

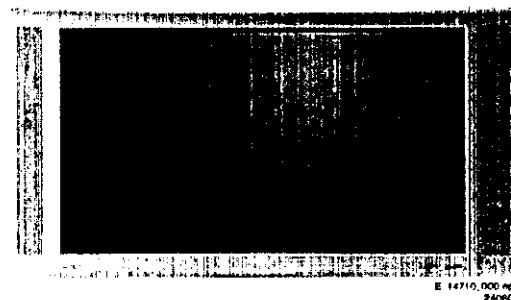
PHILIPS

26PF4310

MODEL

SERVICE MANUAL

Service
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Service



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	: 26" (66 cm), 15.9"
- 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)	: 1280 x 768
- 26PF4310/10	: 1280 x 768
- 26PF5320/10	: 1366 x 768
- 32PF5320/10	: 1366 x 768
- 32PF7320/10	: 1366 x 768
Contrast ratio	: 500:1
- 26PF4310/10	: 500:1
- 26PF5320/10	: 600:1
- 32PF5320/10	: 600:1
- 32PF7320/10	: 600:1
Light output (cd/m ²)	: 400
- 26PF4310/10	: 400
- 26PF5320/10	: 500
- 32PF5320/10	: 500
- 32PF7320/10	: 500
Response time (ms)	: 16
- 26PF4310/10	: 16
- 26PF5320/10	: 16
- 32PF5320/10	: 18
- 32PF7320/10	: 18
Viewing angle (HxV degrees)	: 176x176
- 26PF4310/10	: 176x176
- 26PF5320/10	: 176x176
- 32PF5320/10	: 176x176
- 32PF7320/10	: 176x176
Tuning system	: PLL
TV Colour systems	: PAL B/G, D/K, L
	: SECAM B/G, D/K, L/L'
Video playback	: PAL B/G; SECAM L/L'
- 26PF4310/10	: PAL B/G; SECAM L/L'
- 26PF5320/10	: PAL B/G; SECAM L/L'
- 32PF5320/10	: PAL B/G; SECAM L/L'
- 32PF7320/10	: PAL B/G; SECAM L/L'
Supported computer formats	: VGA (640x480)
	: MAC (640x480)
	: SVGA (800x600)
	: XWGA (1024x768)
	: WXGA (1280x768)
Supported video formats	: 640x480 - 11H
	: 720x576 - 11H
	: 640x480 - 21H
	: 720x576 - 21H
	: 1920x1080 - 21H
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, L, L
	: AV Stereo
Maximum power (W _{RMS})	: 2 x 5
- 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

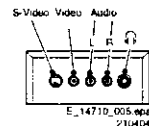


Figure 1-1 Side I/O connections

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	0.5 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

E_0532_001.eps

1.2.2 Rear Connections

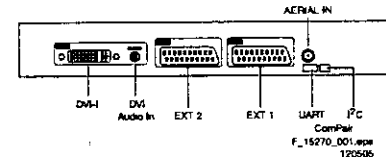


Figure 1-2 Rear I/O

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

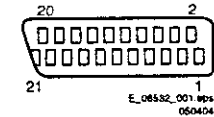


Figure 1-4 SCART connector

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

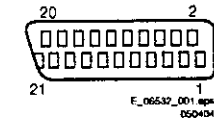


Figure 1-5 SCART connector

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 - Y/C/Y - 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 - Y/C/Y - in	0.7 V _{pp} / 75 ohm
21 - Shield	Gnd

1.3 Chassis Overview

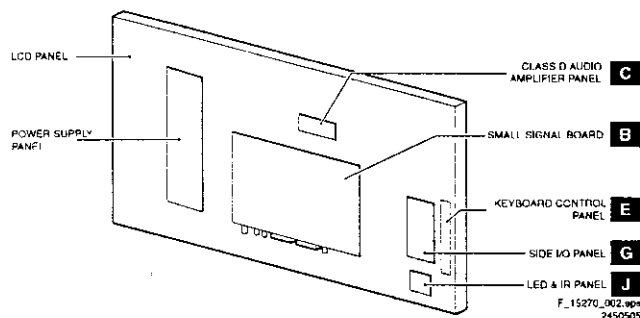


Figure 1-5 Chassis overview

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions

Safety regulations require 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 Δ , 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 Δ). 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 13989.
- 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 ($\rightarrow$), 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 ($\perp$) and without ($\rightarrow$) aerial signal. Measure the voltages in the power supply section both in normal operation ($\perp$) and in stand-by ($\rightarrow$). 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).

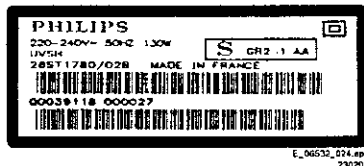


Figure 2-1 Serial number example

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 80°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 T2NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions). You will find this and more technical information within the "Magazine", chapter "Workshop information". For additional questions please contact your local repair help desk.

2.3.5 Practical Service Precautions

- It makes sense to avoid exposure to electrical shock. While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- Always respect voltages. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:

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

4. Mechanical Instructions

Index of this chapter:

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

4.1 Cable Dressing

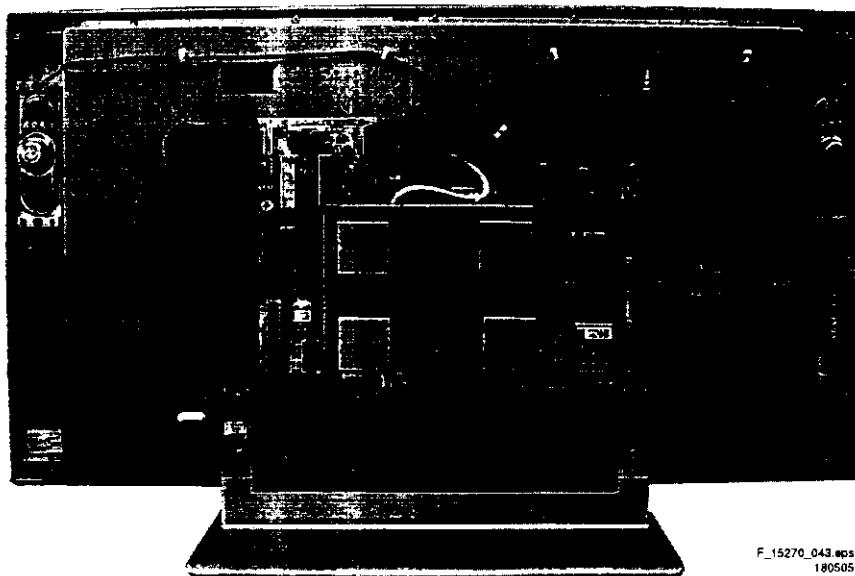


Figure 4-1 Cable dressing

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).

4.2.1 The Foam Bars

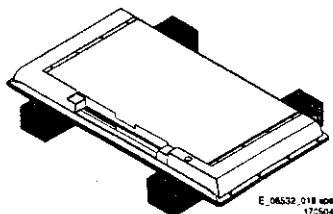


Figure 4-2 Foam bars

Notes:

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

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.

4.3 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

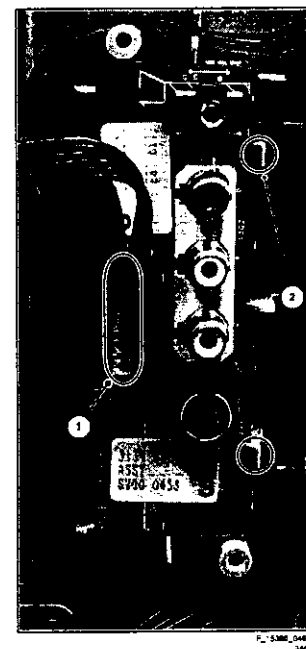


Figure 4-3 Side I/O panel

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

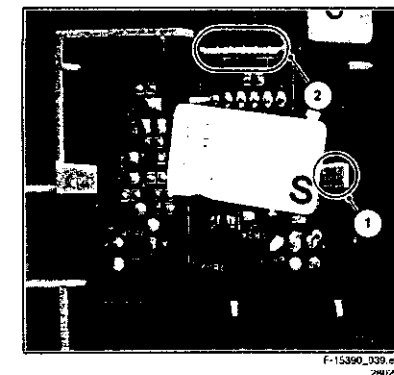


Figure 4-4 LED panel

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

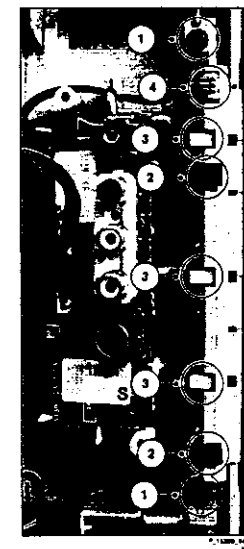


Figure 4-5 Keyboard control panel

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)

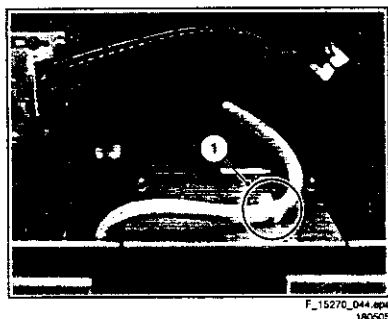


Figure 4-6 Cable clip on cover shield

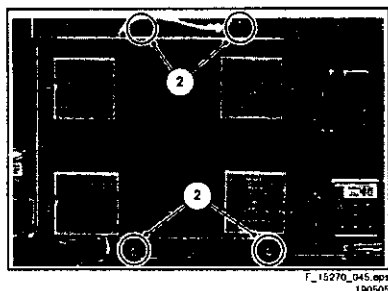


Figure 4-7 SSB board cover shield

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).

4.3.6 SSB Board

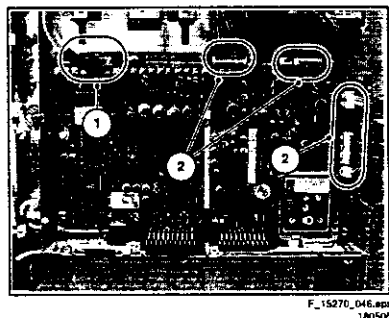


Figure 4-8 SSB board connectors

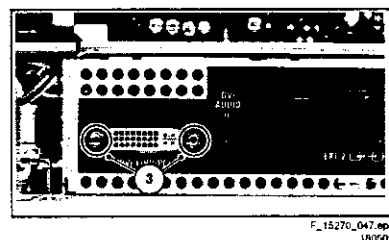


Figure 4-9 DVI-I connector screws

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)

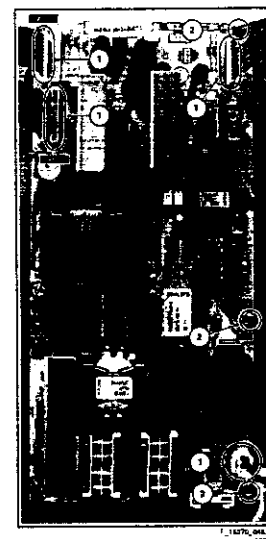


Figure 4-10 Power supply panel

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

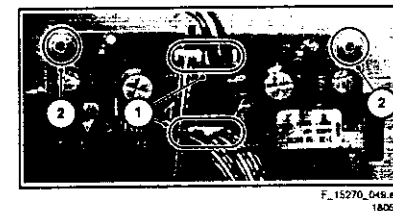
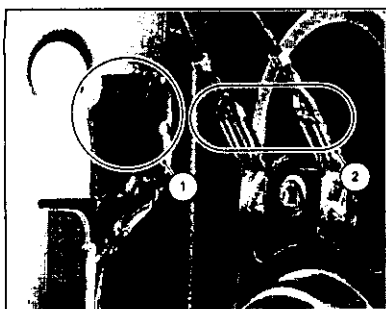


Figure 4-11 Audio amplifier panel

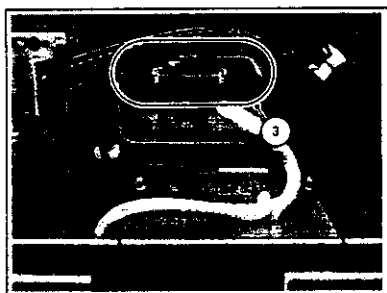
1. Disconnect all cables (1) from the panel.
2. Remove the fixation screws (2) from the panel.
3. Remove the panel.

4.3.9 LCD Panel



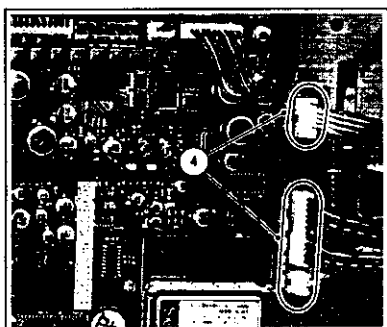
F_15390_047.eps
280205

Figure 4-12 Anti-static copper foil



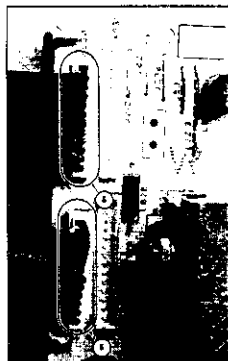
F_15270_051.eps
280205

Figure 4-13 LVDS connector



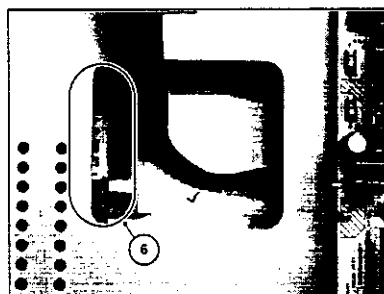
F_15270_052.eps
180505

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



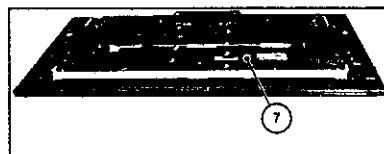
F_15390_061.eps
280205

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



F_15390_061.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 boxx.

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.

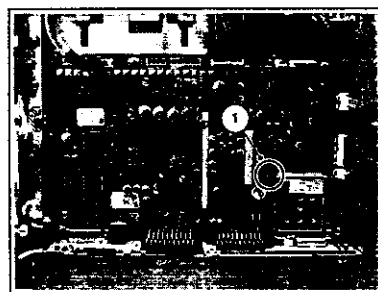
Specifications

- 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:

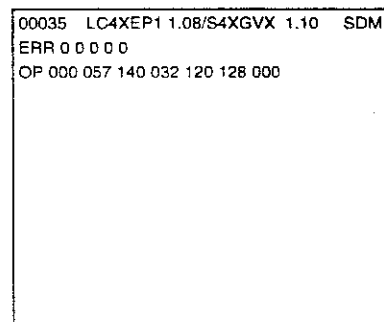
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
- Short "Service" jumpers on the TV board during cold start and apply mains (see Figure "Service jumpers"). 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
190505

Figure 5-1 Service jumpers

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



F_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

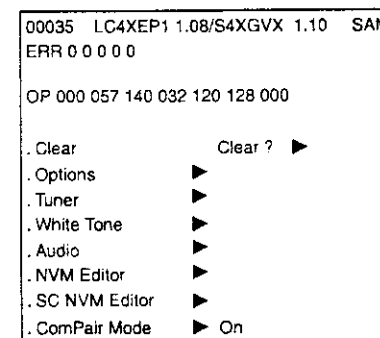
- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- AKB switching.
- Software alignments (Tuner, White Tone, Geometry & Audio).
- NVM Editor.
- ComPair Mode switching.

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(-) 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. EEEEE-F.GG. This is the software identification of theScaler:
 - EEEEE= 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.

