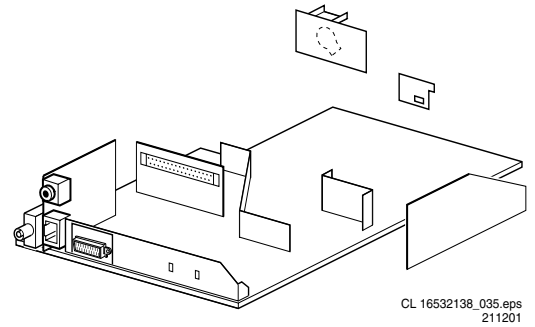


Service  
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**Service**



# Service Manual

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# 1. Technical Specifications, Connections and Chassis Overview

**Note:** Described specifications are valid for the *whole* product range.

## 1.1 Technical Specifications

### 1.1.1 Reception

Tuning system	: PLL
Colour systems	: PAL B/G, D/K, I : SECAM B/G, L/L'
Sound systems	: FM/AM mono : FM stereo (2CS) : NICAM
A/V connections	: FM radio (10.7 MHz) : PAL BG : SECAM L/L' : NTSC 3.58 (playback only)

Channel selections	: NTSC 4.43 (playback only) : 100 channels
IF frequency	: UVSH
Aerial input	: 38.9 MHz : 75 Ω, Coax

### 1.1.2 Miscellaneous

Audio output (RMS)	: 1 W mono : 2 W mono : 4 W mono : 2 x 3 W stereo
Mains voltage	: 220 - 240 V (± 10 %)
Mains frequency	: 50 / 60 Hz (± 5 %)
Ambient temperature	: + 5 to + 45 deg. C
Maximum humidity	: 90 %
Power consumption	: 36 W (14") to : 52 W (21")
Standby Power consumption	: < 3 W

## 1.2 Connections

### 1.2.1 Front Connections and Front Control

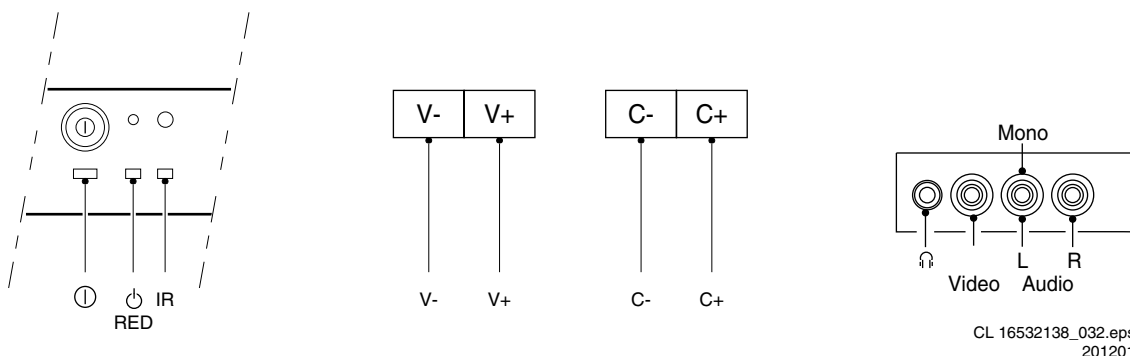


Figure 1-1

#### Audio / Video In

1 Headphone 3.5 mm (8 - 600 Ω / 4 mW)



2 Video

CVBS (1 Vpp / 75 Ω)



3 Audio

Mono (0.5 Vrms / 10 kΩ)



### 1.2.2 Rear Connections

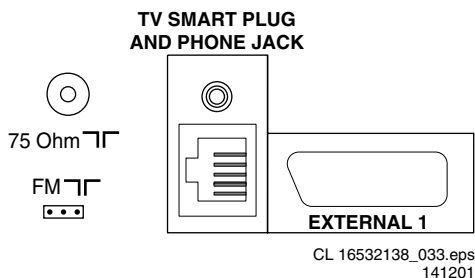


Figure 1-2

#### External 1: RGB/YUV in + CVBS in/out

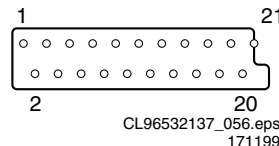


Figure 1-3

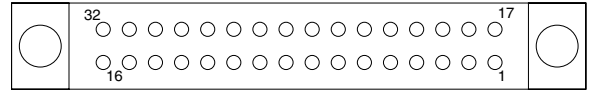
1	Audio	R (0.5 Vrms / 1 kΩ)	
2	Audio	R (0.5 Vrms / 10 kΩ)	
3	Audio	L (0.5 Vrms / 1 kΩ)	
4	-	GND	
5	-	GND	
6	Audio	L (0.5 Vrms / 10 kΩ)	
7	Blue / U	(0.7 Vpp / 75 Ω)	
8	GVBS-status	0 - 2.0 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	

9	-	GND	⏏
10	-		⏏
11	Green / Y	(0.7 Vpp / 75 Ω)	⊕
12	-		⏏
13	-	GND	⏏
14	-	GND	⏏
15	Red / V	(0.7 Vpp / 75 Ω)	⊕
16	RGB-status	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17	-	GND	⏏
18	-	GND	⏏
19	GVBS	(1 Vpp / 75 Ω)	⊕
20	GVBS	(1 Vpp / 75 Ω)	⊕
21	Earth	GND	⏏

**TV Aerial In**  
Aerial input : 75 Ω, coax (IEC-type)

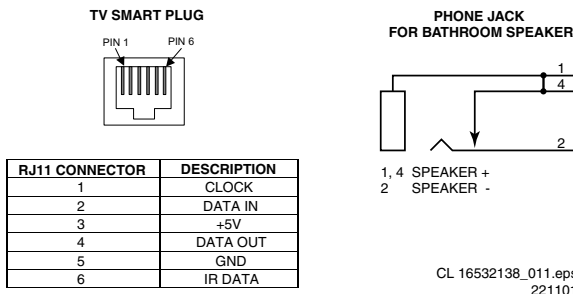
**FM Radio In**  
Aerial input : via 'coax-to-3 pins' adapter  
: 'cable' or 'wire' antenna

32 PIN SMART CARD CONNECTOR



PIN		PIN	
1	RESERVE	17	ANALOG BLUE IN
2	GROUND (POWER)	18	ANALOG GREEN IN
3	+12V	19	ANALOG RED IN
4	GROUND (IIC)	20	FAST BLANKING IN
5	IR-DATA	21	GROUND CVBS-OUT
6	POR	22	CVBS-OUT
7	TV-CLOCK	23	AUDIO OUT MONO +
8	DATA-IN	24	RESERVE
9	DATA-OUT	25	AUDIO OUT MONO -
10	+5V	26	GROUND AUDIO IN
11	HORIZONTAL SYNC OUT	27	RIGHT AUDIO OUT
12	VERTICAL SYNC OUT	28	LEFT AUDIO OUT
13	GROUND CVBS-IN	29	RIGHT AUDIO IN
14	SCL	30	LEFT AUDIO/MONO IN
15	SDA	31	CVBS/Y IN
16	RESERVE	32	"C" IN

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171201

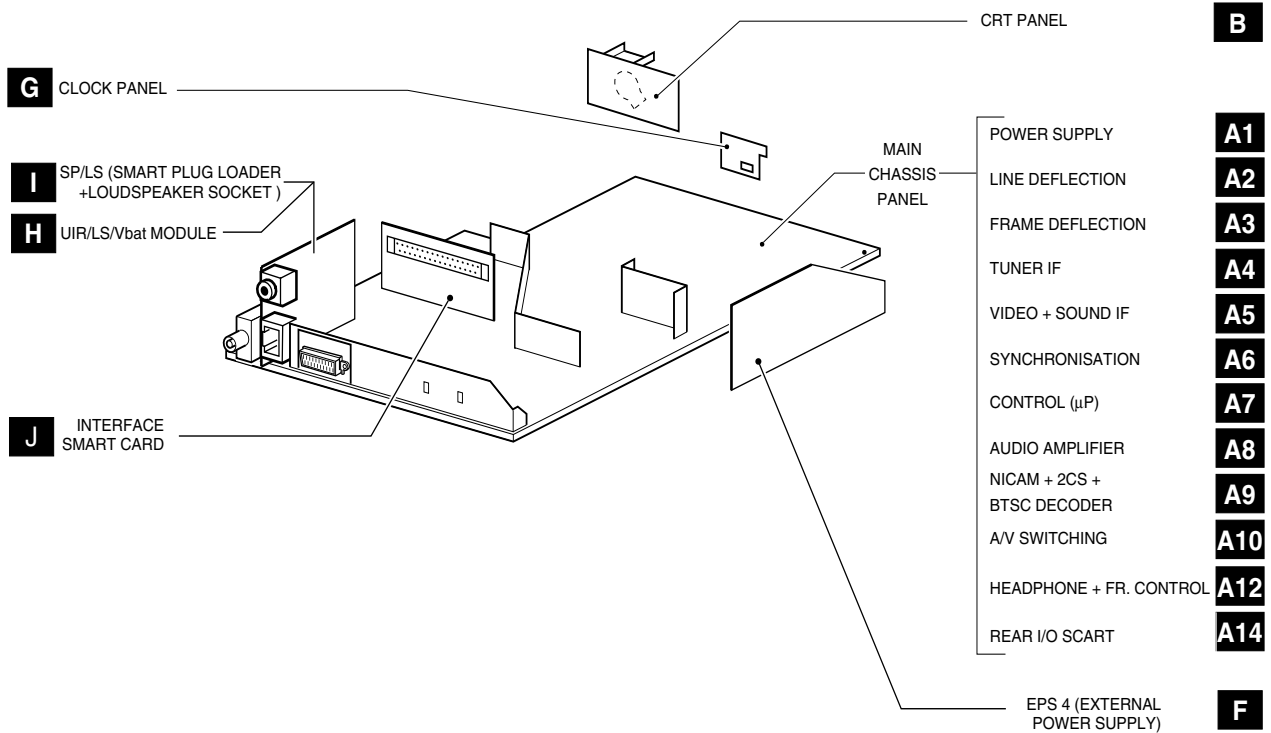


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221101

Figure 1-5

Figure 1-4

1.3 Chassis Overview



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211201

Figure 1-6

## 2. Safety & Maintenance Instructions, Warnings, and Notes

### 2.1 Safety Instructions For Repairs

Safety regulations require that during a repair:

- Due to the 'hot' parts of this chassis, the set must be connected to the AC power via an isolation transformer.
- Safety components, indicated by the symbol **▲**, should be replaced by components identical to the original ones.
- When replacing the CRT, safety goggles must be worn.

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

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current is flowing, in particular:
  - all pins of the line output transformer (LOT)
  - fly-back capacitor(s)
  - S-correction capacitor(s)
  - line output transistor
  - pins of the connector with wires to the deflection coil
  - other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the AC power cord for external damage.
- Check the strain relief of the AC power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the AC plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the AC power cord and connect a wire between the two pins of the AC plug.
  2. Turn on the main power switch (keep the AC power cord unplugged!).
  3. Measure the resistance value between the pins of the AC plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch the TV OFF and remove the wire between the two pins of the AC plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

### 2.2 Maintenance Instructions

It is recommended to have a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When the set is used under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When the set is used in an environment with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

### 2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position VDC). Discharge until the meter reading is 0 V (after approx. 30 s).

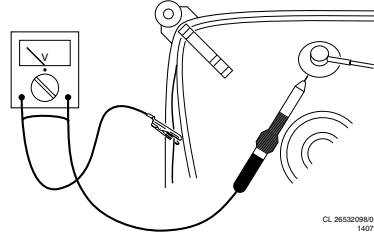


Figure 2-1

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD) **▲**. Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable, and ground cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
- Be careful during measurements in the high voltage section and on the picture tube.
- 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.

### 2.4 Notes

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (⚡), depending on the area of circuitry being tested.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz (PAL) or 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (⏏) and without (⏏) aerial signal. Measure the voltages in the power supply section both in normal operation (Ⓜ) and in standby (Ⓜ). These values are indicated by means of the appropriate symbols.
- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
- The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

## 3. Directions for Use

GB

### PHILIPS Institutional TV - Instructions for use

#### Installing the television

- Safety**
- Place your television on a stable and strong base.
  - Leave at least a minimum free space of 5 cm on both sides and 10 cm from the top for sufficient ventilation of the set.
  - Do not cover the ventilation openings with items such as newspapers, cloths, curtains, etc.
  - Do not place any flame sources such as lighted candles on the television.
  - Never try repairing the set by yourself; always contact a qualified technician.
  - Do not expose the television to moisture or splashing and do not place any object filled with liquids on top of the television.

#### Environmental

Your television contains material that can be recycled and reused by specialised companies. Please find out about local regulations on the disposal of your old television set. Pay particular attention to the disposal of exhausted batteries.

Your television consumes energy in the stand-by mode. Energy consumption contributes to air and water pollution. We advise you to switch off your television overnight instead of leaving it in stand-by mode.

#### Connecting the mains

Insert the mains plug into the wall socket and switch on. Please refer to the label on the back of the television for the correct operating voltage.

#### Installing the remote control

- Remove the cover at the back of the remote control.
- Insert the correct type and size batteries into the compartment making sure they are the right way around.
- You can secure your batteries by fastening an appropriate screw into the hole of the battery cover.

#### Note

Clock and wake-up alarm are not available on Pro-Plus sets when television is switched off by mains switch.

#### Accessing the Set-up Menu

When the set is in the High Security Mode, the Set-up menu can be accessed only by a T374AH Institutional Set-up Remote Control (FG4172BK). When the set is in the Standard Security Mode the Set-up Menu may be accessed with a guest remote control (like the RC2882) by a sequence of commands (3 1 9 7 5 3 MUTE).

#### Navigation

The current menu item can be selected by means of the cursor up and cursor down keys. Submenus can be accessed from menu items with a "↵" symbol pressing the cursor right key.

#### Language

The Language function is shown in the Menu as "LANGUAGE", and its valid modes are "ENGLISH", "DEUTSCH", "FRANCAIS" and "ITALIANO".

#### No. of Programs

This sub menu allows setting the number of television, PAY-TV Radio and Info programs. The overall maximum number of programs is 125.

#### Installation

When this menu is open, all the protections are inactive. To exit any menu press Menu button.

#### Input

The "Input" menu item selects the desired input source that will be assigned to the program. Possible values are Front End, AV1, AV2 and AV2YC (internal interface for system televisions only), and RADIO.

#### System

WEST EU (PAL/SECAM-BG) and EAST EU (PAL/SECAM-DK), UK (PAL-I), FRANCE (SECAM-L/L).

#### Manual Search

Digits can be entered for a frequency in MHz. Right cursor starts an auto search; during frequency entry the digits not yet entered are displayed as dashes "-". Enter "0" for frequencies below 100 MHz.

#### Program no.

The programme type can be selected with the cursor left/right buttons. These buttons will toggle between all available types: "TV", "INFO", "PAY-TV" and "RADIO". If the program number of a certain type is 0, the corresponding type is not displayed. In order to display a program number of the above-mentioned types, always enter two numbers, for example: "01" for TV1 or digit "-" and up/down cursor.

#### Store

The present program information is stored after pressing the cursor left/right button. Press Menu to exit without storing.

#### Fine Tune

Using the "control left/right" commands starts fine-tuning.

#### Protection

This function indicates whether the selected program has a protection or not. With the cursor left/right keys the protection can toggle between "YES" and "NO".

#### Label

This menu item will be used to add a label/name for each program. Pressing the left/right buttons you may enter or exit the label field; pressing the up/down cursor you may insert alphanumeric characters. Pressing M (Menu button) you may exit the Label Menu item.

#### Teletext Language

This menu enables the user to select the Teletext character set to be used for the selected channel. With cursor left/right you can select a letter corresponding to the different language clusters. "W": Pan European (Latin) / West option "E": Pan European (Latin) / East option "G": Greek "A": Arabic "C": Cyrillic

#### Video Blank

This item can change between "YES" and "NO" to activate or deactivate picture mute.

#### Audio Mute

This item can change between "YES" and "NO" to activate or deactivate sound mute.

#### Remarks

TELEVISION up/down, INFO up/down, PAY-TV up/down and RADIO up/down are active in menu mode and the television reacts the same way as in TV mode.

#### Clock set-up

The Clock set-up menu can be entered from this menu item. The Menu items actually displayed depend on whether a LED clock display is available or not.

#### Display (OSD only)

Defines whether the actual time is displayed on the screen or not.

#### Display Standby (LED only)

This menu item will be used to set the intensity of the clock display when the television is in standby mode.

#### Display On (LED only)

This menu item will be used to set the intensity of the clock when the television is in the ON mode.

#### Time Setting

This menu item will be used to set the time for the clock.

#### Teletext Time Download

This menu item is used to activate or deactivate the function for automatic time downloading by means of Teletext.

- Download Program**  
This menu item is used to select the channel from which to retrieve the correct time from the Teletext. When this item is selected the television set tunes to the selected program.
- Time Offset**  
This menu item is used to set the offset needed to adjust the time received from the Teletext channel to represent the current time in the current location.
- **Brightness**  
The brightness control contains 63 discrete values from the minimum to maximum setting.
  - **Colour**  
The colour control contains 63 discrete values from the minimum to maximum setting.
  - **Contrast**  
The contrast control contains 63 discrete values from the minimum to maximum setting.
  - **Sharpness**  
The sharpness control contains 63 discrete values from the minimum to maximum setting.
  - **Forced mono (for stereo televisions only)**  
This command is used to activate or deactivate the stereo feature in stereo sets. Toggle YES, NO using the right/left cursor.
  - **Balance (for stereo televisions only)**  
To balance the output sound from TELEVISION's speakers left and right
  - **Treble (for stereo televisions only)**  
To set the treble frequencies of sound output from TELEVISION's speakers.
  - **Bass (for stereo televisions only)**  
To set the bass frequencies of sound output from television's speakers.
  - **AVL (Automatic Volume Leveller)**  
The Automatic Volume Leveller feature is shown as "AVL" in the menu and its valid states are "YES"; "NO".
  - **Volume Fixed**  
The valid toggle states are "YES" and "NO": if YES, the volume is fixed at a certain volume, if NO, the volume contains 63 discrete values.
  - **Volume Bar**  
To display volume bar when adjusting volume, select "YES". Select "NO" to hide the bar.
  - **Min Volume**  
This item sets the limit for minimum volume allowed for the television set. Use right/left cursor to adjust.
  - **Max Volume**  
This item sets the limit for the maximum volume allowed for the television set. Use right/left cursor to adjust.
  - **Switch on Volume**  
This item sets the television's volume at switch on. Use the right/left cursor to adjust.
  - **Buzzer Volume**  
This item sets the volume of the alarm buzzer. Use the right/left cursor to adjust.
  - **Switch On Program**  
This item sets the television's program at switch on.
  - **Power On**  
The Power On menu function defines the behaviour of the television whenever AC Power is applied.  
The valid states are "FORCED", "STANDARD" and "STANDBY".  
When "FORCED", the television can only be switched OFF by means of the main switch or a set-up remote control or by ESP function (Energy Saving Programmability controls the maximum continuous viewing time allowed by the control system).  
When "STANDARD", the television switches on the previous status, ON or Stand-by.  
When "STAND-BY", the television always switches on in Stand-by.
  - **Step Tuning (YES/NO)**  
If YES, TV programs (1 to 9) are tuned immediately when a digit is pressed.  
If NO, tuning is performed only after the dash disappears.
  - **Digit Time-out**  
This is the time-out to enter the second digit for TV program 10 onwards.
  - **Program Display**  
Program Display values can be: Number, Label, All, None.
  - **Keyboard Lock**  
In Commercial Mode, the Keyboard Lockout menu function disables the television's local keyboard for volume and program control.
  - **Free protected programs**  
With this item all protected programs can be freed. If "free protected programs" is set to "YES", all programs are accessible for the user, if the item is "NO" protected programs are skipped. A TV program can be selected by relevant digit but with picture blanked and sound muted.
  - **ESP**  
Energy Saving Programmability Mode (ESP) controls the maximum continuous viewing time allowed by the control system.  
It allows the establishment to limit the time the Television remains activated once a Guest has checked-out.  
The ESP Menu function is shown as "ESP", and its valid values are 00 - 99 (in hours), 00 value means OFF.
  - **Interface**  
This item is only present in "system" sets and it is used to enable or disable communication with the DCM (Data Communication Module).
  - **Audio / Video Mute**  
The Audio/Video Mute menu function determines whether the video should be blanked and the audio should be muted if the currently tuned channel has no signal (Blue, Black, Off).
  - **Auto Scart**  
Enabler/disable automatic switching to external Scart source.
  - **Welcome Message**  
Press cursor left/right to display Welcome message entry menu:  
Welcome Message, Line 1, and Line 2.  
With the cursor up/down you can set the message characters.
  - **Program Guide**  
This feature will enable/disable in a "list" or "page", the program numbers with the associated labels.
  - **Reminder**  
This menu function is shown as "REMINDER", and its states are "YES"; "NO".
  - **Security**  
The menu function "SECURITY" allows the user to select one of two states "HIGH" or "STANDARD". The default is "STANDARD".  
While the set is in the Security High Mode the set-up menu can only be accessed by a T374AH Institutional Set-up Remote Control  
While the set is in the Security Standard Mode the Set-up Menu may be accessed with a guest remote control by a sequence of commands (3 1 9 7 5 3 MUTE).

## 4. Mechanical Instructions

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

### 4.1 Rear Cover Removal

1. Remove all (seven) fixation screws of the rear cover: two at the top, two at each side and one near the mains cord holder.
2. Now pull the rear cover backward to remove it.

### 4.2 Service Position Main Panel

1. Disconnect the strain relief of the Mains cord.
2. Remove the main panel, by pushing the two centre clips outward [1]. At the same time, pull the panel away from the CRT [2].
3. Disconnect the degaussing coil by removing the cable from (red) connector 0201.
4. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.

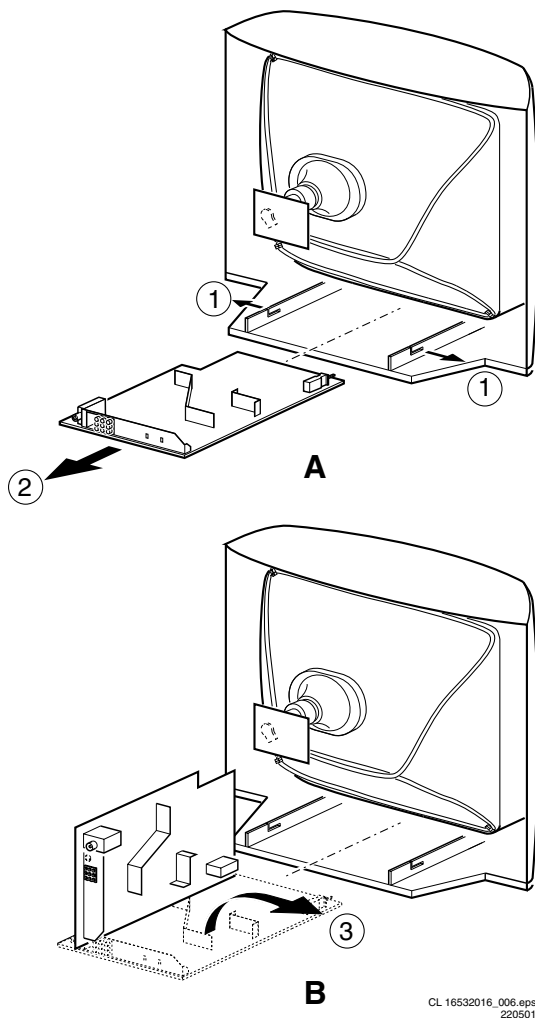


Figure 4-1

### 4.3 Rear Cover Mounting

Before you mount the rear cover:

1. Place the mains cord correctly in its guiding brackets (strain relief).
2. Place all cables in their original position.

## 5. Service Modes, Error Codes and Fault Finding

### Index:

1. Test points.
2. Service Modes.
3. Problems and Solving Tips (related to CSM).
4. Error Buffer.
5. The Blinking LED Procedure.
6. Protections.
7. Repair Tips.

### 5.1 Test Points

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

Table 5-1

TEST POINT OVERVIEW L01		
Test point	Circuit	Diagram
A1-A2-A3-..	Audio processing	A8, A9 / A11
C1-C2-C3-..	Control	A7
F1-F2-F3-..	Frame drive and output	A3
I1-I2-I3-..	Tuner & IF	A4
L1-L2-L3-..	Line drive	A2
P1-P2-P3-..	Power supply	A1
S1-S2-S3-..	Synchronisation	A6
V1-V2-V3-..	Video processing	A5, B1

The numbering is in a logical sequence for diagnostics. Always start diagnosing within a functional block in the sequence of the relevant test points for that block.

Perform measurements under the following conditions:

- Service Default Alignment Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

### 5.2 Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between dealer and customer.

Table 5-2

SW Cluster	Software name	UOC type	Diversity
1EU1	L01HE1 X.Y	TDA9552	L01H.2E
Abbreviations: H = Hotel, E = Europe, 1 = Basic, Basic Plus and System, English, French, German and Italian			

#### 5.2.1 Service Default Alignment Mode (SDAM)

##### Purpose

- To change option settings.
- To create a predefined setting to get the same measurement results as given in the manual.
- To display / clear the error code buffer when leaving SDAM with "STANDBY" key on remote control.
- To override SW protections.
- To perform alignments.
- To start the blinking LED procedure.

##### Specifications

- Tuning frequency:

- 475.25 MHz for PAL/SECAM (Europe and AP-PAL)
- Colour system:
  - PAL-M for LATAM BI/TRI/FOUR-NORMA.
  - SECAM L for France.
  - NTSC for NAFTA and AP-NTSC.
  - PAL-BG for Europe and AP-PAL.
- 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, like:
  - (sleep) timer,
  - child/parental lock,
  - blue mute,
  - hotel/hospitality mode
  - auto switch-off (when no 'IDENT' video signal is received for 15 minutes),
  - skip / blank of non-favorite presets / channels,
  - auto store of personal presets,
  - auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

##### How to Activate SDAM

Use one of the following methods:

- Use a System 7 remote control type T374AH (RC-transmitter RG4172BK) and key in the code '062596' directly followed by the 'M' (menu) button or
- Short circuit jumper wires 9631 and 9641 on the mono carrier (see fig. 8-1) and apply AC power. Then press the power button (remove the short circuit after start-up).  
**Caution:** Entering SDAM by short circuiting wires 9631 and 9641 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 lead to damaging the set.

After activating SDAM, the following screen is visible, with S at the upper right side for recognition.

##### SDAM Menu

LLLL	AAAABC X.Y	S
ERR	XX XX XX XX XX	
OP	XXX XXX XXX XXX XXX XXX XXX	
OPTIONS		>
DEFLECTION		>
TUNER		>
WHITE TONE		>
GEOMETRY		>

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221101

Figure 5-1

1. **LLLL**  
This is the operation hours counter. It counts the normal operation hours, not the standby hours.
2. **AAAABC-X.Y**  
This is the software identification of the main micro controller:
  - A = the project name (L01H).
  - B = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
  - C = the feature and language:



- (Europe: 1 = Basic, Basic Plus and System, English, French, German and Italian)
  - (AP: 1 = Z, R and Y System, English, Malay and Simplified Chinese)
  - (Latam: 1=H and S system)
  - X = the main software version number.
  - Y = the sub software version number.
3. **S Indication of the actual mode.**  
S= SDAM= Service Default Alignment mode.
  4. **Error buffer**  
Five errors possible.
  5. **Option bytes**  
Seven codes possible.
  6. **Options**  
To set the Option Bytes. See chapter 8.3.1 for a detailed description.
  7. **Deflection**  
To set the deflection values. See chapter 8.3.2 for a detailed description.
  8. **Tuner**  
To align the Tuner. See chapter 8.3.3 for a detailed description.
  9. **White Tone**  
To align the White Tone. See chapter 8.3.4 for a detailed description.
  10. **Geometry**  
To align the Geometry. See chapter 8.3.5 for a detailed description.

**How to Navigate**

Use one of the following methods:

- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the MENU key in a submenu, you will return to the previous menu.

**How to Store Settings**

To store settings first go back to the main menu (fig. 5-1) with "MENU" button on the remote control and then leave the SDAM with the "STANDBY" button on the remote control.

**How to Exit**

Switch the set to STANDBY by pressing the power button on the remote control transmitter. The error buffer is cleared. (If you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied and the error buffer will not be cleared.)

**5.2.2 Customer Service Mode (CSM)****Purpose**

When a customer is having problems with his TV-set, he can call his dealer. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge how severe the complaint is. In a lot of cases he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.

The CSM is a read only mode, therefore modifications in this mode are not possible.

**How to Activate**

To activate the CSM press the RECALL button on the System 7 remote control RG4172BK.

After switching ON the Customer Service Mode, the following screen will appear:

**CSM Menu**

1	AAAABC	X.Y				CSM			
2	CODE	XX	XX	XX	XX	XX			
3	OP	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
4	DETECTED SYSTEM					DETECTED SOUND			
5	NOT TUNED					SKIPPED			
6	TIMER								
7	CO	XX	CL	XX	BR	XX	SH	XX	
8	VL	XX	BL	XX					
9	BS	XX	TR	XX					
10	COMMERCIAL/CONSUMER						SMARTPORT	ON/OFF	
11	PROGRAM NO.	XXX							

CL 16532138\_019.eps  
141201

**Figure 5-2**

1. Software identification of the main micro controller (see paragraph 5.2.1 for an explanation).
2. Error code buffer (see paragraph 5.4 for more details). Displays the last five errors of the error code buffer.
3. In this line, the Option Bytes (OB) are visible. Each Option Byte is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8.3.1 for more information on the option settings.
4. Indicates which color and sound system is installed for the selected pre-set.
5. Indicates if the set is receiving an 'IDENT' signal on the selected source. It will display 'NOT TUNED' if not.
6. Shows "TIMER" if the sleep timer is activated, shows nothing when sleep timer is not activated.
7. Value indicates parameter levels at CSM entry. CO= CONTRAST, CL= COLOR, BR= BRIGHTNESS, SH= SHARPNESS
8. Value indicates parameter levels at CSM entry. VL= VOLUME LEVEL, BL= BALANCE LEVEL
9. Value indicates parameter levels at CSM entry (only for stereo sets). BS= BASS, TR= TREBLE
10. Mode Commercial = Hotel / Institutional mode or mode Consumer. Smartport. Indicates whether the Smart Port is selected or not.
11. Program NO. TV. Indicates to what channel the TV is tuned.

**How to Exit**

Use one of the following methods:

- Press any button of the remote control transmitter.
- Press RECALL on a System 7 remote control (the RC-transmitter RG4172BK).
- Switch-off the TV set with the AC power switch.

**5.3 Problems and Solving Tips (Related to CSM)****5.3.1 Picture Problems**

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

**No Colours / Noise in Picture**

Check CSM line 4. Wrong colour system installed. To change the setting:

1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

**Colours Not Correct / Unstable Picture**

Check CSM line 4. Wrong colour system installed. To change the setting:

1. Press the MENU button on the remote control.

2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

#### **Picture too Dark or too Bright**

Increase / decrease the BRIGHTNESS and / or the CONTRAST value when:

- The picture improves after you have pressed the 'Smart Picture' button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new 'Personal' preference value is automatically stored.

#### **White Line Around Picture Elements and Text**

Decrease the SHARPNESS value when:

- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

#### **Snowy Picture**

Check CSM line 5. If this line indicates 'Not Tuned', check the following:

- No or bad antenna signal. Connect a proper antenna signal.
- Antenna not connected. Connect the antenna.
- No channel / pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace / repair if necessary.

#### **Snowy Picture and/or Unstable Picture**

- A scrambled or decoded signal is received.

#### **Black and White Picture**

Increase the COLOR value when:

- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

#### **Menu Text Not Sharp Enough**

Decrease the CONTRAST value when:

- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

### 5.3.2 Sound Problems

#### **No Sound or Sound too Loud (After Channel Change / Switching On)**

Increase / decrease the VOLUME level when the volume is OK after you switched on the CSM. The new 'Personal' preference value is automatically stored.

### 5.4 Error Buffer

The error code buffer contains all detected errors 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 written at the left side and all other errors shift one position to the right.

#### 5.4.1 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SDAM (only if the TV gives 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 first detected and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See next paragraph.

#### 5.4.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- When you exit SDAM with the STANDBY command on the remote control (when leaving SDAM, by disconnecting the set from AC power, the error buffer is not cleared).
- If the content of the error buffer has not changed for 50 hours, it resets the buffer automatically.

#### **Error Codes**

In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure 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 code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

**Table 5-3**

ERROR CODE TABLE				
ERROR	Device	Error description	Def. item	Diagram
0	Not applicable	No Error		
1	Not applicable	X-Ray Protection (USA)	2465, 7460	A2
2	Not applicable	Horizontal Protection	7460, 7461, 7462, 7463, 6467	A2
3	TDA8359/TDA9302	Vertical Protection	7861, VloAux +13v	A2, A3
4	MSP34X5/TDA9853	MAP I2C identification error	7831, 7861	A9 or A11
5	TDA95XX	POR 3.3V / 8V Protection	7200, 7560, 7480	A1, A2, A5, A6, A7
6	I2C bus	General I2C bus error	7200, 3624, 3625	A7
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	7400, 3405, 3406, 3400	A2
9	M24C08	NVM I2C identification error	7602, 3611, 3603, 3604	A7
10	Tuner	Tuner I2C identification error	1000, 7482	A2, A4
11	TDA6107/8	Black current loop protection	7330, RGB amps, CRT	B1, B2
12	M65669	MAP I2C identification error (USA)	7803	P

**Note:** Error 7 is Not applicable, Due to ASD issue.

## 5.5 The Blinking LED Procedure

Via 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.

Go into the SDAM menu with one of the following methods:

1. '062596 M' on a System 7 remote control (the RC-transmitter RG4172BK).
2. Short circuit wires 9631 and 9641 on the mono carrier and apply AC power. Then press the power button (remove the short circuit after start-up).

As soon as you are in SDAM the blinking LED procedure will start.

Error-codes are shown as follows:

1. n short blinks (the number of n indicates the error code number.),
2. a pause of 1.5 s,
3. n short blinks (for the next error),
4. when all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
5. the sequence starts again.

Example of error buffer: 12 9 6 0 0

After entering SDAM:

1. 12 short blinks followed by a pause of 1.5 s,
2. 9 short blinks followed by a pause of 1.5 s,
3. 6 short blinks followed by a pause of 1.5 s,
4. 1 long blink of 3 s to finish the sequence,
5. the sequence starts again.

## 5.6 Protections

If a fault situation is detected an error code will be generated and if necessary, the set will be put in the protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SDAM) or the blinking LED procedure.

To get a quick diagnosis the chassis has two service modes implemented:

- The Customer Service Mode (CSM).
- The Service Default Alignment Mode (SDAM). Start-up of the set in a predefined way and adjustment of the set via a menu and with the help of test patterns.

## 5.7 Repair Tips

Below some failure symptoms are given, followed by a repair tip.

