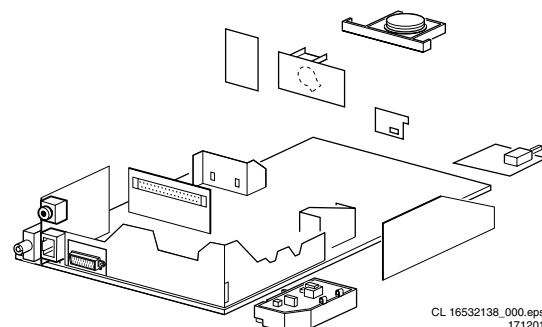


Service
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Service Manual

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PHILIPS

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 : FM radio (10.7 MHz)
A/V connections	: PAL BG : SECAM L/L' : PAL 60 (playback only)

Channel selections

IF frequency
Aerial input

: NTSC 3.58 (playback only)
: NTSC 4.43 (playback only)
: 100 channels
: UVSH
: 38.9 MHz
: 75 Ω , Coax

1.1.2 Miscellaneous

Audio output (RMS)

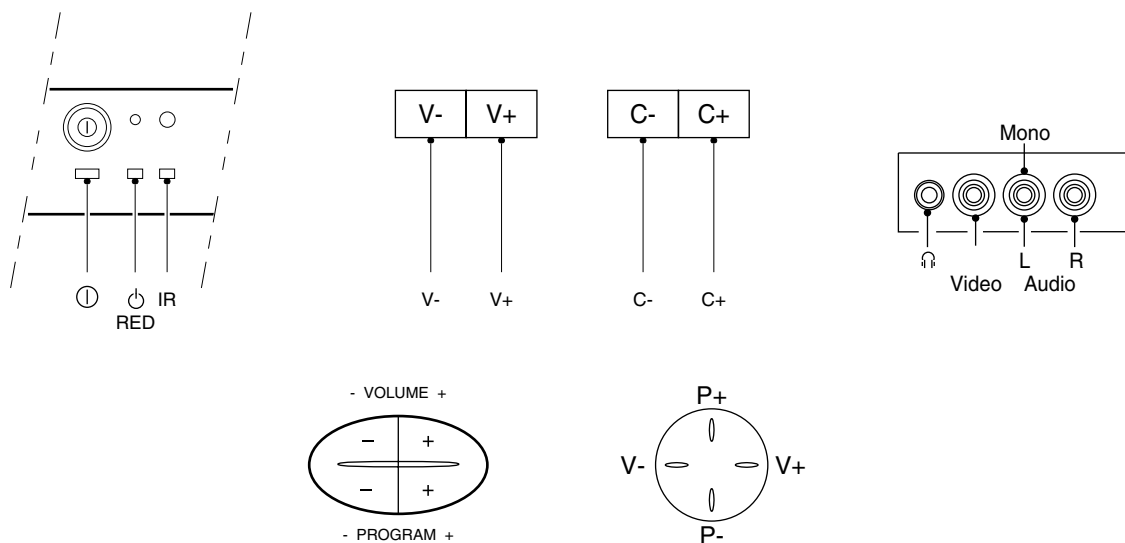
Mains voltage
Mains frequency
Ambient temperature
Maximum humidity
Power consumption

Standby Power consumption

: 2 x 5 W stereo
: 2 x 10 W stereo
: 220 - 240 V ($\pm 10\%$)
: 50 / 60 Hz ($\pm 5\%$)
: + 5 to + 45 deg. C
: 90 % R.H.
: 58 W (21") to
: 100 W (33")
: < 3 W

1.2 Connections

1.2.1 Side (or Front) Connections and Top (or Front) Control



CL 16532016_020.eps
220501

Figure 1-1

Audio / Video In

1	Video	CVBS (1 Vpp / 75 Ω)
2	Audio	L (0.5 Vrms / 10 k Ω)
3	Audio	R (0.5 Vrms / 10 k Ω)
4	Headphone	3.5 mm (8 - 600 Ω / 4 mW)



1.2.2 Rear Connections

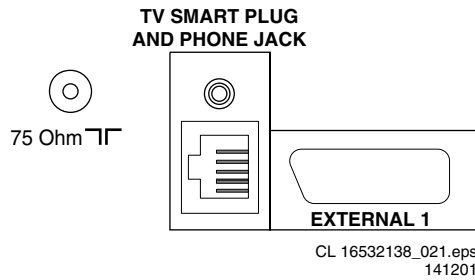


Figure 1-2

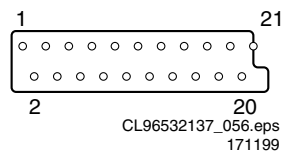
TV Aerial InAerial input : 75 Ω , Coax (IEC-type)**External 1: RGB/YUV in + CVBS in/out**

Figure 1-3

1	Audio	R (0.5 Vrms / 1 k Ω)	$\oplus$
2	Audio	R (0.5 Vrms / 10 k Ω)	$\oplus$
3	Audio	L (0.5 Vrms / 1 k Ω)	$\oplus$
4	-	GND	$\perp$
5	-	GND	$\perp$
6	Audio	L (0.5 Vrms / 10 k Ω)	$\oplus$
7	Blue / U	(0.7 Vpp / 75 Ω)	$\oplus$
8	GVBS-status	0 - 2.0 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	-	GND	$\perp$
10	-		
11	Green / Y	(0.7 Vpp / 75 Ω)	$\oplus$
12	-		
13	-	GND	$\perp$
14	-	GND	$\perp$
15	Red / V	(0.7 Vpp / 75 Ω)	$\oplus$
16	RGB-status	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17	-	GND	$\perp$
18	-	GND	$\perp$
19	GVBS	(1 Vpp / 75 Ω)	$\oplus$
20	GVBS	(1 Vpp / 75 Ω)	$\oplus$
21	Earth	GND	$\perp$

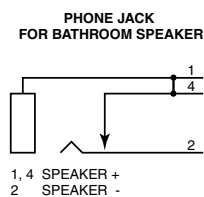
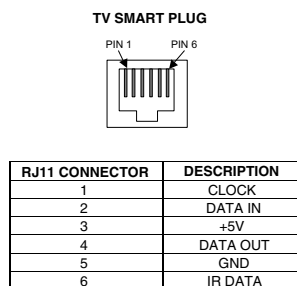
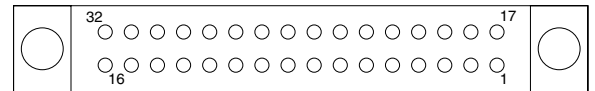
CL 16532138_011.eps
221101

Figure 1-4

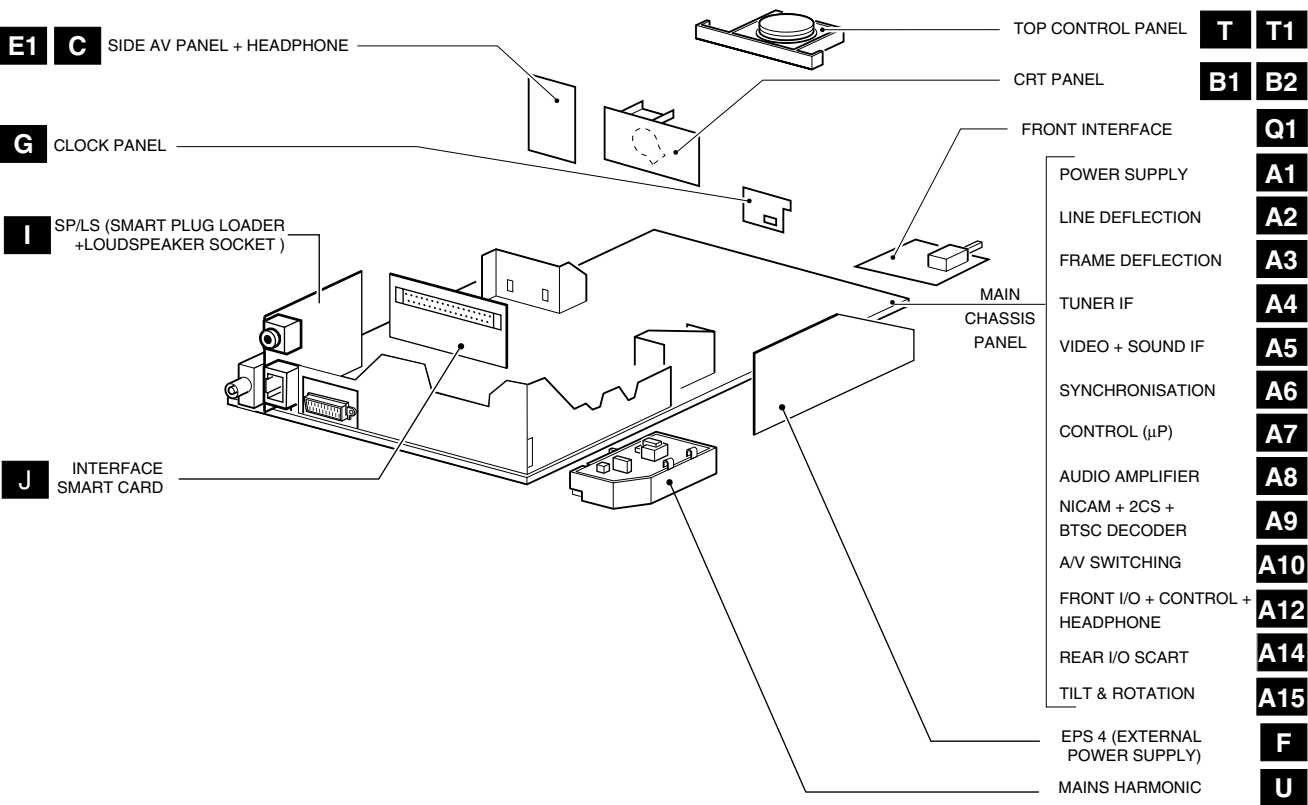
32 PIN SMART CARD CONNECTOR

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

CL16532138_028.eps
171201

Figure 1-5

1.3 Chassis Overview



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171201

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).

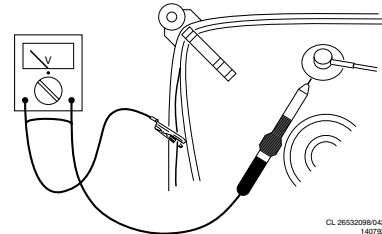


Figure 2-1

- 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 (RG4172BK). 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 "4" 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**

Enable/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 (nine) fixation screws of the rear cover: two at the top, two at each side, two at the bottom and one at the SCART connectors.
2. Now pull the rear cover backward to remove it.

4.2 Service Position Main Panel

There are 2 configurations: one without and one with panel bracket. Both have a different service position.

Main panel **without** bracket.

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. Turn the panel 90 degrees counter clockwise [3].
5. Flip the panel 90 degrees [4], with the components towards the CRT.
6. Turn the panel with the rear I/O towards the CRT [5].
7. Slide the metal heatsink (near the mains transformer 5520) underneath the right chassis bracket, so the panel is secured [6].

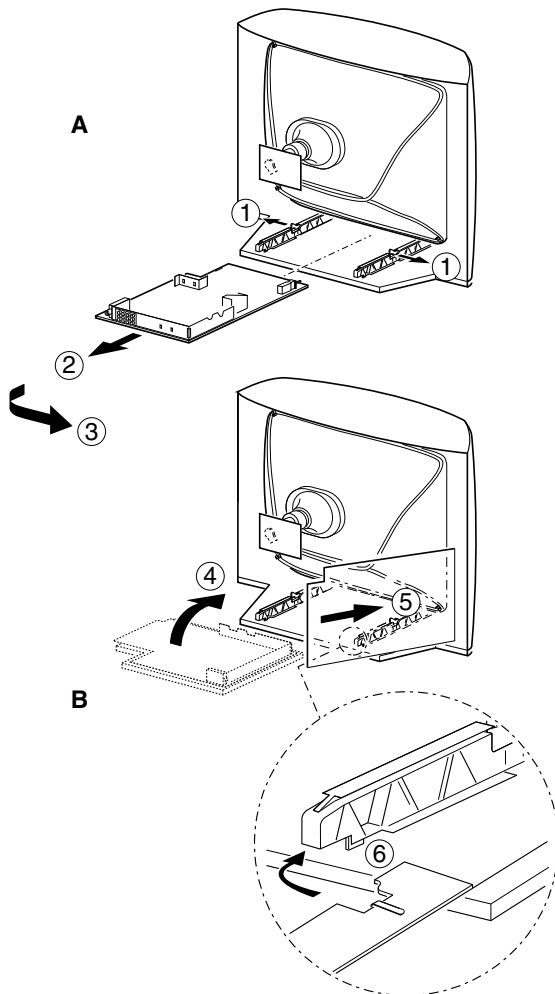


Figure 4-1

Main panel **with** bracket.

1. Disconnect the strain relief of the Mains cord.
2. Disconnect the degaussing coil by removing the cable from (red) connector 0201 [1].
3. Remove the panel bracket from the bottom tray, by pulling it backward [2].
4. Turn the chassis tray 90 degrees counter clockwise.
5. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.
6. Turn the panel with the rear I/O towards the CRT.
7. Place the hook of the tray in the fixation hole of the cabinet bottom [4] and secure it.

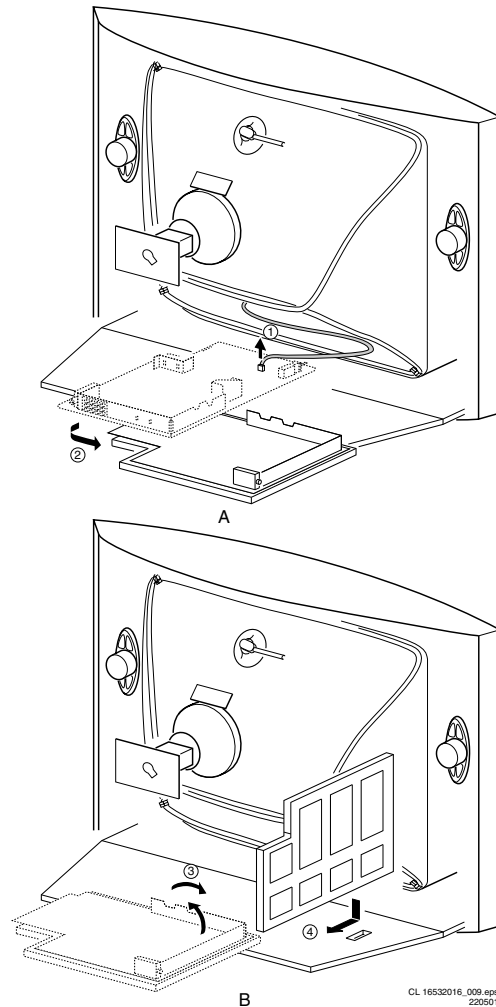


Figure 4-2

4.3 Side I/O Panel Removal (if Present)

1. Remove the complete Side I/O assembly, after unscrewing the 2 fixation screws [1].
2. Release the two fixation clamps [2] and lift the board out of the bracket.

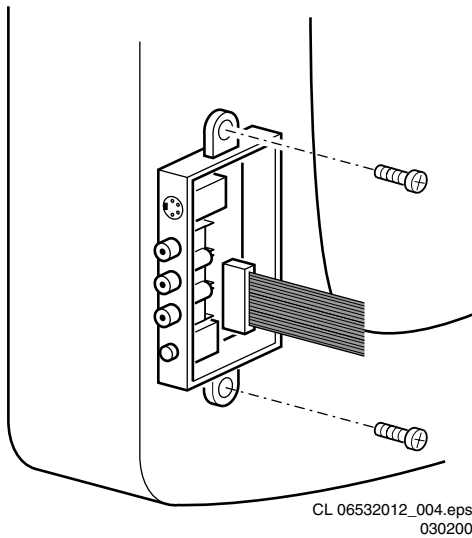


Figure 4-3

4.4 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	TDA9555	L01H.1E
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		
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									

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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**

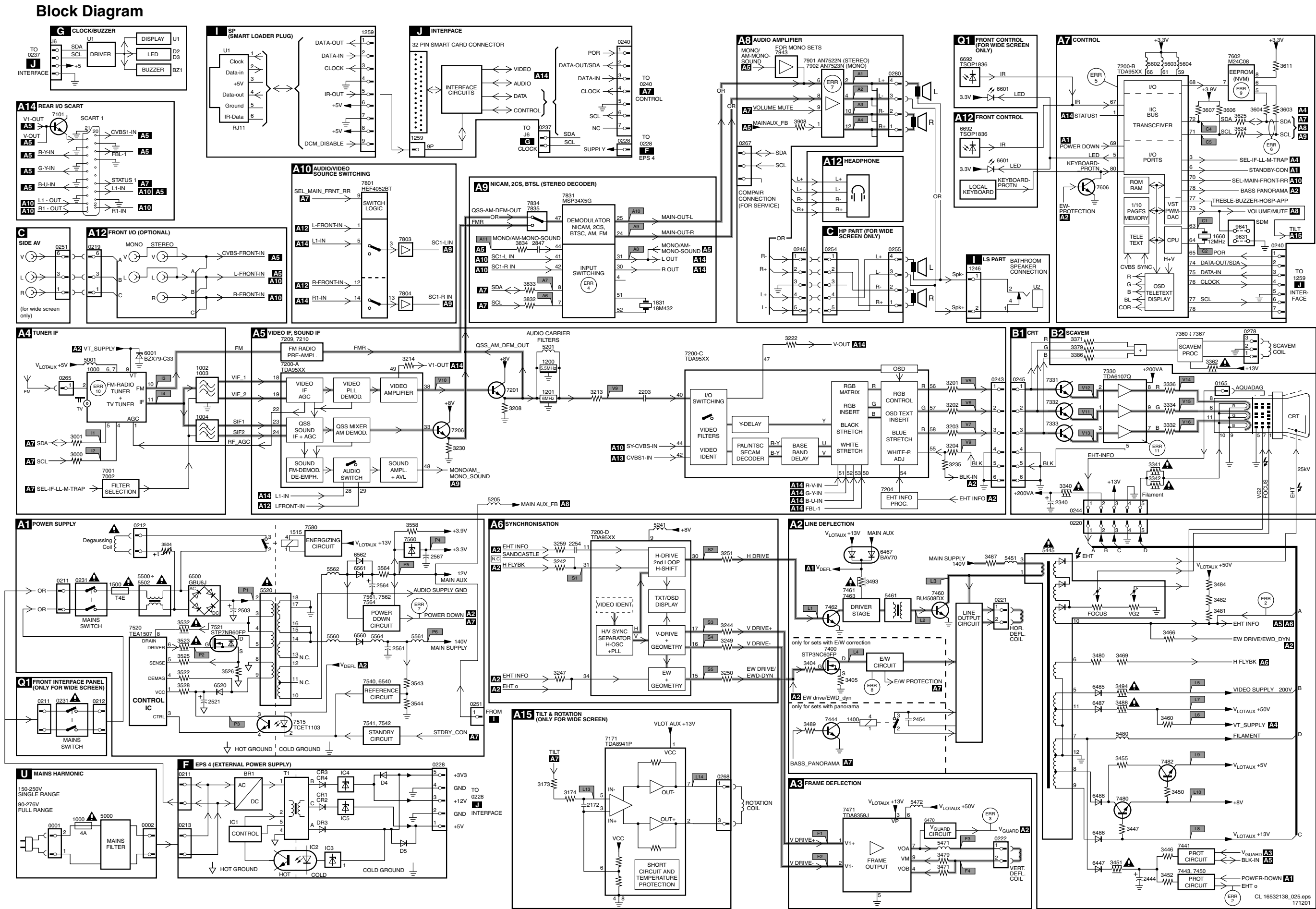
The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 5 and 7 are okay, 'VT_supply' at pin 9 is missing. Conclusion: resistor 3460 is defective.

- **Set turns on, but with a half screen at the bottom. Sound is okay**

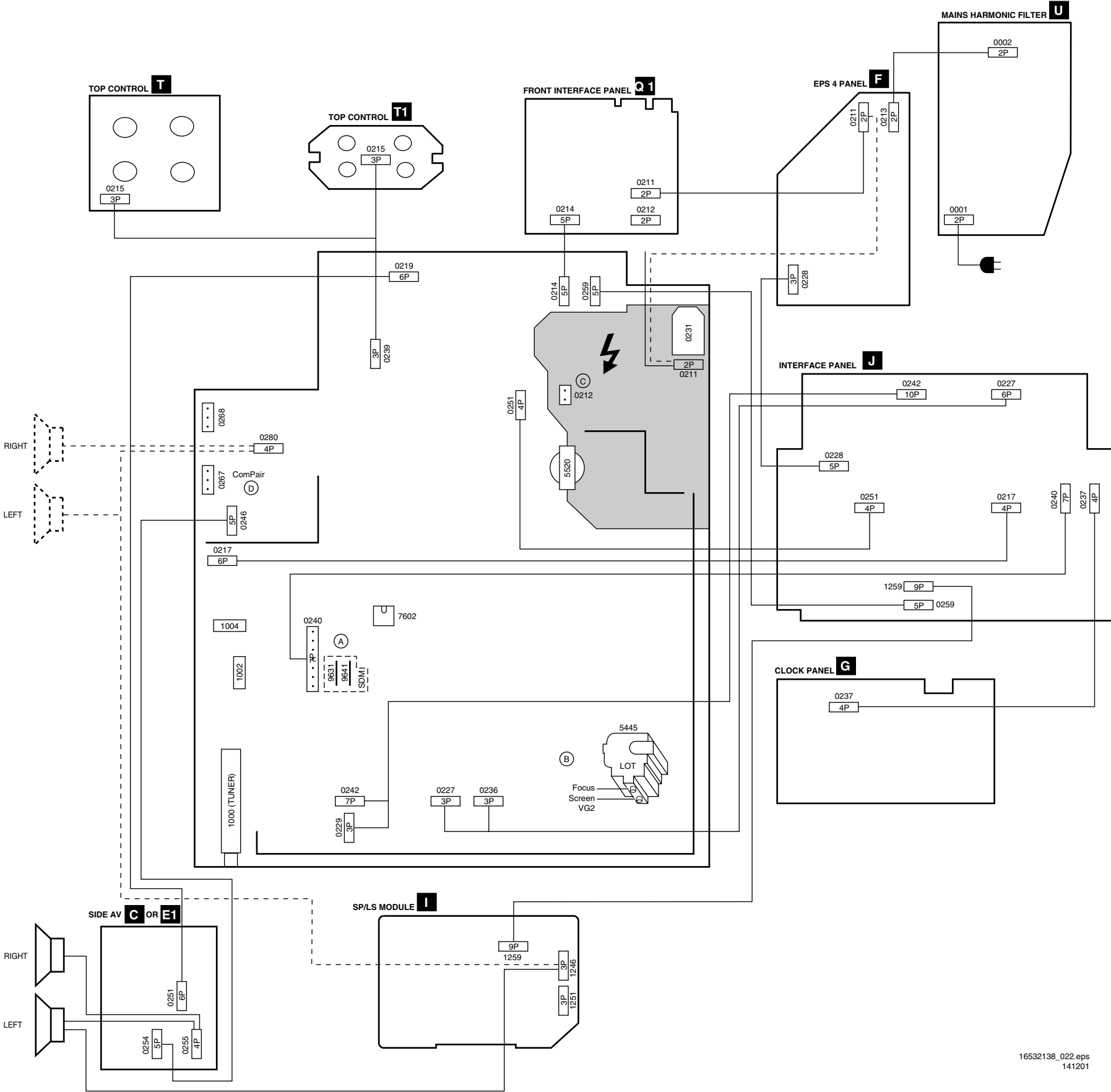
Blinking LED (set in SDAM mode) indicates error 3. Check 'Vlotaux+13V' and '+50V'. If they are okay, problem is expected in the vertical amplifier IC7471. Measure with a scope the waveform on pin 17 of the UOC. Measure also at pin 1 of IC7471. If here the signal is missing, a defective resistor R3244 causes the problem

Personal Notes:

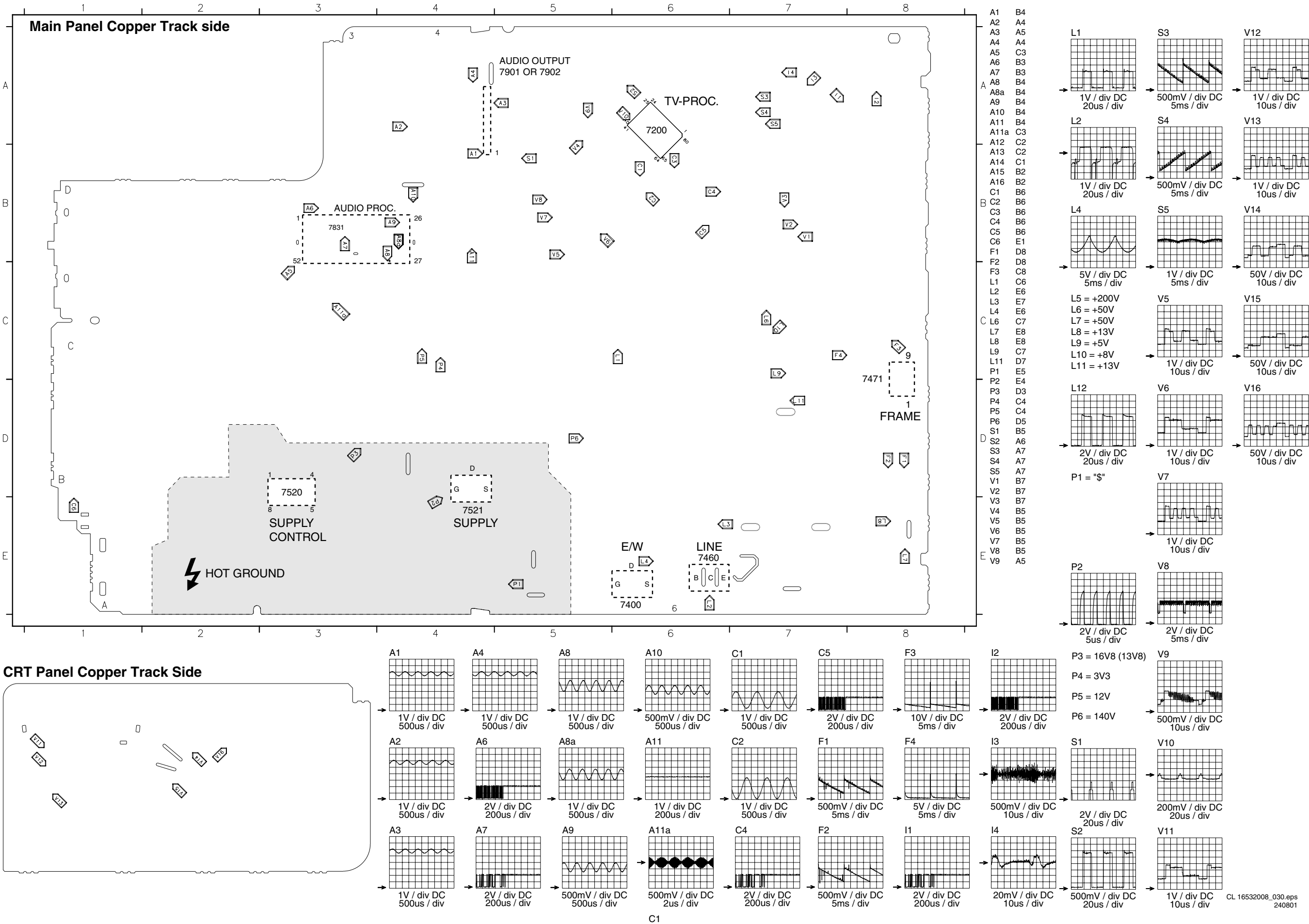
6. Block- and Wiring Diagram, Testpoints, I²C, and Supply Voltage Overview



