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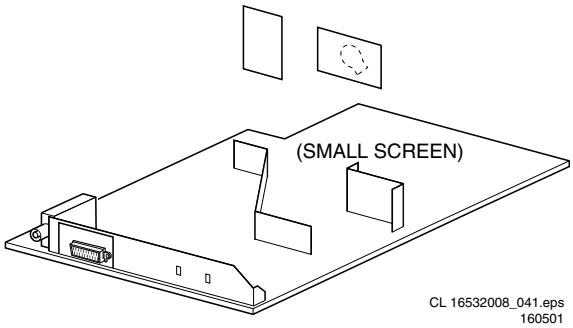

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Service Manual

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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'
	:	NTSC 3.58 (playback only)
	:	NTSC 4.43 (playback only)
Channel selections	:	100 channels
	:	UVSH
IF frequency	:	38.9 MHz
Aerial input	:	75 Ω, Coax

1.1.2 Miscellaneous

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

1.2 Connections

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

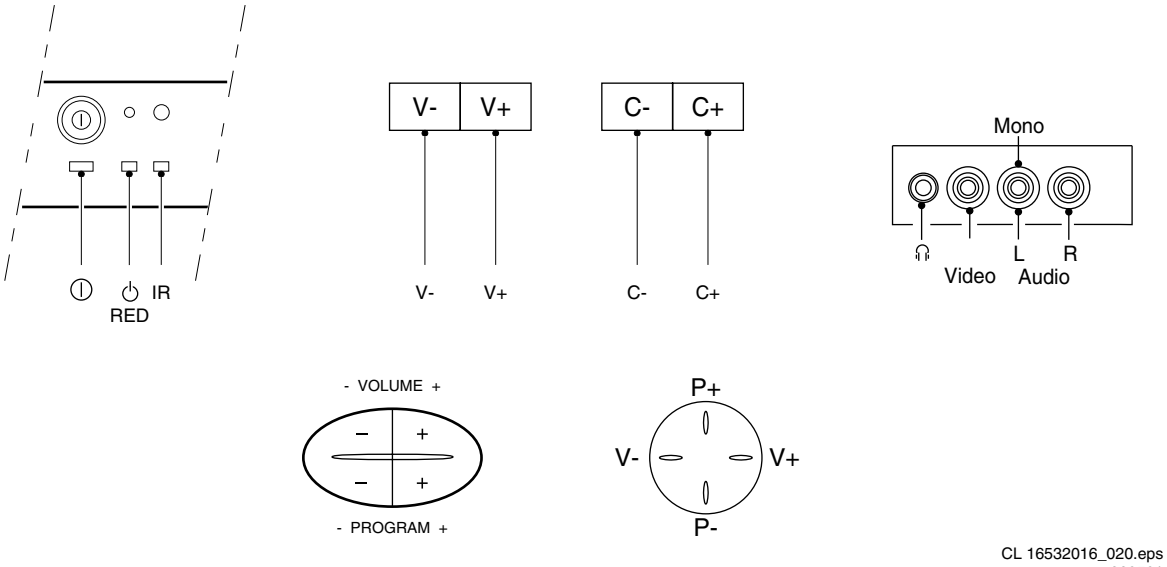

Figure 1-1

Audio / Video In

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

1.2.2 Rear Connections

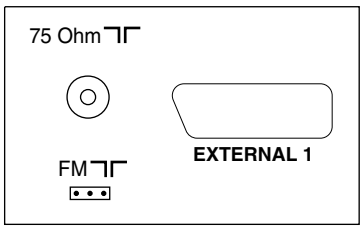

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Figure 1-2 .eps

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

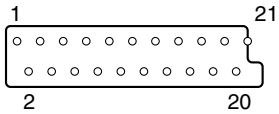

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Figure 1-3

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

TV Aerial In

Aerial input : 75 Ω, coax (IEC-type)

FM Radio In

Aerial input : via 'coax-to-3 pins' adapter
: 'cable' or 'wire' antenna

1.3 Chassis Overview

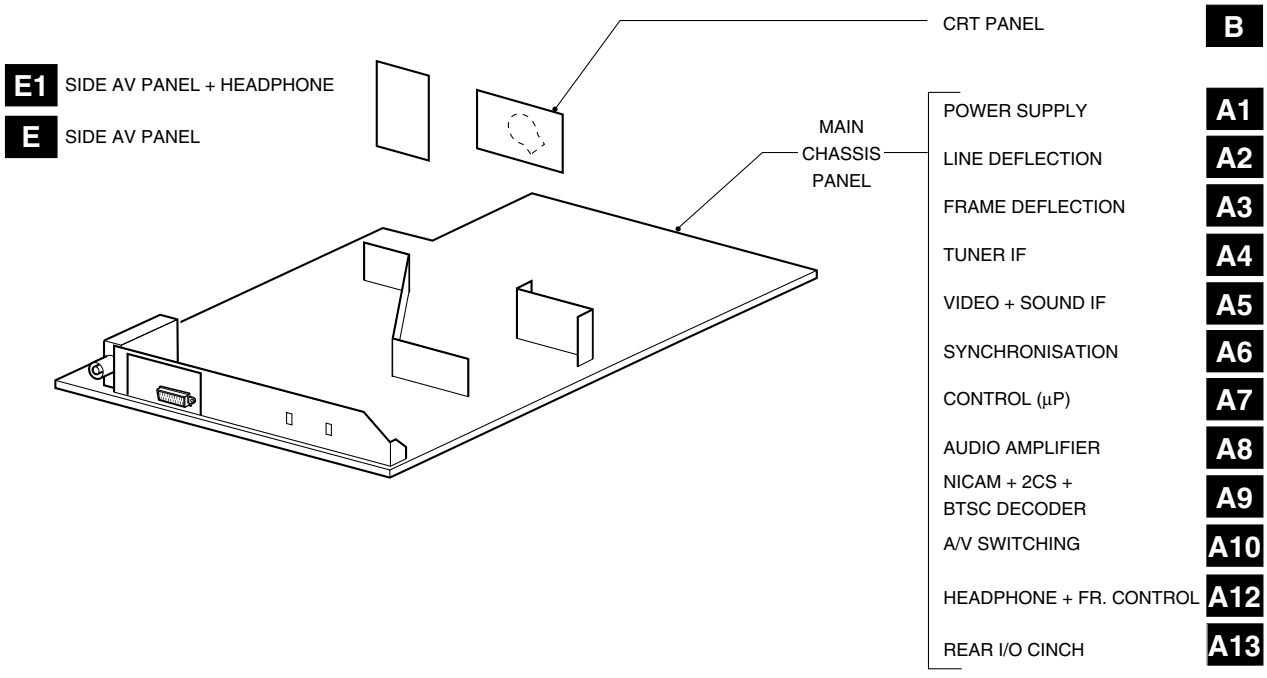

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Figure 1-4

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).

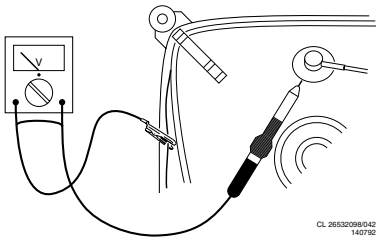


Figure 2-1

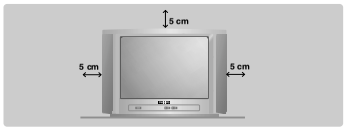
- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD) ⚠. Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and 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.

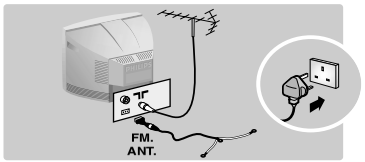
Installing your television set

❶ Positioning the television set



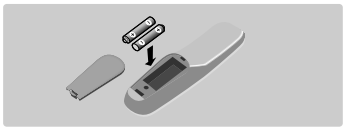
Place your TV on a solid, stable surface, leaving a space of at least 5 cm around the appliance. To avoid accidents, do not put anything on the set such as a cloth or cover, a container full of liquid (vase) or a heat source (lamp). The set must not be exposed to water.

❷ Connections



- Insert the aerial plug into the socket at the rear of the set.
- For the versions equipped with a radio: insert the radio aerial socket into the FM ANT socket using the adapter supplied.
  If you are using an indoor aerial, reception may be difficult in certain conditions. You can improve reception by rotating the aerial. If the reception remains poor, you will need to use an external aerial.
- Insert the mains plug into a wall socket (220-240 V / 50 Hz).

❸ Remote control



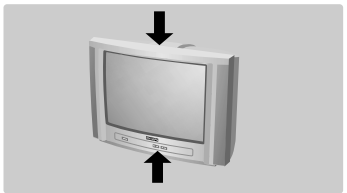
Insert the two R6-type batteries (supplied) making sure that they are the right way round. Check that the mode selector is set to TV. The batteries supplied with this appliance do not contain mercury or nickel cadmium. If you have access to a recycling facility, please do not discard your used batteries (if in doubt, consult your dealer). When the batteries are replaced, use the same type.

❹ Switching on

To switch on the set, press the on/off key. A red indicator comes on and the screen lights up. Go straight to the chapter Quick installation on page 4.
If the television remains in standby mode, press **P** ⊕ on the remote control.
The indicator will flash when you use the remote control.

The keys on the TV set

The television set has 4 keys which are located on the front or the top of the set depending on the model.



The VOLUME - + (- ◿ +) keys are used to adjust sound levels. The PROGRAM - + (- **P** +) keys are used to select the required programmes. To access the menus, simultaneously hold down the ◿ - and ◿ + keys. The PROGRAM - + keys may then be used to select an adjustment and the - ◿ + keys to make that adjustment. To exit from the menus, hold down the 2 ◿ - and ◿ + keys.
Note: when the **Child Lock** *function is activated, these keys are unavailable (refer to* **Features** *menu on page 7).*

Remote control keys

Screen information / permanent no.
To display / clear the program number, name (if it exists), time, audio mode and time remaining for the sleep feature. Press the key for 5 seconds to activate permanent display of the number. This key is also used to exit from the menu.

VCR key *

Incredible Surround
(only available on certain versions)
To activate / disable the Incredible Surround feature. In stereo, the speakers appear further apart. In mono, a pseudo-spatial stereo effect is obtained.

Pre-set sound
Used to access a series of stored settings: **Speech, Music, Theatre** and return to **Personal**.

Menu
To call up or exit the menus.

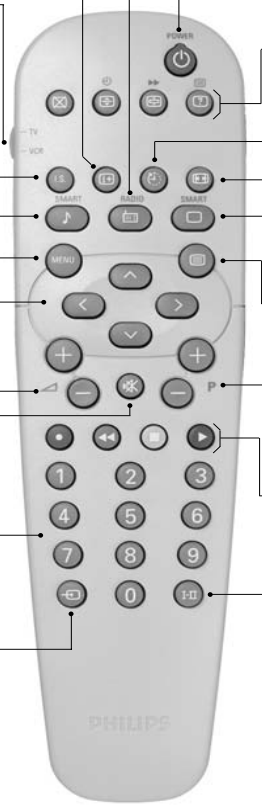
Cursor / Format 16:9
These 4 keys are used to navigate through the menus. The ⌃⌄ keys are used to enlarge or compress the picture vertically.

Volume
To adjust the sound level

Mute
To mute or restore the sound.

Number keys
Direct access to the programmes. For a 2 digit program, enter the 2nd digit before the dash disappears.

Selection of EXT socket
Press several times to select EXT1, EXT2, S-VHS and AV.



Radio / TV mode
To switch the TV set to radio or TV mode (for versions equipped with radio).

Standby
Lets you place the TV set on standby. To turn on the TV, press **P** ⊖ ⊖, ⏻, 0 to 9 (or ⏻).

Teletext keys (p. 8), VCR keys (p.11) and list of radio stations ☰ (p. 5)

Sleep
To select an automatic standby after a preset time (from 0 to 240 minutes).

To enlarge or compress the picture vertically

Pre-set image
Used to access a series of stored settings: **Bright, Natural, Soft, Multimedia** and return to **Personal**.

Teletext (p. 8)

Program selection
To access the next or previous programme. The number, (name) and sound mode are displayed for a few moments.
For some programs, the title of the program will be displayed at the bottom of the screen.

Teletext keys (p.8)
or VCR keys *

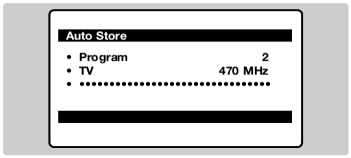
Sound mode *(only available on stereo versions)*
Used to force programmes in **Stereo** to **Mono** or, for bilingual programs, to choose between **Dual I** or **Dual II**. For TV sets equipped for Nicam reception, depending on the programmes, you can force the **Stereo Nicam** sound to **Mono** or select between **Nicam Dual I**, **Nicam Dual II** and **Mono**.
The **Mono** *indication is red when in forced position.*

* **VCR key**
The remote control lets you control the main functions of the VCR.
Press and hold down the VCR key located on the side of the remote control, then press one of the keys to access the VCR functions: ⏻ ⏻ ▶▶ MENU ⌃⌄ ‹› **P** ⊖⊕ ● ◀◀ ■ ▶ 0 9
The remote control is compatible with all VCRs using the RC5 standard.

Plug & Play

Quick installation

The first time you switch on the television, a menu appears on the screen and the tuning starts automatically.



If the menu is not displayed, press and hold down the ◿- and ◿+ keys on the TV set for 5 seconds to start the tuning.

All the available TV programs and radio stations * will be stored. This operation takes a few minutes. The display shows the progress of the search and the number of programs found. At the end of the search, the menu disappears.

To exit or interrupt the search, press (MENU).

If no program is found, consult the possible solutions p. 12.

❶ If the transmitter or cable network sends the automatic sort signal, the programs will be numbered correctly. In this case, the installation is complete.

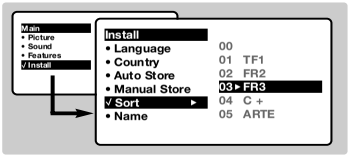
❷ If this is not the case, you need to use the **Sort** menu to number the programs correctly.

Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). In this case, indicate your choice using the ⟨⟩⟨⟩ keys and validate with (›).

* *Only on versions equipped with a radio.*

Program sort

❶ Press key (MENU). The **Main menu** is displayed on the screen.



❷ With the cursor, select the **Install** menu followed by the **Sort** menu.

❸ Select the programme you want to move using the ⟨⟩⟨⟩ keys and press (›).

❹ Then use the ⟨⟩⟨⟩ keys to select the new number and validate with (‹).

❺ Repeat steps ❸ and ❹ for each program you wish to renumber.

❻ To quit the menus, press (⊞).

Program name

If required, you can give a name to the programmes and external connectors.

Note: on installation, the programs are named automatically when an identification signal is sent.

❶ Press the (MENU) key.

❷ With the cursor, select the **Install** menu, then **Name**

❸ Use the ⟨⟩⟨⟩ keys to select the programme to name or rename.

❹ Use the (‹)(›) keys to move around the name display area (5 characters) and the ⟨⟩⟨⟩ keys to select the characters.

❺ When the name has been entered, use the (‹) key to exit. The name is stored.

❻ Repeat steps ❸ to ❺ for each programme you wish to name.

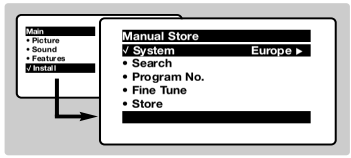
❼ To quit the menus, press (⊞).

Manual store

This menu is used to store the programmes one at a time.

❶ Press the (MENU) key.

❷ With the cursor, select the **Install** menu then **Manual store**:



❸ **System:** select **Europe** (automatic detection*) or **Western Europe** (BG standard), **Eastern Europe** (DK standard), **United Kingdom** (I standard) or **France** (LL' standard).

** Except for France (LL' standard), you must select choice* **France**.

❹ **Search:** press (›). The search starts. Once a programme is found, the scanning stops and its name is displayed (when available). Go to the next step. If you know the frequency of the required programme, this can be entered directly using the (0) to (9) keys.

If no picture is found, consult the possible solutions (p. 10).

❺ **Program No.:** enter the required number with the (‹)(›) or (0) to (9) keys.

❻ **Fine Tune:** if the reception is not satisfactory, adjust using the (‹)(›) keys.

❼ **Store:** press (›). The program is stored.

❽ Repeat steps ❹ to ❽ for each programme to store.

❾ To quit the menus, press (⊞).

Other settings in the Install menu

❶ Press the (MENU) key and select the **Install** menu:

❷ **Language:** to change the display language for the menus.

❸ **Country:** to select your country (**GB** for Great Britain).

This setting is used for the search, automatic programme sort and teletext display. If your country does not appear in the list, select "…"

❹ Auto Store: to start automatic search for all programmes available in your region. If the transmitter or cable network sends the automatic sort signal, the programmes will be numbered correctly. If this is not the case, you need to use the Sort menu to renumber the programmes (see p. 4).

Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). In this case, indicate your choice using the ⟨⟩⟨⟩ keys and validate with (›). To quit or interrupt the search, press (MENU). If no picture is found, consult the possible solutions (p. 10).

❺ To quit the menus, press (⊞).

Using the radio *(only available on certain versions)*

Choice of TV or radio mode

Press the (📺) key on the remote control to switch the TV set to either TV or radio mode. In radio mode, the number, station name (if available), frequency and sound mode are displayed on the screen. *To enter the station names, use the* **Name** *menu (p. 4)*

Program selection

Use the (0) (9) or (−) **P** (+) keys to select the FM stations (from 1 to 40).

List of radio stations

Press the (☰) key to display the list of radio stations radio. Use the ⟨⟩⟨⟩ keys to change station and the (⊞) key to exit.

Using the radio menus

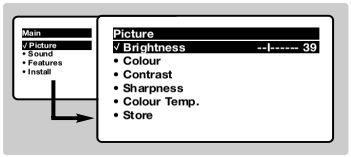
Use the (MENU) key to access the specific radio setting.

Search for radio stations

If you used the quick installation, all available FM stations have already been stored. To start a new search, use the **Install : Auto Store** menu (for a complete search) or **Manual Store** (for a station by station search). The **Sort** and **Name menus** let you sort or name the radio stations. Operation of these menus is the same as for the TV menus.

Picture settings

❶ Press (MENU) then (›). The **Picture** menu is displayed:



❷ Use the (‹)(›) keys to select a setting and the (‹)(›) keys to adjust.
Note: during the picture adjustment, only the selected line remains displayed. Press (‹)(›) to display the menu again.

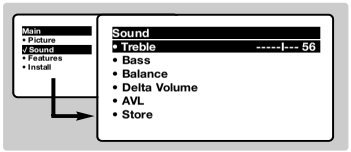
❸ Once the adjustments have been made, select **Store** and press (›) to store them. Press (⏻) to exit.

Description of the adjustments:

- **Brightness:** this changes picture brilliance.
- **Colour:** this changes the intensity of the colour.
- **Contrast:** this changes the difference between the light and dark tones.
- **Sharpness:** this changes the picture definition.
- **Colour Temp.:** this changes the colour rendering: **Cold** (bluer), **Normal** (balanced) or **Warm** (redder).
- **Store:** to store the picture adjustments and settings (as well as the settings for **Contrast +** and **NR** in the **Features** menu).

Sound adjustments

❶ Press (MENU), select Sound (‹) and press (›). The **Sound** menu is displayed:



❷ Use the (‹)(›) keys to select a setting and the (‹)(›) keys to adjust.
❸ Once the adjustments have been made, select Store and press (›) to store these changes.
❹ To quit the menus, press (⏻).

Description of the settings:

- **Treble**: this alters the high frequency sounds.
- **Bass:** this alters the low frequency sounds.
- Balance: this balances the sound on the left and right speakers.
- **Delta Volume***: this is used to compensate any volume discrepancies between the different programs or EXT sockets. This setting is available for programs 0 to 40 and the EXT sockets.
- **AVL*** (Automatic Volume Leveller): this is used to limit increases in sound, especially on program change or advertising slots.
- **Store:** this is used to store the sound settings.

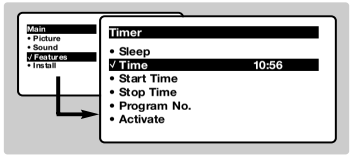
** Only available on certain versions.*

Feature settings

❶ Press (MENU), select **Features** (‹) and press (›). You can adjust:
❷ **Timer**, **Child Lock** and **Parental Cont.**: see next page
❸ **Contrast +:** automatic adjustment of the picture contrast which permanently sets the darkest part of the picture to black.
❹ **NR:** attenuates picture noise (snow) in difficult reception conditions.
Caution: to store the **Contrast +** *and* **NR** *settings, use the* **Store** *choice in the* **Picture** *menu.*
❺ To quit the menus, press (⏻).

Timer function *(only available on certain versions)*

This menu lets you use the TV set as an alarm.
❶ Press the (MENU) key.
❷ With the cursor, select the Options menu then **Timer** :
❸ **Sleep:** to select an automatic standby period.



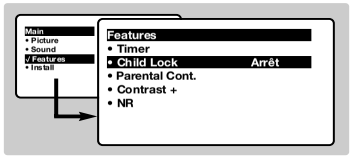
This setting is also available via the ⏲ key on the remote control.
❹ **Time:** enter the current time.
Note: the time is updated automatically each time the TV set is switched on via the teletext information on program no. 1. If this program does not have teletext, the update will not take place.
❺ **Start Time:** enter the start time.
❻ **Stop Time:** enter the standby time.
❼ **Program No.:** enter the number of the programme for the wake-up alarm. For models equipped with a radio, you can select an FM station by using the (‹)(›) keys (the (0)(9) keys are only used to select TV programs).
❽ **Activate:** the settings include:
• **Once** for a single alarm,
• **Daily** for each day,
• **Stop** to cancel.
❾ Press (⏻) to put the TV set in standby. It will automatically come on at the time programmed. If you leave the TV set on, it will just change programmes at the time entered (and will go to standby mode at the **Stop Time**).
By combining the **TV lock** *and* **Timer** *functions, you can restrict the period during which the TV set is used, for example by your children.*

TV lock *(only available on certain versions)*

You can block certain programs or inhibit use of the TV set completely by locking the keys.

Child lock

❶ Press (MENU).
❷ With the cursor, select the **Options** menu and position **Child Lock** to **On**.
❸ Turn off the TV set and hide the remote control. The TV set cannot be used (except via the remote control).
❹ To cancel: position **Child Lock** to **Off**.

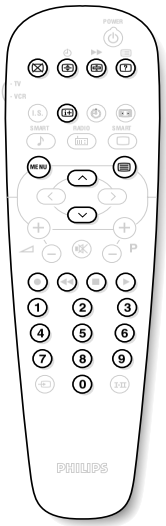


Parental control

❶ Press the (MENU) key, select the **Features** menu then **Parental Cont.**:
❷ You must enter your secret access code.
The first time you enter this, enter code 0711 twice and then enter your new code choice. The menu is displayed.
❸ **Parental Cont.:** Use the (‹)(›) keys to select the TV programme required and validate with (›). The 🔒 symbol will be displayed opposite the programmes or sockets that are locked. From now on, to view a locked programme, you must enter your secret code, otherwise the screen will stay blank.
The access to the **Install** *menu is also locked. Caution, for encrypted programs using an external decoder, you must lock the corresponding EXT socket.*
❹ **Change code:** this allows you to enter a new 4 digit code. Confirm your new code by entering it a second time.
If you have forgotten your secret code, enter the universal code 0711 twice.
❺ **Unlock all:** this is used to unlock all locked programmes.
❻ **Lock All:** this is used to lock all the TV programmes and EXT connectors.
❼ Press the (⏻) key to quit.

Teletext

Teletext is an information system broadcast by certain channels which can be consulted like a newspaper. It also offers access to subtitles for viewers with hearing problems or who are not familiar with the transmission language (cable networks, satellite channels, etc.).

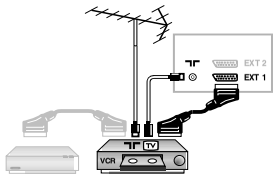


Press :	You will obtain:
Teletext call	This is used to call teletext, change to transparent mode and then exit. The summary appears with a list of items that can be accessed. Each item has a corresponding 3 digit page number. *If the channel selected does not broadcast teletext, the indication 100 will be displayed and the screen will remain blank (in this case, exit teletext and select another channel).*
0/9 **Selecting a page**	Enter the number of the page required using the 0 to 9 or − **P** + keys, ∧∨. Example: page 120, enter 1 2 0. The number is displayed top left, the counter turns and then the page is displayed. Repeat this operation to view another page. *If the counter continues to search, this means that the page is not transmitted. Select another number.*
Direct access to the items	Coloured areas are displayed at the bottom of the screen. The 4 coloured keys are used to access the items or corresponding pages. *The coloured areas flash when the item or the page is not yet available.*
Contents	This returns you to the contents page (usually page 100).
Temporary stop	This is used to temporarily disable or activate the teletext display.
Enlarge a page	This allows you to display the top or bottom part of the page and then return to normal size.
Stop sub-page acquisition	Certain pages contain sub-pages which are automatically displayed successively. This key is used to stop or resume sub-page acquisition. The indication appears top left.
Hidden information	To display or hide the concealed information (games solutions).
MENU **Favourite pages**	For teletext programs 0 to 40, you can store 4 favourite pages which can then be accessed directly using the coloured keys (red, green, yellow, blue). 1 Press the MENU key to change to favourite pages mode. 2 Display the teletext page that you want to store. 3 Press the coloured key of your choice for 3 seconds. The page is now stored. 4 Repeat the operation with the other coloured keys. 5 You can now consult teletext and your favourite pages will appear in colour at the bottom of the screen. To retrieve the standard items, press MENU. *To clear everything, press for 5 seconds.*

Connecting peripheral equipment

Depending on the versions, the TV set will be equipped with 1 or 2 SCART connectors EXT1 and EXT2 located on the rear. *The EXT1 socket has audio, CVBS/RGB inputs and audio, CVBS outputs. The EXT2 socket (if available) has audio, CVBS/S-VHS inputs and audio, CVBS outputs.*

Video recorder



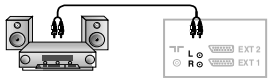
Carry out the connections shown opposite, using a good quality euroconnector cable.
If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder's test signal and assign it programme number 0 (refer to manual store, p. 6).
To reproduce the video recorder picture, press 0.

Video recorder with decoder
Connect the decoder to the second euroconnector socket of the video recorder. You will then be able to record scrambled transmissions.

Other equipment

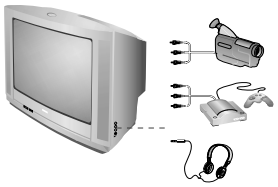
Satellite receiver, decoder, CDV, games, etc.
For TV sets with 2 SCART connectors, preferably connect the equipment delivering RGB signals (digital decoders, DVD players, games consoles, etc.) to EXT1 and the equipment delivering S-VHS signals (S-VHS and Hi-8 VCRs) to EXT2.

Amplifier *(only available on certain versions)*



To connect to a hi-fi system, use an audio connection cable and connect the "L" and "R" outputs on the TV set to the "AUDIO IN" "L" and "R" input on your hi-fi amplifier.

Front panel connectors *(only available on certain versions)*



Depending on the versions, the connectors are located on the front (sometimes under a flap) or on the right-hand side of the TV set. Make the connections as shown opposite. With the key, select AV.
For a monophonic device, connect the audio signal to the AUDIO L input. Use the I-II key to reproduce the sound on the left and right speakers of the TV set.

Headphones
When headphones are connected, the sound on the TV set will be cut. The − **P** + keys are used to adjust the volume level.
The headphone impedance must be between 32 and 600 Ohms.

To select connected equipment

Press the key to select **EXT1** and on the versions with 2 scarts, **EXT2**, **S-VHS2** (S-VHS signals from the EXT2 socket) and **AV** for the side connections (if available).
Most equipment (decoder, video recorder) carries out the switching itself.

4. Mechanical Instructions

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

4.1 Rear Cover Removal

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

4.2 Service Position Main Panel

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

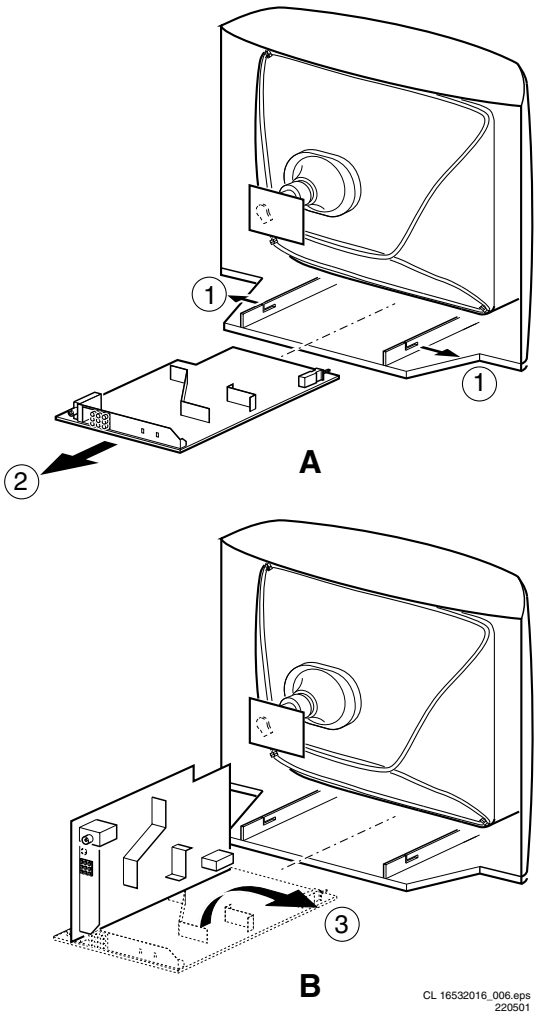


Figure 4-1

4.3 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.

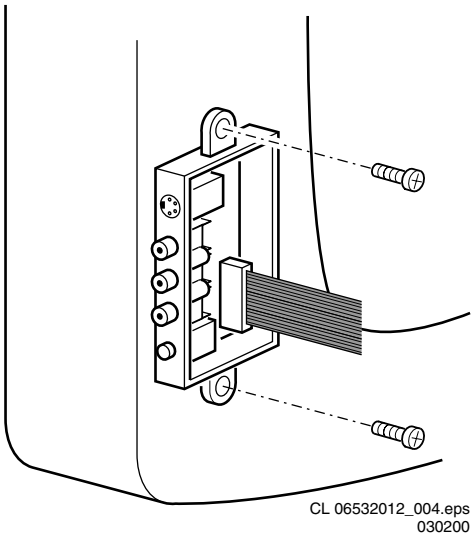


Figure 4-2

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 of this chapter:

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:

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	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

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Figure 5-1

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

5.2 Service Modes

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

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all L01 chassis.
Minimum requirements: a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are also acceptable (see also paragraph 5.4).

SW cluster	SW name	UOC-type	Diversity	Remark
1EU0	L01EM0-x.y	TDA9570/71/72	E/W-Europe, Mono, non-TXT	All Service Modes
2EU0	L01ET0-x.y	TDA9550/52	West-Europe, 1 page TXT	All Service Modes
2EU9	L01ET9-x.y	TDA9551	East-Europe, 1 page TXT	All Service Modes
3EU1	L01EF1-x.y	TDA9567	West-Europe, 10 page TXT	All Service Modes
3EU2	L01EF2-x.y	TDA9561	East-Europe, 10 page TXT	All Service Modes
Abbreviations: E= Europe, F= Full TXT, M= mono, T= 1 page TXT				

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Figure 5-2

5.2.1 Service Default Mode (SDM)

Purpose
- To create a predefined setting to get the same measurement results as given in this manual.
- To override SW protections.
- To start the blinking LED procedure.

Specifications
- Tuning frequency:
  - 475.25 MHz for PAL/SECAM (Europe and AP-PAL).
  - 61.25 MHz (channel 3) for NTSC-sets (AP-NTSC).
- Colour system:
  - 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-favourite pre-sets/channels,
  - auto store of personal pre-sets,
  - auto user menu time-out.

How to enter SDM
Use one of the following methods:
- Use a standard customer RC-transmitter and key in the code '062596' directly followed by the MENU button or
- Short wires 9631 and 9641 on the mono carrier (see Fig. 8-1) and apply Mains voltage. Then press the power button (remove the short after start-up).
  Caution: Entering SDM by shorten 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.
- Or via ComPair.

After entering SDM, the following screen is visible, with SDM at the upper right side for recognition.

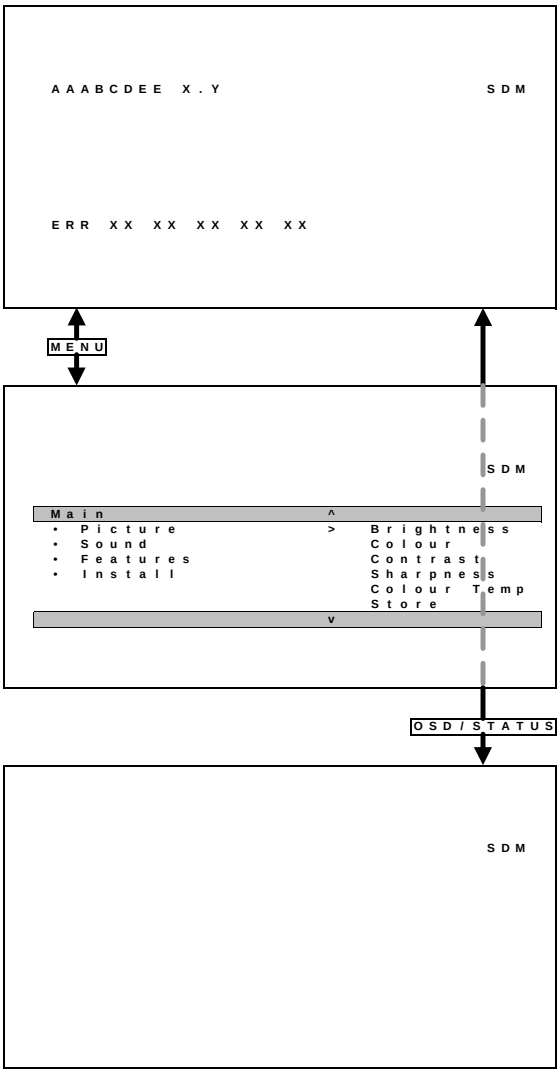

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Figure 5-3

How to navigate
Use one of the following methods:
- When you press the MENU button on the remote control, the set will switch between the SDM and the normal user menu (with the SDM mode still active in the background). Return to the SDM screen with the OSD/STATUS button.
- When you press the OSD/STATUS button on the remote control, the menu will show or hide the error buffer. This feature is available to prevent interference during waveform measurements.
- On the TV, press and hold the 'VOLUME down' and press the 'CHANNEL down' for a few seconds, to switch from SDM to SAM and reverse.

How to exit
Switch the set to STANDBY by pressing the power button on the remote control transmitter (if you switch the set 'off' by removing the Mains voltage, the set will return in SDM when Mains voltage is re-applied). The error buffer is cleared.

5.2.2 Service Alignment Mode (SAM)

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

Specifications
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter
Use one of the following methods:
- Use a standard customer RC-transmitter and key in the code '062596' directly followed by the OSD/STATUS button [i+] or
- Via ComPair.

The following screen is visible, with SAM at the upper right side for recognition.

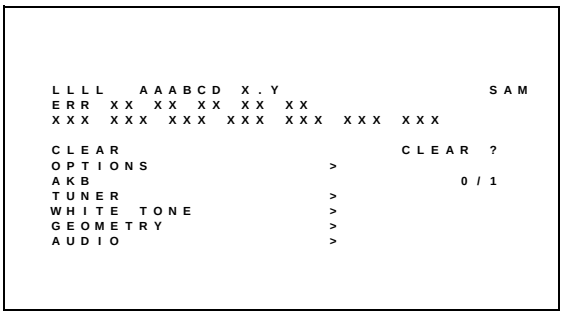

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Figure 5-4

1. **LLLL** This is the operation hours counter. It counts the normal operation hours, not the standby hours.
2. **AAABCD-X.Y** This is the software identification of the main micro controller
   - A = the project name (L01).
   - B = the region: E = Europe, A = Asia Pacific, U = NAFTA, L = LATAM.
   - C = the software diversity: D= DVD, F= full TXT, M= mono, T= 1 page TXT.
   - D = the language cluster number.
   - X = the main software version number.
   - Y = the sub software version number.
3. **SAM** Indication of the actual mode.
4. **Error buffer** Five errors possible.
5. **Option bytes** Seven codes possible.
6. **Clear** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
7. **Options** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
8. **AKB** Disable (0) or enable (1) the 'black current loop' (AKB = Auto Kine Bias).
9. **Tuner** To align the Tuner. See chapter 8.3.2 for a detailed description.
10. **White Tone** To align the White Tone. See chapter 8.3.3 for a detailed description.
11. **Geometry** To align the Geometry. See chapter 8.3.4 for a detailed description.
12. **Audio** To align the Audio. See chapter 8.3.5 for a detailed description.

How to navigate
Use one of the following methods:
- In SAM, 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:

- (De)activate the selected menu item.
- Change the value of the selected menu item.
- Activate the selected submenu.

- When you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the OSD/STATUS button [i+].
- When you press the MENU key in a submenu, you will return to the previous menu.

How to exit

Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the Mains voltage, the set will return in SAM when Mains voltage is re-applied). The error buffer is **not** cleared.

5.2.3 Customer Service Mode (CSM)

Purpose

When a customer is having problems with his TV-set, he can call his dealer. The service technician can than ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severness of the complaint. In many 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 enter

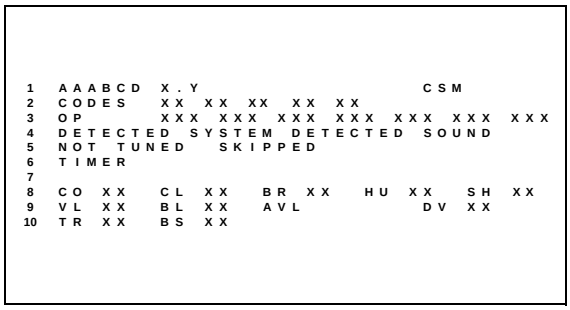

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Figure 5-5

The CSM will be turned on after pressing the MUTE key on the remote control transmitter and any of the control buttons on the TV for at least 4 seconds **simultaneously**. This activation only works if there is no menu on the screen.