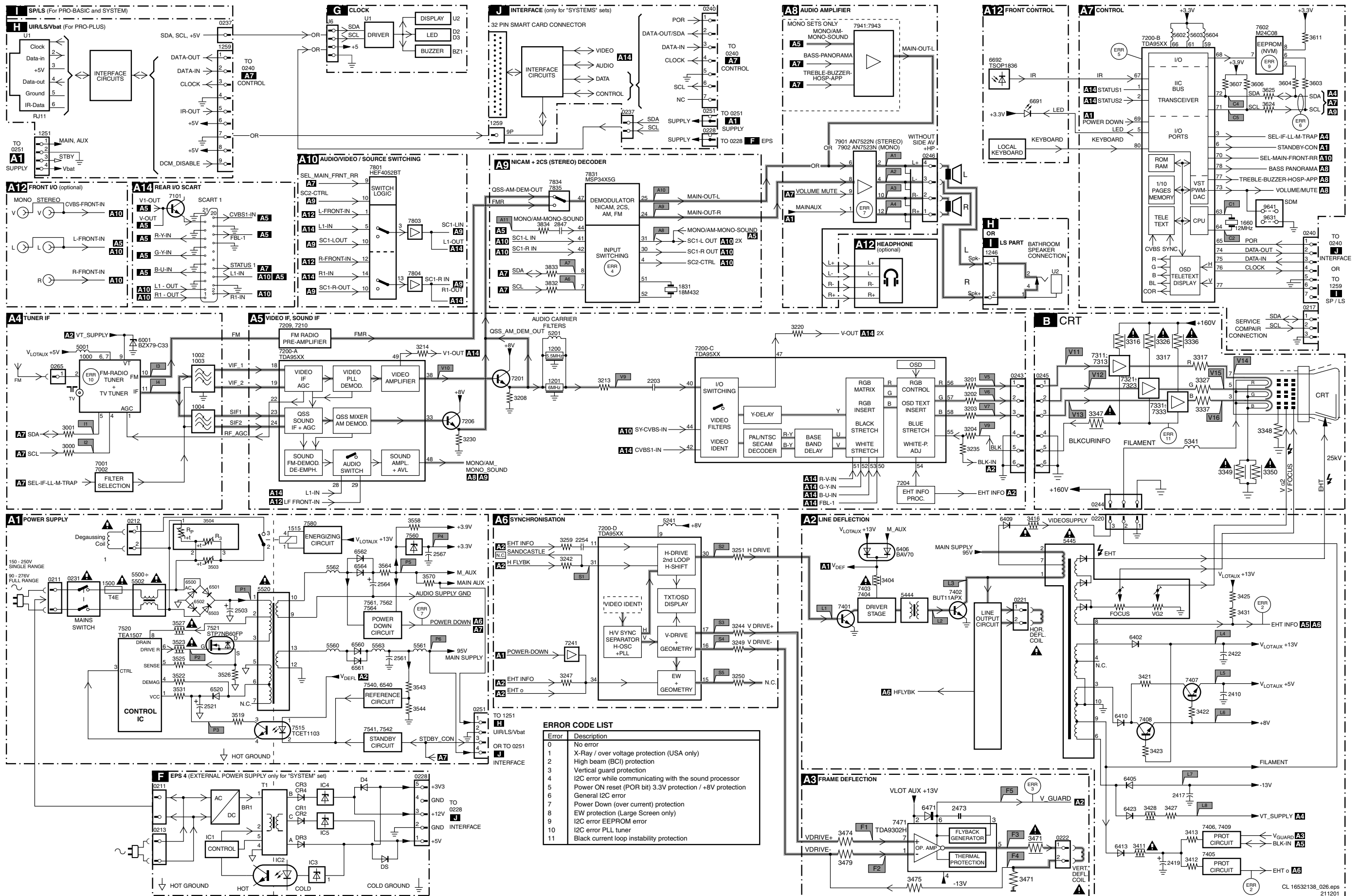
- **Set is dead and makes hiccuping sound**  
'MainSupply' is available. Hiccuping stops when desoldering L5561, meaning that problem is in the 'MainSupply' line. No output voltages at LOT, no horizontal deflection. Reason: line transistor TS7460 is defective.
- **Set is dead, and makes no sound**  
Check power supply IC7520. Result: voltage at pins 1, 3, 4, 5 and 6 are about 180 V and pin 8 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 6) has an open load. That is why MOSFET TS7521 is not able to switch. Reason: feedback resistor 3523 is defective. Caution: be careful measuring on the gate of TS7521; circuitry is very high ohmic and can easily be damaged! (first connect measuring equipment to ground, then to the gate).
- **Set is in hiccup mode and shuts down after 8 s.**  
Blinking LED (set in SDAM mode) indicates error 5. As it is unlikely that P 'POR' and '+8V protection' happen at the same time, measure the '+8V'. If this voltage is missing, check transistor TS7480.

- **Set is non-stop in hiccup mode**  
Set is in over current mode; check the secondary sensing (opto coupler 7515) and the 'MainSupply' voltage. Signal 'Stdby\_con' must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound**  
The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 5 and 7 are okay, 'VT\_supply' at pin 9 is missing. Conclusion: resistor 3460 is defective.
- **Set turns on, but with a half screen at the bottom. Sound is okay**  
Blinking LED (set in SDAM mode) indicates error 3. Check 'Vlotaux+13V' and '+50V'. If they are okay, problem is expected in the vertical amplifier IC7471. Measure with a scope the waveform on pin 17 of the UOC. Measure also at pin 1 of IC7471. If here the signal is missing, a defective resistor R3244 causes the problem



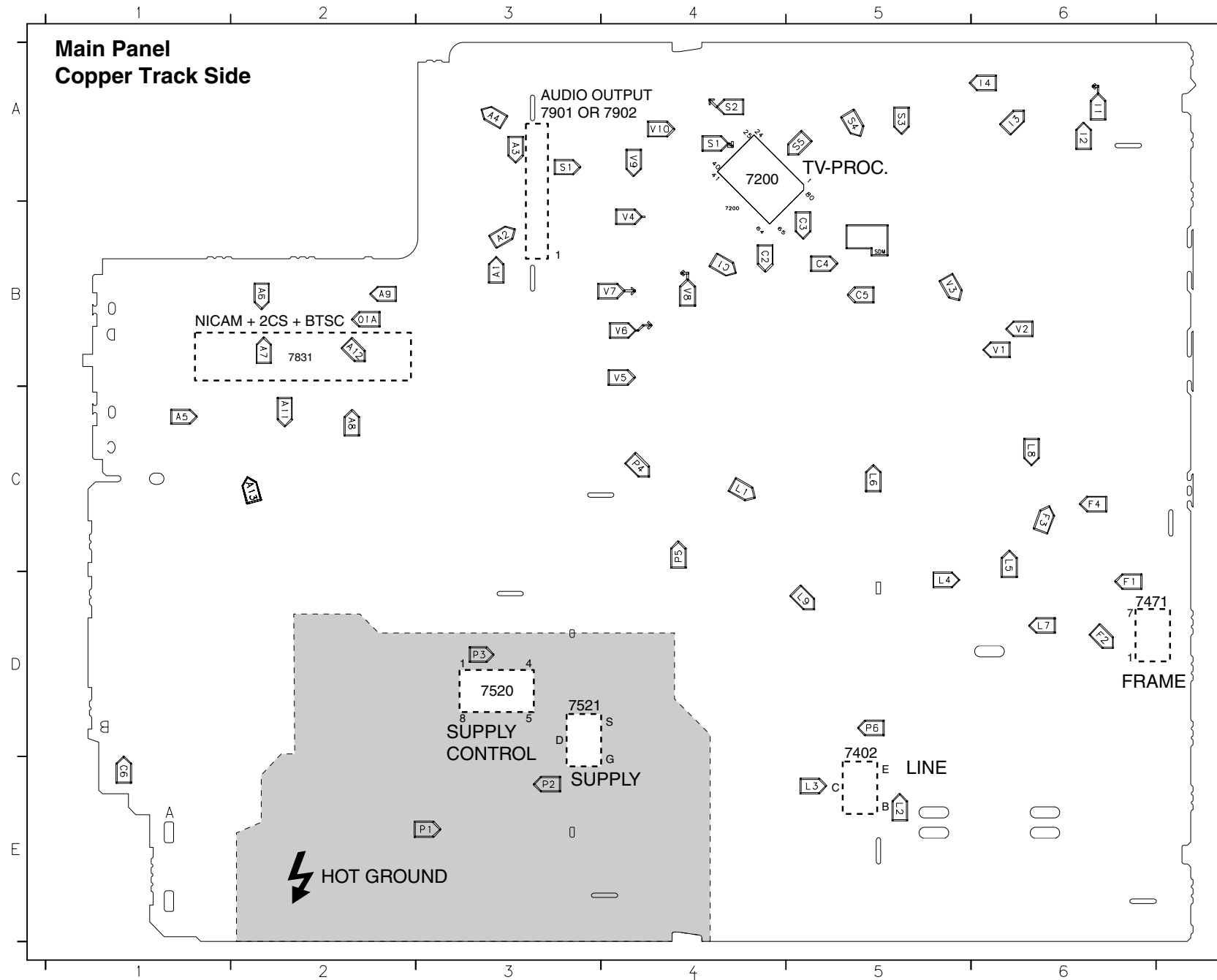
# 6. Block- and Wiring Diagram, Testpoints, I<sup>2</sup>C, and Supply Voltage Overview

## Block Diagram

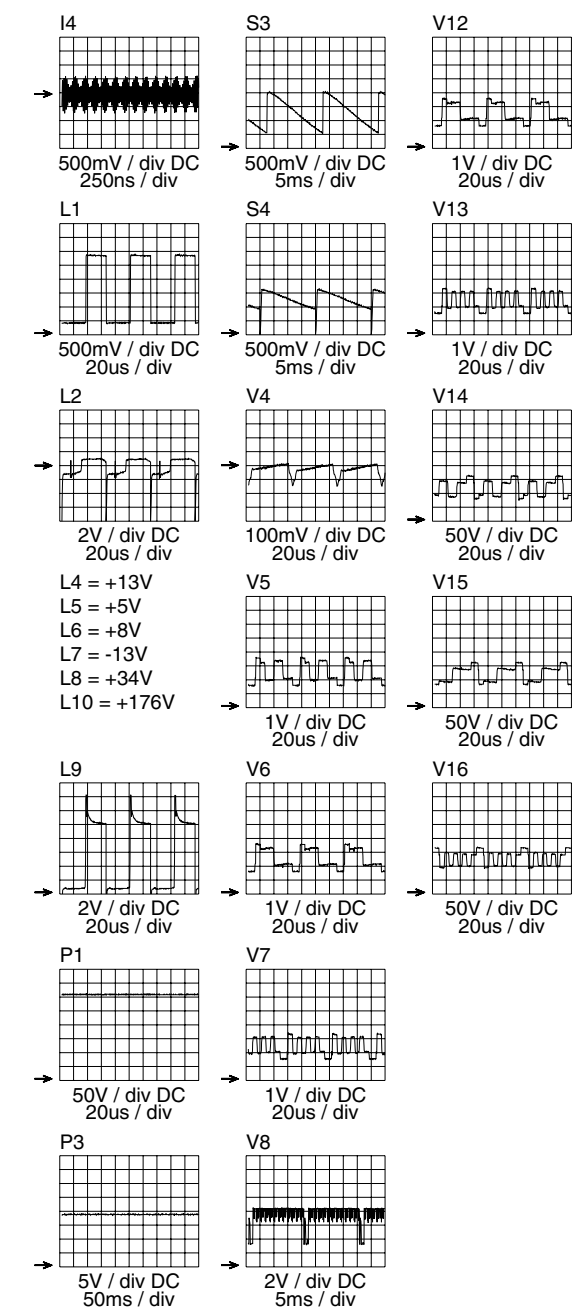




Testpoint Overview



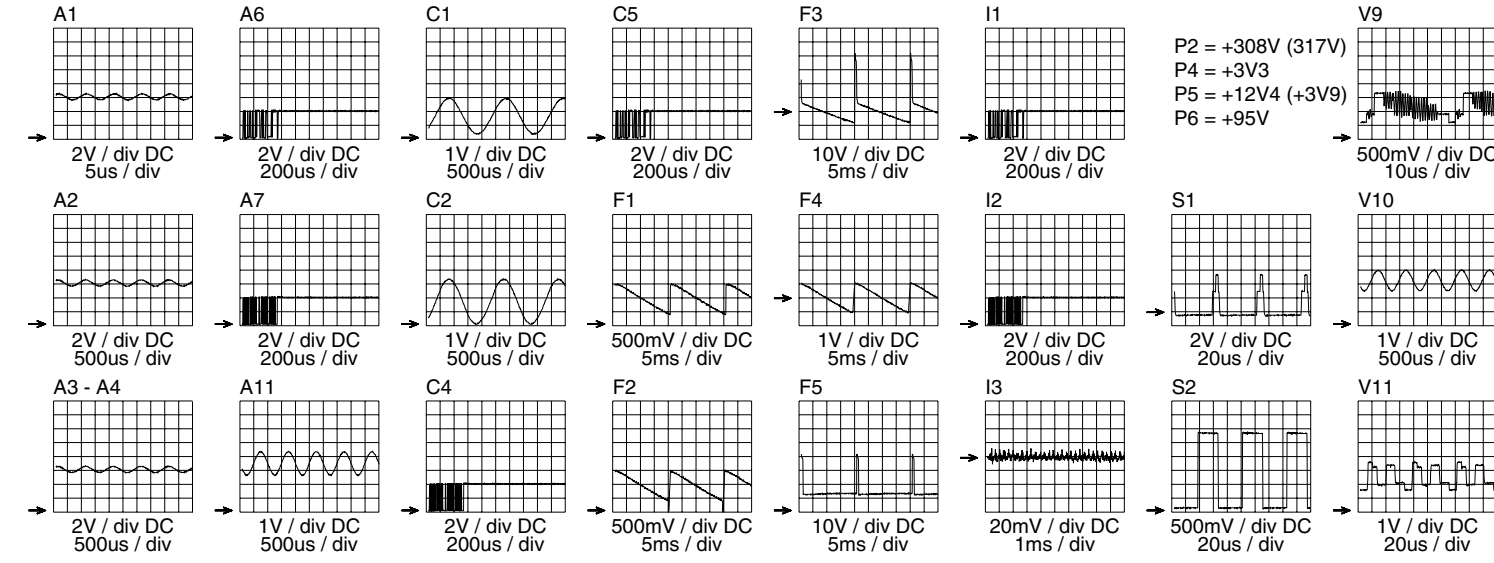
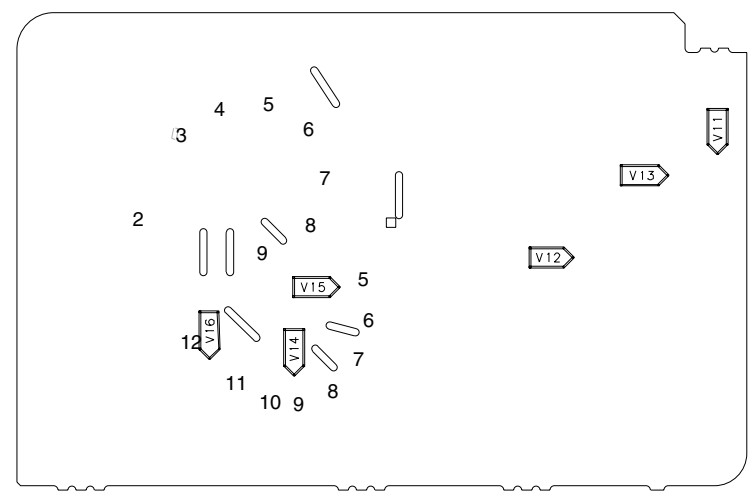
- A1 B3
- A2 B3
- A3 A3
- A4 A3
- A5 C1
- A6 B1
- A7 B1
- A8 C2
- A9 B2
- A10 B3
- A11 C2
- A12 B2
- A13 C3
- C1 B4
- C2 B4
- C3 B5
- C4 B5
- C5 B5
- C6 E1
- F1 D6
- F2 D6
- F3 C6
- F4 C6
- I1 A6
- I2 A6
- I3 A6
- I4 A6
- L1 C4
- L2 E5
- L3 E5
- L4 D5
- L6 C5
- L8 C6
- L9 D5
- P1 E3
- P2 E3
- P3 D3
- P4 C4
- P5 C4
- P6 D5
- S1 A4
- S2 A4
- S3 A5
- S4 A5
- S5 A4
- V1 B6
- V2 B6
- V3 B5
- V4 B4
- V5 B4
- V6 B4
- V7 B4
- V8 B4
- V9 A4
- V10 A4



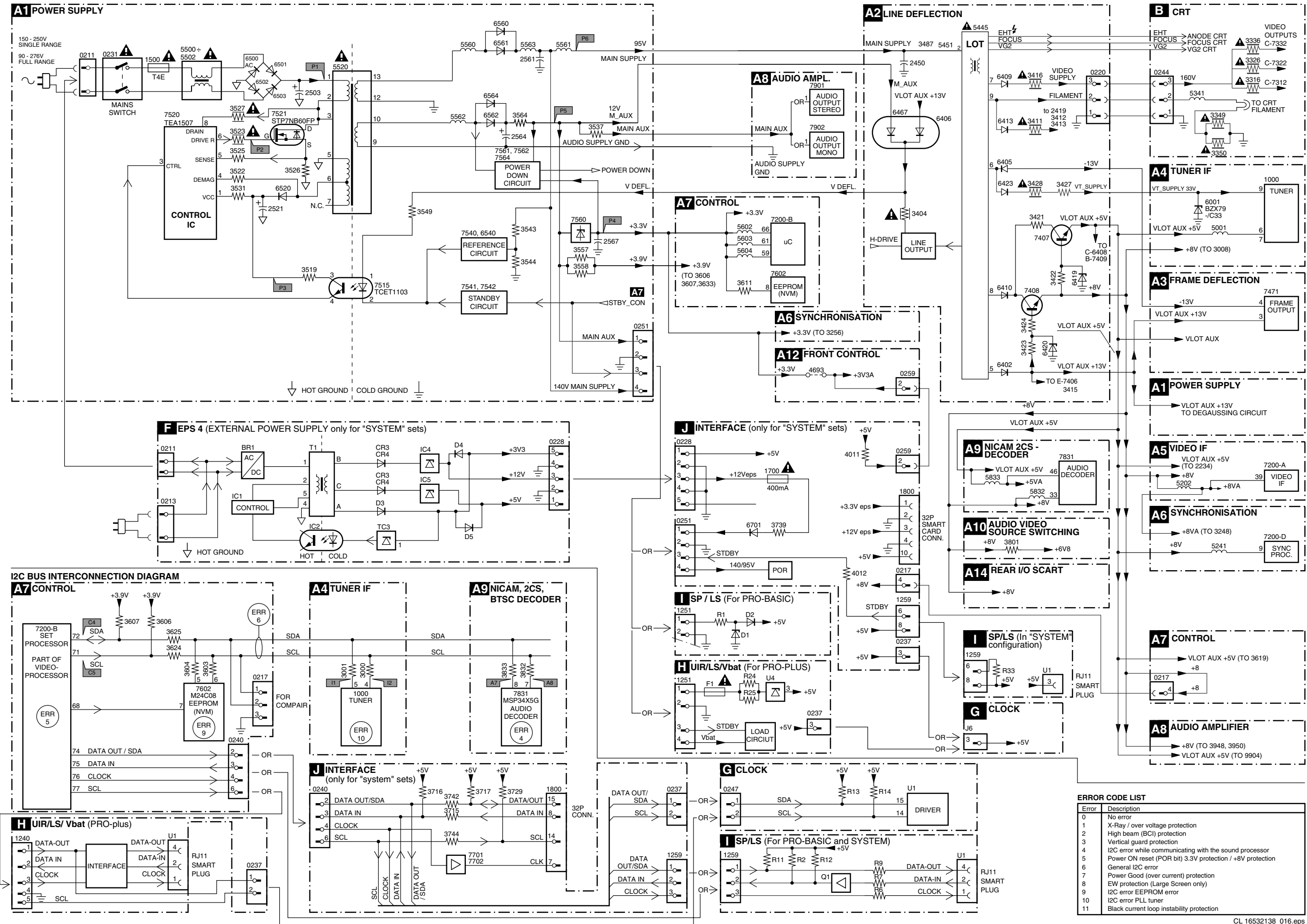
L4 = +13V  
 L5 = +5V  
 L6 = +8V  
 L7 = -13V  
 L8 = +34V  
 L10 = +176V

P2 = +308V (317V)  
 P4 = +3V3  
 P5 = +12V4 (+3V9)  
 P6 = +95V

CRT Panel Copper Track Side



I<sup>2</sup>C and Supply Voltage Diagram



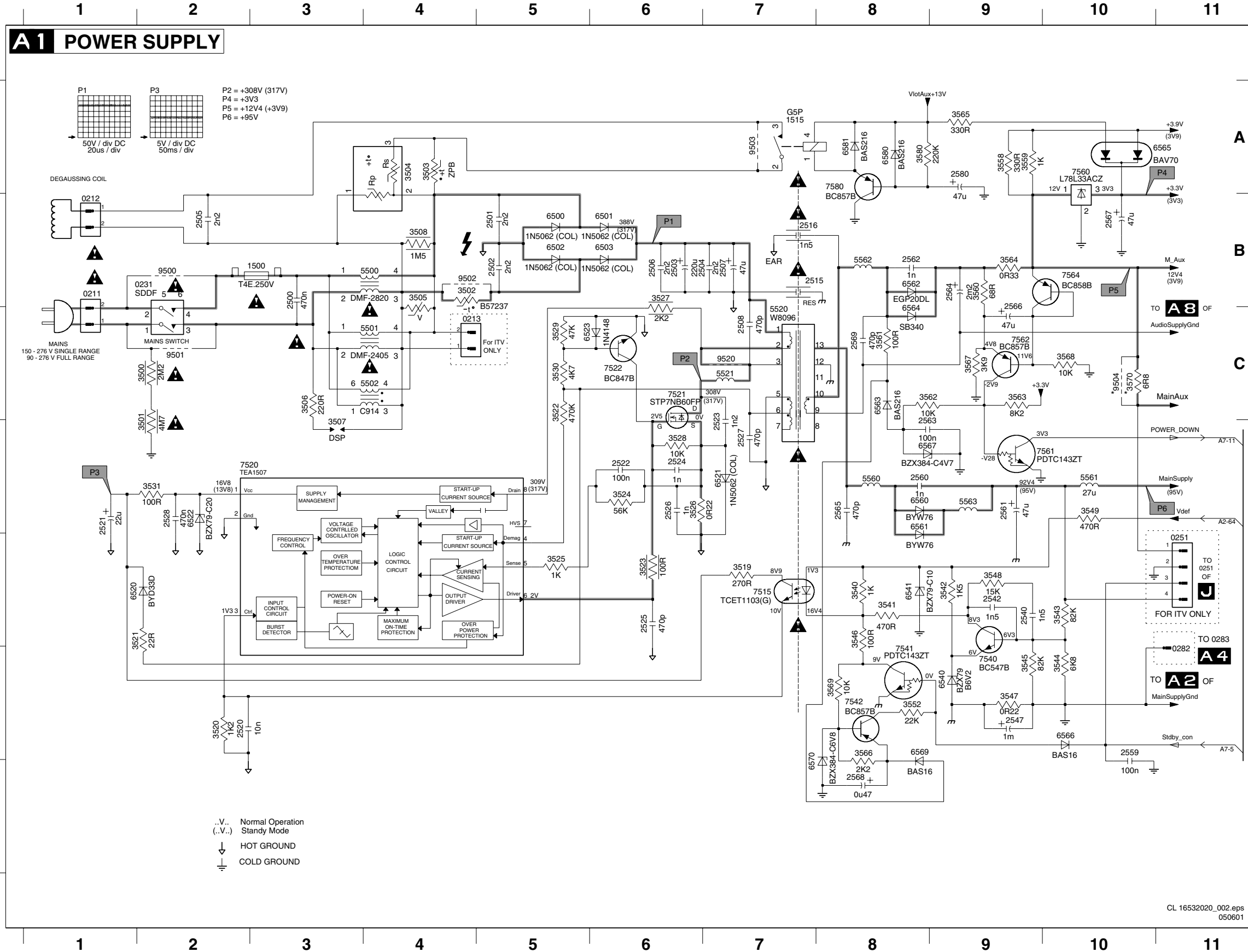
Error	Description
0	No error
1	X-Ray / over voltage protection
2	High beam (BCI) protection
3	Vertical guard protection
4	I2C error while communicating with the sound processor
5	Power ON reset (POR) bit) 3.3V protection / +8V protection
6	General I2C error
7	Power Good (over current) protection
8	EW protection (Large Screen only)
9	I2C error EEPROM error
10	I2C error PLL tuner
11	Black current loop instability protection



# 7. Schematics and PWB's

## Mono Carrier: Power Supply

- 0211 B1 0282 F11 2502 B5 2507 B7 2521 D1 2526 D6 2547 F9 2563 D8 2568 G8 3502 B4 3507 D3 3522 C5 3527 B6 3540 E8 3545 F9 3552 F8 3562 C8 3567 C9 5500 B4 5560 D8 6501 B6 6522 D2 6561 D8 6566 F10 6581 A8 7540 F9 7562 C9 9502 B4
- 0212 B1 1500 B3 2503 B6 2508 C7 2522 D6 2527 D7 2559 F10 2564 B9 2569 C8 3503 A4 3508 B4 3523 E6 3528 D6 3541 E8 3546 E8 3558 A9 3563 C9 3568 C10 5501 C4 5561 D10 6502 B5 6523 C5 6562 B8 6567 D8 7515 E7 7541 F8 7564 B10 9503 A7
- 0213 C4 1515 A7 2504 B7 2515 B7 2523 D7 2528 D2 2560 D8 2565 D8 2580 A9 3504 A4 3519 E7 3524 D6 3529 C5 3542 E9 3547 F9 3559 A9 3564 B9 3569 F8 5502 C4 5562 B8 6503 B6 6540 F9 6563 C8 6569 F8 7520 D2 7542 F8 7580 A8 9504 C10
- 0231 B1 2500 B3 2505 B2 2516 B7 2524 D6 2540 E9 2561 D9 2566 C9 3500 C2 3505 B4 3520 F2 3525 E5 3530 C5 3543 E10 3548 E9 3560 B9 3565 A9 3570 C10 5520 B7 5563 D9 6520 E1 6541 E8 6564 C8 6570 G7 7521 C6 7560 A10 9500 B2 9520 C7
- 0251 E11 2501 B5 2506 B6 2520 F2 2525 E6 2542 E9 2562 B8 2567 B10 3501 D2 3506 C3 3521 E2 3526 D6 3531 D2 3544 F10 3549 D10 3561 C8 3566 F8 3580 A8 5521 C7 6500 B5 6521 D7 6560 D8 6565 A10 6580 A8 7522 C6 7561 D9 9501 C2

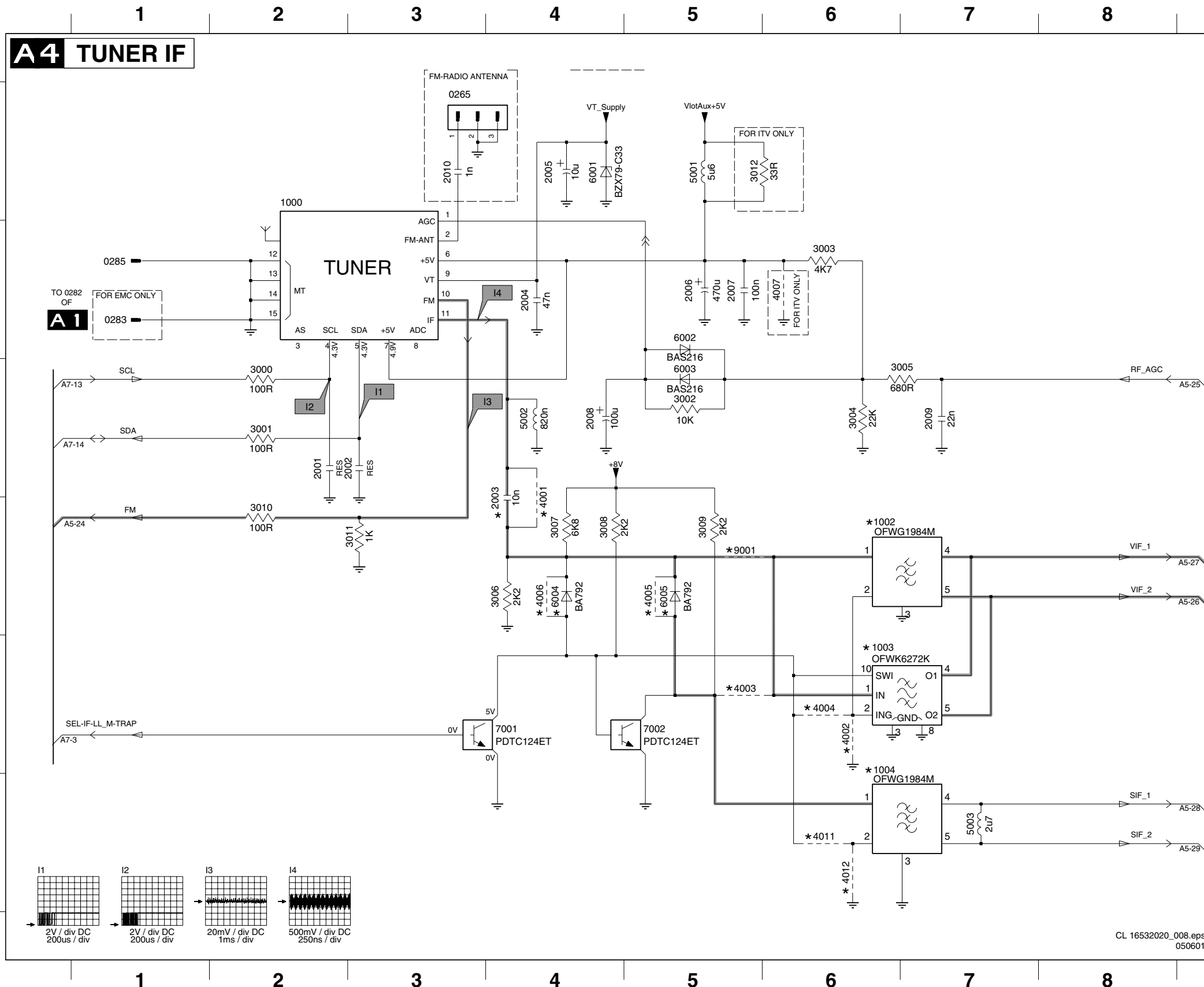






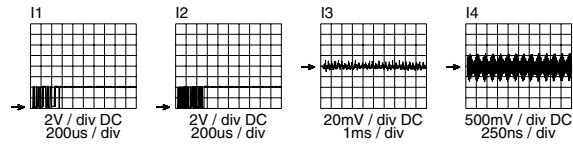
Mono Carrier: Tuner IF

0265 A3 0285 B1 1002 D6 1004 E6 2002 C2 2004 B4 2006 B5 2008 C4 2010 A3 3001 C2 3003 B6 3005 C7 3007 D4 3009 D5 3011 D3 4001 C4 4003 E5 4005 D5 4007 B6 4012 F6 5002 C4 6001 A4 6003 C5 6005 D5 7002 E5  
 0283 B1 1000 A2 1003 E6 2001 C2 2003 D4 2005 A4 2007 B5 2009 C7 3000 C2 3002 C5 3004 C6 3006 D4 3008 D4 3010 D2 3012 A5 4002 E6 4004 E6 4006 D4 4011 F6 5001 A5 5003 F7 6002 B5 6004 D4 7001 E4 9001 D5

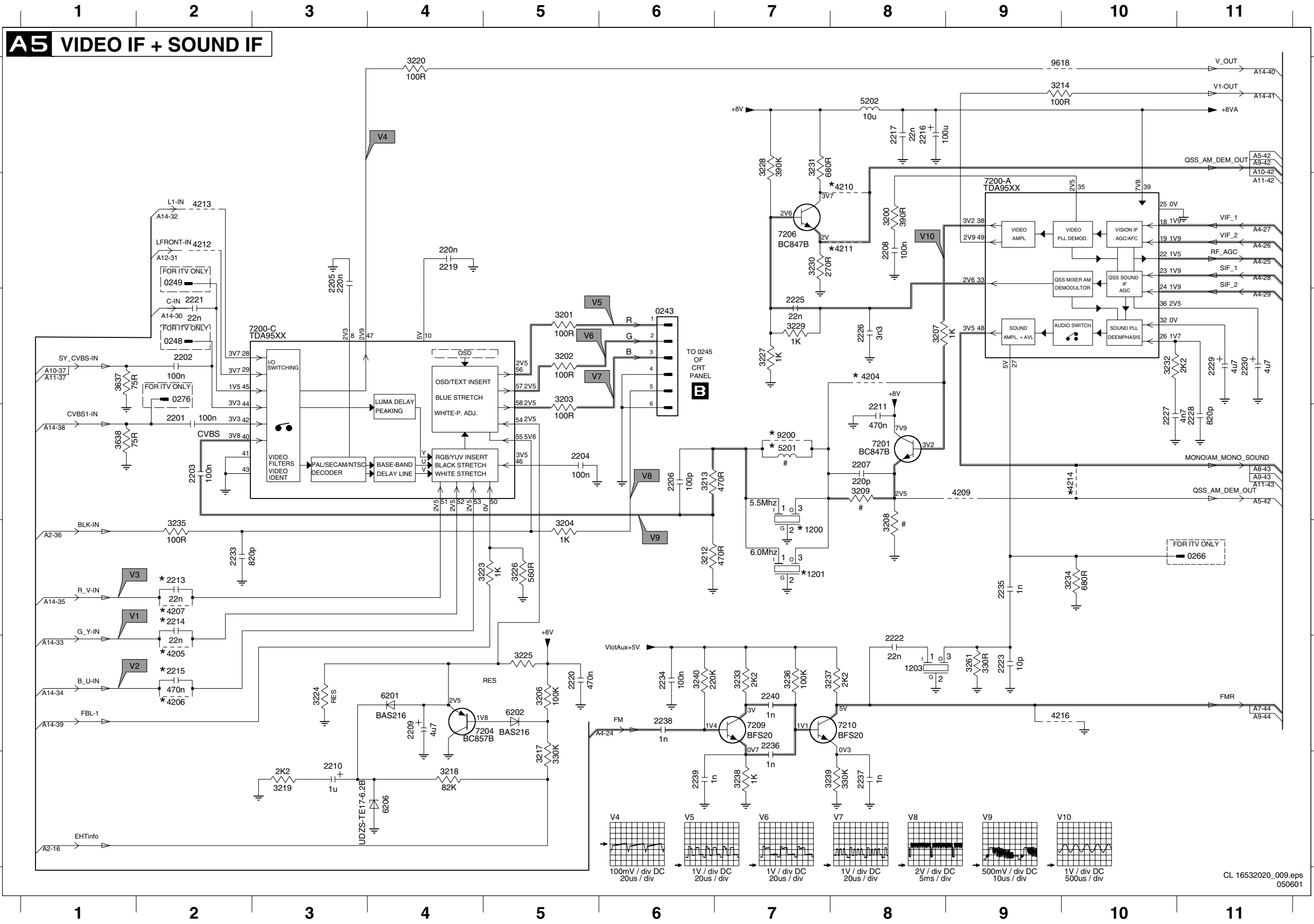


**Diversity Table A4**

Item	Description	14", 21" Stereo 3W, PAL BG-I	14", 17", 21" Mono 4W, PAL BG-I	14", 21" Stereo 3W, PAL, SECAM L-L1	14", 17", 21" Mono 4W, PAL, SECAM L-L1	14", 21" Stereo 3W, East Europe	14", 17", 21" Mono 4W, East Europe	14", 20", 21" Mono 1W, PAL BG-I	14", 20", 21" Mono 1W, PAL, SECAM L-L1	14", 20", 21" Mono 1W, East Europe
0265	3P	X	X	X	X	X	X			
0285	1P									
1000	TUN V+U PLL IEC BGDK							X	X	X
1002	TUNER UR1316R/A 1-3	X	X	X	X	X	X			
1003	OFWK3953M			X	X					X
1004	OFWK6289K	X	X			X	X	X		X
2003	50V 10N			X	X	X	X	X	X	X
2010	1N	X	X	X	X	X	X			
3002	10K			X	X					X
3002	Jumper	X	X			X	X	X		X
3004	8K2									
3010	330R	X		X		X				
3010	Jumper		X		X		X			
3011	330R		X		X		X			
4001	Jumper									
4002	Jumper	X	X	X	X	X	X	X	X	X
4003	Jumper			X	X					X
4004	Jumper									
4005	Jumper									
4006	Jumper									
4011	Jumper			X	X					X
4012	Jumper									
4608	Jumper	X	X	X	X	X	X			
4609	Jumper	X	X	X	X	X	X			
5003	1U8			X	X					X
6002	BAS316			X	X					X
6002	BAS216			X	X					X
6004	BA792	X	X	X	X	X	X	X	X	X
6005	BA792	X	X	X	X	X	X	X	X	X
9001	Wire	X	X	X	X	X	X	X	X	X



