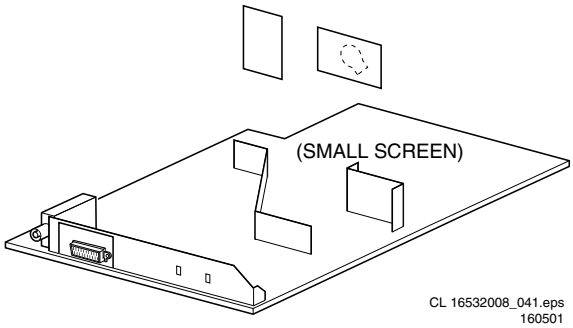
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Service Manual

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PHILIPS

1. Technical Specifications, Connections and Chassis Overview

Index:

1. Technical Specifications.
2. Connections.
3. Chassis Overview.

Note:

- Below described specifications are not valid for *one* product, but for the *whole* product range. See Product Survey for *specific* models.
- Figures can deviate slightly from the actual situation, due to different set executions.

1.1 Technical Specifications

1.1.1 Reception

Tuning system	:	PLL
Colour systems	:	NTSC
	:	PAL B/G, D/K, I
	:	SECAM B/G, D/K, K1
Sound systems	:	FM-mono
	:	FM-stereo
A/V connections	:	NTSC 3.58, 4.43
	:	PAL 60
Channel selections	:	100 channels
	:	U, V, S, H
Aerial input	:	75 Ω, IEC-type

1.1.2 Miscellaneous

Audio output	:	1 x 4 W or,
	:	2 x 3 W or,
	:	2 x 5 W + 10 W (sw) + 2 x 3 W
Mains voltage	:	90 - 276 V or,
	:	150 - 276 V
Mains frequency	:	50 Hz or,
	:	60 Hz
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

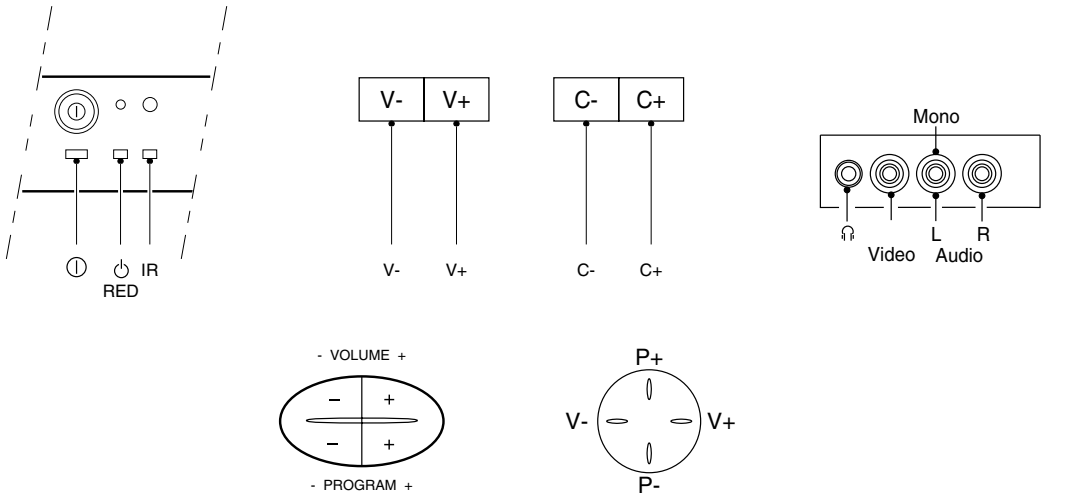


Figure 1-1

A/V In (if present)

1	- Video	CVBS (1 Vpp / 75 Ω)
2	- Audio	L (0.2 Vrms / 10 kΩ)
3	- Audio	R (0.2 Vrms / 10 kΩ)
4	- Headphone	(8 - 600 Ω / 4 mW)

1.2.2 Rear Connections

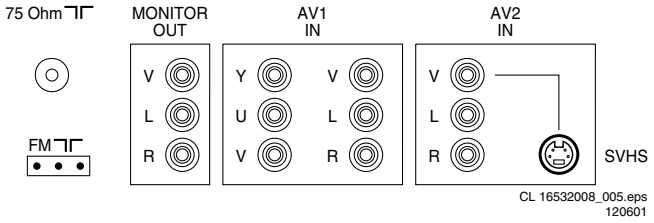


Figure 1-2

Monitor Out

1 - Video	CVBS (1 Vpp / 75 Ω)	
2 - Audio	L (0.5 Vrms / 1 kΩ)	
3 - Audio	R (0.5 Vrms / 1 kΩ)	

YUV In (if present)

1 - Y	0.7 Vpp / 75 Ω	
2 - U	0.7 Vpp / 75 Ω	
3 - V	0.7 Vpp / 75 Ω	

AV1 In

4 - Video	CVBS (1 Vpp / 75 Ω)	
5 - Audio	L (0.5 Vrms / 10 kΩ)	
6 - Audio	R (0.5 Vrms / 10 kΩ)	

AV2 In

1 - Video	CVBS (1 Vpp / 75 Ω)	
2 - Audio	L (0.5 Vrms / 10 kΩ)	
3 - Audio	R (0.5 Vrms / 10 kΩ)	

AV2 In (SVHS)

1 -	gnd	
2 -	gnd	
3 - Y	1 Vpp / 75 Ω	
4 - C	0.3 Vpp / 75 Ω	

1.3 Chassis Overview

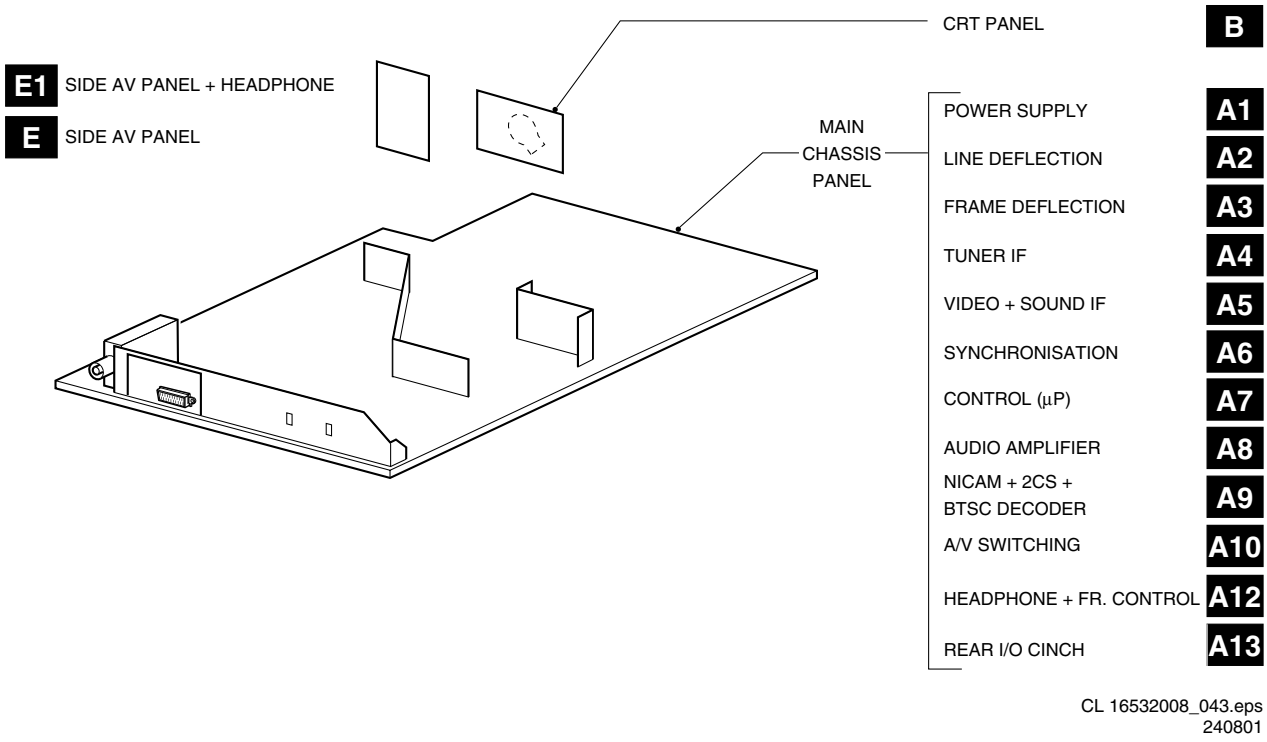


Figure 1-3

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).

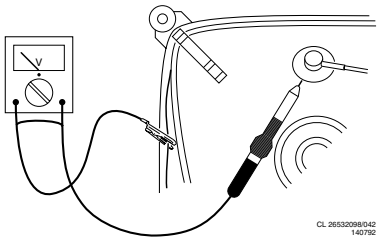


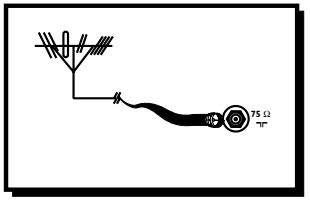
Figure 2-1

- 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

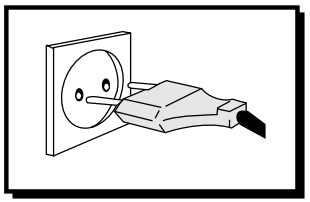
- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the area of circuitry being tested.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal 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.

PREPARATION



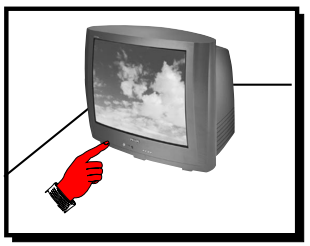
Antenna Connection

- Connect the aerial plug to the antenna socket on the backcover.
- Insert the mains plug into the wall socket.



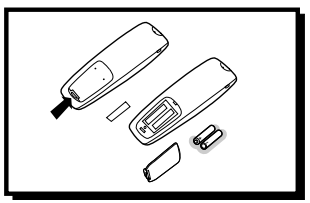
Mains Connection

- For correct mains voltage, refer to type sticker at the rear of the TV set
- Consult your dealer if mains supply is different.
  Note : This diagram is not representative of the actual plug and socket.



Switching on the Set

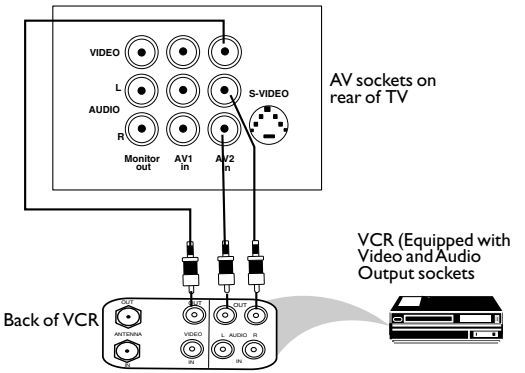
- Press the main power button to switch on/ off the TV.
- If the set is on standby (indicator is red), press the **Power** button on the remote control to switch on set.



Using the Remote Control

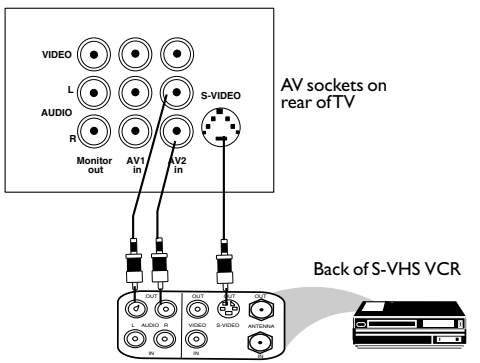
- Insert the correct type of batteries into the compartment.
- Ensure the batteries are placed in the right direction.

CONNECTING THE AUDIO/VIDEO SOCKETS (PLAYBACK)



You can view the playback of VCR tapes (Video Disc players, camcorders, etc.) by using the AUDIO and VIDEO INPUT sockets on the rear of the TV.

– Connect the **VIDEO** and **AUDIO IN** sockets on the rear of the TV to the **AUDIO** and **VIDEO OUT** sockets on the VCR.

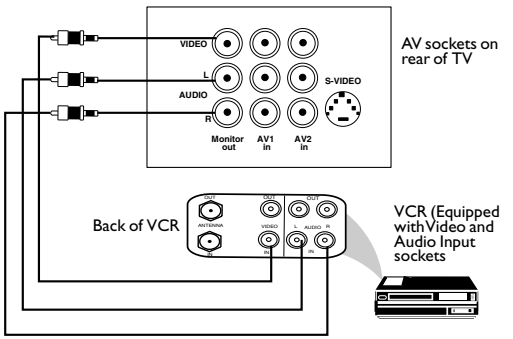


The S-Video connection on the rear of the TV is used for the playback of S-VHS VCR tapes, Video Discs, Video Games or Compact Disc-Interactive (cd-i) discs. Better picture detail and clarity is possible with the S-Video playback as compared to the picture from a normal antenna (RF) connection.

– Connect the **S-VIDEO** socket on the rear of the TV to the **S-VHS OUT** socket on a S-VHS VCR.
– Connect the **AUDIO IN** sockets from the rear of the TV to the **AUDIO OUT** sockets on the VCR. **Note** : You need not connect the **VIDEO IN** socket of the TV if **S-VIDEO IN** socket is connected.

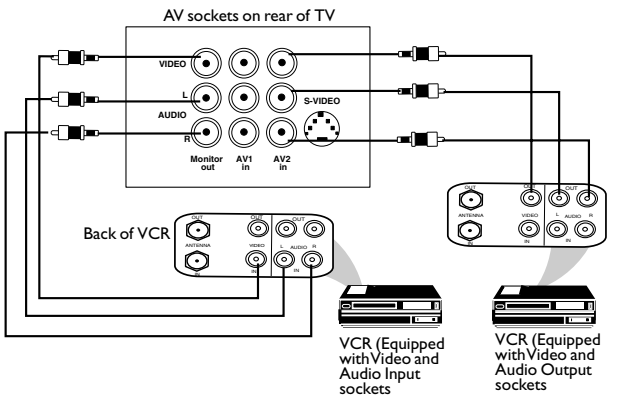
CONNECTING THE AUDIO/VIDEO SOCKETS (RECORDING)

Connection for recording from the TV channel



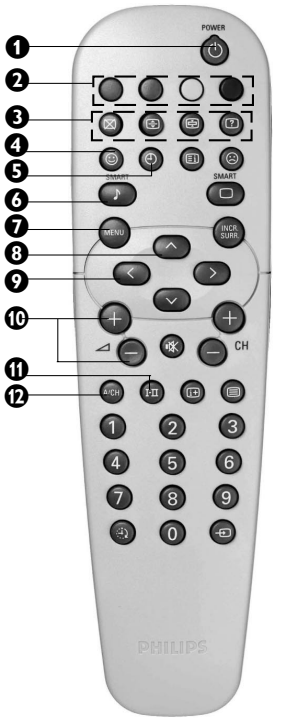
– Connect the corresponding **INPUT** sockets of the VCR to the **MONITOR OUTPUT** sockets on the rear of the TV.
– To enhance the sound of your TV, connect the **AUDIO L** and **R** sockets to an external audio system instead of the VCR. For mono equipment, connect only the **AUDIO L** socket.

Connection for recording from one VCR to another VCR



– Connect the sockets of the VCR which you wish to record from, to the corresponding sockets at either **AV1 or AV2**
– Connect the sockets of the receiving VCR to the **MONITOR OUTPUT** sockets on the rear of the TV.

FUNCTIONS OF REMOTE CONTROL



❶ **Power button**
– Switch set off temporarily to standby mode. (The red light indicator lights up when the set is on standby mode).
– To switch on set from standby mode, press Channel +/– , Digit (0 -9) or Power button.

❷ **Teletext Colour/Personal Zapping buttons**
– In teletext mode, the colour buttons allow you to access directly an item or corresponding pages.
– As Personal Zapping buttons, you can surf up to 10 personal channels for each button. For detailed description of functions, refer to section on "Personal Zapping ".

❸ **Teletext buttons**
Allows you to access teletext information. For detailed description of functions, refer to section on "Using the Teletext"

❹ **Smiley button**
Allows to add and store your personal preference channels in your Personal Preference list. For detailed description of functions, refer to section on "Using your Personal Zapping feature".

❺ **Timer Button**
Allows you to set the clock to switch to another channel at a specified time while you are watching another channel or when the set is on standby mode.

❻ **Smart Sound Button**
Press the Smart Sound button repeatedly to access 4 different types of sound settings and choose your desired setting.

❼ **Menu Button**
Displays the main menu. Also exits menu from screen.

❽ **Cursor Up Button**
Allows you to select the next item on the menu.

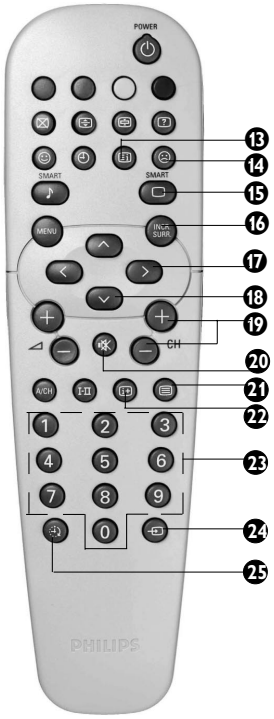
❾ **Cursor Left Button**
Allows you to select the sub-menus and adjust the settings.

❿ **Volume + / – Button**
Increases or decreases volume.

⓫ **I-II**
Allows you to switch from Stereo to Mono sound during stereo transmission or to choose between language I or language II during dual sound transmission.

⓬ **A/CH(Alternate channel) Button**
Allows you to change between the current channel and the previous channel.

Functions of Remote Control



⓭ **Main Index Button**
In teletext mode, press button to return to the main index page.

⓮ **Frownie button**
Allows to delete stored personal preference channels in your Personal Preference list. For detailed description of functions, refer to section on "Personal Zapping ".

⓯ **Smart Picture Button**
Press the Smart Picture button repeatedly to access 5 different types of picture settings and choose your desired setting.

⓰ **Incredible Surround Button**
– Allows you to select Incredible Surround sound when transmission is in stereo mode.
– Allows you to select Spatial Sound when transmission is in mono mode.

⓱ **Cursor Right Button**
Allows you to access the sub-menus and adjust the settings.

⓲ **Cursor Down Button**
Allows you to select the next item on the menu.

⓳ **Channel + / – Buttons**
Allows you to select channels in ascending or descending order.

⓴ **Mute Button**
Mutes sound. To restore sound, press button again.

㉑ **Teletext Button**
Refer to section on "Using the Teletext"

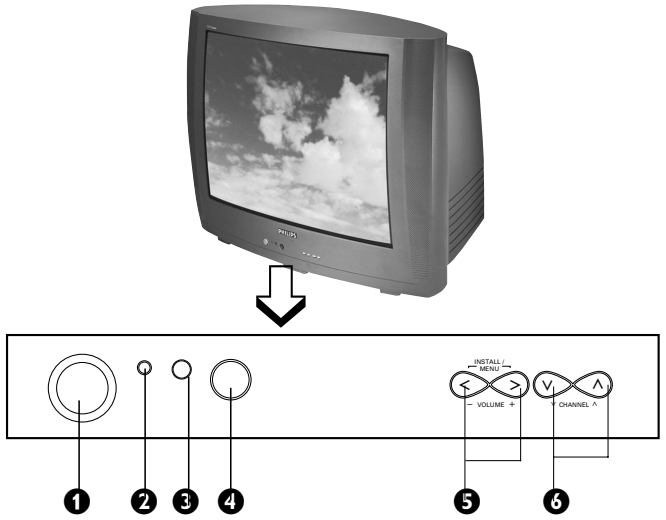
㉒ **OSD button**
Allows you to display the current channel number. It also allows to exit menu from the screen after control adjustments.

㉓ **Digit (0 -9) Buttons**
Press to select a channel. For a 2-digit channel number, press the first digit and followed immediately by the second digit.

㉔ **A/V Button**
Allows you to select the AV channels.

㉕ **Sleeptimer Button**
Allows you to select a time period after which the set will switch to standby mode automatically.

Functions of TV Controls



❶	Mains Power button	Switch mains power on or off.
❷	Standby light indicator	Indicate red light when standby mode is activated.
❸	Remote Sensor	Acts as a sensor for activating the controls of the TV when remote control handset is aimed at it.
❹	Headphone socket	Connect headphone jack to socket for personal listening.
❺	Volume < / > buttons	Adjust sound volume softer/louder.
❻	Channel ∨ / ∧ buttons	Select channel in descending/ascending order.

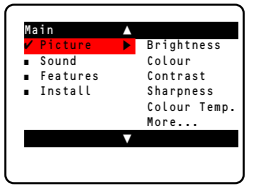
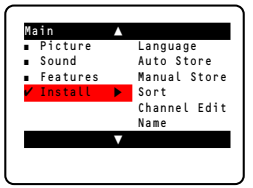
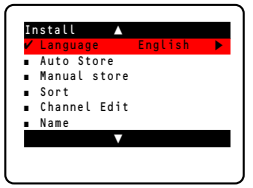
Note

- You can enter the main menu by pressing both the Volume < and > buttons at the same time.
- Press the ∨ or ∧ button to select the next item on the menu.
- Press Volume < or > button to access sub-menu and adjust the settings.

Selecting the Menu Language

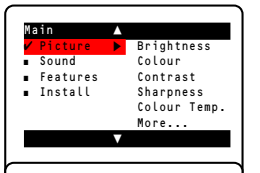
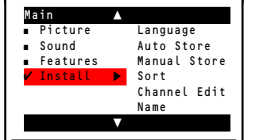
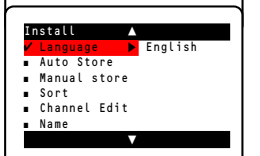
Operating instructions generally explains the operation of the TV set using the buttons on the remote control unless otherwise stated. Please read the following instructions carefully and follow the steps as shown to familiarise yourself with the installations and all features available in your set.

The **Language** feature allows you to set the TV's on-screen menu to be shown in your desired language.

Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Select **Install**.	
3	>	Enter the Install menu.	
4	>	Press button repeatedly to cycle through the language list and select the language of your choice.	
5	⊡	Exit menu from screen.	

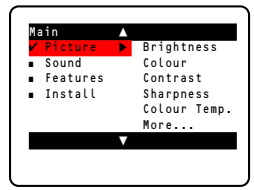
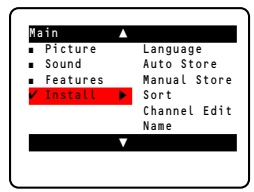
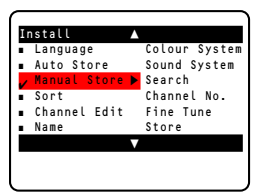
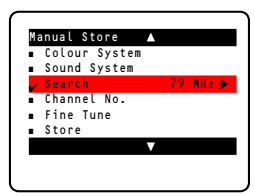
Automatic Tuning of Channels

Automatic tuning of channels allows you to store each programme automatically.

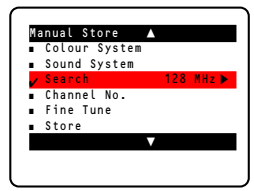
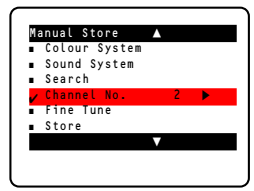
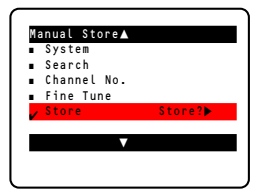
Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	∨	Select **Auto Store**.	
5	>	Start automatic tuning of channels.	
6	⊡	When tuning is completed, exit menu from screen.	

Manual Tuning of Channels

Manual tuning of channels allows you to select your preferred channel number for every available programme.

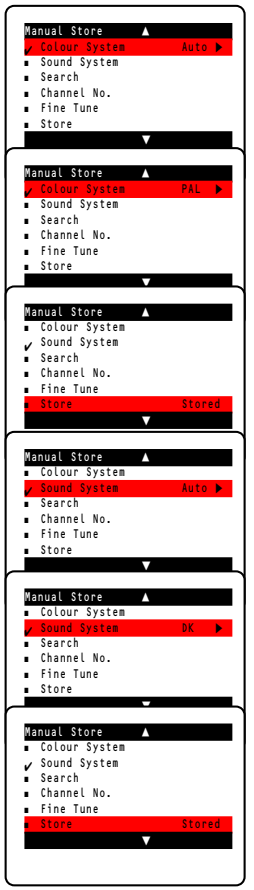
Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	∨	Press button repeatedly until **Manual Store** is selected.	
5	>	Enter manual store menu.	
6	∨	Press button repeatedly until **Search** is selected.	

Manual Tuning of Channels

Step	Press button		Result on TV Screen
7	>	Start manual searching. Searching stops once a transmitting signal is found.	
8	∨	Select **Channel No.**	
9	1 2 3 4 5 6 7 8 9 0	Key in the channel number.	
10	∨	Press button repeatedly until **Store** is selected.	
11	>	Store tuned channel. **Note** : If you want to continue searching for another transmitting channel, repeat steps 7 to 11.	
12	⊡	Exit menu from screen.	

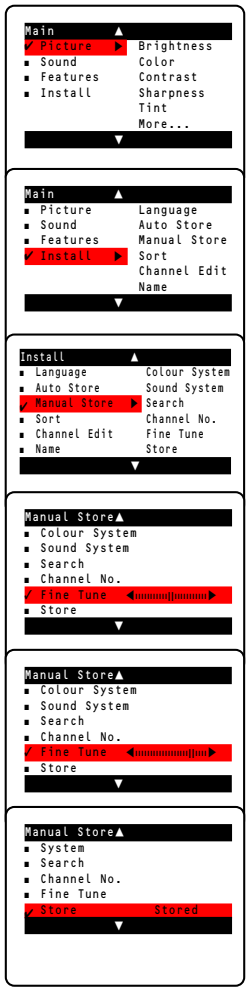
SELECTING THE COLOUR/SOUND SYSTEM

This feature allows you to select your desired **Colour** and **Sound** system. If **Auto** is selected, the respective colour and sound system will be automatically selected according to the transmission system. **Note** : Select your desired colour and sound system manually if reception is poor at **Auto** mode.

Step	Press button		Result on TV Screen
Repeat **step 1** to **step 5** as in **"Manual Tuning of TV Channels"**		**Colour System** is selected.	
6	< or >	Select the desired colour system (**Auto**, **PAL**, **NTSC 3.58**, **NTSC 4.43** or **SECAM**).	
7	v	Press button repeatedly until **STORE** is selected.	
8	>	Store selected system.	
9	v or ^	Proceed to select **Sound System**.	
10	< or >	Select the desired sound system (**Auto, BG, I, DK** or **M.**	
11	v	Press button repeatedly until **STORE** is selected.	
12	>	Store selected system.	
13	⊞	Exit menu from screen.	

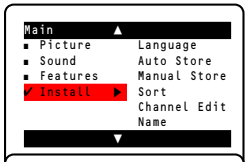
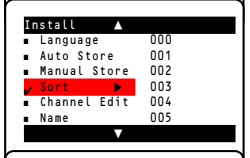
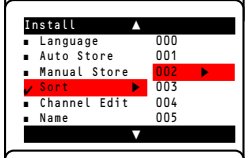
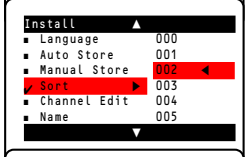
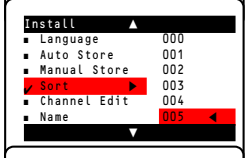
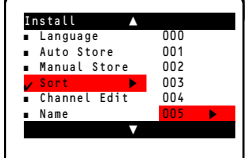
FINE TUNING OF CHANNELS

This feature allows you to adjust picture reception in areas of weak reception.

Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	v	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	v	Press button repeatedly until **Manual Store** is selected.	
	>	Enter manual store menu.	
6	v	Press button repeatedly until **Fine Tune** is selected.	
7	> or <	Fine tune until the best reception is obtained.	
8	v	Select **Store**.	
9	>	Store last fine-tuned status.	
10	⊞	Exit menu from screen.	

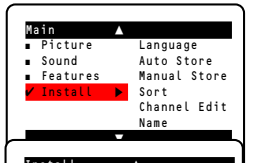
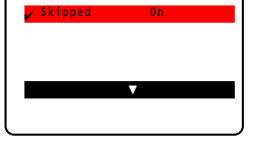
Sorting of Channels

This feature rearranges channel numbers.

Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	∨	Press button repeatedly until **Sort** is selected.	
5	>	Enter sort mode.	
6	∨ or ∧	Select the channel number you want to change from (e.g. 002).	
7	>	Confirm selection.	
8	∨	Select the channel number you want to change to (e.g. 005).	
9	<	Confirm selection. The change is done. **Note** : Channel numbers 5, 4 and 3 will move upwards accordingly. that is, Channel 5 will move up to Channel 4, Channel 4 to 3 and Channel 3 to 2.	
10	⊞	Exit menu from screen.	

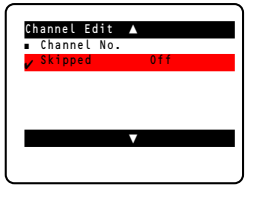
Editing of Channels

This feature allows you to skip or edit channels which have bad or weak TV signal or channels that you do not watch often. **Note** : Once a channel is skipped, you cannot have access to it by theCH (Channel) + or – button. You can only have access to the channel by the Digit (0 -9) buttons.

Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	∨	Press button repeatedly until **Channel Edit** is selected.	
5	>	Enter **Channel Edit** menu.	
6	1 2 3 4 5 6 7 8 9 0	Key in the channel number to be skipped.	
7	∨	Select **Skipped**.	
8	>	Select **On** to skip channel.	
9	⊞	Exit menu from screen.	

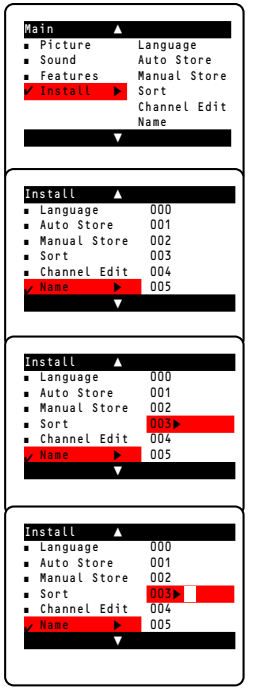
How to Restore Skipped Channels

- Repeat **Steps 1** to **5** as in"**Editing of Channels**".
- Key in the channel number to be restored by the **Digit (0 - 9)** button.
- Select **Skipped** by the **Cursor Dow** button.
- Select **Off** to restore channel by the **Cursor Right** button.
- Exit menu from screen by the **OSD** button.



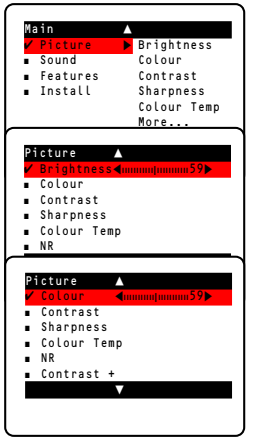
Naming of Channels

This feature enables you to name or rename channels.

Step	Press button		Result on TV Screen
1	MENU	Enter main menu.	
2	∨	Press button repeatedly until **Install** is selected.	
3	>	Enter install menu.	
4	∨	Press button repeatedly until **Name** is selected.	
5	>	Enter name mode.	
6	∧ or ∨	Select the channel you want to name.	
7	>	Move to first character slot.	
8	∧ or ∨	A cursor appears for you to start the input of characters. Select the character you want. Move to next character slot by the **Cursor Right** button and select the next character. You can enter up to a maximum of 5 characters.	
9	⊡	Exit menu from screen.	

Adjusting the TV Picture

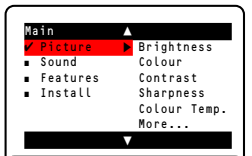
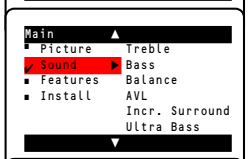
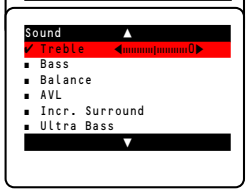
The picture menu allows you to make adjustments to the picture.

Step	Press button		Result on TV Screen
1	MENU	Display the main menu on screen.	
2	>	Enter **Picture** menu.	
3	∧ or ∨	Select item.	
4	< or >	Adjust level or select desired setting.	
5	⊡	Exit menu from screen.	