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

1. Software identification of the main micro controller (see paragraph 5.2.2 for an explanation).
2. Error code buffer (see paragraph 5.5 for more details). Displays the last seven errors of the error code buffer.
3. In this line, the Option Bytes (OP) 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 colour and sound system is installed for the selected pre-set.
5. Indicates if the set is not receiving an 'IDENT' signal on the selected source. It will display 'Not Tuned'.
6. Indicates if the sleep timer is enabled.
7. Not applicable for Europe.
8. Value indicates parameter levels at CSM entry. CO= CONTRAST, CL= COLOR, BR= BRIGHTNESS, HU= HUE, SH= SHARPNESS
9. Value indicates parameter levels at CSM entry. VL= VOLUME LEVEL, BL= BALANCE LEVEL, AVL= AUTO VOLUME LEVEL LIMITER, DV= DELTA VOLUME
10. Value indicates parameter levels at CSM entry (only for stereo sets). TR= TREBLE, BS= BASS

How to exit

Use one of the following methods:

- After you press 'any' key of the remote control transmitter with exception of the CHANNEL and VOLUME keys.
- After you switch-off the TV set with the Mains voltage 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 INSTALL sub menu.
3. Select the MANUAL STORE sub menu.
4. Select and change the SYSTEM setting until picture and sound are correct.
5. 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 INSTALL sub menu.
3. Select the MANUAL STORE sub menu.
4. Select and change the SYSTEM setting until picture and sound are correct.
5. Select the STORE menu item.

TV switches 'off' (or 'on') or changes the channel without any user action

(Sleep)timer switched the set 'off' or changed channel. To change the setting:

1. Press the MENU button on the remote control.
2. Select the FEATURES sub menu.
3. Select the TIMER sub menu.
4. Select and change the SLEEP or TIME setting.

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 picture improves after you have switched on the Customer Service Mode

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 picture improves after you have switched on the Customer Service Mode

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 picture improves after you have switched on the Customer Service Mode

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 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the L01 chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector (located on the Main panel, see also figure 8-1 suffix D).

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I^2C level. ComPair can access the I^2C bus of the television. ComPair can send and receive I^2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I^2C busses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. Does the screen gives a picture? Click on the correct answer: YES/NO) and showing you examples (e.g. Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

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

Beside fault finding, ComPair provides some **additional features** like:
- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the (European) Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. Example: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.*Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568. Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 How To Connect

1. First install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the Mains voltage adapter to the supply connector (marked with 'POWER 9V DC') on the ComPair interface.
4. Switch the ComPair interface OFF.
5. Switch the television set OFF (remove the Mains voltage).
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I^2C') and the ComPair connector on the mono carrier (see figure 8-1 suffix D).
7. Plug the Mains voltage adapter in the Mains voltage outlet and switch on the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'introduction' chapter.

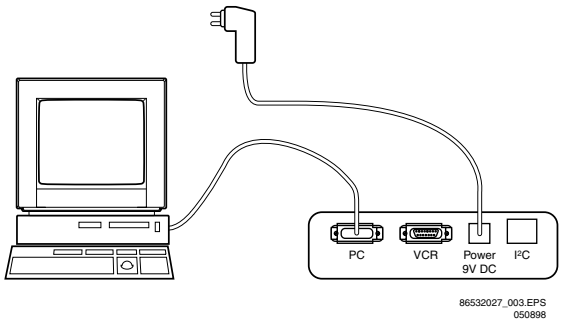

Figure 5-6

5.4.4 How To Order

ComPair order codes:
- Starter kit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- Starter kit ComPair software (registration version): 4822 727 21634
- Starter kit SearchMan software: 4822 727 21635
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable: 3122 785 90004

5.5 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.

5.5.1 How to Read the Error Buffer

Use one of the following methods:
- On screen via the SAM (only if you have a picture). Examples:
  - ERROR: **0 0 0 0 0** : No errors detected
  - ERROR: **6 0 0 0 0** : Error code 6 is the last and only detected error
  - ERROR: **9 6 0 0 0** : Error code 6 was 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.
- Via ComPair.

5.5.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:
- By activation of the CLEAR command in the SAM menu:
- When you exit SDM/SAM with the STANDBY command on the remote control (when leaving SDM/SAM, by disconnecting the set from Mains voltage, the error buffer is not reset).
- When you transmit the command DIAGNOSE-99-OK with ComPair.
- If the content of the error buffer has not changed for 50 hours, it resets automatically.

5.5.3 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. These 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).

ERROR CODE TABLE				
Error	**Device**	**Error description**	**Def. item**	**Diagram**
0	Not applicable	No Error		
1	Not applicable	X-Ray/overvoltage protection (USA only)	2465, 7460	A2
2	Not applicable	Horizontal protection	7460, 7461, 7462, 7463, 6467	A2
	TDA8359/TDA9302	Vertical protection	7861, VlotAux+13V	A2, A3
3	Reserve			
4	MSP34X5 / TDA9853	MSP I²C identification error	7831 or 7861	A9 or A11
5	TDA95xx	POR 3V3 / +8V protection	7200, 7560, 7480	A5, A6, A7, A1, A2
6	I²C bus	General I²C bus error	7200, 3624, 3625	A7
7	AN7522/3	Power down (over current) protection	7901 / 7902, 7561	A8, A1
8	Not applicable	E/W protection (Large Screen)	7400, 3405, 3406, 3400	A2
9	M24C08	NVM I²C identification error	7602, 3611, 3603/04	A7
10	Tuner	Tuner I²C identification error	1000, 7482	A4, A2
11	TDA6107/8	Black current loop protection	7330, RGB amps, CRT	B1, B2
12	M65669	PIP I²C identification error	7803	P

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Figure 5-7

5.6 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.

When the SDM is entered, the LED will blink the contents of the error-buffer.
Error-codes ≥ 10 are shown as follows:
– a long blink of 750 ms (which is an indication of the decimal digit),
– a pause of 1.5 s,
– n short blinks (n = 1 - 9),
– when all the error-codes are displayed, the sequence finishes with a LED blink of 3 s.,
– the sequence starts again.

Example of error buffer: **12 9 6 0 0**
After entering SDM:
– 1 long blink of 750 ms followed by a pause of 1.5 s,
– 2 short blinks followed by a pause of 3 s,
– 9 short blinks followed by a pause of 3 s,
– 6 short blinks followed by a pause of 3 s,
– 1 long blink of 3 s to finish the sequence,
– the sequence starts again.

5.7 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 (SAM), the blinking LED procedure or via ComPair. The DST diagnose functionality will force the set into the Service-standby, which is similar to the usual standby mode, however the microprocessor has to remain in normal operation completely.

To get a quick diagnosis the chassis has three service modes implemented:
- The Customer Service Mode (CSM).
- The Service Default Mode (SDM). Start-up of the set in a predefined way.
- The Service Alignment Mode (SAM). Adjustment of the set via a menu and with the help of test patterns.

See for a detailed description Chapter 9 paragraphs Deflection and Power Supply.

5.8 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 de-soldering L5561, meaning that problem is in the 'MainSupply' load. No output voltages at LOT, no horizontal deflection. Reason: line transistor 7402 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 ground to measuring equipment, than the gate).
- **Set is in hiccup mode and shuts down after 8 s.**
  Blinking LED (set in SDM mode) indicates error 5. As it is unlikely that μP 'POR' and '+8V protection' happen at the same time, measure the '+8V'. If this voltage is missing, check transistor TS7408.
- **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 10, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 6 and 7 are okay, 'VT_supply' at pin 9 is missing. Conclusion: resistor 3428 is defective.
- **Set turns on, but with a half screen at the bottom. Sound is okay**
  Blinking LED (set in SDM mode) indicates error 2. Check 'Vlotaux+13V', '+5V' 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:

Personal Notes:

Personal Notes:

8. Alignments

Index of this chapter:
1. General Alignment Conditions
2. Hardware Alignments
3. Software Alignments and Settings

Note: The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
- Mains voltage and frequency: according to country's standard.
- Connect the set to the Mains 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: Ri > 10 MΩ; Ci < 2.5 pF.
- Use an **isolated** trimmer/screwdriver to perform the alignments.

8.2 Hardware Alignments

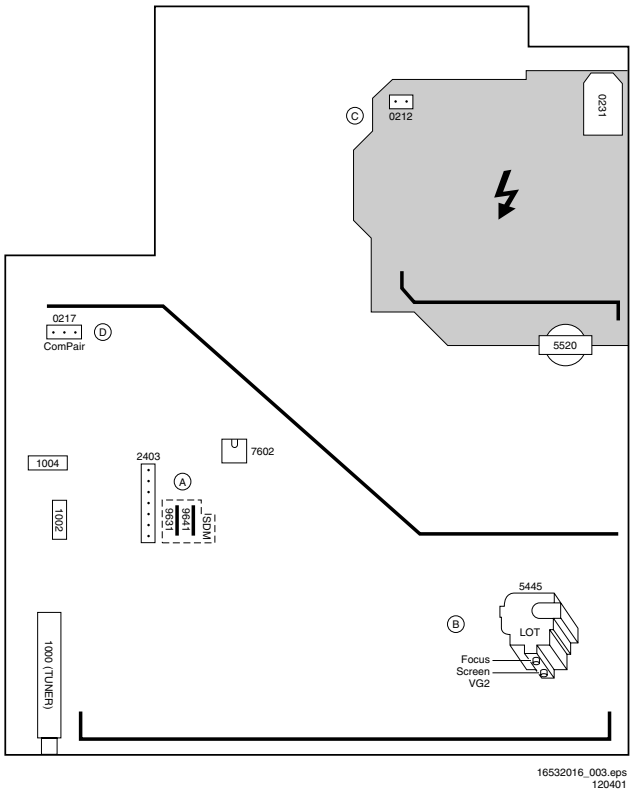

Figure 8-1

8.2.1 Vg2 Adjustment

1. Activate the SAM.
2. Go to the WHITE TONE sub menu.
3. Set the values of NORMAL RED, GREEN and BLUE to 40.
4. Go, via the MENU key, to the normal user menu and set
   – CONTRAST to zero.
   – BRIGHTNESS to minimum (OSD just visible in a dark room).
5. Return to the SAM via the MENU key.
6. 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).
7. Set the channel of the oscilloscope to 50 V/div and the time base to 0.2 ms (external triggering on the vertical pulse).
8. Ground the scope at the CRT panel and connect a 10:1 probe to one of the cathodes of the picture tube socket (see diagram B).
9. Measure the cut off pulse during first full line after the frame blanking (see Fig. 8-2). You will see two pulses, one being the cut off pulse and the other being the white drive pulse. Choose the one with the lowest value, this is the cut off pulse.
10. Select the cathode with the highest V_{DC} value for the alignment. Adjust the V_{cutoff} of this gun with the SCREEN potentiometer (see Fig. 8-1) on the LOT to the correct value (see table below).
11. Restore BRIGHTNESS and CONTRAST to normal (= 31).

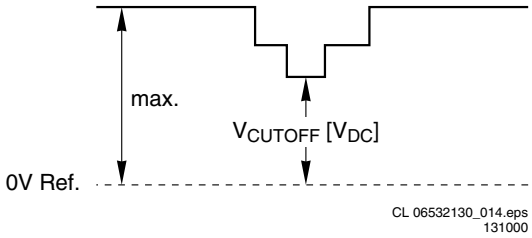

Figure 8-2

CUT-OFF VOLTAGE	
Screen size	**Cut-off [V]**
13V, 14", 14RF, 15RF, 17", 19V, 20"	140 ± 4
21" (L01S)	150 ± 4
21" (L01L), 20RF, 21RF, 24WS, 25BLD, 25HF, 28 BLD, 28WS	125 ± 4
25V, 25BLS, 25RF, 27V, 28BLS, 29", 29RF, 32V, 33", 32WS, 35V	145 ± 10

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Figure 8-3

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 (or MOVIES) 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

Enter the Service Alignment Mode (see chapter 5). The SAM menu will now appear on the screen.
Select one of the following alignments:
1. Options

2. Tuner
3. White Tone
4. Geometry
5. Audio

8.3.1 Options

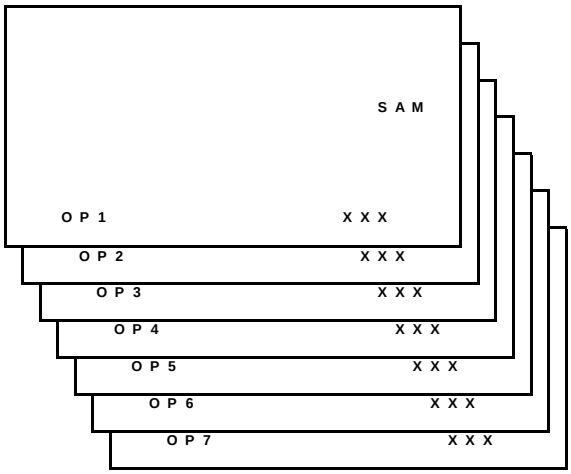

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Figure 8-4

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 saves changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the Mains 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 numbers per typenumber.

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**

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Figure 8-5

Typenumber	OB1	OB2	OB3	OB4	OB5	OB6	OB7
14PT1346/05	4	196	0	0	64	0	66
14PT1346/58	4	196	0	0	64	0	65
14PT1356/00	4	196	0	0	208	0	66
14PT1356/01	4	196	0	0	208	0	67
14PT1356/05	4	196	0	0	208	0	66
14PT1356/58	4	196	0	0	208	0	65
14PT1556/00	4	196	0	0	208	0	66
14PT1546/58	4	196	0	0	64	0	65
14PT1546/05	4	196	0	0	64	0	66
14PT1556/01	4	196	0	0	208	0	67
14PT1556/05	4	196	0	0	208	0	66
14PT1556/21	4	196	0	0	208	0	67
14PT1666/01	220	246	65	16	208	54	67
14PT1666/58	220	246	65	16	208	54	65
14PT1686/01C	220	246	65	16	208	54	67
14PT1686/01B	220	246	65	16	208	54	67
14PT1686/01L	220	246	65	16	208	54	67
14PT1686/01M	220	246	65	16	208	54	67
14PT1686/01V	220	246	65	16	208	54	67
14PT1686/01Y	220	246	65	16	208	54	67
14PT1686/05B	220	246	65	16	208	54	66
14PT1686/05C	220	246	65	16	208	54	66
14PT1686/05L	220	246	65	16	208	54	66
14PT1686/05M	220	246	65	16	208	54	66
14PT1686/05V	220	246	65	16	208	54	66
14PT1686/05Y	220	246	65	16	208	54	66
14PT1686/58B	220	246	65	16	208	54	65
14PT1686/58C	220	246	65	16	208	54	65
14PT1686/58L	220	246	65	16	208	54	65
14PT1686/58M	220	246	65	16	208	54	65
14PT1686/58V	220	246	65	16	208	54	65
14PT1686/58Y	220	246	65	16	208	54	65
14PT2666/01	220	246	65	184	208	54	67
14PT2666/05	220	246	65	184	208	54	66
14PT2666/58	220	246	65	184	208	54	65
17PT1666/00	220	246	65	16	208	54	66
17PT1666/01	220	246	65	16	208	54	67
17PT1666/05	220	246	65	16	208	54	66
17PT1666/58	220	246	65	16	208	54	65
20PT1346/00	4	196	0	0	192	0	67
20PT1346/01	4	196	0	0	192	0	67
20PT1346/58	4	196	0	0	192	0	65
20PT1546/00	4	196	0	0	192	0	67
20PT1546/01	4	196	0	0	192	0	67
20PT1546/58	4	196	0	0	192	0	65
21PT1346/58	4	196	0	0	64	0	65
21PT1356/00	4	196	0	0	208	0	66
21PT1356/01	4	196	0	0	208	0	67
21PT1356/58	4	196	0	0	208	0	65
21PT1546/58	4	196	0	0	64	0	65
21PT1556/00	4	196	0	0	208	0	66
21PT1556/05	4	196	0	0	208	0	66
21PT1556/58	4	196	0	0	208	0	65
21PT1666/01	220	246	65	16	208	54	67
21PT1666/05	220	246	65	16	208	54	66
21PT1866/58	220	246	65	16	208	54	65
21PT4406/01	4	196	64	40	240	0	67
21PT4406/05	4	196	64	40	240	0	67
21PT4406/21	4	196	64	40	240	0	67
21PT4406/58	4	196	64	40	240	0	65
21PT4456/01	220	246	65	56	240	2	67
21PT4456/05	220	246	65	56	240	2	67
21PT4456/58	220	246	65	56	240	2	65
37TA1266/18	4	20	0	0	64	0	67
37TA1266/58	4	20	0	0	64	0	65
37TA1276/03	4	4	0	0	64	0	66
37TA1276/08	4	4	0	0	64	0	66
37TA1276/11	4	4	0	0	64	0	67
37TA1276/16	4	4	0	0	64	0	66
37TA1476/18	4	4	0	0	64	0	67
37TA1476/16	4	4	0	0	64	0	66
37TA1476/03	4	4	0	0	64	0	66
37TB1256/19	4	20	0	0	64	0	67
51TA1266/18	4	4	0	0	64	0	67
51TA1476/11	4	4	0	0	64	0	67
51TA1476/03	4	4	0	0	64	0	66
51TA1476/16	4	4	0	0	64	0	66
51TB1256/19	4	4	0	0	64	0	67
52TA1466/18	4	4	0	0	64	0	67
52TA1476/03	4	4	0	0	64	0	66
52TA1476/11	4	4	0	0	64	0	67
52TA1476/16	4	4	0	0	64	0	66
52TB1456/19	4	4	0	0	64	0	67

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Figure 8-6

Option Bit Assignment

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

- **Option Byte 1 (OB1)**
  - OP10: CHINA
  - OP11: VIRGIN_MODE
  - OP12: UK_PNP
  - OP13: ACI
  - OP14: ATS
  - OP15: LNA
  - OP16: FM_RADIO
  - OP17: PHILIPS_TUNER
- **Option Byte 2 (OB2)**
  - OP20: HUE
  - OP21: COLOR_TEMP
  - OP22: CONTRAST_PLUS
  - OP23: TILT
  - OP24: NOISE_REDUCTION
  - OP25: CHANNEL_NAMING
  - OP26: SMART_PICTURE
  - OP27: SMART_SOUND
- **Option Byte 3 (OB3)**
  - OP30: AVL
  - OP31: WSSB
  - OP32: WIDE_SCREEN
  - OP33: SHIFT_HEADER_SUBTITLE
  - OP34: CONTINUOUS_ZOOM
  - OP35: COMPRESS_16_9
  - OP36: EXPAND_4_3
  - OP37: EW_FUNCTION
- **Option Byte 4 (OB4)**
  - OP40: STEREO_NON_DBX
  - OP41: STEREO_DBX
  - OP42: STEREO_PB
  - OP43: STEREO_NICAM_2CS
  - OP44: DELTA_VOLUME
  - OP45: ULTRA_BASS
  - OP46: VOLUME_LIMITER
  - OP47: INCR_SUR
- **Option Byte 5 (OB5)**
  - OP50: PIP
  - OP51: HOTEL_MODE
  - OP52: SVHS
  - OP53: CVI
  - OP54: AV3
  - OP55: AV2
  - OP56: AV1
  - OP57: NTSC_PLAYBACK
- **Option Byte 6 (OB6)**
  - OP60: Reserved (value = 0)
  - OP61: SMART_TEXT
  - OP62: SMART_LOCK
  - OP63: VCHIP
  - OP64: WAKEUP_CLOCK
  - OP65: SMART_CLOCK
  - OP66: SMART_SURF
  - OP67: PERSONAL_ZAPPING
- **Option Byte 7 (OB7)**
  - OP70: SOUND_SYSTEM_AP_3/ MULTI_STANDARD_EUR/SYSTEM_LT_2
  - OP71: SOUND_SYSTEM_AP_2/WEST_EU/ SYSTEM_LT_1
  - OP72: SOUND_SYSTEM_AP_1
  - OP73: COLOR_SYSTEM_AP
  - OP74: Reserved (value = 0)
  - OP75: Reserved (value = 0)
  - OP76: TIME_WIN2
  - OP77: TIME_WIN1

Option bit definition

OP10: CHINA
0 : Tuning is not for China set, or this option bit is not applicable,
1 : Tuning is for China set,
Default setting : 0.

OP11: VIRGIN_MODE
0 : Virgin mode is disabled or not applicable,
1 : Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial start-up of the TV when VIRGIN_MODE is set to 1. After installation is finished, this option bit will be automatically set to 0,
Default setting : 0.

OP12: UK_PNP
0 : UK's default Plug and Play setting is not available or not applicable,
1 : UK's default Plug and Play setting is available. When UK_PNP and VIRGIN_MODE are set to 1 at the initial set-up, LANGUAGE = ENGLISH, COUNTRY = GREAT BRITAIN and after exiting from menu, VIRGIN_MODE will be set automatically to 0 while UK_PNP remains 1,
Default setting : 0.

OP13: ACI
0 : ACI feature is disabled or not applicable,
1 : ACI feature is enabled,
Default setting : 0.

OP14: ATS
0 : ATS feature is disabled or not applicable,
1 : ATS feature is enabled. When ATS is enabled, it sorts the program in an ascending order starting from program 1,
Default setting : 0.

OP15: LNA
0 : Auto Picture Booster is not available or not applicable,
1 : Auto Picture Booster is available,
Default setting : 0.

OP16: FM_RADIO
0 : FM radio feature is disabled or not applicable,
1 : FM radio feature is enabled,
Default setting : 0.

OP17: PHILIPS_TUNER
0 : ALPS/MASCO compatible tuner is in use,
1 : Philips compatible tuner is in use,
Default setting : 0.

OP20: HUE
0 : Hue/Tint Level is disabled or not applicable,
1 : Hue/Tint Level is enabled,
Default setting : 0.

OP21: COLOR_TEMP
0 : Colour Temperature is disabled or not applicable,
1 : Colour Temperature is enabled,
Default setting : 0.

OP22: CONTRAST_PLUS
0 : Contrast+ is disabled or not applicable,
1 : Contrast+ is enabled,
Default setting : 0.

OP23: TILT
0 : Rotate Picture is disabled or not applicable,
1 : Rotate Picture is enabled,
Default setting : 0.

OP24: NOISE_REDUCTION
0 : Noise Reduction (NR) is disabled or not applicable,
1 : Noise Reduction (NR) is enabled,
Default setting : 0.

OP25: CHANNEL_NAMING
0 : Name FM Channel is disabled or not applicable,
1 : Name FM Channel is enabled,
Default setting : 0.

Note: Name FM channel can be enabled only when FM_RADIO = 1.

OP26: SMART_PICTURE
0 : Smart Picture is disabled or not applicable,
1 : Smart Picture is enabled,
Default setting : 1

OP27: SMART_SOUND
0 : Smart Sound is disabled or not applicable,
1 : Smart Sound is enabled,
Default setting : 1

AP30: AVL
0 : AVL is disabled or not applicable,
1 : AVL is enabled,
Default setting : 0.

OP31: WSSB
0 : WSSB is disabled or not applicable,
1 : WSSB is enabled,
Default setting : 0. **Note:** This option bit can be set to 1 only when WIDE_SCREEN = 1.

OP32: WIDE_SCREEN
0 : Software is used for 4:3 set or not applicable,
1 : Software is used for 16:9 set,
Default setting : 0.

OP33: SHIFT_HEADER_SUBTITLE
0 : Shift Header/Subtitle is disabled or not applicable,
1 : Shift Header/Subtitle is enabled,
Default setting : 0. **Note:** This option bit can be set to 1 only when WIDE_SCREEN = 1.

OP34: CONTINUOUS_ZOOM
0 : Continuous Zoom is disabled or not applicable,
1 : Continuous Zoom is enabled,
Default setting : 0. **Note:** This option bit can be set to 1 only when WIDE_SCREEN = 1.

OP35: COMPRESS_16_9
0 : COMPRESS 16:9 selection is not applicable. Item should not be in the FORMAT menu list,
1 : COMPRESS 16:9 selection is applicable. Item should not be in the FORMAT menu list,
Default setting : 0.

OP36: EXPAND_4_3
0 : Expand 4:3 selection is not applicable. Item should not be in the FORMAT menu list,
1 : Expand 4:3 selection is applicable. Item should be in the FORMAT menu list,
Default setting : 0.

OP37: EW_FUNCTION
0 : EW function is disabled. In this case, only Expand 4:3 is allowed, Compress 16:9 is not applicable.
1 : EW function is enabled. In this case, both Expand 4:3 and Compress 16:9 are applicable.
Default setting : 0.

OP40: STEREO_NON_DBX
0 : For AP_NTSC, chip TDA 9853 is not present,
1 : For AP_NTSC, chip TDA 9853 is present,
Default setting : 0.

OP41: STEREO_DBX
0 : For AP_NTSC, chip MSP 3445 is not present,
1 : For AP_NTSC, chip MSP 3445 is present,
Default setting : 0.

OP42: STEREO_PB
0 : For AP_PAL, chip MSP3465 is not present,
1 : For AP_PAL, chip MSP3465 is present,
Default setting : 0.

OP43: STEREO_NICAM_2CS
0 : For EU and AP_PAL, chip MSP 3415 is not present,
1 : For EU and AP_PAL, chip MSP 3415 is present,
Default setting : 0.

OP44: DELTA_VOLUME
0 : Delta Volume Level is disabled or not applicable,
1 : Delta Volume Level is enabled,
Default setting : 0.

OP45: ULTRA_BASS
0 : Ultra Bass is disabled or not applicable,
1 : Ultra Bass is enabled,
Default setting : 0.

OP46: VOLUME_LIMITER
0 : Volume Limiter Level is disabled or not applicable,
1 : Volume Limiter Level is enabled,
Default setting : 0.

OP47: INCR_SUR
0 : Incredible Surround feature is disabled,
1 : Incredible Surround feature is enabled,
Default setting : 1

OP50: PIP
0 : PIP is disabled or not applicable,
1 : PIP is enabled,
Default setting : 0.

OP51: HOTEL_MODE
0 : Hotel mode is disabled or not applicable,
1 : Hotel mode is enabled,
Default setting : 0.

OP52: SVHS
0 : SVHS source is not available,
1 : SVHS source is available,
Default setting : 0.
Note: This option bit is not applicable for EU.

OP53: CVI
0 : CVI source is not available,
1 : CVI source is available,
Default setting : 0.

OP54: AV3
0 : Side/Front AV3 source is not present,
1 : Side/Front AV3 source is present,
Default setting : 0.

OP55: AV2
0 : AV2 source is not present,
1 : AV2 source is present,
Default setting : 0.
Note: For EU, when AV2=1, both EXT2 and SVHS2 should be included in the OSD loop.

OP56: AV1
0 : AV1 source is not present,
1 : AV1 source is present,
Default setting : 0.

OP57: NTSC_PLAYBACK
0 : NTSC playback feature is not available,
1 : NTSC playback feature is available,
Default setting : 0.

OP60: Reserved
Default setting : 0.

OP61: SMART_TEXT

0 : Smart Text Mode and Favourite Page are disabled or not applicable,
1 : Smart Text Mode and Favourite Page are enabled,
Default setting : 1.

OP62: SMART_LOCK
0 : Child Lock and Lock Channel are disabled or not applicable for EU,
1 : Child Lock and Lock Channel are enabled for EU,
Default setting : 1.

OP63: VCHIP
0 : VCHIP feature is disabled,
1 : VCHIP feature is enabled,
Default setting : 1.

OP64: WAKEUP_CLOCK
0 : Wake up clock feature is disabled or not applicable,
1 : Wake up clock feature is enabled,
Default setting : 1.

OP65: SMART_CLOCK
0 : Smart Clock Using Teletext and Smart Clock Using PBS is disabled or not applicable,
1 : Smart Clock Using Teletext and Smart Clock Using PBS is enabled. For NAFTA, menu item AUTOCHRON is present in the INSTALL submenu,
Default setting : 0.

OP66: SMART_SURF
0 : Smart Surf feature is disabled or not applicable,
1 : Smart Surf feature is enabled,
Default setting : 0.

OP67: PERSONAL_ZAPPING
0 : Personal Zapping feature is disabled or not applicable,
1 : Personal Zapping feature is enabled,
Default setting : 0.

OP70: MULTI_STANDARD_EUR
0 : Not for Europe multi standard set, or this option bit is not applicable,
1 : For Europe multi standard set.
Default setting : 0.
Note: This option bit is used to control the SYSTEM selection in Manual Store : If MULTI_STANDARD_EUR = 1 then SYSTEM = Europe, West Europe, East Europe, UK, France otherwise SYSTEM = 'Europe, West Europe, UK for West Europe' (WEST_EU=1) or SYSTEM = 'Europe, West Europe, East Europe for East Europe' (WEST_EU=0)

OP71: WEST_EU
0 : For East Europe set, or this option bit is not applicable,
1 : For West Europe set,
Default setting : 0.

OP71 and 70: SYSTEM_LT_1, SYSTEM_LT_2
These two option bits are allocated for LATAM system selection.
00 : NTSC-M
01 : NTSC-M, PAL-M
10 : NTSC-M, PAL-M, PAL-N
11 : NTSC-M, PAL-M, PAL-N, PAL-BG
Default setting : 00

OP70, 71 and 72: SOUND_SYSTEM_AP_1, SOUND_SYSTEM_AP_2, SOUND_SYSTEM_AP_3
These three option bits are allocated for AP_PAL sound system selection.
000 : BG
001 : BG/DK
010 : I/DK
011 : BG/I/DK
100 : BG/I/DK/M
Default setting : 00

OP73: COLOR_SYSTEM_AP
This option bit is allocated for AP-PAL colour system selection.
0 : Auto, PAL 4.43, NTSC 4.43, NTSC 3.58
1 : Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, SECAM
Default setting : 0

OP74: Reserved
Default setting : 0.

OP75: Reserved
Default setting : 0.

OP77 and 76: TIME_WIN1, TIME_WIN2
00 : The time window is set to 1.2s
01 : The time window is set to 2s
10 : The time window is set to 5s
11 : not in use
Default setting : 01
Note: The time-out for all digit entries depend on this setting.

8.3.2 Tuner

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

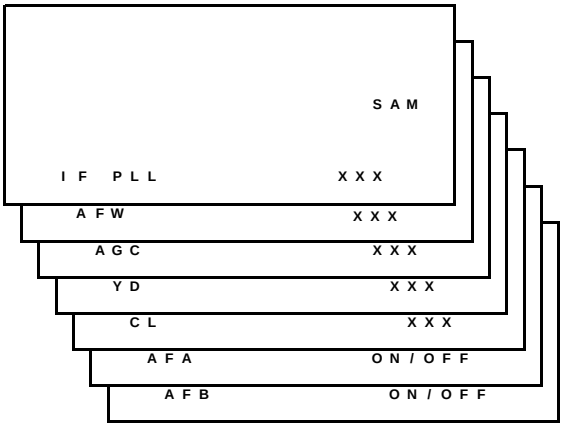

Figure 8-7

IFPLL
This adjustment is auto-aligned. Therefore, no action is required (default= 30).

AFW (AFC window)
Select the lowest value.

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 multi-meter to pin 1 of the tuner (item 1000 on the main panel).
1. Activate the SAM.
2. Go to the TUNER sub menu.
3. Select AFW with the UP/DOWN cursor keys and set to ON.
4. Select AGC with the UP/DOWN cursor keys.
5. Adjust the AGC-value (default value is 27) with the LEFT/RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V.
6. Select AFW with the UP/DOWN cursor keys and set to OFF.
7. Switch the set to STANDBY.

Default value is 28.

YD (Y-delay adjustment)
Fixed value is 7.

CL (Cathode drive level)
Fixed value is 5.

AFA
Read only bit, for monitoring purpose only.

AFB
Read only bit, for monitoring purpose only.

8.3.3 White Tone

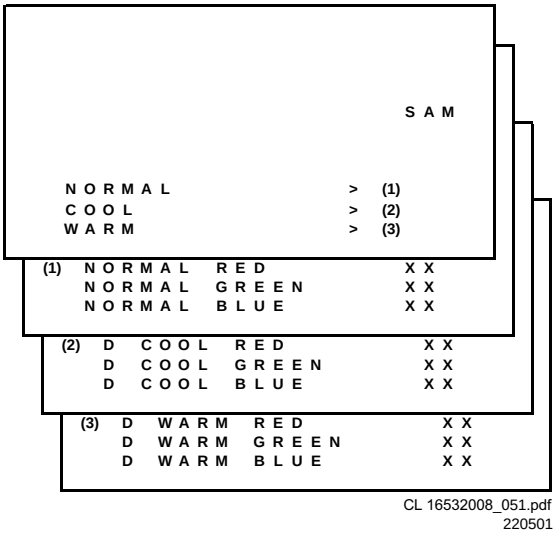

Figure 8-8

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 (R, G, and B) 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 COOL and WARM mode. After alignment, switch the set to standby, in order to store the alignments.

Default settings:
1. **NORMAL** (colour temperature = 8500 K):
   – NORMAL R = 26
   – NORMAL G = 32
   – NORMAL B = 27
2. **COOL** (colour temperature = 11500 K):
   – DELTA COOL R = -3
   – DELTA COOL G = 0
   – DELTA COOL B = 5
3. **WARM** (colour temperature = 7000 K):
   – DELTA WARM R = 2
   – DELTA WARM G = 0
   – DELTA WARM B = -6

8.3.4 Geometry

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

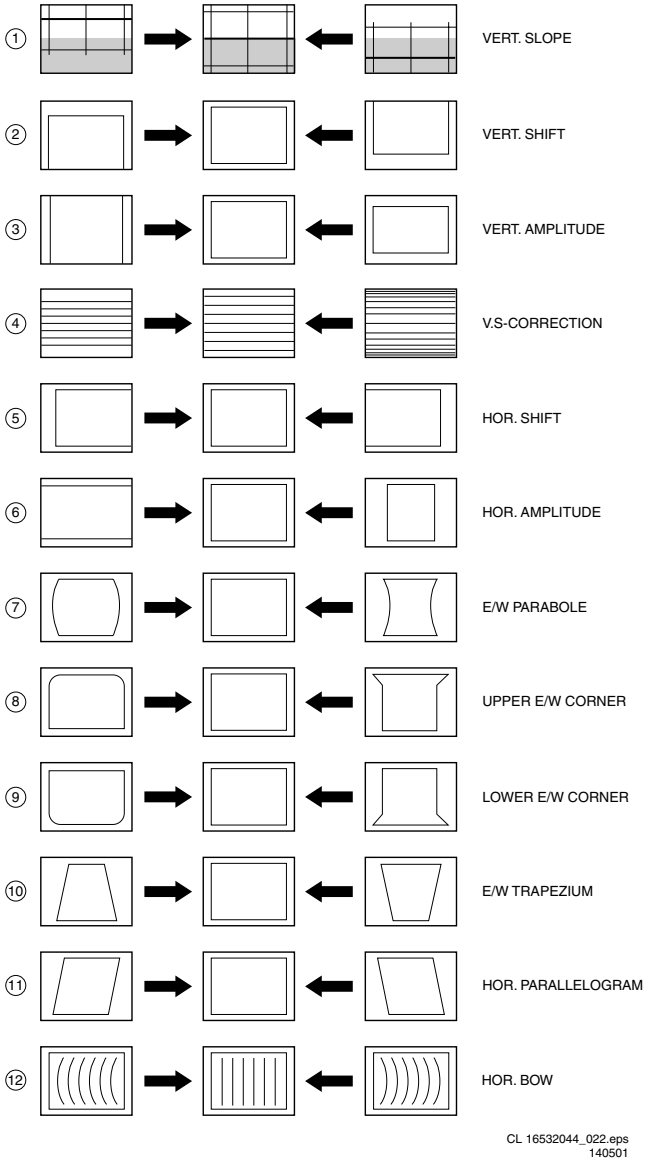

Figure 8-9

How to align
Connect an external video pattern generator to the aerial input of the TV-set and input a crosshatch test pattern. Set amplitude to at least 1 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
1. Set 'Smart Picture' to NATURAL (or MOVIES).
2. Activate the SAM menu (see chapter 5).
3. Go to the GEOMETRY sub menu.
4. Choose HORIZONTAL or VERTICAL alignment

Now you can perform the following alignments:

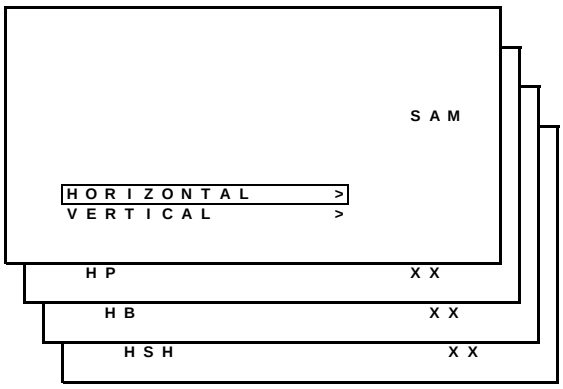

Figure 8-10

Horizontal alignment

- **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 (HSH).** Align the horizontal centre of the picture to the horizontal centre of the CRT.

See also Figure 8-9 numbers 11, 12 and 5.

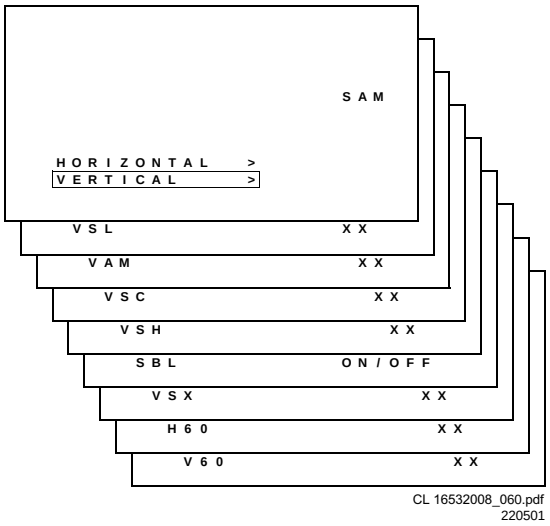

Figure 8-11

Vertical alignment

- **Vertical slope (VSL).** 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 (VAM).** Align the vertical amplitude so that the complete test pattern is visible.
- **Vertical S-Correction (VSC).** 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).
- **H60.** Align straight horizontal lines if NTSC input (60 Hz) is used i.s.o. PAL (50 Hz).
- **V60.** Align straight vertical lines if NTSC input (60 Hz) is used i.s.o. PAL (50 Hz).

See also Figure 8-9 numbers 1, 3, 4, and 2.

