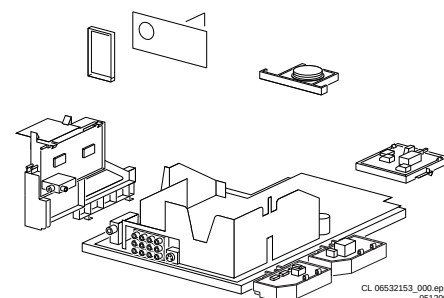


Service Service Service



Service Manual

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PHILIPS

1. Technical specifications, connection facilities and chassis overview

1.1 Technical specifications

Mains voltage	: 90 - 276 Vac
Power consumption	: max 160 W
Standby consumption	: < 3 W
Mains frequency	: 50 - 60 Hz
Tuning system	: PLL
Reception	: PAL B/G/D/K/I
	: SECAM B/G/D/K/
	: K1
	: NTSC M
Sound system	: 2CS BG
	: NICAM B/G/D/K//L
	: 2 NICAM BG/D
Sound output	: 2 x 5 W
	: 2 x 10 W + 10 W
	(Virtual dolby)
Aerial input	: Coaxial 75 Ω

1.2 Connection facilities

1.2.1 Control buttons and Side I/O connections

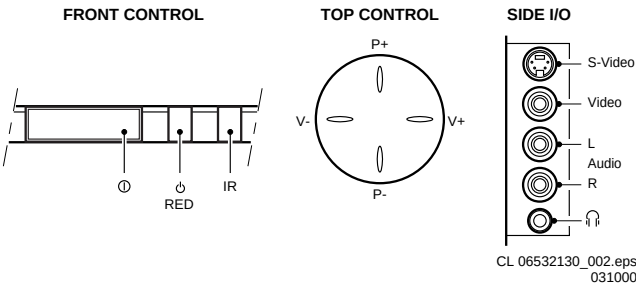


Figure 1-1

SVHS		
1 -	gnd	⏏
2 -	gnd	⏏
3 - Y	1 Vpp / 75 Ω	⊕⊖
4 - C	0.3 Vpp / 75 Ω	⊕⊖
Audio / video		
1 - Video	1 Vpp / 75 Ω	⊕⊖
2 - Audio (L)	0.2 Vrms / 10 kΩ	⊕⊖
3 - Audio (R)	0.2 Vrms / 10 kΩ	⊕⊖
4 - Headphone	32 - 2000 Ω / 10 mW	⏏

1.2.2 Rear connections

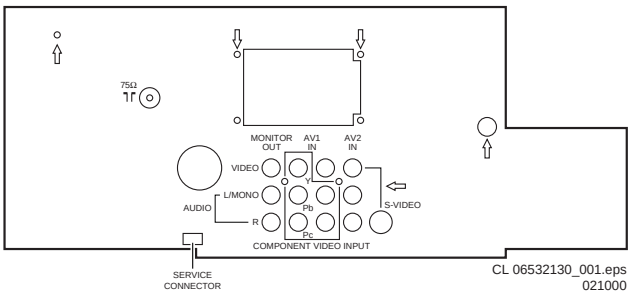


Figure 1-2 (figure can deviate)

Monitor out		
1 - Video	1 Vpp / 75 Ω	⊕⊖
2 - Audio (L)	0.5 Vrms / 10 kΩ	⊕⊖
3 - Audio (R)	0.5 Vrms / 10 kΩ	⊕⊖
AV1 in		
1 - Y	0.7 Vpp / 75 Ω	⊕⊖
2 - Pb	0.7 Vpp / 75 Ω	⊕⊖
3 - Pr	0.7 Vpp / 75 Ω	⊕⊖
4 - Video	1 Vpp / 75 Ω	⊕⊖
5 - Audio (L)	0.5 Vrms / 10 kΩ	⊕⊖
6 - Audio (R)	0.5 Vrms / 10 kΩ	⊕⊖
AV2 in		
1 - Video	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

