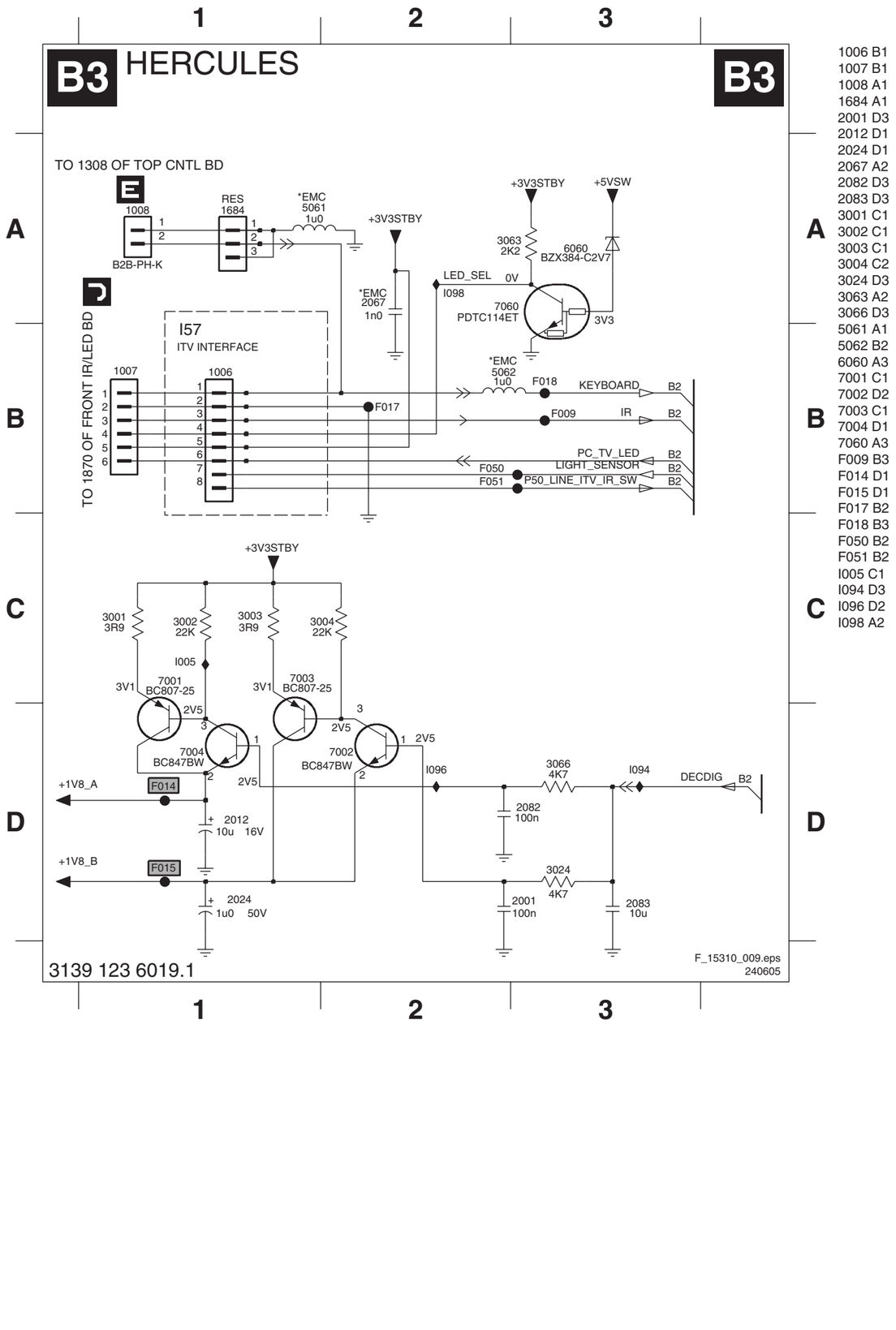
FOR ITV

3139 123 6019.1

F_15310_008.eps 300605

1001 G2	3077 D10	I046 H6
1010 A2	3078 F6	I047 G6
2004 B5	3079 F7	I048 H6
2006 G2	3080 G7	I049 G4
2007 G2	3081 G7	I051 G4
2008 F2	3082 F7	I052 G4
2009 E2	3086 E10	I053 E4
2010 F2	3087 E10	I055 B5
2011 E3	3091 D10	I056 G2
2013 B6	3092 D10	I057 A10
2016 D3	3093 E8	I058 E6
2017 D3	3094 E8	I059 E6
2018 D3	3097 F10	I060 E6
2023 B7	3350 G9	I061 E7
2027 G3	3351 C7	I062 F6
2030 D2	3352 D7	I063 F6
2031 D2	3353 F10	I064 F6
2032 D2	3354 F10	I067 F6
2033 B6	3355 F10	I068 G6
2035 D3	3356 F10	I069 C9
2036 C3	3359 E3	I070 B6
2037 C3	3371 C7	I071 G6
2043 F1	3372 C7	I082 F6
2044 B4	3374 B4	I091 D10
2049 B10	3375 F7	I093 E11
2050 H3	3376 D6	
2051 B6	3389 E6	
2052 D2	3390 C7	
2053 D3	3391 C7	
2054 D3	3394 F1	
2055 G3	4013 G3	
2056 G3	4015 G10	
2057 G3	4050 B9	
2058 E3	4051 C9	
2060 D2	4052 C9	
2061 D2	5002 B5	
2063 G3	5003 E1	
2068 B5	5004 B6	
2072 E2	5005 A6	
2073 G7	5006 B6	
2074 B5	5008 B4	
2076 B5	5013 G3	
2078 E7	5060 B5	
2099 F10	5070 E2	
2355 C3	5071 B5	
2356 E3	5072 B5	
2357 E3	5370 B4	
2358 G7	5371 B5	
2359 C7	5372 B5	
2372 F1	5375 F1	
2374 E2	5376 G2	
2375 E2	6005 A4	
2376 C3	6073 D10	
2377 C3	6076 F10	
2378 B5	7011 B4	
2379 B4	7012 B10	
2380 F3	7013 B10	
2381 F3	7014 C10	
2382 C2	7070 E11	
2383 C2	7099 F10	
2384 C2	7370-1 B8	
2385 C2	7370-2 B7	
2386 H2	F002 F1	
2387 H1	F003 B5	
2388 F2	F004 E10	
2389 C2	F005 G6	
2390 C2	F006 D6	
2391 C2	F007 D7	
2392 F1	F013 D10	
2393 F1	F020 F7	
2394 B5	F021 E4	
2395 B4	F022 E1	
2396 B4	F023 H5	
2399 C2	F026 G10	
3005 D7	F029 D4	
3006 G3	F034 B2	
3007 F2	F040 B2	
3008 E1	F041 B2	
3009 E7	F042 B2	
3010 G7	F043 B2	
3011 D8	F044 B2	
3012 B9	F045 B2	
3013 G7	F099 G11	
3016 E7	I008 B6	
3019 B9	I009 F6	
3020 C9	I011 E6	
3048 D2	I015 B5	
3052 A10	I016 D4	
3054 D2	I017 B5	
3058 D6	I018 F4	
3059 F2	I019 B5	
3060 E3	I020 E4	
3061 G7	I022 G7	
3062 H4	I034 D7	
3064 G7	I035 D7	
3065 H4	I036 D7	
3067 H9	I039 B10	
3068 H4	I040 B9	
3070 F7	I041 C10	
3073 E10	I043 B9	
3075 F10	I044 C10	

SSB: Hercules



1006 B1
1007 B1
1008 A1
1684 A1
2001 D3
2012 D1
2024 D1
2067 A2
2082 D3
2083 D3
3001 C1
3002 C1
3003 C1
3004 C2
3024 D3
3063 A2
3066 D3
5061 A1
5062 B2
6060 A3
7001 C1
7002 D2
7003 C1
7004 D1
7060 A3
F009 B3
F014 D1
F015 D1
F017 B2
F018 B3
F050 B2
F051 B2
I005 C1
I094 D3
I096 D2
I098 A2

Personal Notes:

E_06532_012.eps
131004

SSB: Audio Amplifier + Processing

B4 AUDIO AMPLIFIER + PROCESSING

AUDIO AMP 2 X 2W

7712 TDA1517ATW

AUD_SUP 11V1

2719 100n P_GND

2714 470u 16V P_GND

VP1 VP2

B2 AUDOUTLSL F707

3744 8K2

I719

2718 1u0

I706

*EMC 2742 470p

3727 3K9

2V1 3 IN1+

B2 AUDOUTLSR F708

3745 8K2

I701

2712 1u0

I707

*EMC 2741 470p

3726 3K9

2V1 18 IN2-

Φ POWER AMPLIFIER

OUT1A OUT1B 8 OUT1 9 5V3

I710

5736 2u2 4736

2736 470u 16V

OUT2A OUT2B 12 OUT2 13 5V3

I711

5737 2u2 4737

2737 470u 16V

I721

I722

EMC 2738 1n0

EMC 2739 1n0

P_GND

1701

1 L
2 GND
3 R

TO 1110 OF SIDE I/O D

10V8 17 MODE

I709 5V3

5 SVRR

2724 100u 10V

NC 1 2 6 7 14 19 20

PGND 1 2

SGND 4 10 11 HS 21

P_GND P_GND

F710 P_GND

+3V3STBY

3717 10K

AUD_SUP

3719 10K

I720 3V3

11V2

7702 BC847BW 3V2

I714

3706 10K

I708

2703 10u 16V

+3V3STBY

3725 10K

3722 8K2

7703 BC847BW

I715 11V2

3V3 I705

3V3

B2 STANDBY

Audio Amplifier

RES * 4751

+3V3STBY

3751 100R

4X AND GATES 7751-1 74LVC08AD

I751

B2 SOUND_ENABLE F751

POWER_DOWN B2,B5,B7

3752 100R

3V3 1 3V3 2 3 3V3

7751-2 74LVC08AD

7751-3 74LVC08AD

7751-4 74LVC08AD

B2 EXT_MUTE F753

3V3 13 11 3V3

* 4752 RES

B2 STANDBY 3V2

B2 AUDOUTLSL 3V7

B2 AUDOUTLSR 3V7

3V3

MUTE

1751

1
2
3
4
5
7 6

TO 1706 OF AUD AMP 2X5W I

5751

+5VSW

3753 470R

0V

3755 470R

OUT_MUTE B2

F752

I752

3754 1K0

I753 0V7

7752 BC847BW

Audio Processing

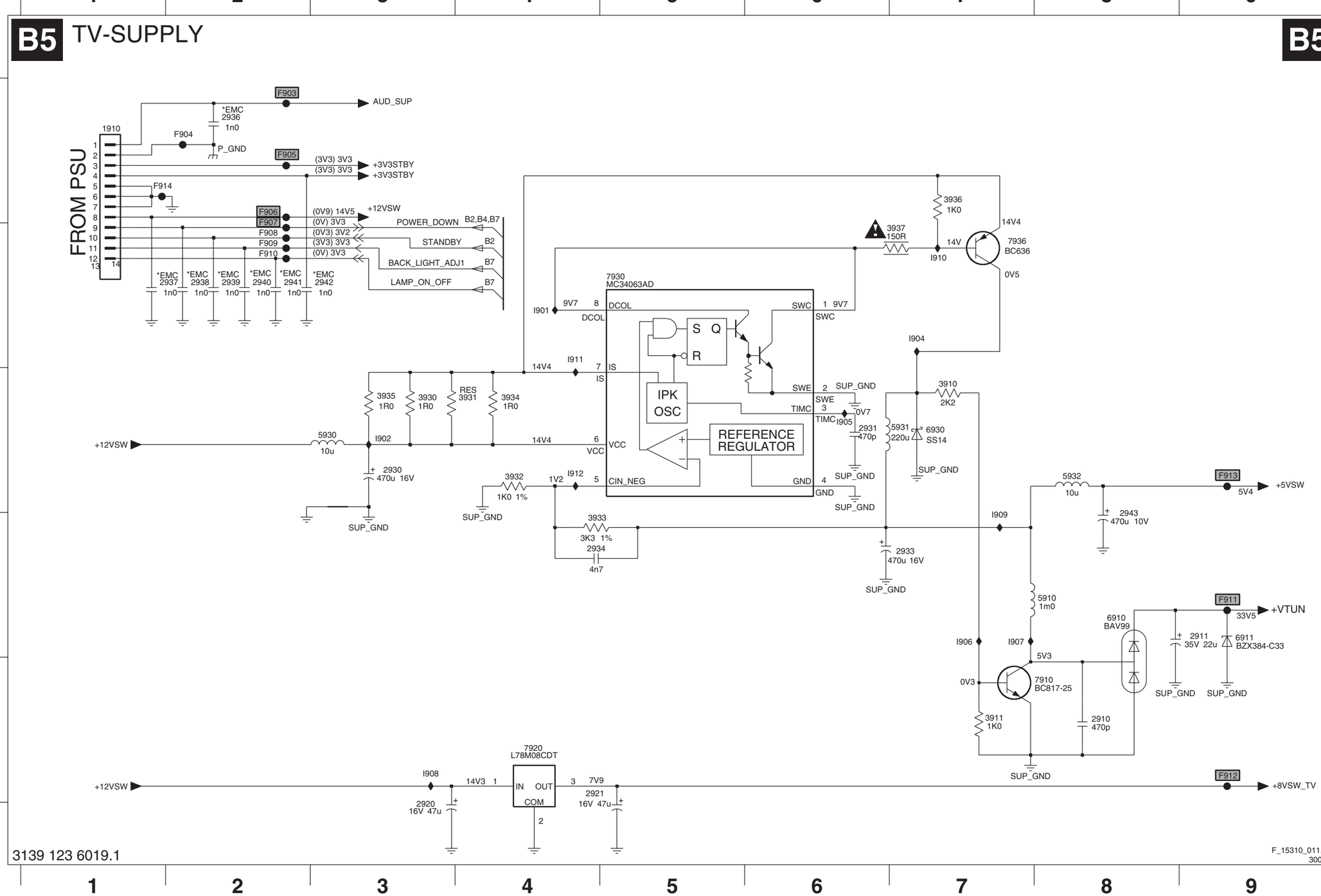
3139 123 6019.1

F_15310_010.eps 300605

1701 A8
1751 D5
2703 C4
2712 B3
2714 A6
2718 B3
2719 A5
2724 B5
2736 A7
2737 B7
2738 B7
2739 B7
2741 B4
2742 B4
3706 B3
3717 B2
3719 C2
3722 C3
3725 C3
3726 B3
3727 B3
3744 B1
3745 B1
3751 D2
3752 D1
3753 E3
3754 F3
3755 F3
4736 B7
4737 B7
4751 D2
4752 F2
5736 A7
5737 B7
5751 E5
7702 C2
7703 C3
7712 A5
7751-1 D2
7751-2 E2
7751-3 E2
7751-4 F2
7752 F3
F707 B1
F708 B1
F710 C6
F751 D1
F752 F4
F753 F1
I701 B2
I705 C3
I706 A4
I707 B4
I708 B4
I709 B5
I710 A6
I711 B6
I714 B3
I715 C3
I719 A2
I720 C2
I721 A8
I722 B8
I751 D3
I752 F2
I753 F3

SSB: TV Supply

B5 TV-SUPPLY

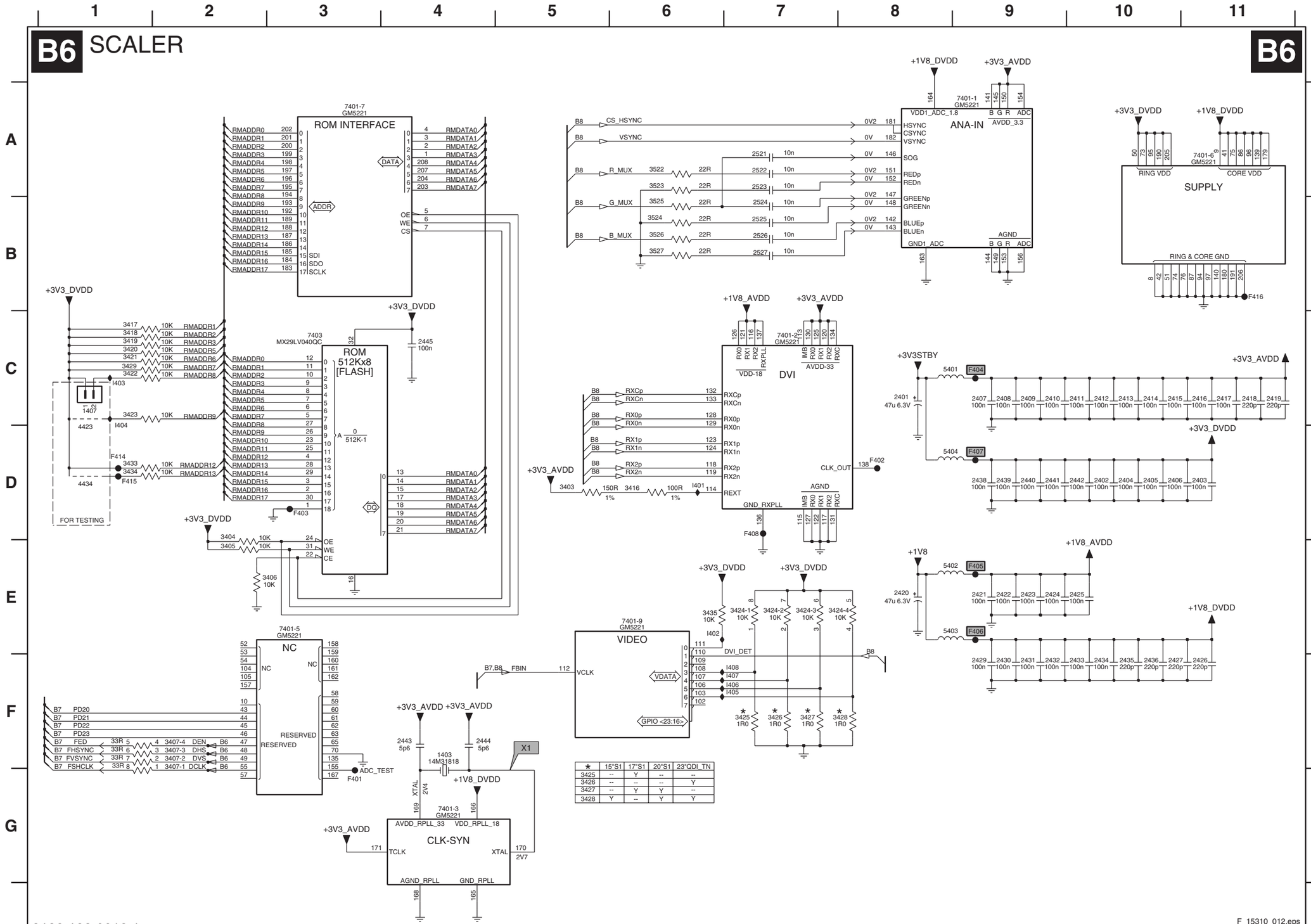


3139 123 6019.1

F_15310_011.eps
300605

SSB: Scaler

B6 SCALER



*	15"S1	17"S1	20"S1	23"QDI_TN
3425	--	Y	--	--
3426	--	--	--	Y
3427	--	Y	Y	--
3428	Y	--	Y	Y

3139 123 6019.1

SSB: Scaler

B7 SCALER

TO 1111 OF SIDE AV

1401 1 2 3 4

EMC 3445 150R 3V3
EMC 3446 150R 3V2
EMC 2451 220p
EMC 2450 220p
F412
F409
F410
F411
3V3
3401 10K
3402 10K
+3V3_DVDD

B2 SC_RESET
1409 1 2 146280-2
2452 10n
F413
F417
178 RESET
173 IN1
174 IN2
175 IN3
176 RETURN
LBADC

B2 SCL 3431 100R 77 SCL
B2 SDA 3430 100R 78 SDA
DDC_VGA

B8 SCL_DVI 79 SCL
B8 SDA_DVI 80 SDA
DDC_DVI

JTAG_SCL_UART_RX 3441 100R 71 SCL
JTAG_SDA_UART_TX 3442 100R 72 SDA
HOST
DI
DO
UART

I412 66 TDI
I411 64 TDO
I410 56 RESET
JTAG

7401-8 GM5221 SYSTEM
+3V3_AVDD 172
LBADC VDD33
GND LBADC 177

0 81 TV_SC_COM B2
1 82 TV_IRQ B2
2 83 FBIN B6,B8
3 84
4 85
5 88 SD_PCHD_SEL B8
6 89 PC_HD_SEL B8
7 90 POWER_DOWN B8
8 91 B2,B4,B5
9 92
10 93 SCL_IO SDA_IO
11 98
12 99 HD_FILTER B8
13 100
14 101 PLL_SEL B8
15 69

GPIO
NVRAM SCL SDA
PWM

+3V3_DVDD
3414 10K
3443 10K
3444 10K
2448 100n
7402 M24C32-WMN6
Φ (4Kx8) EEPROM
WC SCL SDA ADR
F455 0V
F456 3V3
F457 3V3

+3V3_DVDD
+5VSW
3436 2K2
3439
4440 *
3440 * 4K7
*2449 10u
3415 47K
3432 47K
7437 BC847BW
RESERVED
4409
BACK_LIGHT_ADJ1 B5

*	ANALOG	PWM
3440	4K7	N
2449	10u	N
4440	N	Y

+3V3_DVDD
3V3
+3V3_AVDD
7401-4 GM5221
LV_E LV AVDD_3.3
LV_O AVDD_3.3
AVSS LV_E LV
AVSS LV_O

LVDS
CH0p 21 LV_E1_TX0+
CH0n 22 LV_E0_TX0-
CH1p 19 LV_E3_TX1+
CH1n 20 LV_E2_TX1-
CH2p 17 LV_E5_TX2+
CH2n 18 LV_E4_TX2-
CH3p 13 LV_E9_TX3+
CH3n 14 LV_E8_TX3-
CLKp 15 LV_E7_TXC+
CLKn 16 LV_E6_TXC-
PPWR 67 PANEL_PWR_CTL B9
PBIAS 68 LAMP_ON_OFF B5
CH0p 37 LV_O1
CH0n 38 LV_O0
CH1p 35 LV_O3
CH1n 36 LV_O2
CH2p 33 LV_O5
CH2n 34 LV_O4
CH3p 29 LV_O9
CH3n 30 LV_O8
CLKp 31 LV_O7
CLKn 32 LV_O6