Mono Carrier: Video IF + Sound IF



- 0243 C6
- 0248 C2
- 0249 B2
- 0266 E11
- 0276 C2
- 1200 E7
- 1201 E7
- 1203 F8
- 2201 D2
- 2202 C2
- 2203 D2
- 2204 D5
- 2205 B3
- 2206 D6
- 2207 D8
- 2208 B8
- 2209 F4
- 2210 G3
- 2211 D8
- 2213 E2
- 2214 E2
- 2215 F2
- 2216 A8
- 2217 A8
- 2219 B4
- 2220 F5
- 2221 C2
- 2222 F8
- 2223 F9
- 2225 C7
- 2226 C8
- 2227 D10
- 2228 D11
- 2229 C11
- 2230 C11
- 2232 E2
- 2234 F6
- 2235 E9
- 2236 F7
- 2237 G8
- 2238 F6
- 2239 G6
- 2240 F7
- 3200 B8
- 3201 C5
- 3202 C5
- 3203 C5
- 3204 E5
- 3205 F5
- 3206 F5
- 3207 C8
- 3208 E8
- 3209 D8
- 3212 E6
- 3213 D6
- 3214 A9
- 3217 G5
- 3218 G4
- 3219 G3
- 3220 A4
- 3223 E5
- 3224 F3
- 3225 F5
- 3226 E5
- 3227 C7
- 3228 A7
- 3229 C7
- 3230 B7
- 3231 A7
- 3232 C10
- 3233 F7
- 3234 E10
- 3235 E2
- 3236 F7
- 3237 F8
- 3238 G7
- 3239 G8
- 3240 F6
- 3261 F9
- 3637 C1
- 3638 D1
- 4204 C8
- 4205 F2
- 4206 F2
- 4207 E2
- 4209 D9
- 4210 B8
- 4211 B8
- 4212 B2
- 4213 B2
- 4214 D10
- 4216 F9
- 5201 D7
- 5202 A8
- 6201 F4
- 6202 F5
- 6205 G4
- 7200-A B9
- 7201 D8
- 7204 F5
- 7206 B7
- 7207 F7
- 7210 F8
- 9200 D7
- 9618 A9

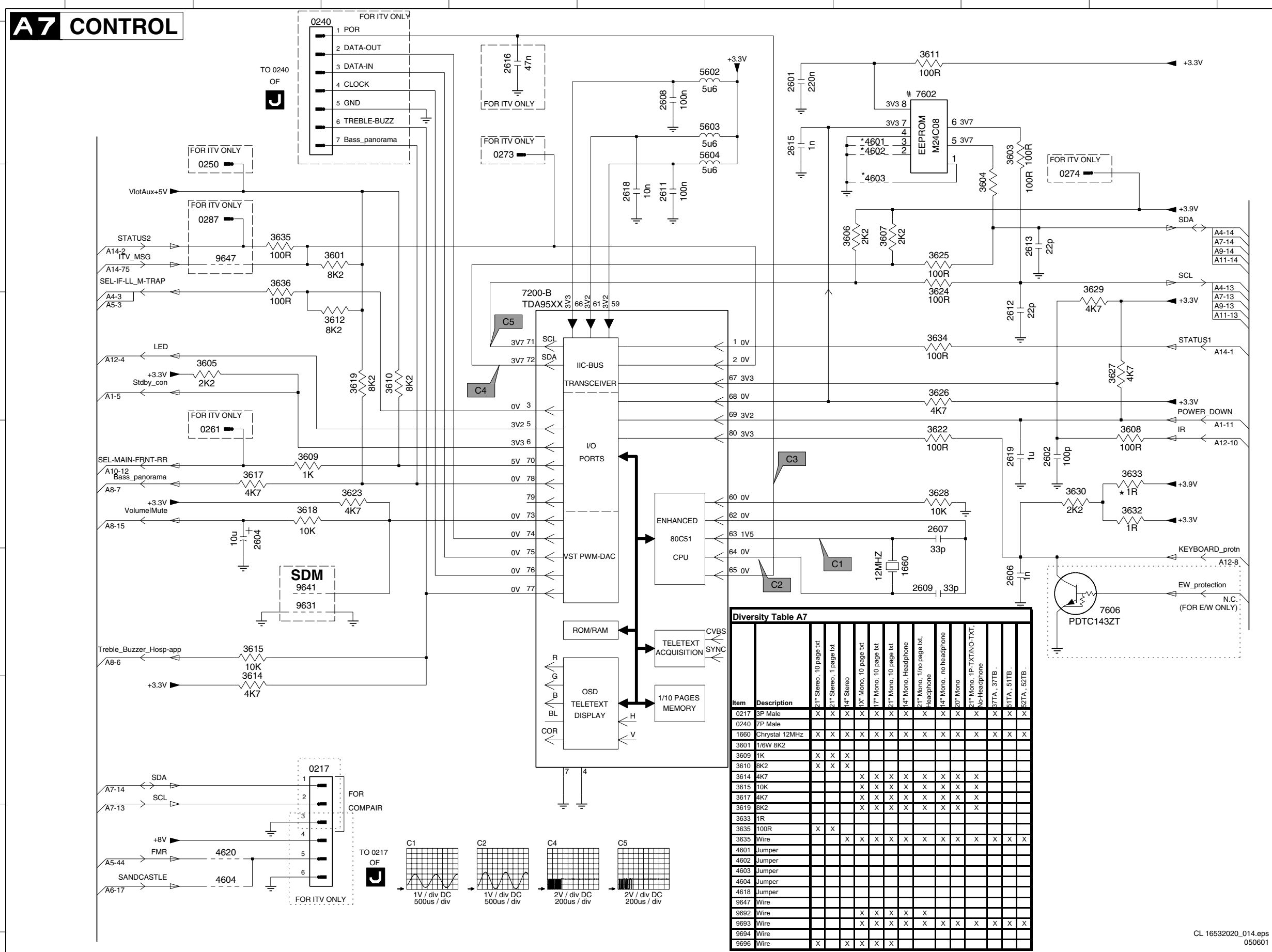


Mono Carrier: Control

**A7 CONTROL**

A  
B  
C  
D  
E  
F  
G

1 2 3 4 5 6 7 8 9



**Diversity Table A7**

Item	Description	21" Stereo, 10 page txt	21" Stereo, 1 page txt	14" Stereo	17" Mono, 10 page txt	17" Mono, 10 page txt	21" Mono, 10 page txt	14" Mono, 10 page txt, Headphone	14" Mono, 10 page txt, No-headphone	20" Mono	21" Mono, 1P-TX/NO-TX, No-headphone	21" Mono, 1P-TX/NO-TX, 3TTB	51TB	52TB
0217	5P Male	X	X	X	X	X	X	X	X	X	X	X	X	X
0240	7P Male	X	X	X	X	X	X	X	X	X	X	X	X	X
1660	Chrystal 12MHz	X	X	X	X	X	X	X	X	X	X	X	X	X
3601	1/6W 8K2													
3609	1K		X	X	X									
3610	8K2	X	X	X										
3614	4K7				X	X	X	X	X	X	X	X	X	X
3615	10K				X	X	X	X	X	X	X	X	X	X
3617	4K7				X	X	X	X	X	X	X	X	X	X
3619	8K2				X	X	X	X	X	X	X	X	X	X
3633	1R													
3635	100R	X	X											
3635	Wire		X	X	X	X	X	X	X	X	X	X	X	X
4601	Jumper													
4602	Jumper													
4603	Jumper													
4604	Jumper													
4618	Jumper													
9647	Wire													
9692	Wire				X	X	X	X	X	X	X	X	X	X
9693	Wire				X	X	X	X	X	X	X	X	X	X
9694	Wire													
9696	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X

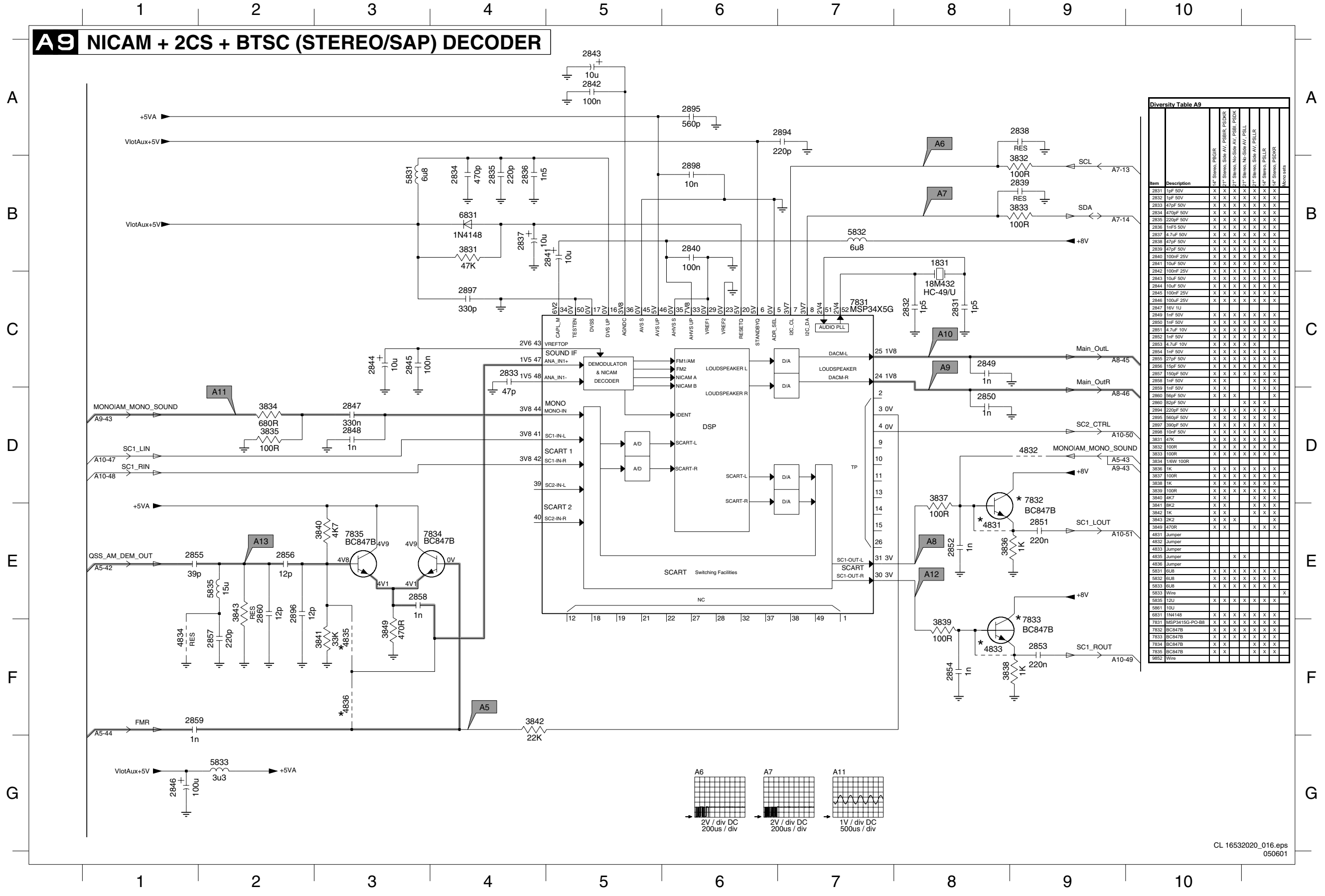
0217 F2  
0240 A2  
0250 B2  
0261 D2  
0273 A4  
0274 B8  
0287 B2  
1660 E7  
2601 A6  
2602 D8  
2604 D2  
2606 E8  
2607 D7  
2608 A5  
2609 E7  
2611 B5  
2612 C8  
2613 B8  
2615 A6  
2616 A4  
2618 B5  
2619 D8  
3601 B3  
3603 A8  
3604 B8  
3605 C2  
3606 B7  
3607 B7  
3608 D9  
3609 D2  
3610 C3  
3611 A7  
3612 C3  
3614 F2  
3615 E2  
3617 D2  
3618 D2  
3619 C3  
3622 D7  
3623 D3  
3624 C7  
3625 B7  
3626 C7  
3627 C9  
3628 D7  
3629 B9  
3630 D8  
3632 D9  
3633 D9  
3634 C7  
3635 B2  
3636 B2  
4601 A7  
4602 A7  
4603 B7  
4604 G2  
4620 G2  
7200-B C4  
7602 A7  
7606 E9  
9631 E2  
9641 E2  
9647 B2





# Mono Carrier: NICAM + 2CS + BTSC (Stereo / SAP) Decoder

## A9 NICAM + 2CS + BTSC (STEREO/SAP) DECODER

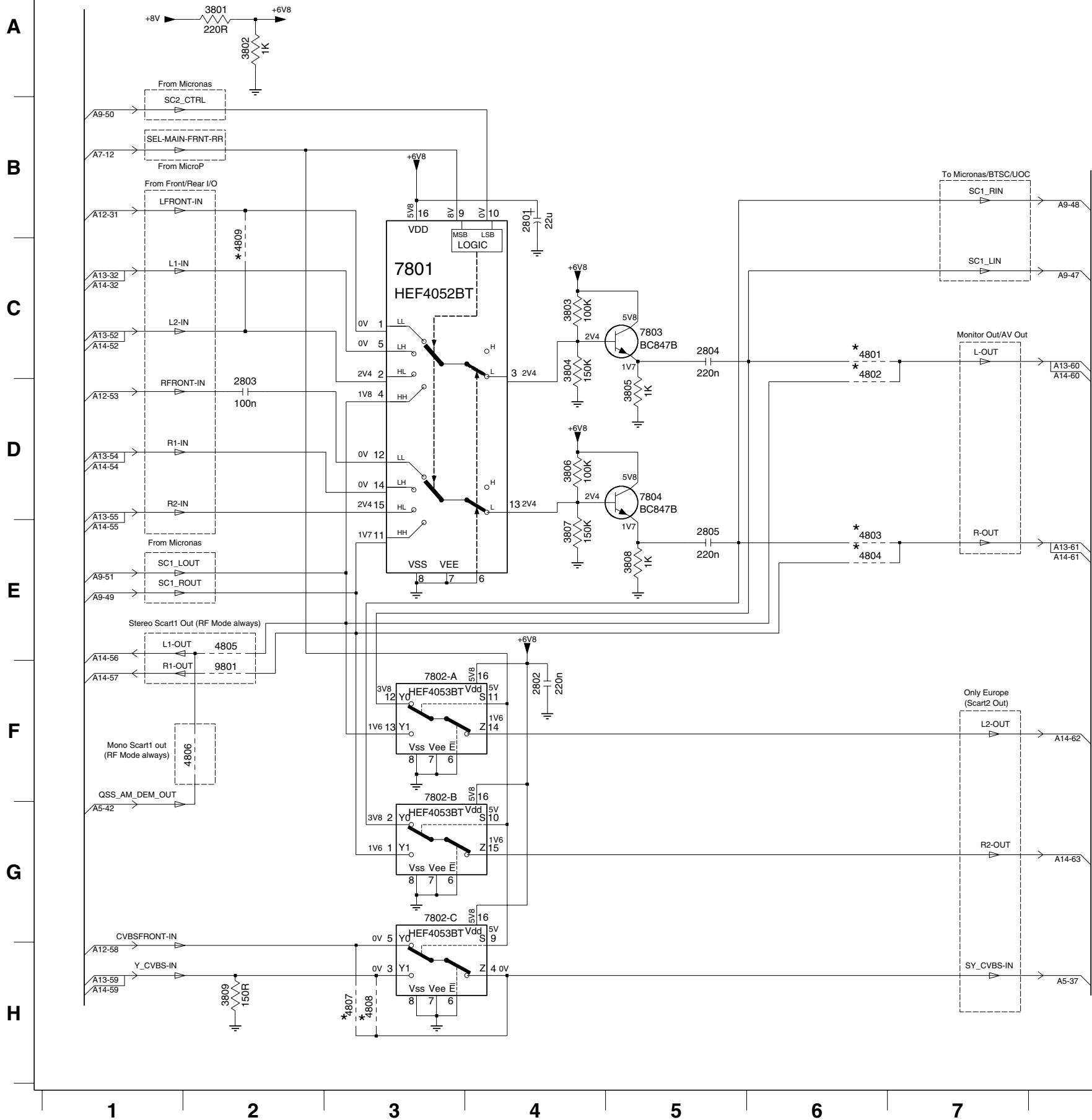


Item	Description	F* Stereo, PBDIR	F* Stereo, Side AV / PBDIR, PBDOR	F* Stereo, No-Side AV / PBDIR, PBDOR	F* Stereo, No-Side AV / PBDIR, PBDOR	F* Stereo, PBDIR	Notes
2831	1pF 50V	X	X	X	X	X	
2832	1pF 50V	X	X	X	X	X	
2833	47pF 50V	X	X	X	X	X	
2834	470pF 50V	X	X	X	X	X	
2835	220pF 50V	X	X	X	X	X	
2836	1nF 50V	X	X	X	X	X	
2837	4.7uF 50V	X	X	X	X	X	
2838	47pF 50V	X	X	X	X	X	
2839	47pF 50V	X	X	X	X	X	
2840	100nF 25V	X	X	X	X	X	
2841	10uF 50V	X	X	X	X	X	
2842	100nF 25V	X	X	X	X	X	
2843	10uF 50V	X	X	X	X	X	
2844	10uF 50V	X	X	X	X	X	
2845	100nF 25V	X	X	X	X	X	
2846	100nF 25V	X	X	X	X	X	
2847	18V 1U	X	X	X	X	X	
2848	1nF 50V	X	X	X	X	X	
2849	1nF 50V	X	X	X	X	X	
2850	1nF 50V	X	X	X	X	X	
2851	1.7uF 10V	X	X	X	X	X	
2852	1nF 50V	X	X	X	X	X	
2853	4.7uF 10V	X	X	X	X	X	
2854	1nF 50V	X	X	X	X	X	
2855	27pF 50V	X	X	X	X	X	
2856	15pF 50V	X	X	X	X	X	
2857	150pF 50V	X	X	X	X	X	
2858	100nF 50V	X	X	X	X	X	
2859	1nF 50V	X	X	X	X	X	
2860	560pF 50V	X	X	X	X	X	
2861	820pF 50V	X	X	X	X	X	
2862	220pF 50V	X	X	X	X	X	
2863	560pF 50V	X	X	X	X	X	
2864	560pF 50V	X	X	X	X	X	
2865	560pF 50V	X	X	X	X	X	
2866	560pF 50V	X	X	X	X	X	
2867	560pF 50V	X	X	X	X	X	
2868	10nF 50V	X	X	X	X	X	
2869	10nF 50V	X	X	X	X	X	
2870	10nF 50V	X	X	X	X	X	
2871	100R	X	X	X	X	X	
2872	100R	X	X	X	X	X	
2873	100R	X	X	X	X	X	
2874	100R	X	X	X	X	X	
2875	100R	X	X	X	X	X	
2876	100R	X	X	X	X	X	
2877	100R	X	X	X	X	X	
2878	100R	X	X	X	X	X	
2879	100R	X	X	X	X	X	
2880	100R	X	X	X	X	X	
2881	100R	X	X	X	X	X	
2882	100R	X	X	X	X	X	
2883	100R	X	X	X	X	X	
2884	100R	X	X	X	X	X	
2885	100R	X	X	X	X	X	
2886	100R	X	X	X	X	X	
2887	100R	X	X	X	X	X	
2888	100R	X	X	X	X	X	
2889	100R	X	X	X	X	X	
2890	100R	X	X	X	X	X	
2891	100R	X	X	X	X	X	
2892	100R	X	X	X	X	X	
2893	100R	X	X	X	X	X	
2894	100R	X	X	X	X	X	
2895	100R	X	X	X	X	X	
2896	100R	X	X	X	X	X	
2897	100R	X	X	X	X	X	
2898	100R	X	X	X	X	X	
2899	100R	X	X	X	X	X	
2900	100R	X	X	X	X	X	
2901	100R	X	X	X	X	X	
2902	100R	X	X	X	X	X	
2903	100R	X	X	X	X	X	
2904	100R	X	X	X	X	X	
2905	100R	X	X	X	X	X	
2906	100R	X	X	X	X	X	
2907	100R	X	X	X	X	X	
2908	100R	X	X	X	X	X	
2909	100R	X	X	X	X	X	
2910	100R	X	X	X	X	X	
2911	100R	X	X	X	X	X	
2912	100R	X	X	X	X	X	
2913	100R	X	X	X	X	X	
2914	100R	X	X	X	X	X	
2915	100R	X	X	X	X	X	
2916	100R	X	X	X	X	X	
2917	100R	X	X	X	X	X	
2918	100R	X	X	X	X	X	
2919	100R	X	X	X	X	X	
2920	100R	X	X	X	X	X	
2921	100R	X	X	X	X	X	
2922	100R	X	X	X	X	X	
2923	100R	X	X	X	X	X	
2924	100R	X	X	X	X	X	
2925	100R	X	X	X	X	X	
2926	100R	X	X	X	X	X	
2927	100R	X	X	X	X	X	
2928	100R	X	X	X	X	X	
2929	100R	X	X	X	X	X	
2930	100R	X	X	X	X	X	
2931	100R	X	X	X	X	X	
2932	100R	X	X	X	X	X	
2933	100R	X	X	X	X	X	
2934	100R	X	X	X	X	X	
2935	100R	X	X	X	X	X	
2936	100R	X	X	X	X	X	
2937	100R	X	X	X	X	X	
2938	100R	X	X	X	X	X	
2939	100R	X	X	X	X	X	
2940	100R	X	X	X	X	X	
2941	100R	X	X	X	X	X	
2942	100R	X	X	X	X	X	
2943	100R	X	X	X	X	X	
2944	100R	X	X	X	X	X	
2945	100R	X	X	X	X	X	
2946	100R	X	X	X	X	X	
2947	100R	X	X	X	X	X	
2948	100R	X	X	X	X	X	
2949	100R	X	X	X	X	X	
2950	100R	X	X	X	X	X	
2951	100R	X	X	X	X	X	
2952	100R	X	X	X	X	X	
2953	100R	X	X	X	X	X	
2954	100R	X	X	X	X	X	
2955	100R	X	X	X	X	X	
2956	100R	X	X	X	X	X	
2957	100R	X	X	X	X	X	
2958	100R	X	X	X	X	X	
2959	100R	X	X	X	X	X	
2960	100R	X	X	X	X	X	
2961	100R	X	X	X	X	X	
2962	100R	X	X	X	X	X	
2963	100R	X	X	X	X	X	
2964	100R	X	X	X	X	X	
2965	100R	X	X	X	X	X	
2966	100R	X	X	X	X	X	
2967	100R	X	X	X	X	X	
2968	100R	X	X	X	X	X	
2969	100R	X	X	X	X	X	
2970	100R	X	X	X	X	X	
2971	100R	X	X	X	X	X	
2972	100R	X	X	X	X	X	
2973	100R	X	X	X	X	X	
2974	100R	X	X	X	X	X	
2975	100R	X	X	X	X	X	
2976	100R	X	X	X	X	X	
2977	100R	X	X	X	X	X	
2978	100R	X	X	X	X	X	
2979	100R	X	X	X	X	X	
2980	100R	X	X	X	X	X	
2981	100R	X	X	X	X	X	
2982	100R	X	X	X	X	X	
2983	100R	X	X	X	X	X	
2984	100R	X	X	X	X	X	
2985	100R	X	X	X	X	X	
2986	100R	X	X	X	X	X	
2987	100R	X	X	X	X	X	
2988	100R	X	X	X	X	X	
2989	100R	X	X	X	X	X	
2990	100R	X	X	X	X	X	
2991	100R	X	X	X	X	X	
2992	100R	X	X	X	X	X	
2993	100R	X	X	X	X	X	
2994	100R	X	X	X	X	X	
2995	100R	X	X	X	X	X	
2996	100R	X	X	X	X	X	
2997	100R	X	X	X	X	X	
2998	100R	X	X	X	X	X	
2999	100R	X	X	X	X	X	
3000	100R	X	X	X	X	X	

- 1831 B8
- 2831 C8
- 2832 C8
- 2833 C4
- 2834 B4
- 2835 B4
- 2836 B4
- 2837 B4
- 2838 A9
- 2839 B9
- 2840 B6
- 2841 B5
- 2842 A5
- 2843 A5
- 2844 C3
- 2845 C3
- 2846 G1
- 2847 D3
- 2848 D3
- 2849 C8
- 2850 D8
- 2851 E9
- 2852 E8
- 2853 F10
- 2854 F8
- 2855 E1
- 2856 E2
- 2857 F2
- 2858 E3
- 2859 F1
- 2860 E2
- 2861 A7
- 2862 A6
- 2863 E2
- 2864 C2
- 2865 C4
- 2866 B6
- 2867 B4
- 2868 B9
- 2869 B9
- 2870 D2
- 2871 D2
- 2872 D2
- 2873 D2
- 2874 D2
- 2875 D2
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- 2880 D2
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- 2890 D2
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- 2895 D2
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- 2897 D2
- 2898 D2
- 2899 D2
- 2900 D2
- 2901 D2
- 2902 D2
- 2903 D2
- 2904 D2
- 2905 D2
- 2906 D2
- 2907 D2
- 2908 D2
- 2909 D2
- 2910 D2
- 2911 D2
- 2912 D2
- 2913 D2
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- 2915 D2
- 2916 D2
- 2917 D2
- 2918 D2
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- 2983 D2
- 2984 D2
- 2985 D2
- 2986 D2
- 2987 D2
- 2988 D2
- 2989 D2
- 2990 D2
- 2991 D2
- 2992 D2
- 2993 D2
- 2994 D2
- 2995 D2
- 2996 D2
- 2997 D2
- 2998 D2
- 2999 D2
- 3000 D2

Mono Carrier: Audio / Video Source Switching

**A 1** AUDIO/VIDEO SOURCE SWITCHING



EU	Output			HEF Logic	
	Scart1	Scart2	Monitor	SEL-MAIN-FRNT-RR	SC2_CTRL
Front In	RF Mode	Front Mode	Front Mode	0	0
Scart 1 in	RF Mode	Scart1 Mode	Scart1 Mode	0	1
Scart 2 in	RF Mode	RF Mode	Scart2 Mode	1	0
R.F In	RF Mode	RF Mode	RF Mode	1	1

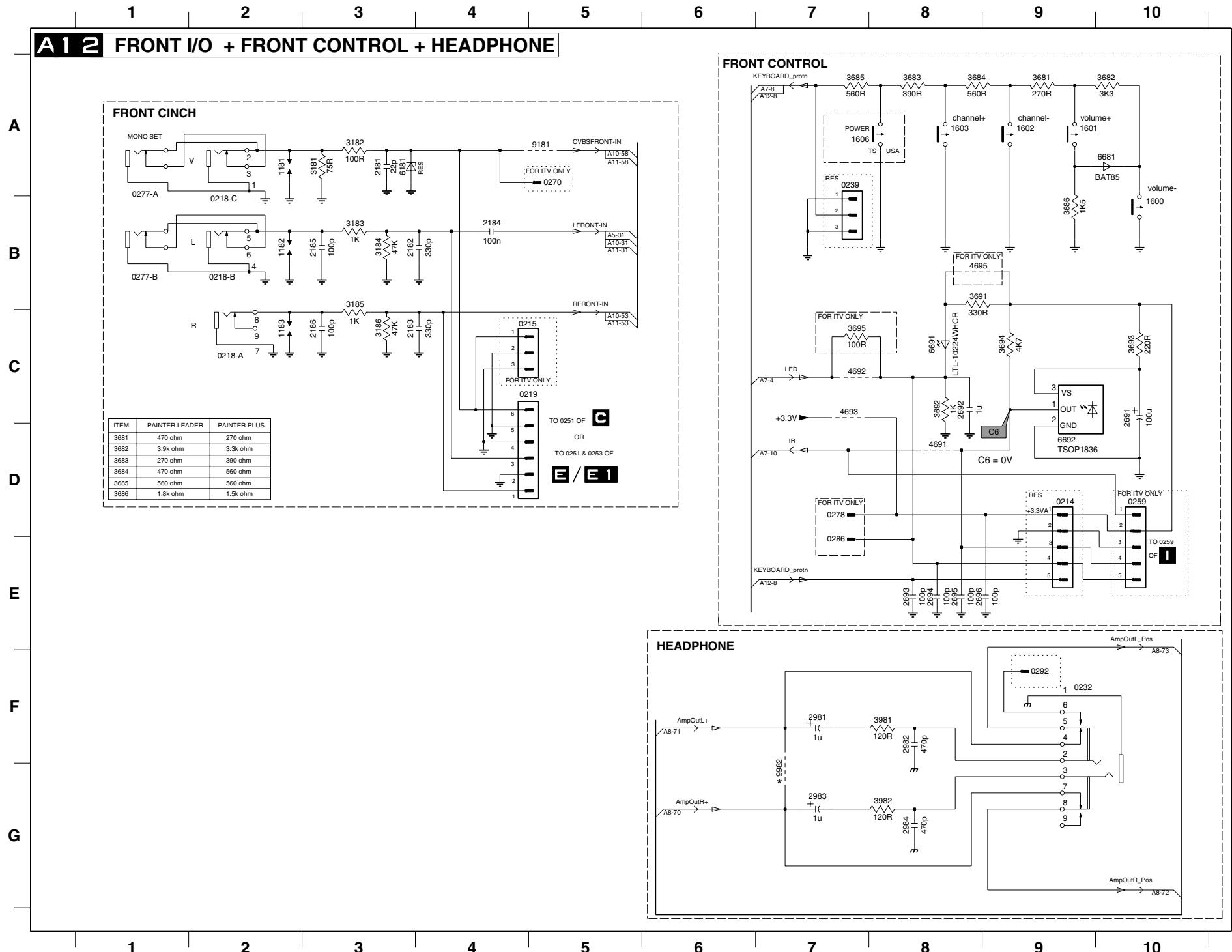
Diversity Table A10

Item	Description	21" Stereo	14" Stereo	14" Mono, Headphone	17" Mono, Headphone	21" Mono, Headphone	14" Mono, No-Headphone	20" Mono, No-Headphone	21" Mono, No-Headphone	37TA, 37TB	51TA, 51TB	52TA, 52TB
2801	22uF 50V	X	X									
2802	220nF 25V	X										
2803	4.7uF 10V	X	X									
2804	4.7uF 10V	X	X									
2805	4.7uF 10V	X	X									
2806	10V 2U2											
3801	220R	X	X									
3802	1K	X	X									
3803	100K	X	X									
3804	82K	X	X									
3805	1K	X	X									
3806	100K	X	X									
3807	82K	X	X									
3808	1K	X	X									
3809	150R	X										
4801	Jumper	X	X	X	X	X	X	X	X	X	X	X
4802	Jumper											
4803	Jumper	X	X	X	X	X	X	X	X	X	X	X
4804	Jumper											
4805	Jumper	X	X									
4806	Jumper			X	X	X	X	X	X	X	X	X
4807	Jumper			X	X	X	X					
4808	Jumper											
4809	Jumper											
7801	HEF4052BT	X	X									
7802	HEF4053BT	X										
7803	BC847B	X	X									
7804	BC847B	X	X									
9801	Wire	X	X									
9819	Wire											

- 2801 B4
- 2802 F4
- 2803 D2
- 2804 C5
- 2805 E5
- 3801 A2
- 3802 A2
- 3803 C4
- 3804 C4
- 3805 D5
- 3806 D4
- 3807 E4
- 3808 E5
- 3809 H2
- 4801 C6
- 4802 C6
- 4803 E6
- 4804 E6
- 4805 E2
- 4806 F2
- 4807 H3
- 4808 H3
- 4809 C2
- 7801 C3
- 7802-A F3
- 7802-B F3
- 7802-C G3
- 7803 C5
- 7804 D5
- 9801 F2

**Mono Carrier: Front I/O + Front Control + Headphone**

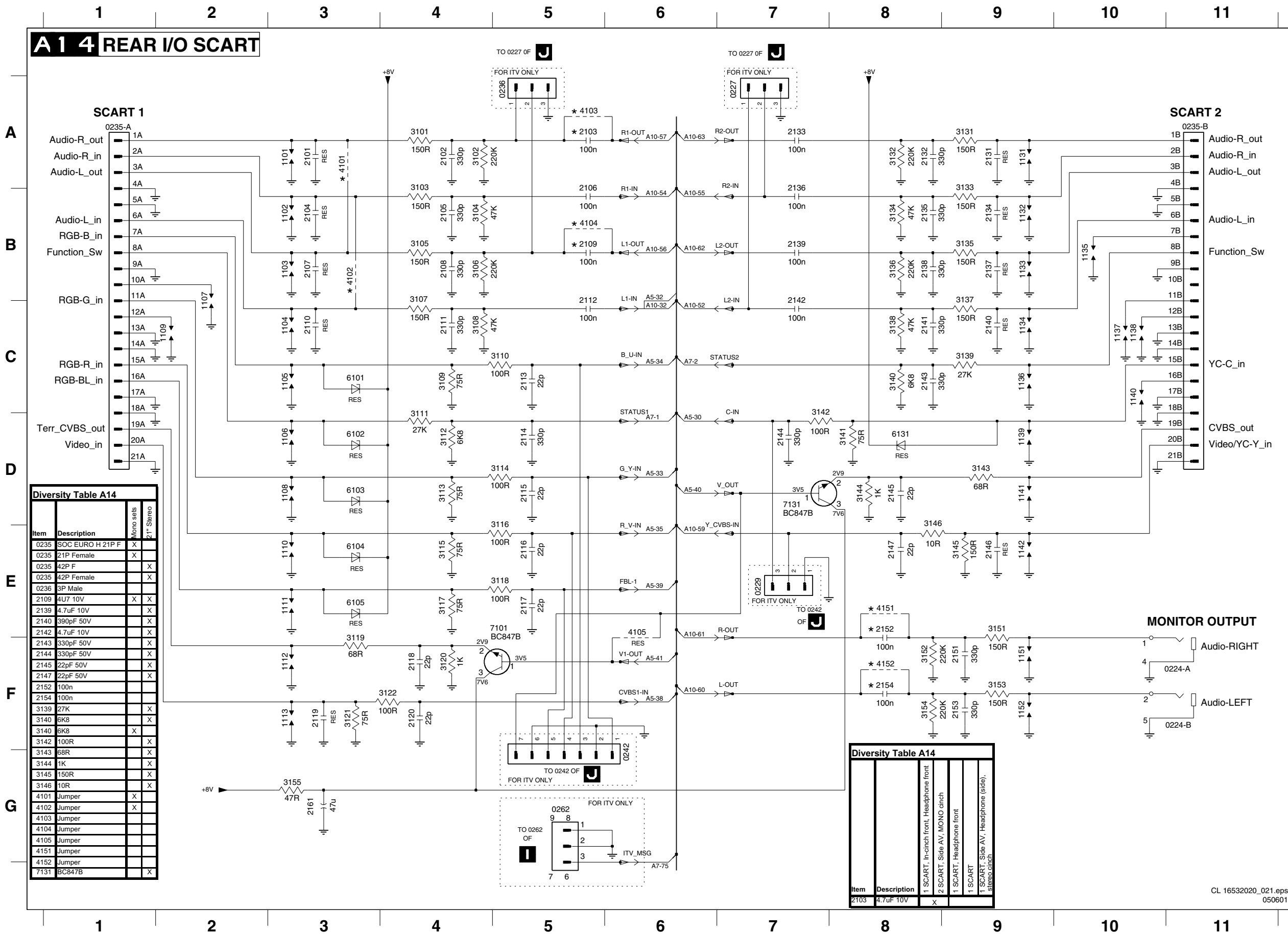
0214 D9 0218-A C2 0218-C A2 0232 E5 0259 D10 0277-A A1 0278 D7 0292 E4 1182 B2 1600 B10 1602 A9 1606 A7 2182 B3 2184 B4 2186 C3 2692 C8 2694 E8 2696 E8 2982 F3 2984 F3 3182 A3 3184 B3 3186 C3 3682 A10 3684 A8 3686 B9 3692 C8 3694 C9 3981 E3 4691 D8 4693 C7 4695 B8 6681 A10 6692 D9 9982 F2  
 0215 C4 0218-B B2 0219 C4 0239 A7 0270 A5 0277-B B1 0286 E7 1181 A2 1183 C2 1601 A9 1603 A8 2181 A3 2183 C3 2185 B3 2691 C10 2693 E8 2695 E8 2981 E2 2983 F2 3181 A3 3183 B3 3185 B3 3681 A9 3683 A8 3685 A7 3689 B8 3693 C10 3695 C7 3982 F3 4692 C7 4694 G1 6181 A3 6691 C8 9181 A5