Picture menu items	Activities
Brightness	Increase or decrease brightness level.
Colour	Increase or decrease color level.
Contrast	Increase or decrease contrast level.
Sharpness	Increase or decrease sharpness level to improve detail in picture.
Color temperature	Choose from 3 settings (Normal, Warm or Cool).
NR (Noise Reduction)	Select "**On**" to reduce "noisy" picture (little dots on picture) due to weak signal.
Contrast +	Select "**On**" to allow you to optimise the total contrast for improved picture quality.

ADUSTING THE TV SOUND

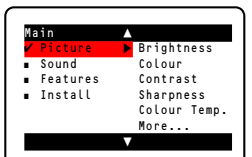
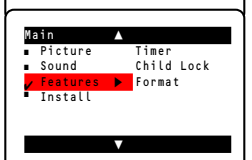
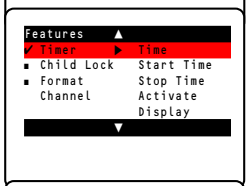
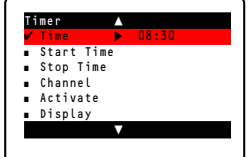
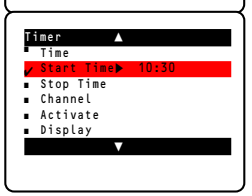
The sound menu allows you to make adjustments to the sound.

Step	Press button		Result on TV Screen
1	MENU	Display the main menu on screen.	
2	∨	Select **Sound** menu.	
3	>	Enter **Sound** menu.	
4	∧ or ∨	Select item.	
5	< or >	Adjust level or select desired setting.	
6		Exit menu from screen.	

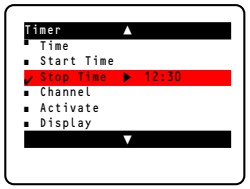
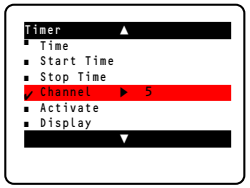
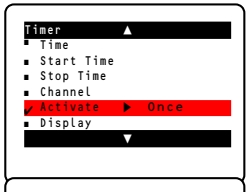
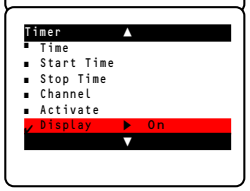
Sound menu items	Activities
Treble	Increase or decrease high frequency level.
Bass	Increase or decrease low frequency level.
Balance	Increase or decrease to adjust balance level.
AVL (Auto Volume Leveller)	Select On to enable volume to remain at a pre-determined level should there be a sudden change in volume during commercial breaks or channel switching.
Incredible Surround	Select On to boost the effect of stereo sound.
Ultra Bass	Select On to enjoy enhanced bass output.

USING THE TIMER

The Timer feature allows you to set the timer to switch to another channel at a specified time while you are watching another channel or when the TV is on standby mode.
Note : For the timer to function, the set must not be switched off. Once the set is switched off, the timer is disabled.

Step	Press button		Result on TV Screen
1	MENU	Display the main menu on screen.	
2	∨	Select **Features**.	
3	>	Enter the Features menu.	
4	>	Enter Timer menu.	
5	1 2 3 4 5 6 7 8 9 0	Key in the current time starting from the hour follow by minute. This is the time where the "start time" and "stop time" will take reference from.	
6	∨	Select **Start Time**.	
7	1 2 3 4 5 6 7 8 9 0	Key in the time you want the programme to be switched on.	

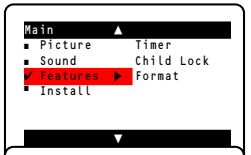
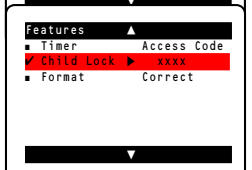
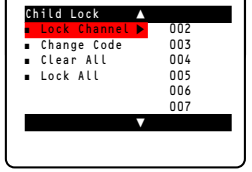
USING THE TIMER

Step	Press button		Result on TV Screen
8	▼	Select **Stop Time**.	
9	1 2 3 4 5 6 7 8 9 0	Key in the time you want the programme to be switched off.	
10	▼	Select **Channel**.	
	1 2 3 4 5 6 7 8 9 0	Key in the channel you want to switch to.	
11	▼	Select **Activate**.	
12	▶	Activate timer. You can select **Once**, **Daily** or **Off**.	
13	▼	Select **Display**.	
14	▶	Select **On** mode if you want to display the time on the TV screen.	
15	MENU	Exit menu from screen.	

Note : After the Stop Time is activated, the TV will go on standby mode. To switch on set from standby mode, press **Channel +/–**, **Digit (0 -9)** or **Power** button.

ACTIVATING THE CHILD LOCK (ACCESS CODE)

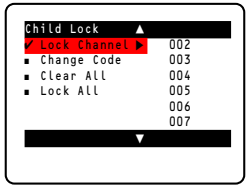
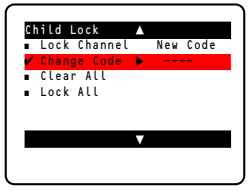
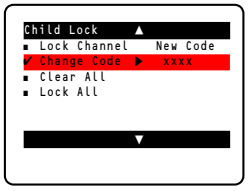
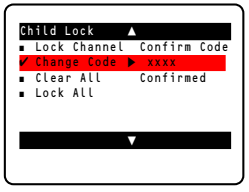
The Child Lock feature allows you to lock channels to prevent your children from watching programmes you deem undesirable.
Note : You can only have access to the locked channels via the remote control. Keep the remote control out of reach so as to prevent your children from having access to it.

Step	Press button		Result on TV Screen
1	MENU	Display the main menu on screen.	
2	▼	Press button repeatedly until **Features** is selected.	
3	▶	Enter the Features menu.	
4	▼	Select **Child Lock**.	
5	▶	Enter Child Lock mode.	
6	1 2 3 4 5 6 7 8 9 0	Key in the 4-digit access code. For the first time or if you have forgotten the access code, enter the universal access code 0711 twice. It will now prompt you to key in a **New Code**.	
7	1 2 3 4 5 6 7 8 9 0	Key in your preferred code (4-digit).	
8	1 2 3 4 5 6 7 8 9 0	Key in the new code the second time to confirm code.	
9	MENU	The Child Lock menu will now appear. You can proceed to lock channel (refer to section on "Lock Channel"). If not, exit menu from screen.	

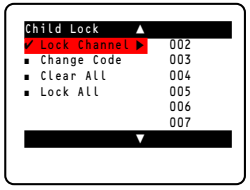
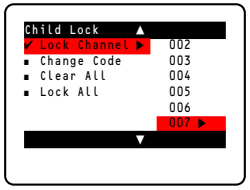
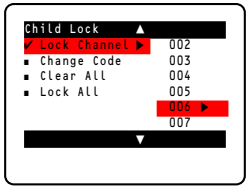
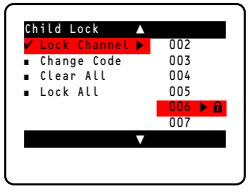
Note : After you have exit menu from screen and you want to enter the child lock menu again, you need to key the new access code only once.

Activating the Child Lock (Change Code)

Note : You need to key the access code only once.

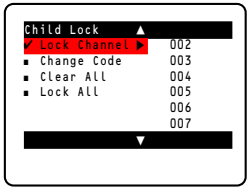
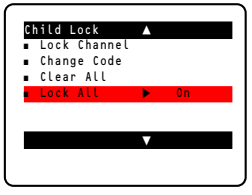
Step	Press button		Result on TV Screen
Repeat **Steps 1** to **8** as in **"Activating the Child Lock (Access Code)"**		The Child Lock menu will now appear. You can proceed to change code.	
9		Select **Change Code**.	
10		Enter change code mode.	
11		Key in your preferred code (4-digit).	
12		Key in the new code the second time to confirm code.	
13		Exit menu from screen.	

Activating the Child Lock (Lock Channel)

Step	Press button		Result on TV Screen
Repeat **Steps 1** to **8** as in **"Child Lock (Access Code)"**		The Child Lock menu will now appear. You can proceed to lock channel.	
9		Enter lock channel mode.	
10		Select the channel you want to lock.	
11		Activate blocking of channel. A keylock symbol will appear beside the channel number indicating that it is locked. **Note** : To lock more than one channel, repeat Steps 10 to 11 before exiting menu from screen.	
12		Exit menu from screen.	

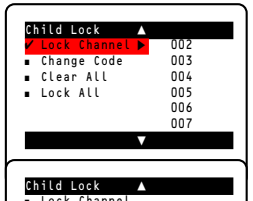
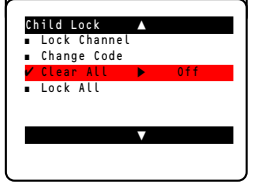
Activating the Child Lock (Lock All)

You can choose to lock all channels in the **Lock All** mode in the Child Lock menu.

Step	Press button		Result on TV Screen
Repeat **Steps 1** to **8** as in **"Child Lock (Access Code)"**		The Child Lock menu will now appear. You can proceed to lock all channels.	
9	∨	Select **Lock All**.	
10	>	Select the **On** option to lock all channels.	
11		Exit menu from screen.	

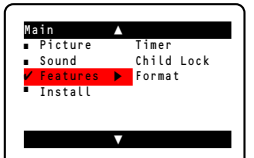
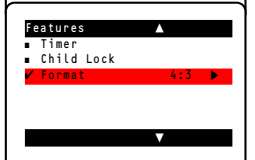
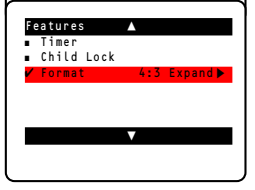
Activating the Child Lock (Clear All)

To unlock channels that you have locked, enter the Child Lock menu and select the **Off** option **Clear All** mode.

Step	Press button		Result on TV Screen
Repeat **Steps 1** to **8** as in **"Child Lock (Access Code)"**		The Child Lock menu will now appear. You can proceed to clear all channels.	
9	∨	Select **Clear All**.	
10	>	Select the **Off** option to unlock all channels.	
11		Exit menu from screen.	

Using the Screen Format

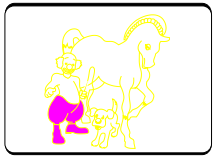
You can have a choice of two formats for your viewing pleasure, namely : - **4:3** mode and the **EXPAND 4:3** mode through the **FORMAT** menu.

Step	Press button		Result on TV Screen
1	MENU	Display the main menu on screen.	
2	∨	Press button repeatedly until **Features** is selected.	
3	>	Enter the Features menu.	
4	∨	Press button repeatedly umtil **Format** is selected.	
5	>	Press the button repeatedly to cycle through the different formats (**4:3** or **Expand 4:3)** or and select your desired format.	
6		Exit menu from screen.	

When to use the Screen Formats

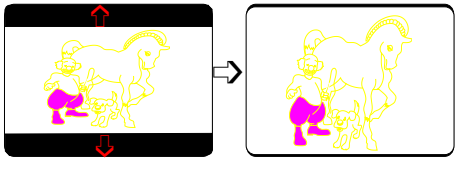
4:3 format

Select the 4:3 format if you want to display the 4:3 picture using the full surface of the screen.



Expand 4:3 format

Select the Expand 4:3 format if you want to expand movie images recorded in the letterbox format. When this format is selected, the black horizontal bars at the top and bottom are expanded thus filling up the entire TV screen.



Smart Picture Control

Whether you are watching a movie or video game, your TV has automatic video control settings matched to your current program source or content. The Smart Picture feature quickly resets your TV's video controls of program for a number of different types of programs and viewing conditions you may have in your home. Each Smart Picture setting is preset at the factory to automatically adjust the TV's Brightness, Colour, Picture and Sharpness levels.

Step	Press button	
1		Press botton repeatedly to cycle through the 5 settings namely, **DVD/VCD, Rich, Natural**, **Soft** and **Personal** and select your desired picture setting.
2		Exit menu from screen.

Defintion of Picture Settings

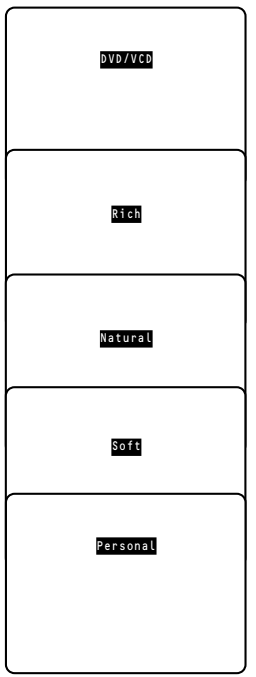
DVD/VCD : For optimal picture setting, whenever the source is connected to DVD/VCD player, select DVD/VCD setting for AV mode.

Rich : Emphasize very vibrant colours. This setting is the optimal setting when you are viewing TV programmes in a brightly-lit room.

Natural : Emphasize original colours.

Soft : Emphasize "warm" colours. (Suitable for dimly-lit room condition and gives cinema-like effect when light is switched off).

Personal : Picture settings are set to your preference.



Smart Sound Control

Whether you are watching a movie or video game, your TV has automatic sound control settings matched to your current program source or content. The Smart Sound feature quickly resets your TV's sound controls of program for a number of different types of programs and viewing conditions you may have in your home. Each Smart Sound setting is preset at the factory to automatically adjust the TV's Treble and Bass levels.

Step	Press button	
1		Press botton repeatedly to cycle through the 4 settings namely, **Personal**, **Voice**, **Music** and **Theatre** and select your desired sound setting.
2		Exit menu from screen.

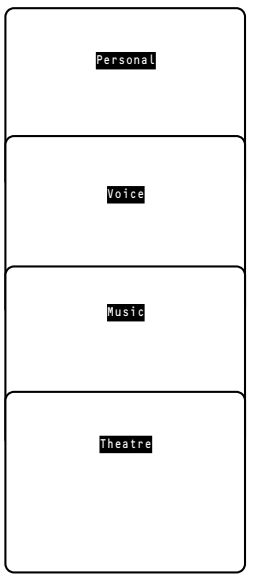
Definition of Sound Settings

Personal : Sound settings are set to your preference.

Voice : Emphasize high tone (treble boosted).

Music : Emphasize low tone (Bass boosted).

Theatre : Emphasize sensation to action. (Bass and Treble boosted)



SPECIFICATIONS

	29PT2152
Picture tube screen size	72 cm
Picture tube visible area	68 cm
Audio Output : Speaker	 2 x 5 W
TV System	NTSC M PAL B/G PAL D/K PAL I SECAM B/G SECAM D/K SECAM K1
Set Dimensions : Width Depth Height	 75.9 cm 51 cm 57.5 cm
Net Weight of Set	approximate 35 kg

Note
For Operating Voltage, Frequency, Power Consumption and Version Number, refer to the type number at the rear of the set.

4. Mechanical Instructions

Index:

1. Rear Cover Removal
2. Service Position Main Panel
3. Side I/O Panel Removal
4. Rear Cover Mounting

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

4.1 Rear Cover Removal

1. Remove all fixation screws of the rear cover.
2. Now pull the rear cover backward and remove it.

4.2 Service Position Main Panel

1. Disconnect the strain relief of the AC power cord.
2. Remove the main panel, by pushing the two center 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.

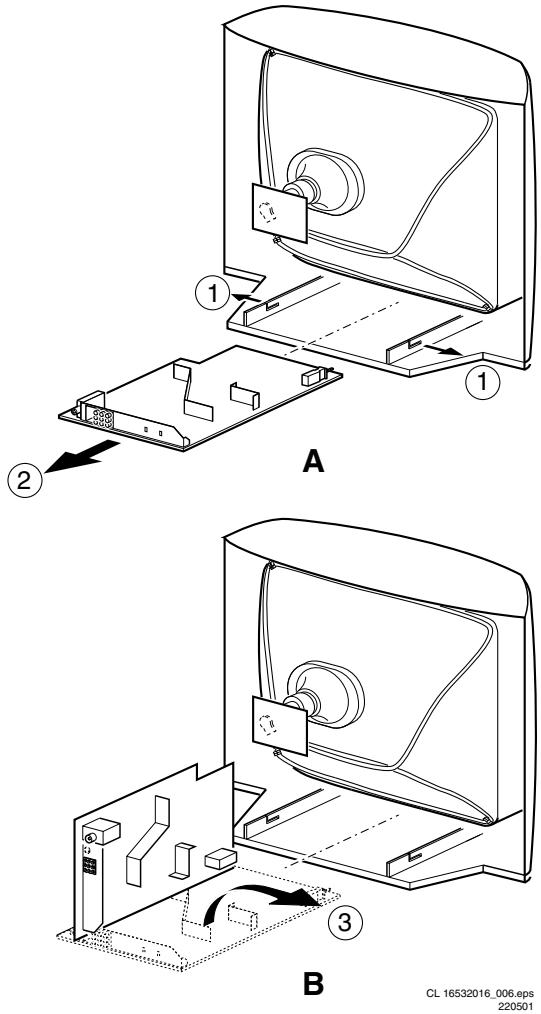


Figure 4-1

4.3 Side I/O Panel Removal

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.

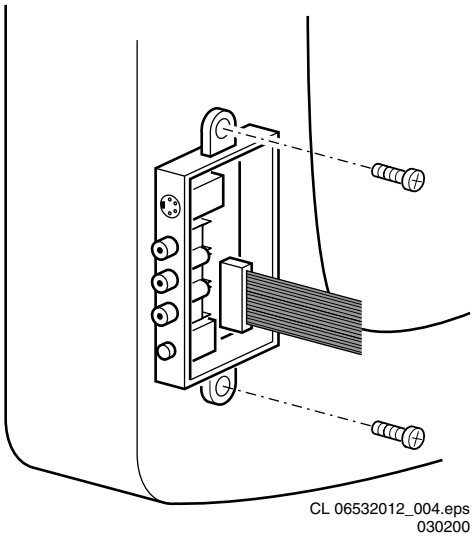


Figure 4-2

4.4 Rear Cover Mounting

Before you mount the rear cover, perform the following checks:

1. Check whether the mains cord is mounted correctly in its guiding brackets.
2. Replace the strain relief of the AC power cord into the cabinet.
3. Check whether all cables are replaced in their original position.

5. Service Modes, Error Codes and Fault Finding

Index:

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

5.1 Test Points

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

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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210501

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 (when this mode is not present, set all controls to 50%, set volume to 25% and select channel 3).
- 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 (see also paragraph 5.4).

SOFTWARE VERSIONS (L01 AP SMALL SCREEN)			
SW cluster	**SW name**	**UOC-type**	**Diversity**
1AP1	L01AN1-x.y	TDA9580/1	AP, non TXT, China/AP
1AP2	L01AN2-x.y	TDA9581/2	AP, non TXT, Thailand/Vietnam
1AP3	L01AN3-x.y	TDA9580/1	AP, non TXT, India
1AP9	L01AN9-x.y	TDA9581	AP, non TXT, Middle East
3AP1	L01AT1-x.y	TDA9561/7	AP, 10 page TXT, Sgp/Aus/NZ
3AP2	L01AT2-x.y	TDA9567	AP, 10 page TXT, Middle East
4AP1	L01AC1-x.y	TDA9580	AP, NTSC, Thailand/Philippines
Abbreviations: A= Asia Pacific, C= NTSC, N= no TXT, T= 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

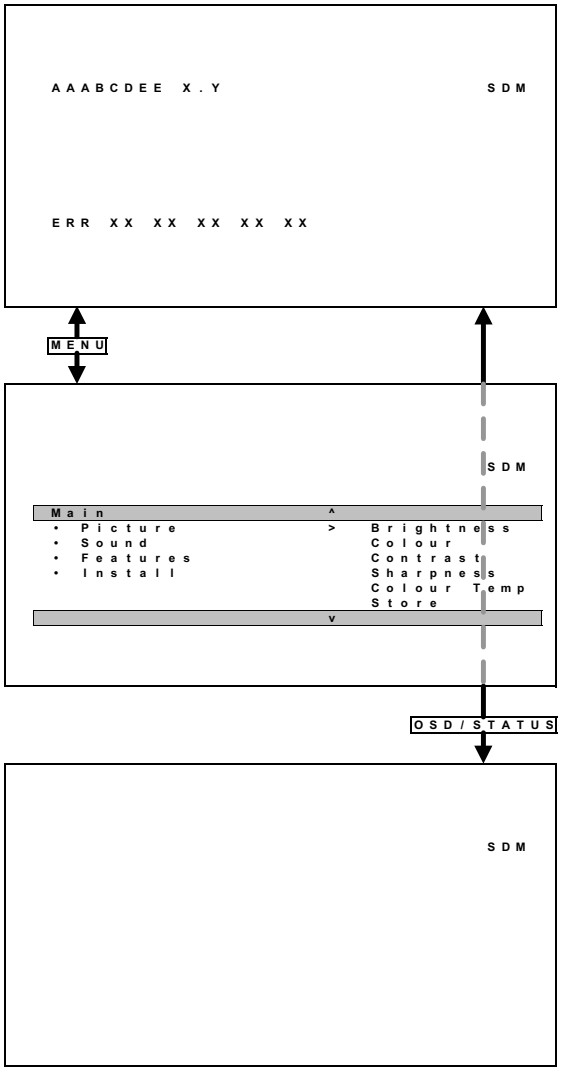
- Tuning frequency:
  - 475.25 MHz for PAL/SECAM (AP-PAL).
  - 61.25 MHz (channel 3) for NTSC-sets (AP-NTSC).
- Colour system:
  - PAL-BG for AP-PAL.
  - NTSC for AP-NTSC.
- All picture settings at 50 % (brightness, colour contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (sleep) timer,
  - child/parental lock,
  - blue mute,
  - hotel/hospitality mode
  - auto switch-off (when no ‘IDENT’ video signal is received for 15 minutes),
  - skip / blank of non-favorite presets / channels,
  - auto store of personal presets,
  - auto user menu time-out.

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 AC power. 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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220501

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 AC power, the set will return in SDM when AC power is re-applied). The error buffer is cleared.

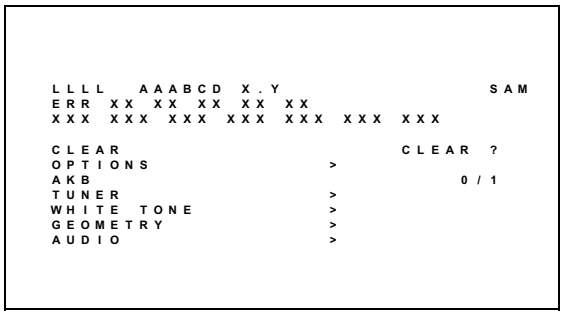
5.2.2 Service Alignment Mode (SAM)

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 or
- Via ComPair.

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



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150401

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: C= NTSC, D= DVD, N= no TXT, T= 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.

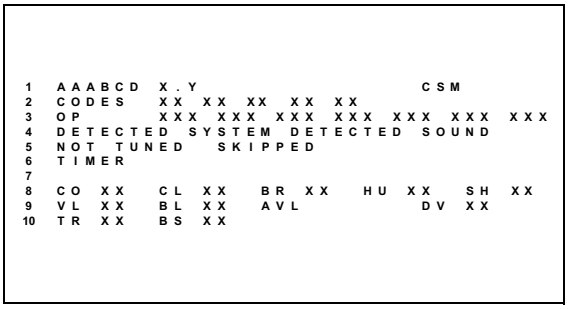
How to exit
Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the AC power, the set will return in SAM when AC power is re-applied). The error buffer is **not** cleared.

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 a lot of cases he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a read only mode, therefore modifications in this mode are not possible.

How to enter
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:



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Figure 5-5

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 (OB) are visible. Each Option Byte is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8.3.1 for more information on the option settings.
4. Indicates which color and sound system is installed for the selected pre-set.
5. Indicates if the set is not receiving an 'IDENT' signal on the selected source. It will display 'Not Tuned'.
6. Indicates if the sleep timer is enabled.
7. Indicates if the V-chip feature is enabled.
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 AC power switch.

5.3 Problems and Solving Tips (Related to CSM)

5.3.1 Picture Problems

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

No colours / noise in picture
Check CSM line 4. Wrong colour system installed. To change the setting:
1. Press the MENU button on the remote control.
2. Select the 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 AC power 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 AC power).
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 AC power adapter in the AC power 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.

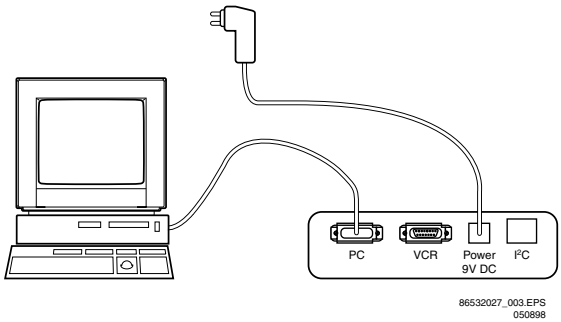


Figure 5-6

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 AC power, 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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210501

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.

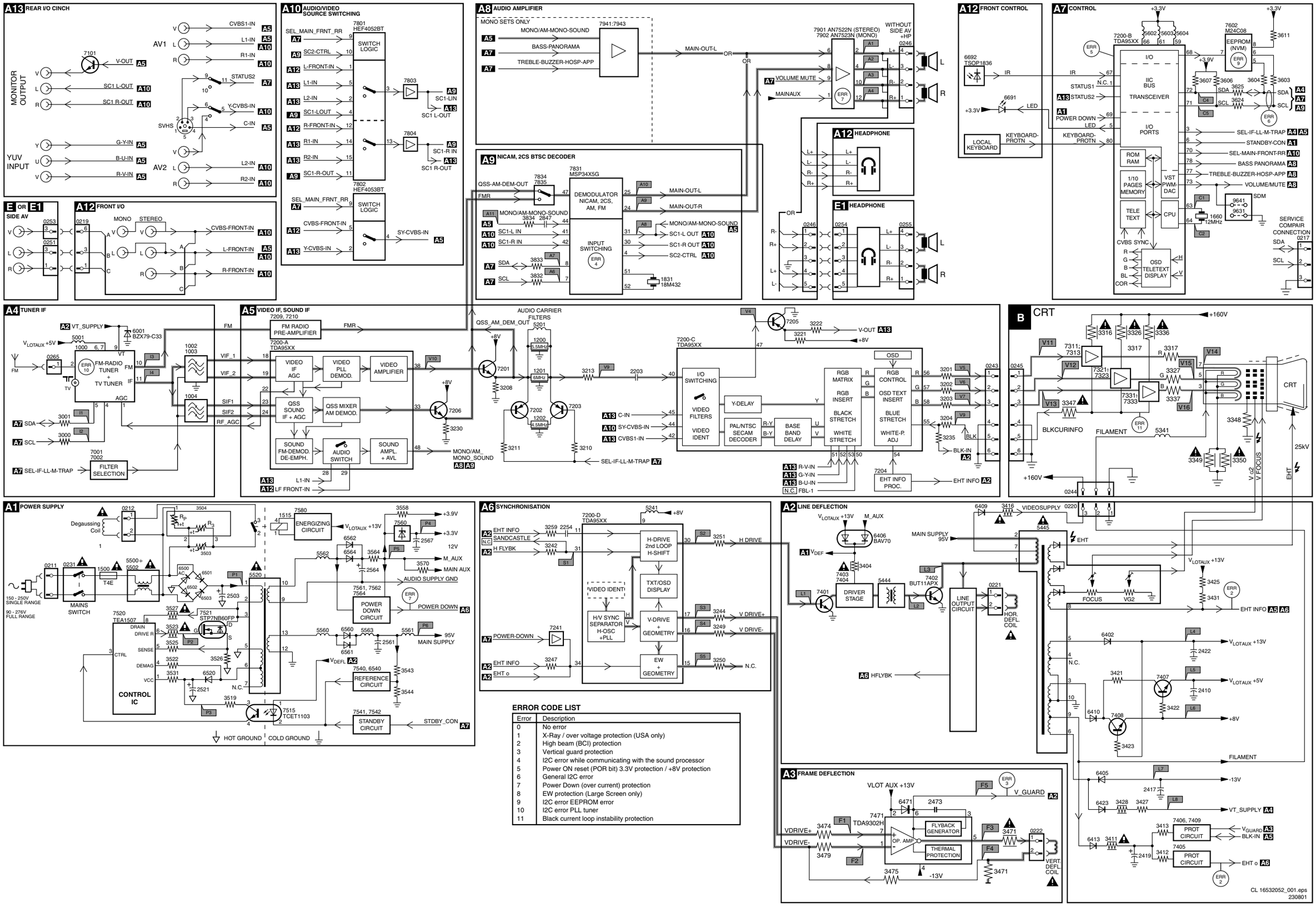
See for a detailed description Chapter 9 paragraphs Deflection and Power Supply.

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' line. No output voltages at LOT, no horizontal deflection. Reason: line transistor TS7460 is defective.
- **Set is dead, and makes no sound** Check power supply IC7520. Result: voltage at pins 1, 3, 4, 5 and 6 are about 180 V and pin 8 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 6) has an open load. That is why MOSFET TS7521 is not able to switch. Reason: feedback resistor 3523 is defective. **Caution:** be careful measuring on the gate of TS7521; circuitry is very high ohmic and can easily be damaged! (first connect measuring equipment to ground, then to the gate).
- **Set is in hiccup mode and shuts down after 8 s.** Blinking LED (set in 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 TS7480.
- **Set is non-stop in hiccup mode** Set is in over current mode; check the secondary sensing (opto coupler 7515) and the 'MainSupply' voltage. Signal 'Stdby_con' must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound** The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 5 and 7 are okay, 'VT_supply' at pin 9 is missing. Conclusion: resistor 3460 is defective.
- **Set turns on, but with a half screen at the bottom. Sound is okay** Blinking LED (set in SDM mode) indicates error 3. Check 'Vlotaux+13V' and '+50V'. If they are okay, problem is expected in the vertical amplifier IC7471. Measure with a scope the waveform on pin 17 of the UOC. Measure also at pin 1 of IC7471. If here the signal is missing, a defective resistor R3244 causes the problem.