B6 PD20 3413-4 4 5 33R EB4
B6 PD21 3413-3 3 6 33R EB5
B6 PD22 3413-2 2 7 33R EB6
B6 PD23 3413-1 1 8 33R EB7
LV_O3 3412-4 4 5 33R EB0
LV_O2 3412-3 3 6 33R EB1
LV_O1 3412-2 2 7 33R EB2
LV_O0 3412-1 1 8 33R EB3
LV_O7 3411-4 4 5 33R EG4
LV_O6 3411-3 3 6 33R EG5
LV_O5 3411-2 2 7 33R EG6
LV_O4 3411-1 1 8 33R EG7
LV_E1_TX0+ 3453 33R EG0
LV_E0_TX0- 3452 33R EG1
LV_O9 3451 33R EG2
LV_O8 3410 33R EG3
LV_E9_TX3+ 3408 33R ER0
LV_E8_TX3- 3409 33R ER1
LV_E7_TXC+ 3459 33R ER2
LV_E6_TXC- 3458 33R ER3
LV_E5_TX2+ 3457 33R ER4
LV_E4_TX2- 3456 33R ER5
LV_E3_TX1+ 3455 33R ER6
LV_E2_TX1- 3454 33R ER7

B6
PAN_VCC 11V9
RES 2446 47p
FSHCLK
FVSYNC
FHSYNC
FED
1402
I413 I414 I416 I418 I419 I420 I422 I438 I451
TO LCD MONITOR CONNECTOR (TTL)

LV_E9_TX3+ F537
LV_E8_TX3- F538
LV_E7_TXC+ F539
LV_E6_TXC- F535
LV_E5_TX2+ F528
LV_E4_TX2- F529
LV_E3_TX1+ F536
LV_E2_TX1- F531
LV_E1_TX0+ F530
LV_E0_TX0- F532
1V2 1V3 11V6
1404
TO LCD MONITOR (LVDS)
B9 PAN_VCC F534
F533

F_15310_013.eps 240605

3139 123 6019.1

1401 A1
1402 C6
1404 D8
1409 A2
2446 C5
2448 A8
2449 B7
2450 B1
2451 B1
2452 A3
3401 B1
3402 B2
3408 E3
3409 E3
3410 E3
3411-1 E3
3411-2 E3
3411-3 E3
3411-4 D3
3412-1 D3
3412-2 D3
3412-3 D3
3412-4 D3
3413-1 D3
3413-2 D3
3413-3 D3
3413-4 D3
3414 A6
3415 C6
3430 B3
3431 B3
3432 C6
3436 B6
3439 B7
3440 B7
3441 B3
3442 B3
3443 A7
3444 A7
3445 B1
3446 B1
3451 E3
3452 E3
3453 E3
3454 F3
3455 F3
3456 F3
3457 F3
3458 E3
3459 E3
4409 C7
4440 B7
7401-4 C1
7401-8 A4
7402 A7
7437 C7
F409 A1
F410 B2
F411 B2
F412 B1
F413 A3
F417 A3
F455 B7
F456 B7
F457 B7
F528 D8
F529 E8
F530 E8
F531 E8
F532 E8
F533 F8
F534 F8
F535 D8
F536 E8
F537 D8
F538 D8
F539 D8
I410 C3
I411 B3
I412 B3
I413 C5
I414 C5
I416 C5
I418 D5
I419 D5
I420 D5
I422 D5
I438 E5
I451 F5

SSB: Scaler I/O

B8 SCALER I/O

PROVISION FOR DVI-COMB1
1463
F474
F475
F476
F477
BM05B-SRSS-TBT

DVI-I CONNECTOR
1485-4
YKF45-7005

F478 F479 F480 F481
S485 S486 S487 S488
3482 75R
3484 75R
3486 75R
3487 1K0
2485 1u0
2486 1u0
2487 1u0
3481 22R
3483 22R
3485 22R
B_Pb_PC
R_Pr_PC
G_Y_PC
HS_PC
2488 22p
3488 2K2
FOR EMC

ROW_C 1485-3
ROW_B 1485-2
ROW_A 1485-1
YKF45-7005
NC

RX0n RX0p RXCp RXCn RX1n RX1p RX2n RX2p
B6

R_SDTV F471 3507 220R
G_SDTV F472 3503 220R
B_SDTV F473 3505 220R
3502 220R
3504 220R
3506 220R
I512 2477 1u0
I513 2478 1u0
I514 2479 1u0
I462
I463
I464

I483 I484 I485 I486 I487 I488
3489 100R
3490 10K
3491 1K0
3492 1K0
6485 BAS316
6486 BAS316
5485
+5VSW
DDC_DVI_5V
DVI_DET
S496 S497 S498

H_CS_SDTV F501
V_SDTV F502
PLL_SEL F504
FBIN F505
F506 F507
SCL_DVI
SDA_DVI
3496 100R
3497 100R
5514
2514 15p

F484
3493 1K0
S489
2489 22p
3494 2K2
FOR EMC
VS_PC

7490
M24C02-WMN6
(256x8)
EEPROM
WC SCL SDA ADR
2490 100n
3495 10K
3514 10K
3515 10K

7516
MK1575-01G
REFIN OE FS NC VDD CLK FCLK FBIN CHGP CHGR GND
Φ PLL
I492 VDD
2517 10n
2518 10n
2513 10u 16V
2519 1n0
5520
2520 100n
I496 2516 680p
I494
I493 3520 33K 2515 10n
4520

7461
SM5301BS-G
VCC Φ VCC
5V4
+5VSW
5462
F489
2471 47u 6.3V
2472 100n
2473 100n
2474 100n
2475 100n

DISABLE THROUGH MUXSEL GSR1 RINA|YINA RINB|YINB GSG1 GINA|UINA GINB|UINB GSB1 BINA|VINA BINB|VINB RFC VFC
NC1 NC2 NC3 ROUT|YOUT GOUT|UOUT BOUT|VOUT
0V 3V3 2V3 1V6 1V7
2476 33p
3471 820R
GND GND_HS

I57
ITV INTERFACE
1462
SC1_CVBS_RF_OUT B2,B10
H_CS_SDTV B2
V_SDTV B2
BM05B-SRSS-TBT

F487 PC_HD_SEL B7
R_MUX G_MUX B_MUX B6
I516 3478 100K 2483 100n
F497 HD_FILTER B7
F498 SD_PCHD_SEL B7

SYNC SELECTION
7463
74HC4053D
VDD MDX
4X1 4X2 VEE_VSS
+3V3STBY
2463 100n
I517 I518
3510 220R
3511 220R
HS_PC 0V
VS_PC

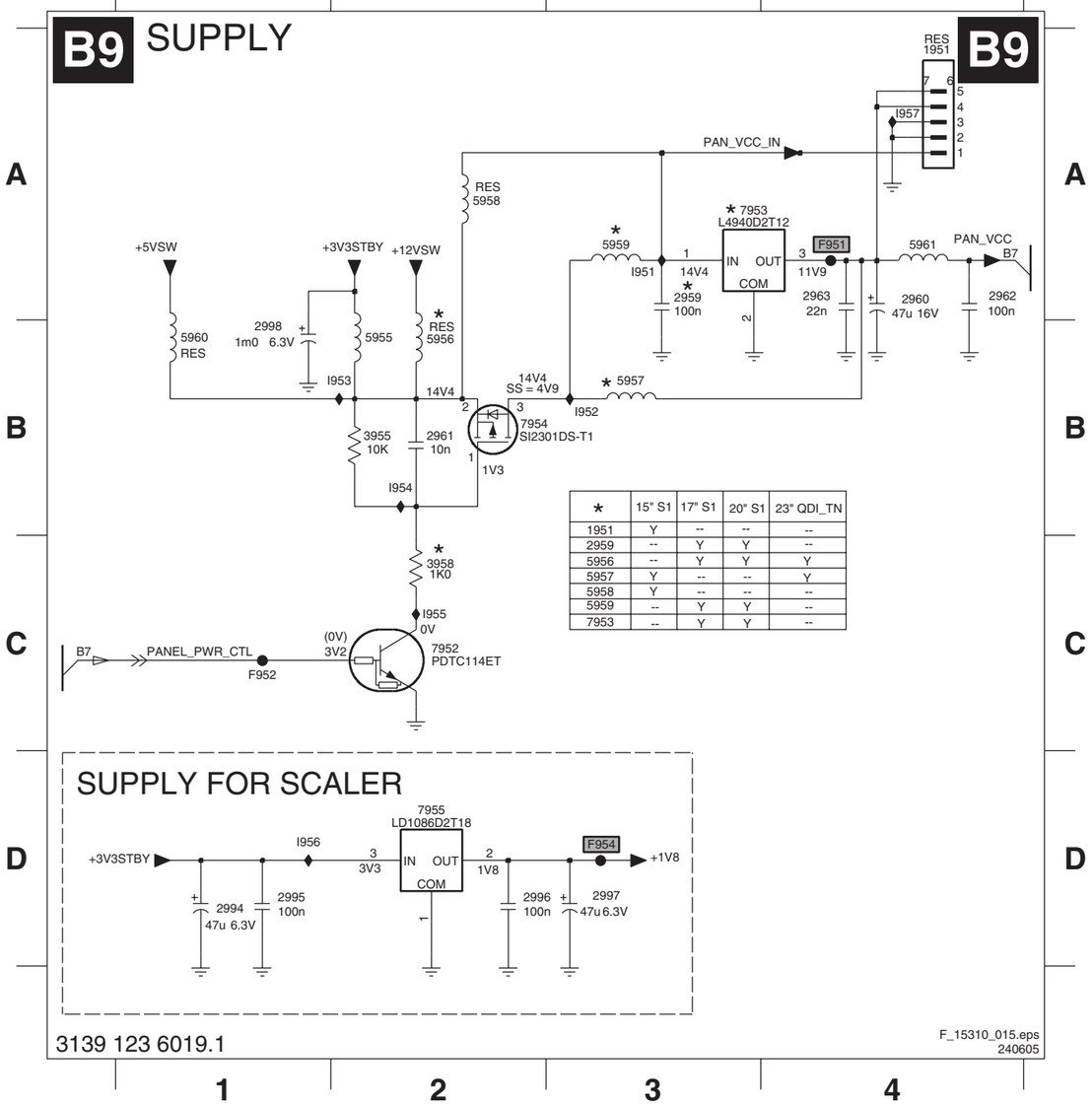
RES 4510
RES 4511
7510-1 74LVC14APW
7510-2 74LVC14APW
7510-3 74LVC14APW
7510-4 74LVC14APW
7510-5 74LVC14APW
7510-6 74LVC14APW
2510 100n
3512 220R
3513 220R
CS_HSYNC B6
VSYNC B6
F499
F503
4X INVERTER SCHMITT-TRIGGER

3139 123 6019.1
F_15310_014.eps
300605

1462 A10
1463 A4
1485-1 E1
1485-2 D1
1485-3 C1
1485-4 B1
2463 E8
2471 C8
2472 C8
2473 C9
2474 C9
2475 C9
2476 E6
2477 C6
2478 D6
2479 D6
2483 D8
2485 A3
2486 A3
2487 B3
2488 C3
2489 F2
2490 G2
2510 E10
2513 F6
2514 F4
2515 F6
2516 F5
2517 F5
2518 F5
2519 F6
2520 F6
3471 E7
3478 D9
3481 A3
3482 A3
3483 A3
3484 B3
3485 B3
3486 B3
3487 B3
3488 C3
3489 D2
3490 D2
3491 E2
3492 E2
3493 F1
3494 F2
3495 G2
3496 E1
3497 E1
3501 F7
3502 C6
3503 D5
3504 D6
3505 D5
3506 D6
3507 C5
3510 E8
3511 F8
3512 E10
3513 F10
3514 G3
3515 G2
3520 F5
4463 F8
4464 F8
4510 D9
4511 F9
4518 G10
4519 G9
4520 F4
5462 B8
5485 D3
5514 E4
5520 E6
6485 D3
6486 D2
7461 B7
7463 E7
7490 G1
7510-1 E9
7510-2 E10
7510-3 E9
7510-4 F10
7510-5 F9
7510-6 F10
7516 F4
F471 C5
F472 D5
F473 D5
F474 A5
F475 A5
F476 A5
F477 A5
S485 A2
S486 B2
S487 B2
S488 C2
S489 F1
S496 E1
S497 E1
S498 E2

SSB: Supply

1951 A4 2959 A3 2960 A4 2961 B2 2962 A4 2963 A4 2994 D1 2995 D1 2996 D2 2997 D3 2998 B1 3955 B2 3956 B2 3958 C2 5955 B2 5956 B2 5957 B3 5958 A2 5959 A3 5960 B1 5961 A4 7952 C2 7953 A3 7954 B3 7955 D2 F951 A4 F952 C1 F954 D3 I951 A3 I952 B3 I953 B2 I954 B2 I955 C2 I956 D1 I957 A4

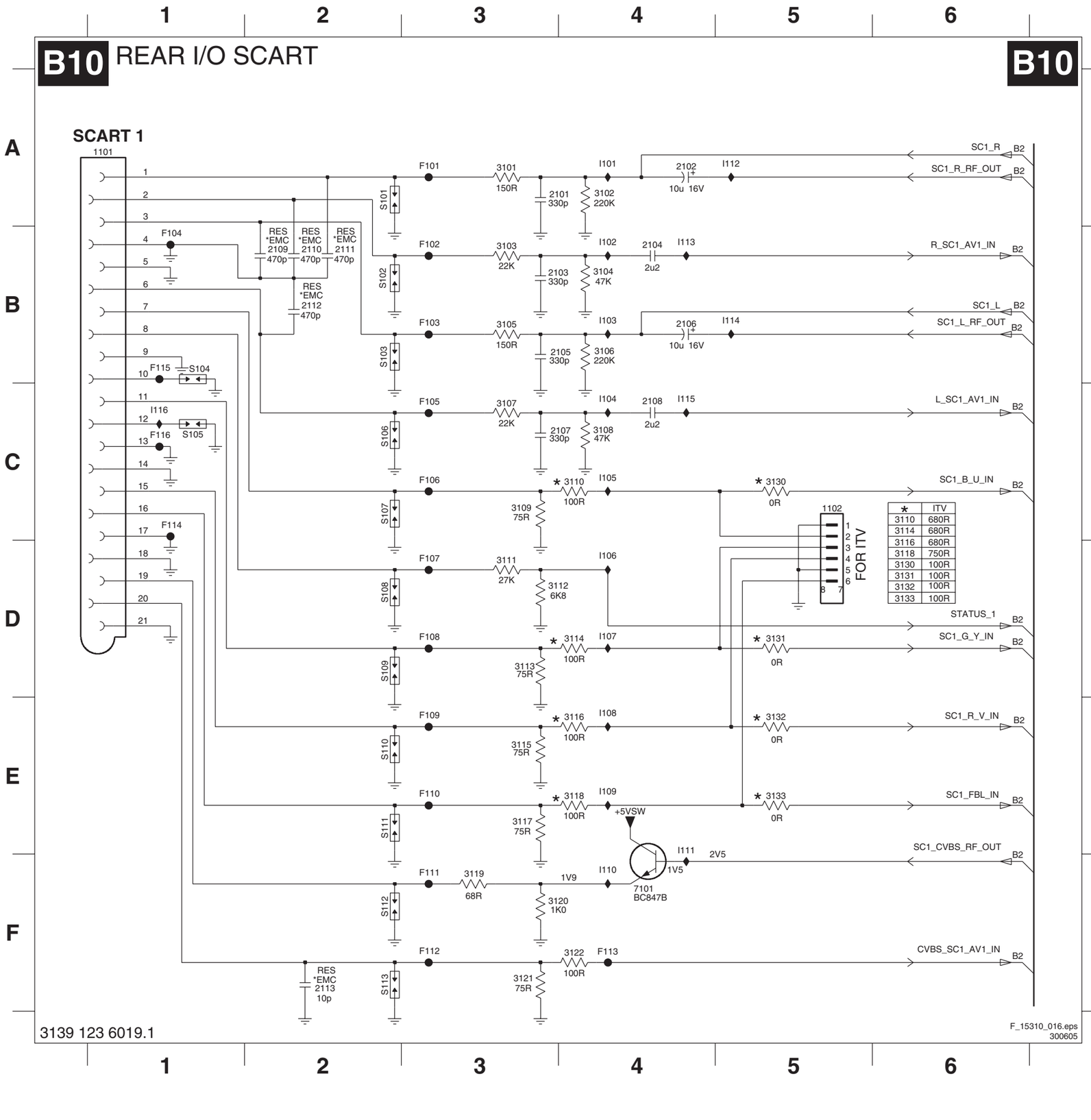


*	15" S1	17" S1	20" S1	23" QDI_TN
1951	Y	--	--	--
2959	--	Y	Y	--
5956	--	Y	Y	Y
5957	Y	--	--	Y
5958	Y	--	--	--
5959	--	Y	Y	--
7953	--	Y	Y	--

Personal Notes:

E_06532_012.eps 131004

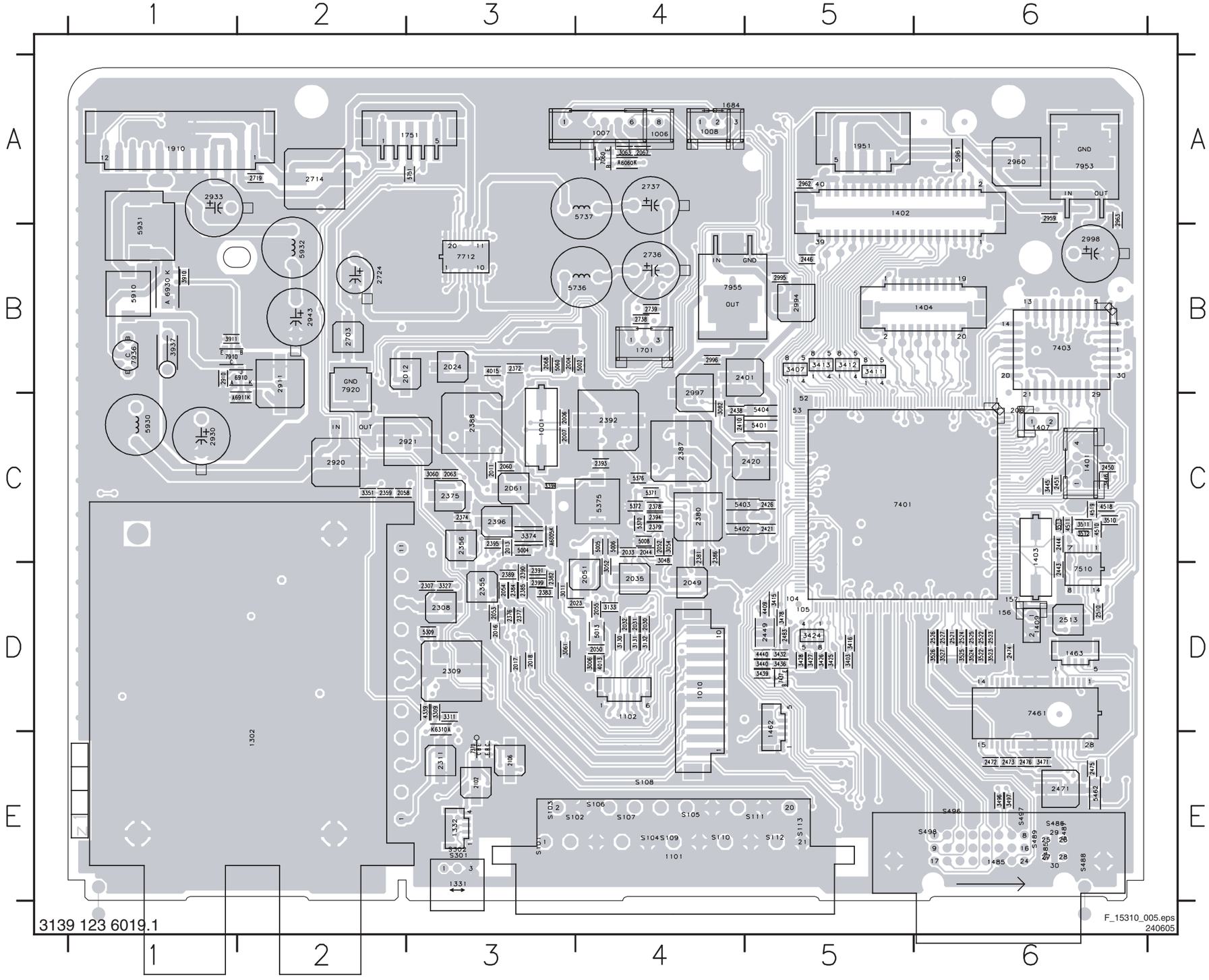
SSB: Rear I/O Scart



1101 A1
1102 C5
2101 A4
2102 A4
2103 B3
2104 B4
2105 B4
2106 B4
2107 C4
2108 C4
2109 B2
2110 B2
2111 B2
2112 B2
2113 F2
3101 A3
3102 A4
3103 B3
3104 B4
3105 B3
3106 B4
3107 C3
3108 C4
3109 C3
3110 C4
3111 D3
3112 D3
3113 D3
3114 D4
3115 E3
3116 E4
3117 E3
3118 E4
3119 F3
3120 F3
3121 F3
3122 F4
3130 C5
3131 D5
3132 E5
3133 E5
7101 F4
F101 A3
F102 B3
F103 B3
F104 B1
F105 C3
F106 C3
F107 D3
F108 D3
F109 E3
F110 E3
F111 F3
F112 F3
F113 F4
F114 C1
F115 B1
F116 C1
I101 A4
I102 B4
I103 B4
I104 C4
I105 C4
I106 D4
I107 D4
I108 E4
I109 E4
I110 F4
I111 E4
I112 A5
I113 B4
I114 B5
I115 C4
I116 C1
S101 A2
S102 B2
S103 B2
S104 B1
S105 C1
S106 C2
S107 C2
S108 D2
S109 D2
S110 E2
S111 E2
S112 F2
S113 F2