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.

```

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.nps
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).

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.

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 last point 17 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!

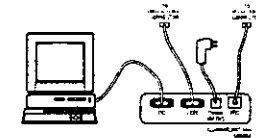


Figure 5-5 ComPair interface connection

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 03781.
- 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 andScaler 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 7801	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). Remarks: 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 Panelink Receiver/ Decoder	I ² C error while communicating with the Board HDMI Panelink Receiver/Decoder (only in NAF-1A and AP sets)	7D03	B12 (only in NAF-1A and AP sets)
14	Scaler SDRAM	Read-write error with the Scaler SDRAM	7B01	B10
15	Not applicable	-	-	-
16	EPLO	I ² C error while communicating with EPI D	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	32PF732010	32PF532010	26PF532010	26PF431010
Byte 0 174(dec)	0	OSS (LSB)	Mode of quasi split sound amplifier	1	1	1	1
	1	FMI	Connection of output of OSS 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	Scavn 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	LP3	LP3	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	32PF732010	32PF532010	26PF532010	26PF431010
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 PC 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 combifilter (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 combifilter (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 & pin13 of 7E03.
2. If they are present, check teletext output.
3. If there is no teletext output, the IC TDA150xx may be defect.

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%.

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.

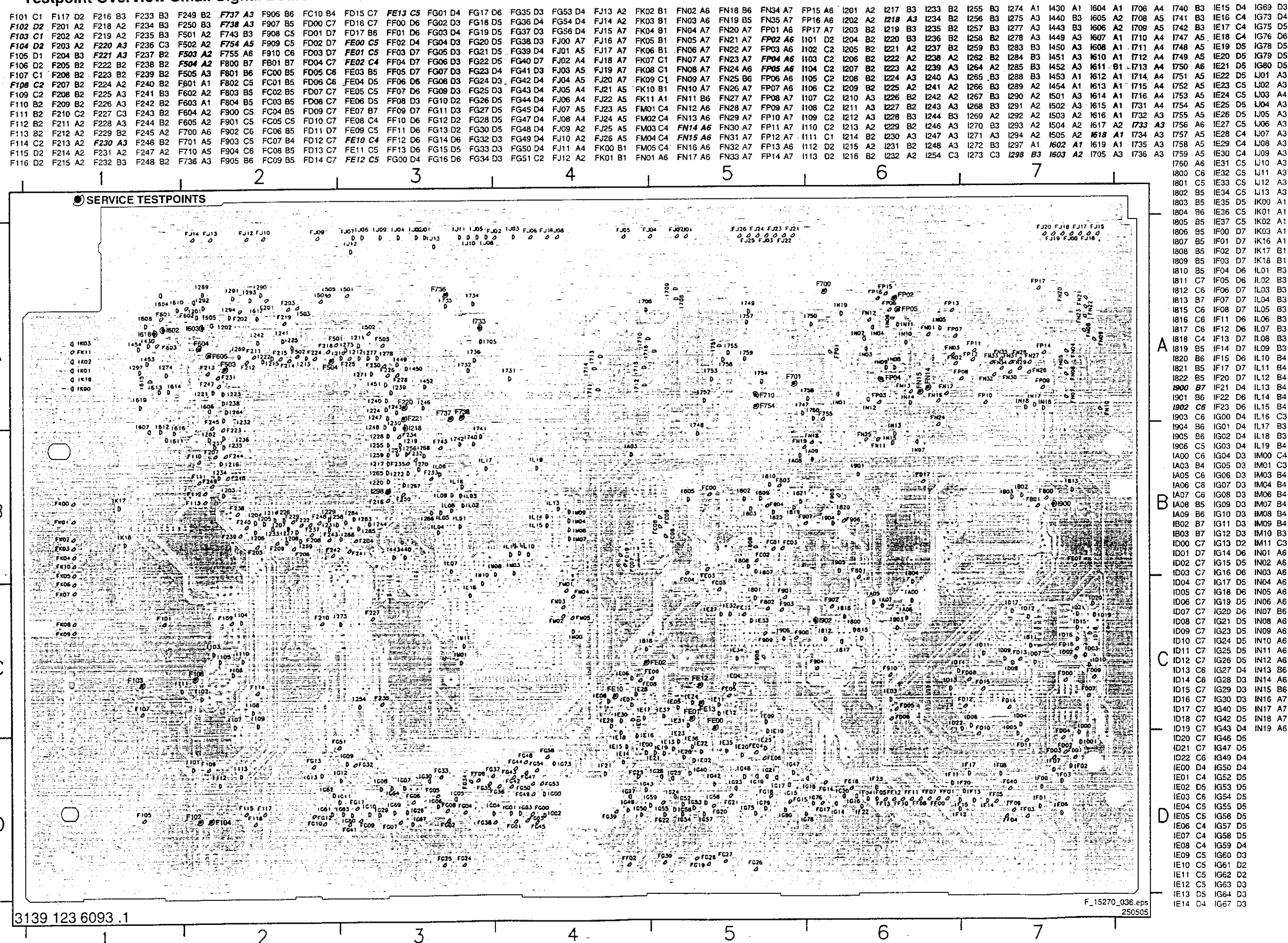
Protections Concept on Power Supply Board (two models)

1. **12 V output (pin 9 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.

Wiring Diagram

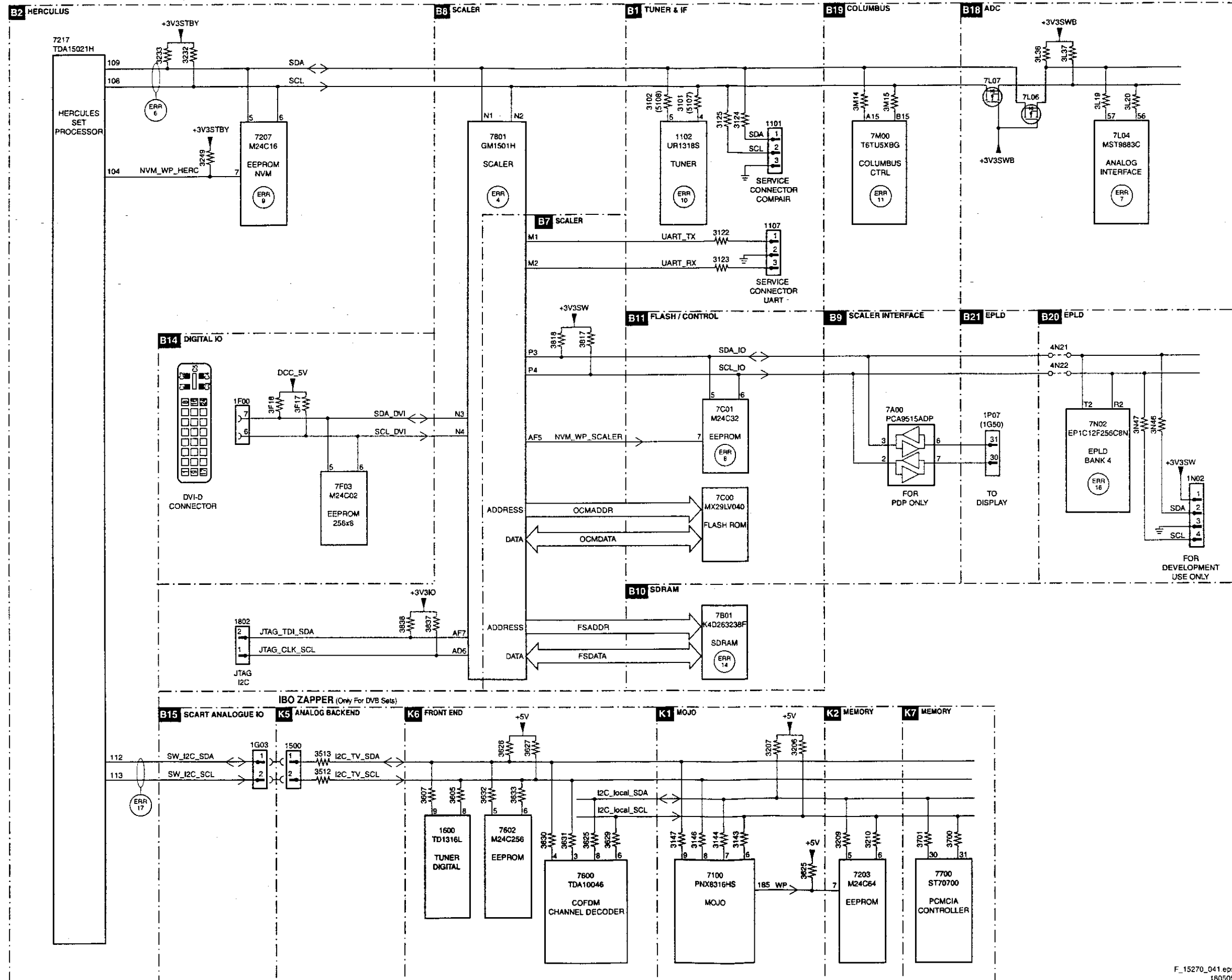


Testpoint Overview Small Signal Board

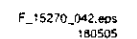


I2C IC Overview

IIC

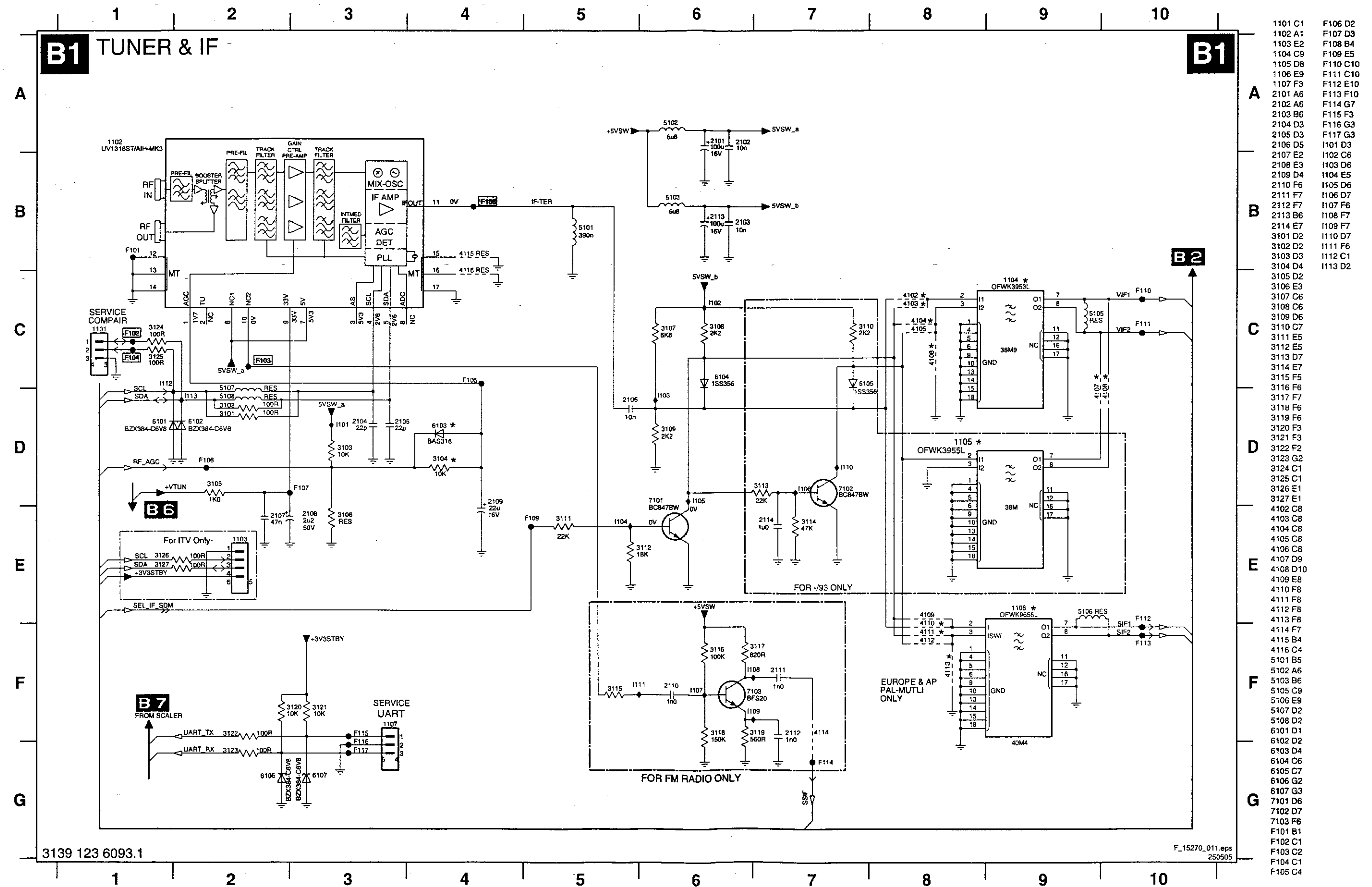


SUPPLY LINE OVERVIEW



7. Circuit Diagrams and PWB Layouts

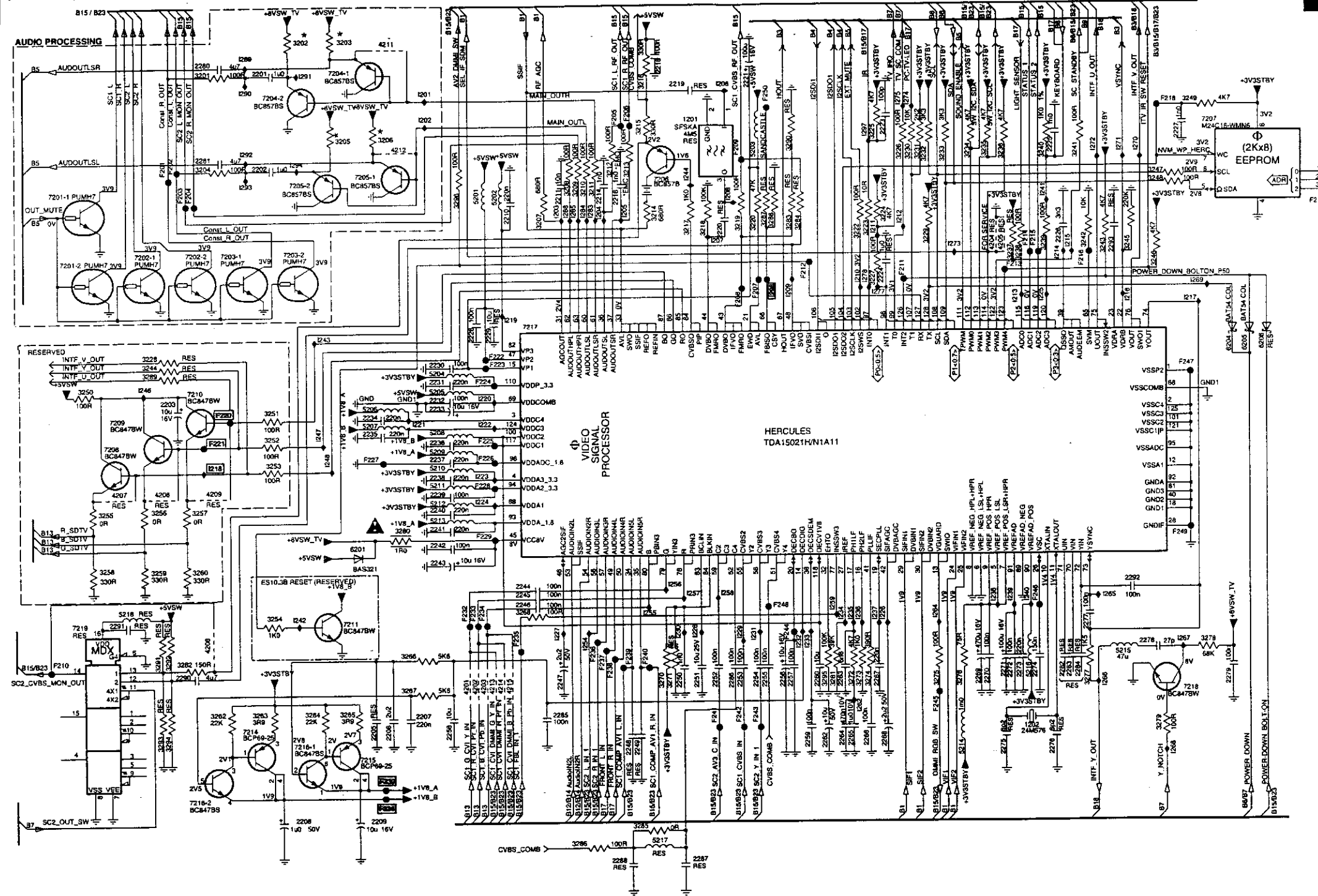
SSB: Tuner and VIF



SSB: Hercules

B2 HERCULES

B2

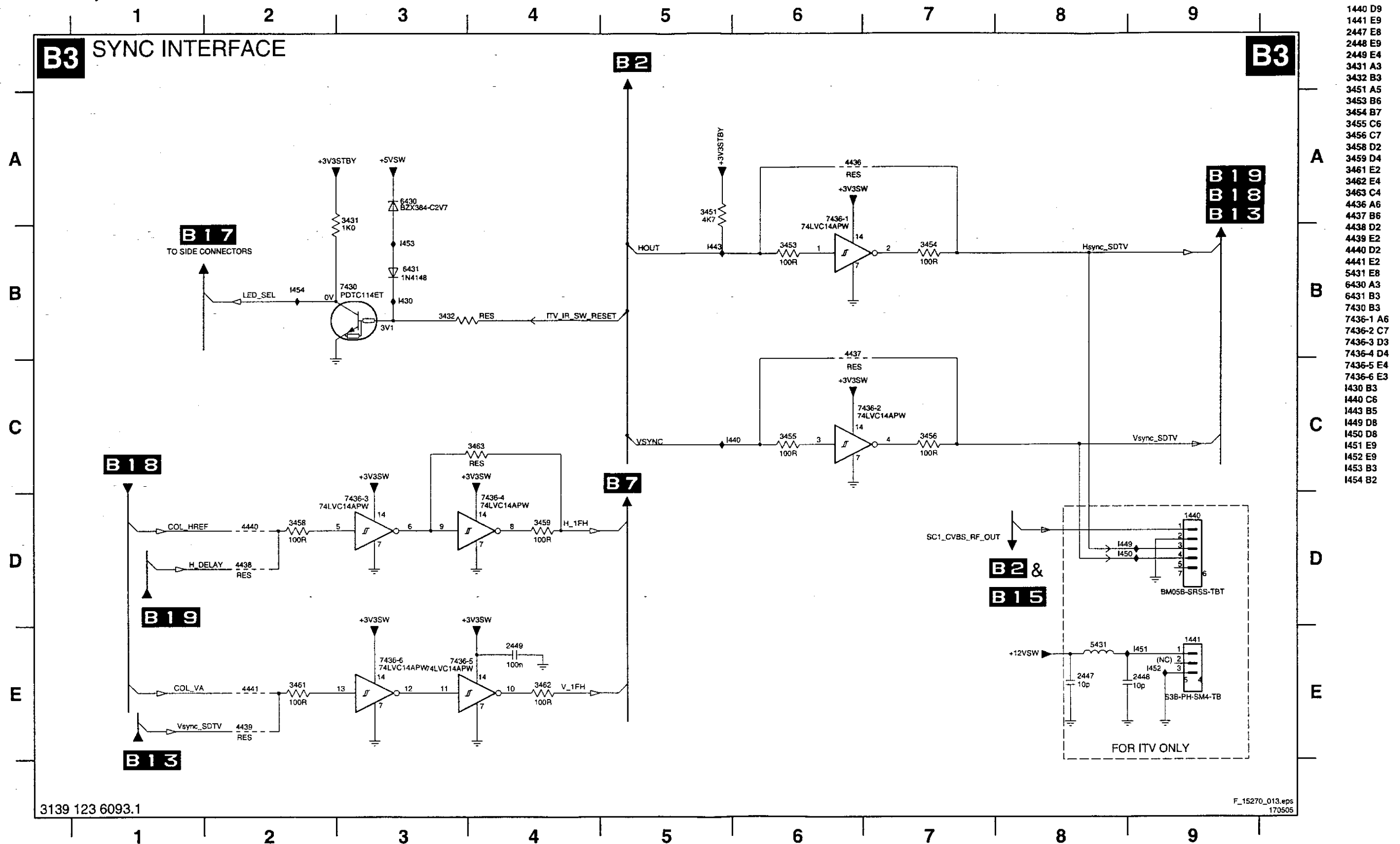


3139 123 6093.1

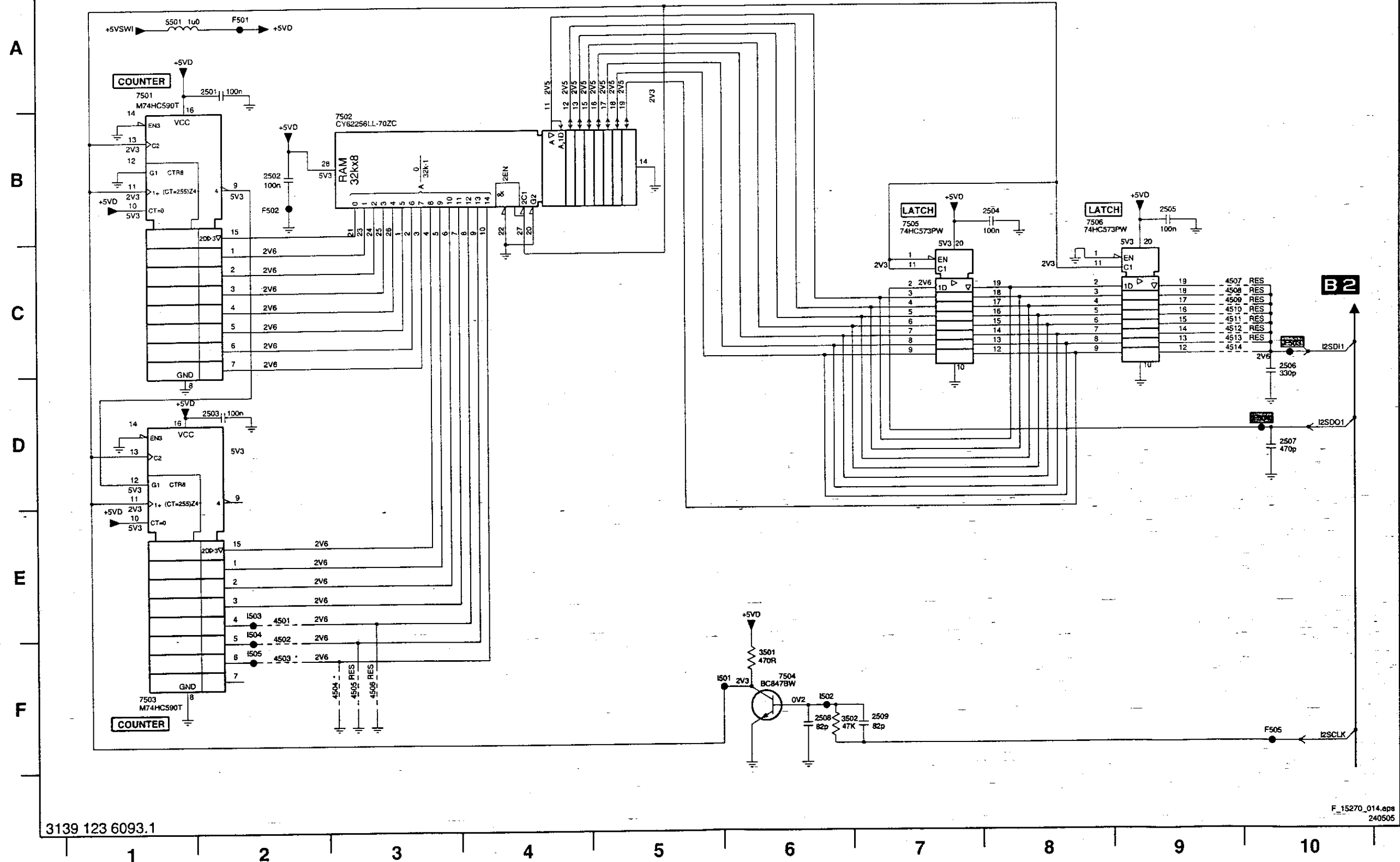
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170505

1201 B7	3215 B6	5209 D5	1216 C10
1202 G10	3216 A6	5210 D5	1217 C11
2201 A3	3217 B7	5211 E5	1218 D3
2202 B3	3218 B7	5212 E5	1219 C5
2203 D2	3219 B7	5213 E5	1220 D5
2205 G4	3220 B7	5214 G9	1221 D5
2206 G4	3222 B8	5215 F10	1222 D5
2207 F5	3223 B8	5216 F10	1223 D5
2208 G4	3224 B8	5217 H7	1224 E5
2209 G4	3225 B8	5218 F2	1225 C10
2210 B5	3226 B9	6201 E4	1226 F8
2211 B6	3227 C8	6204 C11	1227 F8
2214 B6	3228 D2	6205 C11	1228 F7
2216 B6	3229 C9	6206 C12	1229 F7
2218 A7	3230 B9	7201-1 B1	1230 F7
2219 A7	3231 B9	7201-2 C2	1231 F7
2220 B7	3232 B9	7202-1 C2	1232 F8
2221 A7	3233 B9	7202-2 C3	1233 F8
2223 B8	3234 B9	7203-1 C3	1234 F8
2224 C8	3235 B9	7203-2 C3	1235 F8
2225 B10	3236 B9	7204-1 A4	1236 F8
2226 C10	3237 C9	7204-2 A3	1237 F8
2227 B11	3238 C10	7205-1 B4	1238 F9
2228 C5	3239 C10	7205-2 B4	1239 F9
2229 C5	3240 B10	7206 B6	1240 F10
2230 D5	3241 B10	7207 B11	1241 B10
2231 D5	3242 C10	7208 D2	1242 F4
2232 D5	3243 C10	7209 D2	1243 C4
2233 D5	3244 D2	7210 D3	1244 B7
2234 D4	3245 C10	7211 F4	1245 D2
2235 D4	3246 C11	7214 G3	1247 D4
2236 D5	3247 B11	7215 G4	1248 D4
2237 D5	3248 B11	7216-1 G3	1254 F6
2238 E5	3249 A11	7216-2 G3	1255 F6
2239 E5	3250 D2	7217 C6	1256 E7
2240 E5	3251 D3	7218 F11	1257 E7
2241 E5	3252 D3	7219 F2	1258 E7
2242 E5	3253 D3	7201 B2	1259 F8
2243 E5	3254 F3	7202 B2	1262 F8
2244 E5	3255 E2	7203 B3	1264 F9
2245 E5	3256 E2	7204 B3	1265 F10
2246 F5	3257 F3	7205 B6	1266 F10
2247 F6	3258 E2	7206 B6	1267 F11
2248 G6	3259 E2	7207 C7	1268 G11
2249 G6	3260 E3	7208 C7	1269 C11
2250 F7	3262 F3	7209 B7	1270 B11
2251 F7	3263 F3	7210 F1	1271 B10
2252 F7	3264 F4	7211 C9	1272 B10
2253 F7	3265 F4	7212 C8	1273 C9
2254 F7	3266 F4	7213 C10	1274 A9
2255 F7	3267 F4	7214 C10	1275 A9
2256 F8	3268 F5	7215 C10	1277 C8
2257 F8	3270 F7	7216 C10	1278 C8
2258 G5	3271 F7	7218 A11	1283 B6
2259 G8	3272 F8	7219 B12	1284 B6
2260 F8	3273 F8	7220 D3	1285 B6
2262 G8	3274 F8	7221 D3	1288 B6
2263 F8	3275 F9	7222 D5	1289 A3
2264 G8	3276 F9	7223 D5	1290 A3
2265 G8	3277 F10	7224 D5	1291 A4
2266 G8	3278 F11	7225 D5	1292 B3
2267 F8	3279 G11	7226 D5	1293 B3
2268 G8	3280 E4	7227 D4	1294 B3
2269 F9	3281 F8	7228 E5	1297 B8
2270 F9	3282 F3	7229 E5	1298 C7
2271 F9	3283 B8	7230 G4	
2272 F9	3284 B8	7231 G4	
2273 F10	3285 G6	7232 F5	
2274 F10	3286 H6	7233 F5	
2275 G9	3287 B7	7234 F5	
2276 G10	3288 B7	7235 F5	
2277 F10	3289 D2	7236 F6	
2278 F11	3290 B8	7237 F6	
2279 F11	3291 F2	7238 F6	
2280 A3	3292 F2	7239 F6	
2281 B3	3293 G2	7240 F6	
2282 F10	3294 G2	7241 G7	
2283 F10	3295 F8	7242 G7	
2284 F10	3296 B5	7243 G7	
2285 F6	4201 F5	7244 F9	
2286 F7	4202 F5	7245 F9	
2287 H7	4203 F5	7246 F10	
2288 H6	4204 C9	7247 D11	
2290 F3	4205 C9	7248 F8	
2291 F2	4206 F3	7249 E11	
2292 E11	4207 E2	7250 A7	
2293 C10	4208 E2	1201 A5	
3201 A3	4209 E3	1202 B5	
3202 A4	4211 A4	1203 B6	
3203 A4	4212 B4	1204 B6	
3204 B3	4213 F5	1205 B6	
3205 B4	4214 F5	1206 A7	
3206 B4	4215 F5	1207 C7	
3207 B6	5201 B5	1208 B7	
3208 B6	5202 B5	1209 C8	
3209 B6	5203 B7	1210 C8	
3210 B6	5204 D5	1211 B8	
3211 B6	5205 D5	1212 B8	
3212 B6	5206 D4	1213 C10	
3213 B6	5207 D4	1214 C10	
3214 B7	5208 D5	1215 C10	

SSB: Sync Interface

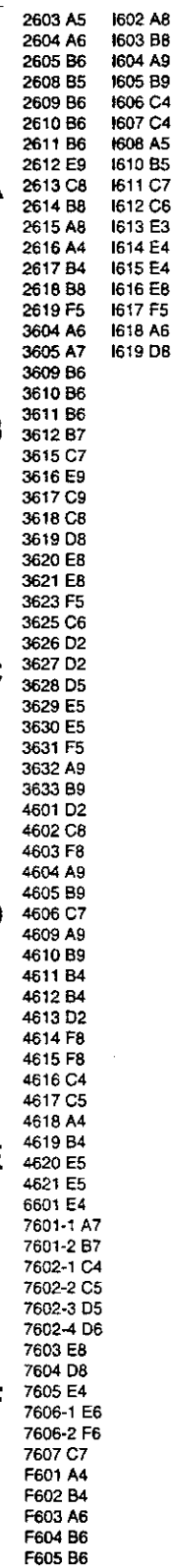


SSB: Audio Delay Line (Reserved)

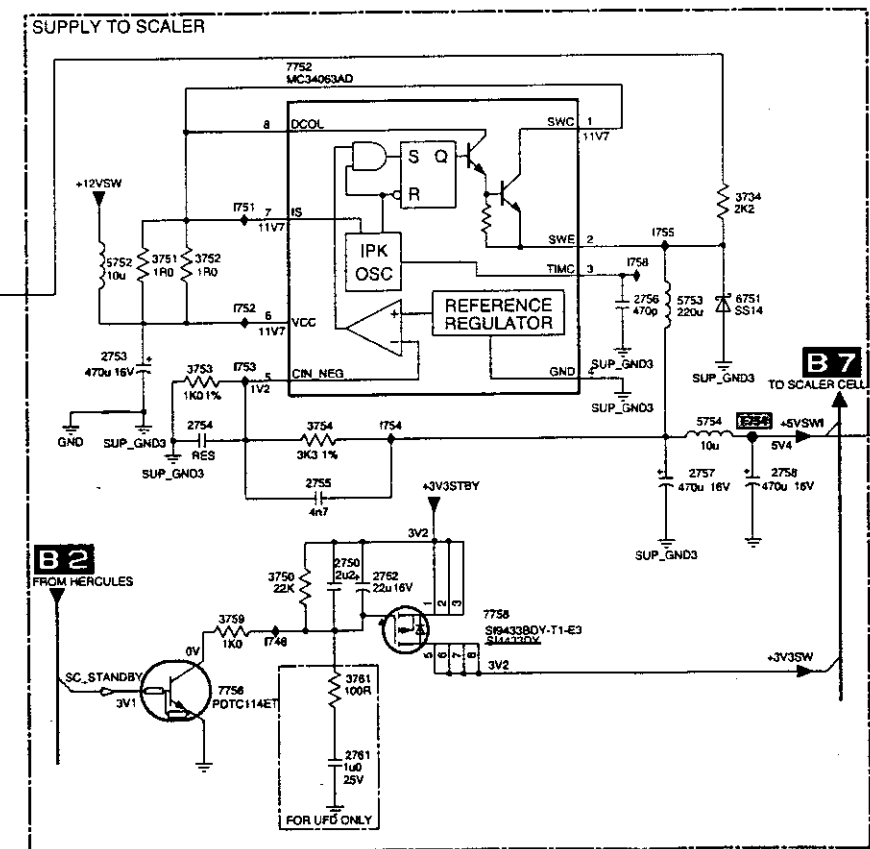
B4 AUDIO DELAY LINE (RESERVED)**B4**

2501 A2
2502 B2
2503 D2
2504 B8
2505 B9
2506 C10
2507 D10
2508 F6
2509 F7
3501 F6
3502 F6
4501 E2
4502 F2
4503 F2
4504 F3
4505 F3
4506 F3
4507 C9
4508 C9
4509 C9
4510 C9
4511 C9
4512 C9
4513 C9
4514 C9
5501 A1
7501 A1
7502 B3
7503 F1
7504 F6
7505 B7
7506 B8
F501 A2
F502 B2
F503 C10
F504 D10
F505 F10
I501 F5
I502 F6
I503 E2
I504 E2
I505 F2

B5 AUDIO PROCESSING



B6 DC-DC CONVERTER



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250505

1751 A10	7738 F2
2700 B11	7741 G3
2701 B11	7742 G4
2704 A3	7752 D9
2706 B3	7753 B10
2708 C3	7754 A9
2709 C3	7755 B8
2710 C2	7756 G8
2711 C2	7758 F10
2713 D5	7700 B11
2714 D4	7701 A3
2715 D4	7710 B6
2716 D6	7736 E6
2730 E2	7737 F6
2731 G5	7738 F6
2733 F2	7743 G6
2734 E3	7754 E11
2735 F6	7755 C8
2736 E6	7705 E3
2737 G6	7706 B3
2738 G2	7708 B3
2739 G3	7709 B3
2741 G3	7710 C2
2750 F9	7711 C2
2751 B9	7712 C4
2752 B10	7713 C5
2753 E8	7714 C4
2754 E8	7715 D4
2755 F9	7716 D5
2756 E10	7731 E2
2757 E11	7732 F4
2758 E11	7733 E5
2759 B9	7734 F5
2760 B9	7735 E5
2761 G9	7736 F5
2762 F9	7740 G2
3708 B2	7741 G3
3709 C3	7742 G4
3712 D5	7747 B9
3713 D5	7748 F8
3716 D5	7749 A10
3732 F4	7750 A10
3733 F4	7751 D8
3734 D11	7752 E8
3735 F5	7753 E8
3736 F3	7754 E9
3740 G2	7755 D10
3741 G2	7756 B9
3742 G3	7757 A9
3743 G4	7758 D10
3750 F9	7759 B9
3751 D8	7760 B8
3752 D8	
3753 E8	
3754 E9	
3755 B9	
3758 B8	
3759 F8	
3760 B9	
3761 F9	
5700 B11	
5704 B4	
5709 C2	
5712 C4	
5713 C5	
5730 E2	
5733 F5	
5735 F5	
5737 F5	
5738 F1	
5752 D8	
5753 E11	
5754 E11	
5755 A9	
5756 A9	
5757 A9	
5758 A8	
5759 B9	
6708 C2	
6709 C2	
6712 D4	
6733 F5	
6735 E6	
6736 E6	
6740 G2	
6751 E11	
7708 B4	
7710 C3	
7730 E3	
7735 E5	

SSB: Diversity Tables B1-B6

B1 TUNER & IF

Item	AP - non China	Europe	NAFTA	AP - DVB	Europe - DVB	China	Description
1102						V	TUN V+U PLL IEC BGDKM B
1102		V					TUN V+U PLL IEC BGHIL B
1102			V				TUNER UV1338/A F S H-4
1102	V						TUNER UV1316E/A I H-4
1102				V	V		TUNER UV1318SD/A CP H N-4
1104		V			V		FIL SAW SM 38MHZ OFWK3953L R
1104					V		FIL SAW SM 38MHZ OFWK3956L R
1104			V				FIL SAW SM 45MHZ75 OFWK1967L R
1104	V		V				FIL SAW SM 38MHZ OFWK7265L R
1105					V		FIL SAW SM 38MHZ OFWK9361L R
1106		V			V		FIL SAW SM 38MHZ OFWK9656L R
1106					V		FIL SAW SM 38MHZ OFWK9352L R
1106	V			V			FIL SAW SM 38MHZ OFWK9361L R
3101	V		V			V	RST SM 0603 100R PM5 COL
3102	V		V			V	RST SM 0603 100R PM5 COL
3104		V			V		RST SM 0603 10K PM5 COL
3104	V		V	V		V	RST SM 0603 JUMP. 0R05 COL
3107	V	V		V	V	V	RST SM 0603 6K8 PM5 COL
3106	V	V		V	V	V	RST SM 0603 2K2 PM5 COL
3109	V	V		V	V	V	RST SM 0603 2K2 PM5 COL
3110						V	RST SM 0603 2K2 PM5 COL
3111	V	V		V	V	V	RST SM 0603 22K PM5 COL
3112	V	V		V	V	V	RST SM 0603 18K PM5 COL
3113						V	RST SM 0603 22K PM5 COL
3114						V	RST SM 0603 47K PM5 COL
4102	V	V	V	V	V		RST SM 0603 JUMP. 0R05 COL
4103						V	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						V	RST SM 0603 JUMP. 0R05 COL
4108						V	RST SM 0603 JUMP. 0R05 COL
4110	V	V		V	V	V	RST SM 0603 JUMP. 0R05 COL
4111		V			V		RST SM 0603 JUMP. 0R05 COL