Wiring Diagram

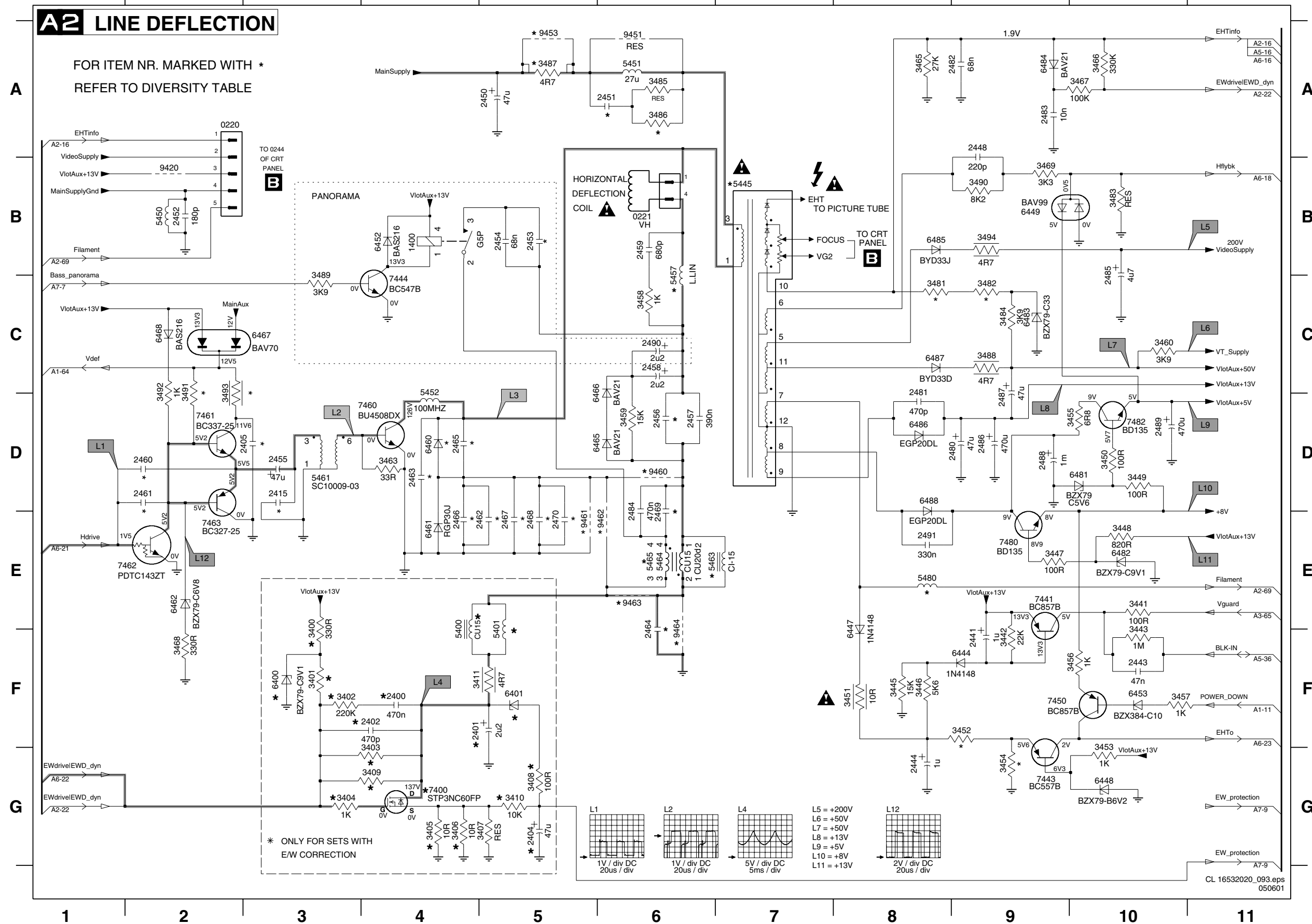


Testpoint Overview



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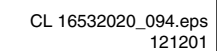
0220 A2	2402 F4	2443 F10	2452 B2	2457 D6	2462 E5	2467 E5	2481 D8	2486 D9	2491 E8	3404 G3	3409 G4	3443 F10	3449 D10	3454 G9	3459 D6	3467 A10	3483 B10	3488 C9	3493 C2	5450 B2	5463 E6	6401 F5	6452 B4	6465 D6	6482 E10	6487 C8	7444 C4	7463 E2	9453 A5
0221 B6	2404 G5	2444 G8	2453 B5	2458 C6	2463 E4	2468 E5	2482 A9	2487 D9	3400 C5	3405 G4	3410 G5	3445 F8	3450 D10	3455 D10	3460 C10	3468 F2	3484 C9	3489 C3	3494 B9	5451 A6	5464 E6	6444 F9	6453 F10	6467 C6	6483 A9	6488 D8	7450 F9	7480 E9	9460 D6
1400 B4	2405 D3	2448 A9	2454 B5	2459 B6	2464 E6	2469 E6	2483 A9	2488 D9	3401 F3	3406 G4	3411 F5	3446 F8	3451 F8	3456 F10	3463 D4	3469 B9	3485 A6	3490 B9	5400 E4	5452 D4	5465 E6	6447 E8	6460 D4	6467 C3	6484 A9	7400 G4	7460 D3	7482 D10	9461 E5
2400 F4	2415 D3	2450 A5	2455 D3	2460 D2	2465 D4	2470 E5	2484 D6	2489 D10	3402 F3	3407 G5	3441 F10	3447 E9	3452 F9	3457 F10	3465 A8	3481 C8	3486 A6	3491 C2	5401 E5	5457 B6	5480 E8	6448 G10	6461 E4	6468 C2	6485 B8	7441 E9	7461 D2	9420 B2	9462 E6
2401 F4	2441 F9	2451 A6	2456 D6	2461 D2	2466 E4	2480 D9	2485 B10	2490 C6	3403 G4	3408 G5	3442 F9	3448 E10	3453 G10	3458 C6	3466 A10	3482 C9	3487 A5	3492 C2	5445 B7	5461 D3	6400 F3	6449 B9	6462 E2	6481 D10	6486 D8	7443 G9	7462 E1	9451 A6	9463 E6
1		2		3		4		5		6		7		8		9		10		11									



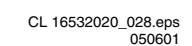
Diversity Table A2														
Item	Description	28" Wide screen, No FM radio	28" Wide screen, FM radio	32" Wide screen	24" Wide screen	21" Blackline	25" Blackline D	25" Blackline S	25" Real flat	28" Stereo 5W, Blackline S	28" Stereo 3W	28" Stereo 5W, Blackline D	29" Super flat	21" Real flat
1400	Relay 5A 10V	X	X	X	X									
2400	470n													
2401	2U2 100V	X	X	X	X	X								
2401	2U2 50V						X	X	X	X	X	X	X	X
2402	470p 500V	X	X	X	X	X	X	X	X	X	X	X	X	X
2404	47u 50V	X	X	X	X	X	X	X	X	X	X	X	X	X
2405	1N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X
2415	capacitor													
2420	1U 16V	X	X	X	X									
2421	470P 50V	X	X	X	X									
2451	15N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X
2451	22N 50V													X
2453	capacitor													
2454	100N 250V	X	X	X										
2454	68N 250V				X									
2456	680N 250V	X	X	X										
2457	360N 250V													X
2457	390N 250V					X	X	X	X					
2457	430N 250V									X	X			
2457	560N 250V				X							X		
2457	270N 250V													X
2458	2U2A 100V					X	X	X	X	X	X	X	X	X
2460	100p 50V	X	X	X	X	X	X	X	X	X	X	X	X	X
2461	capacitor													
2462	50V 330N													
2463	1N 2kV												X	
2463	1N2 2kV				X									
2463	220P 2kV					X	X							
2463	470P 2kV							X						
2463	680P 2kV	X	X					X	X	X	X		X	X
2463	820P 2kV			X										
2464	2U2 160V					X		X						X
2465	10N 1.6kV					X								
2465	11N 1.6kV						X	X						
2465	12N 1.6kV				X								X	X
2465	13N 1.6kV	X	X	X										
2465	15N 1.6kV						X							
2465	7N5 1.6kV					X								X
2465	9N1 1.6kV									X	X			
2466	9N1 1kV												X	
2466	10N 400V									X	X			
2466	18N 400V						X							
2467	15N 1kV	X	X		X									
2467	9N1 1kV			X										
2467	10N 400V													X
2467	15N 400V					X		X						
2467	22N 400V				X			X					X	
2468	9N1 1kV			X									X	
2468	15N 400V					X		X					X	
2468	18N 400V				X			X						X
2468	22N 400V					X			X	X				
2469	510N 250V							X						
2469	680N 250V			X								X		
2470	capacitor													
2482	120N 250V			X										X
2482	68N 250V	X	X		X	X	X	X	X	X	X	X	X	
2484	470N 250V	X	X		X	X	X		X	X				
2490	2U2A 100V	X	X	X	X									
3400	330R 5% 1/6W			X		X	X	X	X	X	X	X	X	X
3401	22K 5% 1/6W						X						X	
3401	33K 5% 1/6W			X		X			X	X	X	X		
3401	220K 5% 1/6W					X		X						X
3402	220K													
3403	82K 5% 1/6W	X	X	X			X							X
3403	100K 5% 1/6W			X		X	X	X	X	X	X	X		
3404	1K 1/6W	X	X	X	X	X	X	X	X	X	X	X	X	X
3405	10R 5% 1/6W	X	X		X			X						X
3405	4R7 5% 1/6W			X		X	X	X	X	X	X	X		
3406	10R 5% 1/6W	X	X		X			X						X
3406	4R7 5% 1/6W			X		X	X	X	X	X	X	X		
3407	4R7 5% 1/6W			X				X						
3408	1K 5% 1/6W	X	X	X	X									
3408	100R 5% 1/6W					X	X	X	X	X	X	X	X	X
3409	resistor													
3410	10K 1/6W	X	X	X	X	X	X	X	X	X	X	X	X	X

Diversity Table A2														
Item	Description	28" Wide screen, No FM radio	28" Wide screen, FM radio	32" Wide screen	24" Wide screen	21" Blackline	25" Blackline D	25" Blackline S	25" Real flat	28" Stereo 5W, Blackline S	28" Stereo 3W	28" Stereo 5W, Blackline D	29" Super flat	21" Real flat
3468	47R 5% 1/6W				X					X				
3468	100R 5% 1/6W			X						X	X	X	X	X
3468	180R 5% 1/6W	X	X				X							X
3468	82R 5%				X									
3481	10K	X	X		X									
3481	12K					X				X	X	X		
3481	15K			X				X		X				X
3481	18K				X									X
3482	10K				X		X							
3482	12K							X	X				X	
3482	24K	X	X		X		X			X	X			
3482	6K8													X
3482	8K2			X										X
3486	33R	X	X	X	X	X	X	X	X	X	X	X	X	X
3486	22R 3W													X
3487	4R7													
3489	3K9 5% 1/6W	X	X	X	X									
3491	10K 5% 1/6W				X			X					X	X
3491	27K 5% 1/6W	X	X	X	X		X	X		X	X	X	X	
3492	1K 5% 1/6W			X		X		X				X	X	X
3492	12K 5% 1/6W						X				X	X		
3492	1K5 5% 1/6W									X				
3492	2K7 5% 1/6W			X										
3492	4K7 5% 1/6W	X	X							X				
3492	470R 5% 1/6W												X	
3493	Fuse 3R9 5%												X	
3493	Fuse 6R8 5%	X	X	X	X	X	X	X	X	X	X	X	X	X
5400	Choke coil	X	X	X	X									
5400	CU15						X	X		X	X	X	X	
5401	1000U					X		X					X	X
5445	TFM LOT PSLOT 1FH			X									X	
5445	TFM LOT PSLOT 29"RF													X
5445	TFM LOT SLOT							X					X	
5445	TFM LOT USLOT+S	X	X		X	X	X			X	X			
5445	TFM LOT USLOT+U						X	X						
5451	22U													X
5451	33U	X	X	X	X	X	X	X	X	X	X	X	X	X
5457	C907-01 Y			X										
5457	COI LINCOR DC12					X								
5457	COI LINCOR DRUM	X	X		X			X				X	X	
5457	COI LINCOR DRUM DC12												X	
5457	Linearity corrector coil							X	X	X	X			
5457	Linearity corrector coil				X									
5461	SRW0913DR-T01				X								X	
5461	SRW0913DR-T02	X	X		X	X	X	X	X	X	X	X	X	
5461	SRW0913DR-T06			X				X					X	
5463	C957-02Y				X									X
5463	CU15							X						X
5464	C946-01 Y	X	X	X	X									
5465	CU15					X				X	X			
5465	U-20D										X			
5465	UU15							X	X					
5480	22U												X	X
5480	33U	X	X		X									
5480	39U			X		X	X	X		X	X			
5480	47U					X			X					
6400	1K			X		X	X	X	X	X	X	X	X	X
6401	BZX79-C39				X	X	X	X	X	X	X	X	X	X
6401	BZX79-C47												X	
6401	BZX79-C68	X	X	X	X									
6452	BAS316	X	X	X	X									
6460	BY228/24	X	X		X	X	X	X	X	X	X	X	X	X
6460	DG3-7005L			X										
6462	BZX79-C10	X	X		X								X	X
6462	BZX79-C12					X		X						
6462	BZX79-C8V2					X								
6462	BZX79-C9V1			X					X	X	X	X		
7444	BC547B	X	X	X	X</									

A3 FRAME DEFLECTION



A4 TUNER IF



Mono Carrier: Video IF + Sound IF

A5 VIDEO IF + SOUND IF

A

B

C

D

E

F

G

0243 C6 4218 F9
0248 C2 5201 D7
0249 B2 5202 A8
0266 E11 5204 F2
0276 C2 5205 G2
1200 E7 5206 F3
1201 E7 6201 F4
1203 F8 6202 F5
2201 C2 6206 G3
2202 C2 7200-A B9
2203 D2 7200-C C2
2204 D5 7201 D8
2205 B3 7204 F5
2206 D6 7206 B7
2207 D8 7209 F7
2208 B8 7210 F8
2209 F4 9200 D7
2210 G3 9618 A10
2211 D8 9653 F2
2213 E2 9673 G2
2214 E2
2215 F2
2216 B10
2217 B11
2219 B4
2220 F5
2221 B2
2222 F8
2223 F9
2225 C7
2226 C8
2227 D10
2228 D10
2229 C11
2230 C11
2233 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
3206 F5
3207 C8
3208 E8
3209 E8
3212 E6
3213 D6
3214 A10
3217 G5
3218 G4
3219 G3
3220 A4
3223 E4
3224 F3
3225 F5
3226 E5
3228 B7
3229 C7
3230 B7
3231 A7
3232 C10
3233 F7
3234 E10
3235 E2
3236 F7
3237 F7
3238 G7
3239 G7
3240 F6
3261 F9
3637 C1
3638 D1
4203 B8
4204 C8
4205 F2
4206 F2
4207 E2
4209 E9
4210 B8
4211 B8
4212 B2
4213 A2
4214 D10

A

B

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D

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Mono Carrier: Synchronisation

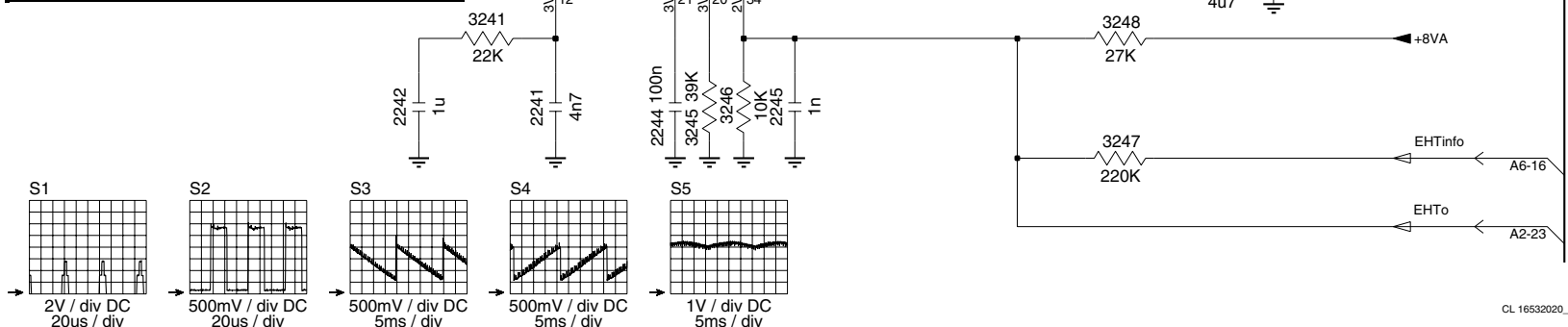
Diversity Table A5

Item	Description	21" Blackline S, 21" Real flat	24" Wide Screen	25" Blackline D & 25" Blackline S, West-Europe	25" Real flat, West Europe	28" Blackline D, West-Europe	29" Super Flat & 29" Real Flat West-Europe	32" Wide Screen, FM-Radio, West-Europe	21" Real flat, East-Europe	25" Blackline D & 25" Blackline S, East-Europe	25" Real flat, East Europe	28" Blackline D, Front I/O, East-Europe	28" Blackline S, East-Europe	28" Wide Screen, East-Europe	29" Real Flat, East-Europe	32" Wide Screen, East-Europe	25" ARISTONA, SBR, RADIOLA	28" Blackline D, Side AV, East-Europe	32" Wide Screen, No-FM-Radio, West-Europe	28" Blackline D, East-Europe	28" Blackline D, Front I/O, West-Europe
1200	FIL 5M5/5M74 TPWA04	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1201	FIL 5M5/5M7/6M5 TPT0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2201	100N 25V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2202	100N 25V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2212	470N 16V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2213	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2214	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2215	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2220	470N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2221	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2230	4U7 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2234	100N 25V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2238	1N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2239	1N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2240	1N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3208	150R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3208	390R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3214	100R 5% 1/6W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3220	100R 5% 1/6W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3223	100R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3229	820R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3230	270R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3231	560R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3233	820R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3236	150K 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3237	1K2 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3238	560R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3239	270R 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3240	100K 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4205	Jumper																				
4206	Jumper																				
4207	Jumper																				
4209	Jumper																				
4210	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4211	Jumper																				
4212	Jumper																				
4213	Jumper																				
4214	Jumper																				
5201	2U2 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5201	4U7 5%	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7200	TDA9555H/N1/3																				
7200	TDA9563H/N1/5																				
7200	TDA9565H/N1/5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7206	BC847C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7209	BFS20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7210	BFS20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9200	Wire																				
9618	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

A6 SYNCHRONISATION

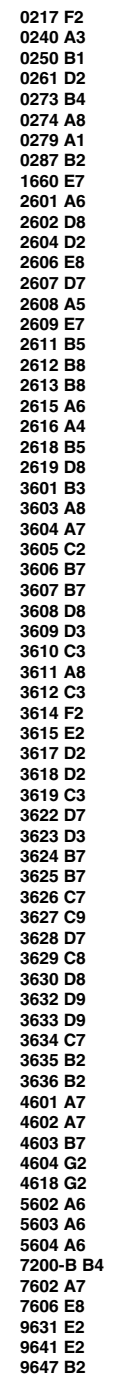
Diversity Table A6

Item	Description	24" Wide screen	25" Blackline S	28" Wide screen	25" Blackline D	21" Blackline	25" Real flat	28" Blackline	29"	21" Real flat	32" Wide screen
3247	680K 5%	X	X	X	X	X	X	X	X	X	X
3247	270K 5%	X	X	X	X	X	X	X	X	X	X
3247	560K 5%	X	X	X	X	X	X	X	X	X	X
3250	1K 5% 1/6W	X	X	X	X	X	X	X	X	X	X
3250	8K2 5% 1/6W			X	X	X	X	X	X	X	X
3254	1M 5%	X	X	X	X	X	X	X	X	X	X



- 2241 E3
- 2242 E2
- 2243 B3
- 2244 E4
- 2245 E4
- 2246 D6
- 2247 B5
- 2248 B5
- 2249 C3
- 2250 C2
- 2252 C6
- 2253 D6
- 2254 B2
- 3241 D3
- 3242 C2
- 3244 C6
- 3245 E4
- 3246 E4
- 3247 E5
- 3248 D5
- 3249 C6
- 3250 D6
- 3251 C5
- 3254 B4
- 3256 B6
- 3257 B3
- 3258 B2
- 3259 B2
- 5241 A6
- 5242 C6
- 7200-D C3

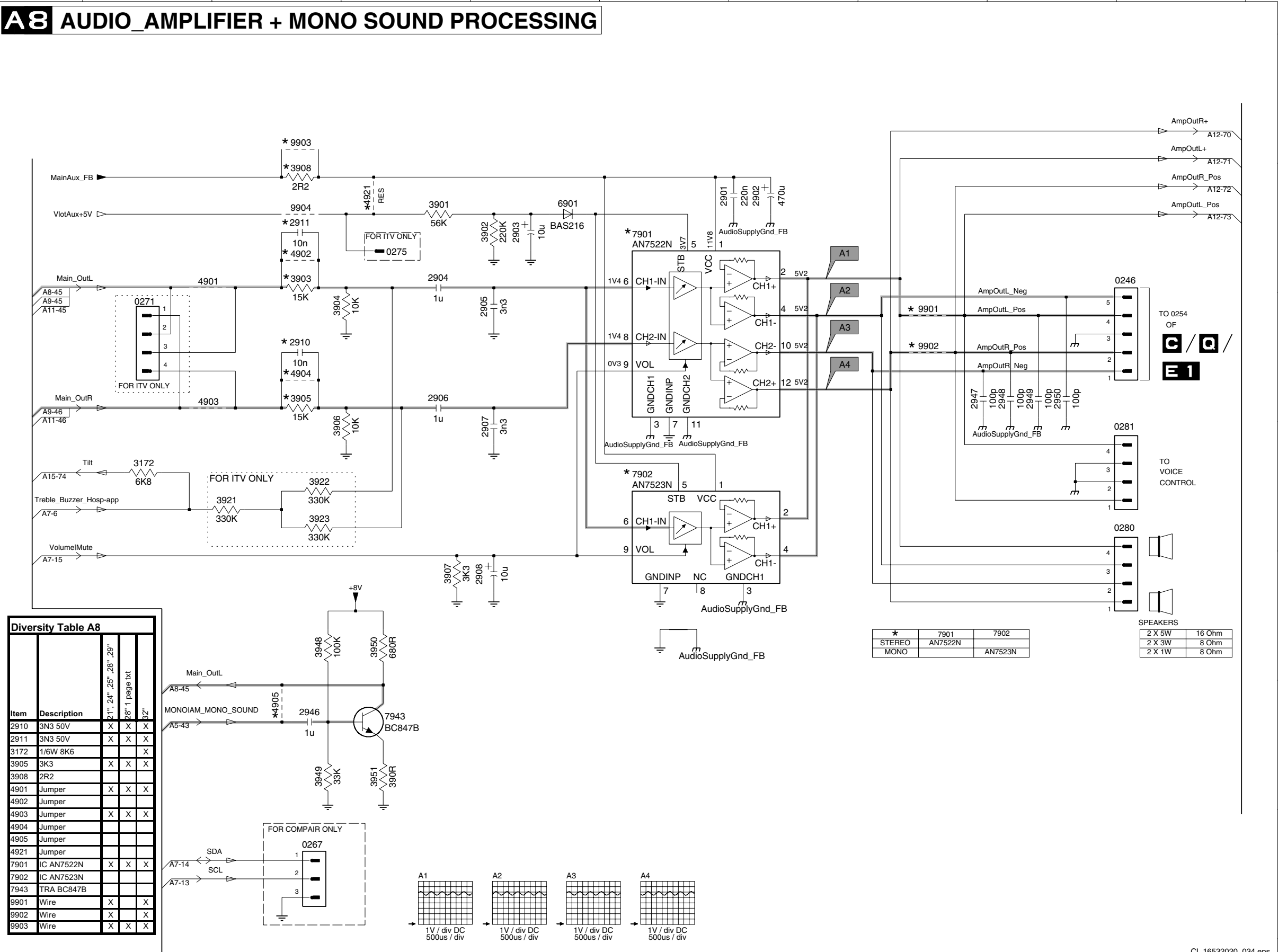
A7 CONTROL



Diversity Table A7								
Item	Description	32" Wide screen, FM Radio	28" Wide screen, FM Radio	29" Real flat	32" Wide screen, No FM Radio	28" Wide screen, No FM Radio	24" Wide screen	21"
		25"	25"	28" Blackline	29" Super flat			
0217	5P male							
0240	4P male							
3601	1/6W 8K2							
3614	4K7	X			X			
3615	10K	X			X			
3617	4K7	X	X		X	X	X	
3619	8K2	X	X		X	X	X	
3633	1R							
4603	Jumper							
4618	Jumper							

Mono Carrier: Audio Amplifier + Mono Sound Processing

A8 AUDIO_AMPLIFIER + MONO SOUND PROCESSING



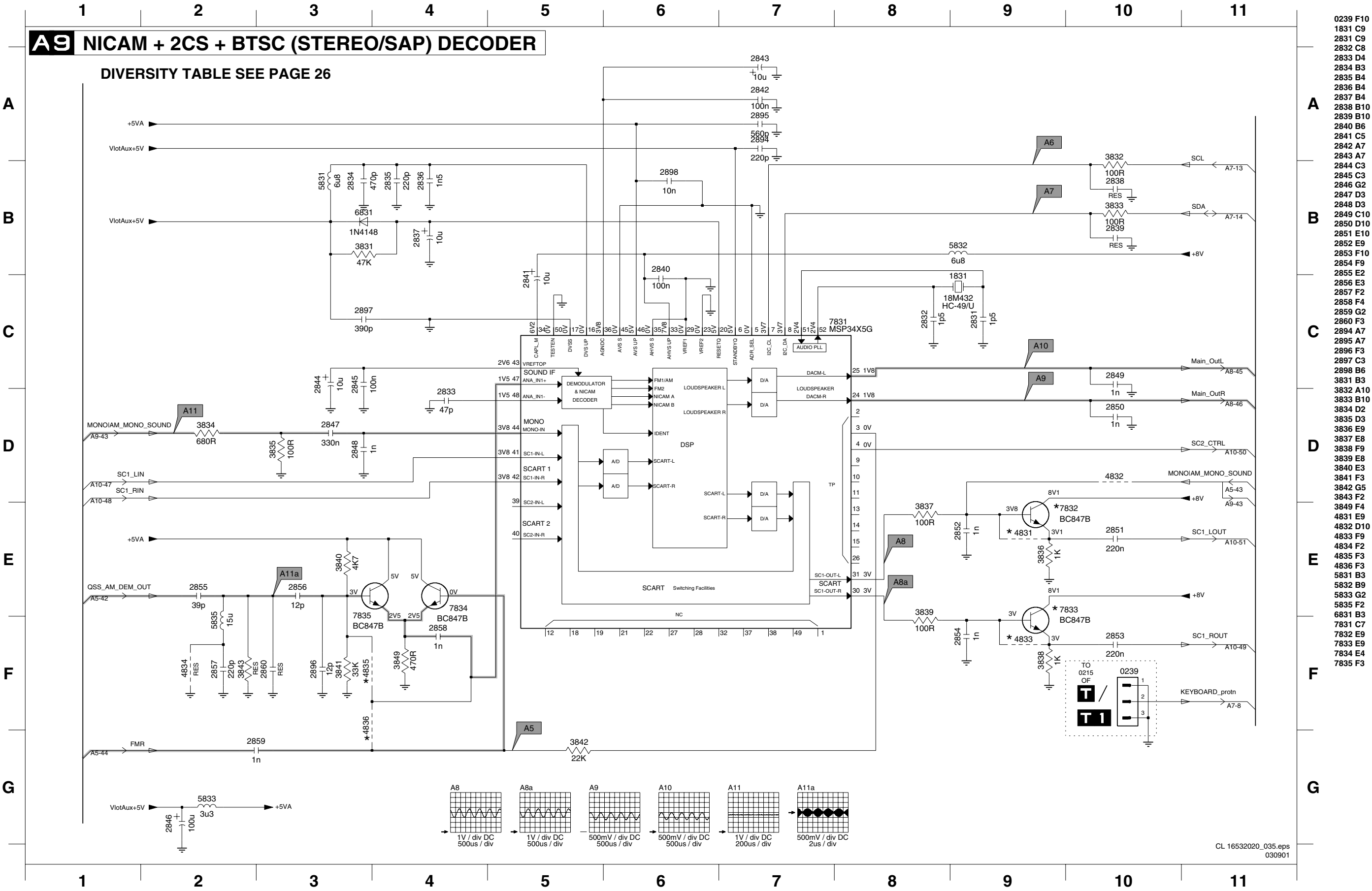
0246 B9
0267 G3
0271 C2
0275 B4
0280 D9
0281 D9
2901 B6
2902 B7
2903 B5
2904 B4
2905 C5
2906 C4
2907 D5
2908 E5
2910 C3
2911 B3
2946 F4
2947 C8
2948 C9
2949 C9
2950 C9
3172 D2
3901 B4
3902 B5
3903 B3
3904 C3
3905 C3
3906 D3
3907 E4
3908 B3
3921 D3
3922 D3
3923 D3
3948 E4
3949 F4
3950 E4
3951 F4
4901 B2
4902 B3
4903 C2
4904 C3
4905 F2
4921 B4
6901 B5
7901 B6
7902 D6
7943 F4
9901 C8
9902 C8
9903 A3
9904 B3