Layout SSB (Top Side)

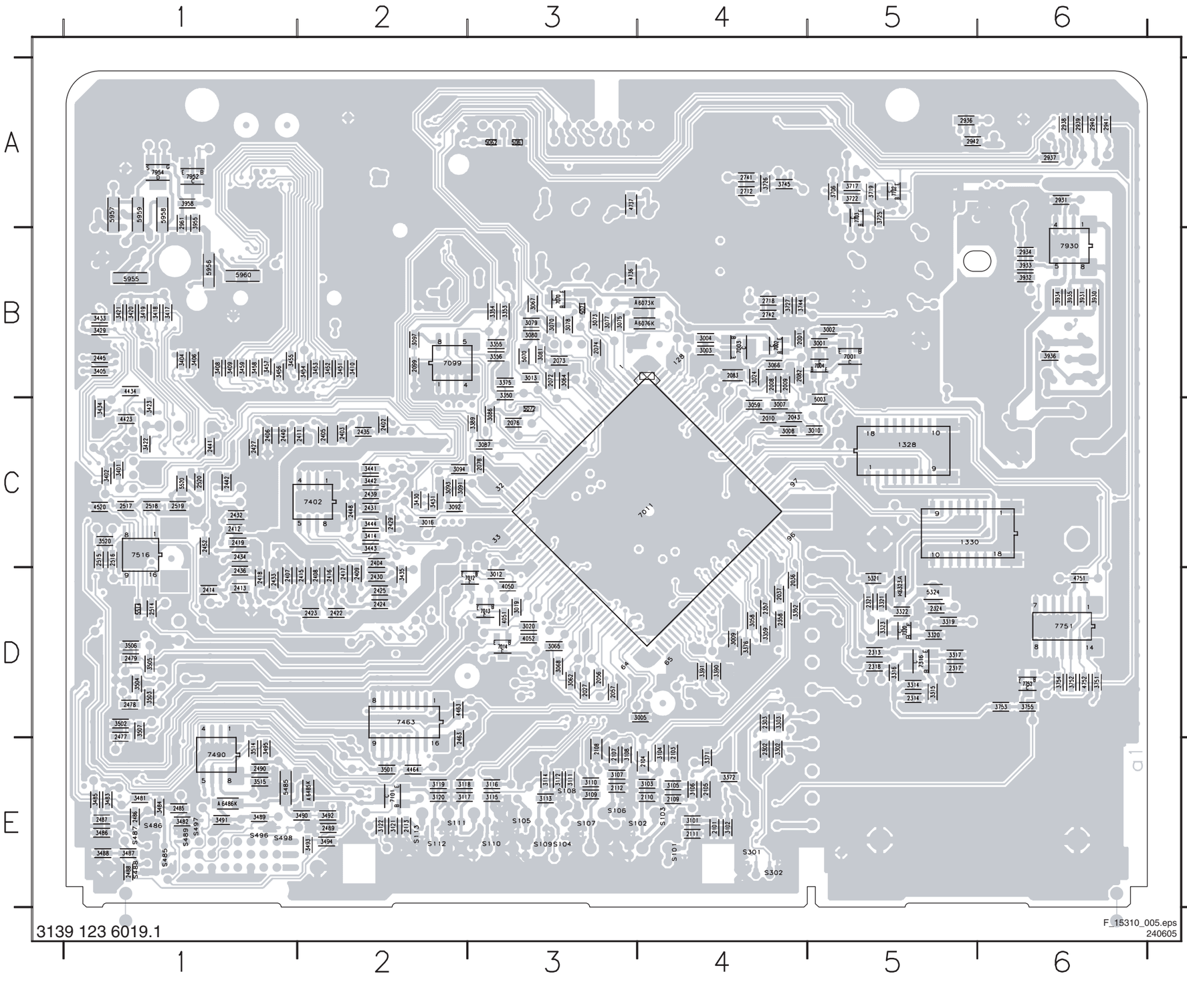
1001 C3 1006 A4 1007 A4 1008 A4 1010 D4 1101 E4 1102 D4
1302 E2 1331 E3 1332 E3 1401 C6 1402 E3 1403 C6 1404 B6
1407 C6 1409 D6 1462 D5 1463 D6 1485 E6 1684 A4 1701 B4
1751 A3 1910 A1 1951 A5 2004 B3 2006 C3 2007 C3 2011 C3
2012 B2 2013 C3 2016 D3 2017 D3 2018 D3 2023 D4 2024 B3
2030 D4 2031 D4 2032 D4 2033 C4 2035 D4 2044 C4 2049 D4
2050 D4 2051 D4 2052 C4 2053 D3 2054 D3 2055 D4 2058 C2
2060 C3 2061 C3 2063 C3 2067 A4 2068 B3 2102 E3 2106 E3
2307 D3 2308 D3 2309 D3 2311 E3 2355 D3 2356 C3 2359 C2
2372 B3 2374 C3 2375 C3 2376 D3 2377 D3 2378 C4 2379 C4
2380 C4 2381 C4 2382 D3 2383 D3 2384 D3 2385 D3 2386 C4
2387 C4 2388 C3 2389 D3 2390 D3 2391 D3 2392 C4 2393 C4
2394 C4 2395 C3 2396 C3 2399 D3 2401 B5 2410 C4 2420 C5
2421 C5 2426 C6 2438 C4 2443 D6 2444 C6 2446 B5 2449 D5
2450 C6 2471 E6 2472 D5 2473 D5 2475 E6 2476 E6 2483 D5
2513 D6 2524 D6 2525 D6 2526 D6 2527 D6 2703 B6 2714 A2
2719 A2 2720 B6 2724 B6 2736 B4 2737 A4 2738 B4 2739 B4
2910 B1 2911 B2 2920 C2 2921 C3 2930 A6 2931 B5 2932 B5
2933 A1 2943 B5 2959 A6 2960 A6 2962 A5 2963 A6 2994 B5
2995 B5 2996 B4 2997 B4 2998 B6 3006 D4 3011 D3 3048 C4
3052 D4 3054 C4 3060 C3 3061 D3 3063 A4 3082 C4 3130 D4
3131 D4 3132 D4 3133 D4 3309 D3 3311 D3 3312 D3 3313 D3
3327 D3 3351 C2 3374 C3 3394 C3 3403 D5 3407 B5 3411 B5
3412 B5 3413 B5 3415 D5 3416 D5 3424 D5 3425 D5 3426 D5
3427 D5 3428 D5 3432 D5 3436 D5 3439 D5 3440 D5 3445 C6
3446 C6 3471 E6 3478 D5 3496 E6 3497 E6 3510 C6 3511 C6
3512 C6 3513 C6 3522 D6 3523 D6 3524 D6 3525 D6 3526 D6
3527 D6 3910 B1 3911 B1 3937 B1 4013 D4 4015 B3 4339 D3
4409 D5 4440 D5 4510 C6 4511 C6 4518 C6 4519 C6 5002 B4
5004 C3 5005 C4 5006 C4 5008 C4 5013 D4 5060 B3 5309 D3
5370 C4 5371 C4 5372 C4 5375 C4 5376 C4 5401 C5 5402 C4
5403 C4 5404 C5 5462 E6 5736 B4 5737 A4 5751 A3 5910 B1
5930 C1 5931 B1 5932 B2 5961 A6 6005 C3 6060 A4 6310 D3
6910 B2 6911 C2 6930 B1 7060 A4 7370 E3 7401 C5 7403 B6
7437 D5 7461 D6 7510 D6 7712 B3 7910 B1 7920 B2 7936 B1
7953 A6 7955 B4



3139 123 6019.1

Layout SSB (Bottom Side)

1328 C5 2036 D4 2074 B3 2103 E4 2111 E4 2317 D5 2403 C2 2411 C2 2418 D1 2429 C2 2436 D1 2452 C1 2487 E1 2517 C1 2742 B4 2940 A6 3004 B4 3013 B3 3062 D3 3073 B3 3086 C3 3101 E4 3108 E3 3115 E3 3122 E2 3319 D5 3353 B3 3375 B3 3404 B1 5003 C5
1330 C5 2037 D4 2076 C3 2104 E4 2112 E3 2318 D5 2404 C2 2412 C1 2419 C1 2430 D2 2439 C2 2463 E2 2488 E1 2518 C1 2931 A6 2941 A6 3005 D4 3016 C2 3064 B3 3075 B3 3087 C3 3102 E4 3109 E3 3116 E3 3302 E4 3320 D5 3354 B3 3376 D4 3405 B1 5061 A3
2001 B4 2043 C4 2078 C3 2105 E4 2113 E2 2321 D5 2405 C2 2413 D1 2422 D2 2431 C2 2440 C1 2477 D1 2489 E2 2519 C1 2934 B6 2942 A5 3007 C4 3019 D3 3065 D3 3077 B3 3091 C2 3103 E4 3110 E3 3117 E2 3303 D4 3321 D5 3355 B3 3389 C3 3406 B1 5062 A3
2008 B4 2056 D3 2082 B4 2107 E3 2302 E4 2324 D5 2406 C1 2414 D1 2423 D2 2432 C1 2441 C1 2478 D1 2490 E1 2520 C1 2936 A5 2961 A1 3008 C4 3020 D3 3066 B4 3078 B3 3092 C2 3104 E4 3111 E3 3118 E2 3314 D5 3322 D5 3356 B3 3390 D4 3408 B1 5070 B3
2009 B4 2057 D3 2083 B4 2108 E3 2303 D4 2357 D4 2407 D1 2415 D2 2424 D2 2433 D1 2442 C1 2479 D1 2514 D1 2712 A4 2937 A6 3001 B5 3009 D4 3024 B4 3067 B3 3079 B3 3093 C2 3105 E4 3112 E3 3119 E2 3315 D5 3323 D5 3359 D4 3391 D4 3409 B1 5071 B3
2010 C4 2072 B3 2099 B2 2109 E4 2313 D5 2358 D4 2408 D2 2416 D2 2425 D2 2434 C1 2445 B1 2485 E1 2515 C1 2718 B4 2938 A6 3002 B5 3010 C5 3058 D4 3068 D3 3080 B3 3094 C2 3106 E4 3113 E3 3120 E2 3316 D5 3350 B3 3371 E4 3401 C1 3410 B2 5072 C3
2027 D3 2073 B3 2101 E4 2110 E4 2314 D5 2402 C2 2409 D2 2417 D2 2427 C1 2435 C2 2448 C2 2486 E1 2516 C1 2741 A4 2939 A6 3003 B4 3012 D3 3059 C4 3070 B3 3081 B3 3097 B2 3107 E3 3114 E3 3121 E2 3317 D5 3352 D4 3372 E4 3402 C1 3414 C2 5321 D5



3417 B1 5324 D5
3418 B1 5485 E1
3419 B1 5514 D1
3420 B1 5520 C1
3421 B1 5955 B1
3422 C1 5956 B1
3423 C1 5957 A1
3429 B1 5958 A1
3430 C2 5959 A1
3431 C2 5960 B1
3433 B1 6073 B4
3434 C1 6076 B4
3435 D2 6323 D5
3441 C2 6485 E2
3442 C2 6486 E1
3443 C2 7001 B5
3444 C2 7002 B4
3451 B2 7003 B4
3452 B2 7004 B5
3453 B2 7011 C4
3454 B2 7012 D3
3455 B1 7013 D3
3456 B1 7014 D3
3457 B1 7070 B3
3458 B1 7099 B2
3459 B1 7101 E2
3481 E1 7316 D5
3482 E1 7320 D5
3483 E1 7402 C2
3484 E1 7463 D2
3485 E1 7490 E1
3486 E1 7516 C1
3487 E1 7702 A5
3488 E1 7703 A5
3489 E1 7751 D6
3490 E2 7752 D6
3491 E1 7930 B6
3492 E2 7952 A1
3493 E2 7954 A1
3494 E2
3495 E1
3501 E2
3502 D1
3503 D1
3504 D1
3505 D1
3506 D1
3507 D1
3514 E1
3515 E1
3520 C1
3706 A5
3717 A5
3719 A5
3722 A5
3725 A5
3726 A4
3727 B4
3744 B4
3745 A4
3751 D6
3752 D6
3753 D6
3754 D6
3755 D6
3930 B6
3931 B6
3932 B6
3933 B6
3934 B6
3935 B6
3936 B6
3955 A1
3958 A1
4050 D3
4051 D3
4052 D3
4423 C1
4434 B1
4463 D2
4464 E2
4520 C1
4736 B3
4737 A3
4751 D6
4752 D6

Side I/O Panel

D SIDE I/O

SVHS
1101
1 I104
3
4 I107
2
6 5 7
S107 3104 75R
6104 RES S108 6106 RES
6103 RES 6105 RES 3105 75R
G_VID
I103

3103 10R AV3_C_IN A2
RES 2115 47p EMC 2102 47p
G_VID

I106
3101 10R AV3_CVBS_Y_IN A2
RES 2116 47p EMC 2101 47p
G_VID

SVHS AUDIO IN
1104 1 4 3 2
F101 3111 1K0 I101
F102 3112 1K0 I102
S106 S105
3113 47K 2105 470p 3114 47K 2106 470p
F109
G_AUD_IN

A2 AV3_CVBS_Y_IN I112
A2 AV3_C_IN I113
A2 AV3_L_IN I114
A2 AV3_R_IN I115
PC_AUDIO_L
PC_AUDIO_R
1108 1 2 3 4 5 6 7 8 9 10
FROM 1010 OF TSSB **B 2**
G_VID G_AUD_IN

*4104
2111 10V 220u I117 120R 3115
2112 10V 220u I118 120R 3116
*4105
F106 F107 F108
1106 4 2 7 1 6 3 5
HEADPHONE
EMC 2113 470p EMC 2114 470p
G_AUD_OUT

3121 0R
3122 0R
FOR ITV
FROM 1704 OF AUD AMP
I (2 X 5W)
1107 L+ L- GND R+ R- 1 2 3 4 5

F110 F112 F111 F113
EMC 2107 1n0 EMC 2108 1n0 EMC 2109 1n0 EMC 2110 1n0
G_AUD_OUT

*4106 *4107 *4108
1105 4 3 2 1
R L 8 OHMS @ 5W 4 OHMS @ 2W
*4103 *4102
I716
G_AUD_OUT

*	2 x 2W	2 x 5W
2107	N	Y
2110	N	Y
4102	Y	N
4103	Y	N
4104	Y	N
4105	Y	N
4106	N	Y
4107	N	Y
4108	Y	N

FROM 1701 OF SSB
B 4 (2 X 2W)
1110 L GND R 1 2 3
G_AUD_OUT

FROM 1401 OF SSB
B 7
1111 1 2 3 4
JTAG_SDA_UART_TX 3123 100R
JTAG_SCL_UART_RX 3124 100R
F105
S101 BZX384-C4V7 6109
6110 BZX384-C4V7
S102 BZX384-C4V7 6111
6112 BZX384-C4V7
G_UART
1112 1 2 3
FOR SERVICE UART

YELLOW
1102-1 1
CVBS 2 G_VID
S109 RES 6101 RES 6102 3106 75R
I108
G_VID

RED
1102-3 5
R 6 G_AUD_IN
I110 3107 1K0 3108 47K 2103 470p AV3_R_IN A2
S103
G_AUD_IN

WHITE
1102-2 3
L 4 G_AUD_IN
I111 3109 1K0 3110 47K 2104 470p AV3_L_IN A2
S104
I116
G_AUD_IN

Screw Mounting Hole
1199 TYPE
EMC 2119 470p G_AUD_IN
EMC 2120 470p G_AUD_OUT

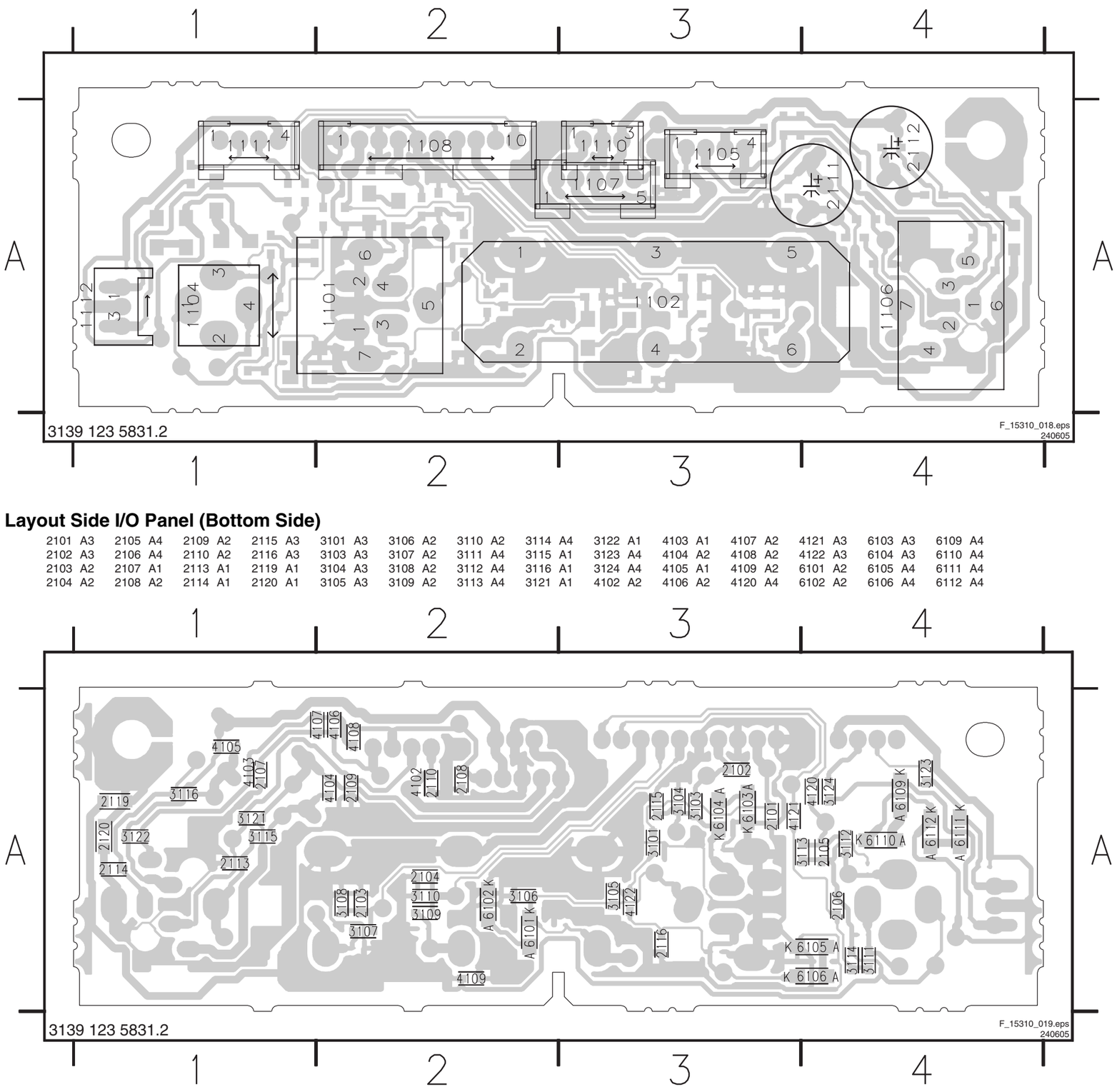
EMC 4109
G_AUD_IN G_VID

3139 123 5831.2
F_15310_017.eps
300605

1101 A1
1102-1 D1
1102-2 E1
1102-3 E1
1104 A5
1105 C9
1106 B9
1107 D5
1108 A9
1110 E5
1111 E5
1112 F8
1199 F1
2101 B3
2102 A3
2103 E3
2104 F3
2105 A7
2106 A7
2107 D7
2108 D7
2109 D8
2110 D8
2111 B6
2112 B6
2113 C7
2114 C8
2115 A3
2116 B3
2119 F1
2120 F1
3101 B3
3103 A3
3104 B2
3105 B3
3106 D3
3107 E3
3108 E3
3109 E3
3110 F3
3111 A6
3112 A6
3113 A7
3114 A7
3115 B7
3116 B7
3121 C6
3122 C6
3123 F6
3124 F6
4102 D8
4103 D8
4104 B6
4105 C6
4106 C8
4107 C8
4108 C8
4109 F9
6101 D2
6102 D2
6103 B2
6104 B2
6105 B2
6106 B2
6109 F6
6110 F6
6111 F7
6112 F7
F101 A6
F102 A6
F105 F5
F106 B8
F107 B8
F108 B8
F109 B5
F110 D8
F111 D8
F112 D8
F113 D8
I101 A7
I102 A7
I103 C1
I104 B2
I106 B3
I107 B2
I108 D3
I110 E2
I111 E2
I112 A8
I113 A8
I114 A8
I115 A8
I116 F3
I117 B6
I118 B6
I716 D8
S101 F6
S102 F7
S103 E2
S104 F2
S105 B6
S106 B6
S107 B2
S108 B2
S109 D2

Layout Side I/O Panel (Top Side)