In the table below, you will find the GEOMETRY default values for the different sets.

DEFAULT GEOMETRY VALUES (L01 SMALL SCREEN)						
Alignment	**Description**	**14"**	**14" Real Flat**	**17"**	**20"**	**21"**
HP	Hor. Parallelogram	31	31	31	31	31
HB	Hor. Bow	31	31	31	31	31
HSH	Hor. Shift	25	25	25	25	25
VSL	Vert. Slope	33	33	33	33	33
VAM	Vert. Amplitude	26	30	26	26	30
VSC	Vert. S-correction	23	23	23	23	23
VSH	Vert. Shift	35	35	35	35	35
VX	Vert. Zoom	25	25	25	25	25
H60	Hor. Shift offset (60 Hz)	9	9	9	9	9
V60	Vert. Shift offset (60 Hz)	4	4	4	4	4

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Figure 8-12

8.3.5 Audio

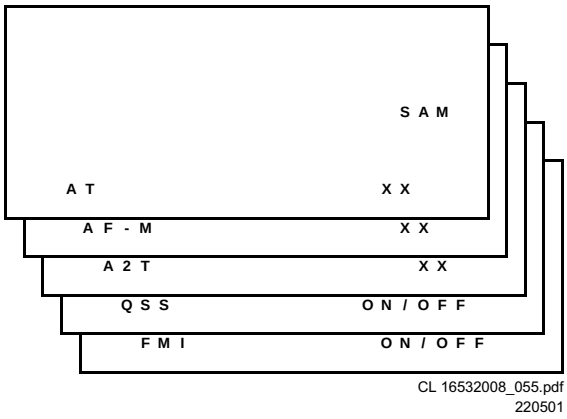

Figure 8-13

No alignments are needed for the audio sub menu. Use the given default values.

AT (Attack Time)
Default value is 0 (**exception:** for the 14PT26xx and 21PT44xx the default value is 8).

AF-M
Default value is 0 (**exception:** for the 14PT26xx and 21PT44xx the default value is 301).

A2T
Default value is 0 (**exception:** for the 14PT26xx and 21PT44xx the default value is 250).

QSS (Quasi Split Sound)
OFF for Intercarrier sets, ON for QSS sets.

FMI (Freq. Modulation Intercarrier)
OFF for QSS sets, ON for Intercarrier sets.

9. Circuit Description

Index of this chapter:

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.

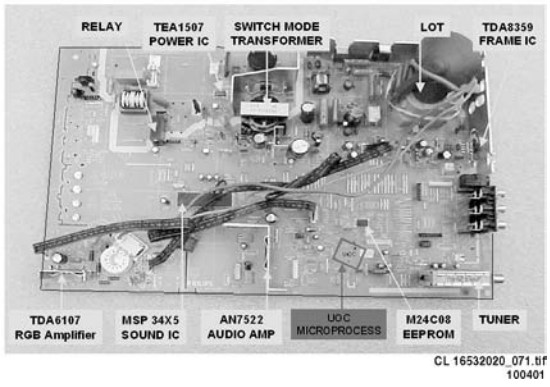

Figure 9-1

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

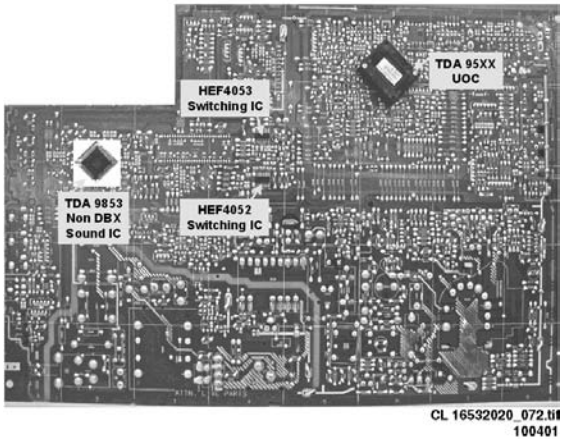

Figure 9-2

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

The tuning system features 100 video channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel.
Also, in some type numbers, an FM radio is implemented with 40 pre-set channels.
The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I^2C 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 Intercarrier demodulation), to the audio demodulator part of the UOC IC7200. The stereo audio output on pin 33 goes, via TS7206, to the stereo decoder 7831.
The switch inside the stereo decoder 7831 selects (via I^2C) 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 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.

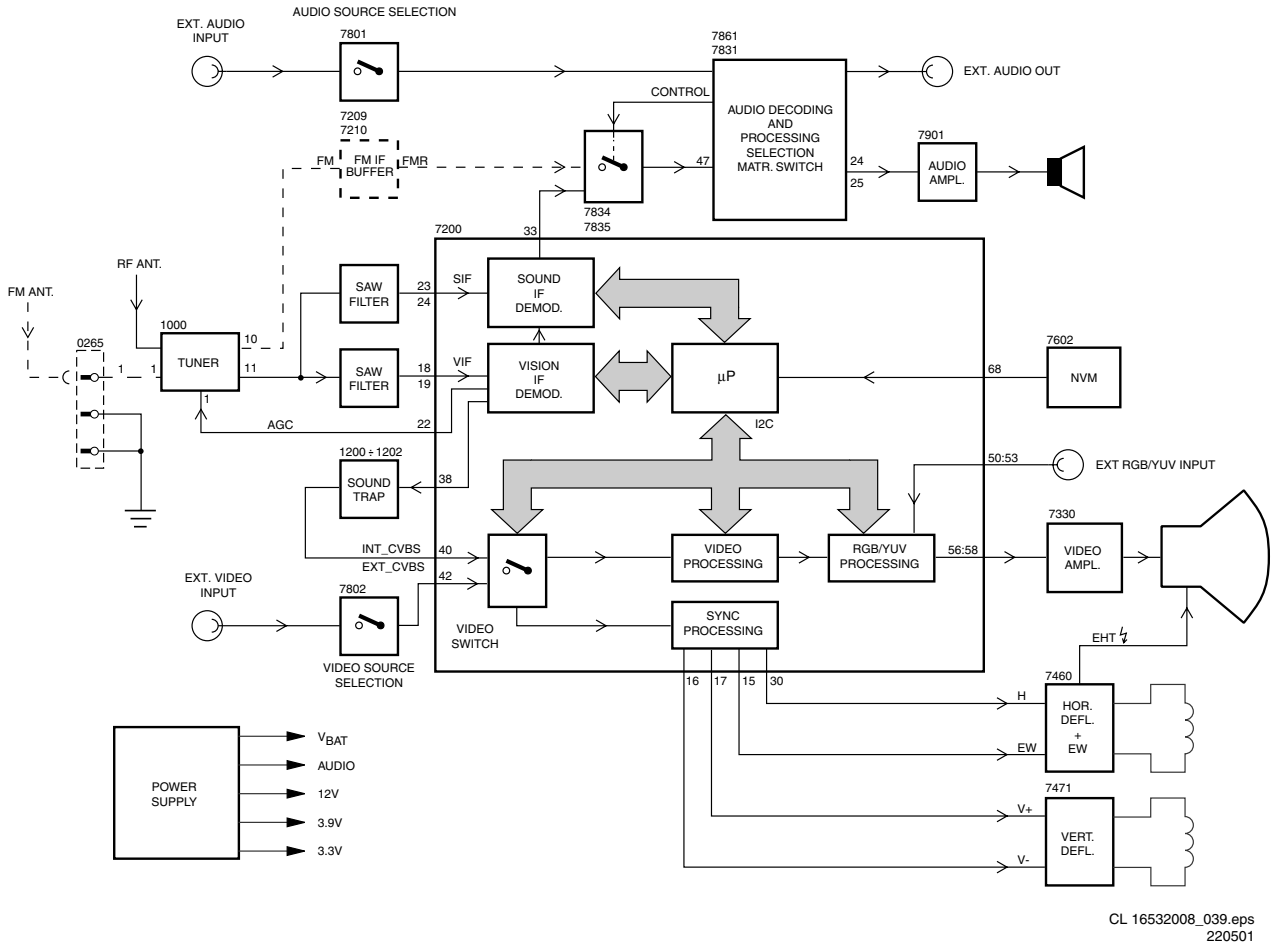

Figure 9-3

9.2.2 Mono

In mono sets, the signal goes via the SAW filter (position 1004 in case of QSS demodulation and 1003 in case of Intercarrier demodulation), to the audio demodulator part of the UOC IC7200. The audio output on pin 48 goes directly, via buffer 7943, to the audio amplifier (AN7523 at position 7902).
The volume level is controlled at this IC (pin 9) by a 'VolumeMute' control line from the microprocessor.
The audio signal from IC7902 is then sent to the speaker/ headphone output panel.

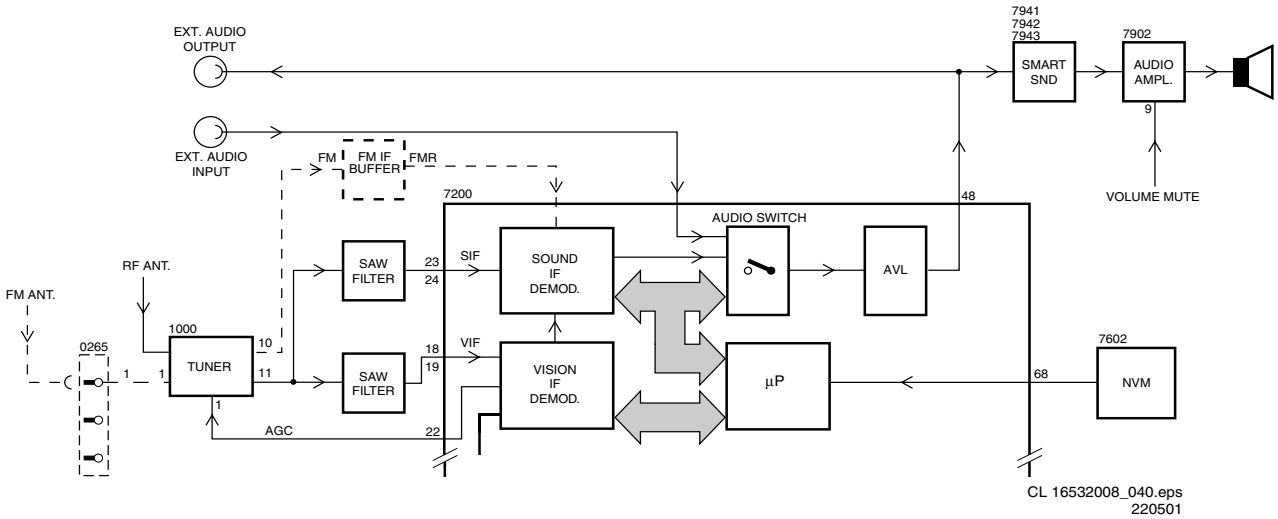

Figure 9-4

9.2.3 FM radio (if present)

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

9.3 Video Signal Processing

9.3.1 Introduction

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

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

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

9.3.2 RF Signal Processing

The incoming RF signal goes to the tuner (pos. 1000), where the 38.9 MHz IF signal is developed and amplified. The IF signals then exits the tuner from pin 11 to pass through the SAW filter (position 1002 in case of QSS demodulation and 1003 in case of Intercarrier demodulation). The shaped signal is then applied to the IF processor part of the UOC (pos. 7200).
Tuner AGC (Automatic Gain Control) will reduce the tuner gain and thus the tuner output voltage when receiving strong RF signals. Adjust the AGC take-over point via the Service Alignment Mode (SAM). The tuner AGC starts working when the video-IF input reaches a certain input level and will adjust this level via the I^2C bus. The tuner AGC signal goes to the tuner (pin 1) via the open collector output (pin 22) of the UOC. The IC also generates an Automatic Frequency Control (AFC) signal that goes to the tuning system via the I^2C bus, to provide frequency correction when needed.
The demodulated composite video signal is available at pin 38 and then buffered by transistor 7201.

9.3.3 Video Source Selection

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

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

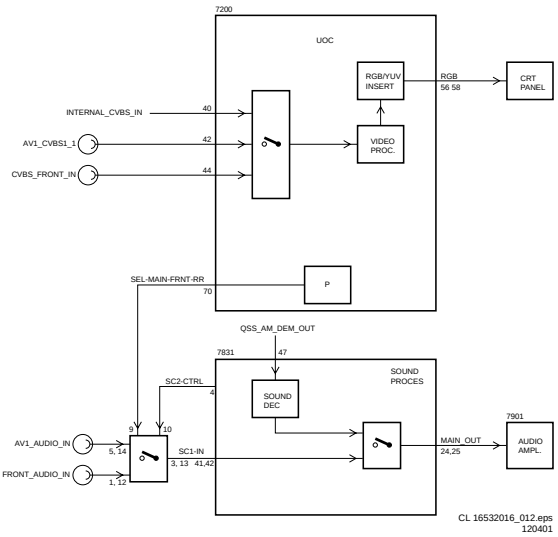

Figure 9-5

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

9.3.4 Video Demodulation

The colour decoder circuit detects whether the signal is a PAL, NTSC or SECAM signal. The result is made known to the auto system manager. The PAL/NTSC decoder has an internal clock generator, which is stabilised to the required frequency by using the 12 MHz clock signal from the reference oscillator of the microcontroller/teletext decoder. The base-band delay line is used to obtain a good suppression of cross colour effects.
The Y signal and the delay line outputs U and V are applied to the luminance/chroma signal processing part of the TV processor.

9.3.5 Luminance/Chrominance Signal Processing

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

- Black stretch This function corrects the black level of incoming signals, which have a difference between the black level and the blanking level. The amount of extension depends upon the difference between actual black level and the darkest part of the incoming video signal level. It is detected by means of an internal capacitor.

- White stretch This function adapts the transfer characteristic of the luminance amplifier in a non-linear way depending on the average picture content of the luminance signal. It operates in such a way that maximum stretching is obtained when signals with a low video level are received. For bright pictures, stretching is not active.
- Dynamic skin tone correction This circuit corrects (instantaneously and locally) the hue of those colours which are located in the area in the UV plane that matches the skin tone. The correction is dependent on the luminance, saturation and distance to the preferred axis.

The YUV signal is then fed to the colour matrix circuit, which converts it to R, G and B signals.
The OSD/TXT signal from the microprocessor is mixed with the main signal at this point, before being output to the CRT board (pins 56, 57 and 58).

9.3.6 RGB Control

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

The following additional controls are used:

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

9.3.7 RGB Amplifier

From outputs 56, 57 and 58 of IC7200, the RGB signals are applied to the analogue output amplifiers on the CRT panel. The R-signal is amplified by a circuit built around transistors TS7311, 7312 and 7313, which drives the picture tube cathodes.
The supply voltage for the amplifier is +160 V and is derived from the line output stage.

9.4 Synchronisation

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

9.5 Deflection

9.5.1 Horizontal Drive

The horizontal drive signal is obtained from an internal VCO, which is running at twice the line frequency. This frequency is divided by two, to lock the first control loop to the incoming signal.
When the IC is switched 'on', the 'Hdrive' signal is suppressed until the frequency is correct.
The 'Hdrive' signal is available at pin 30. The 'Hflybk' signal is fed to pin 31 to phase lock the horizontal oscillator, so that TS7401 cannot switch 'on' during the flyback time.
The 'EWdrive' signal for the E/W circuit (if present) is available on pin 15, where it drives transistor 7400 to make linearity corrections in the horizontal drive.

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

The 'EHTinformation' line on pin 11 is intended to be used as a 'X-ray' protection. When this protection is activated (when the voltage exceeds 6 V), the horizontal drive (pin 30) is switched 'off' immediately. If the 'H-drive' is stopped, pin 11 will become low again. Now the horizontal drive is again switched on via the slow start procedure.
The 'EHTinformation' line (Aquadag) is also fed back to the UOC IC7200 pin 54, to adjust the picture level in order to compensate for changes in the beam current.

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

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

voltages for the CRT, while the line output circuit drives the horizontal deflection coil.

9.5.2 Vertical Drive

A divider circuit performs the vertical synchronisation. The vertical ramp generator needs an external resistor (R3245, pin 20) and capacitor (C2244, pin 21). A differential output is available at pins 16 and 17, which are DC-coupled with the vertical output stage.
To avoid damage of the picture tube when the vertical deflection fails, the 'V_GUARD' output is fed to the beam current limiting input. When a failure is detected, the RGB-outputs are blanked. When no vertical deflection output stage is connected, this guard circuit will also blank the output signals.

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

9.6 Power Supply

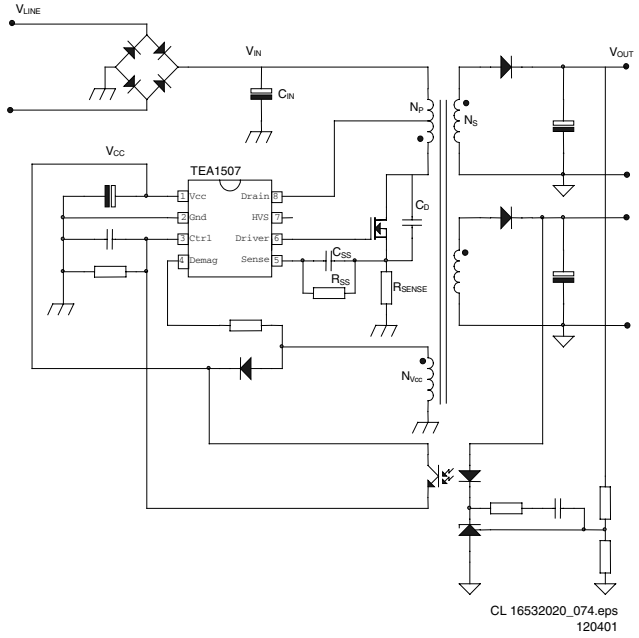

Figure 9-6

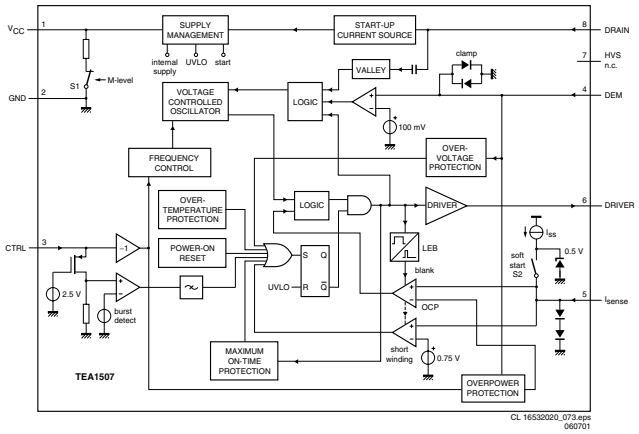

Figure 9-7

9.6.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behaviour has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover the supply runs cooler and safety is enhanced.
The power supply starts operating when a DC voltage goes from the rectifier bridge via T5520, R3532 to pin 8. The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.
The switching regulator IC7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.
The 'MainSupply' line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540/6540. This regulator drives the feedback optocoupler 7515 to set the feedback control voltage on pin 3 of 7520.
The power supply in the set is 'on' any time AC power goes to the set.

Derived Voltages
The voltages supplied by the secondary windings of T5520 are:

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

Other supply voltages are provided by the LOT. It supplies +50 V (only for large screen sets), +13 V, +8 V, +5 V and a +200 V source for the video drive. The secondary voltages of the LOT are monitored by the 'EHTinformation' lines. These lines are fed to the video processor part of the UOC IC7200 on pins 11 and 34.
This circuit will shut 'off' the horizontal drive in case of over-voltage or excessive beam current.

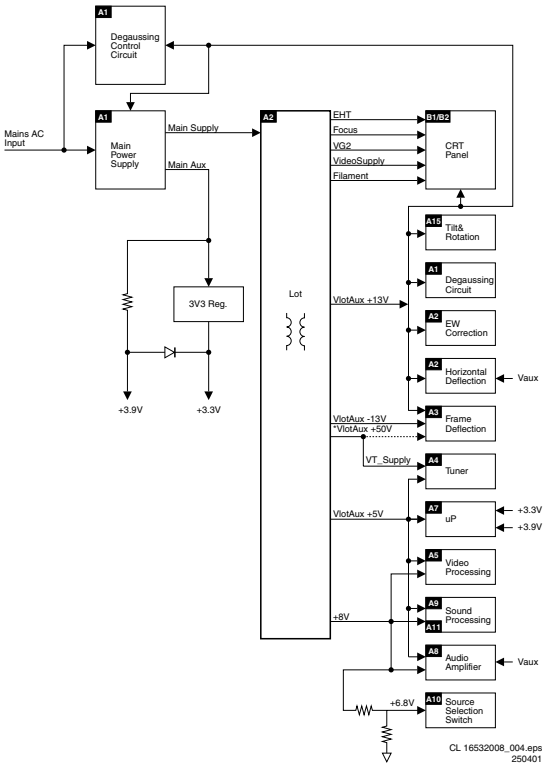

Figure 9-8

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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Figure 9-9

Degaussing

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

9.6.2 Basic IC Functionality

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

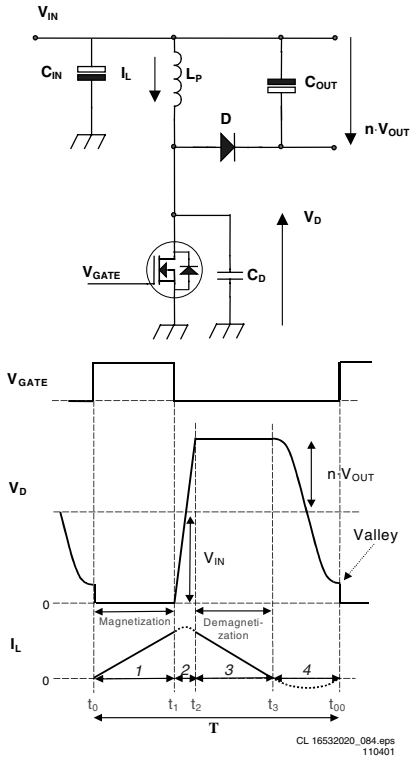


Figure 9-10

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

- Interval 1: t0 < t < t1 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: t1 < t < t2 commutation time In the second interval, the drain voltage will rise from almost zero to $V_{IN}+n•(V_{OUT}+V_F)$. V_F is the forward voltage drop of de 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 $-n•V_{OUT}/L_P$.
- Interval 3: t2 < t < t3 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: t3 < t < t00 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 $V_{IN}+n•V_{OUT}$ to $V_{IN}-n•V_{OUT}$.

Frequency Behaviour

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

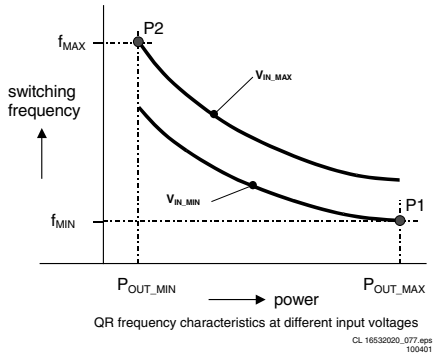


Figure 9-11

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

Start-up Sequence

When the rectified AC voltage V_{IN} (via the centre tap connected to pin 8) reaches the Mains dependent operation level (Mlevel: between 60 and 100 V), the internal 'Mlevel switch' will be opened and the start-up current source is enabled to charge capacitor C2521 at the V_{CC} pin as shown below.

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

Once the V_{CC} capacitor is charged to the start-up voltage $V_{CC\text{-}start}$ (11 V), the IC starts driving the MOSFET. Both internal current sources are switched 'off' after reaching this start-up voltage. Resistor R_{SS} (3524) will discharge the 'soft start' capacitor, such that the peak current will slowly increase. This to prevent 'transformer rattle'.

During start-up, the V_{CC} capacitor will be discharged until the moment that the primary auxiliary winding takes over this voltage.

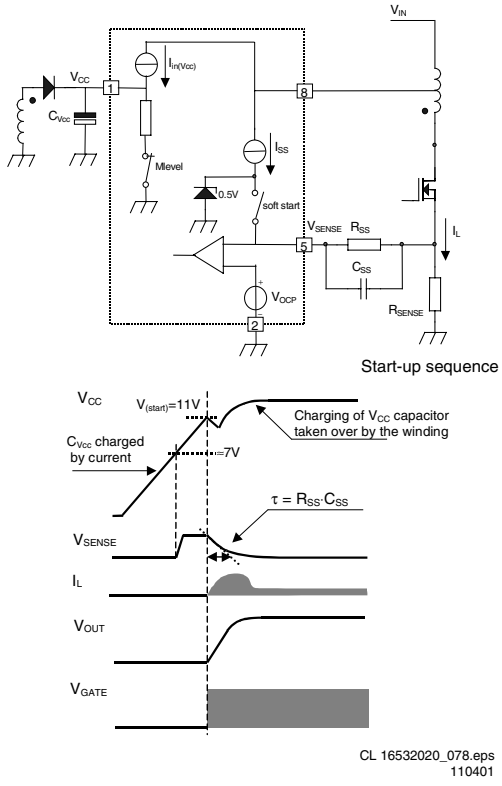


Figure 9-12

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

Operation

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

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

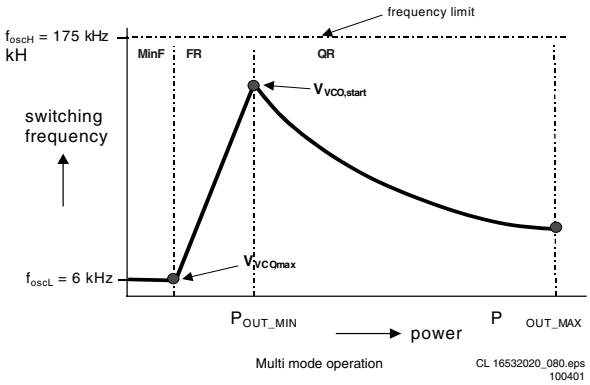


Figure 9-13

Safe-Restart Mode

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

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

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

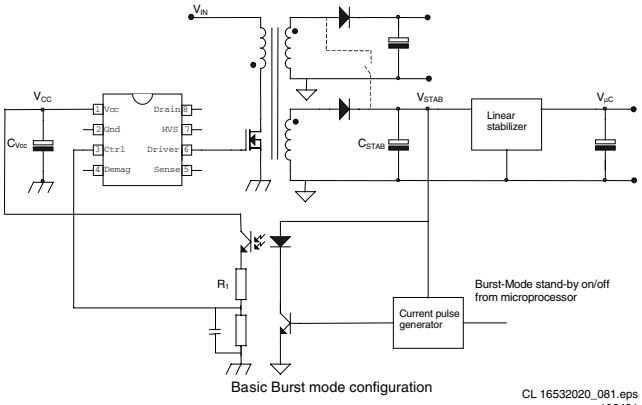
Standby

The set goes to Standby in the following cases:

- After pressing the 'standby' key on the remote control.

- When the set is in protection mode.

In Standby, the power supply works in 'burst mode'.
Burst mode can be used to reduce the power consumption below 1 W at stand-by. During this mode, the controller is active (generating gate pulses) for only a short time and for a longer time inactive waiting for the next burst cycle.
In the active period the energy is transferred to the secondary and stored in the buffer capacitor C_{STAB} in front of the linear stabiliser (see Figure below). During the inactive period, the load (e.g. microprocessor) discharges this capacitor. In this mode, the controller makes use of the Safe-Restart mode.



Basic Burst mode configuration

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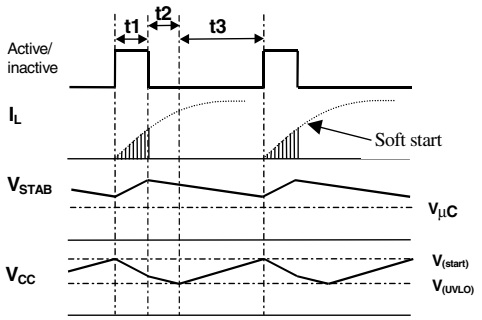
Figure 9-14

The system enters burst mode standby when the microprocessor activates the 'Stdby_con' line. When this line is pulled high, the base of TS7541 is allowed to go high. This is triggered by the current from collector TS7542. When TS7541 turns 'on', the opto-coupler (7515) is activated, sending a large current signal to pin 3 (Ctrl). In response to this signal, the IC stops switching and enters a 'hiccup' mode. This burst activation signal should be present for longer than the 'burst blank' period (typically 30 μs): the blanking time prevents false burst triggering due to spikes.
Burst mode standby operation continues until the microcontroller pulls the 'Stdby_con' signal low again. The base of TS7541 is unable to go high, thus cannot turn 'on'. This will disable the burst mode. The system then enters the start-up sequence and begins normal switching behaviour.

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

- t1: Discharge of V_{CC} when gate drive is active During the first interval, energy is transferred, which result in a ramp-up of the output voltage (V_{STAB}) in front of the stabiliser. When enough energy is stored in the capacitor, the IC will be switched 'off' by a current pulse generated at the secondary side. This pulse is transferred to the primary side via the opto coupler. The controller will disable the output driver (safe restart mode) when the current pulse reaches a threshold level of 16 mA into the Ctrl pin. A resistor R_1 (R3519) is placed in series with the opto coupler, to limit the current going into the Ctrl pin. Meanwhile the V_{CC} capacitor is discharged but has to stay above V_{UVLO} .
- t2: Discharge of V_{CC} when gate drive is inactive During the second interval, the V_{CC} is discharged to V_{UVLO}. The output voltage will decrease depending on the load.
- t3: Charge of V_{CC} when gate drive is inactive The third interval starts when the UVLO is reached. The internal current source charges the V_{CC} capacitor (also the soft start capacitor is recharged). Once the V_{CC} capacitor is charged to the start-up voltage, the driver is activated and a new burst cycle is started.



Burst mode waveforms

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Figure 9-15

9.6.3 Protection Events

The SMPS IC7520 has the following protection features:

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

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

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

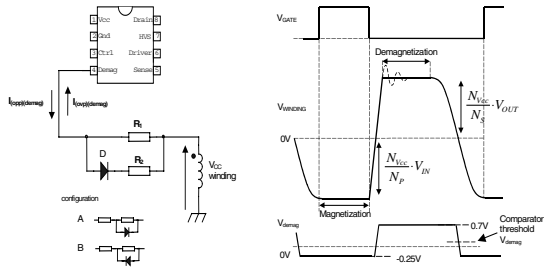

Figure 9-16

Over Voltage Protection
The Over Voltage Protection ensures that the output voltage will remain below an adjustable level. This works by sensing the auxiliary voltage via the current flowing into pin 4 (DEM) during the secondary stroke. This voltage is a well-defined replica of the output voltage. Any voltage spikes are averaged by an internal filter.
If the output voltage exceeds the OVP trip level, the OVP circuit switches the power MOSFET 'off'.
Next, the controller waits until the 'under voltage lock out' level (UVLO = ± 9 V) is reached on pin 1 (V_{CC}). This is followed by a safe restart cycle, after which switching starts again. This process is repeated as long as the OVP condition exists. The output voltage, at which the OVP function trips, is set by the demagnetisation resistor R3522.

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

Over Power Protection
During the primary stroke, the rectified AC input voltage is measured by sensing the current drawn from pin 4 (DEM). This current is dependent on the voltage on pin 9 of transformer 5520 and the value of R3522. The current information is used to adjust the peak drain current, which is measured via pin I_{SENSE}.

Short Winding Protection
If the 'sense' voltage on pin 5 exceeds the short winding protection voltage (0.75 V), the converter will stop switching. Once V_{CC} drops below the UVLO level, capacitor C2521 will be recharged and the supply will start again. This cycle will be repeated until the short circuit is removed (safe restart mode). The short winding protection will also protect in case of a secondary diode short circuit.
This protection circuit is activated after the leading edge blanking time (LEB).

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

Over Temperature protection
When the junction temperature exceeds the thermal shutdown temperature (typ. 140° C), the IC will disable the driver. When the V_{CC} voltage drops to UVLO, the V_{CC} capacitor will be recharged to the $V_{(start)}$ level. If the temperature is still too high, the V_{CC} voltage will drop again to the UVLO level (Safe-Restart mode). This mode will persist until the junction temperature drops 8 degrees typically below the shutdown temperature.

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

9.7 Control

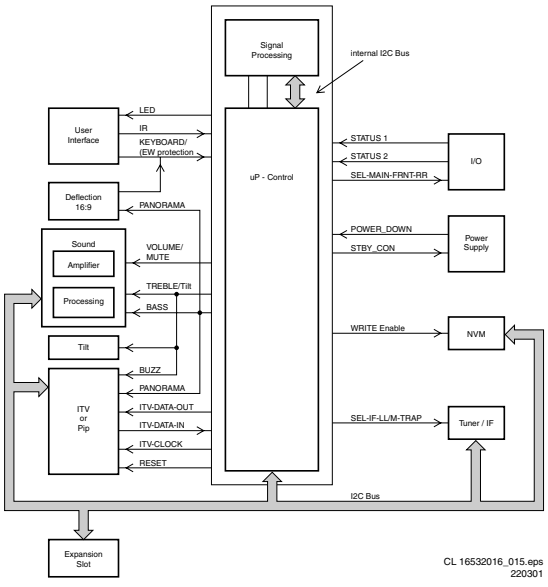

Figure 9-17

9.7.1 Introduction

The microprocessor part of the UOC has the complete control and teletext on board. User menu, Service Default Mode, Service Alignment Mode and Customer Service Mode are generated by the µP. Communication to other ICs is done via the I^2C-bus.