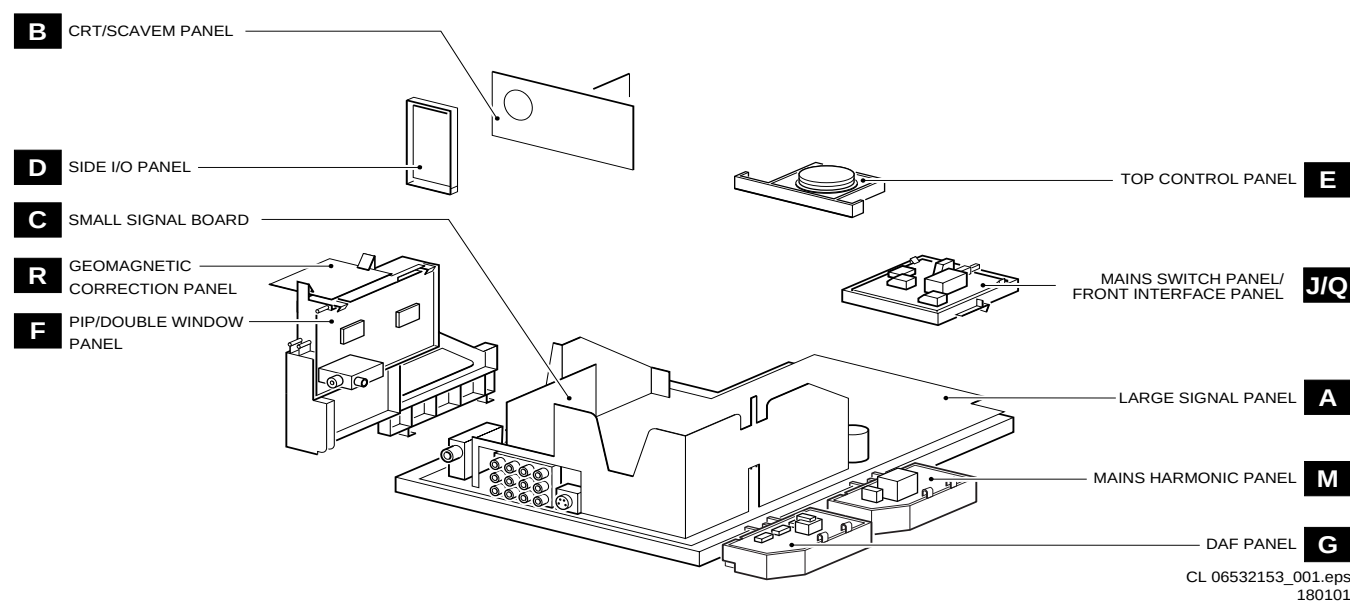


Figure 1-3

2. Safety- & maintenance instructions, warnings and notes

2.1 Safety instructions for repairs

Safety regulations require that during a repair:

- 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. In particular attention should be paid to the following points:

- General repair instruction: as a strict precaution, we advise you to resolder the solder joints, 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 resoldering is advised to prevent bad connections due to metal fatigue in solder joints and is therefore only necessary for television sets older than 2 years.

- The wire trees and EHT cable should be routed correctly and fixed with the mounted cable clamps.
- The insulation of the mains lead should be checked for external damage.
- The mains lead strain relief should be checked for its function in order to avoid touching the CRT, hot components or heat sinks.
- The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets which have a mains isolated power supply). This check can be done as follows:
 - Unplug the mains cord and connect a wire between the two pins of the mains plug;
 - Set the mains switch to the 'ON' position (keep the mains cord unplugged!);
 - Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ.
 - Switch off the TV and remove the wire between the two pins of the mains plug.
- The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Maintenance instructions

It is recommended to have a maintenance inspection carried out by a qualified service employee. 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 3 to 5 years.
- When the set is used in circumstances with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is 1 year.
- The maintenance inspection contains the following actions:
 - Execute the above-mentioned 'general repair instruction'.
 - Clean the power supply and deflection circuitry on the chassis.
 - Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to IC's and transistors, all high-voltage flashovers must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 2-1 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position VDC). Discharge until the meter reading is 0 V (after approx. 30 s).

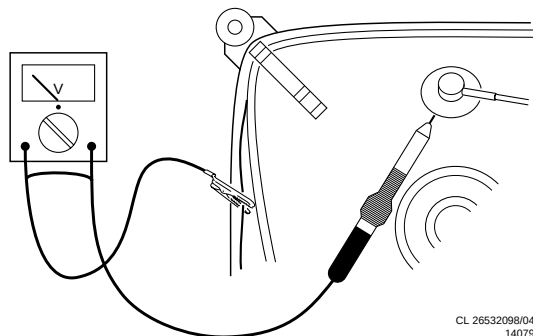


Figure 2-1

- All IC's 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 same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small table mat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multipole unit, the used flat square picture tubes form an integrated unit. The deflection and the multipole 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 making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

- The direct voltages and oscillograms should be measured with regard to the tuner earth ($\perp$), or hot earth ($\downarrow$) as this is called.
- The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz.
- Where necessary, the oscillograms and direct voltages are measured with ($\square$) and without ($\times$) aerial signal. Voltages in the power supply section are measured both for normal operation (Ⓐ) and in Standby (Ⓑ). These values are indicated by means of the appropriate symbols.
- The picture tube PWB 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.
- DOLBY, the double D symbol and PRO LOGIC are trademarks of Dolby Laboratories Licensing Corporation. Manufactured under license from Dolby Laboratories Licensing Corporation.



3. Directions for use

INTRODUCTION

Thank you for purchasing this television set. You are now the proud owner of a **PHILIPS** TV set which promises full value to you as a customer. Please read the instruction manual carefully and thoroughly to help you install and operate your TV set.

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SAFETY INFORMATION/USEFUL TIPS

Safety

Disconnect mains plug when :

- the red light below the TV screen is flashing continuously.
- a bright white line is displayed across the screen.
- cleaning the TV screen. Never use abrasive cleaning agents. Use a slight damp chamois leather or soft cloth.
- there is a lightning storm.
- the set is left unattended for a prolonged period of time.

Useful Tips

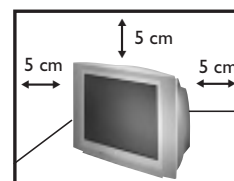
- Do not place your TV set under direct sunlight or heat.
- Avoid placing your set (e.g. near the window) where it is likely to be exposed to rain or water.
- Do not leave your set on standby mode for a prolonged period of time. Switch off set to allow it to be demagnetised. A demagnetised set supports good picture quality.
- Do not shift or move the set around when it is switched on. Unevenness in colour in some parts of the screen may occur.
- Never attempt to repair a defective TV yourself. Always consult a skilled service personnel.

BEFORE CALLING SERVICE

Below is a list of frequently occurred symptoms. Before you call for dservice, make these simple checks. Some of these symptoms can easily be rectified if you know what to do.