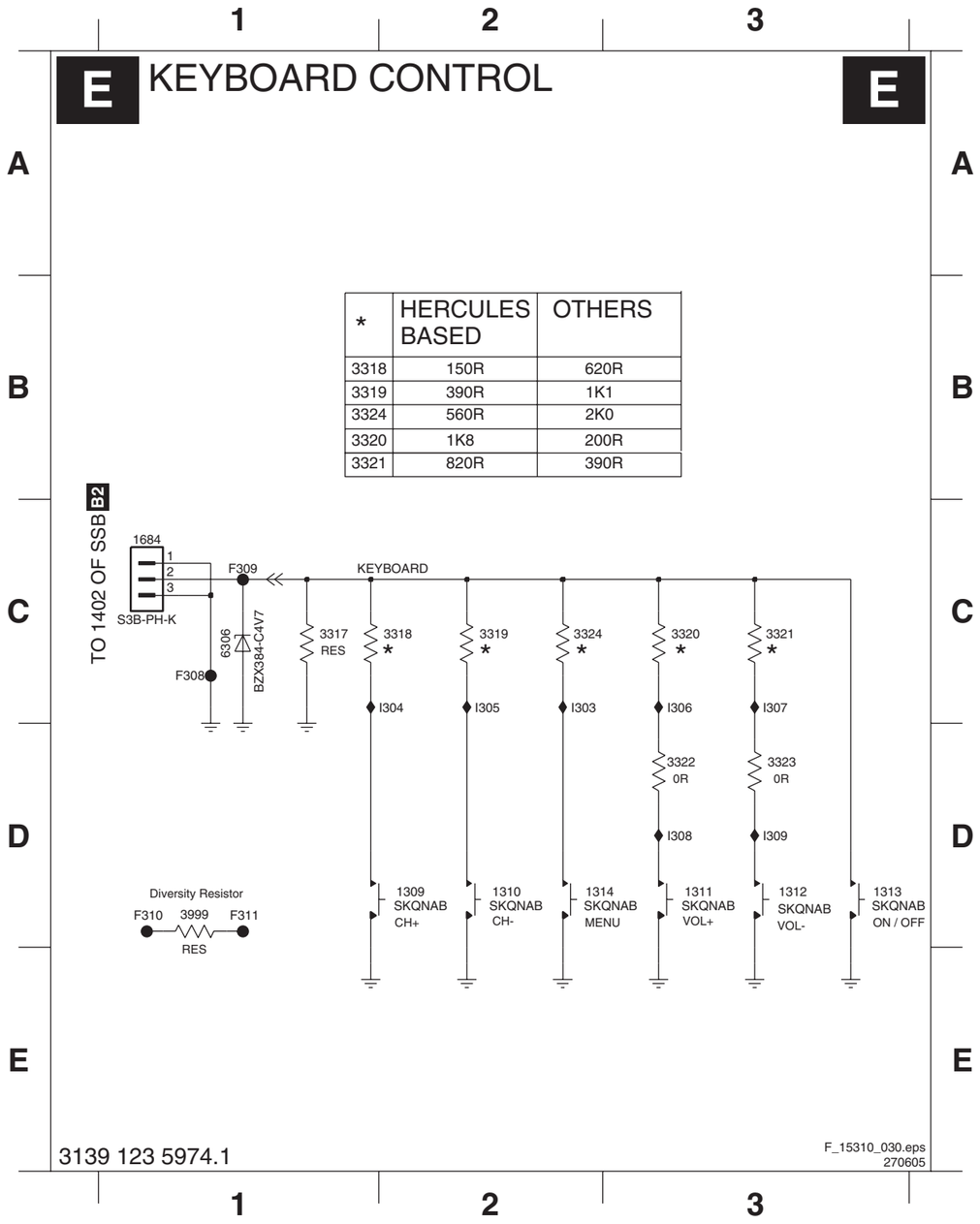
1101 A2
1102 A3
1104 A1
1105 A3
1106 A4
1107 A3
1108 A2
1110 A3
1111 A1
1112 A1
2111 A4
2112 A4



Layout Side I/O Panel (Bottom Side)

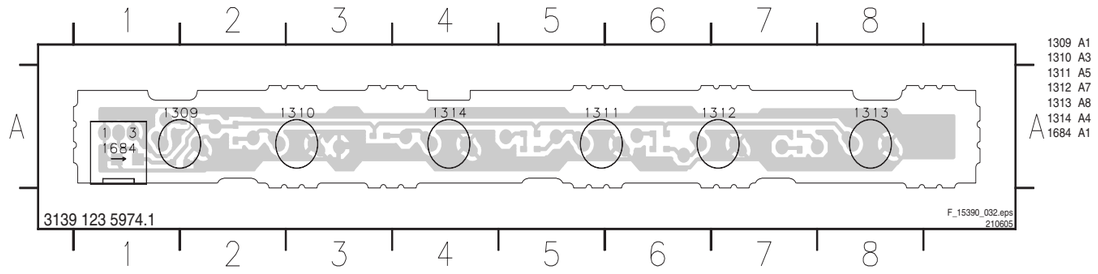
2101 A3
2102 A3
2103 A2
2104 A2
2105 A4
2106 A4
2107 A1
2108 A2
2109 A2
2110 A2
2113 A1
2114 A1
2115 A3
2116 A3
2119 A1
2120 A1
3101 A3
3103 A3
3104 A3
3105 A3
3106 A2
3107 A2
3108 A2
3109 A2
3110 A2
3111 A4
3112 A4
3113 A4
3114 A1
3115 A1
3116 A1
3121 A1
3122 A1
3123 A4
3124 A4
4102 A2
4103 A1
4104 A2
4105 A1
4106 A2
4107 A2
4108 A2
4109 A2
4120 A4
4121 A3
4122 A3
6101 A2
6102 A2
6103 A3
6104 A3
6105 A4
6106 A4
6109 A4
6110 A4
6111 A4
6112 A4

Keyboard Control Panel

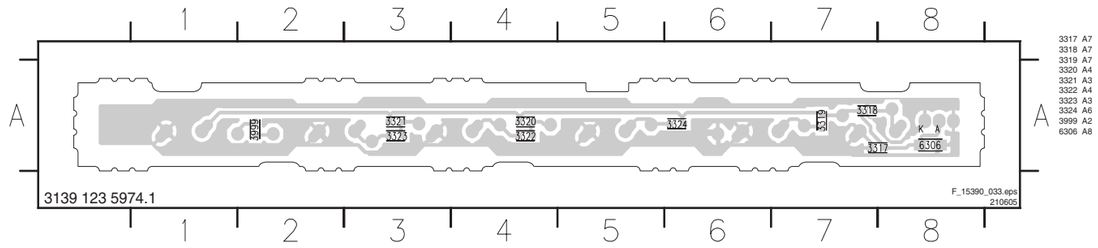


*	HERCULES BASED	OTHERS
3318	150R	620R
3319	390R	1K1
3324	560R	2K0
3320	1K8	200R
3321	820R	390R

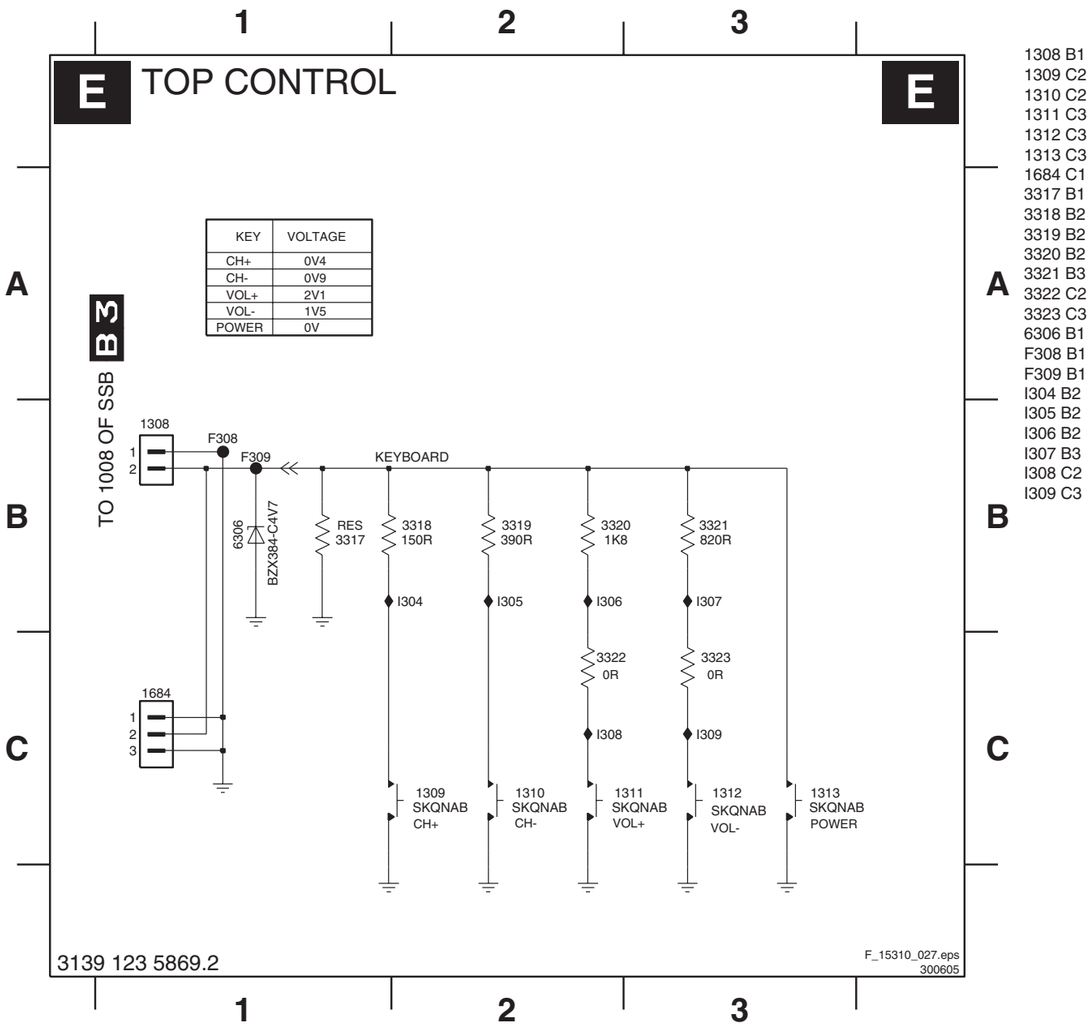
Layout Keyboard Control Panel (Top Side)



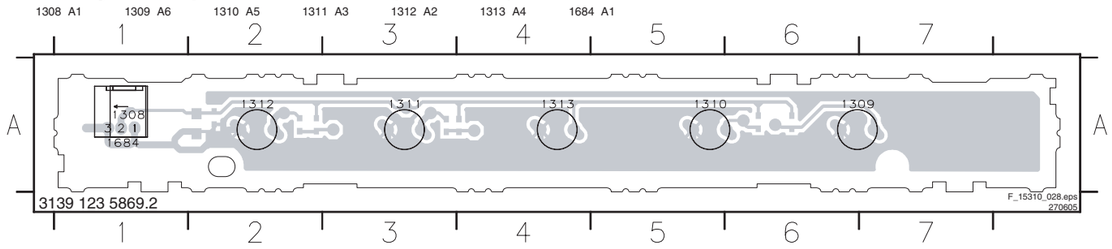
Layout Keyboard Control Panel (BottomSide)



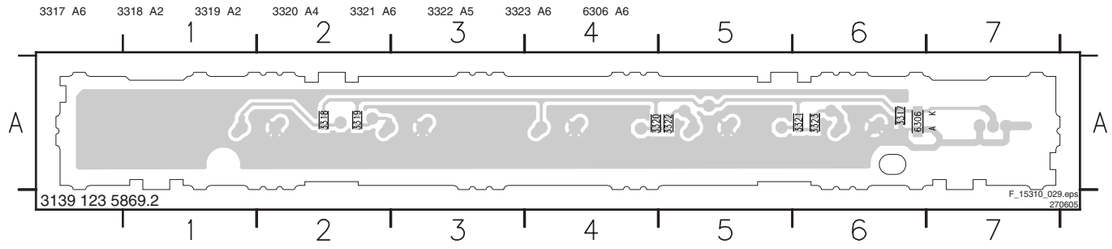
Top Control Panel



Layout Top Control Panel (Top Side)



Layout Top Control Panel (Bottom Side)



Audio Amplifier

AUDIO AMPLIFIER

FROM PSU
1703
1
2
I701
I702
AUD_SUP
P_GND
4710
P_GND
F702 R
3714 8K2
I709
2712 1u0
I712
3715 1K8
*EMC 2741 470p
F703 L
3726 8K2
I718
2718 1u0
I719
3727 1K8
*EMC 2742 470p
AUD_SUP
3746 10K
AUD_SUP
3748 10K
I705
7703-1 BC847BS
4V5
I704
3706 10K
I713
2V8
3702 3K3
3V2
3750 6K8
2703 10u 16V
AUD_SUP
3747 10K
AUD_SUP
3749 10K
I703
7703-2 BC847BS
2V8
3V3
3701 3K3
4V5
I706
3744 10K
I728
3751 6K8
2746 1u0 10V
7709 TDA7297D
Φ VCC
BRIDGE AMPLIFIER
1V4 7
IN
1V4 14
9
4V5
STBY
4V5 8
MUTE
SGND
PW_GND
13
1
10
11
20
P_GND
NC
OUT1
OUT2
3
4
12
17
18
2
5
19
16
5V7
AUD_SUP
(10V)
11V2
6
15
VCC
2713 100n
2719 100n
2714 470u 16V
2715 470u 16V
P_GND P_GND P_GND P_GND
TO 1107 OF SIDE I/O
1704
I707
I708
I710
I711
I714
1
2
3
4
5
P_GND
5709
FROM 1706 OF SSB
B4
1706
1
2
3
4
5
F704 STANDBY
F706 MUTE
5710
F705
SCREW MOUNTING HOLE
1710 TYPE
EMC 2747 470p
EMC 2748 470p
P_GND

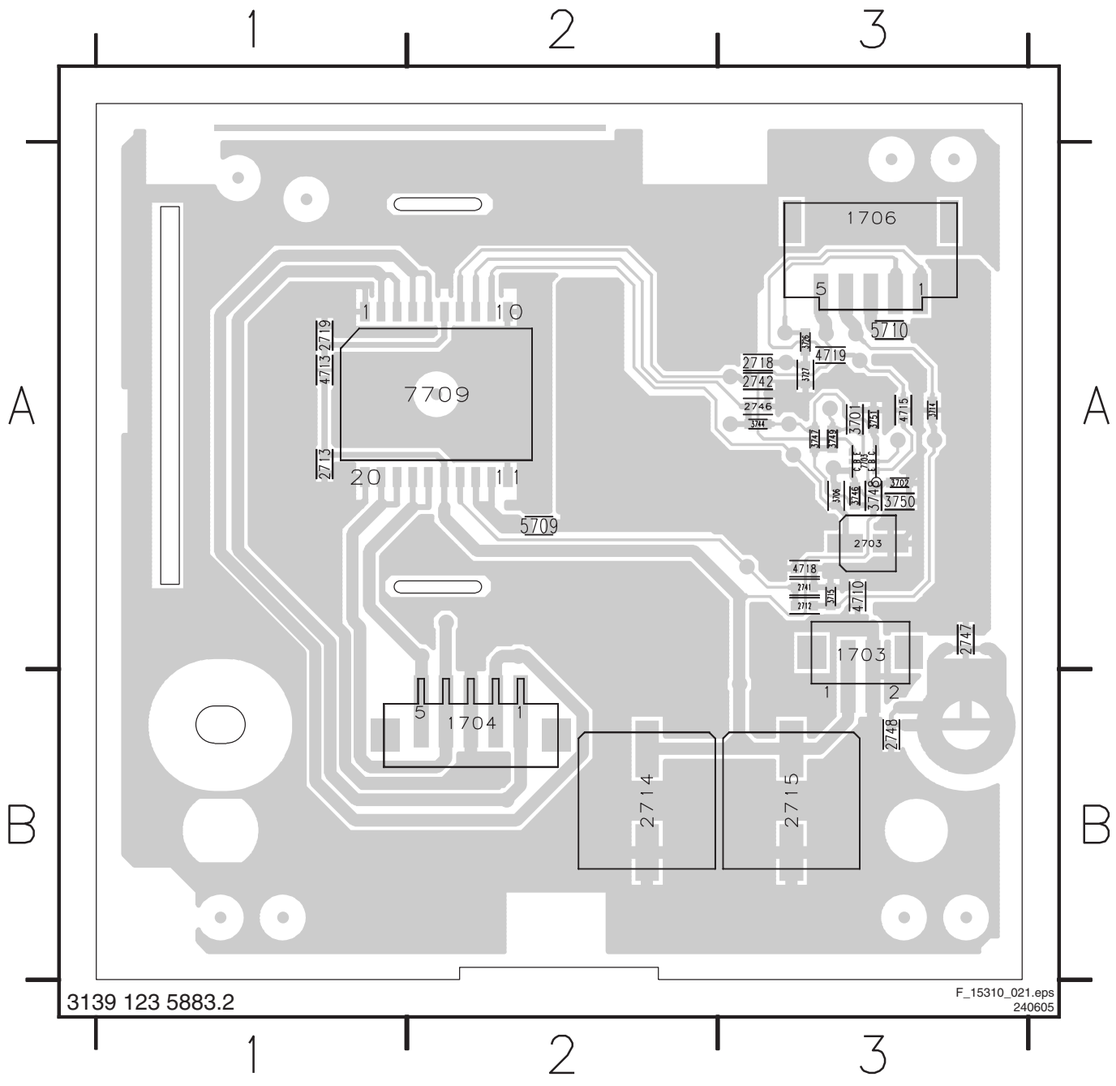
3139 123 5883.2

F_15310_020.eps
300605

1703 A1
1704 C8
1706 C1
1710 E1
2703 D5
2712 B4
2713 B6
2714 B7
2715 B8
2718 B4
2719 B7
2741 B5
2742 C5
2746 D5
2747 E1
2748 E1
3701 E3
3702 D4
3706 C4
3714 B4
3715 B4
3726 B4
3727 C4
3744 D5
3746 C4
3747 D3
3748 D3
3749 D2
3750 D4
3751 D5
4710 B1
5709 D7
5710 D1
7703-1 C4
7703-2 D3
7709 B6
F702 B2
F703 B2
F704 C2
F705 D1
F706 E2
I701 A1
I702 A1
I703 D2
I704 C4
I705 D4
I706 D5
I707 C8
I708 C8
I709 B4
I710 C8
I711 C8
I712 B5
I713 C5
I714 C8
I718 B4
I719 B5
I728 D5

Layout Audio Amplifier (Top Side)

1703 A3	2712 A3	2718 A3	2746 A3	3702 A3	3726 A3	3747 A3	3751 A3	4718 A3	7703 A3
1704 B2	2713 A1	2719 A1	2747 A3	3706 A3	3727 A3	3748 A3	4710 A3	4719 A3	7709 A2
1706 A3	2714 B2	2741 A3	2748 B3	3714 A3	3744 A3	3749 A3	4713 A1	5709 A2	
2703 A3	2715 B3	2742 A3	3701 A3	3715 A3	3746 A3	3750 A3	4715 A3	5710 A3	



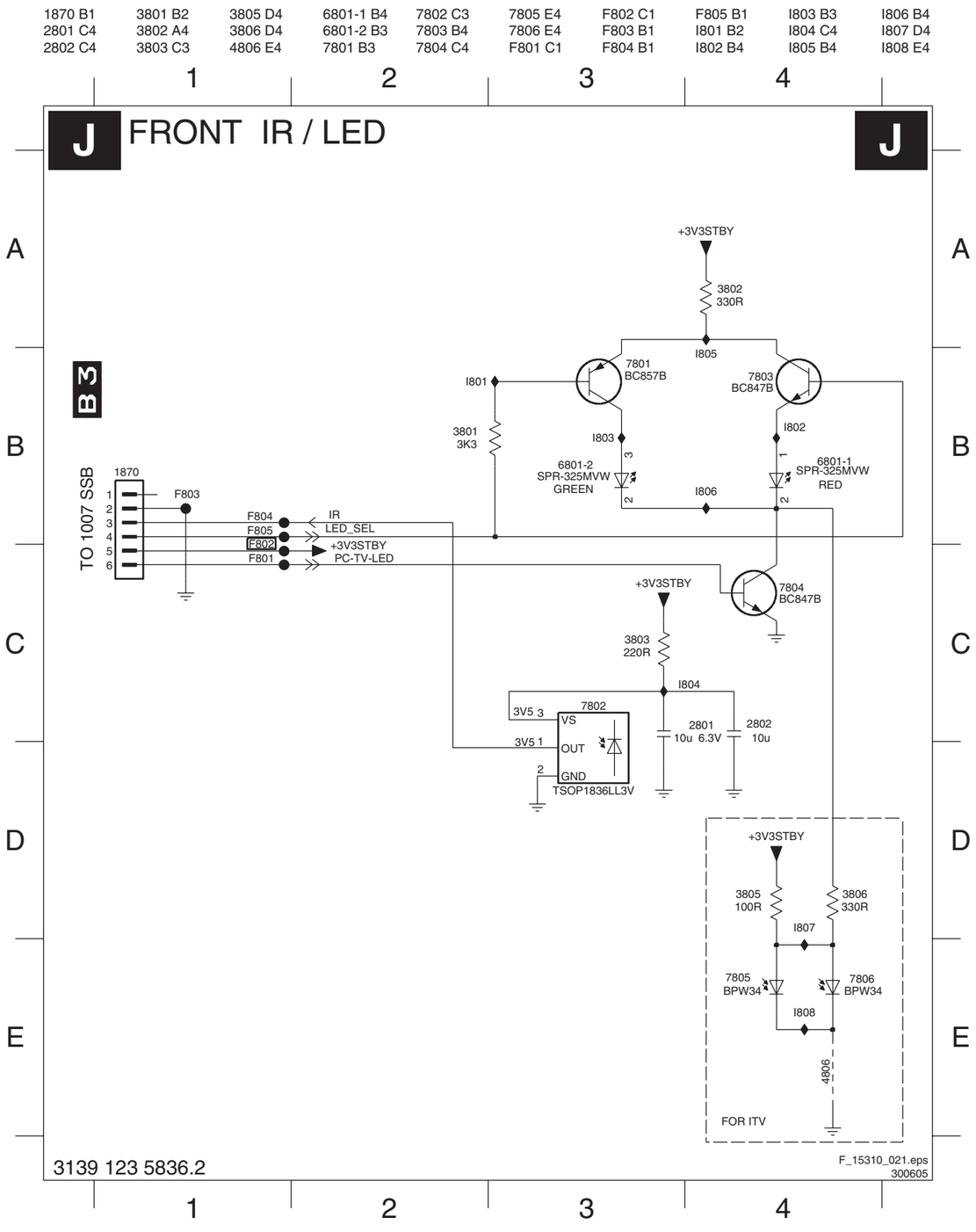
3139 123 5883.2

F_15310_021.eps
240605

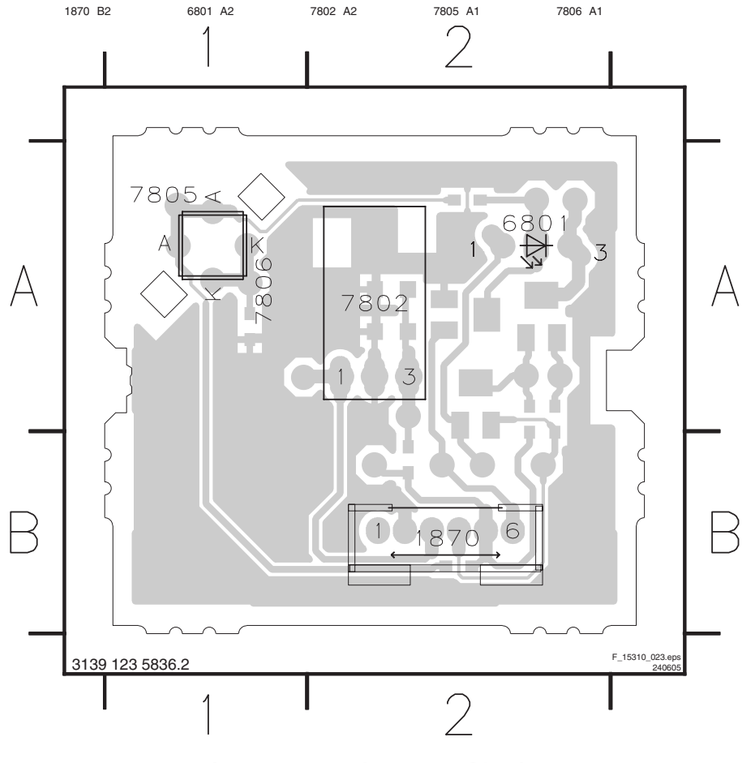
Personal Notes:

E_06532_012.eps
131004

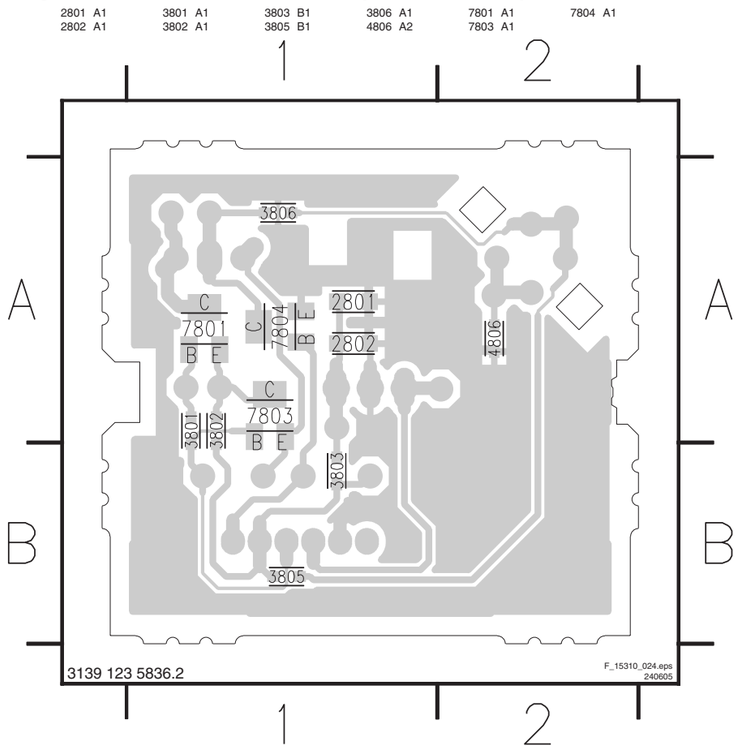
Front IR / LED Panel



Layout Front IR / LED Panel (Top Side)



Layout Front IR / LED Panel (Bottom Side)



Personal Notes:

E_06532_013.eps
131004

8. Alignments

Index of this chapter:

General: 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

Perform all electrical adjustments under the following conditions:
Mains voltage and frequency: 100-240 V / 50/60 Hz.
Allow the set to warm up for approximately 10 minutes.
Test probe: Ri > 10 M ohm; Ci < 2.5 pF.

8.2 Hardware Alignments

There are no hardware alignments foreseen for the LCD-TV.

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.

8.3.1 SAM Menu

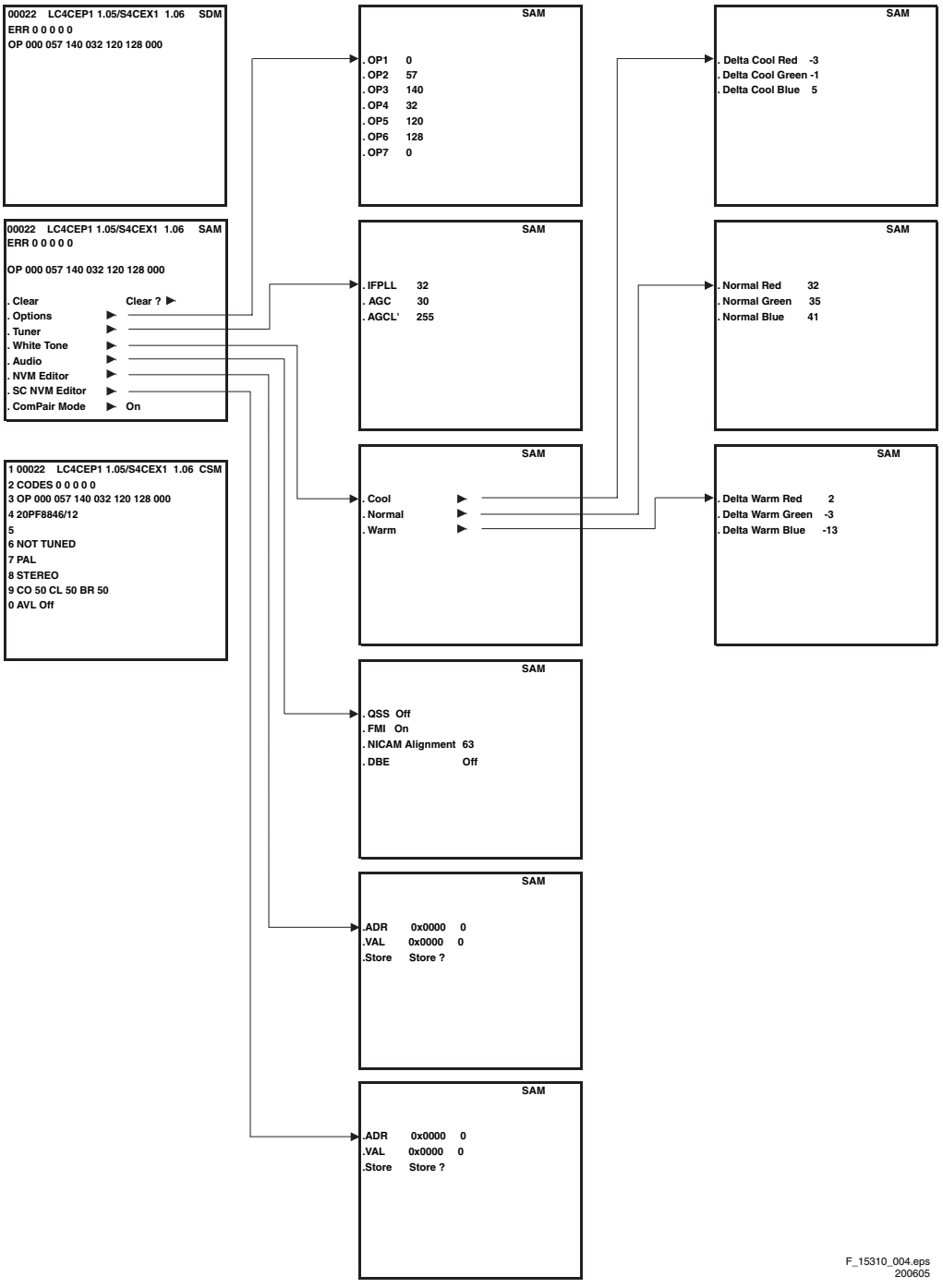


Figure 8-1 SAM Menu

8.3.2 White Tone

In the White Tone sub menu the colour values for the colour temperature values can be changed.
The colour temperature mode (Normal, Delta Cool, Delta Warm) or the colour (R, G, B) can be selected with the Right/ Left cursor keys. The mode or value can be changed with the Up/Down cursor keys.
First the values for the Normal colour temperature should be selected. Range: 0-255, 128 represent the middle of the value (no offset difference). Then the offset values for the Delta Cool and Delta Warm mode can be selected. Note that the alignment values are non-linear. The range is: -50 to +50, 0 represents the middle value, (no offset difference).

Input signal strength: >=10 mV rms (80 dBµV) terminal voltage.

Input injection point: Aerial input.

Alignment Method

Initial Set-up

- 12 minutes soaking time before carrying out Colour Temp alignment.
- Incredible Picture/Contrast+ and Active Control & Light Sensor must be switched Off for proper tracking.
- Set all colour temperature settings to their initial values, i.e. Red=185; Green=180; Blue=193.
- The offset values for Cool & Warm should be preloaded into NVM.
- The alignment is done for Normal only.

Method of alignments
1. Place the colour sensor of the meter at the centre of the screen with standard orientation (at 0 degree orientation).
2. Set the meter in (T, delta UV, Y) mode.
3. Set Brightness and Colour to nominal (Factory mode, Brightness 60).
4. Set Colour temp to normal.
5. Set Contrast to make the light output Y on the meter 250 nit +/-10%.
6. Set Green=128.
7. Adjust Red and Blue to bring delta UV and T to the value as in the table.
8. Repeat the procedure if necessary to obtain the values as in the table.

Expected Results
- Measured parameters: Refer to table,
- Specifications: Refer to table,
- Units of measurement: Kelvin.

Table 8-1 Colour temperatures

Colour temp.	NORMAL		COOL		WARM	
	T (K)	∆UV	T (K)	∆UV	T (K)	∆UV
EUROPE	8500	-003	11500	-005	7000	-005
Tolerance	+/-10%	+/-003	+/-10%	+/-003	+/-10%	+/-003

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 - 10mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.
- Activate the SAM-menu. Go to the sub-menu Tuner, select the sub-menu option AFC Window and adjust the value to 100kHz.
- Select the AGC sub-menu.
- Connect a DC multi-meter to F306 pin1 of the tuner.
- Adjust the AGC until the voltage at pin 1 of the tuner is 3.3 Volts +0.5 / -1.0.
- The value can be incremented or decremented by pressing the right/left Menu-button on the RC.
- Switch the set to standby 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 @ 60Hz (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@60Hz 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.

The default values for the audio alignments are:
- QSS: On
- FMI: Off
- NICAM Alignment: 63
- Lip Sync: Off
- DBE: Off

8.3.6 Options

Options are used to control the presence/absence of certain features and hardware. Some Hercules NVM settings can be changed groupwise (via Option Bytes), as well as bit by bit via the NVM Editor, see the text below.

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 8-2 Option Bytes (via Options Menu in SAM or via the Hercules NVM Editor)

Bit (DEC)	Option	23PF5320/01	23PF5320/58	20PF4110/01	20PF4110/58	20PF5320/01	20PF5320/58	20PF5120/01	20PF5120/58	17PF4310/01	20PF4310/58	15PF5120/01	15PF5120/58	15PF4110/01	15PF4110/58
7 (128) msb	OP_PHILIPS_TUNER	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 (64)	OP_FM_RADIO	1	1	0	0	1	1	1	1	0	0	1	1	0	0
5 (32)	OP_LNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_ATS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 (8)	OP_ACI	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 (4)	OP_UK_PNP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 (2)	OP_VIRGIN_MODE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 (1) lsb	OP_CHINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OP1 (Total DEC Value)		**216**	**216**	**152**	**152**	**216**	**216**	**216**	**216**	**152**	**152**	**216**	**216**	**152**	**152**
OP1 (Total HEX Value)		**D8**	**D8**	**98**	**98**	**D8**	**D8**	**D8**	**D8**	**98**	**98**	**D8**	**D8**	**98**	**98**
7 (128) msb	OP_SC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 (64)	OP_UI_GREEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 (32)	OP_CHANNEL_NAMING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_LTI (Lum Transient Improvmt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 (8)	OP_TILT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (4)	OP_FINE_TUNING	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 (2)	OP_PIP_PHILIPS_TUNER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 (1) lsb	OP_HUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OP2 (Total DEC Value)		**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
OP2 (Total HEX Value)		**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**	**04**
7 (128) msb	OP_EW_FUNCTION	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 (64)	OP_2TUNER_PIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 (32)	OP_PIP_SPLITTER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_SPLITTER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 (8)	OP_VIRTUAL_DOLBY	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 (4)	OP_WIDE_SCREEN	1	1	0	0	1	1	0	0	1	1	0	0	0	0
1 (2)	OP_WSSB	1	1	0	0	1	1	0	0	1	1	0	0	0	0
0 (1) lsb	OP_ECO_SUBWOOFER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OP3 (Total DEC Value)		**142**	**142**	**136**	**136**	**142**	**142**	**136**	**136**	**142**	**142**	**136**	**136**	**136**	**136**
OP3 (Total HEX Value)		**8E**	**8E**	**88**	**88**	**8E**	**8E**	**88**	**88**	**8E**	**8E**	**88**	**88**	**88**	**88**
7 (128) msb	OP_PC_MODE	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 (64)	OP_HD	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5 (32)	OP_ULTRA_BASS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_DELTA_VOLUME	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 (8)	OP_TAIWAN_KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (4)	OP_VOLUME_LIMITER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 (2)	OP_STEREO_DBX	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 (1) lsb	OP_STEREO_NICAM_2CS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OP4 (Total DEC Value)		**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**	**209**
OP4 (Total HEX Value)		**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**	**D1**
7 (128) msb	OP_AV1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 (64)	OP_AV2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 (32)	OP_AV3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4 (16)	OP_CVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 (8)	OP_SVHS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (4)	OP_SVHS3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 (2)	OP_HOTEL_MODE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 (1) lsb	OP_SIMPLY_FACTORY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OP5 (Total DEC Value)		**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**	**164**
OP5 (Total HEX Value)		**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**	**A4**
7 (128) msb	OP_PERSONAL_ZAPPING	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6 (64)	OP_SMART_SURF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 (32)	OP_FMTRAP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_COMBFILTER	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 (8)	OP_ACTIVE_CONTROL	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 (4)	OP_VIDEO_TEXT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 (2)	OP_LIGHT_SENSOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 (1) lsb	OP_TWIN_TEXT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OP6 (Total DEC Value)		**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**
OP6 (Total HEX Value)		**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**
7 (128) msb	OP_TIME_WIN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 (64)	OP_16:9_set	1	1	0	0	1	1	0	0	0	0	0	0	0	0
5 (32)	OP_THAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (16)	OP_3D_COMBFILTER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 (8)	OP_DUMMY6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (4)	OP_DUMMY7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 (2)	OP_WEST_EU	1	0	1	0	1	0	1	0	1	0	1	0	1	0
0 (1) lsb	OP_MULTI_STANDARD_EUR	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OP7 (Total DEC Value)		**67**	**65**	**3**	**1**	**67**	**65**	**3**	**1**	**3**	**1**	**3**	**1**	**3**	**1**
OP7 (Total HEX Value)		**43**	**41**	**03**	**01**	**43**	**41**	**03**	**01**	**03**	**01**	**03**	**01**	**03**	**01**

Table 8-3 Hercules Default NVM Settings (Option Bit Settings via Nvm Editor in Sam Mode)

Byte Nr	Bit	Feature/Mode	Description	23PF5320/01	23PF5320/58	20PF4110/01	20PF4110/58	20PF5320/01	20PF5320/58	20PF5120/01	20PF5120/58	17PF4310/01	17PF4310/58	15PF5120/01	15PF5120/58	15PF4110/01	15PF4110/58
Byte 0 174(dec)	0	QSS (LSB)	Mode of quasi split sound amplifier	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	FMI	Connection of output of QSS amplifier	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	HCO	EHT tracking mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	HP2	Synchronization of OSD/Text display	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	FSL	Forced slicing level for vertical sync	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	5	TFR	DC transfer ratio of luminance signal	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	6	OSVE	Black current measuring in overscan	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	MVK (MSB)	(For Future Usage, as defined by software)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		59	59	59	59	59	59	59	59	59	59	59	59	59	59
		Total Hex Values		3B	3B	3B	3B	3B	3B	3B	3B	3B	3B	3B	3B	3B	3B
Byte 1 175(dec)	0	PSE		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	OPC		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	PRIS		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	CONTINUOUS FACTORY	Continuous factory mode	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	WHITE PATTERN ON	Last color pattern status in factory mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	SDM MODE	Service default mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	SAM MODE	Service Align mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	SVMA	Scavm On / Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		8	8	8	8	8	8	8	8	8	8	8	8	8	8
		Total Hex Values		08	08	08	08	08	08	08	08	08	08	08	08	08	08
Byte 2 176(dec)	0	MUTE STATUS	Mute status	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	TUNER AUTO MODE	Auto mode	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	CABLE MODE	Cable/Antenna mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	LAST POWER MODE	Last power status of the set	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	CHILD LOCK MODE	Child lock enabled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	SURF MODE	Surf mode on/off	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	FACTORY MODE	Factory mode on	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7	PSNS	For PAL color enhancement in ES4	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Total Dec Values		202	202	202	202	202	202	202	202	202	202	202	202	202	202
		Total Hex Values		CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA
Byte 3 177(dec)	0	RADIO/TV MODE	Radio mode or TV mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	WAKE-UP MODE		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	HOTEL MODE	TV in Hotel mode	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	HOTEL KBD LOCK	Keyboard locked	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	HBL		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	BLS	Blue stretch mode	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	6	SL		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	CFA0	Comb filter On/Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		32	32	32	32	32	32	32	32	32	32	32	32	32	32
		Total Hex Values		20	20	20	20	20	20	20	20	20	20	20	20	20	20

Byte 4 178(dec)	0	Signal Strength	Signal Strength Switch in MK2	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	LPG		0	0	0	0	0	0	0	0	0	0	0	0	0
	2	DVD TRAY LOCK	Lock/Unlock DVD tray	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	SCRSAVER MODE	Screen saver mode	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	BKS	Black Stretch Mode	1	1	1	1	1	1	1	1	1	1	1	1	1
	5	BSD	Black Stretch Depth	1	1	1	1	1	1	1	1	1	1	1	1	1
	6	CRA0	Coring on SVM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	PIP QSS	PIP QSS	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		56	56	56	56	56	56	56	56	56	56	56	56	56
		Total Hex Values		38	38	38	38	38	38	38	38	38	38	38	38	38
Byte 5 179(dec)	0	FFI	Fast Filter	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	NNR	No red reduction during blue stretch	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	MUS	NTSC matrix	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	GAM	Gamma control	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	CBS	Control sequence of beam current limiting	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	LLB	Low level of beam current limiter	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	DSA	Dynamic skin tone angle	1	1	1	1	1	1	1	1	1	1	1	1	1
	7	DSK		0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		74	74	74	74	74	74	74	74	74	74	74	74	74
		Total Hex Values		4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A
Byte 6 180(dec)	0	LTI status	LTI last status	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	INC_LIFE_TIME		0	0	0	0	0	0	0	0	0	0	0	0	0
	2	PC_MODE		0	0	0	0	0	0	0	0	0	0	0	0	0
	3	HD_MODE		0	0	0	0	0	0	0	0	0	0	0	0	0
	4	TACT_SWITCH		0	0	0	0	0	0	0	0	0	0	0	0	0
	5	SET_IN_SPECIAL_STBY		0	0	0	0	0	0	0	0	0	0	0	0	0
	6	HOTEL_OSDDISPLAY		0	0	0	0	0	0	0	0	0	0	0	0	0
	7	HOTEL_MONITOROUT		0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Hex Values		00	00	00	00	00	00	00	00	00	00	00	00	00
Byte 7 181(dec)	0	HOTEL_ICONNMODE		0	0	0	0	0	0	0	0	0	0	0	0	0
	1	DBE	DBE Status	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	SET_IN_PC_SLEEP_MODE		0	0	0	0	0	0	0	0	0	0	0	0	0
	3	Reserved	Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	Reserved	Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	Reserved	Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	Reserved	Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	Reserved	Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Dec Values		2	2	2	2	2	2	2	2	2	2	2	2	2
		Total Hex Values		02	02	02	02	02	02	02	02	02	02	02	02	02

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

9.1 Introduction

The LC4.1 LCD TV is a global LCD TV for the year 2005. It is the successor of the LC13 LCD TV and covers screens sizes 15, 17, 20 and 23 inch (in both 4:3 and 16:9 ratio) with ME5 and ARCH3 styling.
This chassis has the following (new) features:

- **Audio**: The sound processor is part of the UOC processor (called “Hercules”). The chassis has a FM Radio with 40 preset channels.
- **Video**: Enhanced video features, video drivers and Active Control.

The architecture consists of a TV and Scaler panel with I/O, Side I/O panel, Top Control panel, Sound Amplifier panel (depending on model), LED/IR panel and Power Supply panel. The functions for video/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA120xx, item 7011), the so-called third generation Ultimate One Chip (UOC-III) or “Hercules”. This chip has the following features:

- Control, small signal, mono/stereo, and extensive Audio/ Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF, including SECAM-L/L1 and AM.
- FM sound 4.5/5.5/6.0/6.5, no traps/bandpass filters.
- Full multi-standard color decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, color decoder, and stereo sound processor).