9.7.2 I^2C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (tuner, NVM, MSP, etc) by means of the I^2C-bus. An internal I^2C-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 µP 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 feautures, 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:

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

9.7.7 Tuner IF

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

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

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

9.7.8 Protection Events

Several protection events are controlled by the UOC:

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

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

9.8 Abbreviation list

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the featurebox
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Level
BC-PROT	Beam Current Protection
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLC-INFORMATION	Black current informationrmation
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 informationrmation
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
Hue	Colour phase control for NTSC (not the same as 'Tint')
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency
IIC	Integrated IC bus
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.
ITV	Institutional TV
LATAM	Latin America
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LNA	Low Noise Amplifier
LS	Large Screen
LS	Loudspeaker
LSP	Large signal panel
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MSP	Multistandard Sound Processor: ITT sound decoder
MUTE	Mute-Line
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)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Byte
OC	Open Circuit
OSD	On Screen Display
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit board
PIP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RC5	Remote Control system 5, signal from the remote control receiver
RGB	Red Green Blue
ROM	Read Only Memory
SAM	Service Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCAVEM	Scan Velocity Modulation
SCL	Serial Clock
SDA	Serial Data
SDM	Service Default Mode
SECAM	SEequence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
µP	Microprocessor
UOC	Ultimate One Chip
VA	Vertical Acquisition
VBAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminance (Y) and Chrominance (C) signal

10. Spare Parts list

Mono Carrier [A]

Various

0040	3139 124 23601	Cinch housing
0040	3139 124 25551	3P cinch cover
0127▲	4822 265 11253	Fuse holder
0136	4822 492 70788	Fix IC
0138	4822 492 70788	Fix IC
0153▲	3104 301 09441	Cable 3P 400mm
0211▲	4822 265 20723	2P
0212▲	4822 267 10774	2P male (red)
0217	4822 267 10735	6P
0218	2422 026 04742	Soc cinch 3P
0218	4822 265 10481	Cinch 2P
0220	2422 025 04851	3P
0221▲	4822 267 10966	2P
0222▲	2422 025 10646	2P male
0231▲	2422 128 02972	Switch
0232▲	4822 267 31014	Headphone socket
0235	4822 267 60385	21P
0243	2422 025 04854	6P female
0246	2422 025 15848	5P male
0246	2422 025 16382	3P male
0265▲	4822 267 10748	3P
1000▲	3139 147 17401	Tuner UR1316R/A I -3
1002	4822 242 81436	Filter OFWK3953M
1003	4822 242 11055	Filter OFWK6289K
1004	2422 549 44341	Filter OFWK9656M
1200	4822 242 81712	TPWA04B
1201	4822 242 10315	TPT02B-TF21
1201	4822 242 81572	TPS6,0MB-TF21
1203	4822 242 70665	SFE10,7MS3-A
1500▲	2422 086 10914	Fuse 4A 250V
1600	4822 276 13775	Switch
1601	4822 276 13775	Switch
1602	4822 276 13775	Switch
1603	4822 276 13775	Switch
1660	2422 543 01203	Chrystal 12MHz
1831	4822 242 10769	Chrystal 18.432MHz

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2001	5322 122 32658	22pF 5% 50V
2002	5322 122 32658	22pF 5% 50V
2003	4822 122 33177	10nF 20% 50V
2004	4822 126 13751	47nF 10% 63V
2005	4822 124 40248	10µF 20% 63V
2006	4822 124 80791	470µF 20% 16V
2007	4822 126 14585	100nF 10% 50V
2008	4822 124 40207	100µF 20% 25V
2009	5322 122 32654	22nF 10% 63V
2010	5322 126 10511	1nF 5% 50V
2101	4822 122 33172	390pF 5% 50V
2102	4822 122 33172	390pF 5% 50V
2103	2020 552 96305	4U7 20% 10V
2104	4822 122 33172	390pF 5% 50V
2105	4822 122 33172	390pF 5% 50V
2106	2020 552 96305	4U7 20% 10V
2107	4822 122 33172	390pF 5% 50V
2108	4822 122 33172	390pF 5% 50V
2109	2020 552 96305	4U7 20% 10V
2110	4822 122 33172	390pF 5% 50V
2111	4822 122 33172	390pF 5% 50V
2112	2020 552 96305	4U7 20% 10V
2113	5322 122 32658	22pF 5% 50V
2114	5322 122 32658	22pF 5% 50V
2115	5322 122 32658	22pF 5% 50V
2116	5322 122 32658	22pF 5% 50V
2117	5322 122 32658	22pF 5% 50V
2118	5322 122 32658	22pF 5% 50V
2120	5322 122 32658	22pF 5% 50V
2161	4822 124 12392	47µF 20% 16V
2181	5322 122 32658	22pF 5% 50V
2182	4822 122 33172	390pF 5% 50V
2183	4822 122 33172	390pF 5% 50V
2184	2020 552 96305	4U7 20% 10V
2185	4822 122 33172	390pF 5% 50V
2186	4822 122 33172	390pF 5% 50V
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	5322 122 32531	100pF 5% 50V
2207	4822 126 13694	68pF 1% 63V
2208	4822 126 14585	100nF 10% 50V
2209	4822 124 40769	4.7µF 20% 100V
2210	4822 124 41407	0.47µF 20% 63V
2211	4822 126 13482	470nF 80/20% 16V
2213	5322 122 32654	22nF 10% 63V
2214	5322 122 32654	22nF 10% 63V
2215	5322 122 32654	22nF 10% 63V
2216	4822 124 40207	100µF 20% 25V
2217	5322 122 32654	22nF 10% 63V
2219	4822 126 14076	220nF 25V
2222	4822 122 33177	10nF 20% 50V
2223	5322 122 32448	10pF 5% 63V
2225	4822 126 14076	220nF 25V
2226	5322 126 10465	3.9nF 10% 50V
2227	5322 126 10223	4.7nF 10% 63V
2228	5322 126 10184	820P 5% 50V 3
2229	4822 124 40248	10µF 20% 63V
2230	4822 124 40769	4.7µF 20% 100V
2234	4822 126 14585	100nF 10% 50V
2235	5322 122 32331	1nF 10% 100V
2238	5322 126 10511	1nF 5% 50V
2239	5322 126 10511	1nF 5% 50V
2240	5322 126 10511	1nF 5% 50V
2241	4822 126 13344	1.5nF 5% 63V
2242	4822 126 14043	1µF 20% 16V
2243	4822 122 33127	2.2nF 10% 63V
2244	5322 121 42386	100nF 5% 63V
2245	4822 126 14076	220nF 25V
2246	4822 124 40769	4.7µF 20% 100V
2247	4822 124 40207	100µF 20% 25V
2248	5322 122 32654	22nF 10% 63V
2249	5322 122 32654	22nF 10% 63V
2250	4822 124 22652	2.2µF 20% 50V
2252	5322 126 10511	1nF 5% 50V
2253	5322 126 10511	1nF 5% 50V
2254	5322 122 32531	100pF 5% 50V
2400	4822 121 43901	4.7nF 5% 50V
2404▲	4822 121 10781	470nF 5% 250V
2405	5322 126 10511	1nF 5% 50V
2407▲	4822 121 70649	9.1nF 5% 1.6kV
2408	4822 122 30103	22nF 80% 63V
2409	4822 124 11575	47µF 20% 160V
2410	2020 021 91577	470µF 16V
2411	5322 121 10472	47µF /25
2412	2222 347 90236	33nF 10% 100V
2413	4822 124 11565	10µF 20% 250V
2414	4822 124 81145	1000µF 20% 16V
2416▲	4822 126 12263	220pF 10% 2kV
2417	4822 124 81145	1000µF 20% 16V
2418	4822 122 33177	10nF 20% 50V
2419	4822 124 22776	1µF 50V
2420	4822 124 21913	1µF 20% 63V
2421	4822 126 13751	47nF 10% 63V
2422	2020 021 91577	470µF 16V
2423	4822 124 42127	100V 20% 10µF
2424	4822 121 43526	47nF 5% 250V
2471	5322 121 42386	100nF 5% 63V
2472	5322 121 42386	100nF 5% 63V
2473	4822 124 40255	100µF 20% 63V
2475	5322 122 32268	470pF 5% 63V
2476	4822 121 42408	220nF 5% 63V
2477	5322 122 32268	470pF 5% 63V
2500▲	4822 126 13589	470nF 275V
2501▲	4822 126 14153	2.2nF 10%B 1kV
2502▲	4822 126 14153	2.2nF 10%B 1kV
2503	4822 124 12439	100µF 20% 400V
2505▲	4822 126 14153	2.2nF 10%B 1kV
2506▲	4822 126 14153	2.2nF 10%B 1kV
2508▲	4822 122 50116	470pF 10% 1kV
2515▲	4822 126 14049	1.5nF 20% 250V
2516▲	4822 126 13867	330P 20% 250V
2520	4822 126 14585	100nF 10% 50V
2521	4822 124 81151	22µF 50V
2522	4822 126 14585	100nF 10% 50V
2523▲	4822 126 13862	1.5nF 10% 2kV
2525	5322 122 34099	470pF 10% 63V
2526	5322 122 31647	1nF 10% 63V
2527	5322 122 34099	470pF 10% 63V
2540	4822 126 13188	15nF 5% 63V
2560▲	4822 126 11382	1nF 10% 1kV
2561	4822 124 42336	47µF 20% 160V
2562	5322 122 32331	1nF 10% 100V
2563	5322 121 42386	100nF 5% 63V
2564	2020 012 93057	2200µF 20% 16V
2565▲	4822 122 50116	470pF 10% 1kV
2566	4822 124 40433	47µF 20% 25V
2567	4822 124 40433	47µF 20% 25V
2568	4822 124 21913	1µF 20% 63V
2569	5322 122 34099	470pF 10% 63V
2601	4822 126 14076	220nF 25V
2602	5322 122 32531	100pF 5% 50V
2606	5322 126 10511	1nF 5% 50V
2607	5322 122 32659	33pF 5% 50V
2608	4822 126 14043	1µF 20% 16V
2609	5322 122 32659	33pF 5% 50V
2611	4822 126 14043	1µF 20% 16V
2612	4822 126 13694	68pF 1% 63V
2613	4822 126 13694	68pF 1% 63V
2615	5322 126 10511	1nF 5% 50V
2618	4822 126 14043	1µF 20% 16V
2619	4822 126 14043	1µF 20% 16V
2691	4822 124 40207	100µF 20% 25V
2801	4822 124 81151	22µF 50V
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	470pF 5% 63V
2835	4822 122 33575	220pF 5% 63V
2836	4822 126 13344	1.5nF 5% 63V
2837	4822 124 40769	4.7µF 20% 100V
2838	4822 126 13692	47pF 1% 63V
2839	4822 126 13692	47pF 1% 63V
2840	4822 126 14585	100nF 10% 50V
2841	4822 124 40248	10µF 20% 63V
2842	4822 126 14585	100nF 10% 50V
2843	4822 124 40248	10µF 20% 63V
2844	4822 124 40248	10µF 20% 63V
2845	4822 126 14585	100nF 10% 50V
2846	4822 124 40207	100µF 20% 25V
2849	5322 126 10511	1nF 5% 50V
2850	5322 126 10511	1nF 5% 50V
2851	2020 552 96305	4U7 20% 10V
2852	5322 126 10511	1nF 5% 50V
2853	2020 552 96305	4U7 20% 10V
2854	5322 126 10511	1nF 5% 50V
2855	4822 122 30045	27pF 2% 100V
2856	4822 126 13486	15pF 2% 63V
2857	5322 122 33538	150pF 2% 63V
2858	5322 126 10511	1nF 5% 50V
2859	5322 126 10511	1nF 5% 50V
2860	4822 126 13693	56pF 1% 63V
2860	4822 126 13695	82pF 1% 63V
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 11767	470µF 20% 25V
2903	4822 124 21913	1µF 20% 63V
2904	4822 126 13482	470nF 80/20% 16V
2904	4822 126 14043	1µF 20% 16V
2905	5322 126 10511	1nF 5% 50V
2906	4822 126 13482	470nF 80/20% 16V
2907	5322 126 10511	1nF 5% 50V
2908	4822 124 40248	10µF 20% 63V
2941	4822 124 21913	1µF 20% 63V
2942	4822 126 12105	50V 33nF 5%
2943	4822 126 14585	100nF 10% 50V
2944	4822 126 13751	47nF 10% 63V
2945	4822 122 33177	10nF 20% 50V
2946	4822 126 14043	1µF 20% 16V
2981	4822 124 40248	10µF 20% 63V
2982	5322 122 32268	470pF 5% 63V
2983	4822 124 40248	10µF 20% 63V
2984	5322 122 32268	470pF 5% 63V

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3000	4822 116 52175	100Ω 5% 0.5W
3001	4822 116 52175	100Ω 5% 0.5W
3002	4822 051 20008	Jumper
3002	4822 117 10833	10k 1% 0.1W
3003	4822 117 11139	1k5 1% 0.1W
3005	4822 116 52175	100Ω 5% 0.5W
3006	4822 117 11449	2k2 5% 0.1W
3007	4822 117 11507	6k8 1% 0.1W
3008	4822 117 11449	2k2 5% 0.1W
3010	4822 051 20008	Jumper
3010	4822 117 13577	330Ω 1% 1.25W
3011	4822 117 13577	330Ω 1% 1.25W
3101	4822 116 83868	150Ω 5% 0.5W
3102	4822 117 13579	220k 1% 0.1W
3103	4822 116 83868	150Ω 5% 0.5W
3104	4822 117 10834	47k 1% 0.1W
3105	4822 116 83868	150Ω 5% 0.5W
3106	4822 117 13579	220k 1% 0.1W
3107	4822 116 83868	150Ω 5% 0.5W
3108	4822 117 10834	47k 1% 0.1W

3109	4822 116 52201	75Ω 5% 0.5W
3110	4822 116 52175	100Ω 5% 0.5W
3111	4822 116 52264	27k 5% 0.5W
3112	4822 117 11507	6k8 1% 0.1W
3113	4822 116 52201	75Ω 5% 0.5W
3114	4822 116 52175	100Ω 5% 0.5W
3115	4822 116 52201	75Ω 5% 0.5W
3116	4822 116 52175	100Ω 5% 0.5W
3117	4822 116 52201	75Ω 5% 0.5W
3118	4822 116 52175	100Ω 5% 0.5W
3119	4822 116 52199	68Ω 5% 0.5W
3120	4822 051 10102	1k 2% 0.25W
3121	4822 116 52201	75Ω 5% 0.5W
3122	4822 116 52176	10Ω 5% 0.5W
3140	4822 117 11507	6k8 1% 0.1W
3155	4822 116 52195	47Ω 5% 0.5W
3181	4822 116 52201	75Ω 5% 0.5W
3182	4822 116 52175	100Ω 5% 0.5W
3183	4822 116 83868	150Ω 5% 0.5W
3184	4822 117 10834	47k 1% 0.1W
3185	4822 116 83868	150Ω 5% 0.5W
3186	4822 117 10834	47k 1% 0.1W
3200	4822 116 83881	390Ω 5% 0.5W
3201	4822 116 52175	100Ω 5% 0.5W
3202	4822 116 52175	100Ω 5% 0.5W
3203	4822 116 52175	100Ω 5% 0.5W
3204	4822 050 21003	10k 1% 0.6W
3206	4822 117 10837	100k 1% 0.1W
3207	4822 050 11002	1k 1% 0.4W
3208	4822 051 20391	390Ω 5% 0.1W
3208	4822 117 10353	150Ω 1% 0.1W
3209	4822 117 11373	100Ω 1%
3212	4822 051 20471	470Ω 5% 0.1W
3213	4822 051 20561	560Ω 5% 0.1W
3214	4822 116 52175	100Ω 5% 0.5W
3217	4822 051 20334	330k 5% 0.1W
3218	4822 117 11149	82k 1% 0.1W
3219	4822 117 11449	2k2 5% 0.1W
3223	4822 117 11373	100Ω 1%
3226	4822 051 20561	560Ω 5% 0.1W
3227	4822 117 10837	100k 1% 0.1W
3228	4822 116 52234	100k 5% 0.5W
3229	4822 117 11454	820Ω 1% 0.1W
3230	4822 051 10102	1k 2% 0.25W
3230	4822 117 11504	270Ω 1% 0.1W
3231	4822 051 20008	Jumper
3231	4822 051 20561	560Ω 5% 0.1W
3232	4822 117 11449	2k2 5% 0.1W
3233	4822 117 11454	820Ω 1% 0.1W
3234	4822 117 10361	680Ω 1% 0.1W
3235	4822 116 52175	100Ω 5% 0.5W
3236	4822 051 20154	150k 5% 0.1W
3236	4822 117 10837	100k 1% 0.1W
3237	4822 051 20122	1k2 5% 0.1W
3237	4822 117 13577	330Ω 1% 1.25W
3238	4822 051 20561	560Ω 5% 0.1W
3238	4822 117 11504	270Ω 1% 0.1W
3239	4822 117 11504	270Ω 1% 0.1W
3239	4822 117 13577	330Ω 1% 1.25W
3240	4822 117 10837	100k 1% 0.1W
3241	4822 051 20223	22k 5% 0.1W
3242	4822 051 20273	27k 5% 0.1W
3244	4822 116 52231	820Ω 5% 0.5W
3245	4822 051 20393	39k 5% 0.1W
3246	4822 117 10833	10k 1% 0.1W
3247	4822 117 13579	220k 1% 0.1W
3248	4822 051 20273	27k 5% 0.1W
3249	4822 116 52231	820Ω 5% 0.5W
3251	4822 116 52175	100Ω 5% 0.5W
3254	4822 051 20105	1M 5% 0.1W
3256	4822 051 10102	1k 2% 0.25W
3257	4822 051 20106	10M 5% 0.1W
3258	4822 051 20334	330k 5% 0.1W
3259	4822 051 20474	470k 5% 0.1W
3261	4822 117 13577	330Ω 1% 1.25W
3403	4822 053 12229	22Ω 5% 3W
3404▲	4822 052 10688	6Ω8 5% 0.33W
3406	4822 050 21003	10k 1% 0.6W
3408	4822 116 52303	8k2 5% 0.5W
3410	4822 051 20333	33k 5% 0.1W
3411▲	4822 052 10109	10Ω 5% 0.33W
3412▲	4822 050 23903	39k 1% 0.6W
3413	4822 117 10833	10k 1% 0.1W
3414▲	4822 050 21203	12k 1% 0.6W
3415▲	4822 050 11002	1k 1% 0.4W
3416	4822 052 10398	3Ω9 5% 0.33W
3417	4822 050 23303	33k 1% 0.6W
3418	4822 051 20333	33k 5% 0.1W
3419	4822 117 11507	6k8 1% 0.1W
3420	4822 051 20333	33k 5% 0.1W
3421	4822 053 11688	6Ω8 5% 2W
3422	4822 117 11373	100Ω 1%
3423	4822 117 11454	820Ω 1% 0.1W
3424	4822 116 52175	100Ω 5% 0.5W
3425▲	4822 116 52238	12k 5% 0.5W
3426	4822 051 20105	1M 5% 0.1W
3427	4822 116 52238	12k 5% 0.5W
3428▲	4822 052 11399	39Ω 5% 0.5W
3429	4822 116 52269	3k3 5% 0.5W
3430	4822 116 52244	15k 5% 0.5W
3431▲	4822 051 20472	4k7 5% 0.1W
3431▲	4822 051 20562	5k6 5% 0.1W
3432	4822 116 52186	22Ω 5% 0.5W
3435	4822 100 12159	100k 30%
3436▲	4822 052 10478	4Ω7 5% 0.33W
3471	4822 050 23908	3Ω9 1% 0.6W
3471	4822 050 25608	5Ω6 1% 0.6W
3472	4822 050 25608	5Ω6 1% 0.6W
3472	4822 050 26808	6Ω8 1% 0.6W
3473	4822 050 22202	2k2 1% 0.6W
3474	4822 050 11002	1k 1% 0.4W
3475	4822 050 22202	2k2 1% 0.6W
3476▲	4822 052 10158	1Ω5 5% 0.33W
3477	4822 116 83872	220Ω 5% 0.5W
3478	4822 116 83872	220Ω 5% 0.5W
3479	4822 050 11002	1k 1% 0.4W
3500▲	4822 053 21335	3M3 5% 0.5W
3501▲	4822 053 21335	3M3 5% 0.5W
3504▲	2120 660 90043	PTC 9Ω 200V
3506▲	4822 116 83872	220Ω 5% 0.5W
3507	4822 252 11215	Spark gap
3519	4822 116 83876	270Ω 5% 0.5W
3520	4822 051 20122	1k2 5% 0.1W
3521	4822 116 52186	22Ω 5% 0.5W
3522	4822 051 20334	330k 5% 0.1W
3523▲	4822 052 10101	100Ω 5% 0.33W
3524	4822 117 11148	56k 1% 0.1W
3525	4822 051 10102	1k 2% 0.25W
3526	2120 106 90636	0Ω18 5%
3527▲	4822 052 10222	2k2 5% 0.33W
3528	4822 117 10833	10k 1% 0.1W
3529	4822 117 10834	47k 1% 0.1W
3530	4822 051 20472	4k7 5% 0.1W
3531	4822 051 20008	Jumper
3541	4822 051 20471	470Ω 5% 0.1W
3542	4822 117 11139	1k5 1% 0.1W
3543▲	4822 050 28203	82k 1% 0.6W
3544▲	4822 050 26802	6k8 1% 0.6W
3545▲	4822 117 11149	82k 1% 0.1W
3546	4822 051 20008	Jumper
3547	4822 117 11342	0Ω33 5% 2W
3548	4822 051 20822	8k2 5% 0.1W
3549	4822 116 83883	470Ω 5% 0.5W
3552	4822 117 10833	10k 1% 0.1W
3559	4822 051 10102	1k 2% 0.25W
3560	4822 116 52195	47Ω 5% 0.5W
3561	4822 116 83872	220Ω 5% 0.5W
3562	4822 117 10833	10k 1% 0.1W
3563	4822 051 20822	8k2 5% 0.1W
3564	3198 012 21070	0.33Ω 2W
3565	4822 053 10331	330Ω 5% 1W
3566	4822 117 11449	2k2 5% 0.1W
3567	4822 117 11449	2k2 5% 0.1W
3568	4822 051 20822	8k2 5% 0.1W
3569	4822 051 20562	5k6 5% 0.1W
3603	4822 116 52175	100Ω 5% 0.5W
3604	4822 116 52175	100Ω 5% 0.5W
3605	4822 051 20472	4k7 5% 0.1W
3606	4822 116 52256	2k2 5% 0.5W
3607	4822 116 52256	2k2 5% 0.5W
3608	4822 116 52175	100Ω 5% 0.5W
3609	4822 050 11002	1k 1% 0.4W
3610	4822 116 52303	8k2 5% 0.5W
3611	4822 117 11373	100Ω 1%
3612	4822 116 52303	8k2 5% 0.5W
3614	4822 116 52283	4k7 5% 0.5W
3615	4822 050 21003	10k 1% 0.6W
3617	4822 116 52283	4k7 5% 0.5W
3618	4822 116 83961	6k8 5%
3619	4822 116 52303	8k2 5% 0.5W
3622	4822 117 11373	100Ω 1%
3623	4822 051 20472	4k7 5% 0.1W
3624	4822 116 52175	100Ω 5% 0.5W
3625	4822 116 52175	100Ω 5% 0.5W
3626	4822 051 20472	4k7 5% 0.1W
3627	4822 051 20472	4k7 5% 0.1W
3628	4822 117 10833	10k 1% 0.1W
3630	4822 117 11449	2k2 5% 0.1W
3632	4822 051 20008	Jumper
3634	4822 116 52175	100Ω 5% 0.5W
3636	4822 117 11373	100Ω 1%
3681	4822 051 20391	390Ω 5% 0.1W
3682	4822 051 20332	3k3 5% 0.1W
3683	4822 051 20391	390Ω 5% 0.1W
3684	4822 051 20561	560Ω 5% 0.1W
3685	4822 051 20561	560Ω 5% 0.1W
3686	4822 117 11139	1k5 1% 0.1W
3691	4822 117 13577	330Ω 1% 1.25W
3692	4822 051 10102	1k 2% 0.25W
3693	4822 117 11503	220Ω 1% 0.1W
3694	4822 051 20472	4k7 5% 0.1W
3801	4822 116 83872	220Ω 5% 0.5W
3802	4822 050 11002	1k 1% 0.4W
3803	4822 117 10837	100k 1% 0.1W
3804	4822 117 11149	82k 1% 0.1W
3805	4822 051 10102	1k 2% 0.25W
3806	4822 117 10837	100k 1% 0.1W
3807	4822 117 11149	82k 1% 0.1W
3808	4822 050 11002	1k 1% 0.4W
3831	4822 117 10834	47k 1% 0.1W
3832	4822 116 52175	100Ω 5% 0.5W
3833	4822 116 52175	100Ω 5% 0.5W
3836	4822 050 11002	1k 1% 0.4W
3837	4822 116 52175	100Ω 5% 0.5W
3838	4822 051 10102	1k 2% 0.25W
3839	4822 116 52175	100Ω 5% 0.5W
3840	4822 051 20472	4k7 5% 0.1W
3841	4822 051 20822	8k2 5% 0.1W
3842	4822 051 10102	1k 2% 0.25W
3843	4822 117 11449	2k2 5% 0.1W
3849	4822 051 20471	470Ω 5% 0.1W
3901	4822 051 10102	1k 2% 0.25W
3902	4822 051 20332	3k3 5% 0.1W
3903	4822 051 20332	3k3 5% 0.1W
3903	4822 051 20822	8k2 5% 0.1W
3904	4822 117 10833	10k 1% 0.1W
3905	4822 051 20332	3k3 5% 0.1W
3906	4822 117 10833	10k 1% 0.1W
3907	4822 051 20822	8k2 5% 0.1W
3941	4822 117 11373	100Ω 1%
3942	4822 051 20392	3k9 5% 0.1W
3943	4822 117 12955	2k7 1% 0.1W
3944	4822 117 12955	2k7 1% 0.1W
3945	4822 051 10102	1k 2% 0.25W
3946	4822 117 10965	18k 1% 0.1W
3947	4822 117 13577	330Ω 1% 1.25W
3948	4822 117 10834	47k 1% 0.1W
3949	4822 116 83933	15k 1% 0.1W
3950	4822 051 20561	560Ω 5% 0.1W
3951	4822 051 20391	390Ω 5% 0.1W
3981	4822 116 52206	120Ω 5% 0.5W
3982	4822 116 52206	120Ω 5% 0.5W
4xxx	4822 051 10008	Jumper
4xxx	4822 051 20008	Jumper

⏦

5001	4822 157 51216	5.6µH
5002	3198 018 18270	820nF 10%
5003	4822 157 11866	1.8µH 10%
5201	4822 157 11835	4.7µH 5%
5201	4822 157 11893	3.9µH 5%
5201	4822 157 62552	2.2µH
5202	4822 157 51462	10µH 10%
5241	4822 157 51462	10µH 10%
5242	4822 157 11706	10µH 5%
5408	4822 157 71401	27µH
5410	4822 157 71401	27µH
5444	2422 531 02446	SC10009-03
5445▲	4822 140 10669	AT2078
5501▲	2422 549 44725	DMF2430H22 Y
5520▲	2422 531 02457	SS28010-06
5521	4822 526 10704	Bead 100MHz
5560	4822 526 10704	Bead 100MHz
5561	4822 157 52392	27µH
5562	4822 526 10704	Bead 100MHz
5563	4822 526 10704	Bead 100MHz
5602	4822 157 11867	5.6µH 5%
5603	4822 157 11867	5.6µH 5%
5604	4822 157 11867	5.6µH 5%
5831	4822 157 11139	6.8µH 5%
5832	4822 157 11139	6.8µH 5%
5833	4822 157 11139	6.8µH 5%
5835	3198 018 31290	12µH 10%

⏩

6001	4822 130 34142	BZX79-B33
6002	4822 130 11397	BAS316
6004	4822 130 10414	BA792
6201	4822 130 11397	BAS316
6202	4822 130 11397	BAS316
6206	4822 130 11416	PDZ6.8B
6241	4822 130 11416	PDZ6.8B
6402	4822 130 10871	SBYV27-200
6404	4822 130 32896	BYD33M
6405	4822 130 42488	BYD33D
6406	5322 130 34331	BAV70
6407	4822 130 11397	BAS316
6408	4822 130 11397	BAS316

6409	4822 130 42488	BYD33D
6410	4822 130 42488	BYD33D
6411	4822 130 42488	BYD33D
6412	4822 130 42488	BYD33D
6413	4822 130 30621	1N4148
6414⚠	4822 130 34167	BZX79-B6V2
6415	4822 130 11397	BAS316
6416	4822 130 11397	BAS316
6419	4822 130 34173	BZX79-B5V6
6420	4822 130 30862	BZX79-B9V1
6423	4822 130 42488	BYD33D
6471	4822 130 42488	BYD33D
6500	4822 130 31083	BYW55
6501	4822 130 31083	BYW55
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6520	4822 130 42488	BYD33D
6523	4822 130 30621	1N4148
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 61219	BZX79-B10
6560	9322 127 32682	BYW76-RAS15/10
6562	9322 164 42682	EGP20DL-5100
6563	4822 130 11397	BAS316
6565	5322 130 34331	BAV70
6566	4822 130 11397	BAS316
6567	4822 130 11148	UDZ4.7B
6569	4822 130 11397	BAS316
6570	4822 130 11378	BZX284-C6V2
6681	4822 130 31983	BAT85
6691	9322 050 99682	LTL-10224WHCR
6692	9322 127 54667	TSOP1836UH1
6831	4822 130 30621	1N4148
6901	4822 130 11397	BAS316

7001	4822 130 63732	MMUN2212
7101	4822 130 60511	BC847B
7200	9352 683 55557	TDA9567H/N1/5Y
7200	9352 684 10557	TDA9561H/N1/5Y
7201	4822 130 60511	BC847B
7204	4822 130 60373	BC856B
7206	5322 130 42755	BC847C
7209	5322 130 42718	BFS20
7210	5322 130 42718	BFS20
7241	3198 010 44010	PDTA114ETR
7401	9340 547 00215	PDTC143ZTR
7402	9340 563 21127	BUT11APX-1200L
7403	4822 130 40981	BC337-25
7404	4822 130 44283	BC636
7405⚠	4822 130 60373	BC856B
7406	4822 130 60373	BC856B
7407	4822 130 41109	BD135-16
7408	4822 130 41109	BD135-16
7409	4822 130 60373	BC856B
7435	4822 130 41109	BD135-16
7471	4822 209 13176	TDA9302H
7515⚠	8238 274 02070	TCET1103G
7520	9352 673 56112	TEA1507P/N1L
7521⚠	9322 164 04687	STP4NC80ZFPL
7522	4822 130 60511	BC847B
7540	4822 130 40959	BC547B
7541	4822 130 11155	PDTC114ET
7542	4822 130 60373	BC856B
7560	4822 209 15576	LE33CZ
7561	9340 547 00215	PDTC143ZTR
7562	4822 130 60373	BC856B
7564	4822 130 60373	BC856B
7602	9322 147 25682	M24C16-WBN6L
7801	5322 209 11102	HEF4052BT
7803	4822 130 60511	BC847B
7804	4822 130 60511	BC847B
7831	9322 160 79682	MSP3415G-PO-B8 FM
7832	4822 130 60511	BC847B
7833	4822 130 60511	BC847B
7834	4822 130 60511	BC847B
7835	4822 130 60511	BC847B
7901	9322 158 65667	AN7522N
7941	4822 130 60511	BC847B
7942	4822 130 60511	BC847B
7943	4822 130 60511	BC847B

CRT panel [B]

Various

0244	2422 025 04851	3P
0245	2422 025 04854	6P female
0254⚠	2422 500 80068	9P female

2313	4822 122 33216	270pF 5% 50V
2323	4822 122 33172	390pF 5% 50V
2331	4822 122 33172	390pF 5% 50V
2341⚠	4822 126 14588	2.2nF 10% 1kV
2342	4822 121 70386	47nF 10% 250V
2343	4822 121 70386	47nF 10% 250V

3311	4822 051 20392	3k9 5% 0.1W
3312	4822 117 13577	330Ω 1% 1.25W
3313	4822 051 20109	10Ω 5% 0.1W
3314	4822 053 12183	18k 5% 3W
3316⚠	4822 052 10689	68Ω 5% 0.33W
3317	3198 013 01520	1k5 2% 0.5W
3321	4822 051 20392	3k9 5% 0.1W
3322	4822 117 13577	330Ω 1% 1.25W
3323	4822 051 20109	10Ω 5% 0.1W
3324	4822 053 12183	18k 5% 3W
3326⚠	4822 052 10689	68Ω 5% 0.33W
3327	3198 013 01520	1k5 2% 0.5W
3331	4822 051 20392	3k9 5% 0.1W
3332	4822 117 13577	330Ω 1% 1.25W
3333	4822 051 20109	10Ω 5% 0.1W
3334	4822 053 12183	18k 5% 3W
3336⚠	4822 052 10689	68Ω 5% 0.33W
3337	3198 013 01520	1k5 2% 0.5W
3341	3198 013 01520	1k5 2% 0.5W
3347⚠	4822 052 10221	220Ω 5% 0.33W
3348	3198 013 01520	1k5 2% 0.5W
3349⚠	4822 052 10158	1Ω5 5% 0.33W
3350⚠	4822 052 10158	1Ω5 5% 0.33W

5341	2422 535 94213	SPT0508A
5342	4822 526 10704	Bead 100MHz

6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	4822 130 33697	1SS135
6343	4822 130 10837	UDZS8.2B

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

Side AV panel + HP panel [C]

Various

0232⚠	4822 267 31014	Headphone socket
0254	4822 267 10734	5P
0255	4822 267 10565	4P

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

3156	4822 116 52206	120Ω 5% 0.5W
3157	4822 116 52206	120Ω 5% 0.5W

Side AV [E]

Various

0250	4822 265 10481	2P
0252	4822 267 10565	4P
0253	4822 267 10735	6P

2172	4822 126 13512	330pF 10% 50V
2173	4822 126 13512	330pF 10% 50V
2175	4822 126 13512	330pF 10% 50V

3152	4822 116 83884	47k 5% 0.5W
3153	4822 050 11002	1k 1% 0.4W

6161	4822 130 34278	BZX79-B6V8

Side AV panel + HP panel [E1]

Various

0163	3139 131 01551	Cable 6P 560mm
0186	3139 110 38861	Cable 5P 680mm
0232⚠	4822 267 31014	Headphone socket
0250	4822 265 11606	3P
0251	4822 267 10735	6P
0253	2422 025 16382	3P male
0253	4822 267 10735	6P
0254	4822 267 10734	5P
0255	4822 267 10565	4P
0261	2422 025 12482	6P male
0261	2422 025 15849	6P male

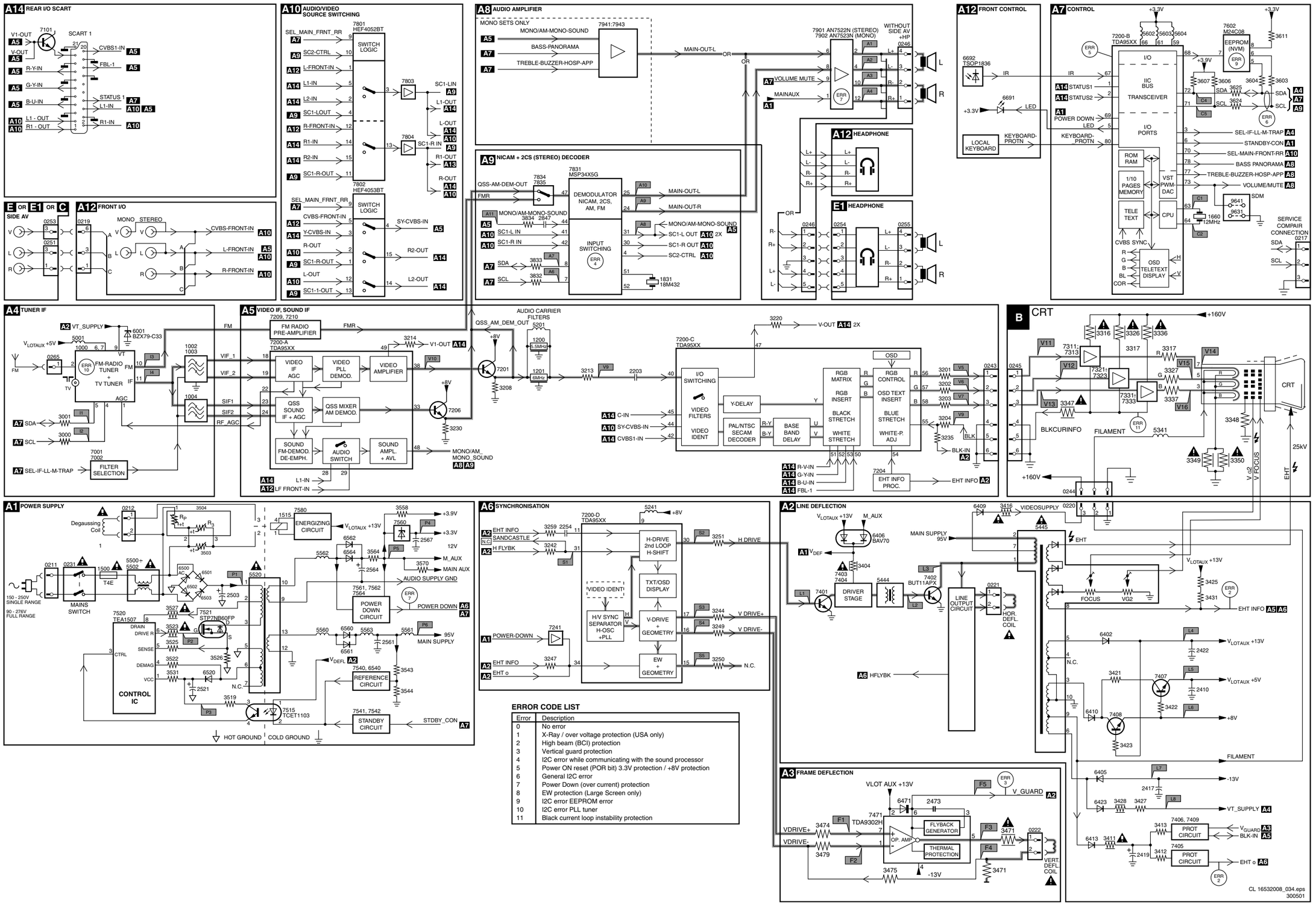
2171	4822 126 13512	330pF 10% 50V
2171	5322 122 32311	470pF 10% 100V
2172	4822 126 13512	330pF 10% 50V
2172	5322 122 32311	470pF 10% 100V
2173	4822 126 13512	330pF 10% 50V
2173	5322 122 32311	470pF 10% 100V
2174	4822 126 13512	330pF 10% 50V
2174	5322 122 32311	470pF 10% 100V
2176	4822 126 13512	330pF 10% 50V
2177	4822 124 40207	100µF 20% 25V
2178	4822 126 13512	330pF 10% 50V
2179	4822 124 40207	100µF 20% 25V

3150	4822 050 21003	10k 1% 0.6W
3150	4822 116 83884	47k 5% 0.5W
3151	4822 116 52303	8k2 5% 0.5W
3151	4822 116 83868	150Ω 5% 0.5W
3152	4822 050 21003	10k 1% 0.6W
3152	4822 116 83884	47k 5% 0.5W
3153	4822 116 52303	8k2 5% 0.5W
3153	4822 116 83868	150Ω 5% 0.5W
3155	4822 116 52201	75Ω 5% 0.5W
3156	4822 116 52219	330Ω 5% 0.5W
3157	4822 116 52219	330Ω 5% 0.5W