**Diversity Table A12**

Item	Description	14" Mono, 1&10 page txt, Headphone	17" Mono	21" Mono, 1&10 page txt, no side av	14" Mono, no bt, headphone	21" Mono, no bt, headphone	14" Stereo	21" Stereo, no side av	21" Mono, 10 page txt, side av	21" Stereo, side av	37 Mono, 1page txt	51 Mono, 1page txt	52 Mono, 1page txt, headphone	37 Mono, no bt, headphone	14" Mono, 1page txt, no headphones	20" Mono, 1page txt	21" Mono, 10 page txt, no headphone	52 Mono, 1page txt, no headphone	14" Mono, no bt, no headphone	20" Mono, no bt	21" Mono, no bt	37 Mono, no bt, no headphone	51 Mono, no bt	
0215	CON 3P																							
0218	SOC CINCH H 2P F	X	X	X	X	X																		
0218	SOC CINCH H 3P F								X	X														
0219	5P Male																							
0232	SOC PHONE H 1P F	X	X	X	X	X	X	X	X	X														
0259	5P Male																							
1606	SWI TACT																							
2181	22pF 50V	X	X	X	X	X	X	X	X	X														
2182	390pF 50V	X	X	X	X	X	X	X	X	X														
2183	390pF 50V																							
2184	4.7uF 10V	X	X	X	X	X	X	X	X	X	X													
2185	390pF 50V	X	X	X	X	X	X	X	X	X														
2186	390pF 50V																							
2981	10uF 50V	X	X	X	X	X	X	X	X	X														
2982	470pF 50V	X	X	X	X	X	X	X	X	X														
2983	10uF 50V	X	X	X	X	X	X	X	X	X														
2984	470pF 50V	X	X	X	X	X	X	X	X	X														
3181	75R	X	X	X	X	X	X	X	X	X														
3182	100R	X	X	X	X	X	X	X	X	X														
3183	150R	X	X	X	X	X	X	X	X	X														
3184	47K	X	X	X	X	X	X	X	X	X														
3185	150R																							
3186	47K																							
3681	390R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3681	470R																							
3682	3K3	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3682	3K9																							
3683	270R																							
3683	390R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3684	470R																							
3684	560R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3686	1K8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3686	1K8																							
3692	1K	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3695	330R																							
3981	120R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3982	120R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4692	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4693	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9181	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9982	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Mono Carrier: Rear I/O SCART



**Diversity Table A14**

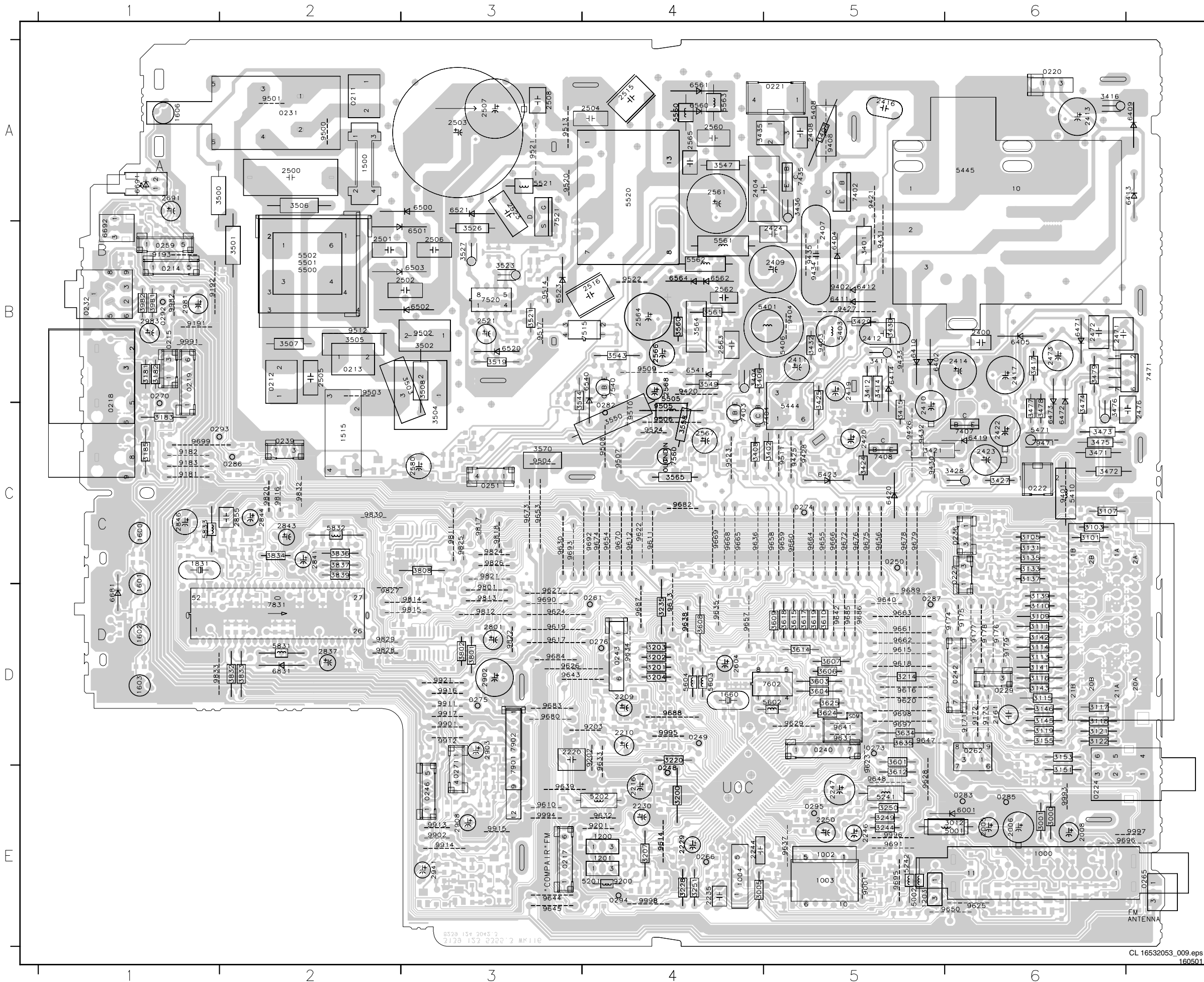
Item	Description	Mono sets	2+ Stereo
0235	SOC EURO H 21P F	X	
0235	21P Female	X	
0235	42P F		X
0235	42P Female		X
0236	3P Male		X
2109	4U7 10V	X	X
2139	4.7uF 10V		X
2140	390pF 50V		X
2142	4.7uF 10V		X
2143	330pF 50V		X
2144	330pF 50V		X
2145	22pF 50V		X
2147	22pF 50V		X
2152	100n		X
2154	100n		X
3139	27K	X	
3140	6K8	X	
3140	6K8	X	
3142	100R	X	
3143	68R	X	
3144	1K	X	
3145	150R	X	
3146	10R	X	
4101	Jumper	X	
4102	Jumper	X	
4103	Jumper		
4104	Jumper		
4105	Jumper		
4151	Jumper		
4152	Jumper		
7131	BC847B		X

**Diversity Table A14**

Item	Description	1 SCART, In-cinch front, Headphone front	2 SCART, Side AV, MONO cinch	1 SCART, Headphone front	1 SCART, Side AV, Headphone (side), stereo cinch
2103	4.7uF 10V	X			

- 0224-A F11
- 0224-B F11
- 0227 A7
- 0229 E7
- 0235-A A1
- 0235-B A11
- 0236 A5
- 0242 F6
- 0262 G5
- 1101 A3
- 1102 B3
- 1103 B3
- 1104 C3
- 1105 C3
- 1106 D3
- 1107 C2
- 1108 D3
- 1109 C2
- 1110 E3
- 1111 E3
- 1112 F3
- 1113 F3
- 1131 A9
- 1132 B9
- 1133 B9
- 1134 C9
- 1135 B10
- 1136 C9
- 1137 C10
- 1138 C10
- 1139 D9
- 1140 C10
- 1141 D9
- 1142 E9
- 1151 F9
- 1152 F9
- 2101 A3
- 2102 A4
- 2103 A5
- 2104 B3
- 2105 B4
- 2106 B5
- 2107 B3
- 2108 B4
- 2109 B5
- 2110 C3
- 2111 C4
- 2112 C5
- 2113 C5
- 2114 D5
- 2115 D5
- 2116 E5
- 2117 E5
- 2118 F4
- 2119 F3
- 2120 F4
- 2131 A9
- 2132 A8
- 2133 A7
- 2134 B9
- 2135 B8
- 2136 B7
- 2137 B9
- 2138 B8
- 2139 B7
- 2140 C9
- 2141 C8
- 2142 C7
- 2143 C8
- 2144 D7
- 2145 D8
- 2146 E9
- 2147 E8
- 2151 F9
- 2152 E8
- 2153 F9
- 2154 F8
- 2161 G3
- 3101 A4
- 3102 A4
- 3103 B4
- 3104 B4
- 3105 B4
- 3106 B4
- 3107 C4
- 3108 C4
- 3109 C4
- 3110 C5
- 3111 D4
- 3112 D4
- 3113 D4
- 3114 D5
- 3115 E4
- 3116 E5

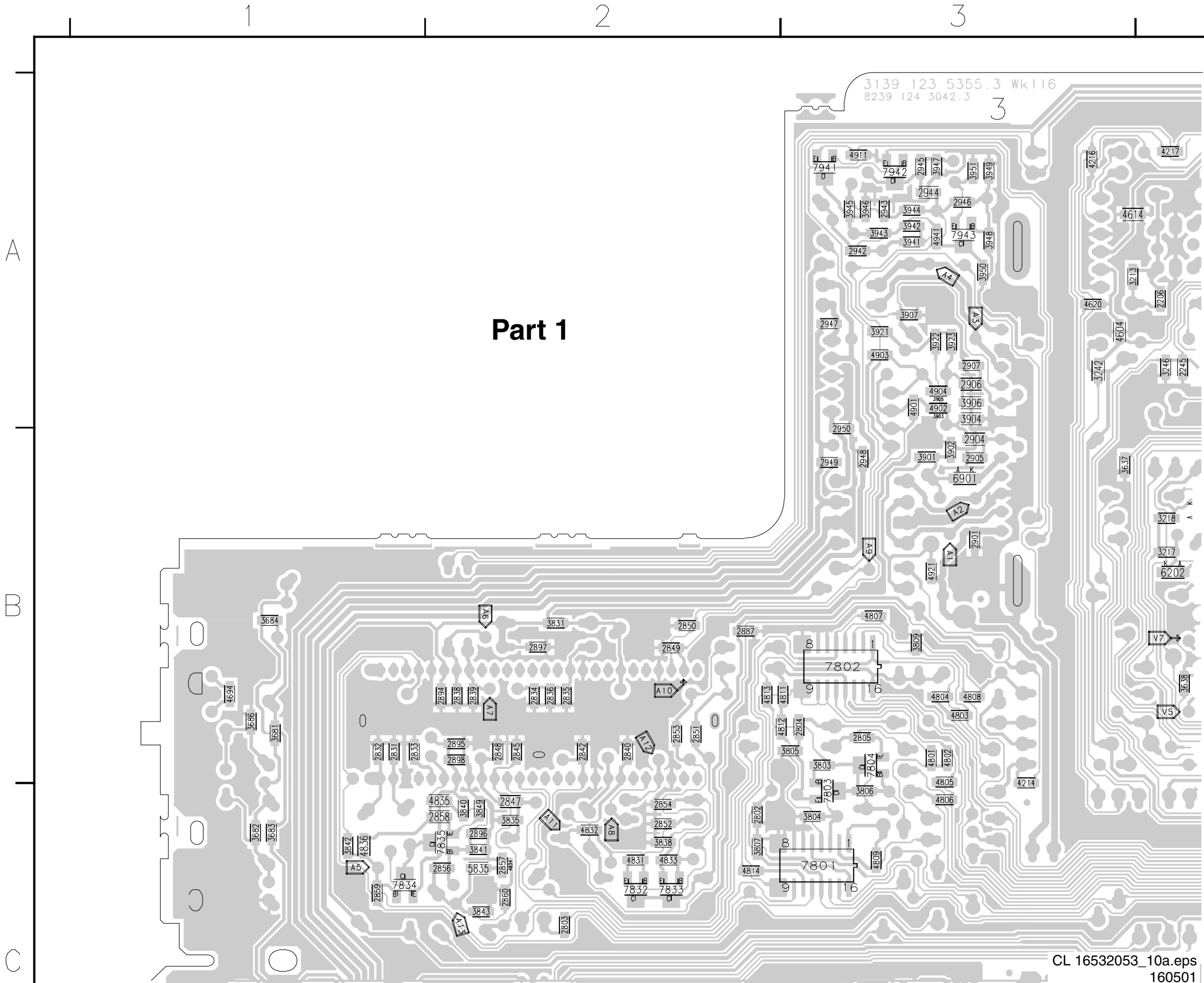
Layout Mono Carrier (Top View)



0211	A2	2903	D3	3832	D2	9508	C4
0212	B2	2908	E3	3833	D2	9509	B4
0213	B2	2941	E3	3834	C2	9510	C4
0214	B1	2981	B1	3836	C2	9511	C5
0215	B1	2983	B1	3837	C2	9512	B2
0217	E3	3000	E6	3839	C2	9513	A3
0218	C1	3001	E6	3981	B1	9514	B3
0219	B1	3005	E4	3982	B1	9517	B3
0220	A6	3012	E6	5001	E6	9520	B4
0221	A5	3101	C6	5002	E5	9521	A3
0222	C6	3103	C6	5201	E4	9522	B4
0224	E6	3105	C6	5202	E4	9523	C4
0227	C6	3107	C6	5241	E5	9524	C4
0229	D6	3109	D6	5242	E5	9510	E3
0231	A2	3110	D6	5401	B5	9511	C4
0232	B1	3111	D6	5403	B5	9512	C4
0235	D6	3113	D6	5406	B5	9513	D4
0236	C6	3114	D6	5408	A5	9514	E4
0239	C2	3115	D6	5410	C6	9515	D5
0240	D5	3116	D6	5444	C5	9516	D5
0242	D6	3117	D6	5445	A6	9517	D5
0243	D4	3118	D6	5471	C6	9518	D5
0246	E3	3119	D6	5500	B2	9519	D3
0248	E4	3121	D6	5502	B2	9520	D5
0249	D4	3122	D6	5502	B2	9522	C4
0250	C5	3131	C6	5505	B4	9523	D5
0251	C3	3133	C6	5520	A4	9524	D3
0259	B1	3135	C6	5521	A3	9525	E6
0261	D4	3137	C6	5560	A4	9526	D3
0262	D6	3139	D6	5561	B4	9527	D3
0265	E7	3141	D6	5562	B4	9528	E5
0266	E4	3142	D6	5563	A4	9529	D5
0270	B1	3143	D6	5602	D5	9530	C3
0271	E3	3145	D6	5603	D4	9531	D5
0273	D5	3146	D6	5604	D4	9532	E4
0274	C5	3151	E6	5831	D2	9533	D4
0275	D3	3153	D6	5832	C2	9534	D4
0276	D4	3158	D6	5833	C2	9535	D4
0277	B1	3181	B1	6001	E5	9536	C4
0282	C4	3182	B1	6402	B5	9537	E5
0283	E6	3183	C1	6404	B5	9538	D4
0285	E6	3185	C1	6405	B6	9539	E3
0286	C2	3200	E4	6409	A7	9540	D5
0287	D5	3201	D4	6410	B5	9541	D5
0292	B1	3202	D4	6411	B5	9542	D5
0293	C1	3203	D4	6412	B5	9543	D3
0294	E4	3204	D4	6413	A7	9544	E3
0295	E5	3207	E4	6414	B5	9545	E3
1000	E6	3214	D5	6419	C6	9547	D5
1002	E5	3220	D4	6420	C5	9548	E5
1003	E5	3228	E4	6423	C5	9549	D5
1004	E4	3235	D4	6471	B6	9553	C3
1200	E4	3244	E5	6472	C6	9554	C4
1201	E4	3249	E5	6473	C6	9555	C5
1203	E5	3250	E5	6500	A3	9556	C5
1500	A2	3251	E4	6501	B3	9557	D4
1515	C2	3401	B5	6502	B3	9558	D5
1600	C1	3402	C5	6503	B3	9559	D5
1601	C1	3403	A5	6520	B3	9560	D5
1602	D1	3404	B4	6521	A3	9561	D5
1603	D1	3406	B4	6523	B3	9562	D5
1606	A1	3408	C4	6540	B4	9563	D5
1660	D4	3411	B5	6541	B4	9564	C5
1631	C1	3412	B5	6542	A4	9565	D4
2005	E5	3414	B5	6561	A4	9566	C5
2006	E6	3415	C5	6562	B4	9566	C4
2008	E6	3416	A6	6564	B4	9569	C4
2161	D6	3417	B6	6681	D1	9570	C4
2209	D4	3421	C5	6691	A1	9572	C5
2210	D4	3424	C5	6692	B1	9573	C3
2216	E4	3425	B4	6831	D2	9574	D4
2220	D3	3427	C6	7402	A5	9575	C5
2229	E4	3428	C6	7403	C4	9576	C5
2230	E4	3429	B5	7404	C5	9578	C5
2235	E4	3430	B5	7407	C6	9579	C5
2244	E4	3432	B5	7408	C5	9580	D3
2246	E5	3435	A4	7405	A5	9580	C4
2247	E5	3436	A5	7471	B7	9583	D3
2250	E5	3471	C6	7515	B4	9584	D3
2400	B6	3472	C6	7520	B3	9585	D5
2404	A4	3473	C6	7521	A3	9586	D5
2407	B5	3474	C6	7540	B4	9587	D4
2408	A5	3475	C6	7560	C4	9588	D4
2409	B5	3476	C6	7502	D5	9589	D5
2410	C5	3477	C6	7831	D2	9590	D3
2411	B5	3478	C6	7901	D3	9591	E5
2412	B5	3479	B6	7902	D3	9592	C4
2413	A6	3500	A1	9001	E5	9593	C3
2414	B6	3501	B2	9171	D6	9595	E5
2416	A5	3502	B3	9172	D6	9596	E5
2417	B6	3503	B3	9173	D6	9597	D5
2419	B5	3504	C3	9174	D6	9598	D5
2420	C5	3505	B2	9175	D6	9599	C1
2422	C6	3506	A2	9176	D6	9599	C1
2423	C6	3507	B2	9177	D6	9811	C3
2424	B5	3508	B3	9178	D6	9812	D3
2471	B6	3519	B3	9179	D6	9813	D3
2472	B6	3521	B3	9181	C1	9814	D3
2473	B6	3523	B3	9182	C1	9815	D3
2476	C7	3526	B3	9183	C1	9816	C2
2500	A2	3527	B3	9191	B1	9817	C3
2501	B2	3543	B4	9192	B1	9818	C3
2502	B3	3544	B3	9193	B1	9820	C2
2503	A3	3547	A4	9200	E4	9821	C3
2504	A4	3548	B4	9201	E4	9822	D3
2505	B2	3550	C4	9202	D4	9824	C3
2506	B3	3558	C4	9203	D4	9825	C3
2507	A3	3560	B4	9401	C6	9826	C3
2508	A3	3561	B4	9402	B5	9827	D2
2515	A4	3564	B4	9403	B5	9828	D2
2516	B4	3565	C4	9404	B5	9829	D2
2521	B3	3570	C3	9408	A5	9830	C2
2523	A3	3601	D5	9420	B4	9832	C2
2560	A4	3603	D5	9421	A5	9833	D1
2561	A4	3604	D5	9425	C5	9901	D3
2562	B4	3606	D5	9426	C5	9902	E3
2563	B4	3607	D5	9427	B5	9911	D3
2564	B4	3608	D4	9428	C5	9912	D3
2565	A4	3609	D5	9430	C5	9913	E3
2566	B4	3610	D5	9431	B5	9914	E3
2567	C4	3612	E5	9432	C5	9915	E3
2568	B4	3614	D5	9433	B5	9916	D3
2580	C3	3615	D5	9434	B5	9917	D3
2604	D4	3617	D5	9405	B5	9921	D3
2601	A1	3618	D5	9471	C6	9982	B1
2601	D3	3619	D5	9500	A2	9991	B1
2637	D2	3624	D5	9501	A2	9993	E6
2841	C2	3625	D5	9502	B3	9994	E3
2843	C2	3634	D5	9503	B2	9995	D4
2844	C2	3635	D5	9504	C3	9996	E5
2846	C1	3801	D3	9505	C4	9997	E7
2855	C2	3802	D3	9506	C4	9998	E4
2902	D3	3808	C3	9507	C4	9999	E4



Layout Mono Carrier (Part 1 Bottom View)



Layout Mono Carrier (Part 2 Bottom View)

4

5

6

Part 2



A

B

C







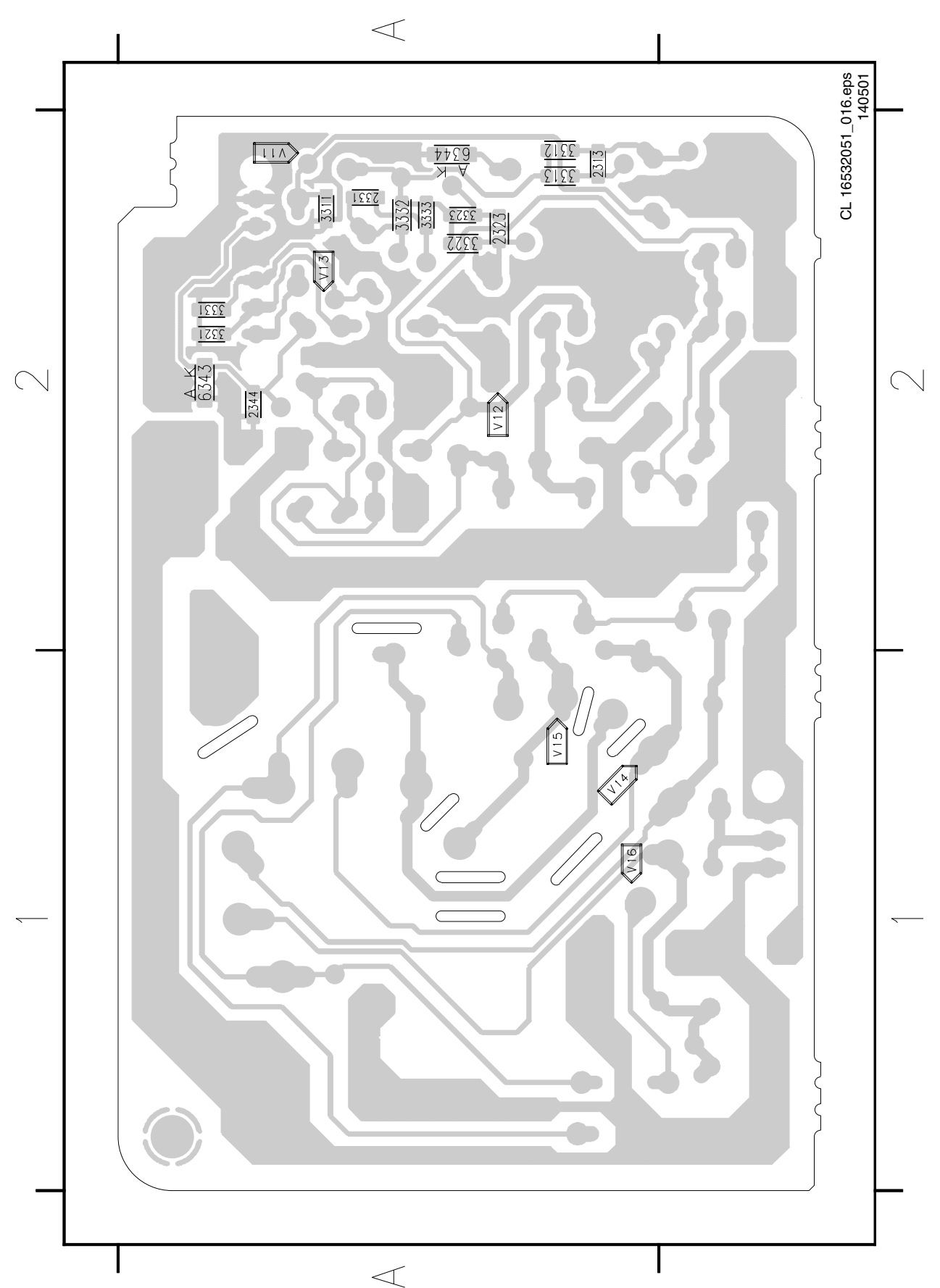
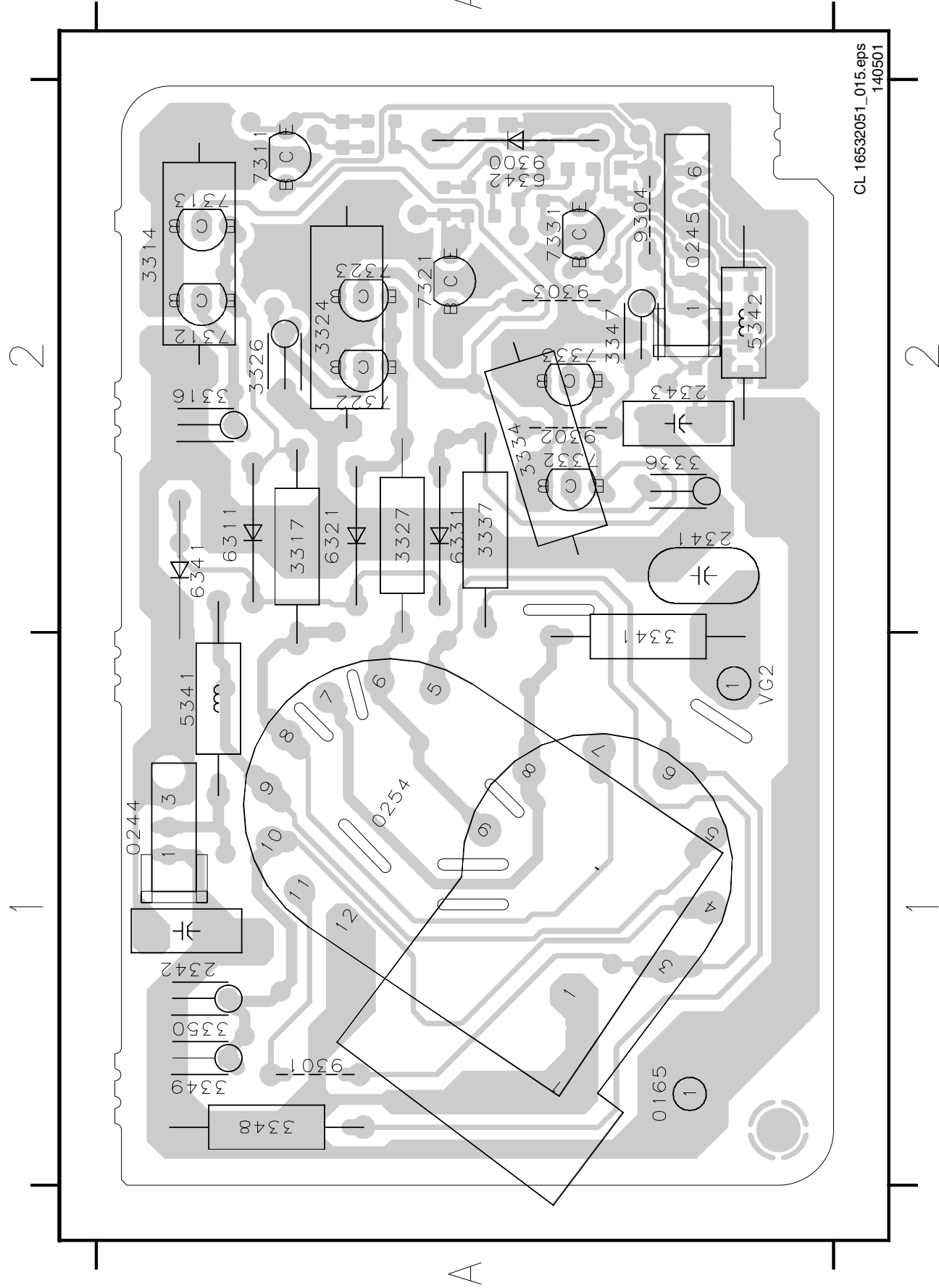


Layout CRT Panel (Top View)

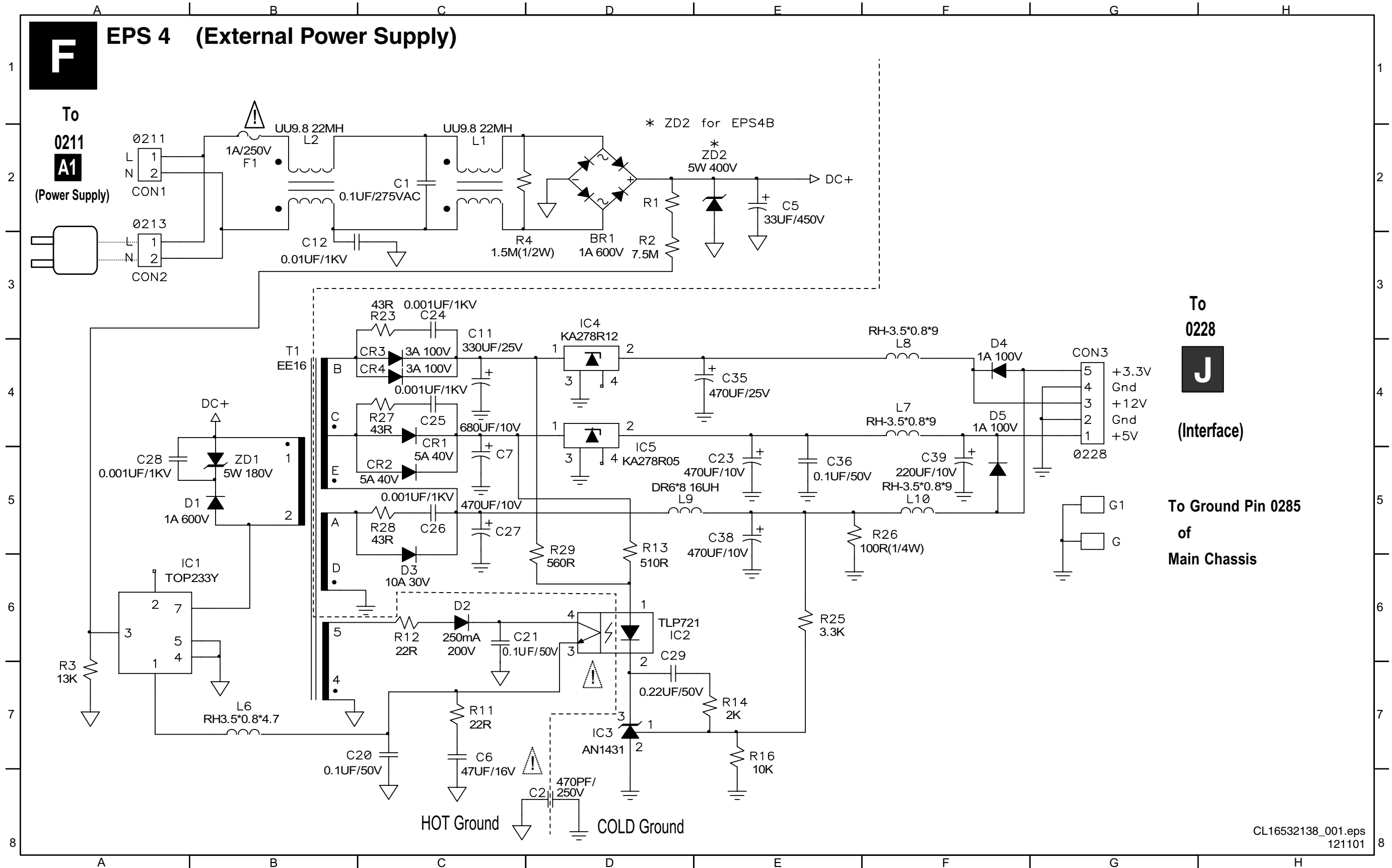
Layout CRT Panel (Bottom View)

- VG2 A1
- 0165 A1
- 0244 A1
- 0245 A2
- 0254 A1
- 1300 A1
- 2341 A2
- 2342 A1
- 2343 A2
- 3314 A2
- 3316 A2
- 3317 A2
- 3324 A2
- 3326 A2
- 3327 A2
- 3334 A2
- 3396 A2
- 3337 A2
- 3341 A1
- 3347 A2
- 3348 A1
- 3349 A1
- 3350 A1
- 5341 A1
- 5342 A2
- 6311 A2
- 6321 A2
- 6322 A2
- 6341 A2
- 6342 A2
- 7311 A2
- 7312 A2
- 7313 A2
- 7321 A2
- 7322 A2
- 7323 A2
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- 7332 A2
- 7333 A2
- 9300 A2
- 9301 A1
- 9302 A2
- 9303 A2
- 9304 A2

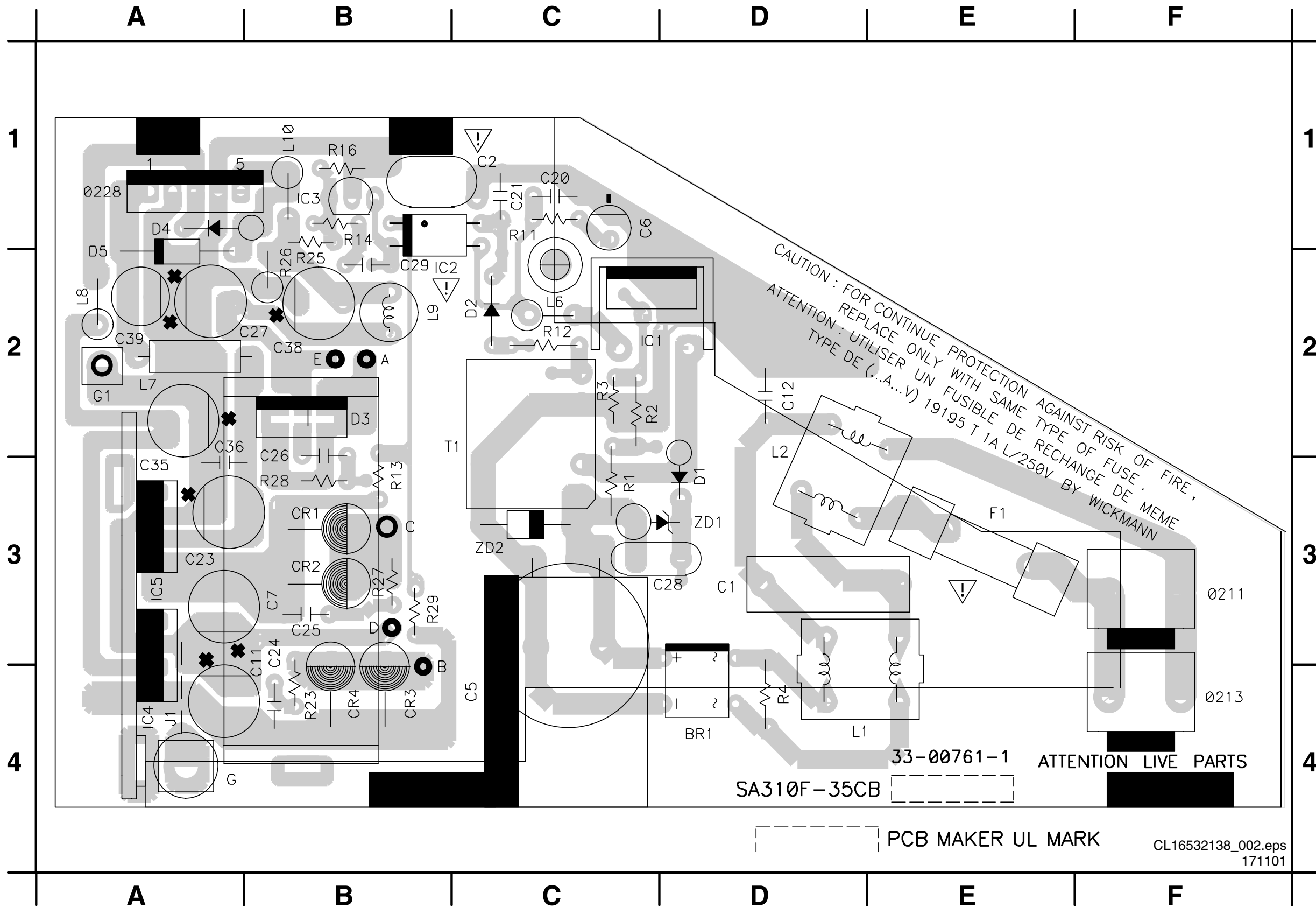
- A2
- 2313 A2
- 2323 A2
- 2331 A2
- 2344 A2
- 3311 A2
- 3312 A2
- 3321 A2
- 3322 A2
- 3323 A2
- 3331 A2
- 3332 A2
- 3333 A2
- 6343 A2
- 6344 A2