9.2 Block Diagram

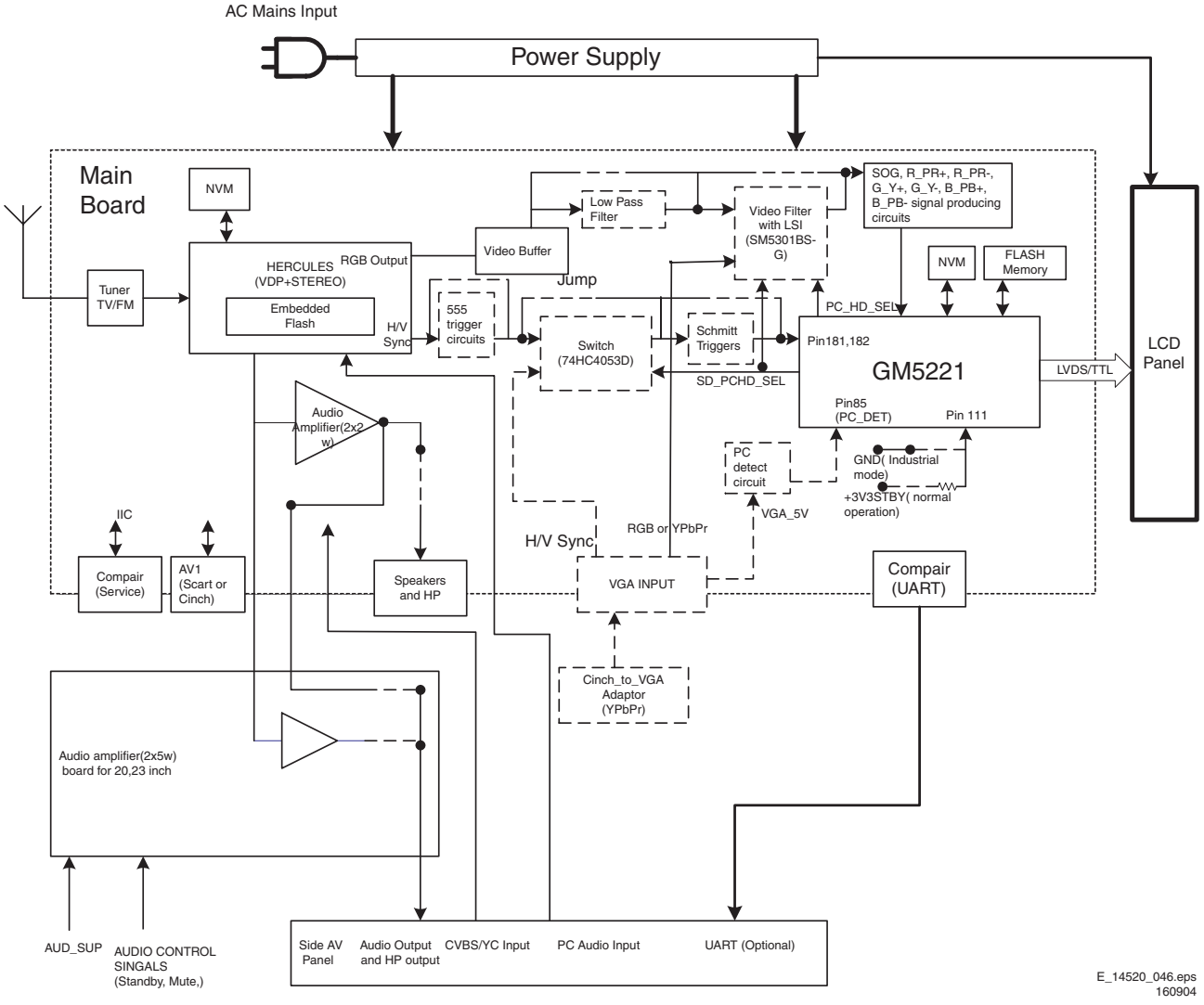


Figure 9-1 Block Diagram LC4.1

The PLL tuner UR1316 (with FM radio) delivers the IF-signal, via audio & video SAW-filters, to the Video Signal Processor and FLASH embedded TEXT/Control/Graphics Micro Controller TDA120x1 (item 7011, also called Hercules). This IC has the following functions:

- Analogue Video Processing
- Sound Demodulation
- Audio Interfaces and switching
- Volume and tone control for loudspeakers
- Reflection and delay for loudspeaker channels
- Micro Controller
- Data Capture
- Display

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. One SCART-connector is used (SCART1). This connector is fully equipped. The video part delivers the RGB signals to the Scaler IC.

The Genesis GM5221 Scaler IC receives either the SDTV video input signals from the Hercules or the PC input signal from an external computer. Switching between the two signals is done via the SD/HD selection IC (7461).
After the video processing done by the Scaler, the digital data is sent 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.

9.3 Power Supply

For Service, this supply panel is a black box. When defect (this can be traced via the fault-finding tips, or by strange phenomena), a new panel must be ordered (see table below for ordering codes), and after receipt, the defective panel must be sent for repair.

Table 9-1 Ordering codes power supply

Screen size (inches)	Ordering Code
15	3341 101 20021
17	3122 137 23041
20	3122 137 23101
23	3122 137 23071

9.4 Tuner and IF

On models with FM radio, 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 I^2C.

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

9.5 Video: TV Part (diagrams B1, B2, and B3)

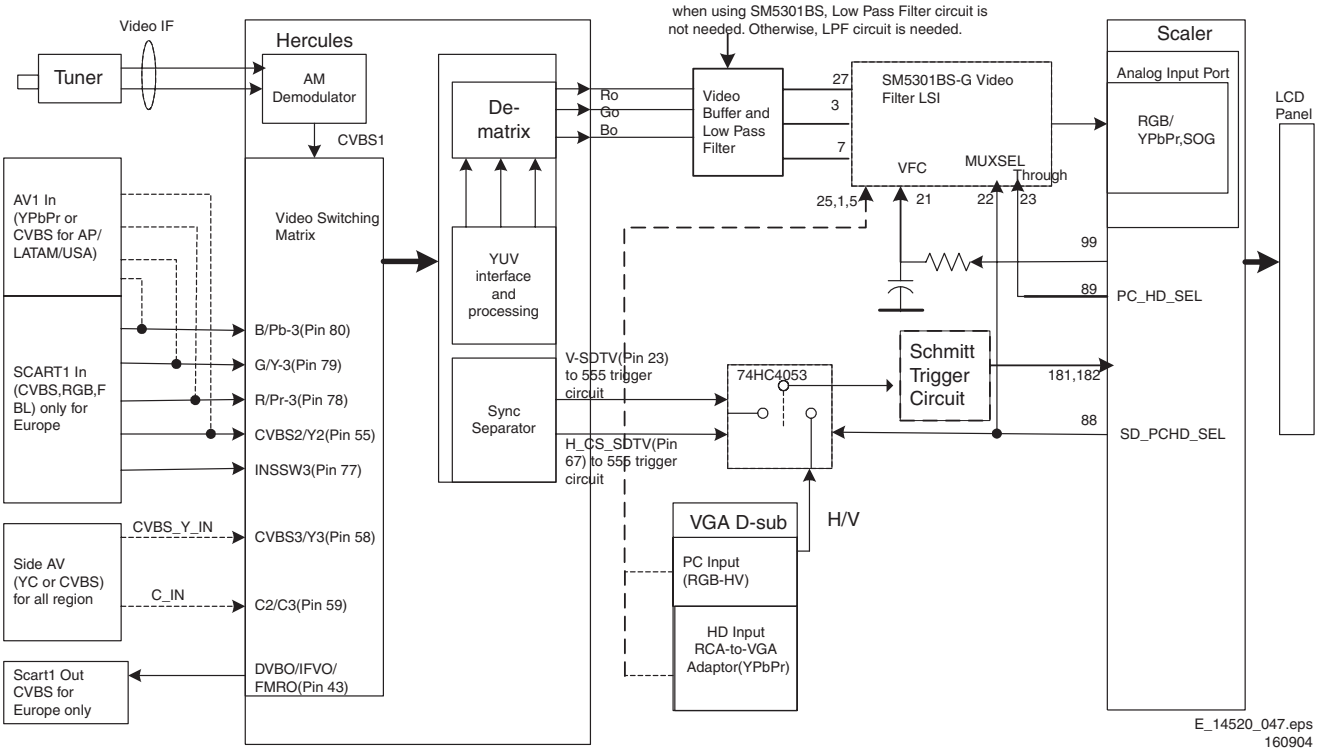


Figure 9-2 Block diagram video processing

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 Video: Scaler Part (diagram B6, B7, and B8)

The Genesis gm5221 Scaler is an all-in-one graphics and video processing IC for LCD monitors and televisions with up to XGA 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.

9.6.1 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

9.6.2 Inputs

Analog RGB

The RGB input is fed to pins 142, 143, 147, 148, 151 and 152. 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 (7461).

PC DVI-D/-I/VGA input

It depends on the model of the TV set, if a DVI-I or DVI-D connector is present. If a DVI to VGA adaptor is used, the analogue DVI input is processed by the VGA block of the Scaler. Digital signals coming from the DVI input are directly processed by the Scaler. The Scaler supports up to 1080i and UXGA 60Hz formats.

9.6.3 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 has four channel 6/8-bit LVDS transmitters and is configurable for single or dual wide LVDS. 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.

9.7 Audio Processing

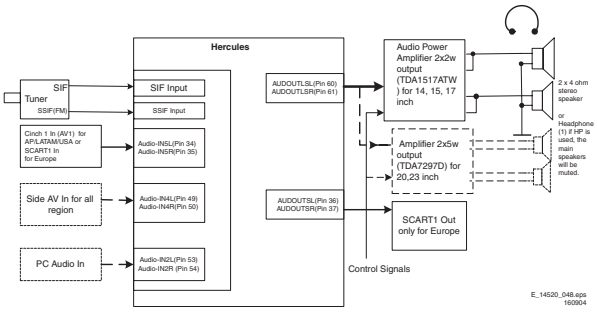


Figure 9-3 Block diagram audio processing

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.

9.7.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:
- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM.

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

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

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

9.7.2 Functionality

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

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

9.7.3 Audio Amplifier

The audio amplifier part is very straightforward. There are two different executions:
- **15, 17 inch:** Amplification is done via the integrated power amplifier TDA1517, and delivers a maximum output of 2 x 6 W_rms. Normal operating supply is from 6 V to 18 V.
- **20, 23 inch:** Amplification is done via the integrated power amplifier TDA7297, and delivers a maximum output of 2 x 15 W_rms. 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.

9.7.4 Audio: Lip Sync

The LC4.1E is not equipped with Lip Sync. This is not needed.

9.8 Control

9.8.1 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 it 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.

9.8.2 Block Diagram

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

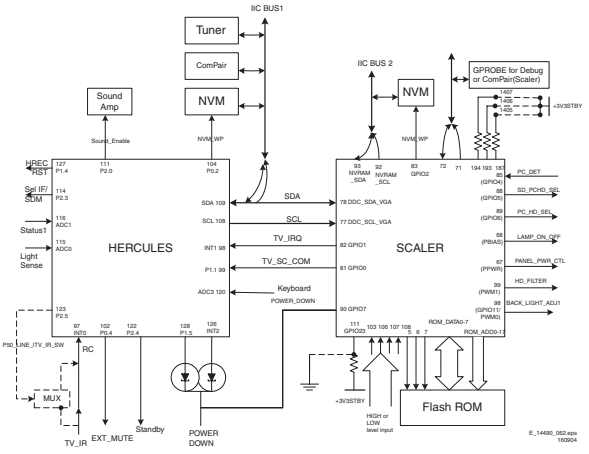


Figure 9-4 Micro Controller block diagram

9.8.3 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.

9.8.4 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

9.9 LCD Display

9.9.1 Specifications

Panel model	:	LC150X02 (15”)
	:	LC171W03 (17”)
	:	LC201V02 (20”)
	:	QD23WL04 (23”)
Resolution (HxV)	:	1024x768 pixels (15”)
	:	1280x768 pixels (17”)
	:	640x480 pixels (20”)
	:	1280x768 (23”)
Luminance	:	450 nit (15”)
	:	450 nit (17”)
	:	450 nit (20”)
	:	450 nit (23”)
Supplier	:	LG.Philips LCD (15”, 17”, 20”)
	:	Quanta Displays Inc (23”)

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 (= NexTView)
EPLD	Electronic Programmable Logic Device
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
FMR	FM Radio
FRC	Frame Rate Converter
FRONT-C	Front input chrominance (SVHS)
FRONT-DETECT	Front input detection
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
G-SC1-IN	Green SCART1 in
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
HD	High Definition
HP	HeadPhone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
I2S	Integrated IC Sound bus
IC	Integrated Circuit
IF	Intermediate Frequency
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.
IR	Infra Red
IRQ	Interrupt ReQuest
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 the customers wishes
LATAM	LATin AMerica
LC04	Philips chassis name for LCD TV 2004 project
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LINE-DRIVE	Line drive signal
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LS	LoudSpeaker
LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MPEG	Motion Pictures Experts Group
MSP	Multi-standard Sound Processor: ITT sound decoder
MUTE	MUTE Line
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe.
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)
NVM	Non Volatile Memory: IC containing TV related data (for example, options)
O/C	Open Circuit
ON/OFF LED	On/Off control signal for the LED
OSD	On Screen Display
P50	Project 50 communication: protocol between TV and peripherals
PAL	Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PC	Personal Computer
PCB	Printed Circuit Board (or PWB)
PIG	Picture In Graphic
PIP	Picture In Picture
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PWB	Printed Wiring Board (or PCB)
RAM	Random Access Memory
RC	Remote Control transmitter
RC5	Remote Control system 5, the signal from the remote control receiver
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.
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
ROM	Read Only Memory
SAM	Service Alignment Mode
SIF	Sound Intermediate Frequency
SC	SandCastle: two-level pulse derived from sync signals
SC1-OUT	SCART output of the MSP audio IC
SC2-B-IN	SCART2 Blue in
SC2-C-IN	SCART2 chrominance in
SC2-OUT	SCART output of the MSP audio IC
S/C	Short Circuit
SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
SCL	CLock Signal on I2C bus
SD	Standard Definition
SDA	DAta Signal on I2C bus
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switch Mode Power Supply
SND	SouND
SNDL-SC1-IN	Sound left SCART1 in
SNDL-SC1-OUT	Sound left SCART1 out
SNDL-SC2-IN	Sound left SCART2 in
SNDL-SC2-OUT	Sound left SCART2 out
SNDR-SC1-IN	Sound right SCART1 in
SNDR-SC1-OUT	Sound right SCART1 out
SNDR-SC2-IN	Sound right SCART2 out
SNDR-SC2-OUT	Sound right SCART2 out
SNDS-VL-OUT	Surround sound left variable level out
SNDS-VR-OUT	Surround sound right variable level out
SOPS	Self Oscillating Power Supply
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
STBY	STandBY
SVHS	Super Video Home System
SW	SubWoofer / SoftWare
THD	Total Harmonic Distortion
TXT	TeleteXT
uP	Microprocessor
VA	Vertical Acquisition
VL	Variable Level out: processed audio output toward external amplifier

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 A7, Type GM5221 (IC7401)

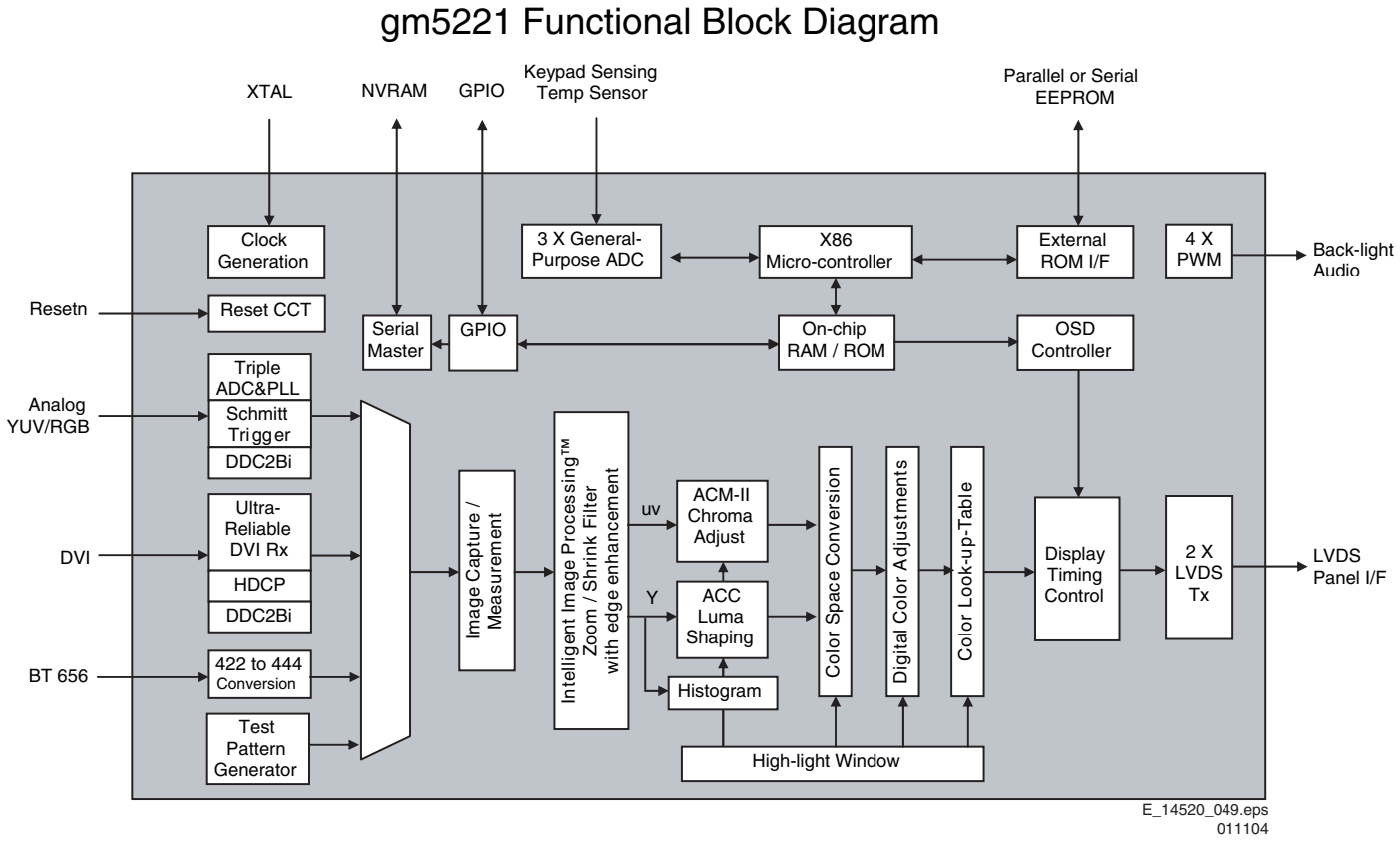
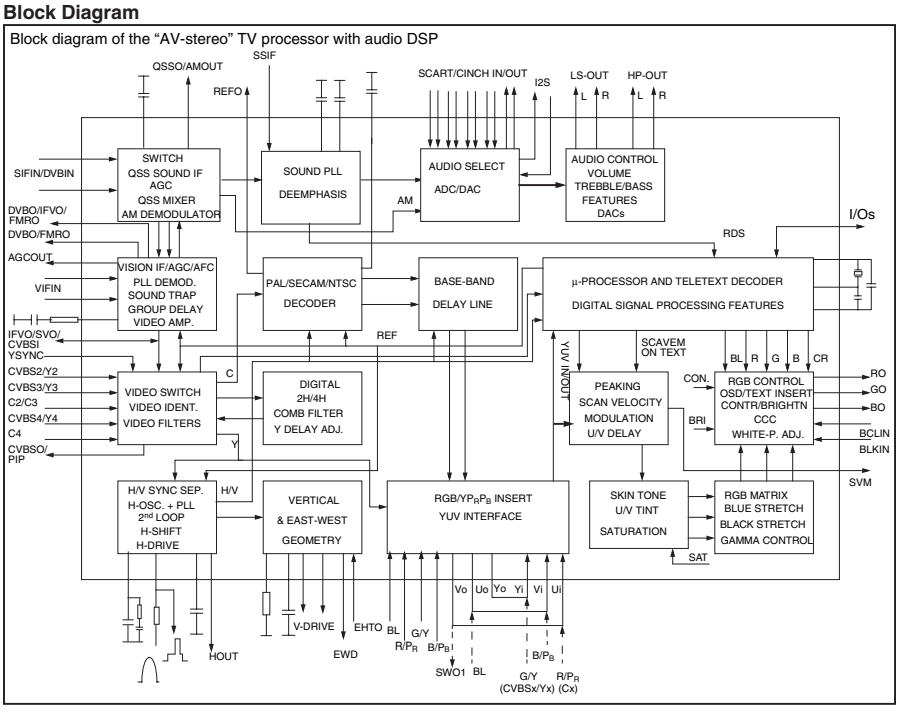