6161	4822 130 34278	BZX79-B6V8

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

Block Diagram

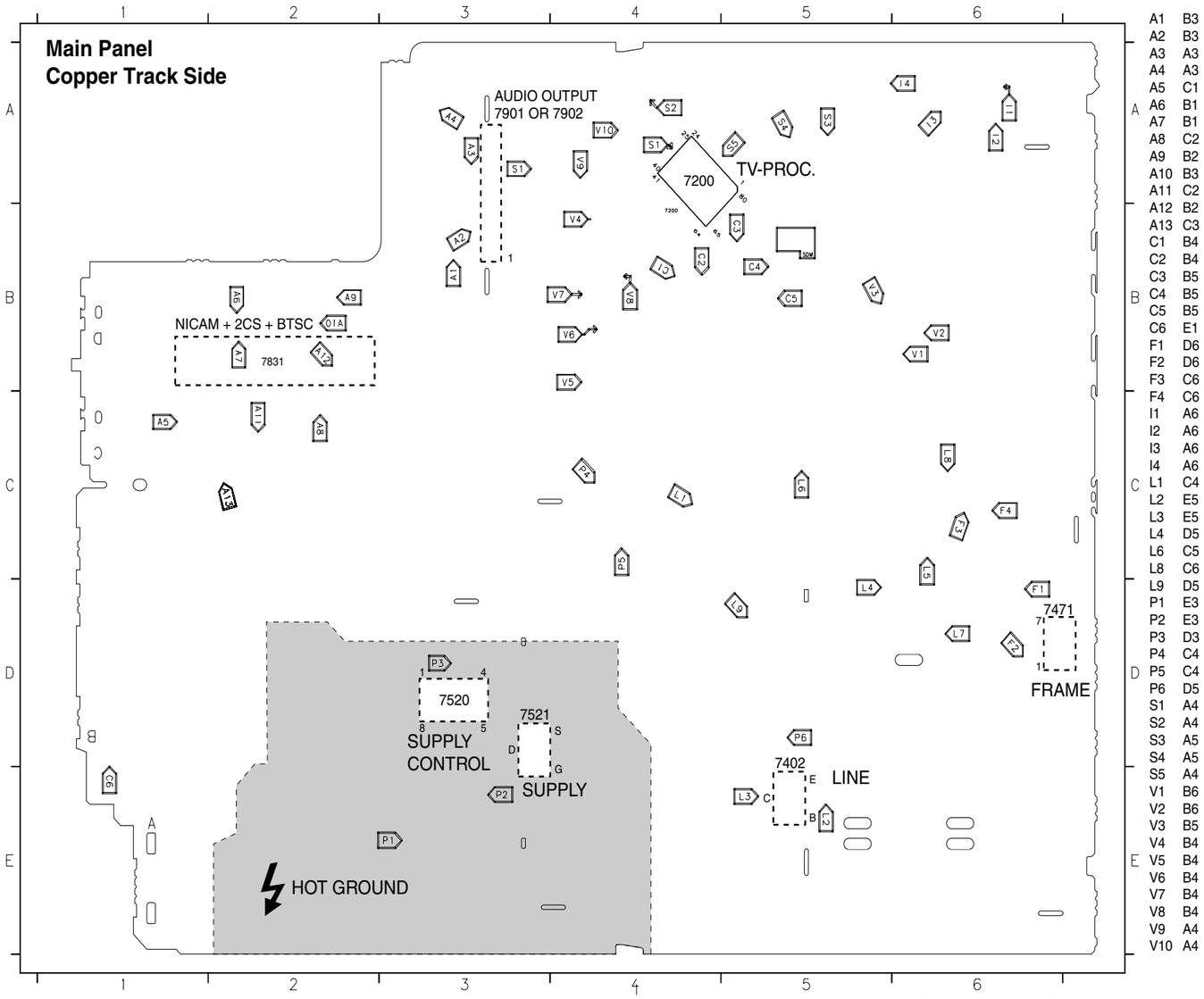


ERROR CODE LIST

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

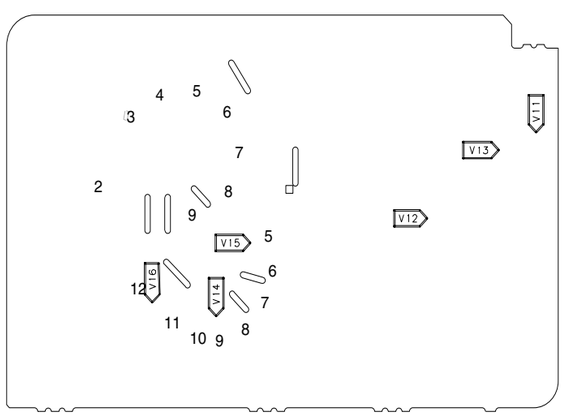
Testpoint Overview

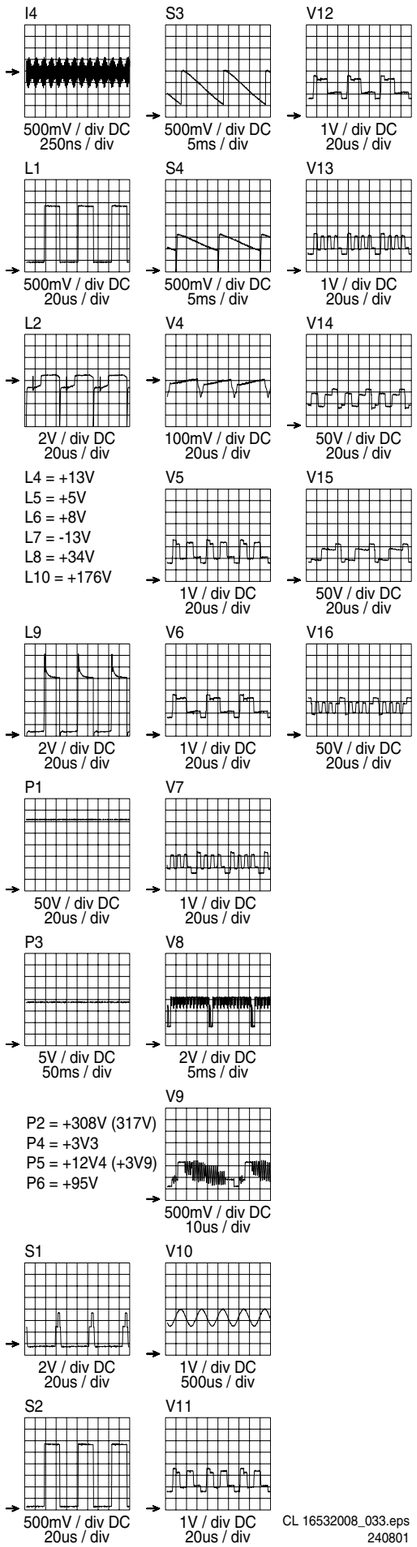
Main Panel
Copper Track Side



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

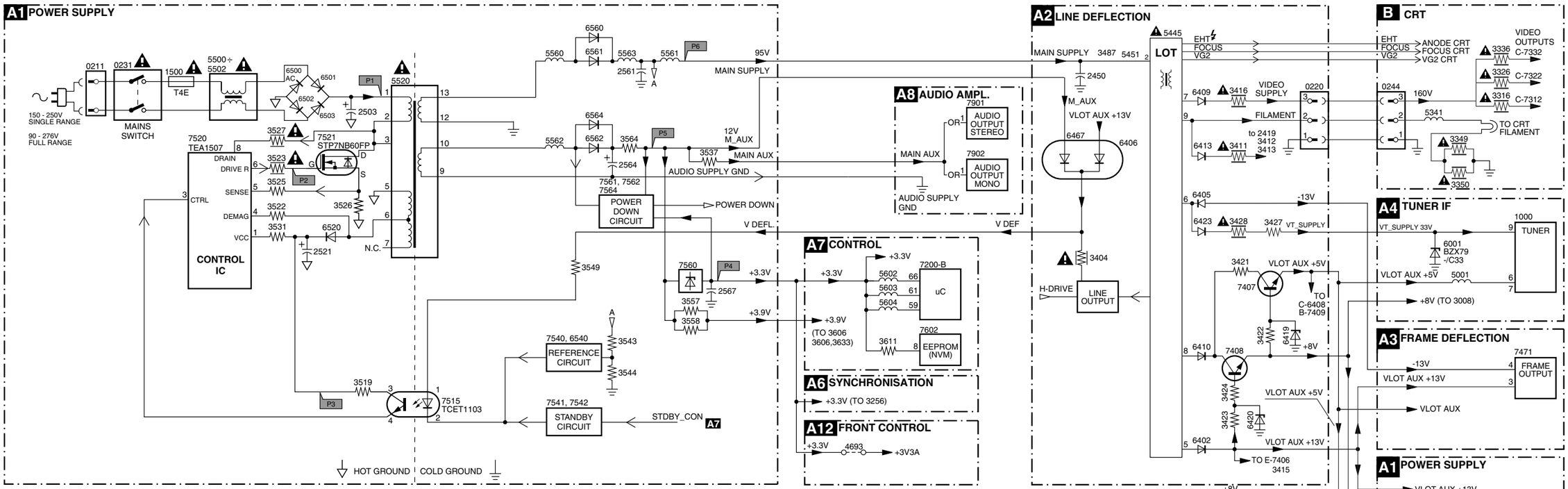
CRT Panel Copper Track Side



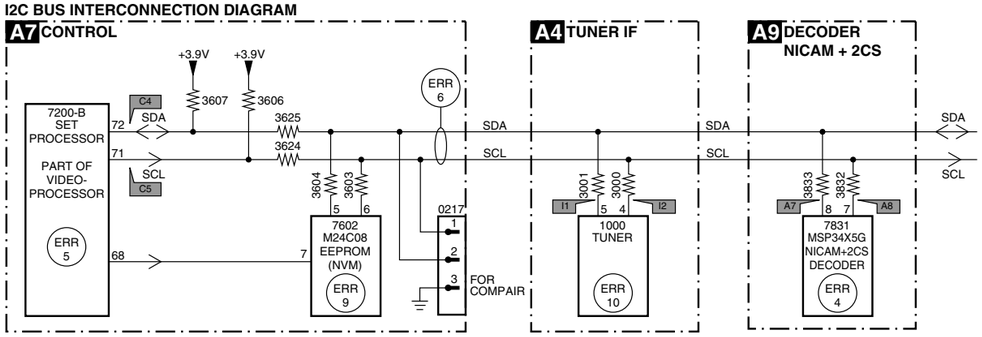


CL 16532008_033.eps
240801

I²C and Supply Voltage Diagram



I2C BUS INTERCONNECTION DIAGRAM



ERROR CODE LIST

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

CL 16532008_032.eps
300501

7. Schematics and PWB's

Large Signal Panel: Power Supply

0211 B1 0282 F11 2502 B5 2507 B7 2521 D1 2526 D6 2547 F9 2563 D8 2568 G8 3502 B4 3507 D3 3522 C5 3527 B6 3540 E8 3545 F9 3552 F8 3562 C8 3567 C9 5500 B4 5560 D8 6501 B6 6522 D2 6561 D8 6566 F10 6581 A8 7540 F9 7562 C9 9502 B4
0212 B1 1500 B3 2503 B6 2508 C7 2522 D6 2527 D7 2559 F10 2564 B9 2569 C8 3503 A4 3508 B4 3523 E6 3528 D6 3541 E8 3546 E8 3553 A9 3563 C9 3568 C10 5501 C4 5561 D10 6502 B5 6523 C5 6562 B8 6567 D8 7515 E7 7541 F8 7564 B10 9503 A7
0213 C4 1515 A7 2504 B7 2515 B7 2523 D7 2528 D2 2560 D8 2565 D8 2580 A9 3504 A4 3519 E7 3524 D6 3529 C5 3542 E9 3547 F9 3559 A9 3564 B9 3569 F8 3570 C10 5502 C4 5562 B8 6503 B6 6540 F9 6563 C8 6569 F8 7520 D2 7542 F8 7580 A8 9504 C10
0231 B1 2500 B3 2505 B2 2516 B7 2524 D6 2540 E9 2561 D9 2566 C9 3500 C2 3505 B4 3520 F2 3525 E5 3530 C5 3543 E10 3548 F9 3553 E10 3564 B9 3565 A9 3570 C10 5520 B7 5563 D9 6520 E1 6541 E8 6564 C8 6570 G7 7521 C6 7560 A10 9500 B2 9520 C7
0251 E11 2501 B5 2506 B6 2520 F2 2525 E6 2542 E9 2562 B8 2567 B10 3501 D2 3506 C3 3521 E2 3526 D6 3531 D2 3544 F10 3549 D10 3561 C8 3566 F8 3580 A8 5521 C7 6500 B5 6521 D7 6560 D8 6565 A10 6580 A8 7522 C6 7561 D9 9501 C2

1 2 3 4 5 6 7 8 9 10 11

A1 POWER SUPPLY

P1 50V / div DC 20us / div
P3 5V / div DC 50ms / div
P2 = +308V (317V)
P4 = +3V3
P5 = +12V4 (+3V9)
P6 = +95V

DEGAUSSING COIL
0212
2505 2n2
MAINS 150 - 276 V SINGLE RANGE 90 - 276 V FULL RANGE
0211
0231 SDDF
MAINS SWITCH
9500
9501
1500 T4E.250V
2500 470n
3500 2M2
3501 4M7
3506 220R
5500 DMF-2820
5501 DMF-2405
5502 C914
3507 DSP
9502 3502 B57237
3505 V
0213 For ITV ONLY
3503 ZPB
3504 Rp Rs
3508 1M5
2501 2n2
2502 2n2
6500 1N5062 (COL)
6501 1N5062 (COL) 389V (317V)
6502 1N5062 (COL)
6503 1N5062 (COL)
P1
2506 2n2
2503 2n2
2504 220u
2507 2n2
47u
9520
5521
P2
7521 STP7NB60FP 308V (317V) 2V5 0V
2523 1n2
2527 470p
3528 10K
2524 1n
6521 1N5062 (COL)
2522 100n
3524 56K
2526 1n
3526 0R22
3523 100R
2525 470p
3525 1K
3527 2K2
6523 1N4148
7522 BC847B
3529 47K
3530 4K7
3522 470K
2508 470p
5520 W8096
G5P 1515
9503
EAR
2516 1n5
RES 2515
VlotAux+13V
6581 BAS216
6580 BAS216
3580 220K
7580 BC857B
2580 47u
3565 330R
6565 BAV70
P4
7560 L78L33ACZ 12V 3 3V3
2567 47u
+3.9V (3V9)
+3.3V (3V3)
3558 330R
3559 1K
5562
2562 1n
6562 EGP20DL
6564 SB340
2564 2m2
3560 330R
68R
0R33
7564 BC858B
P5
M_Aux 12V4 (3V9)
TO A8 OF AudioSupplyGnd
2566 47u
2569 470u
3561 100R
7562 BC857B 4V8 11V6
3567 3K9 -2V9
3568 10K
+3.3V
3563 8K2
3562 10K
2563 100n
6567 BZX384-C4V7
6563 BAS216
*9504
3570 6R8
MainAux
3V3
7561 PDTC143ZT -V28
POWER_DOWN A7-11
92V4 (95V)
5561 27u
MainSupply (95V)
P6 Vdef A2-64
5560 2560 1n 6560 BYW76
6561 BYW76
5563
2565 470p
2561 47u
3549 470R
0251 TO 0251 OF J FOR ITV ONLY
TO 0283 0282 A4
TO A2 OF MainSupplyGnd
3519 270R
7515 TCET1103(G) 8V9 10V 1V3 16V4
3540 1K
3541 470R
6541 BZX79-C10
3542 1K5
3548 15K 2542 1n5
2540 1n5
3543 82K
3546 100R
7541 PDTC143ZT 9V 0V
6540 BZX79 B6V2
3545 82K
3544 6K8
7540 BC547B 8V3 6V3 6V
3569 10K
7542 BC857B
3552 22K
3547 0R22 2547 1m
6566 BAS16
Stdby_con A7-5
6570 BZX384-C6V8
3566 2K2 2568 0u47
6569 BAS16
2559 100n
7520 TEA1507
16V8 (13V8) 1 Vcc
2 Gnd
3 Ctrl
8 Drain
7 HVS
4 Demag
5 Sense
6 Driver 2V
309V (317V)
SUPPLY MANAGEMENT
START-UP CURRENT SOURCE
VALLEY
VOLTAGE CONTRLLED OSCILLATOR
FREQUENCY CONTROL
OVER TEMPERATURE PROTECTIOM
POWER-ON RESET
INPUT CONTROL CIRCUIT
BURST DETECTOR
LOGIC CONTROL CIRCUIT
CURRENT SENSING
OUTPUT DRIVER
MAXIMUM ON-TIME PROTECTION
OVER POWER PROTECTION
3531 100R
2521 22u
2528 470n
6522
BZX79-C20
6520 BYD33D
3521 22R
3520 1K2
2520 10n

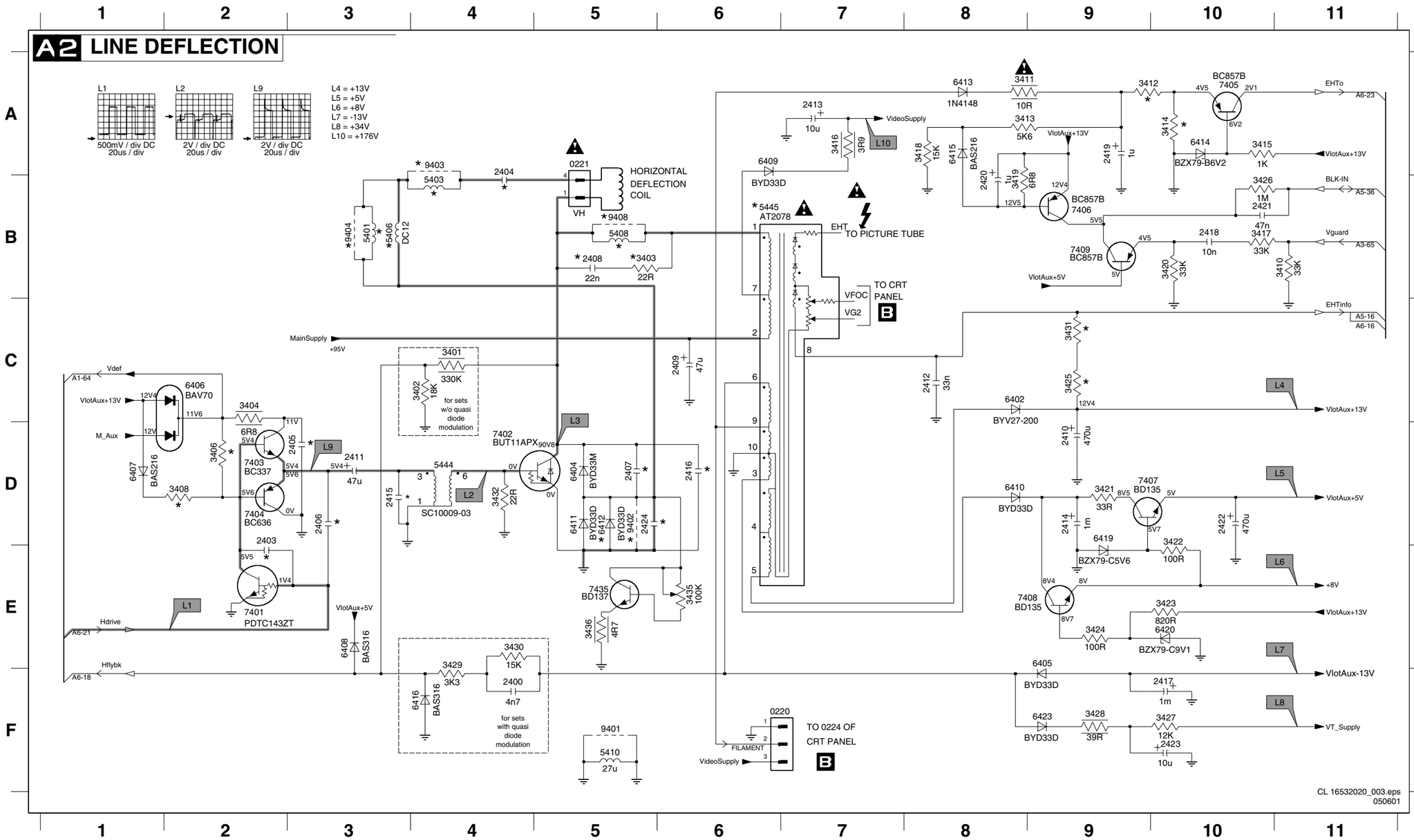
..V.. Normal Operation
(..V..) Standy Mode
HOT GROUND
COLD GROUND

CL 16532020_002.eps
050601

Diversity Table A1

Item	Description	A1 Mono Wide	A1 Stereo	A2 Mono	A2 Stereo	A3 Mono Wide	A3 Mono NTSC	A3 Stereo Wide	A3a, b,D,E	A3c, NTSC
0213	CON 2P									
0251	4P Male									
0315	RELAY 1P 12V 5A									
2503	450V 100U									
2504	1KV 2N2									
2506	47uF 25V	X	X	X	X	X	X			
2508	1uF 50V	X	X	X	X	X	X	X	X	X
2560	25V 47U									
3502	NTC DC 4R7									
3503	PTC DC 10R									
3505	VDR DC 1MA/423V									
3506	1/2W 220R									
3508	1M5									
3519	22R	X	X			X	X			
3521	4R7			X	X			X	X	X
3523	100R	X	X			X	X			
3525	47K			X	X			X	X	X
3526	0.18R 1W	X	X			X	X			
3528	0.15R 1W			X	X			X	X	X
3546	Jumper	X	X	X	X	X	X	X	X	X
3552	10K	X	X	X	X	X	X	X	X	X
3558	330R 1W									
3559	1K	X	X	X	X	X	X	X	X	X
3560	47K	X	X	X	X	X	X	X	X	X
3564	6.1R 2W	X	X	X	X					
3564	4.7R 2W					X	X	X	X	X
3565	330R 1W									
3566	2K2	X	X	X	X	X	X	X	X	X
3567	8K2	X	X	X	X					
3568	8K2	X	X	X	X					
3569	5K6					X	X	X	X	X
3570	10R 1W									
3580	47K	X	X	X	X	X	X	X	X	X
5500	FIL MAINS 20MH									
5502	FIL MAINS 5MH 1A									
5520	TFM SMT LAYER S35984-09 B			X	X			X	X	X
5520	TFM SMT LAYER S5Z8010-06 B	X	X			X	X			
6562	BEAD 100MHz	X	X			X	X			
6562	BEAD 100MHz			X	X			X	X	X
6563	BYW76-RAS15/10									
6563	ECPSDDL-5100	X	X	X	X	X	X	X	X	X
6564	SB340L-7024									
6566	BAS316	X	X	X	X	X	X	X	X	X
6566	BAS216	X	X	X	X	X	X	X	X	X
6569	BAS316	X	X	X	X	X	X	X	X	X
6569	BAS216	X	X	X	X	X	X	X	X	X
6570	BZX284-C6V2	X	X	X	X	X	X	X	X	X
6580	DIO SIG SM BAS216									
6580	DIO SIG SM BAS216									
7521	STP6NC80ZFP									
7521	STP6NC80ZFP	X	X			X	X			
7524	STP4NC80ZFP			X	X			X	X	X
7523	STP4NC80ZFP	X	X			X	X			
7541	PDTC114ET	X	X	X	X	X	X	X	X	X
7542	BC857B	X	X	X	X	X	X	X	X	X
7562	BC857B	X	X	X	X	X	X	X	X	X
7564	BC857B	X	X	X	X					
7580	TRA SIG SM BC857B									
9500	Wire									
9501	Wire									
9502	Wire	X	X	X	X	X	X	X	X	X
9503	Wire	X	X	X	X	X	X	X	X	X
9504	Wire	X	X	X	X	X	X			
9520	Wire									

Large Signal Panel: Line Deflection



0220 F6
0221 A5
2400 F4
2403 D2
2404 A4
2405 D3
2406 D3
2407 D5
2408 B5
2409 C6
2410 D9
2411 D3
2412 C8
2413 A7
2414 D9
2415 D3
2416 D6
2417 F10
2418 B10
2419 A9
2420 B8
2421 B10
2422 D10
2423 F10
2424 D5
3401 C4
3402 C4
3403 B5
3404 C2
3406 D2
3408 D2
3410 B11
3411 A8
3412 A9
3413 A8
3414 A10
3415 A10
3416 A7
3417 B10
3418 A8
3419 B8
3420 B10
3421 D9
3422 D10
3423 E10
3424 E9
3425 C9
3426 B10
3427 F10
3428 F9
3429 E4
3430 E4
3431 C9
3432 D4
3435 E6
3436 E5
5401 B3
5403 B4
5406 B3
5408 B5
5410 F5
5444 D4
5445 B6
6402 C8
6404 D5
6405 E9
6406 C2
6407 D1
6408 E3
6409 A6
6410 D8
6411 D5
6412 D5
6413 A8
6414 A10
6415 A8
6416 F4
6419 D9
6420 E10
6423 F9
7401 E2
7402 D4
7403 D2
7404 D2
7405 A10
7406 B9
7407 D10
7408 E9
7409 B9
7435 E5
9401 F5
9402 D5
9403 A4
9404 B3
9408 B5

Large Signal Panel: Frame Deflection

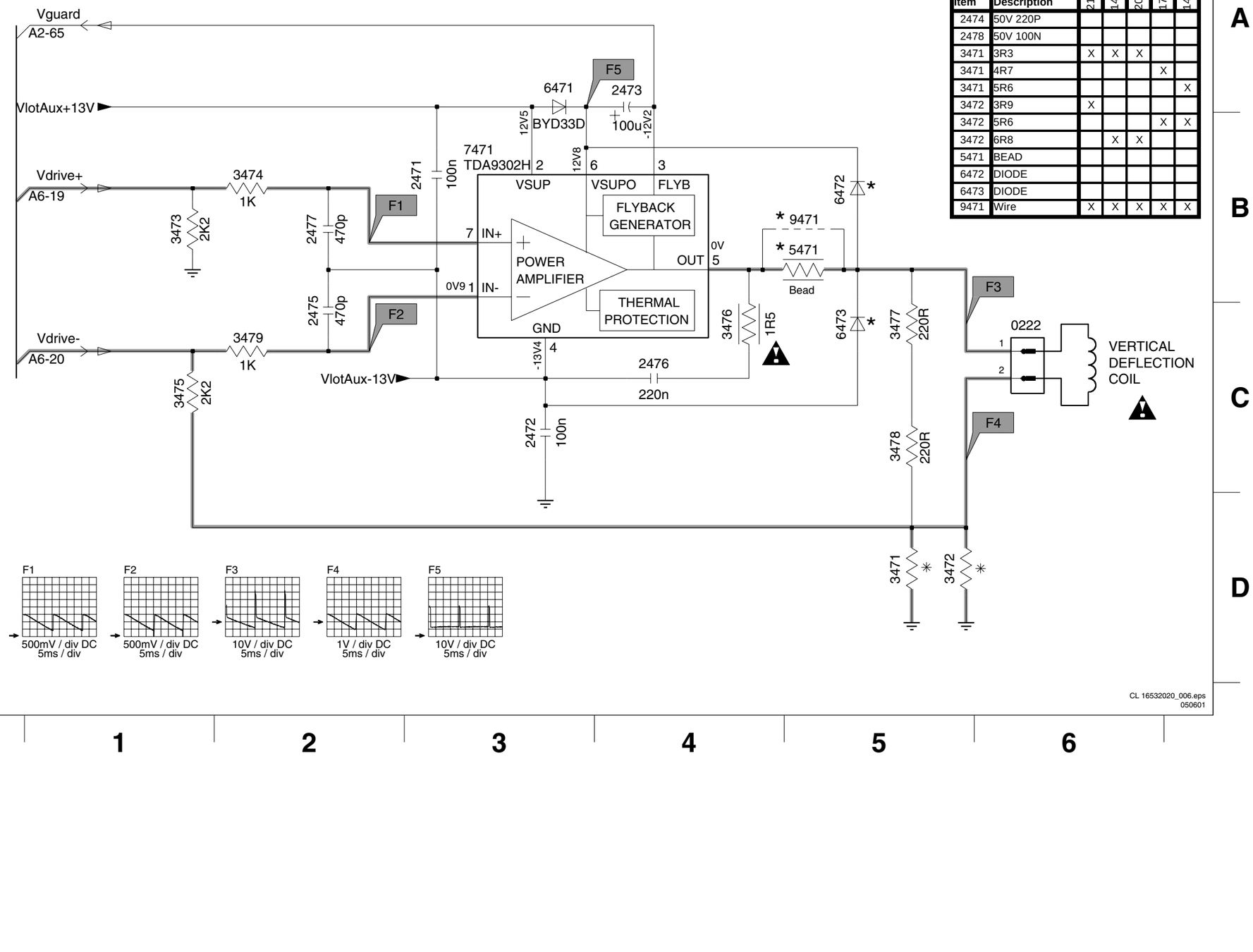
0222 C6 2472 C3 2475 C2 2477 B2 3472 D5 3474 B2 3476 C4 3478 C5 5471 B5 6472 B5 7471 B3
2471 B3 2473 A4 2476 C4 3471 D5 3473 B1 3475 C1 3477 C5 3479 C2 6471 A3 6473 C5 9471 B5

1 2 3 4 5 6

Diversity Table A2

Item	Description	21"	20"	17"	14" Black matrix	14" Black line
2401	50V 680P					
2402	250V 680N					
2403	capacitor					
2404	560nF 250V	X				
2404	680nF 250V		X			
2404	390nF 250V			X		
2404	470nF 250V				X	X
2405	1N 50V	X	X	X	X	X
2406	50V 330P					
2407	9nF1 1.6kV			X	X	X
2407	11nF 1.6kV	X				
2407	12nF 1.6kV		X			
2408	22nF 50V	X	X		X	X
2408	47nF 50V			X		
2415	capacitor					
2416	220pF 2kV				X	X
2416	470pF 2kV	X				
2416	560pF 2kV			X		
2416	2.2nF 2kV		X			
2424	47N 100V	X	X	X	X	X
3221	1/6W 560R					
3222	1/6W 100R					
3401	330K					
3402	1/6W 18K					
3403	22R	X	X	X	X	X
3406	1/6W 10K	X	X	X	X	X
3407	220R					
3408	8K2 1/6W	X	X	X	X	X
3412	39K	X	X	X	X	X
3414	12K	X	X	X	X	X
3425	12K	X	X		X	X
3425	18K			X		
3431	100R			X		
3431	1K	X				
3431	2K7		X			
3431	4K7				X	
3431	5K6					X
5401	68U					
5403	10U	X	X	X		
5406	COI LINCOR DRUM	X		X		
5406	COI LINCOR DRUM		X			
5408	22U		X			
5408	27U	X		X	X	X
5445	TFM 1142.5093D B	X	X	X	X	X
6401	DIO SIG BAV21					
6412	BYD33D	X	X	X	X	X
7402	TRA POW BUT11APX					
7407	TRA POW BD135-16					
7408	TRA POW BD135-16					
9402	Wire					
9403	Wire				X	X
9404	Wire				X	X
9408	Wire					

A3 FRAME DEFLECTION

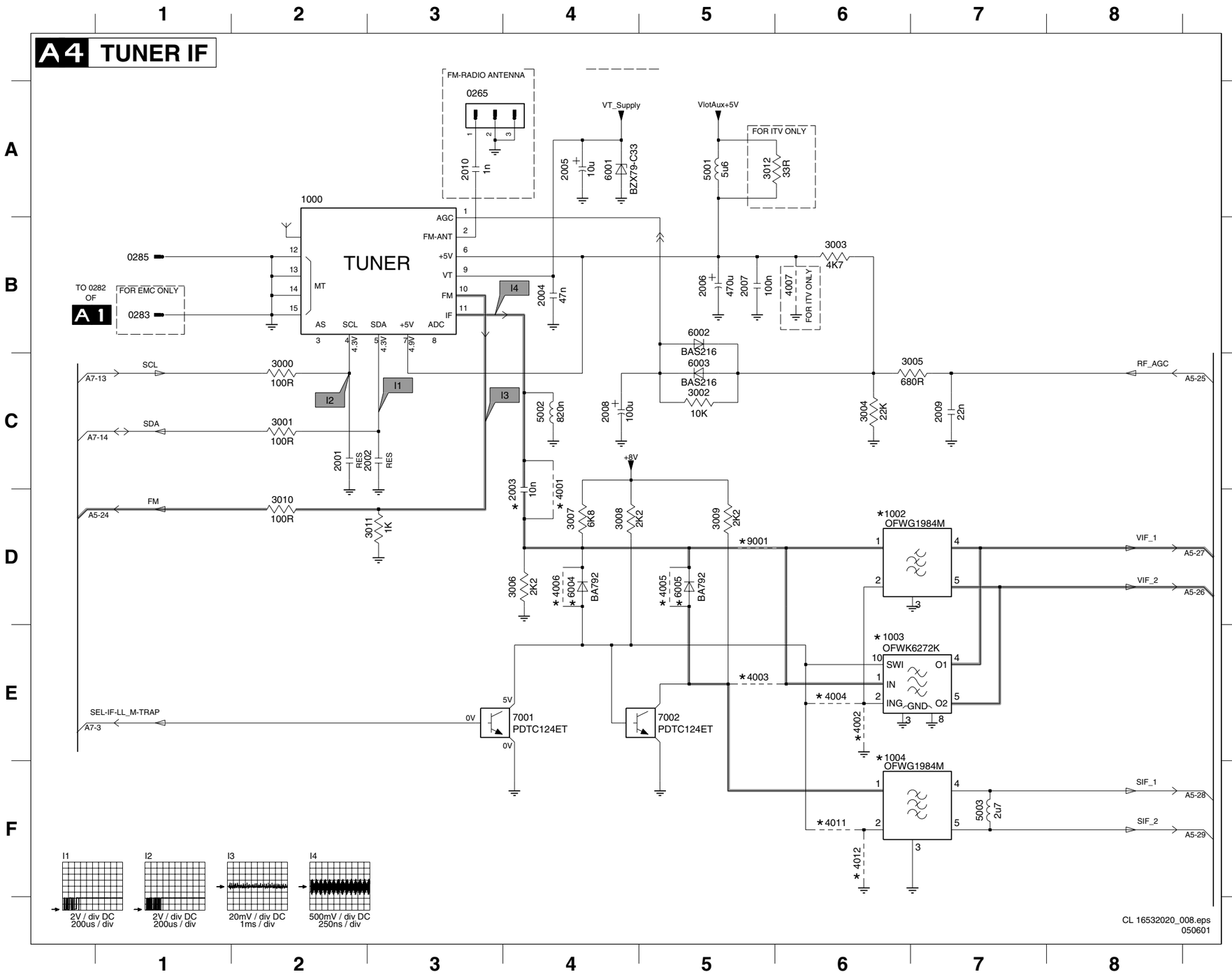


Diversity Table A3

Item	Description	21"	14" Black line	20"	17"	14" Black matrix
2474	50V 220P					
2478	50V 100N					
3471	3R3	X	X	X		
3471	4R7				X	
3471	5R6					X
3472	3R9	X				
3472	5R6				X	X
3472	6R8		X	X		
5471	BEAD					
6472	DIODE					
6473	DIODE					
9471	Wire	X	X	X	X	X

Large Signal Panel: Tuner IF

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

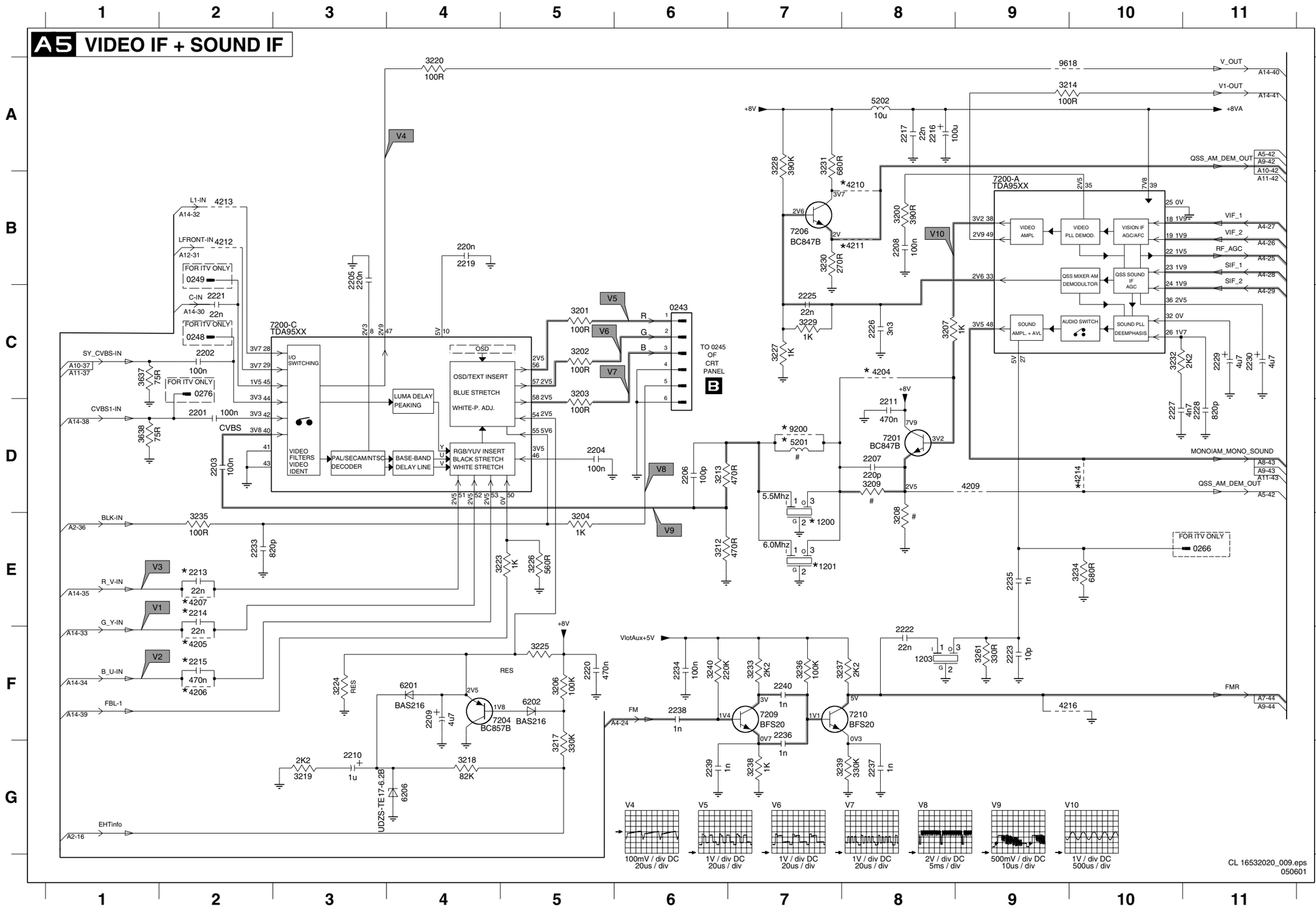


Diversity Table A4

Item	Description	14", 21" Stereo 3W, PAL BG-I	14", 17", 21" Mono 4W, PAL BG-I	14", 21" Stereo 3W, PAL, SECAM L-L1	14", 17", 21" Mono 4W, PAL, SECAM L-L1	14", 21" Stereo 3W, East Europe	14", 17", 21" Mono 4W, East Europe	14", 20", 21" Mono 1W, PAL BG-I	14", 20", 21" Mono 1W, PAL, SECAM L-L1	14", 20", 21" Mono 1W, East Europe
0265	3P	X	X	X	X	X	X			
0285	1P									
1000	TUN V+U PLL IEC BGDK							X	X	X
1000	TUNER UR1316R/A I -3	X	X	X	X	X	X			
1002	OFWK3953M			X	X				X	
1003	OFWK6289K	X	X			X	X	X		X
1004	OFWK9656M			X	X				X	
2003	50V 10N	X	X	X	X	X	X	X	X	X
2010	1N	X	X	X	X	X	X			
3002	10K			X	X				X	
3002	Jumper	X	X			X	X	X		X
3004	8K2									
3010	330R	X		X		X				
3010	Jumper		X		X		X			
3011	330R		X		X		X			
4001	Jumper									
4002	Jumper	X	X	X	X	X	X	X	X	X
4003	Jumper			X	X				X	
4004	Jumper									
4005	Jumper									
4006	Jumper									
4011	Jumper			X	X				X	
4012	Jumper									
4608	Jumper	X	X	X	X	X	X			
4609	Jumper	X	X	X	X	X	X			
5003	1U8			X	X				X	
6002	BAS316			X	X				X	
6002	BAS216			X	X				X	
6004	BA792	X	X	X	X	X	X	X	X	X
6005	BA792									
9001	Wire	X	X	X	X	X	X	X	X	X