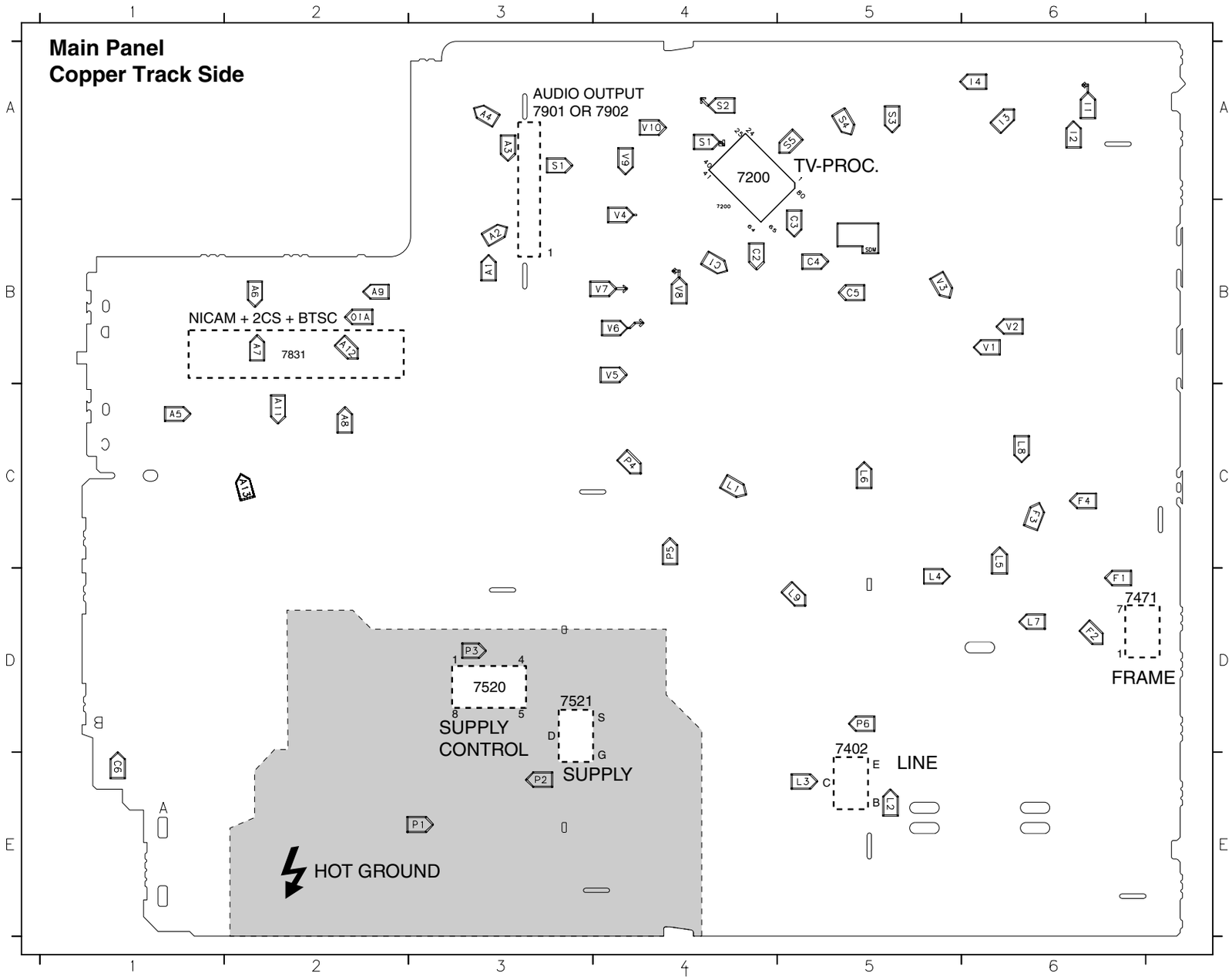
6. Block Diagram, Testpoints, I²C and Supply Voltage Overview

Block Diagram

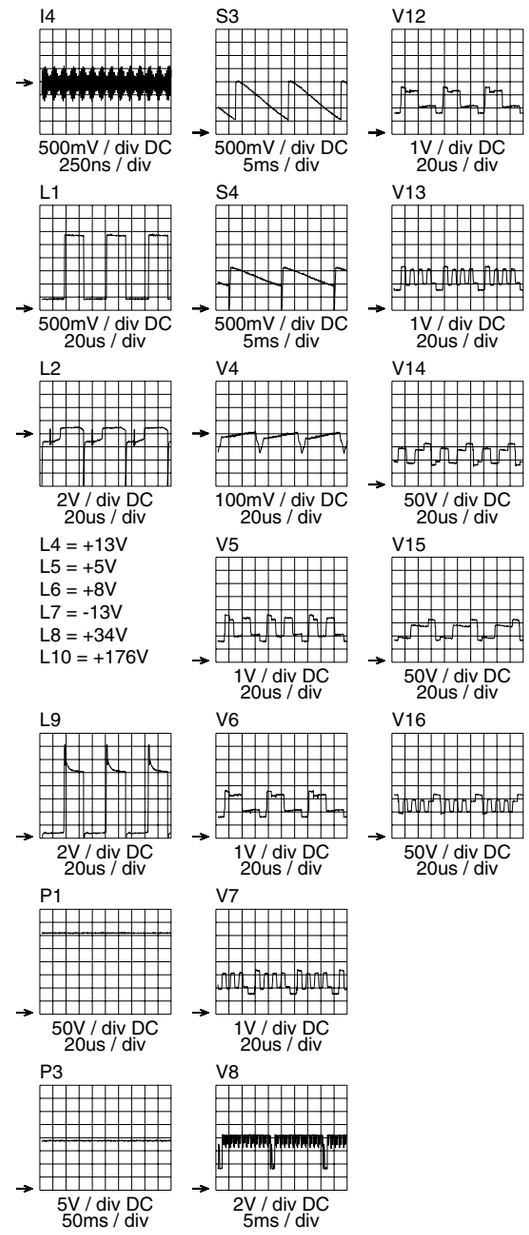


Testpoint Overview

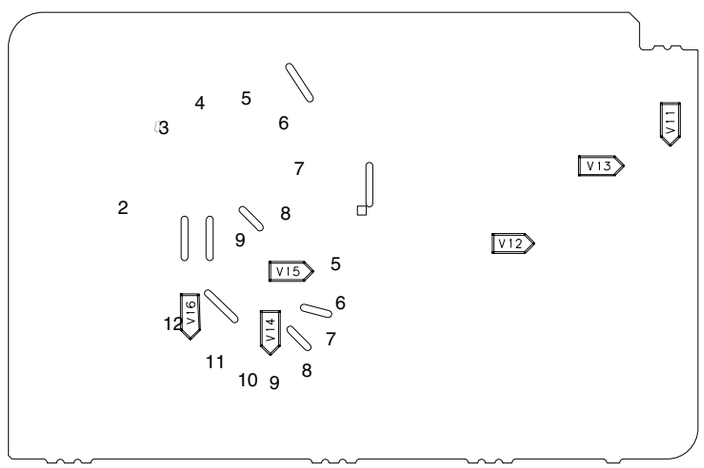
Main Panel
Copper Track Side

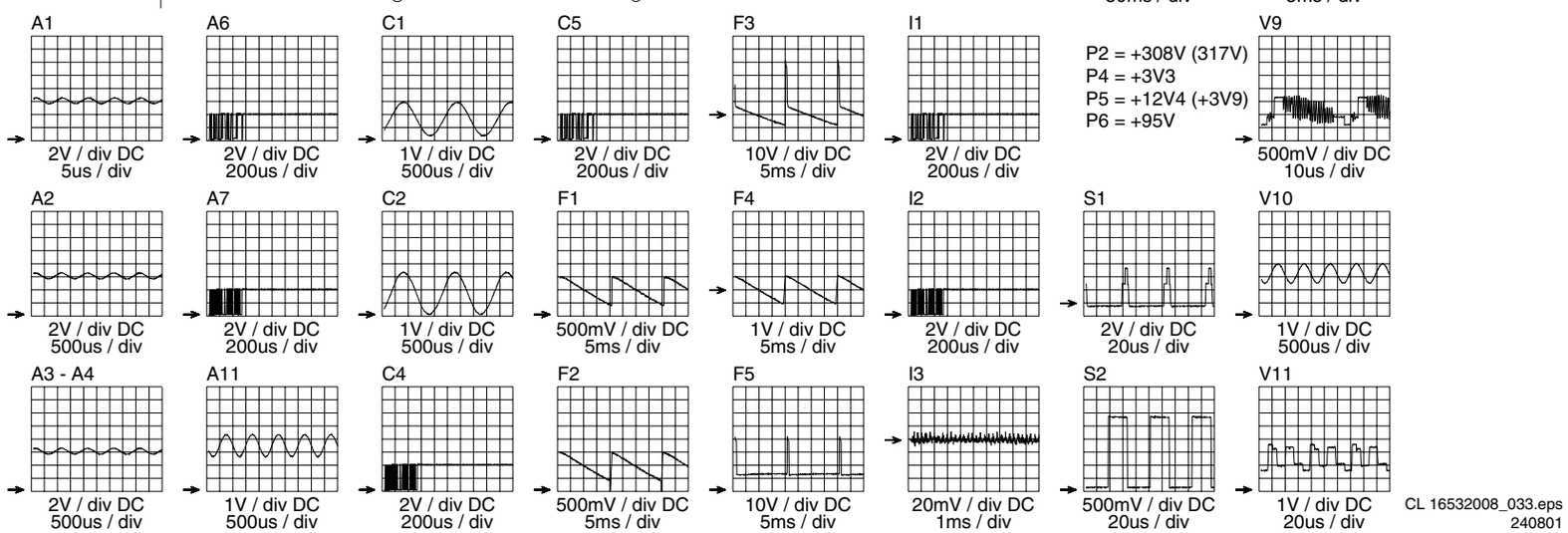


A1	B3
A2	B3
A3	A3
A4	A3
A5	C1
A6	B1
A7	B1
A8	C2
A9	B2
A10	B3
A11	C2
A12	B2
A13	C3
C1	B4
C2	B4
C3	B5
C4	B5
C5	B5
C6	E1
F1	D6
F2	D6
F3	C6
F4	C6
I1	A6
I2	A6
I3	A6
I4	A6
L1	C4
L2	E5
L3	E5
L4	D5
L6	C5
L8	C6
L9	D5
P1	E3
P2	E3
P3	D3
P4	C4
P5	C4
P6	D5
S1	A4
S2	A4
S3	A5
S4	A5
S5	A4
V1	B6
V2	B6
V3	B5
V4	B4
V5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



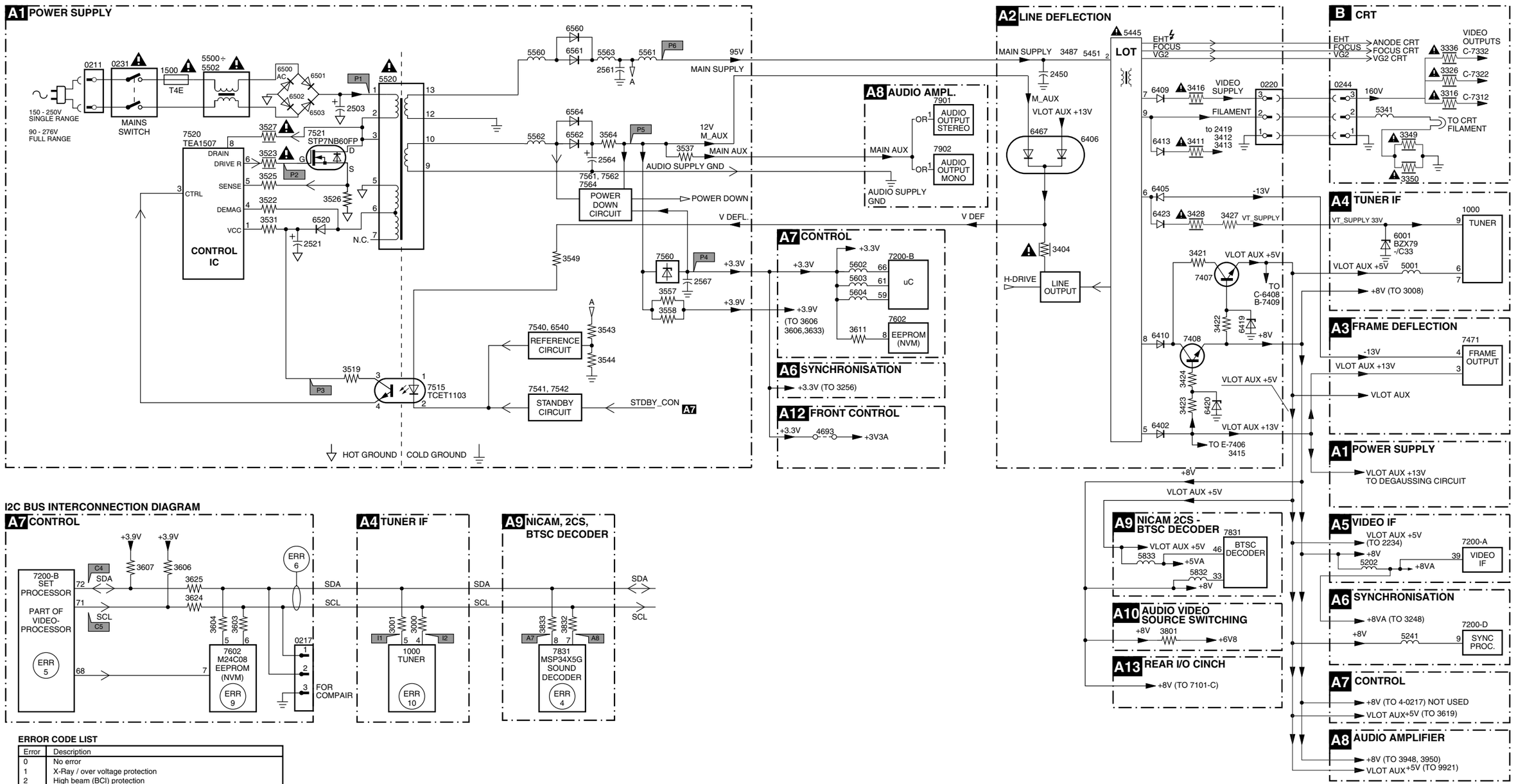
CRT Panel Copper Track Side





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I2C and Supply Voltage Diagram



I2C BUS INTERCONNECTION DIAGRAM

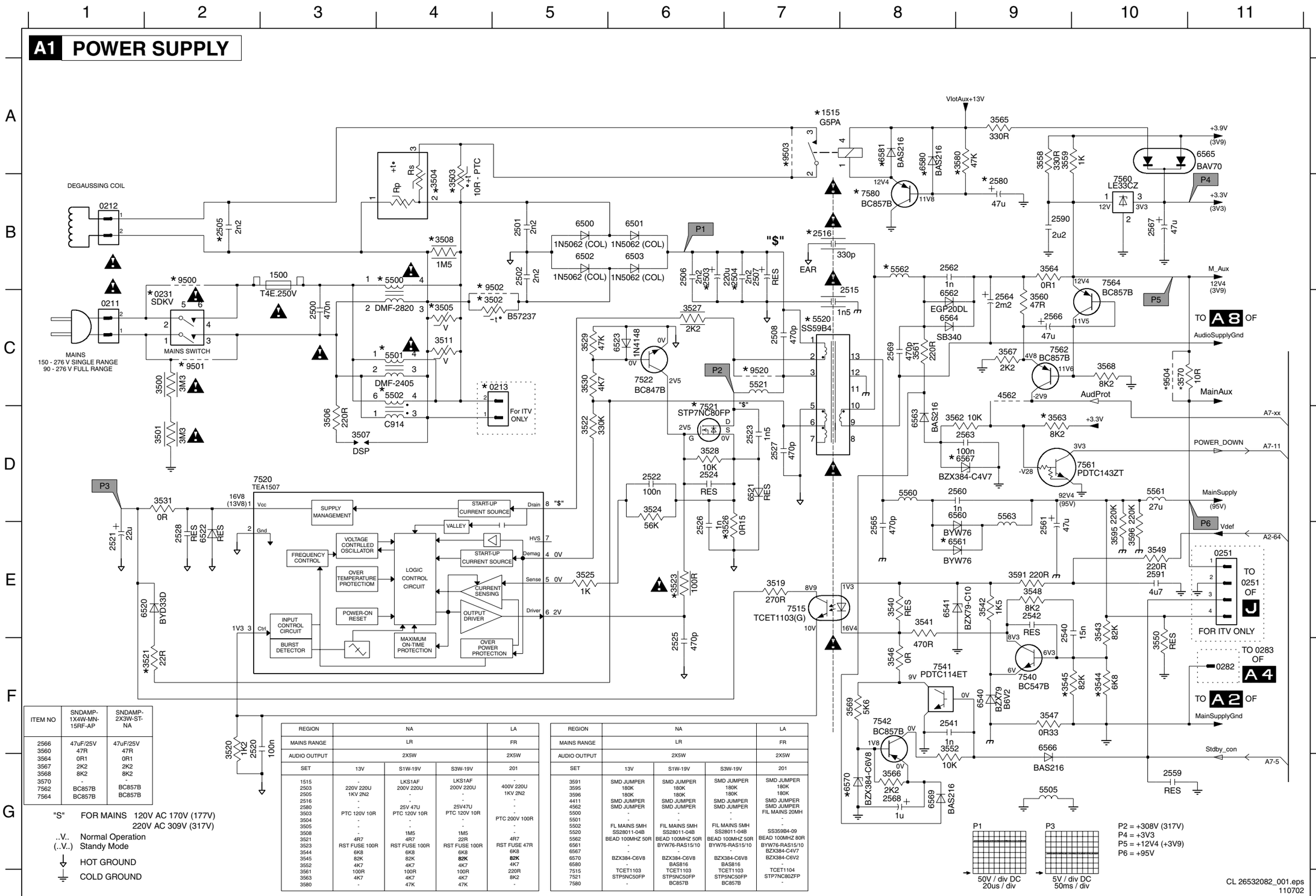
ERROR CODE LIST

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

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230801

7. Schematics and PWB's

Large Signal Panel: Power Supply



ITEM NO	SNDAMP-1X4W-MN-15RF-AP	SNDAMP-2X3W-ST-NA
2566	47uF/25V	47uF/25V
3560	47R	47R
3564	0R1	0R1
3567	2K2	2K2
3568	8K2	8K2
3570	-	-
7562	BC857B	BC857B
7564	BC857B	BC857B

REGION	NA			LA
MAINS RANGE	LR			FR
AUDIO OUTPUT	2X5W			2X5W
SET	13V	S1W-19V	S3W-19V	201
1515	-	LKS1AF	LKS1AF	-
2503	220V 220U	200V 220U	200V 220U	400V 220U
2505	1KV 2N2	-	-	1KV 2N2
2516	-	-	-	-
2580	-	25V 47U	25V47U	-
3503	PTC 120V 10R	PTC 120V 10R	PTC 120V 10R	PTC 200V 100R
3504	-	-	-	-
3505	-	-	-	-
3508	-	1M5	1M5	-
3521	4R7	4R7	22R	4R7
3523	RST FUSE 100R	RST FUSE 100R	RST FUSE 100R	RST FUSE 47R
3544	6K8	6K8	6K8	6K8
3545	82K	82K	**82K**	**82K**
3552	4K7	4K7	4K7	4K7
3561	100R	100R	100R	220R
3563	4K7	4K7	4K7	8K2
3580	-	47K	47K	-

REGION	NA			LA
MAINS RANGE	LR			FR
AUDIO OUTPUT	2X5W			2X5W
SET	13V	S1W-19V	S3W-19V	201
3591	SMD JUMPER	SMD JUMPER	SMD JUMPER	SMD JUMPER
3595	180K	180K	180K	180K
3596	180K	180K	180K	180K
4411	SMD JUMPER	SMD JUMPER	SMD JUMPER	SMD JUMPER
4562	SMD JUMPER	SMD JUMPER	SMD JUMPER	SMD JUMPER
5500	-	-	-	FIL MAINS 20MH
5501	-	-	-	-
5502	FL MAINS 5MH	FIL MAINS 5MH	FIL MAINS 5MH	-
5520	SS28011-04B	SS28011-04B	SS28011-04B	SS359B4-09
5562	BEAD 100MHZ 50R	BEAD 100MHZ 50R	BEAD 100MHZ 50R	BEAD 100MHZ 80R
6561	-	BYW76-RAS15/10	BYW76-RAS15/10	BYW76-RAS15/10
6567	-	-	-	BZX384-C4V7
6570	BZX384-C6V8	BZX384-C6V8	BZX384-C6V8	BZX384-C6V2
6580	-	BAS816	BAS816	-
7515	TCET1103	TCET1103	TCET1103	TCET1104
7521	STP5NC50FP	STP5NC50FP	STP5NC50FP	STP7NC80ZFP
7580	-	BC857B	BC857B	-

0211 C1 3568 C10
0212 B1 3569 F8
0213 C5 3570 C10
0231 C2 3580 A9
0251 E11 3591 E9
0282 F11 3595 E10
1500 B3 3596 E10
1515 A7 4562 C9
2500 C3 5500 B4
2501 B5 5501 C4
2502 B5 5502 C4
2503 B6 5505 G9
2504 B7 5520 C7
2505 B2 5521 C7
2506 B6 5560 D8
2507 B7 5561 D10
2508 C7 5562 B8
2515 C8 5563 D9
2516 B7 6500 B5
2520 F2 6501 B6
2521 E1 6502 B5
2522 D6 6503 B6
2523 D7 6520 E1
2524 D6 6521 D7
2525 F6 6522 E2
2526 E6 6523 C6
2527 D7 6540 F9
2528 E2 6541 E8
2540 E9 6560 D9
2541 F8 6561 E9
2542 E9 6562 C8
2559 G10 6563 D8
2560 D9 6564 C8
2561 E9 6565 A11
2562 B8 6566 F9
2563 D9 6567 D9
2564 C9 6569 G8
2565 E8 6570 G8
2566 C9 6580 A8
2567 B10 6581 A8
2568 G8 7515 E7
2569 C8 7520 D2
2580 B9 7521 D6
2590 B9 7522 C6
2591 E10 7540 F9
3500 C2 7541 F8
3501 D2 7542 F8
3502 C5 7560 B10
3503 B4 7561 D10
3504 B4 7562 C9
3505 C4 7564 B10
3506 D3 7580 B8
3507 D3 9500 B2
3508 B4 9501 C2
3511 C4 9502 C5
3519 E7 9503 A7
3520 F2 9504 C10
3521 F2 9520 C7
3522 D5
3523 E6
3524 D6
3525 E5
3526 E7
3527 C6
3528 D6
3529 C5
3530 C5
3531 D2
3540 E8
3541 E8
3542 E9
3543 E10
3544 F10
3545 F9
3546 F8
3547 F9
3548 E9
3549 E10
3550 F10
3552 F8
3558 A9
3559 A9
3560 C9
3561 C8
3562 D8
3563 D9
3564 B9
3565 A9
3566 G8
3567 C9

Large Signal Panel: Line Deflection

A2 LINE DEFLECTION

MainSupply +95V
3407 220R
2401 680p
* 9405
* 6401
BAV21 6403
BYD33D
* 9403
5403
2402
2404
3405 2K2
0221
HORIZONTAL DEFLECTION COIL
VH
* 9408
5408
2408
3403
*9404 5401 *5406 DC12
Vdef A1-64
6406 BAV70
VlotAux+13V 12V4
M_Aux 12V
11V6
6407 BAS216
3404 6R8
2425 39p
3406
7403 BC337
7404 BC327-25
11V 5V4 5V6 0V
2405
L9
2411 47u
3408
6418 UDZS-TE17-8.2B
2403
5V5
1V4
7401 PDTC143ZT
2406
VlotAux+5V
6408 BAS316
L1
Hdrive A6-21
Hflybk A6-18
3401 330K
3402 18K
for sets w/o quasi diode modulation
2415
5444
3 6 1
SC10009-03
L2
3432 22R
7402 BUT11APX
90V8 0V
L3
6404 BYD33M
2407
2416
6412
*9402 2424
3429 3K3
3430 15K
2400
for sets with quasi diode modulation
6416 BAS316
9401
5410 27u
2409 47u
*5445 AT2078
EHT
TO PICTURE TUBE
TO CRT PANEL
VFOC
VG2
B
2412 33n
0220
TO 0224 OF CRT PANEL
FILAMENT
VideoSupply
2413 10u
VideoSupply
L10
3416 3R9
6409 BYD33D
6413 1N4148
3411 10R
3413 10K
VlotAux+13V
3418 33K
6415 BAS216
2420
3419 6R8
12V4
12V5
BC857B 7406
6417 BZX284-C10
5V5
7409 BC857B
4V5
5V
VlotAux+5V
2419 1u
3412
3414
BC857B 7405
4V5 2V1 6V2
EHTo A6-23
6414 BZX79-B6V2
3415 1K
VlotAux+13V
3426 1M
BLK-IN A5-36
2421 47n
2418 10n
3417 33K
Vguard A3-65
3420 33K
3410 33K
EHTinfo A5-16 A6-16
3431
3425
6402 BYD33D
L4
VlotAux+13V
2410 470u
6410 BYD33D
3421 6R8
7407 BD135
8V5 5V 5V7
L5
VlotAux+5V
2414 1m
6419 BZX79-C5V6
3422 100R
2422 470u
L6
+8V
8V4 8V
7408 BD135
8V7
3423 820R
6420 BZX79-C9V1
3424 100R
VlotAux+13V
6405 BYD33D
2417 1m
L7
VlotAux-13V
6423 BYD33D
3428 39R
3427 27K
2423 10u
3433 1K5
L8
VT_Supply

REGION	NA			LA
MAINS RANGE	LR			FR
AUDIO OUTPUT	2X5W			2X5W
SET	13V	S1W-19V	S3W-19V	201
4411	SMD JUMPER	SMD JUMPER	SMD JUMPER	SMD JUMPER

REGION	NA					NAFTA
TUBE	PHCO		SMGK	OECO	PH.HF	PHCO
SET	13V	19V	18V	19V	20V	20I
2402	250V 560N	250V 680N	250V 820N	250V 820N	250V 560N 50V 1N	250V 680N
2404	- 50V 1N	- 50V 1N	- 50V 1N	- 50V 1N	-	-
2405	1K6V 8N2 50V 22N	1K6V 10N 50V 22N	1K6V 10N 50V 22N	1K6V 10N 50V 22N	1K6V 13N -	1K6V 11N 50V 22N
2407	470R 2KV 470P	470R 2KV 820P	470R -	470R 2KV 820P	470R 2KV 1N2 -	-
2408	3W 22R	3W 22R	3W 22R	3W 22R	2K2,	3W 22R
2412	-	-	-	-	3W 220R	-
2416	3W 220R	3W 220R	3W 220R	3W 220R	3K3	3W 220R
3403	3K3	3K3	3K3	3K3	1K5	39K
3405	1K5	1K5	1K5	1K5	10K	12K
3407	15K	15K	12K	15K		15K
3412						
3414						
3425						

REGION	NA					NAFTA
TUBE	PHCO		SMGK	OECO	PH.HF	PHCO
SET	13V	19V	18V	19V	20V	20I
3426	SMD JUMPER	SMD JUMPER	SMD JUMPER	SMD JUMPER	1M	SMD JUMPER
3431	3K3	SMD JUMPER	2K2	2K2	3K3	SMD JUMPER
3471	6R8	3R9	3R9	3R9	3R3	3R3
3472	3R9	3R9	3R9	4R7	3R9	4R7
5403	-	-	-	-	56UH	-
5406	-	-	-	-	38UH C912-01(91033)	-
5408	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH	-	SPT0508 27UH
5410	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH	SPT0508 27UH
5445	MSLOT4 (21541)	MSLOT4(21541)	MSLOT4(21541)	MSLOT4(21541)	JF0501-19816	SLOT (20662)
6401	BAV21	BAV21	BAV21	BAV21	BAV21	BAV21
6403	-	-	-	-	-	-
6417	-	-	-	-	BZX384-C10	-
9403	JUMPER	JUMPER	JUMPER	JUMPER	-	JUMPER
9404	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER
9408	-	-	-	-	-	-

L1 500mV / div DC 20us / div
L2 2V / div DC 20us / div
L9 2V / div DC 20us / div

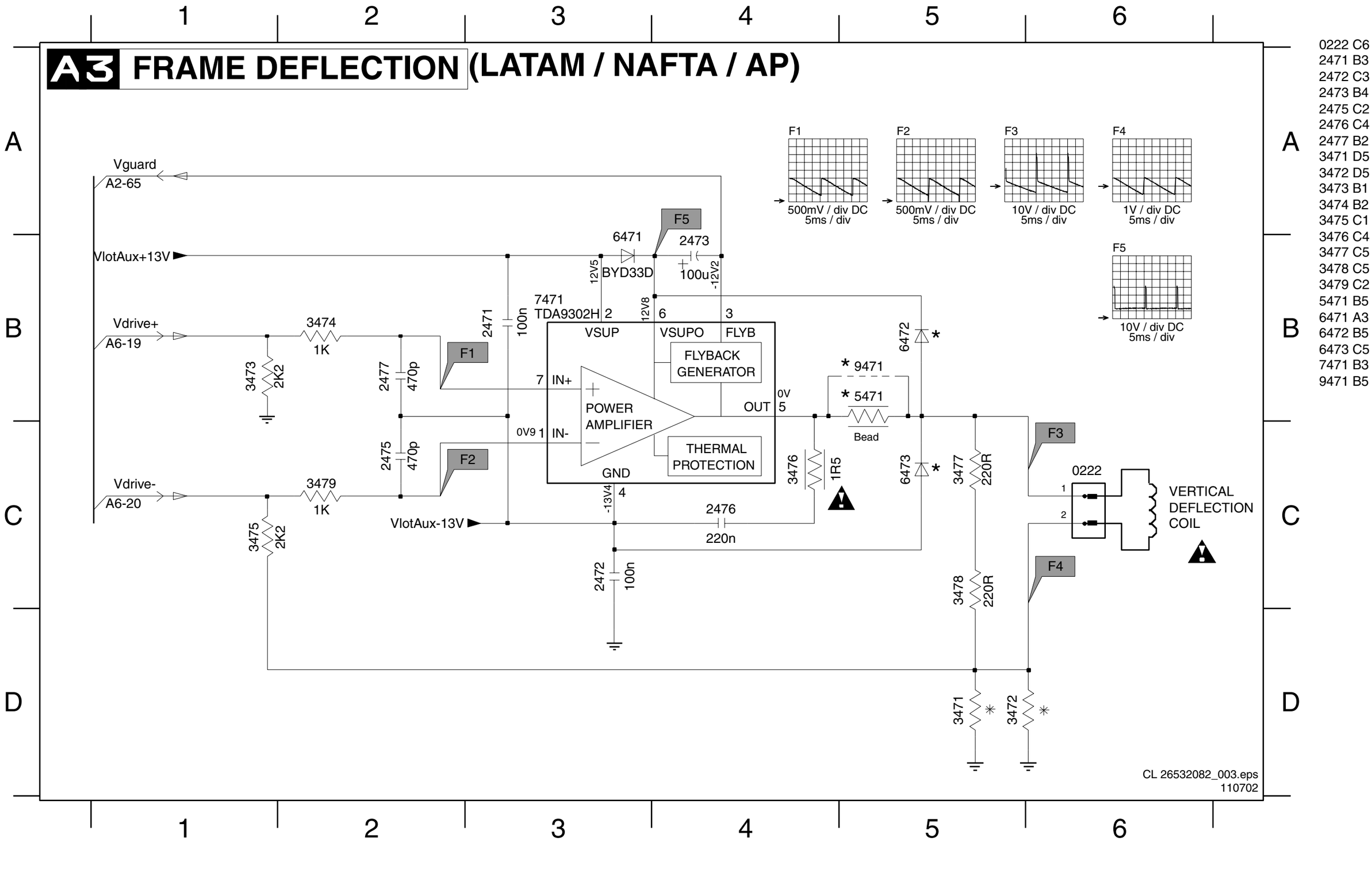
L4 = +13V
L5 = +5V
L6 = +8V
L7 = -13V
L8 = +34V
L10 = +176V

CL 26532082_002.eps
110702

0220 F6
0221 A5
2400 F4
2401 A4
2402 B4
2403 E2
2404 B4
2405 D3
2406 D3
2407 D5
2408 B5
2409 C6
2410 D9
2411 D3
2412 C8
2413 A7
2414 D9
2415 D3
2416 D5
2417 F10
2418 B10
2419 A9
2420 B8
2421 B10
2422 D10
2423 F10
2424 D5
2425 C2
3401 C4
3402 C4
3403 B5
3404 C2
3405 B4
3406 D2
3407 B3
3408 D2
3410 B11
3411 A9
3412 A10
3413 A9
3414 A10
3415 A10
3416 A7
3417 B10
3418 A8
3419 B8
3420 B10
3421 D9
3422 E10
3423 E10
3424 E9
3425 C9
3426 B10
3427 F10
3428 F9
3429 F4
3430 E4
3431 C9
3432 D4
3433 F10
5401 B3
5403 B4
5406 B3
5408 B5
5410 F5
5444 D4
5445 B6
6401 B4
6402 C8
6403 B4
6404 D5
6405 F9
6406 C2
6407 C1
6408 E3
6409 A6
6410 D8
6412 D5
6413 A8
6414 A10
6415 A8
6416 F4
6417 B8
6418 D2
6419 E9
6420 E10
6423 F9
7401 E2
7402 D4
7403 D2
7404 D2
7405 A10
7406 B9
7407 D10
7408 E9
7409 B9
9401 F5
9402 D5
9403 B4
9404 B3
9405 A4
9408 B5

Large Signal Panel: Frame Deflection

A3 FRAME DEFLECTION (LATAM / NAFTA / AP)



0222 C6
2471 B3
2472 C3
2473 B4
2475 C2
2476 C4
2477 B2
3471 D5
3472 D5
3473 B1
3474 B2
3475 C1
3476 C4
3477 C5
3478 C5
3479 C2
5471 B5
6471 A3
6472 B5
6473 C5
7471 B3
9471 B5

Large Signal Panel: Tuner IF

A4 TUNER IF

FM-RADIO ANTENNA
0265
2010 1n
VT_Supply
VlotAux+5V
2005 10u
6001 BZX79-C33
5001 5u6
1000
TUNER
AGC
FM-ANT
+5V
VT
FM
IF
MT
AS SCL SDA +5V ADC
FOR ITV ONLY
0285
FOR EMC ONLY
0283
TO 0282 OF A 1
3003 4K7
2006 470u
2007 100n
2004 47n
I4
6002 BAS216
6003 BAS216
3002 10K
3005 680R
RF_AGC
A5-25
SCL
A7-13
3000 100R
I2
I1
I3
SDA
A7-14
3001 100R
2001 RES
2002 RES
5002 820n
2008 100u
3004 22K
2009 22n
FM
A5-24
3010 100R
3011 RES
2003 10n
4001
+8V
3007 6K8
3008 2K2
3009 2K2
*1002 OFWG1984M
*9001
VIF_1
A5-27
VIF_2
A5-26
0309
3006 2K2
4006 6004 BA792
4005 6005 BA792
*1003 OFWK6272K
SWI O1 IN ING GND O2
*4003
*4004
4002
SEL-IF-LL_M-TRAP
A7-3
5V
0V
7001 PDTC124ET
7002 PDTC124ET
*1004 OFWG1984M
*4011
4012
5003 2u7
SIF_1
A5-28
SIF_2
A5-29

