

Service Service Service



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240604

Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

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

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
Screen size	:
- 26PF4310/10	: 26" (66 cm), 15:9
- 26PF5320/10	: 26" (66 cm), 16:9
- 32PF5320/10	: 32" (82 cm), 16:9
- 32PF7320/10	: 32" (82 cm), 16:9
Resolution (HxV pixels)	:
- 26PF4310/10	: 1280 x 768
- 26PF5320/10	: 1366 x 768
- 32PF5320/10	: 1366 x 768
- 32PF7320/10	: 1366 x 768
Contrast ratio	:
- 26PF4310/10	: 500:1
- 26PF5320/10	: 600:1
- 32PF5320/10	: 600:1
- 32PF7320/10	: 600:1
Light output (cd/m ²)	:
- 26PF4310/10	: 400
- 26PF5320/10	: 500
- 32PF5320/10	: 500
- 32PF7320/10	: 500
Response time (ms)	:
- 26PF4310/10	: 16
- 26PF5320/10	: 16
- 32PF5320/10	: 18
- 32PF7320/10	: 18
Viewing angle (HxV degrees)	:
- 26PF4310/10	: 176x176
- 26PF5320/10	: 178x178
- 32PF5320/10	: 176x176
- 32PF7320/10	: 176x176
Tuning system	: PLL
TV Colour systems	: PAL B/G, D/K, I
	: SECAM B/G, D/K, L/L'
Video playback	:
- 26PF4310/10	: PAL B/G; SECAM L/L'
- 26PF5320/10,	:
- 32PF5320/10,	:
- 32PF7320/10:	: NTSC M/N 3.58, 4.43
	: PAL B/G
	: SECAM L/L'
Supported computer formats	: VGA (640x480)
	: MAC (640x480)
	: SVGA (800x600)
	: XGA (1024x768)
	: WXGA (1280x768)
Supported video formats	: 640x480i - 1fH
	: 720x576i - 1fH
	: 640x480p - 2fH
	: 720x576p - 2fH
	: 1920x1080i - 2fH
Presets/channels	: 100 presets
Tuner bands	: VHF
	: UHF
	: S-band
	: Hyper-band

1.1.2 Sound

Sound systems	: FM-mono
	: FM-stereo B/G
	: NICAM B/G, D/K, I, L
	: AV Stereo
Maximum power (W _{RMS})	:
- 26PF4310/10	: 2 x 5
- 26PF5320/10	: 2 x 5
- 32PF5320/10	: 2 x 15
- 32PF7320/10	: 2 x 15

1.1.3 Miscellaneous

Power supply:	
- Mains voltage (V _{AC})	: 95 - 240
- Mains frequency (Hz)	: 50 / 60
Ambient conditions:	
- Temperature range (°C)	: +5 to +40
- Maximum humidity	: 90% R.H.
Power consumption	
- Normal operation (W)	: ≈ 96
- Stand-by (W)	: < 1
Dimensions (WxHxD cm)	:
- 26PF4310/10	: 79.2 x 43.1 x 24.2
- 26PF5320/10	: 80.45 x 47.7 x 22.2
- 32PF5320/10	: 92.4 x 55.0 x 22.2
- 32PF7320/10	: 92.4 x 55.0 x 22.2
Weight (kg)	:
- 26PF4310/10	: 15
- 26PF5320/10	: 16
- 32PF5320/10	: 18.2
- 32PF7320/10	: 18.2

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 Side I/O connections

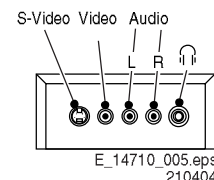


Figure 1-1 Side I/O connections

SVHS (Hosiden): Video Y/C - In

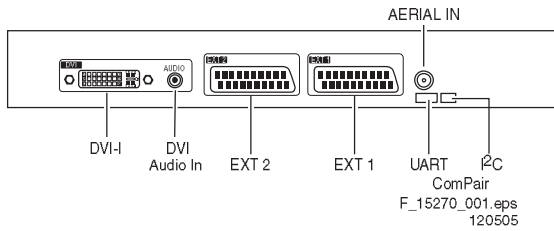
1	- Ground Y	Gnd	⏏
2	- Ground C	Gnd	⏏
3	- Video Y	1 V _{PP} / 75 ohm	⊕
4	- Video C	0.3 V _{PP} / 75 ohm	⊕

Cinch: Video CVBS - In, Audio - In

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

Mini Jack: Audio Head phone - Out

Bk - Head phone 32 - 600 ohm / 10 mW

**1.2.2 Rear Connections****Figure 1-2 Rear I/O****Aerial - In**

- IEC-type (EU) Coax, 75 ohm

**Mini Jack: PC-Audio - In**

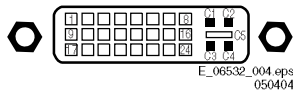
- | | | |
|-------------|--------------------------------|--|
| 1 - Ground | Gnd | |
| 2 - Audio L | 0.5 V _{RMS} / 10 kohm | |
| 3 - Audio R | 0.5 V _{RMS} / 10 kohm | |

Service connector (ComPair)

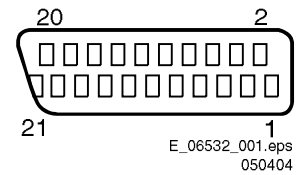
- | | | |
|------------|----------------------------------|--|
| 1 - SDA-S | I ² C Data (0 - 5 V) | |
| 2 - SCL-S | I ² C Clock (0 - 5 V) | |
| 3 - Ground | Gnd | |

Service connector (UART)

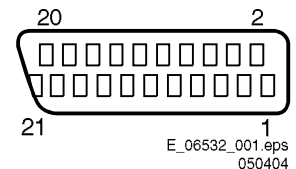
- | | | |
|-------------|----------|--|
| 1 - UART_TX | Transmit | |
| 2 - Ground | Gnd | |
| 3 - UART_RX | Receive | |

DVI-I: Digital/Analogue Video - In**Figure 1-3 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 |

EXT1: Video RGB - In, CVBS - In/Out, Audio - In/Out**Figure 1-4 SCART connector**

- | | | |
|-----------------------|--|--|
| 1 - Audio R | 0.5 V _{RMS} / 1 kohm | |
| 2 - Audio R | 0.5 V _{RMS} / 10 kohm | |
| 3 - Audio L | 0.5 V _{RMS} / 1 kohm | |
| 4 - Ground Audio | Gnd | |
| 5 - Ground Blue | Gnd | |
| 6 - Audio L | 0.5 V _{RMS} / 10 kohm | |
| 7 - Video Blue | 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 | Gnd | |
| 15 - Video Red | 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 Terr. CVBS | 1 V _{PP} / 75 ohm | |
| 20 - Video CVBS/Y | 1 V _{PP} / 75 ohm | |
| 21 - Shield | Gnd | |

EXT2: Video Y/C - in, CVBS - In/Out, Audio - In/Out**Figure 1-5 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 - n.c. | | |
| 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 - n.c. | | |
| 12 - n.c. | | |
| 13 - Ground Red | Gnd | |
| 14 - Ground | Gnd | |
| 15 - YC/C - in | 0.7 V _{PP} / 75 ohm | |
| 16 - n.c. | | |
| 17 - Ground Video | Gnd | |
| 18 - Ground | Gnd | |
| 19 - Video Mon. CVBS | 1 V _{PP} / 75 ohm | |
| 20 - YC/Y - in | 0.7 V _{PP} / 75 ohm | |
| 21 - Shield | Gnd | |

1.3 Chassis Overview

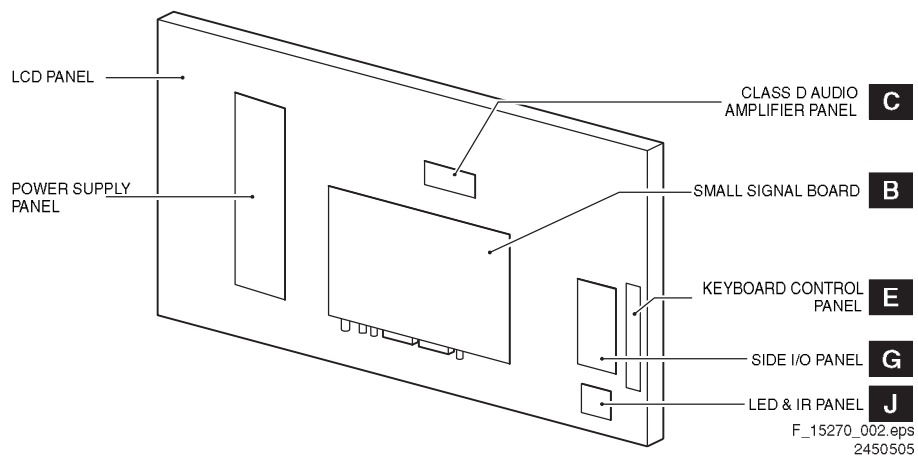


Figure 1-6 Chassis overview


2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions


Safety regulations require 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 (\perp), or hot ground (\perp), 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 (\sqcap) and without (\times) aerial signal. Measure the voltages in the power supply section both in normal operation (\textcircled{I}) and in stand-by (\textcircled{b}). 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 = $\times 10^{-6}$), nano-farads (n= $\times 10^{-9}$), or pico-farads (p= $\times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.3.3 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).

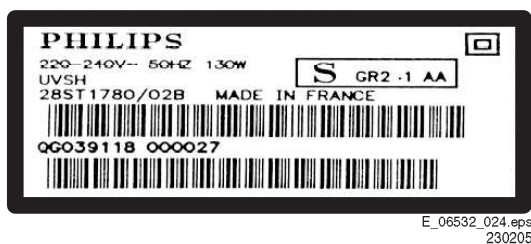


Figure 2-1 Serial number example

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 the mixing 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.

4. Mechanical Instructions

Index of this chapter:

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

Notes:

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

4.1 Cable Dressing

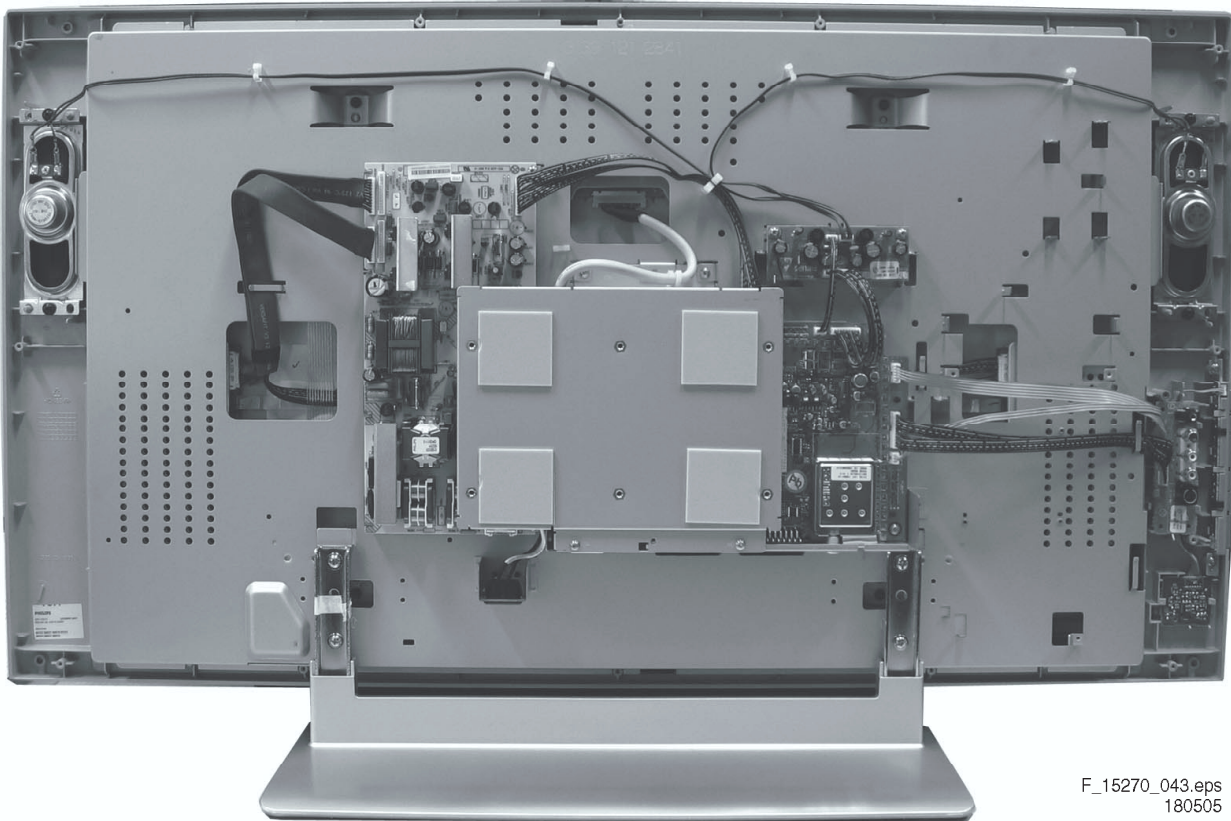


Figure 4-1 Cable dressing

4.2 Service Position

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

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

4.2.1 The Foam Bars

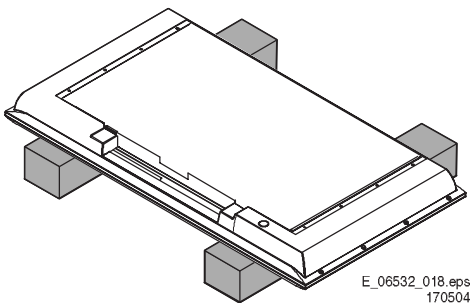


Figure 4-2 Foam bars

4.3 Assy/Panel Removal

4.3.1 Rear Cover

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

1. Remove the screws that secure the rear cover.
2. Lift the rear cover from the cabinet cautiously. Make sure that wires and other internal components are not damaged during cover removal.

4.3.2 Side I/O Panel

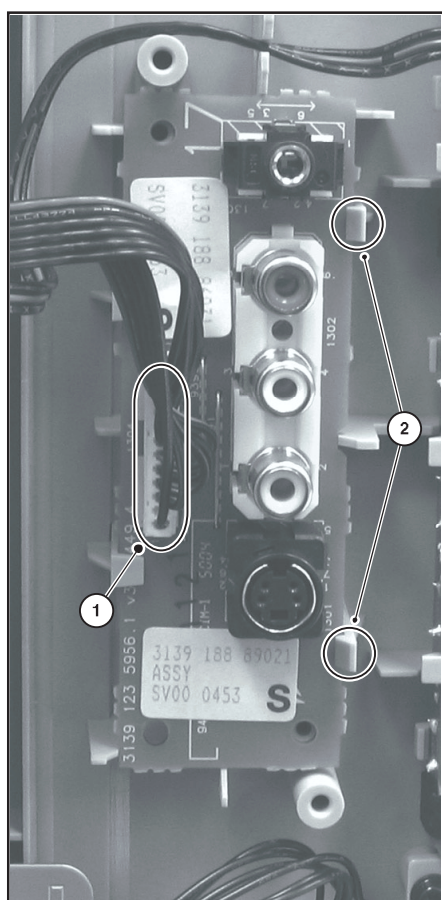


Figure 4-3 Side I/O panel

1. Disconnect the cable (1) from the panel.
2. Release the two fixation clamps (2) and lift the panel out of the bracket.

4.3.3 LED Panel

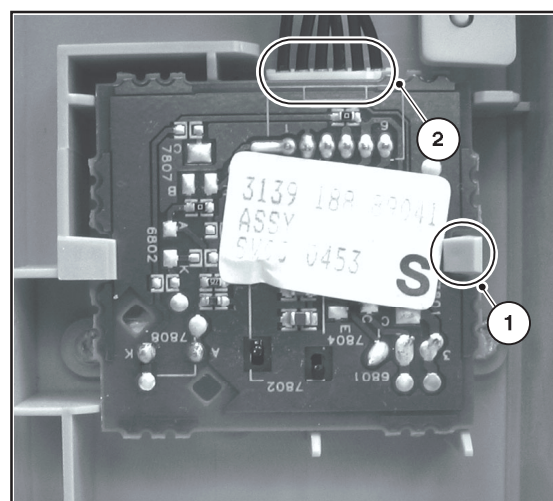


Figure 4-4 LED panel

1. Release the fixation clamp (1) and take the panel out of the bracket.
2. Disconnect the cable (2) from the panel.

4.3.4 Keyboard Control Panel

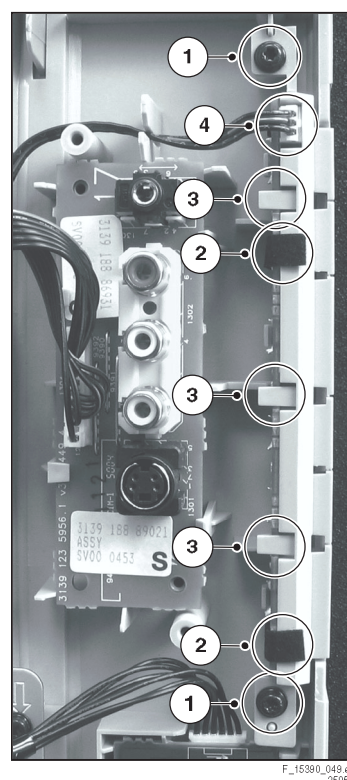


Figure 4-5 Keyboard control panel

1. Remove the two fixation screws (1) from the bracket and take out the panel/bracket combination.
2. Remove the fixation tape (2) from the panel/bracket combination.
3. Release the three fixation clamps (3) and lift the panel out of the bracket.
4. Disconnect the cable (4) from the panel.

4.3.5 SSB Board Cover Shield (depending on model)

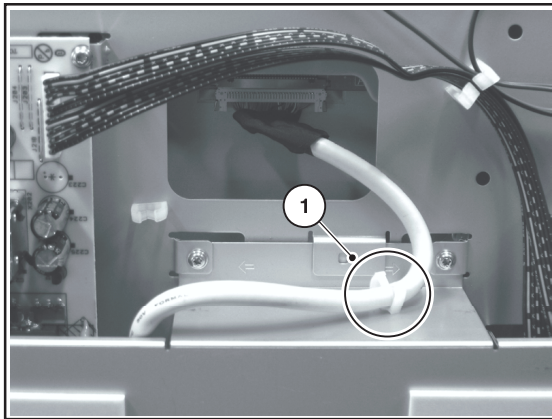
F_15270_044.eps
180505

Figure 4-6 Cable clip on cover shield

4.3.6 SSB Board

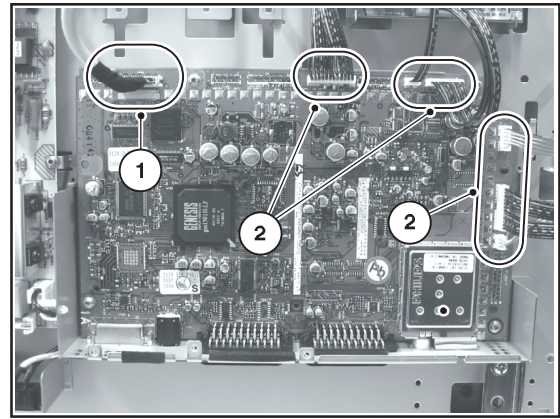
F_15270_046.eps
180505

Figure 4-8 SSB board connectors

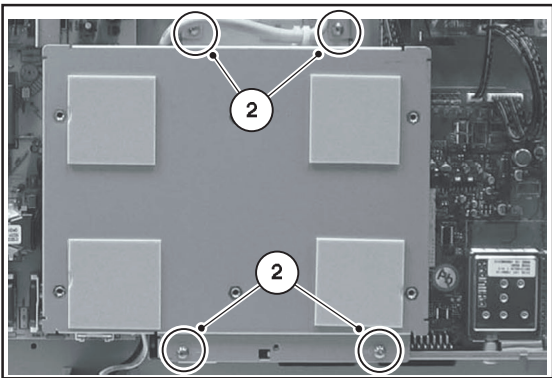
F_15270_045.eps
190505

Figure 4-7 SSB board cover shield

1. Release the cable from the plastic cable clip (1) on the shield (see Figure "Cable clip on cover shield" above).
2. Remove the four fixation screws (2, see Figure "SSB board cover shield"; the screws are also indicated by arrows on the shield) and remove the shield.

Notice that on one side, the shield is not only held by two screws, but also by two brackets (see Figure "Cable clip on cover shield" above).

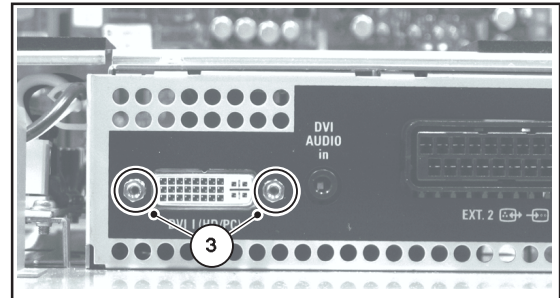
F_15270_047.eps
180505

Figure 4-9 DVI-I connector screws

1. Very **cautiously** disconnect the LVDS cable (1) from the panel (see Figure "SSB board connectors"). Notice that this cable is very fragile.
2. Disconnect the six remaining cables (2) from the panel.
3. Remove the fixation screws that secure the SSB board (depending on model) and also the two fixation screws (3) from the DVI-I connector on the SSB board (see Figure "DVI-I connector screws").
4. Take the panel out of its brackets.

4.3.7 Power Supply Panel (various models used)

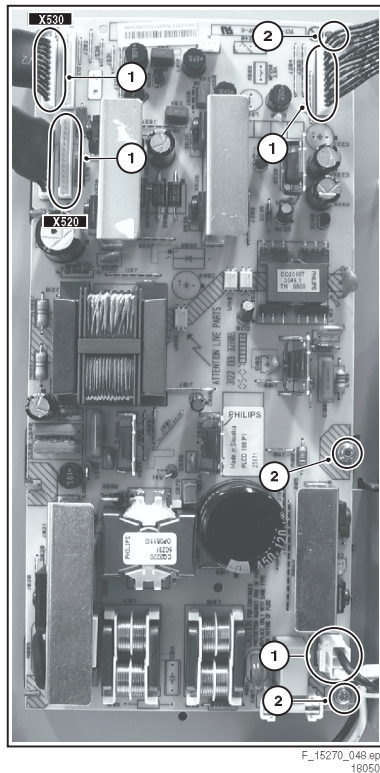
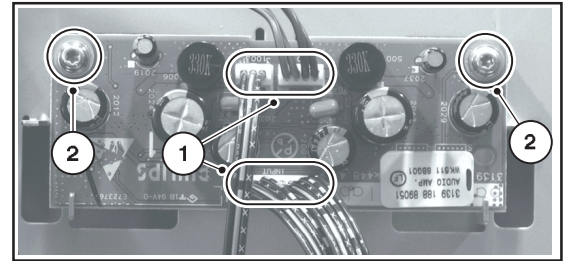


Figure 4-10 Power supply panel

1. Disconnect all cables (1) from the panel.
Notice that the two connectors for X520 and X530 on this panel are similar, and should not be mixed up later when they are reconnected (X520 is connected via its flatcable to connector CN01 on the LCD panel, near the R-speaker; X530 is connected via its flatcable to connector CN04 on the LCD panel, near the L-speaker).
2. Remove the three fixation screws (2) from the panel.
3. Take the panel out of its brackets.

4.3.8 Audio Amplifier Panel

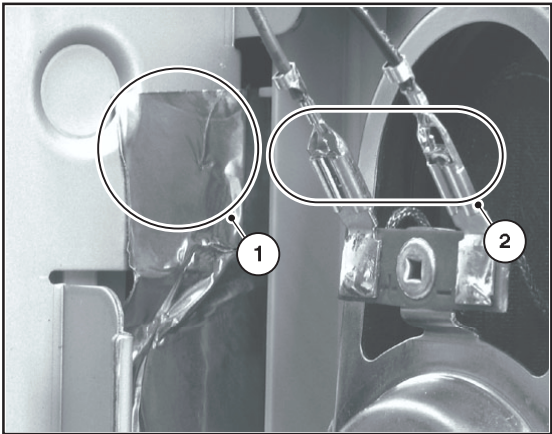


F_15270_049.eps
180505

Figure 4-11 Audio amplifier panel

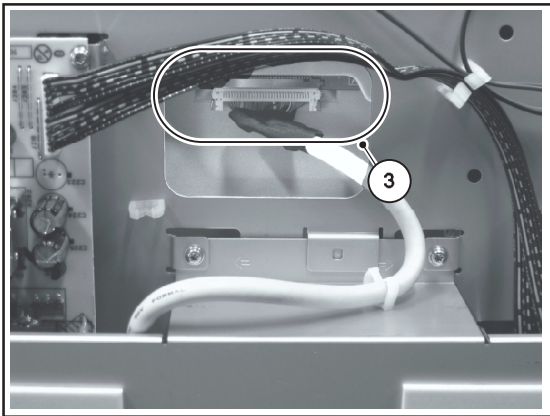
1. Disconnect all cables (1) from the panel.
2. Remove the fixation screws (2) from the panel.
3. Remove the panel.

4.3.9 LCD Panel



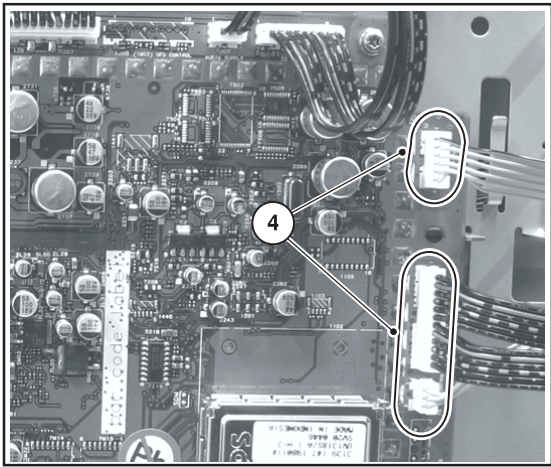
F_15390_047.eps
280205

Figure 4-12 Anti-static copper foil



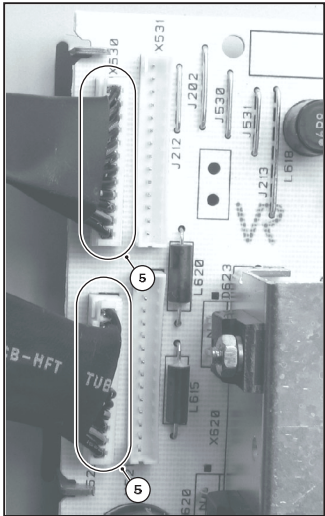
F_15270_051.eps
280205

Figure 4-13 LVDS connector



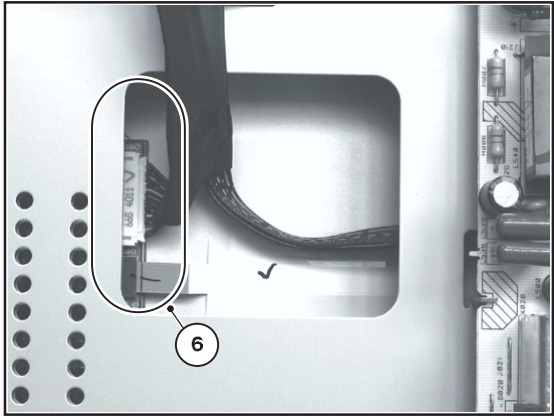
F_15270_052.eps
180505

Figure 4-14 SSB board connectors for side I/O, keyboard control, and LED



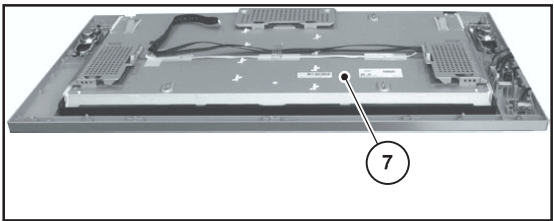
F_15390_052.eps
280205

Figure 4-15 Connectors X520 and X530 on power supply panel



F_15390_051.eps
280205

Figure 4-16 Connector 66B on LCD panel



F_15390_050.eps
280205

Figure 4-17 LCD panel

To remove the LCD-panel, carry out the following steps:

1. Cautiously pull back the upper parts of the anti-static copper foils next to the "L" and "R" loudspeakers (see Figure "Anti-static copper foil"). Do this in such a way that the foils are no longer attached to the metal ground plate on which the SSB board is mounted.
2. Disconnect the cables (2) from the "L" and the "R" loudspeakers (see Figure "Anti-static copper foil").
3. **Important:** Unplug the LVDS connector (3) on the LCD panel (see Figure "LVDS connector").
Be careful, as this is a very fragile connector!
4. Unplug the connectors (4) of the Side I/O panel, the Top Control panel, and the LED panel on the SSB board (see Figure "SSB board connectors for side I/O, keyboard control, and LED").
5. Unplug the X520 and X530 connectors (5) on the Power Supply board (see Figure "Connectors X520 and X530 on power supply panel"). Instead of X520, also connector 66B (6) on the other end of the flatcable can be unplugged (see Figure "Connector 66B on LCD panel").
6. Lift the metal frame (together with all PWBs) from the LCD panel.
Take care not to damage the fragile LVDS cable, the 66B connector and the anti-static copper foils near the "L" and "R" loudspeakers (take care of this too when later re-assembling the TV set and replacing the copper foil).
7. After removal of the metal frame, you can lift the LCD display (7) from its plastic frame (see Figure "LCD panel").
8. If the plastic frame is damaged, replace it by a new frame, after removing the loudspeakers, the Side I/O panel, the Top Control panel, and the LED panel.

4.4 Set Re-assembly

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

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original positions. See Figure "Cable dressing". Also make sure that the anti-static copper foils are not damaged and that they make good electrical contact with the metal frame. Be careful with the fragile LVDS cable.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

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

5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or lxxx.

Perform measurements under the following conditions:

- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

5.2 Service Modes

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

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the possibilities 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.

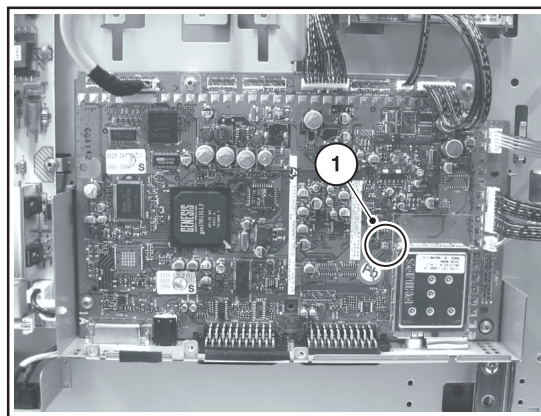
Specifications

- 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 TV 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 +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.
- Or via ComPair.



F_15270_053.eps
180505

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.

```
00035 LC4XEP1 1.08/S4XGVX 1.10 SDM
ERR 0 0 0 0 0
OP 000 057 140 032 120 128 000
```

F_15270_003.eps
1250505

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

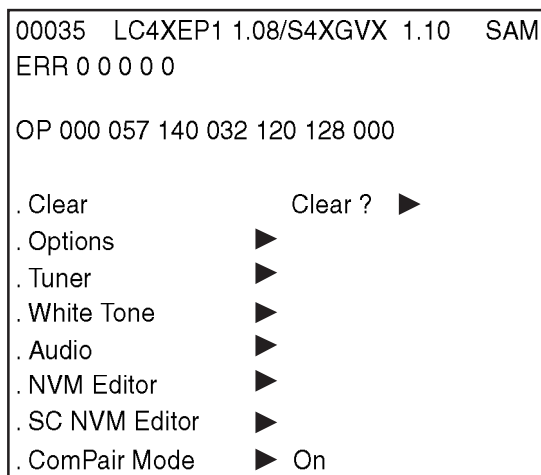
- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- AKB switching.
- Software alignments (Tuner, White Tone, Geometry & Audio).
- NVM Editor.
- ComPair Mode switching.

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/INFO(I+) button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

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



F_15270_004.eps
250505

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 (LC04.x).
 - **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).
3. **EEEE-F.GG**. This is the software identification of the Scaler:
 - **EEEE**= the scaler sw cluster
 - **F**= the main sw version no.
 - **GG**= the sub-version no.
4. **SAM**. Indication of the Service Alignment Mode.
5. **Error Buffer**. Shows all errors detected since the last time the buffer was erased. Five errors possible.
6. **Option Bytes**. Used to set the option bytes. See "Options" in the Alignments section for a detailed description. Seven codes are possible.
7. **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.
8. **Options**. Used to set the option bits. See "Options" in the Alignments section for a detailed description.
9. **Tuner**. Used to align the tuner. See "Tuner" in the Alignments section for a detailed description.
10. **White Tone**. Used to align the white tone. See "White Tone" in the Alignments section for a detailed description.
11. **Audio**. No audio alignment is necessary for this television set.
12. **NVM Editor**. Can be used to change the NVM data in the television set. See table "NVM data" further on.
13. **SC NVM Editor**. Can be used to edit Scaler NVM.
14. **ComPair**. 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:

```

1 00035 LC4XEP1 1.08/S4XGVX 1.10 CSM
2 CODES 0 0 0 0 0
3 OP 000 057 140 032 120 128 000
4
5
6 NOT TUNED
7 PAL
8 STEREO
9 CO 50 CL 50 BR 50
0 AVL Off

```

E_15270_005.eps
120505

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 COLOR.
6. Press the MENU RIGHT key to increase the COLOR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

Menu Text not Sharp Enough

If:

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

Then:

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

5.4 ComPair

5.4.1 Introduction

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

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I²C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I²C commands yourself because ComPair takes care of this.

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

5.4.2 Specifications

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

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

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

5.4.3 How to Connect

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

CAUTION: It is compulsory to connect the TV to the PC as shown in the picture below (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

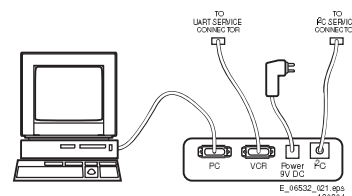


Figure 5-5 ComPair interface connection

5.4.4 How to Order

ComPair order codes (EU/AP/LATAM):

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (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.

5.5 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	Mis-match of TV Hercules SW and Scaler SW	-	-
2	Not applicable	-	-	-
3	Not applicable	-	-	-
4	Genesis Scaler Flash-ROM	I ² C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/empty	7801 7B01	B7 + B8 B10
5	Scaler supply 7752	+5V protection	7752	B6
6	Not applicable	General I ² C error	1102, 7L04, 7M00	B1 + B18 + B19
7	ADC	I ² C error	7L04	B18
8	Scaler EEPROM	I ² C error while communicating with the Scaler EEPROM	7C01	B11
9	Hercules EEPROM	I ² C error while communicating with the Hercules EEPROM (NVM for TV). Remark: when the Hercules EEPROM is defective, the Hercules should operate with its default values.	7207	B2
10	Tuner	I ² C error while communicating with the PLL tuner	1102, F102, F104, F107	B1
11	Columbus	I ² C error while communicating with the 2D/3D combfilter Columbus	7M00	B19
12	Not applicable	-	-	-
13	HDMI Panellink Receiver/ Decoder	I ² C error while communicating with the iBoard HDMI Panellink Receiver/Decoder (only in NAFTA and AP sets)	7D03	B12 (only in NAFTA and AP sets)
14	Scaler SDRAM	Read-write error with the Scaler SDRAM	7B01	B10
15	Not applicable	-	-	-
16	EPLD	I ² C error while communicating with EPLD	7N02	B20 + B21
17	Digital Module (only on Digital sets)	I ² C error while communicating with the Digital Module (only on Digital sets)	Digital Module (only on Digital sets)	
18	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 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 with 12 short blinks.

5.7 Fault Finding and Repair Tips

Notes:

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

5.7.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

Caution:

- **Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!**
- **Do not change the Scaler NVM settings, as this will hamper the DVI functionality of the TV set!**
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 5-2 NVM editor overview

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

Table 5-3 NVM Default values (option bit settings through NVM Editor in SAM Mode)

Byte Nr.	Bit	Feature/Mode	Description	32PF7320/10	32PF5320/10	26PF5320/10	26PF4310/10
Byte 0 174(dec)	0	QSS (LSB)	Mode of quasi split sound amplifier	1	1	1	1
	1	FMI	Connection of output of QSS amplifier	1	1	1	1
	2	HCO	EHT tracking mode	0	0	0	0
	3	HP2	Synchronization of OSD/Text display	1	1	1	1
	4	FSL	Forced slicing level for vertical sync	1	1	1	1
	5	TFR	DC transfer ratio of luminance signal	1	1	1	1
	6	OSVE	Black current measuring in overscan	0	0	0	0
	7	MVK (MSB)	(For Future Usage, as defined by software)	0	0	0	0
		Total Dec Values		59	59	59	59
		Total Hex Values		3B	3B	3B	3B
Byte 1 175(dec)	0	PSE	PSE	0	0	0	0
	1	OPC	OPC	0	0	0	0
	2	PRIS	PRIS	0	0	0	0
	3	CONTINUOUS FACTORY	Continuous factory mode	0	0	0	0
	4	WHITE PATTERN ON	Last color pattern status in factory mode	0	0	0	0
	5	SDM MODE	Service default mode on/off	0	0	0	0
	6	SAM MODE	Service Align mode on/off	0	0	0	0
	7	SVMA	Scavm On / Off	0	0	0	0
		Total Dec Values		0	0	0	0
		Total Hex Values		00	00	00	00
Byte 2 176(dec)	0	MUTE STATUS	Mute status	0	0	0	0
	1	TUNER AUTO MODE	Auto mode	1	1	1	1
	2	CABLE MODE	Cable/Antenna mode	0	0	0	0
	3	LAST POWER MODE	Last power status of the set	1	1	1	1
	4	CHILD LOCK MODE	Child lock enabled	0	0	0	0
	5	SURF MODE	Surf mode on/off	0	0	0	0
	6	FACTORY MODE	Factory mode on	0	0	0	0
	7	PSNS	For PAL color enhancement in ES4	1	1	1	1
		Total Dec Values		138	138	138	138
		Total Hex Values		8A	8A	8A	8A
Byte 3 177(dec)	0	RADIO/TV MODE	Radio mode or TV mode	0	0	0	0
	1	WAKE-UP MODE	WAKE-UP MODE	0	0	0	0
	2	HOTEL MODE	TV in Hotel mode	0	0	0	0
	3	HOTEL KBD LOCK	Keyboard locked	0	0	0	0
	4	HBL	HBL	0	0	0	0
	5	BLS	Blue stretch mode	1	1	1	1
	6	SL	SL	0	0	0	0
	7	CFA0	Comb filter On/Off	0	0	0	0
		Total Dec Values		32	32	32	32
		Total Hex Values		20	20	20	20
Byte 4 178(dec)	0	Signal Strength	Signal Strength Switch in MK2	0	0	0	0
	1	LPG	LPG	0	0	0	0
	2	DVD TRAY LOCK	Lock/Unlock DVD tray	0	0	0	0
	3	SCRSAVER MODE	Screen saver mode	1	1	1	1
	4	BKS	Black Stretch Mode	1	1	1	1
	5	BSD	Black Stretch Depth	1	1	1	0
	6	CRA0	Coring on SVM	1	1	1	1
	7	PIP QSS	PIP QSS	0	0	0	0
		Total Dec Values		120	120	120	88
		Total Hex Values		78	78	78	58

Byte Nr.	Bit	Feature/Mode	Description	32PF7320/10	32PF5320/10	26PF5320/10	26PF4310/10
Byte 5 179(dec)	0	FFI	Fast Filter	0	0	0	0
	1	NNR	No red reduction during blue stretch	1	1	1	1
	2	MUS	NTSC matrix	1	1	1	1
	3	GAM	Gamma control	1	1	1	1
	4	CBS	Control sequence of beam current limiting	0	0	0	0
	5	LLB	Low level of beam current limiter	0	0	0	0
	6	DSA	Dynamic skin tone angle area	1	1	1	0
	7	DSK	Dynamic skin tone angle on/ off	0	0	0	1
		Total Dec Values		78	78	78	142
		Total Hex Values		4E	4E	4E	8E
Byte 6 180(dec)	0	LTI status	LTI last status	0	0	0	0
	1	Inc_Life_Time	Inc_Life_Time	0	0	0	0
	2	PC_Mode	PC_Mode	0	0	0	0
	3	HD_Mode	HD_Mode	0	0	0	0
	4	Tact_Switch	Tact_Switch	0	0	0	0
	5	Set_In_Special_Stby	Set_In_Special_Stby	0	0	0	0
	6	Hotel_OSDDisplay	Hotel_OSDDisplay	0	0	0	0
	7	Hotel_MonitorOut	Hotel_MonitorOut	0	0	0	0
		Total Dec Values		0	0	0	0
		Total Hex Values		00	00	00	00
Byte 7 181(dec)	0	Hotel_IconMode	Hotel_IconMode	0	0	0	0
	1	DBE	DBE	1	1	1	1
	2	SD	SD	0	0	0	0
	3	Set_in_PC_Sleep_Mode	Set_in_PC_Sleep_Mode	0	0	0	0
	4	Reserved	Reserved	0	0	0	0
	5	Reserved	Reserved	0	0	0	0
	6	Reserved	Reserved	0	0	0	0
	7	Reserved	Reserved	0	0	0	0
		Total Dec Values		2	2	2	2
		Total Hex Values		02	02	02	02

5.7.2 Load Default NVM Values

In case a blank NVM is placed or when the NVM content is corrupted, default values can be downloaded into the NVM. (For empty NVM replacement, short the SDM with a jumper and apply the mains voltage. Remember to remove the jumper after the reload is completed). After the default values are downloaded, it will be possible to start up and to start aligning the TV set. This is no longer initiated automatically; to initiate the download the following action has to be performed:

1. Switch "off" the TV set by disconnecting the AC Power plug.
2. Short circuit the SDM jumpers (keep short-circuited).
3. Press P+ or Ch+ on the local keyboard (and keep it pressed).
4. Switch on the TV set via the AC Power plug.
5. Keep pressing the P+/Ch+ button until the set has started up and the SDM is shown.