E

F

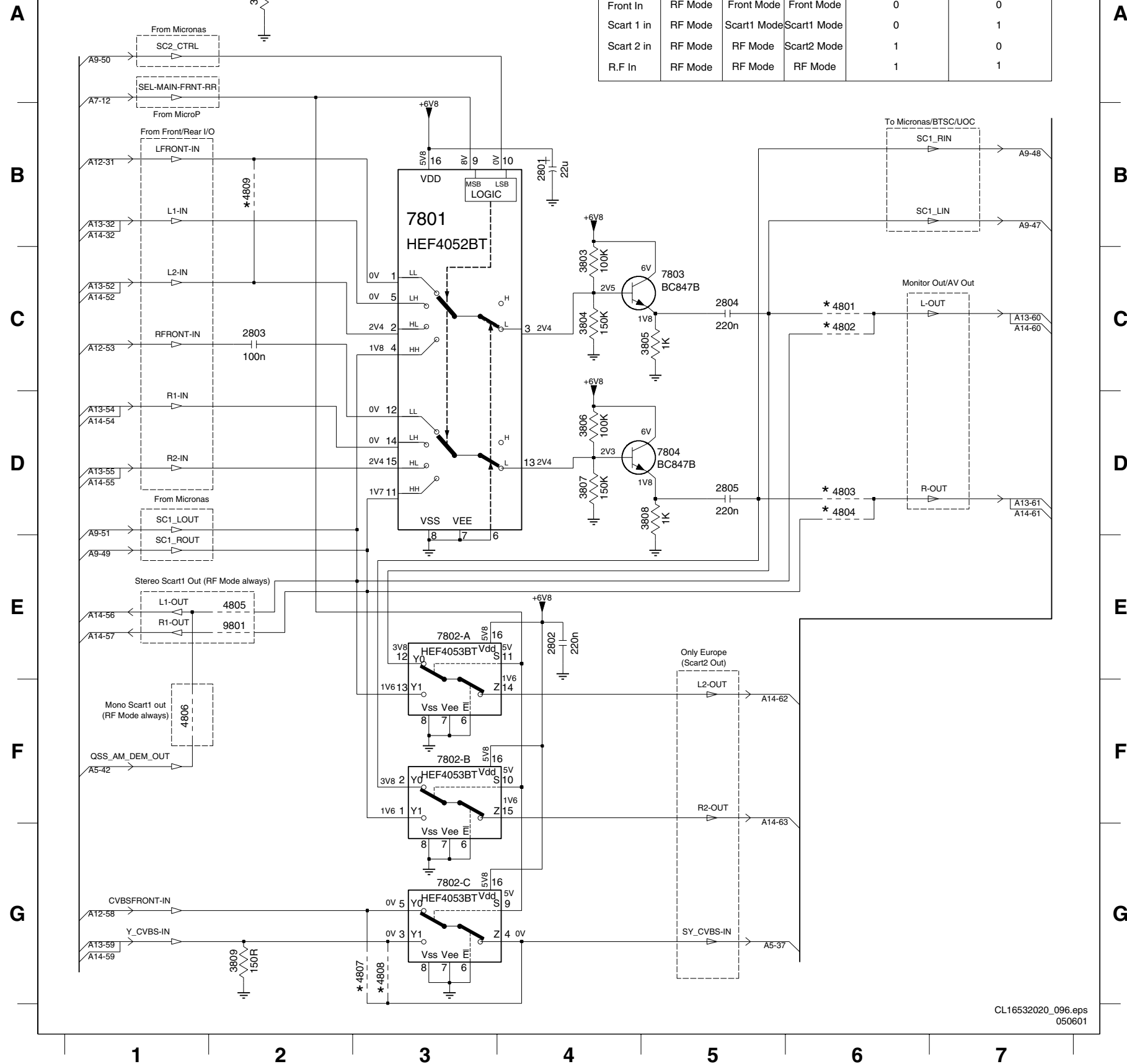
G

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

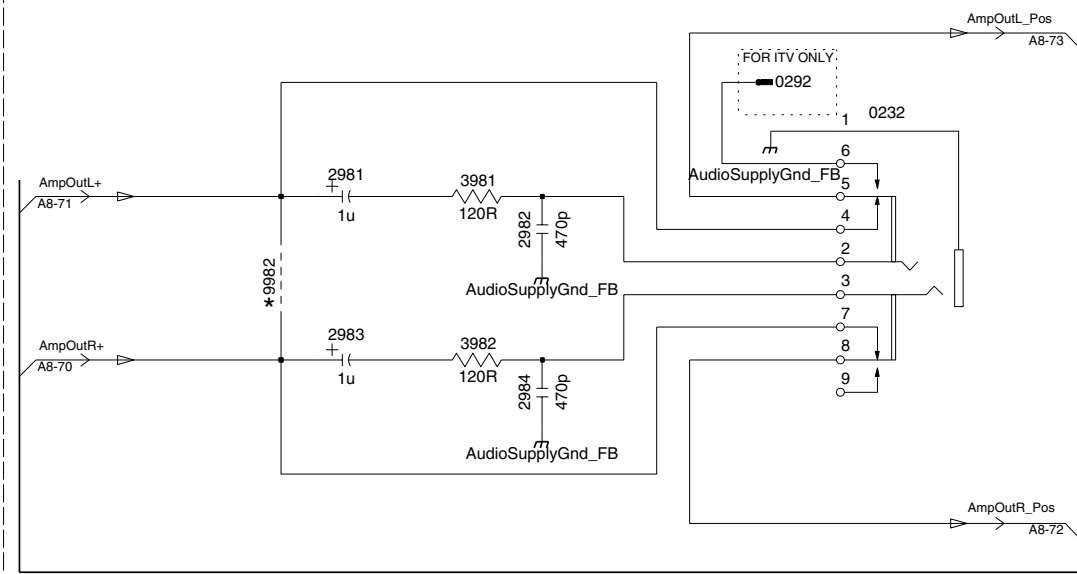
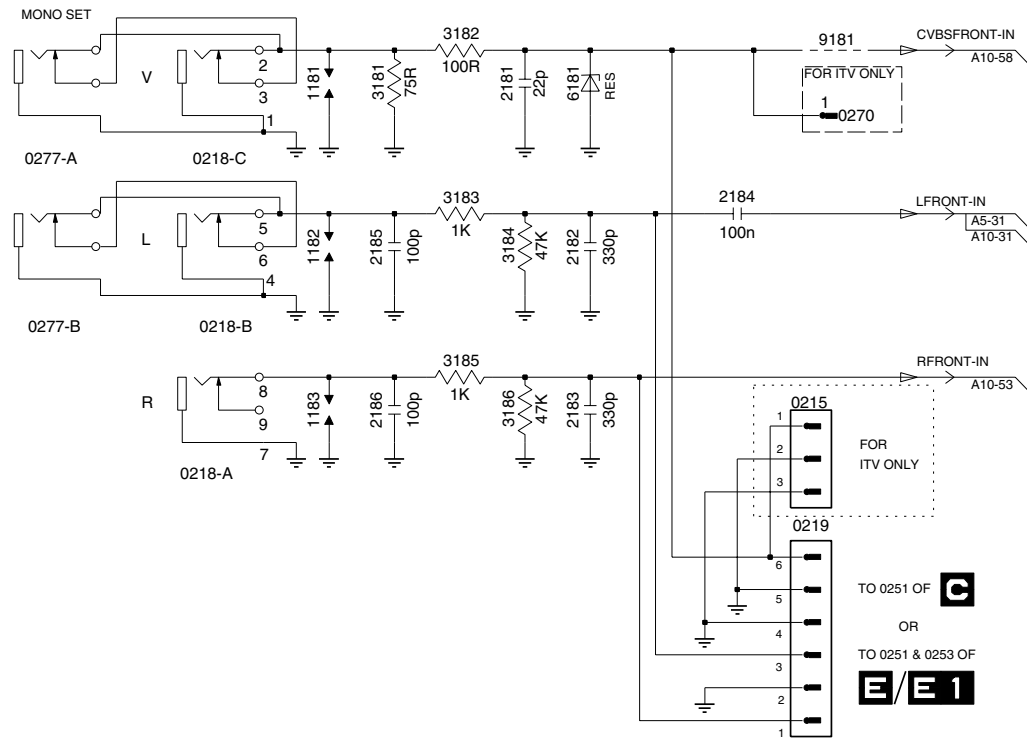


A 1 AUDIO/VIDEO SOURCE SWITCHING

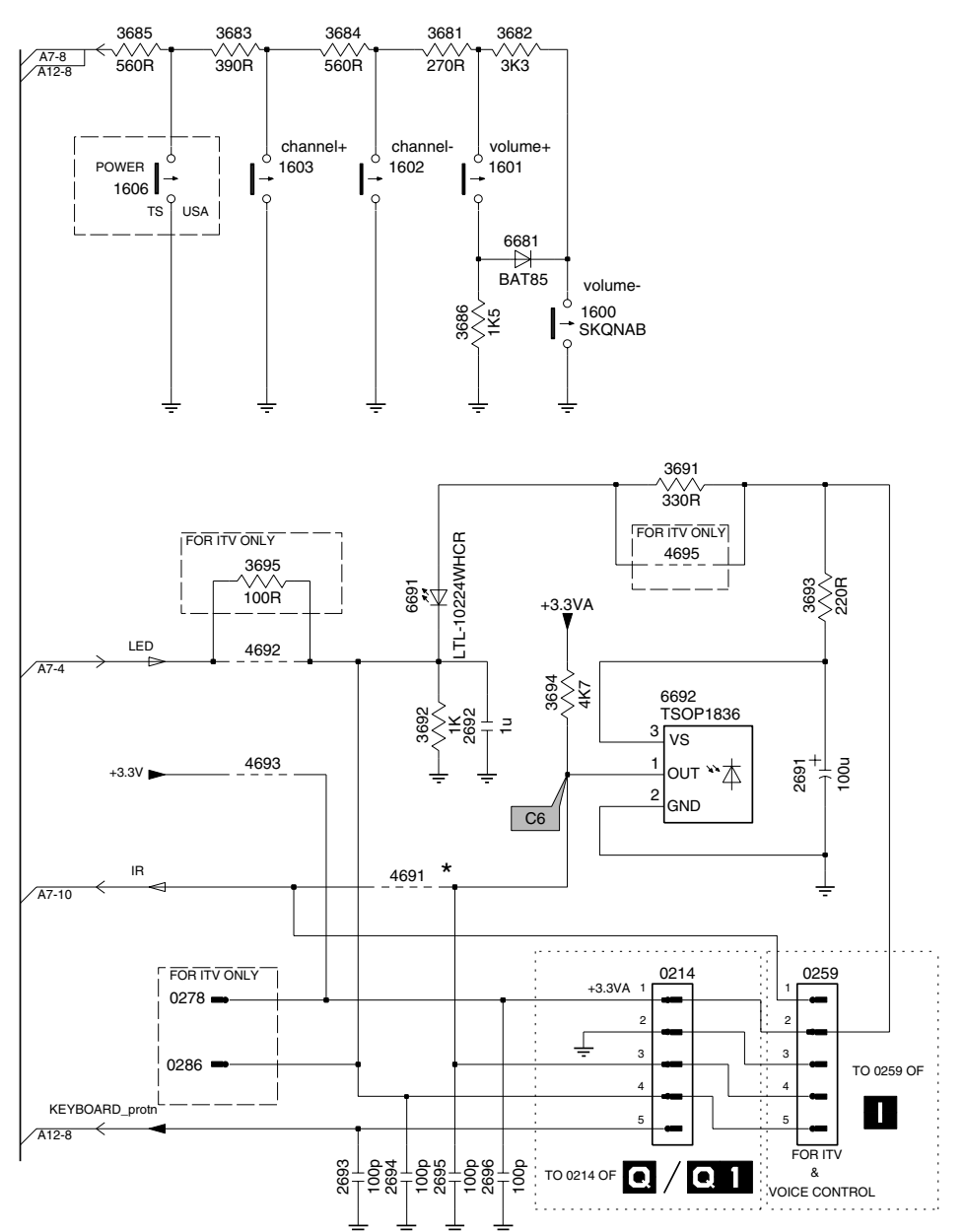
EU	Output			HEF Logic	
	Scart1	Scart2	Monitor	SEL-MAIN-FRNT-RR	SC2_CTRL
Front In	RF Mode	Front Mode	Front Mode	0	0
Scart 1 in	RF Mode	Scart1 Mode	Scart1 Mode	0	1
Scart 2 in	RF Mode	RF Mode	Scart2 Mode	1	0
R.F In	RF Mode	RF Mode	RF Mode	1	1



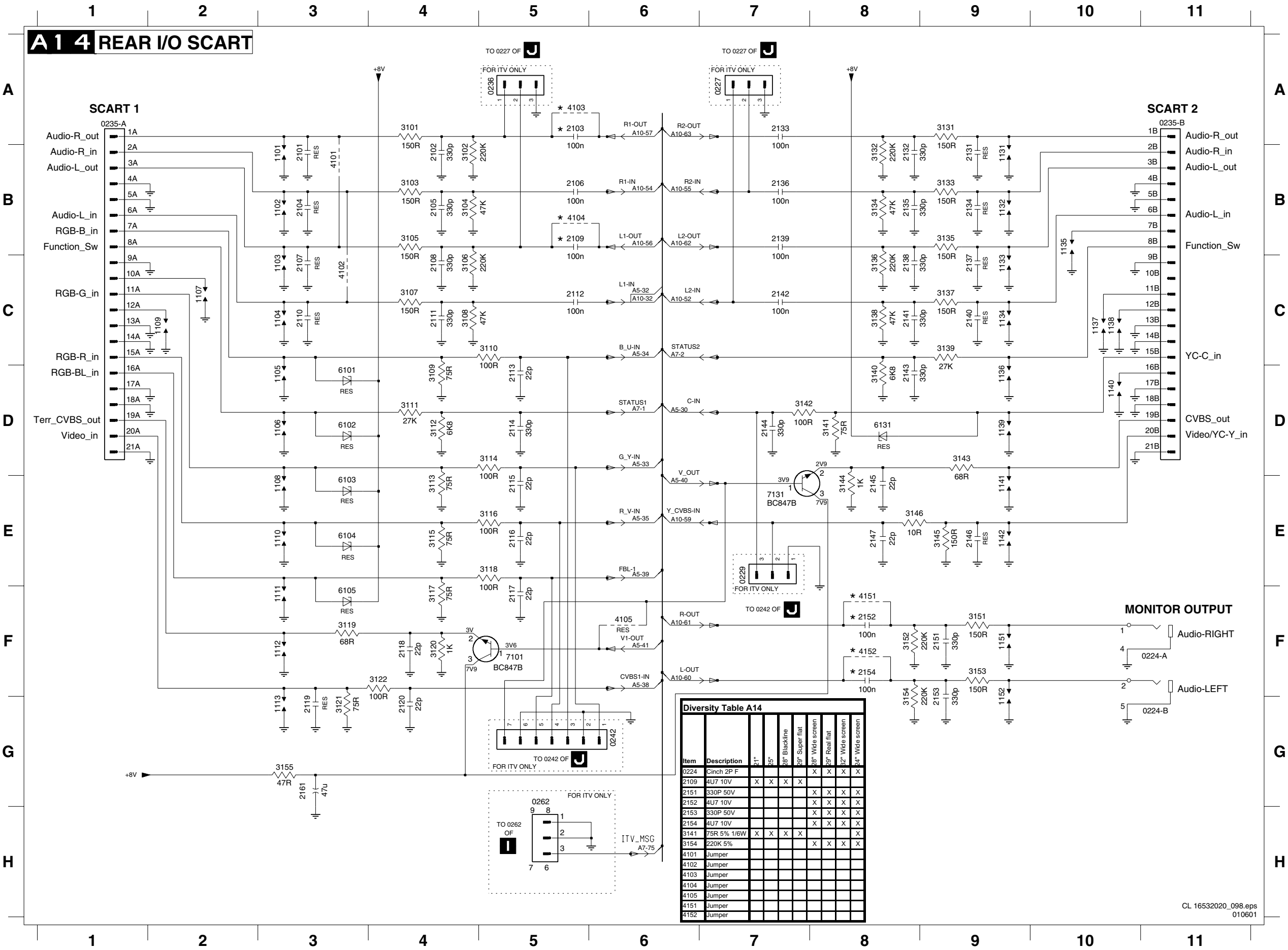
DIVERSITY TABLE SEE PAGE 26



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Mono Carrier: Rear I/O SCART



0224-A F11
0224-B G11
0227 A7
0229 E7
0235-A A1
0235-B A11
0236 A5
0242 G6
0262 G5
1101 B3
1102 B3
1103 C3
1104 C3
1105 D3
1106 D3
1107 C2
1108 E3
1109 C2
1110 E3
1111 F3
1112 F3
1113 G3
1131 B9
1132 B9
1133 C9
1134 C9
1135 B10
1136 D9
1137 C10
1138 C10
1139 D9
1140 D10
1141 E9
1142 E9
1151 F9
1152 F9
2101 B3
2102 B4
2103 A5
2104 B3
2105 B4
2106 B5
2107 C3
2108 C4
2109 B5
2110 C3
2111 C4
2112 C5
2114 D5
2115 E5
2116 E5
2117 F5
2118 F4
2119 G3
2120 G4
2131 B9
2132 B8
2133 A7
2134 B9
2135 B8
2136 B7
2137 C9
2138 C8
2139 B7
2140 C9
2141 C8
2142 C7
2143 D8
2144 D7
2145 E8
2146 E9
2147 E8
2151 F9
2152 F8
2153 F9
2154 F8
2161 G3
3101 A4
3102 B4
3103 B4
3104 B4
3105 B4
3106 C4
3107 C4
3108 C4
3109 D4
3110 C5
3111 D4
3112 D4
3113 E4
3114 D5
3115 E4
3116 E5
3117 F4
3118 E5
3119 F3

0224-A F11
0224-B G11
0227 A7
0229 E7
0235-A A1
0235-B A11
0236 A5
0242 G6
0262 G5
1101 B3
1102 B3
1103 C3
1104 C3
1105 D3
1106 D3
1107 C2
1108 E3
1109 C2
1110 E3
1111 F3
1112 F3
1113 G3
1131 B9
1132 B9
1133 C9
1134 C9
1135 B10
1136 D9
1137 C10
1138 C10
1139 D9
1140 D10
1141 E9
1142 E9
1151 F9
1152 F9
2101 B3
2102 B4
2103 A5
2104 B3
2105 B4
2106 B5
2107 C3
2108 C4
2109 B5
2110 C3
2111 C4
2112 C5
2114 D5
2115 E5
2116 E5
2117 F5
2118 F4
2119 G3
2120 G4
2131 B9
2132 B8
2133 A7
2134 B9
2135 B8
2136 B7
2137 C9
2138 C8
2139 B7
2140 C9
2141 C8
2142 C7
2143 D8
2144 D7
2145 E8
2146 E9
2147 E8
2151 F9
2152 F8
2153 F9
2154 F8
2161 G3
3101 A4
3102 B4
3103 B4
3104 B4
3105 B4
3106 C4
3107 C4
3108 C4
3109 D4
3110 C5
3111 D4
3112 D4
3113 E4
3114 D5
3115 E4
3116 E5
3117 F4
3118 E5
3119 F3

Mono Carrier: Tilt and Rotation

A15 TILT AND ROTATION

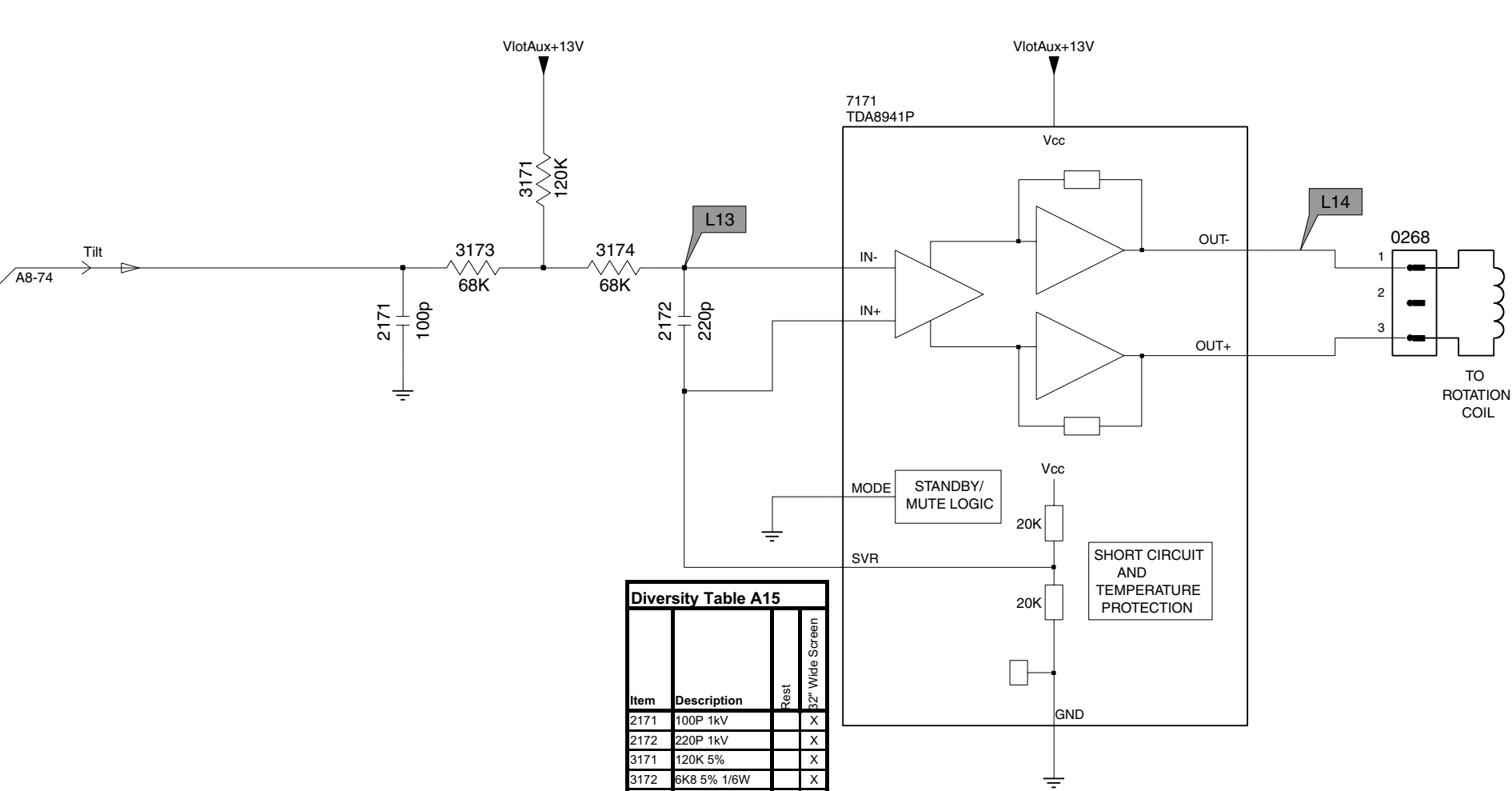
0268 B8
2171 B4
2172 B5
3171 B4
3173 B4
3174 B5
7171 B6

A

B

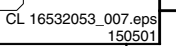
C

D

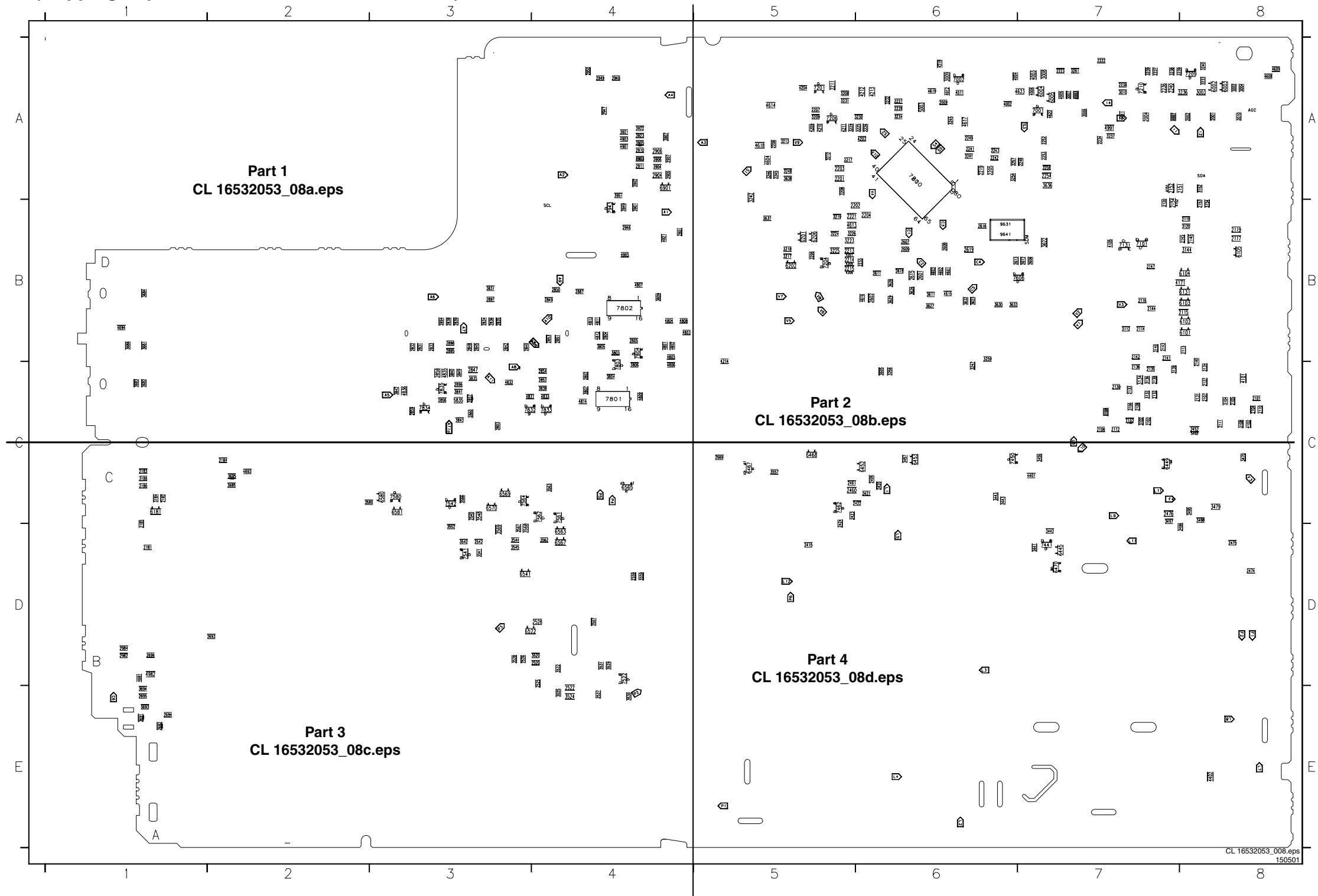


Diversity Table A15			
Item	Description	Rest	32" Wide Screen
2171	100P 1kV		X
2172	220P 1kV		X
3171	120K 5%		X
3172	6K8 5% 1/6W		X
3173	68K 5% 1/6W		X
3174	68K 5% 1/6W		X
7171	BC857B		

A horizontal number line with tick marks at each integer from 1 to 8. The numbers 1, 2, 3, 4, 5, 6, 7, and 8 are written above their respective tick marks.