Item	AP-multi-Inter	AP-Multi-QSS	AP-PAL	CHINA-PAL	NA/LA/AP-NTSC
1002	K7260	K7257	K2960	K2978	F072 M1971
1004	---	K9362	---	---	---
2003	10n	10n	---	---	---
3006	2K2	2K2	---	---	---
3007	6K8	6K8	---	---	---
3008	2K2	2K2	---	---	---
4001	---	---	JMP	JMP	JMP
4002	---	---	JMP	JMP	JMP
4003	---	JMP	---	---	---
4004	JMP	JMP	---	---	---
4012	---	JMP	---	---	---
6004	1SS356	ISS356	---	---	---
7001	PDTC124	PDTC124	---	---	---

Tuner

ITEM	LNA (AP)	AP	NA	LA/AP-NTSC
1000	UV1356A	TEDE9-228B	ENV56D98G3	RTEDH9-200A
			TEDH9-200A	UV1336
5001	47u	47u	27u	5u6
5002	820n	---	820n	820n

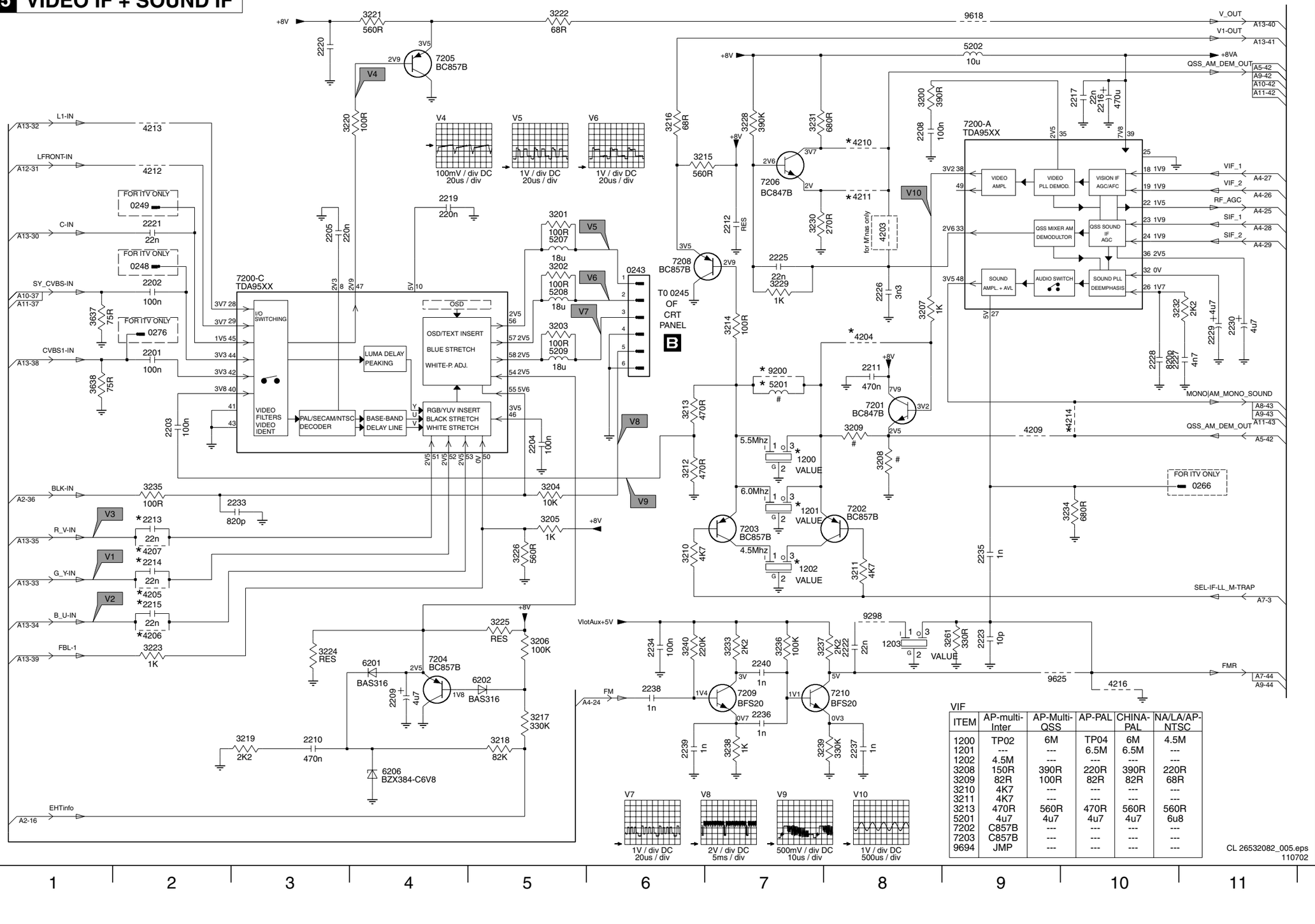
I1 2V / div DC 200us / div
I2 2V / div DC 200us / div
I3 20mV / div DC 1ms / div
I4 500mV / div DC 250ns / div

CL 265320082_004.eps
110702

0265 A4
0283 B2
0285 B2
0309 D8
1000 A3
1002 D7
1003 E7
1004 E7
2001 C3
2002 C4
2003 C5
2004 B5
2005 A5
2006 B6
2007 B6
2008 C5
2009 C8
2010 A4
3000 C3
3001 C3
3002 C6
3003 B7
3004 C7
3005 B7
3006 D5
3007 D5
3008 D5
3009 D6
3010 D3
3011 D4
4001 C5
4002 E7
4003 E6
4004 E7
4005 D6
4006 D5
4011 F7
4012 F7
5001 A6
5002 C5
5003 F8
6001 A5
6002 B6
6003 C6
6004 D5
6005 D6
7001 E5
7002 E6
9001 D6

Large Signal Panel: Video IF + Sound IF

A5 VIDEO IF + SOUND IF



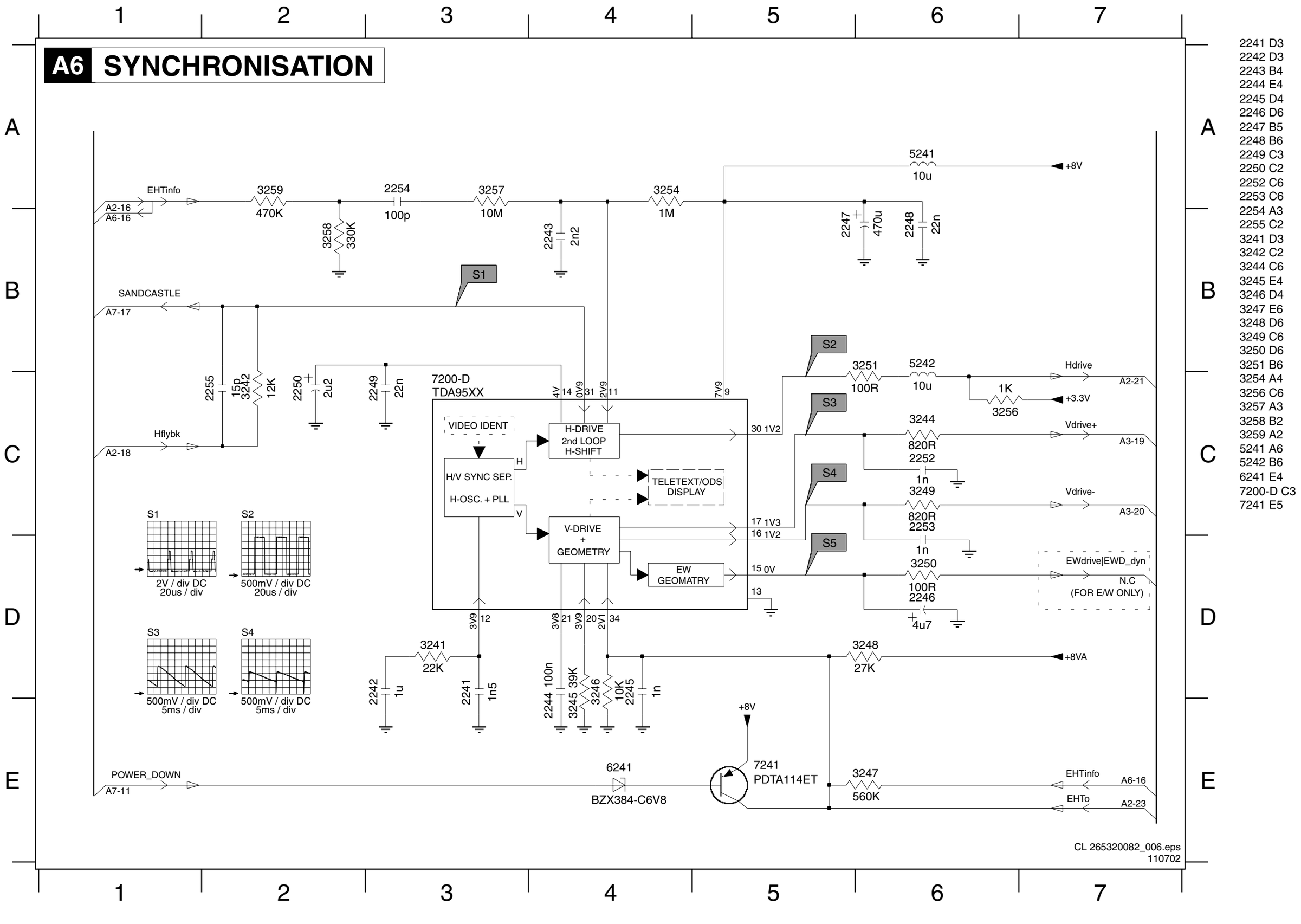
VIF

ITEM	AP-multi-Inter	AP-Multi-QSS	AP-PAL	CHINA-PAL	NA/LA/AP-NTSC
1200	TP02	6M	TP04	6M	4.5M
1201	---	---	6.5M	6.5M	---
1202	4.5M	---	---	---	---
3208	150R	390R	220R	390R	220R
3209	82R	100R	82R	82R	68R
3210	4K7	---	---	---	---
3211	4K7	---	---	---	---
3213	470R	560R	470R	560R	560R
5201	4u7	4u7	4u7	4u7	6u8
7202	C857B	---	---	---	---
7203	C857B	---	---	---	---
9694	JMP	---	---	---	---

0243 C6
0248 C2
0249 B2
0266 E11
0276 C2
1200 D7
1201 E7
1202 E7
1203 F8
2201 C2
2202 C2
2203 D2
2204 D5
2205 B3
2208 B8
2209 F4
2210 G3
2211 D8
2212 B7
2213 E2
2214 E2
2215 F2
2216 A10
2217 A10
2219 B4
2220 A3
2221 B2
2222 F8
2223 F9
2225 C7
2226 C8
2227 C10
2228 C10
2229 C11
2230 C11
2233 E3
2234 F6
2235 E9
2236 F7
2237 G8
2238 F6
2239 G6
2240 F7
3200 A8
3201 B5
3202 C5
3203 C5
3204 E5
3205 E5
3206 F5
3207 C8
3208 D8
3209 D8
3210 E6
3211 E8
3212 D6
3213 D6
3214 C7
3215 B6
3216 A6
3217 F5
3218 G5
3219 G3
3220 A3
3221 A4
3222 A5
3223 F2
3224 F3
3225 F5
3226 E5
3228 A7
3229 C7
3230 B7
3231 A7
3232 C11
3233 F7
3234 E10
3235 E2
3236 F7
3237 F8
3238 G7
3239 G8
3240 F6
3261 F9
3637 C1
3638 D1
4203 B8
4204 C8
4205 E2
4206 F2
4207 E2
4209 D9
4210 B8
4211 B8
4212 B2
4213 B2
4214 D10
4216 F10
5201 D7
5202 A9
5207 B5
5208 C5
5209 C5
6201 F4
6202 F5
6206 G4
7200-A B9
7200-C C3
7201 D8
7202 E8
7203 E7
7204 F4
7205 A4
7206 B7
7208 C6
7209 F7
7210 F8
9200 D7
9298 F8
9618 A9
9625 F9

Large Signal Panel: Synchronisation

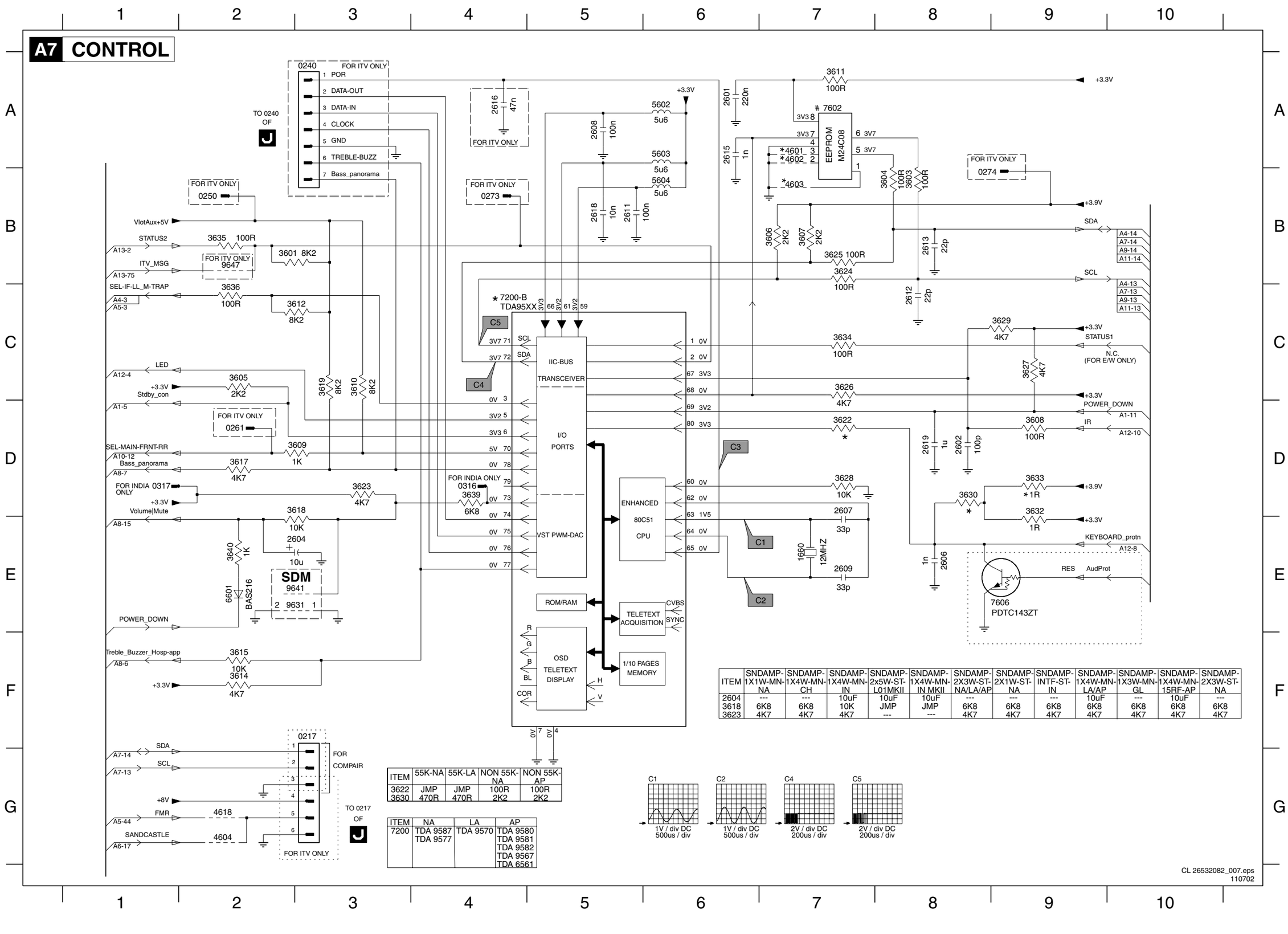
A6 SYNCHRONISATION



2241 D3
2242 D3
2243 B4
2244 E4
2245 D4
2246 D6
2247 B5
2248 B6
2249 C3
2250 C2
2252 C6
2253 C6
2254 A3
2255 C2
3241 D3
3242 C2
3244 C6
3245 E4
3246 D4
3247 E6
3248 D6
3249 C6
3250 D6
3251 B6
3254 A4
3256 C6
3257 A3
3258 B2
3259 A2
5241 A6
5242 B6
6241 E4
7200-D C3
7241 E5

Large Signal Panel: Control

A7 CONTROL



ITEM	55K-NA	55K-LA	NON 55K-NA	NON 55K-AP
3622	JMP	JMP	100R	100R
3630	470R	470R	2K2	2K2

ITEM	NA	LA	AP
7200	TDA 9587 TDA 9577	TDA 9570	TDA 9580 TDA 9581 TDA 9582 TDA 9567 TDA 6561

ITEM	SNDAMP-1X1W-MN-NA	SNDAMP-1X4W-MN-CH	SNDAMP-1X4W-MN-IN	SNDAMP-2x5W-ST-L01MKII	SNDAMP-1X4W-MN-IN MKII	SNDAMP-2X3W-ST-NA/LA/AP	SNDAMP-2X1W-ST-NA	SNDAMP-INTF-ST-IN	SNDAMP-1X4W-MN-LA/AP	SNDAMP-1X3W-MN-GL	SNDAMP-1X4W-MN-15RF-AP	SNDAMP-2X3W-ST-NA
2604	---	---	10uF	10uF	10uF	---	---	---	10uF	---	10uF	---
3618	6K8	6K8	10K	JMP	JMP	6K8	6K8	6K8	6K8	6K8	6K8	6K8
3623	4K7	4K7	4K7	---	---	4K7	4K7	4K7	4K7	4K7	4K7	4K7

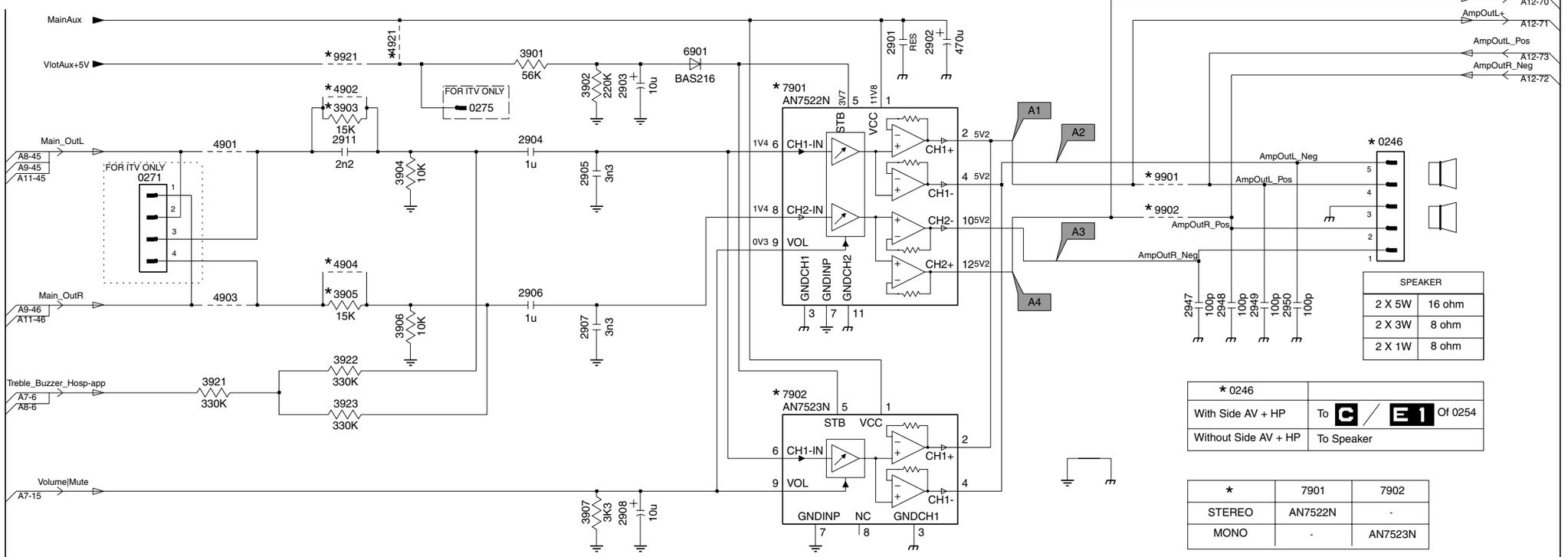
CL 26532082_007.eps
110702

0217 F3
0240 A3
0250 B2
0261 D2
0273 B4
0274 B9
0316 D4
0317 D1
1660 E7
2601 A6
2602 D8
2604 E3
2606 E8
2607 D7
2608 A5
2609 E7
2611 B5
2612 C8
2613 B8
2615 A6
2616 A4
2618 B5
2619 D8
3601 B2
3603 B8
3604 B8
3605 C2
3606 B7
3607 B7
3608 D9
3609 D3
3610 C3
3611 A7
3612 C3
3614 F2
3615 F2
3617 D2
3618 D3
3619 C3
3622 D7
3623 D3
3624 B7
3625 B7
3626 C7
3627 C9
3628 D7
3629 C9
3630 D8
3632 D9
3633 D9
3634 C7
3635 B2
3636 C2
3639 D4
3640 E2
4601 A7
4602 A7
4603 B7
4604 G2
4618 G2
5602 A6
5603 A6
5604 B6
6601 E2
7200-B C4
7602 A7
7606 E9
9631 E3
9641 E3
9647 B2

Large Signal Panel: Audio Amplifier + Mono Sound Processing

A8 AUDIO_AMPLIFIER + MONO_SOUND_PROCESSING

AUDIO AMPLIFIER

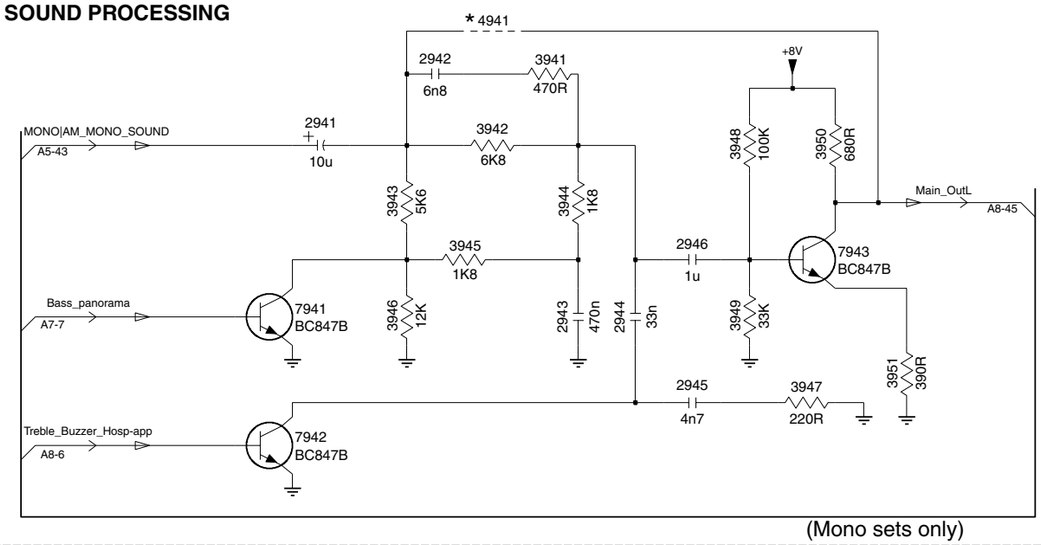


SPEAKER	
2 X 5W	16 ohm
2 X 3W	8 ohm
2 X 1W	8 ohm

*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)

ITEM	WITH STEREO	WITHOUT STEREO	SNDPROC-SMART-MN-15RF-AP
2941	1uF	10uF	1uF
2942	33nF	---	33nF
2943	100nF	---	100nF
2944	47nF	---	39nF
2945	10nF	---	4n7
2946	1uF	---	1uF
3941	100R	---	100R
3942	3K9	---	4K7
3943	2K7	---	2K7
3944	2K7	---	2K7
3945	1K	---	1K
3946	18K	---	8K2
3947	330R	---	10K
3948	47K	---	47K
3949	15K	---	15K
3950	560R	---	560R
3951	390R	---	390R
4903	JUMPER	---	---
4941	---	JUMPER	---
7941	BC847B	---	BC847B
7942	BC847B	---	BC847B
7943	BC847B	---	BC847B
9913	JUMPER	---	---
9914	JUMPER	---	---

ITEM	SNDAMP-1X4W-MN-15RF-AP	SNDAMP-2X3W-ST-AP
2904	1uF	33nF
2906	---	33nF
3903	10K	3K3
3905	---	3K3
3906	---	10K
7901	YES	YES
7902	---	---

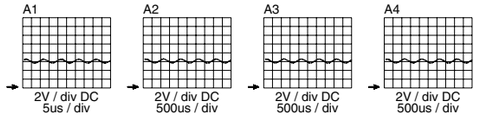
ITEM	1X1 OR 2X1W-NA	1X1W-MN	OTHERS
2902	220uF/50V	470uF/25V	1000uF/16V

ITEM	IC-AN7522N	IC-AN7523N
2907	1nF	---

ITEM	SNDAMP-1X4W-MN-15RF-AP	OTHERS
2911	2n2	---

ITEM	SNDAMP-1X1W-MN-NA	SNDAMP-1X4W-MN-CH	SNDAMP-1X4W-MN-IN	SNDAMP-2x5W-ST-L01MKII	SNDAMP-1X4W-MN-IN MKII	SNDAMP-2X3W-ST-NA/LA/AP
2908	10uF	10uF	---	---	---	10uF

ITEM	SNDAMP-2X1W-ST-NA	SNDAMP-INTF-ST-IN	SNDAMP-1X4W-MN-LA/AP	SNDAMP-1X3W-MN-GL	SNDAMP-1X4W-MN-15RF-AP	SNDAMP-2X3W-ST-NA
2908	10uF	10uF	---	10uF	---	10uF

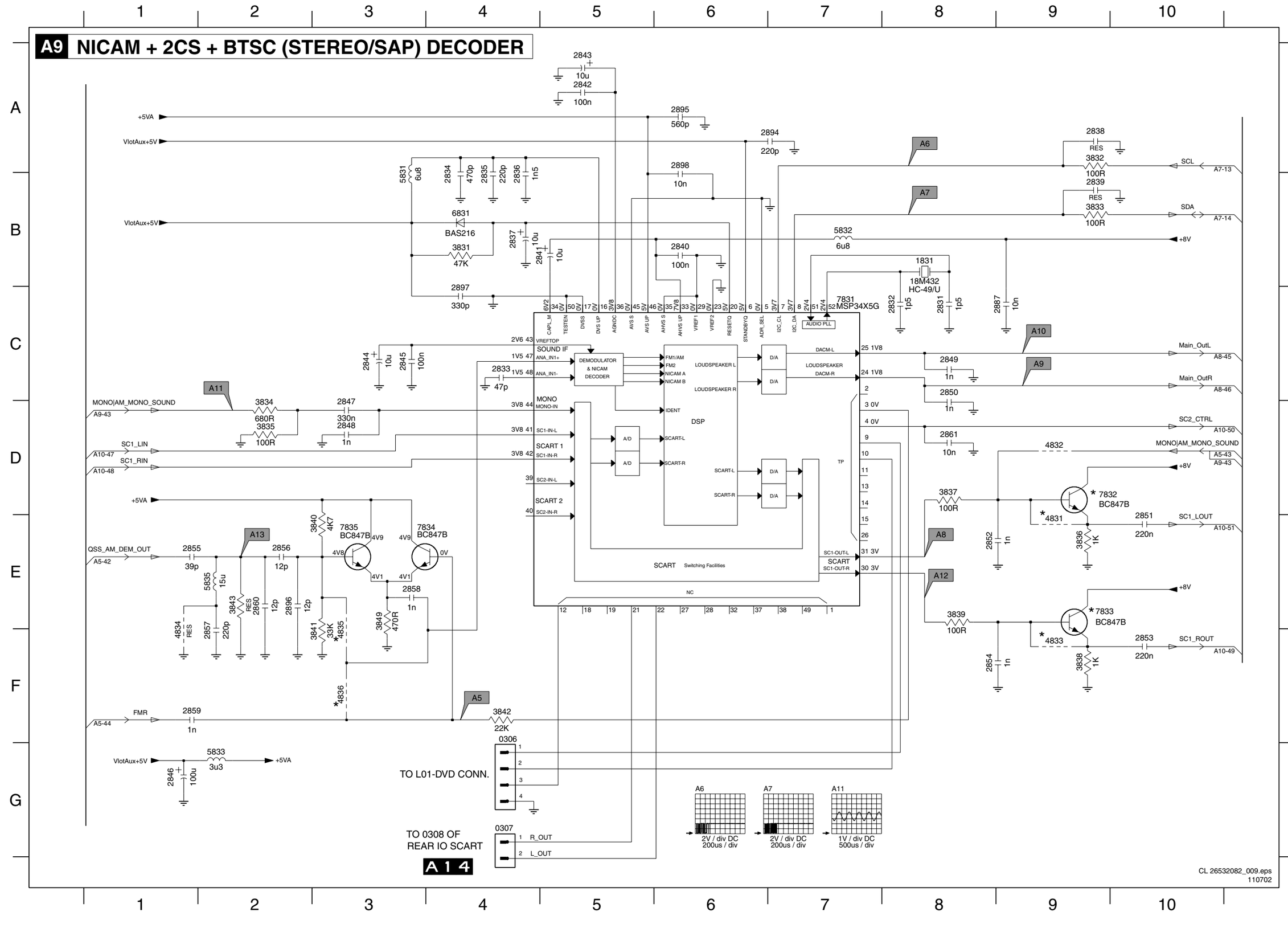


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110702

0246 B10
0271 B2
0275 B4
2901 A7
2902 A7
2903 A5
2904 B5
2905 B5
2906 C5
2907 C5
2908 D5
2911 B3
2941 F3
2942 E3
2943 G4
2944 G4
2945 G4
2946 F4
2947 C9
2948 C9
2949 C9
2950 C10
3901 A5
3902 A5
3903 B3
3904 B4
3905 C3
3906 C4
3907 D5
3921 C2
3922 C3
3923 D3
3941 E4
3942 F3
3943 F3
3944 F4
3945 F3
3946 G3
3947 G5
3948 F5
3949 G5
3950 F5
3951 G6
4901 B3
4902 A3
4903 C3
4904 C3
4921 A4
4941 E3
6901 A6
7901 A6
7902 C6
7941 G2
7942 G2
7943 F5
9901 B9
9902 B9
9921 A3

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

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



0306 F4
0307 G4
1831 B8
2831 C8
2832 C8
2833 C4
2834 B4
2835 B4
2836 B4
2837 B4
2838 A9
2839 B9
2840 B6
2841 B5
2842 A5
2843 A5
2844 C3
2845 C3
2846 G1
2847 D3
2848 D3
2849 C8
2850 C8
2851 E10
2852 E8
2853 F10
2854 F8
2855 E1
2856 E2
2857 F2
2858 E3
2859 F1
2860 E2
2861 D8
2887 C9
2894 A7
2895 A6
2896 E2
2897 C4
2898 A6
3831 B4
3832 A9
3833 B9
3834 D2
3835 D2
3836 E9
3837 D8
3838 F9
3839 E8
3840 E3
3841 F3
3842 F4
3843 E2
3849 E3
4831 E9
4832 D9
4833 F9
4834 F1
4835 F3
4836 F3
5831 B3
5832 B7
5833 G2
5835 E2
6831 B4
7831 C7
7832 D9
7833 E9
7834 E4
7835 E3

Large Signal Panel: Audio / Video Source Switching

A10 AUDIO/VIDEO SOURCE SWITCHING

FOR EUROPE

ITEM	1x Scart With Front / Side Video	2x Scart With Front / Side Video	2x Scart W/O Front / Side Video
3809	x	150R	150R
4807	JUMPER	x	x
4808	x	x	JUMPER

FOR AP/LATAM/NAFTA

ITEM	1x Rear Video In With Front or Side Video With SVHS / 2x Rear Video With Front Or Side Video	1x Rear Video In With Front Or Side Video W/O SVHS / 1x Front Or Sideo Video IN	2x Rear Video In W/O Front Or Side Video	No Video Input
4807	x	JUMPER	x	x
4808	x	x	JUMPER	x
7802	Y	x	x	x