Large Signal Panel: Video IF + Sound IF

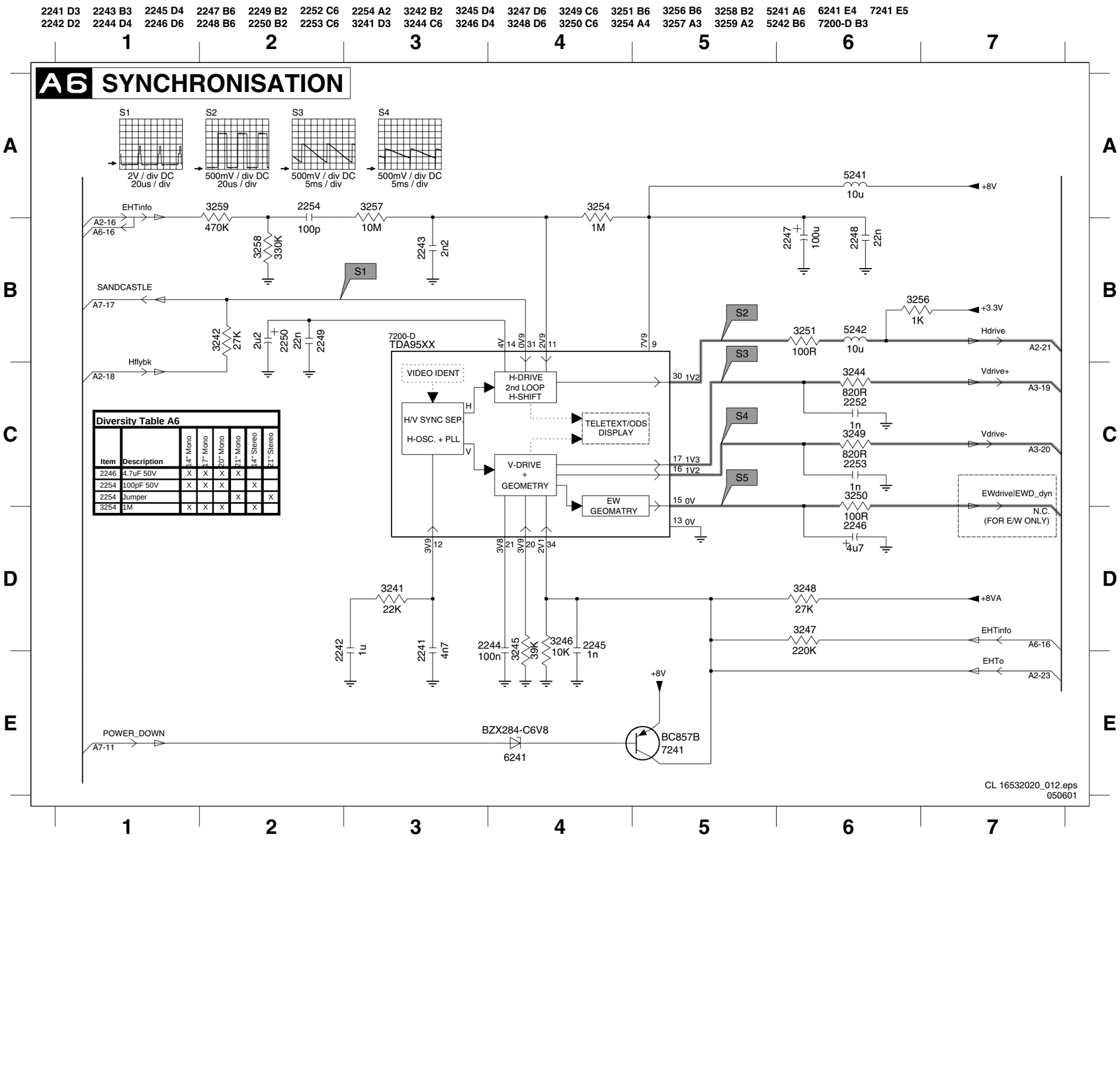
A5 VIDEO IF + SOUND IF



Large Signal Panel: Synchronisation

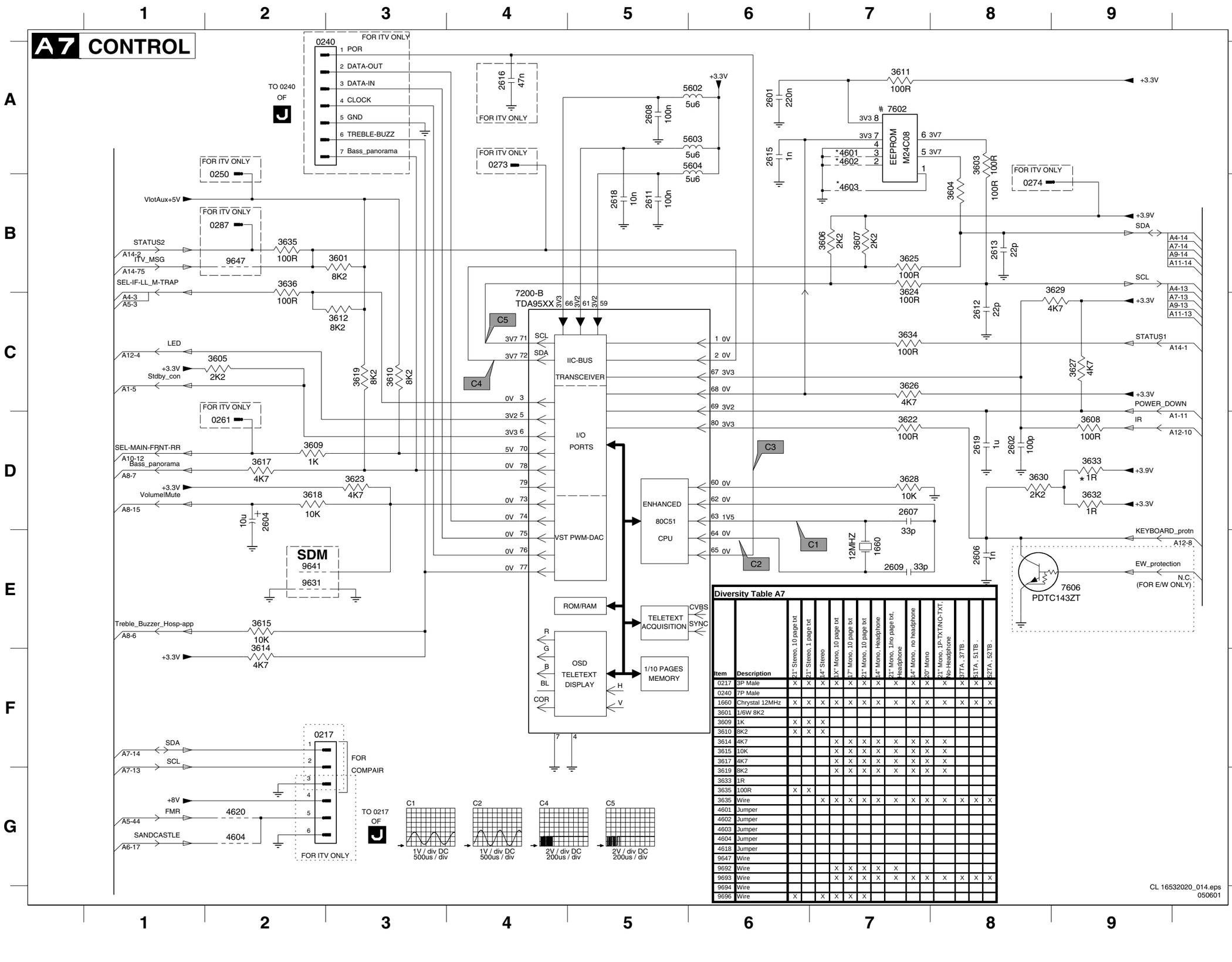
Diversity Table A5

Item	Description	14" Stereo, Single Int, PAL, SECAM L+L1	21" Stereo, 2 scarts	14" Mono, 1Watt, No Int, Headphone, PAL, SECAM L+L1	14" Mono, 1Watt, 1 page Int, Headphone	14" Stereo PAL, SECAM L+L1	20" Mono, PAL, SECAM L+L1, 1page Int	ITTA, PAL, SECAM L+L1, 1page Int	ATATB, PAL, SECAM L+L1, 1page Int	20" Mono, PAL, SECAM L+L1, no Int	PTHATB, PAL, SECAM L+L1, no Int	XTATB, PAL, SECAM L+L1, no Int	14" Mono, 4Watt	17" Mono, 4Watt	21" Mono, 4Watt	21" Stereo, 1 page Int, East Europe	21" Stereo, 1scart	21" Mono 1Watt	14" Mono, 1Watt, No Int, Headphone, East Europe	14" Stereo, East Europe	21" Mono 1Watt	14" Mono, 1Watt, 1 page Int, No Headphone	20" Mono, East Europe, 1page Int	21" Mono 1Watt	14" Mono, 1Watt, No Int, No Headphone	20" Mono, East Europe, no Int	21" Mono 1Watt
1200	Chrystal 5M5/5M74	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1201	Chrystal 5M5/5M7/6M5												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1202	Chrystal 4MHZ5																										
1203	Chrystal 10MHz												X	X	X												
2202	100nF 25V	X	X	X	X	X							X	X	X	X	X	X	X	X	X	X					
2207	68pF 50V	X	X	X	X	X	X	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	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	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	X	X	X	X	X	X
2220	470nF 50V	X	X													X	X										
2221	22nF 25V	X	X													X	X										
2222	10nF 50V												X	X	X												
2223	10pF 50V												X	X	X												
2225	220pF 25V			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2226	3.9nF 50V			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2227	4.7nF 50V			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2228	820pF 50V			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2229	10uF 50V			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2230	4.7uF 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
2234	100nF 25V		X			X							X	X	X		X				X						
2235	1nF 50V												X	X	X												
2238	1nF 50V		X			X							X	X	X		X				X						
2239	1nF 50V		X			X											X										
2240	1nF 50V		X			X							X	X	X		X				X						
3208	150R												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3208	390R	X	X	X	X	X	X	X	X	X	X	X	X	X													
3210	1/6W 4K7																										
3211	1/6W 4K7																										
3220	100R	X	X															X	X								
3227	100K			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3228	100K			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3229	820R	X	X			X																					
3230	1K			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3230	270R	X	X			X																					
3231	560R	X	X			X																					
3231	Jumper			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3232	2K2			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3233	820R		X			X							X	X	X		X				X						
3234	680R												X	X	X												
3236	100K												X	X	X												
3236	150K		X			X											X				X						
3237	1K2		X			X											X				X						
3237	330R												X	X	X												
3238	270R												X	X	X												
3238	560R		X			X											X				X						
3239	270R		X			X											X				X						
3239	330R												X	X	X												
3240	100K		X			X							X	X	X		X				X						
3261	330R												X	X	X												
4204	Jumper																										
4205	Jumper																										
4206	Jumper																										
4207	Jumper																										
4209	Jumper															X	X				X						
4210	Jumper	X	X			X																					
4211	Jumper			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
4212	Jumper			X	X								X	X	X			X	X	X							
4213	Jumper			X	X		X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
4214	Jumper																										
4216	Jumper	X		X	X		X	X	X	X	X	X	X			X		X	X	X		X	X	X	X	X	X
5201	2U2												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5201	4U7	X	X	X	X	X	X	X	X	X	X	X	X														
7200	TDA9551H/N1/3															X		X				X	X	X			
7200	TDA9552H/N1/3	X			X		X	X	X	X																	
7200	TDA9567H/N1/5		X			X																					
7200	TDA9571H/N1/3																	X	X							X	X
7200	TDA9572H/N1/3			X							X	X	X														
7200	TDA9561H/N1/5												X	X	X		X				X						
7202	TRA SIG SM BC857B																										
7203	TRA SIG SM BC857B																										
7205	TRA SIG SM BC857B																										
7206	BC847C	X	X	X	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						
7210	BFS20		X			X							X	X	X		X				X						
9200	Wire																										
9298	Wire																										
9299	Wire																										
9618	Wire	X	X													X	X										



Large Signal Panel: Control

A7 CONTROL



Diversity Table A7

Item	Description	21" Stereo, 10 page txt	21" Stereo, 1 page txt	14" Stereo	17" Mono, 10 page txt	17" Mono, 10 page txt	21" Mono, 10 page txt	14" Mono, Headphone	21" Mono, 1/no page txt, Headphone	14" Mono, no headphone	20" Mono	21" Mono, 1P-TXT/NO-TXT, No-Headphone	37TA , 37TB.	51TA , 51TB .	52TA , 52TB .
0217	3P Male	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0240	7P Male														
1660	Chrystal 12MHz	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3601	1/6W 8K2														
3609	1K	X	X	X											
3610	8K2	X	X	X											
3614	4K7				X	X	X	X	X	X	X	X			
3615	10K				X	X	X	X	X	X	X	X			
3617	4K7				X	X	X	X	X	X	X	X			
3619	8K2				X	X	X	X	X	X	X	X			
3633	1R														
3635	100R	X	X												
3635	Wire			X	X	X	X	X	X	X	X	X	X	X	X
4601	Jumper														
4602	Jumper														
4603	Jumper														
4604	Jumper														
4618	Jumper														
9647	Wire														
9692	Wire				X	X	X	X	X						
9693	Wire				X	X	X	X	X	X	X	X	X	X	X
9694	Wire														
9696	Wire	X		X	X	X	X								

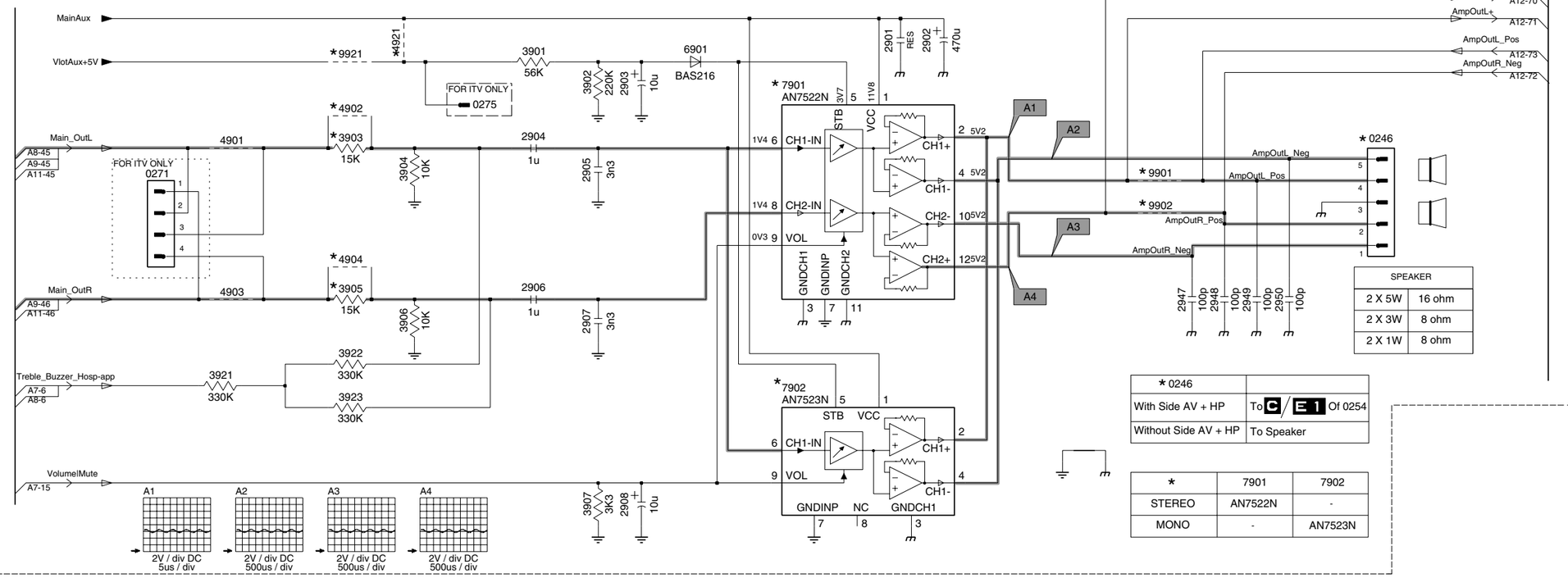
CL 16532020_014.eps
050601

0217 F2
0240 A2
0250 B2
0261 D2
0273 A4
0274 B8
0287 B2
1660 E7
2601 A6
2602 D8
2604 D2
2606 E8
2607 D7
2608 A5
2609 E7
2611 B5
2612 C8
2613 B8
2615 A6
2616 A4
2618 B5
2619 D8
3601 B3
3603 A8
3604 B8
3605 C2
3606 B7
3607 B7
3608 D9
3609 D2
3610 C3
3611 A7
3612 C3
3614 F2
3615 E2
3617 D2
3618 D2
3619 C3
3622 D7
3623 D3
3624 C7
3625 B7
3626 C7
3627 C9
3628 D7
3629 B9
3630 D8
3632 D9
3633 D9
3634 C7
3635 B2
3636 B2
4601 A7
4602 A7
4603 B7
4604 G2
4620 G2
5602 A6
5603 A6
5604 A6
7200-B C4
7602 A7
7606 E9
9631 E2
9641 E2
9647 B2

Large Signal Panel: Audio Amplifier + Mono Sound Processing

A8 AUDIO_AMPLIFIER + MONO_SOUND_PROCESSING

AUDIO AMPLIFIER

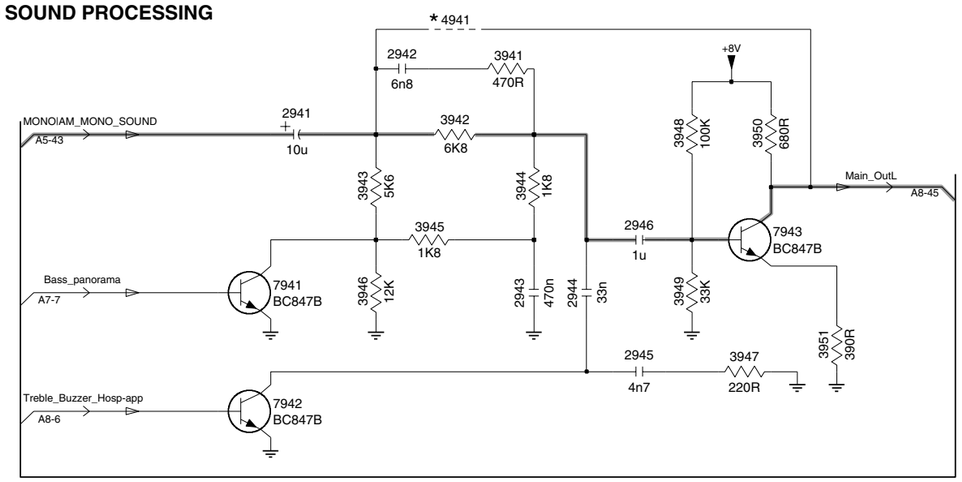


SPEAKER	
2 X 5W	16 ohm
2 X 3W	8 ohm
2 X 1W	8 ohm

*0246	
With Side AV + HP	To C / E1 Of 0254
Without Side AV + HP	To Speaker

*	7901	7902
STEREO	AN7522N	-
MONO	-	AN7523N

MONO SOUND PROCESSING



(Mono sets only)

Diversity Table A8

Item	Description	X* Mono, XWatt	1* Mono, 4Watt	2*1* Mono, 4Watt	1* Mono, 1Watt, No-Headphone, Smart Sound	2*0* Mono, 1Watt, No-Headphone	2*1* Mono, 1Watt, No-Headphone	1* Mono, 1Watt, Headphone	2*1* Mono, 1Watt, Headphone	1* Mono, 1Watt, No-Headphone, No-Smart Sound	2*7A/7B* , Mono, 1Watt, No-Headphone	2*1A/7B* , Mono, 1Watt, No-Headphone	2*7A/7B* , Mono, 1Watt, Headphone	2*1A/7B* , Mono, 1Watt, Headphone	2*7A/7B* , Mono, 1Watt, Headphone	2*1* Stereo, Side AV	1* Stereo	2*1* Stereo, Non Side AV
0246	3P Male	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0246	5P Male															X	X	X
1831	Chrystal 18.432MHz															X	X	X
2904	1uF 16V	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
2904	470nF 16V															X	X	X
2906	470nF 16V															X	X	X
2907	1nF 50V	X	X	X												X	X	X
2941	1uF 50V	X	X	X	X	X	X	X	X									
2941	10uF 50V									X	X	X	X	X	X			
2942	33nF 50V	X	X	X	X	X	X	X	X									
2943	100nF 16V	X	X	X	X	X	X	X	X									
2944	47nF 50V	X	X	X	X	X	X	X	X									
2945	10nF 50V	X	X	X	X	X	X	X	X									
2946	1uF 16V	X	X	X	X	X	X	X	X									
3903	3K3															X	X	X
3903	8K2	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
3905	3K3															X	X	X
3906	10K															X	X	X
3921	330K																	
3922	330K																	
3941	100R	X	X	X	X	X	X	X	X									
3942	3K9	X	X	X	X	X	X	X	X									
3943	2K7	X	X	X	X	X	X	X	X									
3944	2K7	X	X	X	X	X	X	X	X									

Diversity Table A8

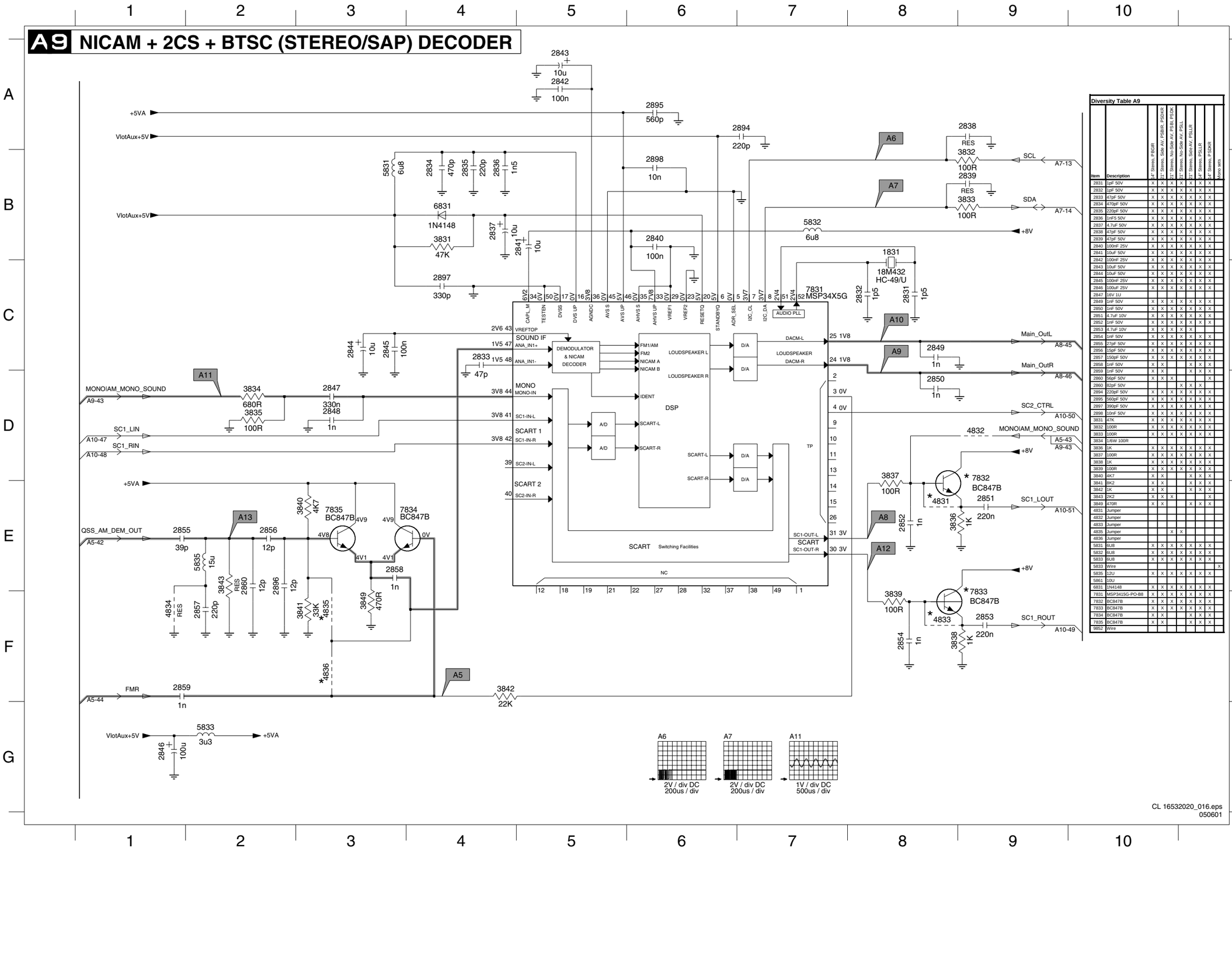
Item	Description	X* Mono, XWatt	1* Mono, 4Watt	2*1* Mono, 4Watt	1* Mono, 1Watt, No-Headphone, Smart Sound	2*0* Mono, 1Watt, No-Headphone	2*1* Mono, 1Watt, No-Headphone	1* Mono, 1Watt, Headphone	2*1* Mono, 1Watt, Headphone	1* Mono, 1Watt, No-Headphone, No-Smart Sound	2*7A/7B* , Mono, 1Watt, No-Headphone	2*1A/7B* , Mono, 1Watt, No-Headphone	2*7A/7B* , Mono, 1Watt, Headphone	2*1A/7B* , Mono, 1Watt, Headphone	2*7A/7B* , Mono, 1Watt, Headphone	2*1* Stereo, Side AV	1* Stereo	2*1* Stereo, Non Side AV
3945	1K	X	X	X	X	X	X	X	X									
3946	18K	X	X	X	X	X	X	X	X									
3947	330R	X	X	X	X	X	X	X	X									
3948	47K	X	X	X	X	X	X	X	X									
3949	15K	X	X	X	X	X	X	X	X									
3950	560R	X	X	X	X	X	X	X	X									
3951	390R	X	X	X	X	X	X	X	X									
4901	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4902	Jumper																	
4903	Jumper															X	X	X
4904	Jumper																	
4921	Jumper																	
4941	Jumper									X	X	X	X	X	X			
7901	AN7522N	X	X	X													X	X	X
7902	AN7523N				X	X	X	X	X	X	X	X	X	X	X			
7941	BC847B	X	X	X	X	X	X	X	X									
7942	BC847B	X	X	X	X	X	X	X	X									
7943	BC847B	X	X	X	X	X	X	X	X									
9901	Wire				X	X	X			X	X	X	X					
9902	Wire				X	X	X			X	X	X	X					
9913	Wire																X	X	X
9914	Wire																X	X	X
9921	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

CL 16532020_015.eps
010601

0246 B10
0271 B2
0275 B4
2901 A7
2902 A7
2903 B5
2904 B4
2905 B5
2906 C4
2907 C5
2908 E5
2941 F3
2942 F3
2943 G4
2944 G4
2945 G4
2946 G4
2947 C9
2948 C9
2949 C9
2950 C9
3901 B4
3902 B5
3903 B3
3904 B4
3905 C3
3906 C4
3907 E5
3921 D2
3922 D3
3923 D3
3941 F4
3942 F3
3943 F3
3944 F4
3945 G3
3946 G3
3947 G5
3948 F5
3949 G5
3950 F5
3951 G5
4901 B2
4902 B3
4903 C2
4904 C3
4921 A4
4941 F3
6901 B6
7901 B6
7902 D6
7941 G2
7942 H2
7943 G5
9901 B9
9902 C9
9921 B3

Large Signal Panel: NICAM + 2CS + BTSC (Stereo / SAP) Decoder

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

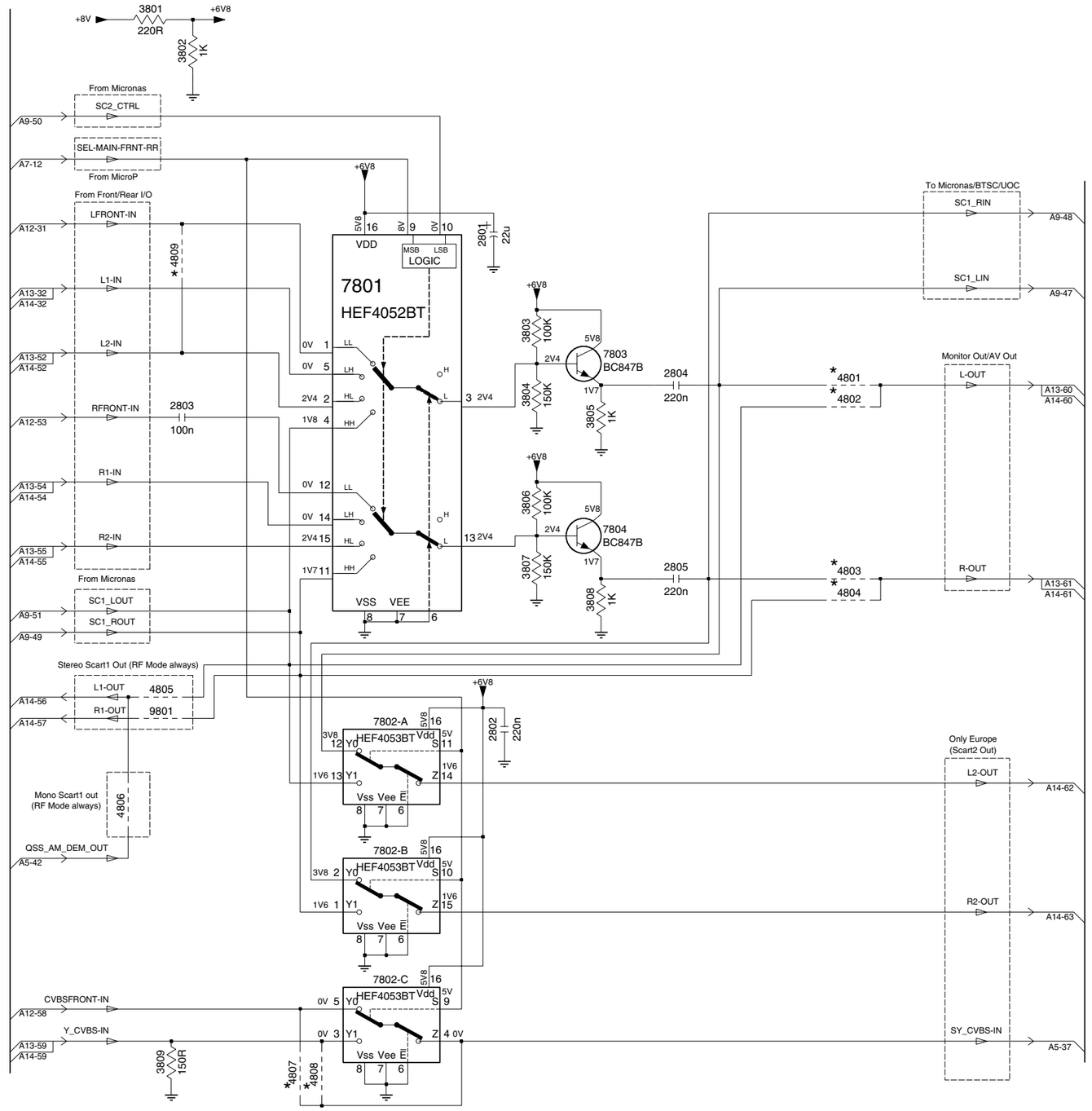


Diversity Table A9

Item	Description	4* Stereo, PSDIR	3* Stereo, Side AV, PSBIR, PSDKR	3* Stereo, No-Side AV, PSBI, PSDK	3* Stereo, No-Side AV, PSLL	3* Stereo, Side-AV, PSLLR	4* Stereo, PSLLR	4* Stereo, PSBKR	Micro wire
2831	1pF 50V	X	X	X	X	X	X	X	
2832	1pF 50V	X	X	X	X	X	X	X	
2833	47pF 50V	X	X	X	X	X	X	X	
2834	470pF 50V	X	X	X	X	X	X	X	
2835	220pF 50V	X	X	X	X	X	X	X	
2836	1nF5 50V	X	X	X	X	X	X	X	
2837	4.7uF 50V	X	X	X	X	X	X	X	
2838	47pF 50V	X	X	X	X	X	X	X	
2839	47pF 50V	X	X	X	X	X	X	X	
2840	100nF 25V	X	X	X	X	X	X	X	
2841	10uF 50V	X	X	X	X	X	X	X	
2842	100nF 25V	X	X	X	X	X	X	X	
2843	10uF 50V	X	X	X	X	X	X	X	
2844	10uF 50V	X	X	X	X	X	X	X	
2845	100nF 25V	X	X	X	X	X	X	X	
2846	100uF 25V	X	X	X	X	X	X	X	
2847	16V 1U								
2849	1nF 50V	X	X	X	X	X	X	X	
2850	1nF 50V	X	X	X	X	X	X	X	
2851	4.7uF 10V	X	X	X	X	X	X	X	
2852	1nF 50V	X	X	X	X	X	X	X	
2853	4.7uF 10V	X	X	X	X	X			
2854	1nF 50V	X	X	X	X	X	X	X	
2855	27pF 50V	X	X	X	X	X	X	X	
2856	15pF 50V	X	X	X	X	X	X	X	
2857	150pF 50V	X	X	X	X	X	X	X	
2858	1nF 50V	X	X			X	X	X	
2859	1nF 50V	X	X			X	X	X	
2860	56pF 50V	X	X	X				X	
2860	62pF 50V					X	X		
2894	220pF 50V	X	X	X	X	X	X	X	
2895	560pF 50V	X	X	X	X	X	X	X	
2897	390pF 50V	X	X	X	X	X	X	X	
2898	10nF 50V	X	X	X	X	X	X	X	
3831	47K	X	X	X	X	X	X	X	
3832	100R	X	X	X	X	X	X	X	
3833	100R	X	X	X	X	X	X	X	
3834	1/8W 100R								
3836	1K	X	X	X	X	X	X	X	
3837	100R	X	X	X	X	X	X	X	
3838	1K	X	X	X	X	X	X	X	
3839	100R	X	X	X	X	X	X	X	
3840	4K7	X	X			X	X	X	
3841	8K2	X	X			X	X	X	
3842	1K	X	X			X	X	X	
3843	2K2	X	X	X				X	
3849	470R	X	X			X	X	X	
4831	Jumper								
4832	Jumper								
4833	Jumper								
4835	Jumper				X	X			
4836	Jumper								
5831	6U8	X	X	X	X	X	X	X	
5832	6U8	X	X	X	X	X	X	X	
5833	6U8	X	X	X	X	X	X	X	
5833	Wire								X
5835	12U	X	X	X	X	X	X	X	
5861	10U								
6831	1N4148	X	X	X	X	X	X	X	
7831	MSP3415G-PO-B8	X	X	X	X	X	X	X	
7832	BC847B	X	X	X	X	X	X	X	
7833	BC847B	X	X	X	X	X	X	X	
7834	BC847B	X	X			X	X	X	
7835	BC847B	X	X			X	X	X	
9852	Wire								

Large Signal Panel: Audio / Video Source Switching

A10 AUDIO/VIDEO SOURCE SWITCHING



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

Diversity Table A10

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

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

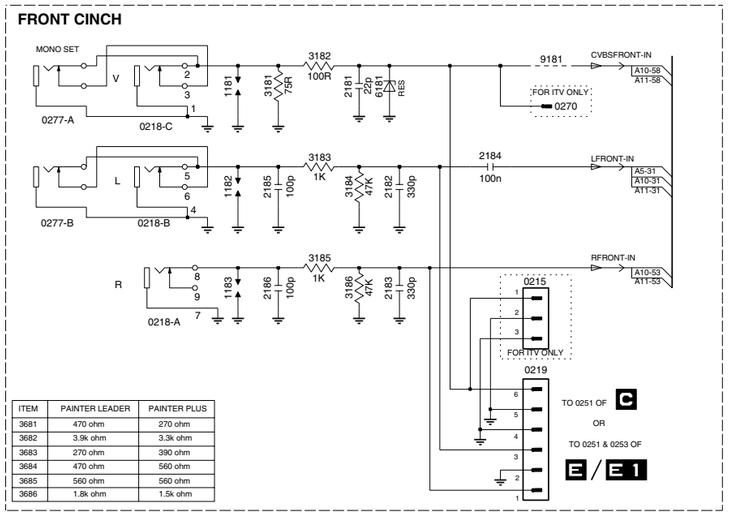
CL 16532020_017.eps
010601

Large Signal Panel: Front I/O + Front Control + Headphone

0214 D9 0215 C4 | 0218-A C2 0218-B B2 | 0218-C A2 0219 C4 | 0232 E5 0239 A7 | 0259 D10 0270 A5 | 0277-A A1 0277-B B1 | 0278 D7 0286 E7 | 0292 E4 1181 A2 | 1182 B2 1183 C2 | 1600 B10 1601 A9 | 1602 A9 1603 A8 | 1606 A7 2181 A3 | 2182 B3 2183 C3 | 2184 B4 2185 B3 | 2186 C3 2691 C10 | 2692 C8 2693 E8 | 2694 E8 2695 E8 | 2696 E8 2981 E2 | 2982 F3 2983 F2 | 2984 F3 3181 A3 | 3182 A3 3183 B3 | 3184 B3 3185 B3 | 3186 C3 3681 A9 | 3682 A10 3683 A8 | 3684 A8 3685 A7 | 3686 B9 3691 B8 | 3692 C8 3693 C10 | 3694 C9 3695 C7 | 3981 E3 3982 F3 | 4691 D8 4692 C7 | 4693 C7 4694 G1 | 4695 B8 6181 A3 | 6681 A10 6691 C8 | 6692 D9 9181 A5 | 9982 F2

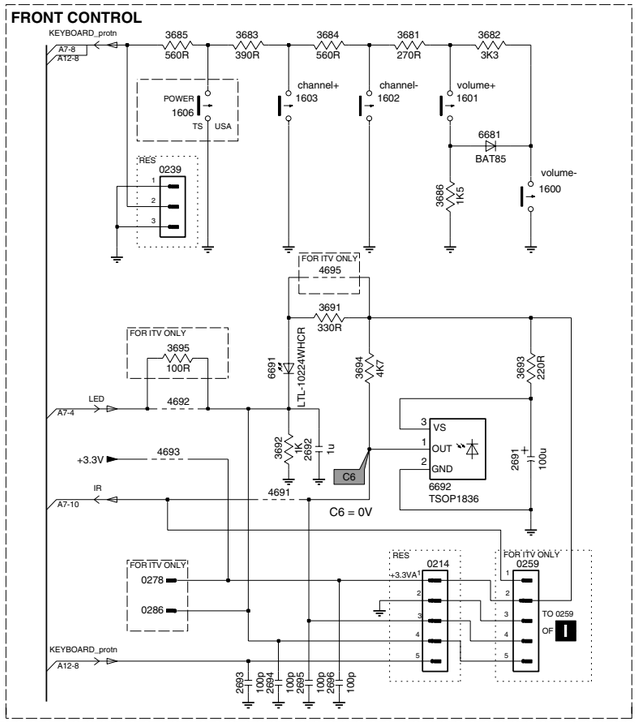
A12 FRONT I/O + FRONT CONTROL + HEADPHONE

FRONT CINCH

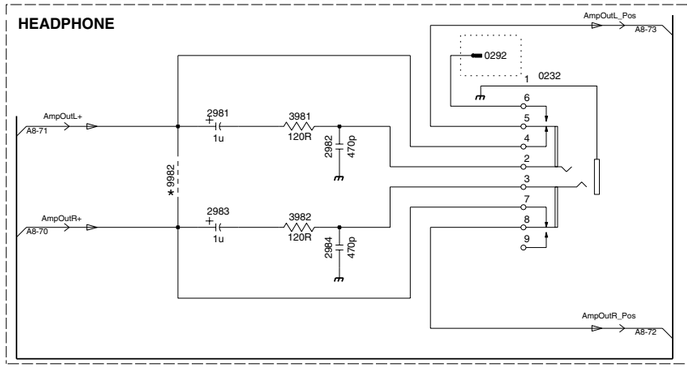


ITEM	PAINTER LEADER	PAINTER PLUS
3681	470 ohm	270 ohm
3682	3.9k ohm	3.3k ohm
3683	270 ohm	390 ohm
3684	470 ohm	560 ohm
3685	560 ohm	560 ohm
3686	1.8k ohm	1.5k ohm