Alternative method:

1. Go to SAM.
2. Select NVM Editor (not SC NVM Editor).
3. Select ADR (address) to 1 (dec).
4. Change the VAL (value) to 170 (dec).
5. Store the value.
6. Disconnect the mains plug and wait for a few seconds.
7. Reconnect the mains plug and wait until the set goes into its standby mode (red LED lights up).
8. Restart the set.

5.7.3 Tuner and IF

No Picture in RF Mode, but there is a Noise Raster

1. Check whether picture is present in AV. If not, go to Video processing troubleshooting section.
2. If present, check if the Option settings are correct.
3. Check if all the supply voltages are present (3.3/5/8/12/33 V).
4. Check if the I²C lines are working correctly (3.3 V).
5. Manually store a known channel and check if there is IF output at Tuner pin 11.
6. Check the tuning DC voltage at pin 2 of the Tuner. The DC voltage should vary according to the frequency/channel being chosen.
7. If the tuning voltage is OK, check the tuner output, pin 11.
8. If it has no output, the Tuner may have a defect. Change the 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

Check whether a Service jumper (#4204 & 4205, 0805 size) is present. If yes, remove it.

5.7.4 Video Processing

No Power

1. Check +12 V and 3V3 at position 1J02.
2. If no supply, check the connector 1J02.
3. If it is correct, check the power supply board.

Power Supply is Correct, but no Green LED

1. Check if the connectors 1K00 are properly inserted.
2. If they are inserted correctly, check if the 3V3 is present.

No Picture Display (blank screen with correct sound output)

1. Check whether the user menu is visible.
2. If the user menu is OK, activate teletext mode.
3. If teletext is OK, the problem is in the ADC (B18) & Columbus 3D combfilter (B19), if present (depending on model, see also paragraph "Teletext Path" in chapter 9).
4. If the user menu is not visible, check if the LCD panel backlight is ON.
5. If the backlight is OFF, the problem is in the power supply board or LCD panel. Also check pin 12 (LAMP_ON_OFF) of 1J02. It should be HIGH during normal operation.

Note: For faultfinding purposes, it is important to know the following: in Pixel Plus and Digital Crystal Clear models, which have an ADC (B18) and Columbus 3D combfilter (B19), the digital input of the scaler is used for the digital video path (Hercules output), whereas the analogue RGB input (analogue input of the scaler) is only used for teletext. This means that no mixed mode (video plus teletext simultaneously) is possible. If there is sound and teletext, but no video and user menu (blank screen), the digital path (Hercules - ADC - Columbus - Scaler) is faulty. If there is sound but no teletext, the back-end part (Scaler - LCD panel) is faulty. In Crystal Clear models, which do not have an ADC and Columbus, the RGB path (analogue input of scaler) is used for both video and teletext.

No TV, but PC is Present

1. Check if Hsync_SDTV and Vsync_SDTV are present at pin 1 & pin 13 of 7E03.
2. If they are present, check teletext output.
3. If there is no teletext output, the IC TDA150xx may be defect.

5.7.5 Power Supply

Check Fuse

The power supply (various models are used) contains one fuse near the AC input connector X002.

1. Check with power supply in "off" state by means of ohmic measurement.
2. Fuse X102 may open in case of severe lightning strikes and/or failures in the power supply.
3. Check the standby signal at pin 10 of X200. ON is HIGH, OFF is LOW. During standby mode only the 3V3 is present at pin 10.

Protections Concept on Power Supply Board (two models)

1. **12 V output (pin 8 of X200):** Short-circuit protected by 2.5 A fuse X610. Over-voltage protection when output voltage is more than 40% above nominal value.
2. **Vaudio output (+18 or +24 V, depending on power supply model used); (pin 1 of X200):** Short-circuit proof (+18 V version has 2.5 A fuse X660). Over voltage protection when output voltage is more than 40% above nominal value.
3. **3V3STBY output (pin 3&4 of X200):** Short-circuit proof with auto-restart. Over voltage protection when output voltage is more than 40% above nominal value.

4. **24 V output (for inverter X520 & X530):** Short-circuit proof with auto-restart. Over voltage protection when output voltage is more than 40% above nominal value.

Standby Mode

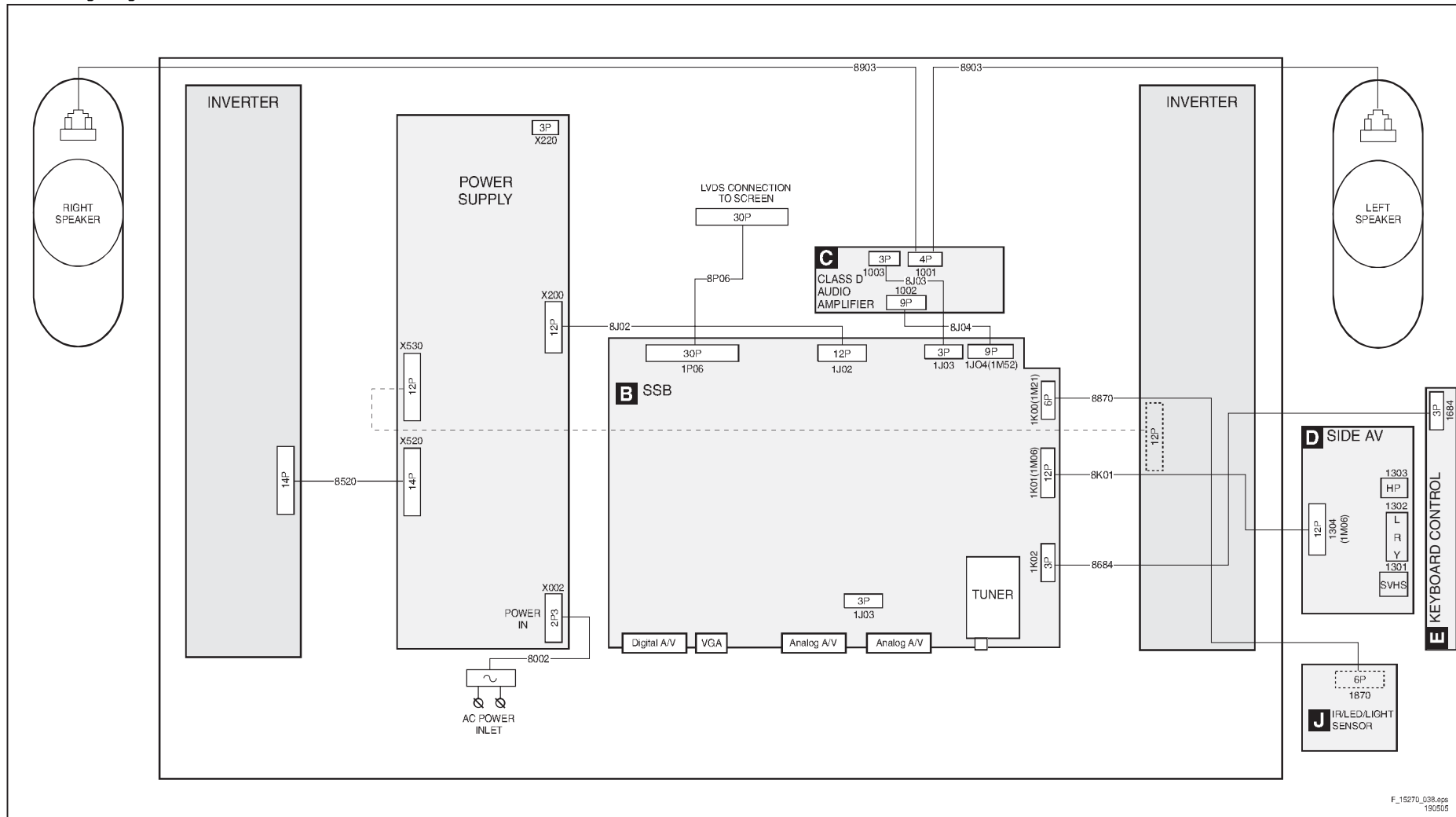
1. Apply a 12 ohm load resistor of sufficient power rating to all outputs mentioned above (+12 V, +18/ 24 V, +3V3 and +24 V). Connect the STBY pin (pin 10 of X200) to logical "L" (low), i.e. to GND.
2. Over an input voltage range of 90 V_{AC} to 276 V_{AC} only the +3V3 STBY output shall be up.

Normal Mode:

1. Apply a 12 ohm load resistor of sufficient power rating to all outputs mentioned above (+12 V, +18/ 24 V, +3V3 and +24 V). Connect the STBY pin (pin 10 of X200) to logical "H" (high), i.e. to the +3V3 STBY output via a 2,2 k pull up resistor.
2. Over an input voltage range of 90 V_{AC} to 276 V_{AC} all outputs shall be up. The voltage on the +3V3 STBY output shall be 3.3 V over the entire input voltage range. The voltage on the big 400 V capacitor on the power supply should also be 400 V $\pm 10\%$.

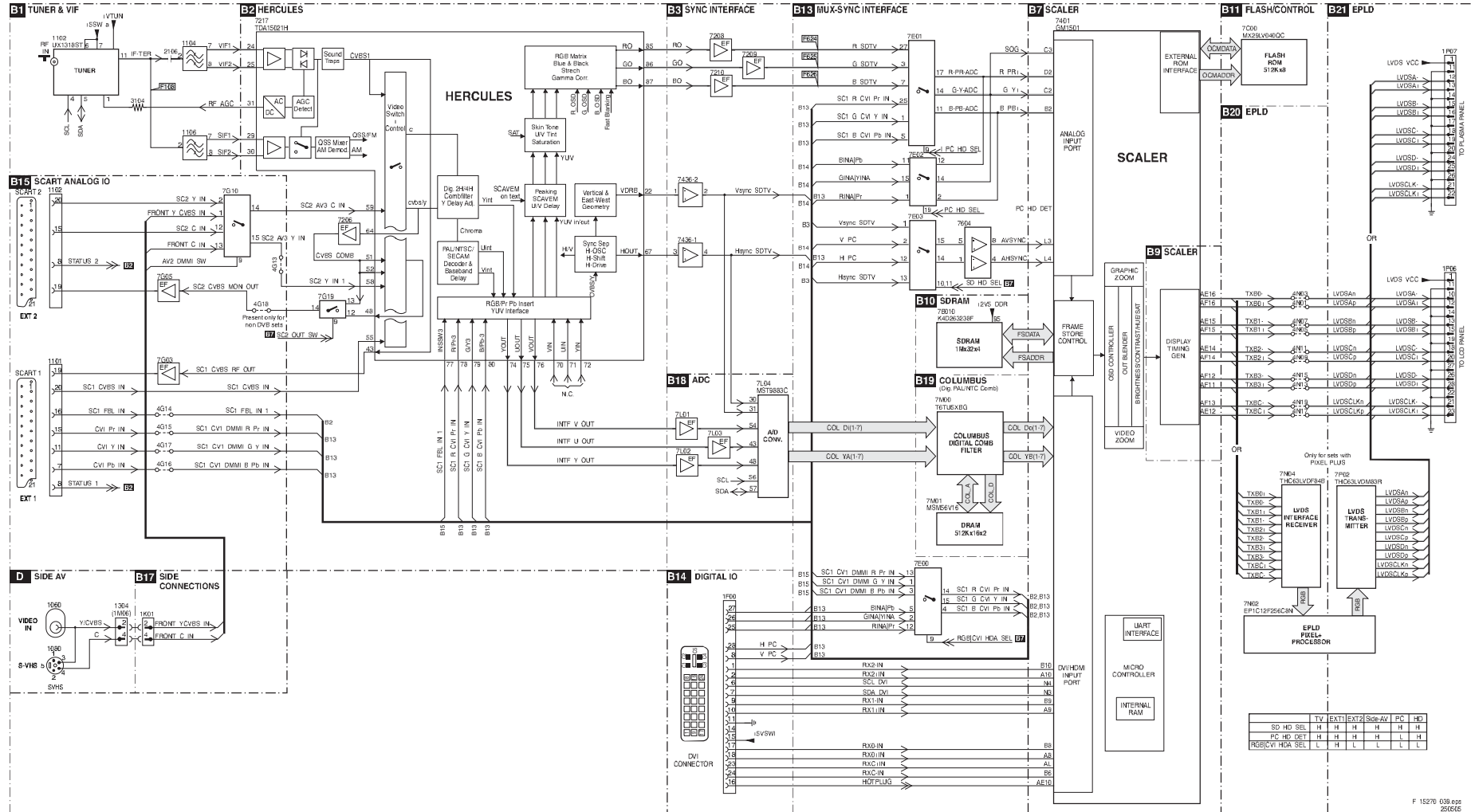
6. Block Diagrams, Testpoint Overviews, and Waveforms

Wiring Diagram



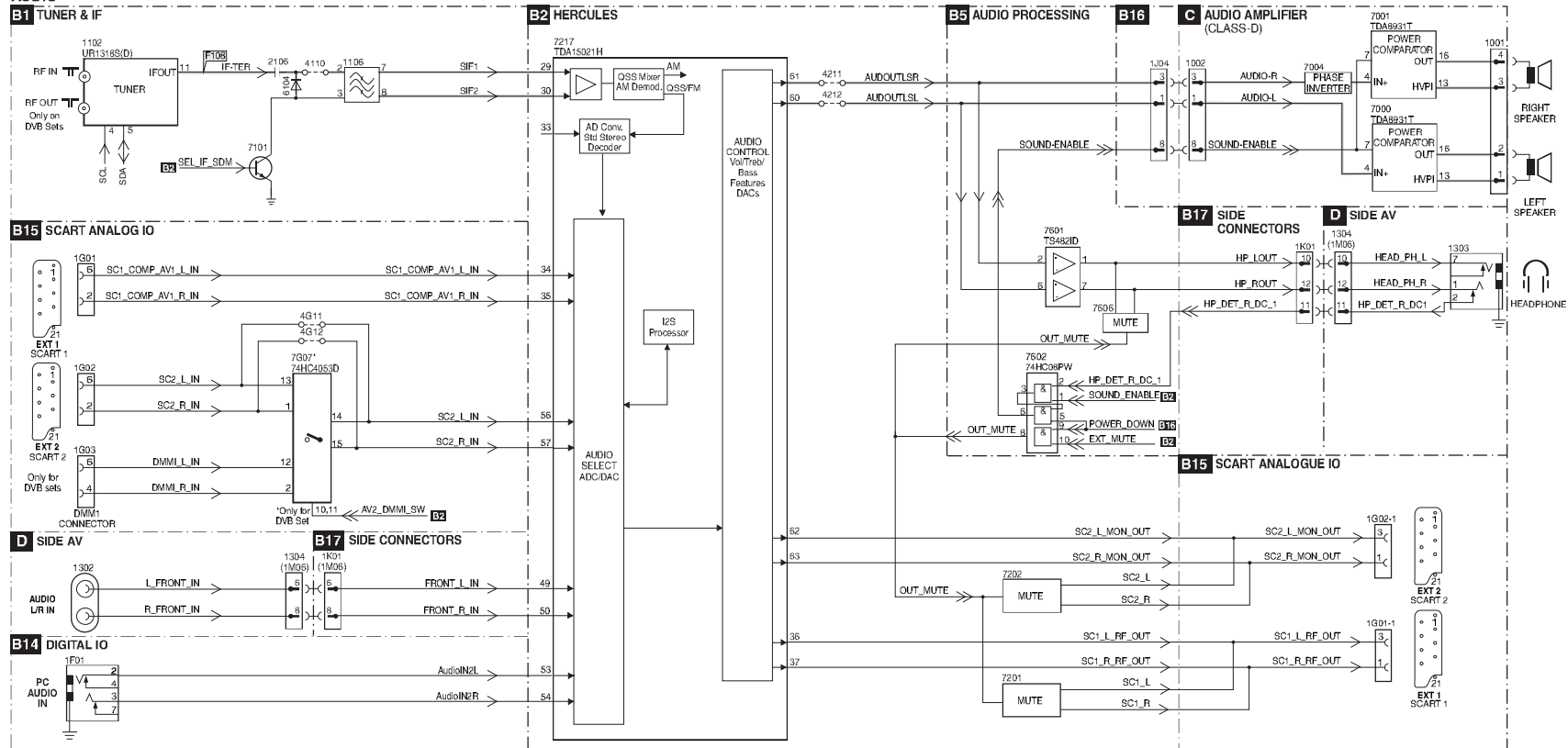
Block Diagram Video

VIDEO

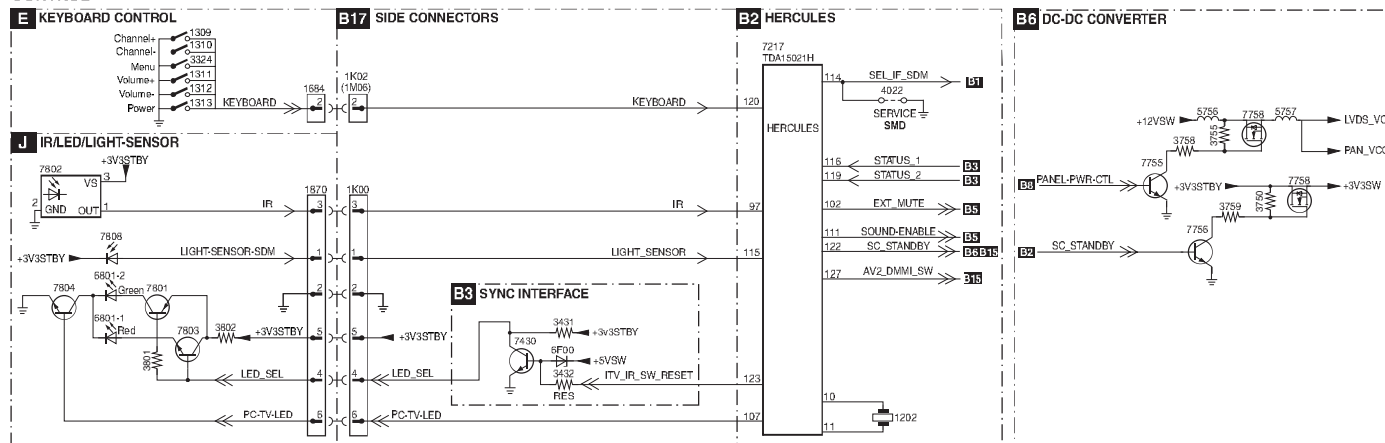


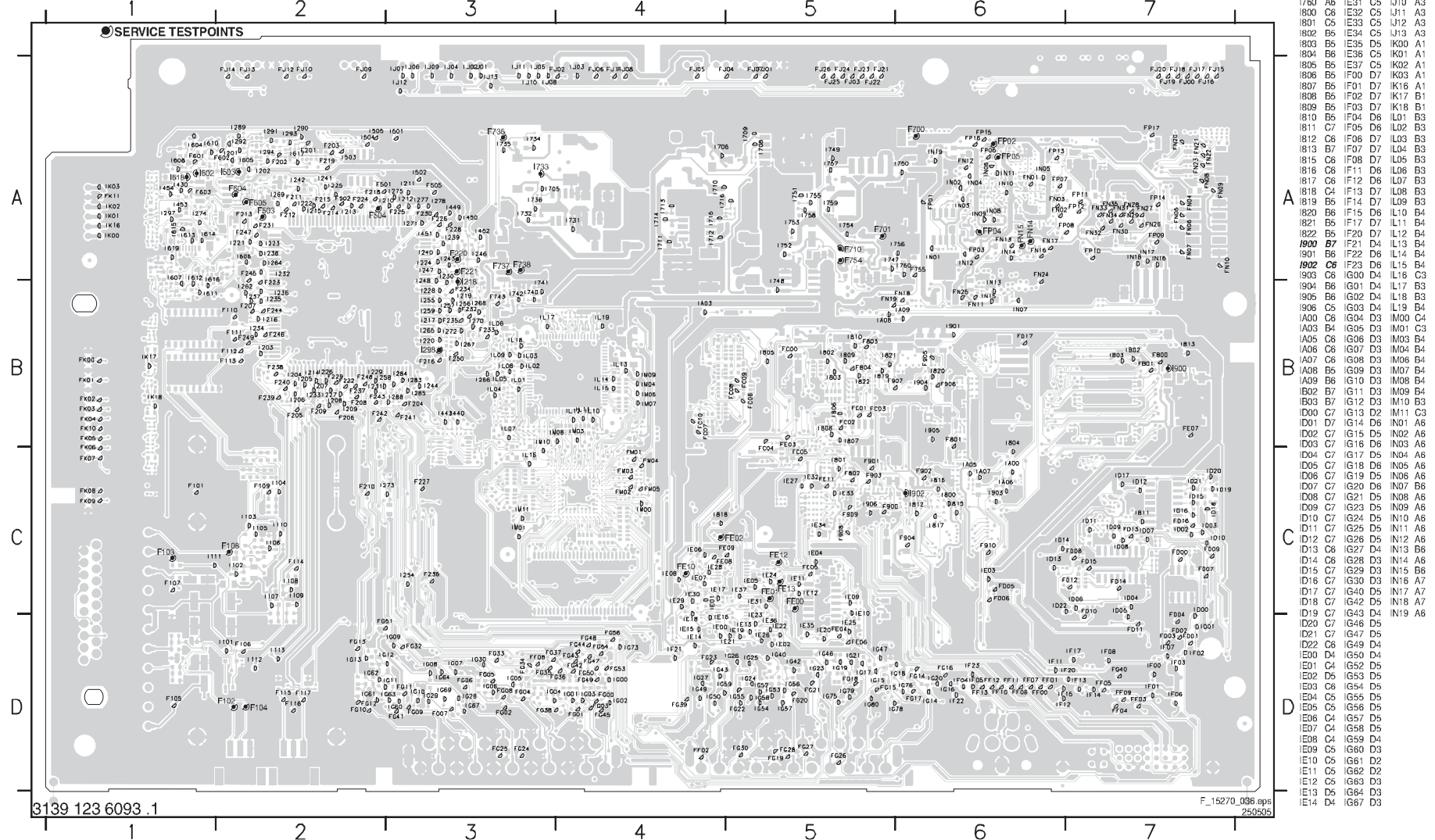
Block Diagram Audio

AUDIO



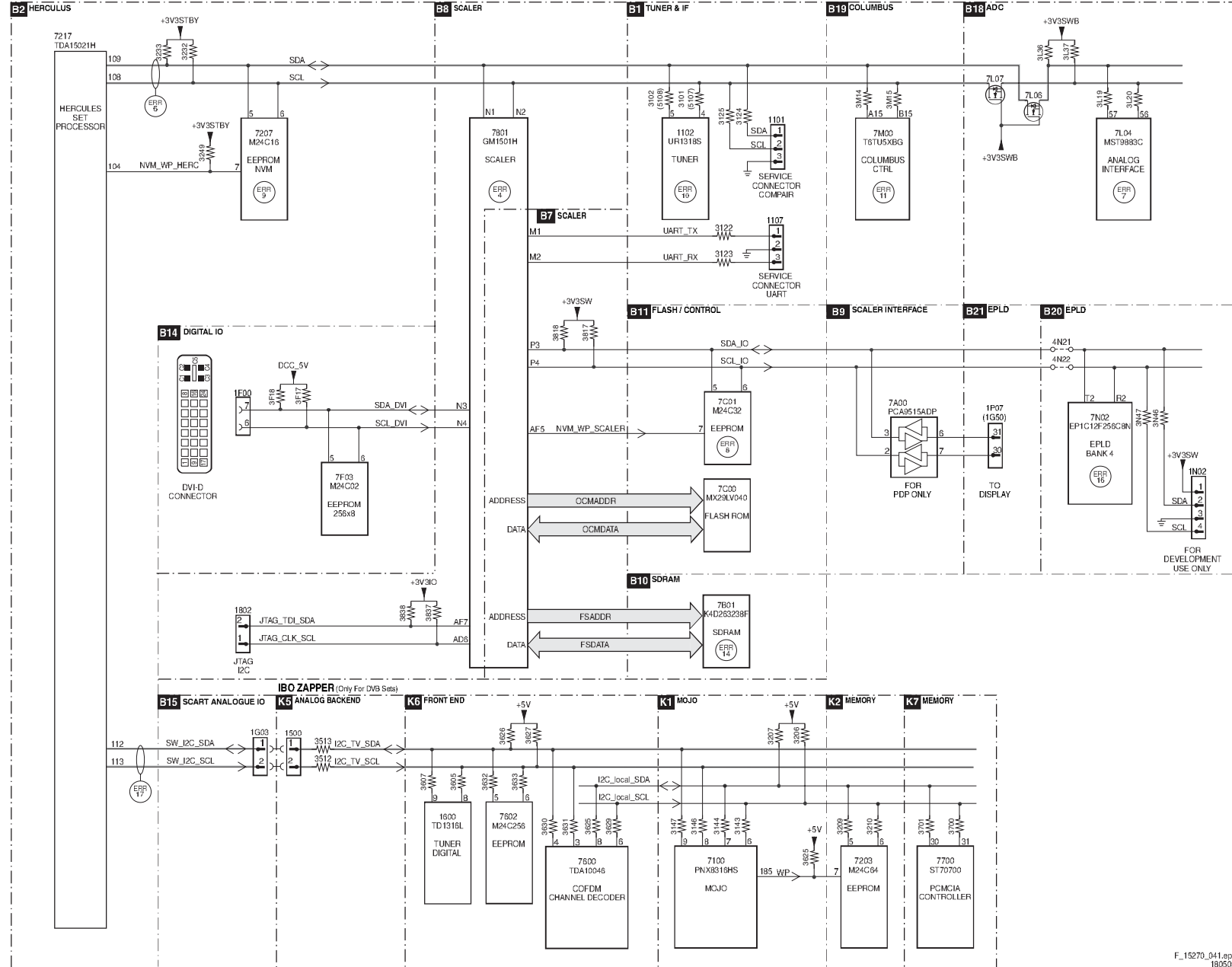
CONTROL



[illegible]

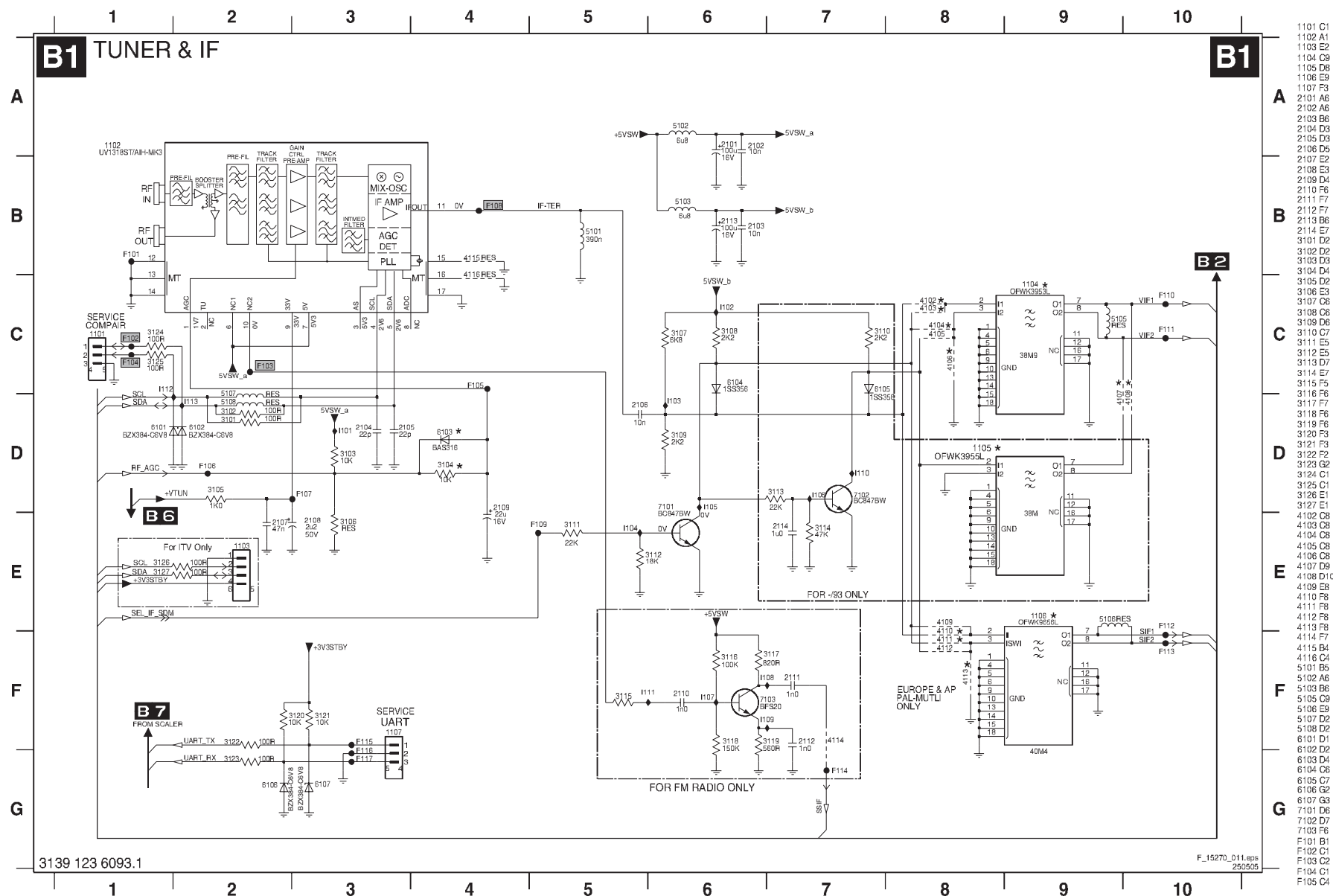
I2C IC Overview

IIC

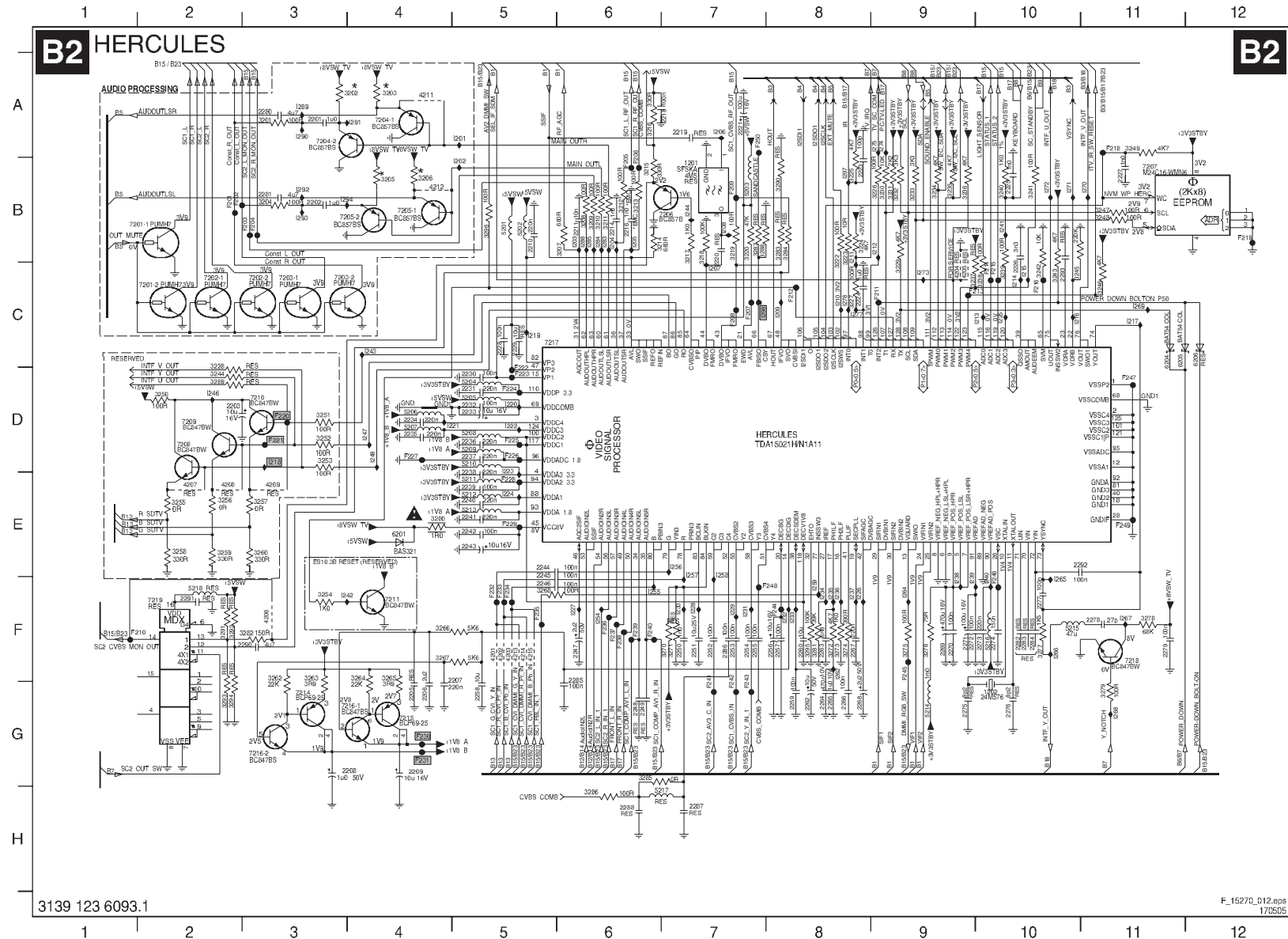


SUPPLY LINE OVERVIEW





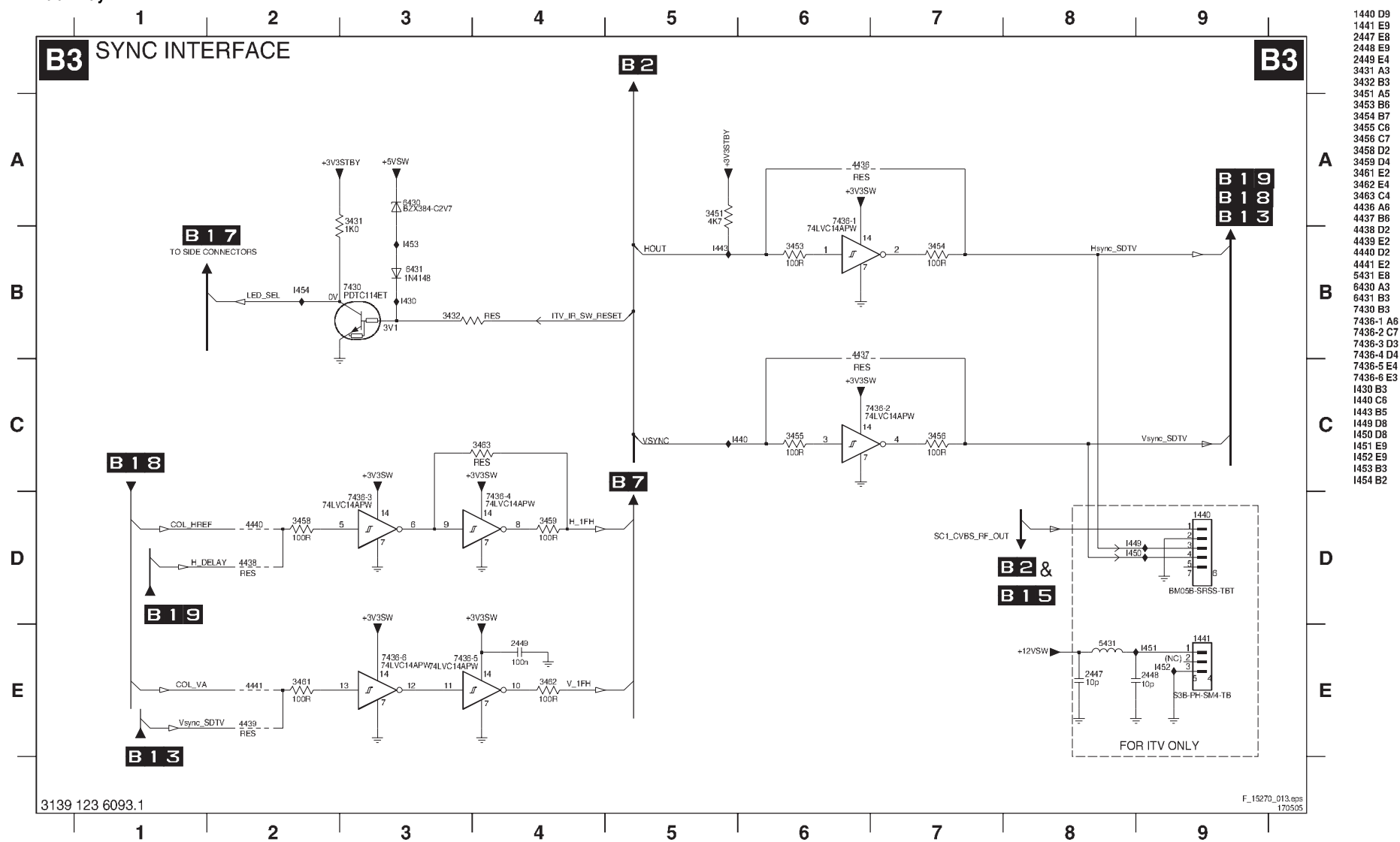
B2 HERCULES



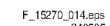
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170505

1201	3215 B6	5209 D6	D216 C10
1202	3216 A0	5210 B7	D217 C11
1203	3217 B7	5211 E5	D218 D3
1204	3218 B7	5212 C1	D219 C5
1205	3219 B7	5213 E5	D220 D5
1206	3220 B8	5214 F9	D221 D5
1207	3221 B8	5215 F10	D222 D5
1208	3222 B8	5216 F10	D223 D5
1209	3223 B8	5217 H7	D224 E5
1210	3224 B8	5218 F2	D225 C10
1211	3225 B8	5219 C1	D226 F8
1212	3226 B8	5220 C1	D227 F8
1213	3227 B9	5221 C2	D228 F7
1214	3228 B9	5222 C2	D229 F7
1215	3229 B9	5223 C2	D230 F7
1216	3230 B9	5224 C2	D231 F7
1217	3231 B9	5225 C2	D232 F7
1218	3232 B9	5226 C2	D233 F8
1219	3233 B9	5227 C3	D234 F8
1220	3234 B9	5228 C3	D235 F8
1221	3235 B9	5229 C3	D236 F8
1222	3236 B9	5230 C3	D237 F8
1223	3237 C0	5231 C4	D238 F9
1224	3238 C0	5232 C4	D239 F9
1225	3239 C0	5233 C4	D240 F9
1226	3240 C0	5234 C4	D241 F9
1227	3241 C0	5235 C4	D242 F9
1228	3242 C0	5236 C4	D243 C4
1229	3243 C0	5237 C4	D244 C4
1230	3244 C0	5238 C4	D245 C4
1231	3245 C1	5239 C4	D246 D4
1232	3246 C1	5240 C4	D247 D4
1233	3247 C1	5241 C4	D248 D4
1234	3248 C1	5242 C4	D249 D4
1235	3249 C1	5243 C4	D250 D4
1236	3250 C2	5244 C5	D251 E7
1237	3251 C3	5245 F1	D252 E7
1238	3252 C3	5246 F1	D253 E7
1239	3253 C3	5247 F1	D254 F6
1240	3254 C3	5248 F1	D255 F6
1241	3255 C3	5249 F1	D256 F6
1242	3256 C3	5250 F1	D257 F6
1243	3257 C3	5251 F2	D258 F8
1244	3258 C3	5252 F2	D259 F8
1245	3259 C3	5253 F2	D260 F8
1246	3260 C3	5254 F2	D261 F8
1247	3261 C3	5255 F2	D262 F8
1248	3262 C3	5256 F2	D263 F8
1249	3263 C3	5257 F2	D264 F8
1250	3264 C3	5258 F2	D265 F8
1251	3265 C3	5259 F2	D266 F8
1252	3266 C3	5260 F2	D267 F8
1253	3267 C3	5261 F2	D268 F8
1254	3268 C3	5262 F2	D269 F8
1255	3269 C3	5263 F2	D270 F8
1256	3270 C3	5264 F2	D271 F8
1257	3271 C3	5265 F2	D272 F8
1258	3272 C3	5266 F2	D273 F8
1259	3273 C3	5267 F2	D274 F8
1260	3274 C3	5268 F2	D275 F8
1261	3275 C3	5269 F2	D276 F8
1262	3276 C3	5270 F2	D277 F8
1263	3277 C3	5271 F2	D278 C8
1264	3278 C3	5272 F2	D279 C8
1265	3279 C3	5273 F2	D280 C8
1266	3280 C3	5274 F2	D281 C8
1267	3281 C3	5275 F2	D282 C8
1268	3282 C3	5276 F2	D283 C8
1269	3283 C3	5277 F2	D284 C8
1270	3284 C3	5278 F2	D285 C8
1271	3285 C3	5279 F2	D286 C8
1272	3286 C3	5280 F2	D287 C8
1273	3287 H6	5281 F2	D288 C8
1274	3288 H6	5282 F3	D289 C7
1275	3289 H6	5283 F3	D290 C7
1276	3290 H6	5284 F3	D291 C7
1277	3291 H6	5285 F3	D292 C7
1278	3292 H6	5286 F3	D293 C7
1279	3293 H6	5287 F3	D294 C7
1280	3294 H6	5288 F3	D295 C7
1281	3295 H6	5289 F3	D296 C7
1282	3296 H6	5290 F3	D297 C7
1283	3297 H6	5291 F3	D298 C7
1284	3298 H6	5292 F3	D299 C7
1285	3299 H6	5293 F3	D300 C7
1286	3300 H6	5294 F3	D301 C7
1287	3301 H6	5295 F3	D302 C7
1288	3302 H6	5296 F3	D303 C7
1289	3303 H6	5297 F3	D304 C7
1290	3304 H6	5298 F3	D305 C7
1291	3305 H6	5299 F3	D306 C7
1292	3306 H6	5300 F3	D307 C7
1293	3307 B6	5301 B8	D308 F7
1294	3308 B6	5302 B8	D309 C8
1295	3309 B6	5303 B8	D310 C7
1296	3310 B6	5304 B8	D311 B8
1297	3311 B6	5305 B8	D312 B9
1298	3312 B6	5306 B8	D313 C10
1299	3313 B6	5307 B8	D314 C10
1300	3314 B7	5308 D5	D315 C10