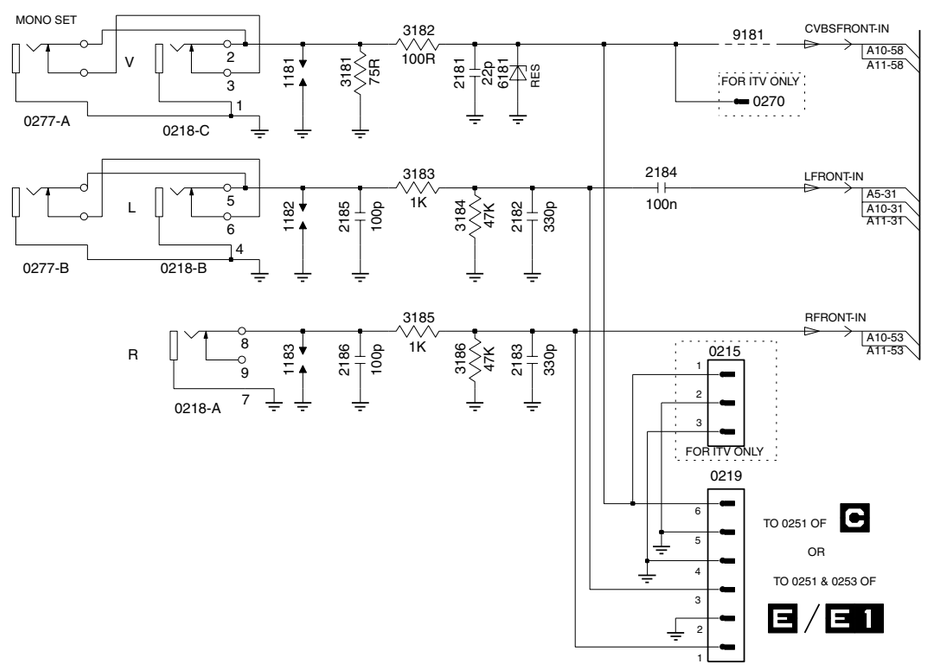
2801 B4
2802 F4
2803 C2
2804 C5
2805 E5
3801 A2
3802 A2
3803 C4
3804 D4
3805 D4
3806 D4
3807 E4
3808 E4
3809 H2
4801 C6
4802 C6
4803 E6
4804 E6
4805 E2
4806 F1
4807 H2
4808 H3
4809 B2
4815 C4
4816 E4
7801 C3
7802-A F3
7802-B F3
7802-C G3
7803 C5
7804 D5
9801 F2

CL 26532082_010.eps
110702

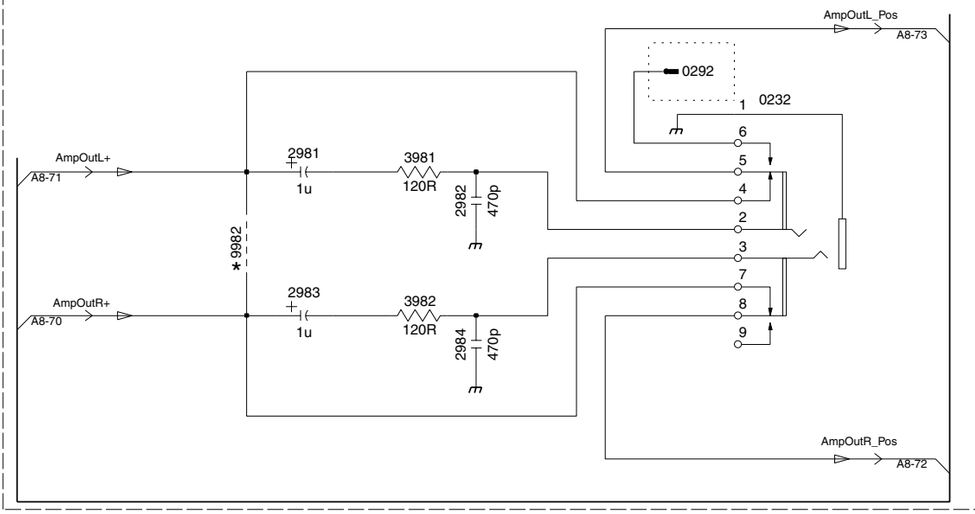
Large Signal Panel: Front I/O + Front Control + Headphone

A12 FRONT IO + FRONT CONTROL + HEADPHONE

FRONT CINCH



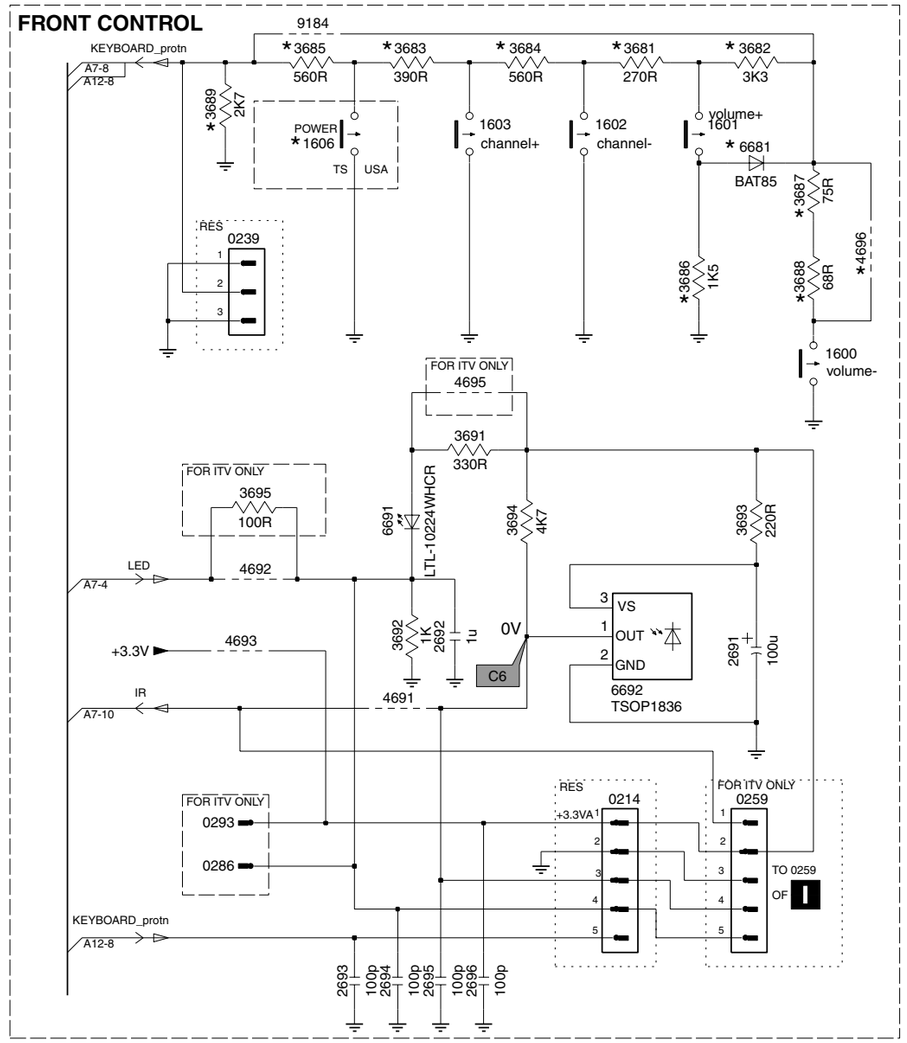
HEADPHONE



For Engg Purpose Only

4694

FRONT CONTROL



ITEM	55K-NA	55K-LA	NON 55K-NA	NON 55K-AP
1606	YES	---	YES	---
3681	180R	180R	390R	390R
3682	270R	270R	3K3	3K3
3684	390R	390R	560R	560R
3685	---	---	560R	560R
3686	JMP	JMP	1K5	1K5
3687	75R	75R	---	---
3688	68R	68R	---	---
3689	2K7	2K7	---	---
4696	---	---	JMP	JMP
6681	---	---	DIO BAT85	DIO BAT85
9184	JMP	JMP	---	---

C6 = 0V

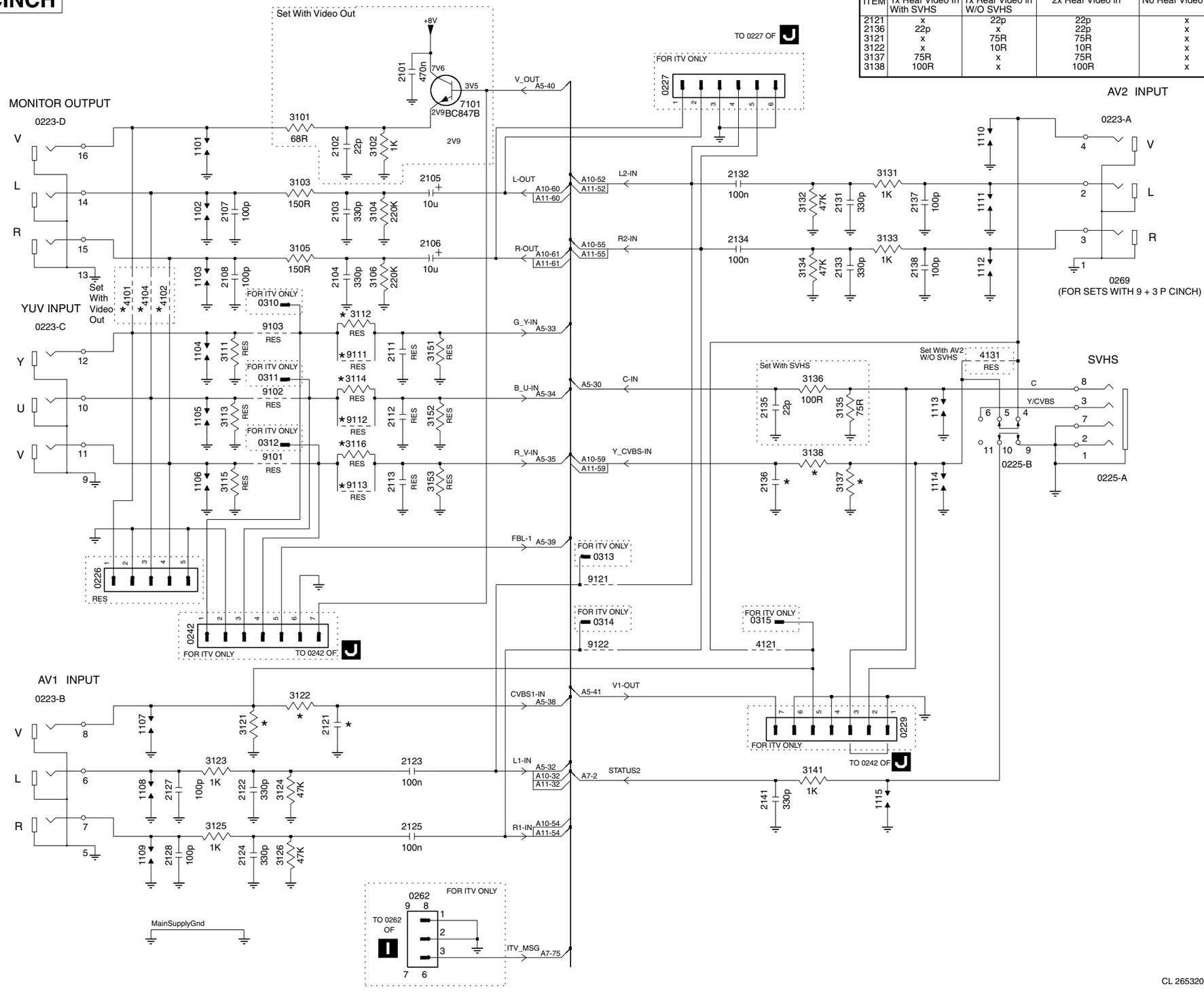
0214 D9
0215 C4
0218-A C2
0218-B B2
0218-C A2
0219 C4
0232 E4
0239 A7
0259 D10
0270 A5
0277-A A1
0277-B B1
0286 E7
0292 E4
0293 D7
1181 A2
1182 B2
1183 C2
1600 B10
1601 A10
1602 A9
1603 A9
1606 A8
2181 A3
2182 B3
2183 C3
2184 B4
2185 B3
2186 C3
2691 C10
2692 C8
2693 E8
2694 E8
2695 E8
2696 E8
2981 E2
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 A9
3685 A8
3686 B10
3687 A10
3688 B10
3689 A7
3691 B8
3692 C8
3693 C10
3694 C9
3695 C7
3981 E3
3982 F3
4691 D8
4692 C7
4693 C7
4694 G5
4695 B8
4696 A10
6181 A3
6681 A10
6691 C8
6692 D9
9181 A5
9184 A8
9982 F2

CL 26532082_011.eps
110702

Large Signal Panel: Rear I/O CINCH

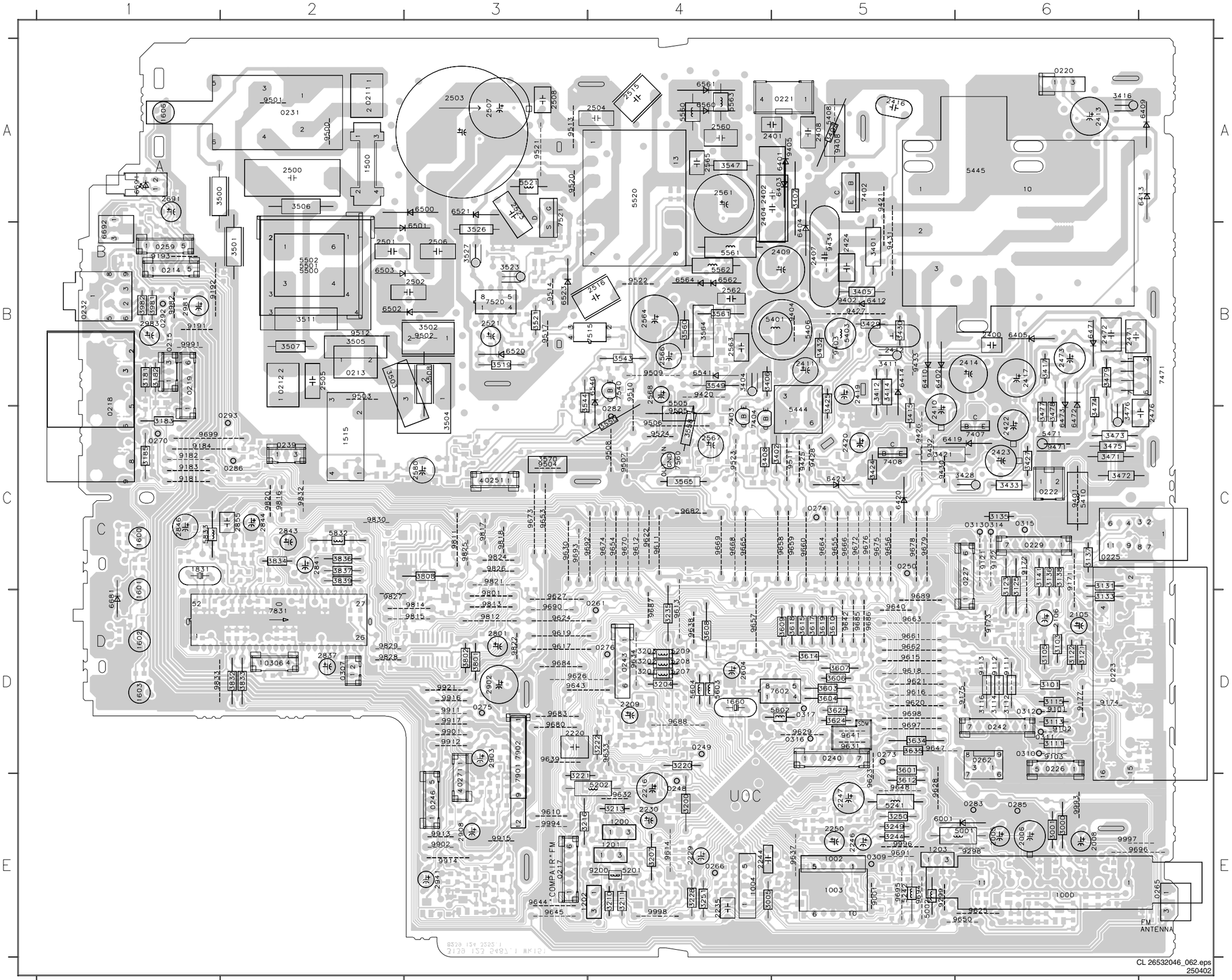
A13 REAR I/O CINCH

ITEM	1x Rear Video In With SVHS	1x Rear Video in W/O SVHS	2x Rear Video in	No Rear Video Inputs
2121	x	22p	22p	x
2136	22p	x	22p	x
3121	x	75R	75R	x
3122	x	10R	10R	x
3137	75R	x	75R	x
3138	100R	x	100R	x



0223-A A10
0223-B F2
0223-C C2
0223-D A2
0225-A D10
0225-B D9
0226 E2
0227 A6
0229 F8
0242 E3
0262 G5
0310 C3
0311 C3
0312 D3
0313 E6
0314 E6
0315 E7
1101 A3
1102 B3
1103 B3
1104 C3
1105 C3
1106 D3
1107 F2
1108 F2
1109 G2
1110 A9
1111 B9
1112 B9
1113 C8
1114 D8
1115 F8
2101 A4
2102 A4
2103 B4
2104 B4
2105 B5
2106 B5
2107 B3
2108 B3
2111 C4
2112 C4
2113 D4
2121 F4
2122 F3
2123 F4
2124 G3
2125 G4
2127 F3
2128 G3
2131 B8
2132 B7
2133 B8
2134 B7
2135 C7
2136 D7
2137 B8
2138 B8
2141 F7
3101 A4
3102 A4
3103 B4
3104 B4
3105 B4
3106 B4
3111 C3
3112 C4
3113 C3
3114 C4
3115 D3
3116 D4
3121 F3
3122 F4
3123 F3
3124 F3
3125 G3
3126 G3
3131 B8
3132 B7
3133 B8
3134 B7
3135 C8
3136 C8
3137 D8
3138 D8
3141 F8
3151 C5
3152 C5
3153 D5
4101 C2
4102 C3
4104 C2
4121 E7
4131 C9
7101 A5
9101 D3
9102 C3
9103 C3
9111 C4
9112 C4
9113 D4
9121 E6
9122 E6

Layout Mono Carrier (Top Side)



0211 A2 2565 A4 3608 D4 9401 C6 9821 C3
0212 B2 2566 B4 3609 D5 9402 B5 9822 D3
0213 B2 2567 C4 3610 D5 9403 B5 9824 C3
0214 B1 2568 B4 3612 E5 9404 B5 9825 C3
0215 B1 2580 C3 3614 D5 9405 A5 9826 C3
0217 E3 2604 D4 3615 D5 9408 A5 9827 D2
0218 C1 2691 A1 3617 D5 9420 B4 9828 D2
0219 B1 2801 D3 3618 D5 9421 A5 9829 D2
0220 A6 2837 D2 3619 D5 9425 C5 9830 C2
0221 A5 2841 C2 3624 D5 9426 C5 9832 C2
0222 C6 2843 C2 3625 D5 9427 B5 9833 D1
0223 D6 2844 C2 3634 D5 9428 C5 9901 D3
0225 C6 2846 C1 3635 D5 9430 C5 9902 E3
0226 D6 2855 C2 3801 D3 9431 B5 9911 D3
0227 C6 2902 D3 3802 D3 9432 C5 9912 D3
0229 C6 2903 D3 3808 C3 9433 B5 9913 E3
0231 A2 2908 E3 3832 D2 9434 B5 9914 E3
0232 B1 2941 E3 3833 D2 9471 C6 9915 E3
0239 C2 2981 B1 3834 C2 9500 A2 9916 D3
0240 D5 2983 B1 3836 C2 9501 A2 9917 D3
0242 D6 3000 E6 3837 C2 9502 B3 9921 D3
0243 D4 3001 E6 3839 C2 9503 B2 9982 B1
0246 E3 3005 E4 3981 B1 9504 C3 9991 B1
0248 E4 3101 D6 3982 B1 9505 C4 9993 E6
0249 D4 3103 D6 5001 E6 9506 C4 9994 E3
0250 C5 3105 D6 5002 E5 9507 C4 9996 E5
0251 C3 3111 D6 5201 E4 9508 C4 9997 E6
0259 B1 3112 D6 5202 E4 9509 B4 9998 E4
0261 D4 3113 D6 5207 D4 9510 B4
0262 D6 3114 D6 5208 D4 9511 C5
0265 E7 3115 D6 5209 D4 9512 B2
0266 E4 3116 D6 5241 E5 9513 A3
0270 C1 3121 D6 5242 E5 9514 B3
0271 E3 3122 D6 5401 B5 9517 B3
0273 D5 3123 C6 5403 B5 9520 A3
0274 C5 3125 C6 5406 B5 9521 A3
0275 D3 3131 C6 5408 A5 9522 B4
0276 D4 3133 D6 5410 C6 9523 C4
0277 B1 3135 C6 5444 C5 9524 C4
0282 C4 3136 C6 5445 A6 9610 E3
0283 E6 3137 C6 5471 C6 9611 C4
0285 E6 3138 C6 5500 B2 9612 C4
0286 C2 3141 C6 5501 B2 9613 D4
0292 B1 3181 B1 5502 B2 9614 E4
0293 C2 3182 B1 5505 B4 9615 D5
0306 D2 3183 C1 5520 A4 9616 D5
0307 D2 3185 C1 5521 A3 9617 D3
0309 E5 3200 E4 5560 A4 9618 D5
0310 D6 3201 D4 5561 B4 9619 D3
0311 D6 3202 D4 5562 B4 9620 D5
0312 D6 3203 D4 5563 A4 9621 D5
0313 C6 3204 D4 5602 D5 9622 C4
0314 C6 3207 E4 5603 D4 9623 E5
0315 C6 3210 E4 5604 D4 9624 D3
0316 D5 3211 E4 5832 C2 9625 E6
0317 D5 3213 E4 5833 C1 9626 D3
1000 E6 3216 E3 6001 E5 9627 D3
1002 E5 3220 D4 6401 A5 9628 E5
1003 E5 3221 E3 6402 B5 9629 D5
1004 E4 3222 D4 6403 A5 9630 C3
1200 E4 3228 E4 6404 B5 9631 D5
1201 E4 3235 D4 6405 B6 9632 E4
1202 E3 3244 E5 6409 A7 9633 D4
1203 E5 3249 E5 6410 B5 9634 D4
1500 A2 3250 E5 6412 B5 9637 E5
1515 C2 3251 E4 6413 A7 9638 D4
1600 C1 3401 B5 6414 B5 9639 D3
1601 D1 3402 C5 6419 C5 9640 D5
1602 D1 3403 A5 6420 C5 9641 D5
1603 D1 3404 B4 6423 C5 9642 D5
1606 A1 3405 B5 6471 B6 9643 D3
1660 D4 3406 B4 6472 C6 9644 E3
1831 C1 3407 A5 6473 C6 9645 E3
2005 E6 3408 C4 6500 A3 9647 D5
2006 E6 3411 B5 6501 B3 9648 E5
2008 E6 3412 B5 6502 B2 9650 E6
2105 D6 3414 B5 6503 B2 9653 C3
2106 D6 3415 C5 6520 B3 9654 C4
2209 D4 3416 A6 6521 A3 9655 C5
2216 E4 3417 B6 6523 B3 9656 C5
2220 D3 3421 C5 6540 B4 9657 D4
2229 E4 3424 C5 6541 B4 9658 C5
2230 E4 3425 B5 6560 A4 9659 C5
2235 E4 3427 C6 6561 A4 9660 C5
2244 E4 3428 C6 6562 B4 9661 D5
2246 E5 3429 B5 6564 B4 9662 D5
2247 E5 3430 B5 6681 D1 9663 D5
2250 E5 3432 B5 6691 A1 9664 C5
2400 B6 3433 C6 6692 B1 9665 C4
2401 A5 3471 C6 6402 A5 9666 C5
2402 A4 3472 C6 6403 C4 9668 C4
2404 A4 3473 C6 6404 C4 9669 C4
2407 B5 3474 C6 6407 C6 9670 C4
2408 A5 3475 C6 6408 C5 9672 C5
2409 B5 3476 C6 6471 B7 9673 C3
2410 C5 3477 C6 6515 B4 9674 C4
2411 B5 3478 C6 6520 B3 9675 C5
2412 B5 3479 B6 6521 A3 9676 C5
2413 A6 3500 A1 6540 B4 9678 C5
2414 B6 3501 B2 6560 C4 9679 C5
2416 A5 3502 B3 6602 D5 9680 D3
2417 B6 3503 B2 6831 D2 9682 C4
2419 B5 3504 C3 6901 D3 9683 D3
2420 C5 3505 B2 6902 D3 9684 D3
2422 C6 3506 A2 9001 E5 9685 D5
2423 C6 3507 B2 9101 D6 9686 D5
2424 B5 3508 B3 9102 D6 9687 D4
2471 B6 3511 B2 9103 D6 9688 D4
2472 B6 3519 B3 9111 D6 9689 D5
2473 B6 3521 B3 9112 D6 9690 D3
2476 C7 3523 B3 9113 D6 9691 E5
2500 A2 3526 B3 9121 C6 9692 C3
2501 B2 3527 B3 9122 C6 9693 C3
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2503 A3 3544 B3 9172 C6 9695 E5
2504 A4 3547 A4 9173 D6 9696 E6
2505 B2 3549 B4 9174 D6 9697 D5
2506 B3 3550 C4 9175 D6 9698 D5
2507 A3 3558 C4 9177 D6 9699 C1
2508 A3 3560 B4 9181 C1 9801 D3
2515 A4 3561 B4 9182 C1 9811 C3
2516 B4 3564 B4 9183 C1 9812 D3
2521 B3 3565 C4 9184 C1 9813 D3
2523 A3 3570 C3 9191 B1 9814 D3
2560 A4 3601 D5 9192 B1 9815 D3
2561 A4 3603 D5 9193 B1 9816 C2
2562 B4 3604 D5 9200 E4 9817 C3
2563 B4 3606 D5 9298 E6 9818 C3
2564 B4 3607 D5 9299 E5 9820 C2

CL 26532046_62m.eps
250402

Layout Mono Carrier (Overview Bottom Side)

Part 1
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Part 2
CL 26532046_63b.eps

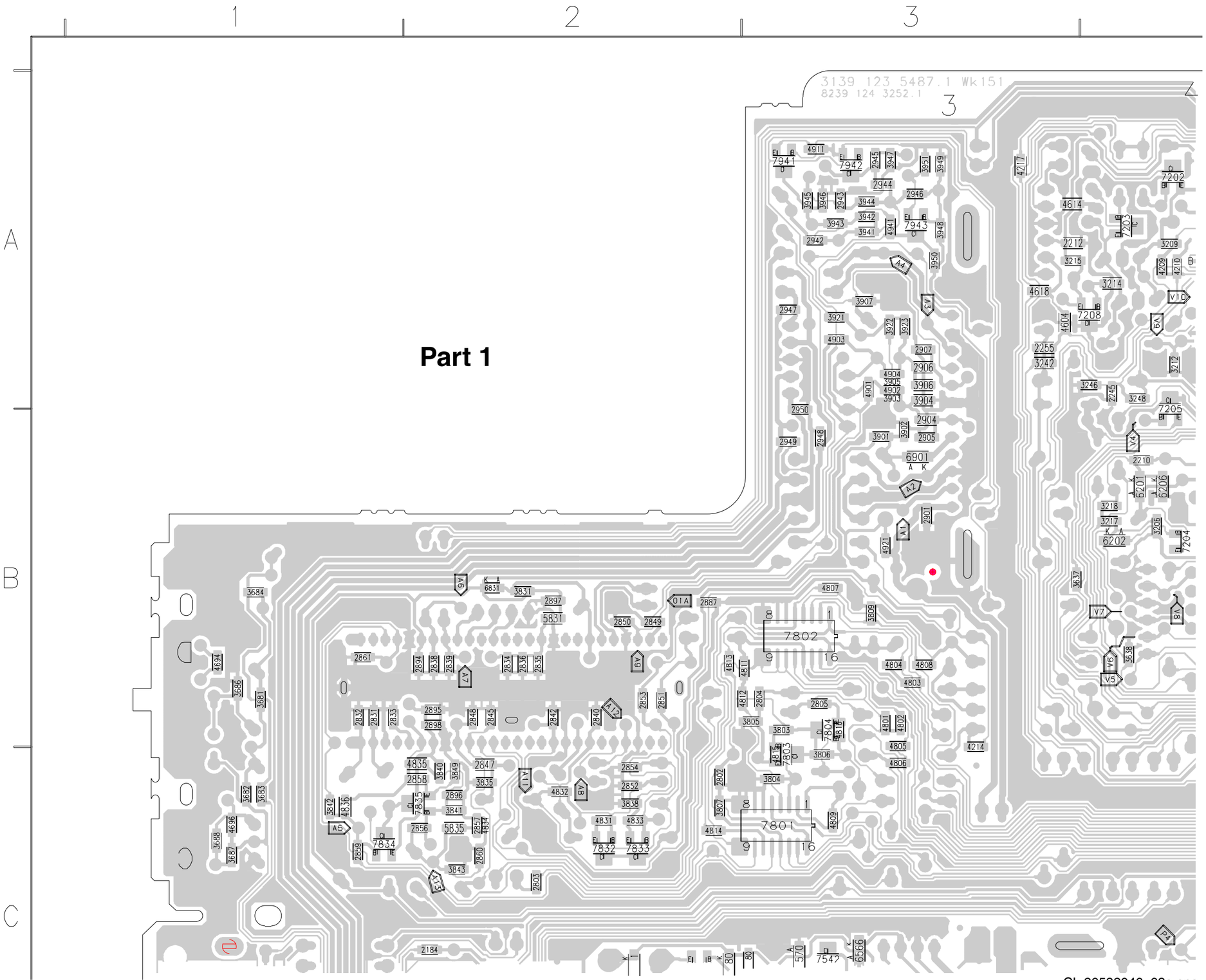
Part 3
CL 26532046_63c.eps

Part 4
CL 26532046_63d.eps

CL 26532046_063.eps
260402

F001	A6	I002	A6	I507	D3
F002	B5	I003	A5	I508	D3
F003	A6	I005	A6	I509	D3
F004	A5	I006	A5	I510	D3
F005	A6	I007	B5	I511	D3
F006	A5	I008	A5	I512	D3
F007	A6	I009	A5	I513	D3
F008	A6	I010	A5	I514	E3
F009	A5	I011	A6	I515	D3
F010	A6	I013	A4	I516	C3
F101	B6	I014	A4	I517	D4
F102	B6	I016	A6	I518	D4
F103	A6	I018	A4	I519	D4
F104	B6	I101	B6	I520	D4
F105	B6	I102	B6	I521	D4
F106	B7	I103	C5	I522	D4
F107	B6	I104	B6	I523	C3
F108	B6	I105	B6	I525	C4
F109	B7	I106	B6	I526	D4
F110	C6	I107	B6	I527	D3
F111	B6	I108	B6	I528	E2
F112	C6	I109	B6	I529	E2
F113	C6	I110	B6	I530	C2
F114	C6	I111	C6	I531	D3
F115	C5	I112	C6	I532	D3
F116	A6	I113	B6	I533	E3
F117	B5	I114	C6	I534	D4
F181	D1	I115	B6	I535	D4
F182	D1	I116	B6	I536	E3
F183	C1	I117	B6	I537	E4
F201	B4	I122	B6	I538	E4
F202	B4	I181	D1	I539	E4
F203	B4	I182	C2	I540	D4
F204	B3	I183	D1	I541	E4
F205	A4	I185	C1	I543	C4
F206	B4	I201	B4	I544	D4
F207	A4	I202	B3	I545	D4
F208	B4	I203	A3	I546	D3
F209	A6	I204	A4	I547	E2
F241	B3	I205	A4	I548	C3
F401	E4	I206	B4	I549	D4
F402	E4	I207	A4	I550	D4
F403	E5	I208	A4	I601	B5
F404	E5	I209	B4	I602	B5
F405	D5	I210	A4	I603	B5
F406	D5	I211	A4	I604	B5
F407	D5	I213	B4	I605	B5
F408	D4	I214	B4	I606	B5
F409	C4	I215	B4	I607	B5
F410	D5	I216	B4	I608	B5
F411	D5	I217	B4	I609	B4
F412	D6	I218	A4	I610	A4
F413	C5	I219	A5	I612	B5
F414	D6	I220	A5	I613	B5
F415	D5	I221	B4	I614	B4
F416	C6	I222	A4	I615	A5
F417	D5	I223	A4	I616	B5
F418	C4	I224	A6	I617	A5
F419	D6	I225	A6	I681	E1
F471	D6	I226	A6	I682	B1
F472	D6	I227	A6	I683	B1
F473	D6	I228	A6	I684	C1
F474	C6	I229	B4	I685	B1
F475	C6	I231	A4	I686	C1
F476	C6	I232	A4	I687	C1
F477	C6	I233	A4	I691	E1
F478	C6	I234	A4	I693	D1
F479	D6	I235	A5	I801	C2
F501	D2	I236	A5	I803	C3
F502	D2	I241	A5	I804	C3
F503	E2	I242	B5	I805	C2
F504	E2	I243	A5	I806	C3
F505	E2	I244	A4	I807	C3
F506	E2	I245	A5	I808	C3
F507	E3	I246	A5	I809	C3
F508	E3	I247	A5	I810	C3
F509	D3	I248	A5	I811	C3
F510	D3	I249	A5	I814	B3
F511	C4	I250	A5	I815	C3
F512	D4	I251	B3	I816	B3
F513	E4	I252	A5	I831	B2
F514	E3	I253	A5	I832	B2
F515	E4	I254	A5	I833	B2
F516	E4	I401	E5	I834	B2
F517	C3	I402	D5	I835	C2
F518	C4	I403	D5	I836	B2
F519	D4	I404	D4	I837	C2
F520	D5	I405	E5	I838	B2
F521	C4	I406	D5	I839	C2
F522	C4	I407	D5	I840	B2
F523	C4	I408	D5	I841	B2
F524	C2	I411	C5	I842	C2
F525	C3	I412	C5	I843	C2
F526	D4	I413	D6	I844	B2
F602	B4	I414	D6	I845	C2
F603	B4	I415	D6	I847	C2
F604	B4	I424	E5	I848	C1
F605	B5	I425	E5	I850	C1
F606	C4	I430	D5	I851	B2
F607	B5	I431	E6	I852	B2
F608	B4	I432	D6	I853	B2
F609	A5	I433	E7	I854	C1
F610	A6	I434	E7	I855	C2
F611	A6	I435	D6	I901	B3
F612	B4	I440	D5	I903	B3
F613	B3	I444	D4	I904	B3
F614	B5	I445	C4	I905	B3
F682	D1	I446	D4	I906	A3
F683	C1	I447	E6	I907	A3
F684	C2	I448	C5	I908	A3
F691	D1	I449	C5	I909	A3
F692	D1	I450	C5	I910	B3
F693	E1	I451	C5	I911	A3
F694	B1	I452	D5	I941	A3
F695	B1	I453	D5	I942	A3
F696	C2	I454	C6	I943	A3
F801	B2	I455	C5	I944	A3
F802	B2	I456	C5	I945	A3
F803	C2	I457	C5	I946	A3
F805	C2	I459	C6	I947	A3
F831	B1	I472	D6	I948	A3
F832	B2	I473	D6	I949	A3
F901	A3	I474	C6	I981	D1
F902	A3	I475	C6	I982	D1
F903	B3	I476	D6	I983	D1
F904	A3	I477	D6	I984	D1
F905	B3	I501	E2	I985	D1
F906	B3	I502	E2	I986	D1
F907	A3	I503	D2		
F908	A3	I504	D2		
F909	B3	I505	D3		
I001	A6	I506	D3		