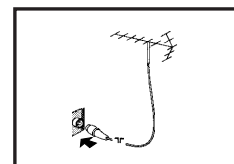
Symptom	What you should do
Colour patch (unevenness)	• Switch off the TV by the mains power button. Wait for 20 minutes before switching on again. • Check the TV is not placed too near speakers or magnetic objects.
No power	• Check the TV's AC power cord is plugged into the mains socket. If there is still no power, disconnect plug. Wait for 60 seconds and re-insert plug. Switch on the TV again.
No picture	• Check the antenna connection at the rear of the TV. • Possible TV station problem. Try another channel.
Good picture but no sound	• Try increasing the volume. • Check that the sound is not muted. If it is muted, press the  (mute) button on the remote control to restore sound. • Try increasing the contrast and brightness setting.
Good sound but poor colour or no picture	• Check antenna connection at the rear of the TV.
Snowish picture and noise	• Possible electrical interference e.g. hairdryer, vacuum cleaner, etc. Switch off appliances.
Horizontal dotted lines	• Possible poor positioning of antenna. Using a highly directional antenna may improve reception.
Double images or "Ghost" images	• Check life span of batteries of remote control handset. • Aim remote control handset directly at remote control sensor lens on the TV.
TV not responding to remote control handset	

INSTALLATION



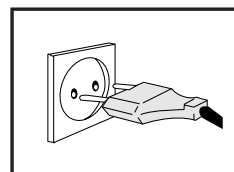
Positioning of the TV set

- Place your TV set on a solid base, strong enough to withstand the weight of the set.
- Leave a space of at least 5 cm around each side of the TV set to allow for proper ventilation.
- Do not place TV set near a radiator or other sources of heat.
- Do not place TV set where it can be exposed to rain or excessive moisture.



Connecting the Aerial

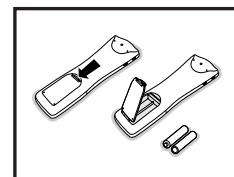
- Insert the aerial plug into the socket  at the rear of the set.



Connecting to the mains

- Insert the mains plug into the wall socket. (For correct mains voltage, refer to the type sticker at the rear of the set).

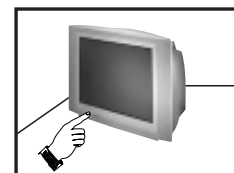
Note : This diagram is not representative of the actual plug and socket.



Using the Remote Control

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

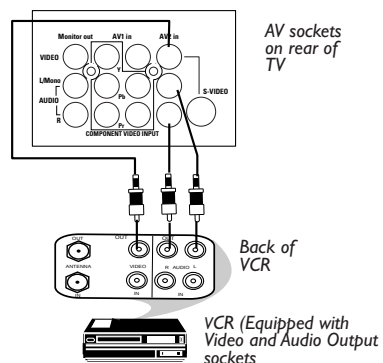
Note : Remove the batteries from the remote control handset if handset is not used for a long time.



Switching on the TV set

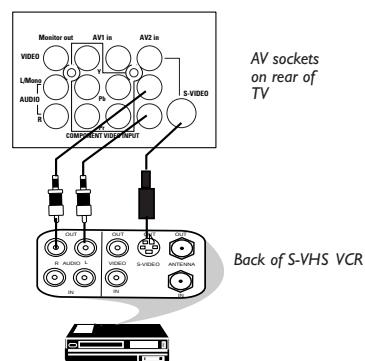
- Press the mains power button to switch on/off the TV set.
- If the set is on standby mode (indicator light is red), press the Standby button on the remote control to switch on set.

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.

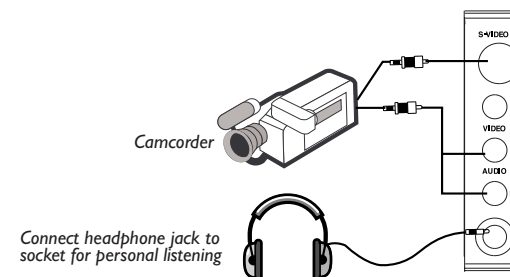


The S-Video connection on the rear of the TV is used for the playback of S-VHS VCR tapes, Video Discs, Video Games or Compact Disc-Interactive (cd-i) discs. Better picture detail and clarity is possible with the S-Video playback as compared to the picture from a normal antenna (RF) connection.

- 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.

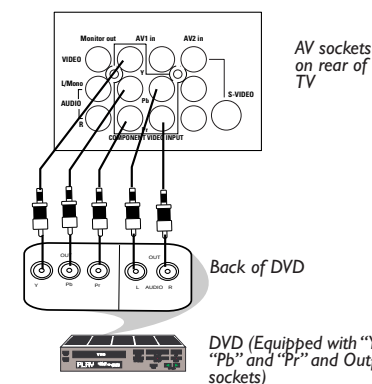
Note : You need not connect the **VIDEO IN** socket of the TV if **S-VIDEO IN** socket is connected.

CONNECTING THE AUDIO/VIDEO SOCKETS (PLAYBACK)



For more convenient direct playback connections, the Side Audio/Video Input sockets allow for quick and easy connections, particularly Camcorder tape recordings.

- Connect the **S-VIDEO** socket (if available) from the Camcorder to the Side **S-VIDEO** socket of the TV. You need not connect the Side **VIDEO IN** socket of the TV if the **S-VIDEO** socket is connected.
- Connect the **AUDIO OUT** sockets (Right and Left) from the Camcorder to the Side **AUDIO IN** sockets.

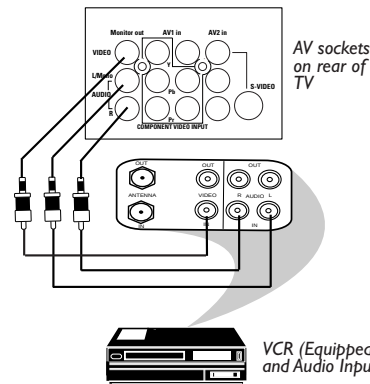


You can view the playback of DVD discs by using the **COMPONENT VIDEO INPUT** sockets on the rear of the TV.

- Connect the **"Y"**, **"Pb"** and the **"Pr"** **INPUT** sockets on the TV to the **"Y"**, **"Pb"** and **"Pr"** **OUTPUT** sockets on the DVD to view playback of DVD discs.