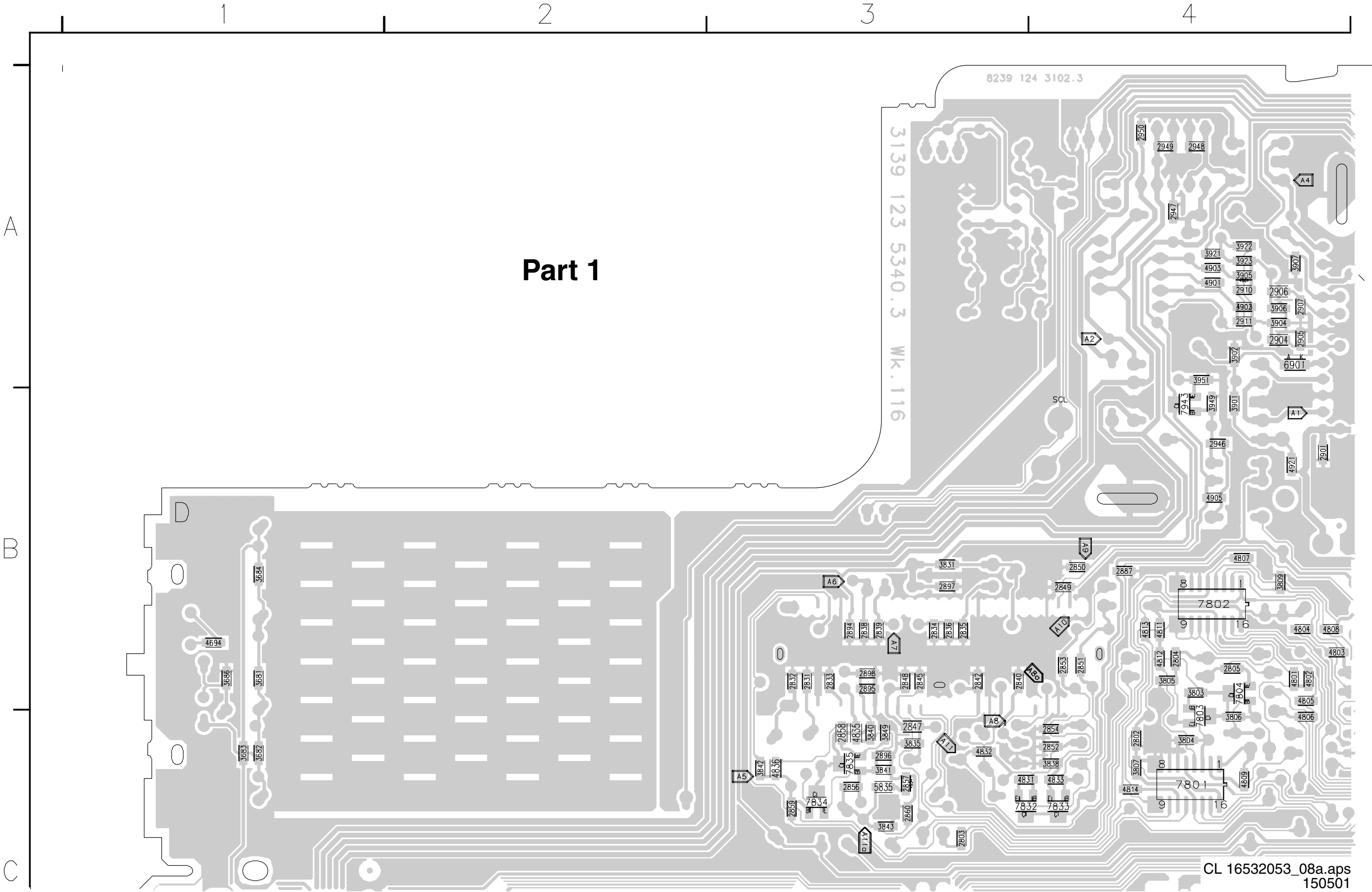


0211	21	02483	47	3458	86	6400	48	9615	07
0212	23	2484	86	3459	86	6401	45	9616	07
0213	43	2485	86	3460	88	6444	87	9617	05
0214	81	2486	88	3463	46	6447	86	9618	07
0215	81	2487	48	3465	88	6448	87	9619	05
0217	85	2488	87	3466	47	6460	46	9620	07
0218	81	2489	87	3467	47	6461	48	9622	08
0219	81	2490	85	3468	85	6462	85	9623	07
0220	81	2491	85	3469	85	6463	85	9624	07
0221	86	2500	42	3471	88	6466	86	9625	07
0222	08	2501	43	3472	08	6476	08	9626	05
0224	08	2502	44	3473	08	6481	07	9627	05
0227	07	2503	44	3474	88	6482	07	9628	07
0229	07	2504	45	3475	88	6483	48	9629	06
0231	42	2505	45	3477	08	6484	47	9630	05
0232	81	2506	83	3478	08	6485	87	9631	06
0235	08	2508	85	3480	88	6486	07	9632	05
0236	07	2509	82	3481	47	6488	48	9633	05
0237	07	2510	82	3482	47	6489	48	9634	05
0240	06	2516	84	3483	06	6500	44	9635	06
0242	07	2521	83	3484	48	6520	84	9636	06
0243	05	2523	44	3485	86	6523	84	9637	07
0246	44	2560	85	3486	86	6524	44	9638	06
0248	85	2561	85	3487	85	6525	44	9639	05
0249	06	2562	84	3488	48	6540	03	9640	07
0250	07	2563	84	3489	06	6560	04	9641	06
0251	83	2564	04	3490	06	6561	04	9642	06
0259	81	2565	85	3493	03	6562	84	9643	05
0260	81	2566	85	3494	03	6563	84	9644	05
0262	07	2567	03	3493	03	6681	01	9645	05
0265	08	2568	03	3494	86	6691	01	9647	07
0266	86	2580	02	3500	42	6692	81	9648	07
0267	44	2581	03	3501	82	6831	03	9650	07
0268	03	2604	06	3503	44	6903	05	9653	05
0270	81	2691	41	3504	03	7000	03	9654	05
0271	44	2801	04	3506	03	7400	46	9655	06
0273	07	2837	04	3507	82	7443	07	9656	07
0274	06	2841	03	3508	06	7444	06	9657	06
0275	06	2842	03	3509	06	7480	46	9658	06
0276	05	2844	03	3510	03	7461	05	9659	06
0277	81	2846	03	3519	84	7463	03	9660	06
0279	06	2855	03	3521	84	7471	08	9661	07
0280	44	2902	04	3523	44	7480	07	9662	07
0281	44	2903	44	3526	44	7482	07	9663	07
0282	85	2908	44	3527	44	7515	83	9664	06
0283	07	2981	81	3532	43	7520	84	9665	06
0285	07	2983	81	3543	03	7521	44	9666	06
0286	02	3000	88	3545	03	7549	02	9668	06
0289	02	3001	85	3550	03	7560			



2001	A6	2606	B7	3254	A6	4214	C5
2002	A6	2607	B7	3256	B8	4218	A5
2003	A7	2611	B6	3259	B6	4220	B5
2004	A7	2612	B6	3259	B7	4402	E5
2007	A7	2611	B6	3259	B6	4601	B6
2009	A6	2612	B7	3261	B7	4602	B6
2010	A6	2612	B7	3261	B7	4603	B6
2011	C6	2615	B5	3442	D7	4604	A5
2102	C7	2616	B6	3443	C6	4608	A8
2103	C7	2616	B6	3443	C6	4609	A8
2104	C6	2619	B6	3457	C6	4613	B5
2105	C8	2692	D1	3470	C8	4614	A5
2106	C7	2693	D2	3470	C8	4615	B6
2107	C7	2693	D2	3470	C8	4616	B6
2108	C7	2695	D1	3496	D8	4617	A6
2109	C7	2696	D1	3497	D7	4618	A5
2110	C7	2696	D1	3497	D7	4619	A5
2111	C8	2803	C3	3520	D4	4622	A7
2112	C8	2804	C3	3522	D4	4623	A7
2113	B8	2805	B4	3524	E6	4691	A1
2114	B8	2805	B4	3524	E6	4692	A1
2115	B8	2833	C3	3528	D3	4693	C2
2116	B7	2833	B3	3529	D4	4694	B1
2117	B7	2833	B3	3529	D4	4695	B1
2118	B8	2835	C3	3531	D4	4901	B4
2119	B8	2838	B3	3541	D3	4902	B4
2120	B7	2838	B3	3542	D3	4803	B4
2121	B7	2838	B3	3542	D3	4804	B4
2132	C7	2842	B3	3548	C3	4805	B4
2133	C7	2842	B3	3548	C3	4806	B4
2134	C7	2842	B3	3548	C3	4807	B4
2135	C7	2847	C3	3557	D5	4908	B4
2136	C7	2848	B3	3559	D5	4909	B4
2137	C7	2848	B3	3559	D5	4909	B4
2138	C7	2848	B3	3559	D5	4909	B4
2139	C7	2848	B3	3559	D5	4909	B4
2140	C8	2852	C4	3563	D3	4814	B4
2141	C8	2852	C4	3563	D3	4814	B4
2142	B7	2854	B4	3569	D3	4832	C3
2143	B7	2856	C3	3580	C6	4833	C4
2144	B7	2856	C3	3580	C6	4833	C4
2145	B6	2856	C3	3611	B6	4835	C4
2146	B8	2859	D3	3622	B7	4836	C3
2147	B7	2860	C3	3623	B6	4901	A4
2148	B7	2860	C3	3623	B6	4901	A4
2152	A7	2884	B3	3627	B6	4903	A4
2153	B6	2898	B3	3628	B6	4904	A4
2154	B6	2898	B3	3628	B6	4904	A4
2181	D1	2897	B3	3630	B6	4921	B4
2182	C1	2898	B3	3632	B6	4982	D1
2183	D1	2900	A4	3633	B5	4991	A7
2184	D1	2900	A4	3633	B5	4991	A7
2185	D1	2905	A4	3637	B5	5450	C8
2186	C1	2906	A4	3638	A5	5835	C3
2187	C1	2906	A4	3638	A5	5835	C3
2202	B5	2910	A4	3682	C1	6003	A8
2203	A5	2911	A4	3683	C1	6004	A7
2204	B5	2946	B4	3983	B1	6005	A7
2205	B5	2946	B4	3983	B1	6005	A7
2206	A5	2948	A4	3986	B1	6102	B8
2207	A5	2948	A4	3986	B1	6103	B8
2208	A5	2948	A4	3986	B1	6103	B8
2211	A5	2982	D1	3693	E1	6105	B8
2213	B5	2984	A4	3694	E1	6131	B8
2214	B5	2984	A4	3694	E1	6131	B8
2215	B5	3000	A4	3803	B4	6201	B5
2217	A5	3004	A8	3804	C4	6202	B5
2218	A6	3008	A7	3805	C6	6206	B5
2219	A6	3008	A7	3805	C6	6206	B5
2222	A7	3017	A7	3807	C4	6449	C7
2223	A9	3017	A7	3807	C4	6452	C8
2224	A7	3017	A7	3807	C4	6452	C8
2226	A6	3011	A7	3835	C3	6467	C5
2227	A6	3012	C7	3838	C4	6468	C5
2228	A6	3104	C8	3842	C4	6470	D7
2229	A6	3104	C8	3842	C4	6470	D7
2232	A7	3118	C7	3842	C3	6541	D3
2236	412	3108	B7	3843	C3	6563	D4
2237	412	3108	B7	3843	C3	6563	D4
2238	412	3108	B7	3843	C3	6567	D4
2239	412	3134	C7	3902	A4	6569	D3
2240	412	3136	C7	3903	A4	6570	D3
2241	412	3136	C7	3903	A4	6570	D3
2242	A6	3140	B7	3905	A4	6581	C3
2243	A6	3144	B8	3906	A4	6901	A4
2244	A6	3144	B8	3906	A4	6901	A4
2246	A7	3154	B8	3921	C1	7002	A6
2249	A6	3184	C1	3922	A4	7101	B7
2252	412	3186	C1	3923	A4	7131	B7
2254	412	3186	C1	3923	A4	7131	B7
2254	A7	3208	A5	3951	A4	7201	A5
2256	C6	3209	A5	3951	A4	7204	B5
2257	C6	3209	A5	3951	A4	7204	B5
2258	C6	3213	A5	4003	A7	7209	A8
2241	C6	3213	A5	4003	A7	7209	A8
2242	C6	3217	A5	4004	A6	7210	A7
2243	C6	3217	A5	4004	A6	7210	A7
2244	C6	3219	B5	4006	A7	7411	D7
2245	C6	3219	B5	4006	A7	7411	D7
2244	D5	3223	B5	4007	A7	7462	C5
2244	C6	3224	B5	4011	E8	7522	D4
2245	C6	3224	B5	4011	E8	7522	D4
2245	C6	3226	B5	4011	E8	7542	C3
2246	C6	3226	B5	4011	E8	7542	C3
2241	D5	3229	A5	4102	C7	7561	C4
2247	D5	3229	A5	4102	C7	7561	C4
2247	D5	3232	A6	4105	B7	7580	C3
2250	D4	3233	A6	4115	A7	7606	B7
2251	D4	3233	A6	4115	A7	7606	B7
2252	D4	3238	A7	4118	B7	7802	B4
2252	D4	3238	A7	4118	B7	7802	B4
2253	D4	3239	A7	4203	B8	7803	C4
2254	D4	3239	A7	4203	B8	7803	C4
2257	E4	3239	A7	4205	B8	7832	C3
2258	D4	3240	A8	4206	B5	7833	C4
2259	D4	3241	A8	4207	B5	7834	C3
2260	D4	3241	A8	4207	B5	7834	C3
2259	D4	3245	A6	4210	A5	7943	B4
2260	D4	3245	A6	4210	A5	7943	B4
2260	B5	3246	A5	4211	A5	7943	B4
2261	B5	3246	A5	4211	A5	7943	B4
2262	B4	3248	A5	4213	A5	7943	B4

Layout Mono Carrier (Part 1 Bottom View)

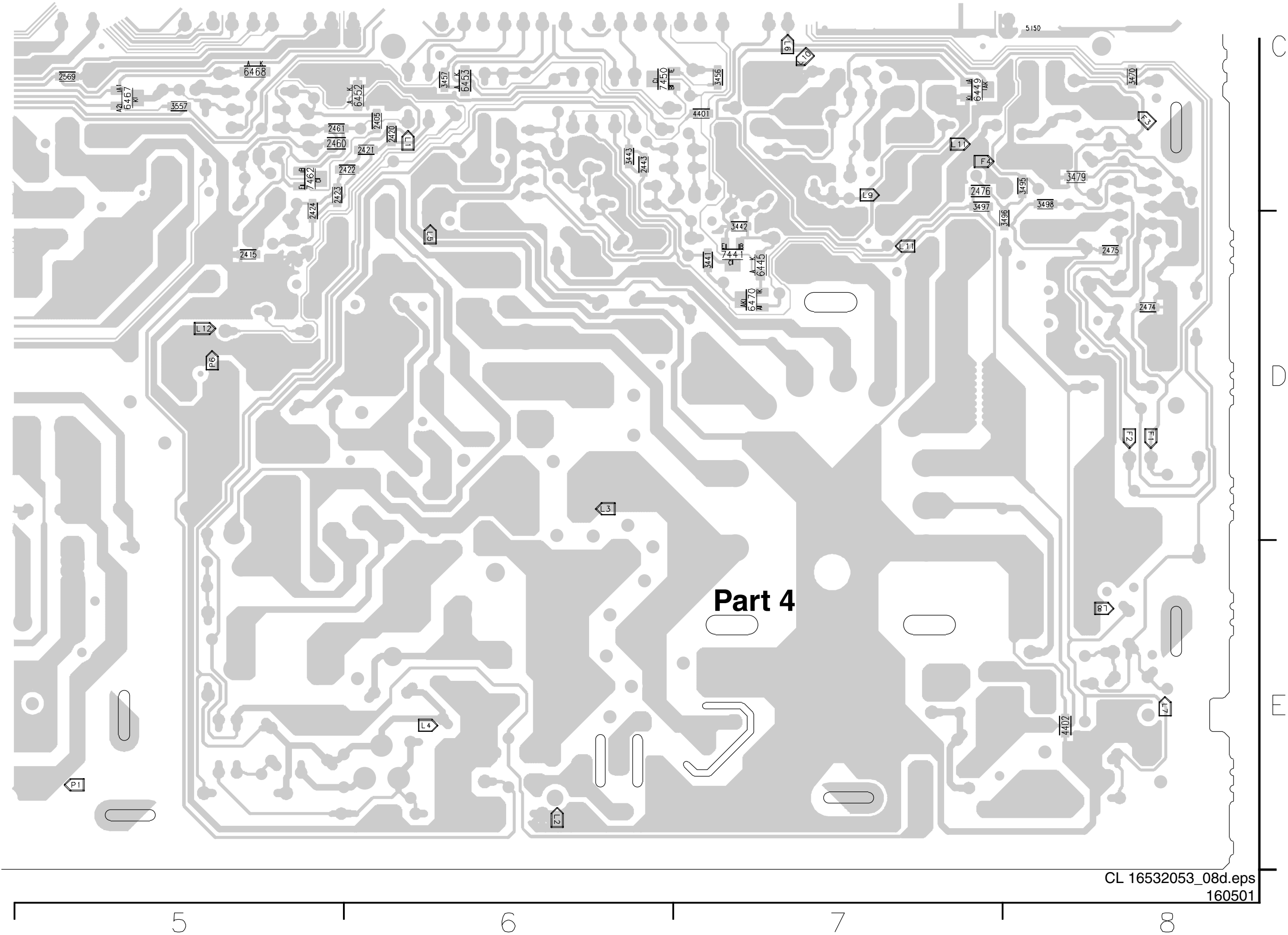


Layout Mono Carrier (Part 2 Bottom View)

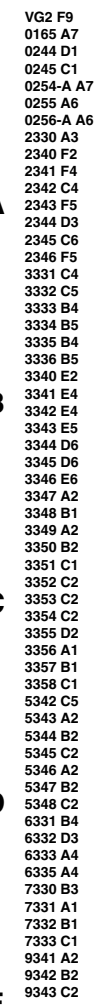


Part 3

Layout Mono Carrier (Part 4 Bottom View)

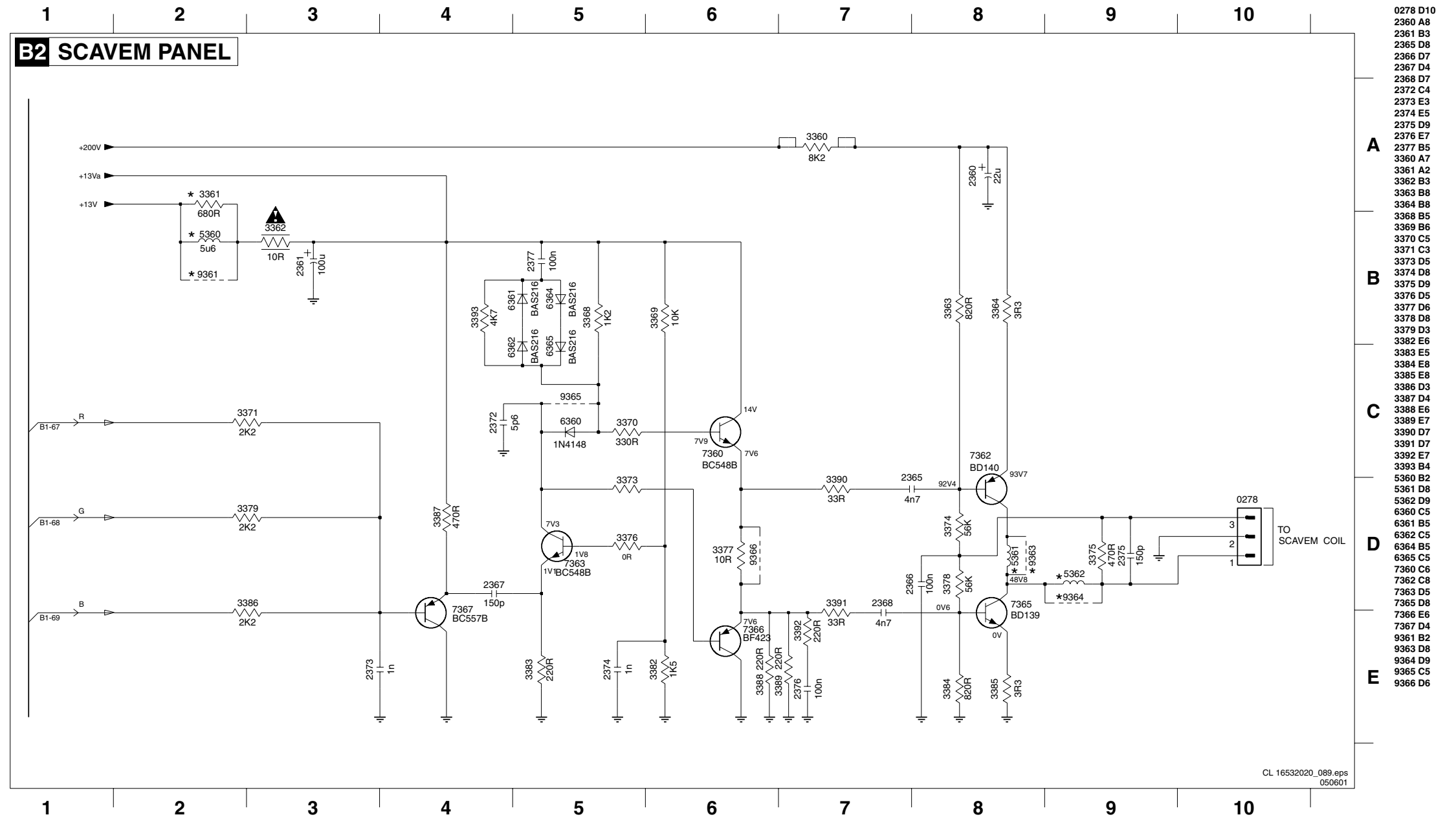


B1 CRT PANEL

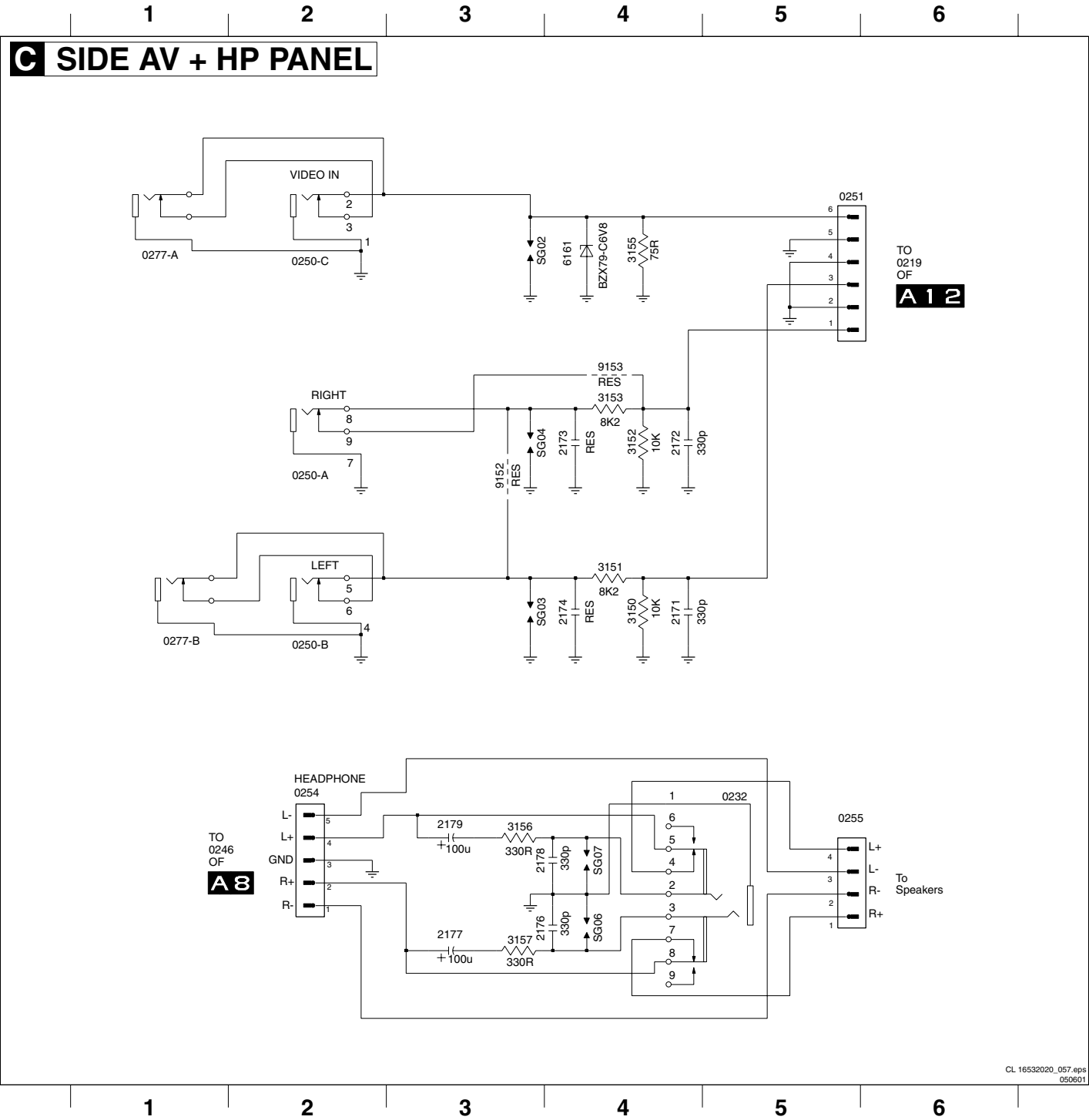


Diversity Table B1															
Item	Description	29" Super flat	21" Real flat	28" Blackline S	25" Real flat	21", 25" Blackline S	28" Wide screen, No FM radio	28" Wide screen, FM radio	28" Blackline D, FM radio	25" Blackline D	28" Blackline D, No FM radio	24" Real flat	32" Wide screen, No FM radio	29" Real flat	32" Wide screen, FM radio
5347	SDL														
5348	SDL														
6332	BAS316	X	X	X	X	X	X		X	X	X	X	X		
7330	TDA6107Q/N2	X	X	X	X	X	X		X	X	X	X	X		
7330	TDA6108JF/N1							X						X	X
7331	BC847B							X						X	X
7332	BC847B							X						X	X
7333	BC847B							X						X	X
9312	Wire							X						X	X
9341	Wire	X	X	X	X	X	X		X	X	X	X	X		
9342	Wire	X	X	X	X	X	X		X	X	X	X	X		
9343	Wire	X	X	X	X	X	X		X	X	X	X	X		

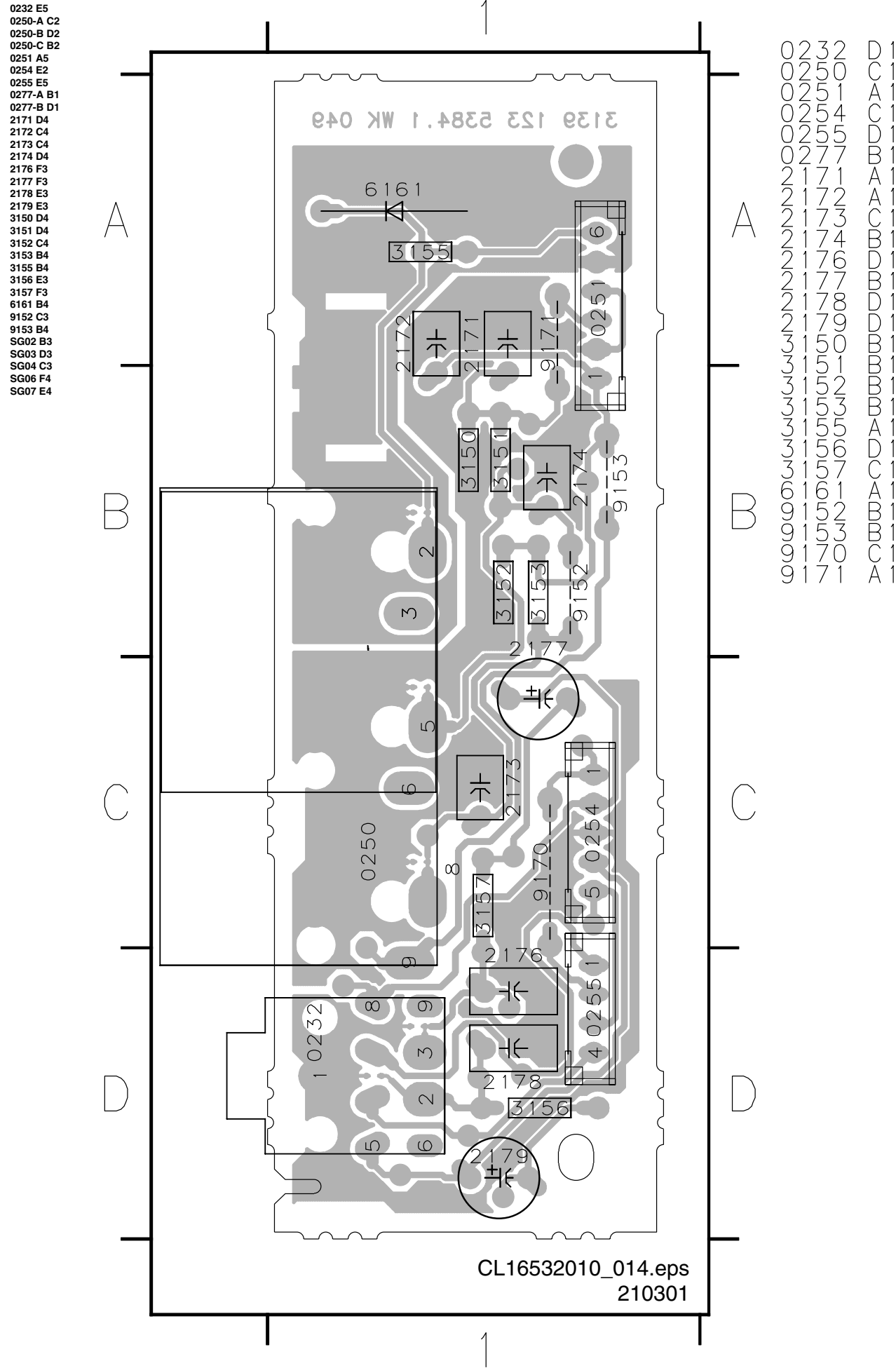
Diversity Table B2														
Item	Description	21" Real flat	25" Real flat	29" Super flat	29" Blackline, FM radio	32" Wide screen, No FM radio	29" Real flat	29" Wide screen, FM radio	32" Wide screen, FM radio	21" Blackline	24" Wide screen	25" Blackline	28" Blackline, No FM radio	28" Wide screen, No FM radio
2365	22N 250V	X	X	X										
2366	100N 100V	X	X	X	X	X	X	X	X					
2367	47P 50V	X	X	X										
2367	56P 50V				X	X								
2367	150P 50V							X						
2367	180P 50V								X	X				
2368	22N 50v	X	X	X	X	X	X	X	X	X				
2372	5P6 50V	X	X	X	X	X								
2373	56P 50V								X	X				
2375	100P 50V	X	X	X	X	X								
2375	330P 50V								X	X				
2376	100N 25V							X	X	X				
2377	100N 25V								X	X				
3360	8K2 5W	X	X	X	X	X	X	X	X	X				
3361	680R													
3362	Fuse 10R	X	X	X	X	X	X	X	X	X				
3363	820R	X	X	X	X	X	X	X	X	X				
3364	1R8							X	X	X				
3364	3R3	X	X	X	X	X								
3368	2K7	X	X	X	X	X	X	X	X	X				
3369	10K	X	X	X	X	X	X	X	X	X				
3370	220R							X	X	X				
3370	330R	X	X	X	X	X								
3371	10K	X	X	X	X	X								
3371	4K7								X	X	X			
3373	220R								X	X	X			
3374	56K	X	X	X	X	X	X	X	X	X				
3375	150R								X	X				
3375	220R							X						
3375	470R	X	X	X	X	X								
3376	Jumper	X	X	X	X	X	X	X	X	X				
3377	10R							X						
3377	4R7								X	X				
3378	56K	X	X	X	X	X	X	X	X	X				
3379	10K	X	X	X	X	X								
3379	4K7							X	X	X				
3382	1K5	X	X	X	X	X	X	X	X	X				
3383	470R	X	X	X	X	X	X	X	X	X				
3384	820R	X	X	X	X	X	X	X	X	X				
3385	1R8							X	X	X				
3385	3R3	X	X	X	X	X								
3386	10K	X	X	X	X	X								
3386	4K7							X	X	X				
3387	470R	X	X	X	X	X	X	X	X	X				
3388	220R	X	X	X	X	X								
3389	220R	X	X	X	X	X								
3390	10R								X	X				
3390	33R	X	X	X	X	X	X							
3391	10R								X	X				
3391	33R													