Layout Mono Carrier (Part 1 Bottom Side)

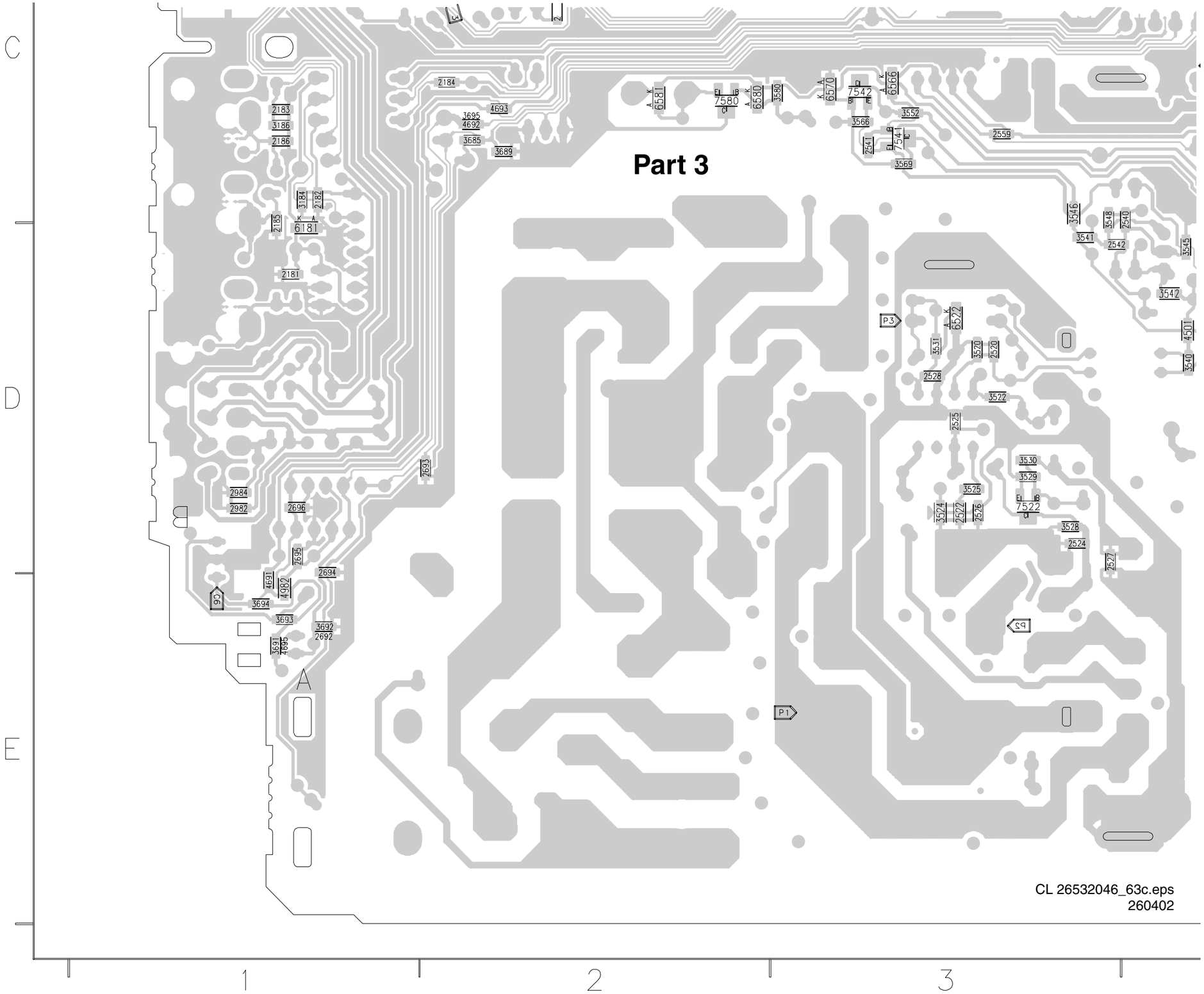


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260402

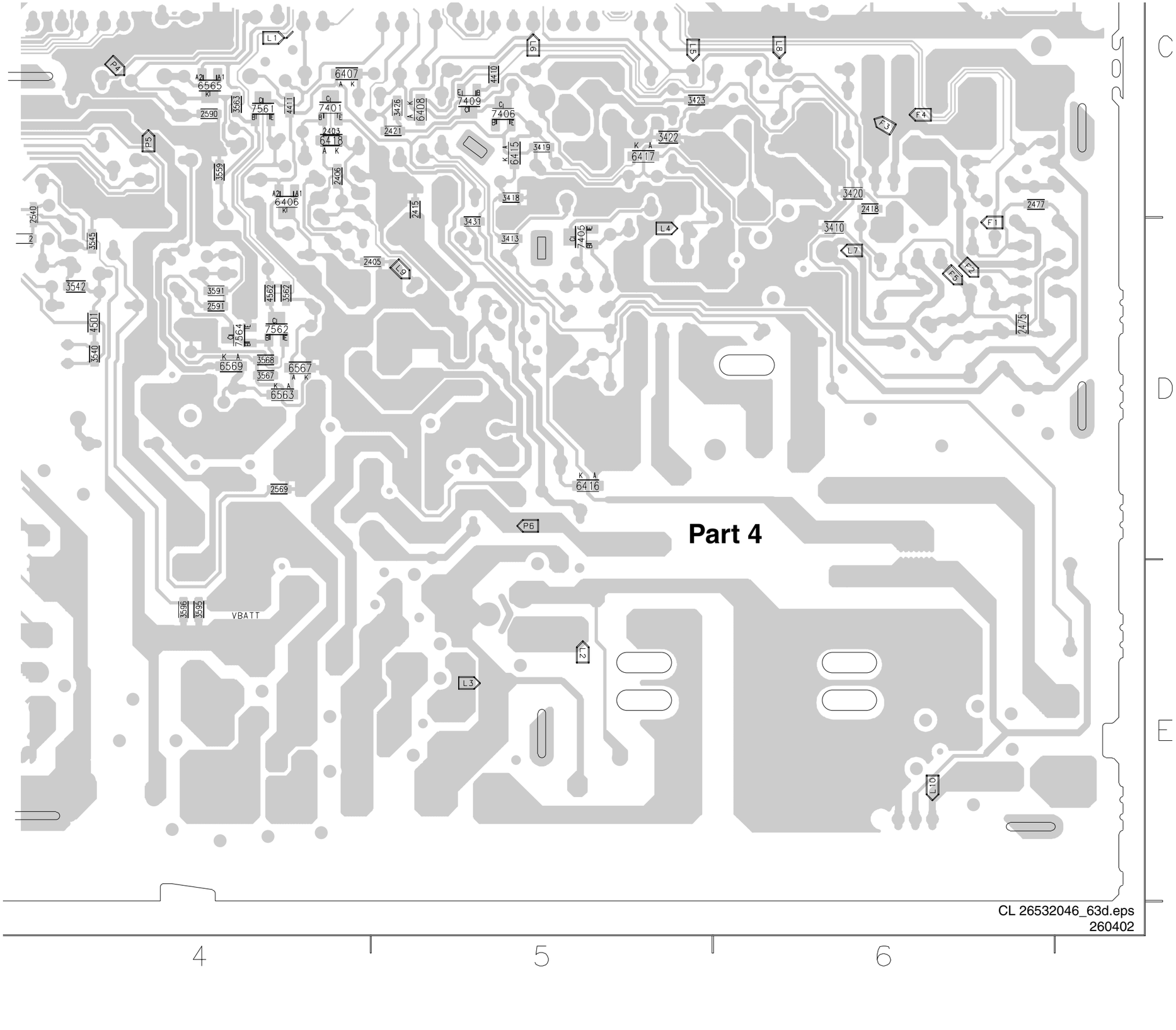
Layout Mono Carrier (Part 2 Bottom Side)



Layout Mono Carrier (Part 3 Bottom Side)



Layout Mono Carrier (Part 4 Bottom Side)



CRT Panel

B CRT PANEL

AP / CH	14"	17"	20"	21"	21" CHINA
3349 3350 5341	2R2 2R2 spt0508 27u	3K9 1R0 spt0508 12u	1R2 1R2 spt0508 2u2	1R2 1R2 fxdind 1u5	1R2 1R2 spt0508 27u

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

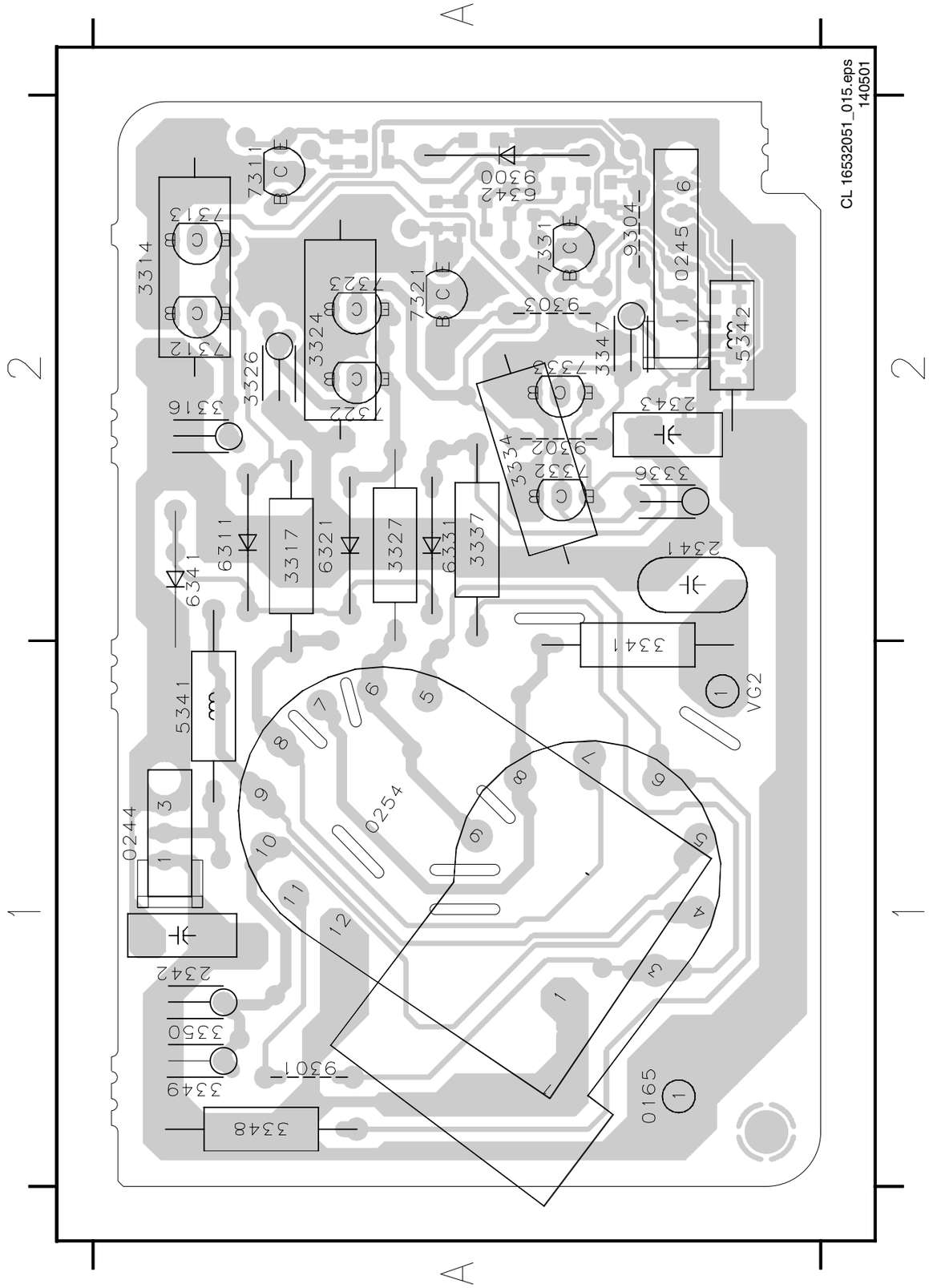
V11 1V / div DC 20us / div
V12 1V / div DC 20us / div
V13 1V / div DC 20us / div
V14 50V / div DC 20us / div
V15 50V / div DC 20us / div
V16 50V / div DC 20us / div

CL 16532101_037.eps 230801

VG2 F10
0165 B8
0244 G2
0245 C2
0254-A D7
1300-1 B7
2313 F3
2323 D3
2331 B3
2341 F6
2342 H3
2343 H3
2344 G5
3311 F3
3312 F3
3313 F3
3314 E4
3316 D4
3317 C6
3321 D3
3322 D3
3323 E3
3324 C4
3326 C4
3327 C6
3331 C3
3332 C3
3333 C3
3334 B4
3336 A4
3337 C6
3341 F6
3347 F5
3348 E6
3349 F6
3350 F6
5341 G3
5342 H3
6311 E5
6321 C5
6331 A5
6341 A5
6342 G4
6343 G5
6344 F4
7311 E3
7312 E4
7313 E4
7321 D3
7322 C4
7323 D4
7331 B3
7332 B4
7333 B4
9300 F4
F301 D2
F302 D2
F303 D2
F304 C3
F305 G5
F306 E6
F307 E6
F308 E5
F309 G4
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F311 C6
F312 C6
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I314 E4
I316 E4
I318 D6
I320 F6
I321 D5
I322 D3
I323 D3
I324 D4
I326 C4
I329 G3
I331 B5
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I339 G3
I341 E6
I343 G4

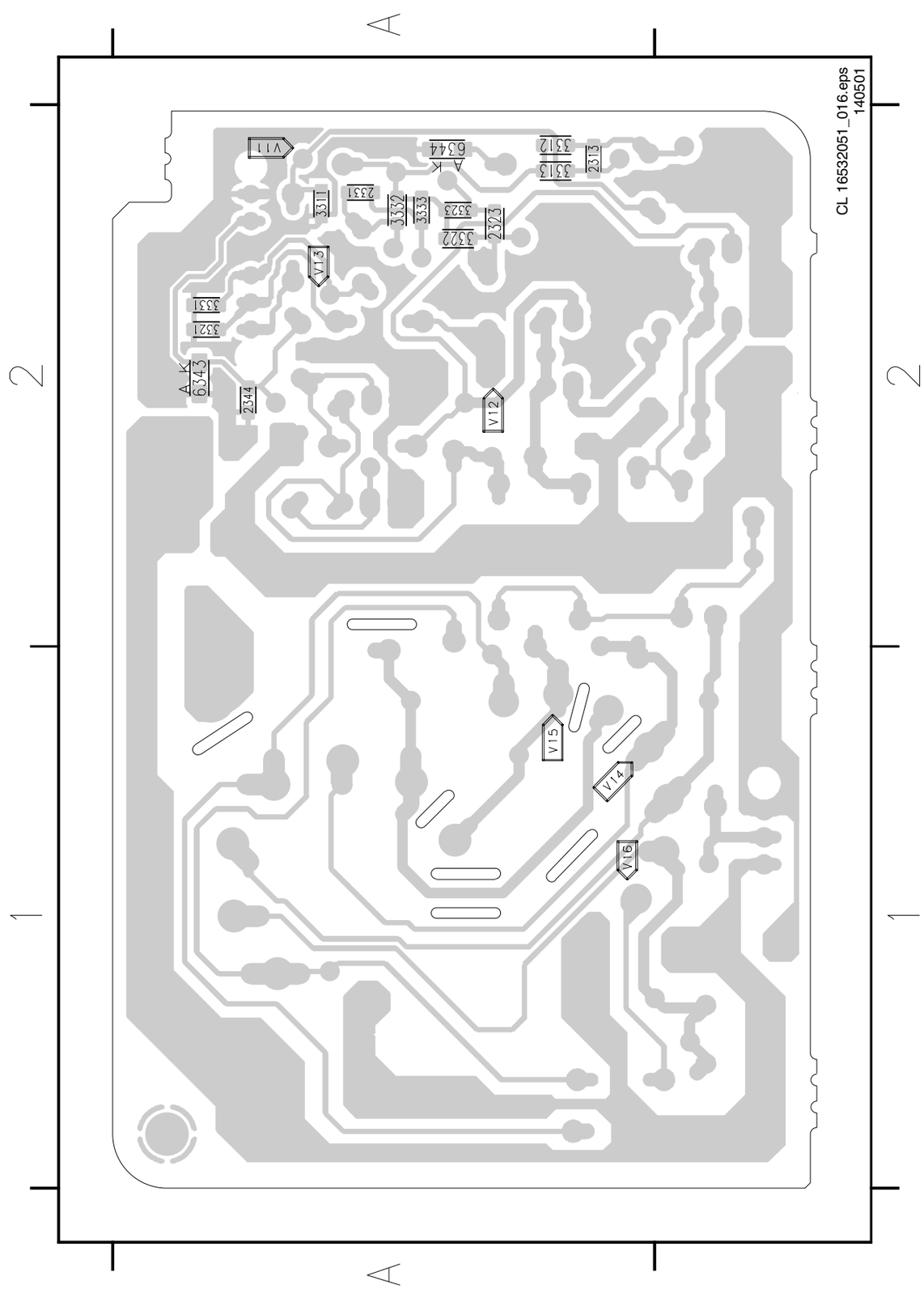
Layout CRT Panel (Top View)

VG2 A1
0165 A1
0244 A2
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

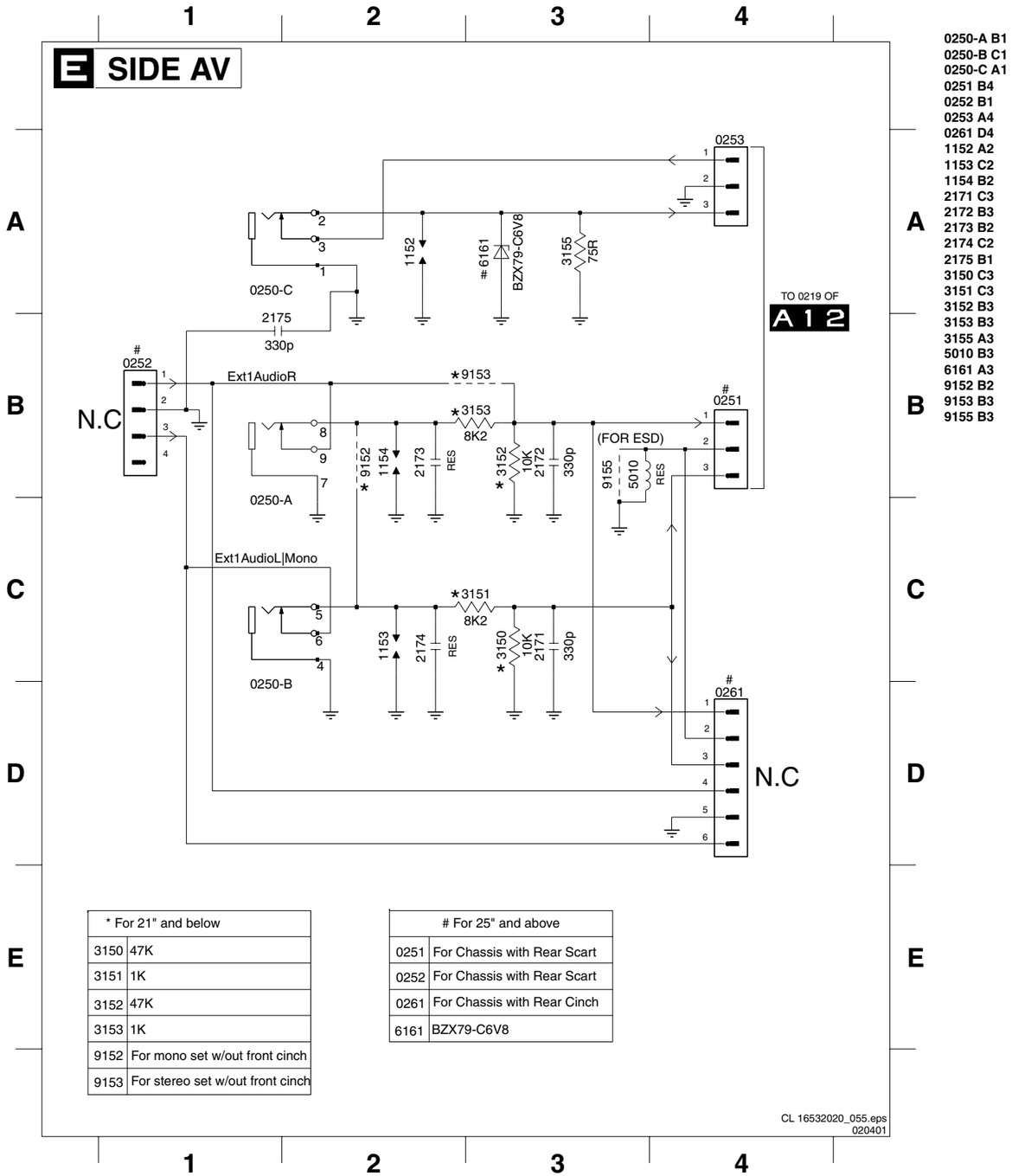


Layout CRT Panel (Bottom View)

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 Panel

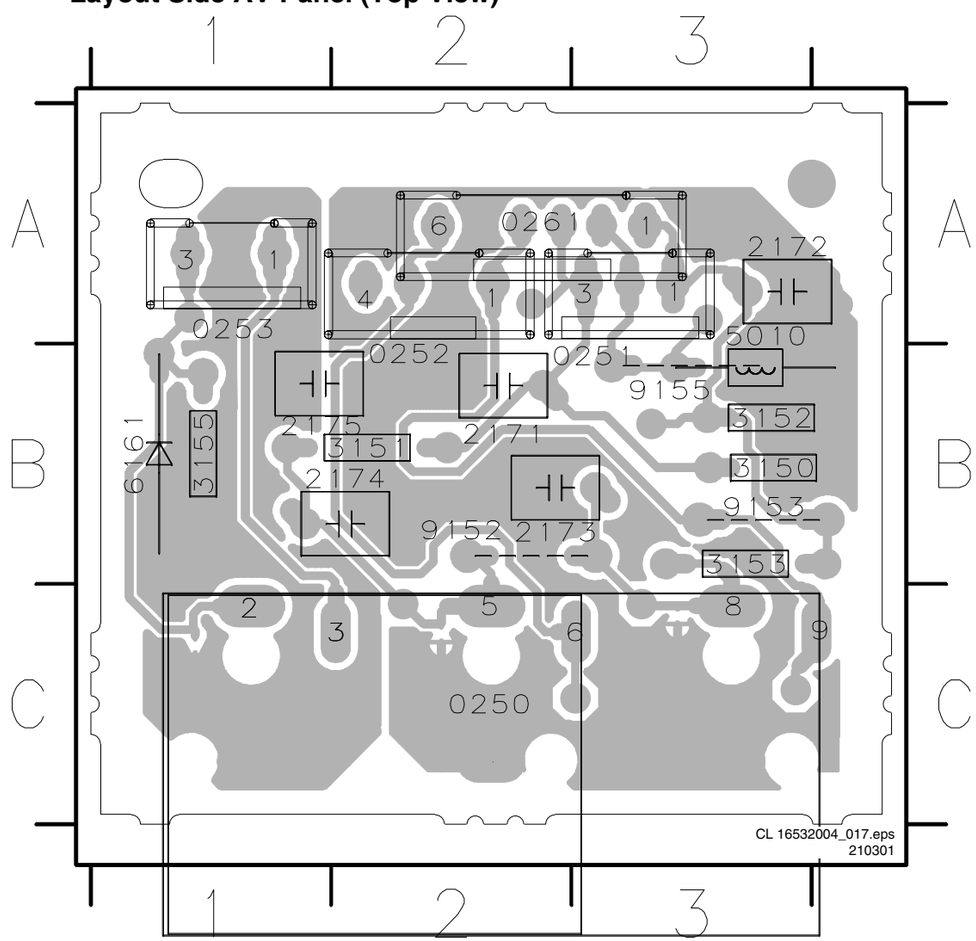


0250-A B1
0250-B C1
0250-C A1
0251 B4
0252 B1
0253 A4
0261 D4
1152 A2
1153 C2
1154 B2
2171 C3
2172 B3
2173 B2
2174 C2
2175 B1
3150 C3
3151 C3
3152 B3
3153 B3
3155 A3
5010 B3
6161 A3
9152 B2
9153 B3
9155 B3

* 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

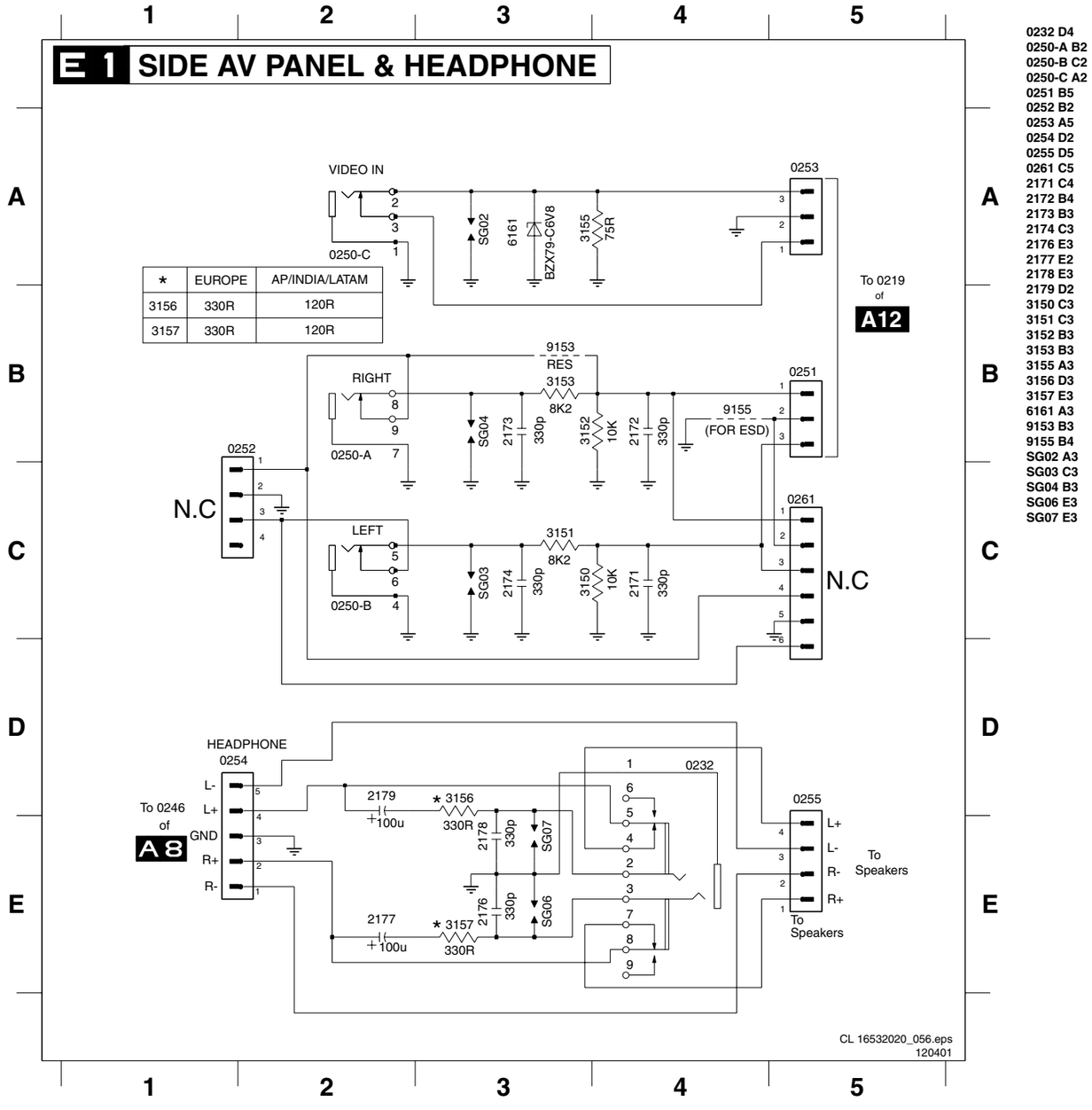
# For 25" and above	
0251	For Chassis with Rear Scart
0252	For Chassis with Rear Scart
0261	For Chassis with Rear Cinch
6161	BZX79-C6V8

Layout Side AV Panel (Top View)



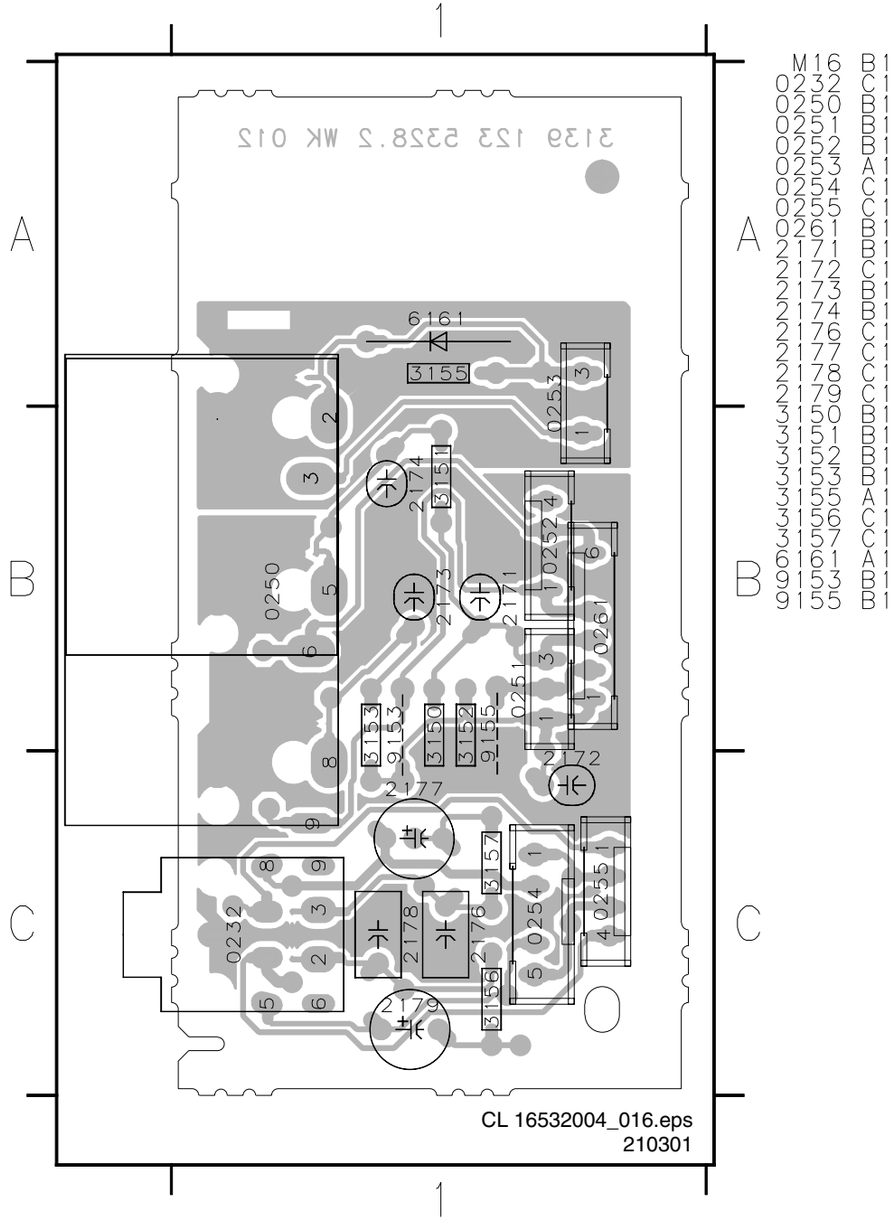
M16 C2
0250 C2
0251 A3
0252 A2
0253 A1
0261 A2
2171 B2
2172 A3
2173 B2
2174 B2
2175 B1
3150 B3
3151 B2
3152 B3
3153 B3
3155 B1
5010 B3
6161 B1
9152 B2
9153 B3
9155 B3

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

8. Alignments

Index:

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.
- Figures can deviate slightly from the actual situation, due to different set executions or software versions.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

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

8.2 Hardware Alignments

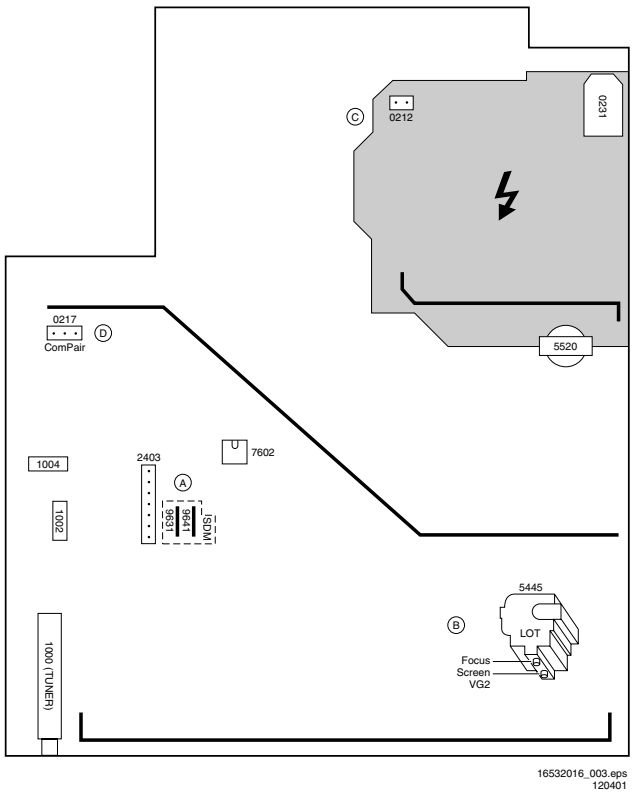


Figure 8-1

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).