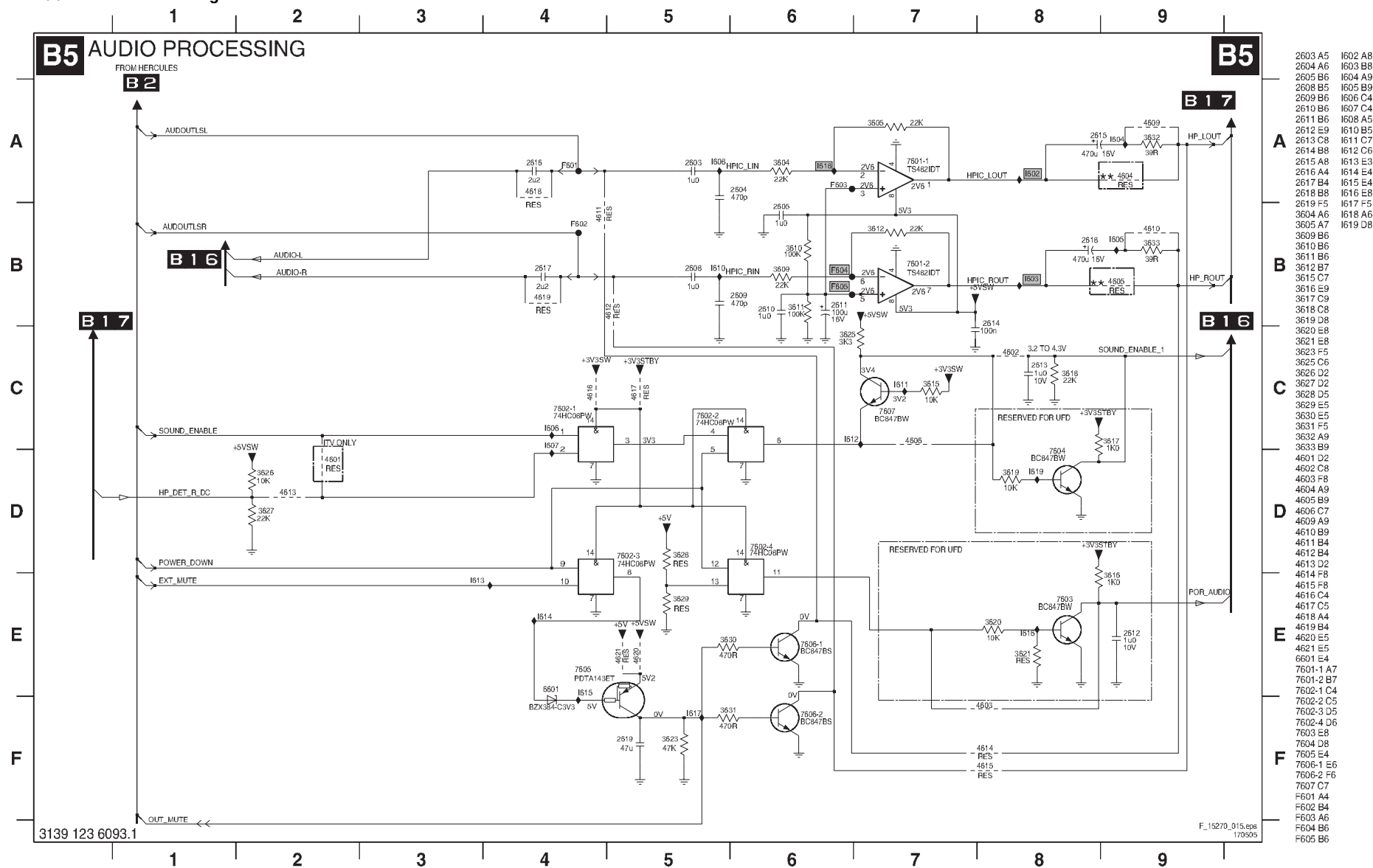
SSB: Sync Interface



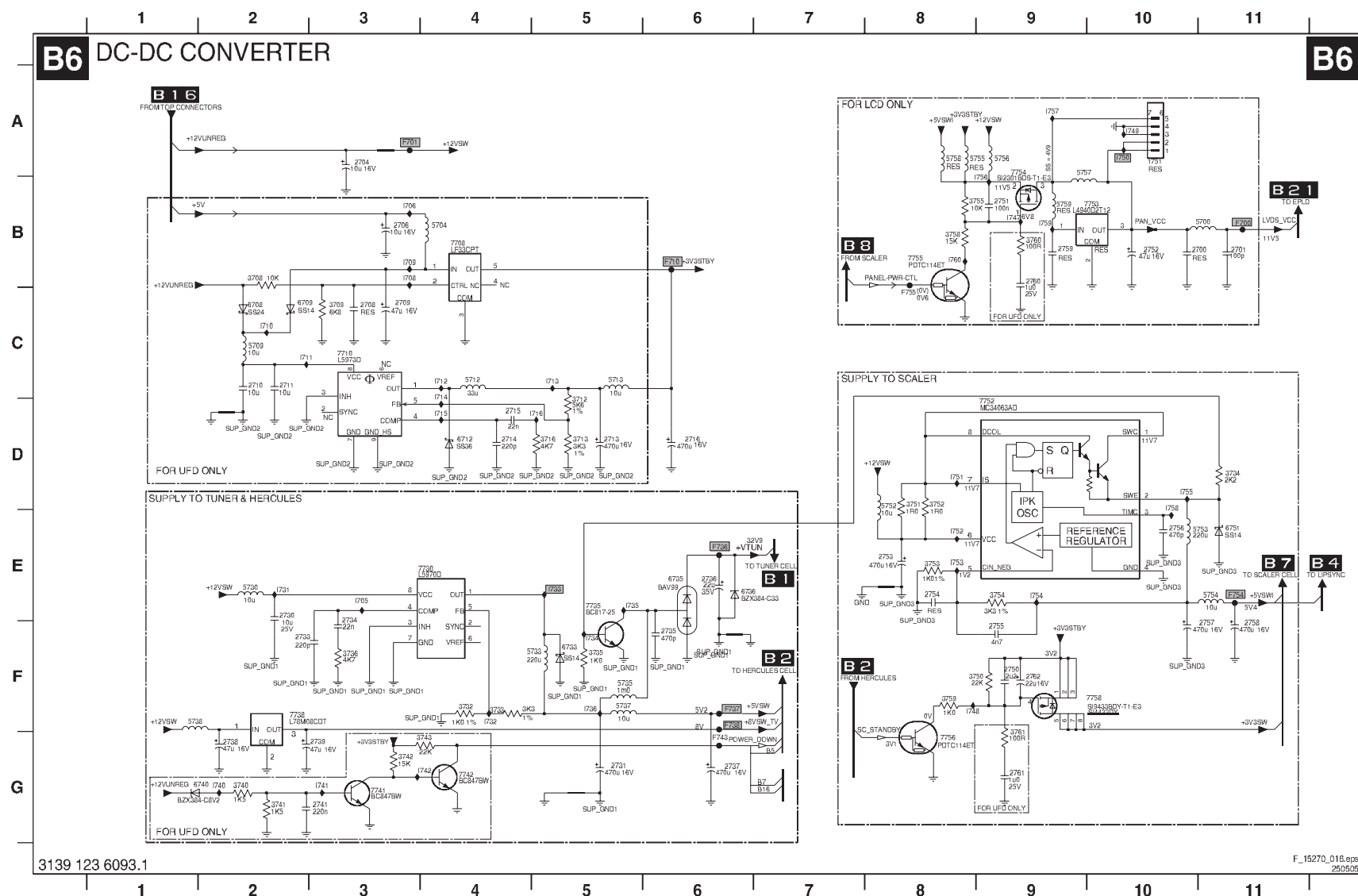
B4 AUDIO DELAY LINE (RESERVED)



B5 AUDIO PROCESSING



B6 DC-DC CONVERTER



	1751 A10	7738 F2
	1751 B1	7741 G3
	1701 A1	7742 G4
	2704 A3	7752 D9
	2704 B3	7753 B10
	2708 C3	7754 A9
	2708 C3	7755 B8
	2710 C2	7756 F8
	2710 D2	7757 B10
	2715 D5	7760 B1
	2714 D4	7701 A3
	2715 D4	7701 B6
	2715 D5	7738 E8
	2730 E2	7737 F6
	2731 G5	7738 F6
	2733 F2	7743 G6
	2733 F2	7754 E1
	2735 F6	7756 F8
	2736 E6	1705 E3
	2737 G6	1706 B3
	2737 G6	1706 B3
	2738 G3	1709 B3
	2741 G3	1710 C2
	2750 F9	1711 C3
	2750 F9	1712 C4
	2752 B10	1713 E2
	2753 E8	1714 C4
	2754 E8	1715 D4
	2754 E8	1716 D5
	2756 E10	1731 E2
	2757 E11	1732 F4
	2757 E11	1733 E5
	2757 E11	1734 F5
	2760 B9	1735 E5
	2761 G9	1736 F5
	2762 F9	1740 G2
	2762 F9	1741 G3
	2705 C3	1742 G4
	3712 D5	1747 B8
	3713 D5	1748 F8
	3713 D5	1749 A10
	3732 F4	1750 A10
	3733 F4	1751 D8
	3734 D11	1752 E8
	3735 D11	1753 E8
	3736 F3	1754 E9
	3736 F3	1755 D10
	3741 G4	1756 B8
	3742 G4	1757 A9
	3750 F9	1758 D10
	3751 D8	1759 B8
	3752 D8	1760 B8
	3753 E8	
	3754 E9	
	3755 B8	
	3756 B8	
	3757 F8	
	3760 B9	
	3761 F9	
	3762 F9	
	5704 B4	
	5708 C2	
	5712 C4	
	5713 C5	
	5715 E2	
	5733 F5	
	5735 F5	
	5737 F5	
	5738 F11	
	5752 D8	
	5753 E11	
	5753 E11	
	5755 A9	
	5755 A9	
	5756 A9	
	5757 A9	
	5758 B11	
	5759 B9	
	6708 C2	
	6712 C3	
	6713 C3	
	6736 E6	
	6740 C2	
	7708 F11	
	7710 C3	
	7730 C3	
	7735 E5	

SSB: Diversity Tables B1-B6

B1 TUNER & IF

Item	AP - non China	Europe	NAFTA/LT	AP - DVB	Europe - DVB	China	Description
1102							TUN V4U PLL IEC B8DKM B
1102		V					TUN V4U PLL IEC B8HIL B
1102			V				TUNER UV1338A F.S.IH4
1102	V						TUNER UV1318E/A1 IH4
1102			V	V			TUNER UV1318SD/A CP HN-4
1104		V					FIL SAW SM 38MHZ OFWK3953L R
1104				V			FIL SAW SM 38MHZ OFWK3958L R
1104			V				FIL SAW SM 45MHZ OFWK1987L R
1104	V		V				FIL SAW SM 38MHZ OFWK7265L R
1106				V			FIL SAW SM 38MHZ OFWK3956L R
1106		V		V			FIL SAW SM 38MHZ OFWK3958L R
1106				V			FIL SAW SM 38MHZ OFWK9352L R
1106	V		V				FIL SAW SM 38MHZ OFWK9361L R
3101	V		V				RST SM 0603 100R PM5 COL
3102	V		V				RST SM 0603 100R PM5 COL
3104	V			V			RST SM 0603 10K PM5 COL
3104	V	V	V				RST SM 0603 JUMP, 0R05 COL
3107	V	V	V	V			RST SM 0603 6K5 PM5 COL
3108	V	V	V	V			RST SM 0603 2K2 PM5 COL
3109	V	V	V	V			RST SM 0603 2K2 PM5 COL
3110							RST SM 0603 2K2 PM5 COL
3111	V	V	V	V			RST SM 0603 22K PM5 COL
3112	V	V	V	V			RST SM 0603 19K PM5 COL
3113							RST SM 0603 22K PM5 COL
3114							RST SM 0603 47K PM5 COL
4102	V	V	V	V			RST SM 0603 JUMP, 0R05 COL
4103							RST SM 0603 JUMP, 0R05 COL
4104	V		V				RST SM 0603 JUMP, 0R05 COL
4106		V	V	V			RST SM 0603 JUMP, 0R05 COL
4107							RST SM 0603 JUMP, 0R05 COL
4108							RST SM 0603 JUMP, 0R05 COL
4110	V	V	V	V			RST SM 0603 JUMP, 0R05 COL
4111	V						RST SM 0603 JUMP, 0R05 COL
4113	V		V	V			RST SM 0603 JUMP, 0R05 COL
5101	V	V	V	V			FXDIND SM 0805 0039 PM10 COL R
5101			V				FXDIND SM 0805 0038 PM10 COL R
5102	V	V	V	V			FXDIND SM 0805 12U PM10 COL R
5102				V			FXDIND SM 1008 908 PM5 COL R
5107			V	V			FXDIND 0603 100MHZ 200R COL R
5107		V					RST SM 0603 100R PM5 COL
5108			V	V			FXDIND 0603 100MHZ 200R COL R
5108		V					RST SM 0603 100R PM5 COL
6103		V					DIO SIG SM BAS316 (COL) R
6105					V		DIO SIG SM 15S356 (RHM0) R
7101	V	V		V	V		TRA SIG SM BC847BW (COL) R
7102					V		TRA SIG SM BC847BW (COL) R

B2 HERCULES

Item	LC4.3A AB (DVB-T)	LC4.3E AB/LC4.3E AB/LC4.3E AB (DVB-T)	LC4.3 UL	LC4.3 EL/LC4.3 EL/LC4.3E	LC4.3E W/O 3D COMB FILTER	LC4.3A - CHINA	LC4.3A - AP (non-China)	Description
2203	V	V						ELCAP SM 16V 10U PM20 COL R
2220			V					CER2 0805 X5R 6V3 10U PM10 R
2244	V	V	V	V				CER2 0402 Y5V 16V 100N COL
2245	V	V	V	V				CER2 0402 Y5V 16V 100N COL
2245	V	V	V	V				CER2 0402 Y5V 16V 100N COL
2255	V	V	V	V	V			CER2 0402 Y5V 16V 100N COL
2286	V	V	V	V	V			CER2 0402 Y5V 16V 100N COL
2289	V	V	V	V				CER2 0805 Y5V 10V 4U7 P8020 R
2289								RST SM 0603 150R PM5 COL
2290	V	V	V	V				CER2 0805 Y5V 10V 4U7 P8020 R
2291	V	V	V					CER2 0402 Y5V 16V 100N COL
2292	V	V						CER2 0402 Y5V 16V 100N COL
3260	V	V	V	V	V			RST SM 0402 100R PM5 COL
3251	V	V	V	V	V			RST SM 0402 100R PM5 COL
3252	V	V	V	V	V			RST SM 0402 100R PM5 COL
3253	V	V	V	V	V			RST SM 0402 100R PM5 COL
3256	V	V	V	V	V			RST SM 0402 JUMP, 0R05 COL
3256	V	V	V	V	V			RST SM 0402 JUMP, 0R05 COL
3257	V	V	V	V	V			RST SM 0402 JUMP, 0R05 COL
3258	V	V	V	V	V			RST SM 0402 1K PM5 COL
3259	V	V	V	V	V			RST SM 0402 1K PM5 COL
3260	V	V	V	V	V			RST SM 0402 1K PM5 COL
3270								RST SM 0402 10K PM5 COL
3282	V							RST SM 0603 150R PM5 COL
3285	V	V	V	V	V			RST SM 0402 JUMP, 0R05 COL
3286	V	V	V	V	V			RST SM 0402 100R PM5 COL
3291	V							RST SM 0402 47K PM5 COL
3292	V	V						RST SM 0402 12K PM5 COL
3292	V							RST SM 0402 47K PM5 COL
3293	V							RST SM 0402 47K PM5 COL
3294	V	V	V					RST SM 0402 47K PM5 COL
3295	V	V	V	V	V			RST SM 0402 100R PM5 COL
3296	V	V	V	V	V			RST SM 0402 100R PM5 COL
4206	V	V	V	V	V			RST SM 0805 JUMP, 0R05 COL R
4213	V	V						RST SM 0402 JUMP, 0R05 COL
4214	V	V						RST SM 0402 JUMP, 0R05 COL
4215	V	V						RST SM 0402 JUMP, 0R05 COL
5218	V	V	V					IND FXD 1206 EMI 100MHZ 120R R
6206	V	V						DIO SIG SM BAT54 SOD323 COL R
7206	V	V	V	V	V			TRA SIG SM BC847BW (COL) R
7209	V	V	V	V	V			TRA SIG SM BC847BW (COL) R
7210	V	V	V	V	V			TRA SIG SM BC847BW (COL) R
7217			V					IC SM TDA1501HN18D0 (PHSE) Y
7217	V	V	V	V				IC SM TDA1502HN18D0 (PHSE) Y
7219	V	V	V					IC SM 74HC4053D (PHSE) R

B3 SYNC INTERFACE

Item	26/32PFxxxx - AP/NAFTA/LT	EU & AP DVB sets	LC4.3E/LC4.3E/LC4.3E/LC4.3A-China	26PF431010	Description
2449	V	V			CER2 0402 Y5V 16V 100N COL
3432	V	V			RST SM 0402 2K2 PM5 COL
3458	V	V			RST SM 0402 100R PM5 COL
3459	V	V			RST SM 0402 100R PM5 COL
3461	V	V			RST SM 0402 100R PM5 COL
3462	V	V			RST SM 0402 100R PM5 COL
4436			V		RST SM 0402 JUMP, 0R05 COL
4437			V		RST SM 0402 JUMP, 0R05 COL
4440	V	V	V		RST SM 0402 JUMP, 0R05 COL
4441	V	V	V		RST SM 0402 JUMP, 0R05 COL
6430	V	V	V		DIO REG SM PDZ2.4B (PHSE) R
6431	V	V	V		DIO SIG SM 1N4148WS (VISH) R
7436	V	V	V		IC SM 74LVC14APW (PHSE) R

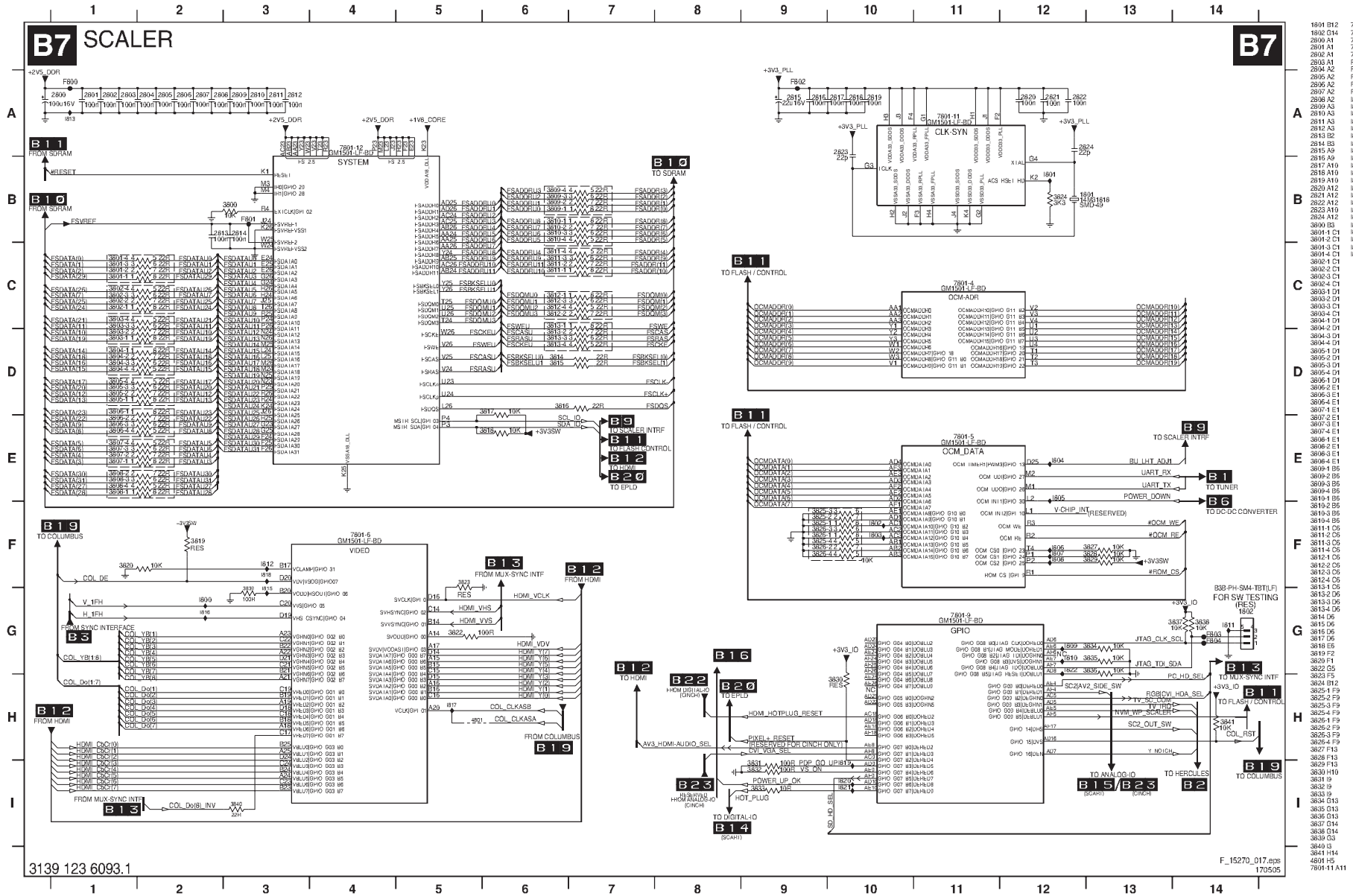
B5 AUDIO WITHOUT AMPLIFIER

Item	26/32PF	374/250PF	Description
2612	V		CER2 0603 Y5V 10V 10U COL
2613	V		CER2 0603 Y5V 10V 10U COL
2616	V		ELCAP SM 16V 10U PM20 COL R
2617	V		ELCAP SM 16V 10U PM20 COL R
3615	V		RST SM 0402 10K PM5 COL
3616	V		RST SM 0402 1K PM5 COL
3617	V		RST SM 0402 1K PM5 COL
3618	V		RST SM 0402 22K PM5 COL
3619	V		RST SM 0402 10K PM5 COL
3620	V		RST SM 0402 10K PM5 COL
3623	V		RST SM 0402 47K PM5 COL
3626	V		RST SM 0402 3K3 PM5 COL
3627	V		RST SM 0402 22K PM5 COL
3628	V		RST SM 0402 10K PM5 COL
3629	V		RST SM 0402 22K PM5 COL
3630	V		RST SM 0402 330R PM5 COL
3630	V		RST SM 0402 470R PM5 COL
3631	V		RST SM 0402 330R PM5 COL
3631	V		RST SM 0402 470R PM5 COL
3632	V		RST SM 0402 RC31 39R PM5 R
3633	V		RST SM 0402 RC31 39R PM5 R
4601	V		RST SM 0603 JUMP, 0R05 COL
4602	V		RST SM 0603 JUMP, 0R05 COL
4603	V		RST SM 0603 JUMP, 0R05 COL
4606	V		RST SM 0603 JUMP, 0R05 COL
4609	V		RST SM 0603 JUMP, 0R05 COL
4610	V		RST SM 0603 JUMP, 0R05 COL
4611	V		RST SM 0603 JUMP, 0R05 COL
4612	V		RST SM 0603 JUMP, 0R05 COL
4613	V		RST SM 0603 JUMP, 0R05 COL
4614	V		RST SM 0603 JUMP, 0R05 COL
4615	V		RST SM 0603 JUMP, 0R05 COL
4616	V		RST SM 0603 JUMP, 0R05 COL
4617	V		RST SM 0603 JUMP, 0R05 COL
4618	V		RST SM 0603 JUMP, 0R05 COL
4619	V		RST SM 0603 JUMP, 0R05 COL
4620	V		RST SM 0603 JUMP, 0R05 COL
4621	V		RST SM 0603 JUMP, 0R05 COL
7603	V		TRA SIG SM BC847BW (COL) R
7604	V		TRA SIG SM BC847BW (COL) R
7607	V		TRA SIG SM BC847BW (COL) R

B6 DC DC CONVERTER

Item	26/32PF	374/250PF	42/50PF	DVB PDP 42PF	DVB LCO 37PF	Description
2701	V					CERT 0402 NPO 50V 100P COL
2703	V	V	V			ELCAP SM 16V 10U PM20 COL R
2708	V	V	V			ELCAP SM 16V 10U PM20 COL R
2710	V	V	V			CER2 1210 Y5V 25V 10U P8020 R
2711	V	V	V			CER2 1210 Y5V 25V 10U P8020 R
2713	V	V	V			ELCAP SM SEV 16V 4700 PM20 R
2714	V	V	V			CER2 0402 X7R 50V 220P COL
2715	V	V	V			CER2 0402 X7R 16V 22N PM10 R
2741	V	V	V			CER2 0603 X7R 16V 220N COL
2751	V	V	V			CER2 0402 Y5V 16V 100N COL
2752	V	V				ELCAP SM 16V 47U PM20 COL R
2763	V	V				CER2 1206 X7R 25V 10U PM10 R
2764	V	V	V			CER2 1206 X7R 25V 10U PM10 R
3709	V	V	V			RST SM 0402 10K PM5 COL
3709	V	V	V			RST SM 0402 6K5 PM5 COL
3712	V	V	V			RST SM 0603 RC22H 5K6 PM1 R
3713	V	V	V			RST SM 0603 RC22H 3K3 PM1 R
3718	V	V	V			RST SM 0402 4K7 PM5 COL
3740	V	V	V			RST SM 0402 1K5 PM5 COL
3741	V	V	V			RST SM 0402 1K5 PM5 COL
3742	V	V	V			RST SM 0402 1K5 PM5 COL
3743	V	V	V			RST SM 0402 22K PM5 COL
3764	V	V				RST SM 0402 10K PM5 COL
3768	V	V				RST SM 0402 1K5 PM5 COL
4602	V	V	V			RST SM 0402 100R PM5 COL
4603	V	V	V			RST SM 0402 100R PM5 COL
4606	V	V	V			IND FXD 1206 EMI 100MHZ 120R R
4609	V	V	V			IND FXD SM 1206 10U PM20 R
4610	V	V	V			IND FXD SM 1206 10U PM20 R
4611	V	V	V			IND FXD SM 1206 10U PM20 R
4612	V	V	V			IND FXD 1206 EMI 100MHZ 120R R
4613	V	V	V			IND FXD 1206 EMI 100MHZ 120R R
6708	V	V	V			DIO REC SS24 COL R
6709	V	V	V			DIO REC SS24 COL R
6712	V	V	V			DIO REC SS24 COL R
6745	V	V	V			DIO REG SM PDZ2.4B (PHSE) R
7208	V	V	V			IC SM LF383CT (ST10) R
7218	V	V	V			IC SM LM4347D (ST10) R
7741	V	V	V			TRA SIG SM BC847BW (COL) R
7742	V	V	V			TRA SIG SM BC847BW (COL) R
7754	V	V	V			FET POW SM SI2301BDS-E3 (VISH) R
7755	V	V	V			TRA SIG SM PDT114ET (COL) R

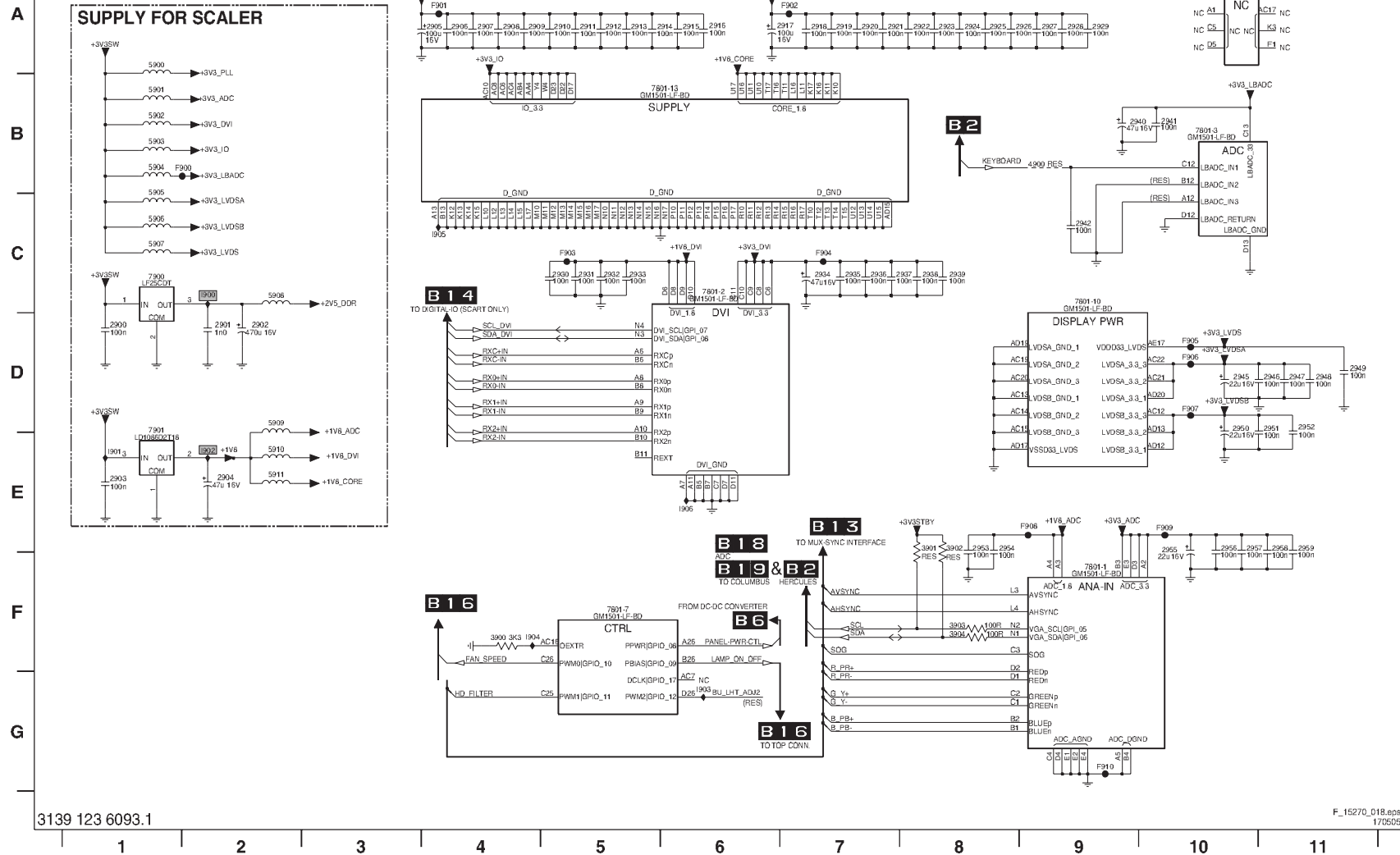
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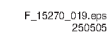
B8 SCALER

B8

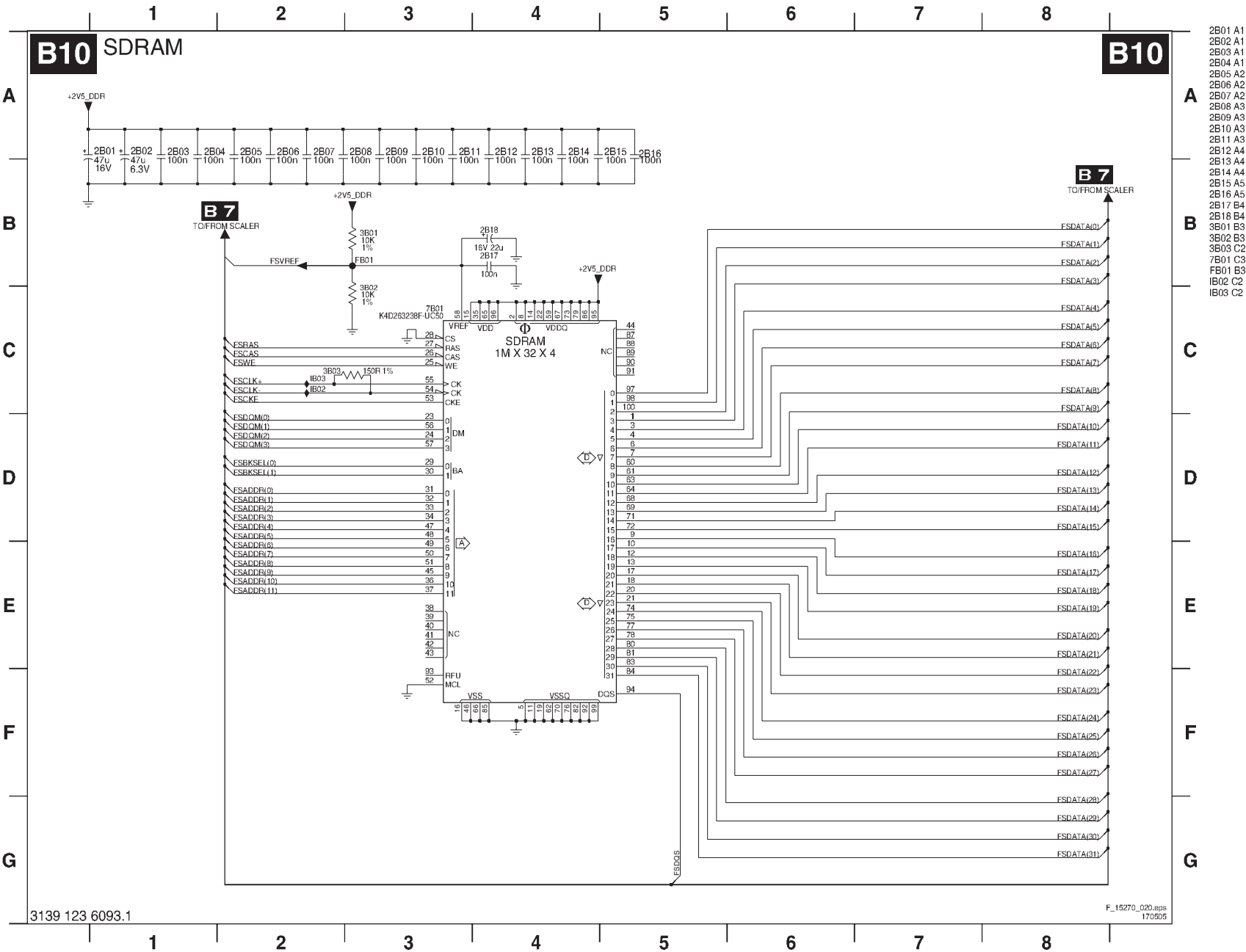


2900 D10
2901 D2 F506 D10
2902 D2 F508 E9
2903 F5 F509 E10
2904 F2 F510 G9
2905 A4
2906 A4 1901 E1
2907 A4 1902 E2
2908 A4 1903 G8
2909 A4 1904 F4
2910 A5 1905 C4
2911 A5 1906 E6
2912 A5
2913 A5
2914 A5
2915 A5
2916 A5
2917 A7
2918 A7
2919 A7
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2921 A7
2922 A8
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2925 A8
2926 A9
2927 A9
2928 A9
2929 A9
2930 C5
2931 C5
2932 C5
2933 C5
2934 C7
2935 C7
2936 C7
2937 C8
2938 C8
2939 C8
2940 B9
2941 B10
2942 B9
2945 D10
2946 D11
2947 D11
2948 D11
2949 D11
2950 D10
2951 D11
2952 D11
2953 F8
2954 F8
2955 E10
2956 E10
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2958 E11
2959 E11
3900 F4
3901 E8
3902 E8
3903 F8
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5902 B1
5903 B1
5904 B1
5905 C1
5906 C1
5907 C1
5908 C2
5909 D2
5910 D2
5911 E2
7801-1 F9
7801-10 C9
7801-13 B6
7801-14 A10
7801-2 C8
7801-3 B10
7801-7 F5
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7903 E2
7904 E2
7905 C5
7906 C7
F506 D10

B9 SCALER INTERFACE

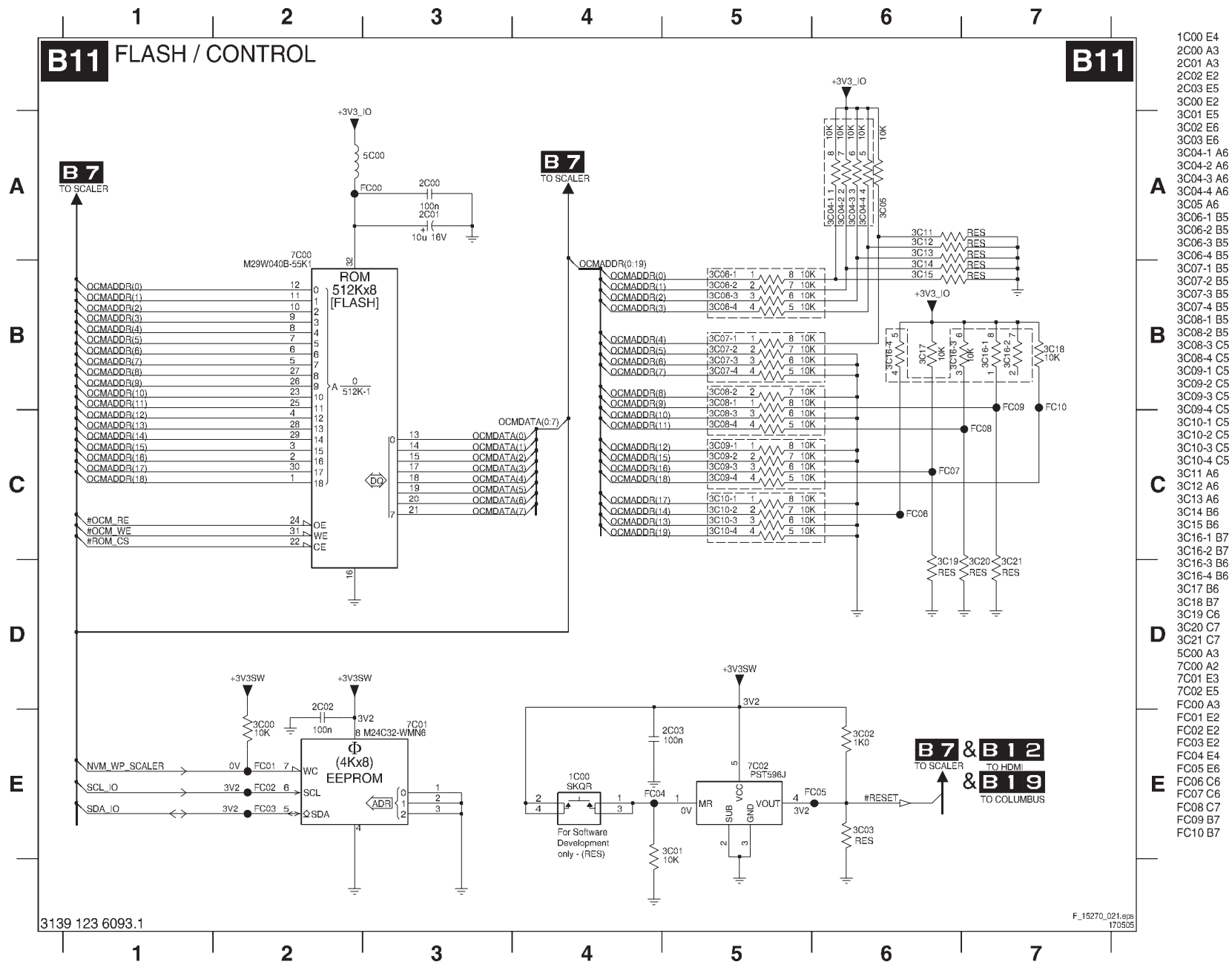


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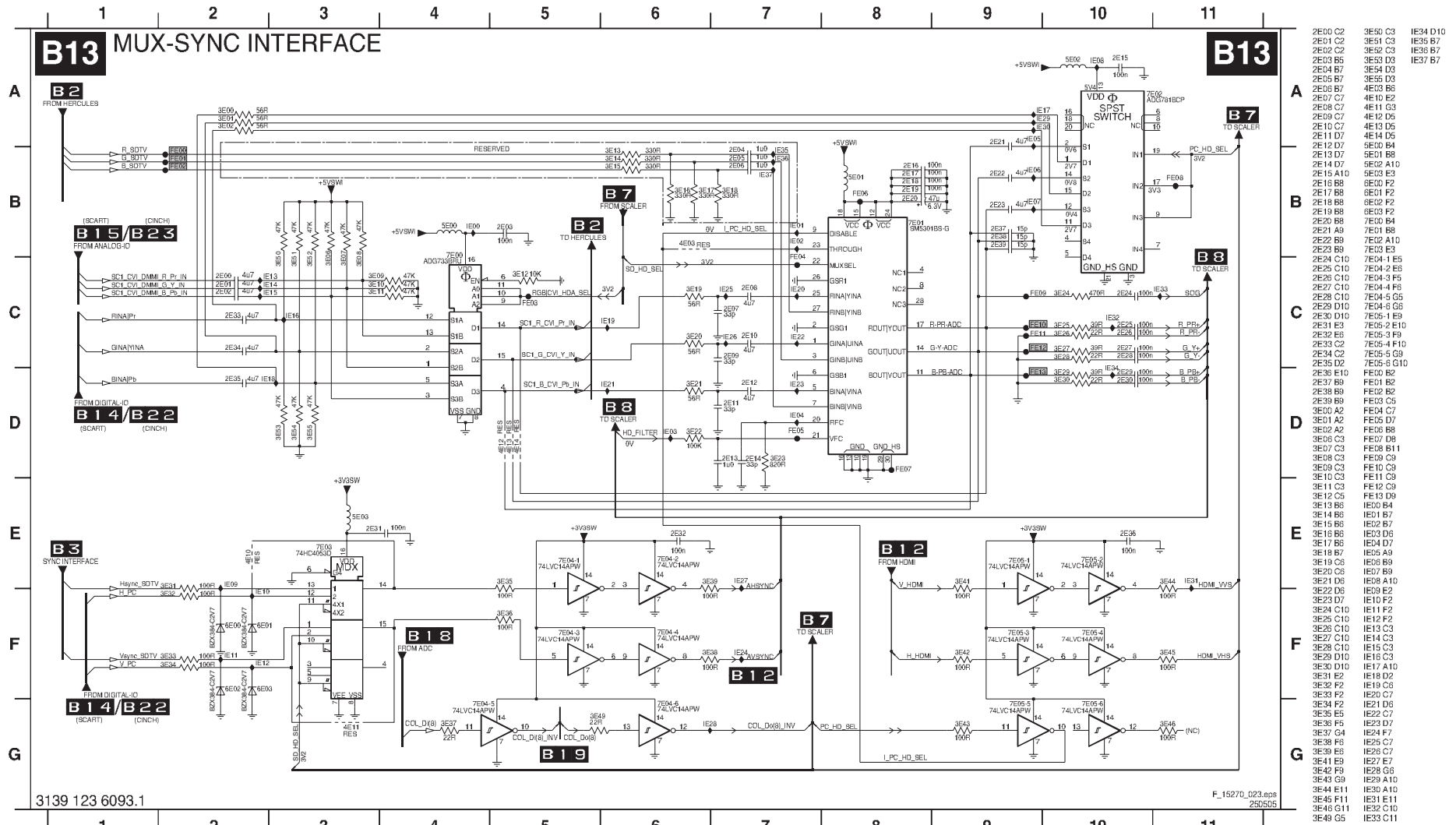