FRONT CONTROL



HEADPHONE



Diversity Table A12

Item	Description	1.4" Mono, 1&10 page txt, Headphone	1.7" Mono	2.1" Mono, 1&10 page txt, no side av	1.4" Mono, no txt, headphone	2.1" Mono, no txt, headphone	1.4" Stereo	2.1" Stereo, no side av	2.1" Mono, 10 page txt, side av	2.1" Stereo, side av	B7 Mono, 1page txt	B1 Mono, 1page txt	B2 Mono, 1page txt, headphone	B7 Mono, no txt, headphone	1.4" Mono, 1page txt, no headphone	2.0" Mono, 1page txt	B2 Mono, 10 page txt, no headphone	B2 Mono, 1page txt, no headphone	1.4" Mono, no txt, no headphone	2.0" Mono, no txt	2.1" Mono, no txt	B7 Mono, no txt, no headphone	B1 Mono, no txt
0215	CON 3P																						
0218	SOC CINCH H 2P F	X	X	X	X	X																	
0218	SOC CINCH H 3P F						X	X															
0219	6P Male								X	X													
0232	SOC PHONE H 1P F	X	X	X	X	X	X	X	X		X	X	X	X									
0259	5P Male																						
1606	SWI TACT																						
2181	22pF 50V	X	X	X	X	X	X	X															
2182	390pF 50V	X	X	X	X	X	X	X															
2183	390pF 50V						X	X															
2184	4.7uF 10V	X	X	X	X	X	X	X	X	X													
2185	390pF 50V	X	X	X	X	X	X	X															
2186	390pF 50V						X	X															
2981	10uF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
2982	470pF 50V	X	X	X	X	X	X	X			X	X	X	X									
2983	10uF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
2984	470pF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
3181	75R	X	X	X	X	X	X	X															
3182	100R	X	X	X	X	X	X	X															
3183	150R	X	X	X	X	X	X	X															
3184	47K	X	X	X	X	X	X	X															
3185	150R						X	X															
3186	47K						X	X															
3681	390R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3681	470R				X	X								X					X	X	X	X	X	
3682	3K3	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3682	3K9				X	X								X					X	X	X	X	X	
3683	270R				X	X								X					X	X	X	X	X	
3683	390R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3684	470R				X	X								X					X	X	X	X	X	
3684	560R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3686	1K5	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3686	1K8				X	X								X					X	X	X	X	X	
3692	1K	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3695	330R																								
3981	120R	X	X	X	X	X	X	X			X	X	X	X											
3982	120R	X	X	X	X	X	X	X			X	X	X	X											
4692	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4693	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9181	Wire	X	X	X	X	X	X	X	X	X															
9982	Wire	X	X	X	X	X			X		X	X	X	X											

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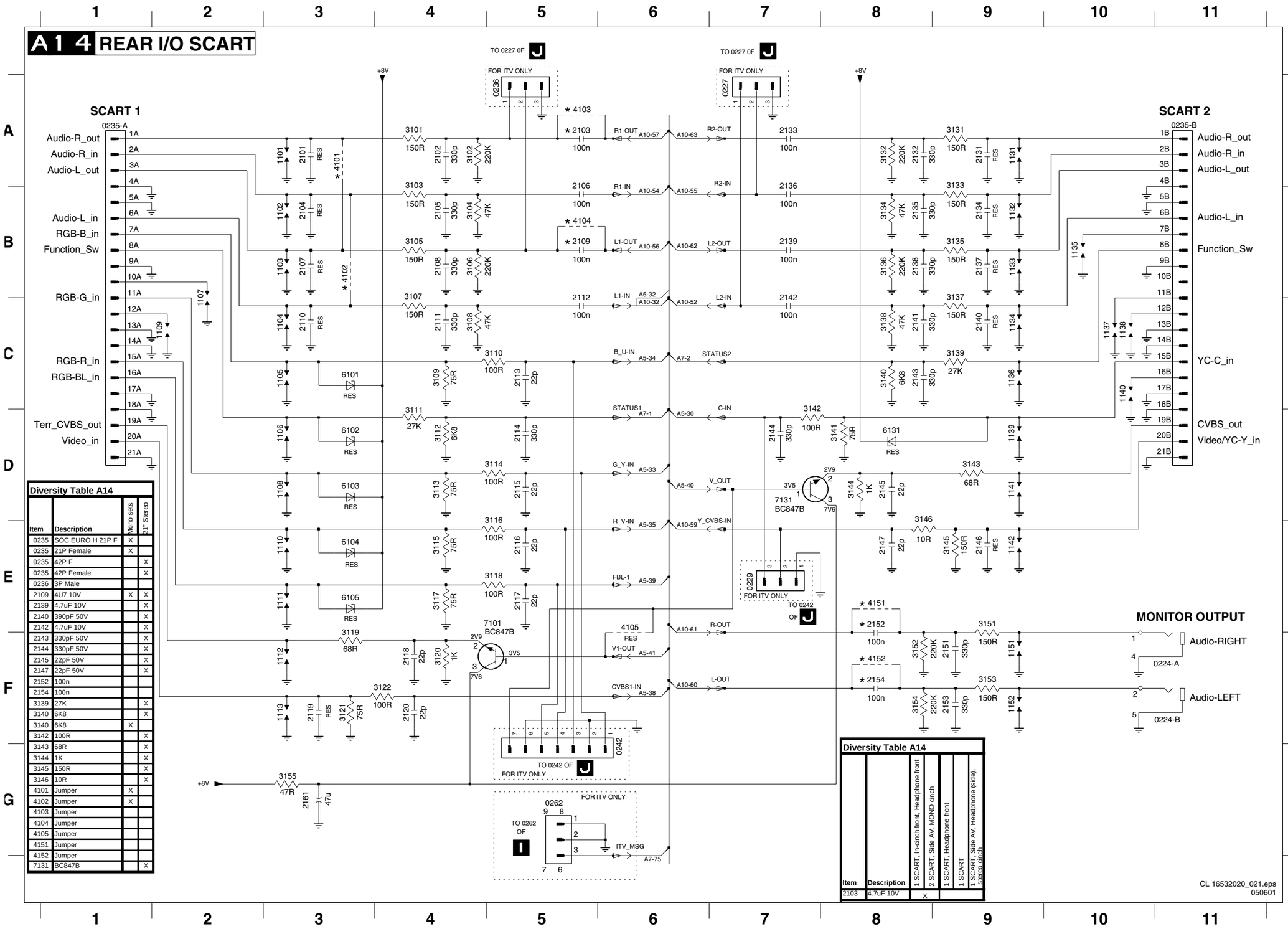
Large Signal Panel: Rear I/O SCART



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0227 A7
0229 E7
0235-A A1
0235-B A11
0236 A5
0242 F6
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1101 A3
1102 B3
1103 B3
1104 C3
1105 C3
1106 D3
1107 C2
1108 D3
1109 C2
1110 E3
1111 E3
1112 F3
1113 F3
1131 A9
1132 B9
1133 B9
1134 C9
1135 B10
1136 C9
1137 C10
1138 C10
1139 D9
1140 C10
1141 D9
1142 E9
1151 F9
1152 F9
2101 A3
2102 A4
2103 A5
2104 B3
2105 B4
2106 B5
2107 B3
2108 B4
2109 B5
2110 C3
2111 C4
2112 C5
2113 C5
2114 D5
2115 D5
2116 E5
2117 E5
2118 F4
2119 F3
2120 F4
2131 A9
2132 A8
2133 A7
2134 B9
2135 B8
2136 B7
2137 B9
2138 B8
2139 B7
2140 C9
2141 C8
2142 C7
2143 C8
2144 D7
2145 D8
2146 E9
2147 E8
2151 F9
2152 E8
2153 F9
2154 F8
2161 G3
3101 A4
3102 A4
3103 B4
3104 B4
3105 B4
3106 B4
3107 C4
3108 C4
3109 C4
3110 C5
3111 D4
3112 D4
3113 D4
3114 D5
3115 E4
3116 E5
3117 E4
3118 E5
3119 F3
3120 F4
3121 F3
3122 F4
3131 A9
3132 A8
3133 B9
3134 B8
3135 B9
3136 B8
3137 C9
3138 C8
3139 C9
3140 C8
3141 D8
3142 D7
3143 E9
3144 E8
3145 E9
3146 E8
3151 E9
3152 F8
3153 F9
3154 F8
3155 G3
4101 A3
4102 B3
4103 A5
4104 B5
4105 E6
4151 E8
4152 F8
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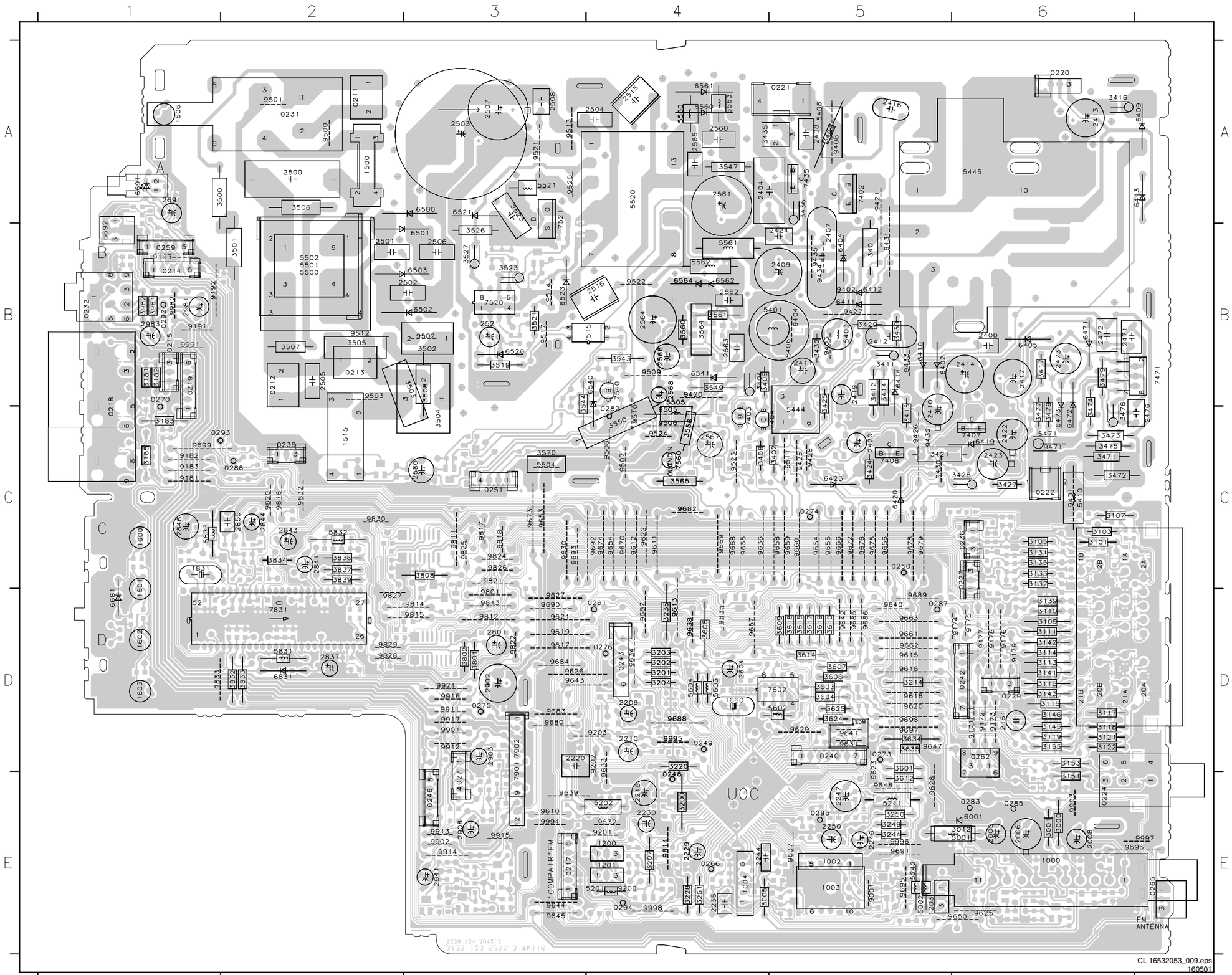
Layout Large Signal Panel (Top View)



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0215 B1 2983 B1 3837 C2 9512 B2
0217 E3 3000 E6 3839 C2 9513 A3
0218 C1 3001 E6 3981 B1 9514 B3
0219 B1 3005 E4 3982 B1 9517 B3
0220 A6 3012 E6 5001 E6 9520 A3
0221 A5 3101 C6 5002 E5 9521 A3
0222 C6 3103 C6 5201 E4 9522 B4
0224 E6 3105 C6 5202 E4 9523 C4
0227 C6 3107 C6 5241 E5 9524 C4
0229 D6 3109 D6 5242 E5 9610 E3
0231 A2 3110 D6 5401 B5 9611 C4
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0235 D6 3113 D6 5406 B5 9613 D4
0236 C6 3114 D6 5408 A5 9614 E4
0239 C2 3115 D6 5410 C6 9615 D5
0240 D5 3116 D6 5444 C5 9616 D5
0242 D6 3117 D6 5445 A6 9617 D3
0243 D4 3118 D6 5471 C6 9618 D5
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0248 E4 3121 D6 5501 B2 9620 D5
0249 D4 3122 D6 5502 B2 9622 C4
0250 C5 3131 C6 5505 B4 9623 D5
0251 C3 3133 C6 5520 A4 9624 D3
0259 B1 3135 C6 5521 A3 9625 E6
0261 D4 3137 C6 5560 A4 9626 D3
0262 D6 3139 D6 5561 B4 9627 D3
0265 E7 3141 D6 5562 B4 9628 E5
0266 E4 3142 D6 5563 A4 9629 D5
0270 B1 3143 D6 5602 D5 9630 C3
0271 E3 3145 D6 5603 D4 9631 D5
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0276 D4 3155 D6 5833 C1 9635 D4
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0285 E6 3185 C1 6405 B6 9639 E3
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0294 E4 3204 D4 6413 A7 9644 E3
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1500 A2 3251 E4 6501 B3 9657 D4
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1600 C1 3402 C5 6503 B3 9659 C5
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1603 D1 3406 B4 6523 B3 9662 D5
1606 A1 3408 C4 6540 B4 9663 D5
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2005 E6 3414 B5 6561 A4 9666 C5
2006 E6 3415 C5 6562 B4 9668 C4
2008 E6 3416 A6 6564 B4 9669 C4
2161 D6 3417 B6 6681 D1 9670 C4
2209 D4 3421 C5 6691 A1 9672 C5
2210 D4 3424 C5 6692 B1 9673 C3
2216 E4 3425 B5 6831 D2 9674 C4
2220 D3 3427 C6 7402 A5 9675 C5
2229 E4 3428 C6 7403 C4 9676 C5
2230 E4 3429 B5 7404 C5 9678 C5
2235 E4 3430 B5 7407 C6 9679 C5
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2408 A5 3475 C6 7560 C4 9688 D4
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2413 A6 3500 A1 9001 E5 9693 C3
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2417 B6 3503 B3 9173 D6 9697 D5
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2473 B6 3523 B3 9182 C1 9815 D3
2476 C7 3526 B3 9183 C1 9816 C2
2500 A2 3527 B3 9191 B1 9817 C3
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2502 B3 3544 B3 9193 B1 9820 C2
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2504 A4 3549 B4 9201 E4 9822 D3
2505 B2 3550 C4 9202 D4 9824 C3
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2507 A3 3560 B4 9401 C6 9826 C3
2508 A3 3561 B4 9402 B5 9827 D2
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2516 B4 3565 C4 9404 B5 9829 D2
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2523 A3 3601 D5 9420 B4 9832 C2
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2564 B4 3608 D4 9428 C5 9912 D3
2565 A4 3609 D5 9430 C5 9913 E3
2566 B4 3610 D5 9431 B5 9914 E3
2567 C4 3612 E5 9432 C5 9915 E3
2568 B4 3614 D5 9433 B5 9916 D3
2580 C3 3615 D5 9434 B5 9917 D3
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2837 D2 3624 D5 9501 A2 9993 E6
2841 C2 3625 D5 9502 B3 9994 E3
2843 C2 3634 D5 9503 B2 9995 D4
2844 C2 3635 D5 9504 C3 9996 E5
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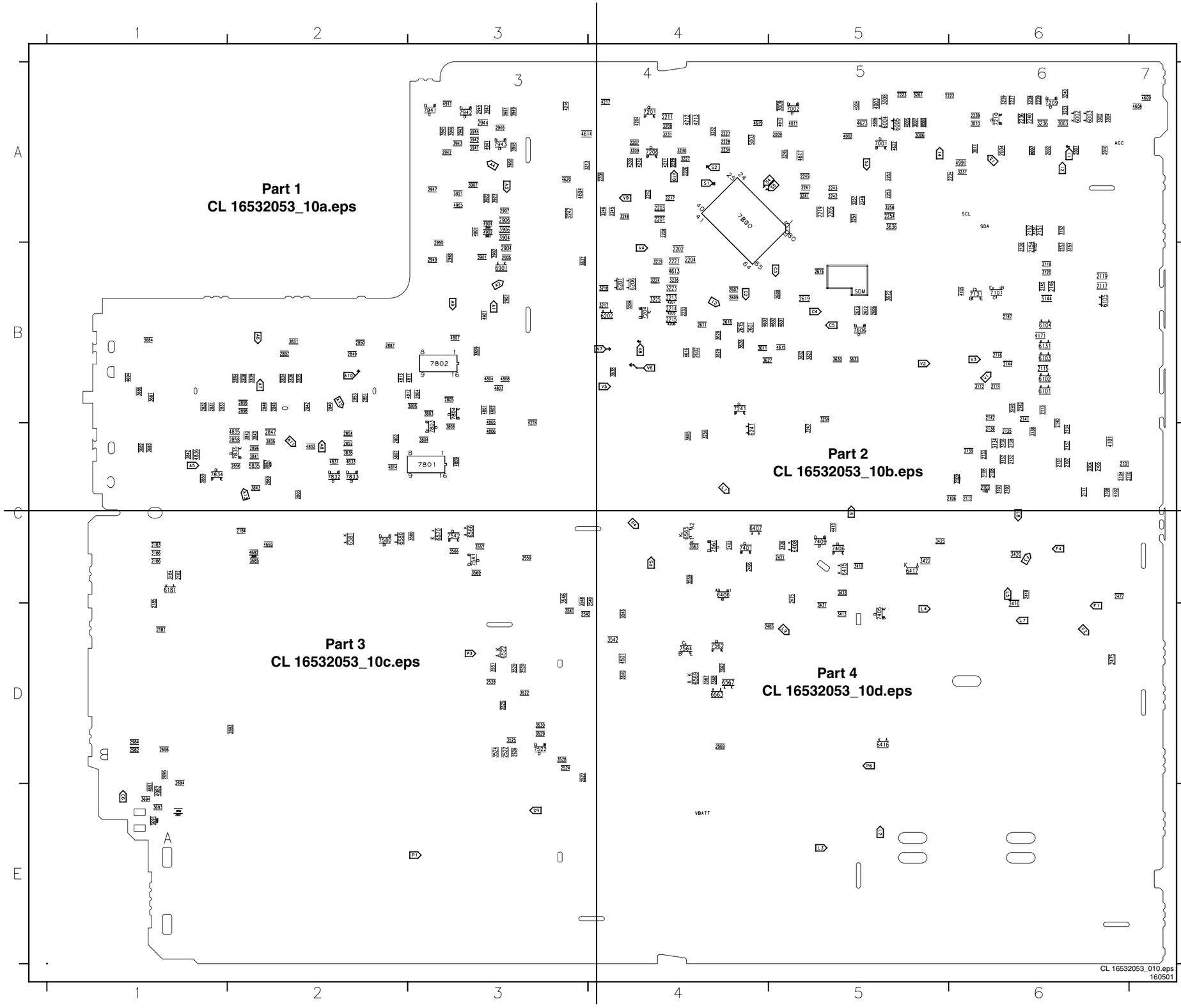
Layout Large Signal Panel (Overview Bottom View)



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2003 A5	2607 B4	3238 A6	4005 A5	7131 B6
2004 A6	2608 B5	3239 A6	4006 A5	7200 A4
2007 A6	2609 B4	3240 A6	4007 A6	7201 A4
2009 A5	2611 B4	3241 A5	4011 A5	7204 B4
2010 A6	2612 B5	3242 A3	4012 A5	7206 A4
2101 C6	2613 B5	3245 A5	4101 C6	7209 A6
2102 C6	2615 B4	3246 A4	4102 C6	7210 A6
2103 C6	2616 B5	3247 C5	4103 C6	7241 B4
2104 C6	2618 B4	3248 A4	4104 C6	7401 C4
2105 C6	2619 B5	3254 A5	4105 B6	7405 D5
2106 C6	2692 E1	3256 C4	4151 A6	7406 C5
2107 C6	2693 D2	3257 A5	4152 B6	7409 C5
2108 C6	2694 D1	3258 A5	4171 B6	7522 D3
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2110 C6	2696 D1	3261 A5	4205 B4	7542 C3
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2116 B6	2832 B1	3422 C5	4212 A4	7801 C3
2117 B6	2833 B1	3423 C5	4213 A4	7802 B3
2118 B6	2834 B2	3426 C5	4214 B3	7803 C3
2119 B6	2835 B2	3431 D5	4216 A3	7804 B3
2120 B6	2836 B2	3520 D3	4217 A4	7832 C2
2131 C6	2838 B2	3522 D3	4410 C5	7833 C2
2132 C6	2839 B2	3524 D3	4501 D4	7834 C1
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2140 C6	2851 B2	3542 D4	4614 A3	
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2185 D1	2904 B3	3623 B5	4804 B3	
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2207 A4	2946 A3	3636 A5	4813 B2	
2208 A4	2947 A3	3637 B3	4814 C2	
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2217 A4	2984 D1	3684 B1	4835 C2	
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2226 A4	3008 A5	3694 E1	4911 A3	
2227 A4	3009 A5	3695 C2	4921 B3	
2228 A4	3010 A6	3803 B3	4941 A3	
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2234 A6	3102 C6	3805 B3	4991 A6	
2236 A6	3104 C6	3806 C3	5003 A4	
2237 A6	3106 C6	3807 C2	5835 C2	
2238 A6	3108 C6	3809 B3	6002 A6	
2239 A6	3112 B6	3831 B2	6003 A6	
2240 A6	3120 B6	3835 C2	6004 A5	
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2243 A5	3136 C6	3841 C2	6102 B6	
2245 A4	3138 C6	3842 C1	6103 B6	
2248 A5	3140 B6	3843 C2	6104 B6	
2249 A5	3144 B6	3849 C2	6105 B6	
2252 A5	3152 A6	3901 B3	6131 B6	
2253 A5	3154 B6	3902 B3	6181 C1	
2254 A5	3184 C1	3903 A3	6201 B4	
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2405 D5	3206 B4	3905 A3	6206 B4	
2406 C4	3208 A4	3906 A3	6241 C4	
2415 C5	3209 A4	3907 A3	6406 C4	
2418 C6	3212 A4	3921 A3	6407 C4	
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2527 D3	3227 A4	3947 A3	6567 D4	
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2540 C4	3230 A4	3949 A3	6570 C3	
2542 D3	3231 A4	3950 A3	6580 C2	
2559 C3	3232 A4	3951 A3	6581 C2	
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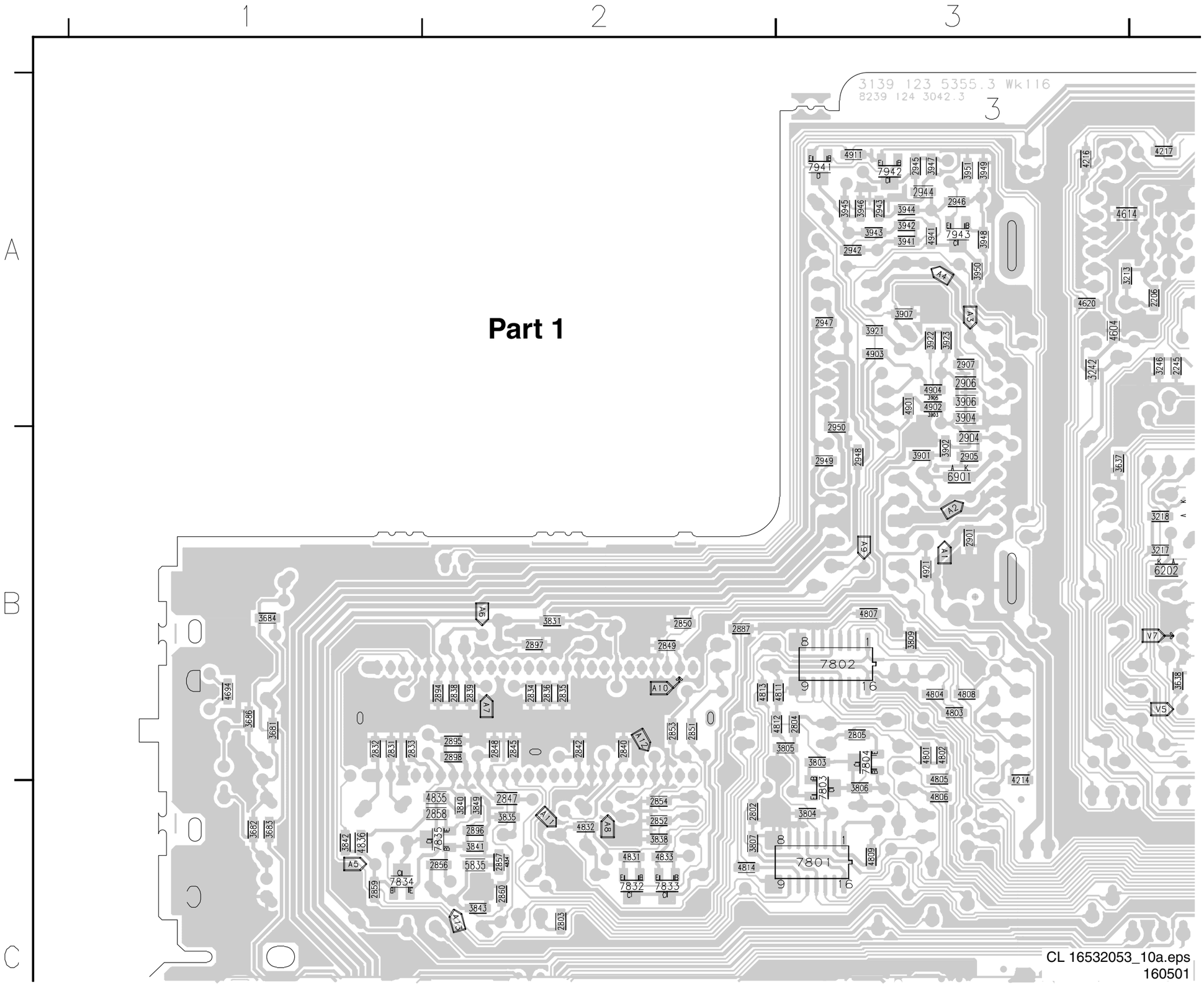
Layout Large Signal Panel (Part 1 Bottom View)

Part 1



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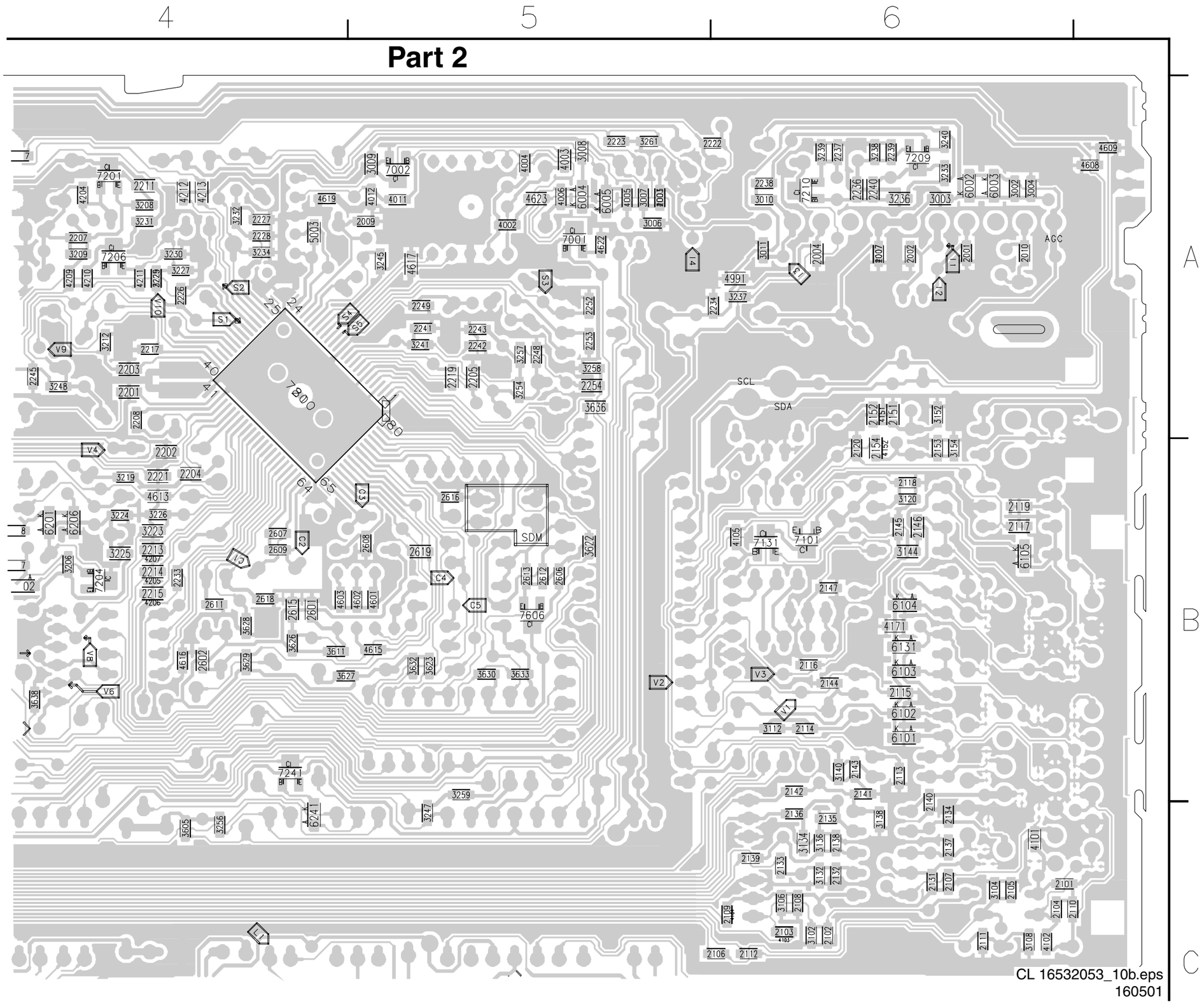
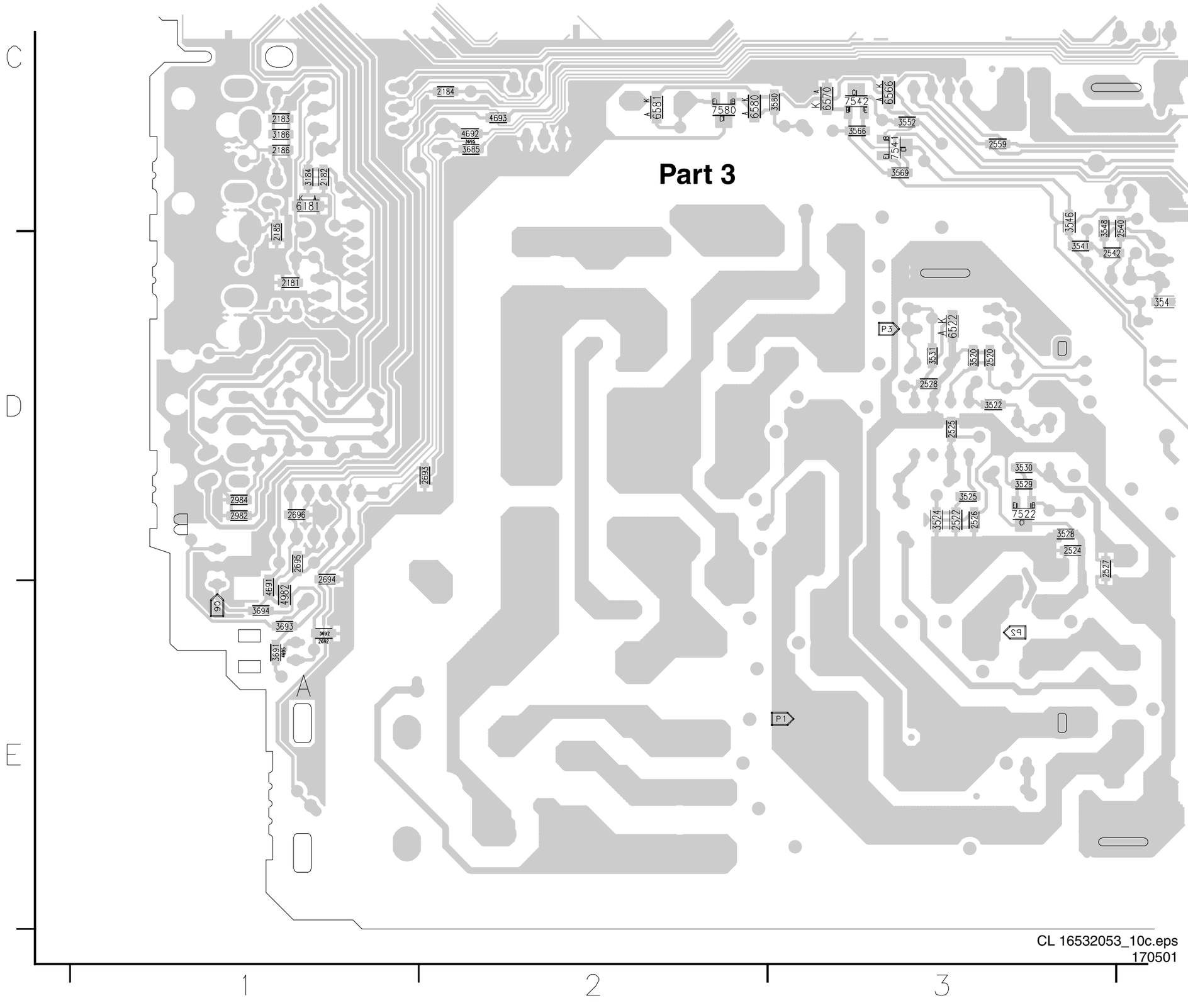
Layout Large Signal Panel (Part 2 Bottom View)

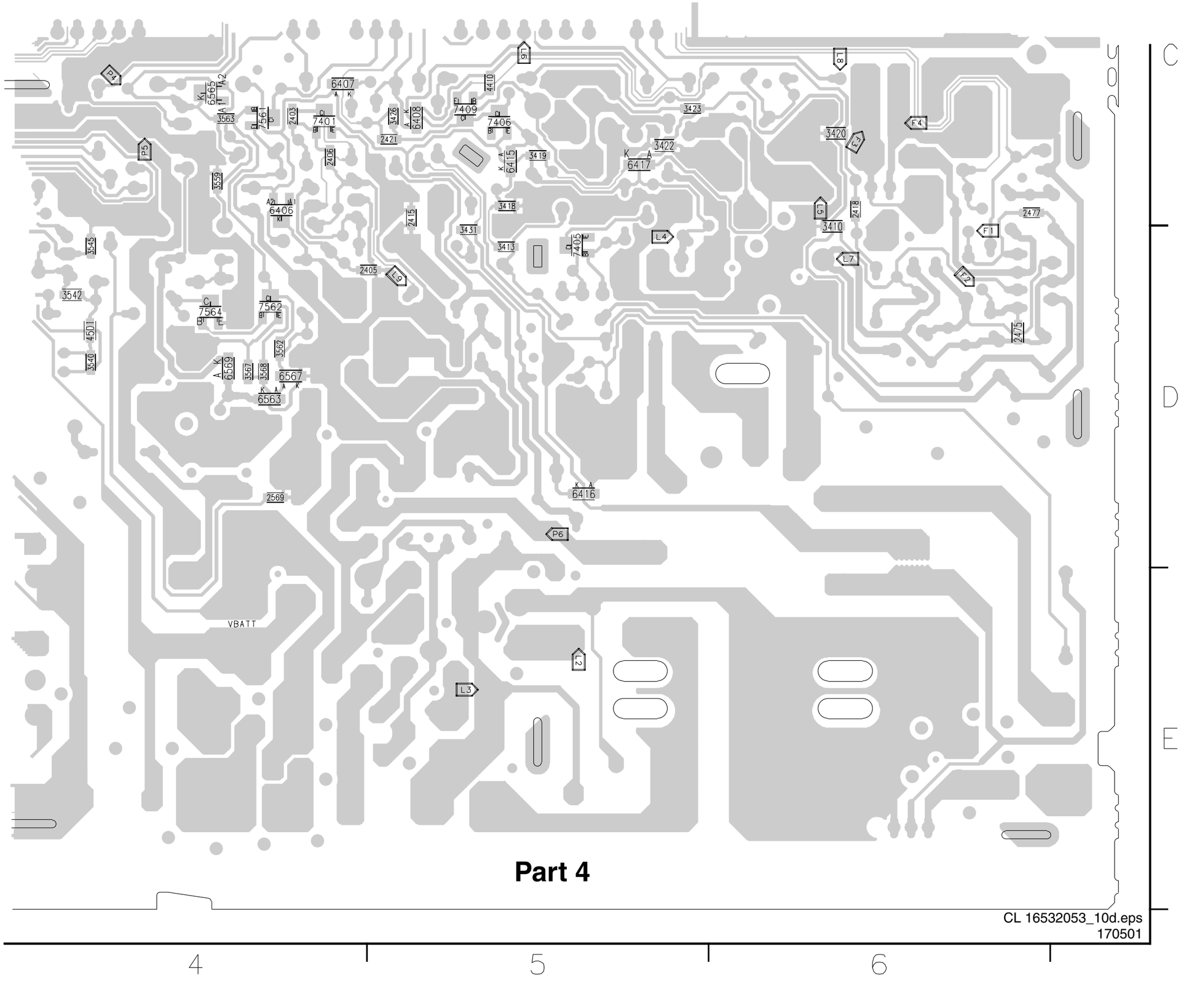


Layout Large Signal Panel (Part 3 Bottom View)