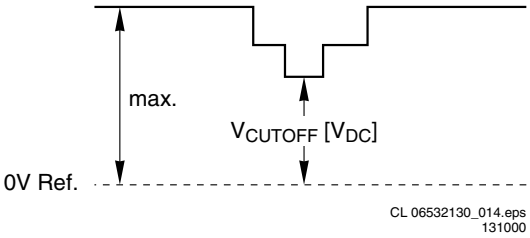


Figure 8-2

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.

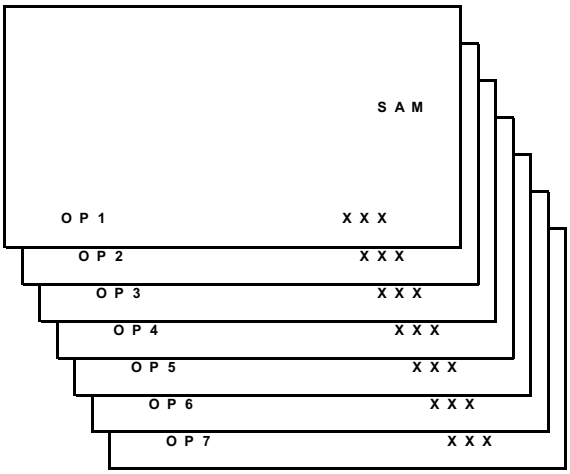
8.3 Software Alignments and Settings

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 AC power switch (cold start).

How to calculate the value of an Option Byte

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

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

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
14PT2001/59A	0	215	65	0	194	80	9
14PT2001/59B	0	215	65	0	194	80	9
14PT2001/59C	0	215	65	0	194	80	9
14PT2001/65R	0	215	65	0	194	80	9
14PT2001/67R	0	215	65	0	194	80	9
14PT2001/71R	0	215	65	0	194	80	4
14PT2001/79R	0	215	65	0	194	80	11
14PT2011/71R	0	215	65	0	210	80	4
14PT2011/74R	0	215	65	0	210	80	9
14PT2012/59A	0	247	65	0	210	80	9
14PT2012/59B	0	247	65	0	210	80	9
14PT2012/59C	0	247	65	0	210	80	9
14PT2012/65R	0	247	65	0	210	80	9
14PT2401/94R	192	215	65	0	194	80	0
14PT2411/94R	192	215	65	0	194	80	0
15PT2301/67R	160	215	65	168	246	144	44
15PT2301/71R	160	215	65	162	246	144	36
15PT2301/74R	160	215	65	168	246	144	44
15PT2302/56A	160	247	65	168	246	144	44
15PT2302/57R	160	247	65	168	246	144	44
15PT2302/65R	160	247	65	168	246	144	44
15PT2302/68R	160	247	65	168	246	144	44
15PT2302/69R	160	247	65	168	246	144	44
15PT2302/79R	160	247	65	168	246	144	44
15PT2441/94R	192	215	65	164	246	144	12
20PT2001/59A	0	215	65	0	194	80	9
20PT2001/59B	0	215	65	0	194	80	9
20PT2001/59C	0	215	65	0	194	80	9
20PT2001/59S	0	215	65	0	194	80	9
20PT2001/65R	0	215	65	0	194	80	9
20PT2001/67R	0	215	65	0	194	80	9
20PT2001/71R	0	215	65	0	194	80	4
20PT2001/79R	0	215	65	0	194	80	11
20PT2011/67R	160	215	65	0	210	80	41
20PT2011/71R	160	215	65	0	210	80	36
20PT2011/74R	160	215	65	0	210	80	41
20PT2012/59A	160	247	65	0	210	80	41
20PT2012/59B	160	247	65	0	210	80	41
20PT2012/59C	160	247	65	0	210	80	41
20PT2012/59S	160	247	65	0	210	80	41
20PT2012/65R	160	247	65	0	210	80	41
20PT2151/67R	160	215	65	164	242	80	44
20PT2151/71R	160	215	65	162	242	80	36
20PT2151/74R	160	215	65	164	242	80	44
20PT2152/65R	160	247	65	164	242	80	44
20PT2152/68R	160	247	65	164	242	80	44
20PT2152/69R	160	247	65	164	242	80	44
20PT2401/94R	0	215	65	0	194	80	0
20PT2411/94R	192	215	65	0	194	80	0
20PT2421/94R	160	215	65	164	210	80	32
21PT2001/59B	0	215	65	0	194	80	9
21PT2001/67R	0	215	65	0	194	80	9
21PT2001/71R	0	215	65	0	194	80	4
21PT2001/79R	0	215	65	0	194	80	11
21PT2011/67R	160	215	65	0	194	80	41
21PT2011/71R	160	215	65	0	194	80	36
21PT2011/74R	160	215	65	0	194	80	41
21PT2012/59A	0	247	65	0	194	80	9
21PT2012/59B	160	247	65	0	194	80	41
21PT2012/59C	0	247	65	0	194	80	9
21PT2012/65R	160	247	65	0	194	80	41
21PT2012/79R	160	247	65	0	194	80	43
21PT2411/94R	0	215	65	0	210	80	0
21PT2421/94R	192	215	65	164	226	80	0
21PT2425/94R	192	215	65	164	242	144	0
21PT2426/94R	192	215	65	164	242	144	0
21PT2501/93R	1	215	65	0	194	16	3
21PT2502/93R	1	215	65	0	194	16	3
21PT2521/93R	1	215	65	164	226	16	3

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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.

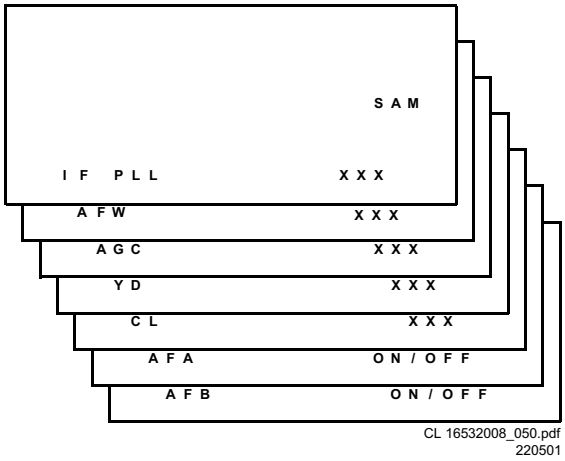


Figure 8-7

IF PLL
This adjustment is auto-aligned. Therefore, no action is required.

AFW (AFC window)
Fixed value is OFF.

AGC (AGC take over point)
Set the external pattern generator to a colour bar video signal and connect the RF output to aerial input. Set amplitude to 10 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main panel).

1. Activate the 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 28) 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.

YD (Y-delay)
Always set to 8.

CL (cathode drive level)
Always set to 7.

AFA
Read only bit, for monitoring purpose only.

AFB
Read only bit, for monitoring purpose only.

8.3.3 White Tone

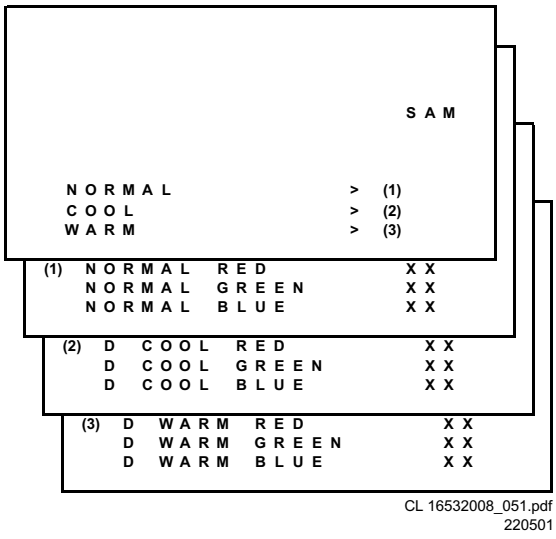


Figure 8-8

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 = 11500 K):
   – NORMAL R = 32
   – NORMAL G = 35
   – NORMAL B = 30
2. **COOL** (colour temperature = 14000 K):
   – DELTA COOL R = 0
   – DELTA COOL G = -5
   – DELTA COOL B = 5
3. **WARM** (colour temperature = 8200 K):
   – DELTA WARM R = 8
   – DELTA WARM G = -3
   – DELTA WARM B = 2

8.3.4 Geometry

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

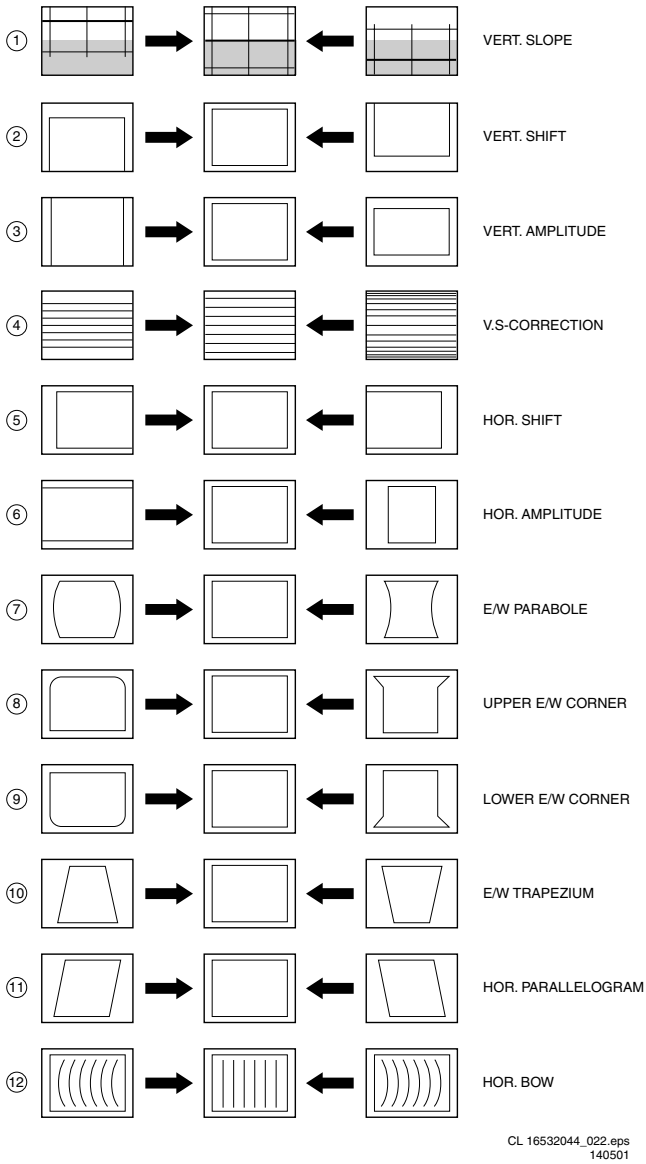


Figure 8-9

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

Horizontal:
- **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.

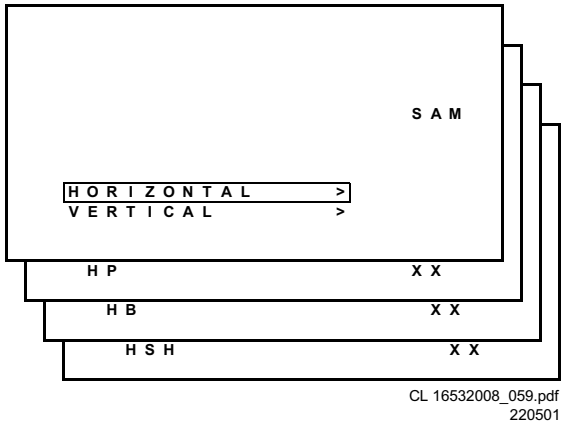


Figure 8-10

Vertical:

- **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.

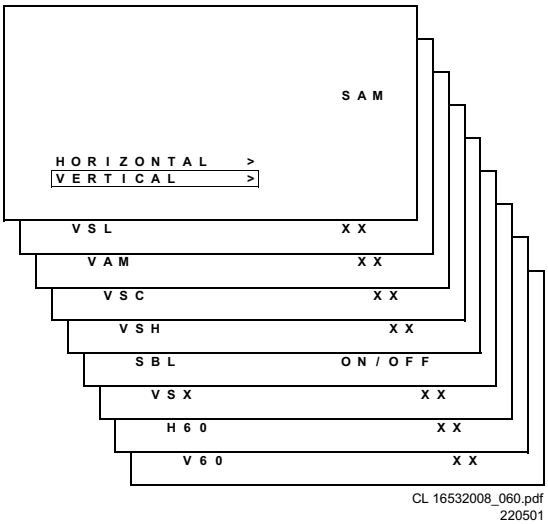


Figure 8-11

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

DEFAULT GEOMETRY VALUES (L01 SMALL SCREEN)

Alignment	Description	13V	14	14RF	15RF	17	19V	20	21
HP	Hor. Parallelogram	31	31	31	31	31	31	31	31
HB	Hor. Bow	31	31	31	31	31	31	31	31
HSH	Hor. Shift	23	35	23	35	35	23	35	35
EWW	East West Width	-	-	-	-	-	-	-	-
EWP	East West Parabola	-	-	-	-	-	-	-	-
UCP	Upper Corner Parabola	-	-	-	-	-	-	-	-
LCP	Lower Corner Parabola	-	-	-	-	-	-	-	-
EWT	East West Trapezium	-	-	-	-	-	-	-	-
VSL	Vert. Slope	31	33	31	33	33	31	33	33
VAM	Vert. Amplitude	26	26	26	26	26	26	26	26
VSC	Vert. S-correction	23	23	23	23	23	23	23	23
VSH	Vert. Shift	30	35	30	35	35	30	35	35
VX	Vert. Zoom	-	-	-	-	-	-	-	-
H60	Hor. Shift offset (60 Hz)	0	9	0	9	9	0	9	9
V60	Vert. Shift offset (60 Hz)	0	-2	0	-2	-2	0	-2	-2
Abbreviations: V= visual, RF= Real Flat									

CL 16532008_072.pdf
220801

Figure 8-12

8.3.5 Audio

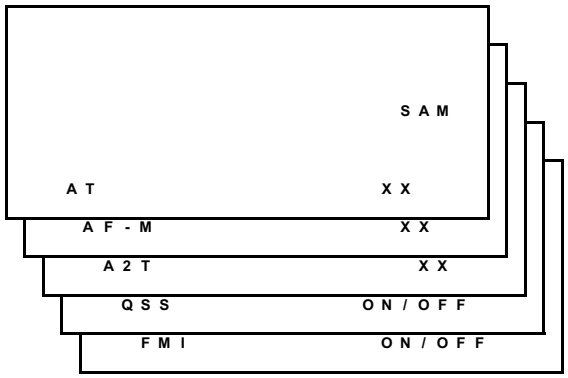


Figure 8-13

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

AT
Default value is 8.

AF-M
Default value is 44.

A2T
Default value is 250.

QSS
OFF for mono sets, ON for stereo sets.

FMI
OFF for mono sets, ON for stereo sets.

9. Circuit Description

Index:

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

Note:

- 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 (small screen) chassis is a global TV chassis for the model year 2001 and is used for TV sets with screen sizes from 14" - 21". The standard architecture consists of a Main panel, a Picture Tube panel, a Side (or Front) I/O panel and a Front Control panel. The Main panel consists primarily of conventional components with hardly any surface mounted devices.

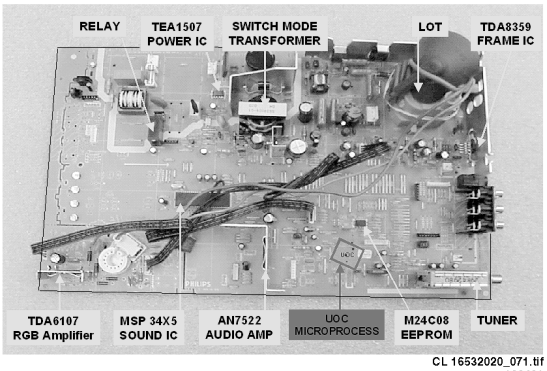


Figure 9-1

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.

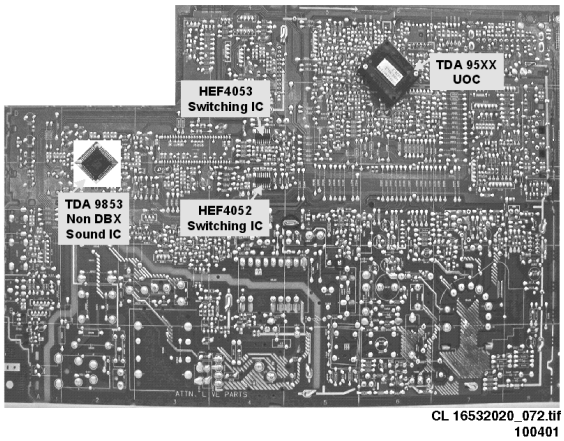


Figure 9-2

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 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 (or 38 for QSS) goes, via TS7206 or (TS7201 for QSS), 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 is then sent to the speaker/headphone output panel.

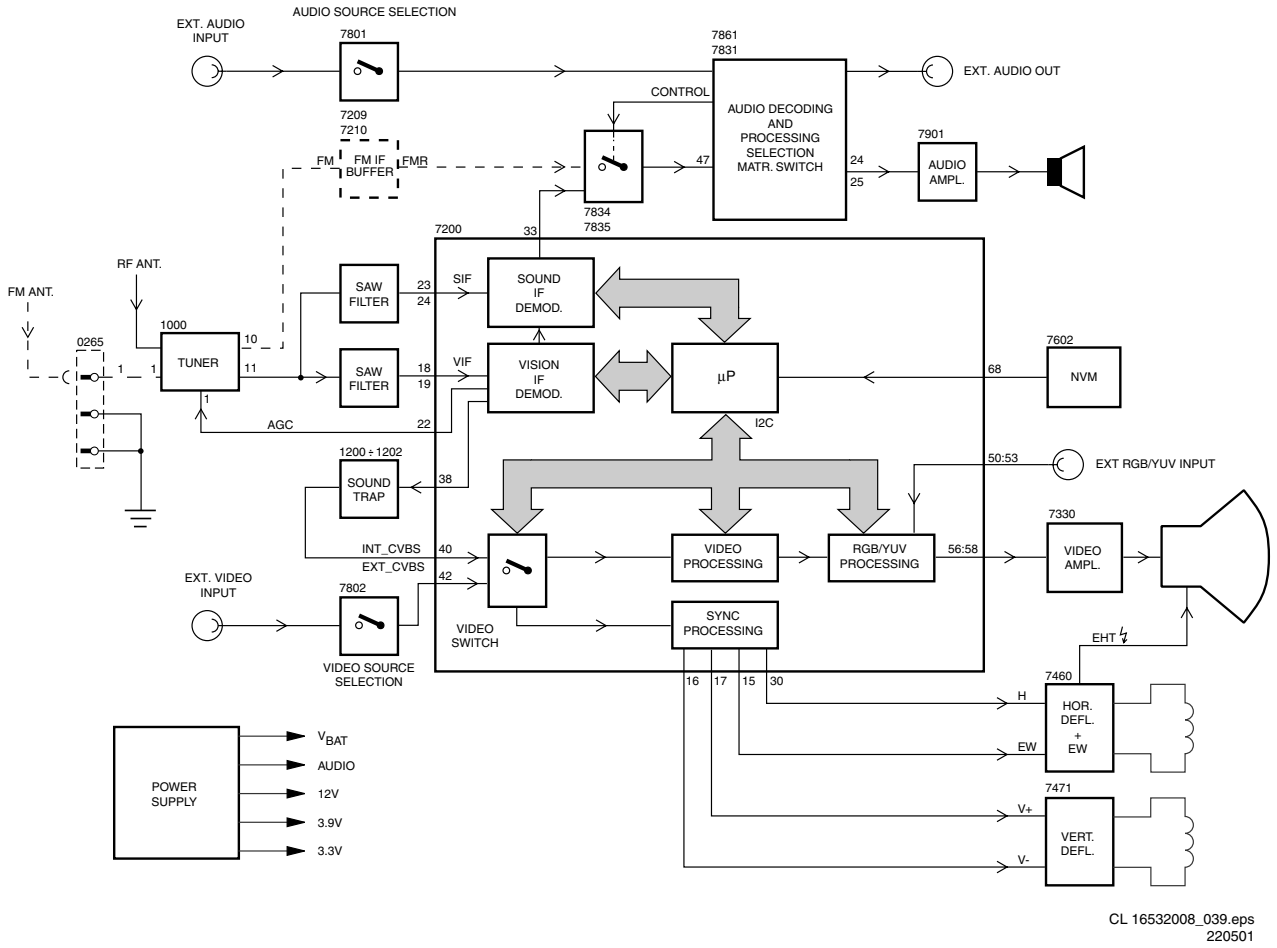


Figure 9-3

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 mono audio output on pin 48 goes directly, via the smart sound circuit (7941 for Bass and 7942 for Treble) and 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 is then sent to the speaker/headphone output panel.

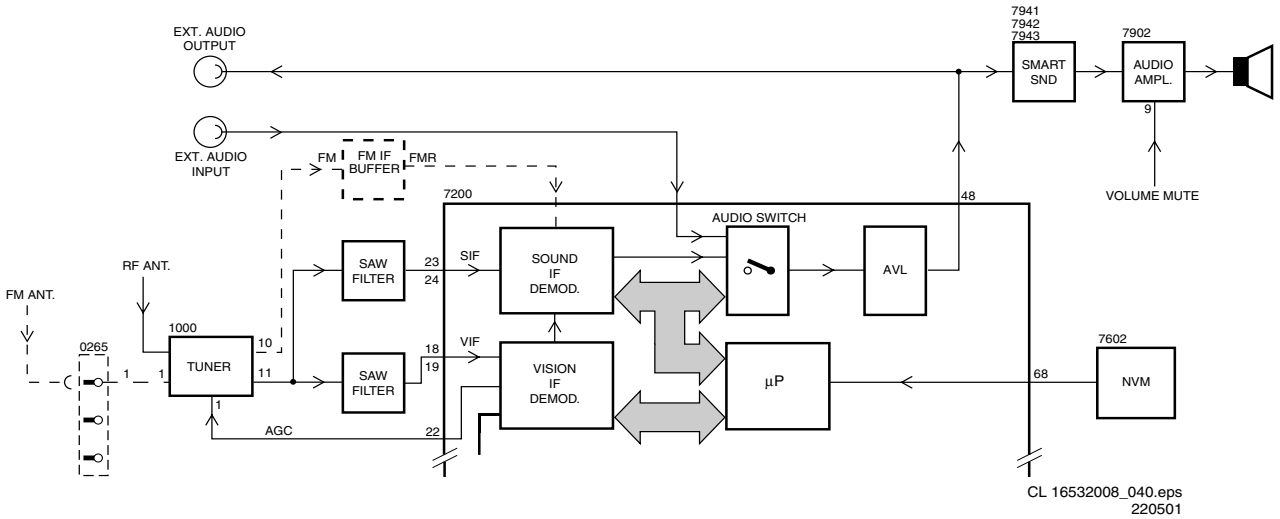


Figure 9-4

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 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, 1201, or 1202 depending on the system used) 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

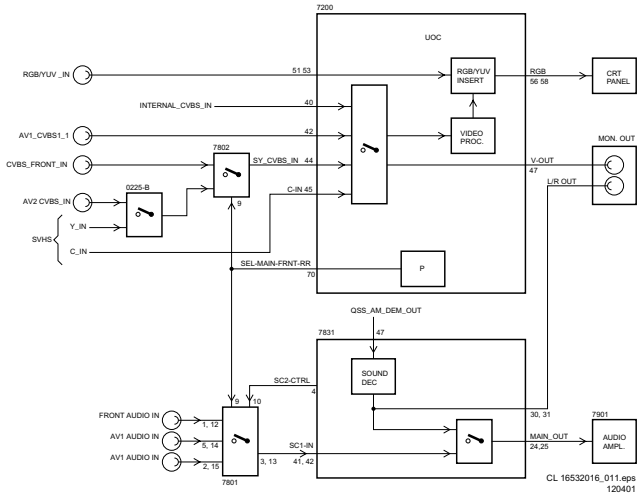


Figure 9-5

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/NTSC 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. For the other two signals see the blockdiagram in chapter 6.
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.
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 TS7405. If this voltage goes above 6.8 V, TS7405 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 TS7401, the horizontal driver transistor. The signal is amplified and coupled to the base circuit of TS7402, 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

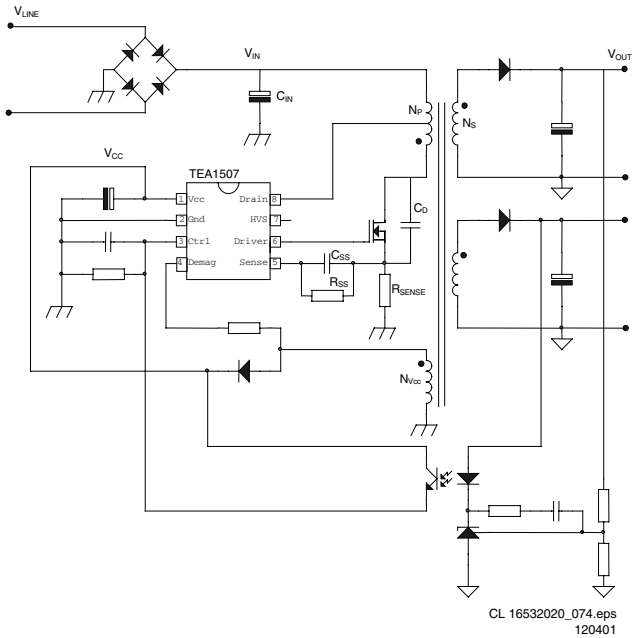


Figure 9-6

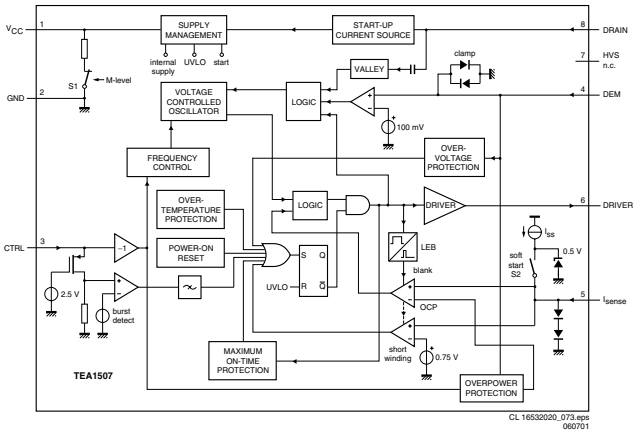


Figure 9-7

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 IC 7520 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 IC 7200 on pins 11 and 34.
This circuit will shut 'off' the horizontal drive in case of over-voltage or excessive beam current.

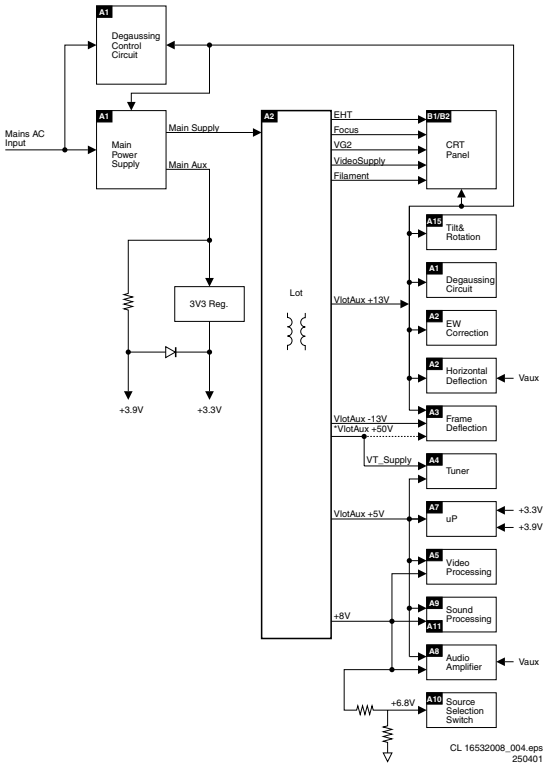


Figure 9-8

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).