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2B03 A1
2B04 A1
2B05 A2
2B06 A2
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2B08 A3
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2B10 A3
2B11 A3
2B12 A4
2B13 A4
2B14 A4
2B15 A5
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7B02 C2
7B03 C2

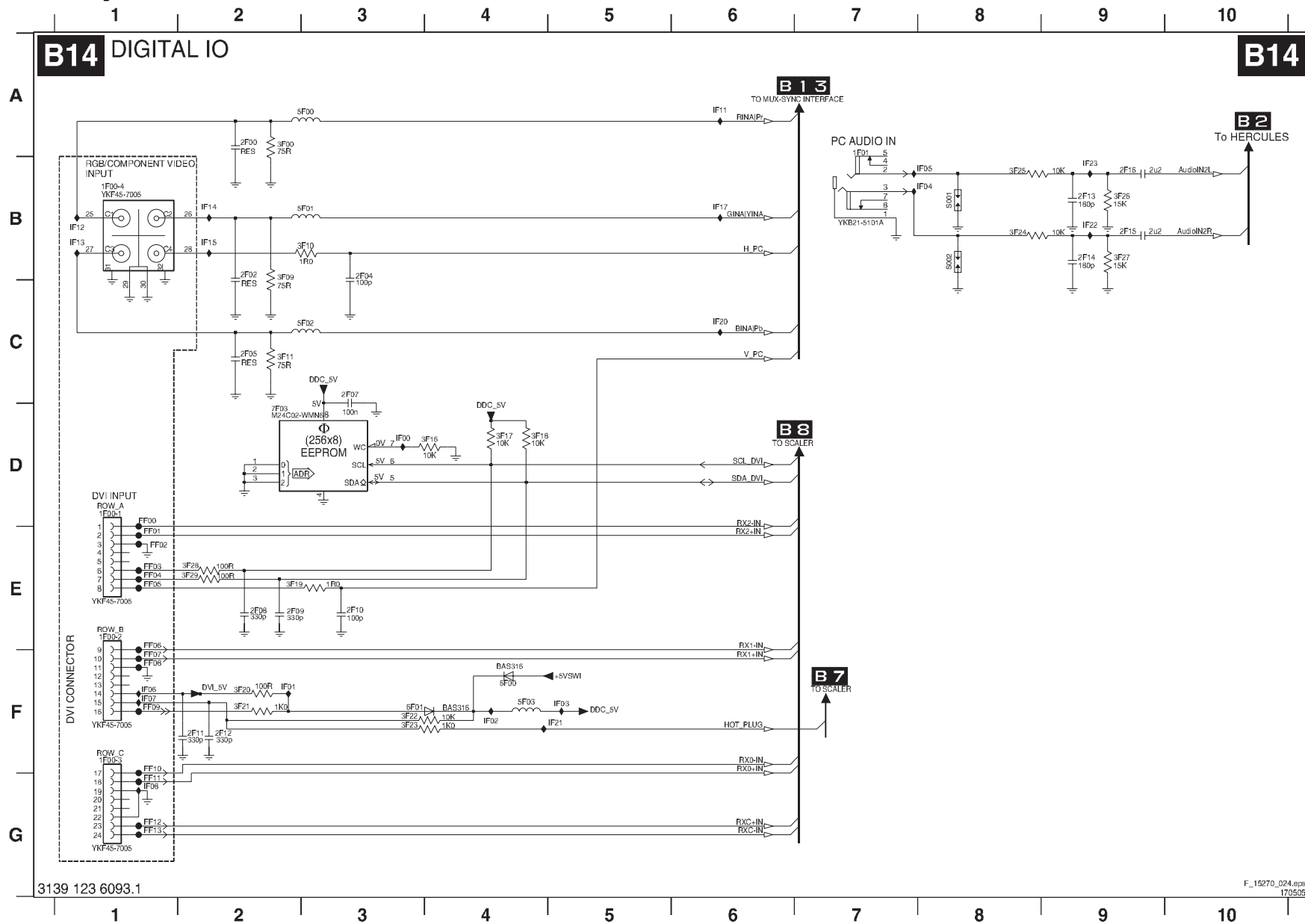
SSB: Flash / Control



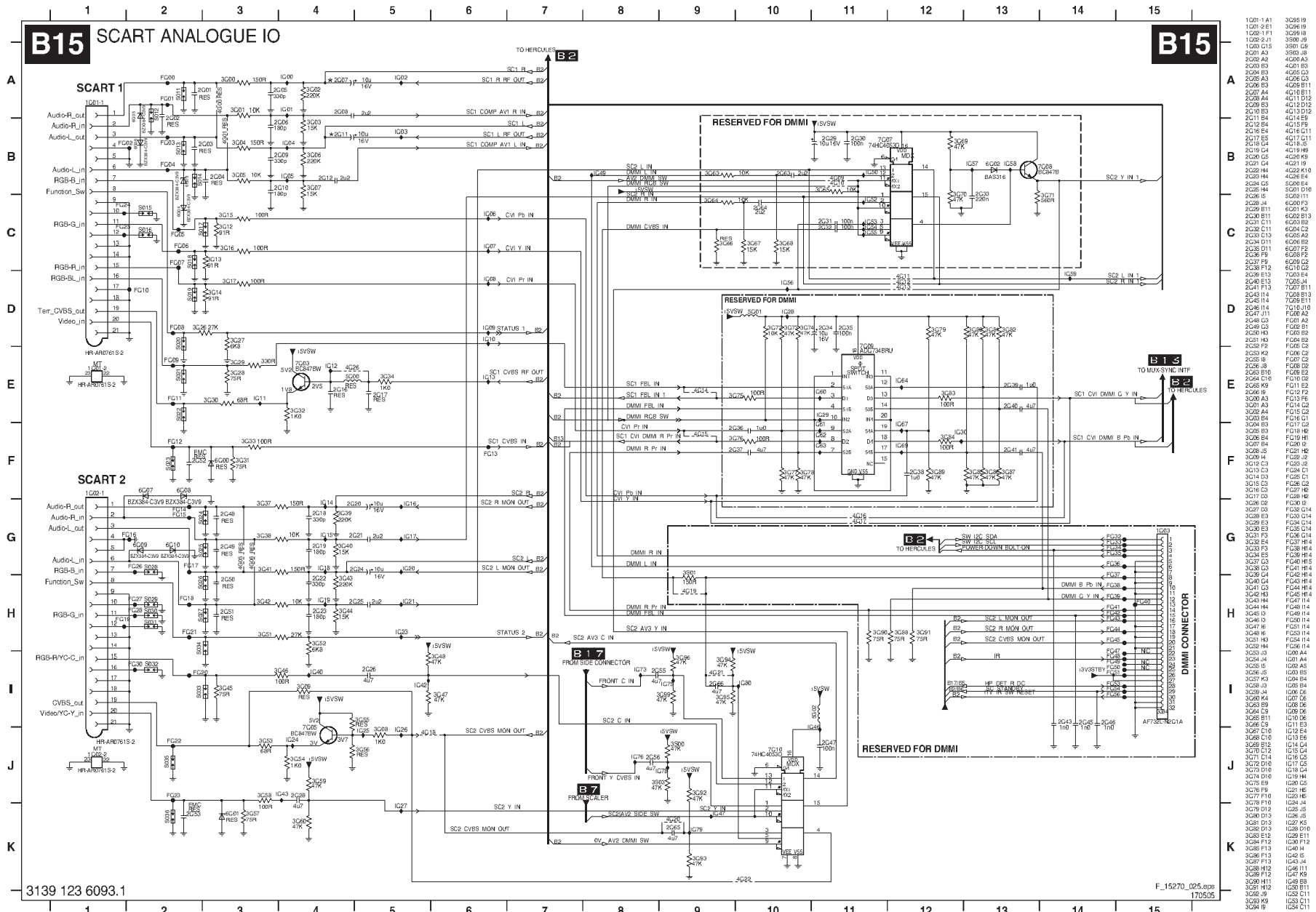
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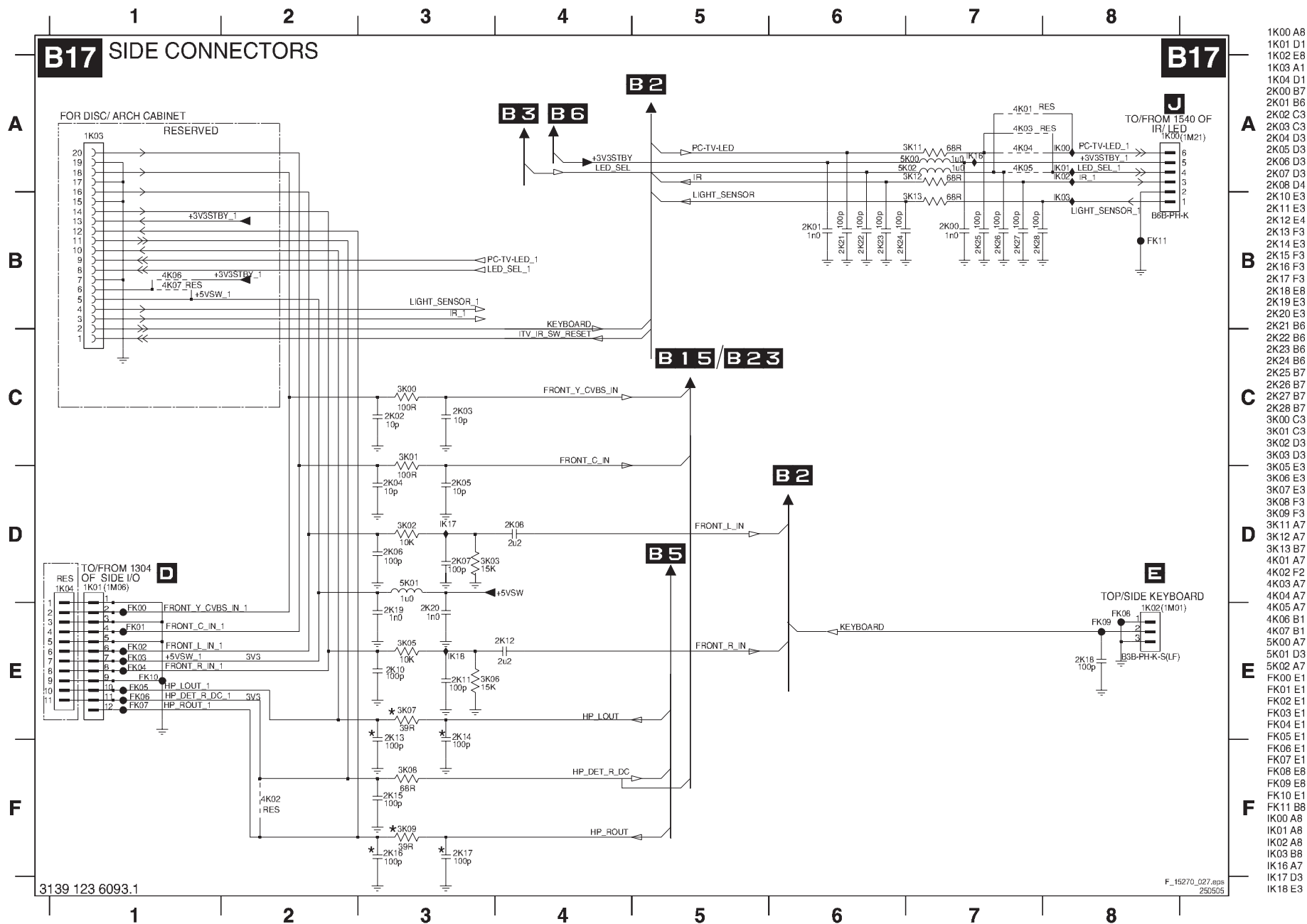
SSB: Digital I/O



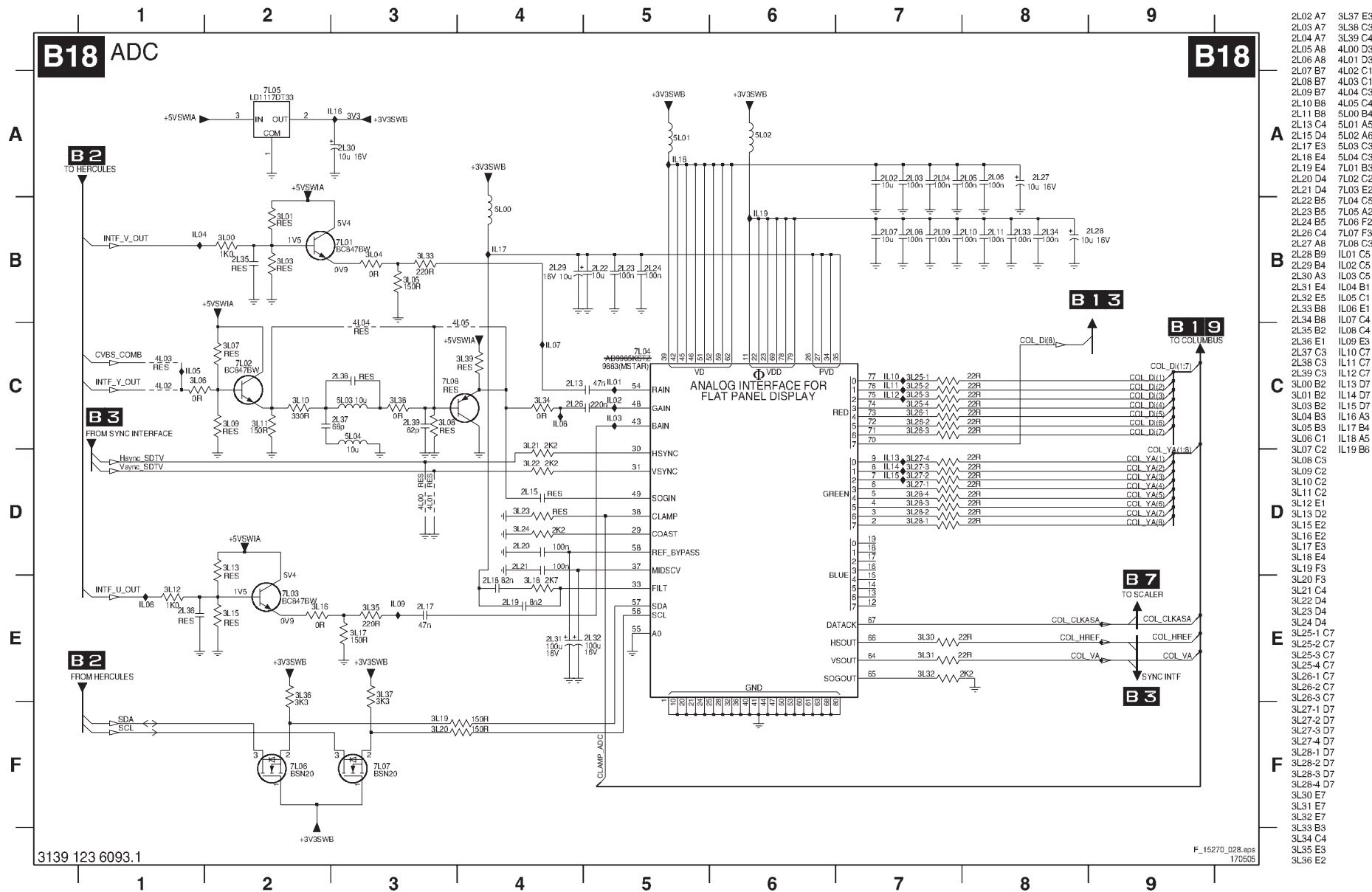
SSB: SCART Analogue I/O



SSB: Side Connectors



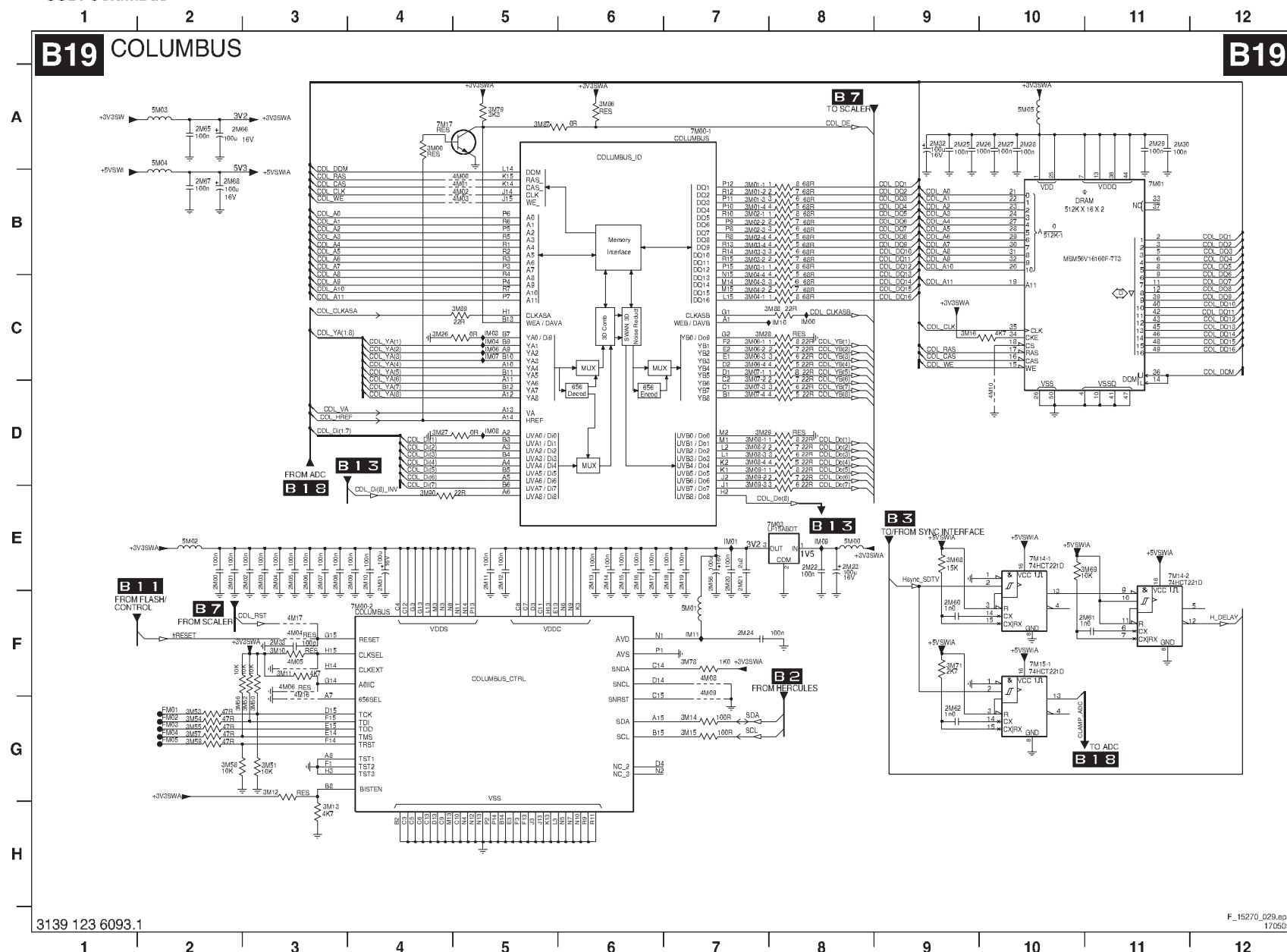
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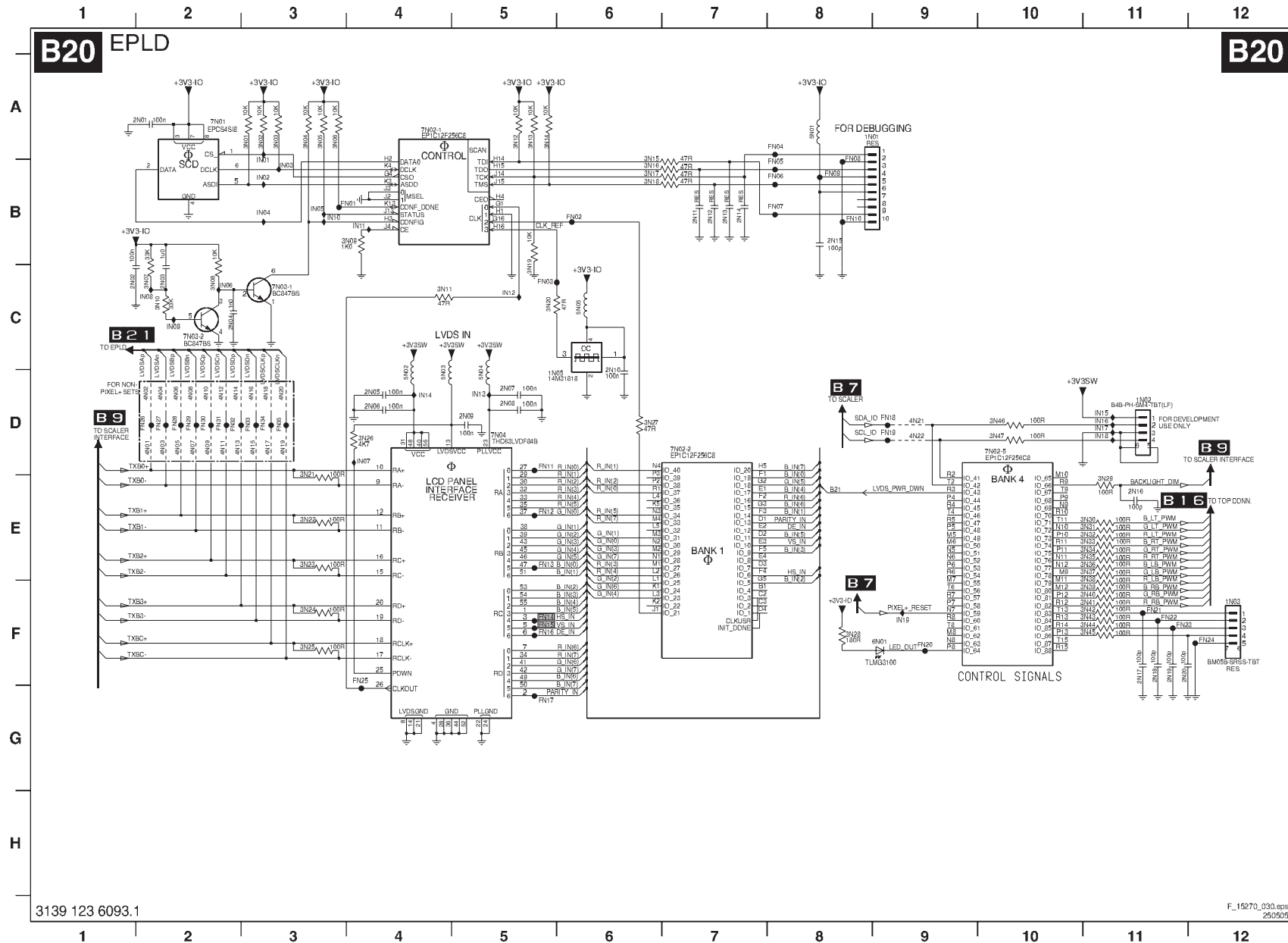
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B19 COLUMBUS

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SSB: EPLD

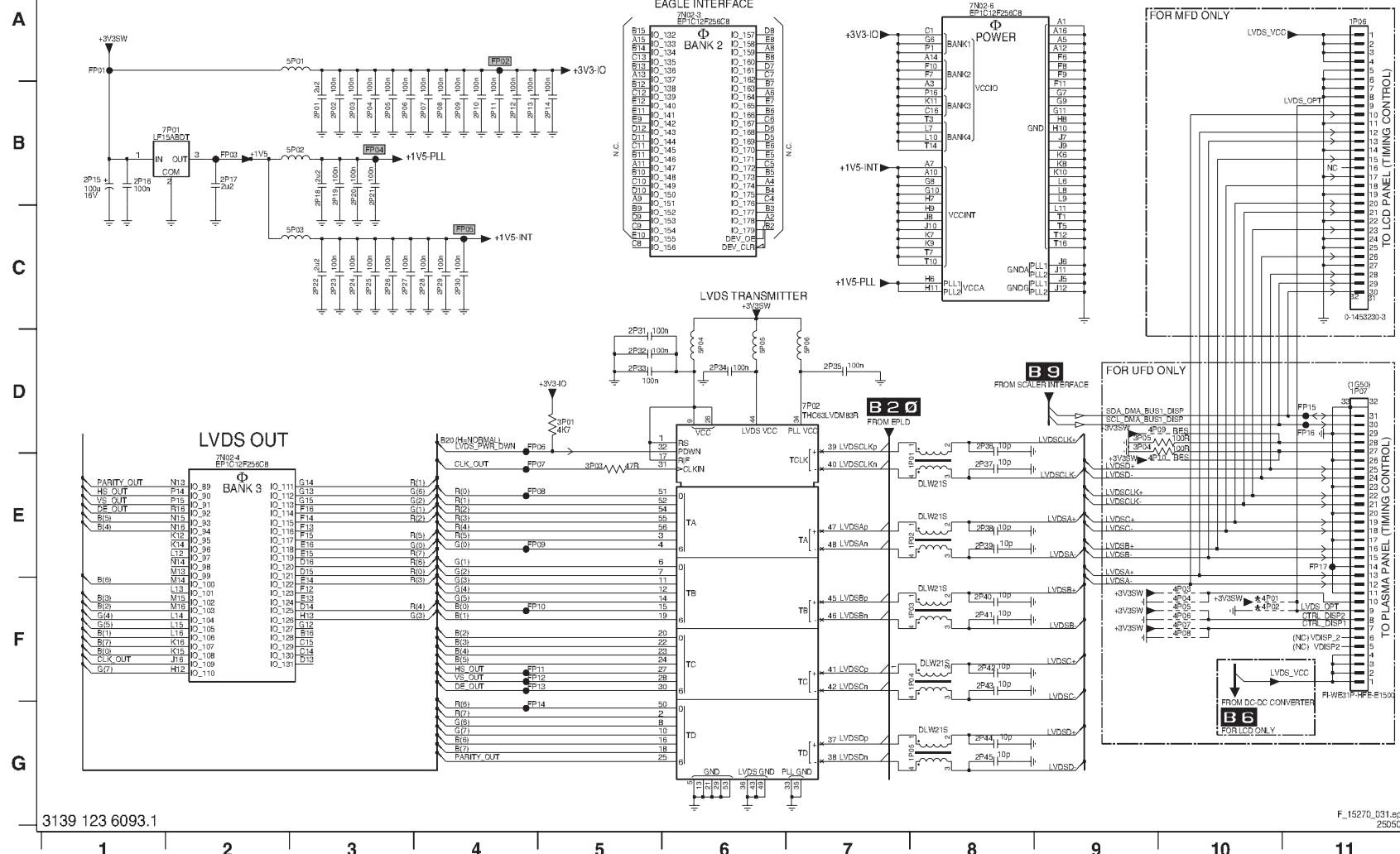


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2N02 C1	FN01 B4
2N03 C2	FN02 B5
2N04 D1	FN03 B6
2N05 D4	FN04 A8
2N06 D5	FN05 B8
2N07 D5	FN06 B8
2N08 D5	FN07 B5
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2N11 B7	FN10 B5
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2N17 F11	FN16 F5
2N18 F11	FN17 D5
2N19 F11	FN18 D5
2N20 F11	FN19 D9
3N01 A3	FN20 F9
3N02 A3	FN21 F11
3N03 A3	FN22 F11
3N04 A3	FN23 F11
3N05 A3	FN24 F2
3N06 C2	FN25 F4
3N07 C2	FN26 C2
3N08 C2	FN27 D2
3N09 B4	FN28 D2
3N10 C2	FN29 D2
3N11 C4	FN30 D2
3N12 A5	FN31 D2
3N13 A5	FN32 D2
3N14 A5	FN33 D3
3N15 B6	FN34 B6
3N16 B6	FN35 D3
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3N18 B6	IN02 B3
3N19 B6	IN03 B4
3N20 C5	IN04 B3
3N21 E3	IN05 B3
3N22 F3	IN06 C2
3N23 F3	IN07 C4
3N24 F3	IN08 C2
3N25 F3	IN09 C2
3N26 F3	IN10 C4
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3N28 B8	IN12 C5
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7N02 A4

B21 EPLD

B21



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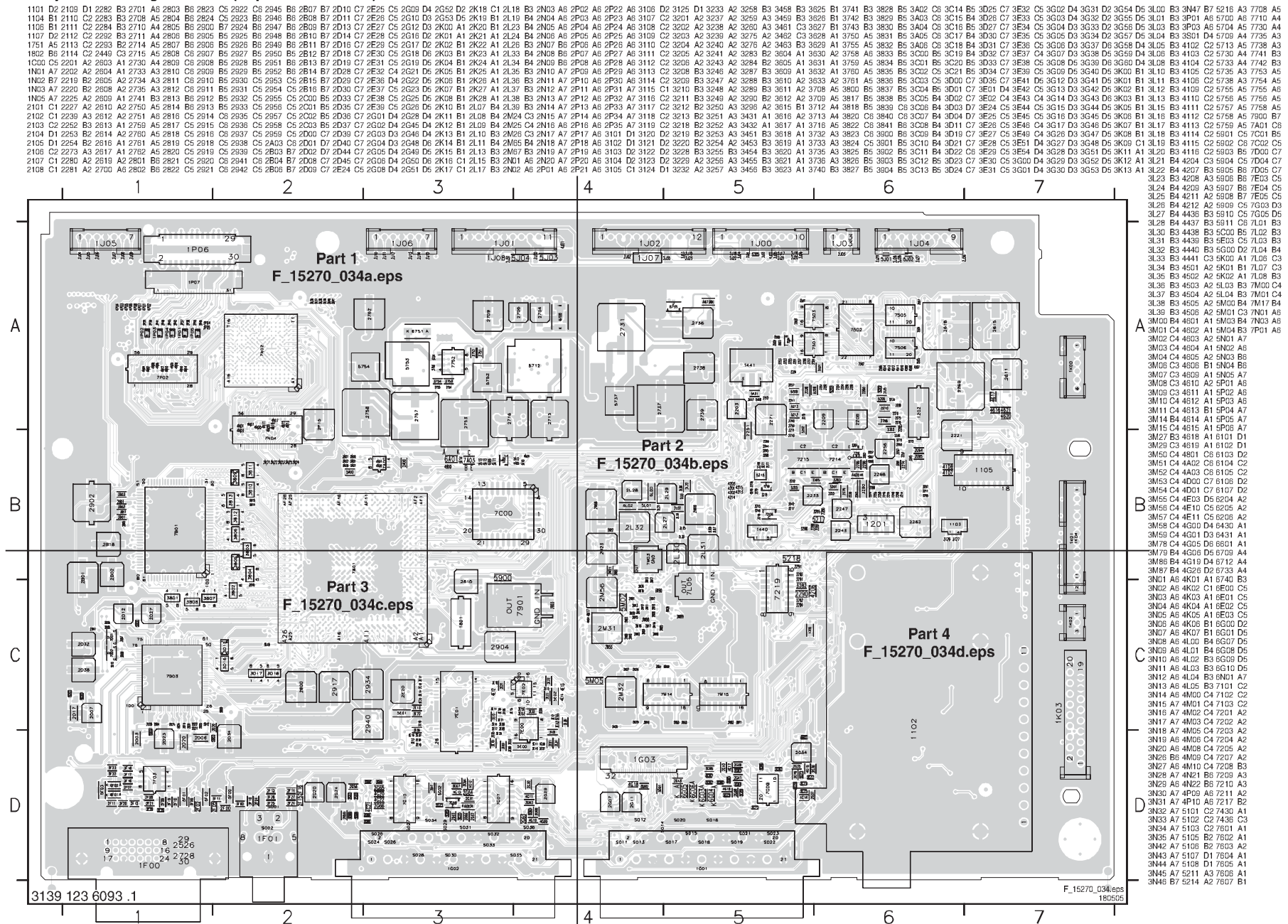
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2P02 B3	FP17 E11
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4P09 D9	
5P01 E9	
5P02 A3	
5P03 C3	
5P04 D5	
5P05 D6	
5P06 D7	
7N02-3 A6	
7N02-4 E2	
7N02-5 A8	
7P01 B2	
7P02 D7	
7P03 A1	
FP02 A4	
FP03 B3	
FP04 B3	
FP05 C4	
FP06 D4	
FP07 E4	
FP08 F4	

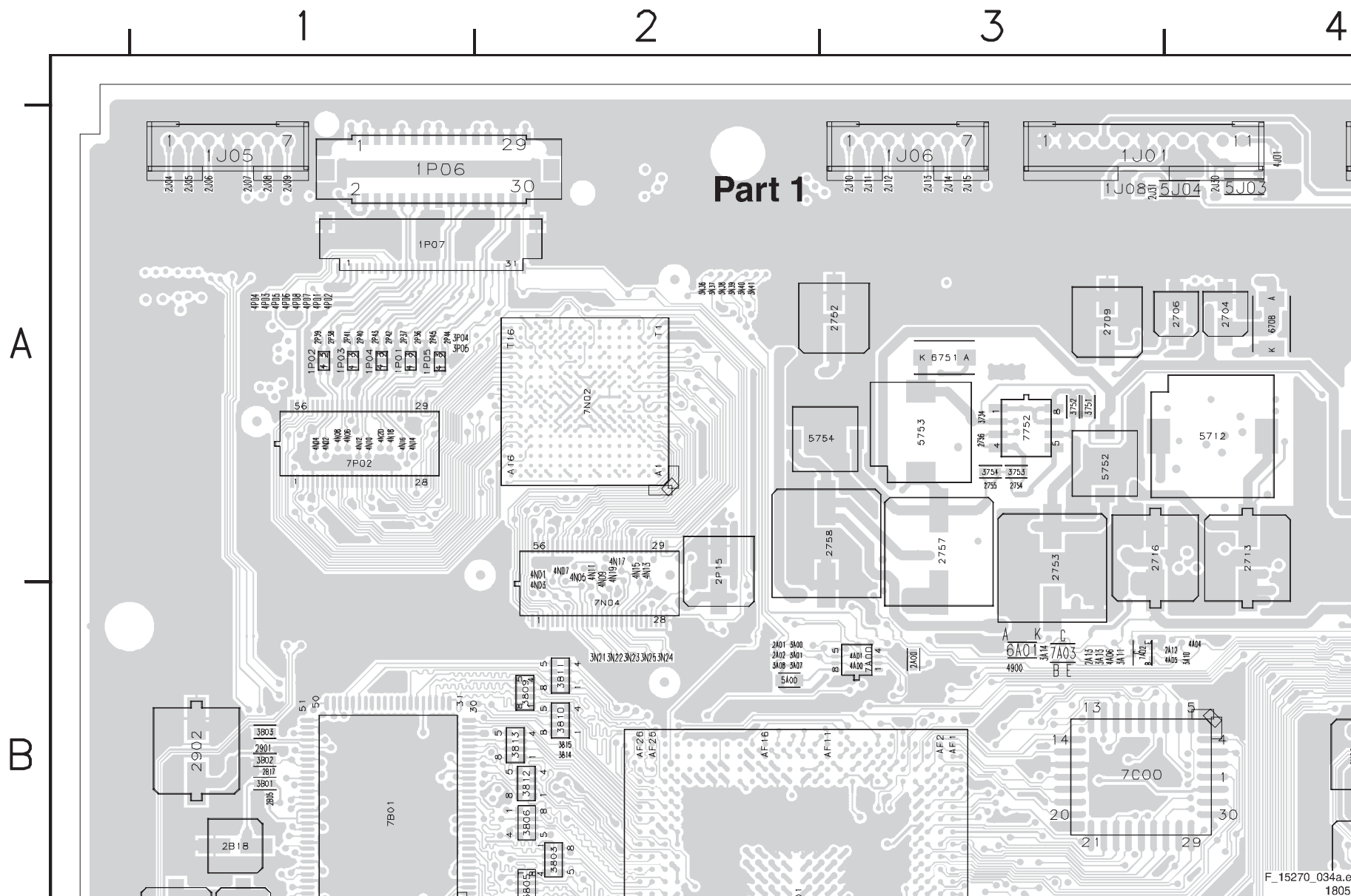
B20 & B21 PIXEL PLUS

[illegible]

Layout Small Signal Board (Top Side Overview)



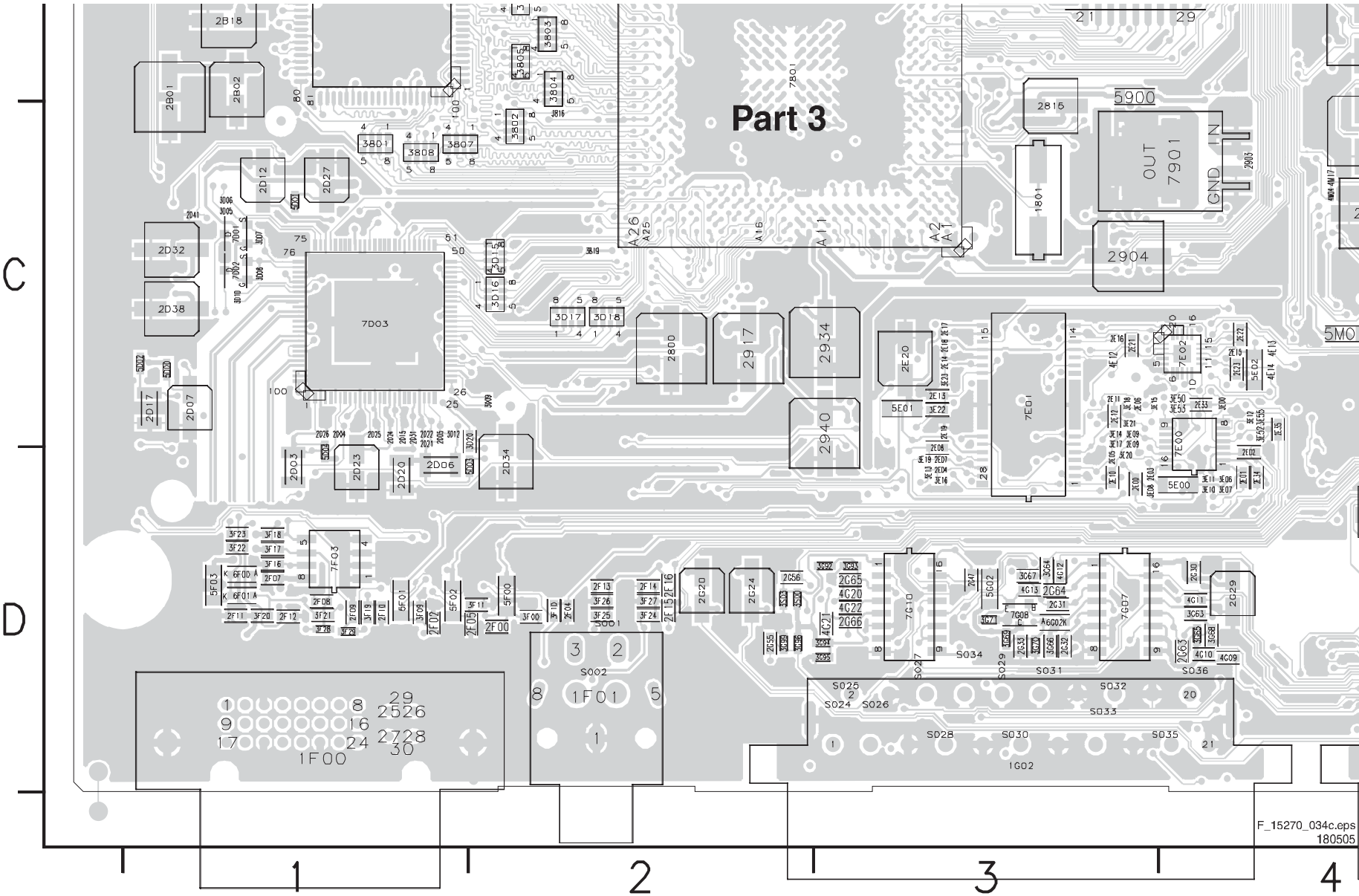
Layout Small Signal Board (Top Side Part 1)