Figure 9-5 Internal Block diagram

9.11.2 Diagram A2, Type TDA12029H (IC7011)

Block Diagram



Pin Configuration

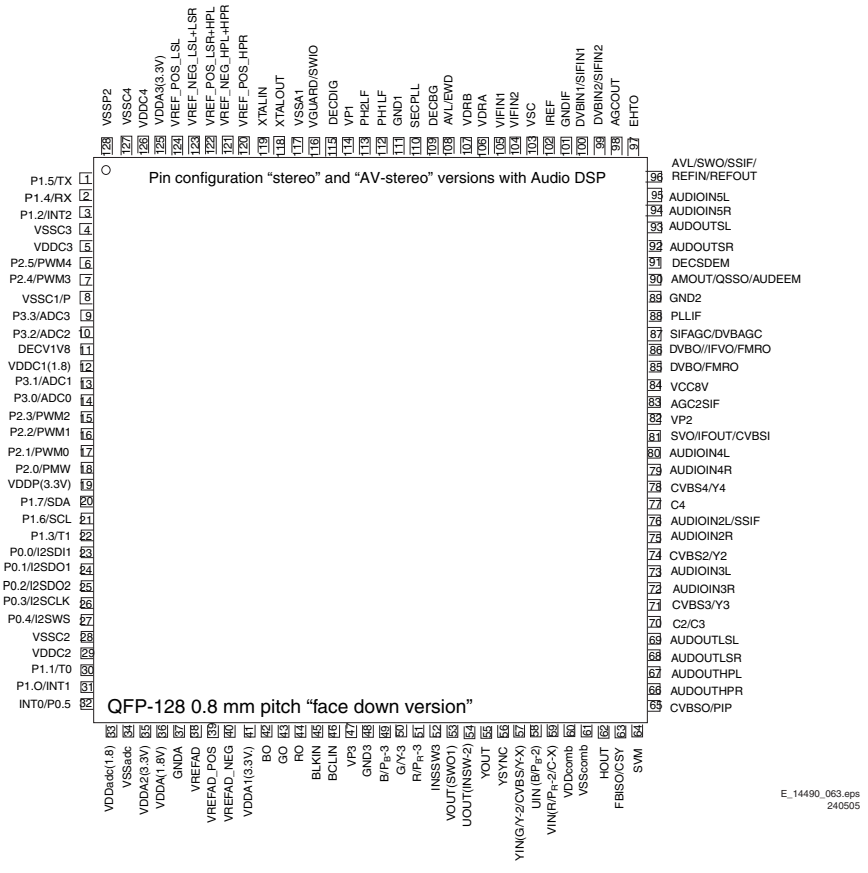
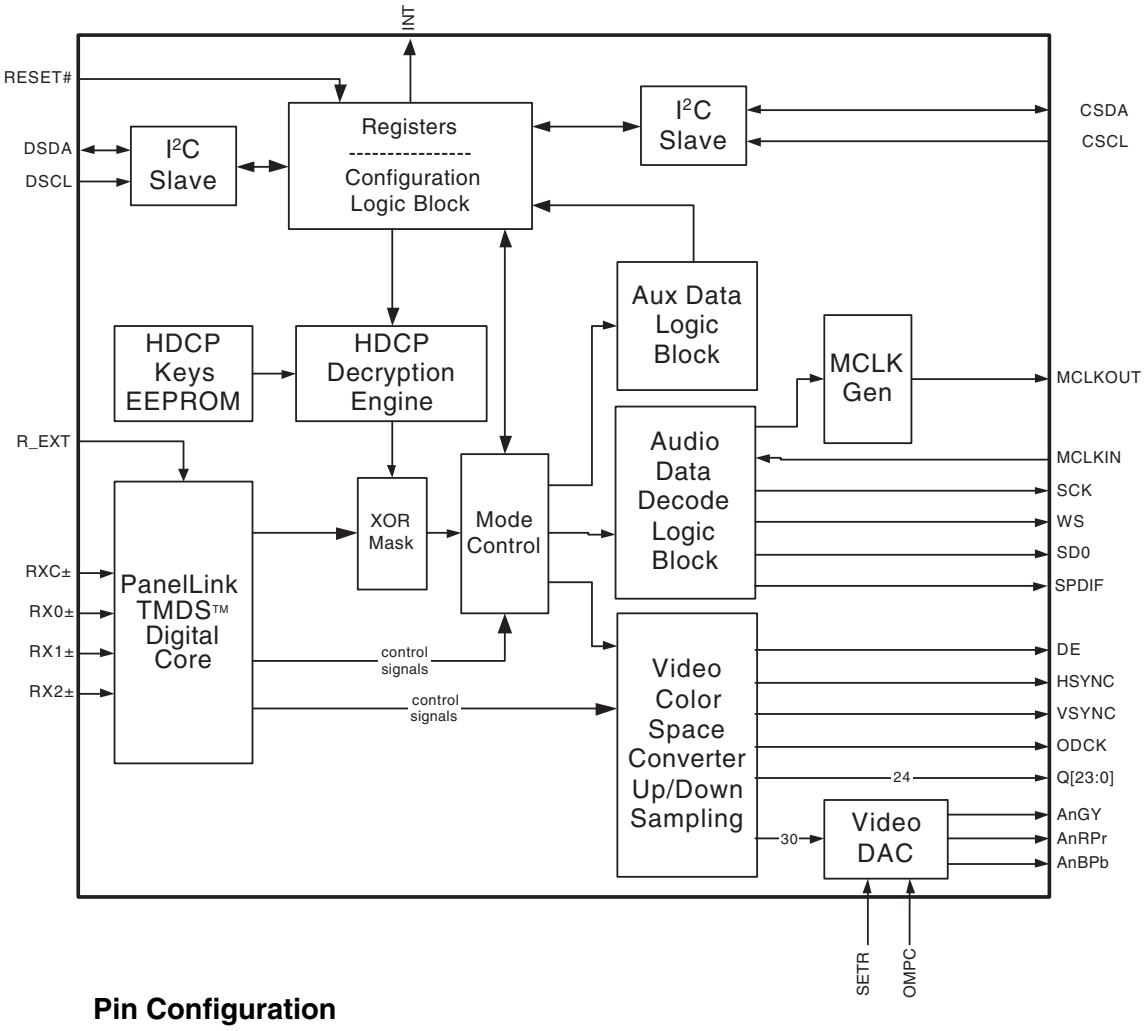


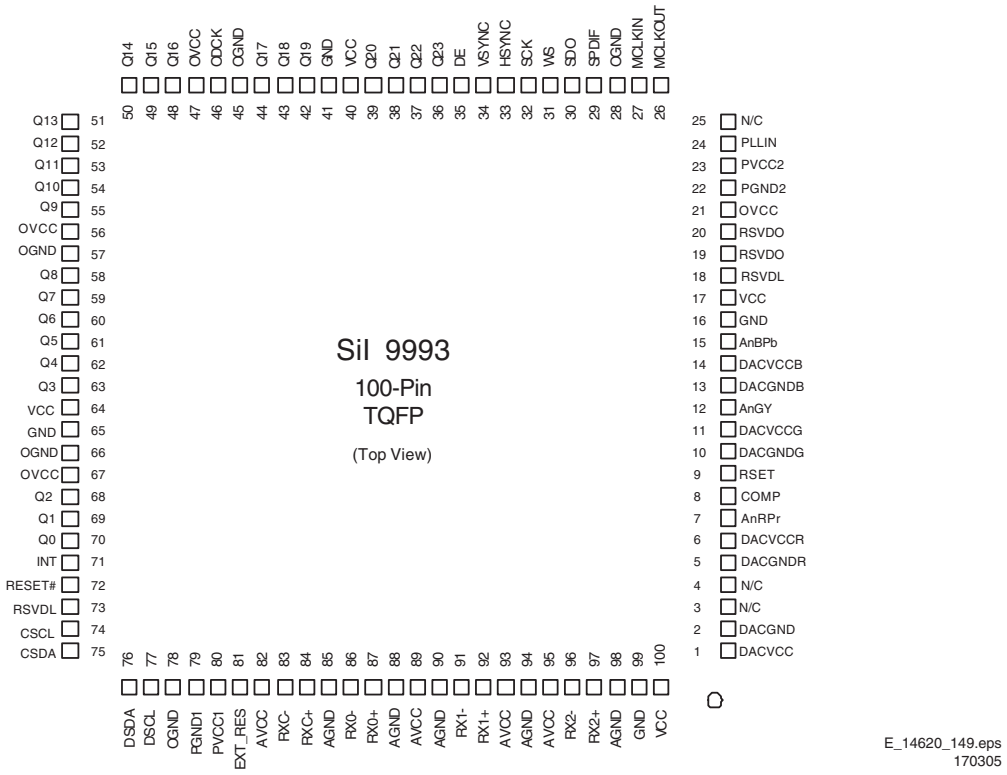
Figure 9-6 Internal block diagram and pin configuration

9.11.3 Diagram A12, Type S9993CT (IC7808)

Block Diagram



Pin Configuration



E_14620_149.eps
170305

Figure 9-7 Internal block diagram and pin configuration

10. Spare Parts List

Set Level

Various

0032	3341 101 20021	Power Supply Unit (15 inch)
0032	3122 137 23041	Power Supply Unit (17 inch)
0032	3122 137 23101	Power Supply Unit (20 inch)
0032	3122 137 23071	Power Supply Unit (23 inch)
0041	3139 124 62171	PC LENS
8105	3139 131 04951	Cable 04p/220

—~~—

5213	2422 264 00541	Loudspeaker 5W fullrange

Small Signal Board [B]

Various

0606	3139 127 04921	Hercules SW (check Prod. Survey)
0611	3139 127 04842	Scaler SW (check Prod. Survey)
1001	2422 543 01414	Xtal 24.576MHz
1007	2422 025 08149	Connector 6p m
1008	2422 025 09405	Connector 2p m
1010	2422 025 18734	Connector 11p m
1101	4822 265 10703	Socket scart 21p
1302	3139 147 19801	Tuner UV1318S/A IH -3
1302	3139 147 23021	TUNER UR1316S/A I H-3
1328	2422 549 44372	SAW 38.9MHz K3953L
1330	2422 549 44369	SAW 38.9MHz K9656L
1331	4822 267 10459	Connector 3p
1401	2422 025 09406	Connector 4p m
1402	2422 025 18024	Connector 40p m
1403	2422 543 01374	Xtal 14.318 Mhz
1404	2422 025 18314	Connector 20p m v 1.25
1485	2422 033 00484	Socket DVI 24p f
1485	2422 033 00515	Socket DVI-I 29p f
1684	2422 025 10768	Connector 3p m
1701	2422 025 10768	Connector 3p m
1751	2422 025 18739	Connector 5p m
1910	2422 025 18746	Connector 12p m
1951	2422 025 18752	Connector 5p m
8010	3104 311 10781	Cable 10p/140/10p
8401	3139 110 27731	Cable 04p/080/04p
8401	3139 131 06171	Cable 04p/220/04p
8701	3103 308 90612	CWAS 03PH/03PH 220 BK AWG26
8751	3139 131 06261	Cable 05p/300/05p
8910	3139 110 28271	Cable 12P
8910	3139 131 04311	Cable 12p 180
8951	3104 157 02361	Cable 5p 280

—||—

2001	2238 586 59812	100nF 20% 50V 0603
2004	3198 017 42240	220nF 16V Y5V 0603
2008	3198 017 44740	470nF 10V 0603
2009	3198 017 41050	1µF 10V 0603
2010	5322 126 11582	6.8nF 10% 63V
2011	3198 017 42240	220nF 16V Y5V 0603
2012	4822 124 23002	10µF 16V
2013	2238 586 59812	100nF 20% 50V 0603
2016	2238 586 59812	100nF 20% 50V 0603
2017	2238 586 59812	100nF 20% 50V 0603
2018	5322 126 11583	10nF 10% 50V 0603
2023	3198 017 42240	220nF 16V Y5V 0603
2024	4822 124 12084	1µF 20% 50V
2027	2238 586 59812	100nF 20% 50V 0603
2030	2238 586 59812	100nF 20% 50V 0603
2031	2238 586 59812	100nF 20% 50V 0603
2032	2238 586 59812	100nF 20% 50V 0603
2033	3198 017 42240	220nF 16V Y5V 0603
2035	2020 021 91729	4.7µF 20% 35V
2036	4822 126 11785	47pF 5% 50V 0603
2037	4822 126 11785	47pF 5% 50V 0603
2043	2238 586 59812	100nF 20% 50V 0603
2044	3198 017 42240	220nF 16V Y5V 0603
2049	4822 124 23002	10µF 16V
2051	4822 124 23002	10µF 16V
2052	3198 016 31020	1nF 25V 0603
2053	2238 586 59812	100nF 20% 50V 0603
2054	2238 586 59812	100nF 20% 50V 0603
2055	2238 586 59812	100nF 20% 50V 0603
2056	2238 586 59812	100nF 20% 50V 0603
2057	2238 586 59812	100nF 20% 50V 0603
2058	3198 016 31020	1nF 25V 0603
2060	2238 586 59812	100nF 20% 50V 0603
2061	4822 124 23002	10µF 16V
2063	3198 017 31540	150nF 10V 0603
2067	3198 016 31020	1nF 25V 0603
2068	3198 017 42240	220nF 16V Y5V 0603
2072	3198 017 42240	220nF 16V Y5V 0603
2073	5322 126 11583	10nF 10% 50V 0603
2074	3198 017 42240	220nF 16V Y5V 0603
2076	3198 017 42240	220nF 16V Y5V 0603
2078	2020 552 94427	100pF 5% 50V
2082	2238 586 59812	100nF 20% 50V 0603
2083	2020 552 96637	10µF 10% 6.3V 0805
2099	3198 016 31020	1nF 25V 0603
2101	4822 126 14241	330pF 0603 50V
2102	4822 124 23002	10µF 16V
2103	4822 126 14241	330pF 0603 50V
2104	4822 126 14491	2.2µF 10V 0805
2105	4822 126 14241	330pF 0603 50V
2106	4822 124 23002	10µF 16V
2107	4822 126 14241	330pF 0603 50V
2108	4822 126 14491	2.2µF 10V 0805
2307	3198 017 34730	47nF 16V 0603
2309	2020 012 00029	330µF 6.3V
2311	4822 124 23237	22µF 6.3V
2313	5322 126 11578	1nF 10% 50V 0603
2314	2238 586 59812	100nF 20% 50V 0603
2317	5322 126 11578	1nF 10% 50V 0603
2318	5322 126 11578	1nF 10% 50V 0603
2321	5322 126 11583	10nF 10% 50V 0603
2324	5322 126 11583	10nF 10% 50V 0603
2357	2238 586 59812	100nF 20% 50V 0603
2359	5322 126 11583	10nF 10% 50V 0603
2372	2238 586 59812	100nF 20% 50V 0603
2374	2238 586 59812	100nF 20% 50V 0603
2375	4822 124 23002	10µF 16V
2376	2238 586 59812	100nF 20% 50V 0603
2377	2238 586 59812	100nF 20% 50V 0603
2378	3198 017 42240	220nF 16V Y5V 0603
2379	3198 017 42240	220nF 16V Y5V 0603
2380	4822 124 12095	100µF 20% 16V
2381	2238 586 59812	100nF 20% 50V 0603
2382	2020 552 00035	2.2µF 6.3V 10% 0603
2383	2020 552 00035	2.2µF 6.3V 10% 0603
2384	2020 552 00035	2.2µF 6.3V 10% 0603
2385	2020 552 00035	2.2µF 6.3V 10% 0603
2386	3198 017 42240	220nF 16V Y5V 0603
2387	2020 012 00029	330µF 6.3V
2388	2020 012 00028	470µF 20% 16V
2389	4822 126 11785	47pF 5% 50V 0603
2390	4822 126 11785	47pF 5% 50V 0603
2394	2238 586 59812	100nF 20% 50V 0603
2395	2238 586 59812	100nF 20% 50V 0603
2401	4822 124 11131	47µF 6.3V
2402	2238 586 59812	100nF 20% 50V 0603
2403	2238 586 59812	100nF 20% 50V 0603
2404	2238 586 59812	100nF 20% 50V 0603
2405	2238 586 59812	100nF 20% 50V 0603
2406	2238 586 59812	100nF 20% 50V 0603
2407	2238 586 59812	100nF 20% 50V 0603
2408	2238 586 59812	100nF 20% 50V 0603
2409	2238 586 59812	100nF 20% 50V 0603
2410	2238 586 59812	100nF 20% 50V 0603
2411	2238 586 59812	100nF 20% 50V 0603
2412	2238 586 59812	100nF 20% 50V 0603
2413	2238 586 59812	100nF 20% 50V 0603
2414	2238 586 59812	100nF 20% 50V 0603
2415	2238 586 59812	100nF 20% 50V 0603
2416	2238 586 59812	100nF 20% 50V 0603
2417	2238 586 59812	100nF 20% 50V 0603
2418	4822 126 13883	220pF 5% 50V
2419	4822 126 13883	220pF 5% 50V
2420	4822 124 11131	47µF 6.3V
2421	2238 586 59812	100nF 20% 50V 0603
2422	2238 586 59812	100nF 20% 50V 0603
2423	2238 586 59812	100nF 20% 50V 0603
2424	2238 586 59812	100nF 20% 50V 0603
2425	2238 586 59812	100nF 20% 50V 0603
2426	4822 126 13883	220pF 5% 50V
2427	4822 126 13883	220pF 5% 50V
2429	2238 586 59812	100nF 20% 50V 0603
2430	2238 586 59812	100nF 20% 50V 0603
2431	2238 586 59812	100nF 20% 50V 0603
2432	2238 586 59812	100nF 20% 50V 0603
2433	2238 586 59812	100nF 20% 50V 0603
2434	2238 586 59812	100nF 20% 50V 0603
2435	4822 126 13883	220pF 5% 50V
2436	4822 126 13883	220pF 5% 50V
2438	2238 586 59812	100nF 20% 50V 0603
2439	2238 586 59812	100nF 20% 50V 0603
2440	2238 586 59812	100nF 20% 50V 0603
2441	2238 586 59812	100nF 20% 50V 0603
2442	2238 586 59812	100nF 20% 50V 0603
2443	3198 016 35680	5.6pF 0.5pF 50V 0603
2444	3198 016 35680	5.6pF 0.5pF 50V 0603
2445	2238 586 59812	100nF 20% 50V 0603
2448	2238 586 59812	100nF 20% 50V 0603
2450	4822 126 13883	220pF 5% 50V
2451	4822 126 13883	220pF 5% 50V
2452	5322 126 11583	10nF 10% 50V 0603
2463	2238 586 59812	100nF 20% 50V 0603
2471	4822 124 11131	47µF 6.3V
2472	2238 586 59812	100nF 20% 50V 0603
2473	2238 586 59812	100nF 20% 50V 0603
2474	2238 586 59812	100nF 20% 50V 0603
2475	2238 586 59812	100nF 20% 50V 0603
2476	2222 867 15339	33pF 5% 50V 0603
2477	3198 017 41050	1µF 10V 0603
2478	3198 017 41050	1µF 10V 0603
2479	3198 017 41050	1µF 10V 0603
2483	2238 586 59812	100nF 20% 50V 0603
2485	3198 017 41050	1µF 10V 0603
2486	3198 017 41050	1µF 10V 0603
2487	3198 017 41050	1µF 10V 0603
2488	4822 122 33761	22pF 5% 50V
2489	4822 122 33761	22pF 5% 50V
2490	2238 586 59812	100nF 20% 50V 0603
2510	2238 586 59812	100nF 20% 50V 0603
2513	4822 124 23002	10µF 16V
2514	3198 016 31590	15pF 10% 50V 0603
2515	5322 126 11583	10nF 10% 50V 0603
2516	3198 016 36810	680pF 25V 0603
2517	5322 126 11583	10nF 10% 50V 0603
2518	5322 126 11583	10nF 10% 50V 0603
2519	3198 016 31020	1nF 25V 0603
2520	2238 586 59812	100nF 20% 50V 0603
2521	5322 126 11583	10nF 10% 50V 0603
2522	5322 126 11583	10nF 10% 50V 0603
2523	5322 126 11583	10nF 10% 50V 0603
2524	5322 126 11583	10nF 10% 50V 0603
2525	5322 126 11583	10nF 10% 50V 0603
2526	5322 126 11583	10nF 10% 50V 0603
2527	5322 126 11583	10nF 10% 50V 0603
2703	4822 124 23002	10µF 16V
2712	3198 017 41050	1µF 10V 0603
2714	2020 012 00028	470µF 20% 16V
2718	3198 017 41050	1µF 10V 0603
2719	2238 586 59812	100nF 20% 50V 0603
2724	4822 124 41584	100µF 20% 10V
2736	4822 124 80791	470µF 20% 16V
2737	4822 124 80791	470µF 20% 16V
2738	3198 016 31020	1nF 25V 0603
2739	3198 016 31020	1nF 25V 0603
2741	4822 126 13881	470pF 5% 50V
2742	4822 126 13881	470pF 5% 50V
2910	4822 126 13881	470pF 5% 50V
2911	2022 031 00308	22µF 20% 35V
2920	4822 124 80151	47µF 16V
2921	4822 124 80151	47µF 16V
2930	4822 124 80791	470µF 20% 16V
2931	4822 126 13881	470pF 5% 50V
2933	4822 124 80791	470µF 20% 16V
2934	4822 126 13193	4.7nF 10% 63V
2936	5322 126 11578	1nF 10% 50V 0603
2937	5322 126 11578	1nF 10% 50V 0603
2938	5322 126 11578	1nF 10% 50V 0603
2939	5322 126 11578	1nF 10% 50V 0603
2940	5322 126 11578	1nF 10% 50V 0603
2941	5322 126 11578	1nF 10% 50V 0603
2942	5322 126 11578	1nF 10% 50V 0603
2943	4822 124 80195	470µF 20% 10V
2959	2238 586 59812	100nF 20% 50V 0603
2960	4822 124 80151	47µF 16V
2961	5322 126 11583	10nF 10% 50V 0603
2962	2238 586 59812	100nF 20% 50V 0603
2963	2238 586 59812	100nF 20% 50V 0603
2994	4822 124 11131	47µF 6.3V
2995	2238 586 59812	100nF 20% 50V 0603
2996	2238 586 59812	100nF 20% 50V 0603
2997	4822 124 11131	47µF 6.3V
2998	4822 124 40184	1000µF 20% 10V