4113	V			V	V	V	RST SM 0603 JUMP. 0R05 COL
5101	V	V		V	V	V	FXDIND SM 0805 0U39 PM10 COL R
5101			V				FXDIND SM 0805 0U68 PM10 COL R
5102	V	V	V	V		V	FXDIND SM 0805 12U PM10 COL R
5102					V		FXDIND SM 1008 6U8 PM5 COL R
5107				V	V		FXDIND 0603 100MHZ 600R COL R
5107		V					RST SM 0603 100R PM5 COL
5108				V	V		FXDIND 0603 100MHZ 600R COL R
5108		V					RST SM 0603 100R PM5 COL
6103		V			V		DIO SIG SM BAS316 (COL) R
6105						V	DIO SIG SM 1SS356 (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/LC4.8E AB (DVB-T)	LC4.3U/L	LC4.3E/LC4.8E/LC4.9E	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
2229			V					CER2 0805 X5R 6V3 10U PM10 R
2244	V	V		V				CER2 0402 Y5V 16V 100N COL
2245	V	V		V				CER2 0402 Y5V 16V 100N COL
2246	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							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							CER2 0402 Y5V 16V 100N COL
3250	V			V	V	V		RST SM 0402 100R PM5 COL
3251	V			V	V	V		RST SM 0402 100R PM5 COL
3252	V			V	V	V		RST SM 0402 100R PM5 COL
3253	V			V	V	V		RST SM 0402 100R PM5 COL
3255	V			V	V	V		RST SM 0402 JUMP. 0R05 COL
3256	V			V	V	V		RST SM 0402 JUMP. 0R05 COL
3257	V			V	V	V		RST SM 0402 JUMP. 0R05 COL
3258	V			V	V	V		RST SM 0402 1K PM5 COL
3259	V			V	V	V		RST SM 0402 1K PM5 COL
3260	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							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 100K PM5 COL
3296	V	V						RST SM 0402 100R PM5 COL
4206			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
7208	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 TDA15011HN1BD0 (PHSE) Y
7217	V	V		V	V			IC SM TDA15021HN1B91 (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/LC4.9x/LC4.8x/LC4.3A-China	26PF4310/10	Description
2449	V	V			CER2 0402 Y5V 16V 100N COL
3432		V			RST SM 0402 2K7 PM5 COL
3456	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		DIO SIG SM 1N4148WS (VISH) R
7436	V	V	V		IC SM 74LVC14APW (PHSE) R

B5 AUDIO WITHOUT AMPLIFIER

Item	26/32PF	37/42/50PF	Description
2612	V		CER2 0603 Y5V 10V 1U COL
2613	V		CER2 0603 Y5V 10V 1U COL
2616	V		CER2 0603 X5R 6V3 2U2 PM10 R
2617	V		CER2 0603 X5R 6V3 2U2 PM10 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
3625	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 LCD	37/42PF LCD	42/50PF PDP	DVB PDP 42PF	DVB LCD 37PF	Description
2701	V	V				CER1 0402 NP0 50V 100P COL
2706	V	V	V			ELCAP SM 16V 10U PM20 COL R
2709	V	V	V			ELCAP SM 16V 47U 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 470U 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 10V 220N COL
2751	V	V				CER2 0402 Y5V 16V 100N COL
2752	V	V				ELCAP SM 16V 47U PM20 COL R
2760	V	V				CER2 1206 X7R 25V 1U PM10 R
2761	V	V	V			CER2 1206 X7R 25V 1U PM10 R
3708	V	V	V			RST SM 0402 10K PM5 COL
3709	V	V	V			RST SM 0402 6K8 PM5 COL
3712	V	V	V			RST SM 0603 RC22H 5K6 PM1 R
3713	V	V	V			RST SM 0603 RC22H 3K3 PM1 R
3716	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 15K PM5 COL
3743	V	V	V			RST SM 0402 22K PM5 COL
3755	V	V				RST SM 0402 10K PM5 COL
3758	V	V				RST SM 0402 15K PM5 COL
3760	V	V				RST SM 0402 100R PM5 COL
3761	V	V	V			RST SM 0402 100R PM5 COL
5700	V	V				IND FXD 1206 EMI 100MHZ 120R R
5704	V	V	V			IND FXD SM 1206 10U PM20 R
5709	V	V	V			IND FXD SM 7032 10U PM20 R
5712	V	V	V			IND FXD SM 12565 33U PM20 R
5713	V	V	V			INDFXD SM 10145 10U PM20 R
5756	V	V				IND FXD 1206 EMI 100MHZ 120R R
5757	V	V				IND FXD 1206 EMI 100MHZ 120R R
6708	V	V	V			DIO REC SS24 COL R
6709	V	V	V			DIO REC SS14 COL R
6712	V	V	V			DIO REC SS36 COL R
6740	V	V	V			DIO REG SM PDZ8.2B (PHSE) R
7708	V	V	V			IC SM LF33CPT (ST00) R
7710	V	V	V			IC SM E-L5973D (ST00) R
7741	V	V	V			TRA SIG SM BC847BW (COL) R
7742	V	V	V			TRA SIG SM BC847BW (COL) R
7754	V	V				FET POW SM 5I2301BDS-E3(VISH)R
7755	V	V				TRA SIG SM PDTCT14ET (COL) R

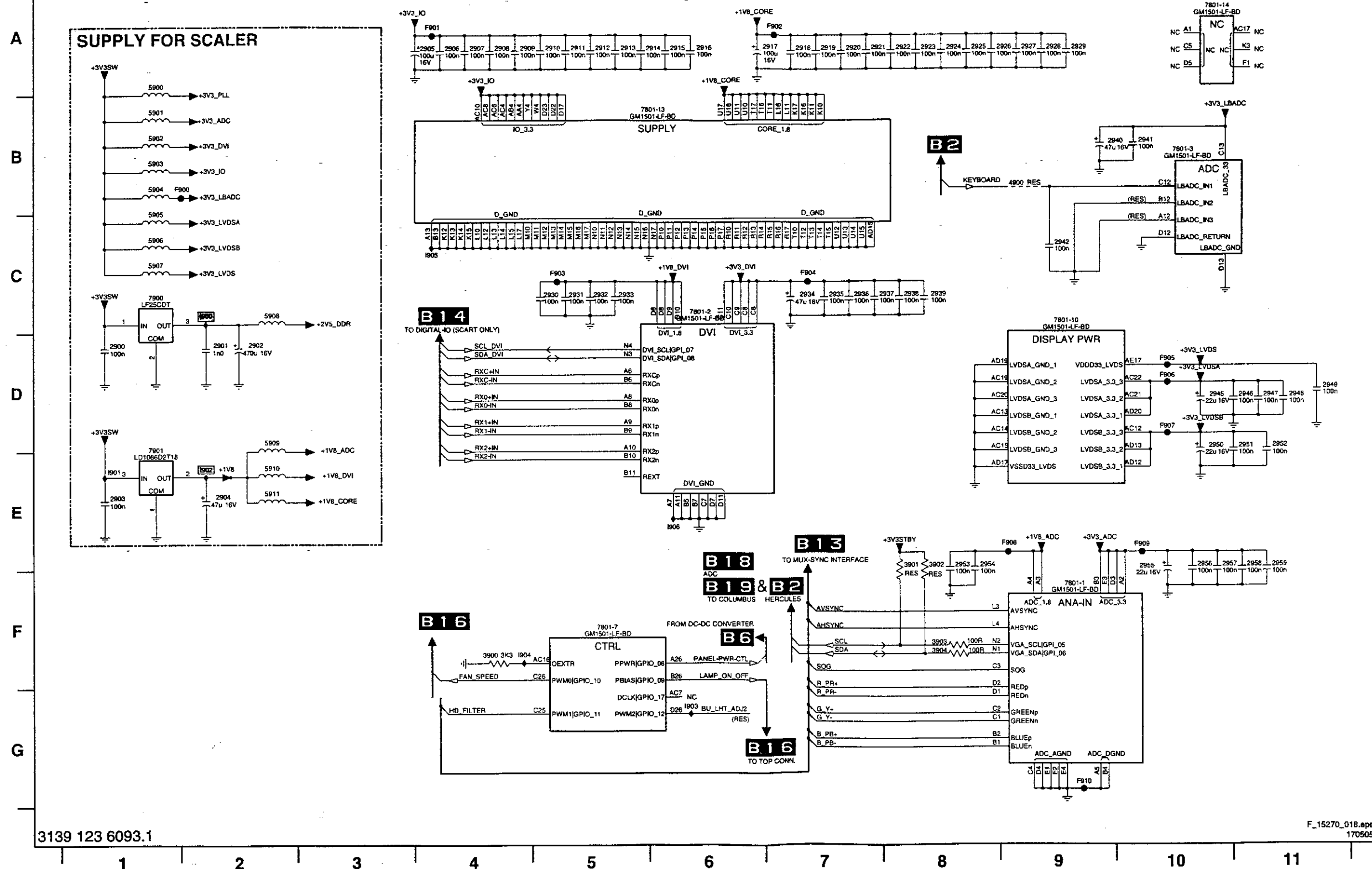
SCALER



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2117 A10	8009 G12
2118 A10	8010 G12
2119 A10	8011 G14
2202 A12	8012 F3
2221 A12	8113 A1
2222 A12	8116 G2
2223 A12	8117 H5
3000 B3	8118 F3
3001-1 C1	8119 B0
3002-1 C1	8120 B0
3003-1 C1	8121 B0
3004-1 C1	8122 G12
3005-1 C1	
3006-1 C1	
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3019-1 C2	
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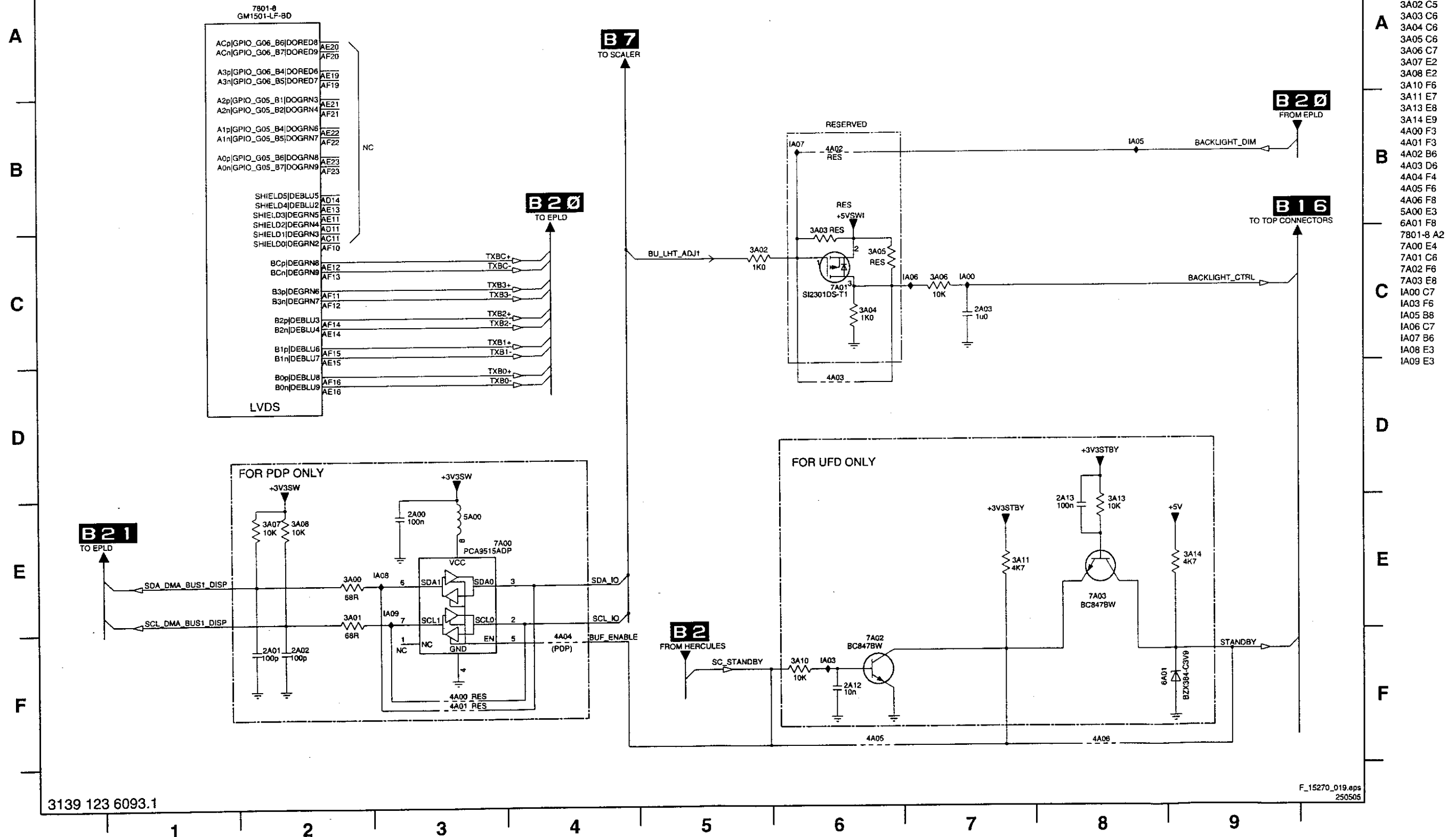
B8 SCALER

B8



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2903 E1 F909 E10
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2905 A4 I900 C2
2906 A4 I901 E1
2907 A4 I902 E2
2908 A4 I903 G6
2909 A4 I904 F4
2910 A5 I905 C4
2911 A5 I906 E6
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5905 C1
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5907 C1
5908 C2
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5911 E2
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7801-13 B6
7801-14 A10
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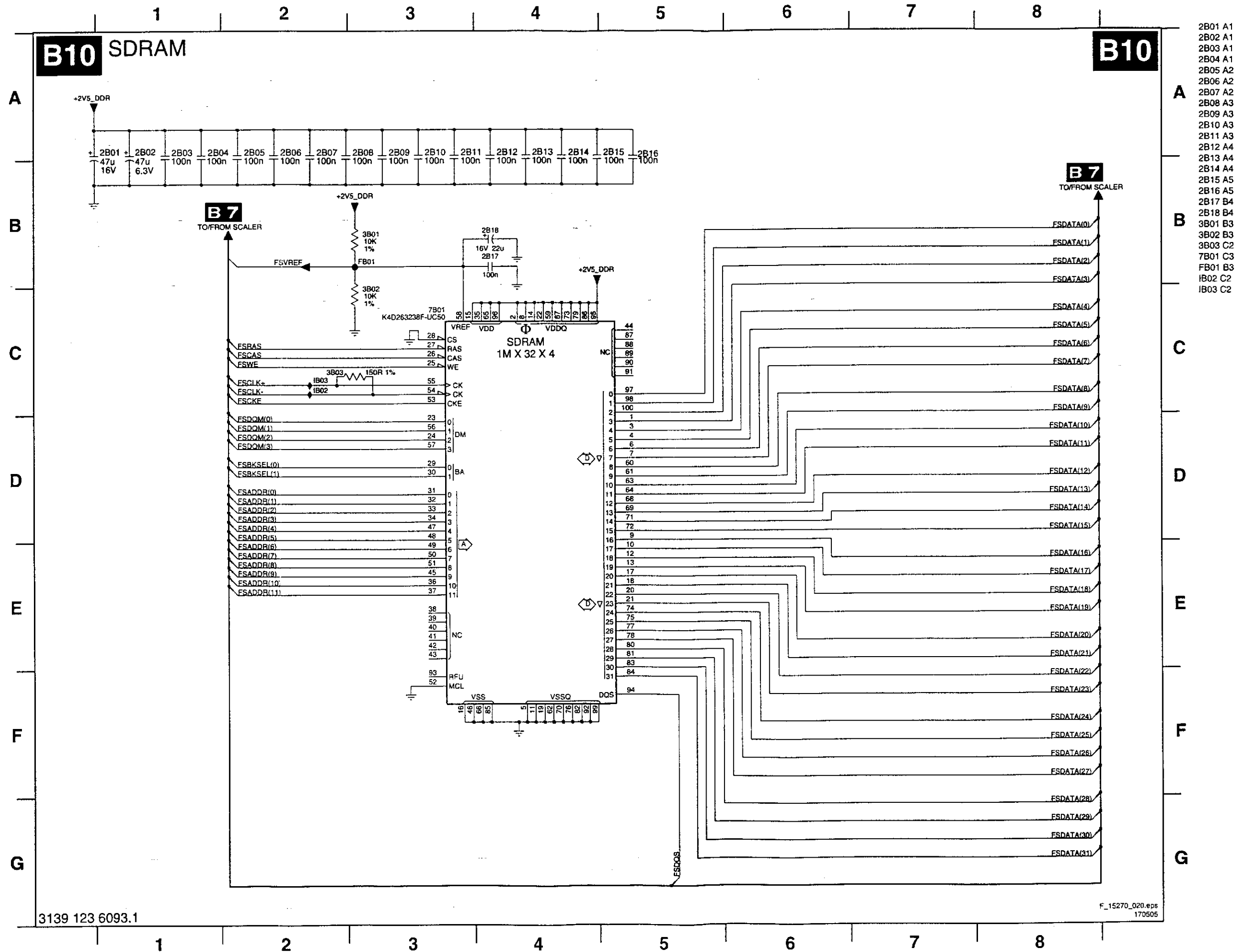
SSB: Scaler Interface

B9 SCALER INTERFACE

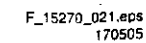
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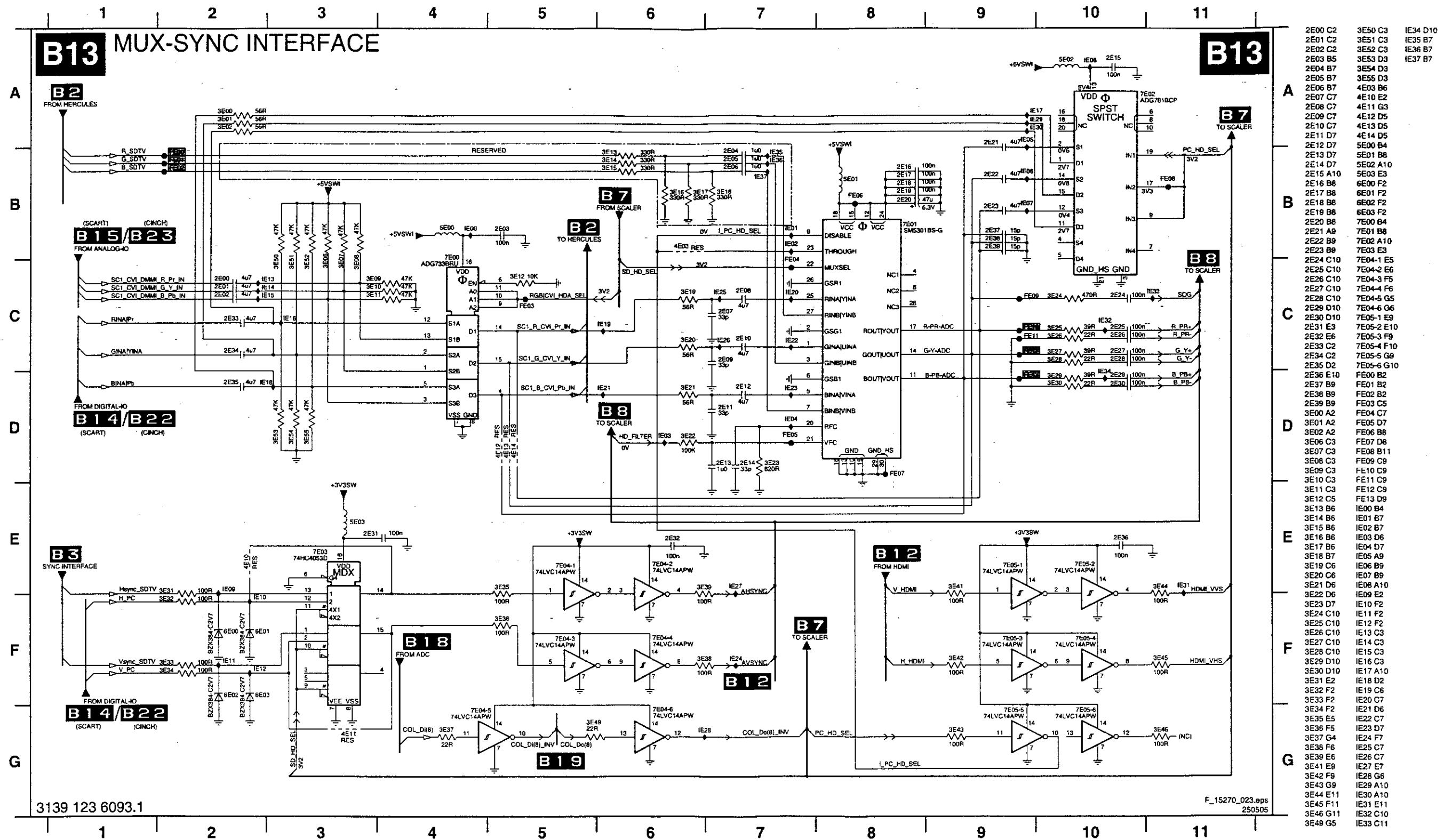
SSB: SDRAM



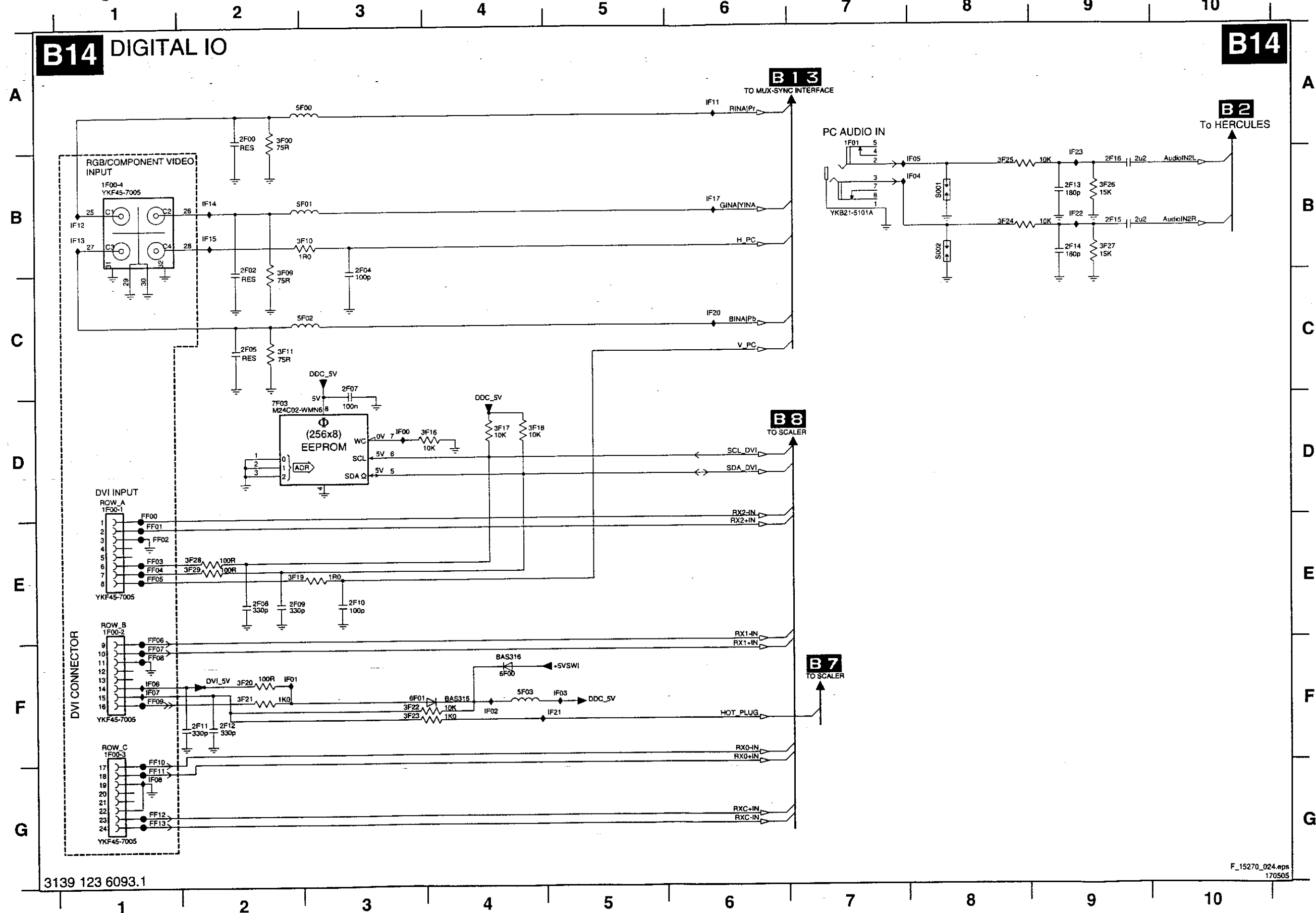
B11 FLASH / CONTROL



B13 MUX-SYNC INTERFACE



SSB: Digital I/O



B15 SCART ANALOGUE IO

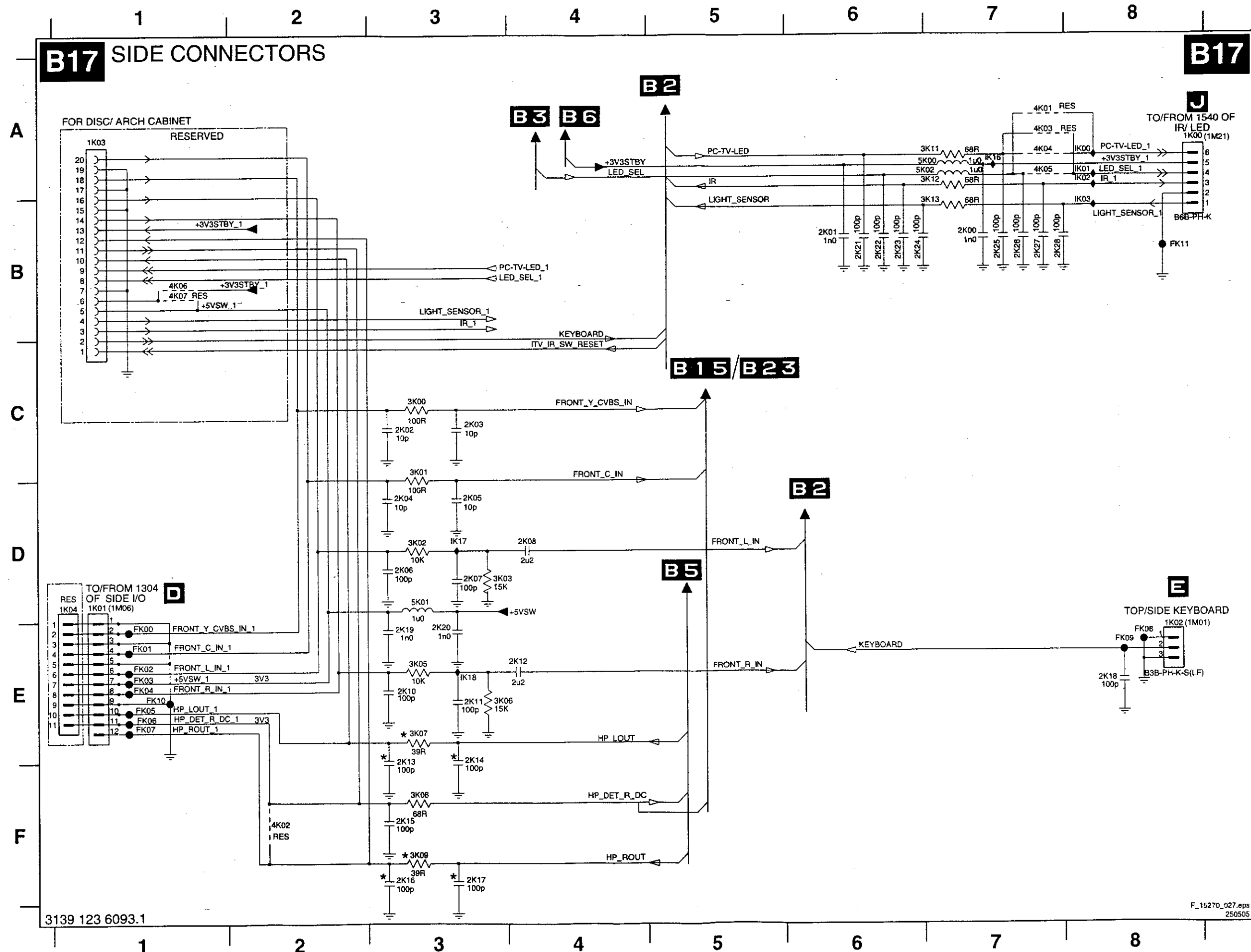


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	2001 A3	3503.38
	2001 A2	4000.43
	2001 B3	4001.83
	2001 B2	4006.63
	2005 A3	4006.63
	2006 B3	4010.81
	2007 A4	4011.81
	2007 B3	4012.02
	2010 B3	4013.02
	2011 B4	4014.69
	2012 B4	4015.59
	2016 A5	4016.14
	2017 E5	4017.11
	2018 A5	4018.35
	2019 G4	4019.19
	2020 B4	4020.19
	2021 G4	4021.89
	2022 H4	4022.10
	2023 H4	4026.04
	2024 B5	5002.00
	2025 B5	5002.11
	2026 B5	5002.11
	2028 J4	6000.73
	2029 B11	6000.73
	2030 B11	6002.83
	2031 C11	6003.82
	2032 C11	6004.82
	2029 C13	6005.82
	2030 C13	6006.82
	2031 C13	6007.82
	2032 C13	6008.72
	2033 F9	6009.72
	2034 F9	6010.62
	2035 F12	7003.04
	2036 E13	7003.04
	2040 E13	7005.34
	2041 F13	7006.81
	2042 H13	7007.81
	2043 H13	7009.11
	2044 H14	7010.10
	2047 J11	7000.82
	2048 C13	7001.81
	2049 B13	7002.81
	2050 H3	7003.82
	2061 H3	7004.82
	2062 F2	7005.82
	2063 F2	7007.82
	2064 J6	7008.82
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	2068 J6	7012.72
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	2121 C13	7066.82
	2122 C13	7067.82
	2123 C13	7068.82
	2124 C13	7069.82
	2125 C13	7070.82
	2126 C13	7071.82
	2127 C13	7072.82
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	2129 C13	7074.82
	2130 C13	7075.82
	2131 C13	7076.82
	2132 C13	7077.82
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	2134 C13	7079.82
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	2136 C13	7081.82

B16 TOP CONNECTORS

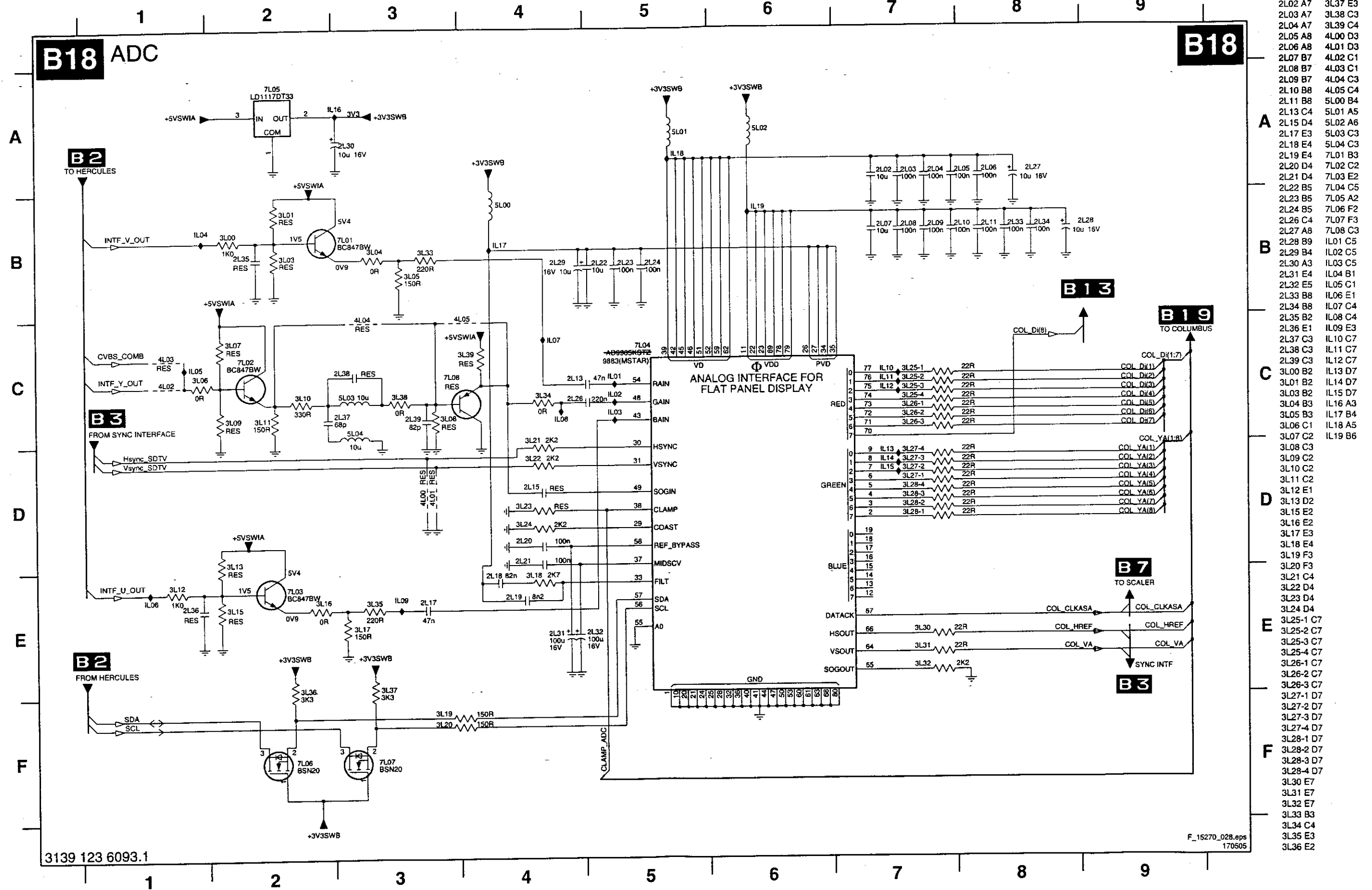


SSB: Side Connectors



1K00 A8
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1K02 E8
1K03 A1
1K04 D1
2K00 B7
2K01 B6
2K02 C3
2K03 C3
2K04 D3
2K05 D3
2K06 D3
2K07 D3
2K08 D4
2K10 E3
2K11 E3
2K12 E4
2K13 F3
2K14 E3
2K15 F3
2K16 F3
2K17 F3
2K18 E8
2K19 E3
2K20 E3
2K21 B6
2K22 B6
2K23 B6
2K24 B6
2K25 B7
2K26 B7
2K27 B7
2K28 B7
3K00 C3
3K01 C3
3K02 D3
3K03 D3
3K05 E3
3K06 E3
3K07 E3
3K08 F3
3K09 F3
3K11 A7
3K12 A7
3K13 B7
4K01 A7
4K02 F2
4K03 A7
4K04 A7
4K05 A7
4K06 B1
4K07 B1
5K00 A7
5K01 D3
5K02 A7
FK00 E1
FK01 E1
FK02 E1
FK03 E1
FK04 E1
FK05 E1
FK06 E1
FK07 E1
FK08 E8
FK09 E8
FK10 E1
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IK00 A8
IK01 A8
IK02 A8
IK03 B8
IK16 A7
IK17 D3
IK18 E3

SSB: ADC

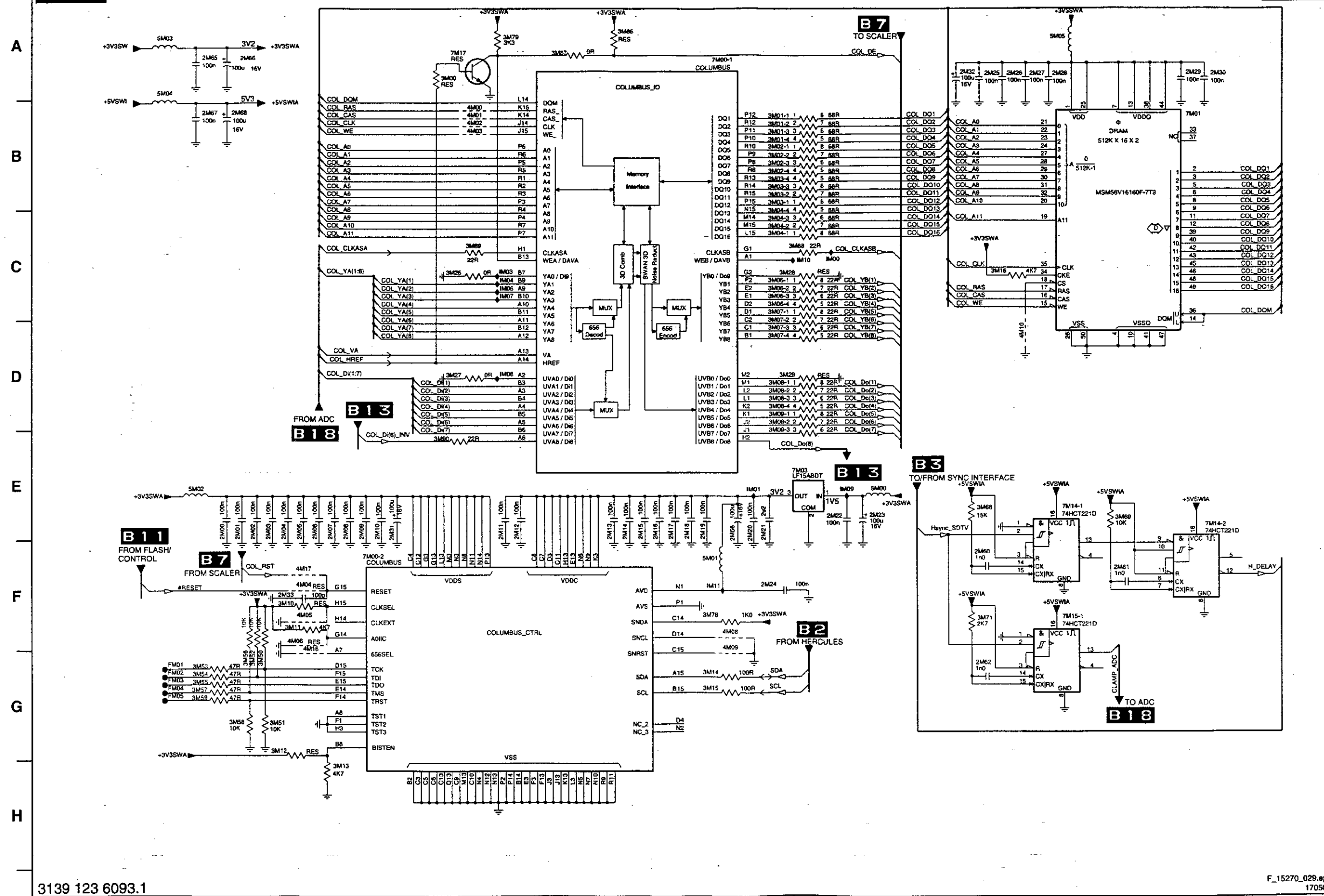


2L02 A7	3L37 E3
2L03 A7	3L38 C3
2L04 A7	3L39 C4
2L05 A8	4L00 D3
2L06 A8	4L01 D3
2L07 B7	4L02 C1
2L08 B7	4L03 C1
2L09 B7	4L04 C3
2L10 B8	4L05 C4
2L11 B8	5L00 B4
2L13 C4	5L01 A5
2L15 D4	5L02 A6
2L17 E3	5L03 C3
2L18 E4	5L04 C3
2L19 E4	7L01 B3
2L20 D4	7L02 C2
2L21 D4	7L03 E2
2L22 B5	7L04 C5
2L23 B5	7L05 A2
2L24 B5	7L06 F2
2L26 C4	7L07 F3
2L27 A8	7L08 C3
2L28 B9	IL01 C5
2L29 B4	IL02 C5
2L30 A3	IL03 C5
2L31 E4	IL04 B1
2L32 E5	IL05 C1
2L33 B8	IL06 E1
2L34 B8	IL07 C4
2L35 B2	IL08 C4
2L36 E1	IL09 E3
2L37 C3	IL10 C7
2L38 C3	IL11 C7
2L39 C3	IL12 C7
3L00 B2	IL13 D7
3L01 B2	IL14 D7
3L03 B2	IL15 D7
3L04 B3	IL16 A3
3L05 B3	IL17 B4
3L06 C1	IL18 A5
3L07 C2	IL19 B6
3L08 C3	
3L09 C2	
3L10 C2	
3L11 C2	
3L12 E1	
3L13 D2	
3L15 E2	
3L16 E2	
3L17 E3	
3L18 E4	
3L19 F3	
3L20 F3	
3L21 C4	
3L22 D4	
3L23 D4	
3L24 D4	
3L25-1 C7	
3L25-2 C7	
3L25-3 C7	
3L25-4 C7	
3L26-1 C7	
3L26-2 C7	
3L26-3 C7	
3L27-1 D7	
3L27-2 D7	
3L27-3 D7	
3L27-4 D7	
3L28-1 D7	
3L28-2 D7	
3L28-3 D7	
3L28-4 D7	
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3L35 E3	
3L36 E2	

SSB: Columbus

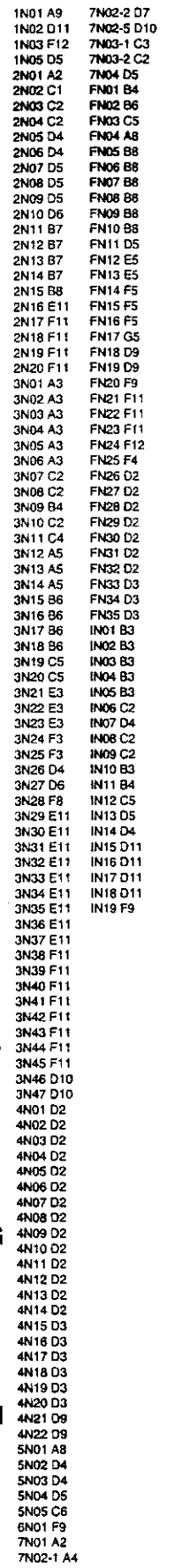
B19 COLUMBUS

B19



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2M04 E3 4M01 B5
2M05 E3 4M02 B5
2M06 E3 4M03 B5
2M07 E3 4M04 F3
2M08 E3 4M05 F3
2M09 E4 4M06 F3
2M10 E4 4M07 F3
2M11 E5 4M08 F7
2M12 E5 4M09 F7
2M13 E6 4M10 D10
2M14 E6 4M11 F3
2M15 E6 4M12 F3
2M16 E6 5M00 E8
2M17 E6 5M01 F7
2M18 E7 5M02 E2
2M19 E7 5M03 A2