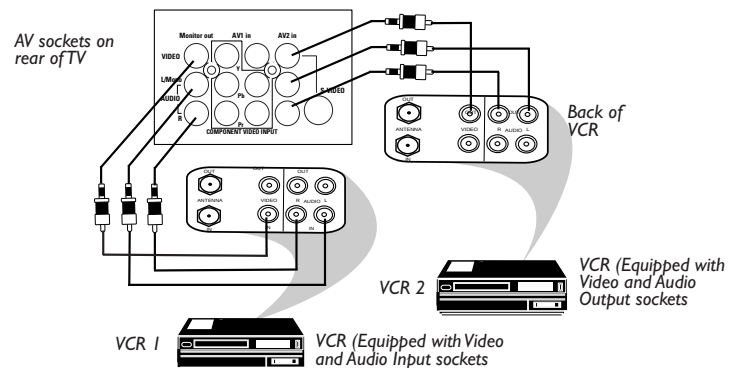
CONNECTING THE AUDIO/VIDEO SOCKETS (RECORDING)

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.

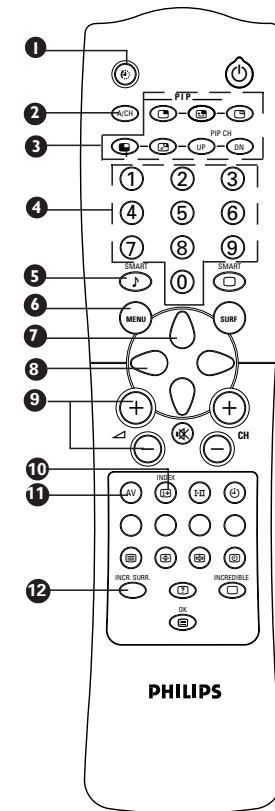
Connection for recording from one VCR to another VCR



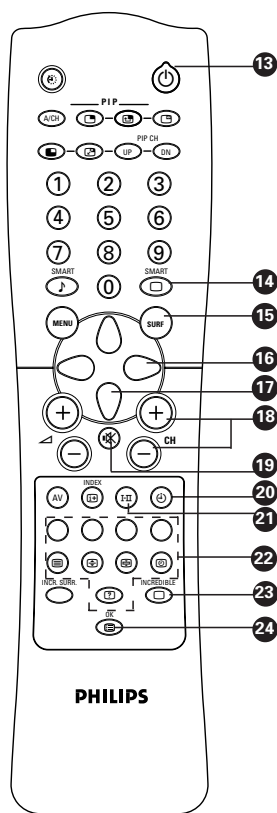
- Connect the sockets of the VCR which you wish to record from, to the corresponding sockets at either **AV1** or **AV2**.
- Connect the sockets of the receiving VCR to the **MONITOR OUTPUT** sockets on the rear of the TV.

FUNCTIONS OF REMOTE CONTROL

- SLEEPTIMER**
Allows you to select a time period after which the set will switch to standby mode automatically.
- A/CH (Alternate Channel)**
Allows you to alternate between the last viewed channel and the present channel.
- PIP ON/OFF (Picture-in-Picture On/Off)**
Allows you to access the Picture-in-Picture and Double Window features. (For more detailed description of functions, refer to the sections on "Activating the PIP and Double Window Control")
- DIGIT (0 -9)**
Allows you select a channel. **Note** : For a 2-digit number, the second digit must be entered before the "..." sign disappears.
- SMART SOUND**
Allows you to select your desired sound setting from 4 types of sound settings.
- MENU**
Displays main menu. Also exits menu from screen.
- CURSOR UP**
Allows you to select the next item on the menu.
- CURSOR LEFT**
Allows you to access the sub-menus and adjust the settings.
- VOLUME + / -**
Increases or decreases volume.
- OSD**
– Displays the channel number, sound and colour transmission mode, status of the sleeptimer, channel name (if channel is named) and the current time (if current time is being entered in the Timer menu).
– Also allows you to exit menu from screen.
- AV**
Allows you to select the AV channels.
- INCREDIBLE SURROUND**
– Allows you to select Incredible Surround/Virtual Dolby surround sound when transmission is in stereo mode. Virtual Dolby Surround allows you to enjoy the sensation of Home Cinema surround sound with just 2 front speakers.
– Allows you to select Spatial Sound when transmission is in mono mode.