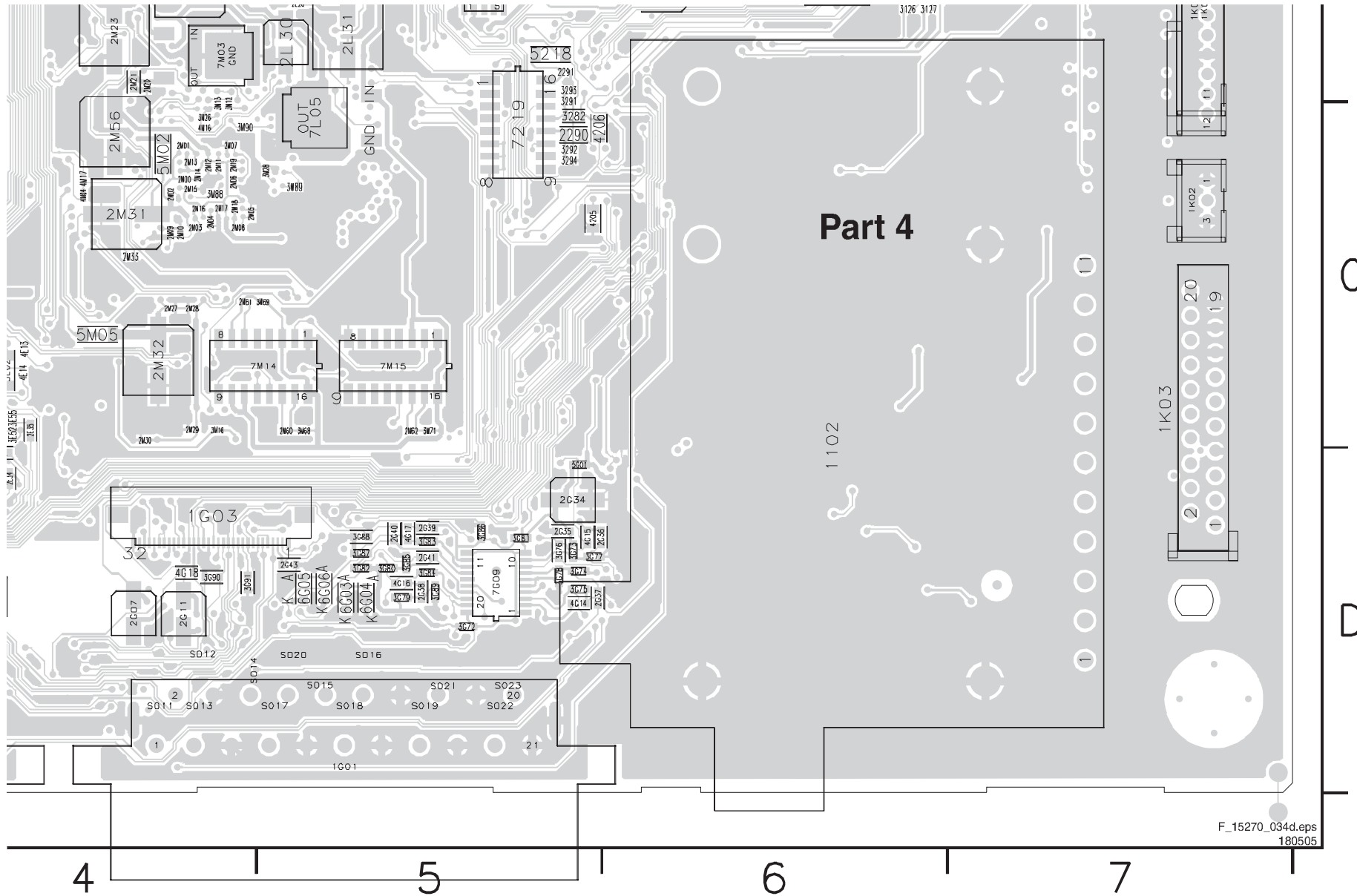


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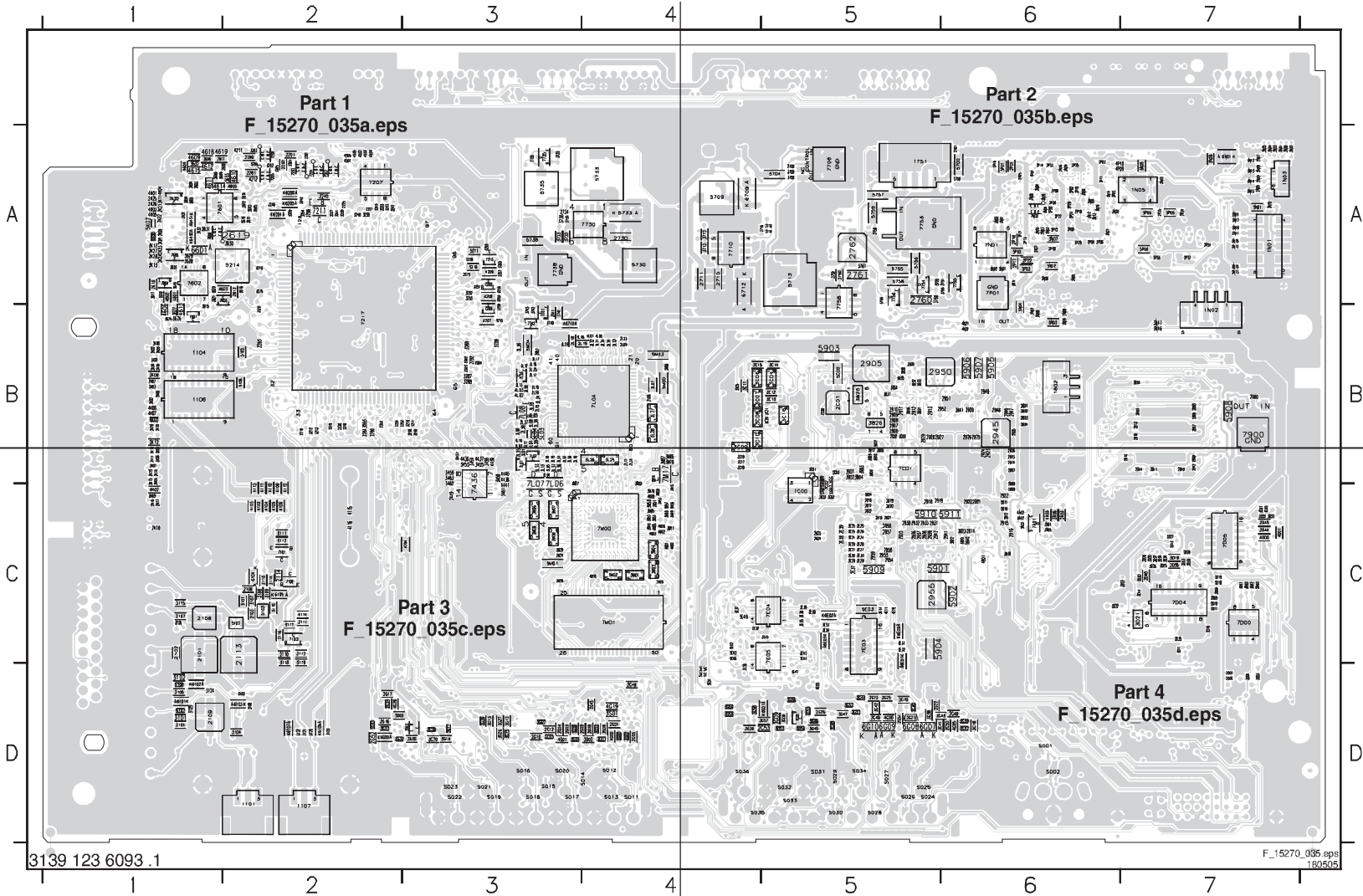
Layout Small Signal Board (Top Side Part 3)



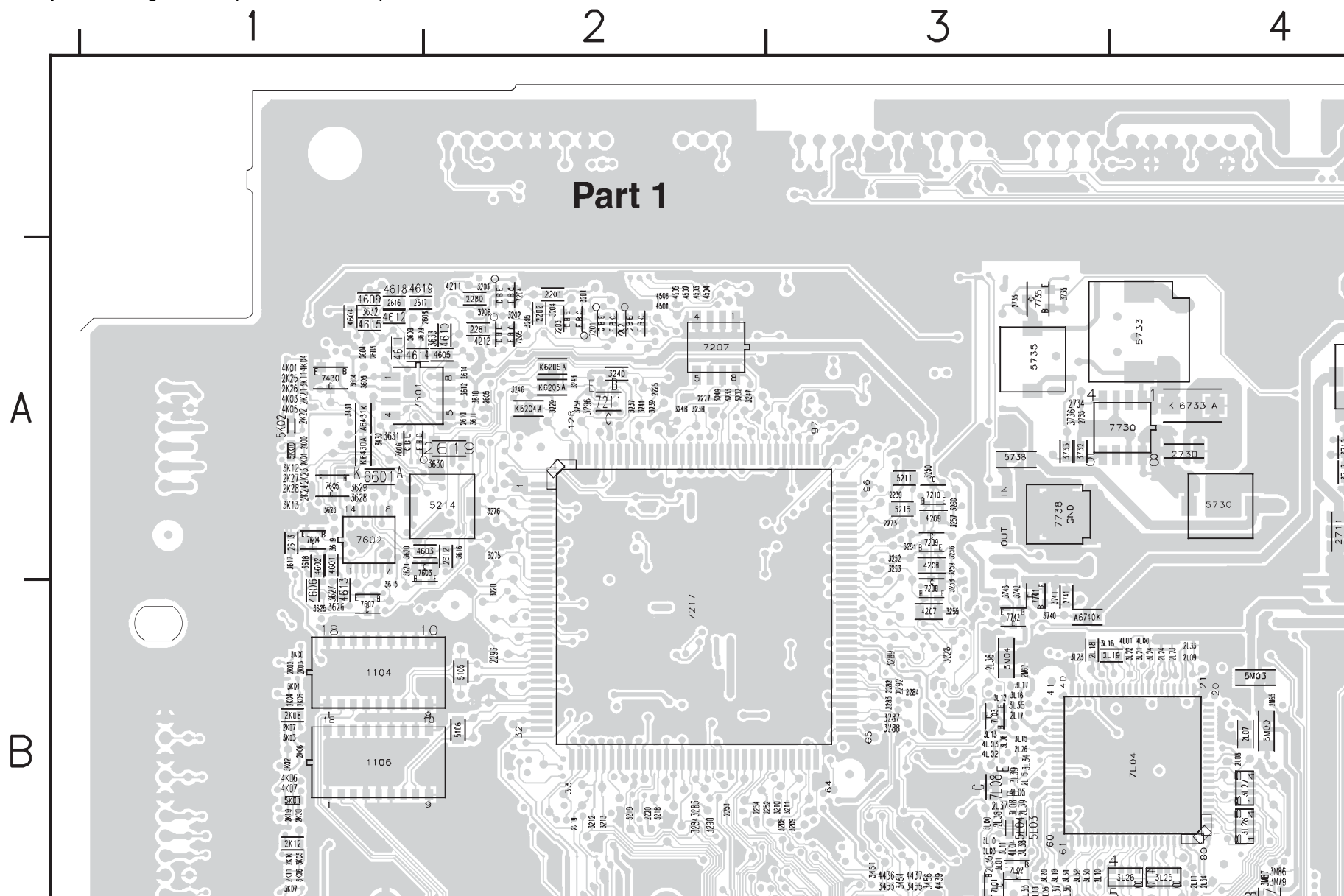


Layout Small Signal Board (Bottom Side Overview)

1102 C6	1J04 A6	2203 A5	2230 B6	2248 B6	2269 A6	2448 A5	2716 A3	2903 C4	2D05 C1	2D38 C1	2E15 C4	2F08 D1	2G33 D3	2J02 A4	2J19 A5	2L04 B5	2M05 C4	2M22 B4	2P37 A1	3223 A5	3266 B6	3292 C5	3807 C1	3A13 B3	3E00 C4	3E22 C3	3F23 D1	4620 A7	5G02 D3
1103 B6	1J05 A1	2205 B6	2231 A6	2249 B6	2270 A6	2501 A5	2731 A4	2904 C3	2D06 D1	2D41 C1	2E16 C3	2F09 D1	2G34 D5	2J03 A6	2J20 A5	2L05 B5	2M06 C4	2M23 B4	2P38 A1	3224 A5	3267 B6	3293 D5	3808 C1	3A14 B3	3E06 D4	3E23 C3	3F24 D2	4621 A7	5J01 A6
1106 B7	1J06 A3	2206 B6	2232 B5	2250 A5	2271 A5	2502 A6	2736 A5	2917 C2	2D07 C1	2E00 D3	2E17 C3	2F10 D1	2G35 D5	2J04 A1	2J21 A5	2L06 B5	2M07 C4	2M27 C4	2P39 A1	3225 A5	3268 B5	3294 C5	3809 B2	3B01 B1	3E07 D4	3E50 C4	3F25 D2	4900 B3	5J02 A6
1201 B6	1J07 A4	2207 B6	2233 B5	2251 B5	2272 A5	2503 A5	2737 A4	2934 C3	2D12 C1	2E01 D4	2E18 C3	2F11 D1	2G36 D5	2J05 A1	2J22 A5	2L20 B5	2M08 C4	2M28 C4	2P40 A1	3226 A5	3270 A5	3295 B6	3810 B2	3B02 B1	3E08 D3	3E52 C4	3F26 D2	4A00 B3	5J03 A4
1202 A6	1J08 A3	2208 A6	2234 A6	2255 B6	2274 B6	2504 A6	2738 A5	2940 C3	2D15 C1	2E02 D4	2E19 C3	2F12 D1	2G37 D5	2J06 A1	2J23 A5	2L21 B4	2M09 C4	2M29 C4	2P41 A1	3227 A5	3271 B5	3501 A5	3811 B2	3B03 B1	3E09 C3	3E53 C4	3F27 D2	4A01 B3	5J04 A4
1440 B5	1K00 A7	2209 A6	2235 A6	2256 B6	2275 A6	2505 A6	2739 A5	2A00 B3	2D17 C1	2E03 D3	2E20 C3	2F13 D2	2G38 D5	2J07 A1	2J26 A6	2L22 B5	2M10 C4	2M30 C4	2P42 A1	3230 A6	3272 B6	3502 A5	3812 B2	3D05 C1	3E10 D4	3E55 C4	3F28 D1	4A04 B4	5J05 A5
1441 A5	1K01 B7	2210 B5	2236 A5	2257 B6	2276 A6	2506 A6	2752 A3	2A01 B2	2D20 C1	2E04 D3	2E21 C3	2F14 D2	2G39 D5	2J08 A1	2J27 A6	2L27 B5	2M11 C4	2M31 C4	2P43 A1	3231 A6	3273 B6	3734 A3	3813 B2	3D06 C1	3E11 D4	3F00 D2	3F29 D1	4A05 B4	5L00 B4
1801 C3	1K02 C7	2211 B6	2237 A5	2258 A6	2277 B5	2507 A6	2753 A3	2A02 B2	2D21 C1	2E05 D3	2E22 C4	2F15 D2	2G40 D5	2J09 A1	2J28 A6	2L28 B4	2M12 C4	2M32 C4	2P44 A1	3234 A6	3274 B6	3751 A3	3814 B2	3D07 C1	3E12 C4	3F00 D2	3F30 D1	4A06 B3	5L01 B4
1F00 D1	1K03 C7	2214 B6	2238 A6	2259 B6	2278 B5	2508 A5	2754 A3	2A12 B4	2D22 C1	2E06 C3	2E23 C4	2F16 D2	2G41 D5	2J10 A3	2J29 A6	2L29 B5	2M13 C4	2M33 C4	2P45 A1	3235 A6	3277 B5	3752 A3	3815 B2	3D08 C1	3E13 D3	3F10 D2	3F31 D1	4E12 C3	5L02 B4
1F01 D2	1K04 B7	2216 B6	2240 A5	2260 A6	2279 B5	2509 A5	2755 A3	2A13 B3	2D23 D1	2E07 D3	2E23 C4	2G07 D4	2G43 D5	2J11 A3	2J30 A4	2L30 B5	2M14 C4	2M56 C4	3126 B6	3236 A6	3278 B5	3753 A3	3816 C2	3D09 C2	3E14 C3	3F11 D2	3F32 D1	4E13 C4	5M02 C4
1G01 D5	1P01 A1	2218 B5	2241 A5	2262 B6	2285 A6	2611 A7	2756 A3	2B01 B1	2D24 C1	2E08 D3	2E24 D4	2G11 D4	2G47 D5	2J12 A3	2J31 A3	2L31 B5	2M15 C4	2M60 C5	3127 B6	3242 B5	3279 B5	3754 A3	3819 C2	3D10 C1	3E15 C3	3F16 D1	3F33 D1	4E14 C4	5M05 C4
1G02 D3	1P02 A1	2221 B6	2242 B6	2263 B6	2286 B6	2615 A7	2757 A3	2B02 B1	2D25 C1	2E09 C3	2E25 C4	2G20 D2	2G55 D2	2J13 A3	2J33 A5	2L32 B4	2M16 C4	2M61 C4	3207 B6	3244 B5	3280 B6	3801 C1	3A00 B2	3D12 C1	3E16 D3	3F17 D1	3F34 D1	4E15 C4	5M06 C4
1G03 D4	1P03 A1	2223 A5	2243 B6	2264 B6	2287 B6	2618 A6	2758 A3	2B05 B1	2D26 C1	2E10 D3	2F00 D2	2G24 D2	2G56 D2	2J14 A3	2J34 A5	2M00 C4	2M17 C4	2M62 C5	3214 B6	3245 B6	3281 B6	3802 C2	3A01 B2	3D15 C2	3E17 C3	3F18 D1	3F35 D1	4E16 C4	5M07 C4
1J00 A5	1P04 A1	2224 A5	2244 B5	2265 B6	2288 B5	2704 A4	2800 C2	2B17 B1	2D27 C1	2E11 C3	2F02 D1	2G29 D4	2G63 D4	2J15 A3	2J35 A5	2M01 C4	2M18 C4	2M68 B4	3215 B5	3262 B6	3282 C5	3803 B2	3A07 B2	3D16 C2	3E18 C3	3F19 D1	3F36 D1	4E17 C4	5M08 C4
1J01 A3	1P05 A1	2226 B6	2245 B5	2266 B6	2290 C5	2706 A4	2815 C3	2B18 B1	2D28 C1	2E12 C3	2F04 D2	2G30 D4	2G64 D3	2J16 A5	2J36 A5	2M02 C4	2M19 C4	2M68 B5	3216 B5	3263 B6	3285 B5	3804 B2	3A08 B2	3D17 C2	3E19 D3	3F20 D1	3F37 D1	4E18 D3	5M09 C4
1J02 A4	1P06 A1	2228 B6	2246 B5	2267 B6	2291 B5	2709 A3	2901 B1	2D03 D1	2D32 C1	2E13 C3	2F05 D2	2G31 D3	2G65 D3	2J17 A5	2L02 B5	2M03 C4	2M20 B4	2P15 A2	3217 B5	3264 B6	3286 B5	3805 B2	3A10 B4	3D18 C2	3E20 D3	3F21 D1	3F38 D1	4E19 D3	5M10 C4
1J03 A6	1P07 A1	2229 B6	2247 B6	2268 B6	2447 A5	2713 A4	2902 B1	2D04 C1	2D34 D2	2E14 C3	2F07 D1	2G32 D3	2G66 D3	2J18 A5	2L03 B5	2M04 C4	2M21 B4	2P36 A1	3222 A5	3265 B6	3291 B5	3806 B2	3A11 B3	3D20 C2	3E21 C3	3F22 D1	3F39 D1	4E20 D3	5M11 C4



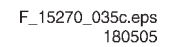
Layout Small Signal Board (Bottom Side Part 1)



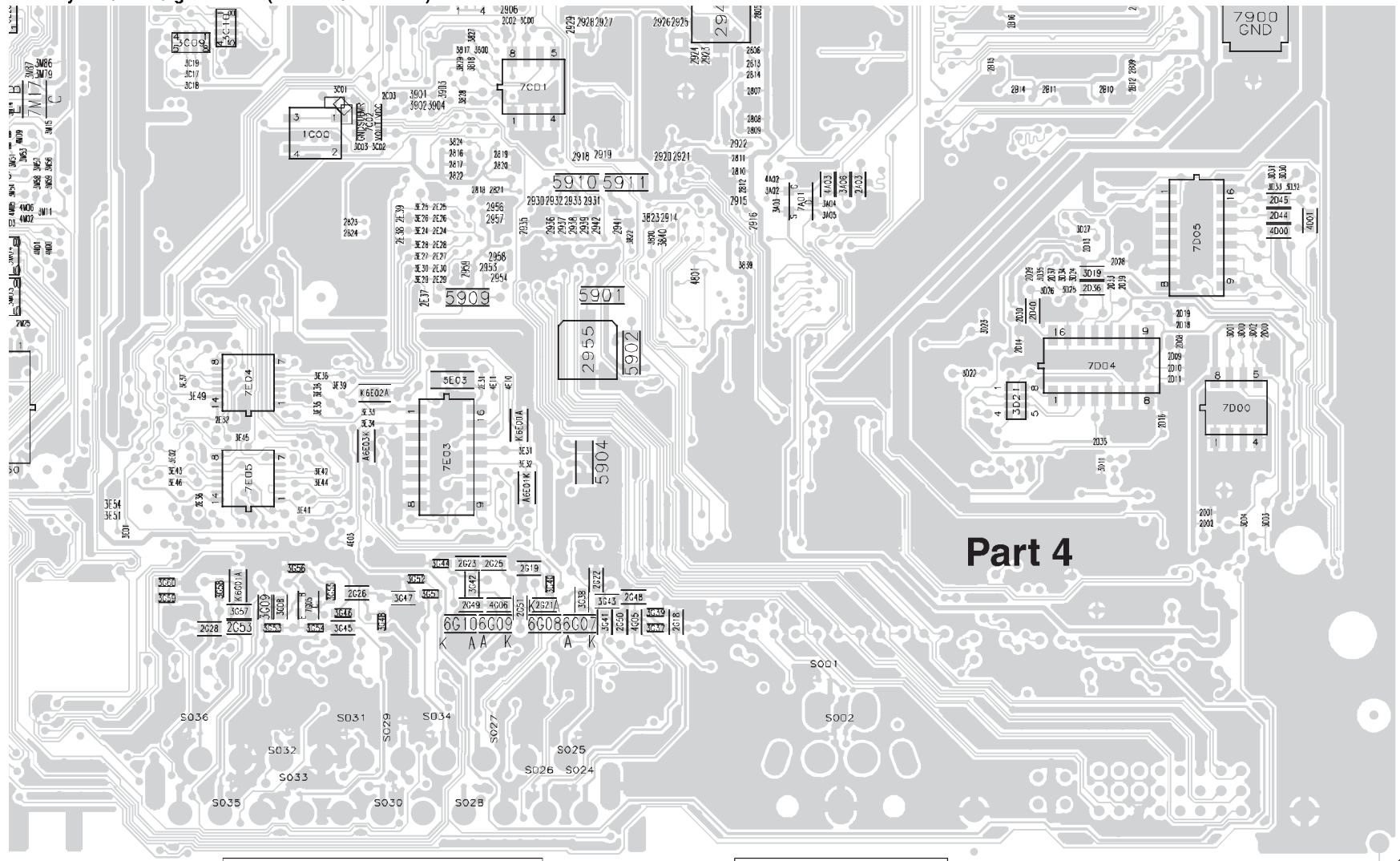
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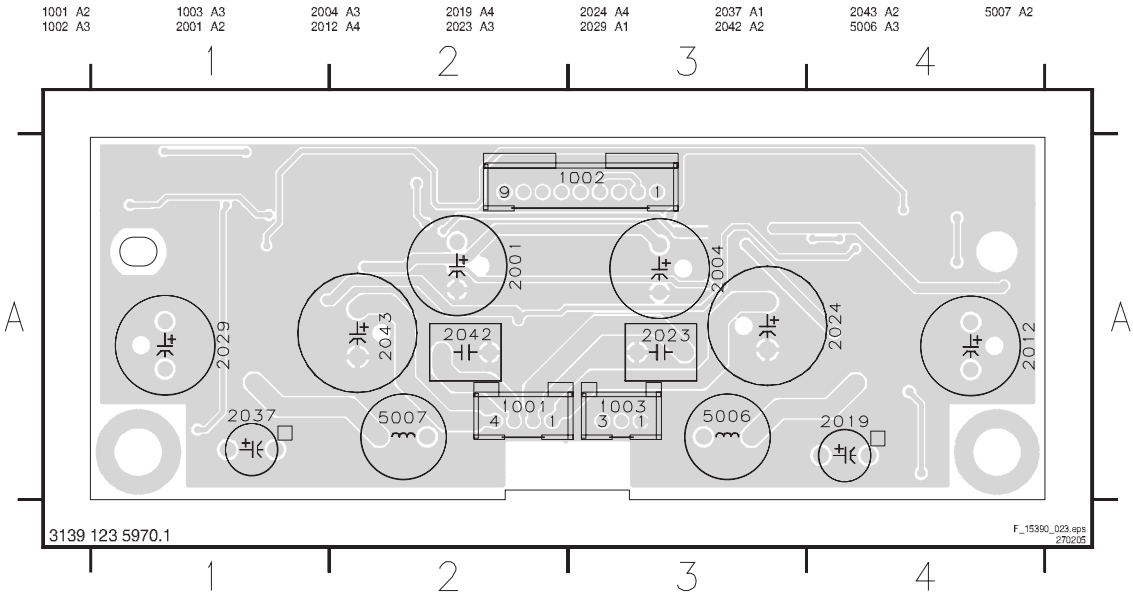
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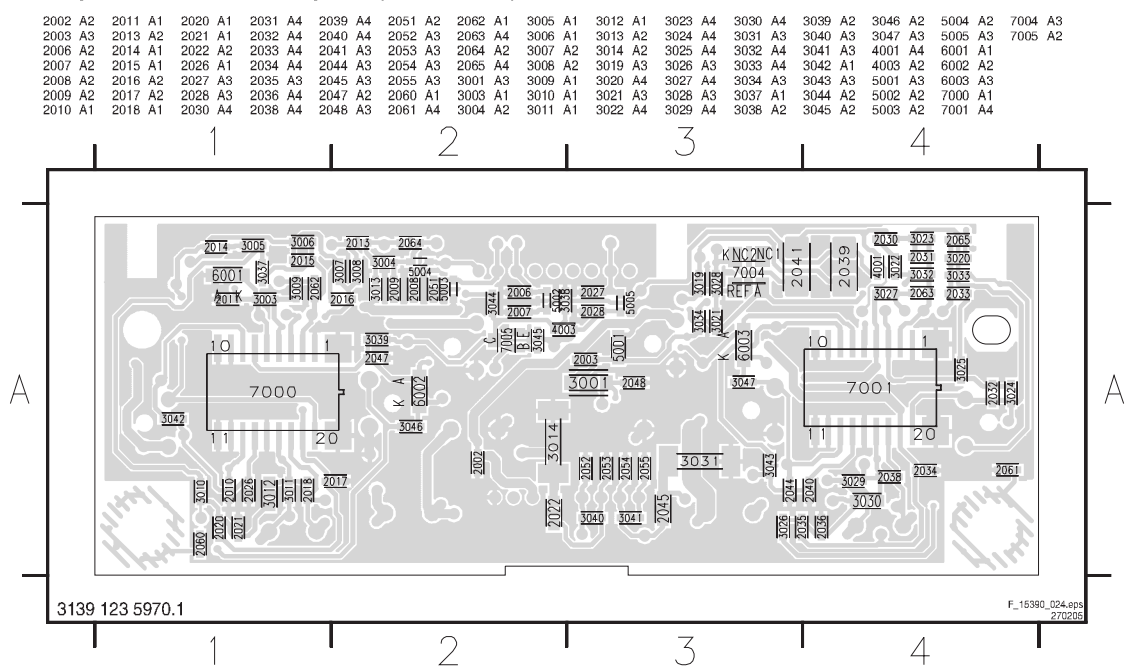
Layout Small Signal Board (Bottom Side Part 4)



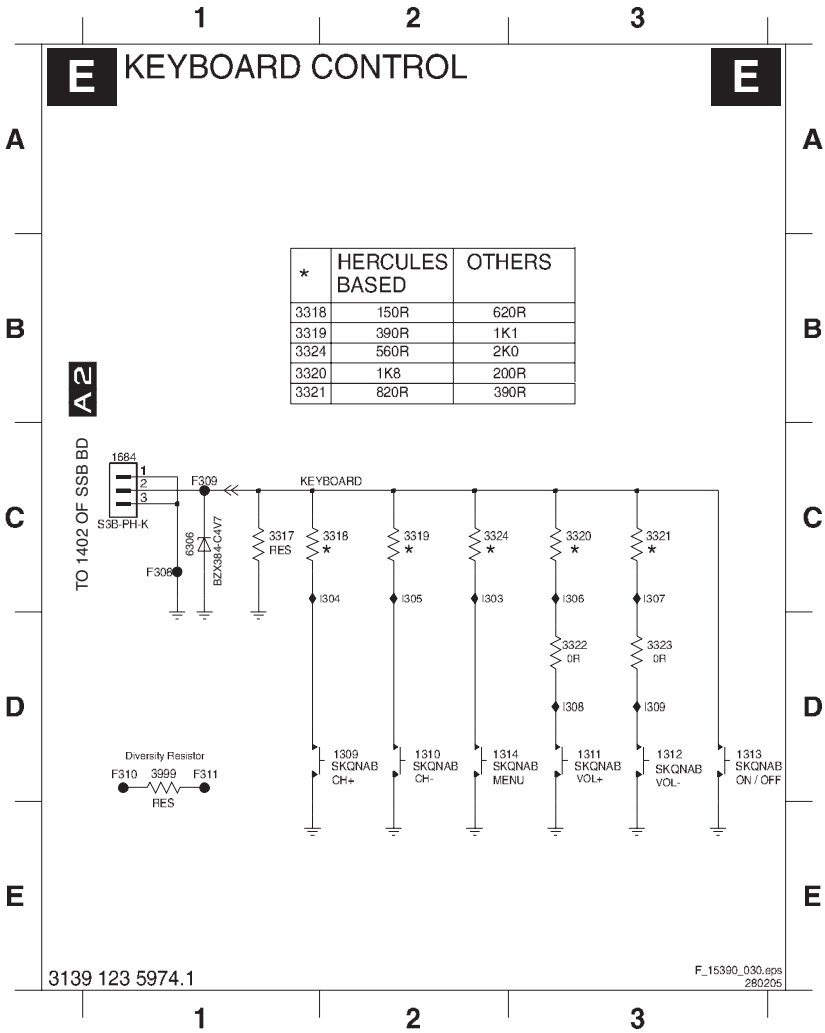
Layout Class D Audio Amplifier (Top Side)



Layout Class D Audio Amplifier (Bottom Side)



Keyboard Control Panel



Personal Notes:

1008 D1

1309 D2

1310 D2

1311 D3

1312 D3

1313 D3

1314 D2

1684 C1

3317 C1

3318 C2

3319 C2

3320 C3

3321 C3

3322 D3

3323 D3

3324 C2

3999 D1

6306 C1

F308 C1

F309 C1

F310 D1

F311 D1

I303 C2

I304 C2

I305 C2

I306 C3

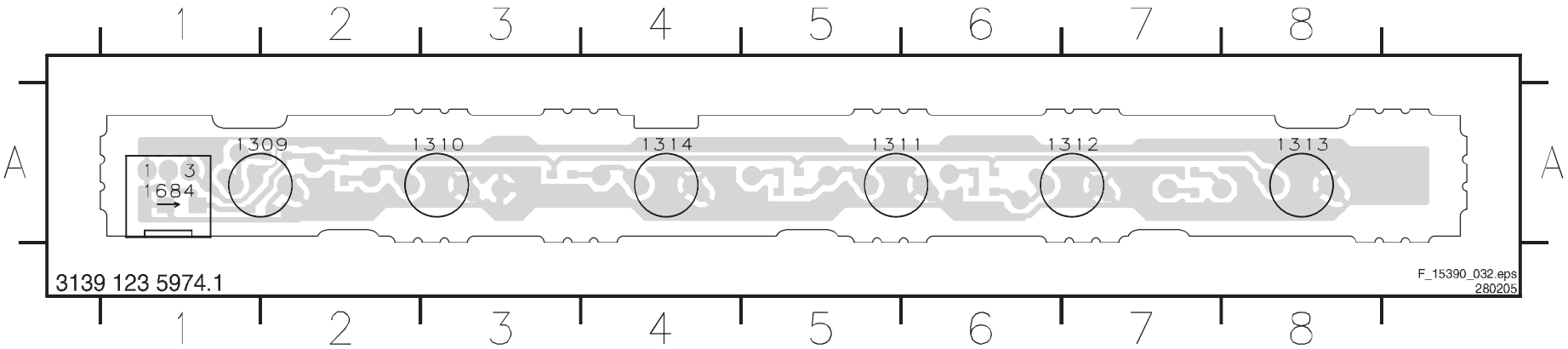
I307 C3

I308 D3

I309 D3

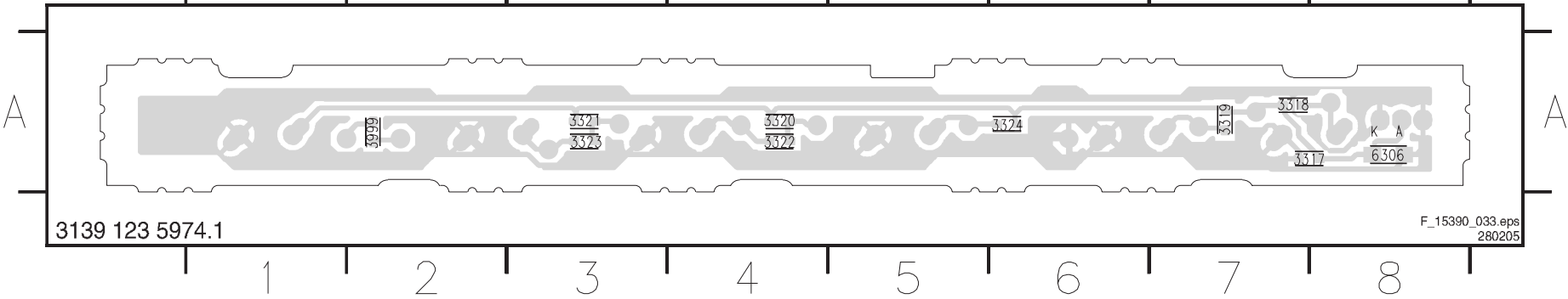
Layout Keyboard Control Panel (Top Side)

1309 A1 1310 A3 1311 A5 1312 A7 1313 A8 1314 A4 1684 A1

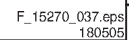


Layout Keyboard Control Panel (Bottom Side)

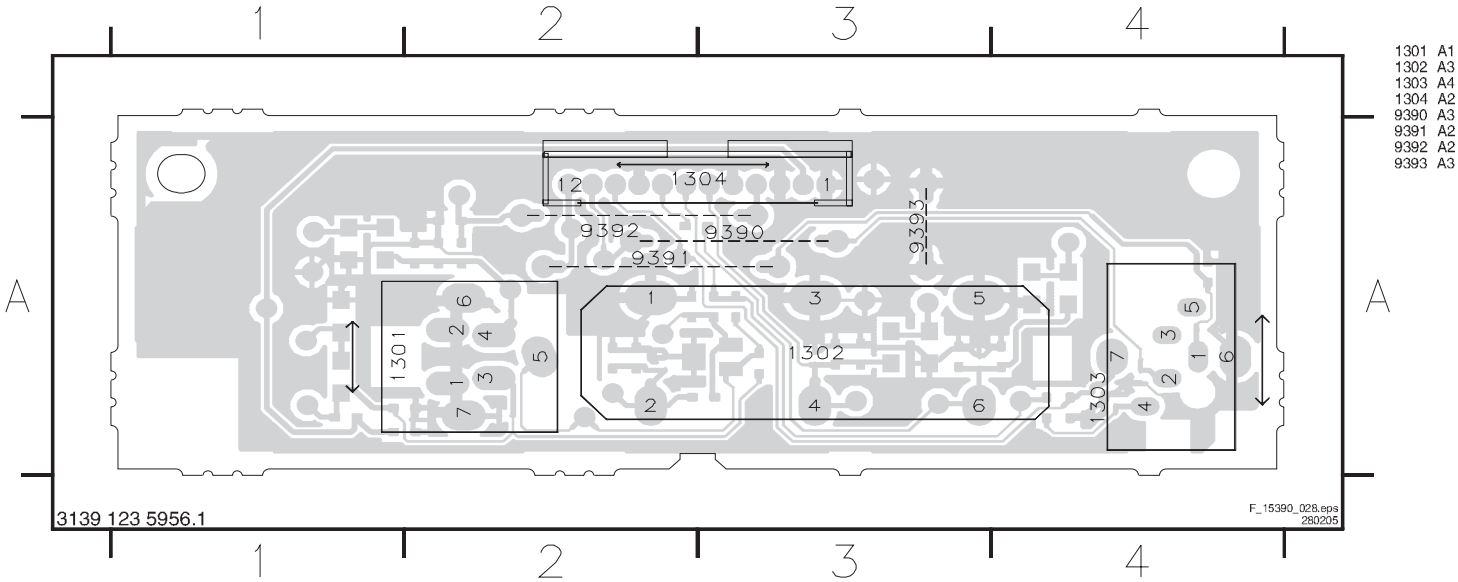
1 2 3 4 5 6 7 8



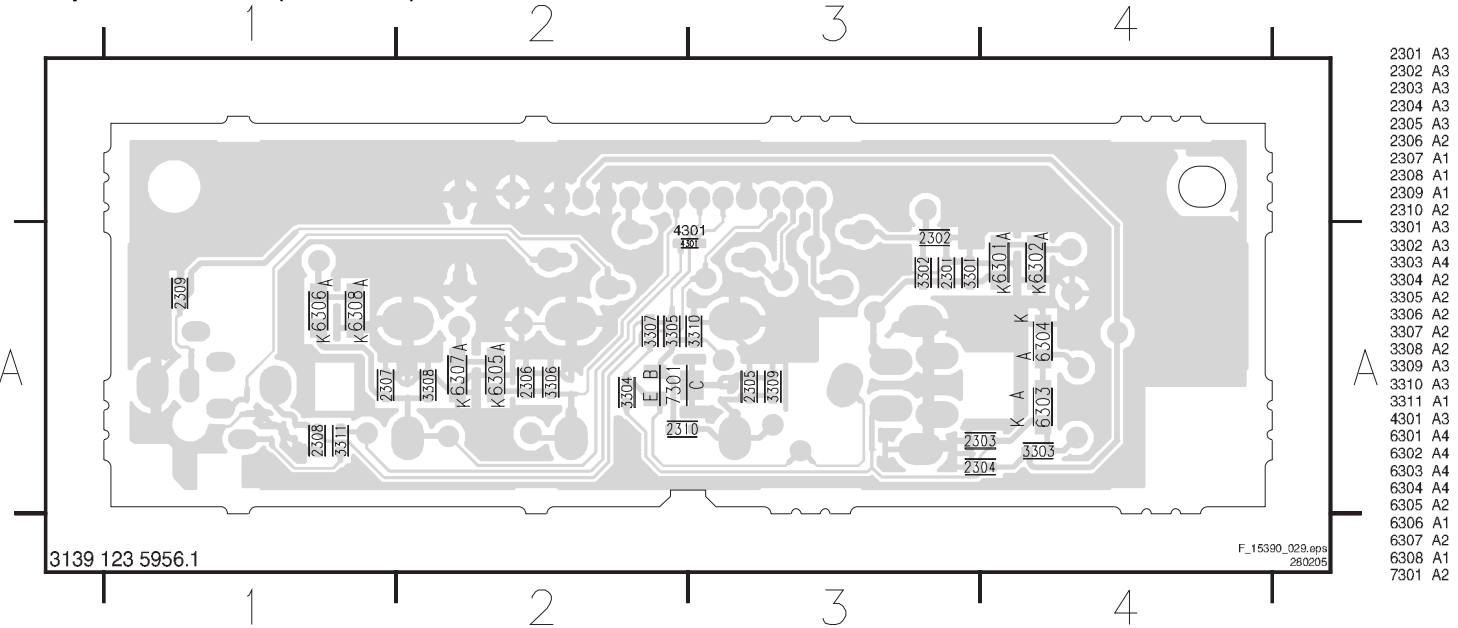
G SIDE-AV



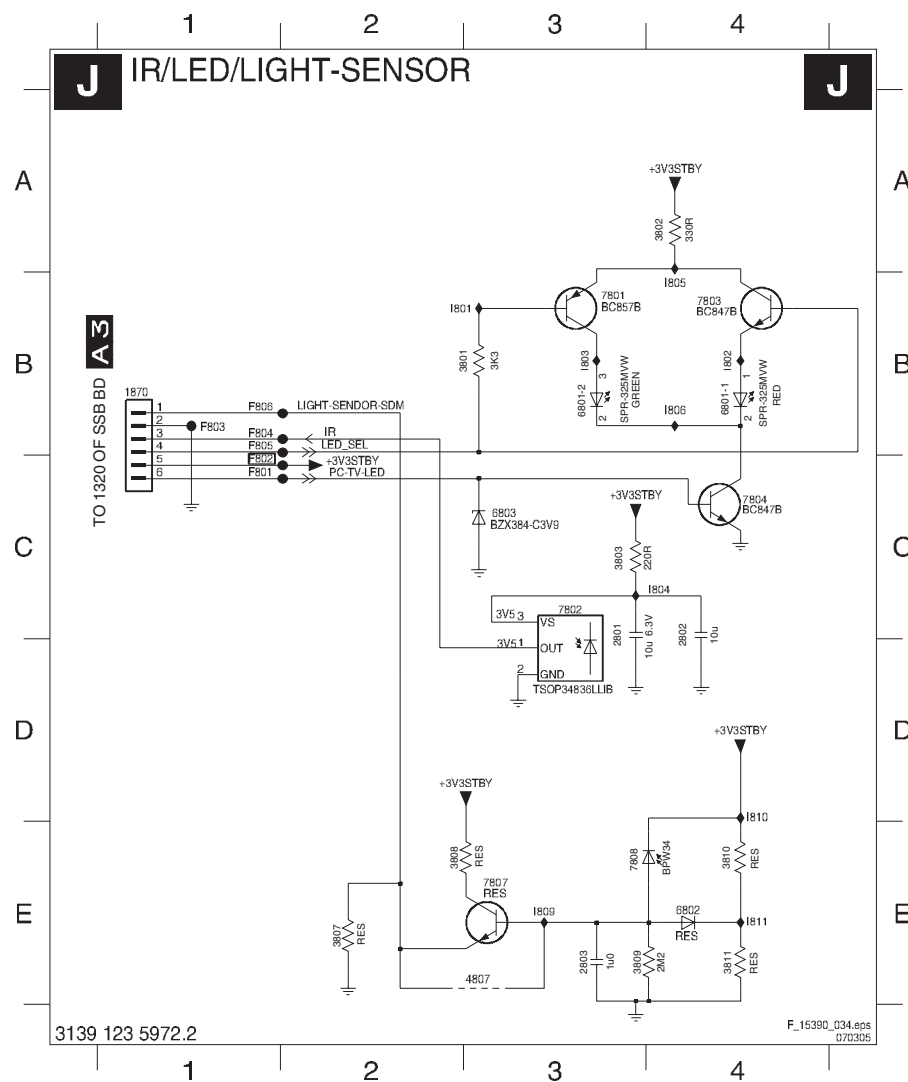
Layout Side A/V Panel (Top Side)



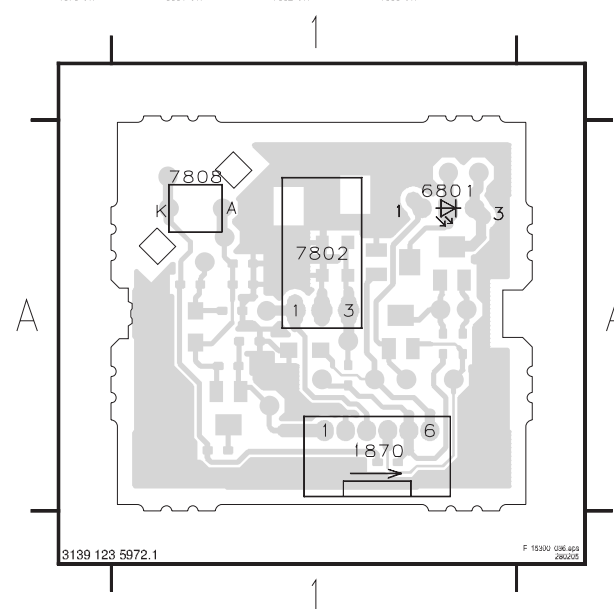
Layout Side A/V Panel (Bottom Side)



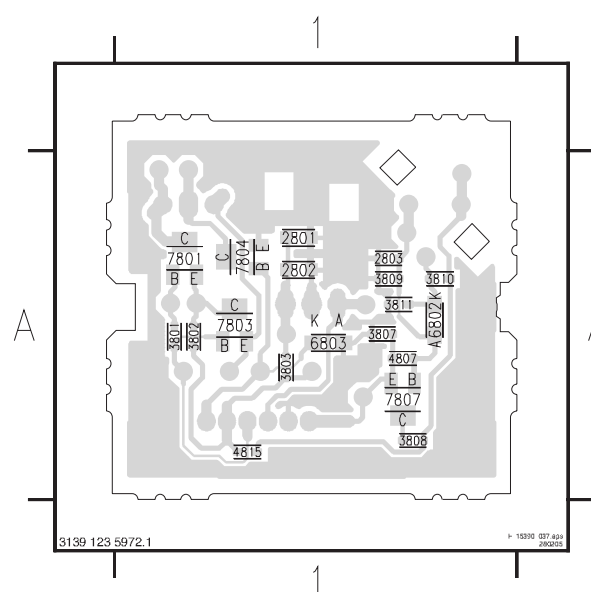
1870 B1	3801 B2	3808 E2	4807 E3	6803 C3	7804 C4	F802 C1	F806 B1	I804 C4	I810 D4
2801 C3	3802 A4	3809 E3	6801-1 B4	7801 B3	7807 E3	F803 B1	I801 B2	I805 B4	I811 E4
2802 C4	3803 C3	3810 E4	6801-2 B3	7802 C3	7808 E3	F804 B1	I802 B4	I806 B4	
2803 E3	3807 E2	3811 E4	6802 E4	7803 B4	F801 C1	F805 B1	I803 B3	I809 E3	



1870 A1	6801 A1	7802 A1	7808 A1
---------	---------	---------	---------



2801 A1	2803 A1	3802 A1	3807 A1	3809 A1	3811 A1	4815 A1	6803 A1	7803 A1	7807 A1
2802 A1	3801 A1	3803 A1	3808 A1	3810 A1	4807 A1	6802 A1	7801 A1	7804 A1	



8. Alignments

Index of this chapter:

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

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

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: $R_i > 10 \text{ M}\Omega$; $C_i < 2.5 \text{ pF}$.