2M20 E7 5M04 A2
2M21 E7 5M05 A10
2M22 E8 7M00-1 A7
2M23 E8 7M00-2 F4
2M24 F7 7M01 B11
2M25 A9 7M03 E8
2M26 A10 7M14-1 E10
2M27 A10 7M14-2 E11
2M28 A10 7M15-1 F10
2M29 A11 7M17 A4
2M30 A11 FM01 G2
2M31 E4 FM02 G2
2M32 A9 FM03 G2
2M33 F3 FM04 G2
2M34 E7 FM05 G2
2M35 E7 FM06 C8
2M36 F9 FM07 E7
2M37 F1 FM08 C5
2M38 G9 FM09 C5
2M39 A2 FM10 C5
2M40 A2 FM11 C5
2M41 B2 FM12 C5
2M42 B2 FM13 C5
2M43 B2 FM14 C5
2M44 B2 FM15 C5
2M45 B2 FM16 C5
2M46 B2 FM17 C5
2M47 B2 FM18 C5
2M48 B2 FM19 C5
2M49 B2 FM20 C5
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2M98 B2 FM69 C5
2M99 B2 FM70 C5
2M100 B2 FM71 C5

B20



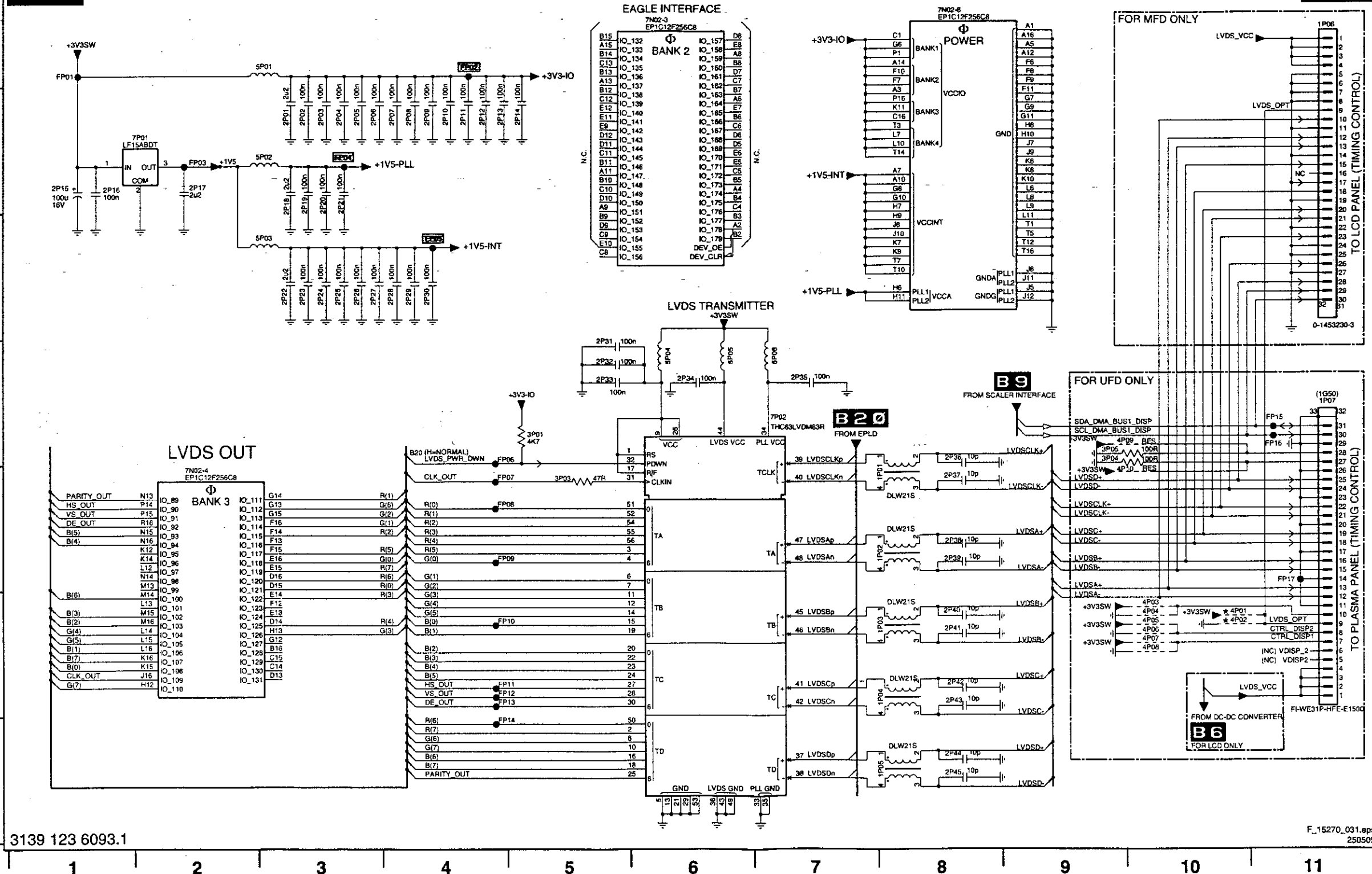
SSB: EPLD

B21 EPLD

B21

A
B
C
D
E
F
G

1P01 E8
1P02 E8
1P03 F8
1P04 F8
1P05 G8
1P06 A11
1P07 D11
2P01 B3
2P02 B3
2P03 B3
2P04 B3
2P05 B3
2P06 B3
2P07 B4
2P08 B4
2P09 B4
2P10 B4
2P11 B4
2P12 B4
2P13 B4
2P14 B5
2P15 B1
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2P17 B2
2P18 B3
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4P08 F10
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5P03 C3
5P04 D6
5P05 D6
5P06 D7
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7N02-4 E2
7N02-6 A8
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7P02 D7
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FP02 A4
FP03 B2
FP04 B3
FP05 C4
FP06 D4
FP07 E4
FP08 E4
FP09 E4
FP10 F4
FP11 F4
FP12 F4
FP13 F4
FP14 G4
FP15 D11
FP16 D11
FP17 E11



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SSB: Diversity Tables B9-B21

B9 MUX-SYNC INTERFACE

Item	LC4.3x	LC4.8x	LC4.9x	Description
2A00			V	CER2 0603 X7R 16V 100N COL
2A01			V	CER1 0402 NP0 50V 100P COL
2A02			V	CER1 0402 NP0 50V 100P COL
2A03		V		CER2 0603 Y5V 10V 1U COL
2A12		V	V	CER2 0402 X7R 16V 10N COL
2A13		V	V	CER2 0402 Y5V 16V 100N COL
3A00			V	RST SM 0402 68R PM5 COL
3A01			V	RST SM 0402 68R PM5 COL
3A02	V	V		RST SM 0402 1K PM5 COL
3A06	V	V		RST SM 0603 10K PM5COL
3A06	V			RST SM 0603 JUMP. 0R05 COL
3A07		V		RST SM 0402 10K PM5 COL
3A07			V	RST SM 0402 68R PM5 COL
3A08		V		RST SM 0402 10K PM5 COL
3A10		V	V	RST SM 0402 10K PM5 COL
3A11		V	V	RST SM 0402 10K PM5 COL
3A13		V	V	RST SM 0402 10K PM5 COL
3A14		V	V	RST SM 0402 560R PM5 COL
4A03	V	V		RST SM 0603 JUMP. 0R05 COL
4A04		V		RST SM 0402 JUMP. 0R05 COL
4A05	V			RST SM 0402 JUMP. 0R05 COL
4A06	V			RST SM 0402 JUMP. 0R05 COL
5A00		V		FXDIND 0603 100MHZ 30R COL R
6A01		V	V	DIO REG SM BZX384-C3V9 COL R
7A00			V	IC SM PCA9515ADP (PHSE) R
7A02		V	V	TRA SIG SM BC847BW (COL) R
7A03		V	V	TRA SIG SM BC847BW (COL) R

B13 MUX-SYNC INTERFACE

ITEM	APIEUAP-DVB (with Teletext)	EU-DVB (with Teletext)	NAFTA/LT & China (non-Teletext)	DESCRIPTION
2E00	V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2E01	V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2E02	V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2E04	V	V		CER2 0402 X5R 6V3 1U PM20 R
2E05	V	V		CER2 0402 X5R 6V3 1U PM20 R
2E06	V	V		CER2 0402 X5R 6V3 1U PM20 R
3E06	V	V		RST SM 0402 47K PM5 COL
3E07	V	V		RST SM 0402 47K PM5 COL
3E08	V	V		RST SM 0402 47K PM5 COL
3E13	V	V		RST SM 0402 330R PM5 COL
3E14	V	V		RST SM 0402 330R PM5 COL
3E15	V	V		RST SM 0402 330R PM5 COL
3E16	V	V		RST SM 0402 330R PM5 COL
3E17	V	V		RST SM 0402 330R PM5 COL
3E18	V	V		RST SM 0402 330R PM5 COL

B15 ANALOG I/O SCART

Item	20/32PF	DVB-T 20/32PF	37/42PF	DVB-T 37/42PF	Description
1G01			V		SOC EURO H 21P F BK R-GRND B
1G01			V		SOC EURO H 21P F SHD R-GRND Y
1G02	V	V			SOC EURO H 21P F BK R-GRND B
1G02			V		SOC EURO H 21P F SHD R-GRND Y
1G03		V	V		CON H 32P F 0.50 SM FPC 0.3 R
2G29		V	V		ELCAP SM 16V 10U PM20 COL R
2G30		V	V		CER2 0603 X7R 16V 100N COL
2G31		V	V		CER2 0603 X7R 16V 100N COL
2G32		V	V		CER2 0603 Y5V 25V 100N COL
2G33		V	V		CER2 0603 Y5V 16V 220N COL
2G34		V	V		ELCAP SM 16V 10U PM20 COL R
2G35		V	V		CER2 0603 Y5V 25V 100N COL
2G36		V	V		CER2 0603 Y5V 10V 1U COL
2G37		V	V		RST SM 0603 330R PM5 COL
2G38		V	V		CER2 0603 Y5V 10V 1U COL
2G39		V	V		CER2 0603 Y5V 10V 1U COL
2G40		V	V		RST SM 0603 JUMP. 0R05 COL
2G41		V	V		RST SM 0603 330R PM5 COL
2G43		V	V		CER2 0603 X7R 50V 1N COL
2G45		V	V		CER2 0603 X7R 50V 1N COL
2G46		V	V		CER2 0603 X7R 50V 1N COL
2G63		V	V		CER2 0603 X5R 6V3 2U2 PM10 R
2G64		V	V		CER2 0603 X5R 6V3 2U2 PM10 R
2G65		V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2G65		V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2G66		V	V		CER2 0603 X5R 6V3 4U7 PM10 R
2G66		V	V		CER2 0603 X5R 6V3 4U7 PM10 R
3G63		V	V		RST SM 0603 10K PM5COL
3G64		V	V		RST SM 0603 10K PM5COL
3G65		V	V		RST SM 0603 10K PM5COL
3G66		V	V		RST SM 0603 150R PM5 COL
3G67		V	V		RST SM 0603 15K PM5 COL
3G68		V	V		RST SM 0603 15K PM5 COL
3G69		V	V		RST SM 0603 47K PM5 COL
3G70		V	V		RST SM 0603 47K PM5 COL
3G71		V	V		RST SM 0603 560R PM5 COL
3G72		V	V		RST SM 0603 10K PM5COL
3G73		V	V		RST SM 0603 47K PM5 COL
3G75		V	V		RST SM 0603 100R PM5 COL
3G76		V	V		RST SM 0603 100R PM5 COL
3G77		V	V		RST SM 0603 47K PM5 COL
3G79		V	V		RST SM 0603 47K PM5 COL
3G81		V	V		RST SM 0603 47K PM5 COL
3G83		V	V		RST SM 0603 100R PM5 COL
3G84		V	V		RST SM 0603 100R PM5 COL
3G85		V	V		RST SM 0603 47K PM5 COL
3G88		V	V		RST SM 0603 75R PM5 COL
3G89		V	V		RST SM 0603 47K PM5 COL
3G92		V	V		RST SM 0603 47K PM5 COL
3G93		V	V		RST SM 0603 47K PM5 COL
3G94		V	V		RST SM 0603 47K PM5 COL
3G95		V	V		RST SM 0603 47K PM5 COL
4G09		V	V		RST SM 0603 JUMP. 0R05 COL
4G11		V	V		RST SM 0603 JUMP. 0R05 COL
4G12		V	V		RST SM 0603 JUMP. 0R05 COL
4G13		V	V		RST SM 0603 JUMP. 0R05 COL
4G14		V	V		RST SM 0603 JUMP. 0R05 COL
4G15		V	V		RST SM 0603 JUMP. 0R05 COL
4G16		V	V		RST SM 0603 JUMP. 0R05 COL
4G17		V	V		RST SM 0603 JUMP. 0R05 COL
4G18		V	V		RST SM 0603 JUMP. 0R05 COL
4G19		V	V		RST SM 0603 JUMP. 0R05 COL
4G22		V	V		RST SM 0603 JUMP. 0R05 COL
5G01		V	V		FXDIND 0603 100MHZ 120R COL R
6G02		V	V		DIO SIG SM BAS316 (COL) R
7G07		V	V		IC SM 74HC4053D (PHSE) R
7G08		V	V		TRA SIG SM BC847B (COL) R
7G09		V	V		IC SM ADG734BRUZ (ANA0) R

B16 SIDE CONNECTORS

Item	LC4.3x - CINCH	LC4.3x - SCART	LC4.8x - PDP	LC4.8x - LCD	Description
1J00		V			CON V 10P M 2.00 PH B
1J01		V			CON V 11P M 2.00 PH B
1J02	V	V			CON V 12P M 2.00 PH B
1J03	V	V			CON V 3P M 2.00 PH B
1J07		V	V		FUSE SM T 3A 125V UL R
1J08		V	V		FUSE SM F 630MA 50V UL R
2J31		V	V		CER1 0402 NP0 50V 100P COL
3J03	V	V			RST SM 0402 68R PM5 COL
3J04	V	V			RST SM 0402 JUMP. 0R05 COL
4J01		V	V		RST SM 0402 JUMP. 0R05 COL
5J04		V	V		IND FXD 1206 EMI 100MHZ 120R R

B17 SIDE CONNECTORS

Item	LC4.3x - MES styling	LC4.3x - Arch Styling	LC4.8x - LCD	LC4.8x - PDP	Description
1K00		V			CON V 6P M 2.00 PH B
1K01	V				CON V 12P M 2.00 PH B
1K03		V			CON V 20P F 1.25 FFC 0.3 B
1K04		V	V		CON V 11P M 2.00 PH B
2K15	V	V			CER1 0402 NP0 50V 100P COL
3K08	V	V			RST SM 0402 68R PM5 COL
4K02		V	V		RST SM 0603 JUMP. 0R05 COL
4K06		V	V		RST SM 0402 JUMP. 0R05 COL
5K01	V	V	V		FXDIND SM 0603 1U PM10 COL R

B18 ADC

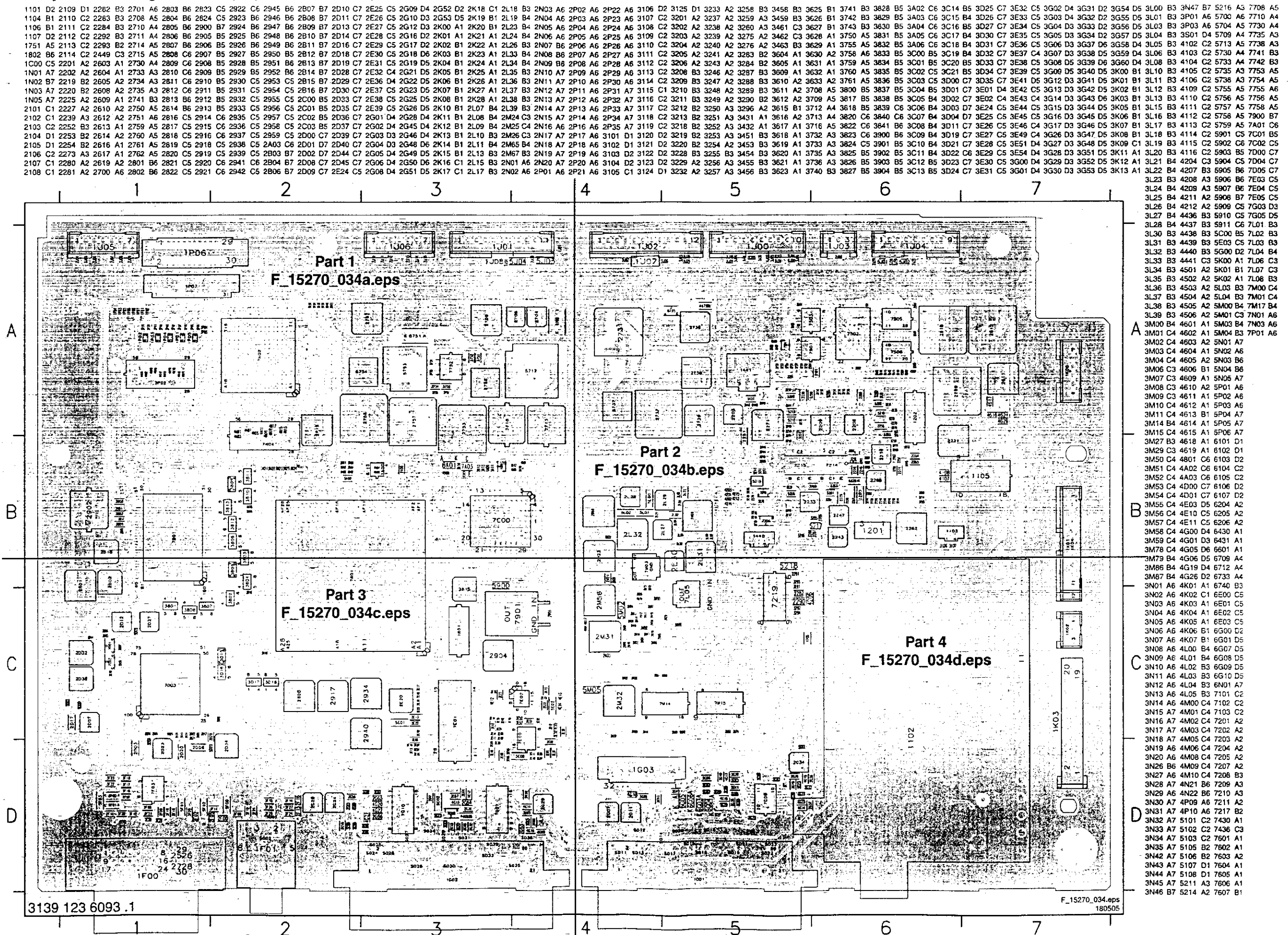
Item	non-DVB sets with 3D Comb Filter	DVB sets with 3D Comb Filter	Description
3L38	V		RST SM 0402 JUMP. 0R05 COL
4L05	V		RST SM 0402 JUMP. 0R05 COL
5L04	V		RST SM 0603 JUMP. 0R05 COL

B20 & B21 PIXEL PLUS

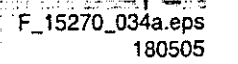
Item	LC4.3 non PIXEL+	LC4.3 with PIXEL+	42PF/32028	LC4.8/LC4.9 non PIXEL+	LC4.8/LC4.9 with PIXEL+	Description
1N02		V	V			CON V 4P M 2.00 SM PH R
1N05		V	V			OSC XTL SM 14M31818 15P OC R
1P06	V	V	V			CON V 30P M 1.25 SM 1453230 R
1P07		V	V			CON H 31P F 1.25 SM FLWE R
2N01		V	V			CER2 0402 Y5V 16V 100N COL
2N02		V	V			CER2 0402 Y5V 16V 100N COL
2N03		V	V			CER2 0402 X5R 6V3 1U PM20 R
2N04		V	V			CER2 0402 X7R 50V 1N COL
2N05		V	V			CER2 0402 Y5V 16V 100N COL
2N06		V	V			CER2 0402 Y5V 16V 100N COL
2N07		V	V			CER2 0402 Y5V 16V 100N COL
2N08		V	V			CER2 0402 Y5V 16V 100N COL
2N09		V	V			CER2 0402 Y5V 16V 100N COL
2N10		V	V			CER2 0402 NP0 50V 100P COL
2N11		V	V			CER1 0402 NP0 50V 100P COL
2N12		V	V			CER1 0402 NP0 50V 100P COL
2N13		V	V			CER1 0402 NP0 50V 100P COL
2N14		V	V			CER1 0402 NP0 50V 100P COL
2N15		V	V			CER1 0402 NP0 50V 100P COL
2N16		V	V			CER1 0402 NP0 50V 100P COL
2P01		V	V			CER2 0603 X5R 6V3 2U2 PM10 R
2P02		V	V			CER2 0402 Y5V 16V 100N COL
2P03		V	V			CER2 0402 Y5V 16V 100N COL
2P04		V	V			CER2 0402 Y5V 16V 100N COL
2P05		V	V			CER2 0402 Y5V 16V 100N COL
2P06		V	V			CER2 0402 Y5V 16V 100N COL
2P07		V	V			CER2 0402 Y5V 16V 100N COL
2P08		V	V			CER2 0402 Y5V 16V 100N COL
2P09		V	V			CER2 0402 Y5V 16V 100N COL
2P10		V	V			CER2 0402 Y5V 16V 100N COL
2P11		V	V			CER2 0402 Y5V 16V 100N COL
2P12		V	V			CER2 0402 Y5V 16V 100N COL
2P13		V	V			CER2 0402 Y5V 16V 100N COL
2P14		V	V			CER2 0402 Y5V 16V 100N COL
2P15		V	V			ELCAP SM 16V 100U PM20 COL R
2P16		V	V			CER2 0402 Y5V 16V 100N COL
2P17		V	V			CER2 0603 X5R 6V3 2U2 PM10 R
2P18		V	V			CER2 0603 X5R 6V3 2U2 PM10 R
2P19		V	V			CER2 0402 Y5V 16V 100N COL
2P20		V	V			CER2 0402 Y5V 16V 100N COL
2P21		V	V			CER2 0402 Y5V 16V 100N COL
2P22		V	V			CER2 0402 Y5V 16V 100N COL
2P23		V	V			CER2 0402 Y5V 16V 100N COL
2P24		V	V			CER2 0402 Y5V 16V 100N COL