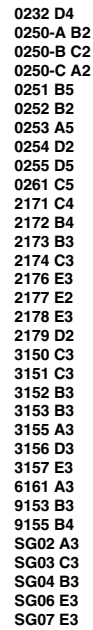
Side AV + HP Panel



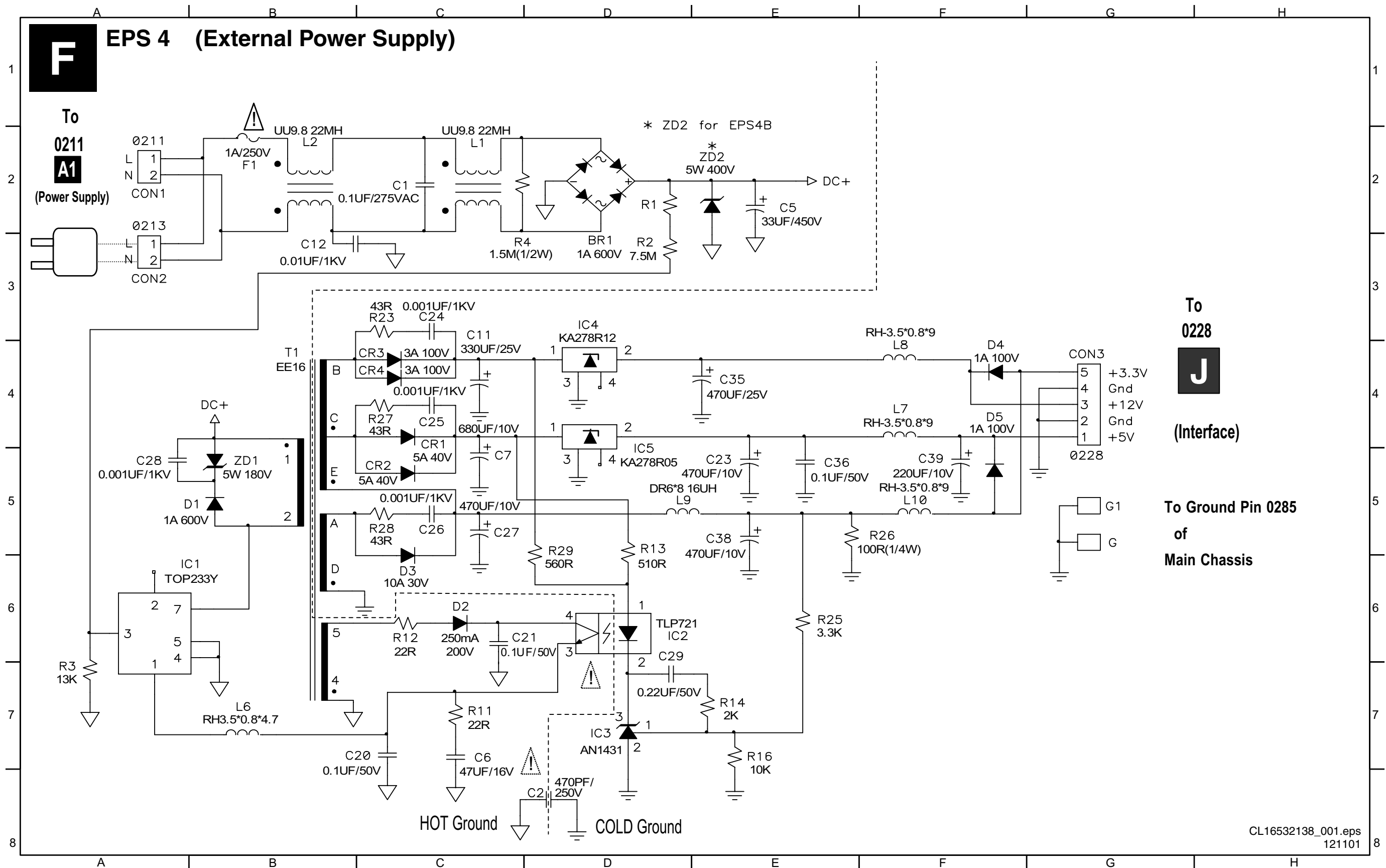
Layout Side AV + HP Panel (Top View)



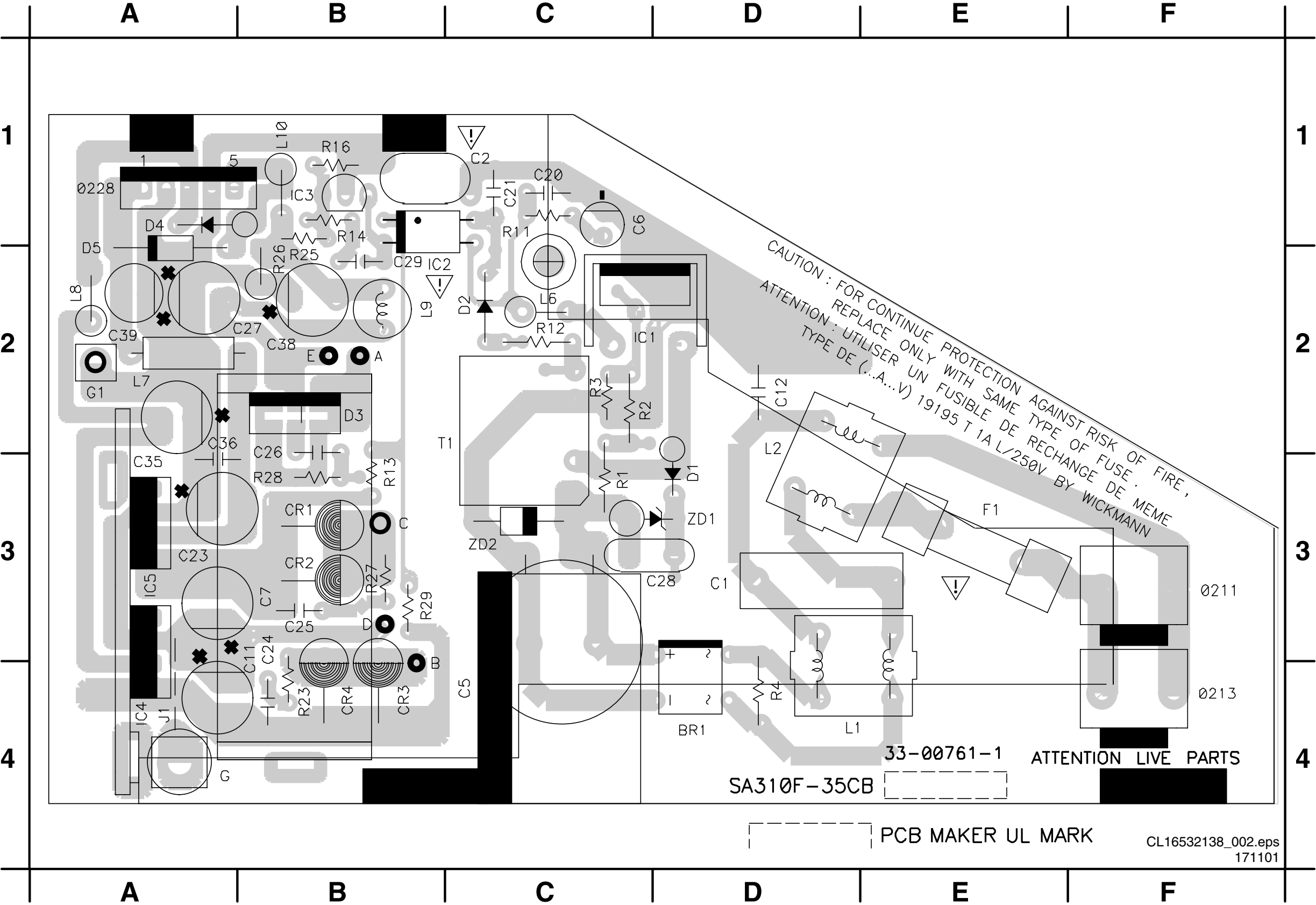
E 1 SIDE AV PANEL AND HEADPHONE

[illegible]

EPS 4 (External Power Supply)

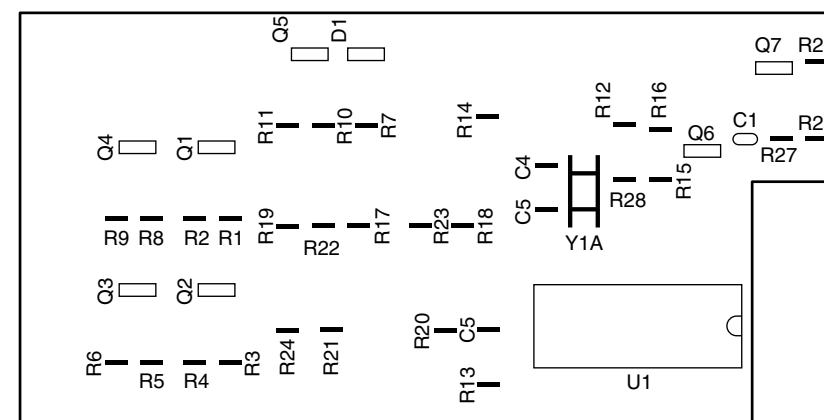
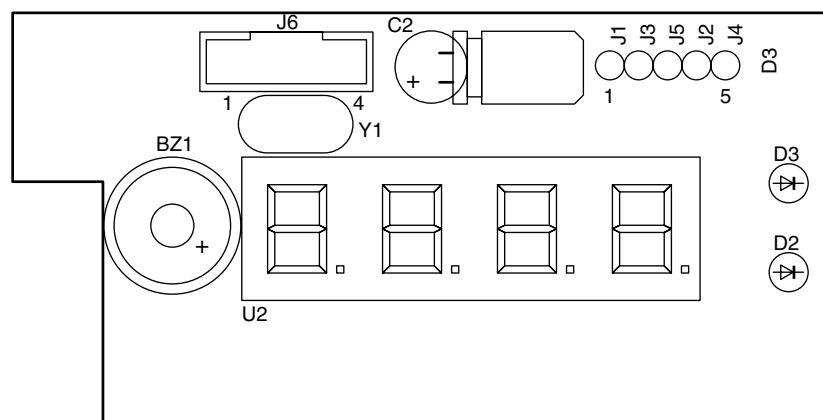
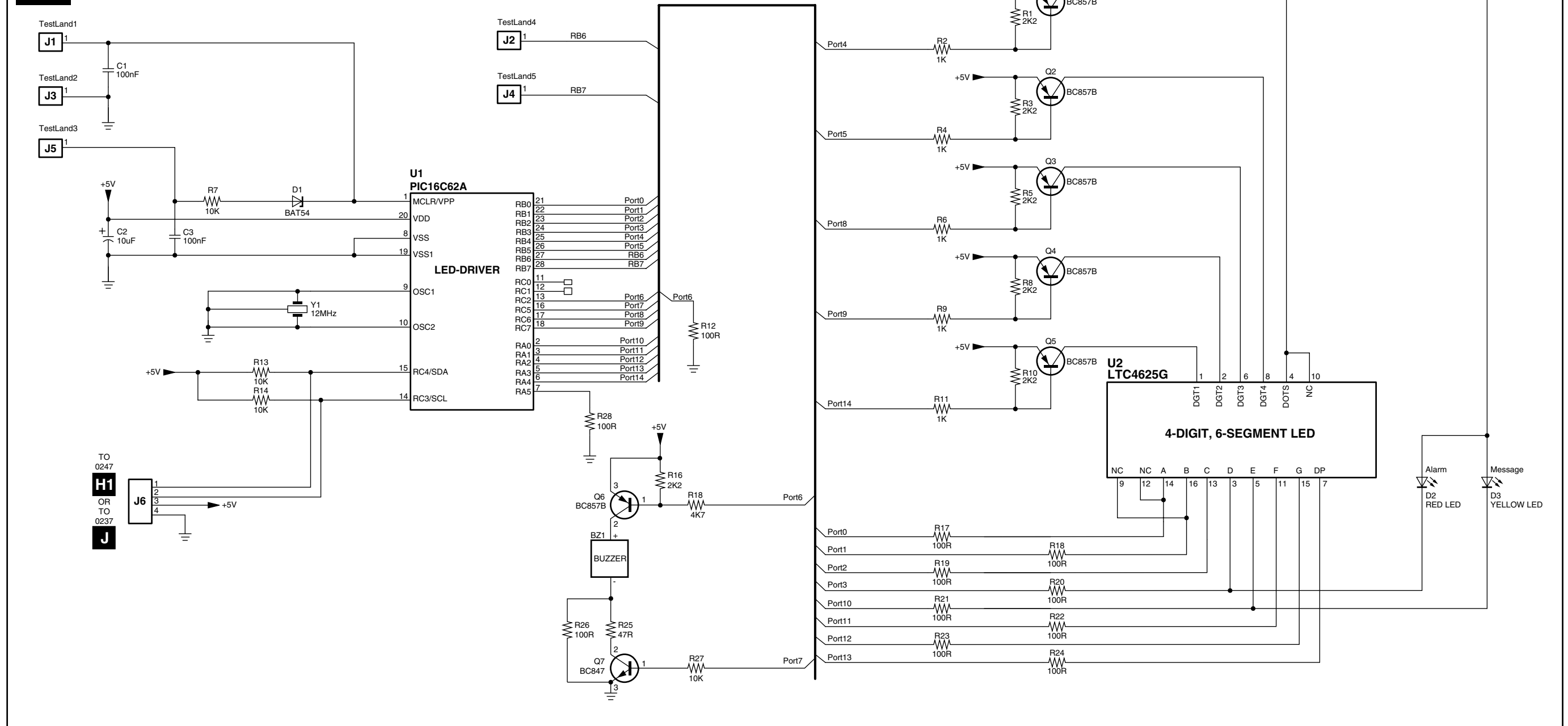


Layout EPS 4 (External Power Supply)

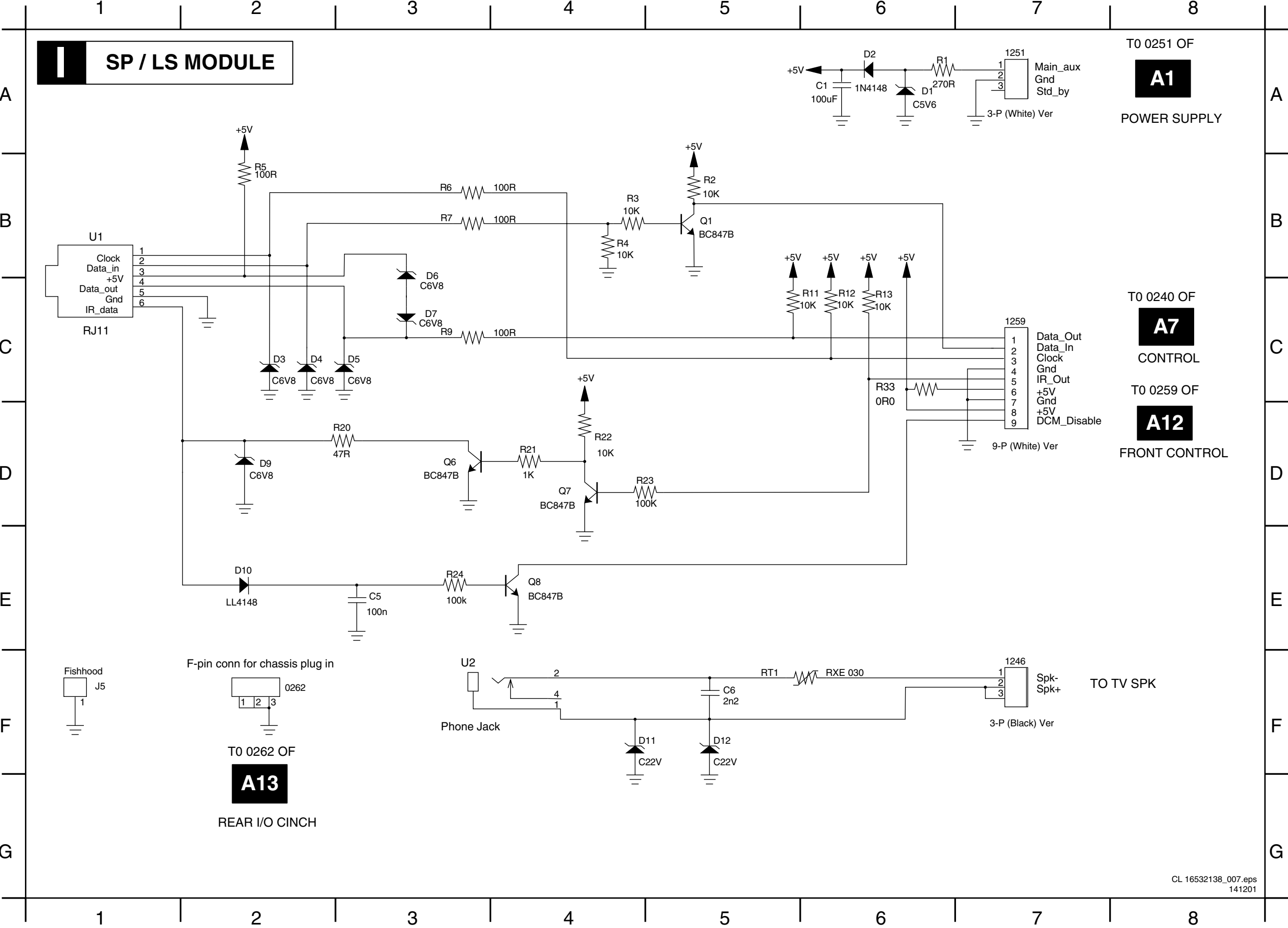


211	F3	R13	B3
213	F4	R14	B1
228	A1	R16	B1
BR1	D4	R23	B4
C1	D3	R25	B2
C2	C1	R26	B2
C5	C4	R27	B3
C6	C1	R28	B3
C7	B3	R29	B3
C11	B3	ZD1	D3
C12	D2	ZD2	C3
C20	C1		
C21	C1		
C23	A3		
C24	B3		
C25	B3		
C26	B2		
C27	B2		
C28	D3		
C29	B2		
C35	A3		
C36	A2		
C38	B2		
C39	A2		
CR1	B3		
CR2	B3		
CR3	B4		
CR4	B4		
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		

G CLOCK DISPLAY

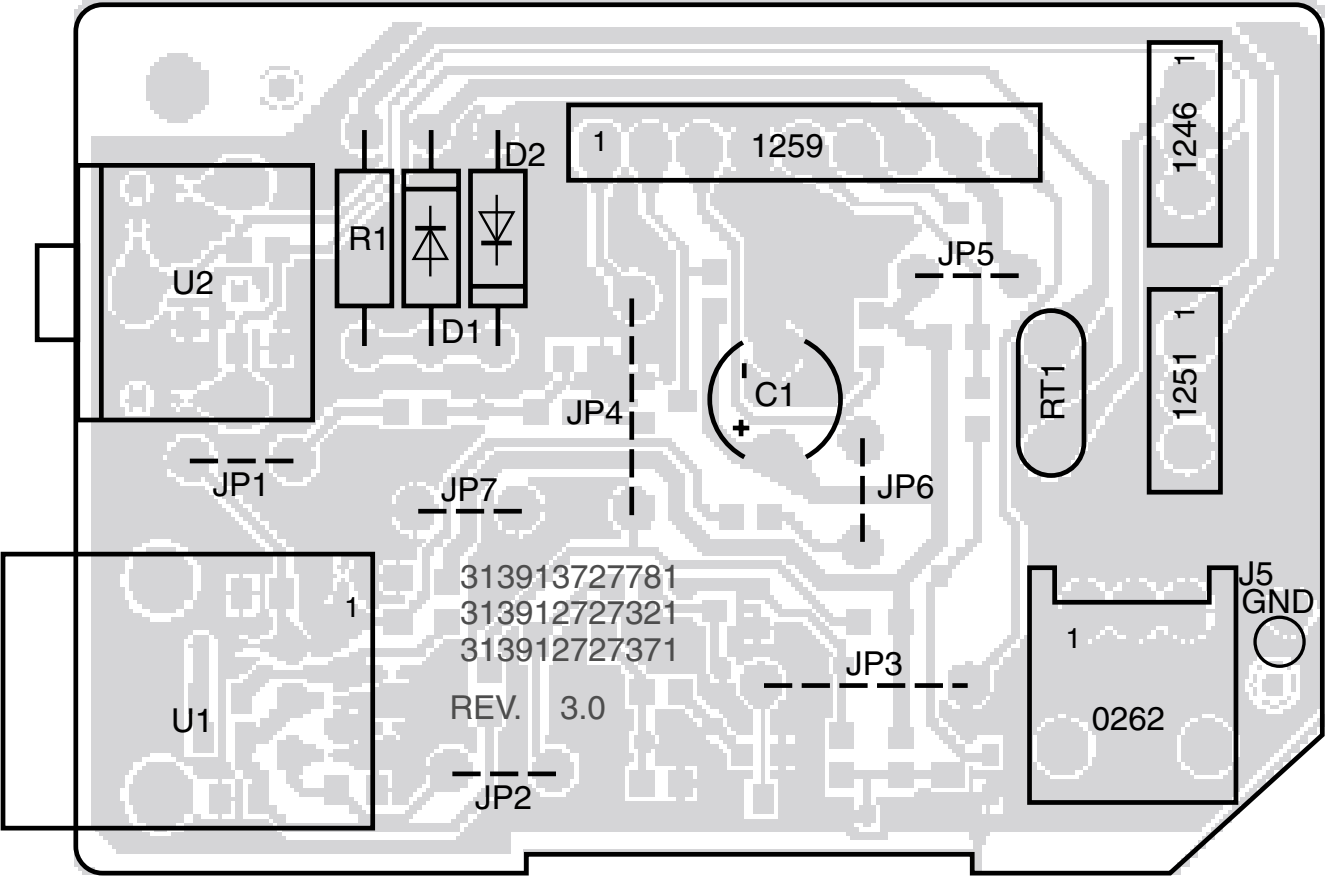


SP/LS Module



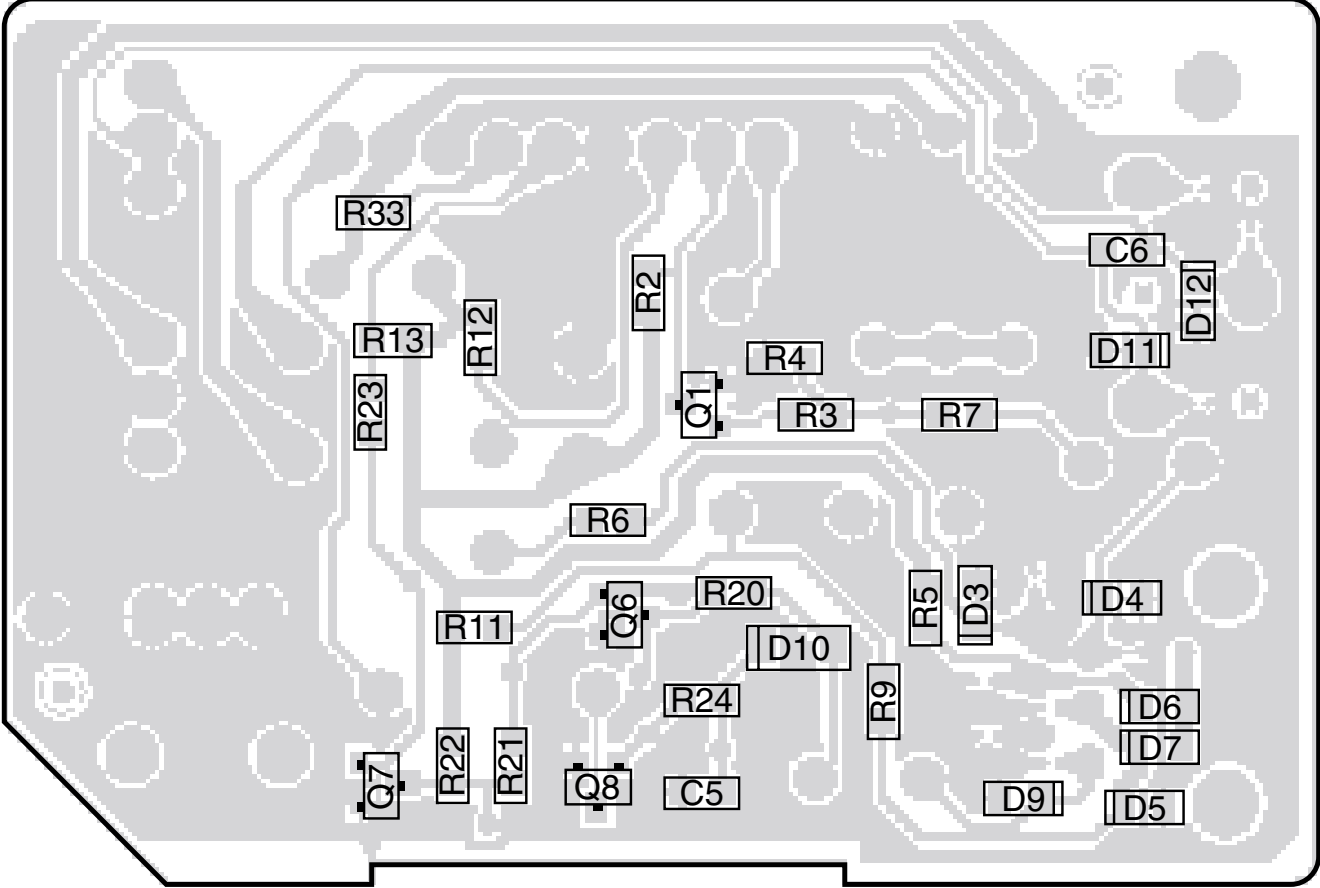
0262	F2
1246	F7
1251	A7
1259	C7
C1	A6
C5	E3
C6	F5
D1	A6
D10	E2
D11	F4
D12	F5
D2	A6
D3	C2
D4	C2
D5	C3
D6	B3
D7	C3
D9	D2
J5	F1
Q1	B5
Q6	D3
Q7	D4
Q8	E4
R11	C5
R12	C6
R13	C6
R2	B5
R20	D3
R21	D4
R22	D4
R23	D5
R24	E3
R3	B4
R33	C6
R4	B4
R5	B5
R6	B2
R7	B3
R9	C3
RT1	F6
U1	B1
U2	F3

Layout SP/LS Module (Top View)