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

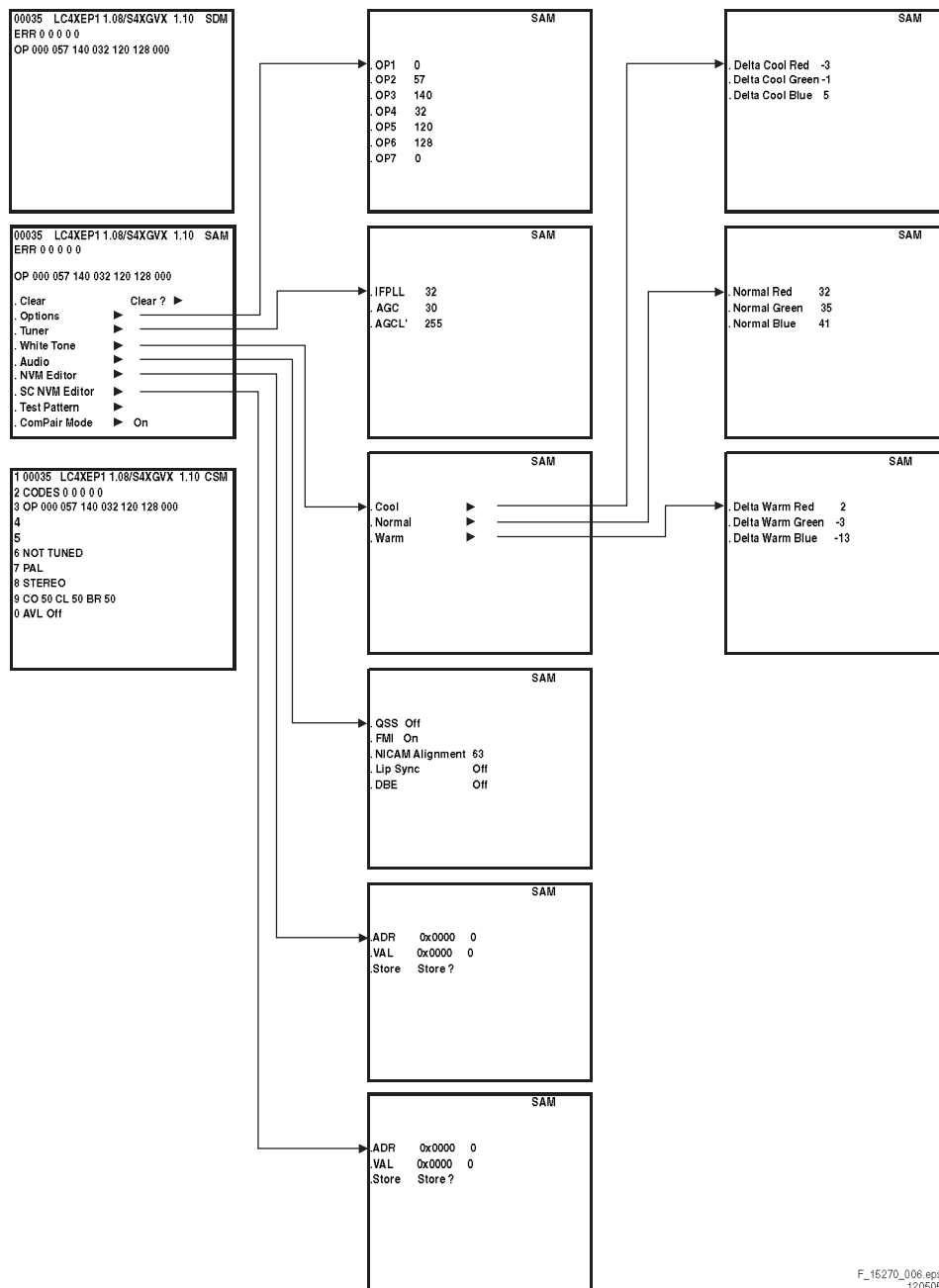
F_15270_006.eps
120505

Figure 8-1 Overview SAM menu.

8.3.2 Tuner Adjustment

AGC (RF AGC Take Over Point)

- Activate the SAM menu.
- Go to the sub-menu Tuner.
- Select the AGC sub-menu.
- Adjust the AGC value to AGC = 27.
- Adjust the AGC L' value to AGC L' = 27 (Europe only).
- Adjust the IFPLL value to IFPLL = 32 (Europe only).
- Switch the set to standby to store the data.

8.3.3 DCXO (Digital Xtal Oscillator) Alignment (for NICAM sets only)

- Input a Colour bar signal with a colour subcarrier frequency of 4.43 MHz on SCART1 or SCART2.
- Select as a signal source EXT1 or AV1.
- Go to the SAM menu and select Audio.
- Activate DCXO Alignment and wait until this process has finished (DONE).
- Check if the NICAM audio reception is OK, if not: repeat the procedure.
- Switch the set to standby to store the data.

8.3.4 ADC Gain, Grey Scale Alignment & Panel Size Settings

The table below shows a number of NVM settings used for each model of TV set. Be sure to use the correct editor in the SAM menu (NVM Editor or SC NVM Editor), because the first one is used for the Hercules NVM, and the second one for the SCALER (SC) part of the TV set. For further important NVM settings, see also the other NVM tables elsewhere in this manual.

Caution:

- Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!
- Do not change the Scaler NVM settings, as this will hamper the DVI functionality of the TV set!
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 8-1 ADC gain, grey scale alignment & panel size settings

SDTV ADC Gain settings: Use the NVM Editor in SAM to set these values in the Hercules NVM								
		These models are with ADC & Columbus 3D Combfilter				Without ADC & 3D Combfilter		
Setting	Hercules NVM Address (decimal value)	32PF7320/10	32PF5320/10	26PF5320/10	Settings Range (decimal value)		26PF4310/10	Settings Range (decimal value)
NVM_ADC_GAIN_R	006	110	110	110	075 - 155		N.A.	N.A.
NVM_ADC_GAIN_G	007	180	180	180	150 - 200		N.A.	N.A.
NVM_ADC_GAIN_B	008	110	110	110	075 - 155		N.A.	N.A.
SDTV Greyscale settings: Use the SC NVM Editor in SAM to set these values in the Scaler NVM								
		These models are with ADC & Columbus 3D Combfilter				Without ADC & 3D Combfilter		
Setting	Scaler NVM Address (decimal value)	32PF7320/10	32PF5320/10	26PF5320/10	Settings Range (decimal value)		26PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	338	080	080	080	050 - 110		080	050 - 110
ADC_GRN_OFFSET2	339	080	080	080	050 - 110		080	050 - 110
ADC_BLU_OFFSET2	340	080	080	080	050 - 110		080	050 - 110
ADC_RED_GAIN	341	065	065	065	040 - 095		170	135 - 190
ADC_GRN_GAIN	343	065	065	065	040 - 095		135	135 - 190
ADC_BLU_GAIN	345	065	065	065	040 - 095		170	135 - 190
PC Greyscale settings								
		These models are with ADC & Columbus 3D Combfilter				Without ADC & 3D Combfilter		
Setting	Scaler NVM Address (decimal value)	32PF7320/10	32PF5320/10	26PF5320/10	Settings Range (decimal value)		26PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	325	080	080	080	040 - 090		080	040 - 090
ADC_GRN_OFFSET2	326	080	080	080	040 - 090		080	040 - 090
ADC_BLU_OFFSET2	327	080	080	080	040 - 090		080	040 - 090
ADC_RED_GAIN	328	200	200	200	180 - 270		154	180 - 270
ADC_GRN_GAIN	330	200	200	200	180 - 270		154	180 - 270
ADC_BLU_GAIN	332	200	200	200	180 - 270		154	180 - 270
HD Greyscale settings								
		These models are with ADC & Columbus 3D Combfilter				without ADC & 3D Combfilter		
Setting	Scaler NVM Address (decimal value)	32PF7320/10	32PF5320/10	26PF5320/10	Settings Range (decimal value)		26PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	351	064	064	064	050 - 090		064	050 - 090
ADC_GRN_OFFSET2	352	082	082	082	050 - 090		082	050 - 090
ADC_BLU_OFFSET2	353	064	064	064	050 - 090		064	050 - 090
ADC_RED_GAIN	354	159	159	159	120 - 200		159	120 - 200
ADC_GRN_GAIN	356	144	144	144	120 - 200		144	120 - 200
ADC_BLU_GAIN	358	147	147	147	120 - 200		147	120 - 200
Panel size settings								
		WXGA 16x9 panel, brand: LPL				WXGA 15x9 panel		
Setting	Scaler NVM Address (decimal value)	32PF7320/10	32PF5320/10	26PF5320/10			26PF4310/10, brand: ODI	26PF4310/10, brand: LPL
NVM_PANEL_SEL	320	015	015	026			025	027

8.3.5 Sound

- For NICAM sets: see paragraph 8.3.3.
- For other sets: No adjustments needed for sound.

8.3.6 Options

Options OP1...OP7 in the SAM menu can be used for quickly restoring 64 features or settings of the SCALER part of the TV set to their original default factory values (8 groups of 8 features/settings each). When the decimal value of one option byte OP1...OP7 is changed (see the first table below) then a group of 8 bits, representing 8 SCALER options or features, is changed as well (see the second table below for a detailed description of the features or settings that are changed). The second table shows which option byte (OP1...OP7) represents which group of 8 option bits. Each bit (0...7) switches a particular SCALER feature or setting ON or OFF, depending on its value (1 or 0).

It is also possible to change the features or settings mentioned in the second table directly at bit level, by means of the SC (i.e., SCALER) NVM Editor in the SAM menu. In the SC NVM Editor, first the correct NVM address (ADR) has to be entered, then the correct value (VAL, 1 or 0) for each bit (see second table), and finally the settings have to be stored (STORE). For quickly restoring the SCALER part of the TV set to its original factory settings, however, it is more convenient to simply enter the default factory settings OP1...OP7 that are given in the first table below. How to do this, is described in the next paragraph.

How to Change an Option Byte

As has been explained above, an Option byte (OP) represents a number of different SCALER options. Changing these bytes directly makes it possible to set all SCALER options very fast. All options are controlled via seven option bytes. Select the option byte (OP1.. OP7) with the Menu Up/ Down keys, and enter the new (decimal) value. For the correct Factory Default settings, see the first table below. For more detailed information, see the second table.

Leaving the Option submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched "off" and "on" with the AC power switch (cold start).

Table 8-2 Option codes OP1...OP7

Option table for quickly restoring the SCALER to its Factory Default settings				
	Model number	32PF7320/10	32PF5320/10	26PF5320/10
OP1		152	152	152
OP2		37	37	37
OP3		79	15	14
OP4		113	113	113
OP5		252	252	252
OP6		27	27	27
OP7		19	19	3
Options (can be changed only via the SAM menu)		Total decimal value for each option per model number		

How to Change Options at Bit Level

If you wish to know which features or settings of the SCALER are changed via OP1...OP7, or if you want to change each option or feature bit by bit, use the more detailed table below.

Note: the table below contains only part of the NVM settings that can be changed (i.e., only part of the SCALER settings). A second range of settings and features, belonging to the HERCULES part of the TV set, can be found in Chapter 5 of this manual, in Table 5-2. The HERCULES NVM settings mentioned there can only be changed via the NVM editor, and not via the SCALER "Options" OP1...OP7. For further settings,

see also the NVM settings in the Table "ADC Gain, Grey scale alignment & panel size settings" elsewhere in this manual.

Table 8-3 Option codes in detail, at bit level

Option byte & bit table for restoring the SCALER to its original Factory Default settings via the SC NVM Editor in the SAM menu						
		Model number	32PF7320/10	32PF5320/10	26PF5320/10	26PF4310/10
OP1	Description of feature/option to be switched ON or OFF					
bit 7 (msb)	OP_PHILIPS_TUNER		1	1	1	1
bit 6	OP_FM_RADIO		0	0	0	0
bit 5	OP_LNA		0	0	0	0
bit 4	OP_ATS // for EU		1	1	1	1
bit 3	OP_ACI		1	1	1	1
bit 2	OP_UK_PNP		0	0	0	0
bit 1	OP_VIRGIN_MODE		0	0	0	0
bit 0 (lsb)	OP_CHINA		0	0	0	0
	Total DEC Value		152	152	152	152
	Total HEX Value		98	98	98	98
OP2						
bit 7 (msb)	OP_SC		0	0	0	0
bit 6	OP_IBEX		0	0	0	0
bit 5	OP_CHANNEL_NAMING		1	1	1	1
bit 4	OP_LTI (Lum Transcient Improvmt)		0	0	0	0
bit 3	OP_TILT		0	0	0	0
bit 2	OP_FINE_TUNING		1	1	1	1
bit 1	OP_PIP_PHILIPS_TUNER		0	0	0	0
bit 0 (lsb)	OP_HUE		1	1	1	1
	Total DEC Value		37	37	37	37
	Total HEX Value		25	25	25	25
OP3						
bit 7 (msb)	OP_EW_FUNCTION		0	0	0	0
bit 6	OP_PIXEL_PLUS		1	0	0	0
bit 5	OP_PIP_SPLITTER // temp		0	0	0	0
bit 4	OP_SPLITTER // temp		0	0	0	0
bit 3	OP_VIRTUAL_DOLBY		1	1	1	1
bit 2	OP_WIDE_SCREEN		1	1	1	1
bit 1	OP_WSSB		1	1	1	1
bit 0 (lsb)	OP_OP_ME5 // OP_ME5 - 5/6 local buttons implementation		1	1	1	0
	Total DEC Value		79	15	15	14
	Total HEX Value		4F	0F	0F	0E
OP4						
bit 7 (msb)	OP_LIP_SYNC		0	0	0	0
bit 6	OP_HD		1	1	1	1
bit 5	OP_ULTRA_BASS		1	1	1	1
bit 4	OP_DELTA_VOLUME		1	1	1	1
bit 3	OP_TAIWAN_KOREA		0	0	0	0
bit 2	OP_VOLUME_LIMITER		0	0	0	0
bit 1	OP_STEREO_DBX		0	0	0	0
bit 0 (lsb)	OP_STEREO_NICAM_2CS		1	1	1	1
	Total DEC Value		113	113	113	113
	Total HEX Value		71	71	71	71
OP5						
bit 7 (msb)	OP_AV1		1	1	1	1
bit 6	OP_AV2		1	1	1	1
bit 5	OP_AV3		1	1	1	1
bit 4	OP_CVI		1	1	1	1
bit 3	OP_SVHS2		1	1	1	1
bit 2	OP_SVHS3		1	1	1	1
bit 1	OP_HOTEL_MODE		0	0	0	0
bit 0 (lsb)	OP_SIMPLY_FACTORY=OP_BTSC_AVSTEREO		0	0	0	0
	Total DEC Value		252	252	252	252
	Total HEX Value		FC	FC	FC	FC
OP6						
bit 7 (msb)	OP_PERSONAL_ZAPPING		0	0	0	0
bit 6	OP_SMART_SURF		0	0	0	0
bit 5	OP_FMTRAP		0	0	0	0
bit 4	OP_COMBFILTER		1	1	1	1
bit 3	OP_ACTIVE_CONTROL		1	1	1	1
bit 2	OP_VIDEO_TEXT		0	0	0	0
bit 1	OP_LIGHT_SENSOR		1	1	1	1
bit 0 (lsb)	OP_TWIN_TEXT		1	1	1	1
	Total DEC Value		27	27	27	27
	Total HEX Value		1B	1B	1B	1B
OP7						
bit 7 (msb)	OP_TIME_WIN1		0	0	0	0
bit 6	OP_DVB_USB = OP_MALAY		0	0	0	0
bit 5	OP_AMBLIGHT		0	0	0	0
bit 4	OP_COLUMBUS		1	1	1	0
bit 3	OP_DUMMY6		0	0	0	0
bit 2	OP_DUMMY7		0	0	0	0
bit 1	OP_WEST_EU		1	1	1	1
bit 0 (lsb)	OP_MULTI_STANDARD_EUR		1	1	1	1
	Total DEC Value		19	19	19	3
	Total HEX Value		03	03	03	03

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

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- 9.1 Introduction
- 9.2 Block Diagram
- 9.3 Input/Output
- 9.4 Tuner and IF
- 9.5 Video: TV Part (Diagrams B1, B2, and B3)
- 9.6 Columbus
- 9.7 Video: Scaler Part (Diagram B7, B8 and B9)
- 9.8 Audio Processing
- 9.9 Control
- 9.10 Abbreviation List
- 9.11 IC Data Sheets

9.1 Introduction

The LC4.3 LCD TV is a global LCD TV for the year 2005. It is the successor of the LC4.2 LCD TV and covers screens sizes 26 inch (in 15:9 and 16:9 ratio) and 32 inch (in 16:9 ratio) and has a new styling, called ME5. There are three different picture qualities available, depending on the model: Pixel Plus, Digital

Cristal Clear and Cristal Clear. The block diagram below (Figure 2.1) shows the Pixel Plus architecture; the architectures of the other models are shown in the block diagram on the next page (Figure 2.2).

The architecture consists of a TV and Scaler panel, I/O panel, Side I/O and Local Keyboard panel and Power Supply panel. The functions for video/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA150xx, item 7217), 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 colour decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, colour decoder, and stereo sound processor).

9.2 Block Diagram

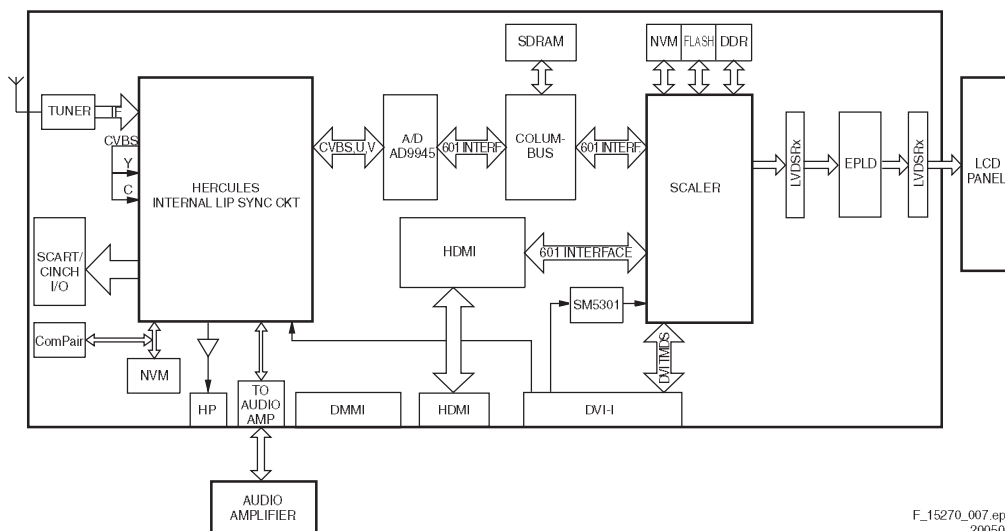


Figure 9-1 Block Diagram

The PLL tuner UV1318 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. Two SCART-connectors are used: SCART1 is for RGB-in, video in (CVBS)

and terrestrial out (CVBS), and SCART2 is meant for VCR (CVBS out and Y/C in). The CVBS-out on pin 19 of SCART2 can be used for monitoring purposes: WYSIWYR (What You See Is What You Record).

Depending on the model of the TV set, the Hercules delivers its RGB signals either directly to the Scaler IC or indirectly, via a Columbus chip (for 2D/3D comb filtering and spatial/temporal noise reduction, for its description: see further down in this text). The EPLD, which is present in Pixel Plus models, provides additional sharpening to the picture. For a general outline, see the table and the block diagrams below, in which the architectures of the various models are given, together with their electronic building blocks.

Table 9-1 Models and picture quality

Model	Picture quality
32PF7320/10	Pixel Plus
32PF5320/10	Digital Crystal Clear
26PF5320/10	Digital Crystal Clear
26PF4310/10	Crystal Clear

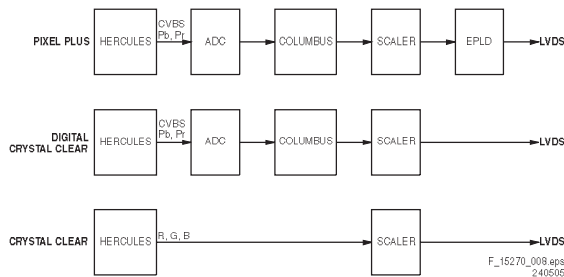


Figure 9-2 Block diagram of the internal building blocks

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

After the video processing, 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 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs, a PC/DVI-I input (VGA to DVI-I via an external adaptor) and an Audio input. The side has a CVBS and Y/C (SVHS) input, combined with L+R audio inputs, and has also a headphone output.

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

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS_SC2_MON_OUT (+ sound). SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C_in: Y_in on pin 20 and Chroma_in on pin 15. The selection of the external I/O's is controlled by the Hercules.

PC in (DVI-I, or VGA via external VGA to DVI-I adaptor): This input is directly going to the Scaler IC. See paragraph "Video: Scaler Part".

9.4 Tuner and IF

A Philips UV1318 Tuner is used in the TV board. The SIF signals are decoded by the Hercules. Tuning is done via I²C.

9.4.1 Video IF Amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1104, in some models: 1105) and one for IF-audio (1106). The type of these filters depends on the standard(s) that has/have 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)

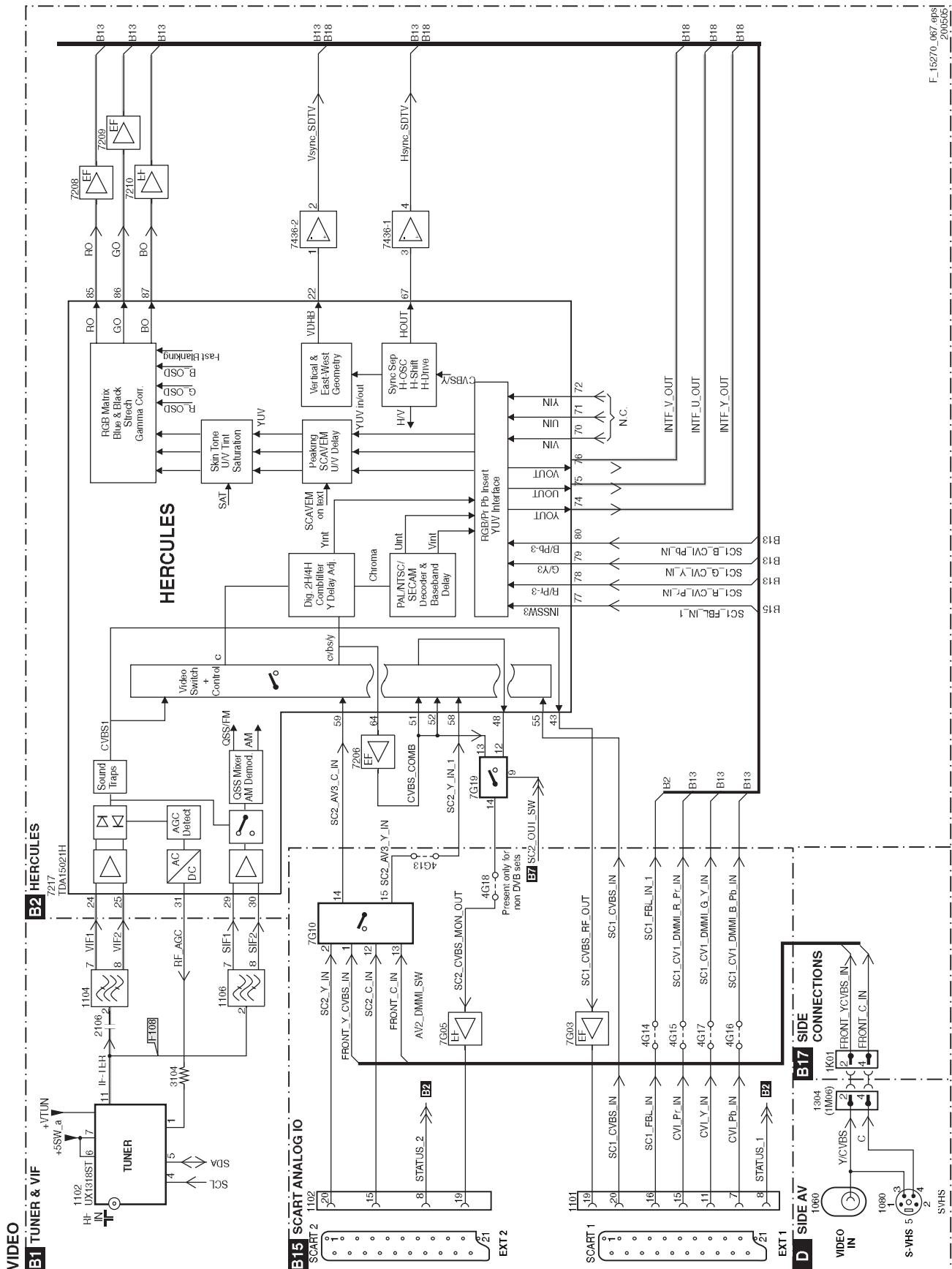


Figure 9-3 Block diagram video processing

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 built-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 Columbus

9.6.1 Introduction

The Columbus is a combination of:

- A **2D/3D Comb filter** for both PAL and NTSC, and
- A **spatial/temporal noise reduction system** for both colour and luminance signals.

The Columbus 3D Comb filter uses digitalised CVBS, U, and V (or C) signals and can be used with or without an external 16 Mbit SDRAM. Without external 16Mbit SDRAM, 3D comb filtering and temporal noise reduction are not possible.

The noise reduction part of the Columbus is controlled by the FBX software using the SNERT interface. The 2D/3D Comb filter part is controlled by the Main software using the PC bus.

9.6.2 2D/3D Comb Filter

Introduction

The "3D Comb filter Columbus" is a combined 2D/3D Comb filter function that is part of the Columbus chip (circuit diagram B19, item 7M00). It is a comb filter for both PAL and NTSC.

The 3D Comb filter is used to separate chroma and luminance components out of a CVBS signal. It is of no use when the CVBS signal is a SECAM signal (SECAM signals cannot be combed) The Columbus chip can be used with or without 16 Mbit external SDRAM (circuit diagram B10, item 7B01). When an external SDRAM is connected to the IC, the Comb filter function can work in combined 2D/3D processing (depending on the detected pixel based motion). When no external SDRAM is connected, only 2D Comb filtering is possible.

The Columbus can comb the following standard signals:

- PAL B, PAL G, PAL H, PAL I, PAL D, PAL K: Colour standard PAL, Colour carrier at 4.43 MHz, field frequency: 50 Hz
- PAL M: Colour standard PAL, Colour carrier at 3.58 MHz, field frequency: 60 Hz
- PAL N: Colour standard PAL, Colour carrier at 3.58 MHz, field frequency: 50 Hz
- NTSC M: Colour standard NTSC, Colour carrier at 3.58 MHz, field frequency: 60 Hz

For NTSC signals, the PAL delay line must always be bypassed.

The following signals CANNOT be combed:

- Double Window signals or Multi PIP. For these signals, only one part or even no part of the signal is in relation with the burst. The part that is not in relation with the burst can become very blurred when combed by the Columbus

Comb filter. Such a signal must be bypassed. Notch mode is not even an option since e.g. in double window, one part can be a PAL signal while the other part is NTSC or SECAM.

- In cases where a SECAM signal is presented to the Columbus Comb filter; both the luminance and UV path must be bypassed. The PAL delay line inside the Columbus cannot be used for SECAM signals so it must also be bypassed. The luminance path must have luminance at its input instead of CVBS. A chroma delay line outside Columbus must be used for SECAM signals. Reason for this: the Columbus PAL delay line halves the output of the chroma signals in case of SECAM.
- Y/C, YPbPr, and RGB signals do not have to be combed. So both the luminance and UV path must be bypassed. The PAL delay line will also be bypassed.
- In cases where the Columbus Comb filter does not receive a CVBS signal with burst at the right place according to the standard (this includes black and white signals without burst), phase correction results become unpredictable and the Comb filter must be set in bypass (= luminance path bypassed, UV path bypassed, PAL delay line bypassed)
- VCR signals cannot be combed and must be processed in notch mode, or bypassed.

Columbus Modes

The several modes of the Columbus 3D Comb filter are:

- Bypass mode.
- Band-Pass-Notch mode.
- 2D Comb filter modes.
 - Simple median.
 - Median.
- Field Comb filter mode.
- Frame Comb filter mode.

Bypass Mode

The 3D Comb filter can be set in bypass mode. In this mode, the CVBS, U and V signals are just bypassed to the output.

Band-Pass-Notch Mode

This is a mode where no Comb filtering is applied. A "Band Pass Filter" is used to filter the chroma information out of the CVBS signal. A "Notch Filter" is used to subtract the sub carrier out of the CVBS in order to make a luminance signal without chroma sub carrier.

In terms of cross colour and cross luminance, this mode has the worst performance of all. It is only used on these signals where no comb filtering can be applied (non-standard signals and most VCR signals for example).

2D Comb Filter Modes

A Comb filter does an action on a current pixel and a delayed pixel. When the delayed pixel is a line-delayed pixel, we talk about a "Spatial or 2D Comb Filter" (for NTSC the delay must be 1 line, for PAL it must be 2 lines).

Spatial or 2D Comb filters show problems on vertical colour transients and on single coloured lines. For these situations, extra hardware is added in the Columbus chip to avoid these kinds of problems. However even with these extra measures, there are still situations where the 2D Comb filter does not perform optimally (diagonal resolution and single lines with equal luminance content). In order to restrict the working area of the 2D Comb filter to the frequencies where the sub carrier is present, a horizontal band pass filter always precedes a 2D Comb filter.

When a 2D Comb filter has no extra hardware to avoid problems at vertical colour transients (or this extra hardware is switched "off"), the Comb filter is called a "simple median filter". When there is extra hardware to avoid these kinds of problems, the filter is called a "median filter".

Field Comb Filter Mode

A Comb filter does an action on a current pixel and a delayed pixel. When the delayed pixel is a field-delayed pixel, we talk

about a “Field Comb Filter”. Field Comb filters are only for PAL of commercial interest.

Field Comb filters show also problems on vertical colour transients and on motion. For the vertical transients, a hanging dots detector has been added, however the performance on vertical transients of the field Comb filter, even with this hanging dots detector, is worse than the performance of the 2D Comb filter. On motion, the field Comb filter performs very badly. A motion detector must detect the pixels where there is motion and on these pixels, the Comb filter must be forced back to 2D Comb filter mode. This switching back is not implemented with a hard switch, but with a motion controlled fader. When there is a lot of motion, the fader will take a lot of the 2D Comb filter output, when there is less motion, more field-combed signal will be taken.

A field Comb filter is also called a “vertical-temporal filter” because it filters in the vertical and temporal direction.

Frame Comb Filter Mode

A Comb filter does an action on a current pixel and a delayed pixel. When the delay is a frame, we talk about a “Frame Comb Filter”. For NTSC we need a delay of one frame, for PAL however the delay must be two frames.

Frame Comb filters have the best performance, but just like the Field Comb filter, they perform very badly on motion. A motion detector will have to detect motion and on these motion pixels, 2D Comb filtering will have to be applied. A frame Comb filter is a pure “temporal filter”.

The Columbus needs an external memory connected to it, before it can do a temporal or vertical-temporal Comb filter action. When no external memory is connected, field or frame Comb filtering is impossible.

Block Diagram

In the next block diagram, two main parts of the Columbus 2D/3D Comb filter can be seen:

- The upper part is what is called the luminance Comb filter. It tries to make an as clean as possible luminance signal out of the CVBS signal at the input.
- The lower part receives U and V signals (sequentially) that are normally only band pass filtered in front of the 3D Comb filter. It filters all left over luminance signals out of it, in order to make an as clean as possible U and V signal.

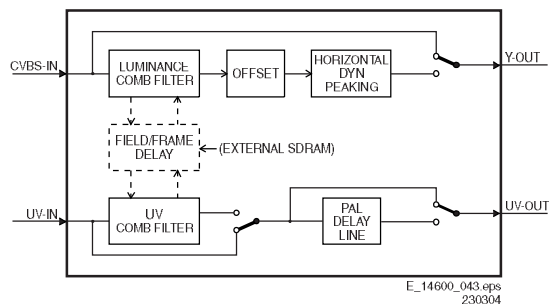


Figure 9-4 Columbus 2D/3D Comb Filter block diagram

The Comb filter has two inputs. One is the CVBS where clean luminance (Y) will be extracted from; the other one is UV where a clean U and V signal will be extracted. Both input signals are digital signals.

The field or frame delay is used for the Field and Frame Comb filter mode. An external memory connected to the Columbus IC provides this delay.

Phase correction is done at the inputs of both the Comb filter blocks. There is a phase correction for spatial filtering (called the spatial phase corrector) and a separate phase correction on the signals used for temporal (Frame or Field) Comb filtering (called the temporal phase corrector).

The offset block receives the motion dependant 2D/3D Comb filtered signal as input. The black level of the luminance signal is restored and the result is output. The black level restoration is corrected continuously. However, on VCR signals, this restoration can become unstable. Therefore, on VCR signals, a fixed black level restoration value must be forced.

A horizontal dynamic peaking can be done on the luminance signal. This peaking is adaptive in order not to amplify any cross luminance distortion. It detects where there could be left over sub carrier in the luminance signal and reduces the peaking over there. The detection of the left over cross luminance is different depending on the pre-filter or post-filter mode.

The amount of peaking and coring can be chosen. The peaking algorithm behind it is a simplified copy of the luminance peaking of picnic. After the peaking block, the signal is output as clean luminance.

The bypass switches have the obvious purpose of bypassing the input signal, in case no Comb filtering is wanted.

A PAL delay line is added in the UV path. This is done because a delay line in front of the 3D Comb filter does need an extra vertical filter action on the UV signals. This vertical filtering deteriorates the vertical transient performance for colours. The Columbus Comb filter cannot undo this. However, this reduction in performance can be omitted by putting the PAL delay line after the 3D Comb filter block.

For PAL signals, the PAL delay line in front of the Columbus 3D Comb filter is bypassed and the Columbus delay line is switched “on”. In cases where the delay line in front of Columbus cannot be bypassed, the Columbus PAL delay line is bypassed.

For NTSC signals, the PAL delay line is bypassed as usual.

9.6.3 Noise Reduction and Noise Estimator

The noise reduction function is a sophisticated successor of the noise reduction module from the PICNIC-chip, also known as "LIMERIC".

Besides the noise reduction part, the Columbus noise reduction module also comprises a noise estimator. This noise estimator (the LORE-noise estimator) is a new design with the ambition of more accuracy and with less control complexity than the existing noise estimators.