2P25		V	V			CER2 0402 Y5V 16V 100N COL
2P26		V	V			CER2 0402 Y5V 16V 100N COL
2P27		V	V			CER2 0402 Y5V 16V 100N COL
2P28		V	V			CER2 0402 Y5V 16V 100N COL
2P29		V	V			CER2 0402 Y5V 16V 100N COL
2P30		V	V			CER2 0402 Y5V 16V 100N COL
2P31		V	V			CER2 0402 Y5V 16V 100N COL
2P32		V	V			CER2 0402 Y5V 16V 100N COL
2P33		V	V			CER2 0402 Y5V 16V 100N COL
2P34		V	V			CER2 0402 Y5V 16V 100N COL
2P35		V	V			CER2 0402 Y5V 16V 100N COL
3N01		V	V			RST SM 0402 10K PM5 COL
3N02		V	V			RST SM 0402 10K PM5 COL
3N03		V	V			RST SM 0402 10K PM5 COL
3N04		V	V			RST SM 0402 10K PM5 COL
3N05		V	V			RST SM 0402 10K PM5 COL
3N06		V	V			RST SM 0402 10K PM5 COL
3N07		V	V			RST SM 0603 33K PM5 COL
3N08		V	V			RST SM 0402 10K PM5 COL
3N09		V	V			RST SM 0402 1K PM5 COL
3N10		V	V			RST SM 0402 47R PM5 COL
3N11		V	V			RST SM 0402 47R PM5 COL
3N12		V	V			RST SM 0402 10K PM5 COL
3N13		V	V			RST SM 0402 10K PM5 COL
3N14		V	V			RST SM 0402 10K PM5 COL
3N15		V	V			RST SM 0402 47R PM5 COL
3N16		V	V			RST SM 0402 47R PM5 COL

Item	LC4.3 non PIXEL+	LC4.3 with PIXEL+	42PF/32028	LC4.8/LC4.9 non PIXEL+	LC4.8/LC4.9 with PIXEL+	Description
3N17		V	V		V	RST SM 0402 47R PM5 COL
3N18		V	V		V	RST SM 0402 47R PM5 COL
3N19		V	V		V	RST SM 0402 10K PM5 COL
3N20		V	V		V	RST SM 0402 47R PM5 COL
3N21		V	V		V	RST SM 0402 100R PM5 COL
3N22		V	V		V	RST SM 0402 100R PM5 COL
3N23		V	V		V	RST SM 0402 100R PM5 COL
3N24		V	V		V	RST SM 0402 100R PM5 COL
3N25		V	V		V	RST SM 0402 100H PM5 COL
3N26		V	V		V	RST SM 0402 4K7 PM5 COL
3N27		V	V		V	RST SM 0402 47R PM5 COL
3N28		V	V		V	RST SM 0603 180R PM5 COL
3N29		V	V		V	RST SM 0402 100R PM5 COL
3N30		V	V		V	RST SM 0402 100R PM5 COL
3N31		V	V		V	RST SM 0402 100R PM5 COL
3N32		V	V		V	RST SM 0402 100R PM5 COL
3N33		V	V		V	RST SM 0402 100R PM5 COL
3N34		V	V		V	RST SM 0402 100R PM5 COL
3N35		V	V		V	RST SM 0402 100R PM5 COL
3N46		V	V		V	RST SM 0402 100R PM5 COL
3N47		V	V		V	RST SM 0402 100R PM5 COL
3P01		V	V		V	RST SM 0402 4K7 PM5 COL
3P03		V	V		V	RST SM 0402 47R PM5 COL
3P04				V		RST SM 0402 100R PM5 COL
3P04				V		RST SM 0402 JUMP 0R05 COL
3P06				V		RST SM 0402 100R PM5 COL
3P06				V		RST SM 0402 JUMP 0R05 COL
4N01	V	V			V	RST SM 0402 JUMP 0R05 COL
4N02	V	V			V	RST SM 0402 JUMP 0R05 COL
4N03	V	V			V	RST SM 0402 JUMP 0R05 COL
4N04	V	V			V	RST SM 0402 JUMP 0R05 COL
4N05	V	V			V	RST SM 0402 JUMP 0R05 COL
4N06	V	V			V	RST SM 0402 JUMP 0R05 COL
4N07	V	V			V	RST SM 0402 JUMP 0R05 COL
4N08	V	V			V	RST SM 0402 JUMP 0R05 COL
4N09	V	V			V	RST SM 0402 JUMP 0R05 COL
4N10	V	V			V	RST SM 0402 JUMP 0R05 COL
4N11	V	V			V	RST SM 0402 JUMP 0R05 COL
4N12	V	V			V	RST SM 0402 JUMP 0R05 COL
4N13	V	V			V	RST SM 0402 JUMP 0R05 COL
4N14	V	V			V	RST SM 0402 JUMP 0R05 COL
4N15	V	V			V	RST SM 0402 JUMP 0R05 COL
4N16	V	V			V	RST SM 0402 JUMP 0R05 COL
4N17	V	V			V	RST SM 0402 JUMP 0R05 COL
4N18	V	V			V	RST SM 0402 JUMP 0R05 COL
4N19	V	V			V	RST SM 0402 JUMP 0R05 COL
4N20	V			V		RST SM 0402 JUMP 0R05 COL
4N21		V	V		V	RST SM 0402 JUMP 0R05 COL
4N22		V	V		V	RST SM 0402 JUMP 0R05 COL
4P02						RST SM 0402 JUMP 0R05 COL
4P07				V		RST SM 0402 JUMP 0R05 COL
5N01	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5N02	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5N03	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5N04	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5N05	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5P01	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5P02	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5P03	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5P04	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
5P05	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
6P06	V	V	V		V	FXIND0 0805 100MHZ 30R COL R
6P08	V	V	V		V	LED VS SM TLHG33100 (VISH) R
7N01	V	V	V		V	IC SM EPIC54S8M (ALT0) R
7N02	V	V	V		V	IC SM EPIC12F256C8N (ALT0) Y
7N03	V	V	V		V	TRA SIG SM 8C847B8 (PHSE) R
7N04	V	V	V		V	IC SM THC83LVDF84B (THIN) R
7P01	V	V	V		V	IC SM LF15AB0T (ST00) R
7P02	V	V	V		V	IC SM THC83LVDM83R (THIN) R

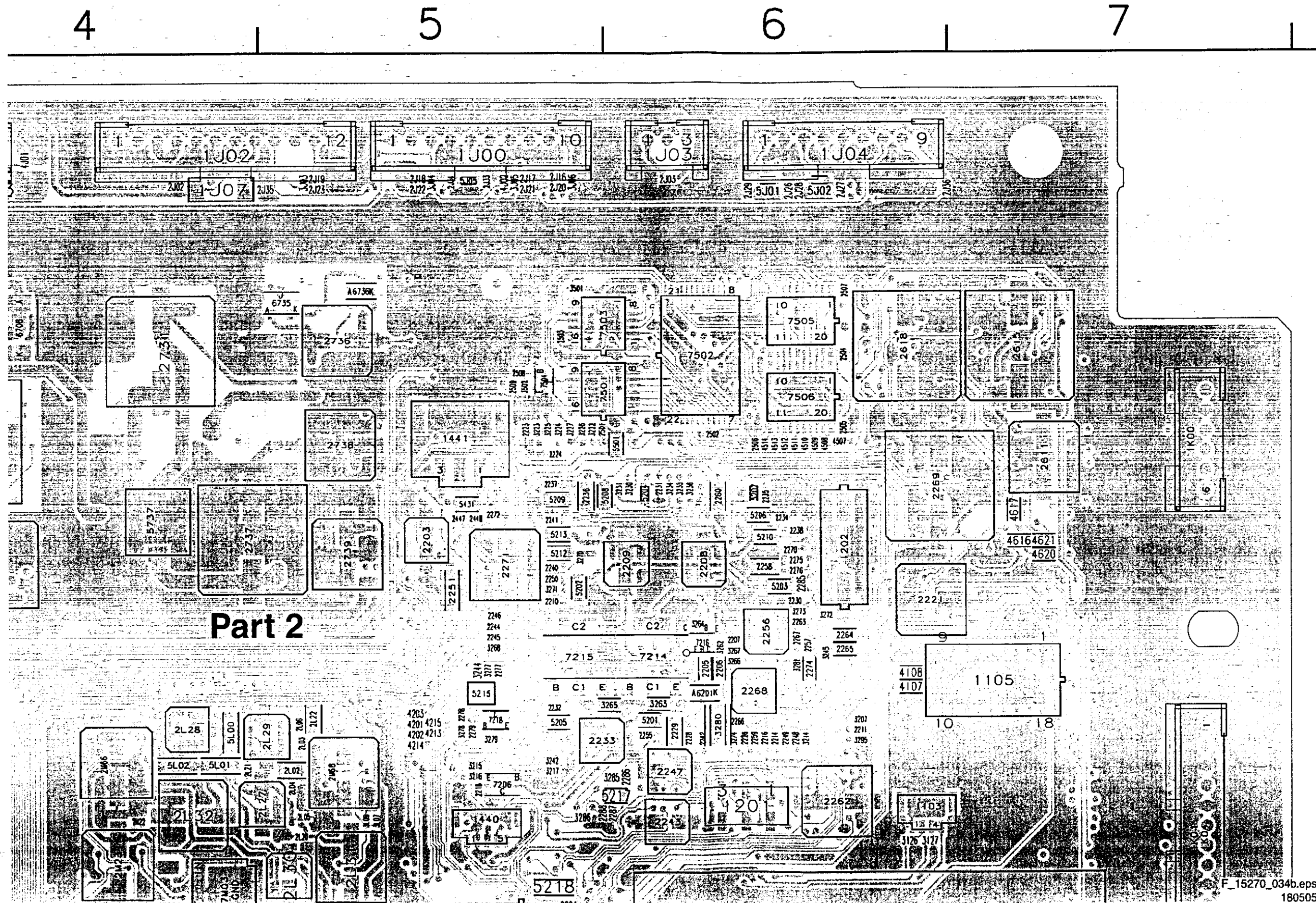
Layout Small Signal Board (Top Side Overview)



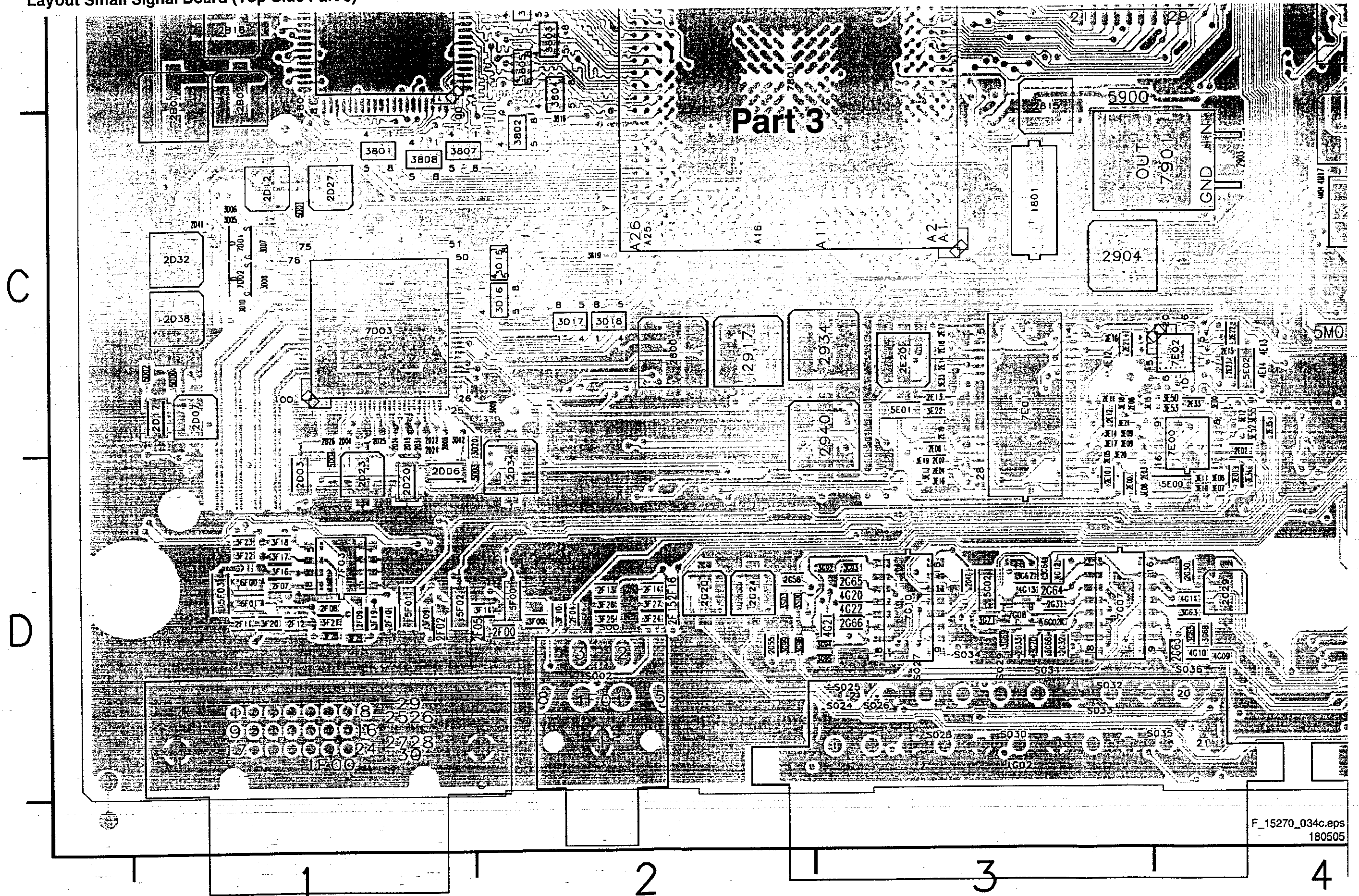
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Layout Small Signal Board (Top Side Part 2)



Layout Small Signal Board (Top Side Part 3)

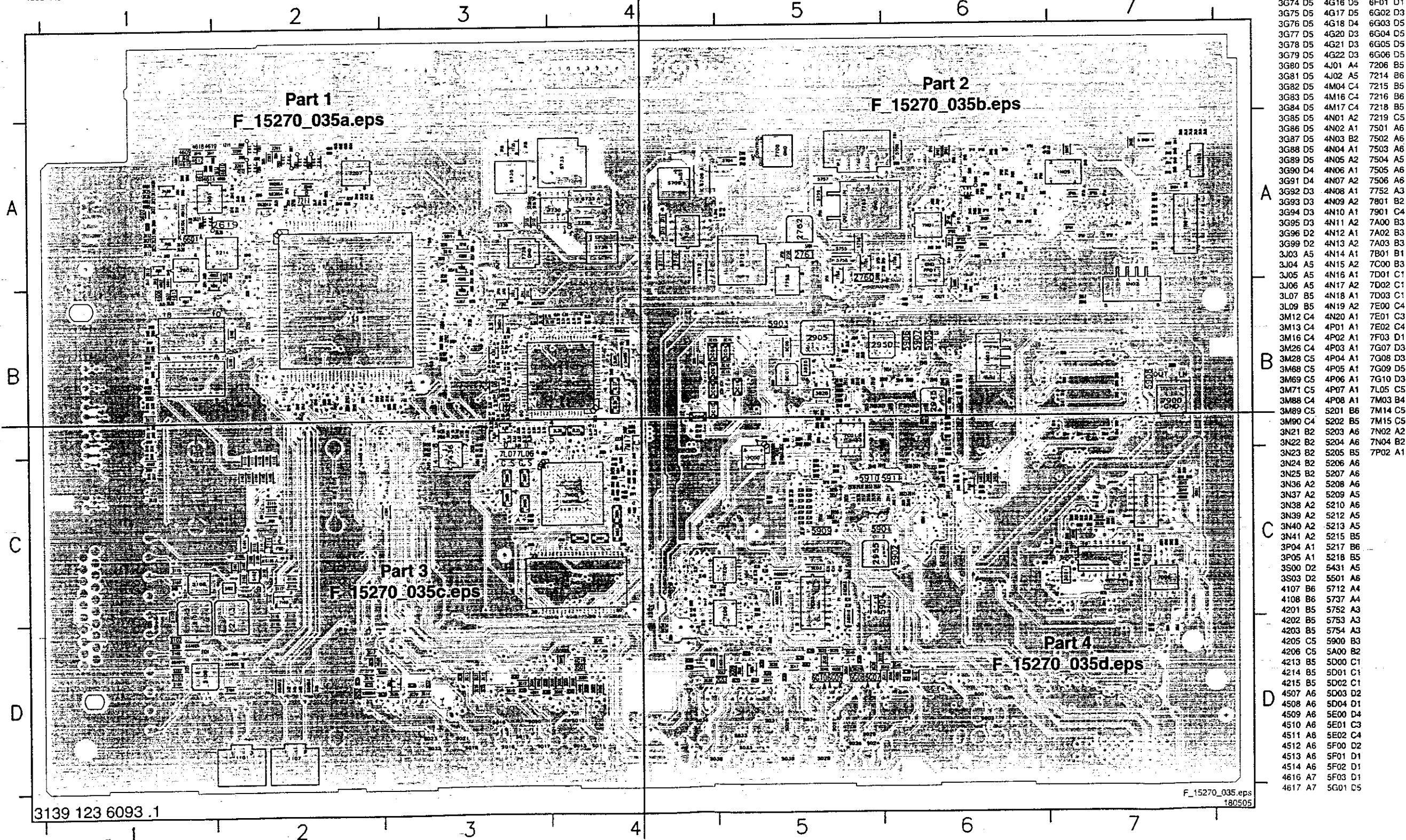


Part 4

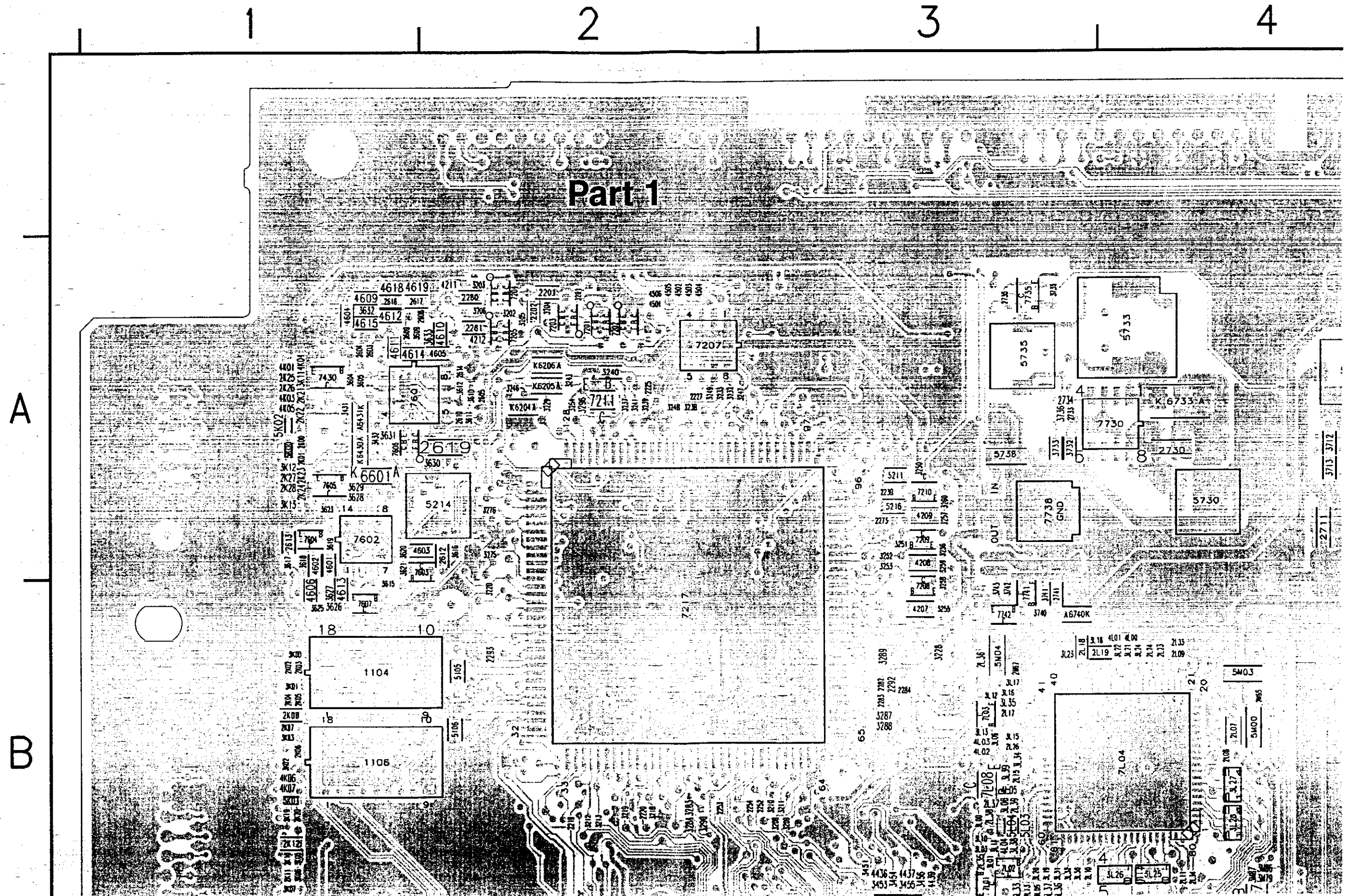
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Layout Small Signal Board (Bottom Side Overview)

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 B5	3808 C1	3A14 B3	3E06 D4	3E23 C3	3F24 D2	4621 A7	5J01 A6
1105 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	3801 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	3802 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	3803 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	2209 B5	2236 A5	2257 B6	2276 A6	2506 A6	2752 A3	2A01 B2	2D20 D1	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 A8	3274 B6	3751 A3	3814 B2	3D07 C1	3E12 C4	3F09 D1	3F30 D2	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 D2	4E12 C3	5L02 B4
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1G01 D5	1P01 A1	2218 B5	2241 A5	2262 B6	2285 A6	2611 A7	2756 A3	2B01 B1	2D24 C1	2E08 D3	2E25 C4	2F18 D2	2G43 D5	2J12 A3	2J31 A3	2L31 B5	2M15 C4	2M35 C4	2P47 A1	3237 B6	3279 B5	3754 A3	3817 C2	3D10 C1	3E15 C3	3F12 D2	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	2E26 C4	2F19 D2	2G44 D5	2J13 A3	2J32 A5	2L32 B4	2M16 C4	2M36 C4	2P48 A1	3238 A6	3280 B6	3755 A3	3818 C2	3D11 C1	3E16 C3	3F13 D1	3F34 D1	4G09 D4	6201 B6
1G03 D4	1P03 A1	2223 A5	2243 B6	2264 B6	2287 B6	2618 A6	2758 A3	2B03 B1	2D26 C1	2E10 D3	2E27 C4	2F20 D2	2G45 D5	2J14 A3	2J33 A5	2L33 B5	2M17 C4	2M37 C4	2P49 A1	3239 B6	3281 B6	3756 A3	3819 C2	3D12 C1	3E17 C3	3F14 D1	3F35 D1	4G10 D4	6708 A4
1J00 A5	1P04 A1	2224 A5	2244 B5	2265 B6	2288 B5	2704 A4	2800 C2	2B17 B1	2D27 C1	2E11 C3	2E28 C4	2F21 D2	2G46 D5	2J15 A3	2J34 A5	2L34 B5	2M18 C4	2M38 C4	2P50 A1	3240 B6	3282 B6	3757 A3	3820 C2	3D13 C1	3E18 C3	3F15 D1	3F36 D1	4G11 D4	6735 A5
1J01 A3	1P05 A1	2226 B6	2245 B5	2266 B6	2290 C5	2706 A4	2815 C3	2B18 B1	2D28 C1	2E12 C3	2E29 C4	2F22 D2	2G47 D5	2J16 A5	2J35 A5	2L35 B5	2M19 C4	2M39 C4	2P51 A2	3241 B6	3283 B6	3758 A3	3821 B2	3D14 C2	3E19 D3	3F16 D1	3F37 D1	4G12 D3	6736 A5
1J02 A4	1P06 A1	2228 B6	2246 B5	2267 B6	2291 B5	2709 A3	2901 B1	2D03 D1	2D32 C1	2E13 C3	2E30 C4	2F23 D2	2G48 D5	2J17 A5	2L36 B5	2M20 B4	2M40 C4	2P52 A1	3242 A5	3284 B6	3759 B5	3802 C2	3A01 B2	3D15 C2	3E20 D3	3F17 D1	3F38 D1	4G13 D3	6751 A3
1J03 A6	1P07 A1	2229 B6	2247 B6	2268 B6	2247 A5	2713 A4	2902 B1	2D04 C1	2D34 D2	2E14 C3	2E31 C4	2F24 D2	2G49 D5	2J18 A5	2L37 B5	2M21 B4	2M41 C4	2P53 A1	3222 A5	3265 B6	3291 B5	3806 B2	3A11 B3	3D16 C2	3E21 C3	3F18 D1	3F39 D1	4G14 D5	6A01 B3



Layout Small Signal Board (Bottom Side Part 1)



Layout Small Signal Board (Bottom Side Part 2)

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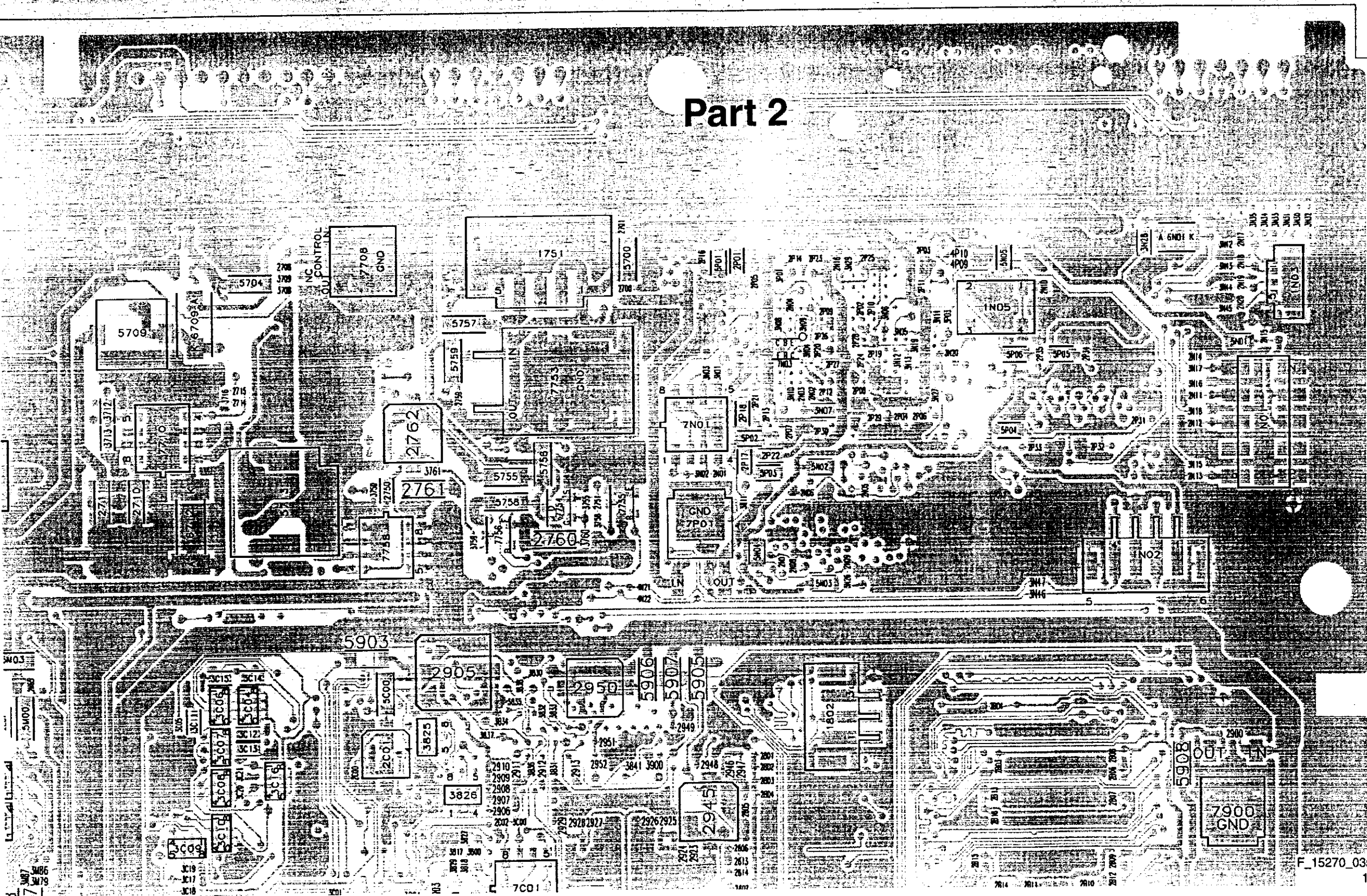
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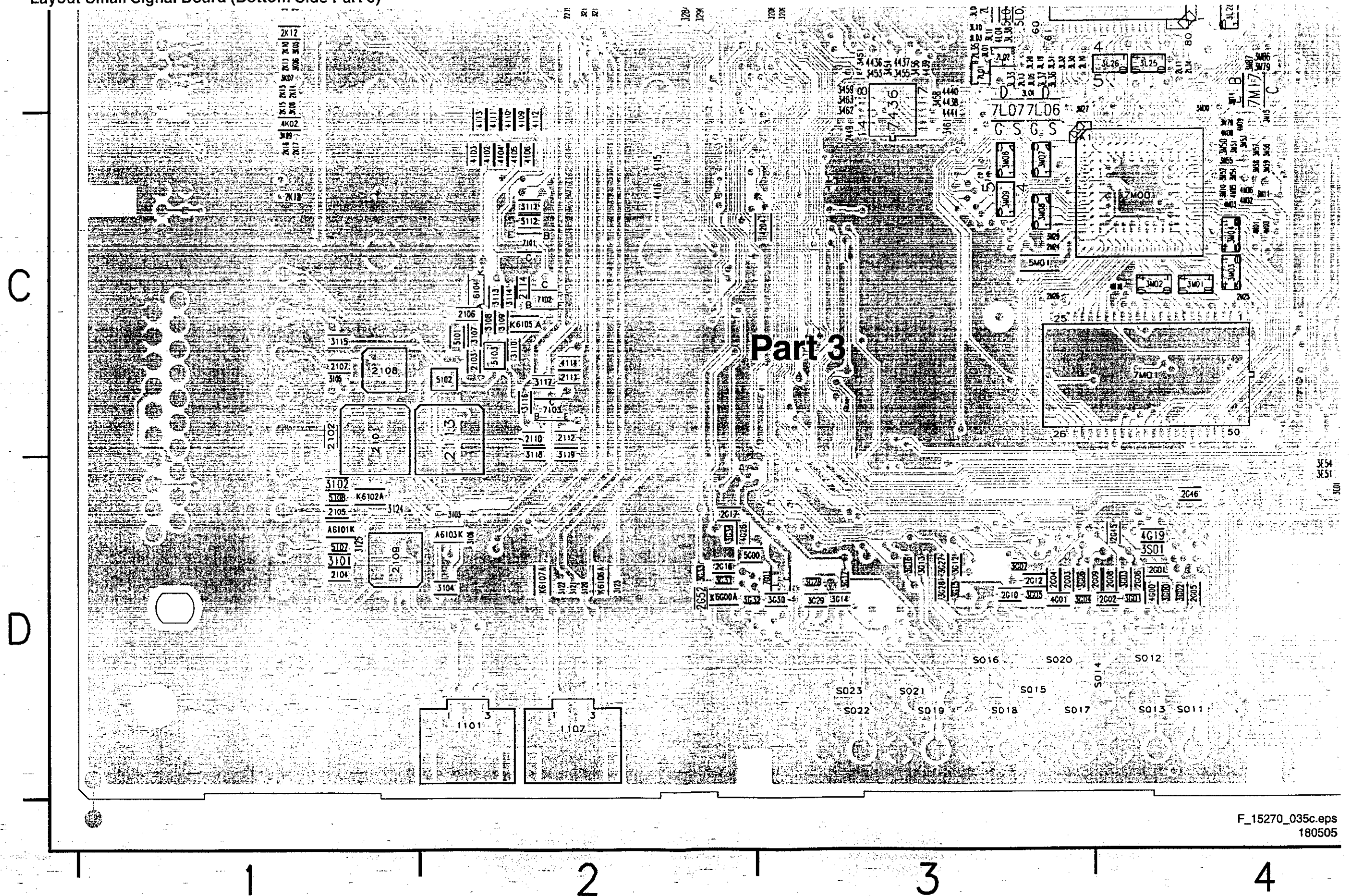
Part 2

A

B



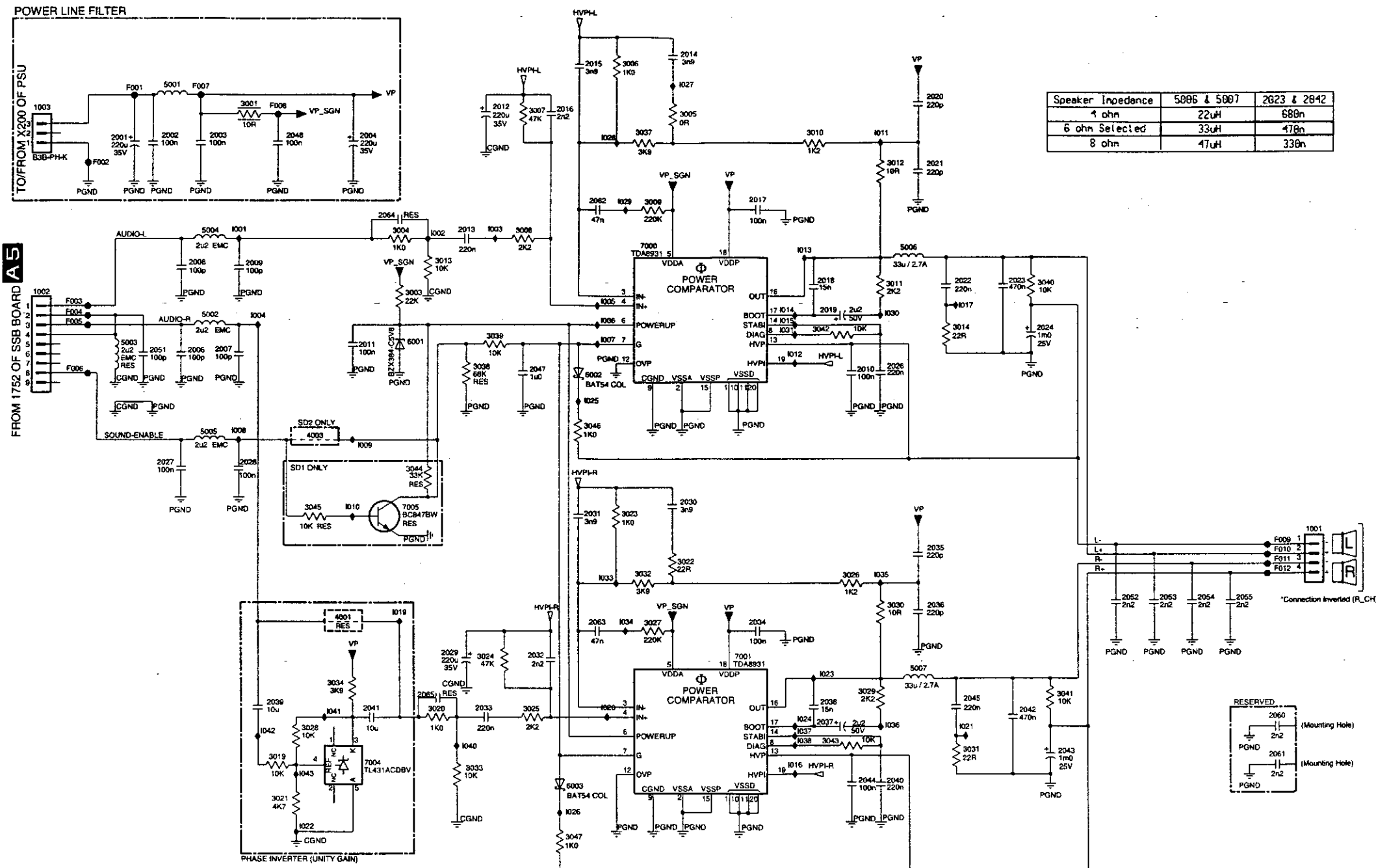
Layout Small Signal Board (Bottom Side Part 3)



Part 4

Class D Audio Amplifier

CLASS D AUDIO AMPLIFIER

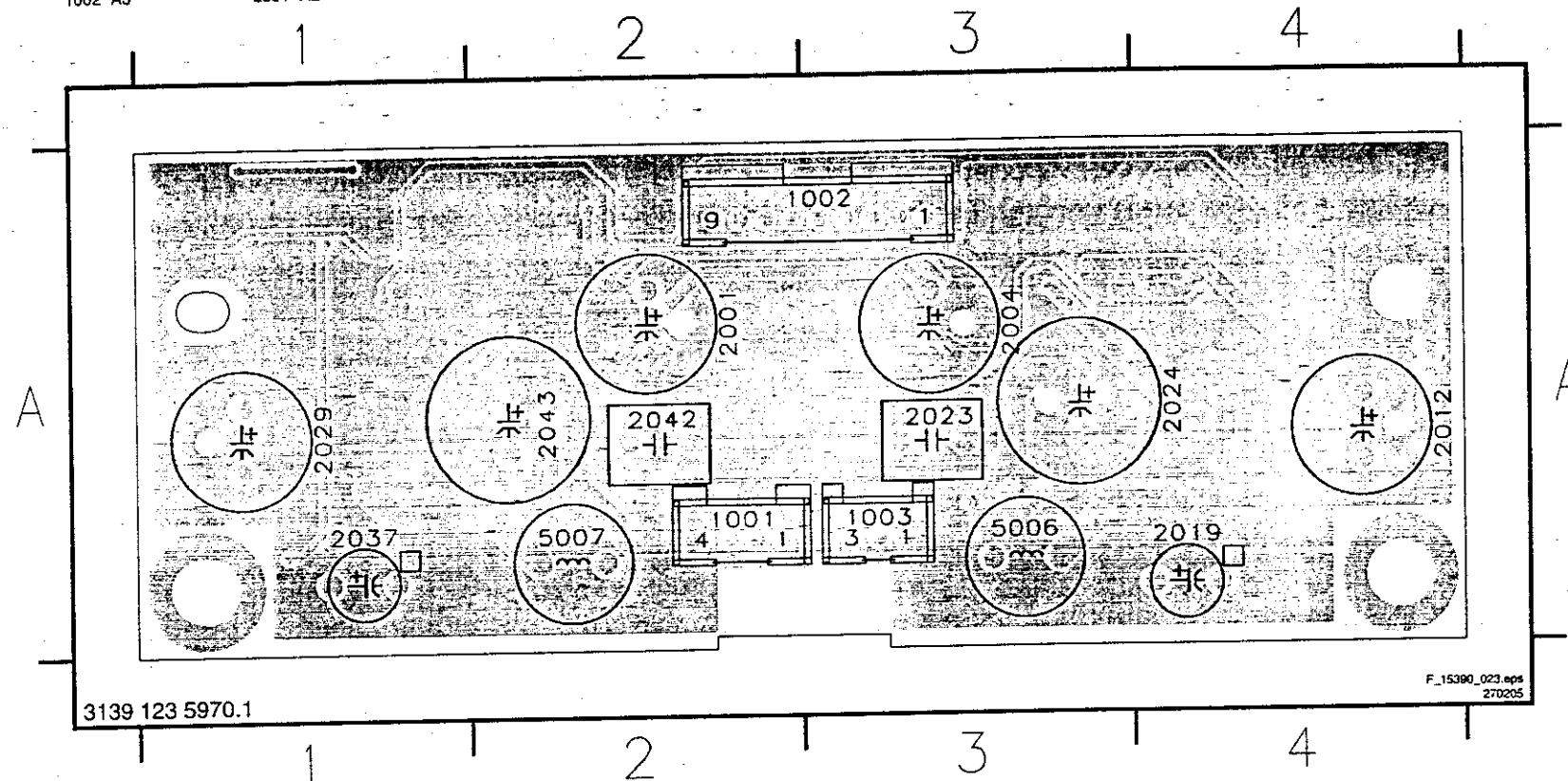


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1002 C2
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2001 B2
2002 B3
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2012 A5
2013 B5
2014 A7
2015 A6
2016 A6
2017 B7
2018 C8
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2026 C8
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2028 D3
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2030 D7
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2034 E7
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2044 G8
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2047 C5
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2052 E10
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3003 C4
3004 B4
3005 B7
3006 A6
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3012 B8
3013 C5
3014 C9
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3047 G6
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4003 D4

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5007 F8
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6002 C6
6003 G6
7000 C6
7001 F7
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7005 D4
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F004 C2
F005 C2
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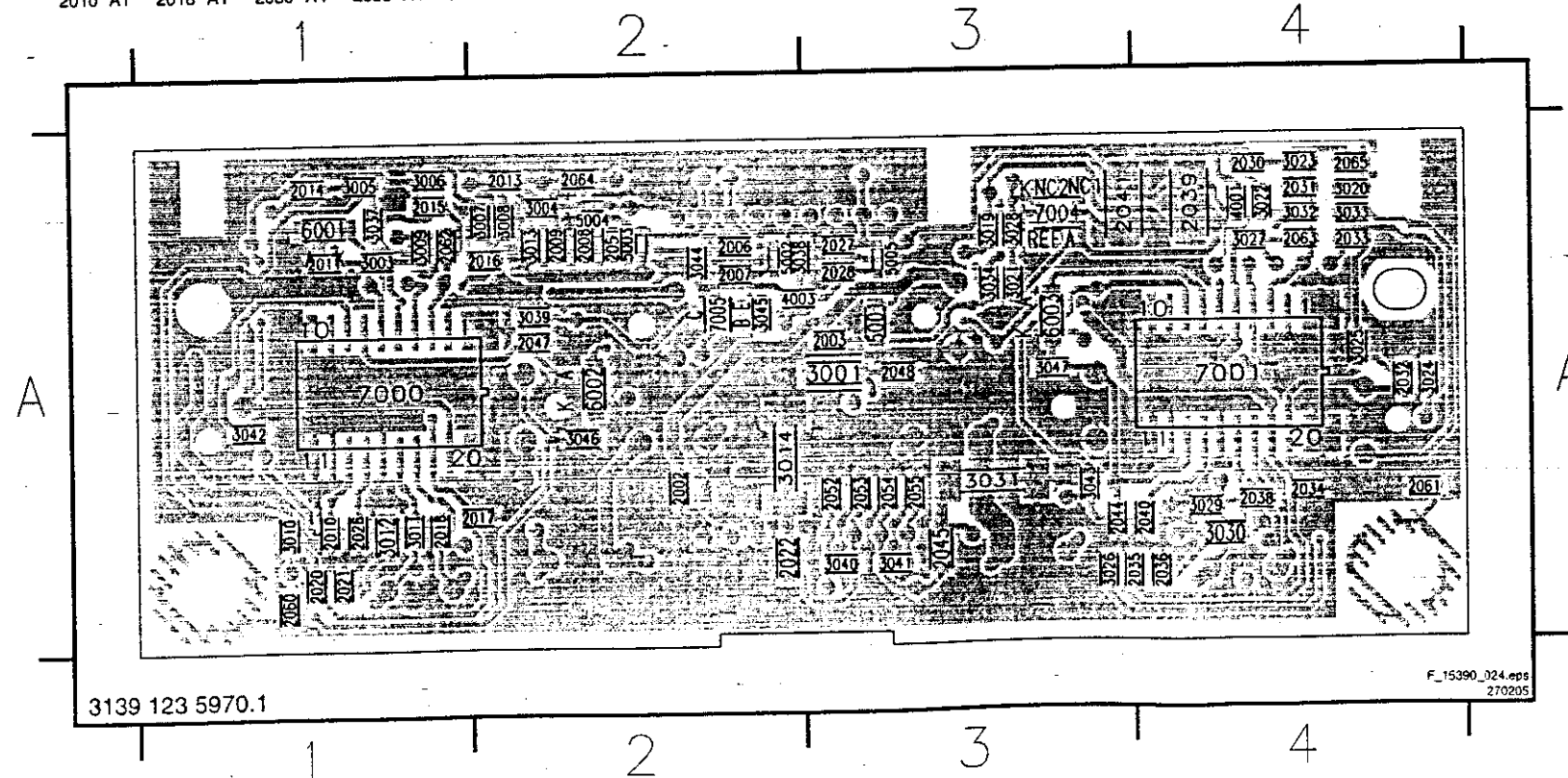
Layout Class D Audio Amplifier (Top Side)

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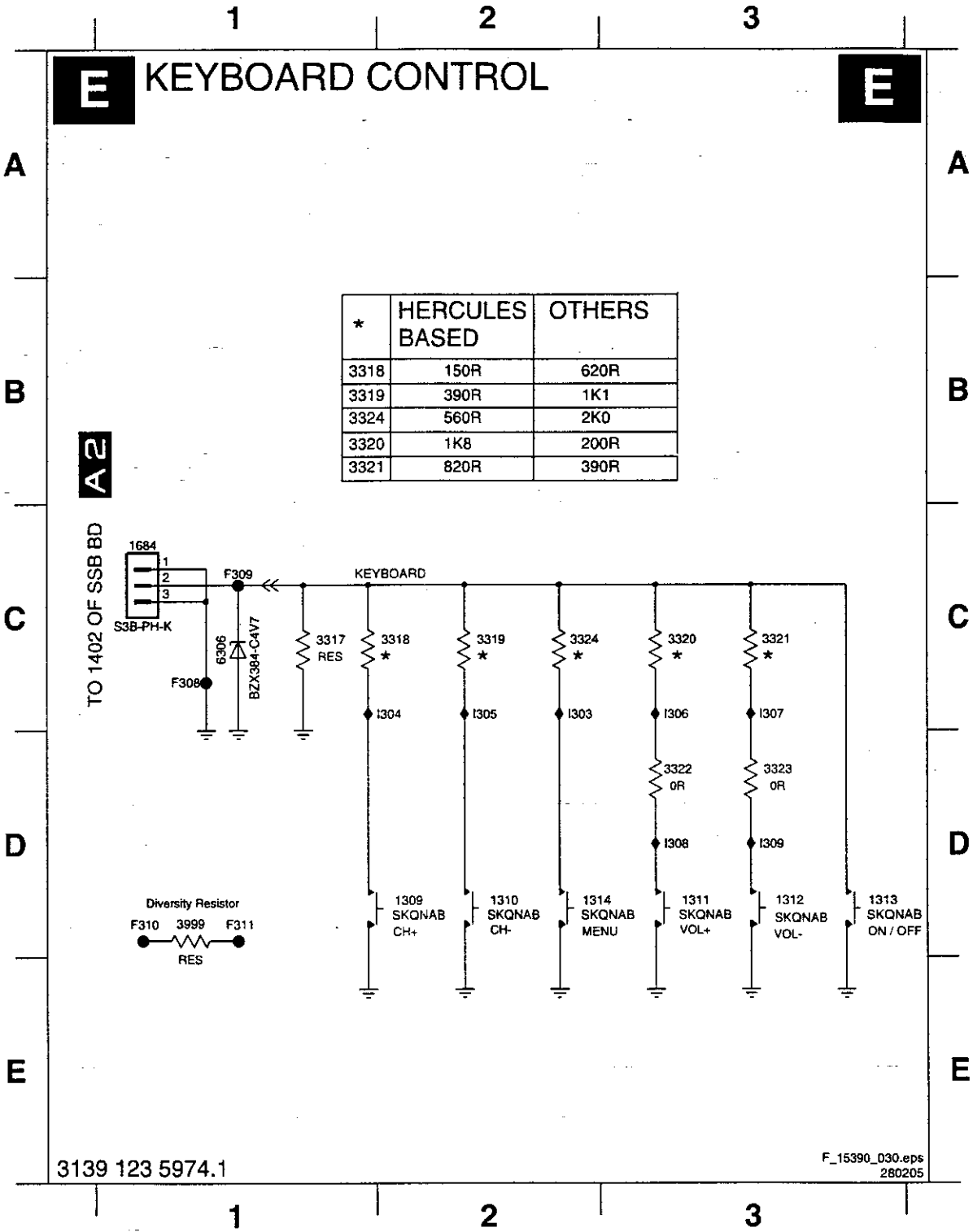


Layout Class D Audio Amplifier (Bottom Side)

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2008 A2 2016 A2 2027 A3 2035 A3 2045 A3 2055 A3 3009 A1 3020 A4 3027 A4 3034 A3 3043 A3 5001 A3 6003 A3