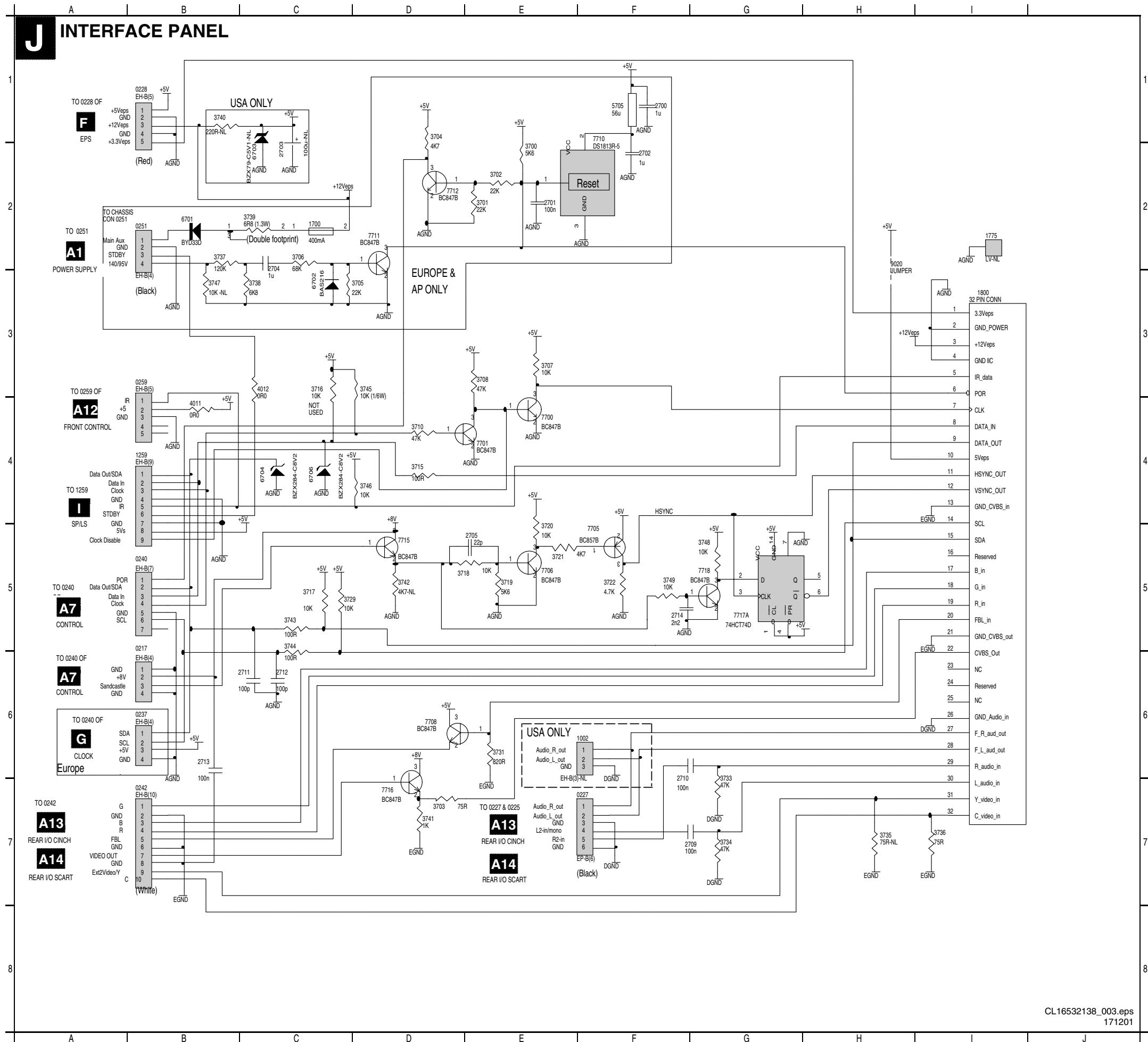
CL 16532138_008.eps
201101

Layout SP/LS Module (Bottom View)

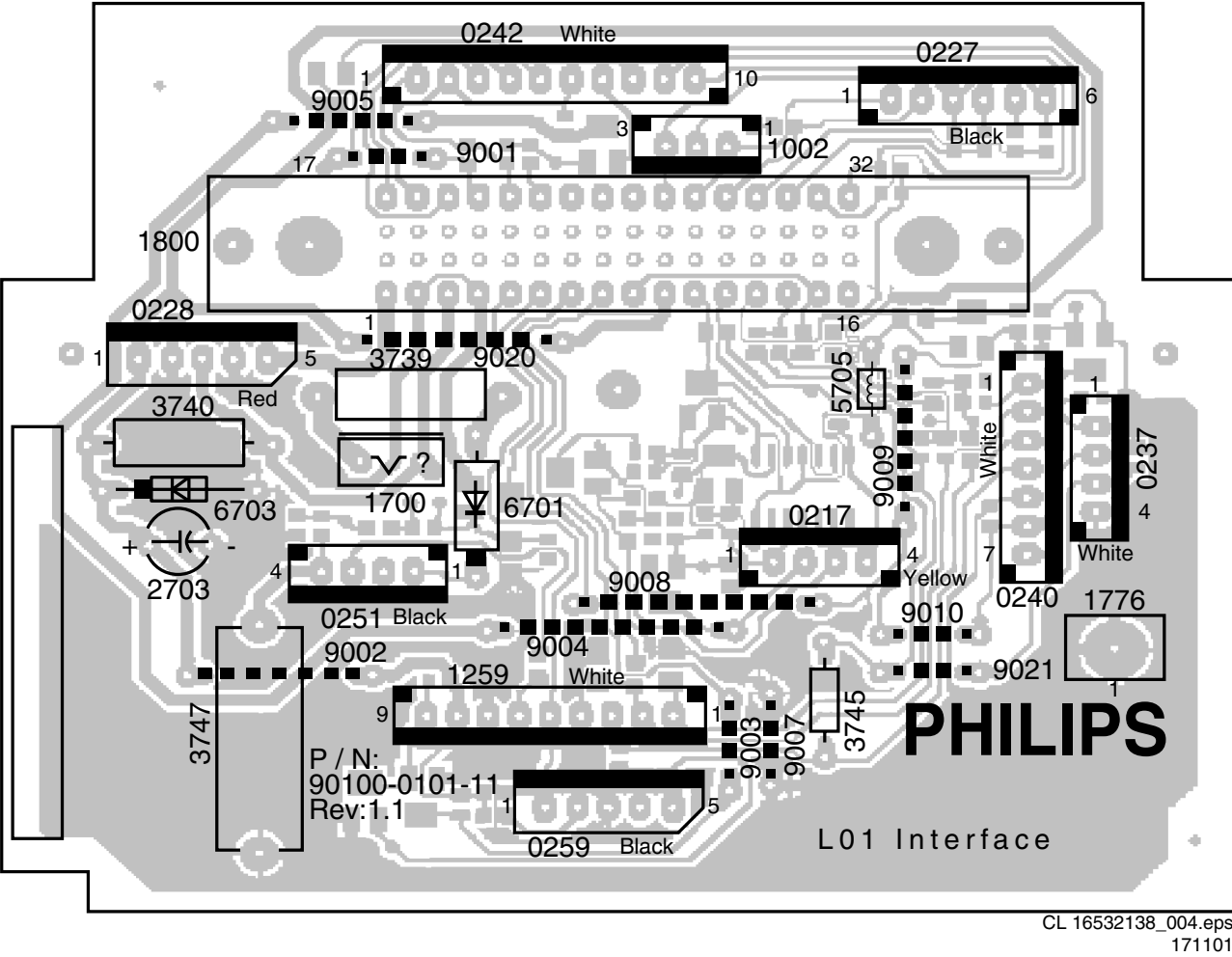


CL 16532138_009.eps
201101

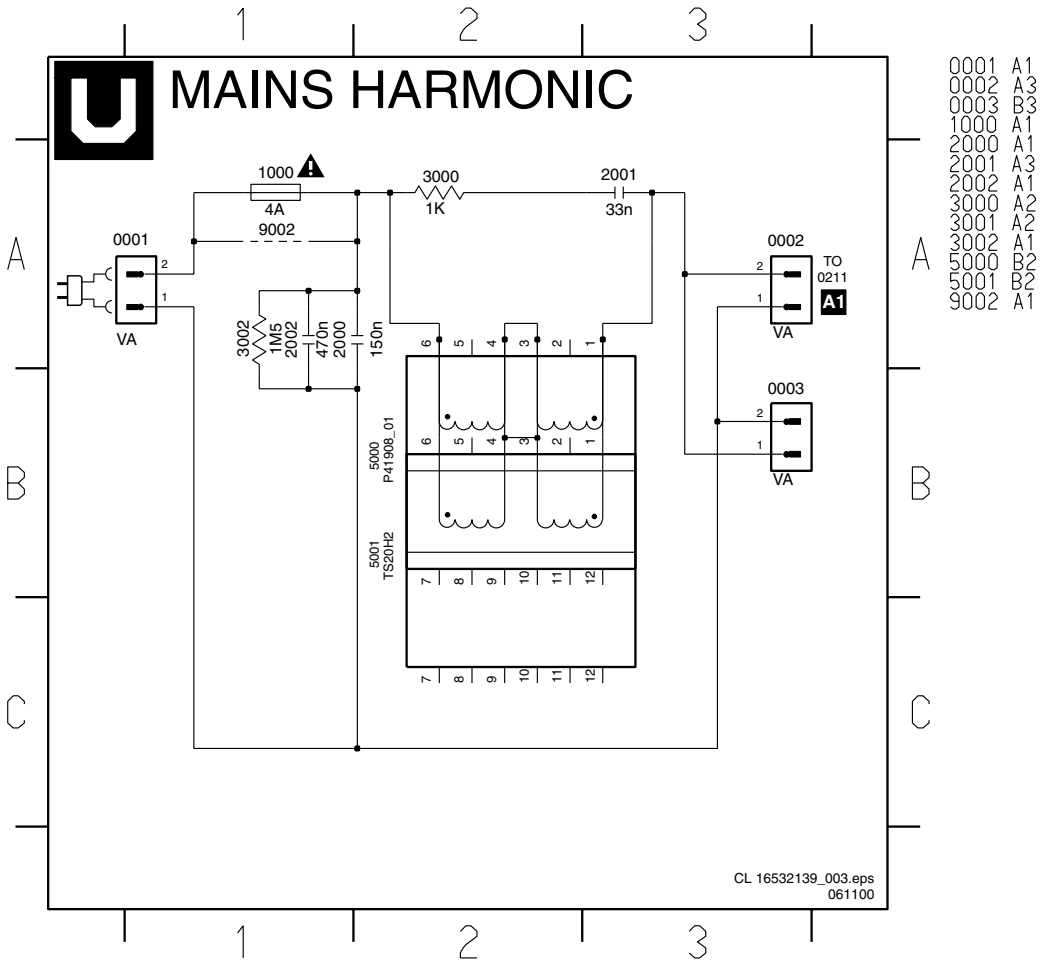
Interface Panel



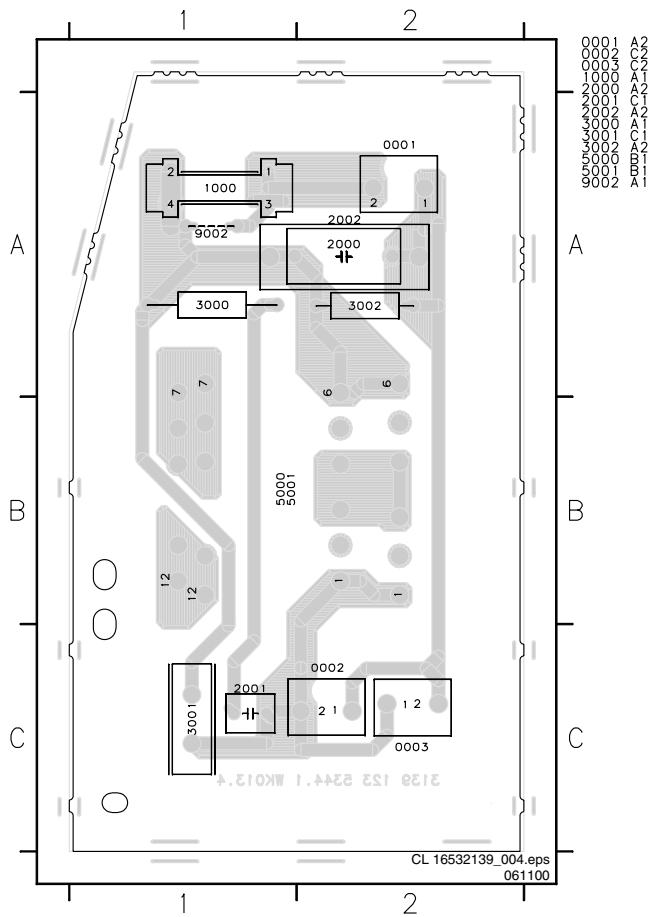
Layout Interface Panel



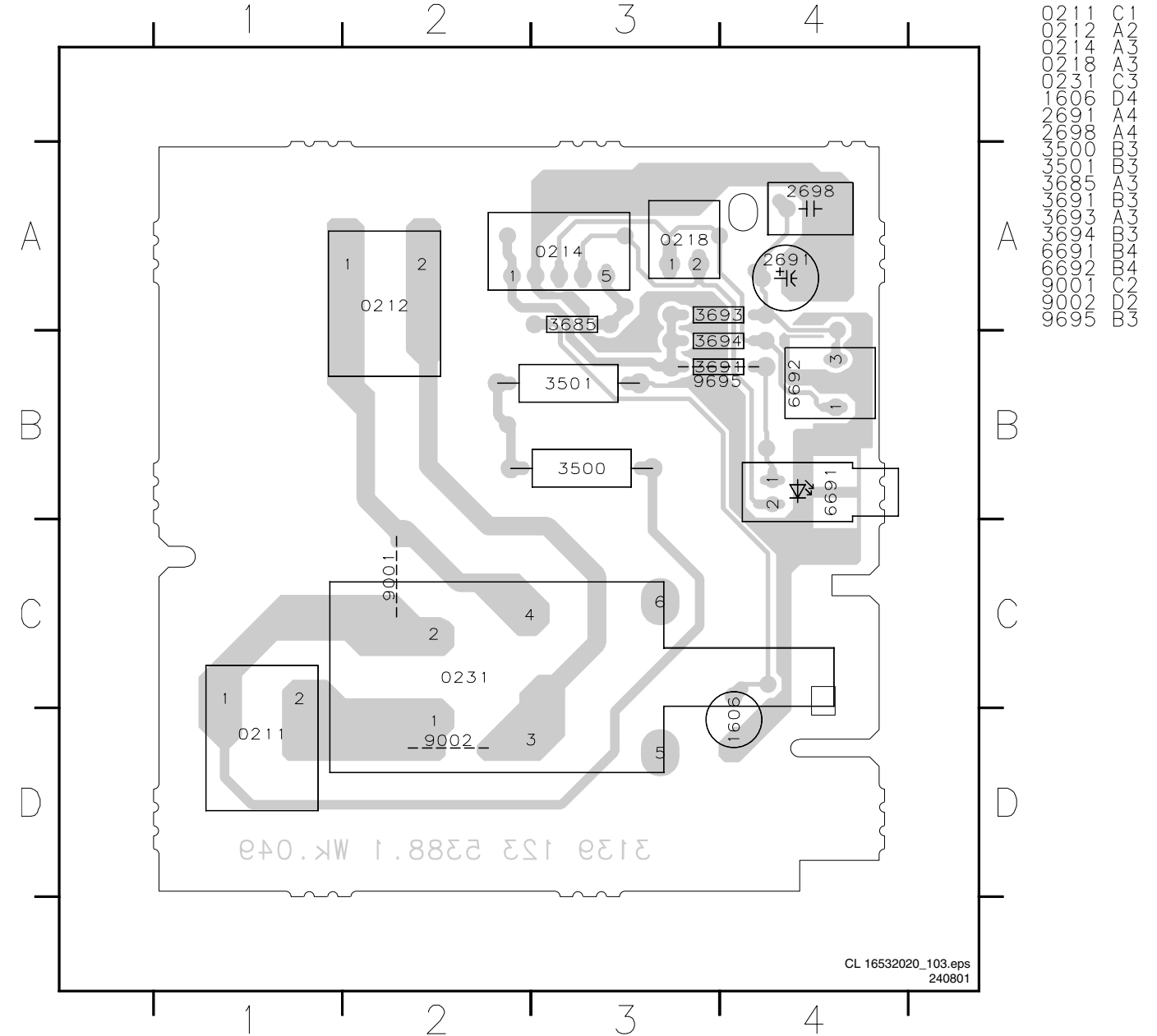
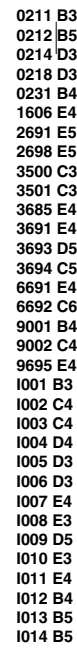
Mains Harmonic Panel



Layout Mains Harmonic Panel



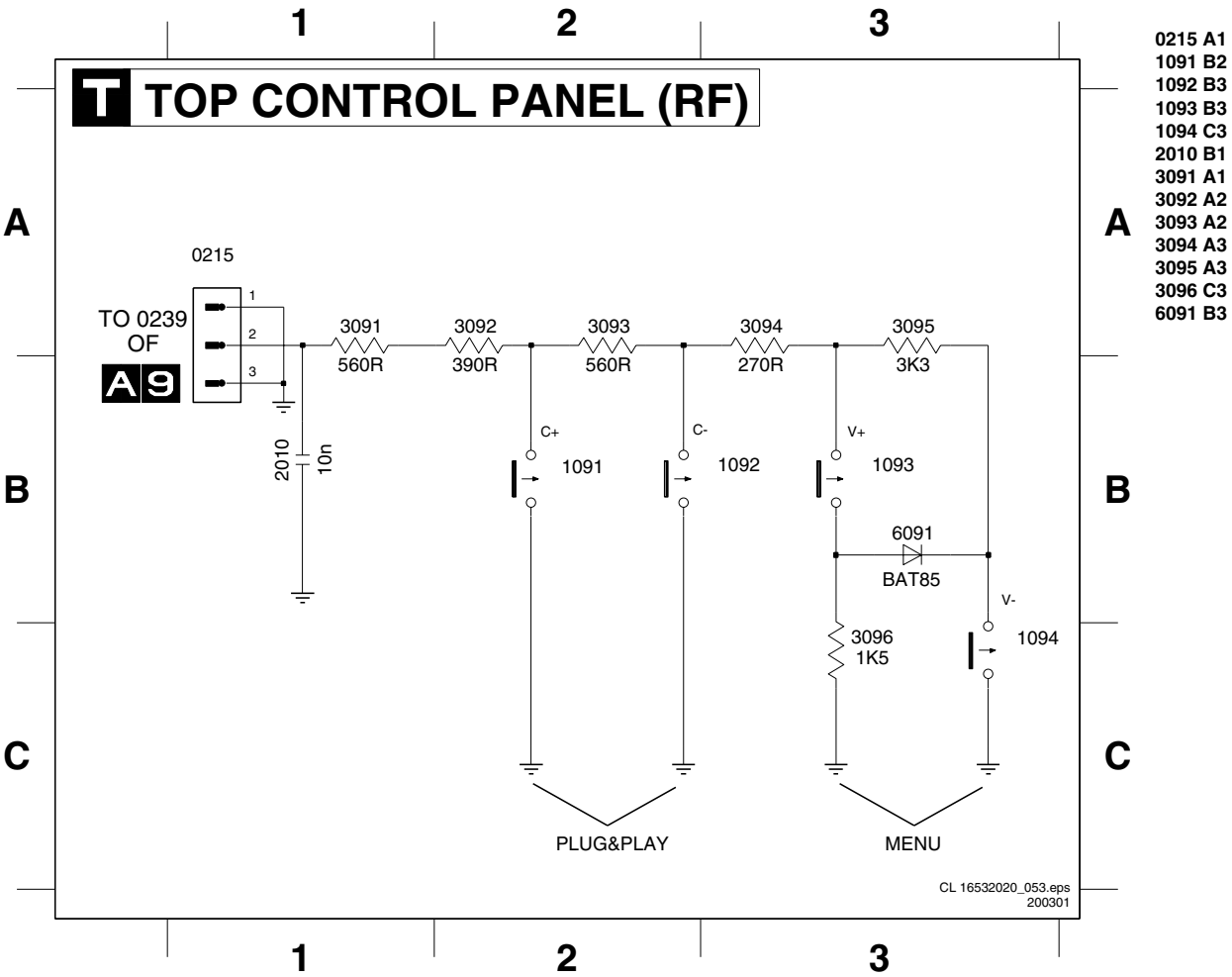
Layout Front Interface Panel (Top View)



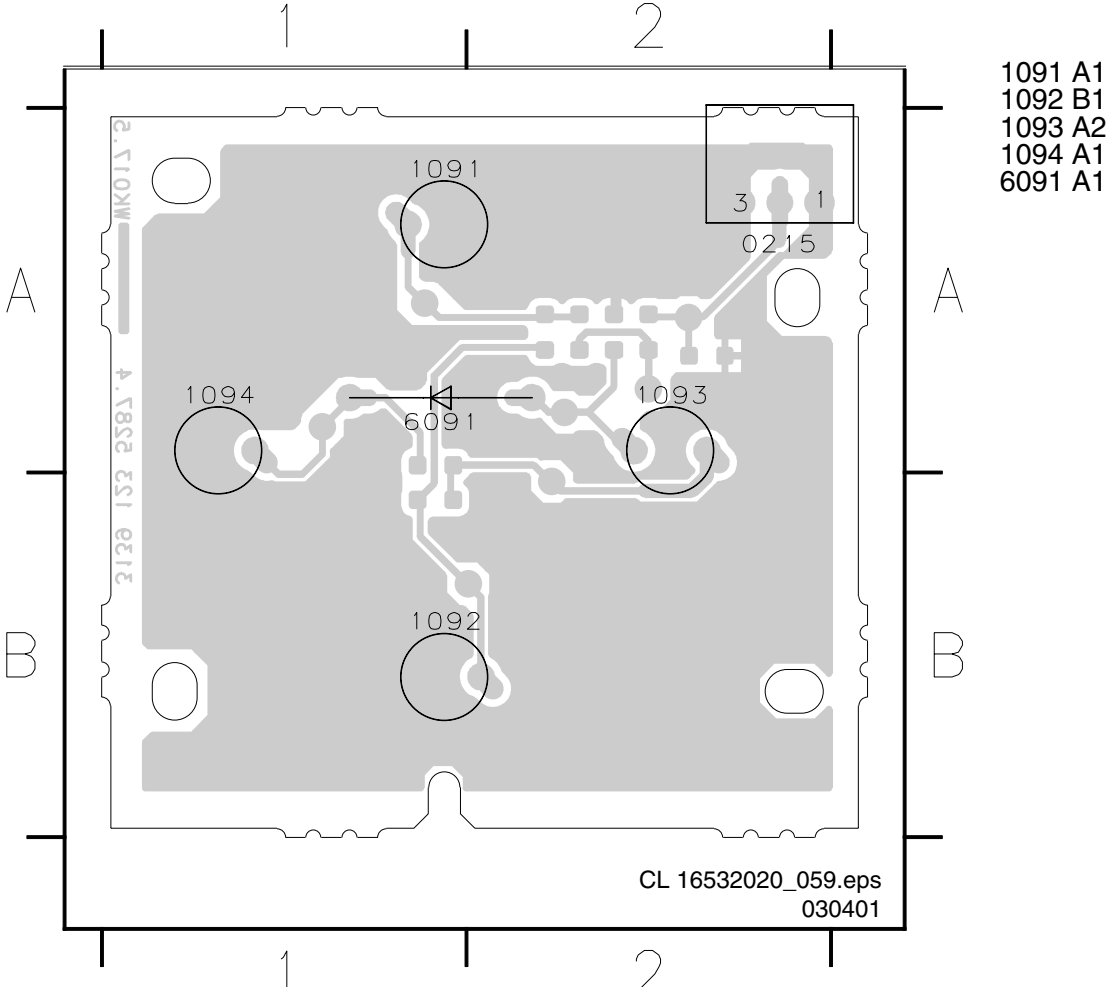
ITEM	KEYBOARD IR+LED-GL	KEYBOARD IR+LED-NA	IR+LED-NA	IR+LED EU/AP	FRNT.INTERF AP	TOP CTL + FR.PT INTERF - EU/NA
0231	2P 8/128A SDKV	-	-	2P 8/128A SDKV	-	-
9001	-	YES	YES	-	YES	YES
9002	-	YES	YES	-	YES	YES

ITEM	FRNT INTERF. - SLIM EU / LA	FRNT INTERF. - SLIM NA	FRNT INTERF. - SLIM EU NON ULL01L
0231	YES	---	YES
1606	---	YES	---
2691	YES	YES	---
2698	YES	YES	---
3500	YES	YES	---
3501	YES	YES	---
3685	---	YES	---
3691	YES	YES	---
3693	YES	YES	---
6691	YES	YES	---
6692	YES	YES	---
9901	---	YES	---
9002	---	YES	---

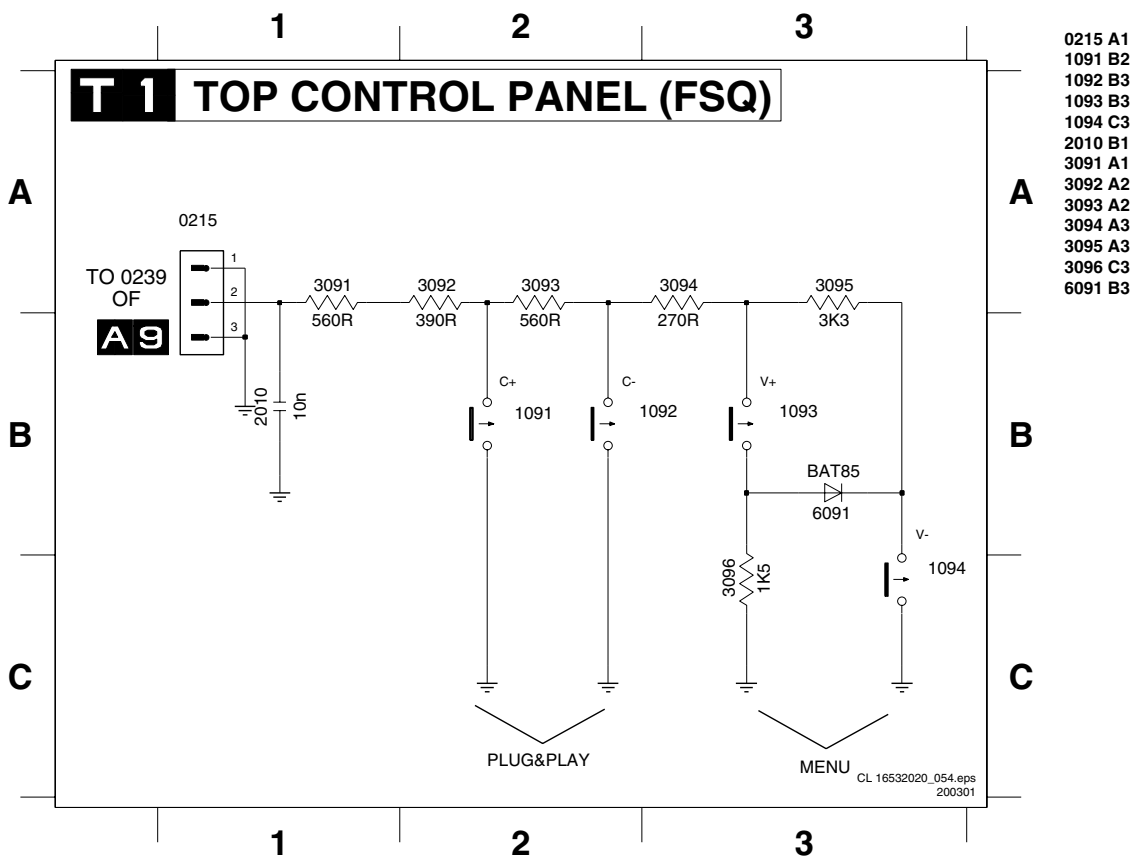
Top Control Panel (RF)



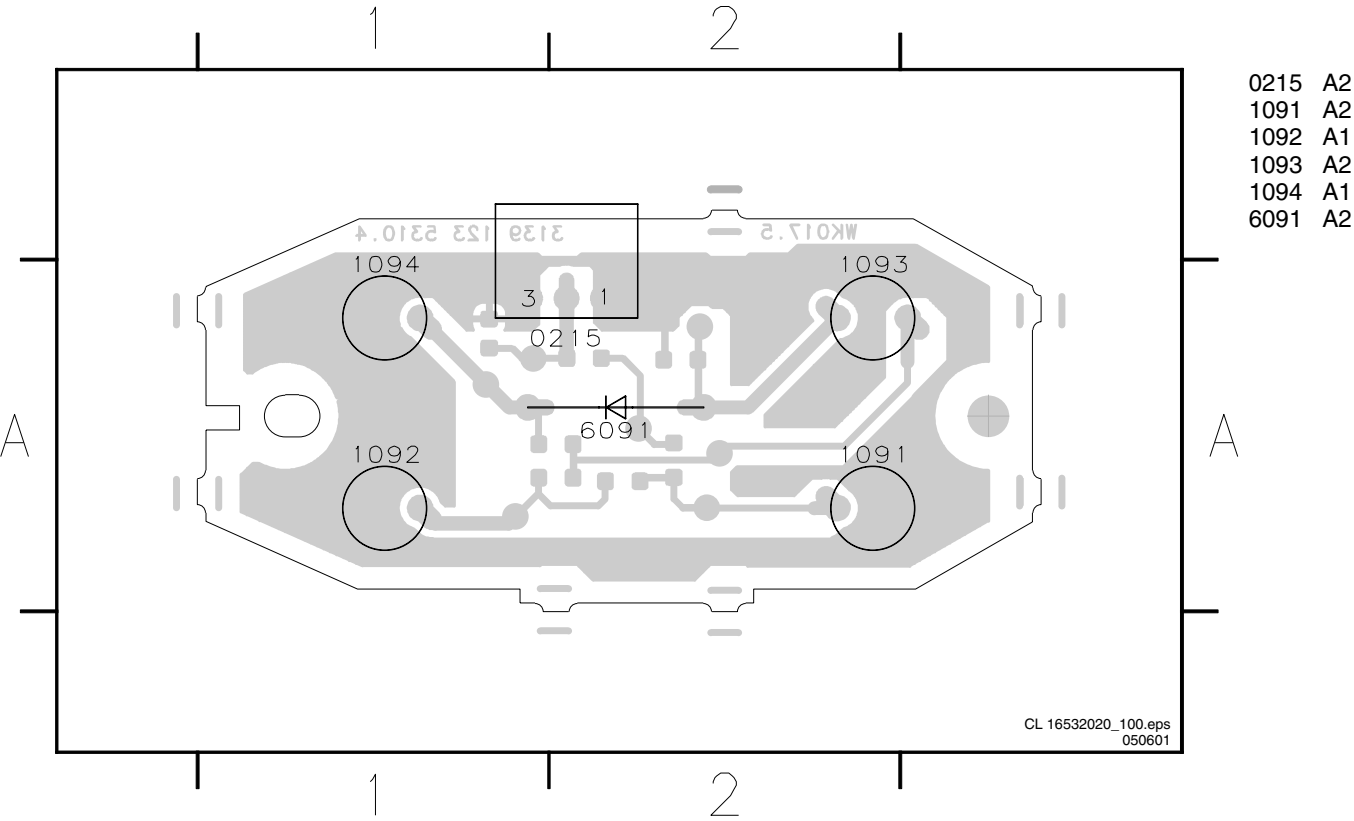
Layout Top Control Panel (RF) (Top View)