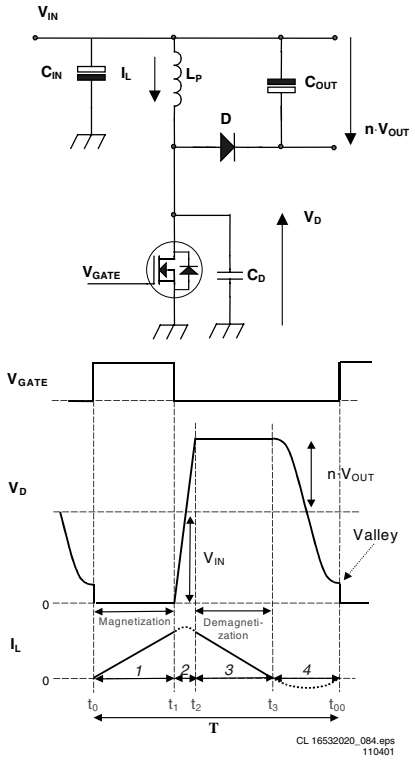


Figure 9-10

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 $V_{IN}+n\bullet(V_{OUT}+V_F)$. 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 $-n\bullet V_{OUT}/L_P$.
- 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 $V_{IN}+n\bullet V_{OUT}$ to $V_{IN}-n\bullet V_{OUT}$.

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.

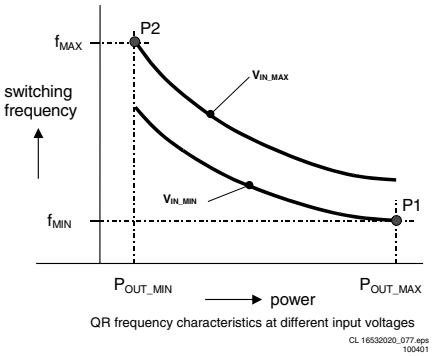


Figure 9-11

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.

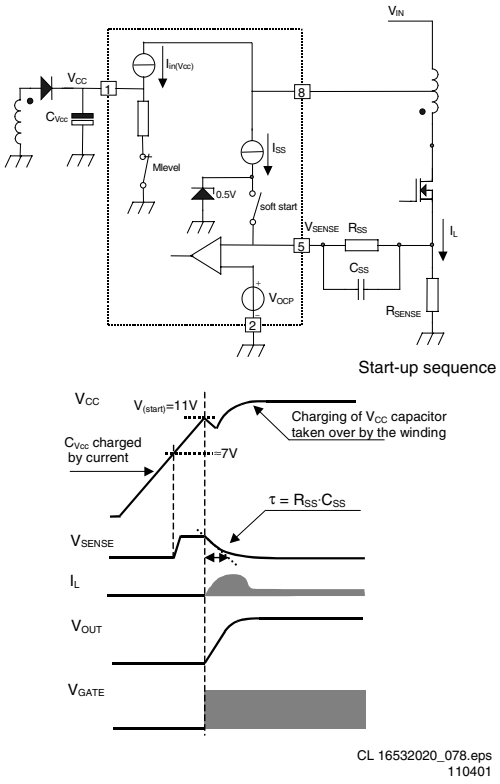


Figure 9-12

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.

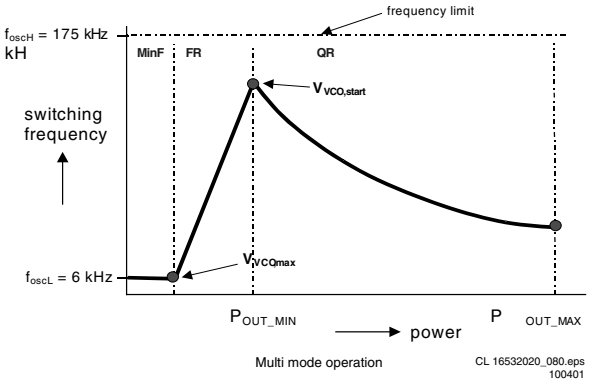


Figure 9-13

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.

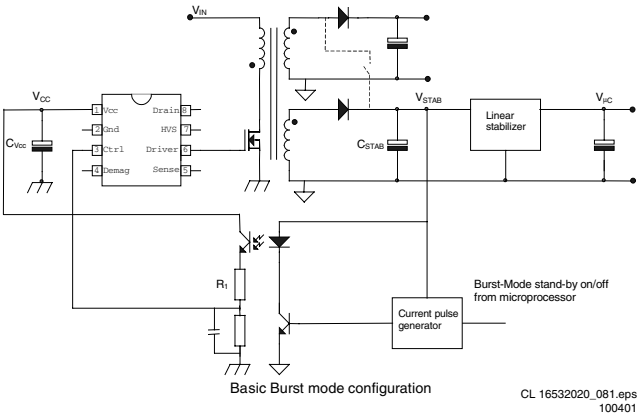


Figure 9-14

The system enters burst mode standby when the microprocessor activates the 'Stdby_con' line. When this line is pulled high, the base of Q7541 is allowed to go high. This is triggered by the current from collector Q7542. When Q7541 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 Q7541 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.

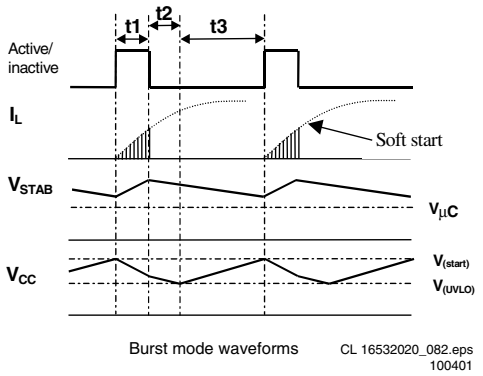


Figure 9-15

9.6.3 Protection Events

The SMPS IC 7520 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.

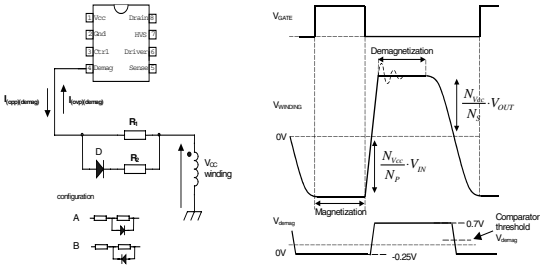


Figure 9-16

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. 140º 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

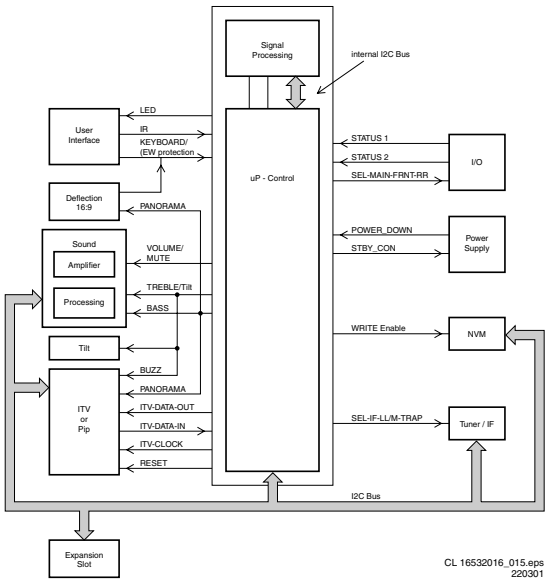


Figure 9-17

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 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 are used (in mono 4:3 sets) to switch between different smart sound modes.

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 (only for Europe). This signal is not connected in NAFTA sets.
- **STATUS2** This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (only for Europe). For sets with an SVHS input it provides the additional information if a Y/C or CVBS source is present. The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.
- **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

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.
- **E/W protection**, two protection mechanisms are built in, over-current and over-voltage.
  - In case of over-current due to defective parts in the line deflection output stage, a high current will flow through resistors 3405//3406. If this current is large enough to create a voltage drop of 0.7 V across 3405//3406, transistor TS7606 (in A7 diagram) will conduct and pin 80 of the UOC will be pulled down. Thereafter, the UOC will shut down the power supply. In case of further current increase, the fused resistor 3411 is built-in for double protection.
  - In case of a high voltage appearing across capacitor 2401 (dependent of the tube size), which is high enough to trigger zener diode 6401 into conduction, transistor TS7606 (in A7 diagram) will conduct and UOC is triggered to shut down the power supply.
- **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 feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Level
BC-PROT	Beam Current Protection
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLC-INFORMATION	Black current information
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue teletext
CC	Closed Caption
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DBX	Dynamic Bass Expander
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFORMATION	Extra High Tension information
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FLASH	Flash memory
FM	Field Memory
FM	Frequency Modulation
HA	Horizontal Acquisition: horizontal sync pulse coming out of the HIP
HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection

HP	Headphone
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	Multi-standard 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
0127▲	4822 265 11253	Fuse holder
0136	4822 492 70788	Fix IC
0137	4822 492 70289	IC spring
0138	4822 492 70788	Fix IC
0139	3122 121 24785	Spring for bracket
0152	3139 121 08841	Dipmate cable
0211▲	4822 265 20723	2p
0212▲	4822 267 10774	2p male (red)
0217	4822 267 10735	3p
0218	4822 265 10481	Cinch 2p
0220	2422 025 04851	3p
0221▲	4822 267 10966	2p
0222▲	2422 025 10646	2p male
0223	2422 026 05185	Cinch socket 4p female
0231▲	2422 128 02972	Power switch
0232▲	4822 267 31014	Headphone socket
0243	2422 025 04854	6p female
0244	2422 025 04851	3p
0245	2422 025 04854	6p female
0246	2422 025 16382	3p male
0254▲	2422 500 80067	CRT 9p female
1000	3139 147 16481	UV1356A/AIG-3
1002	4822 242 10357	OFWK2960M
1002	2422 549 44223	OFWK7260M
1200	4822 242 10315	TPT02B-TF21
1200	4822 242 81712	TPWA04B
1201	4822 242 81572	TPS6,0MB-TF21
1201	4822 242 81301	TPS6,5MB-TF21
1202	4822 242 81978	TPS4,5MB-TF21
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	Crystal 12.00MHz

⊣⊢

2003	4822 122 33177	10nF 20% 50V
2004	4822 126 13751	47nF 10% 63V
2005	4822 124 40248	10µF 20% 63V
2006	4822 124 80791	470µF 16V 20%
2007	4822 126 14585	100nF 10% 50V
2008	4822 124 40207	100µF 20% 25V
2009	5322 122 32654	330pF 5% 63V
2101	4822 126 13482	470nF 80/20% 16V
2102	5322 122 32658	22pF 5% 50V
2103	5322 122 31863	33nF 5% 50V
2105	4822 124 40248	10µF 20% 63V
2121	5322 122 32658	22pF 5% 50V
2122	5322 122 31863	1.2nF 10% 63V
2123	5322 126 14103	2.2µF 20-80% 10V
2141	4822 051 20008	Jumper
2181	5322 122 32658	22pF 5% 50V
2182	5322 122 31863	22nF 10% 63V
2184	5322 126 14103	2.2µF 20-80% 10V
2201	4822 126 14585	100nF 10% 50V
2202	4822 126 14585	100nF 10% 50V
2203	4822 126 14585	100nF 10% 50V
2204	4822 126 14585	100nF 10% 50V
2205	4822 126 14076	220nF 25V
2208	4822 126 14585	100nF 10% 50V
2209	4822 124 40769	4.7µF 20% 100V
2210	4822 126 13482	470nF 80/20% 16V
2211	4822 126 13482	470nF 80/20% 16V
2216	4822 124 80791	470µF 16V 20%
2217	5322 122 32654	330pF 5% 63V
2219	4822 126 14076	220nF 25V
2220	4822 121 51252	470nF 5% 63V
2226	5322 126 10465	3.9nF 10% 50V
2227	4822 122 32614	330pF 5% 63V
2228	5322 122 31863	22nF 10% 63V
2229	4822 124 40248	10µF 20% 63V
2233	5322 126 10184	820pF 5% 50V
2241	4822 126 13344	1.5nF 5% 63V
2242	4822 126 14043	1µF 20-80% 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 80791	470µF 16V 20%
2248	5322 122 32654	470pF 5% 63V
2249	5322 122 32654	470pF 5% 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
2313	4822 122 33216	270pF 5% 50V
2323	4822 122 33172	390pF 5% 50V
2331	4822 122 33172	390pF 5% 50V
2341▲	2020 558 90571	2.2nF 10% 1kV
2342	4822 121 70386	47nF 10% 250V
2343	4822 121 70386	47nF 10% 250V
2401	4822 126 13461	680pF 10% 50V
2404▲	4822 121 43888	360nF 5% 250V
2406	5322 122 31863	22nF 10% 63V
2407▲	4822 121 70618	12nF 5% 1600V
2409	4822 124 11575	47µF 20% 160V
2410	2020 021 91577	470µF 20% 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 11503	820pF 10% 2kV
2417	4822 124 81145	16V S 1000µF
2418	4822 122 33177	10nF 20% 50V
2419	4822 124 22776	1µF 50V
2420	4822 124 21913	1µF 20% 63V
2421	4822 126 13751	47nF 10% 63V
2422	2020 021 91577	470µF 20% 16V
2423	4822 124 42127	10µF 20% 100V
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	330pF 5% 63V
2476	4822 121 42408	220nF 5% 63V
2477	5322 122 32268	330pF 5% 63V
2500▲	4822 126 13589	470nF 275V
2501▲	4822 126 14153	2.2nF 10% 1kV
2502▲	4822 126 14153	2.2nF 10% 1kV
2503	4822 124 12415	220µF 20% 400V
2505▲	4822 126 14153	2.2nF 10% 1kV
2506▲	4822 126 14153	2.2nF 10% 1kV
2508▲	4822 122 50116	470pF 10% 1kV
2515▲	4822 126 14049	1.5nF 20% 250V
2516▲	4822 126 13867	330P 20% 250V
2520	4822 126 14585	100nF 10% 50V
2521	4822 124 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
2541	4822 122 33177	10nF 20% 50V
2560▲	4822 126 13449	1nF 10% 2kV
2561	4822 124 42336	47µF 20% 160V
2562	5322 122 32331	1nF 10% 100V
2563	5322 121 42386	100nF 5% 63V
2564	2020 012 93057	2200µF 20% 16V
2565▲	4822 122 50116	470pF 10% 1kV
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
2604	4822 124 40248	10µF 20% 63V
2606	5322 122 31647	1nF 10% 63V
2607	2238 861 18339	33P 1% 50V
2608	4822 126 14043	1µF 20-80% 16V
2609	2238 861 18339	33P 1% 50V
2611	4822 126 14043	1µF 20-80% 16V
2612	4822 126 13694	68pF 1% 63V
2613	4822 126 13694	68pF 1% 63V
2615	5322 122 31647	1nF 10% 63V
2618	4822 126 14043	1µF 20-80% 16V
2619	4822 126 14043	1µF 20-80% 16V
2691	4822 124 40207	100µF 20% 25V
2851	2020 552 96305	4.7µF 20-80% 10V
2902	4822 124 81144	1000µF 16V
2903	4822 124 21913	1µF 20% 63V
2904	4822 126 14043	1µF 20-80% 16V
2905	5322 126 10511	1nF 5% 50V
2907	5322 126 10511	1nF 5% 50V
2911	4822 122 33127	2.2nF 10% 63V
2941	4822 124 21913	1µF 20% 63V
2942	4822 126 12105	330pF 5% 63V
2943	4822 126 14585	100nF 10% 50V
2944	4822 126 14127	39nF 10% 50V
2945	5322 126 10223	4.7nF 10% 63V
2946	4822 126 14043	1µF 20-80% 16V
2950	5322 122 31863	22nF 10% 63V
2981	4822 124 40248	10µF 20% 63V
2982	5322 122 34099	470pF 10% 63V
2983	4822 124 40248	10µF 20% 63V
2984	5322 122 34099	470pF 10% 63V

⊣▭⊢

3000	4822 116 52175	100Ω 5% 0.5W
3001	4822 116 52175	100Ω 5% 0.5W
3002	4822 051 20008	Jumper (0805)
3003	4822 117 11139	1.5kΩ 1% 0.1W
3004	4822 051 20822	8.2kΩ 5% 0.1W
3005	4822 116 52175	100Ω 5% 0.5W
3006	4822 117 11449	2.2kΩ 5% 0.1W
3007	4822 117 11507	6.8kΩ 1% 0.1W
3008	4822 117 11449	2.2kΩ 5% 0.1W
3101	4822 116 52199	68Ω 5% 0.5W
3102	4822 051 10102	1kΩ 2% 0.25W
3103	4822 116 83868	150Ω 5% 0.5W
3104	3198 021 52240	220kΩ 5%
3121	4822 116 52201	75Ω 5% 0.5W
3122	4822 116 52176	10Ω 5% 0.5W
3123	4822 116 83868	150Ω 5% 0.5W
3124	4822 117 10834	47kΩ 1% 0.1W
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	47kΩ 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	10kΩ 1% 0.6W
3206	4822 117 10837	100kΩ 1% 0.1W
3207	4822 050 11002	1kΩ 1% 0.4W
3208	4822 117 10353	150Ω 1% 0.1W
3208	4822 117 11503	220Ω 1% 0.1W
3209	4822 051 20829	82Ω 5% 0.1W
3210	4822 116 52283	4.7kΩ 5% 0.5W
3211	4822 116 52283	4.7kΩ 5% 0.5W
3212	4822 051 20471	470Ω 5% 0.1W
3213	4822 116 83883	470Ω 5% 0.5W
3217	4822 051 20334	330kΩ 5% 0.1W
3218	4822 117 11149	82kΩ 1% 0.1W
3219	4822 117 11449	2.2kΩ 5% 0.1W
3220	4822 116 52175	100Ω 5% 0.5W
3221	4822 116 52226	560Ω 5% 0.5W
3222	4822 116 52175	100Ω 5% 0.5W
3226	4822 051 20561	560Ω 5% 0.1W
3232	4822 051 20392	3.9kΩ 5% 0.1W
3235	4822 116 52175	100Ω 5% 0.5W
3241	4822 051 20223	22kΩ 5% 0.1W
3242	4822 117 11383	12kΩ 1% 0.1W
3244	4822 116 52231	820Ω 5% 0.5W
3245	4822 051 20393	39kΩ 5% 0.1W
3246	4822 117 10833	10kΩ 1% 0.1W
3247	3198 021 52240	220kΩ 5%
3248	4822 051 20273	27kΩ 5% 0.1W
3249	4822 116 52231	820Ω 5% 0.5W
3251	4822 116 52175	100Ω 5% 0.5W
3256	4822 051 10102	1kΩ 2% 0.25W
3257	4822 051 20106	10M Ω 5% 0.1W
3258	4822 051 20334	330kΩ 5% 0.1W
3259	4822 051 20474	470kΩ 5% 0.1W
3311	4822 051 20392	3.9kΩ 5% 0.1W
3312	4822 117 13577	330Ω 1% 1.25W
3313	4822 051 20109	10Ω 5% 0.1W
3314	4822 053 12183	18kΩ 5% 3W
3316▲	4822 052 10689	68Ω 5% 0.33W
3317	3198 013 01520	1.5kΩ 20% 0.5W
3321	4822 051 20392	3.9kΩ 5% 0.1W
3322	4822 117 13577	330Ω 1% 1.25W
3323	4822 051 20109	10Ω 5% 0.1W
3324	4822 053 12183	18kΩ 5% 3W
3326▲	4822 052 10689	68Ω 5% 0.33W
3327	3198 013 01520	1.5kΩ 20% 0.5W
3331	4822 051 20392	3.9kΩ 5% 0.1W
3332	4822 117 13577	330Ω 1% 1.25W
3333	4822 051 20109	10Ω 5% 0.1W
3334	4822 053 12183	18kΩ 5% 3W
3336▲	4822 052 10689	68Ω 5% 0.33W
3337	3198 013 01520	1.5kΩ 20% 0.5W
3341	3198 013 01520	1.5kΩ 20% 0.5W
3347▲	4822 052 10221	220Ω 5% 0.33W
3348	3198 013 01520	1.5kΩ 20% 0.5W
3349▲	4822 052 10108	1Ω 5% 0.33W
3350▲	4822 052 10108	1Ω 5% 0.33W
3401	4822 053 21334	330kΩ 5% 0.5W
3402	4822 116 52251	18kΩ 5% 0.5W

3404▲	4822 052 10688	6.8kΩ 5% 0.33W
3405	4822 116 52256	2.2kΩ 5% 0.5W
3406	4822 050 21003	10kΩ 1% 0.6W
3407	4822 053 12331	330Ω 5% 3W
3408	4822 050 11002	1kΩ 1% 0.4W
3410	4822 051 20333	33kΩ 5% 0.1W
3411▲	4822 052 10109	10Ω 5% 0.33W
3412▲	4822 050 23903	39kΩ 1% 0.6W
3413	4822 117 10833	10kΩ 1% 0.1W
3414▲	4822 050 21203	12kΩ 1% 0.6W
3415▲	4822 050 11002	1kΩ 1% 0.4W
3416▲	4822 052 11398	3.9Ω 5% 0.5W
3417	4822 050 23303	33kΩ 1% 0.6W
3418	4822 051 20333	33kΩ 5% 0.1W
3419	4822 117 11507	6.8kΩ 1% 0.1W
3420	4822 051 20333	33kΩ 5% 0.1W
3421	4822 053 11688	6.8kΩ 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	12kΩ 5% 0.5W
3426	4822 051 20105	1M Ω 5% 0.1W
3427	4822 116 52238	12kΩ 5% 0.5W
3428▲	4822 052 11399	39Ω 5% 0.5W
3431▲	4822 117 12955	2.7kΩ 1% 0.1W
3432	4822 116 52186	22Ω 5% 0.5W
3471	4822 050 23308	3.3Ω 1% 0.6W
3472	4822 050 23908	3.3Ω 1% 0.6W
3473	4822 050 22202	2.2kΩ 1% 0.6W
3474	4822 050 11002	1kΩ 1% 0.4W
3475	4822 050 22202	2.2kΩ 1% 0.6W
3476▲	4822 052 10158	1.5Ω 5% 0.33W
3477	4822 116 83872	220Ω 5% 0.5W
3478	4822 116 83872	220Ω 5% 0.5W
3479	4822 050 11002	1kΩ 1% 0.4W
3500▲	4822 053 21335	3.3M Ω 5% 0.5W
3501▲	4822 053 21335	3.3M Ω 5% 0.5W
3502	2122 612 00055	NTC 4.7Ω 20%
3504▲	2120 660 90043	PTC 9Ω/100Ω 200V
3506▲	4822 116 83872	220Ω 5% 0.5W
3507	4822 252 11215	DSP301N-A21F
3519	4822 116 83876	270Ω 5% 0.5W
3520	4822 051 20122	1.2kΩ 5% 0.1W
3521	4822 050 24708	4.7Ω 1% 0.6W
3522	4822 051 20334	330kΩ 5% 0.1W
3523▲	4822 052 10479	47Ω 5% 0.33W
3524	4822 117 11148	56kΩ 1% 0.1W
3525	4822 051 10102	1kΩ 2% 0.25W
3526	3198 012 11570	0.15Ω 5% 1W
3527▲	4822 052 10222	2.2kΩ 5% 0.33W
3528	4822 117 10833	10kΩ 1% 0.1W
3529	4822 117 10834	47kΩ 1% 0.1W
3530	4822 051 20472	4.7kΩ 5% 0.1W
3531	4822 051 20008	Jumper (0805)
3541	4822 051 20471	470Ω 5% 0.1W
3542	4822 117 11139	1.5kΩ 1% 0.1W
3543▲	4822 050 28203	82kΩ 1% 0.6W
3544▲	4822 050 26802	6.8kΩ 1% 0.6W
3545▲	4822 117 11149	82kΩ 1% 0.1W
3546	4822 051 20008	Jumper (0805)
3547	4822 117 11342	0.33Ω 5% 2W
3548	4822 051 20822	8.2kΩ 5% 0.1W
3549	4822 116 83872	220Ω 5% 0.5W
3552	4822 051 20472	4.7kΩ 5% 0.1W
3559	4822 051 10102	1kΩ 2% 0.25W
3561	4822 116 83872	220Ω 5% 0.5W
3562	4822 117 10833	10kΩ 1% 0.1W
3563	4822 051 20822	8.2kΩ 5% 0.1W
3564	2120 106 90565	0.1Ω 5% 2W
3565	4822 053 10331	330Ω 5% 1W
3566	4822 117 11449	2.2kΩ 5% 0.1W
3569	4822 051 20562	5kΩ6 5% 0.1W
3591	4822 051 20008	Jumper (0805)
3595	2120 108 92641	ERJ6EN180k
3596	2120 108 92641	ERJ6EN180k
3603	4822 116 52175	100Ω 5% 0.5W
3604	4822 116 52175	100Ω 5% 0.5W
3605	4822 051 20472	4.7kΩ 5% 0.1W
3606	4822 116 52256	2.2kΩ 5% 0.5W
3607	4822 116 52256	2.2kΩ 5% 0.5W
3608	4822 116 52175	100Ω 5% 0.5W
3611	4822 117 11373	100Ω 1%
3612	4822 116 52303	8.2kΩ 5% 0.5W
3614	4822 116 52283	4.7kΩ 5% 0.5W
3615	4822 050 21003	10kΩ 1% 0.6W
3617	4822 116 52283	4.7kΩ 5% 0.5W
3618	4822 116 83961	6.8kΩ 5%
3619	4822 116 52303	8.2kΩ 5% 0.5W
3622	4822 117 11373	100Ω 1%
3623	4822 051 20472	4.7kΩ 5% 0.1W
3624	4822 116 52175	100Ω 5% 0.5W
3625	4822 116 52175	100Ω 5% 0.5W
3626	4822 051 20472	4.7kΩ 5% 0.1W
3627	4822 051 20472	4.7kΩ 5% 0.1W
3628	4822 117 10833	10kΩ 1% 0.1W
3630	4822 117 11449	2.2kΩ 5% 0.1W
3632	4822 051 20008	Jumper (0805)
3636	4822 117 11373	100Ω 1%
3639	4822 051 20008	Jumper (0805)
3681	4822 051 20391	390Ω 5% 0.1W
3682	4822 051 20332	3.3kΩ 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	1.5kΩ 1% 0.1W
3691	4822 117 13577	330Ω 1% 1.25W
3693	4822 117 11503	220Ω 1% 0.1W
3694	4822 051 20472	4.7kΩ 5% 0.1W
3901	4822 051 10102	1kΩ 2% 0.25W
3902	4822 051 20332	3.3kΩ 5% 0.1W
3903	4822 117 10833	10kΩ 1% 0.1W
3904	4822 117 10833	10kΩ 1% 0.1W
3907	4822 051 20822	8.2kΩ 5% 0.1W
3941	4822 117 11373	100Ω 1%
3942	4822 051 20472	4.7kΩ 5% 0.1W
3943	4822 117 12955	2.7kΩ 1% 0.1W
3944	4822 117 12955	2.7kΩ 1% 0.1W
3945	4822 051 10102	1kΩ 2% 0.25W
3946	4822 051 20822	8.2kΩ 5% 0.1W
3947	4822 117 10833	10kΩ 1% 0.1W
3948	4822 117 10834	47kΩ 1% 0.1W
3949	4822 116 83933	15kΩ 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 (1206)
4xxx	4822 051 20008	Jumper (0805)



5001	4822 157 51216	5.6µH
5002	3198 018 18270	820nH 10%
5201	4822 157 11835	4.7µH 5%
5202	4822 157 51462	10µH 10%
5241	4822 157 51462	10µH 10%
5242	4822 157 11706	10µH 5%
5341	4822 157 11441	22µH 5%
5342	4822 526 10704	Bead 100MHz
5403	4822 157 11891	27µH 10%
5406	3128 138 56801	Linearity coil drum DC12
5444	2422 531 02446	Transformer driver SC10009-03
5445▲	2422 531 02475	LOT JF0501-19163A
5500▲	4822 157 10476	DMF-2820H
5520▲	2422 531 02456	Transformer S359B4-09 B
5521	4822 526 10704	Bead 100MHz
5560	4822 526 10704	Bead 100MHz
5561	4822 157 52392	27µH
5562	4822 157 11411	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%



6001	4822 130 34142	BZX79-B33
6004	4822 130 11525	1SS356
6201	4822 130 11397	BAS316
6202	4822 130 11397	BAS316
6206	4822 130 11416	PDZ6.8B
6241	4822 130 11416	PDZ6.8B
6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	9337 587 20673	BA282
6343	4822 130 10837	UDZS8.2B
6344	4822 051 20008	Jumper (0805)
6402	4822 130 10871	SBYV27-200
6403	4822 130 42488	BYD33D
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
6413	4822 130 30621	1N4148
6414▲	4822 130 34167	BZX79-B6V2
6415	4822 130 11397	BAS316
6417	4822 130 11551	UDZS10B
6419	4822 130 34173	BZX79-B5V6
6420	4822 130 30862	BZX79-B9V1
6423	4822 130 42488	BYD33D
6471	4822 130 42488	BYD33D
6500	4822 130 31083	BYW55
6501	4822 130 31083	BYW55
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6520	4822 130 42488	BYD33D
6523	4822 130 30621	1N4148
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 61219	BZX79-B10
6560	9322 127 32682	BYW76-RAS15/10
6561	9322 127 32682	BYW76-RAS15/10
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	9322 163 91685	BZX384-C6V2
6681	4822 130 31983	BAT85
6691	9322 050 99682	LTL-10224WHCR
6692	9322 127 54667	IR receiver TSOP1836UH1
6901	4822 051 20008	Jumper (0805)



7001	4822 130 63732	MMUN2212
7101	5322 130 60159	BC846B
7200	9352 707 37557	TDA9561H/N1/4/0630
7201	5322 130 60159	BC846B
7202	4822 130 60373	BC856B
7203	4822 130 60373	BC856B
7204	4822 130 60373	BC856B
7205	4822 130 60373	BC856B
7241	3198 010 44010	PDTA114ET
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
7401	9340 547 00215	PDTC143ZT
7402	9340 563 21127	BUT11APX-1200
7403	4822 130 40981	BC337-25
7404	4822 130 41246	BC327-25
7405▲	4822 130 60373	BC856B
7406	4822 130 60373	BC856B
7407	4822 130 40823	BD139
7408	4822 130 40823	BD139
7409	4822 130 60373	BC856B
7471	4822 209 13176	TDA9302H
7515	9322 175 72667	TCET1104(G)
7520	9352 673 56112	TEA1507P/N1
7521	9322 160 63687	STP7NC80ZFP
7522	5322 130 60159	BC846B
7540	4822 130 40959	BC547B
7541	4822 130 11155	PDTC114ET
7542	4822 130 60373	BC856B
7560	4822 209 16978	LF33CV
7561	9340 547 00215	PDTC143ZT
7602	9322 147 25682	M24C16-WBN6
7901	9322 158 65667	AN7522N
7941	5322 130 60159	BC846B
7942	5322 130 60159	BC846B
7943	5322 130 60159	BC846B

Picture tube panel [B]

Various

0244	2422 025 04851	3P
0245	2422 025 04854	6P female
0254	2422 500 80067	6P 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 117 11139	1k5 1% 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 117 11139	1k5 1% 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 117 11139	1k5 1% 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

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
6344	4822 051 20008	Jumper 0805

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 [E][E1]

Various

0232▲	4822 267 31014	Headphone socket
0250	2422 026 04742	Socket 3 x cinch

2171	4822 126 13512	330pF 10% 50V
2172	5322 122 32311	470pF 10% 100V
2172	4822 126 13512	330pF 10% 50V
2173	5322 122 32311	470pF 10% 100V
2173	4822 126 13512	330pF 10% 50V
2174	5322 122 32311	470pF 10% 100V
2174	4822 126 13512	330pF 10% 50V
2176	4822 126 13512	330pF 10% 50V
2176	5322 122 32311	470pF 10% 100V
2177	4822 124 40207	100µF 20% 25V
2177	4822 124 40248	10µF 20% 63V
2178	4822 126 13512	330pF 10% 50V
2178	5322 122 32311	470pF 10% 100V
2179	4822 124 40207	100µF 20% 25V
2179	4822 124 40248	10µF 20% 63V

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-B6V8P