2009 A2 2017 A2 2028 A3 2036 A4 2047 A2 2060 A1 3003 A1 3010 A1 3021 A3 3028 A3 3037 A1 3044 A2 5002 A2 7000 A1
2010 A1 2018 A1 2030 A4 2038 A4 2048 A3 2061 A4 3004 A2 3011 A1 3022 A4 3038 A2 3045 A2 5003 A2 7001 A4



Keyboard Control Panel



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
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F310 D1
F311 D1
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Personal Notes:

Layout Keyboard Control Panel (Top Side)

1309 A1

1310 A3

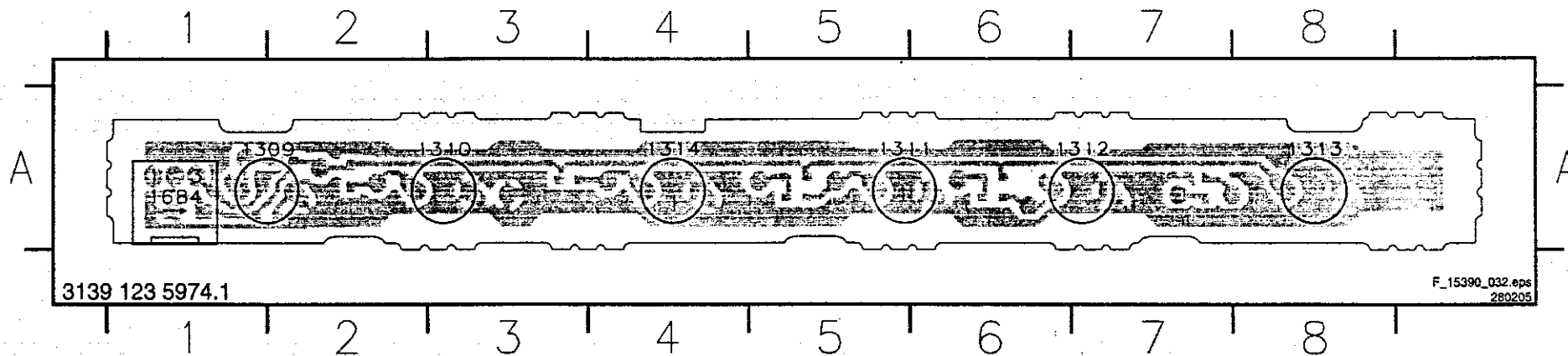
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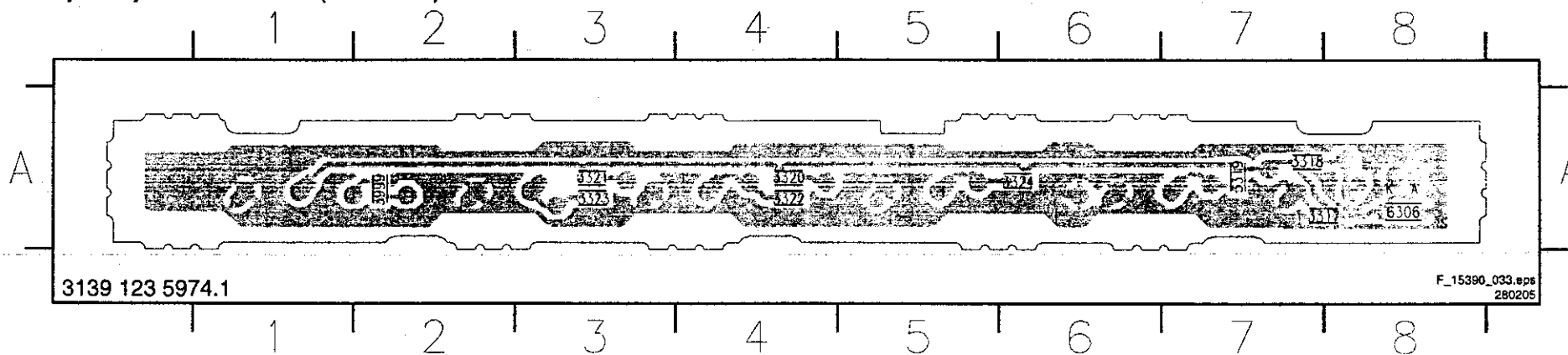
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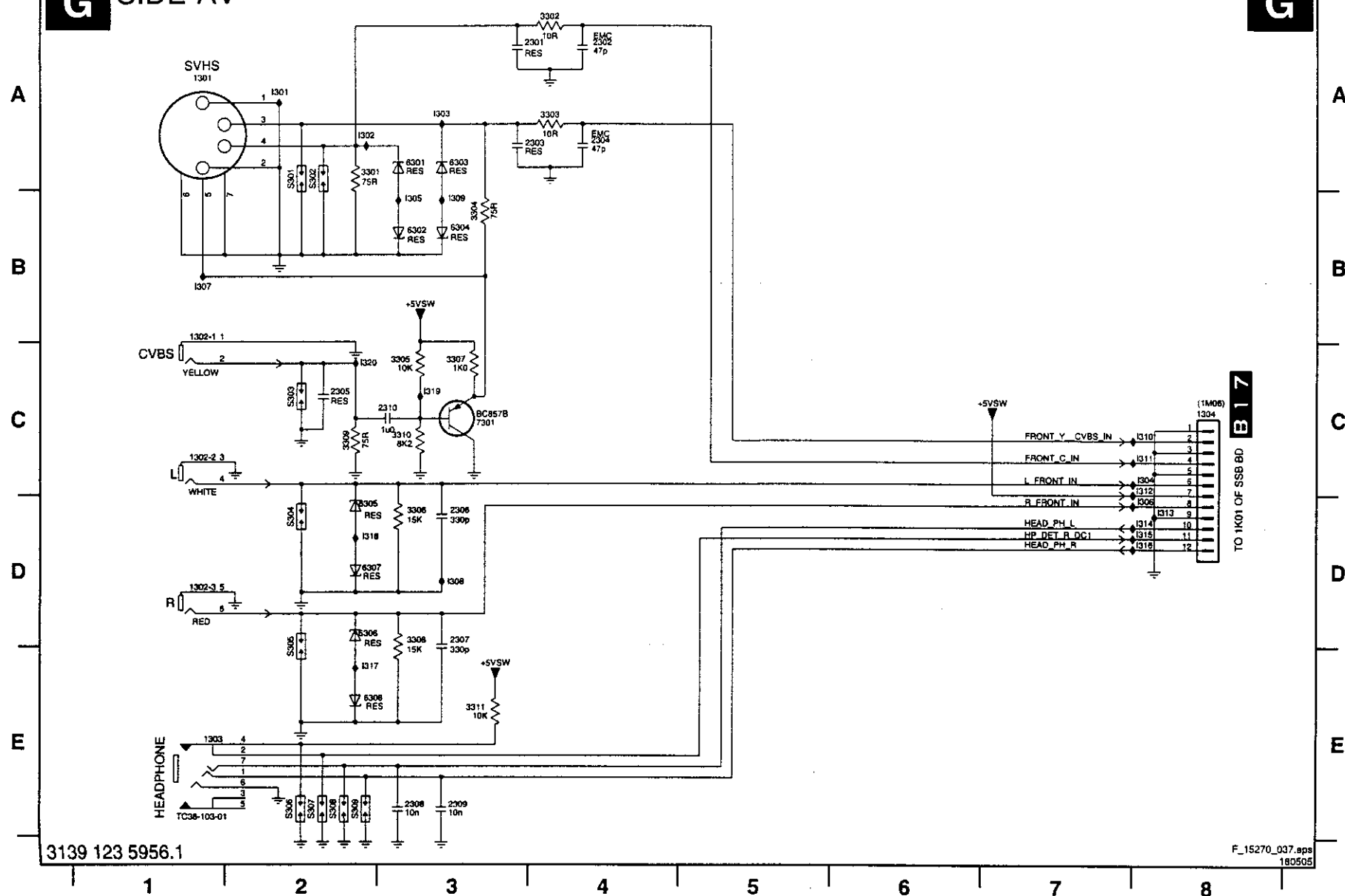
1314 A4

1684 A1



Layout Keyboard Control Panel (Bottom Side)



G SIDE-AV

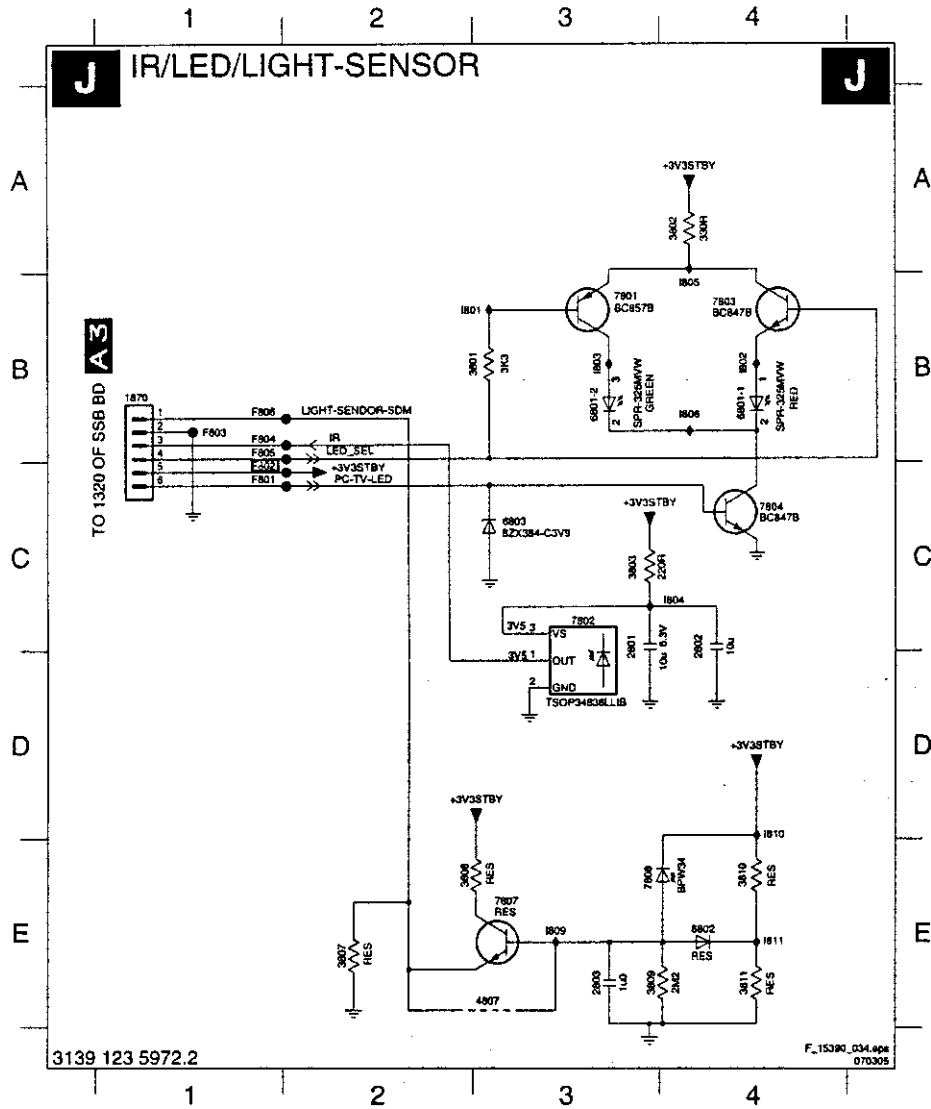
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2306 D3
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2308 E3
2309 E3
2310 C3
3301 A2
3302 A4
3303 A4
3304 B3
3305 C3
3306 D3
3307 C3
3308 D3
3309 C2
3310 C3
3311 E3
6301 A3
6302 B3
6303 A3
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6308 E2
7301 C3
I301 A2
I302 A2
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I319 C3
I320 C2
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S303 C2
S304 D2
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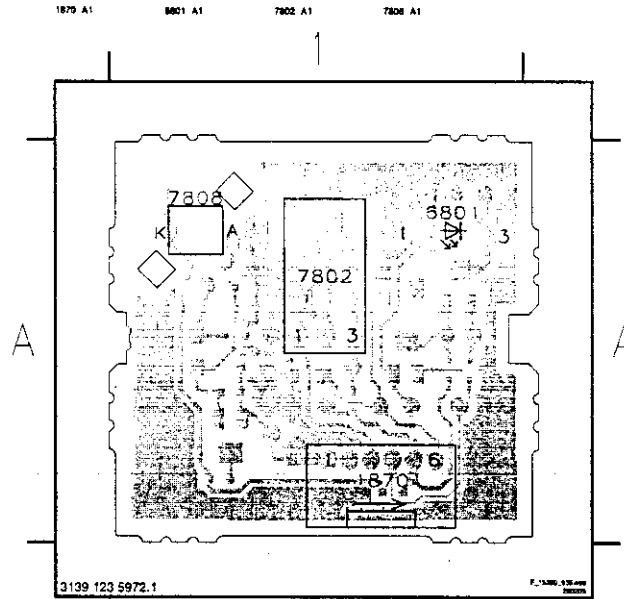
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6308	A1
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IR-LED and Light Sensor Panel

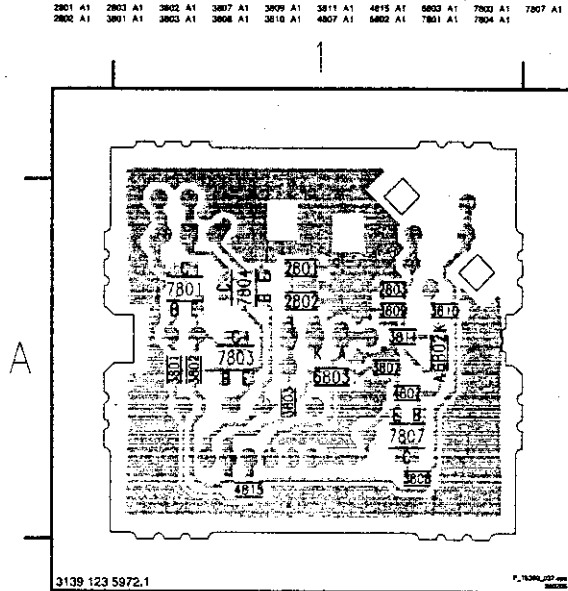
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2801 C3	3802 A4	3809 E3	6801-1 B4	7801 B3	7807 E3	F803 B1	I801 B2	I805 B4	I811 E4
2802 C4	3803 C3	3810 E4	6801-2 B3	7802 C3	7808 E3	F804 B1	I802 B4	I808 B4	
2803 E3	3807 E2	3811 E4	6802 E4	7803 B4	F801 C1	F805 B1	I803 B3	I809 E3	



Layout IR-LED and Light Sensor Panel (Top Side)



Layout IR-LED and Light Sensor Panel (Bottom Side)



Personal Notes:

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: Ri > 10 MΩ; Ci < 2.5 pF.

8.2 Hardware Alignments

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

8.3 Software Alignments

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

8.3.1 SAM Menu

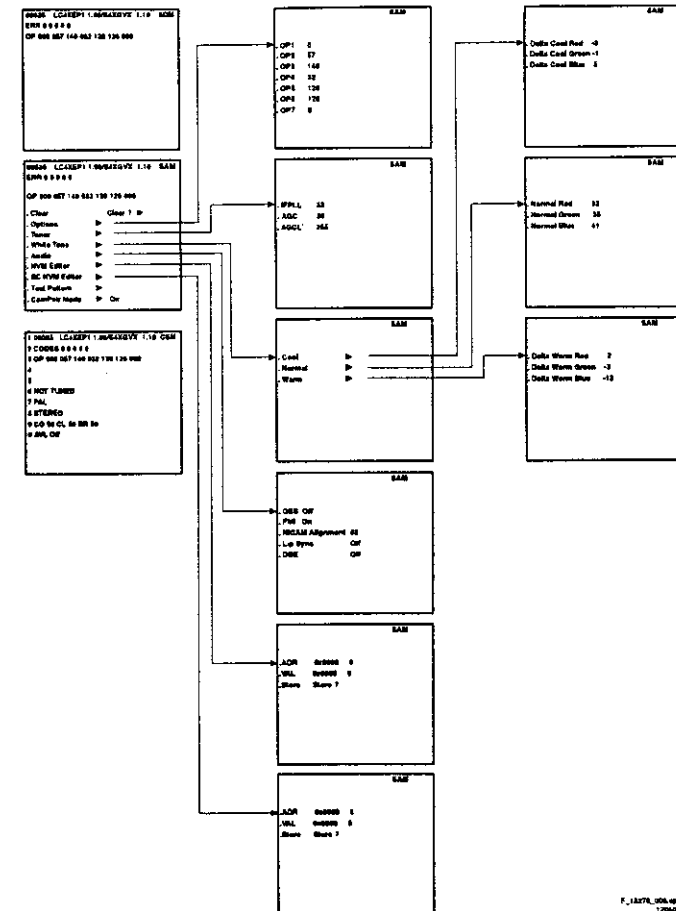


Figure 8-1 Overview SAM menu.

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						
Setting	Hercules NVM Address (decimal value)	These models are with ADC & Columbus 3D CombFilter			Without ADC & 3D CombFilter	
		20PF7320/10	20PF6320/10	20PF6320/10	20PF4310/10	Settings Range (decimal value)
NVM_ADC_GAIN_R	006	110	110	110	N/A	N/A
NVM_ADC_GAIN_G	007	180	180	180	N/A	N/A
NVM_ADC_GAIN_B	008	110	110	110	N/A	N/A
SDTV Greyscale settings: Use the SC NVM Editor in SAM to set these values in the SCALER NVM						
Setting	Scaler NVM Address (decimal value)	These models are with ADC & Columbus 3D CombFilter			Without ADC & 3D CombFilter	
		20PF7320/10	20PF6320/10	20PF6320/10	20PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	338	080	080	080	080	050 - 110
ADC_GRN_OFFSET2	339	080	080	080	080	050 - 110
ADC_BLU_OFFSET2	340	080	080	080	080	050 - 110
ADC_RED_GAIN	341	065	065	065	170	135 - 190
ADC_GRN_GAIN	343	065	065	065	135	135 - 190
ADC_BLU_GAIN	345	065	065	065	170	135 - 190
PC Greyscale settings						
Setting	Scaler NVM Address (decimal value)	These models are with ADC & Columbus 3D CombFilter			Without ADC & 3D CombFilter	
		20PF7320/10	20PF6320/10	20PF6320/10	20PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	335	080	080	080	080	040 - 080
ADC_GRN_OFFSET2	336	080	080	080	080	040 - 080
ADC_BLU_OFFSET2	337	080	080	080	080	040 - 080
ADC_RED_GAIN	338	200	200	200	154	180 - 270
ADC_GRN_GAIN	339	200	200	200	164	180 - 270
ADC_BLU_GAIN	337	200	200	200	164	180 - 270
HD Greyscale settings						
Setting	Scaler NVM Address (decimal value)	These models are with ADC & Columbus 3D CombFilter			Without ADC & 3D CombFilter	
		20PF7320/10	20PF6320/10	20PF6320/10	20PF4310/10	Settings Range (decimal value)
ADC_RED_OFFSET2	351	064	064	064	064	050 - 090
ADC_GRN_OFFSET2	352	062	062	062	062	050 - 090
ADC_BLU_OFFSET2	353	064	064	064	064	050 - 090
ADC_RED_GAIN	354	150	150	150	150	120 - 200
ADC_GRN_GAIN	356	144	144	144	144	120 - 200
ADC_BLU_GAIN	358	147	147	147	147	120 - 200
Panel size settings						
Setting	Scaler NVM Address (decimal value)	WXGA 16:9 panel, brand: LPL			WXGA 16:9 panel	
		20PF7320/10	20PF6320/10	20PF6320/10	20PF4310/10, brand: SDI	20PF4310/10, 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				
Option	Model number	20PF7320/10	20PF6320/10	20PF6320/10
OP1		150	150	150
OP2		37	37	37
OP3		76	15	14
OP4		113	113	113
OP5		252	252	252
OP6		27	27	27
OP7		19	19	19
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 4 bit table for restoring the SCALER to its original Factory Default settings via the SC NVM Editor in the SAM menu					
			Model number		
			32PF7320/16	32PF7320/16	32PF7320/16
OP1	Description of feature/option to be switched ON or OFF				
bit 7 (msb)	OP_PHILIPS_TUNER		1	1	1
bit 6	OP_FM_RADIO		0	0	0
bit 5	OP_LNA		0	0	0
bit 4	OP_ATS // 60 EU		1	1	1
bit 3	OP_ACI		1	1	1
bit 2	OP_VCR_CHIP		0	0	0
bit 1	OP_REGION_MODE		0	0	0
bit 0 (lsb)	OP_CHINA		0	0	0
	Total DEC Value		152	152	152
	Total HEX Value		98	98	98
OP2					
bit 7 (msb)	OP_SC		0	0	0
bit 6	OP_IBEX		0	0	0
bit 5	OP_PXAVINEL_NAMING		1	1	1
bit 4	OP_LTL (Lum. Transient Improvmt)		0	0	0
bit 3	OP_HLT		0	0	0
bit 2	OP_PINE_TUNING		1	1	1
bit 1	OP_PIP_PHILIPS_TUNER		0	0	0
bit 0 (lsb)	OP_HDE		1	1	1
	Total DEC Value		37	37	37
	Total HEX Value		25	25	25
OP3					
bit 7 (msb)	OP_EW_FUNCTION		0	0	0
bit 6	OP_PIXEL_PLUS		1	0	0
bit 5	OP_PP_SPOTTER // lamp		0	0	0
bit 4	OP_SPOTTER // lamp		0	0	0
bit 3	OP_VIRTUAL_DOLBY		1	1	1
bit 2	OP_WIDE_SCREEN		1	1	1
bit 1	OP_WSSB		1	1	1
bit 0 (lsb)	OP_CIP_MES // OP_MES - 5% local button implementation		1	1	1
	Total DEC Value		78	15	14
	Total HEX Value		4F	0F	0E
OP4					
bit 7 (msb)	OP_CIP_SYNC		0	0	0
bit 6	OP_HD		1	1	1
bit 5	OP_ULTRA_BASS		1	1	1
bit 4	OP_DELTA_VOLUME		1	1	1
bit 3	OP_TAIWAN_KOREA		0	0	0
bit 2	OP_VOLUME_LIMITER		0	0	0
bit 1	OP_STEREO_DBX		0	0	0
bit 0 (lsb)	OP_STEREO_NICAM_SC5		1	1	1
	Total DEC Value		113	113	113
	Total HEX Value		71	71	71
OP5					
bit 7 (msb)	OP_AV1		1	1	1
bit 6	OP_AV2		1	1	1
bit 5	OP_AV3		1	1	1
bit 4	OP_DVI		1	1	1
bit 3	OP_SVHS2		1	1	1
bit 2	OP_SVHS3		1	1	1
bit 1	OP_HOTEL_MODE		0	0	0
bit 0 (lsb)	OP_SIMPLE_FACTORY.OP_BISC_AVSTEREO		0	0	0
	Total DEC Value		252	252	252
	Total HEX Value		FC	FC	FC
OP6					
bit 7 (msb)	OP_PERSONAL_ZAPPING		0	0	0
bit 6	OP_SMART_SURF		0	0	0
bit 5	OP_PUSTRAP		0	0	0
bit 4	OP_COMBFILTER		1	1	1
bit 3	OP_ACTIVE_CONTROL		1	1	1
bit 2	OP_AUDIO_TEXT		0	0	0
bit 1	OP_LIGHT_SENSOR		1	1	1
bit 0 (lsb)	OP_THWN_TEXT		1	1	1
	Total DEC Value		27	27	27
	Total HEX Value		1B	1B	1B
OP7					
bit 7 (msb)	OP_DAE_WMT		0	0	0
bit 6	OP_DVB_USB - OP_MALAY		0	0	0
bit 5	OP_AMBLIGHT		0	0	0
bit 4	OP_COLUMBUS		1	1	1
bit 3	OP_DUMMYS		0	0	0
bit 2	OP_DUMMYS		0	0	0
bit 1	OP_WEST_EU		1	1	1
bit 0 (lsb)	OP_MUIC_STANDARD_EUR		1	1	1
	Total DEC Value		19	19	19
	Total HEX Value		03	03	03

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

Index of this chapter:

- 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

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 (TDA1500x, 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).

9.1 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

9.2 Block Diagram

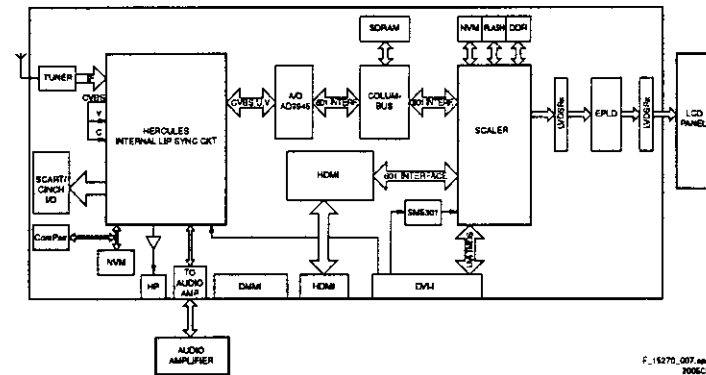


Figure 9-1 Block Diagram

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 theScaler 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 architecture 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

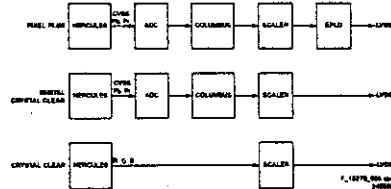


Figure 9-2 Block diagram of the internal building blocks

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)

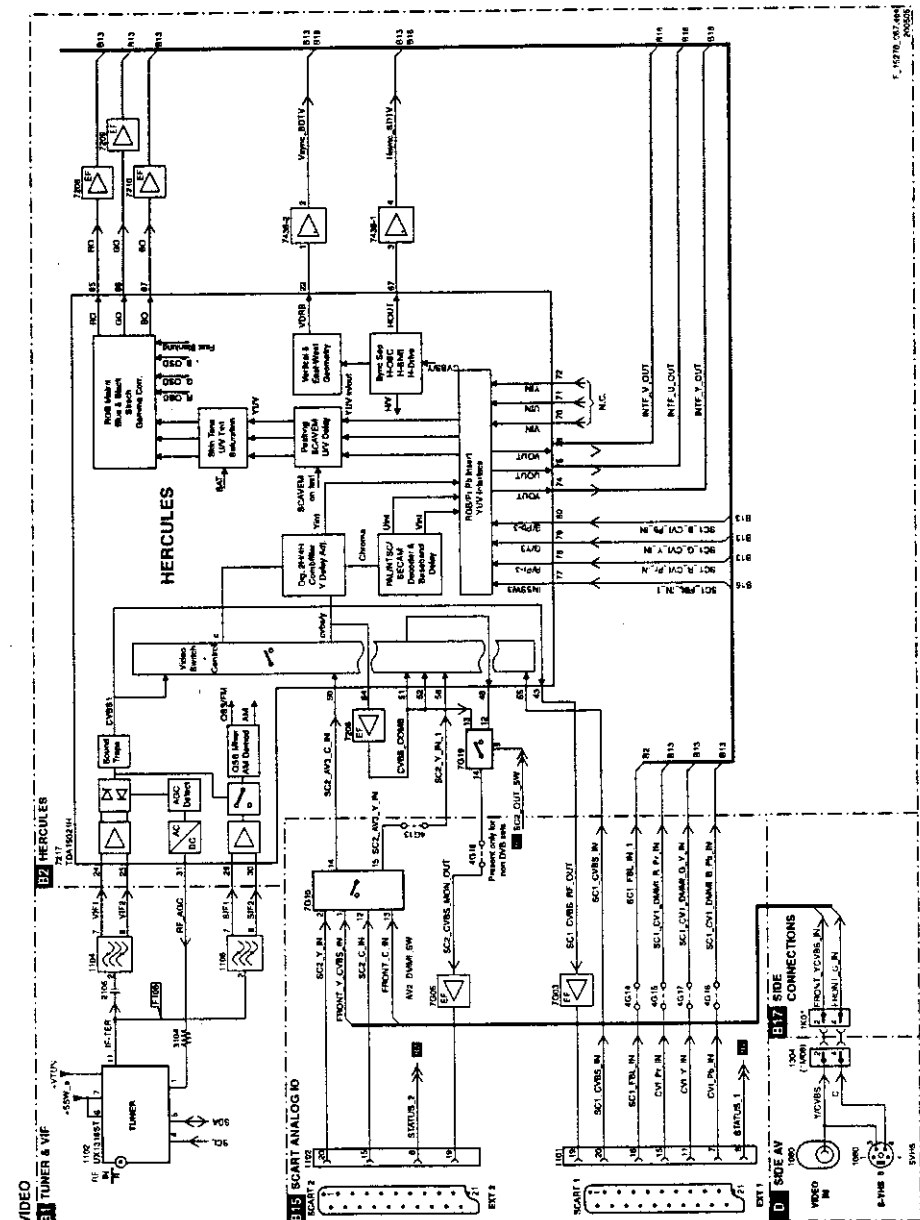


Figure 9-3 Block diagram video processing

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 I²C 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.

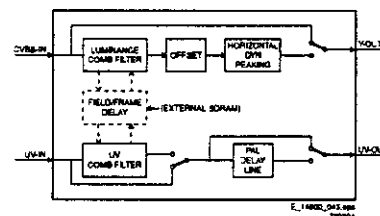


Figure 9-4 Columbus 2D/3D Comb Filter block diagram

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.

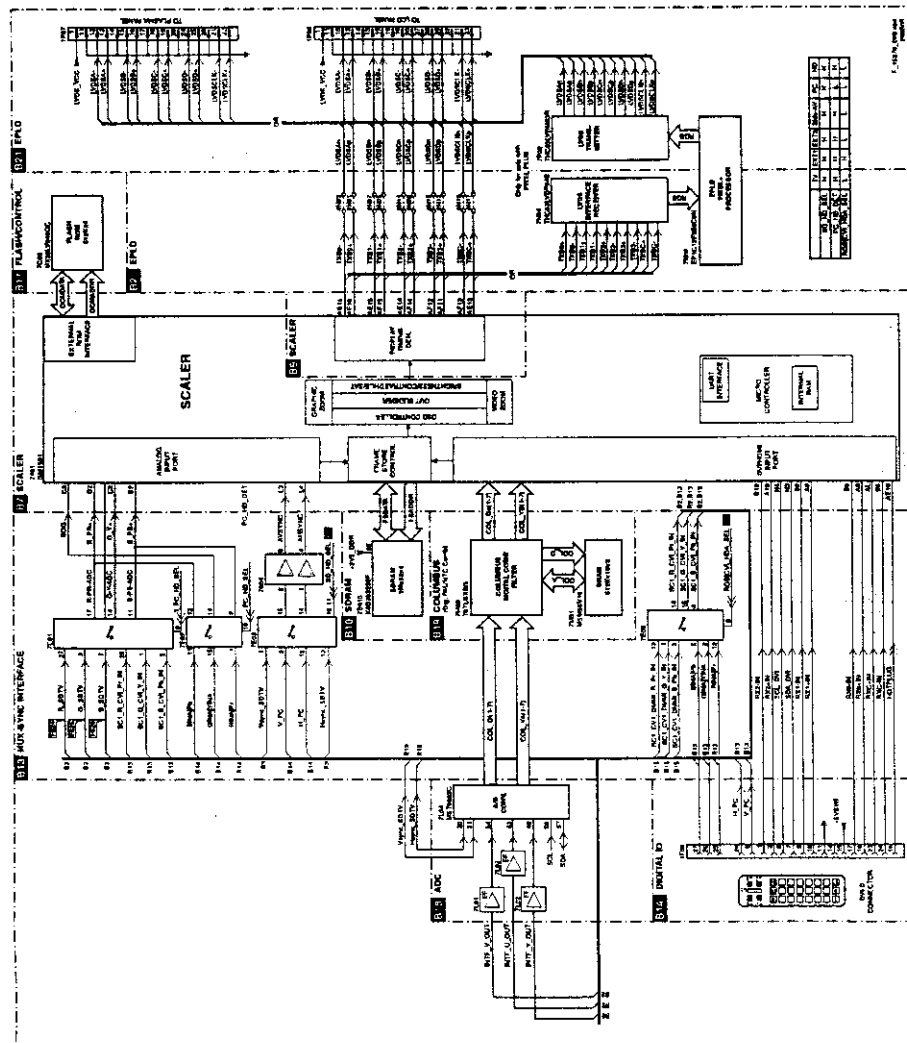


Figure 9-6 Block diagram scaler part

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:
 - Analog 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/1080L.

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

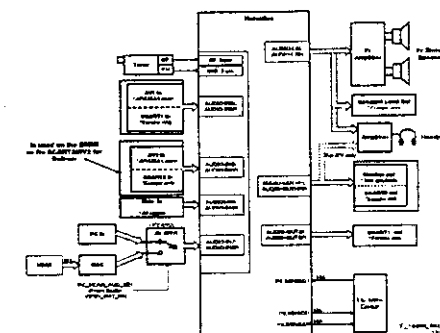


Figure 9-6 Block diagram audio processing

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 Inter-carrier 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 VDK 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/AM for a Multi-System set. The diversity here will then depend on

the region. AP China can have a Multi-System and VDK 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.

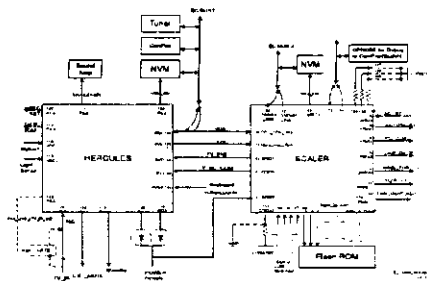