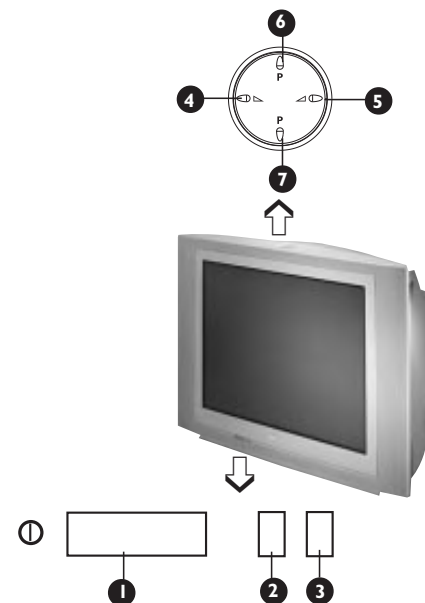


FUNCTIONS OF REMOTE CONTROL



- 13 STANDBY**
 - Switch set off temporarily to standby mode. (The red light indicator lights up when set is on standby mode).
 - To switch on set from standby mode, press Channel Up/Down, Digit (0 -9) or Standby button.
- 14 SMART PICTURE**
 Allows you to select your desired picture setting from 5 types of picture settings.
- 15 SURF**
 Allows you to select up to a maximum of 10 channels and view quickly the selected channels.
- 16 CURSOR RIGHT**
 Allows you to access the sub-menus and adjust the settings.
- 17 CURSOR DOWN**
 Allows you to select the next item on the menu.
- 18 CHANNEL + / -**
 Selects channel in ascending or descending order.
- 19 MUTE**
 Mutes sound. To restore sound, press button again.
- 20 TIMER**
 Allows you to set the clock to switch to another channel at a specified time while you are watching nother channel or when the set is on standby mode.
- 21 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.
- 22 TELETEXT**
 Allows you to access teletext information. (For detailed description of functions, refer to section on "Using the Teletext")
- 23 INCREDIBLE PICTURE**
 Allows you to view a more vivid and realistic picture with better contrast when the "ON" function is selected.
- 24 PROGRAMME LIST**
 Allows you to navigate through a list of installed programmes for a quick overview of the channels and activate the channel you have selected.

FUNCTIONS OF TV CONTROLS



1	Mains Power button	Switch mains power on or off.
2	Standby Light indicator	Indicate red light when standby mode is activated.
3	Remote Sensor	Acts as a sensor for activating the controls of the TV when remote control handset is aimed at it.
4	Volume ▾ button	Adjust sound volume softer.
5	Volume ▴ button	Adjust sound volume louder.
6	Programme ⏴ button	Select channel in ascending order.
7	Programme ⏵ button	Select channel in descending order. Note - You can enter the main menu by pressing both the Volume ▴ and ▾ buttons at the same time. - Press the Programme ⏴ or ⏵ button to select the next item on the menu. - Press the Volume ▴ or ▾ button to access the sub-menus and adjust the settings.

SELECTING THE MENU LANGUAGE AND AUTOMATIC TUNING OF CHANNELS

10

Before you tune in the channels by the Auto Store method, select the menu language of your choice.

Press button

1. Enter main menu.
2. Press button repeatedly until **INSTALL** is selected.
3. Enter **INSTALL** menu.
4. Enter **LANGUAGE** mode.
5. Select desired language.
6. Exit from language mode.
7. Select **AUTO STORE**.
8. Enter **AUTO** store mode.
9. Start automatic tuning.
10. When tuning is completed, exit menu from screen.

Result on TV Screen



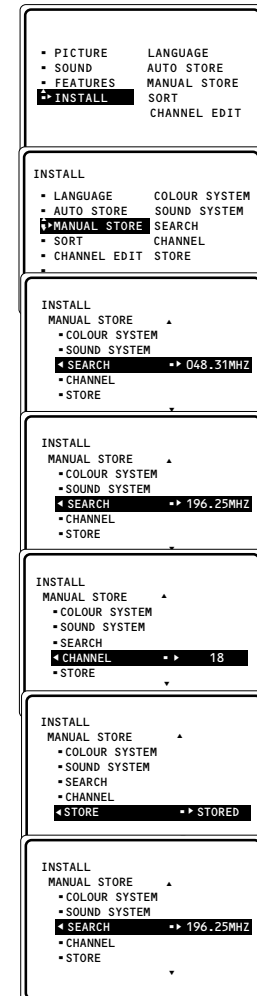
MANUAL TUNING OF CHANNELS

Manual tuning allows you to store each programme manually.

Press button

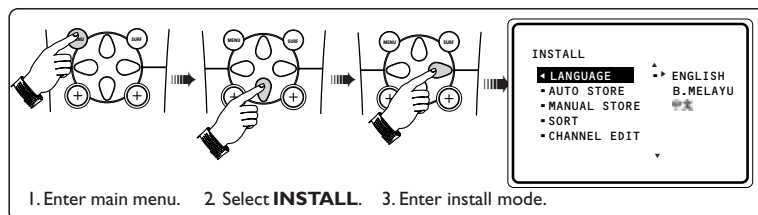
1. Enter main menu.
2. Press button repeatedly until **INSTALL** is selected.
3. Enter **INSTALL** menu.
4. Press button repeatedly until **MANUAL STORE** is selected.
5. Enter **MANUAL STORE** menu.
6. Select **SEARCH**.
7. Start manual tuning of channel. Searching stops once a transmitting channel is found.
8. Select **CHANNEL**.
9. Key in the desired channel number.
10. Select **STORE**.
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.

Result on TV Screen



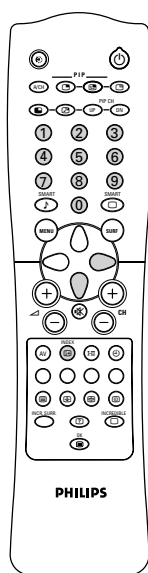
SORTING OF CHANNELS

This feature allows you to change the channel number to your choice for a particular TV station.

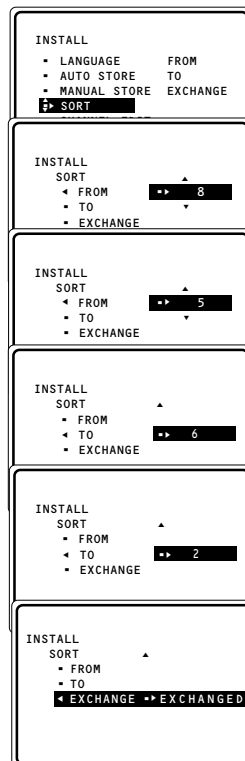


Press button

Result on TV Screen



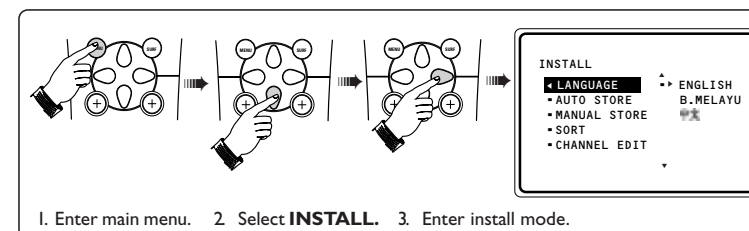
4. Press button repeatedly until **SORT** is selected.
5. Enter **SORT** menu and press **CURSOR RIGHT** button again to enter **FROM** mode.
6. Key in the channel number in the **FROM** column, that is, the channel you want to swap from.
7. Exit from **FROM** mode.
8. Select **TO** and press **CURSOR RIGHT** button to enter **TO** mode.
9. Key in the channel number in the **TO** column, that is, the channel you want to swap to.
10. Exit from **TO** mode.
11. Select **EXCHANGE**.
10. Activate exchange of channels.