9.7 Video: Scaler Part (Diagram B7, B8 and B9)

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

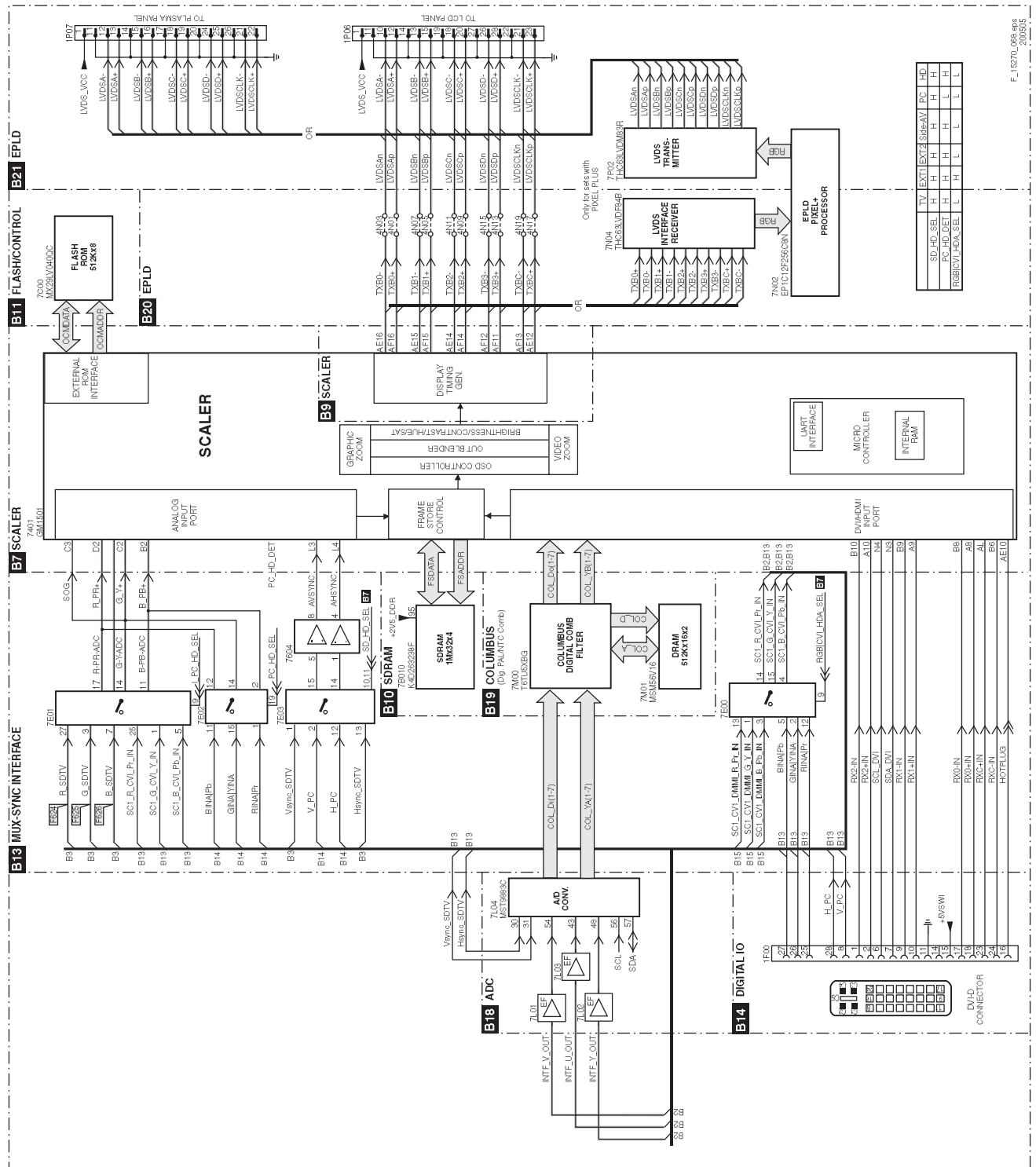


Figure 9-5 Block diagram scaler part

9.7.1 Teletext Path

In Pixel Plus and Digital Crystal Clear models, which have an ADC (B18) and Columbus 3D combfilter (B19), the digital input of the scaler is used for the digital video signal (Columbus output), whereas the analogue RGB input of the scaler is used for teletext. This means that no mixed mode (video plus teletext simultaneously) is possible. In Crystal Clear models, which do not have an ADC and Columbus, the analogue RGB input of the scaler is used for both video and teletext (generated by the Hercules). The digital input of the Scaler is not used in Crystal Clear TV sets. See also the block diagrams at the beginning of this chapter. When faultfinding, checking the teletext path may be useful: if there is sound and teletext, but no video and user menu (blank screen), the digital path (Hercules - ADC - Columbus - Scaler) is faulty. If there is sound but no teletext, the back-end part (Scaler - LCD panel) is faulty.

9.7.2 Features

The Scaler provides several key IC functions:

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

9.7.3 Inputs

Analog RGB

The RGB input is fed to pins B2, C2 and D2 of the Scaler IC (Genesis GM1501, item 7801, see circuit diagram B8). 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 (see circuit diagram B13).

PC (VGA) Input

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

9.7.4 Output

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

9.8 Audio Processing

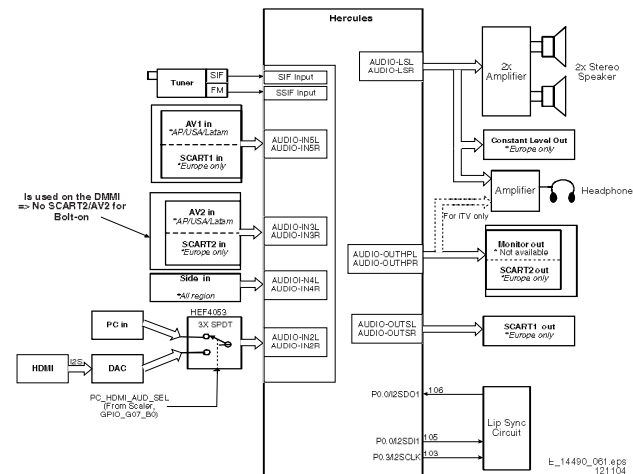


Figure 9-6 Block diagram audio processing

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

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

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

9.8.1 Diversity

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

- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM. The UOC-III family makes no difference 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 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/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/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 depend on

the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

9.8.2 Functionality

The features available in the Hercules are as follows:

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

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

9.8.3 Audio Amplifier

The audio amplifier part is very straightforward. It uses two integrated TDA8931T power amplifiers for the L and R channels; each amplifier IC is able to deliver a maximum output of 20 W_{RMS} continuously in a 4-6 ohm speaker without needing a heatsink.

The operating supply for the amplifier may range from 12 V to 32 V; in the LC04x TV set, depending on the model, supply voltages of 18 V (for the 5 W / 8 ohm version) or 24 V (for the 15 W / 4 ohm version) are used.

Muting is done via the SOUND_ENABLE line connected to pins 7 of both amplifier-ICs, which comes from the Hercules.

9.8.4 Audio: Lip Sync

No Lip Sync adjustments are necessary in this model.

9.9 Control

9.9.1 Hercules

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

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

Each micro-controller has its own I²C bus which hosts 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.

9.9.2 Block Diagram

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

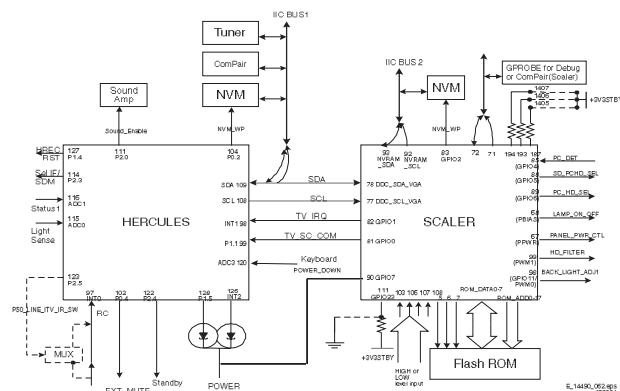


Figure 9-7 Micro Controller block diagram

9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:

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

9.9.4 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:

- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

The following table shows the ports used for the LC04 control:

Table 9-2 Micro Controller ports overview

Pin	Name	Description	Configuration
97	INT0/ P0.5	IR	INT0
98	P1.0/ INT1	TV_IRQ	INT2
99	P1.1/ T0	TV_SC_COM	P1.1
102	P0.4/ I2SWS	EXT_MUTE	P0.4
103	P0.3/ I2SCLK	Lip Sync	I2SCLK
104	P0.2/ I2SDO2	NVM_WP	P0.2
105	P0.1/ I2SDO1	Lip Sync	I2SDO1
106	P0.0/ I2SDI/O	Lip Sync	I2SDI/O
107	P1.3/ T1	PC-TV_LED	P1.3
108	P1.6/ SCL	SCL	SCL
109	P1.7/ SDA	SDA	SDA
111	P2.0/ TPWM	SOUND_ENABLE	P2.0
112	P2.1/ PWM0	(for future use)	-
113	P2.2/ PWM1	(for future use)	-
114	P2.3/ PWM2	SEL_IF	P2.3
115	P3.0/ ADC0	Light Sensor - SDM	ADC0
116	P3.1/ ADC1	STATUS_1	ADC1
119	P3.2/ ADC2	STATUS_2	ADC2
120	P3.3/ ADC3	KEYBOARD	ADC3
122	P2.4/ PWM3	STANDBY	P2.4
123	P2.5/ PWM4	(for future use)	-
126	P1.2/ INT2	(for future use)	-
127	P1.4/ RX	HERC_RESET	-
128	P1.5/ TX	POWER_DOWN	P1.5

The description of each functional pin is explained below:

- **LED.** This signal is used as an indication for the Standby, Remote and Error Indicator. Region diversity:
 - During protection mode, the LED blinks and the set is in standby mode.
 - During error conditions it blinks at a predefined rate.
 - After receiving a valid RC-5 or local keyboard command it flashes once.
 - For sets with error message indication, the LED blinks when message is active and the set is in standby mode.
- **SCL.** This is the clock wire of the two-wire single master bi-directional I²C bus.
- **SDA.** This is the data wire of the two-wire single master bi-directional I²C bus.
- **STANDBY.** The Hercules generates this signal. This can enable the power supply in normal operation and disable it during Standby. It is of logic "high" (3.3 V) under normal operation and "low" (0 V) during Standby.
- **IR.** This input pin is connected to an RC5 remote control receiver.
- **SEL-IF.** This is an output pin to switch the Video SAW filter between M system and other systems.
 - 0: NTSC M (default)
 - 1: PAL B/G, DK, I, L
- **NVM_WP.** The global protection line is used to enable and disable write protection to the NVM. When write to the NVM is required, pin 7 of the NVM must be pulled to logic '0' first (via Write_Protect of the micro-controller pin) before a write is performed. Otherwise pin 7 of NVM must always be at logic "1"
 - 0: Disabled
 - 1: Enabled (default)
- **SOUND_ENABLE.** This pin is used to MUTE the audio amplifier. It is configured as push pull.
- **STATUS_1.** This signal is used to read the status of the SCART 1 input.
- **STATUS_2.** This signal is used to read the status of the SCART 2 input.
- **HERC_RESET.** This pin is used to switch the +1.8V supply.
- **POWER_DOWN.** The power supply generates this signal. Logic "high" (3.3 V) under normal operation of the TV and goes "low" (0 V) when the Mains input voltage supply goes below 70 V_{AC}.
- **KEYBOARD.** Following are the Keyboard functions and the step values (8 bit) for it.

Table 9-3 Local keyboard values

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

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

9.10 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format
1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
2CS	2 Carrier Sound (or 2 Channel 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 and lock to the correct frequency
AGC	Automatic gain control (feedback) signal to the tuner. This circuit ensures a constant output amplitude regardless of the input amplitude
AM	Amplitude Modulation; A "data encoding to a carrier" method, such that the carrier amplitude is proportional to the data value
AP or A/P	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASD	Automatic Standard Detection
AV	External Audio Video
B-SC1-IN	Blue SCART1/EXT1 in
B-SC2-IN	Blue SCART2/EXT2 in
B-TXT	Blue TeleteXT
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz. B= VHF-band, G= UHF-band
BOCMA	Bimos one Chip Mid-end Architecture: video and chroma decoder
C-FRONT	Chrominance front input
CBA	Circuit Board Assembly (also called PCB or PWB)
CL	Constant Level: audio output to connect with an external amplifier
CLUT	Colour Look-Up Table
COLUMBUS	COLOUR LUMInance Baseband Universal Subsystem. IC performing noise reduction and 2D/3D comb filtering
ComPair	Computer aided rePair. A tool for diagnosing a TV through a PC controlled interface
CSM	Customer Service Mode
CVBS	Composite Video and Blanking Signal; A single video signal that contains luminance, colour, and timing information
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)
CVBS-INT	CVBS signal from internal Tuner
CVBS-MON	CVBS monitor signal
CVBS-TER-OUT	CVBS TERrestrial OUTput signal
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DFU	Directions For Use: Owner's manual
DNR	Dynamic Noise Reduction / Digital Noise Reduction; Noise reduction feature of the set
DRAM	Dynamic RAM; dynamically refreshed RAM
DSP	Digital Signal Processing
DST	Dealer Service Tool; Special remote control designed for dealers to enter

	e.g. service mode (a DST-emulator is available in ComPair)	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
DTS	Digital Theatre System; A multi-channel surround sound format, similar to Dolby Digital	LS	LoudSpeaker
DVD	Digital Versatile Disc	LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
EEPROM	Electrically Erasable and Programmable Read Only Memory	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz. M= 525 lines @ 60 Hz, N= 625 lines @ 50 Hz
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NextView)	MOSFET	Metal Oxide Semiconductor Field Effect Transistor
EU	Europe	MPEG	Motion Pictures Experts Group. An ISO/IEC body that has given its name to an image compressing scheme for moving video
EXT	EXternal (source), entering the set by SCART or by cinches (jacks)	MSP	Multi-standard Sound Processor: ITT sound decoder
FBL	Fast BLanking; DC signal accompanying RGB signals. To blank the video signal when it is returning from the right side of the screen to the left side. The video level is brought down below the black video level	MUTE	MUTE Line
FBL-SC1-IN	Fast blanking signal for SCART1 in	NC	Not Connected
FBL-SC2-IN	Fast blanking signal for SCART2 in	NICAM	Near Instantaneously Companded Audio Multiplexing; This is a digital sound system, mainly used in Europe
FBL-TXT	Fast Blanking Teletext		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)
FM	Field Memory; A memory chip that is capable of storing one or more TV picture fields / Frequency Modulation; A technique that sends data as frequency variations of a carrier signal	NTSC	
FMR	Radio receiver that can receive the FM Band 87.5 - 108 MHz		
FRC	Frame Rate Converter	NVM	Non Volatile Memory; IC containing data such as alignment values, preset stations
FRONT-C	Front input chrominance (SVHS)	O/C	Open Circuit
FRONT-DETECT	Control line for detection of headphone insertion, Service Mode jumper, power failure detection	ON/OFF LED	On/Off control signal for the LED
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)	OSD	On Screen Display
G-SC1-IN	Green SCART1/EXT1 in	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)
G-SC2-IN	Green SCART2/EXT2 in		
G-TXT	Green teletext	PC	Personal Computer
H	H_sync to the module	PCB	Printed Circuit Board (or PWB)
HA	Horizontal Acquisition; horizontal sync pulse	PIG	Picture In Graphic
HD	High Definition	PIP	Picture In Picture
HP	HeadPhone	PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency
I	Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
I ² C	Integrated IC bus	PWB	Printed Wiring Board (also called PCB or CBA)
I ² S	Integrated IC Sound bus	RAM	Random Access Memory
IC	Integrated Circuit	RC	Remote Control transmitter
IF	Intermediate Frequency	RC5 or 6	Remote Control system 5 or 6, the signal from the remote control receiver
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.	RGB	Red, Green, and Blue colour space; The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced
IR	Infra Red	RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
IRQ	Interrupt ReQuest	ROM	Read Only Memory
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences	SAM	Service Alignment Mode
LATAM	LATin AMerica	SC	SandCastle: two-level pulse derived from sync signals
LC04	Philips chassis name for LCD TV 2004 project	SC-IN	SCART in
LCD	Liquid Crystal Display	SC-OUT	SCART out
LED	Light Emitting Diode; A semiconductor diode that emits light when a current is passed through it	S/C	Short Circuit
LINE-DRIVE	Horizontal (line) deflection drive signal (for the Line transistor)	SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et

	Téléviseurs; This is a 21-pin connector used in EU, that carries various audio, video, and control signals (it is also called Péritel connector)
SCL	Serial CLock Signal on I ² C bus
SD	Standard Definition
SDA	Serial DAta Signal on I ² C bus
SDRAM	Synchronous DRAM
SECAM	SÉquence Couleur Avec Mémoire; Colour system mainly used in France and East Europe. The chroma is FM modulated and the R-Y and B-Y signals are transmitted line sequentially. Colour carriers= 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switched 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 in
SNDR-SC2-OUT	Sound right SCART2 out
SOPS	Self Oscillating Power Supply
S/PDIF	Sony Philips Digital InterFace; This is a consumer interface used to transfer digital audio
SRAM	Static RAM
STBY	STandBY
SVHS	Super Video Home System
SW	Software or Subwoofer or Switch
THD	Total Harmonic Distortion
TXT	Teletext; TXT is a digital addition to analogue TV signals that contain textual and graphical information (25 rows x 40 columns). The information is transmitted within the first 25 lines during the Vertical Blank Interval (VBI)
uP	Microprocessor
VA	Vertical Acquisition
VL	Variable Level out: processed audio output towards external amplifier
VCR	Video Cassette Recorder
VGA	Video Graphics Array; 640x480 (4:3)
WD	Watch Dog
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
Y	Luminance signal
Y/C	Y consists of luminance signal, blanking level and sync; C consists of chroma (colour) signal
YPbPr	This is a scaled version of the YUV colour space. Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV
YUV	Colour space used by the NTSC and PAL video systems. Y is the luminance and U/V are the colour difference signals

9.11.2 Diagram B19, Type T6TU5XB (IC7M00, Columbus)

Figure 1 Package outline (top view)

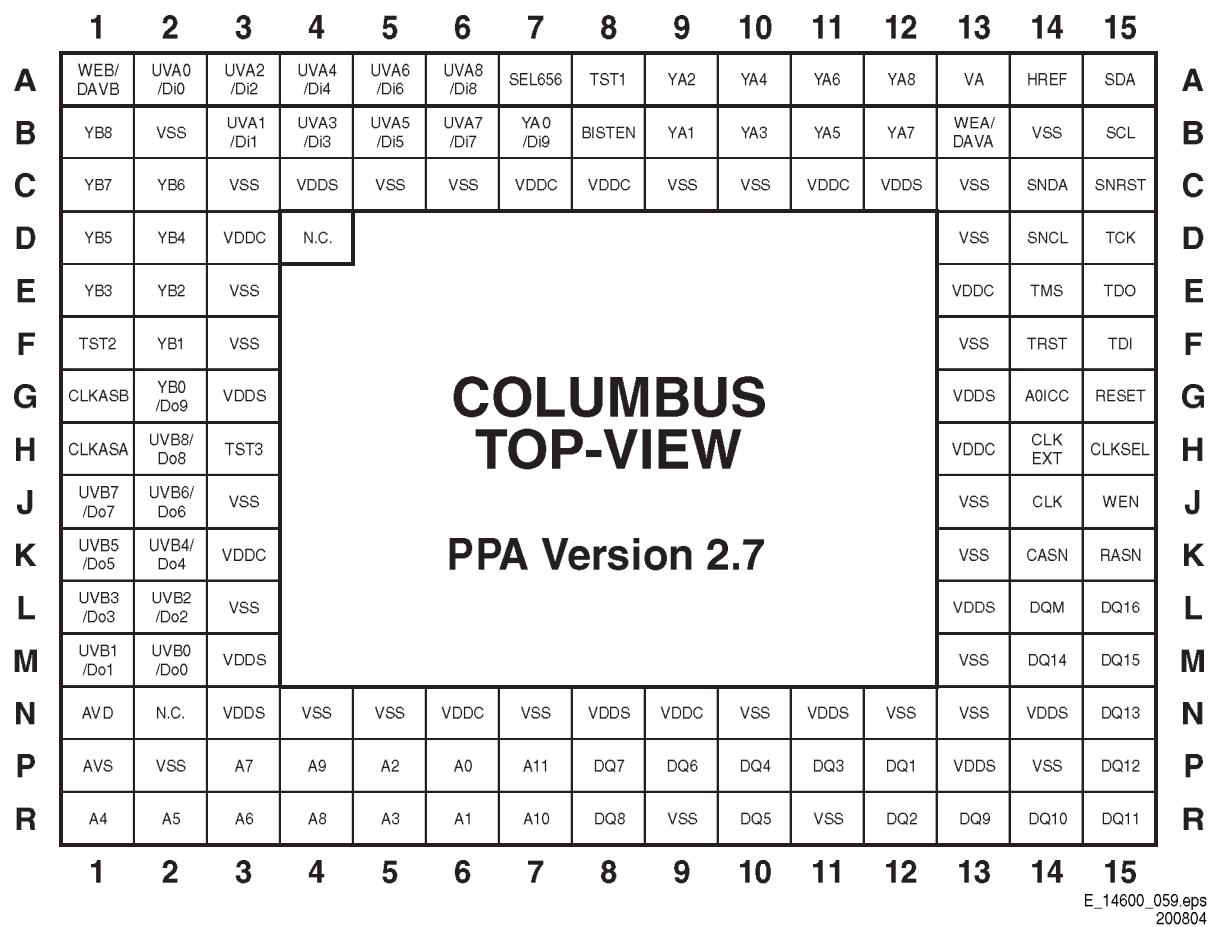
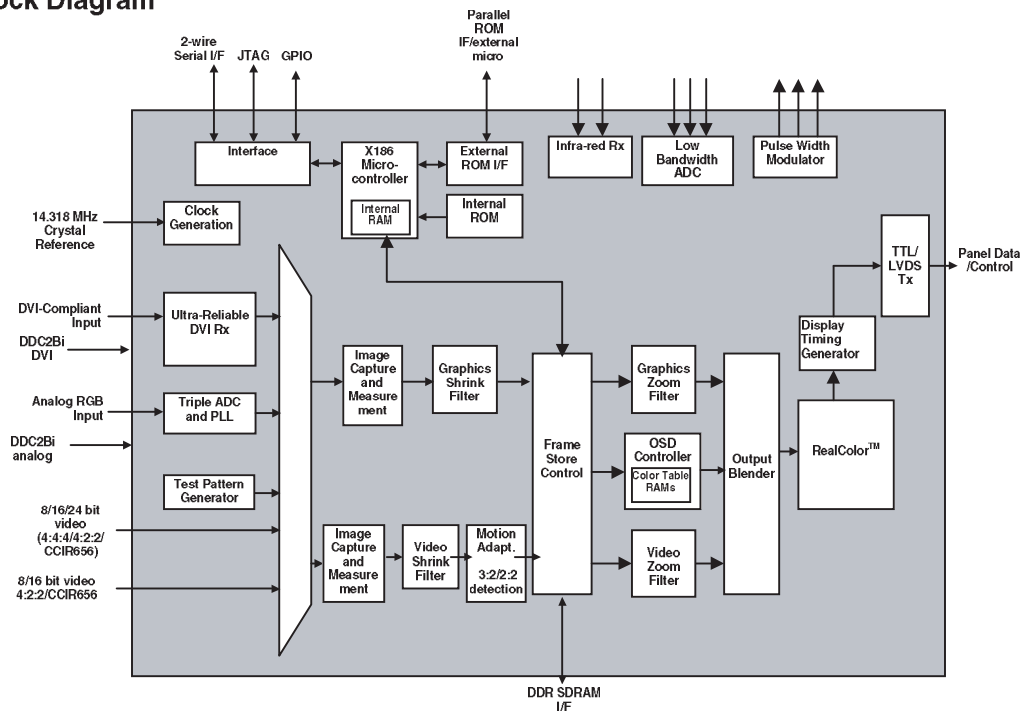


Figure 9-9 Pin configuration

9.11.3 Diagram B7+B8+B9, Type GM1501 (IC7401, Genesis)

Block Diagram



Pin Configuration

A	NC	ADC_3.3	ADC_1.8	ADC_1.8	ADC_DGND	RXC+	DVI_GND	RX0+	RX1+	RX2+	DVI_GND	LBADC_IN3	D_GND
B	BLUE-	BLUE+	ADC_3.3	ADC_DGND	DVI_GND	RXC-	DVI_GND	RX0-	RX1-	RX2-	REXT	LBADC_IN2	D_GND
C	GREEN-	GREEN+	SOG	ADC_DGND	NC	DVI_3.3	DVI_GND	DVI_3.3	DVI_3.3	DVI_3.3	DVI_3.3	LBADC_IN1	LBADC_3.3
D	RED-	RED+	ADC_3.3	ADC_AGND	NC	DVI_1.8	DVI_GND	DVI_1.8	DVI_1.8	DVI_1.8	DVI_GND	LBADC_RETURN	LBADC_GND
E	ADC_AGND	ADC_AGND	ADC_3.3	ADC_AGND									
F	NC	VDD33_PLL	VSSA33_RPLL	VDDA33_RPLL									
G	VDDA33_FPLL	VSSD33_PLL	TCLK	XTAL									
H	VDD33_SDDS	VSSA33_SDDS	VDDA33_SDDS	VSSA33_FPLL									
J	VDD33-DDDS	VSSA33-DDDS	VDDA33-DDDS	VSSD33-SDDS									
K	RESETn	ACS_RESET_HD	NC	VSSD33-DDDS						CORE_1.8	CORE_1.8	D_GND	D_GND
L	OCM_INT2	OCM_INT1	AVSYNC	AHSYNC						D_GND	CORE_1.8	D_GND	D_GND
M	OCM_UD0	OCM_UD1	IR0	IR1						D_GND	D_GND	D_GND	D_GND
N	VGA_SDA	VGA_SCL	DVI_SDA	DVI_SCL						D_GND	D_GND	D_GND	D_GND
P	OCM_CS1n	OCM_CS2n	MSTR_SDA	MSTR_SCL						D_GND	D_GND	D_GND	D_GND
R	ROM_CSn	OCM_REn	OCM_WEn	EXTCLK						D_GND	D_GND	D_GND	D_GND
T	OCMADDR17	OCMADDR18	OCMADDR19	OCM_CS0n						D_GND	CORE_1.8	D_GND	D_GND
U	OCMADDR13	OCMADDR14	OCMADDR15	OCMADDR16						CORE_1.8	CORE_1.8	D_GND	D_GND
V	OCMADDR9	OCMADDR10	OCMADDR11	OCMADDR12									
W	OCMADDR6	OCMADDR7	OCMADDR8	IO_3.3									
Y	OCMADDR3	OCMADDR4	OCMADDR5	IO_3.3									
AA	OCMADDR0	OCMADDR1	OCMADDR2	IO_3.3									
AB	OCMDATA13	OCMDATA14	OCMDATA15	IO_3.3									
AC	OCMDATA10	OCMDATA11	OCMDATA12	IO_3.3	GPIO_008_B2 (DEGRN0)	IO_3.3	DCLK	IO_3.3	GPIO_007_B2 (DERED0)	IO_3.3	SHIELD[1] (DEGRN3)	LVDSB_3.3	LVDSB_GND
AD	OCMDATA9	OCMDATA6	OCMDATA3	OCMDATA0	GPIO_008_B3 (DEGRN1)	GPIO_008_B0 (DOR0)	DEN	GPIO_008_B3 (DOBLU1)	GPIO_007_B3 (DERED5)	GPIO_007_B6 (DERED8)	SHIELD[2] (DEGRN4)	LVDSB_3.3	LVDSB_3.3
AE	OCMDATA8	OCMDATA5	OCMDATA2		GPIO_008_B4 (DEBLU0)	GPIO_008_B1 (DOR1)	GPIO_008_B3 (DOGRN1)	GPIO_007_B4 (DERED2)	GPIO_007_B4 (DERED6)	GPIO_007_B7 (DERED9)	SHIELD[3] (DEGRN5)	BC+ (DEGRN8)	SHIELD[4] (DEBLU2)
AF	OCMDATA7	OCMDATA4	OCMDATA1		GPIO_008_B5 (DEBLU1)	GPIO_008_B2 (DOGRN0)	GPIO_008_B4 (DOBLU0)	GPIO_007_B5 (DERED3)	GPIO_007_B5 (DERED7)	SHIELD[0] (DEGRN2)	B3+ (DEGRN6)	B3- (DEGRN7)	BC- (DEGRN9)
	1	2	3	4	5	6	7	8	9	10	11	12	13

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241204

Figure 9-10 Internal block diagram and pin configuration

9.11.4 Diagram B12, Type S9993CT (IC7D03, HDMI Panellink), Reserved

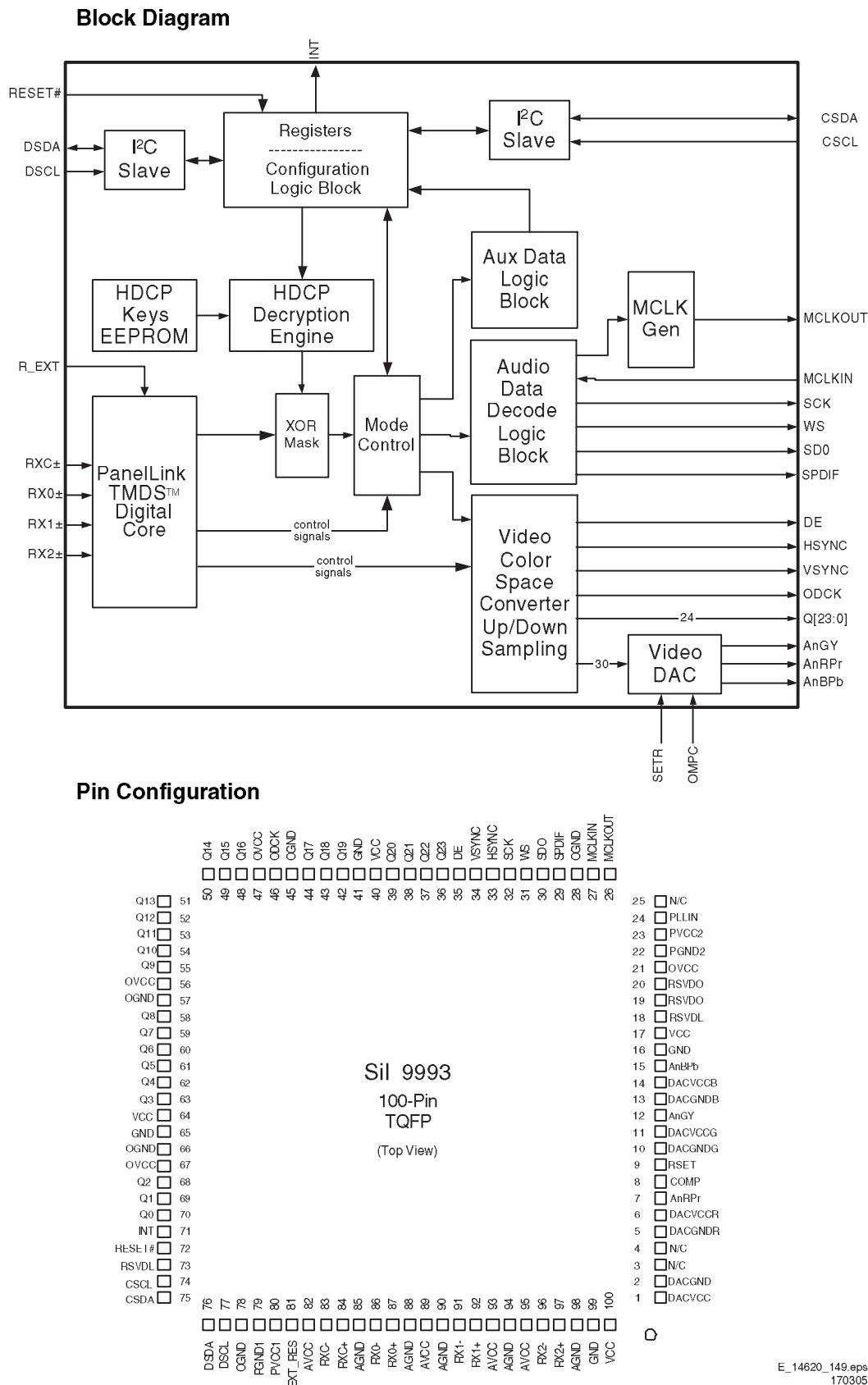


Figure 9-11 Internal block diagram and pin configuration

10. Spare Parts List

Set Level			2231	2020 552 96718	220nF 10% 6.3V 0402	2806	3198 035 71040	100nF 10% 16V 0402
Various			2232	3198 035 71040	100nF 10% 16V 0402	2807	3198 035 71040	100nF 10% 16V 0402
			2233	4822 124 23002	10µF 16V	2808	3198 035 71040	100nF 10% 16V 0402
			2234	2020 552 96718	220nF 10% 6.3V 0402	2809	3198 035 71040	100nF 10% 16V 0402
			2235	2020 552 96718	220nF 10% 6.3V 0402	2810	3198 035 71040	100nF 10% 16V 0402
			2236	4822 126 14076	220nF +80/-20% 25V	2811	3198 035 71040	100nF 10% 16V 0402
			2237	2020 552 96718	220nF 10% 6.3V 0402	2812	3198 035 71040	100nF 10% 16V 0402
			2238	2020 552 96718	220nF 10% 6.3V 0402	2813	3198 035 71040	100nF 10% 16V 0402
			2239	3198 035 71040	100nF 10% 16V 0402	2814	3198 035 71040	100nF 10% 16V 0402
			2240	2020 552 96718	220nF 10% 6.3V 0402	2815	5322 124 41945	22µF 20% 35V
			2241	2020 552 96718	220nF 10% 6.3V 0402	2816	3198 035 71040	100nF 10% 16V 0402
0032	3122 137 23171	Power Supply Unit (32 inch)	2242	3198 035 71040	100nF 10% 16V 0402	2817	3198 035 71040	100nF 10% 16V 0402
0032	3122 137 23191	Power Supply Unit (26 inch)	2243	4822 124 23002	10µF 16V	2818	3198 035 71040	100nF 10% 16V 0402
8188	2422 070 98151	MAINSCORD EUR 1M5 BK B	2244	3198 035 71040	100nF 10% 16V 0402	2819	3198 035 71040	100nF 10% 16V 0402
8903	3104 311 09141	Cable 4P/560	2245	3198 035 71040	100nF 10% 16V 0402	2820	3198 035 71040	100nF 10% 16V 0402
8903	3139 131 05771	Cable 04P/280	2246	3198 035 71040	100nF 10% 16V 0402	2821	3198 035 71040	100nF 10% 16V 0402
Loudsp. 8Ω 5W fullrange			2250	2020 552 96618	1nF 10% 50V 0402	2822	3198 035 71040	100nF 10% 16V 0402
			2251	2020 552 96656	10µF 20% 25V 1210	2823	4822 126 14519	22pF 5% 50V 0402
			2252	3198 035 71040	100nF 10% 16V 0402	2824	4822 126 14519	22pF 5% 50V 0402
			2253	3198 035 71040	100nF 10% 16V 0402	2900	3198 035 71040	100nF 10% 16V 0402
			2254	3198 035 71040	100nF 10% 16V 0402	2901	2020 552 96618	1nF 10% 50V 0402
			2255	3198 035 71040	100nF 10% 16V 0402	2902	2020 021 00046	470µF 20% 16V
			2256	4822 124 23002	10µF 16V	2903	3198 035 71040	100nF 10% 16V 0402
			2257	3198 035 71040	100nF 10% 16V 0402	2904	4822 124 80151	47µF 16V
			2258	2020 552 96637	10µF 10% 6.3V 0805	2905	2020 021 91557	100µF 20% 16V
			2259	3198 035 71040	100nF 10% 16V 0402	2906	3198 035 71040	100nF 10% 16V 0402
Small Signal Board [B]			2260	2020 552 96637	10µF 10% 6.3V 0805	2907	3198 035 71040	100nF 10% 16V 0402
			2262	4822 124 12082	10µF 20% 50V	2908	3198 035 71040	100nF 10% 16V 0402
			2263	3198 035 26820	6.8nF 10% 16V 0402	2909	3198 035 71040	100nF 10% 16V 0402
			2264	3198 017 44740	470nF 10V 0603	2910	3198 035 71040	100nF 10% 16V 0402
			2265	3198 017 41050	1µF 10V 0603	2911	3198 035 71040	100nF 10% 16V 0402
			2266	3198 035 71040	100nF 10% 16V 0402	2912	3198 035 71040	100nF 10% 16V 0402
			2267	2020 552 96718	220nF 10% 6.3V 0402	2913	3198 035 71040	100nF 10% 16V 0402
			2269	2020 012 00003	470µF 16V 20% SMD	2914	3198 035 71040	100nF 10% 16V 0402
			2270	3198 035 71040	100nF 10% 16V 0402	2915	3198 035 71040	100nF 10% 16V 0402
			2271	4822 124 12095	100µF 20% 16V	2916	3198 035 71040	100nF 10% 16V 0402
Various			2272	3198 035 71040	100nF 10% 16V 0402	2917	2020 021 91557	100µF 20% 16V
			2273	2020 552 96718	220nF 10% 6.3V 0402	2918	3198 035 71040	100nF 10% 16V 0402
			2274	3198 017 31540	150nF 10V 0603	2919	3198 035 71040	100nF 10% 16V 0402
			2277	3198 035 71040	100nF 10% 16V 0402	2920	3198 035 71040	100nF 10% 16V 0402
			2280	2020 552 00027	4.7µF 2% 6.3V 0603	2921	3198 035 71040	100nF 10% 16V 0402
			2281	2020 552 00027	4.7µF 2% 6.3V 0603	2922	3198 035 71040	100nF 10% 16V 0402
			2283	3198 035 71040	100nF 10% 16V 0402	2923	3198 035 71040	100nF 10% 16V 0402
			2286	3198 035 71040	100nF 10% 16V 0402	2924	3198 035 71040	100nF 10% 16V 0402
			2289	4822 051 30151	150Ω 5% 0.062W	2925	3198 035 71040	100nF 10% 16V 0402
			2290	2222 240 59872	4.7µF 5% 10V 0805	2926	3198 035 71040	100nF 10% 16V 0402
Loudsp. 8Ω 5W fullrange			2291	3198 035 71040	100nF 10% 16V 0402	2927	3198 035 71040	100nF 10% 16V 0402
			2449	3198 035 71040	100nF 10% 16V 0402	2928	3198 035 71040	100nF 10% 16V 0402
			2603	2020 552 96834	1µF 20% 6.3V 0402	2929	3198 035 71040	100nF 10% 16V 0402
			2604	3198 035 04710	470pF 50V 0402	2930	3198 035 71040	100nF 10% 16V 0402
			2605	2020 552 96834	1µF 20% 6.3V 0402	2931	3198 035 71040	100nF 10% 16V 0402
			2608	2020 552 96834	1µF 20% 6.3V 0402	2932	3198 035 71040	100nF 10% 16V 0402
			2609	3198 035 04710	470pF 50V 0402	2933	3198 035 71040	100nF 10% 16V 0402
			2610	2020 552 96834	1µF 20% 6.3V 0402	2934	4822 124 80151	47µF 16V
			2611	4822 124 12095	100µF 20% 16V	2935	3198 035 71040	100nF 10% 16V 0402
			2613	3198 017 41050	1µF 10V 0603	2936	3198 035 71040	100nF 10% 16V 0402
Various			2614	3198 035 71040	100nF 10% 16V 0402	2937	3198 035 71040	100nF 10% 16V 0402
			2615	2020 012 00003	470µF 16V 20% SMD	2938	3198 035 71040	100nF 10% 16V 0402
			2616	2020 552 00035	2.2µF 6.3V 10% 0603	2939	3198 035 71040	100nF 10% 16V 0402
			2617	2020 552 00035	2.2µF 6.3V 10% 0603	2940	4822 124 80151	47µF 16V
			2618	2020 012 00003	470µF 16V 20% SMD	2941	3198 035 71040	100nF 10% 16V 0402
			2619	2020 552 96738	47µF 6.3V	2942	3198 035 71040	100nF 10% 16V 0402
			2701	2238 869 15101	100pF 5% 50V 0402	2945	5322 124 41945	22µF 20% 35V
			2704	4822 124 23002	10µF 16V	2946	3198 035 71040	100nF 10% 16V 0402
			2716	2020 012 00028	470µF 20% 16V	2947	3198 035 71040	100nF 10% 16V 0402
			2730	2020 552 96656	10µF 20% 25V 1210	2948	3198 035 71040	100nF 10% 16V 0402
Loudsp. 8Ω 5W fullrange			2731	2020 012 00003	470µF 16V 20% SMD	2949	3198 035 71040	100nF 10% 16V 0402
			2733	3198 035 02210	220pF 5% 50V 0402	2950	5322 124 41945	22µF 20% 35V
			2734	2238 787 16641	22nF 10% 16V 0402	2951	3198 035 71040	100nF 10% 16V 0402
			2735	3198 035 04710	470pF 50V 0402	2952	3198 035 71040	100nF 10% 16V 0402
			2736	2022 031 00308	22µF 20% 35V	2953	3198 035 71040	100nF 10% 16V 0402
			2737	2020 012 00003	470µF 16V 20% SMD	2954	3198 035 71040	100nF 10% 16V 0402
			2738	4822 124 80151	47µF 16V	2955	5322 124 41945	22µF 20% 35V
			2739	4822 124 80151	47µF 16V	2956	3198 035 71040	100nF 10% 16V 0402
			2750	2020 552 00035	2.2µF 6.3V 10% 0603	2957	3198 035 71040	100nF 10% 16V 0402
			2751	3198 035 71040	100nF 10% 16V 0402	2958	3198 035 71040	100nF 10% 16V 0402
Loudsp. 8Ω 5W fullrange			2752	4822 124 80151	47µF 16V	2959	3198 035 71040	100nF 10% 16V 0402
			2753	2020 012 00003	470µF 16V 20% SMD	2B01	4822 124 80151	47µF 16V
			2755	3198 035 14720	4.7nF 5% 25V 0402	2B02	4822 124 11131	47µF 6.3V
			2756	3198 035 04710	470pF 50V 0402	2B03	3198 035 71040	100nF 10% 16V 0402
			2757	2020 012 00003	470µF 16V 20% SMD	2B04	3198 035 71040	100nF 10% 16V 0402
			2758	2020 012 00003	470µF 16V 20% SMD	2B05	3198 035 71040	100nF 10% 16V 0402
			2760	2020 552 96671	1µF 10% 25V	2B06	3198 035 71040	100nF 10% 16V 0402
			2800	2020 021 91557	100µF 20% 16V	2B07	3198 035 71040	100nF 10% 16V 0402
			2801	3198 035 71040	100nF 10% 16V 0402	2B08	3198 035 71040	100nF 10% 16V 0402
			2802	3198 035 71040	100nF 10% 16V 0402	2B09	3198 035 71040	100nF 10% 16V 0402
Loudsp. 8Ω 5W fullrange			2803	3198 035 71040	100nF 10% 16V 0402	2B10	3198 035 71040	100nF 10% 16V 0402
			2804	3198 035 71040	100nF 10% 16V 0402	2B11	3198 035 71040	100nF 10% 16V 0402
			2805	3198 035 71040	100nF 10% 16V 0402	2B12	3198 035 71040	100nF 10% 16V 0402