Figure 9-7 Micro Controller block diagram

9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:

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

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	P1.8/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 RCS 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 to the NVM. When write to the NVM is required, pin 7 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 _{CC})	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 pop.

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 SCART/EXT1 in
B-SC2-IN	Blue SCART/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	Simos 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
CompPair	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

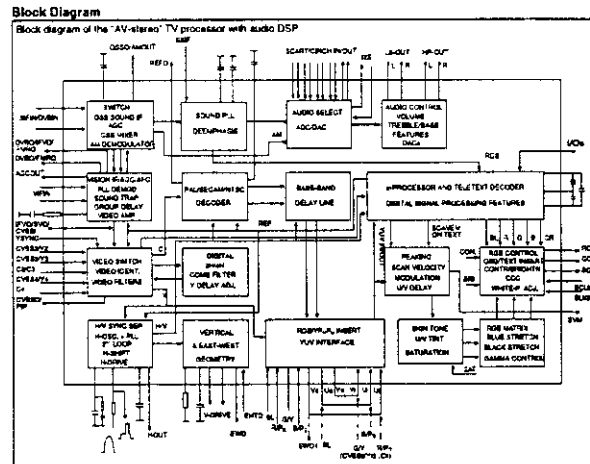
	e.g. service mode (a DST-emulator is available in ComPair)	LL'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
OTS	Digital Theatre System; A multi-channel surround sound format, similar to Dolby Digital	LS	LoudSpeaker
DVD	Digital Versatile Disc	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	NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
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	NVM	Non Volatile Memory; IC containing data such as alignment values, preset stations
FMR	Radio receiver that can receive the FM Band 87.5 - 106 MHz	O/C	Open Circuit
FRC	Frame Rate Converter	ON/OFF LED	On/Off control signal for the LED
FRONT-C	Front input chrominance (SVHS)	OSD	On Screen Display
FRONT-DETECT	Control line for detection of headphone insertion, Service Mode jumper, power failure detection	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)
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)	PC	Personal Computer
G-SC1-IN	Green SCART1/EXT1 in	PCB	Printed Circuit Board (or PWB)
G-SC2-IN	Green SCART2/EXT2 in	PIQ	Picture In Graphic
G-TXT	Green teletext	PIP	Picture In Picture
H	H_sync to the module	PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency
HA	Horizontal Acquisition; horizontal sync pulse	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
HD	High Definition	PWB	Printed Wiring Board (also called PCB or CBA)
HP	HeadPhone	RAM	Random Access Memory
I	Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band	RC	Remote Control transmitter
I ² C	Integrated IC bus	RC5 or 6	Remote Control system 5 or 6, the signal from the remote control receiver
I ² S	Integrated IC Sound bus	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
IC	Integrated Circuit	RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
IF	Intermediate Frequency	ROM	Read Only Memory
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.	SAM	Service Alignment Mode
IR	Infra Red	SC	SandCastle: two-level pulse derived from sync signals
IRQ	Interrupt ReQuest	SCART IN	SCART in
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	SCART OUT	SCART out
LATAM	LATin AMerica	S/C	Short Circuit
LC04	Philips chassis name for LCD TV 2004 project	SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et
LCD	Liquid Crystal Display		
LED	Light Emitting Diode; A semiconductor diode that emits light when a current is passed through it		
LINE-DRIVE	Horizontal (line) deflection drive signal (for the Line transistor)		

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 IC Data Sheets

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

9.11.1 Diagram B2, Type TDA15021H (IC7217, Hercules)



Pin Configuration

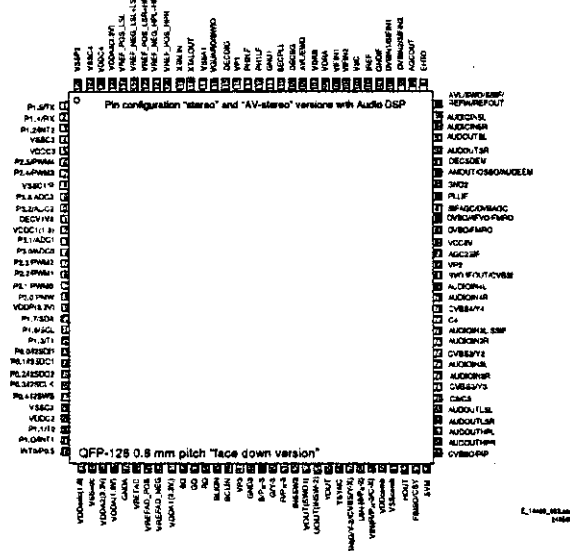


Figure 9-8 Internal block diagram and pin configuration

9.11.2 Diagram B19, Type T6TU5XB (IC7M00, Columbus)

Figure 1 Package outline (top view)

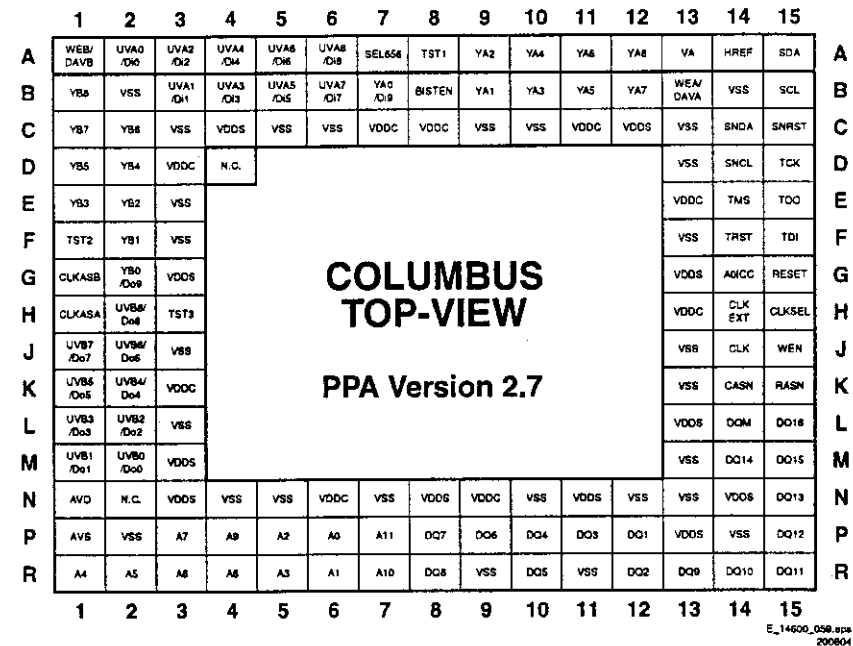
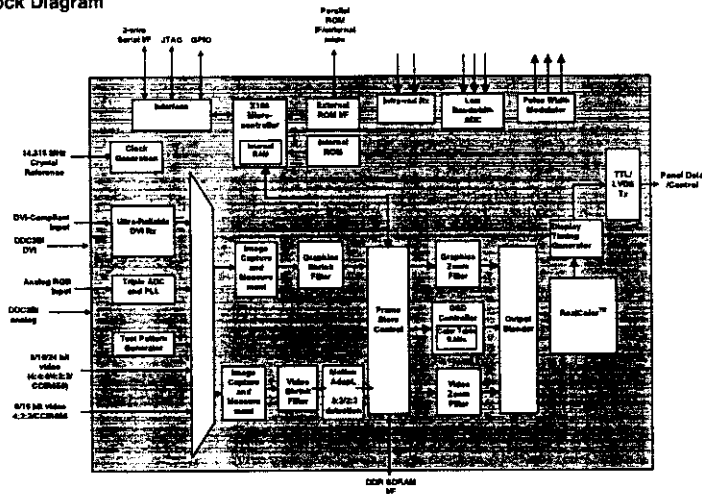


Figure 9-9 Pin configuration

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

Block Diagram



Pin Configuration

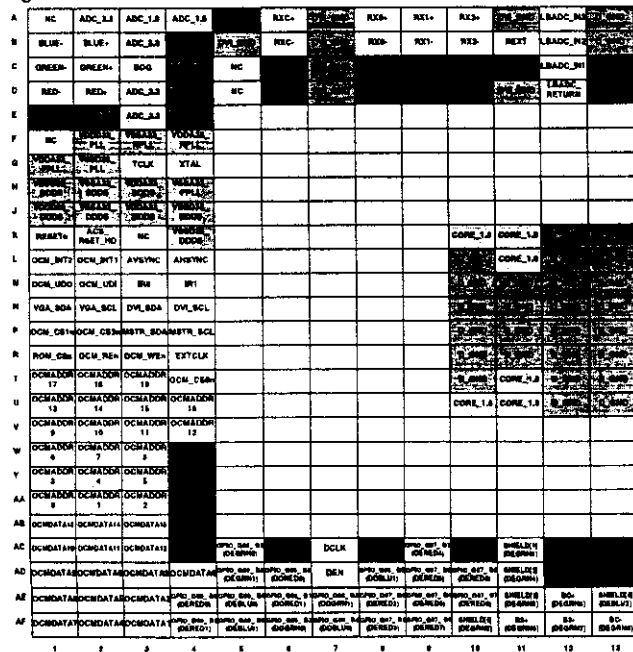
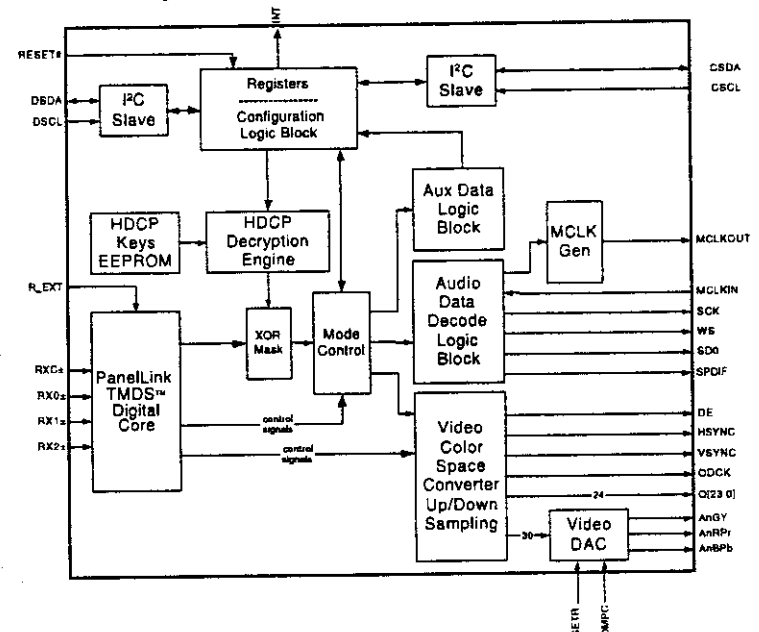


Figure 9-10 Internal block diagram and pin configuration

9.11.4 Diagram B12, Type S9903CT (IC7D03, HDMI PanelLink), Reserved

Block Diagram



Pin Configuration

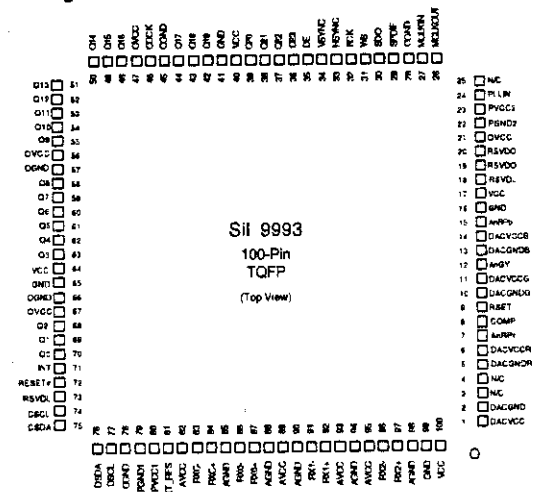


Figure 9-11 Internal block diagram and pin configuration

10. Spare Parts List

Set Level

Various

0032	3122 137 23171	Power Supply Unit (32 inch)
0032	3122 137 23191	Power Supply Unit (28 inch)
8188	2422 970 98151	MAINSCORD EUR 1M5 BK B
8903	3104 311 09141	Cable 4P/560
8903	3139 131 05771	Cable 4P/230

5213	2422 264 00506	Loudsp. 8r 5W fullrange
5213	2422 264 00536	Loudsp. 5W fullrange

Small Signal Board [B]

Various

0601	3139 127 04122	Hercules SW (check Prod. Survey)
0611	3139 127 04112	Scaler SW (check Prod. Survey)
1101	2422 025 18749	Connector 3p m
1102	3139 147 19801	Turner UV1315/A IH-3
1104	2422 549 44372	SAW 38.9MHz K9653L
1108	2422 549 44389	SAW 38.9MHz K9659L
1107	2422 025 18749	Connector 3p m
1206	2422 543 01143	Xtal 24.576MHz
1801	2422 543 01133	Xtal 14.32MHz 20pF
1F00	2422 038 00515	Socket 01W 29pF
1F01	2422 025 05703	Socket 1P 1
1G01	4822 265 10703	Socket scant 21p
1G02	4822 265 10703	Socket scant 21p
1J02	4822 025 10772	Connector 12p m
1J03	4822 025 10758	Connector 3p m
1J04	2422 025 10759	Connector 3p m
1K01	2422 025 08149	Connector 5p m
1K02	2422 025 10772	Connector 12p m
1K03	2422 025 10758	Connector 3p m
1N01	2422 025 17274	Connector 10p m
1N02	2422 025 18779	Connector 40p m
1N05	2722 171 08925	Xtal 14.318MHz 15pF
1P01	2422 549 45325	Bead 67r at 100MHz
1P02	2422 549 45325	Bead 67r at 100MHz
1P03	2422 549 45325	Bead 67r at 100MHz
1P04	2422 549 45325	Bead 67r at 100MHz
1P05	2422 549 45325	Bead 67r at 100MHz
1P06	2422 025 18772	Connector 30p m
8J02	3139 131 05901	Cable 12P/280P/2P
8J03	3139 110 27651	Cable 03P/100P/3P
8J04	3104 311 09251	Cable 9P/140P/5P
8K01	3139 131 05901	Cable 12P/280P/2P

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2101	4822 124 12095	100uF 50V 16V
2102	5322 126 11583	100uF 20V 50V 0603
2103	5322 126 11583	100uF 10V 50V 0603
2104	4822 122 33751	22pF 50V 50V
2105	4822 122 33751	22pF 50V 50V
2106	5322 126 11583	100uF 10V 50V 0603
2107	3198 035 71040	100uF 10V 18V 0402
2108	5322 124 11945	22uF 20V 35V
2113	4822 124 12095	100uF 20V 16V
2118	4822 124 23002	10uF 16V
2206	2020 552 00035	2.2uF 6.3V 10% 0603
2207	2020 552 96718	220nF 10V 6.3V 0402
2208	4822 124 12084	1uF 20V 50V
2209	4822 124 23002	10uF 16V
2210	2020 552 96718	220nF 10V 6.3V 0402
2211	2020 552 96618	1nF 10V 50V 0402
2214	2020 552 96618	1nF 10V 50V 0402
2216	2020 552 96618	1nF 10V 50V 0402
2218	3198 035 71040	100uF 10V 18V 0402
2221	4822 124 12095	100uF 20V 16V
2223	2238 869 15101	100pF 5% 50V 0402
2225	2020 552 96618	1nF 10V 50V 0402
2226	3198 035 03320	3.3nF 5% 50V 0402
2227	2020 552 96618	1nF 10V 50V 0402
2228	3198 035 71040	100uF 10V 18V 0402
2230	3198 035 71040	100uF 10V 18V 0402

2231	2020 552 96718	220nF 10V 6.3V 0402
2232	3198 035 71040	100uF 10V 18V 0402
2233	4822 124 23002	10uF 16V
2234	2020 552 96718	220nF 10V 6.3V 0402
2235	2020 552 96718	220nF 10V 6.3V 0402
2236	4822 126 14076	220nF 80V 20V 25V
2237	2020 552 96718	220nF 10V 6.3V 0402
2238	2020 552 96718	220nF 10V 6.3V 0402
2239	3198 035 71040	100uF 10V 18V 0402
2240	2020 552 96718	220nF 10V 6.3V 0402
2241	2020 552 96718	220nF 10V 6.3V 0402
2242	3198 035 71040	100uF 10V 18V 0402
2243	4822 124 23002	10uF 16V
2244	3198 035 71040	100uF 10V 18V 0402
2245	3198 035 71040	100uF 10V 18V 0402
2246	3198 035 71040	100uF 10V 18V 0402
2250	2020 552 96618	1nF 10V 50V 0402
2251	2020 552 96618	1uF 20V 25V 1210
2252	3198 035 71040	100uF 10V 18V 0402
2253	3198 035 71040	100uF 10V 18V 0402
2254	3198 035 71040	100uF 10V 18V 0402
2255	3198 035 71040	100uF 10V 18V 0402
2256	4822 124 23002	10uF 16V
2257	3198 035 71040	100uF 10V 18V 0402
2258	2020 552 96618	10uF 10V 6.3V 0603
2259	3198 035 71040	100uF 10V 18V 0402
2260	2020 552 96618	10uF 10V 6.3V 0603
2262	4822 124 12082	10uF 20V 50V
2263	3198 035 71040	8.8nF 10V 16V 0603
2264	3198 017 44740	470pF 10V 0603
2266	3198 017 41060	1uF 10V 0603
2268	3198 035 71040	100uF 10V 18V 0402
2269	2020 552 96718	220nF 10V 6.3V 0402
2270	2020 012 00308	470uF 16V 20% SMD
2271	3198 035 71040	100uF 10V 18V 0402
2272	4822 124 12095	100uF 20V 16V
2273	3198 035 71040	100uF 10V 18V 0402
2274	3198 017 31540	150nF 10V 0603
2277	3198 035 71040	100uF 10V 18V 0402
2280	2020 552 00027	4.7uF 2% 6.3V 0603
2281	2020 552 00027	4.7uF 2% 6.3V 0603
2282	3198 035 71040	100uF 10V 18V 0402
2283	3198 035 71040	100uF 10V 18V 0402
2286	3198 035 71040	100uF 10V 18V 0402
2289	4822 051 30151	150uF 5% 0.062W
2290	2222 240 59872	4.7uF 5% 10V 0805
2291	3198 035 71040	100uF 10V 18V 0402
2449	3198 035 71040	100uF 10V 18V 0402
2603	2020 552 96834	1uF 20V 6.3V 0402
2604	3198 035 04710	470pF 50V 0402
2605	2020 552 96834	1uF 20V 6.3V 0402
2608	2020 552 96834	1uF 20V 6.3V 0402
2609	3198 035 04710	470pF 50V 0402
2610	2020 552 96834	1uF 20V 6.3V 0402
2611	4822 124 12095	100uF 20V 16V
2613	3198 017 41060	1uF 10V 0603
2614	3198 035 71040	100uF 10V 18V 0402