EPS 4 (External Power Supply)

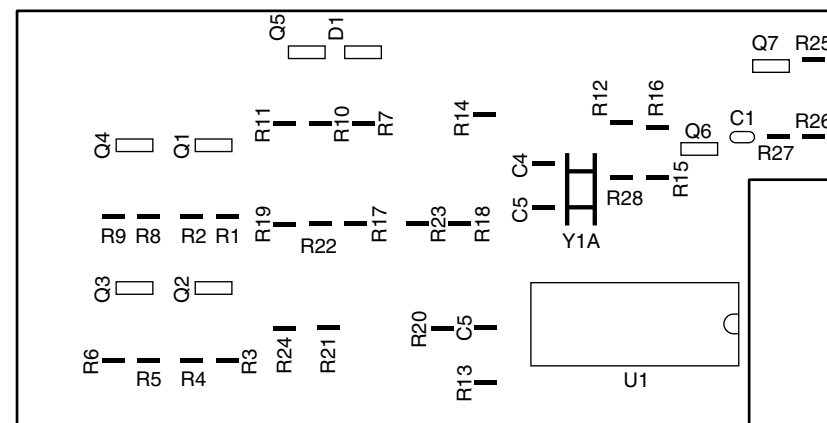
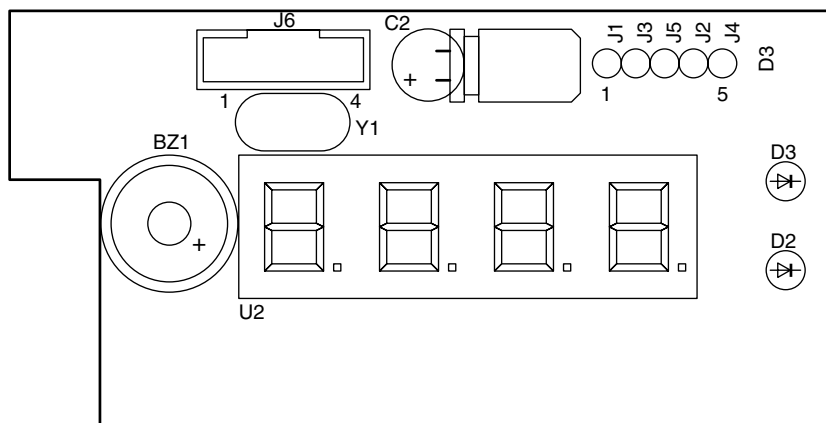
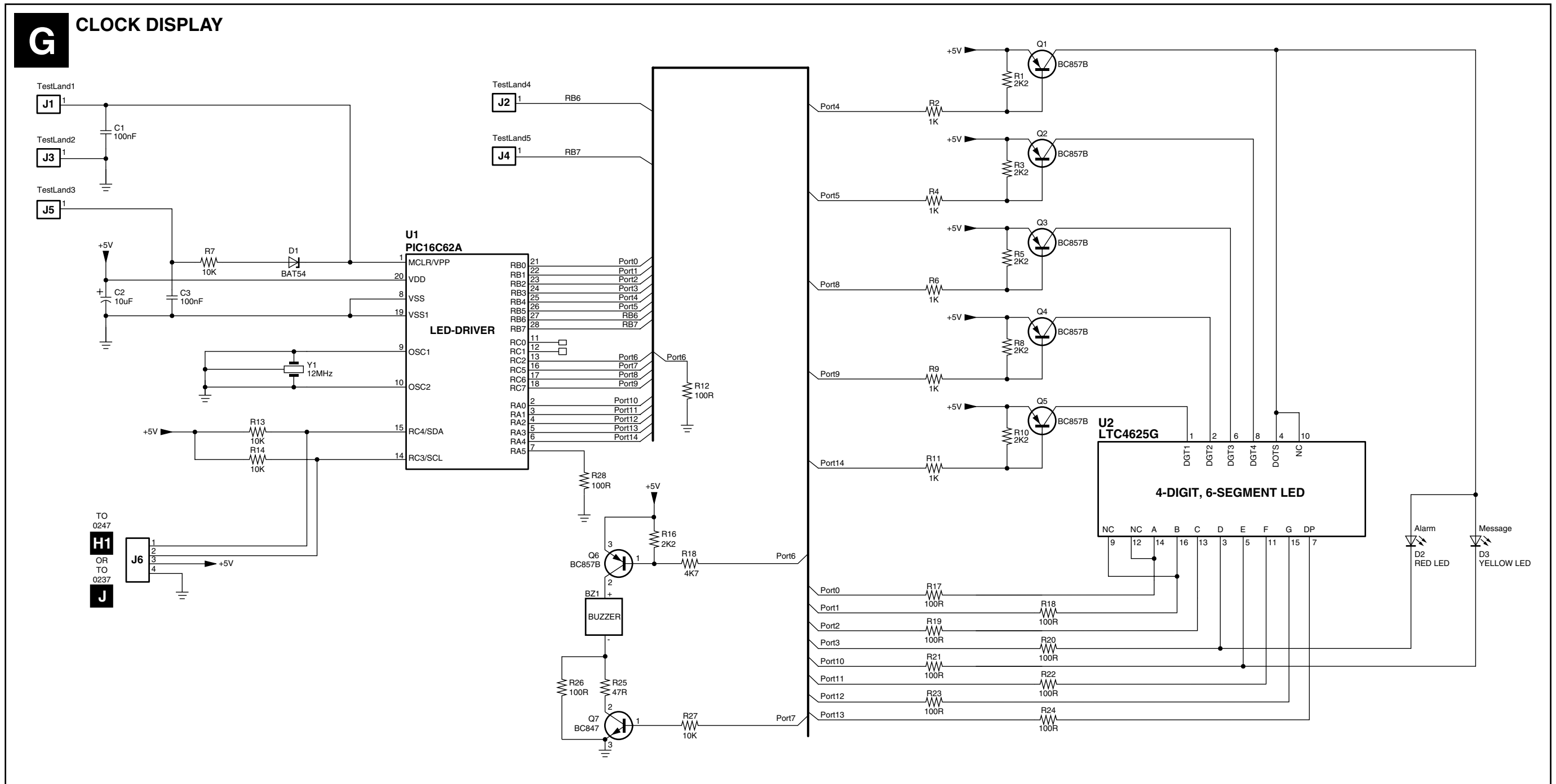


Layout EPS 4 (External Power Supply)

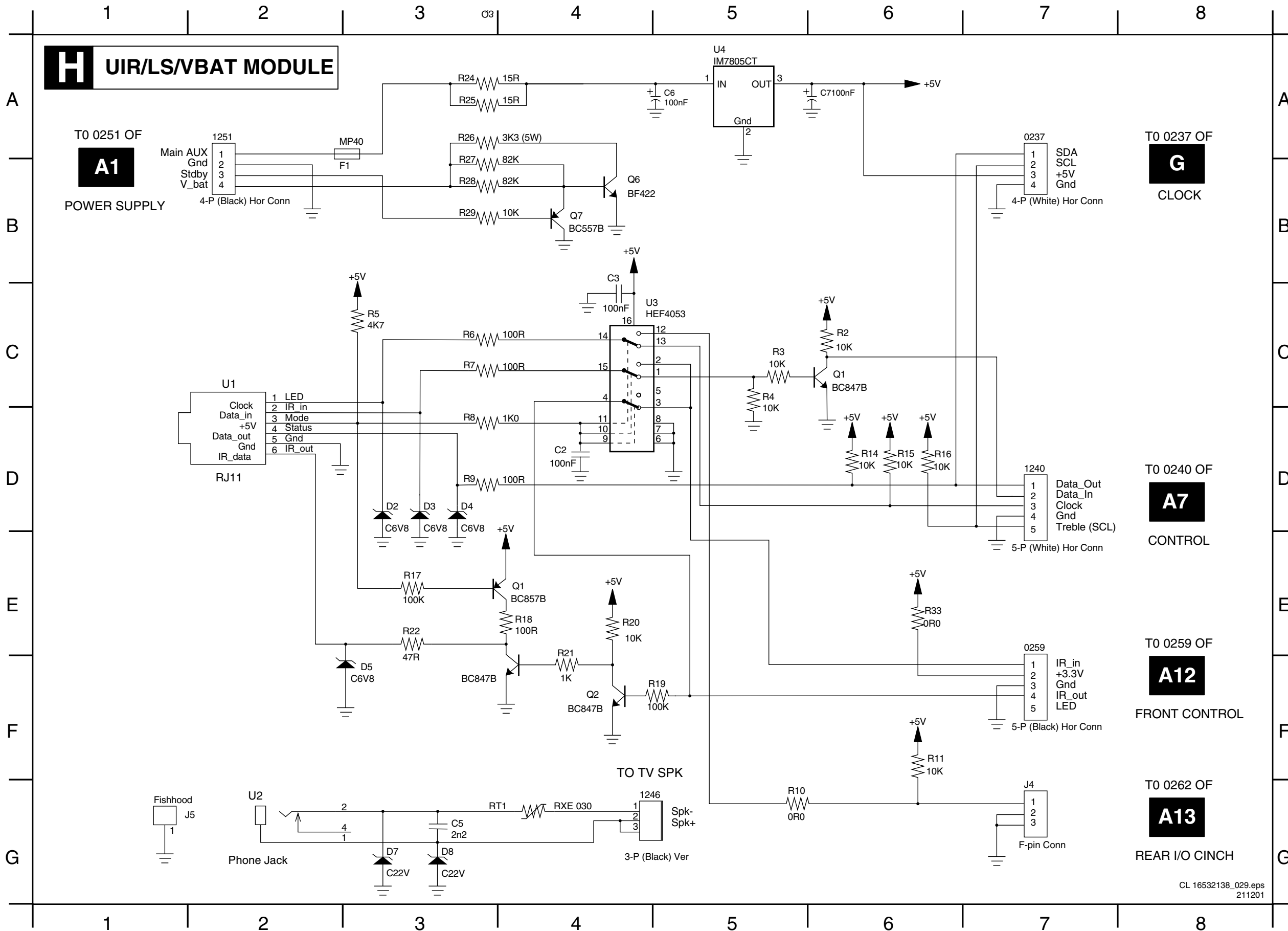


211	F3	R13	B3
213	F4	R14	B1
228	A1	R16	B1
BR1	D4	R23	B4
C1	D3	R25	B2
C2	C1	R26	B2
C5	C4	R27	B3
C6	C1	R28	B3
C7	B3	R29	B3
C11	B3	ZD1	D3
C12	D2	ZD2	C3
C20	C1		
C21	C1		
C23	A3		
C24	B3		
C25	B3		
C26	B2		
C27	B2		
C28	D3		
C29	B2		
C35	A3		
C36	A2		
C38	B2		
C39	A2		
CR1	B3		
CR2	B3		
CR3	B4		
CR4	B4		
D1	D3		
D2	C2		
D3	B2		
D4	A1		
D5	A2		
F1	E3		
G1	A2		
IC1	C2		
IC2	B2		
IC3	B1		
IC4	A4		
IC5	A3		
J1	A4		
L1	D4		
L2	D2		
L6	C2		
L7	A2		
L8	A2		
L9	B2		
L10	B1		
R1	C3		
R2	C2		
R3	C2		
R4	D4		
R11	C1		
R12	C2		
R13	B3		

Clock Display



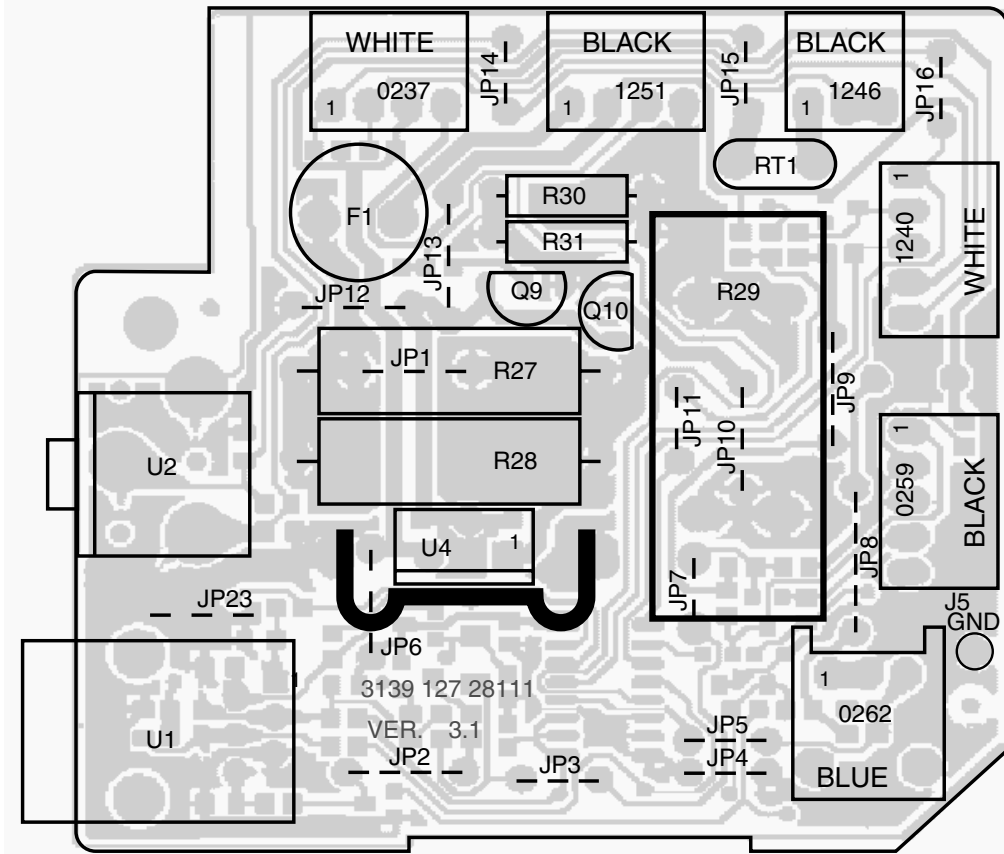
UIR / LS / Vbat Module



C2	D4
C3	C3
C5	G3
C6	A5
D2	D3
D3	D3
D4	D3
D5	F3
D7	G3
D8	G3
F1	A2
J4	G7
J5	G1
Q1	C6
Q1	E4
Q2	F4
Q6	B4
Q6	F4
Q7	B4
RT1	G4
R10	G5
R11	F6
R14	D6
R15	D6
R16	D6
R17	E3
R18	E4
R19	F5
R02	C6
R20	F4
R21	F4
R22	E3
R24	A3
R25	A3
R26	A3
R27	B3
R28	B3
R29	B3
R03	C5
R33	E6
R04	C5
R05	C3
R06	C3
R07	C3
R08	D3
R09	D3
U1	C3
U2	G2
U3	C3
U4	A5
0237	A7
0259	F7
1240	D7
1246	G4
1251	A2

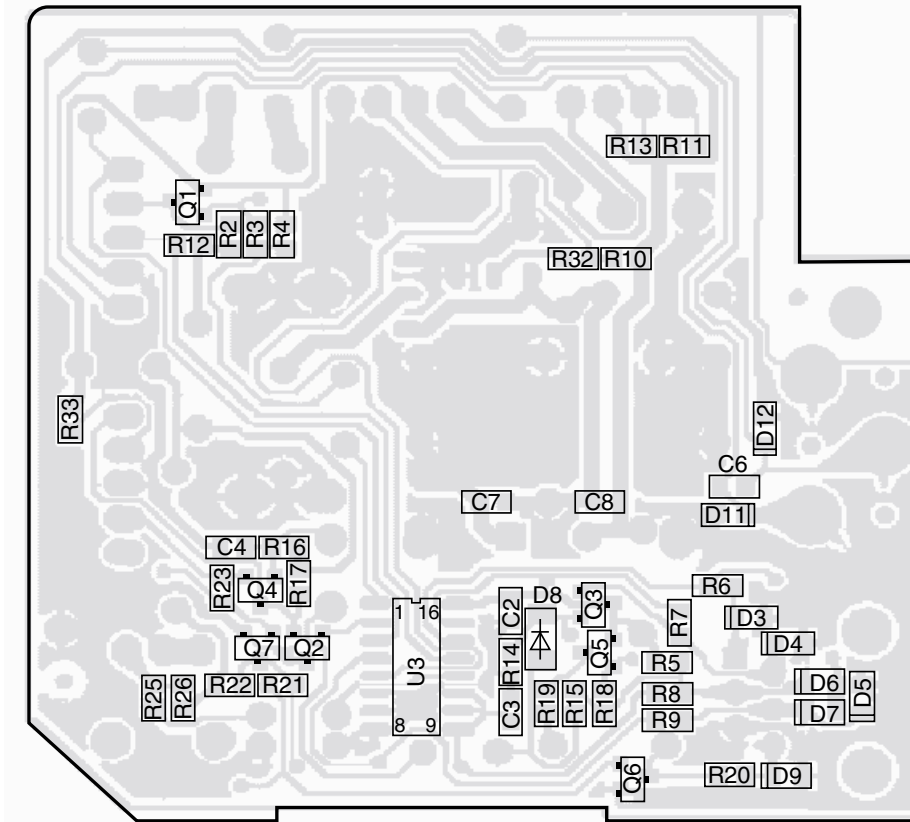


Layout UIR / LS / Vbat Module (Top View)



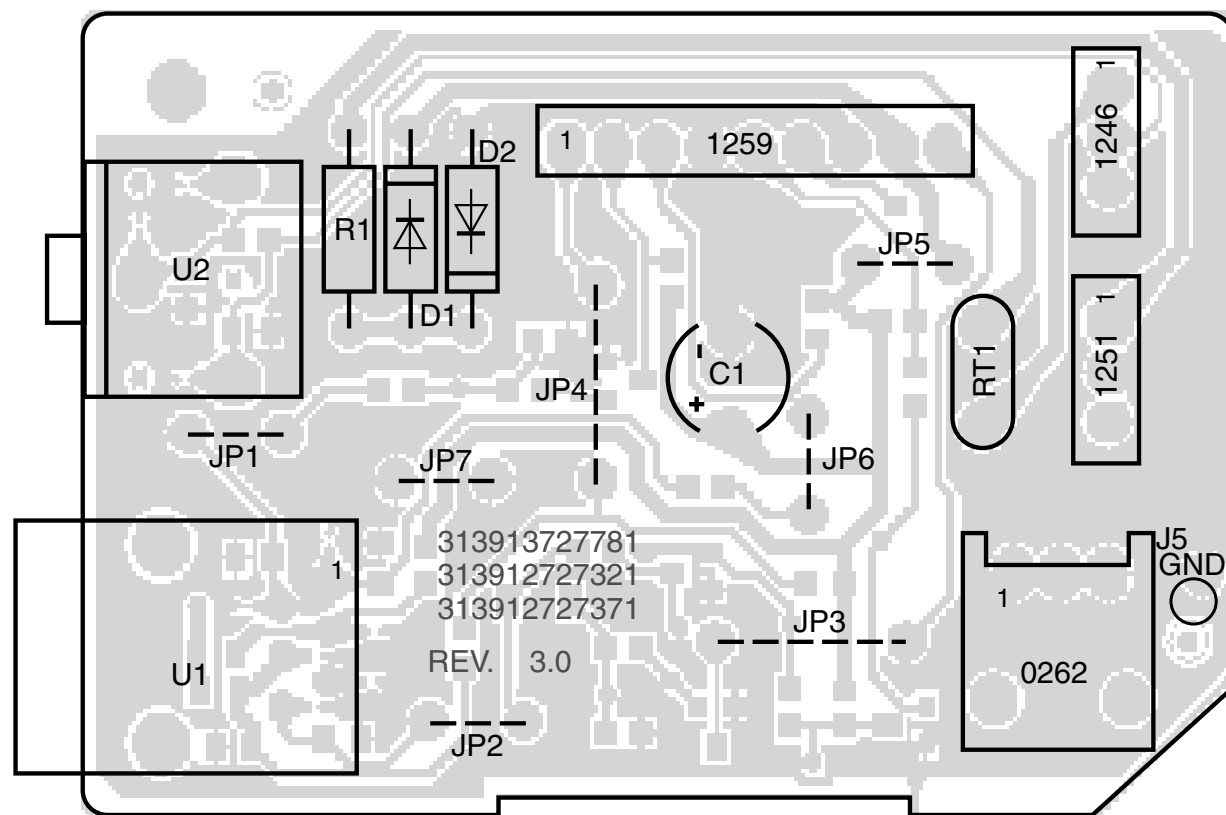
CL 16532138\_030.eps  
191201

Layout UIR / LS / Vbat Module (Bottom View)



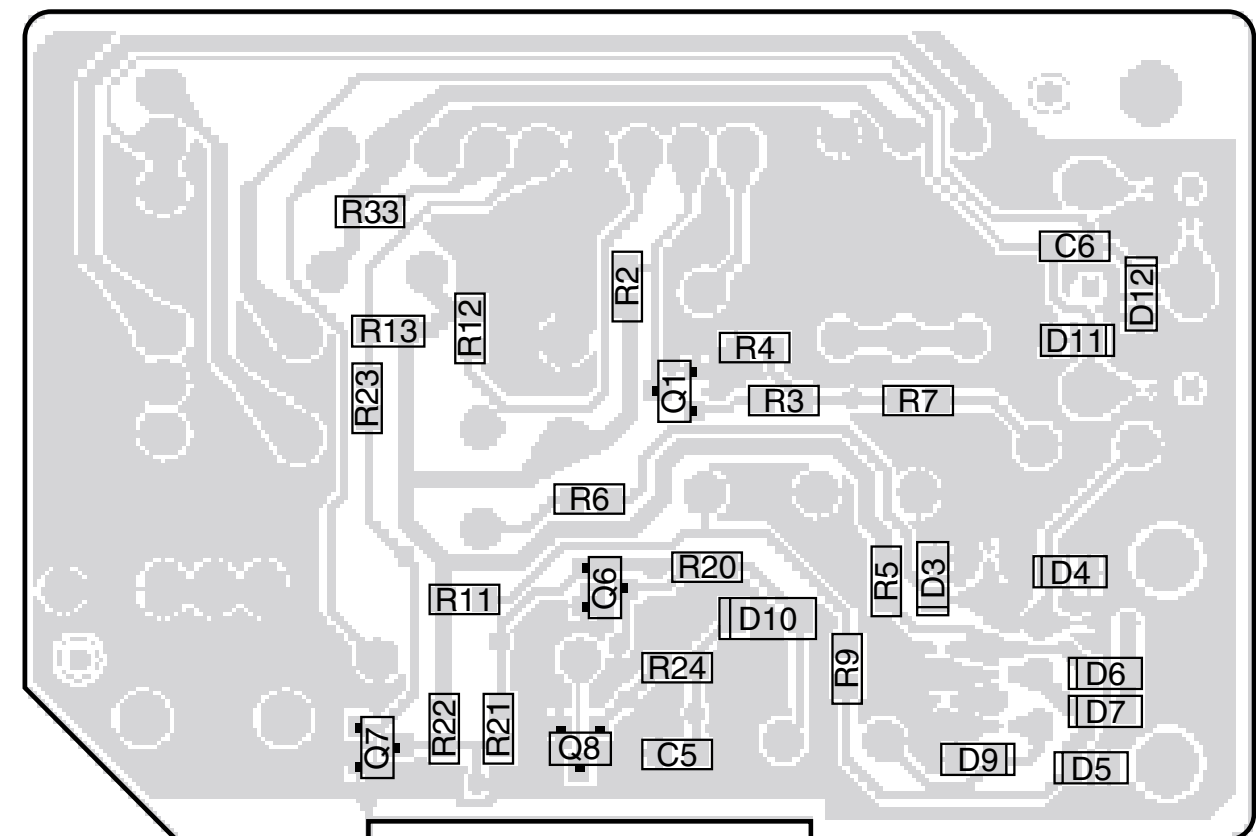
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191201

Layout SP/LS Module (Top View)



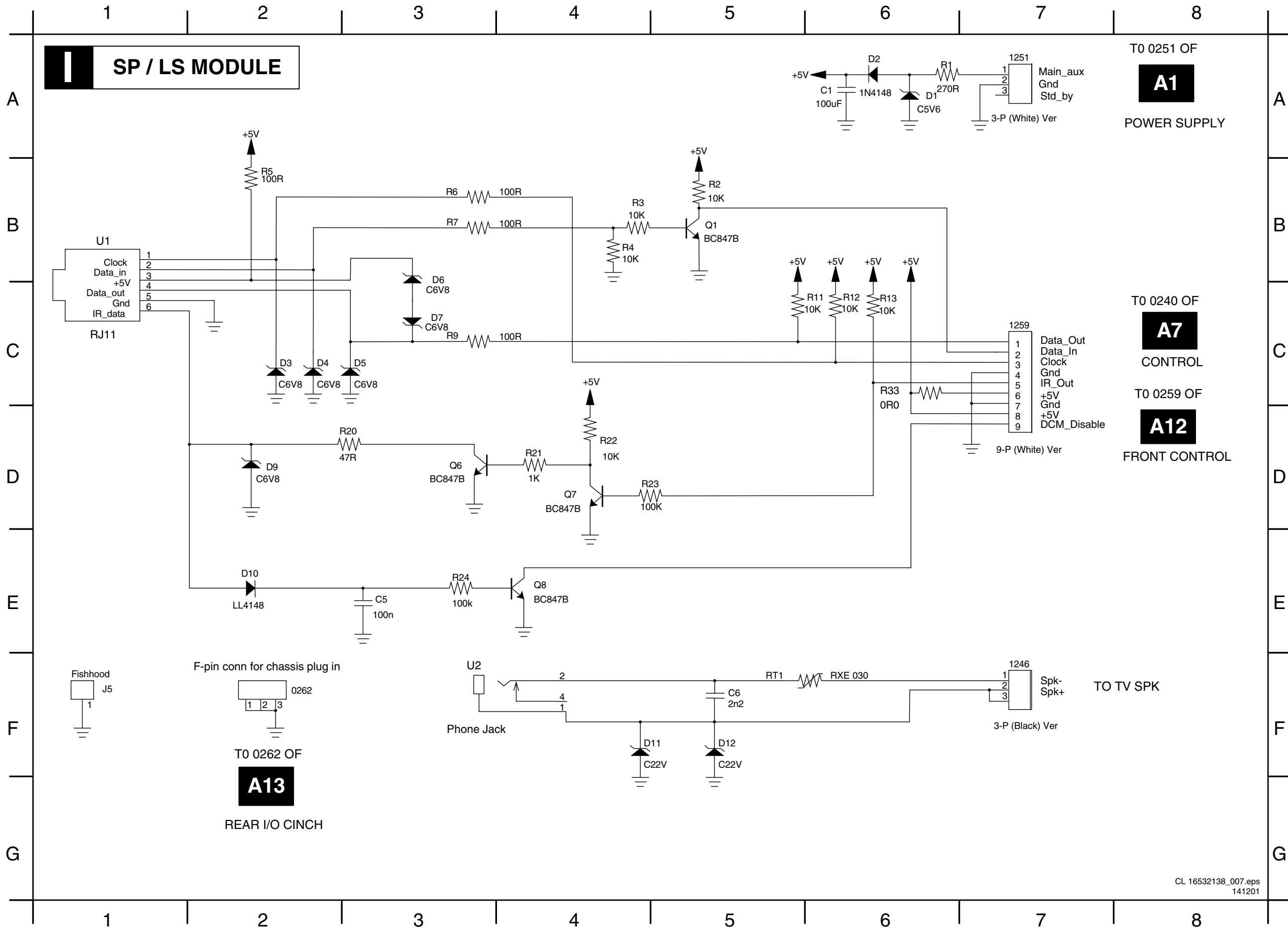
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201101

Layout SP/LS Module (Bottom View)



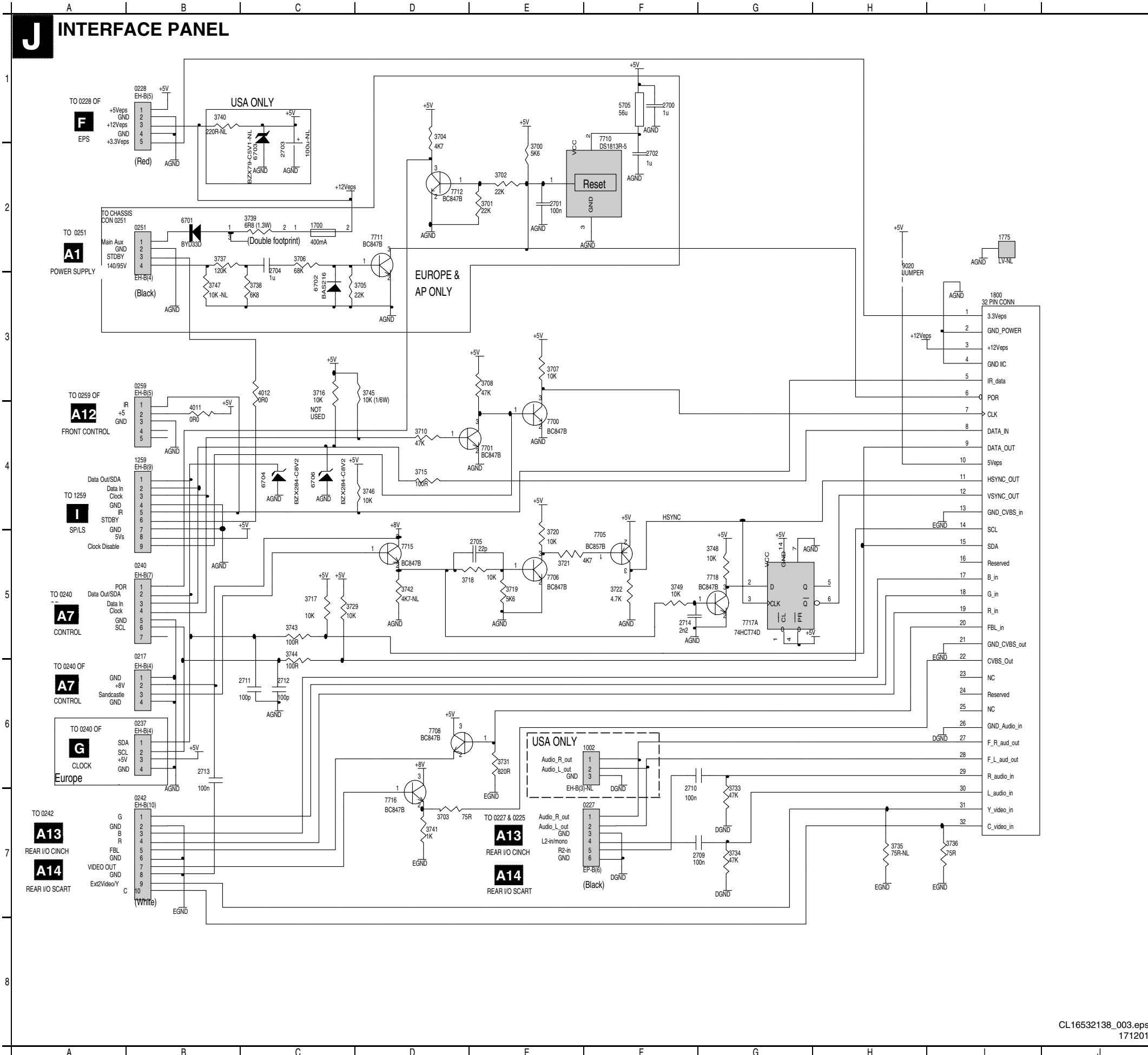
CL 16532138\_009.eps  
201101

SP/LS Module



0262	F2
1246	F7
1251	A7
1259	C7
C1	A6
C5	E3
C6	F5
D1	A6
D10	E2
D11	F4
D12	F5
D2	A6
D3	C2
D4	C2
D5	C3
D6	B3
D7	C3
D9	D2
J5	F1
Q1	B5
Q6	D3
Q7	D4
Q8	E4
R11	C5
R12	C6
R13	C6
R2	B5
R20	D3
R21	D4
R22	D4
R23	D5
R24	E3
R3	B4
R33	C6
R4	B4
R5	B5
R6	B2
R7	B3
R9	C3
RT1	F6
U1	B1
U2	F3

Interface Panel





## 8. Alignments

### Index:

General Alignment Conditions  
Hardware Alignments  
Software Alignments and Settings

### Note:

- The Service Default Alignment Mode (SDAM) is described in chapter 5.
- Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the remote control transmitter.
- Figures can deviate slightly from the actual situation, due to different set executions or software versions.

### 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- AC voltage and frequency: according to country's standard.
- Connect the set to the AC power via an isolation transformer.
- Allow the set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use the cooling fins / plates as ground.
- Test probe:  $R_i > 10 \text{ M}\Omega$ ;  $C_i < 2.5 \text{ pF}$ .
- Use an isolated trimmer / screwdriver to perform the alignments.

### 8.2 Hardware Alignments

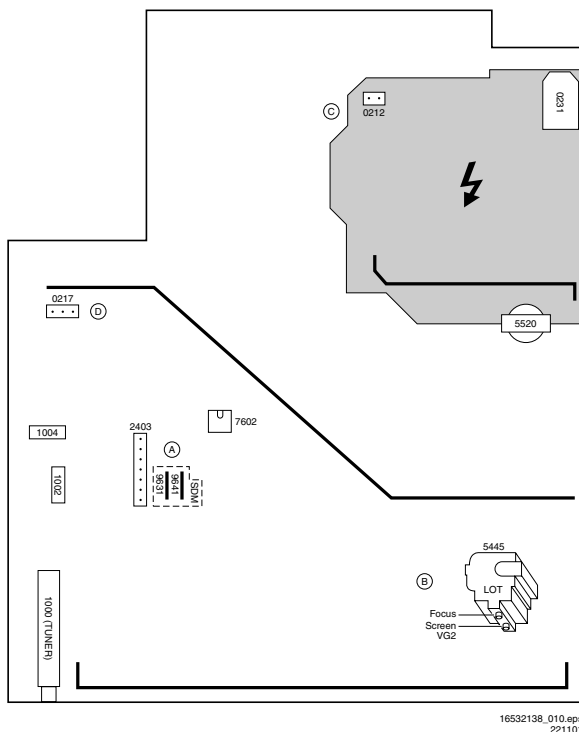


Figure 8-1

#### 8.2.1 Vg2 Adjustment (AKB method)

1. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info). Set TV to AV mode.
2. Activate the SDAM.
3. Select Options and set item "protection" to off.
4. Select Deflection menu.
  - Set AKB to OFF (OFF=1 position, CCC loop disabled)
  - Set BRIGHTNESS to 75%
  - Set CONTRAST and BRIGHTNESS to zero.
5. Unplug the vertical deflection coil connector "0222" (one bright vertical line).
6. Adjust Vg2 until the vertical line just appears.
7. Connect back the deflection coil connector "0222"
8. Set AKB back to ON (=0).
9. Restore BRIGHTNESS and CONTRAST to normal picture setting.
10. Select Options and set item "protection" back to on.
11. Return to the SDAM (main menu) via the MENU key
12. Exit service mode

#### 8.2.2 Focusing

1. Tune the set to a circle or crosshatch test pattern (use an external video pattern generator).
2. Choose picture mode NATURAL with the 'SMART PICTURE' button on the remote control transmitter.
3. Adjust the FOCUS potentiometer (see Fig. 8-1) until the vertical lines at 2/3 from east and west, at the height of the centreline, are of minimum width without visible haze.

### 8.3 Software Alignments and Settings

Activate the Service Default Alignment Mode (see chapter 5). The SDAM menu will now appear on the screen.