3001	2322 702 70398	3.9Ω 5% 0603
3002	4822 051 30223	22kΩ 5% 0.062W
3003	2322 702 70398	3.9Ω 5% 0603
3004	4822 051 30223	22kΩ 5% 0.062W
3005	4822 051 30273	27kΩ 5% 0.062W
3007	4822 051 30472	4.7Ω 5% 0.062W
3008	4822 117 12925	47kΩ 1% 0.063W 0603
3009	4822 117 13632	100kΩ 1% 0603 0.62W
3010	4822 117 12891	220kΩ 1%
3011	4822 051 30472	4.7Ω 5% 0.062W
3012	4822 051 30101	100Ω 5% 0.062W
3013	4822 051 30101	100Ω 5% 0.062W
3016	4822 051 30101	100Ω 5% 0.062W
3019	4822 051 30101	100Ω 5% 0.062W
3020	4822 051 30101	100Ω 5% 0.062W
3024	4822 051 30472	4.7Ω 5% 0.062W
3052	4822 051 30101	100Ω 5% 0.062W
3058	4822 051 30101	100Ω 5% 0.062W
3059	4822 051 30102	1kΩ 5% 0.062W
3060	4822 051 30393	39kΩ 5% 0.062W
3063	4822 051 30222	2.2kΩ 5% 0.062W
3064	4822 051 30103	10kΩ 5% 0.062W
3066	4822 051 30472	4.7Ω 5% 0.062W
3070	4822 051 30101	100Ω 5% 0.062W
3075	4822 051 30472	4.7Ω 5% 0.062W
3077	4822 051 30472	4.7Ω 5% 0.062W
3078	4822 051 30472	4.7Ω 5% 0.062W
3079	4822 051 30222	2.2kΩ 5% 0.062W
3080	2322 704 61002	1kΩ 1%
3081	4822 051 30101	100Ω 5% 0.062W
3082	4822 051 30101	100Ω 5% 0.062W
3086	4822 051 30222	2.2kΩ 5% 0.062W
3087	4822 051 30103	10kΩ 5% 0.062W
3091	4822 051 30101	100Ω 5% 0.062W
3092	4822 051 30472	4.7Ω 5% 0.062W
3093	4822 051 30472	4.7Ω 5% 0.062W
3094	4822 051 30109	10Ω 5% 0.062W
3097	4822 051 30472	4.7Ω 5% 0.062W
3101	4822 051 30151	150Ω 5% 0.062W
3102	4822 117 12891	220kΩ 1%
3103	4822 051 30103	10kΩ 5% 0.062W
3104	4822 051 30153	15kΩ 5% 0.062W
3105	4822 051 30151	150Ω 5% 0.062W
3106	4822 117 12891	220kΩ 1%
3107	4822 051 30103	10kΩ 5% 0.062W
3108	4822 051 30153	15kΩ 5% 0.062W
3109	4822 051 30759	75Ω 5% 0.062W
3110	4822 051 30101	100Ω 5% 0.062W
3111	4822 051 30273	27kΩ 5% 0.062W
3112	4822 051 30682	6.8Ω 5% 0.062W
3113	4822 051 30759	75Ω 5% 0.062W
3114	4822 051 30101	100Ω 5% 0.062W
3115	4822 051 30759	75Ω 5% 0.062W
3116	4822 051 30101	100Ω 5% 0.062W
3117	4822 051 30759	75Ω 5% 0.062W
3118	4822 051 30101	100Ω 5% 0.062W
3119	4822 051 30689	68Ω 5% 0.063W 0603
3120	4822 051 30102	1kΩ 5% 0.062W
3121	4822 051 30759	75Ω 5% 0.062W
3122	4822 051 30101	100Ω 5% 0.062W
3302	4822 051 30101	100Ω 5% 0.062W
3303	4822 051 30101	100Ω 5% 0.062W
3309	4822 051 30103	10kΩ 5% 0.062W
3311	4822 051 30103	10kΩ 5% 0.062W
3314	4822 117 13632	100kΩ 1% 0603 0.62W
3315	4822 051 30154	150kΩ 5% 0.062W
3316	4822 117 12968	820Ω 5% 0.62W
3317	4822 051 30561	560Ω 5% 0.062W
3319	4822 051 30273	27kΩ 5% 0.062W
3320	4822 051 30183	18kΩ 5% 0.062W
3321	4822 051 30222	2.2kΩ 5% 0.062W
3322	4822 051 30682	6.8Ω 5% 0.062W
3323	4822 051 30222	2.2kΩ 5% 0.062W
3327	4822 051 30102	1kΩ 5% 0.062W
3350	4822 051 30472	4.7Ω 5% 0.062W
3351	4822 051 30681	680Ω 5% 0.062W
3352	4822 051 30681	680Ω 5% 0.062W
3353	4822 051 30101	100Ω 5% 0.062W
3354	4822 051 30101	100Ω 5% 0.062W
3355	4822 051 30332	3.3Ω 5% 0.062W
3356	4822 051 30332	3.3Ω 5% 0.062W
3359	4822 051 30391	390Ω 5% 0.062W
3371	4822 051 30101	100Ω 5% 0.062W
3372	4822 051 30101	100Ω 5% 0.062W
3374	5322 117 11726	10Ω 5%
3375	4822 051 30101	100Ω 5% 0.062W
3376	4822 117 13632	100kΩ 1% 0603 0.62W
3389	4822 051 30101	100Ω 5% 0.062W
3390	4822 051 30101	100Ω 5% 0.062W
3391	4822 051 30101	100Ω 5% 0.062W
3394	4822 051 30759	75Ω 5% 0.062W
3401	4822 051 30103	10kΩ 5% 0.062W
3402	4822 051 30103	10kΩ 5% 0.062W
3403	2322 704 61501	150Ω 1% 0603
3404	4822 051 30103	10kΩ 5% 0.062W
3405	4822 051 30103	10kΩ 5% 0.062W
3406	4822 051 30103	10kΩ 5% 0.062W
3407	3198 031 13390	4X 33Ω 5% 1206
3408	4822 051 30339	33Ω 5% 0.062W
3409	4822 051 30339	33Ω 5% 0.062W
3410	4822 051 30339	33Ω 5% 0.062W
3411	3198 031 13390	4X 33Ω 5% 1206
3412	3198 031 13390	4X 33Ω 5% 1206
3413	3198 031 13390	4X 33Ω 5% 1206
3414	4822 051 30103	10kΩ 5% 0.062W
3416	2322 704 61001	100Ω 1% 0603
3417	4822 051 30103	10kΩ 5% 0.062W
3418	4822 051 30103	10kΩ 5% 0.062W
3419	4822 051 30103	10kΩ 5% 0.062W
3420	4822 051 30103	10kΩ 5% 0.062W
3421	4822 051 30103	10kΩ 5% 0.062W
3422	4822 051 30103	10kΩ 5% 0.062W
3423	4822 051 30103	10kΩ 5% 0.062W
3424	3198 031 11030	4 x 10kΩ 5% 1206
3427	3198 021 31080	1Ω 5% 0603
3428	3198 021 31080	1Ω 5% 0603
3430	4822 051 30101	100Ω 5% 0.062W
3431	4822 051 30101	100Ω 5% 0.062W
3433	4822 051 30103	10kΩ 5% 0.062W
3434	4822 051 30103	10kΩ 5% 0.062W
3435	4822 051 30103	10kΩ 5% 0.062W
3441	4822 051 30101	100Ω 5% 0.062W
3442	4822 051 30101	100Ω 5% 0.062W
3443	4822 051 30103	10kΩ 5% 0.062W
3444	4822 051 30103	10kΩ 5% 0.062W
3445	4822 051 30151	150Ω 5% 0.062W
3446	4822 051 30151	150Ω 5% 0.062W
3451	4822 051 30339	33Ω 5% 0.062W
3452	4822 051 30339	33Ω 5% 0.062W
3453	4822 051 30339	33Ω 5% 0.062W
3454	4822 051 30339	33Ω 5% 0.062W
3455	4822 051 30339	33Ω 5% 0.062W
3456	4822 051 30339	33Ω 5% 0.062W
3457	4822 051 30339	33Ω 5% 0.062W
3458	4822 051 30339	33Ω 5% 0.062W
3459	4822 051 30339	33Ω 5% 0.062W
3471	4822 117 12968	820Ω 5% 0.62W
3478	4822 117 13632	100kΩ 1% 0603 0.62W
3481	9965 000 23109	22Ω 5% 0603
3482	4822 051 30759	75Ω 5% 0.062W
3483	9965 000 23109	22Ω 5% 0603
3484	4822 051 30759	75Ω 5% 0.062W
3485	9965 000 23109	22Ω 5% 0603
3486	4822 051 30759	75Ω 5% 0.062W
3487	4822 051 30102	1kΩ 5% 0.062W
3488	4822 051 30222	2.2kΩ 5% 0.062W
3489	4822 051 30101	100Ω 5% 0.062W
3490	4822 051 30103	10kΩ 5% 0.062W
3491	4822 051 30102	1kΩ 5% 0.062W
3492	4822 051 30102	1kΩ 5% 0.062W
3493	4822 051 30102	1kΩ 5% 0.062W
3494	4822 051 30222	2.2kΩ 5% 0.062W
3495	4822 051 30103	10kΩ 5% 0.062W
3496	4822 051 30101	100Ω 5% 0.062W
3497	4822 051 30101	100Ω 5% 0.062W
3501	4822 051 30103	10kΩ 5% 0.062W
3502	4822 051 30221	220Ω 5% 0.062W
3503	4822 051 30221	220Ω 5% 0.062W
3504	4822 051 30221	220Ω 5% 0.062W
3505	4822 051 30221	220Ω 5% 0.062W
3506	4822 051 30221	220Ω 5% 0.062W
3507	4822 051 30221	220Ω 5% 0.062W
3510	4822 051 30221	220Ω 5% 0.062W
3511	4822 051 30221	220Ω 5% 0.062W
3512	4822 051 30221	220Ω 5% 0.062W
3513	4822 051 30221	220Ω 5% 0.062W
3514	4822 051 30103	10kΩ 5% 0.062W
3515	4822 051 30103	10kΩ 5% 0.062W
3520	4822 051 30333	33kΩ 5% 0.062W
3522	9965 000 23109	22Ω 5% 0603
3523	9965 000 23109	22Ω 5% 0603
3524	9965 000 23109	22Ω 5% 0603
3525	9965 000 23109	22Ω 5% 0603
3526	9965 000 23109	22Ω 5% 0603
3527	9965 000 23109	22Ω 5% 0603
3706	4822 051 30103	10kΩ 5% 0.062W
3717	4822 051 30103	10kΩ 5% 0.062W
3719	4822 051 30103	10kΩ 5% 0.062W
3722	3198 021 38220	8.2kΩ 5% 0.062W 0603
3725	4822 051 30103	10kΩ 5% 0.062W
3726	4822 051 30392	3.9Ω 5% 0.063W 0603
3727	4822 051 30392	3.9Ω 5% 0.063W 0603
3744	3198 021 38220	8.2kΩ 5% 0.062W 0603
3745	3198 021 38220	8.2kΩ 5% 0.062W 0603
3751	4822 051 30101	100Ω 5% 0.062W
3752	4822 051 30101	100Ω 5% 0.062W
3753	4822 051 30471	47Ω 5% 0.062W
3754	4822 051 30102	1kΩ 5% 0.062W
3755	4822 051 30471	47Ω 5% 0.062W
3910	4822 051 30222	2.2kΩ 5% 0.062W
3911	4822 051 30102	1kΩ 5% 0.062W
3930	3198 021 31080	1Ω 5% 0603
3932	2322 704 61002	1kΩ 1%
3933	2322 704 63302	3.3kΩ 1% 0603
3934	3198 021 31080	1Ω 5% 0603
3935	3198 021 31080	1Ω 5% 0603
3936	4822 051 30102	1kΩ 5% 0.062W
3937	2306 207 03151	150Ω 5% 0.5W
3955	4822 051 30103	10kΩ 5% 0.062W
3958	4822 051 30102	1kΩ 5% 0.062W

5002	2422 549 44197	Bead 220Ω at 100MHz
5003	4822 157 11716	Bead 30Ω at 100MHz
5004	4822 157 11716	Bead 30Ω at 100MHz
5005	4822 157 11716	Bead 30Ω at 100MHz
5006	4822 157 11716	Bead 30Ω at 100MHz
5008	2422 549 44197	Bead 220Ω at 100MHz
5060	2422 549 44197	Bead 220Ω at 100MHz
5070	4822 157 11716	Bead 30Ω at 100MHz
5071	2422 549 42896	Bead 120Ω 100MHz
5072	2422 549 42896	Bead 120Ω 100MHz
5321	3198 018 33970	0.39µF 10% 0805
5324	4822 157 71334	0.68µH 5% 1008
5370	4822 157 11716	Bead 30Ω at 100MHz
5371	4822 157 11716	Bead 30Ω at 100MHz
5372	2422 549 44197	Bead 220Ω at 100MHz
5375	2422 536 00667	1000µF 20% 7032
5376	2422 549 44197	Bead 220Ω at 100MHz
5401	4822 157 11717	Bead 50Ω at 100MHz
5402	4822 157 11717	Bead 50Ω at 100MHz
5403	4822 157 11717	Bead 50Ω at 100MHz
5404	4822 157 11717	Bead 50Ω at 100MHz
5462	4822 157 11717	Bead 50Ω at 100MHz
5485	2422 549 45333	Bead 120Ω 100MHz
5514	2422 549 42896	Bead 120Ω 100MHz
5520	4822 157 11716	Bead 30Ω at 100MHz
5736	3198 018 72280	2.2µ 8mm
5737	3198 018 72280	2.2µ 8mm
5751	4822 157 11716	Bead 30Ω at 100MHz
5910	2422 536 00667	1000µF 20% 7032
5930	2422 535 94639	10µH 20%
5931	2422 536 00689	220µF 20%
5932	2422 535 94639	10µH 20%
5956	2422 549 45333	Bead 120Ω 100MHz
5957	2422 549 45333	Bead 120Ω 100MHz
5958	2422 549 45333	Bead 120Ω 100MHz
5959	2422 549 45333	Bead 120Ω 100MHz
5961	4822 157 11717	Bead 50Ω at 100MHz

6005	4822 130 11397	BAS316
6060	9322 102 64685	UDZ2.7B
6073	4822 130 80622	BAT54
6076	4822 130 80622	BAT54
6310	4822 130 11397	BAS316
6323	4822 130 11525	1SS356
6485	4822 130 11397	BAS316
6486	4822 130 11397	BAS316
6910	5322 130 34337	BAV99
6911	9340 548 71115	PDZ33B
6930	9322 128 70685	SMSS14

7001	3198 010 43130	BC807-25
7002	3198 010 42310	BC847BW
7003	3198 010 43130	BC807-25
7004	3198 010 42310	BC847BW
7011	9352 785 19557	TDA15021H1/N1B91 For SW see item number 0606
7012	3198 010 42310	BC847BW
7013	3198 010 42310	BC847BW
7014	3198 010 42310	BC847BW
7060	4822 130 11155	PDTC114ET
7099	9322 214 45668	M24C16-WMN6P
7101	5322 130 60159	BC846B
7316	5322 130 42718	BFS20
7320	3198 010 42310	BC847BW
7370	9340 425 20115	BC847BS
7401	9322 219 95671	GM5221H-LF-BC For SW see item number 0611

7402	9322 189 01668	AT24C32AN
7403	9322 205 12671	MX29LV040QC-70G
7461	9322 199 80668	SM5301BS-G
7463	9322 164 91668	IC SM CD74HC4053M
7490	9322 206 24668	M24C02-WMN6P
7510	9322 221 97668	SN74LVC14APW
7516	9322 212 97668	MK1575-01G
7702	3198 010 42310	BC847BW
7703	3198 010 42310	BC847BW
7712	9352 683 73118	TDA1517ATW/N1
7751	9352 500 20118	74LVC08AD
7752	3198 010 42310	BC847BW
7910	4822 130 42804	BC817-25
7920	9322 163 24668	L78M08CDT
7930	5322 209 90529	MC34063AD
7936	4822 130 41087	BC638
7952	4822 130 11155	PDTC114ET
7953	9322 199 25668	L4940D2T12
7954	9322 214 00668	SI2301BDS-E3
7955	9322 189 19668	LD1086D2T18

Side I/O Panel [D]

Various

1101	4822 267 10484	YKF51-5359
1102	4822 265 10658	Soc 3P
1104	2422 026 05513	Soc phone 1p
1105	2422 025 09406	Connector 4p m
1106	2422 026 05059	Connector Phone
1107	4822 267 10637	Connector 5p
1108	2422 025 10771	Connector 10p m
1110	2422 025 10768	Connector 3p m
1111	2422 025 09406	Connector 4p m
1112	2422 025 10768	Connector 3p m
1112	2422 025 18468	Connector 3p m
8107	3139 110 27841	Cable 05p/180/05p

2101	3198 016 31510	150pF 10% 50V 0603
2101	4822 126 11785	47pF 5% 50V 0603
2102	3198 016 31510	150pF 10% 50V 0603
2102	4822 126 11785	47pF 5% 50V 0603
2103	4822 126 13881	470pF 5% 50V
2104	4822 126 13881	470pF 5% 50V
2105	2020 552 94427	100pF 5% 50V
2106	2020 552 94427	100pF 5% 50V
2107	3198 016 31020	1nF 25V 0603
2108	3198 016 31020	1nF 25V 0603
2109	3198 016 31020	1nF 25V 0603
2110	3198 016 31020	1nF 25V 0603
2111	4822 124 12245	220µF 20% 10V
2112	4822 124 12245	220µF 20% 10V
2113	4822 126 13881	470pF 5% 50V
2114	4822 126 13881	470pF 5% 50V
2117	2020 552 96305	4.7µF 20-80% 10V

3101	4822 051 30109	10Ω 5% 0.062W
3103	4822 051 30109	10Ω 5% 0.062W
3104	4822 051 30759	75Ω 5% 0.062W
3105	4822 051 30759	75Ω 5% 0.062W
3106	4822 051 30759	75Ω 5% 0.062W
3107	4822 051 30223	22kΩ 5% 0.062W
3108	4822 117 12925	47kΩ 1% 0.063W 0603
3109	4822 051 30223	22kΩ 5% 0.062W
3110	4822 117 12925	47kΩ 1% 0.063W 0603
3111	4822 051 30223	22kΩ 5% 0.062W
3112	4822 051 30223	22kΩ 5% 0.062W
3113	4822 117 12925	47kΩ 1% 0.063W 0603
3114	4822 117 12925	47kΩ 1% 0.063W 0603
3115	4822 051 30121	120Ω 5% 0.062W
3116	4822 051 30121	120Ω 5% 0.062W
3123	4822 051 30101	100Ω 5% 0.062W
3124	4822 051 30101	100Ω 5% 0.062W
3125	4822 051 30102	1kΩ 5% 0.062W
3126	4822 051 30183	18kΩ 5% 0.062W
3127	4822 051 30183	18kΩ 5% 0.062W
4102	4822 051 30008	Jumper 0603
4103	4822 051 30008	Jumper 0603
4104	4822 051 30008	Jumper 0603
4105	4822 051 30008	Jumper 0603
4108	4822 051 30008	Jumper 0603
4120	4822 051 30008	Jumper 0603
4121	4822 051 30008	Jumper 0603
4122	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603

6101	4822 130 11148	UDZ4.7B
6102	4822 130 11148	UDZ4.7B
6105	4822 130 11148	UDZ4.7B
6106	4822 130 11148	UDZ4.7B
6109	4822 130 11148	UDZ4.7B
6110	4822 130 11148	UDZ4.7B
6111	4822 130 11148	UDZ4.7B
6112	4822 130 11148	UDZ4.7B

7101	4822 130 60373	BC856B

Top Control Panel [E]

Various

1308	4822 265 20682	S2B-PH-K
1309	4822 276 13775	Switch 1p 0.1A 12V
1310	4822 276 13775	Switch 1p 0.1A 12V
1311	4822 276 13775	Switch 1p 0.1A 12V
1312	4822 276 13775	Switch 1p 0.1A 12V
1313	4822 276 13775	Switch 1p 0.1A 12V
8308	3139 110 27581	Cable 2p 180
8684	3104 157 03961	Cable 03p/180/03p

3318	4822 051 30151	150Ω 5% 0.062W
3319	4822 051 30391	390Ω 5% 0.062W
3320	4822 117 12903	1.8kΩ 1% 0.063W 0603
3321	4822 117 12968	820Ω 5% 0.62W
3322	4822 051 30008	Jumper 0603
3323	4822 051 30008	Jumper 0603

6306	4822 130 11148	UDZ4.7B

Audio Amplifier [I]

Various

1703	2422 025 17117	Connector 2p m
1703	2422 025 18737	Connector 2p m
1704	2422 025 16966	Connector 5p m SMD
1704	2422 025 18739	Connector 5p m
1706	2422 025 16702	Connector 5p m h
1706	2422 025 18752	Connector 5p m

2703	4822 124 23002	10µF 16V
2712	3198 017 41050	1µF 10V 0603
2713	2238 586 59812	100nF 20% 50V 0603
2714	2020 012 00003	470µF 16V 20% SMD
2715	2020 012 00003	470µF 16V 20% SMD
2718	3198 017 41050	1µF 10V 0603
2719	2238 586 59812	100nF 20% 50V 0603
2741	4822 126 13881	470pF 5% 50V
2742	4822 126 13881	470pF 5% 50V
2746	3198 017 41050	1µF 10V 0603

3701	4822 051 30332	3.3Ω 5% 0.062W
3702	4822 051 30332	3.3Ω 5% 0.062W
3706	4822 051 30103	10kΩ 5% 0.062W
3714	5322 117 13056	8.2kΩ 1% 0.063W 0603
3715	4822 117 12903	1.8kΩ 1% 0.063W 0603
3726	5322 117 13056	8.2kΩ 1% 0.063W 0603
3727	4822 117 12903	1.8kΩ 1% 0.063W 0603
3744	4822 051 30103	10kΩ 5% 0.062W
3746	4822 051 30103	10kΩ 5% 0.062W
3747	4822 051 30103	10kΩ 5% 0.062W
3748	4822 051 30103	10kΩ 5% 0.062W
3749	4822 051 30103	10kΩ 5% 0.062W
3750	4822 051 30682	6.8Ω 5% 0.062W
3751	4822 051 30682	6.8Ω 5% 0.062W

5709	4822 157 11716	Bead 30Ω at 100MHz
5710	4822 157 11716	Bead 30Ω at 100MHz

7703	9340 425 20115	BC847BS
7709	9322 206 09668	TDA7297D

Front IR / LED Panel [J]

Various

1870	4822 265 31067	Connector 7p m

2801	2020 552 96637	10µF 10% 6.3V 0805
2802	2020 552 96637	10µF 10% 6.3V 0805

3801	4822 051 30332	3.3Ω 5% 0.062W
3802	4822 051 30331	330Ω 5% 0.062W
3803	4822 051 30221	220Ω 5% 0.062W

6801	9322 192 35676	SPR-325MVW

7462	3139 127 02471	M24C02-WMN6T/DDC ASSY - 17 S1
7801	4822 130 60373	BC856B
7802	9322 207 16667	TSOP34836LL1B
7803	5322 130 60159	BC846B
7804	5322 130 60159	BC846B

11. Revision List

Manual xxxx xxx xxxx.0

- First release.