EDITING OF CHANNELS

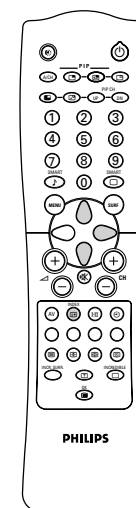
This feature allows you to edit or skip channels which have bad or weak TV signal or channels that you do not watch often.

Note : Once a channel is skipped, you cannot have access to it by the **CHANNEL +** or **-** button. You can only access the channel by the **DIGIT (0-9)** button.

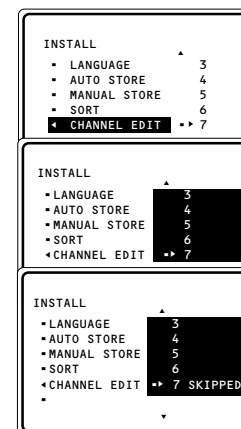


Press button

Result on TV Screen



4. Press button repeatedly until **CHANNEL EDIT** is selected.
5. Enter channel edit mode.
6. Select the channel you want to skip.
7. Activate skipped mode.
8. Exit menu from screen.

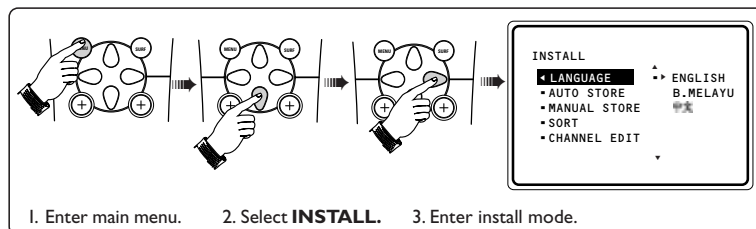


How to add back channels

- Repeat steps 1 to 5 as in "Editing of Channels".
- Select the channel you want to add back by the **CURSOR UP** or **CURSOR DOWN** button.
- Press the **CURSOR RIGHT** button to activate adding back of channel.
- Exit menu from screen by the **OSD** button.

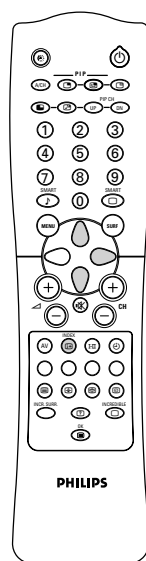
NAMING OF CHANNELS

This feature allows a selection of 40 channels for preset names. It also allows you to enter a new name or modify an existing name of a channel including external channels.

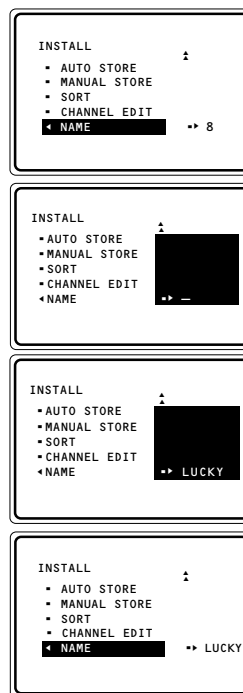


Press button

Result on TV Screen



4. Press button repeatedly until **NAME** is highlighted.
5. Enter **NAME** mode
6. Press button repeatedly to cycle through the characters and select desired character. Move to next character slot by the **(CURSOR RIGHT)** button and select in the next character. (You can enter up to a maximum of 5 characters)
7. Store named channel.
8. Exit menu from screen.

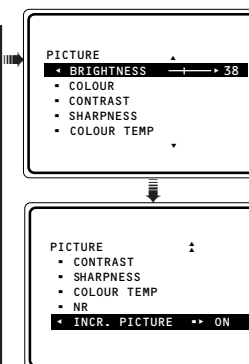


USING THE PICTURE/SOUND MENU

The picture and sound menus allow you to make adjustments to the picture and sound. It also allow you to select and activate other features in the menu.

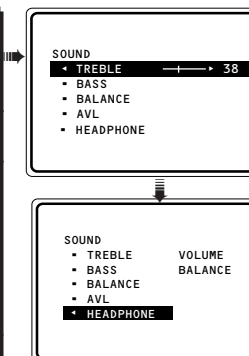
- 1 Press the **(MENU)** button to enter main menu.
- 2 Use the **(CURSOR UP/DOWN)** buttons to select the items on the **PICTURE/SOUND** menu.
- 3 Use the **(CURSOR LEFT/RIGHT)** buttons to access the sub-menus.

Picture menu items	Activities
Brightness	Increase or decrease brightness level.
Colour	Increase or decrease color level.
Contrast	Increase or decrease contrast level until lightest parts of the picture show good detail.
Sharpness	Increase or decrease sharpness level to improve detail in the picture.
Colour Temp	Allows you a choice of 3 picture settings (NORMAL, WARM and COOL).
NR (Noise Reduction)	Allows you to reduce the "noise" (little dots on the picture) from weak signal broadcast. Selecting the "ON" option will make the picture clearer.
Incredible Picture	Selecting the "ON" option enhances the details in the picture. The result is a more dynamic and vivid picture.