CL 16532053_10c.eps
170501

Layout Large Signal Panel (Part 4 Bottom View)

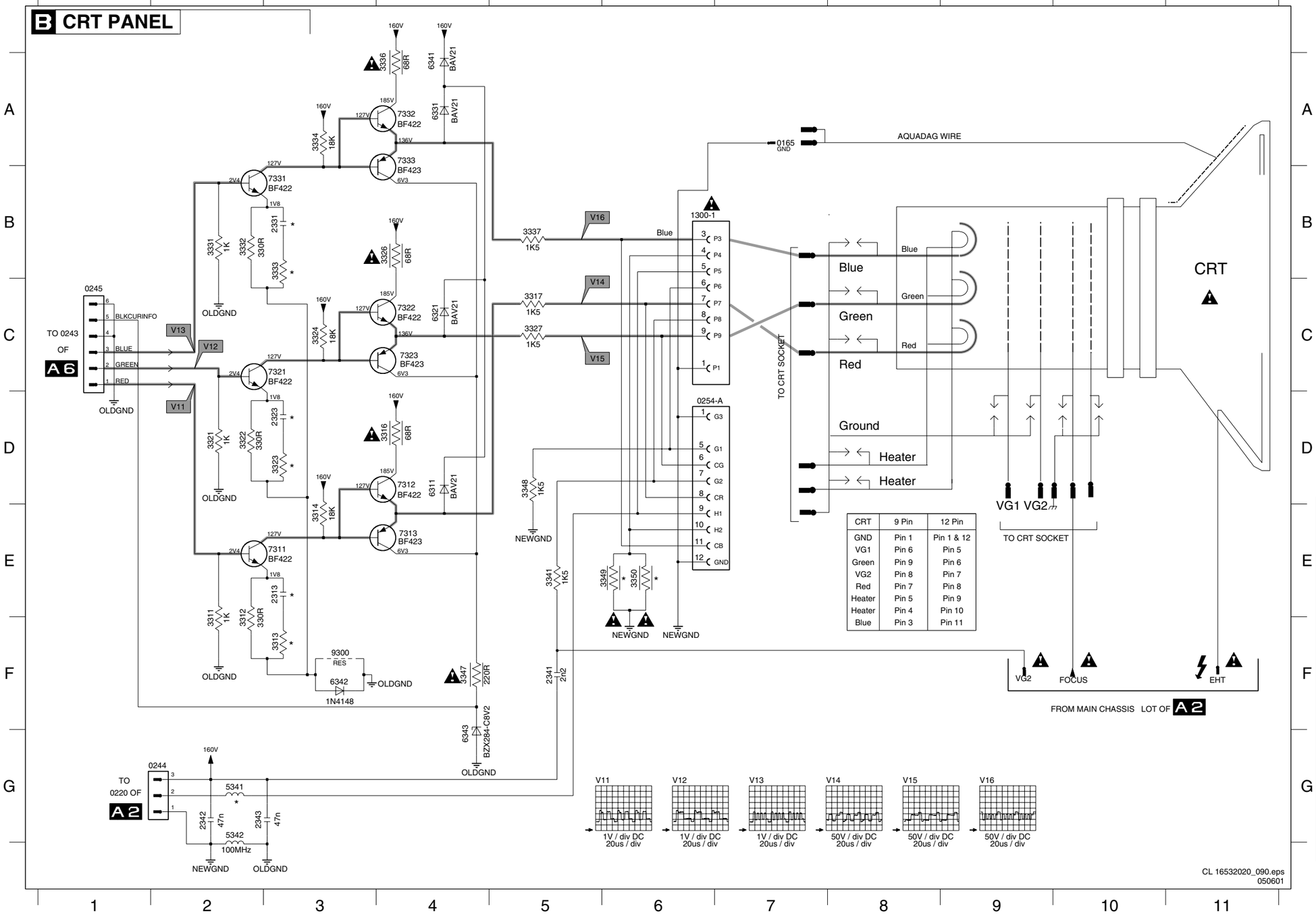


Part 4

CL 16532053_10d.eps
170501

CRT Panel

VG2 F9 0165 A7 | 0244 G2 0245 C1 | 0254-A D7 1300-1 B7 | 2313 E3 2323 D3 | 2331 B3 2341 F5 | 2342 G2 2343 G2 | 3311 F2 3312 F2 | 3313 F3 3314 E3 | 3316 D4 3317 C5 | 3321 D2 3322 D2 | 3323 D3 3324 C3 | 3326 B4 3327 C5 | 3331 B2 3332 B2 | 3333 B3 3334 A3 | 3336 A4 3337 B5 | 3341 E5 3347 F4 | 3348 D5 3349 E6 | 3350 E6 5341 G2 | 5342 G2 6311 D4 | 6321 C4 6331 A4 | 6341 A4 6342 F3 | 6343 G4 7311 E3 | 7312 D4 7313 E4 | 7321 C3 7322 C4 | 7323 C4 7331 B3 | 7332 A4 7333 A4 | 9300 F3

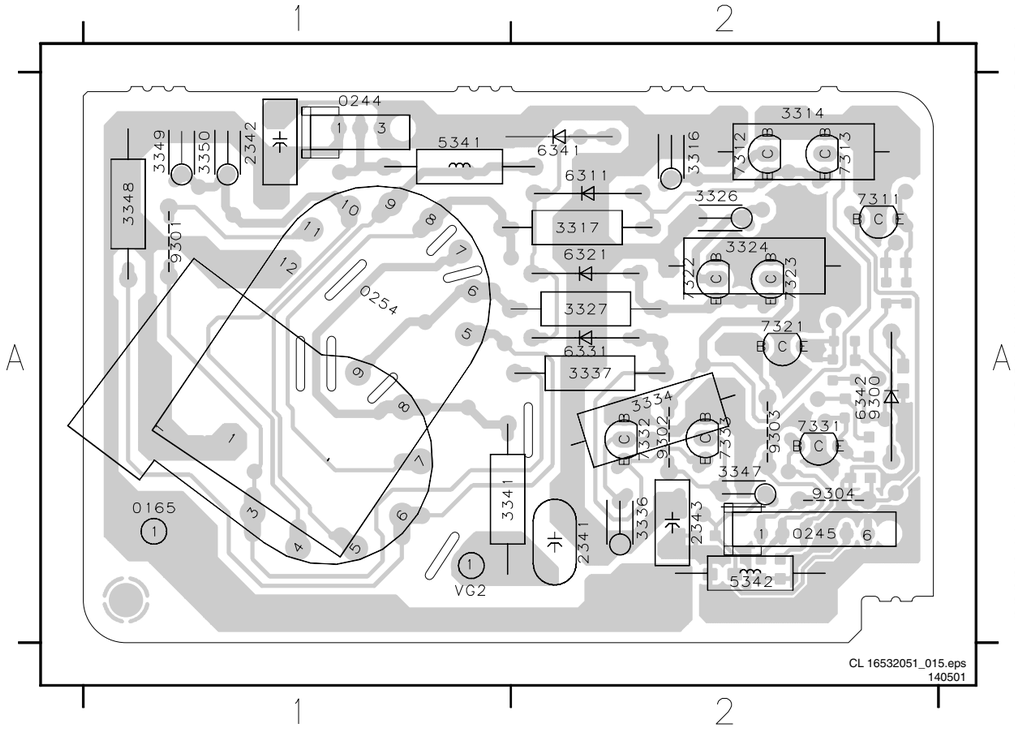


CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11

Diversity Table B

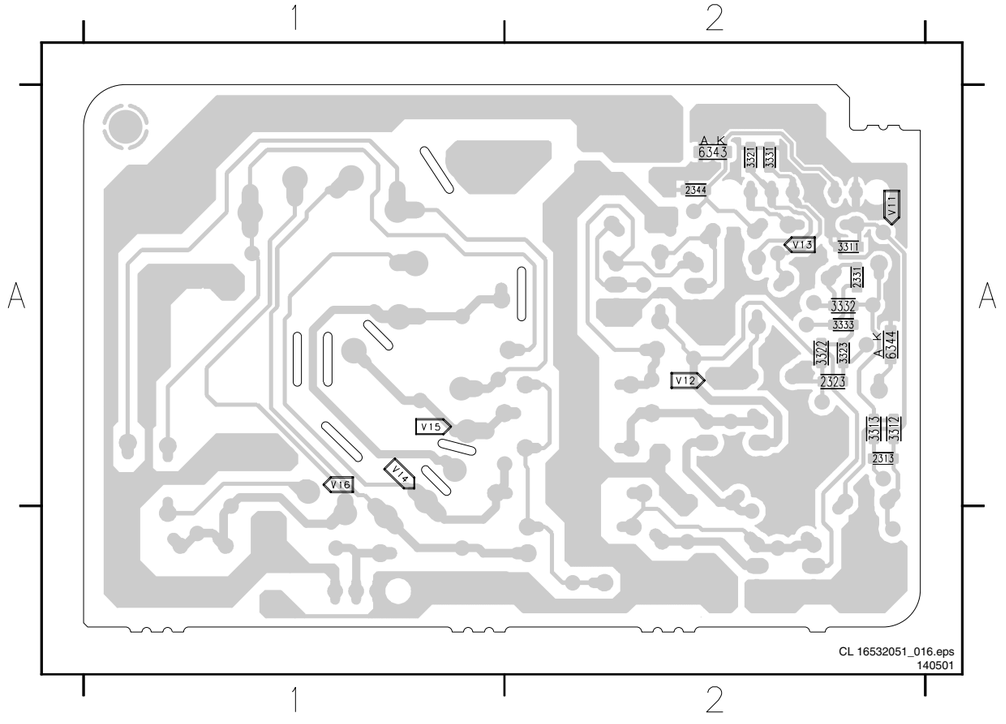
Item	Description	14"	17"	20"	21" Stereo, CRT A51EER133X72	21" Mono	21" Stereo
0254	9P F CRT N-NECK			X	X	X	X
0254	9P F CRT M-NECK	X	X				
2313	270P 50V	X	X				
2313	220P 50V			X	X	X	X
2323	50V 390P	X	X	X	X	X	X
2331	50V 390P	X	X	X	X	X	X
3313	10R	X	X	X	X	X	X
3323	10R	X	X	X	X	X	X
3333	10R	X	X	X	X	X	X
3349	1R			X			
3349	1R5	X	X		X		
3349	1R8					X	X
3350	1R			X			
3350	1R5	X	X		X		
3350	1R8					X	X
5341	4U7	X					
5341	22U				X		
5341	1U			X			
5341	15U					X	X
5341	12U		X				

Layout CRT Panel (Top View)



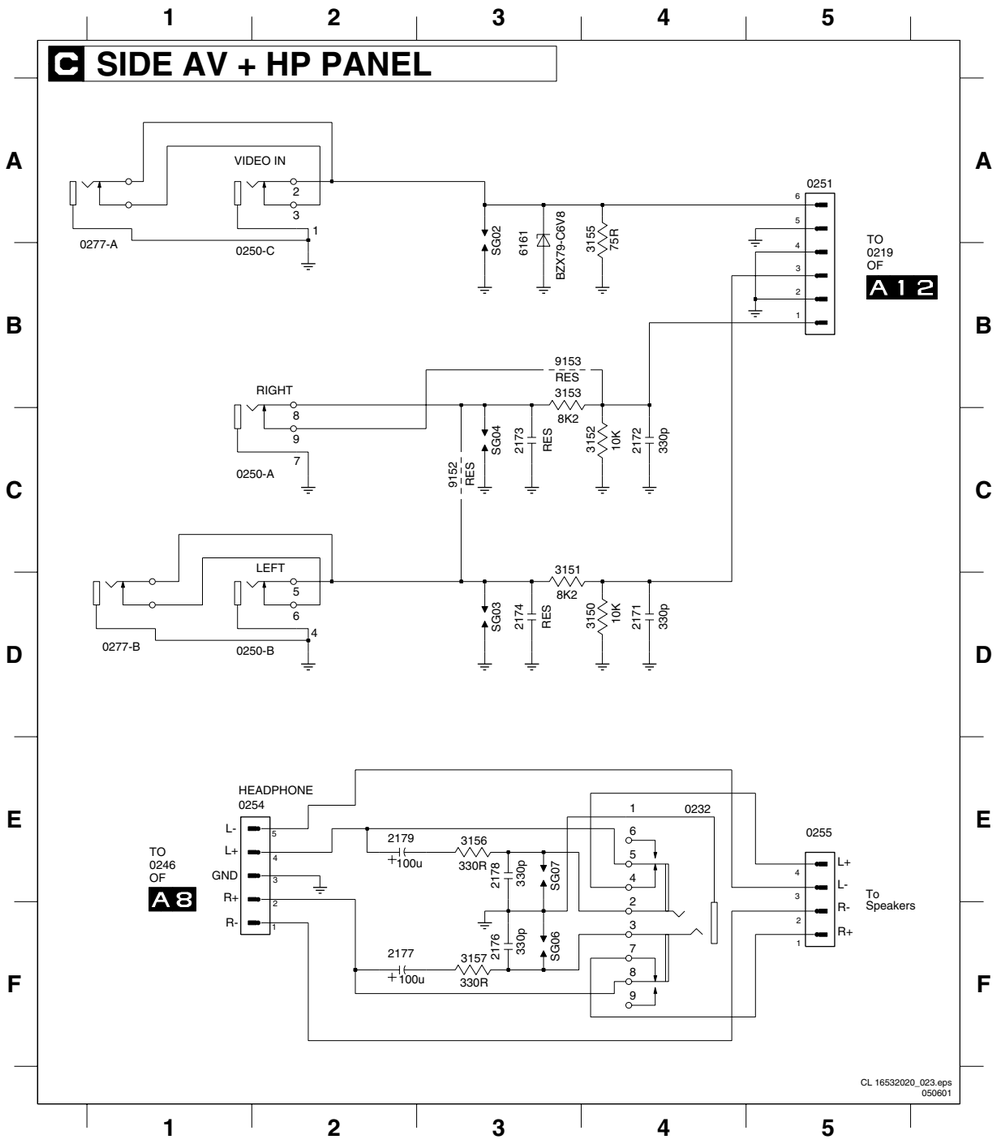
VG2 A1
0165 A1
0244 A1
0245 A2
0254 A1
1300 A1
2341 A2
2342 A1
2343 A2
3314 A2
3316 A2
3317 A2
3324 A2
3326 A2
3327 A2
3334 A2
3336 A2
3337 A2
3341 A1
3347 A2
3348 A1
3349 A1
3350 A1
5341 A1
5342 A2
6311 A2
6321 A2
6331 A2
6341 A2
6342 A2
7311 A2
7312 A2
7313 A2
7321 A2
7322 A2
7323 A2
7331 A2
7332 A2
7333 A2
9300 A2
9301 A1
9302 A2
9303 A2
9304 A2

Layout CRT Panel (Bottom View)



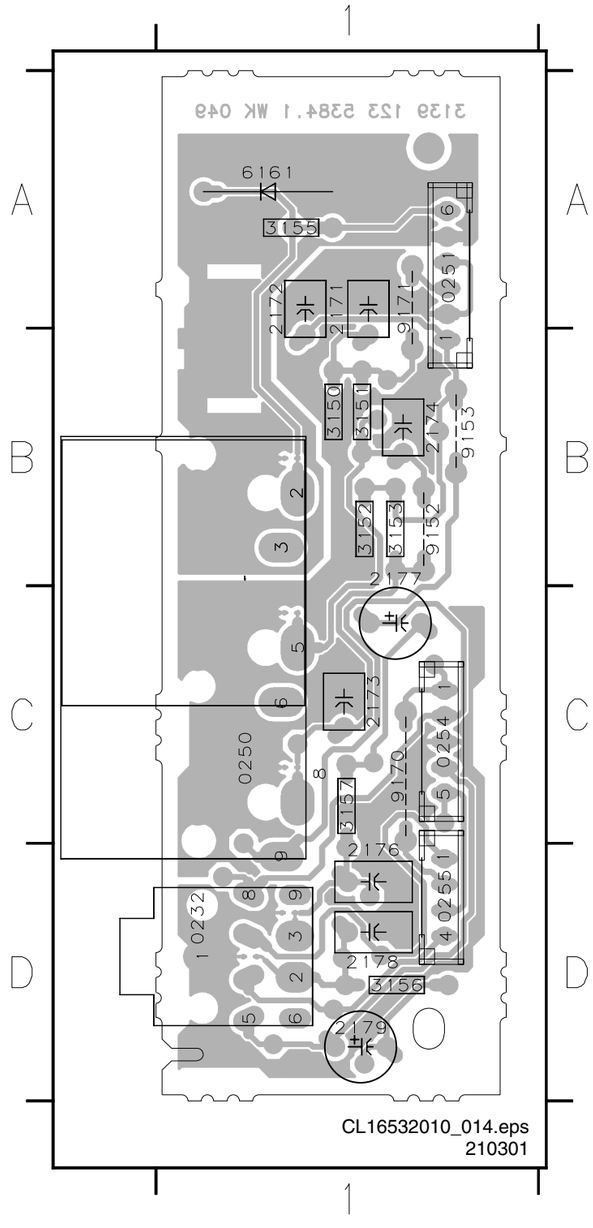
2313 A2
2323 A2
2331 A2
2344 A2
3311 A2
3312 A2
3313 A2
3321 A2
3322 A2
3323 A2
3331 A2
3332 A2
3333 A2
6343 A2
6344 A2

Side AV + HP Panel



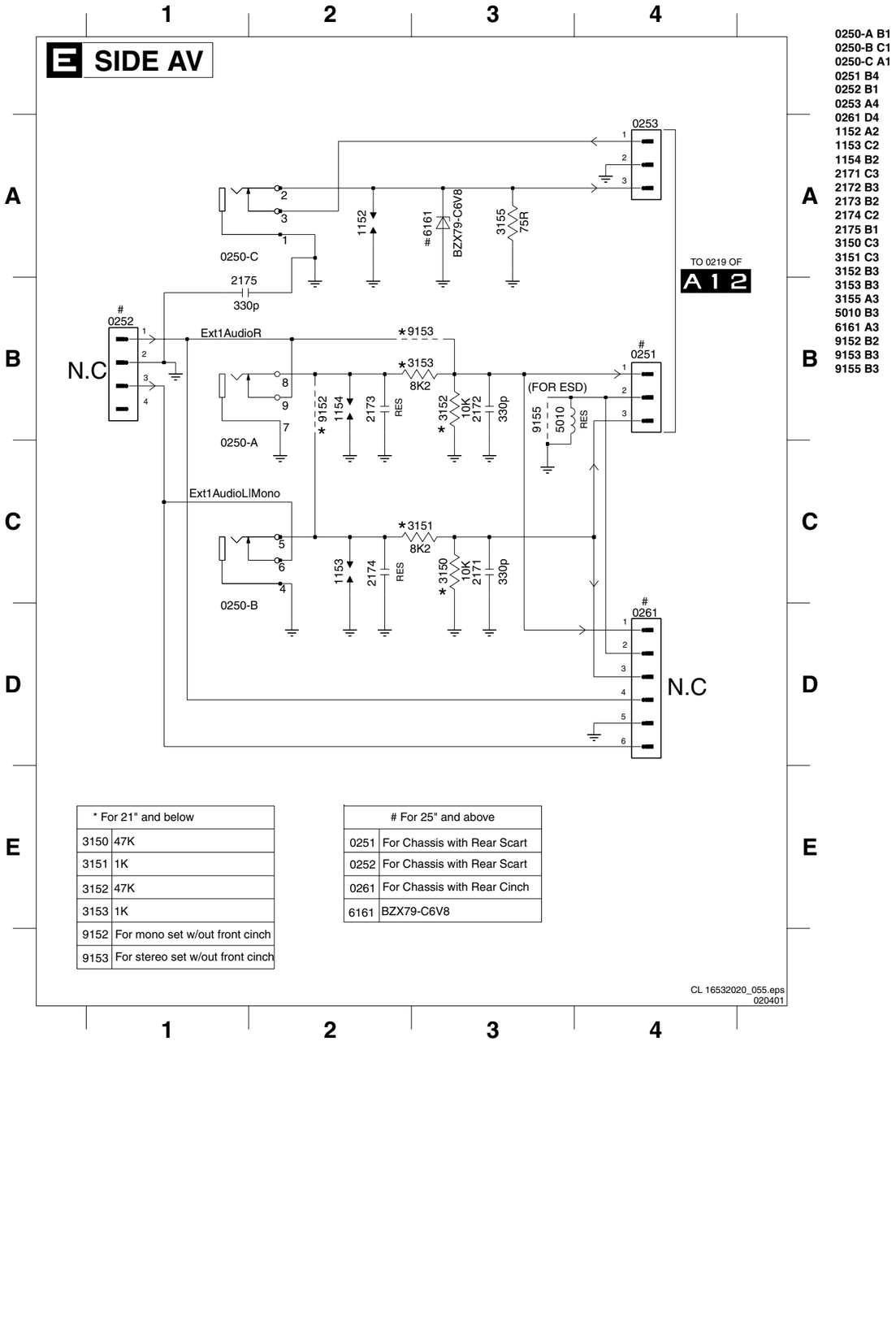
0232 E4
0250-A C2
0250-B D2
0250-C B2
0251 A5
0254 E2
0255 E5
0277-A A1
0277-B D1
2171 D4
2172 C4
2173 C3
2174 D3
2176 F3
2177 F2
2178 E3
2179 E2
3150 D4
3151 D3
3152 C4
3153 B3
3155 A4
3156 E3
3157 F3
6161 A3
9152 C3
9153 B3
SG02 A3
SG03 D3
SG04 C3
SG06 F3
SG07 E3

Layout Side AV + HP Panel (Top View)



0232 D1
0250 C1
0251 A1
0254 C1
0255 D1
0277 B1
2171 A1
2172 A1
2173 C1
2174 B1
2176 D1
2177 B1
2178 D1
2179 D1
3150 B1
3151 B1
3152 B1
3153 B1
3155 A1
3156 D1
3157 C1
6161 A1
9152 B1
9153 B1
9170 C1
9171 A1

Side AV Panel



* For 21" and below	
3150	47K
3151	1K
3152	47K
3153	1K
9152	For mono set w/out front cinch
9153	For stereo set w/out front cinch

# For 25" and above	
0251	For Chassis with Rear Scart
0252	For Chassis with Rear Scart
0261	For Chassis with Rear Cinch
6161	BZX79-C6V8

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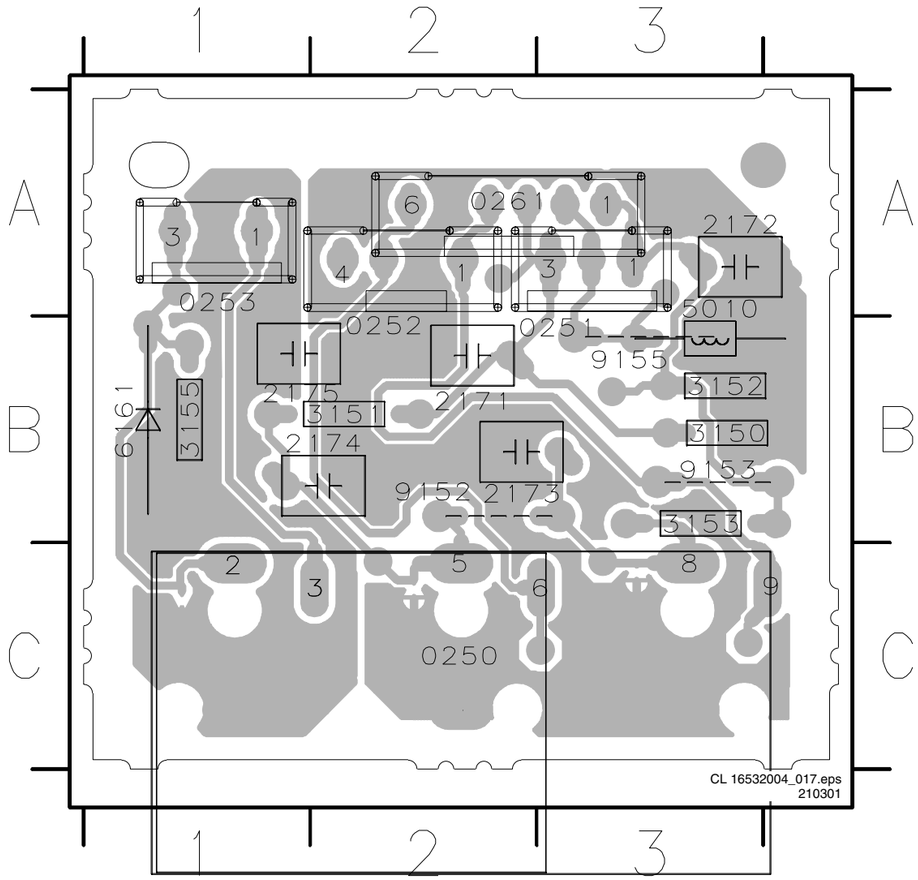
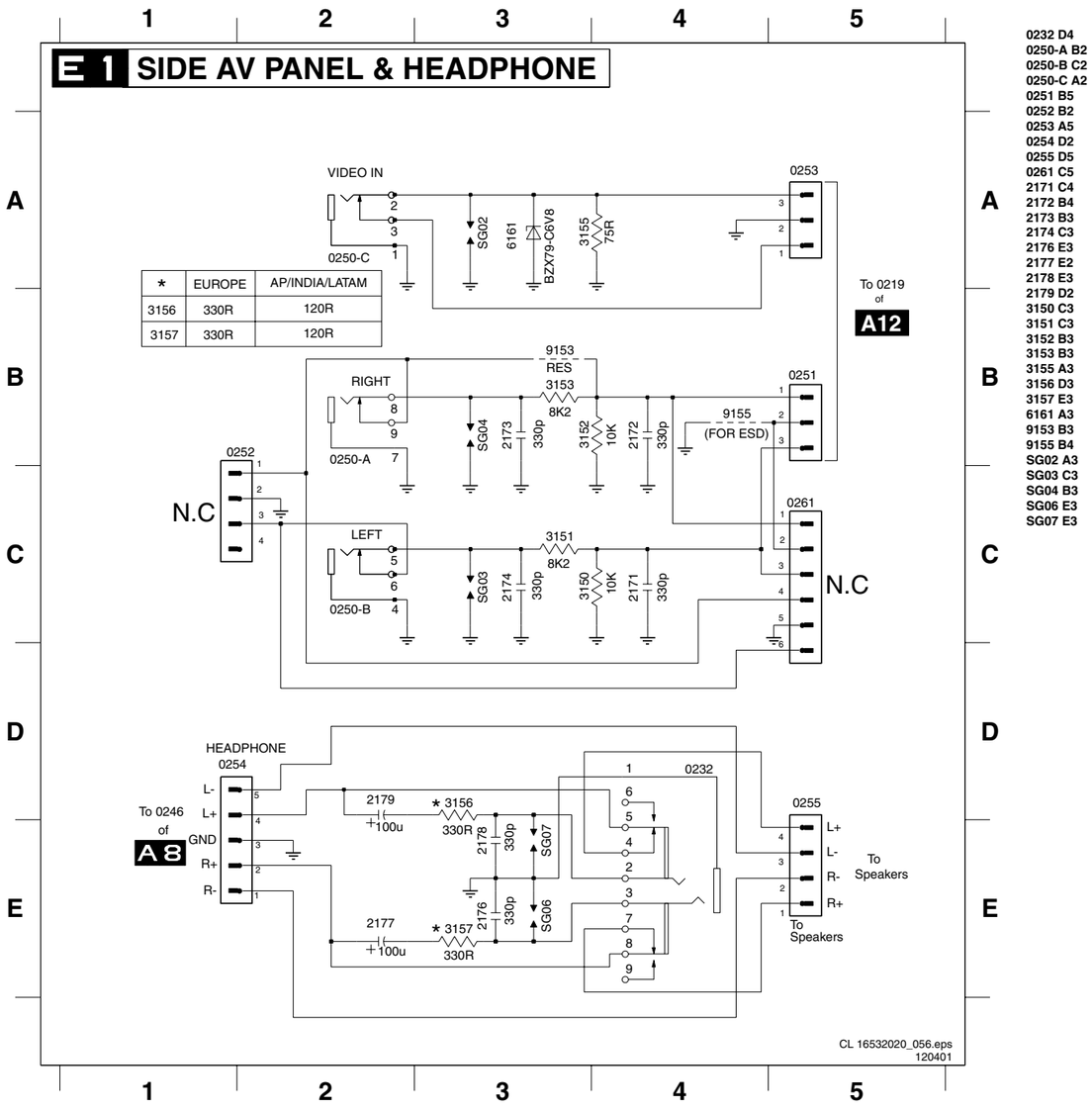
Layout Side AV Panel (Top View)



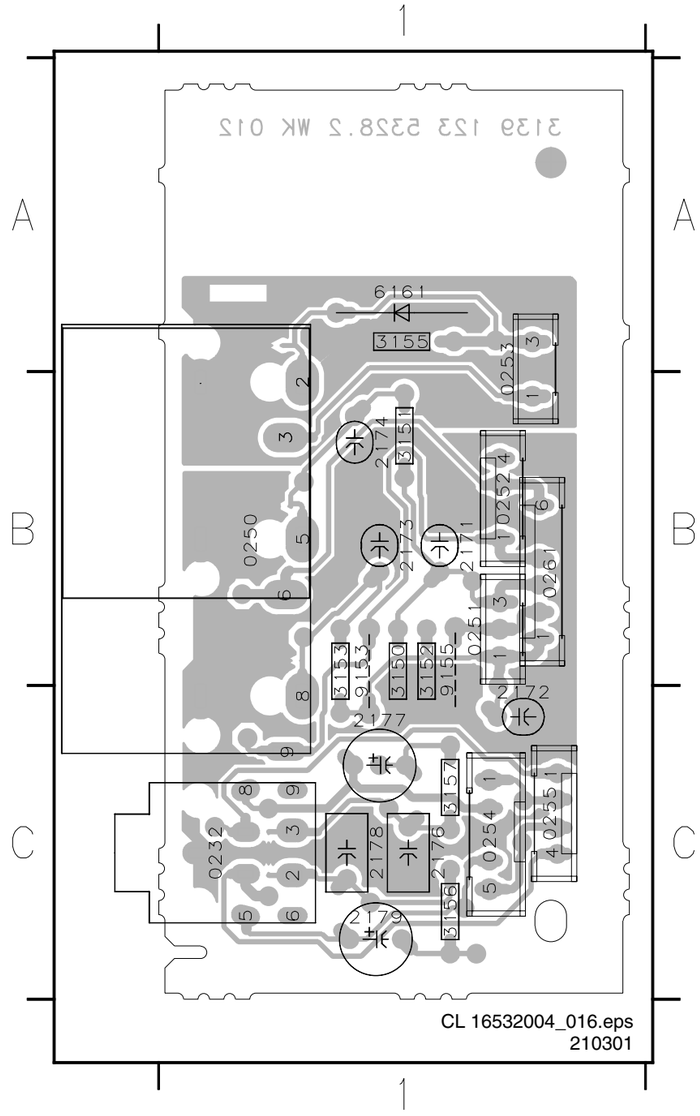
M16	C2
0250	C2
0251	A3
0252	A2
0253	A1
0261	A2
2171	B2
2172	A3
2173	B2
2174	B2
2175	B1
3150	B3
3151	B2
3152	B3
3153	B3
3155	B1
5010	B3
6161	B1
9152	B2
9153	B3
9155	B3

Side AV Panel + Headphone



0232 D4
0250-A B2
0250-B C2
0250-C A2
0251 B5
0252 B2
0253 A5
0254 D2
0255 D5
0261 C5
2171 C4
2172 B4
2173 B3
2174 C3
2176 E3
2177 E2
2178 E3
2179 D2
3150 C3
3151 C3
3152 B3
3153 B3
3155 A3
3156 D3
3157 E3
6161 A3
9153 B3
9155 B4
SG02 A3
SG03 C3
SG04 B3
SG06 E3
SG07 E3

Layout Side AV Panel + Headphone (Top View)



M16 B1
0232 C1
0250 B1
0251 B1
0252 B1
0253 A1
0254 C1
0255 C1
0261 B1
2171 B1
2172 C1
2173 B1
2174 B1
2176 C1
2177 C1
2178 C1
2179 C1
3150 B1
3151 B1
3152 B1
3153 B1
3155 A1
3156 C1
3157 C1
6161 A1
9153 B1
9155 B1

L01.2E
AA 02.01

Service
Service
Service

Service Information

(GB)

L01 Stamp Print for Picture Quality Improvement

In this Service Information the schematic and PWB layout are given of the L01 Stamp print. The L01 Stamp Print is a temporary solution to achieve a better picture quality. In later models this function will be implemented in the design of the Mono-carrier. The Module is applicable for all Europe MTV and ITV 17", 21" and 52TA MTV models.

(D)

L01 Zusatzprint zur Bildqualitätsverbesserung

In dieser Serviceinformation finden Sie den Schaltplan sowie das PWB-Layout für den L01 Zusatzprint zur Bildqualitätsverbesserung (L01 Stamp Print). Dieses Modul wurde in der laufenden Produktion zur Verbesserung der Bildqualität eingeführt und stellt nur eine übergangsmäßige Lösung dar. In zukünftigen Modellen wird diese Funktion auf dem Mono-Carrier integriert. Dieser Print kommt bei allen europäischen MTV und ITV-Modellen mit den Bildschirmdiagonalen 17“ und 21“ sowie bei den 52TA-MTV Modellen zur Anwendung.

(F)

L01 Module d'amélioration de la qualité d'image

Cette information service donne le schéma et le circuit imprimé du module concerné. L'ajout de ce module est une solution provisoire permettant une meilleure qualité d'image. Dans les futurs modèles cette fonction sera intégrée dans la platine principale. Ce module est applicable pour tous les TV de 17" à 21" basé sur le châssis L01.2E en versions standard et institutionnelle.

(I)

Modulo L01 per il miglioramento della qualità dell’immagine

In questa Service Information sono riportati gli schemi elettrici e planimetrici del modulo L01 aggiuntivo. Il modulo L01 aggiuntivo è una soluzione temporanea per ottenere una migliore qualità dell’immagine. Nei prossimi modelli questa funzione sarà implementata sulla piastra madre. Questo modulo è utilizzabile su tutti i TVC e ITV (Europa) 17”, 21” e sui modelli 52TA.

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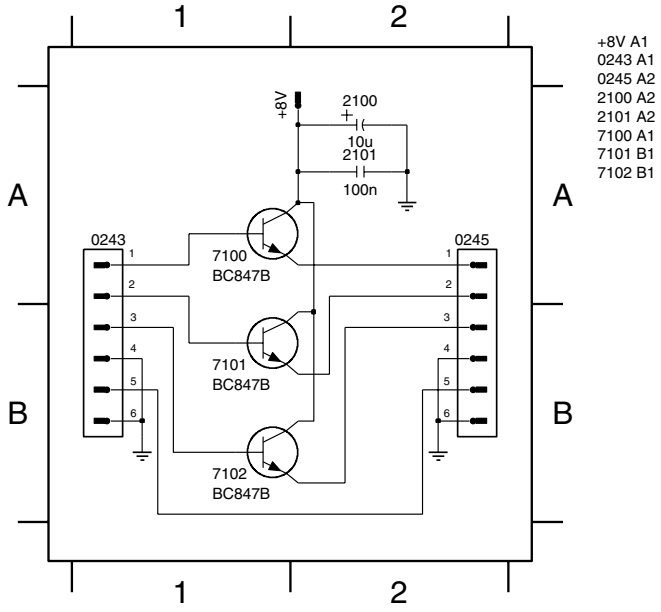
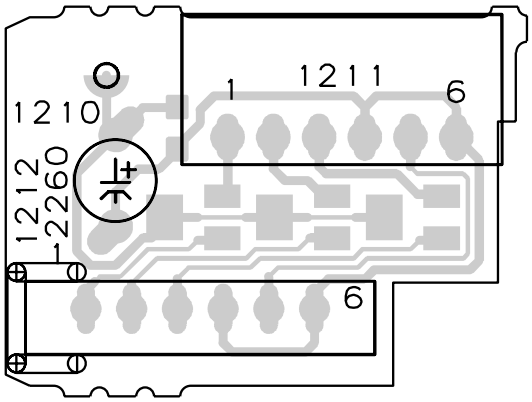
PHILIPS

Electrical Diagram and PWB

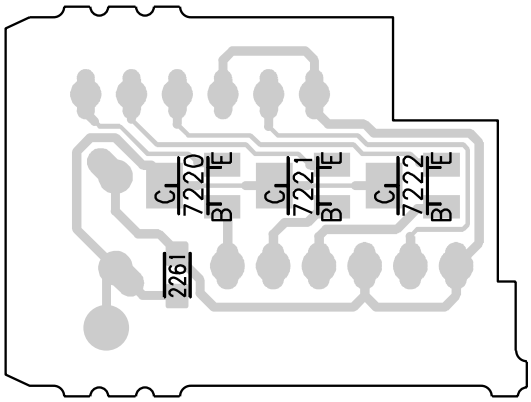
L01 Video Buffer



Component side



Copper side



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Spare Parts List

Video Buffer

Various

0152	3104 301 09421	CBLE 6P/400/6P
1212	2422 025 04854	CON 6P Female

⊣⊢

2260	3198 025 51090	10µF PM20 50V
2261	3198 023 21040	100nF 25V

7220	3198 010 42030	BC847B
7221	3198 010 42030	BC847B
7222	3198 010 42030	BC847B