Top Control Panel (FSQ)



Layout Top Control Panel (FSQ) (Top View)



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

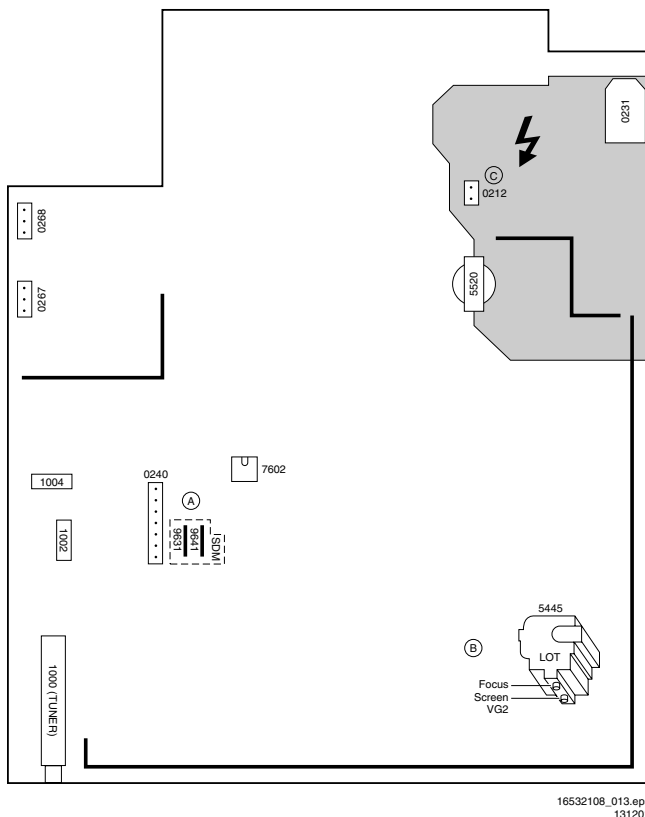


Figure 8-1

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 XY	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	ON / OFF
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
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
25HT5404/21R	9	17	34	9	22	122	0
25HT5404/25R	9	17	34	9	22	122	0
25HT5404/01Z	9	17	34	9	22	122	0
25HT5404/05Z	9	17	34	9	22	122	0
28HT5404/01Z	9	17	34	13	22	121	0
28HT5404/05Z	9	17	34	13	22	121	0
28HW6404/01Z	9	17	98	13	30	121	0
28HW6404/05Z	9	17	98	13	30	121	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	7	Multi-system	0 = Multi, 1 = Dual I-DK
(TV System)	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	7	Not Used	
(Pin Usage)	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 ² C (at 32-pin card interface)
	0		
Byte 2	7	Pin 78	0 = None (not used), 1 = Wide Screen, 2 = Rotation/Tilt
(Devices)	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	7	Not Used	
(Devices)	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 ² 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	7	Not Used	
(AV, Tuning)	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	7	Not Used	
(Feature)	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 ² 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"

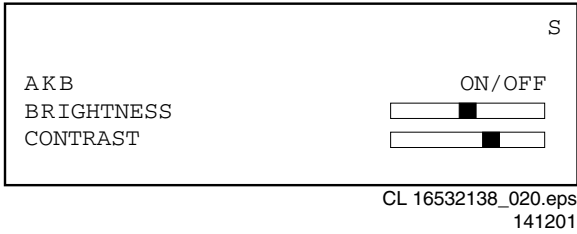


Figure 8-2

8.3.3 Tuner

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

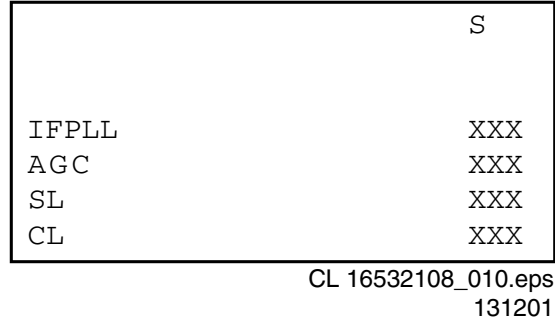


Figure 8-3

The Tuner Sub menu contains the following items:

- **IF PLL**
Phase Locked Loop used for FST tuning systems. Adjust the IFPLL value (default value is 30) with the LEFT/RIGHT cursor keys.
- **AGC (AGC take over point)**
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.
- **SL (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

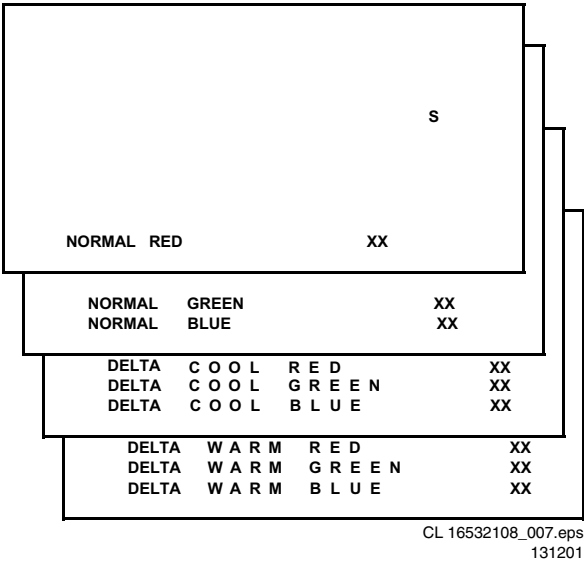


Figure 8-4

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.

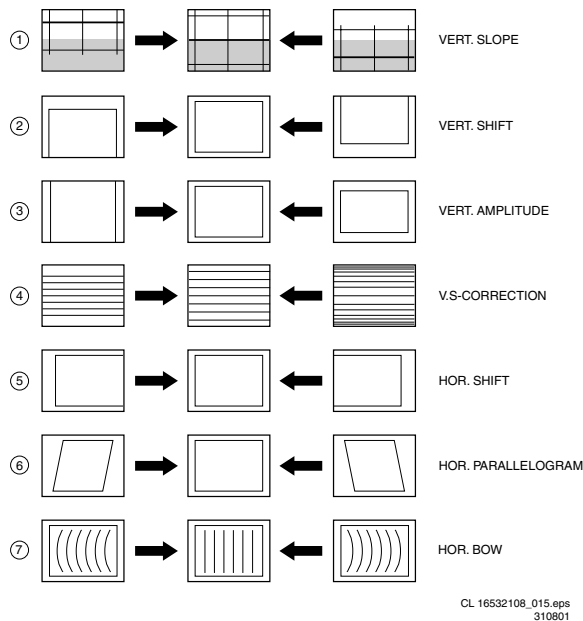


Figure 8-5

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 HP to prevent the picture
from slanting to one side.
- Set Horizontal Bow HB to prevent the top and bottom of
picture from bending to the sides.
- Select Vertical Zoom VX to align the vertical linearity over
the entire screen height (for 16 : 9 applications only).

- Set Trapezium Correction TC to align the lines at the
vertical sides.
- Select East-West Width EW and align the picture width
until the side castellations disappear.
- Select East-West Parabola / width PW and align the
vertical sides until the sides are straightened.
- Select Upper Corner Parabola UCP to straighten the top of
the vertical lines at the sides.
- Select Lower Corner Parabola LCP to straighten the
bottom of the vertical lines at the sides.
- Repeat the last 5 steps if necessary.

Geometry Alignments Menu

Table 8-5

	S
VX	XX
SC	XX
SBL	ON/OFF
VS	XX
VSH	XX
VA	XX
HS	XX
EW	XX
PW	XX
UCP	XX
LCP	XX
TC	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 al executions) and a Top Control panel. The Main panel consists primarily of conventional components with hardly any surface mounted devices.

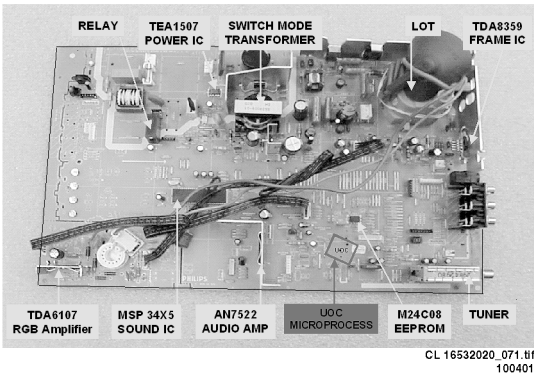


Figure 9-1

The functions for video processing, microprocessor (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.

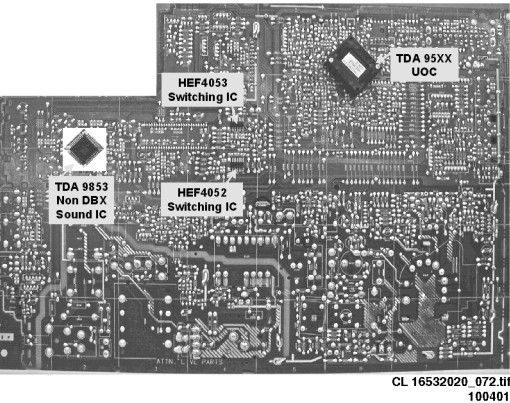


Figure 9-2

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 I²C 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 I²C) 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.

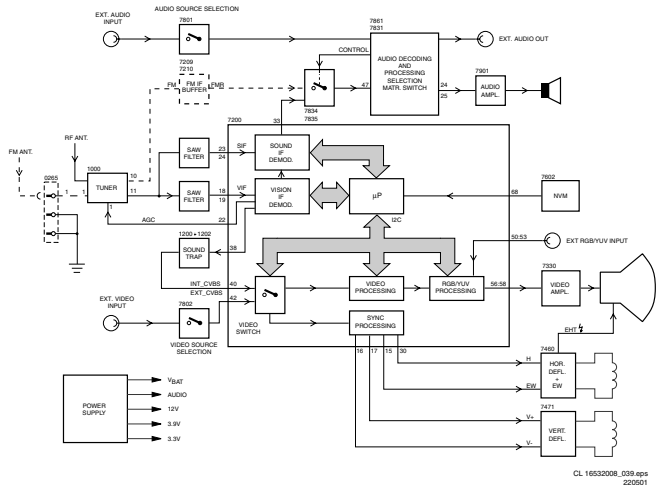


Figure 9-3

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 A are generated to adjust the cut off voltage. During the second frame, three pulses with a current of 20 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 integrated output amplifier (7330) on the CRT panel. Via the outputs 7, 8 and 9, the picture tube cathodes are driven.

The supply voltage for the amplifier is +200 V and is derived from the line output stage.

9.3.8 SCAVEM (if Present)

The SCAn VElocity Modulation (SCAVEM) circuitry is implemented in the layout of the picture tube panel. It is thus not an extra module. This circuit influences the horizontal deflection as a function of the picture content. In an ideal square wave, the sides are limited in slope due to a limited bandwidth (5 MHz).

SCAVEM will improve the slope as follows:

At a positive slope, a SCAVEM current is generated which supports the deflection current. At the first half of the slope, the spot is accelerated and the picture is darker. At the second half of the slope, the spot is delayed and the slope becomes steeper.

At the end of the slope, the SCAVEM-current decays to zero and the spot is at the original position. An overshoot occurs which improves the impression of sharpness.

At the negative slope, the SCAVEM-current counteracts the deflection. During the first half of the slope, the spot is delayed and the slope becomes steeper. During the second half the spot accelerates, the SCAVEM-current is zero at the end of the slope.

Via the three resistors R3371, R3379 and R3386, Red, Green and Blue are added together, buffered and offered to the emitter of TS7363. On the collector of this transistor, configured in a common base, the sum of these 3 signals is obtained. Via the emitter follower formed with TS7360, this signal is conveyed to the differentiator C2376 and R3392. Only the high frequencies are differentiated (small RC-time).

The positive and negative pulses of this signal drive respectively TS7365 and TS7362 into conductivity. The DC setting of the output stage is set by R3363, R3374, R3378 and R3384. The working voltage of the transistors is settled at half the supply voltage.

At the positive section of the pulse, the current flows through TS7365 and the SCAVEM coil. At the negative section of the pulse, the current flows through TS7362 and the SCAVEM coil.

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 TS7462 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 TON time of the horizontal output transistor. The TOFF 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 6447 and fed to the emitter of transistor TS7443. If this voltage goes above 6.8 V, TS7443 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 TS7462, the horizontal driver transistor. The signal is amplified and coupled to the base circuit of TS7460, 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 1 and 2 of IC 7471 (full bridge vertical deflection amplifier). These are voltage driven differential inputs. As the driver device (IC 7200) delivers output currents, R3474 and R3475 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 pins 4 and 7 where they drive the vertical deflection coil (connector 0222) in phase opposition. IC7471 is supplied by +13 V. The vertical flyback voltage is determined by an external supply voltage at pin 6 (VlotAux+50V). This voltage is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor (which is not necessary, due to the 'bridge' configuration).

9.5.3 Deflection Corrections

The Linearity Correction

A constant voltage on the horizontal deflection coil should result in a sawtooth current. This however is not the case as the resistance of the coil is not negligible. In order to compensate for this resistance, a pre-magnetised coil L5457 is used. R3485 and C2459 ensure that L5457 does not excite, because of its own parasite capacitance. This L5457 is called the 'linearity coil'.

The Mannheim Effect

When clear white lines are displayed, the high-voltage circuit is heavily loaded. During the first half of the flyback, the high voltage capacitors are considerable charged. At that point in time, the deflection coil excites through C2465. This current peak, through the high-voltage capacitor, distorts the flyback pulse. This causes synchronisation errors, causing an oscillation under the white line.

During t3 - t5, C2490//2458 is charged via R3459. At the moment of the flyback, C2490//2458 is subjected to the negative voltage pulses of the parabola as a result of which D6465 and D6466 are conducting and C2490//2458 is switched in parallel with C2456//2457. This is the moment the high-voltage diodes are conducting. Now extra energy is available for excitation through C2465 and the line deflection. As a consequence, the flyback pulse is less distorted.

The S-Correction

Since the sides of the picture are further away from the point of deflection than from the centre, a linear sawtooth current would result in a non-linear image being scanned (the centre would be scanned slower than the sides). For the centre-horizontal line, the difference in relation of the distances is larger than those for the top and bottom lines. An S-shaped current will have to be superimposed onto the sawtooth current. This correction is called finger-length correction or S-correction.

C2456//2457 is relatively small, as a result of which the sawtooth current will generate a parabolic voltage with negative voltage peaks. Left and right, the voltage across the deflection coil decreases, and the deflection will slow down; in the centre, the voltage increases and deflection is faster. The larger the picture width, the higher the deflection current through C2456//2457. The current also results in a parabolic voltage across C2484//2469, resulting in the finger length correction proportionally increasing with the picture width. The east/west drive signal will ensure the largest picture width in the centre of the frame. Here the largest correction is applied.

East/West Correction

In the L01, there are three types of CRTs, namely the 100°, 110° and wide screen CRTs. The 100° CRT is raster-correction-free and does not need East/West correction. The 110° 4:3 CRT comes with East/West correction and East/West protection.

The wide screen TV sets have all the correction of the 110 4:3 CRT and also have additional picture format like the 4:3 format, 16:9, 14:9, 16:9 zoom, subtitle zoom and the Super-Wide picture format

A line, written at the upper- or lower side of the screen, will be larger at the screen centre when a fixed deflection current is used. Therefore, the amplitude of the deflection current must

be increased when the spot approaches the centre of the screen. This is called the East/West or pincushion correction.

The 'Ewdrive' signal from pin 15 of IC7200 takes care of the correct correction. It drives FET TS7400. It also corrects breathing of the picture, due to beam current variations (the EHT varies dependent of the beam current). This correction is derived from the 'EHTinformation' line.

Two protections are built-in for the E/W circuit: over-current and over-voltage protection. See paragraph Power Supply.

Panorama

The panorama function is only used in 16:9 sets. This is a function to enable the 4:3 and Super-Wide feature. It drives the 'Bass_panorama' line, to activate relay 1400. When this relay is switched on, the capacitors 2453//2454 are added in parallel to the default S-correction capacitors 2456//2457. This results in an increased capacitance, a lower resonance frequency of the line deflection coil and the S-correction capacitors and therefore a less steep S-corrected line deflection current.

9.5.4 Rotation (only Present in Widescreen Sets)

To cope with the different earth magnetism situations in the world, a rotation coil is added in widescreen sets. This coil is controlled by the rotation circuitry (see diagram A15).

The amount of frame rotation is user controlled via the the PWM output (pin 77) of the UOC.

With the tilt setting at '-10', the PWM duty cycle is 0.1 (leftmost tuning).

With the setting at '+10', the duty cycle is 0.9 (rightmost tuning).

The output of amplifier IC7171 is a DC-voltage in the range from 0 (user setting = -10), via 6 V (user setting = 0) to 12 V (user setting = +10).

9.6 Power Supply

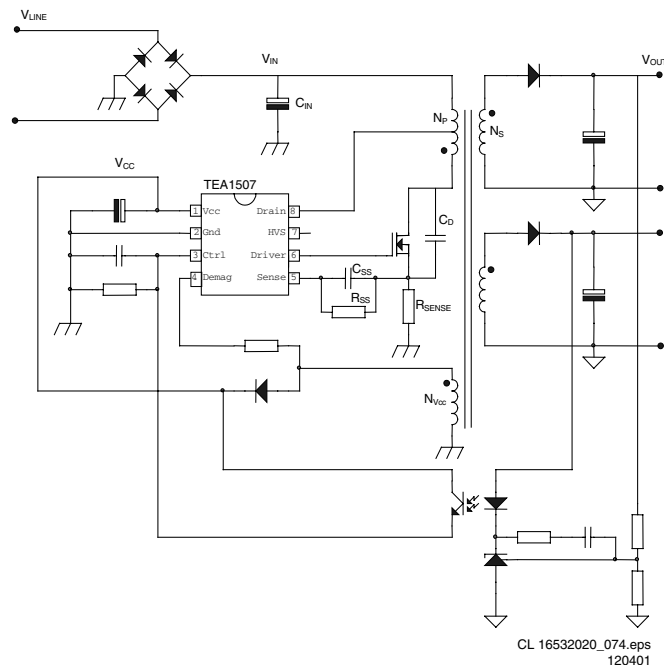


Figure 9-6

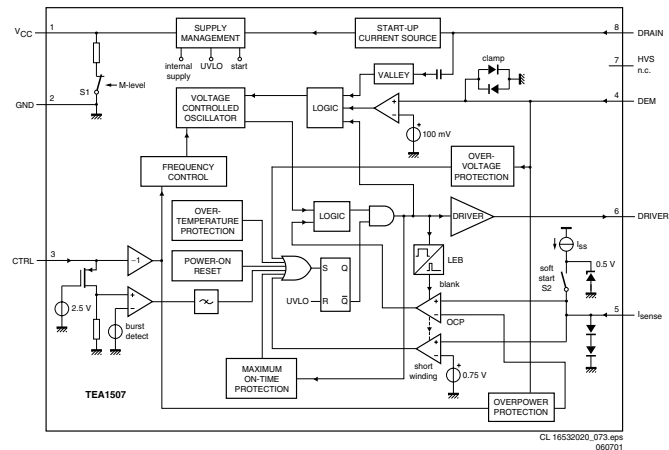


Figure 9-7

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.

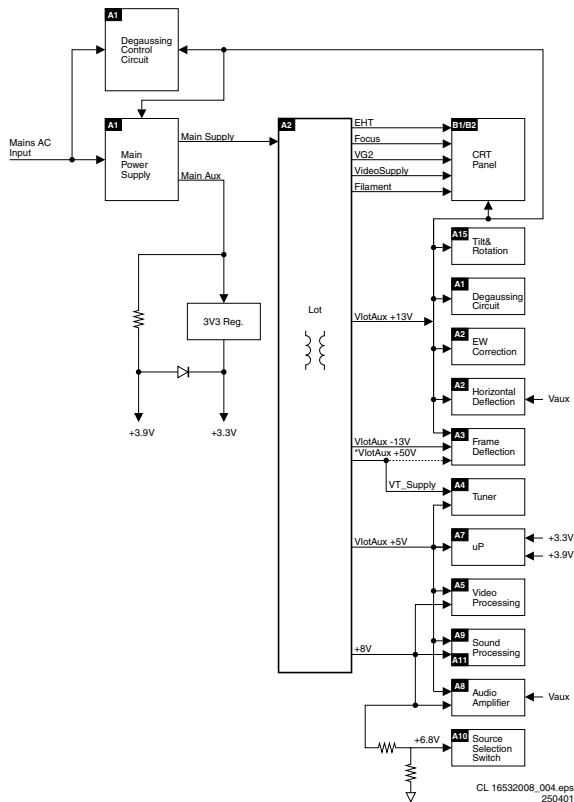


Figure 9-8

Table Power Supply

Power supply voltages L01				
Screen Size	Voltage name	Meas. point	Value	Remark
14", 17", 20", 21"	MainSupply	P6 (C2561)	95 V	
	MainAux	P5 (C2564)	11 V	Stereo 2x3 W and Mono 1x2 W, 3 W, 4 W
			10 V	Stereo 2x1 W and Mono 1x1 W
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

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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).

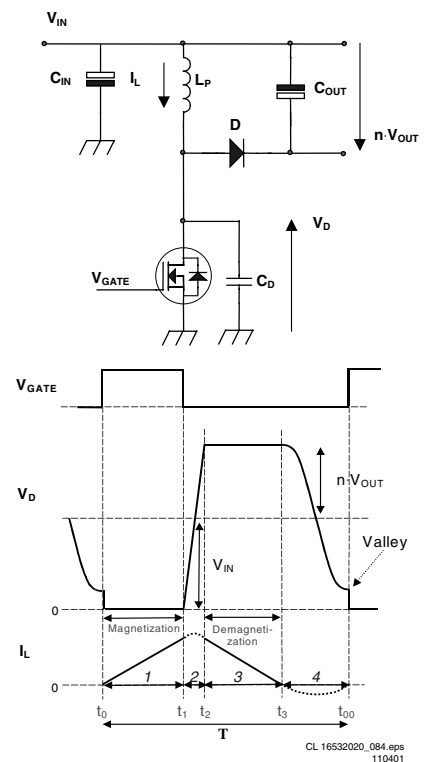


Figure 9-9

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.

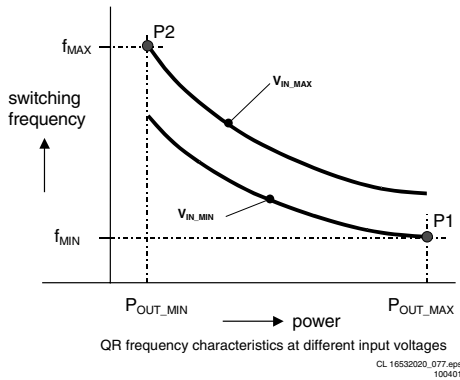


Figure 9-10

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 C2521 at the VCC pin as shown below.

The 'soft start' switch is closed when the VCC reaches a level of 7 V and the 'soft start' capacitor C_{SS} (C2522, between pin 5 and the sense resistor R3526), is charged to 0.5 V.

Once the VCC capacitor is charged to the start-up voltage VCC-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 VCC capacitor will be discharged until the moment that the primary auxiliary winding takes over this voltage.

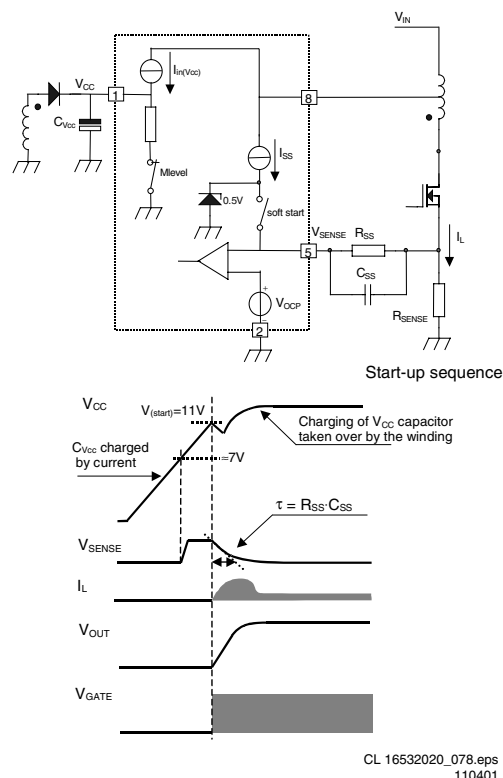


Figure 9-11

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 < 1.425 V, 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.

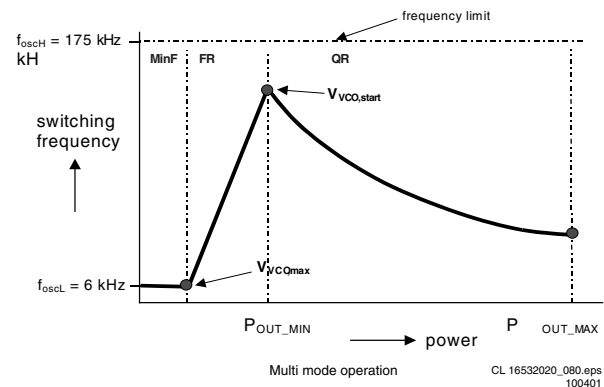


Figure 9-12

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,
- VCC 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 VCC winding will not charge the VCC capacitor anymore and the VCC voltage will drop until UVLO is reached. To recharge the VCC 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 the active period the energy is transferred to the secondary and stored in the buffer capacitor CSTAB 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.



- t1: Discharge of VCC when gate drive is active During the first interval, energy is transferred, which result in a ramp-up of the output voltage (VSTAB) 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 R1 (R3519) is placed in series with the opto coupler, to limit the current going into the Ctrl pin. Meanwhile the VCC capacitor is discharged but has to stay above VUVLO .
- t2: Discharge of VCC when gate drive is inactive During the second interval, the VCC is discharged to VUVLO. The output voltage will decrease depending on the load.
- t3: Charge of VCC when gate drive is inactive The third interval starts when the UVLO is reached. The internal current source charges the VCC capacitor (also the soft start capacitor is recharged). Once the VCC capacitor is charged to the start-up voltage, the driver is activated and a new burst cycle is started.



The SMPS IC7520 has the following protection features:

The Figure below shows the circuit and the idealised waveforms across this winding.



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 ISENSE.

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 VCC 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 VCC voltage drops to UVLO, the VCC capacitor will be recharged to the V(start) level. If the temperature is still too high, the VCC 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 (CIN). In this case, the supply will not be able to start-up because the VCC capacitor will not be charged to the start-up voltage.

9.7 Control

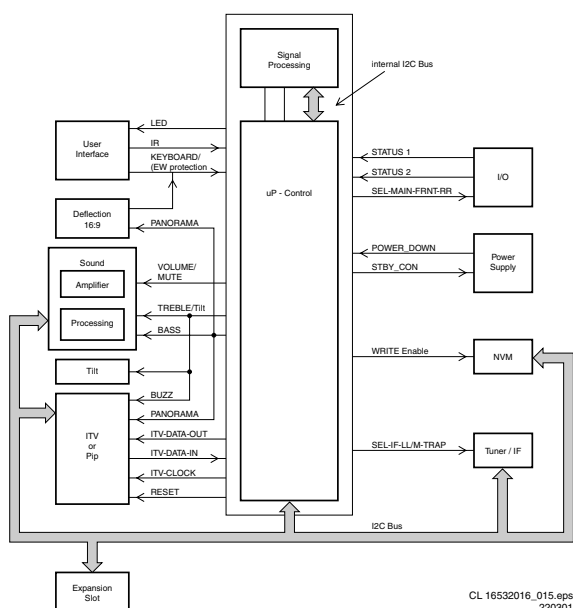


Figure 9-16

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 P. Communication to other ICs is done via the I²C-bus.