Note : **HUE** feature is only applicable to NTSC programmes. The **HUE** item will not appear on the menu if programme is in PAL mode.

Sound menu items	Activities
Treble	Increase or decrease the high frequency level.
Bass	Increase or decrease the low frequency level.
Balance	Adjusts the balance of the right and left speakers' sound output.
AVL (Auto Volume Leveller)	As variation in signal conditions can result in a sudden change in volume during commercial breaks or channel switching, selecting the "ON" function will enable the volume to remain at a standard volume level.
Headphone	Allows you to adjust the volume and balance of the headphone

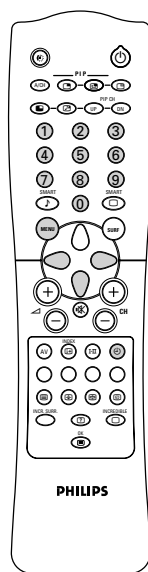


Note : Headphone feature does not work if PIP (Picture-in-Picture) mode is activated.

ACTIVATING 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.



Press button

1. Enter **TIMER** menu.

2. Enter **TIME** mode.

3. Key in the current time
For example, if the current time is 12:30, key digit 1 and 2 in the hour column, followed by digit 3 and 0 in the minute column.

4. Exit from **TIME** mode.

5. Select **START TIME**.

6. Enter the **START TIME** mode.

7. Key in the time you want the programme to be switched on.

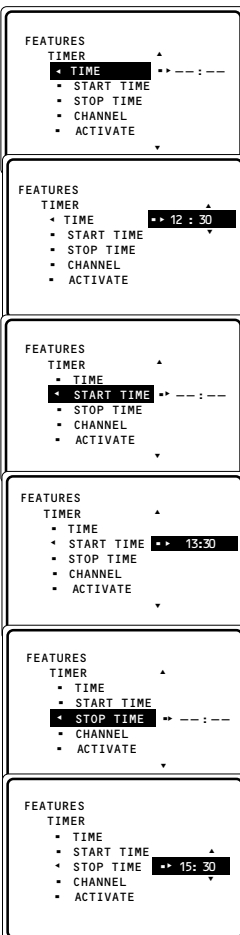
8. Exit from **START TIME** mode.

9. Select **STOP TIME**.

10. Enter **STOP TIME** mode.

11. Key in the time you want the programme to be switched off.

Result on TV Screen

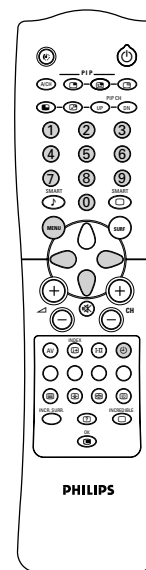
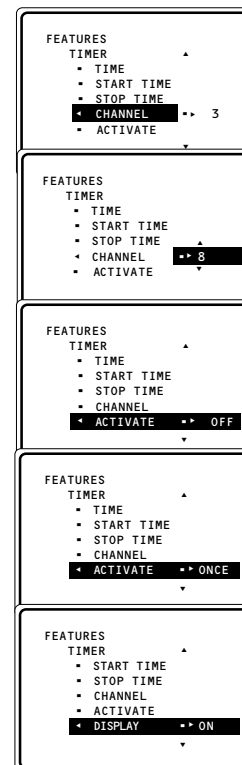


ACTIVATING THE TIMER (CONTINUE)

Press button

11. Exit from **STOP TIME** mode.
12. Select **CHANNEL**.
13. Enter the **CHANNEL** mode.
14. Key in the channel you want to switch to.
15. Exit from **CHANNEL** mode.
16. Select **ACTIVATE**.
17. Activate timer. You can select to activate timer by **DAILY** or **ONCE** mode.
18. Select **DISPLAY**.
19. Select **ON** mode if you want to display the current time on the TV screen.
20. Exit menu from screen.

Result on TV Screen



Note

30 seconds before the timer is activated, a message indicating the time left for the channel switch will appear on the screen. To disable the channel switch, press any button on the remote control.

ACTIVATING THE CHILD LOCK (ACCESS CODE)

The Child Lock feature allows you to lock channels to prevent their children from watching programmes they deem undesirable.

Note :You cannot have access to the locked channels via the top controls of the TV set. You can only have access to the locked channels via the remote control.

1. Enter main menu. 2. Select **FEATURES** . 3. Enter **FEATURES** menu.

FEATURES	
• TIMER	TIME
• CHILD LOCK	START TIME
• PIP	STOP TIME
• FORMAT	CHANNEL
• BLUE MUTE	ACTIVATE

4. Select **CHILD LOCK** .

FEATURES	
• CHILD LOCK	ACCESS CODE
• PIP	---
• FORMAT	
• BLUE MUTE	

5. Enter **ACCESS CODE** mode.

6. Key in access code **0711** (0711 is the default access code).A message **INCORRECT** will appear.

FEATURES	
• CHILD LOCK	ACCESS CODE
• PIP	X X X X
• FORMAT	INCORRECT
• BLUE MUTE	

7. Key in **0711** the second time. When the message **CORRECT** appears, the **CHILD LOCK** menu is now accessible.

FEATURES	
• CHILD LOCK	ACCESS CODE
• PIP	X X X X
• FORMAT	CORRECT
• BLUE MUTE	

You can now proceed to change the access code of your choice.