2B13	3198 035 71040	100nF 10% 16V 0402	2K01	2020 552 96618	1nF 10% 50V 0402	2N02	3198 035 71040	100nF 10% 16V 0402
2B14	3198 035 71040	100nF 10% 16V 0402	2K02	2238 869 15109	10pF 5% 50V 0402	2N03	2020 552 96834	1µF 20% 6.3V 0402
2B15	3198 035 71040	100nF 10% 16V 0402	2K03	2238 869 15109	10pF 5% 50V 0402	2N04	2020 552 96618	1nF 10% 50V 0402
2B16	3198 035 71040	100nF 10% 16V 0402	2K04	2238 869 15109	10pF 5% 50V 0402	2N05	3198 035 71040	100nF 10% 16V 0402
2B17	3198 035 71040	100nF 10% 16V 0402	2K05	2238 869 15109	10pF 5% 50V 0402	2N06	3198 035 71040	100nF 10% 16V 0402
2B18	5322 124 41945	22µF 20% 35V	2K06	2238 869 15101	100pF 5% 50V 0402	2N07	3198 035 71040	100nF 10% 16V 0402
2C00	3198 035 71040	100nF 10% 16V 0402	2K07	2238 869 15101	100pF 5% 50V 0402	2N08	3198 035 71040	100nF 10% 16V 0402
2C01	4822 124 23002	10µF 16V	2K08	2020 552 00035	2.2µF 6.3V 10% 0603	2N09	3198 035 71040	100nF 10% 16V 0402
2C02	3198 035 71040	100nF 10% 16V 0402	2K10	2238 869 15101	100pF 5% 50V 0402	2N10	3198 035 71040	100nF 10% 16V 0402
2C03	3198 035 71040	100nF 10% 16V 0402	2K11	2238 869 15101	100pF 5% 50V 0402	2N11	2238 869 15101	100pF 5% 50V 0402
2E00	2020 552 00005	4.7µF 10% 6.3V 0603	2K12	2020 552 00035	2.2µF 6.3V 10% 0603	2N12	2238 869 15101	100pF 5% 50V 0402
2E01	2020 552 00005	4.7µF 10% 6.3V 0603	2K13	2238 869 15101	100pF 5% 50V 0402	2N13	2238 869 15101	100pF 5% 50V 0402
2E02	2020 552 00005	4.7µF 10% 6.3V 0603	2K14	2238 869 15101	100pF 5% 50V 0402	2N14	2238 869 15101	100pF 5% 50V 0402
2E03	3198 035 71040	100nF 10% 16V 0402	2K15	2238 869 15101	100pF 5% 50V 0402	2N15	2238 869 15101	100pF 5% 50V 0402
2E04	2020 552 96834	1µF 20% 6.3V 0402	2K16	2238 869 15101	100pF 5% 50V 0402	2N16	2238 869 15101	100pF 5% 50V 0402
2E05	2020 552 96834	1µF 20% 6.3V 0402	2K17	2238 869 15101	100pF 5% 50V 0402	2P01	2020 552 00035	2.2µF 6.3V 10% 0603
2E06	2020 552 96834	1µF 20% 6.3V 0402	2K18	2238 869 15101	100pF 5% 50V 0402	2P02	3198 035 71040	100nF 10% 16V 0402
2E07	4822 126 14324	33pF 5% 50V 0402	2K19	2020 552 96618	1nF 10% 50V 0402	2P03	3198 035 71040	100nF 10% 16V 0402
2E08	2020 552 00005	4.7µF 10% 6.3V 0603	2K20	2020 552 96618	1nF 10% 50V 0402	2P04	3198 035 71040	100nF 10% 16V 0402
2E09	4822 126 14324	33pF 5% 50V 0402	2K21	2238 869 15101	100pF 5% 50V 0402	2P05	3198 035 71040	100nF 10% 16V 0402
2E10	2020 552 00005	4.7µF 10% 6.3V 0603	2K22	2238 869 15101	100pF 5% 50V 0402	2P06	3198 035 71040	100nF 10% 16V 0402
2E11	4822 126 14324	33pF 5% 50V 0402	2K23	2238 869 15101	100pF 5% 50V 0402	2P07	3198 035 71040	100nF 10% 16V 0402
2E12	2020 552 00005	4.7µF 10% 6.3V 0603	2K24	2238 869 15101	100pF 5% 50V 0402	2P08	3198 035 71040	100nF 10% 16V 0402
2E13	3198 017 41050	1µF 10V 0603	2K25	2238 869 15101	100pF 5% 50V 0402	2P09	3198 035 71040	100nF 10% 16V 0402
2E14	4822 126 14324	33pF 5% 50V 0402	2K26	2238 869 15101	100pF 5% 50V 0402	2P10	3198 035 71040	100nF 10% 16V 0402
2E15	3198 035 71040	100nF 10% 16V 0402	2K27	2238 869 15101	100pF 5% 50V 0402	2P11	3198 035 71040	100nF 10% 16V 0402
2E16	3198 035 71040	100nF 10% 16V 0402	2K28	2238 869 15101	100pF 5% 50V 0402	2P12	3198 035 71040	100nF 10% 16V 0402
2E17	3198 035 71040	100nF 10% 16V 0402	2L02	2020 552 96637	10µF 10% 6.3V 0805	2P13	3198 035 71040	100nF 10% 16V 0402
2E18	3198 035 71040	100nF 10% 16V 0402	2L03	3198 035 71040	100nF 10% 16V 0402	2P14	3198 035 71040	100nF 10% 16V 0402
2E19	3198 035 71040	100nF 10% 16V 0402	2L04	3198 035 71040	100nF 10% 16V 0402	2P15	4822 124 12095	100µF 20% 16V
2E20	4822 124 11131	47µF 6.3V	2L05	3198 035 71040	100nF 10% 16V 0402	2P16	3198 035 71040	100nF 10% 16V 0402
2E21	2020 552 00005	4.7µF 10% 6.3V 0603	2L06	3198 035 71040	100nF 10% 16V 0402	2P17	2020 552 00035	2.2µF 6.3V 10% 0603
2E22	2020 552 00005	4.7µF 10% 6.3V 0603	2L07	2020 552 96637	10µF 10% 6.3V 0805	2P18	2020 552 00035	2.2µF 6.3V 10% 0603
2E23	2020 552 00005	4.7µF 10% 6.3V 0603	2L08	3198 035 71040	100nF 10% 16V 0402	2P19	3198 035 71040	100nF 10% 16V 0402
2E24	3198 035 71040	100nF 10% 16V 0402	2L09	3198 035 71040	100nF 10% 16V 0402	2P20	3198 035 71040	100nF 10% 16V 0402
2E25	3198 035 71040	100nF 10% 16V 0402	2L10	3198 035 71040	100nF 10% 16V 0402	2P21	3198 035 71040	100nF 10% 16V 0402
2E26	3198 035 71040	100nF 10% 16V 0402	2L11	3198 035 71040	100nF 10% 16V 0402	2P22	2020 552 00035	2.2µF 6.3V 10% 0603
2E27	3198 035 71040	100nF 10% 16V 0402	2L13	3198 035 74730	47nF 5% 16V 0402	2P23	3198 035 71040	100nF 10% 16V 0402
2E28	3198 035 71040	100nF 10% 16V 0402	2L17	3198 035 74730	47nF 5% 16V 0402	2P24	3198 035 71040	100nF 10% 16V 0402
2E29	3198 035 71040	100nF 10% 16V 0402	2L20	3198 035 71040	100nF 10% 16V 0402	2P25	3198 035 71040	100nF 10% 16V 0402
2E30	3198 035 71040	100nF 10% 16V 0402	2L21	3198 035 71040	100nF 10% 16V 0402	2P26	3198 035 71040	100nF 10% 16V 0402
2E31	3198 035 71040	100nF 10% 16V 0402	2L22	2020 552 96637	10µF 10% 6.3V 0805	2P27	3198 035 71040	100nF 10% 16V 0402
2E32	3198 035 71040	100nF 10% 16V 0402	2L23	3198 035 71040	100nF 10% 16V 0402	2P28	3198 035 71040	100nF 10% 16V 0402
2E33	2020 552 00005	4.7µF 10% 6.3V 0603	2L24	3198 035 71040	100nF 10% 16V 0402	2P29	3198 035 71040	100nF 10% 16V 0402
2E34	2020 552 00005	4.7µF 10% 6.3V 0603	2L26	2020 552 96718	220nF 10% 6.3V 0402	2P30	3198 035 71040	100nF 10% 16V 0402
2E35	2020 552 00005	4.7µF 10% 6.3V 0603	2L27	4822 124 23002	10µF 16V	2P31	3198 035 71040	100nF 10% 16V 0402
2E36	3198 035 71040	100nF 10% 16V 0402	2L28	4822 124 23002	10µF 16V	2P32	3198 035 71040	100nF 10% 16V 0402
2F04	2020 552 94427	100pF 5% 50V	2L29	4822 124 23002	10µF 16V	2P33	3198 035 71040	100nF 10% 16V 0402
2F07	2238 866 59812	100nF 20% 50V 0603	2L30	4822 124 23002	10µF 16V	2P34	3198 035 71040	100nF 10% 16V 0402
2F08	4822 126 14241	330pF 0603 50V	2L31	4822 124 12095	100µF 20% 16V	2P35	3198 035 71040	100nF 10% 16V 0402
2F09	4822 126 14241	330pF 0603 50V	2L32	4822 124 12095	100µF 20% 16V	2P36	2238 869 15109	10pF 5% 50V 0402
2F10	2020 552 94427	100pF 5% 50V	2L33	3198 035 71040	100nF 10% 16V 0402	2P37	2238 869 15109	10pF 5% 50V 0402
2F11	4822 126 14241	330pF 0603 50V	2L34	3198 035 71040	100nF 10% 16V 0402	2P38	2238 869 15109	10pF 5% 50V 0402
2F12	4822 126 14241	330pF 0603 50V	2L37	4822 126 14524	68pF 5% 50V 0402	2P39	2238 869 15109	10pF 5% 50V 0402
2F13	4822 126 14508	180pF 5% 50V 0603	2L39	2238 869 15829	82pF 5% 50V 0402	2P40	2238 869 15109	10pF 5% 50V 0402
2F14	4822 126 14508	180pF 5% 50V 0603	2M00	3198 035 71040	100nF 10% 16V 0402	2P41	2238 869 15109	10pF 5% 50V 0402
2F15	2020 552 00035	2.2µF 6.3V 10% 0603	2M01	3198 035 71040	100nF 10% 16V 0402	2P42	2238 869 15109	10pF 5% 50V 0402
2F16	2020 552 00035	2.2µF 6.3V 10% 0603	2M02	3198 035 71040	100nF 10% 16V 0402	2P43	2238 869 15109	10pF 5% 50V 0402
2G05	4822 126 14241	330pF 0603 50V	2M03	3198 035 71040	100nF 10% 16V 0402	2P44	2238 869 15109	10pF 5% 50V 0402
2G06	4822 126 14508	180pF 5% 50V 0603	2M04	3198 035 71040	100nF 10% 16V 0402	2P45	2238 869 15109	10pF 5% 50V 0402
2G07	4822 124 23002	10µF 16V	2M05	3198 035 71040	100nF 10% 16V 0402			
2G08	2020 552 00035	2.2µF 6.3V 10% 0603	2M06	3198 035 71040	100nF 10% 16V 0402			
2G09	4822 126 14241	330pF 0603 50V	2M07	3198 035 71040	100nF 10% 16V 0402			
2G10	4822 126 14508	180pF 5% 50V 0603	2M08	3198 035 71040	100nF 10% 16V 0402			
2G11	4822 124 23002	10µF 16V	2M09	3198 035 71040	100nF 10% 16V 0402			
2G12	2020 552 00035	2.2µF 6.3V 10% 0603	2M10	3198 035 71040	100nF 10% 16V 0402			
2G18	4822 126 14241	330pF 0603 50V	2M11	3198 035 71040	100nF 10% 16V 0402			
2G19	4822 126 14508	180pF 5% 50V 0603	2M12	3198 035 71040	100nF 10% 16V 0402			
2G20	4822 124 23002	10µF 16V	2M13	3198 035 71040	100nF 10% 16V 0402			
2G21	2020 552 00035	2.2µF 6.3V 10% 0603	2M14	3198 035 71040	100nF 10% 16V 0402			
2G22	4822 126 14241	330pF 0603 50V	2M15	3198 035 71040	100nF 10% 16V 0402			
2G23	4822 126 14508	180pF 5% 50V 0603	2M16	3198 035 71040	100nF 10% 16V 0402			
2G24	4822 124 23002	10µF 16V	2M17	3198 035 71040	100nF 10% 16V 0402			
2G25	2020 552 00035	2.2µF 6.3V 10% 0603	2M18	3198 035 71040	100nF 10% 16V 0402			
2G26	2020 552 00005	4.7µF 10% 6.3V 0603	2M19	3198 035 71040	100nF 10% 16V 0402			
2G28	2020 552 00005	4.7µF 10% 6.3V 0603	2M20	3198 035 71040	100nF 10% 16V 0402			
2G47	2238 866 59812	100nF 20% 50V 0603	2M21	2020 552 00035	2.2µF 6.3V 10% 0603			
2G55	2020 552 00005	4.7µF 10% 6.3V 0603	2M22	3198 035 71040	100nF 10% 16V 0402			
2G56	2020 552 00005	4.7µF 10% 6.3V 0603	2M23	4822 124 12095	100µF 20% 16V			
2J02	2020 552 96618	1nF 10% 50V 0402	2M24	3198 035 71040	100nF 10% 16V 0402			
2J03	2020 552 96618	1nF 10% 50V 0402	2M25	3198 035 71040	100nF 10% 16V 0402			
2J17	2238 869 15101	100pF 5% 50V 0402	2M26	3198 035 71040	100nF 10% 16V 0402			
2J18	2238 869 15101	100pF 5% 50V 0402	2M27	3198 035 71040	100nF 10% 16V 0402			
2J19	2238 869 15101	100pF 5% 50V 0402	2M28	3198 035 71040	100nF 10% 16V 0402			
2J21	2238 869 15101	100pF 5% 50V 0402	2M29	3198 035 71040	100nF 10% 16V 0402			
2								

Spare Parts List

LC4.3E AA

10.

EN 91

3224	3198 031 04720	4.7kΩ 5% 0402	3804	2350 035 10229	4 x 22Ω 5% 1206	3E42	4822 117 13545	100Ω 1% 0402
3225	3198 031 04720	4.7kΩ 5% 0402	3805	2350 035 10229	4 x 22Ω 5% 1206	3E43	4822 117 13545	100Ω 1% 0402
3226	4822 117 13545	100Ω 1% 0402	3806	2350 035 10229	4 x 22Ω 5% 1206	3E44	4822 117 13545	100Ω 1% 0402
3227	4822 117 13545	100Ω 1% 0402	3807	2350 035 10229	4 x 22Ω 5% 1206	3E45	4822 117 13545	100Ω 1% 0402
3229	3198 031 04720	4.7kΩ 5% 0402	3808	2350 035 10229	4 x 22Ω 5% 1206	3E49	3198 031 02290	22Ω 5% 0.1W 0402
3230	4822 117 13606	10kΩ 5% 0.01W 0402	3809	2350 035 10229	4 x 22Ω 5% 1206	3E50	3198 031 04730	47Ω 5% 0402
3231	4822 117 13602	2.2kΩ 5% 0.01W 0402	3810	2350 035 10229	4 x 22Ω 5% 1206	3E51	3198 031 04730	47Ω 5% 0402
3232	3198 031 03320	3.3kΩ 5% 0402	3811	2350 035 10229	4 x 22Ω 5% 1206	3E52	3198 031 04730	47Ω 5% 0402
3233	3198 031 03320	3.3kΩ 5% 0402	3812	2350 035 10229	4 x 22Ω 5% 1206	3E53	3198 031 04730	47Ω 5% 0402
3234	3198 031 04720	4.7kΩ 5% 0402	3813	2350 035 10229	4 x 22Ω 5% 1206	3E54	3198 031 04730	47Ω 5% 0402
3235	3198 031 04720	4.7kΩ 5% 0402	3814	3198 031 02290	22Ω 5% 0.1W 0402	3E55	3198 031 04730	47Ω 5% 0402
3236	3198 031 04720	4.7kΩ 5% 0402	3815	3198 031 02290	22Ω 5% 0.1W 0402	3F00	4822 051 30759	75Ω 5% 0.062W
3238	4822 117 13545	100Ω 1% 0402	3816	3198 031 02290	22Ω 5% 0.1W 0402	3F09	4822 051 30759	75Ω 5% 0.062W
3239	4822 117 13545	100Ω 1% 0402	3817	4822 117 13606	10kΩ 5% 0.01W 0402	3F10	3198 021 31080	1Ω 5% 0603
3240	2322 704 61002	1kΩ 1%	3818	4822 117 13606	10kΩ 5% 0.01W 0402	3F11	4822 051 30759	75Ω 5% 0.062W
3241	4822 117 13545	100Ω 1% 0402	3820	4822 117 13606	10kΩ 5% 0.01W 0402	3F16	4822 051 30103	10kΩ 5% 0.062W
3242	4822 117 13606	10kΩ 5% 0.01W 0402	3822	4822 117 13545	100Ω 1% 0402	3F17	4822 051 30103	10kΩ 5% 0.062W
3243	3198 031 04720	4.7kΩ 5% 0402	3824	3198 031 03320	3.3kΩ 5% 0402	3F18	4822 051 30103	10kΩ 5% 0.062W
3245	3198 031 02240	220kΩ 5% 0.1W 0402	3825	3198 031 11030	4 x 10kΩ 5% 1206	3F19	3198 021 31080	1Ω 5% 0603
3246	3198 031 04720	4.7kΩ 5% 0402	3826	3198 031 11030	4 x 10kΩ 5% 1206	3F20	4822 051 30101	100Ω 5% 0.062W
3247	4822 117 13545	100Ω 1% 0402	3827	4822 117 13606	10kΩ 5% 0.01W 0402	3F21	4822 051 30102	1kΩ 5% 0.062W
3248	4822 117 13545	100Ω 1% 0402	3828	4822 117 13606	10kΩ 5% 0.01W 0402	3F22	4822 051 30103	10kΩ 5% 0.062W
3249	3198 031 04720	4.7kΩ 5% 0402	3829	4822 117 13606	10kΩ 5% 0.01W 0402	3F23	4822 051 30102	1kΩ 5% 0.062W
3250	4822 117 13545	100Ω 1% 0402	3831	4822 117 13545	100Ω 1% 0402	3F24	4822 051 30103	10kΩ 5% 0.062W
3251	4822 117 13545	100Ω 1% 0402	3832	4822 117 13545	100Ω 1% 0402	3F25	4822 051 30103	10kΩ 5% 0.062W
3252	4822 117 13545	100Ω 1% 0402	3833	3198 031 01090	10kΩ 5% 0.01W 0402	3F26	4822 051 30153	15kΩ 5% 0.062W
3253	4822 117 13545	100Ω 1% 0402	3834	4822 117 13606	10kΩ 5% 0.01W 0402	3F27	4822 051 30153	15kΩ 5% 0.062W
3255	4822 117 13605	Jumper 0402	3835	4822 117 13606	10kΩ 5% 0.01W 0402	3F28	4822 051 30101	100Ω 5% 0.062W
3256	4822 117 13605	Jumper 0402	3836	4822 117 13606	10kΩ 5% 0.01W 0402	3F29	4822 051 30101	100Ω 5% 0.062W
3257	4822 117 13605	Jumper 0402	3837	4822 117 13606	10kΩ 5% 0.01W 0402	3G00	4822 051 30151	150Ω 5% 0.062W
3258	4822 117 13548	1kΩ 5% 0402	3838	4822 117 13606	10kΩ 5% 0.01W 0402	3G01	4822 051 30103	10kΩ 5% 0.062W
3259	4822 117 13548	1kΩ 5% 0402	3839	4822 117 13545	100Ω 1% 0402	3G02	4822 117 12891	220kΩ 1%
3260	4822 117 13548	1kΩ 5% 0402	3840	3198 031 02290	22Ω 5% 0.1W 0402	3G03	4822 051 30153	15kΩ 5% 0.062W
3262	4822 117 13601	22kΩ 5% 0402	3841	4822 117 13606	10kΩ 5% 0.01W 0402	3G04	4822 051 30151	150Ω 5% 0.062W
3263	2322 702 70398	3.9Ω 5% 0603	3900	3198 031 03320	3.3kΩ 5% 0402	3G05	4822 051 30103	10kΩ 5% 0.062W
3264	4822 117 13601	22kΩ 5% 0402	3901	4822 117 13606	10kΩ 5% 0.01W 0402	3G06	4822 117 12891	220kΩ 1%
3265	2322 702 70398	3.9Ω 5% 0603	3902	4822 117 13606	10kΩ 5% 0.01W 0402	3G07	4822 051 30153	15kΩ 5% 0.062W
3266	3198 031 05620	5.6kΩ 5% 0.01W 0402	3903	4822 117 13545	100Ω 1% 0402	3G08	4822 051 30151	150Ω 5% 0.062W
3267	3198 031 05620	5.6kΩ 5% 0.01W 0402	3904	4822 117 13545	100Ω 1% 0402	3G12	2122 118 06408	91Ω 5% 0603
3268	4822 117 13545	100Ω 1% 0402	3A02	4822 117 13548	1kΩ 5% 0402	3G13	2122 118 06408	91Ω 5% 0603
3272	3198 031 04720	4.7kΩ 5% 0402	3B01	4822 117 12706	10kΩ 1% 0.063W 0603	3G14	2122 118 06408	91Ω 5% 0603
3273	4822 117 13548	1kΩ 5% 0402	3B02	4822 117 12706	10kΩ 1% 0.063W 0603	3G15	4822 051 30101	100Ω 5% 0.062W
3274	3198 031 03910	390Ω 1% 0402	3B03	2322 704 61501	150Ω 1% 0603	3G16	4822 051 30101	100Ω 5% 0.062W
3275	4822 117 13545	100Ω 1% 0402	3C00	4822 117 13606	10kΩ 5% 0.01W 0402	3G17	4822 051 30101	100Ω 5% 0.062W
3276	3198 031 07590	75Ω 5% 0402	3C01	4822 117 13606	10kΩ 5% 0.01W 0402	3G26	4822 051 30273	27kΩ 5% 0.062W
3277	3198 031 01520	1.2kΩ 5% 0.01W 0402	3C02	4822 117 13548	1kΩ 5% 0402	3G27	4822 051 30682	6.8Ω 5% 0.062W
3280	4822 117 11151	1Ω 5%	3C04	3198 031 11030	4 x 10kΩ 5% 1206	3G28	4822 051 30759	75Ω 5% 0.062W
3281	3198 031 03930	39kΩ 5% 0402	3C05	4822 117 13606	10kΩ 5% 0.01W 0402	3G29	4822 051 30331	330Ω 5% 0.062W
3285	4822 117 13605	Jumper 0402	3C06	3198 031 11030	4 x 10kΩ 5% 1206	3G30	4822 051 30689	68Ω 5% 0.063W 0603
3286	4822 117 13545	100Ω 1% 0402	3C07	3198 031 11030	4 x 10kΩ 5% 1206	3G31	4822 051 30759	75Ω 5% 0.062W
3292	3198 031 01230	12kΩ 5% 0402	3C08	3198 031 11030	4 x 10kΩ 5% 1206	3G32	4822 051 30102	1kΩ 5% 0.062W
3294	3198 031 04730	47Ω 5% 0402	3C09	3198 031 11030	4 x 10kΩ 5% 1206	3G33	4822 051 30101	100Ω 5% 0.062W
3295	4822 117 11297	100kΩ 5% 0.1W	3C10	3198 031 11030	4 x 10kΩ 5% 1206	3G34	4822 051 30102	1kΩ 5% 0.062W
3431	4822 117 13548	1kΩ 5% 0402	3C16	3198 031 11030	4 x 10kΩ 5% 1206	3G37	4822 051 30151	150Ω 5% 0.062W
3451	3198 031 04720	4.7kΩ 5% 0402	3C17	4822 117 13606	10kΩ 5% 0.01W 0402	3G38	4822 051 30103	10kΩ 5% 0.062W
3453	4822 117 13545	100Ω 1% 0402	3C18	4822 117 13606	10kΩ 5% 0.01W 0402	3G39	4822 117 12891	220kΩ 1%
3454	4822 117 13545	100Ω 1% 0402	3E00	2322 705 70569	56Ω 5% 0402	3G40	4822 051 30153	15kΩ 5% 0.062W
3455	4822 117 13545	100Ω 1% 0402	3E01	2322 705 70569	56Ω 5% 0402	3G41	4822 051 30151	150Ω 5% 0.062W
3456	4822 117 13545	100Ω 1% 0402	3E02	2322 705 70569	56Ω 5% 0402	3G42	4822 051 30103	10kΩ 5% 0.062W
3458	4822 117 13545	100Ω 1% 0402	3E06	3198 031 04730	47Ω 5% 0402	3G43	4822 117 12891	220kΩ 1%
3459	4822 117 13545	100Ω 1% 0402	3E07	3198 031 04730	47Ω 5% 0402	3G44	4822 051 30153	15kΩ 5% 0.062W
3461	4822 117 13545	100Ω 1% 0402	3E08	3198 031 04730	47Ω 5% 0402	3G45	4822 051 30759	75Ω 5% 0.062W
3462	4822 117 13545	100Ω 1% 0402	3E09	3198 031 04730	47Ω 5% 0402	3G46	4822 051 30101	100Ω 5% 0.062W
3604	4822 117 13601	22kΩ 5% 0402	3E10	3198 031 04730	47Ω 5% 0402	3G47	4822 117 12925	47kΩ 1% 0.063W 0603
3605	4822 117 13601	22kΩ 5% 0402	3E11	3198 031 04730	47Ω 5% 0402	3G48	4822 117 12925	47kΩ 1% 0.063W 0603
3609	4822 117 13601	22kΩ 5% 0402	3E12	4822 117 13606	10kΩ 5% 0.01W 0402	3G51	4822 051 30273	27kΩ 5% 0.062W
3610	4822 117 11297	100kΩ 5% 0.1W	3E13	4822 117 13597	330Ω 5% 0402 0.01W	3G52	4822 051 30682	6.8Ω 5% 0.062W
3611	4822 117 11297	100kΩ 5% 0.1W	3E14	4822 117 13597	330Ω 5% 0402 0.01W	3G53	4822 051 30689	68Ω 5% 0.063W 0603
3612	4822 117 13601	22kΩ 5% 0402	3E15	4822 117 13597	330Ω 5% 0402 0.01W	3G54	4822 051 30102	1kΩ 5% 0.062W
3615	4822 117 13606	10kΩ 5% 0.01W 0402	3E16	4822 117 13597	330Ω 5% 0402 0.01W	3G57	4822 051 30759	75Ω 5% 0.062W
3618	4822 117 13601	22kΩ 5% 0402	3E17	4822 117 13597	330Ω 5% 0402 0.01W	3G58	4822 051 30101	100Ω 5% 0.062W
3623	3198 031 04730	47Ω 5% 0402	3E18	4822 117 13597	330Ω 5% 0402 0.01W	3G59	4822 117 12925	47kΩ 1% 0.063W 0603
3625	3198 031 03320	3.3kΩ 5% 0402	3E19	2322 705 70569	56Ω 5% 0402	3G60	4822 117 12925	47kΩ 1% 0.063W 0603
3627	4822 117 13601	22kΩ 5% 0402	3E20	2322 705 70569	56Ω 5% 0402	3G96	4822 117 12925	47kΩ 1% 0.063W 0603
3630	4822 117 13597	330Ω 5% 0402 0.01W	3E21	2322 705 70569	56Ω 5% 0402	3G99	4822 117 12925	47kΩ 1% 0.063W 0603
3631	4822 117 13597	330Ω 5% 0402 0.01W	3E22	4822 117 13632	100kΩ 1% 0603 0.62W	3J03	3198 031 06890	68Ω 5% 0402
3732	2322 704 61002	1kΩ 1%	3E23	3198 031 08210	820Ω 5% 0.5W	3J04	3198 031 06890	68Ω 5% 0402
3733	2322 704 63302	3.3kΩ 1% 0603	3E24	4822 117 13543	470Ω 5% 0402	3J05	3198 031 06890	68Ω 5% 0402
3734	4822 117 13602	2.2kΩ 5% 0.01W 0402	3E25	2322 705 70399	39Ω 5% 0402	3K00	4822 117 13545	100Ω 1% 0402
3735	4822 117 13548	1kΩ 5% 0402	3E26	3198 031 02290	22Ω 5% 0.1W 0402	3K01	4822 117 13545	100Ω 1% 0402
3736	3198 031 04720	4.7kΩ 5% 0402	3E27	2322 705 70399	39Ω 5% 0402	3K02	4822 117 13606	10kΩ 5% 0.01W 0402
3750	4822 117 13601	22kΩ 5% 0402	3E28	3198 031 02290	22Ω 5% 0.1W 0402	3K03	3198 031 01530	15kΩ 5% 0.01W 0402
3751	3198 021 31080	1Ω 5% 0603	3E29	2322 705 70399	39Ω 5% 0402	3K05	4822 117 13606	10kΩ 5% 0.01W 0402
3752	3198 021 31080	1Ω 5% 0603	3E30	3198 031 02290	22Ω 5% 0.1W 0402	3K06	3198 031 01530	15kΩ 5% 0.01W 0402
3753	2322 704 61002	1kΩ 1%	3E31	4822 117 135				

7900	9322 142 88668	LF25CDT
7901	9322 189 19668	LD1086D2T18
7B01	9322 214 42671	K4D263238F-QC50
7C00	9322 205 12671	MX29LV040QC-70G
7C01	9322 206 23668	M24C32-WMN6P
7C02	9322 215 39685	PST596JN
7E00	9322 195 23668	ADG733BRU
7E01	9322 199 80668	SM5301BS-G
7E02	9322 199 56668	ADG781BCP
7E03	4822 209 60792	74HC4053D
7E04	9352 607 39118	74LVC14APW
7E05	9352 607 39118	74LVC14APW
7F03	9322 206 24668	M24C02-WMN6P
7G03	3198 010 42310	BC847BW
7G05	3198 010 42310	BC847BW
7G10	4822 209 60792	74HC4053D
7L01	3198 010 42310	BC847BW
7L02	3198 010 42310	BC847BW
7L03	3198 010 42310	BC847BW
7L04	9322 212 77672	MST9883C-LF-110
7L05	4822 209 17398	LD1117DT33
7L06	9965 000 04199	BSN20
7L07	9965 000 04199	BSN20
7M00	9322 204 76671	T6TU5XBG-0001
7M01	9322 206 19672	MSM56V16160F-7T3-FG
7M03	9322 170 14668	LF15ABDT
7N01	9322 210 01668	EPCS4S18N
7N02	9322 217 35671	EP1C12F256C8N
7N03	9340 425 20115	BC847BS
7N04	9322 210 59668	THC63LVDF84B
7P01	9322 170 14668	LF15ABDT
7P02	9322 201 03668	THC63LVDM83R

Audio Amplifier Panel [C]

Various

1001	2422 025 09406	Connector 4p m
1002	2422 025 10769	Connector 9p m
1003	2422 025 10768	Connector 3p m



2001	2020 024 00023	220μ 35V
2002	2238 586 59812	100nF 20% 50V 0603
2003	2238 586 59812	100nF 20% 50V 0603
2004	2020 024 00023	220μ 35V
2006	2020 552 94427	100pF 5% 50V
2007	2020 552 94427	100pF 5% 50V
2008	2020 552 94427	100pF 5% 50V
2009	2020 552 94427	100pF 5% 50V
2010	2238 586 59812	100nF 20% 50V 0603
2011	4822 051 30562	5.6kΩ 5% 0.063W 0603
2012	2020 024 00023	220μ 35V
2013	4822 126 13879	220nF +80-20% 16V
2014	4822 126 14238	2.2nF 50V 0603
2015	4822 126 14238	2.2nF 50V 0603
2016	4822 126 14238	2.2nF 50V 0603
2017	2238 586 59812	100nF 20% 50V 0603
2018	3198 017 31530	15nF 20% 50V 0603
2019	3198 037 52280	2.2μ 50V
2020	4822 126 13883	220pF 5% 50V
2021	4822 126 13883	220pF 5% 50V
2022	4822 126 14076	220nF +80/-20% 25V
2023	4822 121 51252	470nF 5% 63V
2024	2020 012 00036	1000μ 25V
2026	4822 126 13879	220nF +80-20% 16V
2027	2238 586 59812	100nF 20% 50V 0603
2028	2238 586 59812	100nF 20% 50V 0603
2029	2020 024 00023	220μ 35V
2030	4822 126 14238	2.2nF 50V 0603
2031	4822 126 14238	2.2nF 50V 0603
2032	4822 126 14238	2.2nF 50V 0603
2033	4822 126 13879	220nF +80-20% 16V
2034	2238 586 59812	100nF 20% 50V 0603
2035	4822 126 13883	220pF 5% 50V
2036	4822 126 13883	220pF 5% 50V
2037	3198 037 52280	2.2μ 50V
2038	3198 017 31530	15nF 20% 50V 0603
2039	2020 552 96656	10μF 20% 25V 1210
2040	4822 126 13879	220nF +80-20% 16V
2041	2020 552 96656	10μF 20% 25V 1210
2042	4822 121 51252	470nF 5% 63V
2043	2020 012 00036	1000μ 25V
2044	2238 586 59812	100nF 20% 50V 0603
2045	4822 126 14076	220nF +80/-20% 25V
2047	3198 017 41050	1μF 10V 0603
2048	2238 586 59812	100nF 20% 50V 0603
2051	2020 552 94427	100pF 5% 50V
2052	4822 126 14238	2.2nF 50V 0603
2053	4822 126 14238	2.2nF 50V 0603

2054	4822 126 14238	2.2nF 50V 0603
2055	4822 126 14238	2.2nF 50V 0603
2060	4822 126 14238	2.2nF 50V 0603
2061	4822 126 14238	2.2nF 50V 0603
2062	3198 017 34730	47nF 16V 0603
2063	3198 017 34730	47nF 16V 0603
2064	5322 126 11579	3.3nF 10% 63V
2065	5322 126 11579	3.3nF 10% 63V



3001	5322 117 11726	10kΩ 5%
3003	4822 051 30223	22kΩ 5% 0.062W
3004	4822 051 30103	10kΩ 5% 0.062W
3006	4822 051 30102	1kΩ 5% 0.062W
3007	4822 117 12925	47kΩ 1% 0.063W 0603
3008	4822 051 30222	2.2kΩ 5% 0.062W
3009	4822 117 12891	220kΩ 1%
3010	4822 051 30682	6.8kΩ 5% 0.062W
3011	4822 051 30222	2.2kΩ 5% 0.062W
3012	4822 051 20109	10kΩ 5% 0.1W
3013	4822 051 30103	10kΩ 5% 0.062W
3014	2322 762 60229	22kΩ 5% 1005
3019	4822 051 30103	10kΩ 5% 0.062W
3020	4822 051 30103	10kΩ 5% 0.062W
3021	4822 051 30472	4.7kΩ 5% 0.062W
3022	9965 000 23109	22kΩ 5% 0603
3023	4822 051 30102	1kΩ 5% 0.062W
3024	4822 117 12925	47kΩ 1% 0.063W 0603
3025	4822 051 30222	2.2kΩ 5% 0.062W
3026	4822 051 30682	6.8kΩ 5% 0.062W
3027	4822 117 12891	220kΩ 1%
3028	4822 051 30103	10kΩ 5% 0.062W
3029	4822 051 30222	2.2kΩ 5% 0.062W
3030	4822 051 20109	10kΩ 5% 0.1W
3031	2322 762 60229	22kΩ 5% 1005
3032	4822 051 30392	3.9kΩ 5% 0.063W 0603
3033	4822 051 30103	10kΩ 5% 0.062W
3034	4822 051 30392	3.9kΩ 5% 0.063W 0603
3037	4822 051 30392	3.9kΩ 5% 0.063W 0603
3039	4822 051 30103	10kΩ 5% 0.062W
3040	4822 051 30103	10kΩ 5% 0.062W
3041	4822 051 30103	10kΩ 5% 0.062W
3042	4822 051 30103	10kΩ 5% 0.062W
3043	4822 051 30103	10kΩ 5% 0.062W
3046	4822 051 30102	1kΩ 5% 0.062W
3047	4822 051 30102	1kΩ 5% 0.062W



5001	2422 549 44197	Bead 220kΩ at 100MHz
5002	3198 018 52280	2.2μF 10% 1008
5003	3198 018 52280	2.2μF 10% 1008
5004	3198 018 52280	2.2μF 10% 1008
5005	3198 018 52280	2.2μF 10% 1008
5006	2422 536 01034	33μ
5007	2422 536 01034	33μ



6002	4822 130 80622	BAT54
6003	4822 130 80622	BAT54



7000	9352 760 45118	TDA8931T/N1
7001	9352 760 45118	TDA8931T/N1
7004	9322 209 56685	TL431ACDBV

Keyboard Control Panel [E]

Various

0100	3139 129 90041	PROCESS BOX PCB PNL LFS
0229	3122 120 01701	FACTORY PLATE
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
1314	4822 276 13775	Switch 1p 0.1A 12V
1684	4822 267 10459	Connector 3p
8684	3139 131 04421	Cable 03P/340/03P



3318	4822 051 30151	150kΩ 5% 0.062W
3319	4822 051 30391	390kΩ 5% 0.062W

3320	3198 021 31820	1.8kΩ 5% 0.062W 0603
3321	4822 117 12968	820kΩ 5% 0.62W
3322	4822 051 30008	Jumper 0603
3323	4822 051 30008	Jumper 0603
3324	4822 051 30561	560kΩ 5% 0.062W



6306	4822 130 11148	UDZ4.7B
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Side AV Panel [G]

Various

1301	2422 025 14531	20p f
1301	4822 267 10484	YKF51-5359
1302	2422 025 10738	Connector 6p m
1302	2422 026 05655	Socket CINCH 3P F RDWDYE
1303	2422 026 05059	Connector Phone
1304	2422 025 10772	Connector 12p m
1306	2422 026 05059	Connector Phone
1307	4822 267 10484	YKF51-5359
1308	2422 026 05513	Soc phone 1p



2301	3198 017 41050	1μF 10V 0603
2302	4822 126 11785	47pF 5% 50V 0603
2302	4822 126 14241	330pF 0603 50V
2303	3198 017 41050	1μF 10V 0603
2304	4822 126 11785	47pF 5% 50V 0603
2304	4822 126 14241	330pF 0603 50V
2305	4822 126 14241	330pF 0603 50V
2306	4822 126 14241	330pF 0603 50V
2307	4822 126 14241	330pF 0603 50V
2308	5322 126 11583	10nF 10% 50V 0603
2309	5322 126 11583	10nF 10% 50V 0603
2310▲	3198 017 41050	1μF 10V 0603
2326	3198 017 41050	1μF 10V 0603



3301	4822 051 30101	100kΩ 5% 0.062W
3301	4822 051 30759	75kΩ 5% 0.062W
3302	4822 051 30109	10kΩ 5% 0.062W
3302	4822 051 30759	75kΩ 5% 0.062W
3303	4822 051 30109	10kΩ 5% 0.062W
3303	4822 051 30221	22kΩ 5% 0.062W
3304	4822 051 30223	22kΩ 5% 0.062W
3304	4822 051 30759	75kΩ 5% 0.062W
3305	4822 117 12925	47kΩ 1% 0.063W 0603
3305	4822 117 13632	100kΩ 1% 0603 0.62W
3306	4822 051 30153	15kΩ 5% 0.062W
3306	4822 051 30759	75kΩ 5% 0.062W
3307	4822 051 30102	1kΩ 5% 0.062W
3307	4822 051 30223	22kΩ 5% 0.062W
3308	4822 051 30153	15kΩ 5% 0.062W
3308	4822 117 12925	47kΩ 1% 0.063W 0603
3309▲	4822 051 30759	75kΩ 5% 0.062W
3310▲	4822 051 30563	56kΩ 5% 0.062W
3311	4822 051 30103	10kΩ 5% 0.062W
3325	4822 051 30759	75kΩ 5% 0.062W
3326	4822 051 30102	1kΩ 5% 0.062W
3327	4822 117 13632	100kΩ 1% 0603 0.62W
3328	4822 051 30101	100kΩ 5% 0.062W
3329	4822 051 30563	56kΩ 5% 0.062W



6301	9322 129 41685	BZM55-C12
6302	9322 129 41685	BZM55-C12
6303	9322 129 41685	BZM55-C12
6304	9322 129 41685	BZM55-C12
6305	9322 129 41685	BZM55-C12
6306	9322 129 41685	BZM55-C12
6307	9322 129 41685	BZM55-C12
6308	9322 129 41685	BZM55-C12
6310	4822 130 11416	PDZ6.8B
6311	4822 130 11416	PDZ6.8B



7301▲	4822 130 60373	BC856B
7326	4822 130 60373	BC856B

IR/LED/Light-sensor Panel [J]

Various

0080	3139 120 10171	Light sensor holder
1540	2422 025 10738	Connector 6p m
1870	4822 265 31067	Connector 7p m



2540	4822 124 41643	100µF 20% 16V
2541	3198 017 41050	1µF 10V 0603
2801	2020 552 96637	10µF 10% 6.3V 0805
2802	2020 552 96637	10µF 10% 6.3V 0805
2803	3198 017 41050	1µF 10V 0603



3540	4822 051 30331	330Ω 5% 0.062W
3542	4822 051 30221	220Ω 5% 0.062W
3544	4822 051 30332	3.3Ω 5% 0.062W
3547	3198 021 32250	2.2MΩ 5% 0603
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
3809	3198 021 32250	2.2MΩ 5% 0603



6540	9322 192 35676	SPR-325MVW
6541	9322 207 16667	TSOP34836LL1B
6801	9322 192 35676	SPR-325MVW
6803	4822 130 11564	UDZ3.9B



7540	4822 130 60373	BC856B
7541	5322 130 60159	BC846B
7542	5322 130 60159	BC846B
7543	9322 190 43682	BPW34
7801	4822 130 60373	BC856B
7802	9322 207 16667	TSOP34836LL1B
7803	5322 130 60159	BC846B
7804	5322 130 60159	BC846B
7808	9322 190 43682	BPW34