9.7.2 I²C-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 I²C-bus. An internal I²C-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 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 plop).

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 (Inter-carrier 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 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 I²C 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 feature box
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

HP	Headphone	SCL	Serial Clock
Hue	Colour phase control for NTSC (not the same as 'Tint')	SDA	Serial Data
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	SDM	Service Default Mode
I2C	Integrated IC bus	SECAM	SEequence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
IC	Integrated Circuit Inter Carrier		
IF	Intermediate Frequency	SIF	Sound Intermediate Frequency
IIC	Integrated IC bus	SS	Small Screen
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.	STBY	Standby
ITV	Institutional TV	SVHS	Super Video Home System
LATAM	Latin America	SW	Software
LED	Light Emitting Diode	THD	Total Harmonic Distortion
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	TXT	Teletext
LNA	Low Noise Amplifier	P	Microprocessor
LS	Large Screen	UOC	Ultimate One Chip
LS	Loudspeaker	VA	Vertical Acquisition
LSP	Large signal panel	Vbat	Main supply voltage for the deflection stage (mostly 141 V)
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz	V-chip	Violence Chip
MSP	Multi-standard Sound Processor: ITT sound decoder	VCR	Video Cassette Recorder
MUTE	Mute-Line	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
NC	Not Connected		
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)	XTAL	Quartz crystal
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments	YC	Luminance (Y) and Chrominance (C) signa
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)		
QSS	Quasi Split Sound		
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 signalsr		
S/C	Short Circuit		
SCAVEM	Scan Velocity Modulation		

10. Spare Parts List

Mono Carrier [A]

Various

0127	4822 265 11253	Fuse holder
0129	3139 120 10151	NTC holder
0136	4822 492 70788	IC fix
0137	4822 492 70289	
0138	4822 492 70788	IC fix
0139	3122 121 24785	spring bracket
0140	4822 492 70289	
0141	4822 492 70788	IC fix
0150	3104 311 02201	4P 560mm
0152	3104 301 09421	6P 400mm
0153	3104 301 08381	Cable assy
0159	4822 320 12525	
0180	3104 328 16421	Cable assy
0211	4822 265 20723	2P
0212	4822 267 10774	2P male (red)
0214	4822 267 10734	B5B-EH-A
0217	2422 025 12482	6P
0219	2422 025 15849	6P
0220	4822 265 30735	5P
0221	4822 267 10966	2P
0222	2422 025 10646	2P M 3.96 VH B
0227	2422 025 16383	EH-A-Y B
0229	4822 267 10735	B3B-EH-A
0231	2422 128 02972	2P
0232	4822 267 31014	Hp socket
0235	4822 267 60385	Scart conn.
0236	2422 025 16382	3P
0239	2422 025 16382	3P
0240	2422 025 11244	7P
0242	2422 025 17042	7P
0243	2422 025 04854	6P
0244	4822 265 30735	5P
0245	2422 025 04854	6P
0246	4822 267 10734	B5B-EH-A
0251	4822 267 10565	4P
0254	2422 500 80067	CRT 9P N-Neck
0259	2422 025 15848	5P
0262	2422 025 16937	3P
0267	4822 267 10735	B3B-EH-A
0278	2422 025 16382	3P
0280	4822 267 10565	4P
0285	4822 267 10676	1P
1000	2422 542 90111	Tuner V+U PLL IEC BGDK
1002	4822 242 81436	Filter OFWK3953M
1004	2422 549 44341	Saw fit 38.9M OFWK9656M
1200	4822 242 81712	TPWA04B
1400	2422 132 07478	Relay 1P 10V 5A
1500	2422 086 10914	Fuse 5X20 ET 4A 250V
1515	2422 132 07444	Relay 1P 12V 5A
1600	4822 276 13775	Switch
1601	4822 276 13775	Switch
1602	4822 276 13775	Switch
1603	4822 276 13775	Switch
1660	2422 543 01203	Xtal 12MHz 20P
1831	4822 242 10769	Xtal 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 16V 20%
2007	4822 126 14585	100nF 10% 50V
2008	4822 124 40207	100µF 20% 25V
2009	5322 122 32654	63V 22nF
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
2184	2020 552 96305	4U7 20% 10V
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 3
2208	4822 126 14585	100nF 10% 50V
2209	4822 124 40769	4.7µF 20% 100V
2210	4822 124 21913	1µF 20% 63V
2211	4822 126 13482	470nF 80/20% 16V
2213	5322 122 32654	63V 22nF
2214	5322 122 32654	63V 22nF
2215	5322 122 32654	63V 22nF
2216	2020 012 93728	10V 2200µF
2217	5322 122 32654	63V 22nF
2219	4822 126 14076	220nF 25V
2220	4822 121 51252	470nF 5% 63V
2221	5322 122 32654	63V 22nF
2230	4822 124 40769	4.7µF 20% 100V
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
2247	2020 012 93728	10V S 2200µF
2248	5322 122 32654	63V 22nF
2249	5322 122 32654	63V 22nF
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
2401	4822 124 12438	2.2µF 20% 100V
2401	5322 124 41379	2.2µF 20% 50V
2402	4822 122 33177	470pF 10% 500V
2404	4822 124 41751	47µF 20% 50V
2405	5322 126 10511	1nF 5% 50V
2420	4822 126 14043	1µF 20% 16V
2421	5322 122 32268	63V 470P
2441	4822 124 21913	1µF 20% 63V
2443	4822 126 13751	47nF 10% 63V
2444	4822 124 21913	1µF 20% 63V
2450	4822 124 11575	47µF 20% 160V
2451	4822 121 51305	15nF 5% 50V
2452	4822 126 10326	180pF 5% 63V
2454	5322 121 40323	100nF 10% 100V
2455	4822 124 40433	47µF 20% 25V
2456	4822 126 14097	680nF 5% 250V
2457	2222 479 90022	250V 0.43µF
2457	4822 121 10518	250V 390nF 5%
2458	4822 124 12438	2.2µF 20% 100V
2459	4822 126 13185	680pF 10% 500V
2460	5322 122 32531	100pF 5% 50V
2463	4822 126 12263	220pF 10% 1KV
2463	4822 126 14138	680pF 10% 2KV
2465	2222 375 90157	1K6V S 13nF B
2465	4822 121 70617	10nF 5% 1.6KV
2465	4822 121 70649	9.1nF 5% 1.6KV
2466	4822 121 40483	10nF 10% 400V
2467	2222 375 90429	1KV S 15nF
2467	4822 121 40488	22nF 10% 400V
2468	2222 347 90219	POL 347 400V S 15nF
2468	4822 121 40488	22nF 10% 400V
2471	5322 121 42386	100nF 5% 63V
2472	4822 121 41854	150nF 5% 63V
2473	5322 121 42386	100nF 5% 63V
2474	4822 122 33127	2.2nF 10% 63V
2475	4822 122 33127	2.2nF 10% 63V
2476	5322 126 10223	4.7nF 10% 63V
2480	5322 121 10472	47µF /25
2481	4822 122 33177	470pF 10% 500V
2482	4822 121 40482	68nF 10% 250V
2484	4822 121 10781	470nF 5% 250V
2485	4822 124 12265	4.7µF 20% 250V
2486	2020 021 91577	EL VZ 16V S 470µF
2487	4822 124 80604	47µF 20% 50V
2488	4822 124 81145	16V S 1000µF
2489	2020 021 91577	EL VZ 16V S 470µF
2490	4822 124 12438	2.2µF 20% 100V
2491	4822 122 31175	1nF 10% 500V
2501	4822 126 14153	2.2nF 10%B 1KV
2502	4822 126 14153	2.2nF 10%B 1KV
2503	4822 124 12415	220µF 20% 400V
2505	4822 126 14153	2.2nF 10%B 1KV

2507	5322 122 34099	470pF 10% 63V
2508	4822 122 50116	470pF 10% 1KV
2509	4822 121 10711	100nF 20% 275V
2515	4822 126 14049	1.5nF 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	4822 126 13482	470nF 16V
2527	4822 122 33127	2.2nF 10% 63V
2528	5322 122 31647	1nF 10% 63V
2540	4822 122 33177	10nF 20% 50V
2560	4822 126 14152	680pF 10% 1KV
2561	2020 021 91496	160V S100µF
2562	5322 122 32331	1nF 10% 100V
2563	5322 121 42386	100nF 5% 63V
2564	4822 124 12417	2200µF 20% 25V
2566	4822 124 81044	470µF 20% 6.3V
2567	4822 124 81286	47µF 20% 16V
2580	4822 124 81286	47µF 20% 16V
2581	4822 122 81151	22µF 50V
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 126 13482	470nF 80/20% 16V
2618	4822 126 14043	1µF 20% 16V
2619	4822 126 14043	1µF 20% 16V
2691	4822 124 40248	10µF 20% 63V
2801	4822 124 81151	22µF 50V
2802	4822 126 14076	220nF 25V
2803	2020 552 96305	4U7 20% 10V
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
2835	4822 122 33575	220pF 5% 63V
2836	4822 126 13344	1.5nF 5% 63V
2837	4822 124 40769	4.7µF 20% 100V
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
2860	4822 126 13693	56pF 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 80/20% 16V
2905	5322 122 31647	1nF 10% 63V
2906	4822 126 13482	470nF 80/20% 16V
2907	5322 122 31647	1nF 10% 63V
2908	4822 124 40248	10µF 20% 63V
2910	4822 122 33891	3.3nF 10% 63V
2911	4822 122 33891	3.3nF 10% 63V

Spare Parts List

3002	4822 117 10833	10k 1% 0.1W	3459	4822 053 11153	15k 5% 2W	3626	4822 051 20472	4k7 5% 0.1W
3003	4822 117 11139	1k5 1% 0.1W	3460	4822 116 52276	3k9 5% 0.5W	3627	4822 051 20472	4k7 5% 0.1W
3005	4822 116 52175	100Ω 5% 0.5W	3463	4822 116 52191	33Ω 5% 0.5W	3628	4822 117 10833	10k 1% 0.1W
3006	4822 117 11449	2k2 5% 0.1W	3465	4822 050 22703	27k 1% 0.6W	3630	4822 117 11449	2k2 5% 0.1W
3007	4822 117 11507	6k8 1% 0.1W	3468	4822 116 52175	100Ω 5% 0.5W	3632	4822 051 20008	0Ω jumper (0805)
3008	4822 117 11449	2k2 5% 0.1W	3468	4822 116 52213	180Ω 5% 0.5W	3634	4822 116 52175	100Ω 5% 0.5W
3101	4822 116 83868	150Ω 5% 0.5W	3469	4822 116 52269	3k3 5% 0.5W	3636	4822 117 11373	100Ω 1%
3102	3198 021 52240	220k	3470	4822 051 20154	150k 5% 0.1W	3638	4822 117 11927	75Ω 1% 0.1W
3103	4822 116 83868	150Ω 5% 0.5W	3471	4822 050 23308	30Ω 1% 0.6W	3681	4822 051 20391	390Ω 5% 0.1W
3104	4822 117 10834	47k 1% 0.1W	3471	4822 050 23908	30Ω 1% 0.6W	3682	4822 051 20332	3k3 5% 0.1W
3105	4822 116 83868	150Ω 5% 0.5W	3471	4822 050 24708	407 1% 0.6W	3683	4822 051 20391	390Ω 5% 0.1W
3106	3198 021 52240	220k	3472	4822 050 22202	2k2 1% 0.6W	3684	4822 051 20561	560Ω 5% 0.1W
3107	4822 116 83868	150Ω 5% 0.5W	3472	4822 050 23908	30Ω 1% 0.6W	3685	4822 051 20561	560Ω 5% 0.1W
3108	4822 117 10834	47k 1% 0.1W	3473	4822 050 22202	2k2 1% 0.6W	3686	4822 117 11139	1k5 1% 0.1W
3109	4822 116 52201	75Ω 5% 0.5W	3473	4822 050 22608	608 1% 0.6W	3691	4822 117 13577	330Ω 1% 1.25W
3110	4822 116 52228	680Ω 5% 0.5W	3474	4822 050 22202	2k2 1% 0.6W	3692	4822 051 10102	1k 2% 0.25W
3111	4822 116 52264	27k 5% 0.5W	3475	4822 050 22202	2k2 1% 0.6W	3693	4822 117 11503	220Ω 1% 0.1W
3112	4822 117 11507	6k8 1% 0.1W	3477	4822 116 83868	150Ω 5% 0.5W	3801	4822 116 83872	220Ω 5% 0.5W
3113	4822 116 52201	75Ω 5% 0.5W	3478	4822 116 83868	150Ω 5% 0.5W	3802	4822 050 11002	1k 1% 0.4W
3114	4822 116 52228	680Ω 5% 0.5W	3479	4822 117 12955	2k7 1% 0.1W	3803	4822 117 10837	100k 1% 0.1W
3115	4822 116 52201	75Ω 5% 0.5W	3480	4822 116 80076	105 5% 0.5W	3804	4822 117 11149	82k 1% 0.1W
3116	4822 116 52228	680Ω 5% 0.5W	3481	4822 050 21063	10k 1% 0.6W	3805	4822 051 10102	1k 2% 0.25W
3117	4822 116 52201	75Ω 5% 0.5W	3481	4822 050 21203	12k 1% 0.6W	3806	4822 117 10837	100k 1% 0.1W
3118	4822 116 52175	100Ω 5% 0.5W	3482	4822 050 22403	24k 1% 0.6W	3807	4822 117 11149	82k 1% 0.1W
3119	4822 116 52199	680Ω 5% 0.5W	3484	4822 116 52276	3k9 5% 0.5W	3808	4822 050 11002	1k 1% 0.4W
3120	4822 051 10102	1k 2% 0.25W	3486	4822 053 12339	33Ω 5% 3W	3809	4822 117 11927	75Ω 1% 0.1W
3155	4822 116 52195	47Ω 5% 0.5W	3488	4822 052 11478	407 5% 0.5W	3810	4822 117 11927	75Ω 1% 0.1W
3200	4822 116 83881	390Ω 5% 0.5W	3489	4822 116 52276	3k9 5% 0.5W	3831	4822 117 10834	47k 1% 0.1W
3201	4822 116 52175	100Ω 5% 0.5W	3490	4822 116 52303	8k2 5% 0.5W	3832	4822 116 52175	100Ω 5% 0.5W
3202	4822 116 52175	100Ω 5% 0.5W	3491	4822 116 52264	27k 5% 0.5W	3833	4822 116 52175	100Ω 5% 0.5W
3203								

6201	4822 130 11397	BAS316
6202	4822 130 11397	BAS316
6206	4822 130 11416	PDZ6.8B
6400	4822 050 21002	1K00 1% 0.6W
6401	4822 130 30864	BZX79-B68
6401	4822 130 34383	BZX79-B47
6444	4822 130 30621	1N4148
6445	4822 130 11551	UDZS10B
6447	4822 130 30621	1N4148
6448	4822 130 34167	BZX79-B6V2
6449	5322 130 34337	BAV99
6452	4822 130 11397	BAS316
6453	4822 130 11416	PDZ6.8B
6460	9340 559 50112	BY228/24
6461	4822 130 80572	RGP30J
6462	4822 130 30862	BZX79-B9V1 (28" 4:3)
6462	4822 130 34382	BZX79-B8V2 (25" 4:3)
6462	4822 130 61219	BZX79-B10 (28"WS)
6465	4822 130 30842	BAV21
6466	4822 130 30842	BAV21
6467	5322 130 34331	BAV70
6468	4822 130 11397	BAS316
6470	5322 130 34337	BAV99
6476	4822 130 34281	BZX79-B15
6481	4822 130 34173	BZX79-B5V6
6482	4822 130 30862	BZX79-B9V1
6483	4822 130 34142	BZX79-B33
6485	4822 130 42606	BYD33J
6486	9322 164 42682	EGP20DL-5100
6487	4822 130 42488	BYD33D
6488	9322 164 42682	EGP20DL-5100
6500	9322 132 55667	Br GBU4JL-7002
6520	4822 130 42488	BYD33D
6522	4822 130 11152	UDZ18B
6523	4822 130 30621	1N4148
6525	4822 130 31083	BYW55
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 11551	UDZS10B
6560	3139 120 52021	BYV29X-500
6561	4822 130 32715	SB340
6562	9322 164 42682	EGP20DL-5100
6563	4822 130 11397	BAS316
6565	5322 130 34331	BAV70
6567	4822 130 11148	UDZ4.7B
6570	4822 051 20008	jumper (0805)
6580	4822 130 11397	BAS316
6681	4822 130 31983	BAT85
6691	9322 172 20682	LED LTL-102SRHAP
6692	9322 174 42667	Ir rec. TOSP4136UH1
6831	4822 130 30621	1N4148
6901	4822 051 20008	jumper (0805)



7001	4822 130 63732	MMUN2212
7101	4822 130 60511	BC847B
7200	9352 706 23557	TDA9555H/N1/3/0608
7201	4822 130 60511	BC847B
7204	4822 130 60373	BC856B
7206	5322 130 42755	BC847C
7400	9322 157 37687	FET STP3NC60FP
7441	4822 130 60373	BC856B
7443	4822 130 44568	BC557B
7444	4822 130 40959	BC547B
7450	3198 010 44010	PDTA114ET
7460	9340 550 92127	BU4508DX
7461	4822 130 40981	BC337-25
7462	9340 547 00215	PDTC143ZT
7463	4822 130 41246	BC327-25
7471	9352 635 76112	TDA8359J
7480	4822 130 40823	BD139
7482	4822 130 40823	BD139
7515	8238 274 02070	TCET1103G
7520	9352 673 56112	TEA1507P/N1
7521	9322 160 63687	FET STP7NC80ZFP
7522	4822 130 60511	BC847B
7540	4822 130 40959	BC547B
7560	4822 209 16978	LF33CV
7561	9340 547 00215	PDTC143ZT
7562	4822 130 60373	BC856B
7564	4822 130 60373	BC856B
7580	4822 130 60373	BC856B
7602	9322 147 25682	M24C16-WBN6
7606	9340 547 00215	PDTC143ZT
7801	5322 209 11102	HEF4052BT
7802	5322 209 14481	HEF4053BT
7803	4822 130 60511	BC847B
7804	4822 130 60511	BC847B
7831	9322 160 79682	MSP3415G-PO-B8
7832	4822 130 60511	BC847B
7833	4822 130 60511	BC847B
7901	9322 158 65667	AN7522N
9611	4822 157 52392	27UH

CRT Panel [B]



2330	4822 121 51473	470nF 20% 63V
2340	4822 124 11565	10µF 20% 250V
2341	4822 126 13599	3.3nF 10% 500V
2342	5322 122 31647	1nF 10% 63V
2343	4822 126 12278	3300pF 10% 2KV
2344	4822 051 20008	jumper (28"WS)
2344	4822 126 14585	100nF 10% 50V (25/28" 4:3)
2345	4822 122 31175	1nF 10% 500V
2346	4822 126 13435	1.2nF 10% 2KV
2360	4822 124 40764	22µF 100 V
2361	4822 124 40207	100µF 20% 25V
2365	4822 121 40516	22nF 10% 250V
2366	4822 121 40334	100nF 10% 100V
2367	4822 126 10326	180pF 5% 63V
2368	5322 122 32654	63V 22nF
2373	4822 126 13693	56pF 1% 63V
2375	5322 122 31863	63V 330pF
2376	4822 126 14585	100nF 10% 50V
2377	4822 126 14585	100nF 10% 50V



3331	4822 116 52175	100Ω 5% 0.5W
3332	3198 013 01020	1/2W A 1k
3333	4822 116 52175	100Ω 5% 0.5W
3334	3198 013 01020	1/2W A 1k
3335	4822 116 52175	100Ω 5% 0.5W
3336	3198 013 01020	1/2W A 1k
3340	4822 052 11109	10Ω 5% 0.5W
3341	4822 052 10108	1Ω 5% 0.33W
3341	4822 052 10158	1Ω5 5% 0.33W (28"WS)
3342	4822 052 10108	1Ω 5% 0.33W
3342	4822 052 10158	1Ω5 5% 0.33W (28"WS)
3343	3198 013 01520	1/2W A 1k5
3344	4822 116 52186	22Ω 5% 0.5W
3345	4822 117 13016	1M A/50V
3346	4822 116 52186	22Ω 5% 0.5W
3347	4822 051 10102	1k 2% 0.25W (28"WS)
3347	4822 051 20008	0Ω jumper(0805)
3348	4822 051 10102	1k 2% 0.25W
3350	4822 051 10102	1k 2% 0.25W (28"WS)
3350	4822 051 20008	0Ω jumper (0805)
3351	4822 051 10102	1k 2% 0.25W
3353	4822 051 10102	1k 2% 0.25W
3353	4822 051 20008	0Ω jumper (0805)
3354	4822 051 10102	1k 2% 0.25W
3356	4822 051 20008	0Ω jumper (0805)
3357	4822 051 20008	0Ω jumper (0805)
3358	4822 051 20008	0Ω jumper (0805)
3360	4822 117 13424	8k2 5%
3362	4822 052 10109	10Ω 5% 0.33W
3363	4822 116 52231	820Ω 5% 0.5W
3364	4822 116 81039	1Ω8 5% 0.5W
3368	4822 117 12955	2k7 1% 0.1W
3369	4822 117 10833	10k 1% 0.1W
3370	4822 117 11503	220Ω 1% 0.1W
3371	4822 051 20472	4k7 5% 0.1W
3373	4822 117 11503	220Ω 1% 0.1W
3374	4822 116 52291	56k 5% 0.5W
3375	4822 116 83868	150Ω 5% 0.5W
3376	4822 051 20008	0Ω jumper (0805)
3377	4822 050 24708	4Ω7 1% 0.2W
3378	4822 117 11148	56k 1% 0.1W
3379	4822 051 20472	4k7 5% 0.1W
3382	4822 117 11139	1k5 1% 0.1W
3383	4822 051 20471	470Ω 5% 0.1W
3384	4822 117 11454	820Ω 1% 0.1W
3385	4822 116 81039	1Ω8 5% 0.5W
3386	4822 051 20472	4k7 5% 0.1W
3387	4822 051 20471	470Ω 5% 0.1W
3390	4822 051 20109	10Ω 5% 0.1W
3391	4822 051 20109	10Ω 5% 0.1W
3392	4822 117 11503	220Ω 1% 0.1W
3393	4822 051 20472	4k7 5% 0.1W
4xxx	4822 051 10008	0Ω 5% 0.25W (1206)
4xxx	4822 051 20008	0Ω 5% 0.25W (0805)



5342	4822 157 50961	22µH (28"WS)
5342	4822 157 50965	15µH
5343	2722 122 00333	SDL
5344	2722 122 00333	SDL
5345	2722 122 00333	SDL
5360	4822 157 51216	5.6µH



6331	4822 130 30842	BAV21
6332	4822 130 11397	BAS316
6333	4822 130 30842	BAV21
6335	4822 130 30842	BAV21
6360	4822 130 30621	1N4148
6361	4822 130 11397	BAS316
6362	4822 130 11397	BAS316
6364	4822 130 11397	BAS316
6365	4822 130 11397	BAS316



7330	9352 561 40112	TDA6108
7330	9352 576 50112	TDA6107Q/N2
7331	4822 130 60511	BC847B
7332	4822 130 60511	BC847B
7333	4822 130 60511	BC847B
7360	4822 130 40959	BC547B
7362	9322 166 55682	2SA1358
7363	4822 130 40959	BC547B
7365	9322 166 56682	2SC3421
7366	4822 130 41646	BF423
7367	4822 130 44568	BC557B

Side AV [C/E1]

Various

0232▲	4822 267 31014	Hp socket
0250	4822 265 11606	3P
0251	2422 025 15849	6P
0254	4822 267 10734	B5B-EH-A
0255	4822 267 10565	4P



2171	5322 122 32311	470pF 10% 100V
2172	5322 122 32311	470pF 10% 100V
2173	5322 122 32311	470pF 10% 100V
2174	5322 122 32311	470pF 10% 100V
2176	5322 122 32311	470pF 10% 100V
2177	4822 124 40248	10µF 20% 63V
2178	5322 122 32311	470pF 10% 100V
2179	4822 124 40248	10µF 20% 63V



3150	4822 116 83884	47k 5% 0.5W
3151	4822 116 83868	150Ω 5% 0.5W
3152	4822 116 83884	47k 5% 0.5W
3153	4822 116 83868	150Ω 5% 0.5W
3155	4822 116 52201	75Ω 5% 0.5W
3156	4822 116 52206	120Ω 5% 0.5W
3156	4822 116 83876	270Ω 5% 0.5W
3157	4822 116 52206	120Ω 5% 0.5W
3157	4822 116 83876	270Ω 5% 0.5W



6161	4822 130 34278	BZX79-B6V8
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External Power Supply [F]

xxxx	3139 137 22222	Ext. power supply module
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Clock/Alarm [G]

Various

1076	3119 108 52191	Small digit display
1076	3119 108 52321	Non-Display alarm

SP/LS Module [I]

Various

C1	4822 124 40207	100UF20% 25V
C5	2238 586 59812	Y5V50V 100N
C6	4822 126 14238	X7R 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	10K00 5% 0,062W
R3	4822 051 30103	10K00 5% 0,062W
R4	4822 051 30103	10K00 5% 0,062W
R5	4822 051 30101	100R00 5% 0,062W
R6	4822 051 30101	100R00 5% 0,062W
R7	4822 051 30101	100R00 5% 0,062W
R9	4822 051 30101	100R00 5% 0,062W
U1	9965 000 11573	Jack
U2	2422 026 05223	Con phone 1P
D10	4822 130 81637	PMLL4148L
D11	4822 130 34441	BZX79-B22
D12	4822 130 34441	BZX79-B22
R11	4822 051 30103	10K00 5% 0,062W
R12	4822 051 30103	10K00 5% 0,062W
R13	4822 051 30103	10K00 5% 0,062W
R20	4822 051 30479	47R00 5% 0,062W
R21	4822 051 30102	1K00 5% 0,062W
R22	4822 051 30103	10K00 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	3P
1251	2422 020 00725	3P
1259	4822 265 41391	B9B-EH-A

Interface [J]

Various

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

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2700	3198 017 41050	10V 1μF
2701	4822 126 14305	100nF 10% 16V
2702	3198 017 41050	10V 1μF
2703	4822 124 41584	100μF 20% 10V
2704	3198 017 41050	10V 1μF
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	50V 2N2

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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 8 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 (1206)
4xxx	4822 051 20008	0Ω 5% 0.25W (0805)

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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



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	DS1813
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

Front Interface [Q1]

Various

0187	3139 124 32521	Fr. int. bracket
0211	2422 025 16268	2P
0212	2422 025 16268	2P
0214	2422 025 06353	5P
0231	2422 128 02972	switch

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2691	4822 124 40248	10μF 20% 63V
2698	5322 121 42386	100nF 5% 63V

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3500	4822 053 21335	3M3 5% 0.5W
3501	4822 053 21335	3M3 5% 0.5W
3691	4822 116 52219	330Ω 5% 0.5W
3693	4822 116 83872	220Ω 5% 0.5W

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6691	9322 172 20682	LED LTL-102SRHAP
6692	9322 174 42667	Ir rec. TOSP4136UH1

Top Control [T/T1]

Various

0011	3139 137 66921	Top ctr assy
0158	3139 131 01771	3P
0215	4822 267 10748	3P
0310	3139 124 30381	Top ctr bracket
1091	4822 276 13775	Switch
1092	4822 276 13775	Switch
1093	4822 276 13775	Switch
1094	4822 276 13775	Switch

—□—

3091	4822 051 20561	560Ω 5% 0.1W
3092	4822 051 20391	390Ω 5% 0.1W
3093	4822 051 20561	560Ω 5% 0.1W
3094	4822 051 20391	390Ω 5% 0.1W
3095	4822 051 20332	3k3 5% 0.1W
3096	4822 117 11139	1k5 1% 0.1W

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6091	4822 130 31983	BAT85
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Mains Harmonic [U]

Various

1052	3139 137 20111	Mains harm. panel
0001	4822 265 20723	B2P3-VH
0002	2422 025 16374	2P
0127	4822 265 11253	Fuse holder
0185	3139 124 38211	Mains harm. bracket
0187	3119 107 17441	CBLE 02
1000	2422 086 10914	Fuse 5X20 ET 4A IEC 250V

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2001	4822 121 10798	33nF 5% 400V
2002	4822 126 13589	470nF 275V

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3000	3198 013 01020	1/2W A 1k
3002	4822 053 21155	1M5 5% 0.5W

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5000	2422 549 44444	Mains harm. 56mH B
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