Select one of the following alignments:

1. OPTIONS
2. DEFLECTION
3. TUNER
4. WHITE TONE
5. GEOMETRY

## 8.3.1 Options

Table 8-1

LLLL AAAABC X.Y	S
ERR XX XX XX XX XX	
OP XXX XXX XXX XXX XXX XXX XXX	
OB0	XXX
OB1	XXX
OB2	XXX
OB3	XXX
OB4	XXX
OB5	XXX
OB6	XXX
LOAD DEFAULT	>
WATCHDOG	ON / OFF
PROTECTION	ON / OFF
SOUND	NONE / 3415 / 3465
DEFAULT SOUND	WEST-EU / UK / EAST- EU / FRANCE
QSS	ON / OFF
PIN2	NONE / UIR MSG
PIN77	NONE / I2C
CLOCK	OSD / LED / NONE
BUZZER	NONE / INT / EXT
EW	ON / OFF
WIDESCREEN	ON / OFF
TUNER	NONE / APLS / PHILIPS
LNA	ON / OFF
RADIO	ON / OFF
WSL	NONE / 4136 / 1836
ACTIVE-OFF LED	ON / OFF
RGB	ALWAYS / AV
AV1	ON / OFF
AV2	ON / OFF
AV3	ON / OFF
AV2YC	ON / OFF
NO IDENT STANDBY	ON / OFF

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

**How to Change an Option Byte**

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OB1.. OB7) with the MENU UP/DOWN keys, and enter the new value.

Leaving the OPTION submenu and switching the set off with the standby button on the remote saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the AC power switch (cold start)

**How to Calculate the Value of an Option Byte**

Calculate an Option Byte value (OB1 .. OB7) in the following way:

1. Check the status of the single option bits (OP): are they enabled (1) or disabled (0).
2. When an option bit is enabled (1) it represents a certain value (see first column 'value between brackets' in first table below). When an option bit is disabled, its value is 0.
3. The total value of an Option Byte is formed by the sum of its eight option bits. See second table below for the correct Option Bytes per typenumber.

Table 8-2

Bit (value)	OB1	OB2	OB3	OB4	OB5	OB6	OB7
0 (1)	OP10	OP20	OP30	OP40	OP50	OP60	OP70
1 (2)	OP11	OP21	OP31	OP41	OP51	OP61	OP71
2 (4)	OP12	OP22	OP32	OP42	OP52	OP62	OP72
3 (8)	OP13	OP23	OP33	OP43	OP53	OP63	OP73
4 (16)	OP14	OP24	OP34	OP44	OP54	OP64	OP74
5 (32)	OP15	OP25	OP35	OP45	OP55	OP65	OP75
6 (64)	OP16	OP26	OP36	OP46	OP56	OP66	OP76
7 (128)	OP17	OP27	OP37	OP47	OP57	OP67	OP77
Total:	Sum	Sum	Sum	Sum	Sum	Sum	Sum

Table 8-3

L01 ITV Europe Options	OB1	OB2	OB3	OB4	OB5	OB6	OB7
14HT3154/01	8	16	2	1	3	117	0
14HT3154/05	8	16	2	1	3	117	0
14HT3304/01	8	21	9	1	3	122	0
14HT3304/05	8	21	9	1	3	122	0
17HT3154/01	8	16	2	1	3	117	0
17HT3154/05	8	16	2	1	3	117	0
17HT3304/01	8	21	9	1	3	122	0
17HT3304/05	8	21	9	1	3	122	0
17HT5404/01Z	8	17	2	9	22	122	0
17HT5404/05Z	8	17	2	9	22	122	0
17HT5404/21R	8	17	2	9	22	122	0
17HT5404/25R	8	17	2	9	22	122	0
21HT3154/01	8	16	2	1	3	117	0
21HT3154/05	8	16	2	1	3	117	0
21HT3304/01	9	21	9	1	3	122	0
21HT3304/05	9	21	9	1	3	122	0
21HT5404/01Z	9	17	2	9	22	122	0
21HT5404/05Z	9	17	2	9	22	122	0
21HT5404/21R	9	17	2	9	22	122	0
21HT5404/25R	9	17	2	9	22	122	0

**Option Bit Assignment**

Following are the option bit assignments for all L01 ITV software clusters.

**Table 8-4**

Options	Bit	Description	Value
Byte 0 (TV System)	7	Multi-system	0 = Multi, 1 = Dual I-DK
	6		
	5		
	4	Default sound	1 = BG (or West EU), 2 = I (or UK), 3 = DK (or East EU), 4 = M, 5 = LL (or France)
	3		
	2		
	1	Sound Board	0 = Mono (no sound board), 1 = MSP 3415G, 2 = MSP 3445G - (BTSC), 3 = MSP 3465G - AV stereo
	0		
Byte 1 (Pin Usage)	7	Not Used	
	6	Not Used	
	5	Not Used	
	4	QSS	1 = UOC and chasis support QSS
	3	Pin 2	0 = None (not used), 1 = UIR-Link Message Input
	2		
	1	Pin 77	0 = None (not used), 1 = SPI I <sup>2</sup> C (at 32-pin card interface)
	0		
Byte 2 (Devices)	7	Pin 78	0 = None (not used), 1 = Wide Screen, 2 = Rotation/Tilt
	6		
	5	EW	1 = Chasis supports East-West alignment
	4	China	1 = Vision IF is set for China
	3	Radio	1 = Tuner has FM radio feature and TV chasis support FM radio
	2	LNA	1 = Tuner has LNA feature
	1	Tuner	0 = None (no tuner), 1 = Philips (model), 2 = Alps (model)
	0		
Byte 3 (Devices)	7	Not Used	
	6	Not Used	
	5	Not Used	
	4	US Region Code	1 = US Region code is used in SmartPort (except command 0x00)
	3	SmartPort	1 = Chasis supports SmartPort (SPI or I <sup>2</sup> C)
	2	Active-Off LED	1 = LED ON
	1	WSL	0 = None (no used), 1 = 4136 (IR receiver model), 2 = 1836 (IR receiver model)
	0		
Byte 4 (AV, Tuning)	7	Not Used	
	6	Not Used	
	5	Not Used	
	4	AVYC	1 = AV available
	3	AV3	1 = AV available
	2	AV2	1 = AV available
	1	AV1	1 = AV available
	0	RGB	0 = RGB input always allowed, 1 = RGB insertion allowed only when current input source is AV1
Byte 5 (Feature)	7	Not Used	
	6	Protection	1 = Protection (TV go to standby). 0 = No protection but errors are still logged.
	5	WatchDog	1 = Watchdog feature is enabled
	4	No Ident Standby	1 = TV goes standby after 10mins of no RF signal.
	3	Buzzer Type	0 = None (no buzzer), 1 = Internal (generated by TV microp), 2 = External (generated by I <sup>2</sup> C device)
	2		
	1	Clock Type	0 = None (no clock), 1 = OSD, 2 = LED Module
	0		
Byte 6	7	Not Used	
	6	Not Used	
	5	Not Used	
	4	Not Used	
	3	Not Used	
	2	Not Used	
	1	Not Used	
	0	Not Used	

### 8.3.2 Deflection

The Deflection Sub menu contains the following items:

- AKB, ON to enable, OFF to disable the 'black current loop' (AKB = Auto Kine Bias).
- Brightness, (set Brightness)
- Contrast, (set Contrast)

"See Vg2 alignment"

#### Deflection Menu

S	
AKB	ON/OFF
BRIGHTNESS	<input type="text"/>
CONTRAST	<input type="text"/>

CL 16532138\_020.eps  
141201

Figure 8-2

### 8.3.3 Tuner

**Note:** Described alignments are only necessary when the NVM (item 7602) is replaced.

#### Tuner Submenu

S	
IFPLL	XXX
AGC	XXX
SL	XXX
CL	XXX

CL 16532108\_010.eps  
131201

Figure 8-3

The Tuner Sub menu contains the following items:

- Phase Locked Loop used for FST tuning systems. Adjust the IFPLL value (default value is 30) with the LEFT/RIGHT cursor keys.
- (AGC take over point) asis Emphasistype= 'Bold'>Set the external pattern generator to a colour bar video signal and connect the RF output to aerial input. Set amplitude to 10 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC). Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main panel).
  1. Activate the SDAM.
  2. Go to the TUNER sub menu.
  3. Select AGC with the UP/DOWN cursor keys.
  4. Adjust the AGC-value (default value is 28) with the LEFT/RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V.
  5. Switch the set to STANDBY.
- **Slicing level**  
Slicing level for the vertical sync. This adjustment is always set to 0 (for NTSC system only).
- **CL (cathode drive level)**  
Adjust the CL value (default value is 4) with the LEFT/RIGHT cursor keys.

### 8.3.4 White Tone

#### White Tone Menu

S			
NORMAL RED		XX	
NORMAL	GREEN	XX	
NORMAL	BLUE	XX	
DELTA	COOL	RED	XX
DELTA	COOL	GREEN	XX
DELTA	COOL	BLUE	XX
DELTA	WARM	RED	XX
DELTA	WARM	GREEN	XX
DELTA	WARM	BLUE	XX

CL 16532108\_007.eps  
131201

Figure 8-4

In the WHITE TONE sub menu, the values of the black cut off level can be adjusted. Normally, no alignment is needed for the WHITE TONE. You can use the given default values.

The colour temperature mode (NORMAL, COOL and WARM) and the colour (RED, GREEN, and BLUE) can be selected with the UP/DOWN RIGHT/LEFT cursor keys. The value can be changed with the LEFT/RIGHT cursor keys. First, select the values for the NORMAL colour temperature. Then select the values for the DELTA COOL and DELTA WARM mode. After alignment, switch the set to standby, in order to store the alignments.

Default settings:

- NORMAL (colour temperature = 11500 K):
  - NORMAL RED = 32
  - NORMAL GREEN = 35
  - NORMAL BLUE = 30
- DELTA COOL (colour temperature = 14000 K):
  - DELTA COOL RED = 0
  - DELTA COOL GREEN = -5
  - DELTA COOL BLUE = 5
- DELTA WARM (colour temperature = 8200 K):
  - DELTA WARM RED = 8
  - DELTA WARM GREEN = -3
  - DELTA WARM BLUE = 2



### 8.3.5 Geometry

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

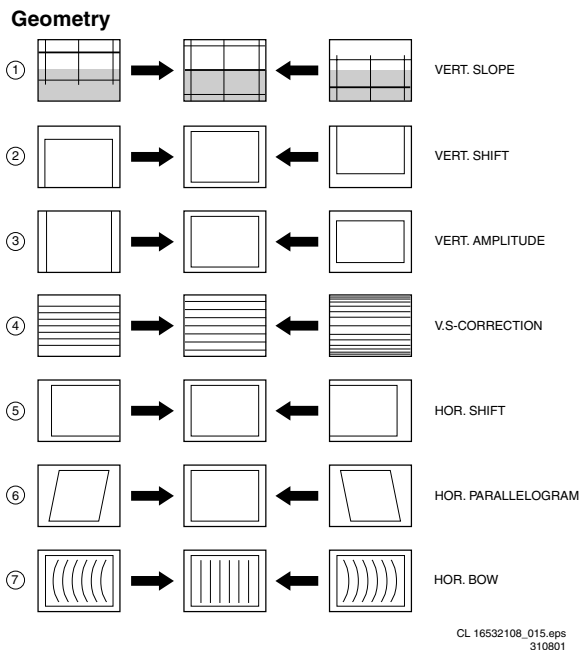


Figure 8-5

Connect an external video pattern generator to the aerial input of the TV-set and input a crosshatch test pattern. Set the generator amplitude to at least 1 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).

1. Activate the SDAM menu (see chapter 5).
2. Go to the GEOMETRY sub menu.

Now you can perform the following alignments:

- **Horizontal Parallelogram (HP)**  
Align straight vertical lines in the top and the bottom; vertical rotation around the centre.
- **Horizontal Bow (HB)**  
Align straight horizontal lines in the top and the bottom; horizontal rotation around the centre.
- **Horizontal Shift (HS)**  
Align the horizontal centre of the picture to the horizontal centre of the CRT.
- **Vertical Slope (VS)**  
Align the vertical centre of the picture to the vertical centre of the CRT. This is the first of the vertical alignments to perform. For an easy alignment, set SBL to ON.
- **Vertical Amplitude (VA)**  
Align the vertical amplitude so that the complete test pattern is visible.
- **Vertical S-Correction (SC)**  
Align the vertical linearity, meaning that vertical intervals of a grid pattern must be equal over the entire screen height.
- **Vertical Shift (VSH)**  
Align the vertical centring so that the test pattern is located vertically in the middle. Repeat the 'vertical amplitude' alignment if necessary.
- **Service Blanking (SBL)**  
Switch the blanking of the lower half of the screen ON or OFF (to be used in combination with the vertical slope alignment).

#### For EW versions

- Set Horizontal Parallelogram to prevent the picture from slanting to one side.
- Set Horizontal Bow to prevent the top and bottom of picture from bending to the sides.

- Select Vertical Zoom to align the vertical linearity over the entire screen height (for 16 : 9 applications only).
- Set Trapezium Correction to align the lines at the vertical sides.
- Select East-West Width and align the picture width until the side castellations disappear.
- Select East-West Parabola / width and align the vertical sides until the sides are straightened.
- Select Upper Corner Parabola to straighten the top of the vertical lines at the sides.
- Select Lower Corner Parabola to straighten the bottom of the vertical lines at the sides.
- Repeat the last 5 steps if necessary.

#### Geometry alignments menu

Table 8-5

SC	S	XX
SBL	ON/OFF	XX
VS		XX
VSH		XX
VA		XX
HS		XX
HP		XX
HB		XX

## 9. Circuit Description

Index of this chapter:

1. Introduction
2. Audio Signal Processing
3. Video Signal Processing
4. Synchronisation
5. Deflection
6. Power Supply
7. Control
8. Abbreviations

### Notes:

- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the block diagram in chapter 6, or the electrical diagrams in chapter 7. Where necessary, you will find a separate drawing for clarification.

### 9.1 Introduction

The L01 chassis is a global TV chassis for the model year 2001 and is used for TV sets with screen sizes from 14" - 21" (small screen) to 21" - 32" (large screen).

The standard architecture consists of a Main panel, a Picture Tube panel, a Side I/O panel (not all executions) and a Top Control panel.

The Main panel consists primarily of conventional components with hardly any surface mounted devices.

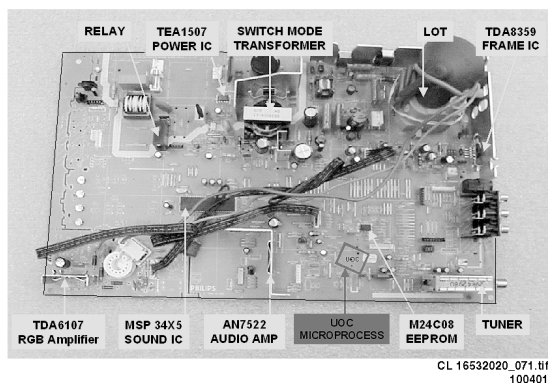


Figure 9-1

The functions for video processing, microprocessor ( $\mu P$ ) and teletext (TXT) decoder are combined in one IC (TDA958xH), the so-called Ultimate One Chip (UOC). This chip is (surface) mounted on the copper side of the main panel.

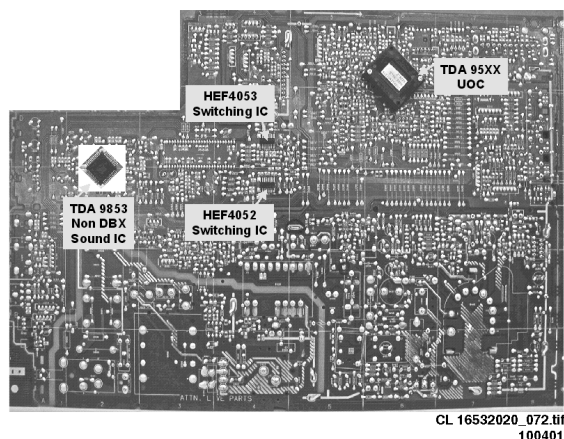


Figure 9-2

The L01 is divided into 2 basic systems, i.e. mono and stereo sound. While the audio processing for the mono sound is done in the audio block of the UOC, an external audio processing IC is used for stereo sets.

The tuning system features 100 video channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. Also, in some type numbers, an FM radio is implemented with 40 pre-set channels.

The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I<sup>2</sup>C bus. The memory IC retains the settings for favourite stations, customer-preferred settings, and service/factory data.

The on-screen graphics and closed caption decoding are done within the microprocessor, and then sent to the signal processor IC to be added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

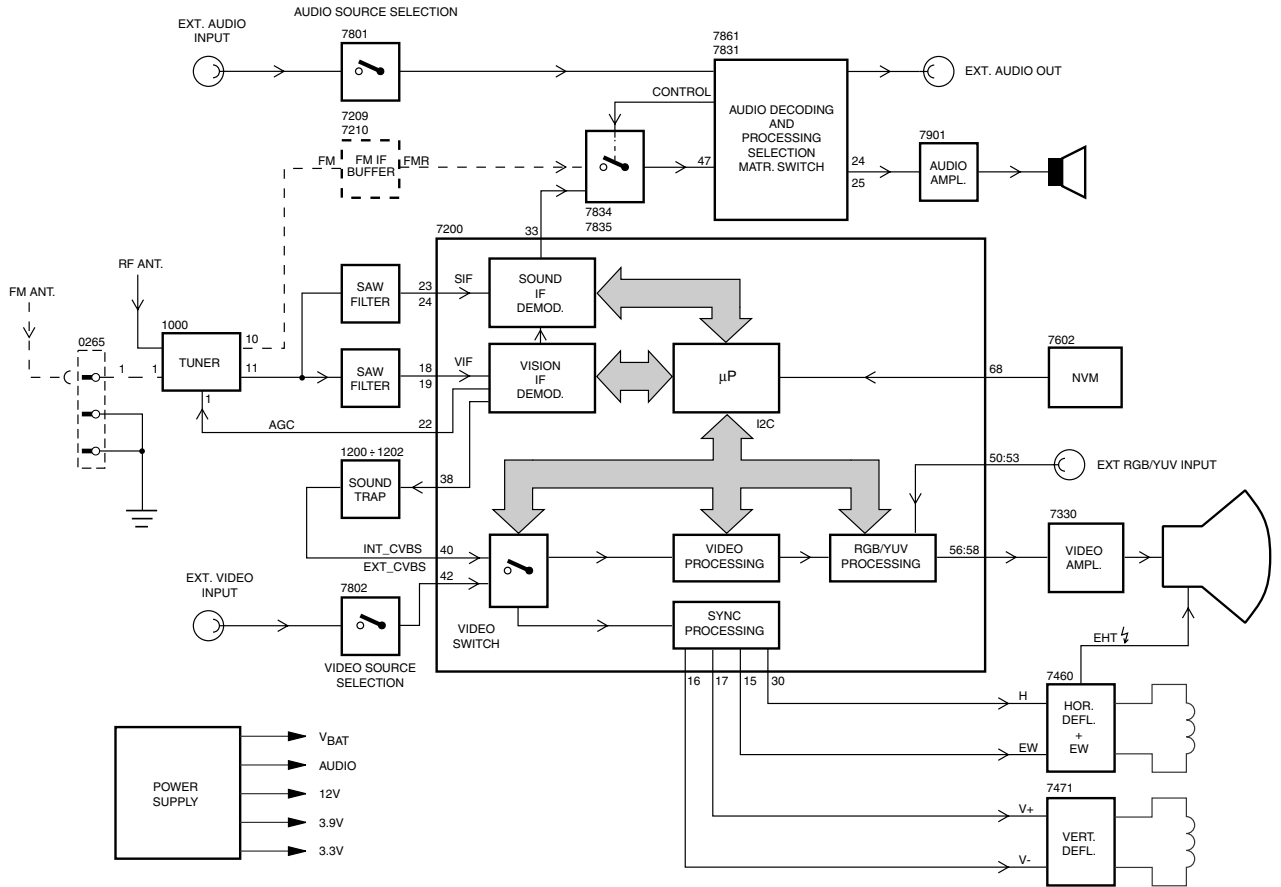
### 9.2 Audio Signal Processing

#### 9.2.1 Stereo

In stereo sets, the signal goes via the SAW filter (position 1004 in case of QSS demodulation and 1003 in case of Inter-carrier demodulation), to the audio demodulator part of the UOC IC7200. The stereo audio output on pin 33 goes, via TS7206, to the stereo decoder 7831.

The switch inside the stereo decoder 7831 selects (via I<sup>2</sup>C) either the internal decoder or an external source.

The NICAM + 2CS AM/FM stereo decoder is an ITT MSP34X5. The output is fed to the audio amplifier (AN7522 at position 7901). The volume level is controlled at this IC (pin 9) by a control line (VolumeMute) from the microprocessor. The audio signal from 7901 is then sent to the speaker/headphone output panel.



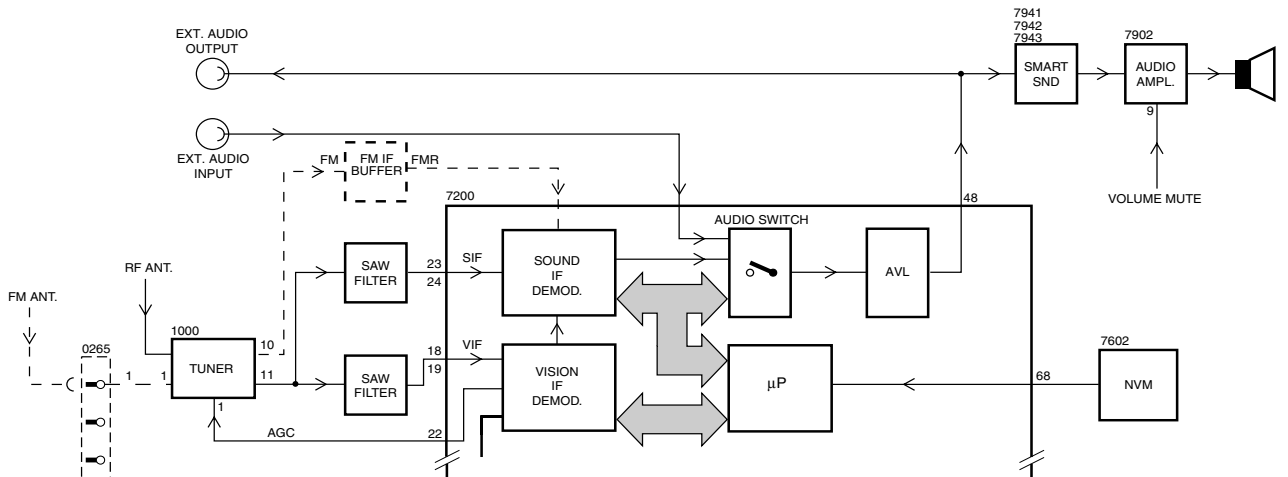
CL 16532008\_039.eps  
220501

Figure 9-3

9.2.2 Mono

In mono sets, the signal goes via the SAW filter (position 1004 in case of QSS demodulation and 1003 in case of Inter-carrier demodulation), to the audio demodulator part of the UOC

IC7200. The audio output on pin 48 goes directly, via buffer 7943, to the audio amplifier (AN7523 at position 7902). The volume level is controlled at this IC (pin 9) by a 'VolumeMute' control line from the microprocessor. The audio signal from IC7902 is then sent to the speaker/headphone output panel.



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220501

Figure 9-4

### 9.2.3 FM radio (if present)

The FM radio uses the 10.7 MHz concept. This SIF frequency is available at pin 10 of the tuner. Via a pre-amplifier (TS7209 and TS7210), the signal is fed for demodulation to either the UOC (for mono FM radio) or by the Micronas MSP34X5 (for stereo FM radio).

## 9.3 Video Signal Processing

### 9.3.1 Introduction

The video signal-processing path consists of the following parts:

- RF signal processing.
- Video source selection.
- Video demodulation.
- Luminance/Chrominance signal processing.
- RGB control.
- RGB amplifier

The processing circuits listed above are all integrated in the UOC TV processor. The surrounding components are for the adaptation of the selected application. The I<sup>2</sup>C bus is for defining and controlling the signals.

### 9.3.2 RF Signal Processing

The incoming RF signal goes to the tuner (pos. 1000), where the 38.9 MHz IF signal is developed and amplified. The IF signal then exits the tuner from pin 11 to pass through the SAW filter (position 1002 in case of QSS demodulation and 1003 in case of Intercarrier demodulation). The shaped signal is then applied to the IF processor part of the UOC (pos. 7200). Tuner AGC (Automatic Gain Control) will reduce the tuner gain and thus the tuner output voltage when receiving strong RF signals. Adjust the AGC take-over point via the Service Alignment Mode (SAM). The tuner AGC signal goes to the tuner (pin 1) via the open collector output (pin 22) of the UOC. The IC also generates an Automatic Frequency Control (AFC) signal that goes to the tuning system via the I<sup>2</sup>C bus, to provide frequency correction when needed.

The demodulated composite video signal is available at pin 38 and then buffered by transistor 7201.

### 9.3.3 Video Source Selection

The Composite Video Blanking Signal (CVBS) from buffer 7201 goes to the audio carrier trap filters (1200 and 1201) to remove the audio signal. The signal then goes to pin 40 of IC7200. The internal input switch selects the following input signals:

- Pin 40: terrestrial CVBS input
- Pin 42: external AV1 CVBS input
- Pin 44: external Side I/O CVBS or AV2 Luminance (Y) input
- Pin 45: external AV2 Chrominance (C) input

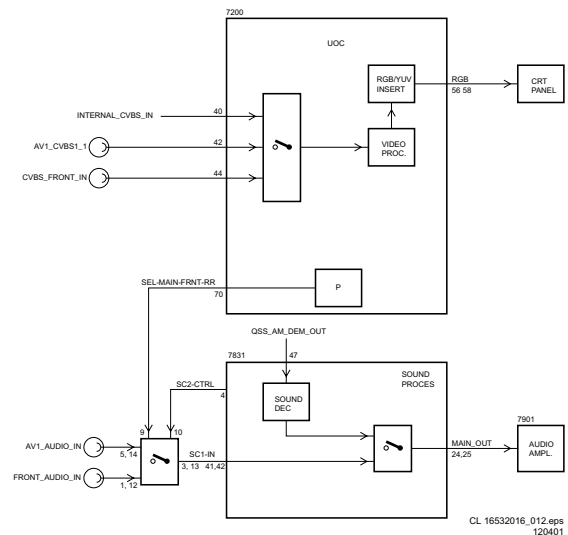


Figure 9-5

Once the signal source is selected, a chroma filter calibration is performed. The received colour burst sub-carrier frequency is used for this. Correspondingly, the chroma band pass filter for PAL processing or the cloche filter for SECAM processing is switched on. The selected luminance (Y) signal is supplied to the horizontal and vertical synchronisation processing circuit and to the luminance processing circuit. In the luminance-processing block, the luminance signal goes to the chroma trap filter. This trap is switched 'on' or 'off', depending on the colour burst detection of the chroma calibration circuit. The group delay correction part can be switched between the BG and a flat group delay characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter.

### 9.3.4 Video Demodulation

The colour decoder circuit detects whether the signal is a PAL, NTSC or SECAM signal. The result is made known to the auto system manager. The PAL/NTSC decoder has an internal clock generator, which is stabilised to the required frequency by using the 12 MHz clock signal from the reference oscillator of the microcontroller/teletext decoder.

The base-band delay line is used to obtain a good suppression of cross colour effects.

The Y signal and the delay line outputs U and V are applied to the luminance/chroma signal processing part of the TV processor.

### 9.3.5 Luminance/Chrominance Signal Processing

The output of the YUV separator is fed to the internal YUV switch, which switches between the output of the YUV separator or the external YUV (for DVD or PIP) on pins 51-53. Pin 50 is the input for the insertion control signal called 'FBL-1'. When this signal level becomes higher than 0.9 V (but less than 3 V), the RGB signals at pins 51, 52 and 53 are inserted into the picture by using the internal switches.

Also some picture improvement features are implemented in this part:

- **Black stretch** This function corrects the black level of incoming signals, which have a difference between the black level and the blanking level. The amount of extension depends upon the difference between actual black level and the darkest part of the incoming video signal level. It is detected by means of an internal capacitor.
- **White stretch** This function adapts the transfer characteristic of the luminance amplifier in a non-linear way depending on the average picture content of the luminance

signal. It operates in such a way that maximum stretching is obtained when signals with a low video level are received. For bright pictures, stretching is not active.

- **Dynamic skin tone correction** This circuit corrects (instantaneously and locally) the hue of those colours which are located in the area in the UV plane that matches the skin tone. The correction is dependent on the luminance, saturation and distance to the preferred axis.

The YUV signal is then fed to the colour matrix circuit, which converts it to R, G and B signals.

The OSD/TXT signal from the microprocessor is mixed with the main signal at this point, before being output to the CRT board (pins 56, 57 and 58).

### 9.3.6 RGB Control

The RGB control circuit enables the picture parameters contrast, brightness and saturation to be adjusted, by using a combination of the user menus and the remote control. Additionally automatic gain control for the RGB signals via cut-off stabilisation is achieved in this functional block to obtain an accurate biasing of the picture tube. Therefor this block inserts the cut-off point measuring pulses into the RGB signals during the vertical retrace period.

The following additional controls are used:

- **Black current calibration loop** Because of the 2-point black current stabilisation circuit, both the black level and the amplitude of the RGB output signals depend on the drive characteristics of the picture tube. The system checks whether the returning measuring currents meet the requirements, and adapt the output level and gain of the circuit when necessary. After stabilisation of the loop, the RGB drive signals are switched on. The 2-point black level system adapts the drive voltage for each cathode in such a way that the two measuring currents have the right value. This is done with the measurement pulses during the frame flyback. During the first frame, three pulses with a current of 8  $\mu\text{A}$  are generated to adjust the cut off voltage. During the second frame, three pulses with a current of 20  $\mu\text{A}$  are generated to adjust the 'white drive'. This has as a consequence, that a change in the gain of the output stage will be compensated by a gain change of the RGB control circuit. Pin 55 (BLKIN) of the UOC is used as the feedback input from the CRT base panel.
- **Blue stretch** This function increases the colour temperature of the bright scenes (amplitudes which exceed a value of 80% of the nominal amplitude). This effect is obtained by decreasing the small signal gain of the red and green channel signals, which exceed this 80% level.
- **Beam current limiting** A beam current limiting circuit inside the UOC handles the contrast and brightness control for the RGB signals. This prevents the CRT from being overdriven, which could otherwise cause serious damage in the line output stage. The reference used for this purpose is the DC voltage on pin 54 (BLCIN) of the TV processor. Contrast and brightness reduction of the RGB output signals is therefore proportional to the voltage present on this pin. Contrast reduction starts when the voltage on pin 54 is lower than 2.8 V. Brightness reduction starts when the voltage on pin 54 is less than 1.7 V. The voltage on pin 54 is normally 3.3 V (limiter not active). During set switch 'off', the black current control circuit generates a fixed beam current of 1 mA. This current ensures that the picture tube capacitance is discharged. During the switch-off period, the vertical deflection is placed in an over-scan position, so that the discharge is not visible on the screen.

### 9.3.7 RGB Amplifier

From outputs 56, 57 and 58 of IC7200, the RGB signals are applied to the analogue output amplifiers on the CRT panel. The R-signal is amplified by a circuit built around transistors TS7311, 7312 and 7313, which drives the picture tube cathodes.

The supply voltage for the amplifier is +160 V and is derived from the line output stage.

## 9.4 Synchronisation

Inside IC7200 (part D), the vertical and horizontal sync-pulses are separated. These 'H' and 'V' signals are synchronised with the incoming CVBS signal. They are then fed to the H- and V-drive circuits and to the OSD/TXT circuit for synchronisation of the On Screen Display and Teletext (or Closed Caption) information.

## 9.5 Deflection

### 9.5.1 Horizontal Drive

The horizontal drive signal is obtained from an internal VCO, which is running at twice the line frequency. This frequency is divided by two, to lock the first control loop to the incoming signal.

When the IC is switched 'on', the 'Hdrive' signal is suppressed until the frequency is correct.

The 'Hdrive' signal is available at pin 30. The 'Hflybk' signal is fed to pin 31 to phase lock the horizontal oscillator, so that TS7401 cannot switch 'on' during the flyback time.

The 'EWdrive' signal for the E/W circuit (if present) is available on pin 15, where it drives transistor 7400 to make linearity corrections in the horizontal drive.

When the set is switched on, the '+8V' voltage goes to pin 9 of IC7200. The horizontal drive starts up in a soft start mode. It starts with a very short  $T_{\text{ON}}$  time of the horizontal output transistor. The  $T_{\text{OFF}}$  of the transistor is identical to the time in normal operation. The starting frequency during switch on is therefore about 2 times higher than the normal value. The 'on' time is slowly increased to the nominal value in 1175 ms. When the nominal value is reached, the PLL is closed in such a way that only very small phase corrections are necessary.

The 'EHTinformation' line on pin 11 is intended to be used as a 'X-ray' protection. When this protection is activated (when the voltage exceeds 6 V), the horizontal drive (pin 30) is switched 'off' immediately. If the 'H-drive' is stopped, pin 11 will become low again. Now the horizontal drive is again switched on via the slow start procedure.

The 'EHTinformation' line (Aquadag) is also fed back to the UOC IC7200 pin 54, to adjust the picture level in order to compensate for changes in the beam current.

The filament voltage is monitored for 'no' or 'excessive' voltage. This voltage is rectified by diode 6413 and fed to the emitter of transistor 7405. If this voltage goes above 6.8 V, transistor 7405 will conduct, making the 'EHT0' line 'high'. This will immediately switch off the horizontal drive (pin 30) via the slow stop procedure.

The horizontal drive signal exits IC7200 at pin 30 and goes to 7401, the horizontal driver transistor. The signal is amplified and coupled to the base circuit of 7402, the horizontal output transistor. This will drive the line output transformer (LOT) and associated circuit. The LOT provides the extra high voltage (EHT), the VG2 voltage and the focus and filament voltages for the CRT, while the line output circuit drives the horizontal deflection coil.

9.5.2 Vertical Drive

A divider circuit performs the vertical synchronisation. The vertical ramp generator needs an external resistor (R3245, pin 20) and capacitor (C2244, pin 21). A differential output is available at pins 16 and 17, which are DC-coupled with the vertical output stage.

To avoid damage of the picture tube when the vertical deflection fails, the 'V\_GUARD' output is fed to the beam current limiting input. When a failure is detected, the RGB-outputs are blanked. When no vertical deflection output stage is connected, this guard circuit will also blank the output signals.

These 'V\_DRIVE+' and 'V\_DRIVE-' signals are applied to the input pins 7 and 1 of IC7471 (vertical deflection amplifier). These are voltage driven differential inputs. As the driver device (IC7200) delivers output currents, R3474 and R3479 convert them to voltage. The differential input voltage is compared with the voltage across measuring resistor R3471 that provides internal feedback information. The voltage across this measuring resistor is proportional to the output current, which is available at pin 5 where it drives the vertical deflection coil (connector 0222). IC7471 is supplied by +/-13 V. The vertical flyback voltage is generated at pin 3.

9.6 Power Supply

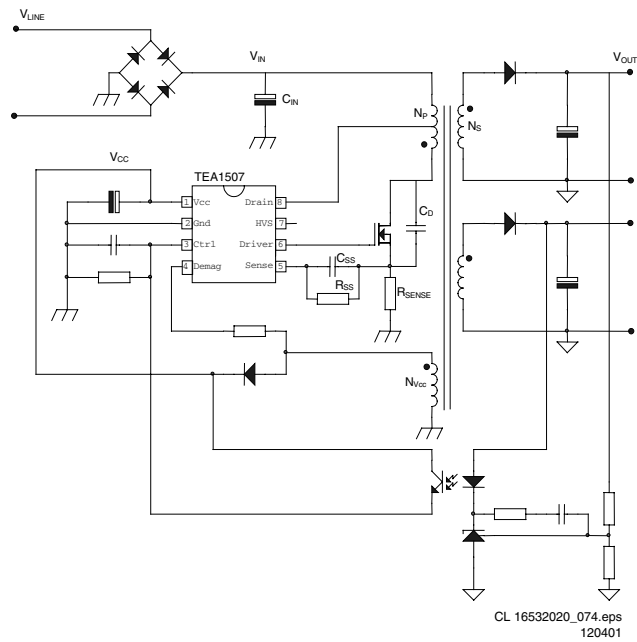


Figure 9-6

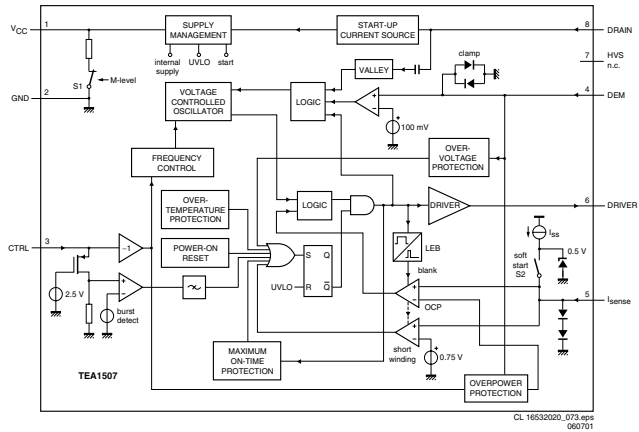


Figure 9-7

9.6.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behaviour has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover the supply runs cooler and safety is enhanced.