2615	2020 012 00308	470uF 16V 20% SMD
2616	2020 552 00035	2.2uF 6.3V 10% 0603
2617	2020 552 00035	2.2uF 6.3V 10% 0603
2618	2020 552 00035	2.2uF 6.3V 10% 0603
2619	2020 552 96738	4.7uF 6.3V
2701	2238 869 15101	100pF 5% 50V 0402
2704	4822 124 23002	10uF 16V
2716	4822 012 00028	470uF 20V 18V
2730	2020 552 96618	1uF 20V 25V 1210
2731	2020 012 00030	470uF 16V 20% SMD
2732	3198 035 02210	220pF 5% 50V 0402
2733	2238 787 18641	22nF 10V 18V 0402
2734	3198 035 04710	470pF 50V 0402
2736	2020 031 00308	22uF 20V 35V
2737	2020 012 00030	470uF 16V 20% SMD
2738	4822 124 80151	47uF 16V
2739	4822 124 80151	47uF 16V
2750	2020 552 00035	2.2uF 6.3V 10% 0603
2751	3198 035 71040	100uF 10V 18V 0402
2752	4822 124 80151	47uF 16V
2753	2020 012 00030	470uF 16V 20% SMD
2755	3198 035 14720	4.7nF 5% 25V 0402
2756	3198 035 04710	470pF 50V 0402
2757	2020 012 00030	470uF 16V 20% SMD
2758	2020 012 00030	470uF 16V 20% SMD
2760	2020 552 96618	1uF 10V 25V
2800	2020 012 91557	100uF 20% 18V
2801	3198 035 71040	100uF 10V 18V 0402
2802	3198 035 71040	100uF 10V 18V 0402
2803	3198 035 71040	100uF 10V 18V 0402
2804	3198 035 71040	100uF 10V 18V 0402
2805	3198 035 71040	100uF 10V 18V 0402
2806	3198 035 71040	100uF 10V 18V 0402
2807	3198 035 71040	100uF 10V 18V 0402
2808	3198 035 71040	100uF 10V 18V 0402
2809	3198 035 71040	100uF 10V 18V 0402
2810	3198 035 71040	100uF 10V 18V 0402
2811	3198 035 71040	100uF 10V 18V 0402

2808	3198 035 71040	100uF 10V 18V 0402
2809	3198 035 71040	100uF 10V 18V 0402
2810	3198 035 71040	100uF 10V 18V 0402
2811	3198 035 71040	100uF 10V 18V 0402
2812	3198 035 71040	100uF 10V 18V 0402
2813	3198 035 71040	100uF 10V 18V 0402
2814	3198 035 71040	100uF 10V 18V 0402
2815	5322 124 41945	22uF 20V 35V
2816	3198 035 71040	100uF 10V 18V 0402
2817	3198 035 71040	100uF 10V 18V 0402
2818	3198 035 71040	100uF 10V 18V 0402
2819	3198 035 71040	100uF 10V 18V 0402
2820	3198 035 71040	100uF 10V 18V 0402
2821	3198 035 71040	100uF 10V 18V 0402
2822	3198 035 71040	100uF 10V 18V 0402
2823	4822 126 14519	22pF 5% 50V 0402
2824	4822 126 14519	22pF 5% 50V 0402
2900	3198 035 71040	100uF 10V 18V 0402
2901	2020 552 96618	1nF 10V 50V 0402
2902	2020 021 00046	470uF 20% 16V
2903	3198 035 71040	100uF 10V 18V 0402
2904	4822 124 80151	47uF 16V
2905	2020 021 91557	100uF 20% 16V
2906	3198 035 71040	100uF 10V 18V 0402
2907	3198 035 71040	100uF 10V 18V 0402
2908	3198 035 71040	100uF 10V 18V 0402
2909	3198 035 71040	100uF 10V 18V 0402
2910	3198 035 71040	100uF 10V 18V 0402
2911	3198 035 71040	100uF 10V 18V 0402
2912	3198 035 71040	100uF 10V 18V 0402
2913	3198 035 71040	100uF 10V 18V 0402
2914	3198 035 71040	100uF 10V 18V 0402
2915	3198 035 71040	100uF 10V 18V 0402
2916	3198 035 71040	100uF 10V 18V 0402
2917	2020 021 91557	100uF 20% 16V
2918	3198 035 71040	100uF 10V 18V 0402
2919	3198 035 71040	100uF 10V 18V 0402
2920	3198 035 71040	100uF 10V 18V 0402
2921	3198 035 71040	100uF 10V 18V 0402
2922	3198 035 71040	100uF 10V 18V 0402
2923	3198 035 71040	100uF 10V 18V 0402
2924	3198 035 71040	100uF 10V 18V 0402
2925	3198 035 71040	100uF 10V 18V 0402
2926	3198 035 71040	100uF 10V 18V 0402
2927	3198 035 71040	100uF 10V 18V 0402
2928	3198 035 71040	100uF 10V 18V 0402
2929	3198 035 71040	100uF 10V 18V 0402
2930	3198 035 71040	100uF 10V 18V 0402
2931	3198 035 71040	100uF 10V 18V 0402
2932	3198 035 71040	100uF 10V 18V 0402
2933	3198 035 71040	100uF 10V 18V 0402
2934	4822 124 80151	47uF 16V
2935	3198 035 71040	100uF 10V 18V 0402
2936	3198 035 71040	100uF 10V 18V 0402
2937	3198 035 71040	100uF 10V 18V 0402
2938	3198 035 71040	100uF 10V 18V 0402
2939	3198 035 71040	100uF 1

7900	9322 142 88888	LP25COT
7901	9322 189 19999	LD10862T18
7901	9322 214 42671	KAD23238F-CC50
7C00	9322 205 12871	MX29LV040QC-70G
7C01	9322 206 23668	M24C32-WMN5P
7C02	9322 215 36695	PST596JN
7E00	9322 195 23668	ADG7338RU
7E01	9322 198 80668	SM5301BS-G
7E02	9322 199 56668	ADG7818CP
7E03	4822 209 60792	74HC4053D
7E04	9352 607 39118	74LVC14APW
7E05	9352 607 39118	74LVC14APW
7F03	9322 206 24668	M24C02-WMN5P
7G03	3198 010 42310	BC847BW
7G05	3198 010 42310	BC847BW
7G10	4822 208 60792	74HC4053D
7L01	3198 010 42310	BC847BW
7L02	3198 010 42310	BC847BW
7L03	3198 010 42310	BC847BW
7L04	9322 212 77672	MS70889C-LF-110
7L05	4822 205 17398	LD11170T33
7L06	9965 000 04199	BSN20
7L07	9965 000 04199	BSN20
7MC0	9322 204 76671	76TUSXB0-0001
7MC1	9322 205 19872	MSM58V16160F-7T3-FG
7MC3	9322 170 14668	LF15ABDT
7N01	9322 210 01688	EPG54518N
7N02	9322 217 35671	EP1C12F258C8N
7N03	9340 425 20115	BC847BW
7N04	9322 210 59668	THC63LVDF84B
7P01	9322 170 14668	LF15ABDT
7P02	9322 201 03668	THC63LVDM83R

Audio Amplifier Panel [C]

Various

1001	2422 025 08406	Connector 4p m
1002	2422 025 10789	Connector 5p m
1003	2422 025 10758	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 30582	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 14075	220nF +80-20% 25V
2023	4822 121 51252	470nF 5% 63V
2024	2020 012 00036	1000µ 25V
2025	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 98556	10µF 20% 25V 1210
2040	4822 126 13879	220nF +80-20% 16V
2041	2020 552 98556	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 14075	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

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3001	5322 117 11728	10Ω 5%
3003	4822 051 30223	22kΩ 5% 0.062W
3004	4822 051 30103	10kΩ 5% 0.062W
3005	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	8.8Ω 5% 0.062W
3011	4822 051 30222	2.2kΩ 5% 0.062W
3012	4822 051 20108	10Ω 5% 0.1W
3013	4822 051 30103	10kΩ 5% 0.062W
3014	2322 782 60229	22Ω 5% 1005
3019	4822 051 30103	10kΩ 5% 0.062W
3020	4822 051 30103	10kΩ 5% 0.062W
3021	4822 051 30472	4.7Ω 5% 0.062W
3022	9965 000 23106	22Ω 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	8.8Ω 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 20108	10Ω 5% 0.1W
3031	2322 782 60229	22Ω 5% 1005
3032	4822 051 30392	3.9Ω 5% 0.063W 0603
3033	4822 051 30103	10kΩ 5% 0.062W
3034	4822 051 30392	3.9Ω 5% 0.063W 0603
3037	4822 051 30392	3.9Ω 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
3045	4822 051 30102	1kΩ 5% 0.062W
3047	4822 051 30102	1kΩ 5% 0.062W

5001	2422 549 44197	Beed 220Ω 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

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6002	4822 130 80622	BAT54
6003	4822 130 80622	BAT54

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7000	9352 760 45118	TDA8931/T/N1
7001	9352 760 45118	TDA8931/T/N1
7004	9322 209 56885	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 tp 0.1A 12V
1310	4822 276 13775	Switch tp 0.1A 12V
1312	4822 276 13775	Switch tp 0.1A 12V
1313	4822 276 13775	Switch tp 0.1A 12V
1314	4822 276 13775	Switch tp 0.1A 12V
1684	4822 287 10459	Connector 3p
9844	3139 131 04421	Cable 03P/340/03P
3318	4822 061 30151	150Ω 5% 0.062W
3319	4822 061 30391	390Ω 5% 0.062W

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

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6306	4822 130 11148	UD24.7B
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Side AV Panel [G]

Various

1301	2422 025 14531	20p1
1001	4822 267 10484	YKF51-5359
1302	2422 025 10738	Connector 6p m
1302	2422 026 05655	Socket CINC 3P F
1303		RDWVJE
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

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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
2310A	3198 017 41050	1µF 10V 0603
2326	3198 017 41050	1µF 10V 0603

-WW-

3301	4822 051 30101	100Ω 5% 0.062W
3301	4822 051 30759	75Ω 5% 0.062W
3302	4822 051 30109	10Ω 5% 0.062W
3302	4822 051 30759	75Ω 5% 0.062W
3303	4822 051 30109	10Ω 5% 0.062W
3303	4822 051 30221	220Ω 5% 0.062W
3304	4822 051 30223	22kΩ 5% 0.062W
3304	4822 051 30759	75Ω 5% 0.062W
3306	4822 117 12925	47kΩ 1% 0.063W 0603
3306	4822 117 13832	100kΩ 1% 0603 0.62W
3306	4822 051 30153	15kΩ 5% 0.062W
3306	4822 051 30759	75Ω 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
3309A	4822 051 30759	75Ω 5% 0.062W
3310A	4822 051 30683	58kΩ 5% 0.062W
3311	4822 051 30103	10kΩ 5% 0.062W
3325	4822 051 30759	75Ω 5% 0.062W
3326	4822 051 30102	1kΩ 5% 0.062W
3327	4822 117 13632	100kΩ 1% 0603 0.62W
3328	4822 051 30101	100Ω 5% 0.062W
3329	4822 051 30583	58kΩ 5% 0.062W

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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 276 13775	Switch tp 0.1A 12V
6311	4822 130 11416	PD26.9B
6311	4822 130 11416	PD26.9B

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7301A	4822 130 60373	BC856B
7326	4822 130 60373	BC856B

IR/LED/Light-sensor Panel [J]

Various

0080	3198 120 10171	Light sensor holder
1540	2422 025 10738	Connector 6p m
1870	4822 265 31987	Connector 7p m

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2540	4822 124 41643	100pF 20% 16V
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11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- Corrected several errors in the text, drawings and spare parts list.

Manual xxxx xxx xxxx.2

- Corrected several errors in the text, drawings and spare parts list.