The power supply starts operating when a DC voltage goes from the rectifier bridge via T5520, R3532 to pin 8. The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.

The switching regulator IC7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.

The 'MainSupply' line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540/6540. This regulator drives the feedback optocoupler 7515 to set the feedback control voltage on pin 3 of 7520.

The power supply in the set is 'on' any time AC power goes to the set.

Derived Voltages

The voltages supplied by the secondary windings of T5520 are:

- 'MainAux' for the audio circuit (voltage depends on set execution, see table below),
- 3.3 V and 3.9 V for the microprocessor and
- 'MainSupply' for the horizontal output (voltage depends on set execution, see table below).

Other supply voltages are provided by the LOT. It supplies +50 V (only for large screen sets), +13 V, +8 V, +5 V and a +200 V source for the video drive. The secondary voltages of the LOT are monitored by the 'EHTinformation' lines. These lines are fed to the video processor part of the UOC IC7200 on pins 11 and 34.

This circuit will shut 'off' the horizontal drive in case of over-voltage or excessive beam current.

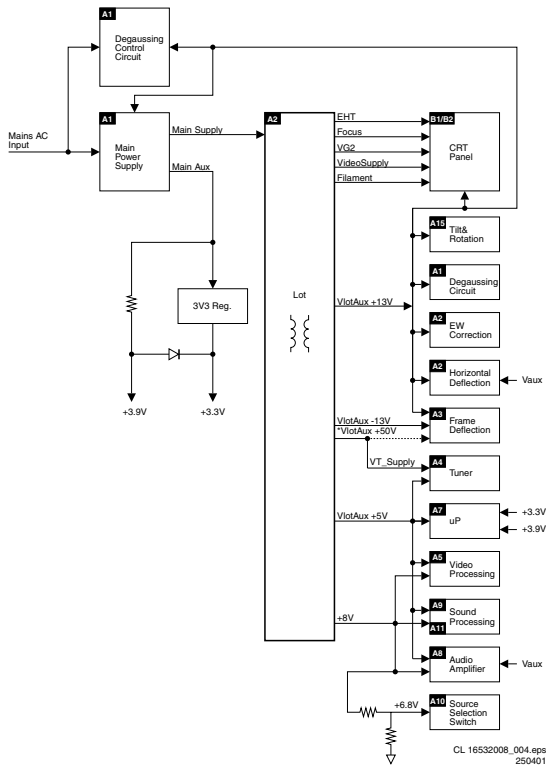


Figure 9-8

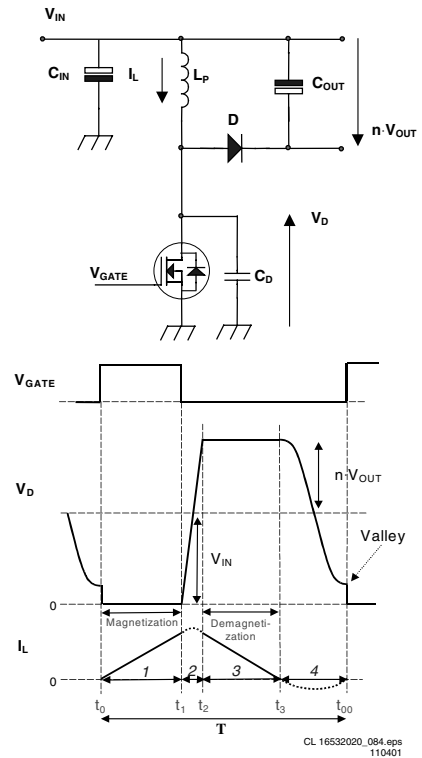


Figure 9-10

Power supply voltages L01				
Screen Size	Voltage name	Meas. point	Value	Remark
14", 17", 20", 21"	MainSupply	P6 (C2561)	95 V	Stereo 2x3 W and Mono 1x2 W, 3 W, 4 W
	MainAux	P5 (C2564)	10 V	
All others	MainSupply	P6 (C2561)	130 V	21/25/29RF and 25/27/32/35V
			143 V	25/28/29SF, 25/28BLD, 25/28BLS, 28/32WS, 24/28BLDWS & BLSWS
	MainAux	P5 (C2564)	12 V	Stereo 2x1 W, 3 W, 5 W
			10 V	Mono 1x1 W

Figure 9-9

**Degaussing**

When the set is switched on, the degaussing relay 1515 is immediately activated as transistor 7580 is conducting. Due to the RC-time of R3580 and C2580, it will last about 3 to 4 seconds before transistor 7580 is switched off.

**9.6.2 Basic IC Functionality**

For a clear understanding of the Quasi-Resonant behaviour, it is possible to explain it by a simplified circuit diagram (see Figure below). In this circuit diagram, the secondary side is transferred to the primary side and the transformer is replaced by an inductance  $L_P$ .  $C_D$  is the total drain capacitance including the resonance capacitor  $C_R$ , parasitic output capacitor  $C_{OSS}$  of the MOSFET and the winding capacitance  $C_W$  of the transformer. The turns ratio of the transformer is represented by  $n$  ( $N_P/N_S$ ).

In the Quasi-Resonant mode each period can be divided into four different time intervals, in chronological order:

- Interval 1:  $t_0 < t < t_1$  primary stroke At the beginning of the first interval, the MOSFET is switched 'on' and energy is stored in the primary inductance (magnetisation). At the end, the MOSFET is switched 'off' and the second interval starts.
- Interval 2:  $t_1 < t < t_2$  commutation time In the second interval, the drain voltage will rise from almost zero to  $V_{IN} + n \cdot (V_{OUT} + V_F)$ .  $V_F$  is the forward voltage drop of diode that will be omitted from the equations from now on. The current will change its positive derivative, corresponding to  $V_{IN}/L_P$ , to a negative derivative, corresponding to  $-n \cdot V_{OUT}/L_P$ .
- Interval 3:  $t_2 < t < t_3$  secondary stroke In the third interval, the stored energy is transferred to the output, so the diode starts to conduct and the inductive current  $I_L$  will decrease. In other words, the transformer will be demagnetised. When the inductive current has become zero the next interval begins.
- Interval 4:  $t_3 < t < t_0$  resonance time In the fourth interval, the energy stored in the drain capacitor  $C_D$  will start to resonate with the inductance  $L_P$ . The voltage and current waveforms are sinusoidal waveforms. The drain voltage will drop from  $V_{IN} + n \cdot V_{OUT}$  to  $V_{IN} - n \cdot V_{OUT}$ .

**Frequency Behaviour**

The frequency in the QR-mode is determined by the power stage and is not influenced by the controller (important parameters are  $L_P$  and  $C_D$ ). The frequency varies with the input voltage  $V_{IN}$  and the output power  $P_{OUT}$ . If the required output power increases, more energy has to be stored in the transformer. This leads to longer magnetising  $t_{PRIM}$  and demagnetising  $t_{SEC}$  times, which will decrease the frequency. See the frequency versus output power characteristics below. The frequency characteristic is not only output power-, but also input voltage dependent. The higher the input voltage, the smaller  $t_{PRIM}$ , so the higher the frequency will be.

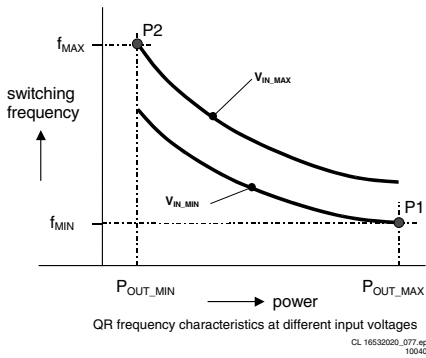


Figure 9-11

Point P1 is the minimum frequency  $f_{MIN}$  that occurs at the specified minimum input voltage and maximum output power required by the application. Of course the minimum frequency has to be chosen above the audible limit (>20 kHz).

**Start-up Sequence**

When the rectified AC voltage  $V_{IN}$  (via the centre tap connected to pin 8) reaches the Mains dependent operation level (Mlevel: between 60 and 100 V), the internal 'Mlevel switch' will be opened and the start-up current source is enabled to charge capacitor  $C_{2521}$  at the  $V_{CC}$  pin as shown below. The 'soft start' switch is closed when the  $V_{CC}$  reaches a level of 7 V and the 'soft start' capacitor  $C_{SS}$  ( $C_{2522}$ , between pin 5 and the sense resistor  $R_{3526}$ ), is charged to 0.5 V. Once the  $V_{CC}$  capacitor is charged to the start-up voltage  $V_{CC, start}$  (11 V), the IC starts driving the MOSFET. Both internal current sources are switched 'off' after reaching this start-up voltage. Resistor  $R_{SS}$  (3524) will discharge the 'soft start' capacitor, such that the peak current will slowly increase. This to prevent 'transformer rattle'. During start-up, the  $V_{CC}$  capacitor will be discharged until the moment that the primary auxiliary winding takes over this voltage.

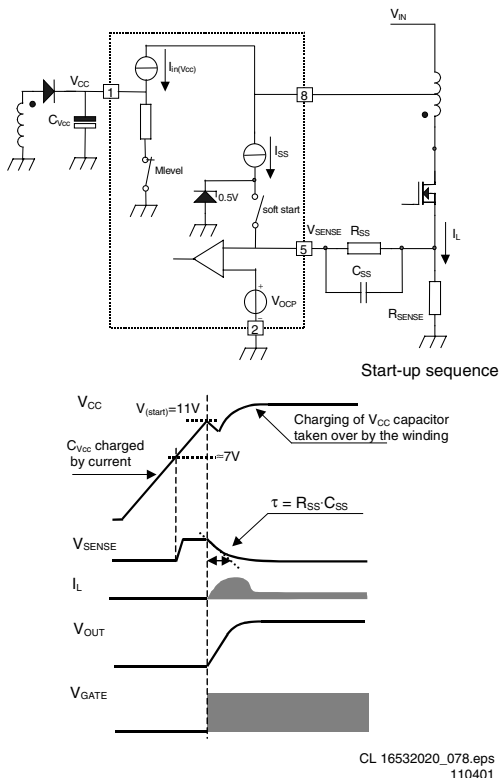


Figure 9-12

The moment that the voltage on pin 1 drops below the 'under voltage lock out' level ( $UVLO = \pm 9 V$ ), the IC will stop switching and will enter a safe restart from the rectified mains voltage.

**Operation**

The supply can run in three different modes depending on the output power:

- Quasi-Resonant mode (QR) The QR mode, described above, is used during normal operation. This will give a high efficiency.
- Frequency Reduction mode (FR) The FR mode (also called VCO mode) is implemented to decrease the switching losses at low output loads. In this way the efficiency at low output powers is increased, which enables power consumption smaller than 3 W during stand-by. The voltage at the pin 3 (Ctrl) determines where the frequency reduction starts. An external Ctrl voltage of 1.425 V corresponds with an internal VCO level of 75 mV. This fixed VCO level is called  $V_{VCO, start}$ . The frequency will be reduced in relation to the VCO voltage between 75 mV and 50 mV (at levels larger than 75 mV, Ctrl voltage < 1.425V, the oscillator will run on maximum frequency  $f_{oscH} = 175$  kHz typically). At 50 mV ( $V_{VCO, max}$ ) the frequency is reduced to the minimum level of 6 kHz. Valley switching is still active in this mode.
- Minimum Frequency mode (MinF) At VCO levels below 50 mV, the minimum frequency will remain on 6 kHz, which is called the MinF mode. Because of this low frequency, it is possible to run at very low loads without having any output regulation problems.

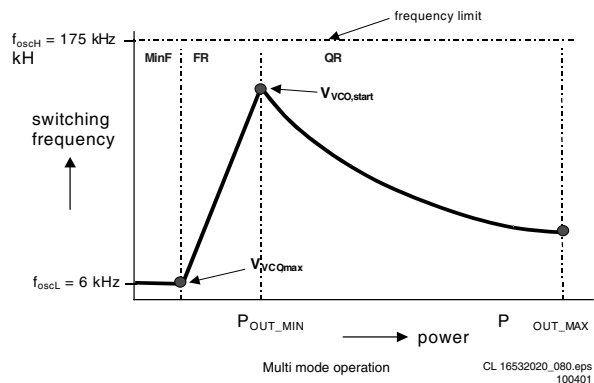


Figure 9-13

**Safe-Restart Mode**

This mode is introduced to prevent the components from being destroyed during eventual system fault conditions. It is also used for the Burst mode. The Safe-Restart mode will be entered if it is triggered by one of the following functions:

- Over voltage protection,
- Short winding protection,
- Maximum 'on time' protection,
- $V_{CC}$  reaching UVLO level (fold back during overload),
- Detecting a pulse for Burst mode,
- Over temperature protection.

When entering the Safe-Restart mode, the output driver is immediately disabled and latched. The  $V_{CC}$  winding will not charge the  $V_{CC}$  capacitor anymore and the  $V_{CC}$  voltage will drop until UVLO is reached. To recharge the  $V_{CC}$  capacitor, the internal current source ( $I_{(restart)(VCC)}$ ) will be switched 'on' to initiate a new start-up sequence as described before. This Safe-Restart mode will persist until the controller detects no faults or burst triggers.

**Standby**

The set goes to Standby in the following cases:

- After pressing the 'standby' key on the remote control.
- When the set is in protection mode.



In Standby, the power supply works in 'burst mode'.

Burst mode can be used to reduce the power consumption below 1 W at stand-by. During this mode, the controller is active (generating gate pulses) for only a short time and for a longer time inactive waiting for the next burst cycle.

In the active period the energy is transferred to the secondary and stored in the buffer capacitor  $C_{STAB}$  in front of the linear stabiliser (see Figure below). During the inactive period, the load (e.g. microprocessor) discharges this capacitor. In this mode, the controller makes use of the Safe-Restart mode.

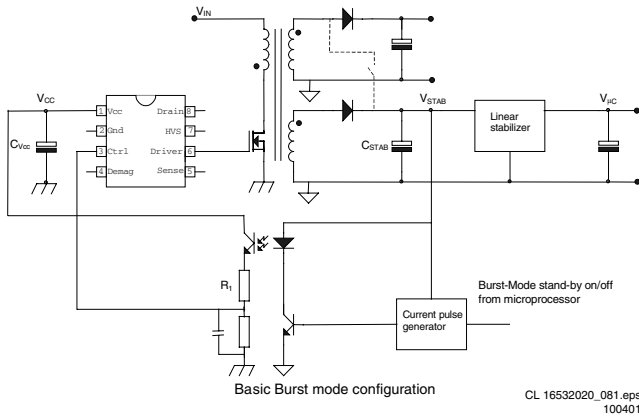


Figure 9-14

The system enters burst mode standby when the microprocessor activates the 'Stdby\_con' line. When this line is pulled high, the base of TS7541 is allowed to go high. This is triggered by the current from collector TS7542. When TS7541 turns 'on', the opto-coupler (7515) is activated, sending a large current signal to pin 3 (Ctrl). In response to this signal, the IC stops switching and enters a 'hiccup' mode. This burst activation signal should be present for longer than the 'burst blank' period (typically 30  $\mu$ s): the blanking time prevents false burst triggering due to spikes.

Burst mode standby operation continues until the microcontroller pulls the 'Stdby\_con' signal low again. The base of TS7541 is unable to go high, thus cannot turn 'on'. This will disable the burst mode. The system then enters the start-up sequence and begins normal switching behaviour.

For a more detailed description of one burst cycle, three time intervals are defined:

- $t_1$ : Discharge of  $V_{CC}$  when gate drive is active During the first interval, energy is transferred, which result in a ramp-up of the output voltage ( $V_{STAB}$ ) in front of the stabiliser. When enough energy is stored in the capacitor, the IC will be switched 'off' by a current pulse generated at the secondary side. This pulse is transferred to the primary side via the opto coupler. The controller will disable the output driver (safe restart mode) when the current pulse reaches a threshold level of 16 mA into the Ctrl pin. A resistor  $R_1$  (R3519) is placed in series with the opto coupler, to limit the current going into the Ctrl pin. Meanwhile the  $V_{CC}$  capacitor is discharged but has to stay above  $V_{UVLO}$ .
- $t_2$ : Discharge of  $V_{CC}$  when gate drive is inactive During the second interval, the  $V_{CC}$  is discharged to  $V_{UVLO}$ . The output voltage will decrease depending on the load.
- $t_3$ : Charge of  $V_{CC}$  when gate drive is inactive The third interval starts when the UVLO is reached. The internal current source charges the  $V_{CC}$  capacitor (also the soft start capacitor is recharged). Once the  $V_{CC}$  capacitor is charged to the start-up voltage, the driver is activated and a new burst cycle is started.

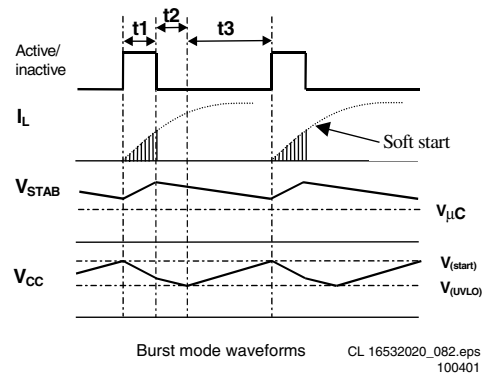


Figure 9-15

### 9.6.3 Protection Events

The SMPS IC7520 has the following protection features:

#### Demagnetisation sense

This feature guarantees discontinuous conduction mode operation in every situation. The oscillator will not start a new primary stroke until the secondary stroke has ended. This is to ensure that FET 7521 will not turn on until the demagnetisation of transformer 5520 is completed. The function is an additional protection feature against:

- saturation of the transformer,
- damage of the components during initial start-up,
- an overload of the output.

The demag(netisation) sense is realised by an internal circuit that guards the voltage ( $V_{demag}$ ) at pin 4 that is connected to  $V_{CC}$  winding by resistor  $R_1$  (R3522). The Figure below shows the circuit and the idealised waveforms across this winding.

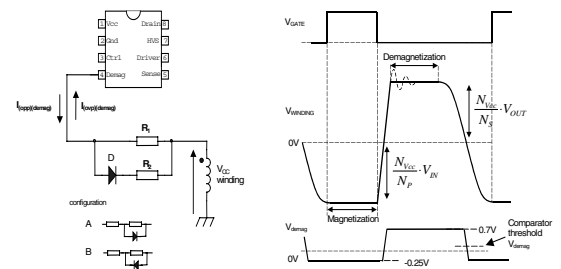


Figure 9-16

#### Over Voltage Protection

The Over Voltage Protection ensures that the output voltage will remain below an adjustable level. This works by sensing the auxiliary voltage via the current flowing into pin 4 (DEM) during the secondary stroke. This voltage is a well-defined replica of the output voltage. Any voltage spikes are averaged by an internal filter.

If the output voltage exceeds the OVP trip level, the OVP circuit switches the power MOSFET 'off'.

Next, the controller waits until the 'under voltage lock out' level ( $UVLO = \pm 9$  V) is reached on pin 1 ( $V_{CC}$ ). This is followed by a safe restart cycle, after which switching starts again. This process is repeated as long as the OVP condition exists. The output voltage, at which the OVP function trips, is set by the demagnetisation resistor R3522.

#### Over Current Protection

The internal OCP protection circuit limits the 'sense' voltage on pin 5 to an internal level.

### Over Power Protection

During the primary stroke, the rectified AC input voltage is measured by sensing the current drawn from pin 4 (DEM). This current is dependent on the voltage on pin 9 of transformer 5520 and the value of R3522. The current information is used to adjust the peak drain current, which is measured via pin I<sub>SENSE</sub>.

### Short Winding Protection

If the 'sense' voltage on pin 5 exceeds the short winding protection voltage (0.75 V), the converter will stop switching. Once V<sub>CC</sub> drops below the UVLO level, capacitor C2521 will be recharged and the supply will start again. This cycle will be repeated until the short circuit is removed (safe restart mode). The short winding protection will also protect in case of a secondary diode short circuit.

This protection circuit is activated after the leading edge blanking time (LEB).

### LEB time

The LEB (Leading Edge Blanking) time is an internally fixed delay, preventing false triggering of the comparator due to current spikes. This delay determines the minimum 'on' time of the controller.

### Over Temperature protection

When the junction temperature exceeds the thermal shutdown temperature (typ. 140° C), the IC will disable the driver. When the V<sub>CC</sub> voltage drops to UVLO, the V<sub>CC</sub> capacitor will be recharged to the V<sub>(start)</sub> level. If the temperature is still too high, the V<sub>CC</sub> voltage will drop again to the UVLO level (Safe-Restart mode). This mode will persist until the junction temperature drops 8 degrees typically below the shutdown temperature.

### Mains dependent operation enabling level

To prevent the supply from starting at a low input voltage, which could cause audible noise, a mains detection is implemented (Mlevel). This detection is provided via pin 8, that detects the minimum start-up voltage between 60 and 100 V. As previous mentioned, the controller is enabled between 60 and 100 V. An additional advantage of this function is the protection against a disconnected buffer capacitor (C<sub>IN</sub>). In this case, the supply will not be able to start-up because the V<sub>CC</sub> capacitor will not be charged to the start-up voltage.

## 9.7 Control

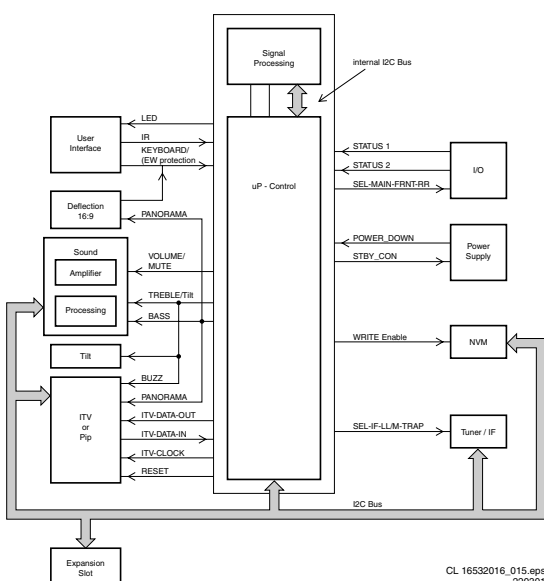


Figure 9-17

### 9.7.1 Introduction

The microprocessor part of the UOC has the complete control and teletext on board. User menu, Service Default Mode, Service Alignment Mode and Customer Service Mode are generated by the  $\mu$ P. Communication to other ICs is done via the I<sup>2</sup>C-bus.

### 9.7.2 I<sup>2</sup>C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (tuner, NVM, MSP, etc) by means of the I<sup>2</sup>C-bus. An internal I<sup>2</sup>C-bus is used to control other signal processing functions, like video processing, sound IF, vision IF, synchronisation, etc.

### 9.7.3 User Interface

There are two control signals, called 'KEYBOARD\_protn' and 'IR'. Users can interact either through the Remote Control transmitter, or by activation of the appropriate keyboard buttons.

The L01 uses a remote control with RC5 protocol. The incoming signal is connected to pin 67 of the UOC.

The 'Top Control' keyboard, connected to UOC pin 80, can also control the set. Button recognition is done via a voltage divider. The 'KEYBOARD\_protn' line, also serves to detect faults in the E/W circuit, which would require the  $\mu$ P to shut down the set (by forcing the power supply in standby mode).

The front LED (6691) is connected to an output control line of the microprocessor (pin 5). It is activated to provide the user information about whether or not the set is working correctly (e.g., responding to the remote control or fault condition)

### 9.7.4 Sound Interface

There are three control signals, called 'Volume\_Mute', 'Treble\_Buzzer\_Hosp\_app' and 'Bass\_panorama'. The 'Volume\_Mute' line controls the sound level output of the audio amplifier or to mute it in case of no video identification or from user command. This line also controls the volume level during set switch 'on' and 'off' (to prevent audio pop).

The 'Treble' and 'Bass' lines have another functionality:

- The 'Bass\_panorama' line is used to switch the panorama mode in widescreen sets (to fit 4:3 pictures into a 16:9 display, it is possible to apply a panoramic horizontal distortion, to make a screen-fitting picture without black sidebars or lost video).
- The 'Treble\_Buzzer\_Hosp\_app' is used in ITV applications for other features, and in widescreen sets to enable the 'Tilt' feature (via R3172 on diagram A8) in the deflection part.

### 9.7.5 In- and Output Selection

For the control of the input and output selections, there are three lines:

- **STATUS1** This signal provides information to the microprocessor on whether a video signal is available on the SCART1 AV input and output port.
  - 0 to 2 V: INTERNAL 4:3
  - 4.5 to 7 V: EXTERNAL 16:9
  - 9.5 to 12 V: EXTERNAL 4:3
- **STATUS2** This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (signal is low). For sets with an SVHS input, it provides the additional information if a Y/C or CVBS source is present (signal is high). The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.
  - 0 to 2 V: INTERNAL 4:3
  - 4.5 to 7 V: EXTERNAL 16:9

- 9.5 to 12 V: EXTERNAL 4:3
- **SEL-MAIN-FRNT-RR** This is the 'source select control' signal from the microprocessor. This control line is under user control or can be activated by the other two control lines.

### 9.7.6 Power Supply Control

The microprocessor part is supplied with 3.3 V and 3.9 V both derived from the 'MainAux' voltage via a 3V3 stabiliser (7560) and a diode.

Two signals are used to control the power supply:

- **Stdbby\_con** This signal is generated by the microprocessor when over-current takes place at the 'MainAux' line. This is done to enable the power supply into standby burst mode, and to enable this mode during a protection. This signal is 'low' under normal operation conditions and goes to 'high' (3.3 V) under 'standby' and 'fault' conditions.
- **POWER\_DOWN** This signal is generated by the power supply. Under normal operating conditions this signal is 'high' (3.3 V). During 'standby' mode, this signal is a pulse train of approx. 10 Hz and a 'high' duration of 5 ms. It is used to give information to the UOC about the fault condition in the Audio amplifier supply circuit. This information is generated by sensing the current on the 'MainAux' line (using voltage drop across R3564 to trigger TS7562). This signal goes 'low' when the DC-current on the 'MainAux' line exceeds 1.6 - 2.0 A. It is also used to give an early warning to the UOC about a power failure. Then the information is used to mute the sound amplifier to prevent a switch off noise and to solve the switch-off spot.

### 9.7.7 Tuner IF

Pin 3 of the UOC (SEL-IF-LL'\_M-TRAP), is an output pin to switch the SAW-filter to the appropriate system.

- If UOC pin 3 is 'low', the selected system is:
  - West Europe: PAL B/G, I, SECAM L/L'
  - East Europe: PAL B/G
  - Asia Pacific: NTSC M
- If UOC pin 3 is 'high', the selected system is:
  - West Europe: SECAM L', L'-NICAM
  - East Europe: PAL D/K
  - Asia Pacific: PAL B/G, D/K, I

**Note:** For West Europe, two separate SAW filters (1002 and 1004) are used for video and audio (Quasi Split Sound demodulation). For East Europe, one SAW filter (1003) is used for both (Intercarrier demodulation).

### 9.7.8 Protection Events

Several protection events are controlled by the UOC:

- **BC protection**, to protect the picture tube from a too high beam current. The UOC has the capability of measuring the normal back level current during the vertical flyback. So if for some reason the CRT circuit is malfunctioning (i.e. high beam current), the normal black current will be out of the 75  $\mu$ A range, and the UOC will trigger the power supply to shut down. However, this is a high beam-current situation, the TV screen will be bright white before the set is shut down.
- **I2C protection**, to check whether all I<sup>2</sup>C IC's are functioning.

In case one of these protections is activated, the set will go into 'standby'. The 'on' and 'standby' LEDs are controlled via the UOC.

## 9.8 Abbreviation list

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the featurebox
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Level
BC-PROT	Beam Current Protection
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLC-INFORMATION	Black current information
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue teletext
CC	Closed Caption
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DBX	Dynamic Bass Expander
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFORMATION	Extra High Tension information
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FLASH	Flash memory
FM	Field Memory
FM	Frequency Modulation
HA	Horizontal Acquisition: horizontal sync pulse coming out of the HIP

HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection	SCL	Serial Clock
HP	Headphone	SDA	Serial Data
Hue	Colour phase control for NTSC (not the same as 'Tint')	SDM	Service Default Mode
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	SECAM	SEquence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
I2C	Integrated IC bus	SIF	Sound Intermediate Frequency
IF	Intermediate Frequency	SS	Small Screen
IIC	Integrated IC bus	STBY	Standby
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.	SVHS	Super Video Home System
ITV	Institutional TV	SW	Software
LATAM	Latin America	THD	Total Harmonic Distortion
LED	Light Emitting Diode	TXT	Teletext
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	μP	Microprocessor
LNA	Low Noise Amplifier	UOC	Ultimate One Chip
LS	Large Screen	VA	Vertical Acquisition
LS	Loudspeaker	VBAT	Main supply voltage for the deflection stage (mostly 141 V)
LSP	Large signal panel	V-chip	Violence Chip
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz	VCR	Video Cassette Recorder
MSP	Multistandard Sound Processor: ITT sound decoder	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
MUTE	Mute-Line	XTAL	Quartz crystal
NC	Not Connected	YC	Luminance (Y) and Chrominance (C) signal
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.		
NTSC	National Television Standard Committee. Colour system mainly used in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)		
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments		
OB	Option Byte		
OC	Open Circuit		
OSD	On Screen Display		
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)		
PCB	Printed Circuit board		
PIP	Picture In Picture		
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency		
POR	Power-On Reset		
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.		
PTP	Picture Tube Panel (or CRT-panel)		
RAM	Random Access Memory		
RC	Remote Control handset		
RC5	Remote Control system 5, signal from the remote control receiver		
RGB	Red Green Blue		
ROM	Read Only Memory		
SAM	Service Alignment Mode		
SAP	Second Audio Program		
SC	Sandcastle: pulse derived from sync signals		
S/C	Short Circuit		
SCAVEM	Scan Velocity Modulation		

# 10. Spare Parts List

## Mono Carrier [A1-14]

### Various

0127	4822 265 11253	FUSE HOLDER
0136	4822 492 70788	FIX IC
0138	4822 492 70788	FIX IC
0149	3104 311 02651	CABLE 9P
0152	3139 121 08841	CABLE 6P
0153	3104 301 09441	CABLE 3P
0154	3119 107 17611	CABLE 5P
0155	3119 107 17541	TREE ASSY SPEAKER
0157	3119 107 17461	CABLE 10P
0160	3119 107 17371	CABLE 6P/220/3P
0162	3119 107 17451	CABLE 7P/220/7P
0168	3119 107 17671	CABLE 4P/280/4P
0172	3104 311 03411	CABLE
0173	3104 311 04181	CABLE 5P/340/5P
0174	3119 107 17281	CABLE 6P/180/4P
0211	4822 265 20723	CABKE 2P3
0212	4822 267 10774	2P MALE
0217	2422 025 12482	CON 6P Male
0217	4822 267 10735	CON
0220	2422 025 04851	CON 3P
0221	4822 267 10966	CON 2P
0222	2422 025 10646	CON 2P Male
0227	2422 025 16383	CON
0229	4822 267 10735	B3B-EH-A
0231	2422 128 02972	SWITCH
0232	4822 267 31014	HEADPHONE SOCKET
0235	4822 267 60385	CON 21P
0236	2422 025 16382	CON 3P Male
0240	2422 025 11244	CON 7P Male
0242	2422 025 17042	CON 7P Male
0243	2422 025 04854	CON 6P Female
0246	4822 267 10734	B5B-EH-A
0246	4822 267 10735	B3B-EH-A
0251	4822 267 10565	4P
0259	2422 025 15848	CON 5P Male
0262	2422 025 16937	CON 3P Female
0265	4822 267 10748	3P
0285	4822 267 10676	1P
1000	2422 542 90111	TUN V+U PLL IEC
1000	3139 147 17401	TUNER UR1316R/A I-3
1002	4822 242 81436	OFWK3953M
1004	2422 549 44341	FILTER 38MHz OFWK9656M
1200	4822 242 81712	TPWA04B
1203	4822 242 70665	SFE10,7MS3-A
1500	2422 086 10914	FUSE 4A 250V
1600	4822 276 13775	SWITCH
1601	4822 276 13775	SWITCH
1602	4822 276 13775	SWITCH
1603	4822 276 13775	SWITCH
1660	2422 543 01203	Chrystal 12MHz
1831	4822 242 10769	Chrystal 18.432MHz

### -II-

2001	5322 122 32658	22pF 5% 50V
2002	5322 122 32658	22pF 5% 50V
2003	4822 122 33177	10nF 20% 50V
2004	4822 126 13751	47nF 10% 63V
2005	4822 124 40248	10µF 20% 63V
2006	4822 124 80791	470µF 20% 16V
2007	4822 126 14585	100nF 10% 50V
2008	4822 124 40207	100µF 20% 25V
2009	5322 122 32654	63V 22nF
2010	5322 126 10511	1nF 5% 50V
2101	4822 122 33172	390pF 5% 50V
2102	4822 122 33172	390pF 5% 50V
2103	2020 552 96305	4U7 20% 10V
2104	4822 122 33172	390pF 5% 50V
2105	4822 122 33172	390pF 5% 50V
2106	2020 552 96305	4U7 20% 10V
2107	4822 122 33172	390pF 5% 50V
2108	4822 122 33172	390pF 5% 50V
2109	2020 552 96305	4U7 20% 10V
2110	4822 122 33172	390pF 5% 50V
2111	4822 122 33172	390pF 5% 50V
2112	2020 552 96305	4U7 20% 10V
2113	5322 122 32658	22pF 5% 50V
2114	5322 122 32658	22pF 5% 50V
2115	5322 122 32658	22pF 5% 50V
2116	5322 122 32658	22pF 5% 50V
2117	5322 122 32658	22pF 5% 50V
2118	5322 122 32658	22pF 5% 50V
2120	5322 122 32658	22pF 5% 50V

2161	4822 124 12392	47µF 20% 16V
2201	4822 126 14585	100nF 10% 50V
2202	4822 126 14585	100nF 10% 50V
2203	4822 126 14585	100nF 10% 50V
2204	4822 126 14585	100nF 10% 50V
2205	4822 126 14076	220nF 25V
2206	4822 126 13693	56pF 1% 63V
2207	5322 126 10184	820P 5% 50V
2208	4822 126 14585	100nF 10% 50V
2209	4822 124 40769	4.7µF 20% 100V
2210	4822 124 41407	0.47µF 20% 63V
2211	4822 126 13482	470nF 20% 16V
2213	5322 122 32654	22nF 10% 63V
2214	5322 122 32654	22nF 10% 63V
2215	5322 122 32654	22nF 10% 63V
2216	4822 124 80791	470µF 20% 16V
2217	5322 122 32654	22nF 10% 63V
2219	4822 126 14076	220nF 25V
2221	4822 126 14585	100nF 10% 50V
2221	5322 122 32654	22nF 10% 63V
2222	4822 122 33177	10nF 20% 50V
2223	5322 122 32448	10pF 5% 63V
2225	4822 126 14076	220nF 25V
2226	5322 126 10465	3.9nF 10% 50V
2227	5322 126 10223	4.7nF 10% 63V
2228	5322 126 10184	820P 5% 50V
2229	4822 124 40248	10µF 20% 63V
2230	4822 124 40769	4.7µF 20% 100V
2233	5322 126 10184	820P 5% 50V
2234	4822 126 14585	100nF 10% 50V
2235	5322 122 32331	1nF 10% 100V
2238	5322 126 10511	1nF 5% 50V
2239	5322 126 10511	1nF 5% 50V
2240	5322 126 10511	1nF 5% 50V
2241	4822 126 13344	1.5nF 5% 63V
2242	4822 126 14043	1µF 20% 16V
2243	4822 122 33177	10nF 20% 50V
2244	5322 121 42386	100nF 5% 63V
2245	4822 126 14076	220nF 25V
2246	4822 124 40769	4.7µF 20% 100V
2247	4822 124 80791	470µF 20% 16V
2248	5322 122 32654	22nF 10% 63V
2249	5322 122 32654	22nF 10% 63V
2250	4822 124 22652	2.2µF 20% 50V
2252	5322 126 10511	1nF 5% 50V
2253	5322 126 10511	1nF 5% 50V
2254	4822 051 20008	JUMPER
2254	5322 122 32531	100pF 5% 50V
2254	4822 121 43901	4.7nF 5% 50V
2400	4822 121 51655	47nF 50V
2404	2022 333 00167	560nF 5% 250V
2404	4822 121 10518	390nF 5% 250V
2404	4822 121 10781	470nF 5% 250V
2405	5322 126 10511	1nF 5% 50V
2407	4822 121 70434	11nF 5% 1.6KV
2407	4822 121 70649	9.1nF 5% 1.6KV
2408	4822 122 30103	22nF 80% 63V
2408	4822 122 33449	47nF 30% 50V
2409	4822 124 11575	47µF 20% 160V
2410	2020 021 91577	470µF 20% 16V
2411	5322 121 10472	47µF 25V
2412	2222 347 90236	33nF 10% 100V
2413	4822 124 11565	10µF 20% 250V
2414	4822 124 81145	1000µF 20% 16V
2415	5322 122 32531	100pF 5% 50V
2416	4822 126 12239	560pF 10% 2KV
2416	4822 126 12263	220pF 10% 1KV
2416	4822 126 14237	470pF 10% 2KV
2417	4822 124 81145	1000µF 20% 16V
2418	4822 122 33177	10nF 20% 50V
2419	4822 124 22776	1µF 50V
2420	4822 124 21913	1µF 20% 63V
2421	4822 126 13751	47nF 10% 63V
2422	2020 021 91577	470µF 20% 16V
2423	4822 124 42127	10µF 20% 100V
2424	4822 121 43526	47nF 5% 250V
2424	5322 121 42465	68nF 5% 63V
2471	5322 121 42386	100nF 5% 63V
2472	5322 121 42386	100nF 5% 63V
2473	4822 124 40255	100µF 20% 63V
2475	5322 122 32268	470P 5% 63V
2476	4822 121 42408	220nF 5% 63V
2477	5322 122 32268	470P 5% 63V
2500	4822 126 13589	470nF 275V
2501	4822 126 14153	2.2nF 10% 1KV
2502	4822 126 14153	2.2nF 10% 1KV
2503	4822 124 12439	100µF 20% 400V
2505	4822 126 14153	2.2nF 10% 1KV
2506	4822 126 14153	2.2nF 10% 1KV
2508	4822 122 50116	470pF 10% 1KV
2515	4822 126 14049	1.5nF 20% 250V
2516	4822 126 13867	330P 20% 250V
2520	4822 126 14585	100nF 10% 50V
2521	4822 124 41751	47µF 20% 50V
2522	4822 126 14585	100nF 10% 50V
2523	4822 126 13862	1.5nF 10% 2KV
2525	5322 122 34099	470pF 10% 63V
2526	5322 122 31647	1nF 10% 63V
2527	5322 122 34099	470pF 10% 63V
2540	4822 126 13188	15nF 5% 63V
2560	4822 126 13449	1nF 10% 2KV
2561	4822 124 42336	47µF 20% 160V
2562	5322 122 32331	1nF 10% 100V
2563	5322 121 42386	100nF 5% 63V
2564	2020 012 93057	2200µF 20% 16V
2565	4822 122 50116	470pF 10% 1KV
2566	4822 124 40433	47µF 20% 25V
2567	4822 124 40433	47µF 20% 25V
2569	5322 122 34099	470pF 10% 63V
2601	4822 126 14076	220nF 25V
2602	5322 122 32531	100pF 5% 50V
2606	5322 126 10511	1nF 5% 50V
2607	5322 122 32659	33pF 5% 50V
2608	4822 126 14043	1µF 20% 16V
2609	5322 122 32659	33pF 5% 50V
2611	4822 126 14043	1µF 20% 16V
2612	4822 126 13694	68pF 1% 63V
2613	4822 126 13694	68pF 1% 63V
2615	5322 126 10511	1nF 5% 50V
2616	4822 122 13482	470nF 20% 16V
2618	4822 126 14043	1µF 20% 16V
2619	4822 126 14043	1µF 20% 16V
2691	4822 124 40207	100µF 20% 25V
2801	4822 124 81151	22µF 50V
2804	2020 552 96305	4U7 20% 10V
2805	2020 552 96305	4U7 20% 10V
2831	5322 122 32447	1pF 5% 63V
2832	5322 122 32447	1pF 5% 63V
2833	4822 126 13692	47pF 1% 63V
2834	5322 122 32268	63V 470P 5%
2835	4822 122 33575	220pF 5% 63V
2836	4822 126 13344	1.5nF 5% 63V
2837	4822 124 40769	4.7µF 20% 100V
2838	4822 126 13692	47pF 1% 63V
2839	4822 126 13692	47pF 1% 63V
2840	4822 126 14585	100nF 10% 50V
2841	4822 124 40248	10µF 20% 63V
2842	4822 126 14585	100nF 10% 50V
2843	4822 124 40248	10µF 20% 63V
2844	4822 124 40248	10µF 20% 63V
2845	4822 126 14585	100nF 10% 50V
2846	4822 124 40207	100µF 20% 25V
2849	5322 126 10511	1nF 5% 50V
2850	5322 126 10511	1nF 5% 50V
2851	2020 552 96305	4U7 20% 10V
2852	5322 126 10511	1nF 5% 50V
2853	2020 552 96305	4U7 20% 10V
2854	5322 126 10511	1nF 5% 50V
2855	4822 122 30045	27pF 2% 100V
2856	4822 126 13486	15pF 2% 63V
2857	5322 122 33538	150pF 2% 63V
2858	5322 126 10511	1nF 5% 50V
2859	5322 126 10511	1nF 5% 50V
2860	4822 126 13695	82pF 1% 63V
2887	4822 122 33177	10nF 20% 50V
2894	4822 122 33575	220pF 5% 63V
2895	5322 116 80853	560pF 5% 63V
2897	4822 122 33172	390pF 5% 50V
2898	4822 122 33177	10nF 20% 50V
2902	4822 124 81144	1000µF 16V
2903	4822 124 21913	1µF 20% 63V
2904	4822 126 13482	470nF 20% 16V
2904	4822 126 14043	1µF 20% 16V
2905	5322 126 10511	1nF 5% 50V
2906	4822 126 13482	470nF 20% 16V
2907	5322 126 10511	1nF 5% 50V
2908	4822 124 40248	10µF 20% 63V
2941	4822 124 40248	

3002	4822 117 10833	10k 1% 0.1W	3415	4822 050 11002	1k 1% 0.4W	3630	4822 117 11449	2k2 5% 0.1W
3003	4822 117 11139	1k5 1% 0.1W	3416	4822 052 11398	3Ω9 5% 0.5W	3632	4822 051 20008	jumper
3005	4822 116 52175	100Ω 5% 0.5W	3417	4822 050 23303	33k 1% 0.6W	3634	4822 116 52175	100Ω 5% 0.5W
3006	4822 117 11449	2k2 5% 0.1W	3418	4822 051 20333	33k 5% 0.1W	3636	4822 117 11373	100Ω 1%
3007	4822 117 11507	6k8 1% 0.1W	3419	4822 117 11507	6k8 1% 0.1W	3681	4822 051 20391	390Ω 5% 0.1W
3008	4822 117 11449	2k2 5% 0.1W	3420	4822 051 20333	33k 5% 0.1W	3682	4822 051 20332	3k3 5% 0.1W
3010	4822 051 20008	jumper	3421	4822 053 11688	6Ω8 5% 2W	3683	4822 051 20391	390Ω 5% 0.1W
3010	4822 117 13577	330Ω 1% 1.25W	3422	4822 117 11373	100Ω 1%	3684	4822 051 20561	560Ω 5% 0.1W
3011	4822 117 13577	330Ω 1% 1.25W	3423	4822 117 11454	820Ω 1% 0.1W	3685	4822 051 20561	560Ω 5% 0.1W
3101	4822 116 83868	150Ω 5% 0.5W	3424	4822 116 52175	100Ω 5% 0.5W	3686	4822 117 11139	1k5 1% 0.1W
3102	3198 021 52240	220k 5%	3425	4822 116 52238	12k 5% 0.5W	3691	4822 117 13577	330Ω 1% 1.25W
3103	4822 116 83868	150Ω 5% 0.5W	3425	4822 116 52251	18k 5% 0.5W	3692	4822 051 10102	1k 2% 0.25W
3104	4822 117 10834	47k 1% 0.1W	3426	4822 051 20105	1M 5% 0.1W	3693	4822 117 11503	220Ω 1% 0.1W
3105	4822 116 83868	150Ω 5% 0.5W	3427	4822 116 52238	12k 5% 0.5W	3801	4822 116 83872	220Ω 5% 0.5W
3106	3198 021 52240	220k 5%	3428	4822 052 11399	39Ω 5% 0.5W	3802	4822 050 11002	1k 1% 0.4W
3107	4822 116 83868	150Ω 5% 0.5W	3429	4822 116 52269	3k3 5% 0.5W	3803	4822 117 10837	100k 1% 0.1W
3108	4822 117 10834	47k 1% 0.1W	3430	4822 116 52244	15k 5% 0.5W	3804	4822 117 11149	82k 1% 0.1W
3109	4822 116 52201	75Ω 5% 0.5W	3431	4822 051 10102	1k 2% 0.25W	3805	4822 051 10102	1k 2% 0.25W
3110	4822 116 52228	10Ω 5% 0.5W	3431	4822 051 20562	5k6 5% 0.1W	3806	4822 117 10837	100k 1% 0.1W
3111	4822 116 52264	27k 5% 0.5W	3431	4822 117 11373	100Ω 1%	3807	4822 117 11149	82k 1% 0.1W
3112	4822 117 11507	6k8 1% 0.1W	3432	4822 116 52186	22Ω 5% 0.5W	3808	4822 050 11002	1k 1% 0.4W
3113	4822 116 52201	75Ω 5% 0.5W	3435	4822 100 12159	100k 30%	3809	4822 117 11927	75Ω 1% 0.1W
3114	4822 116 52228	680Ω 5% 0.5W	3436	4822 052 10478	4Ω7 5% 0.33W	3831	4822 117 10834	47k 1% 0.1W
3115	4822 116 52201	75Ω 5% 0.5W	3471	4822 050 23308	3Ω3 1% 0.6W	3832	4822 116 52175	100Ω 5% 0.5W
3116	4822 116 52228	680Ω 5% 0.5W	3471	4822 050 23908	3Ω9 1% 0.6W	3833	4822 116 52175	100Ω 5% 0.5W
3117	4822 116 52201	75Ω 5% 0.5W	3471	4822 050 24708	4Ω7 1% 0.6W	3836	4822 050 11002	1k 1% 0.4W
3118	4822 116 52175	100Ω 5% 0.5W	3472	4822 050 23908	3Ω9 1% 0.6W	3837	4822 116 52175	100Ω 5% 0.5W
3119	4822 116 52199	680Ω 5% 0.5W	3472	4822 050 25608	5Ω6 1% 0.6W	3838	4822 051 10102	1k 2% 0.25W
3120	4822 051 10102	1k 2% 0.25W	3472	4822 050 26808	6Ω8 1% 0.6W	3839	4822 116 52175	100Ω 5% 0.5W
3121	4822 116 52201	75Ω 5% 0.5W	3473	4822 050 22202	2k2 1% 0.6W	3840	4822 051 20472	4k7 5% 0.1W
3122	4822 116 52176	10Ω 5% 0.5W	3474	4822 050 11002	1k 1% 0.4W	3841	4822 051 20822	8k2 5% 0.1W
3155	4822 116 52195	47Ω 5% 0.5W	3475	4822 050 22202	2k2 1% 0.6W	3842	4822 051 10102	1k 2% 0.25W
3200	4822 116 83881	390Ω 5% 0.5W	3476	4822 052 10158	12Ω 5% 0.33W	3849	4822 051 20471	470Ω 5% 0.1W
3201	4822 116 52175	100Ω 5% 0.5W	3477	4822 116 83872	220Ω 5% 0.5W	3901	4822 051 10102	1k 2% 0.25W
3202	4822 116 52175	100Ω 5% 0.5W	3478	4822 116 83872	220Ω 5% 0.5W	3902	4822 051 20332	3k3 5% 0.1W
3203	4822 116 52175	100Ω 5% 0.5W	3479	4822 050 11002	1k 1% 0.4W	3903	4822 051 20332	3k3 5% 0.1W
3204	4822 050 21003	10k 1% 0.6W	3500	4822 053 21335	3M3 5% 0.5W	3903	4822 051 20822	8k2 5% 0.1W
3206	4822 117 10837	100k 1% 0.1W	3501	4822 053 21335	3M3 5% 0.5W	3904	4822 117 10833	10k 1% 0.1W
3207	4822 050 11002	1k 1% 0.4W	3504	2120 660 90043	PTC 9Ω 200V 100R	3905	4822 051 20332	3k3 5% 0.1W
3208	4822 117 11503	220Ω 1% 0.1W	3506	4822 116 83872	220Ω 5% 0.5W	3906	4822 117 10833	10k 1% 0.1W
3209	4822 117 12521	68Ω 1% 0.1W	3507	4822 252 11215	DSP301N-A21F	3907	4822 117 11507	6k8 1% 0.1W
3212	4822 051 20471	470Ω 5% 0.1W	3519	4822 116 83876	270Ω 5% 0.5W	3921	4822 051 20334	330k 5% 0.1W
3213	4822 051 20561	560Ω 5% 0.1W	3520	4822 051 20122	1k2 5% 0.1W	3922	4822 051 20334	330k 5% 0.1W
3214	4822 116 52175	100Ω 5% 0.5W	3521	4822 050 24708	4Ω7 1% 0.6W	3981	4822 116 83876	270Ω 5% 0.5W
3217	4822 051 20334	330k 5% 0.1W	3521	4822 116 52186	22Ω 5% 0.5W	3982	4822 116 83876	270Ω 5% 0.5W
3218	4822 117 11149	82k 1% 0.1W	3522	4822 051 20334	330k 5% 0.1W	4xxx	4822 051 10008	0Ω 5% 0.25W
3219	4822 117 11449	2k2 5% 0.1W	3523	4822 052 10101	100Ω 5% 0.33W	4xxx	4822 051 20008	0Ω 5% 0.25W
3223	4822 117 11373	100Ω 1%	3523	4822 052 10479	47Ω 5% 0.33W			
3226	4822 051 20561	560Ω 5% 0.1W	3524	4822 117 11148	56k 1% 0.1W			
3227	4822 117 10837	100k 1% 0.1W	3525	4822 051 10102	1k 2% 0.25W			
3228	4822 116 52234	100Ω 5% 0.5W	3526	2120 106 90636	MTL 1W 0Ω18 5%			
3229	4822 117 11454	820Ω 1% 0.1W	3526	3198 012 11570	1W 0Ω15 5%	5001	4822 157 51216	5.6μH
3230	4822 051 10102	1k 2% 0.25W	3527	4822 052 10222	2k2 5% 0.33W	5002	2422 535 94639	10U 20%
3230	4822 117 11504	270Ω 1% 0.1W	3528	4822 117 10833	10k 1% 0.1W	5003	4822 157 11866	1.8μH 10%
3231	4822 051 20008	jumper	3529	4822 117 10834	47k 1% 0.1W	5201	4822 157 11868	2.7μH 5%
3231	4822 051 20561	560Ω 5% 0.1W	3530	4822 051 20472	4k7 5% 0.1W	5202	4822 157 51462	10μH 10%
3232	4822 117 11449	2k2 5% 0.1W	3531	4822 051 20008	jumper	5241	4822 157 51462	10μH 10%
3233	4822 117 11454	820Ω 1% 0.1W	3541	4822 051 20471	470Ω 5% 0.1W	5242	4822 157 11706	10μH 5%
3234	4822 117 10361	680Ω 1% 0.1W	3542	4822 117 11139	1k5 1% 0.1W	5406	4822 157 11539	LIN CORRECTOR COIL
3235	4822 116 52175	100Ω 5% 0.5W	3543	4822 050 28203	82k 1% 0.6W	5408	4822 157 71401	27μH
3236	4822 051 20154	150k 5% 0.1W	3544	4822 050 26802	6k8 1% 0.6W	5410	4822 157 71401	27μH
3236	4822 117 10837	100k 1% 0.1W	3545	4822 117 11149	82k 1% 0.1W	5444	2422 531 02446	DRIVER SC10009-03
3237	4822 051 20122	1k2 5% 0.1W	3547	4822 117 11342	0Ω33 5% 2W	5445	4822 140 10669	LOT 1142.5093D
3237	4822 117 13577	330Ω 1% 1.25W	3548	4822 051 20822	8k2 5% 0.1W	5501	2422 549 44725	MAINS 30mH DMF2430H22
3238	4822 051 20561	560Ω 5% 0.1W	3549	4822 116 83872	220Ω 5% 0.5W	5505	4822 526 10704	100mH
3238	4822 117 11504	270Ω 1% 0.1W	3550	4822 053 12103	10k 5% 3W	5520	2422 531 02456	S359B4-09
3239	4822 117 11504	270Ω 1% 0.1W	3558	4822 053 10331	330Ω 5% 1W	5520	2422 531 02457	SS28010-06
3239	4822 117 13577	330Ω 1% 1.25W	3560	4822 116 52195	47Ω 5% 0.5W	5521	4822 526 10704	100mH
3240	4822 117 10837	100k 1% 0.1W	3561	4822 116 83872	220Ω 5% 0.5W	5560	4822 526 10704	100mH
3241	4822 051 20223	22k 5% 0.1W	3562	4822 117 10833	10k 1% 0.1W	5561	4822 157 52392	27μH
3242	4822 117 11383	12k 1% 0.1W	3563	4822 051 20822	8k2 5% 0.1W	5562	4822 157 11411	100mH
3244	4822 116 52231	820Ω 5% 0.5W	3564	3198 012 21070	2W 0Ω1 100%	5562	4822 526 10704	100mH
3245	4822 051 20393	39k 5% 0.1W	3567	4822 117 11449	2k2 5% 0.1W	5563	4822 526 10704	100mH
3246	4822 117 10833	10k 1% 0.1W	3568	4822 051 20822	8k2 5% 0.1W	5602	4822 157 11867	5.6μH 5%
3247	3198 021 52240	220k 5%	3603	4822 116 52175	100Ω 5% 0.5W	5603	4822 157 11867	5.6μH 5%
3248	4822 051 20273	27k 5% 0.1W	3604	4822 116 52175	100Ω 5% 0.5W	5604	4822 157 11867	5.6μH 5%
3249	4822 116 52231	820Ω 5% 0.5W	3605	4822 051 20472	4k7 5% 0.1W	5831	4822 157 11139	6.8μH 5%
3251	4822 116 52175	100Ω 5% 0.5W	3606	4822 116 52256	2k2 5% 0.5W	5832	4822 157 11139	6.8μH 5%
3254	4822 051 20105	1M 5% 0.1W	3607	4822 116 52256	2k2 5% 0.5W	5833	4822 157 11139	6.8μH 5%
3256	4822 051 10102	1k 2% 0.25W	3608	4822 116 52175	100Ω 5% 0.5W	5835	3198 018 31290	12U 10%
3257	4822 051 20106	10M 5% 0.1W	3609	4822 050 11002	1k 1% 0.4W			
3258	4822 051 20334	330k 5% 0.1W	3610	4822 116 52303	8k2 5% 0.5W			
3259	4822 051 20474	470k 5% 0.1W	3611	4822 117 11373	100Ω 1%			
3261	4822 117 13577	330Ω 1% 1.25W	3612	4822 116 52303	8k2 5% 0.5W	6001	4822 130 34142	BZX79-B33
3403	4822 053 12229	22Ω 5% 3W	3614	4822 116 52283	4k7 5% 0.5W	6002	4822 130 11397	BAS316
3404	4822 052 10688	6Ω8 5% 0.33W	3615	4822 050 21003	10k 1% 0.6W	6004	4822 130 10414	BA792
3405	4822 117 11824	2k2 5%	3618	4822 050 21003	10k 1% 0.6W	6201	4822 130 11397	BAS316
3406	4822 050 21003	10k 1% 0.6W	3622	4822 117 11373	100Ω 1%	6202	4822 130 11397	BAS316
3408	4822 116 52303	8k2 5% 0.5W	3623	4822 051 20472	4k7 5% 0.1W	6206	4822 130 11416	PDZ6.8B
3410	4822 051 20333	33k 5% 0.1W	3624	4822 116 52175	100Ω 5% 0.5W	6241	4822 130 11416	PDZ6.8B
3411	4822 052 10109	10Ω 5% 0.33W	3625	4822 116 52175	100Ω 5% 0.5W	6402	4822 130 10871	SBYV27-200
3412	4822 050 23903	39k 1% 0.6W	3626	4822 051 20472	4k7 5% 0.1W	6403	9340 559 50112	BY228/24
3413	4822 117 1083							

6405	4822 130 42488	BYD33D
6406	5322 130 34331	BAV70
6407	4822 130 11397	BAS316
6408	4822 130 11397	BAS316
6409	4822 130 42488	BYD33D
6410	4822 130 42488	BYD33D
6411	4822 130 42488	BYD33D
6411	5322 130 81917	SB140
6412	4822 130 42488	BYD33D
6412	5322 130 81917	SB140
6413	4822 130 30621	1N4148
6414	4822 130 34167	BZX79-B6V2
6415	4822 130 11397	BAS316
6416	4822 130 11397	BAS316
6417	4822 130 11551	UDZS10B
6419	4822 130 34173	BZX79-B5V6
6420	4822 130 30862	BZX79-B9V1
6423	4822 130 42488	BYD33D
6471	4822 130 42488	BYD33D
6500	4822 130 31083	BYW55
6501	4822 130 31083	BYW55
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6520	4822 130 42488	BYD33D
6523	4822 130 30621	1N4148
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 61219	BZX79-B10
6560	9322 127 32682	BYW76-RAS15/10
6561	9322 127 32682	BYW76-RAS15/10
6563	4822 130 11397	BAS316
6564	9322 161 76682	SB340L-7024
6565	5322 130 34331	BAV70
6567	4822 130 11148	UDZ4.7B
6681	4822 130 31983	BAT85
6691	9322 172 20682	LED LTL-102SRHAP
6692	9322 174 42667	IR RECEIVER TOSP4136UH1
6831	4822 130 30621	1N4148
6901	4822 051 20008	JUMP



7001	4822 130 63732	MMUN2212
7101	4822 130 60511	BC847B
7200	9352 706 22557	TDA9552H/N1/3/0607
7201	4822 130 60511	BC847B
7204	4822 130 60373	BC856B
7206	5322 130 42755	BC847C
7209	5322 130 42718	BFS20
7210	5322 130 42718	BFS20
7241	3198 010 44010	PDTA114ET
7401	9340 547 00215	PDTC143ZT
7402	9340 563 21127	BUT11APX-1200
7403	4822 130 40981	BC337-25
7404	4822 130 41087	BC638
7405	4822 130 60373	BC856B
7406	4822 130 60373	BC856B
7407	4822 130 40823	BD139
7408	4822 130 40823	BD139
7409	4822 130 60373	BC856B
7435	4822 130 40823	BD139
7471	4822 209 13176	TDA9302H
7515	8238 274 02070	TCET1103G
7520	9352 673 56112	IC TEA1507P/N1
7521	9322 160 62687	STP6NC80ZFP
7521	9322 164 04687	STP4NC80ZFP
7522	4822 130 60511	BC847B
7540	4822 130 40959	BC547B
7560	4822 209 15576	LE33CZ
7560	4822 209 16978	LF33CV
7561	9340 547 00215	PDTC143ZT
7562	4822 130 60373	BC856B
7564	4822 130 60373	BC856B
7602	9322 147 25682	M24C16-WBN6
7801	5322 209 11102	HEF4052BT
7803	4822 130 60511	BC847B
7804	4822 130 60511	BC847B
7831	9322 160 79682	MSP3415G-PO-B8 FM
7832	4822 130 60511	BC847B
7833	4822 130 60511	BC847B
7834	4822 130 60511	BC847B
7835	4822 130 60511	BC847B
7901	9322 158 65667	AN7522N

### CRT Panel [B]

#### Various

0156	3119 107 17411	WIRETREE MAIN-SPK STEREO
0244	2422 025 04851	CON 3P

0245	2422 025 04854	CON 6P Female
0254	2422 500 80076	SOC CRT 9P F N-NECK B
0254	2422 500 80077	SOC CRT V 9P F M-NECK B

#### II

2313	4822 122 33216	270pF 5% 50V
2313	4822 122 33575	220pF 5% 63V
2323	4822 122 33172	390pF 5% 50V
2331	4822 122 33172	390pF 5% 50V
2341	2020 558 90571	2N2 10% 1KV
2341	4822 126 14588	2.2nF 10% 1KV
2342	4822 121 70386	47nF 10% 250V
2343	4822 121 70386	47nF 10% 250V

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3311	4822 051 20392	3k9 5% 0.1W
3312	4822 117 13577	330Ω 1% 1.25W
3313	4822 051 20109	10Ω 5% 0.1W
3314	4822 053 12183	18k 5% 3W
3316	4822 052 10689	68Ω 5% 0.33W
3317	3198 013 01520	1k5 2% 1/2W
3321	4822 051 20392	3k9 5% 0.1W
3322	4822 117 13577	330Ω 1% 1.25W
3323	4822 051 20109	10Ω 5% 0.1W
3324	4822 053 12183	18k 5% 3W
3326	4822 052 10689	68Ω 5% 0.33W
3327	3198 013 01520	1k5 2% 1/2W
3331	4822 051 20392	3k9 5% 0.1W
3332	4822 117 13577	330Ω 1% 1.25W
3333	4822 051 20109	10Ω 5% 0.1W
3334	4822 053 12183	18k 5% 3W
3336	4822 052 10689	68Ω 5% 0.33W
3337	3198 013 01520	1k5 2% 1/2W
3341	3198 013 01520	1k5 2% 1/2W
3347	4822 052 10221	220Ω 5% 0.33W
3348	3198 013 01520	1k5 2% 1/2W
3349	4822 052 10158	1Ω5 5% 0.33W
3349	4822 052 10188	1Ω8 5% 0.33W
3350	4822 052 10158	1Ω5 5% 0.33W
3350	4822 052 10188	1Ω8 5% 0.33W

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5341	4822 157 11672	12μH 5%
5341	4822 157 50965	15μH
5342	4822 526 10704	100mH

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6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	9337 587 20673	BA282
6343	4822 130 10837	UDZS8.2B
6344	4822 051 20008	JUMPER



7311	4822 130 41782	BF422
7312	4822 130 41782	BF422
7313	4822 130 41646	BF423
7321	4822 130 41782	BF422
7322	4822 130 41782	BF422
7323	4822 130 41646	BF423
7331	4822 130 41782	BF422
7332	4822 130 41782	BF422
7333	4822 130 41646	BF423

### EPS 4 [F]

#### Various

1073	3139 137 22222	Ext. Power Supply Module
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### Clock Module [G]

#### Various

1076	3119 108 52471	Small digit disp 14" sets
1076	3119 108 52191	Small digit disp

### UIR/LS/Vbat Module [H]

#### Various

C2	2238 586 59812	100N
C3	2238 586 59812	100N
C6	4822 126 14238	50V 2N2
C7	2238 586 59812	100N
C8	2238 586 59812	100N
D3	4822 130 10852	BZX284-C6V8
D4	4822 130 10852	BZX284-C6V8
D5	4822 130 10852	BZX284-C6V8
D9	4822 130 10852	BZX284-C6V8
F1	4822 071 54001	19372(400MA)
Q1	4822 130 60511	BC847B
Q2	4822 130 60373	BC856B
Q4	9310 125 00235	N-CHANNEL MOS BSN20
Q5	4822 130 60373	BC856B
Q6	4822 130 60511	BC847B
Q7	4822 130 60511	BC847B
Q9	4822 130 40959	BC547B
R2	4822 051 30103	10K 5% 0,062W
R3	4822 051 30103	10K 5% 0,062W
R4	4822 051 30103	10K 5% 0,062W
R5	4822 051 30272	2K7 5% 0,062W
R6	4822 051 30101	100R 5% 0,062W
R7	4822 051 30101	100R 5% 0,062W
R8	4822 051 30102	1K 5% 0,062W
R9	4822 051 30471	470R 5% 0,062W
U1	9965 000 11573	MOD JACK
U2	2422 026 05223	PHONE 1P Female 3.5 ST
U3	5322 209 14481	HEF4053BT
U4	4822 209 90008	L78M05CP
D11	4822 130 34441	BZX79-B22
D12	4822 130 34441	BZX79-B22
Q10	4822 130 41782	BF422
R10	4822 051 30103	10K 5% 0,062W
R11	4822 051 30103	10K 5% 0,062W
R12	4822 051 30103	10K 5% 0,062W
R13	4822 051 30103	10K 5% 0,062W
R15	4822 051 30102	1K 5% 0,062W
R17	4822 051 30103	10K 5% 0,062W
R18	4822 117 13632	100K 1% 0,62W
R19	4822 051 30101	100R 5% 0,062W
R20	4822 051 30479	47R 5% 0,062W
R21	4822 051 30102	1K 5% 0,062W
R22	4822 051 30103	10K 5% 0,062W
R23	4822 117 13632	100K 1% 0,62W
R25	4822 051 30008	JUMPER
R26	4822 051 30103	10K 5% 0,062W
R29	2322 257 41332	3.3K 5% 5W
R30	4822 116 52304	82K 5% 0,5W
R31	4822 116 52304	82K 5% 0,5W
R32	4822 051 30103	10K 5% 0,062W
R33	4822 051 30008	JUMPER
RT1	9965 000 11572	RXE030
Q237	4822 267 10567	4P
Q259	2422 025 16759	CON 5P Male
Q262	2422 025 16936	CON 3P Male
1240	2422 025 06353	CON 5P Male
1246	2422 025 16601	CON 3P Male
1251	2422 025 15851	CON 4P Male

### SP/LS Module [I]

#### Various

C1	4822 124 40207	100uF 20% 25V
C5	2238 586 59812	100N
C6	4822 126 14238	50V 2N2
D1	4822 130 34173	BZX79-B5V6
D2	4822 130 30621	1N4148
D3	4822 130 10852	BZX284-C6V8
D4	4822 130 10852	BZX284-C6V8
D5	4822 130 10852	BZX284-C6V8
D9	4822 130 10852	BZX284-C6V8
Q1	4822 130 60511	BC847B
Q6	4822 130 60511	BC847B
Q7	4822 130 60511	BC847B
Q8	4822 130 60511	BC847B
R1	4822 116 83876	270R 5% 0,5W
R2	4822 051 30103	10K 5% 0,062W
R3	4822 051 30103	10K 5% 0,062W
R4	4822 051 30103	10K 5% 0,062W
R5	4822 051 30101	100R 5% 0,062W
R6	4822 051 30101	100R 5% 0,062W
R7	4822 051 30101	100R 5% 0,062W
R9	4822 051 30101	100R 5% 0,062W
U1	9965 000 11573	JACK 95001-2661 HOR
U2	2422 026 05223	PHONE 1P F 3.5 ST

D10	4822 130 81637	PMLL4148L
D11	4822 130 34441	BZX79-B22
D12	4822 130 34441	BZX79-B22
R11	4822 051 30103	10K 5% 0,062W
R12	4822 051 30103	10K 5% 0,062W
R13	4822 051 30103	10K 5% 0,062W
R20	4822 051 30479	47R 5% 0,062W
R21	4822 051 30102	1K 5% 0,062W
R22	4822 051 30103	10K 5% 0,062W
R23	4822 117 13632	100K 1% 0.62W
R24	4822 117 13632	100K 1% 0.62W
RT1	9965 000 11572	RXE030
1246	2422 025 16382	CON 3P Male
1251	2422 020 00725	CON 3P Male
1259	4822 265 41391	B9B-EH-A

### Interface Module [J]

#### Various

0217	2422 025 16385	CON 4P Male
0227	2422 025 15849	CON 6P Male
0228	2422 025 16386	CON 5P Male
0237	4822 267 10565	4P
0240	2422 025 11244	CON 7P Male
0242	4822 267 10557	B10B-EH-A
0251	4822 267 10565	4P
0259	2422 025 15848	CON 5P Male
1259	4822 265 41391	B9B-EH-A
1800	3135 010 03531	32PIN CON

#### -II-

2700	3198 017 41050	1μF 10V
2701	4822 126 14305	100nF 10% 16V
2702	3198 017 41050	1μF 10V
2703	4822 124 41584	100μF 20% 10V
2704	3198 017 41050	1μF 10V
2705	4822 122 33761	22pF 5% 50V
2709	4822 126 14305	100nF 10% 16V
2710	4822 126 14305	100nF 10% 16V
2711	4822 122 31765	100pF 2% 63V
2712	4822 122 31765	100pF 2% 63V
2713	4822 126 14305	100nF 10% 16V
2714	4822 126 14238	2N2 50V

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3700	4822 051 30562	5k6 5% 0.063W
3701	4822 051 30223	22k 5% 0.062W
3702	4822 051 30223	22k 5% 0.062W
3703	4822 051 30759	75Ω 5% 0.062W
3704	4822 051 30472	4k7 5% 0.062W
3706	4822 051 30683	68k 5% 0.062W
3707	4822 051 30103	10k 5% 0.062W
3708	4822 117 12925	47k 1% 0.063W
3710	4822 117 12925	47k 1% 0.063W
3715	4822 051 30101	100Ω 5% 0.062W
3716	4822 051 30103	10k 5% 0.062W
3717	4822 051 30103	10k 5% 0.062W
3718	4822 051 30103	10k 5% 0.062W
3719	4822 051 30562	5k6 5% 0.063W
3720	4822 051 30103	10k 5% 0.062W
3721	4822 051 30472	4k7 5% 0.062W
3722	4822 051 30472	4k7 5% 0.062W
3729	4822 051 30103	10k 5% 0.062W
3731	4822 117 12968	820Ω 5% 0.62W
3733	4822 117 12925	47k 1% 0.063W
3734	4822 117 12925	47k 1% 0.063W
3736	4822 051 30759	75Ω 5% 0.062W
3737	4822 051 30124	120k 5% 0.062W
3738	4822 051 30682	6k8 5% 0.062W
3739	4822 053 11688	6Ω 5% 2W
3740	4822 116 83872	220Ω 5% 0.5W
3741	4822 051 30102	1k 5% 0.062W
3743	4822 051 30101	100Ω 5% 0.062W
3744	4822 051 30101	100Ω 5% 0.062W
3745	4822 050 21003	10k 1% 0.6W
3746	4822 051 30103	10k 5% 0.062W
3748	4822 051 30103	10k 5% 0.062W
3749	4822 051 30103	10k 5% 0.062W
4xxx	4822 051 10008	0Ω 5% 0.25W
4xxx	4822 051 20008	0Ω 5% 0.25W

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5705	4822 157 11149	56μH 5%
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6701	4822 130 42488	BYD33D
6702	4822 130 83757	MCL4148
6703	4822 130 34233	BZX79-B5V1
6704	4822 130 11666	BZX284-C8V2
6706	4822 130 11666	BZX284-C8V2

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7700	4822 130 60511	BC847B
7701	4822 130 60511	BC847B
7705	4822 130 60373	BC856B
7706	4822 130 60511	BC847B
7708	4822 130 60511	BC847B
7710	9322 119 29685	DS1813R-5
7711	4822 130 60511	BC847B
7712	4822 130 60511	BC847B
7715	4822 130 60511	BC847B
7716	4822 130 60511	BC847B
7717	5322 209 73179	74HCT74D
7718	4822 130 60511	BC847B