FEATURES	
• CHILD LOCK	▲
• LOCK CHANNEL	→ 2
• CHANGE CODE	3
• CLEAR ALL	4
	5
	6

ACTIVATING THE CHILD LOCK (CHANGE CODE)

8. Select **CHANGE CODE**.

FEATURES	
• CHILD LOCK	
• LOCK CHANNEL	ENTER
• CHANGE CODE	NEW CODE
• CLEAR ALL	---

9. Enter **CHANGE CODE** mode.

10. Key in the access code of your choice.

FEATURES	
• CHILD LOCK	
• LOCK CHANNEL	ENTER
• CHANGE CODE	NEW CODE
• CLEAR ALL	X X X X

11. Confirm access code.

FEATURES	
• CHILD LOCK	
• LOCK CHANNEL	CONFIRM
• CHANGE CODE	CODE
• CLEAR ALL	X X X X

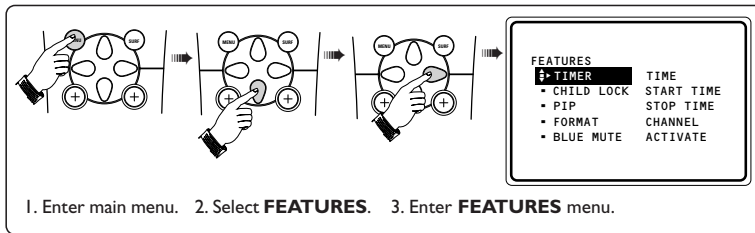
When the new code is confirmed, the message **CORRECT** will appear.

FEATURES	
• CHILD LOCK	
• LOCK CHANNEL	CONFIRM
• CHANGE CODE	CODE
• CLEAR ALL	X X X X
	CORRECT

12. Exit menu from screen.

Note : After you have exit menu from screen and you want to enter child lock menu again , you need to key the new access code only once. If you have forgotten the new access code, key in 0711 twice to enter the child lock menu. Upon entering the child lock menu, you can proceed to change code again.

ACTIVATING THE CHILD LOCK (LOCK CHANNEL)

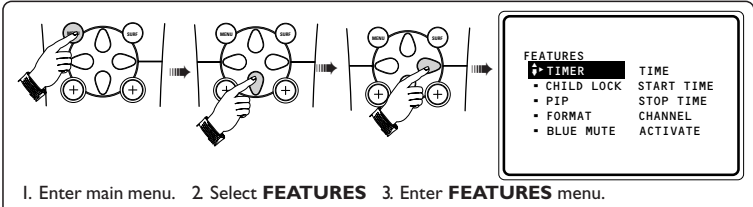


Press button	Result on TV Screen
4. Select CHILD LOCK .	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE -----
5. Enter ACCESS CODE mode.	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE x x x x
6. Key in access code.	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE CORRECT
7. Enter LOCK CHANNEL mode.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 2 3 4 5 6
8. Select the channel you want to block.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 3 4 5 6 7
9. Activate blocking of channel. A keylock symbol will appear beside the channel number indicating that it is locked.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 3 4 5 6 7
10. Exit menu from screen.	

Note :You cannot have access to the locked channels via the top controls of the TV set. You can only have access to the locked channels via the remote control. If you attempt to enter the **INSTALL** menu after locking a channel, a message "Enter **ACCESS CODE**" will appear on the screen. You need to enter the **ACCESS CODE** to enable you to enter the **INSTALL** menu.

ACTIVATING THE CHILD LOCK (CLEAR ALL)

To unlock channels that you have locked, enter the Child Lock menu and activate the **CLEARALL** mode.



Press button	Result on TV Screen
4. Select CHILD LOCK .	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE -----
5. Enter ACCESS CODE mode.	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE x x x x
6. Key in access code.	 FEATURES • TIMER • CHILD LOCK • PIP • FORMAT • BLUE MUTE ACCESS CODE CORRECT
7. Press button repeatedly until CLEAR ALL is selected.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 2 3 4 5 6
8. Activate clearing of all locked channels.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 2 3 4 5 6
9. Exit menu from screen.	 FEATURES CHILD LOCK • LOCK CHANNEL • CHANGE CODE • CLEAR ALL 2 3 4 5 6

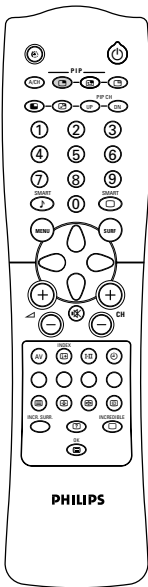
Note
 You can also unlock individual channel by the **LOCK CHANNEL** menu.

- Repeat **step 1 to 7** as in "**ACTIVATING THE CHILD LOCK (LOCK CHANNEL)**".
- Select the channel you want to unlock by the **0** or **0** (**CURSOR UP / DOWN**) buttons.
- Press the **0** (**CURSOR RIGHT**) button to unlock channel (the keylock symbol will disappear).

USING THE SURF CONTROL

A list or series of previously viewed channels can be selected with the **SURF** button. This feature allows you to switch between different TV programmes that currently interest you. You can set up to a maximum of eight channels in the **SURF** list.

How to add a channel to the surf list

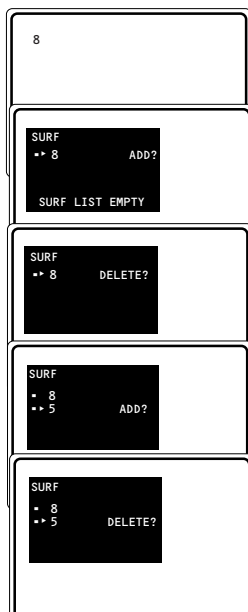


Press button

1. Select a channel you want to add to the surf list.
2. Enter **SURF** menu.
3. Add selected channel to the surf list.
4. After you have completed adding the selected channels to the surf list, exit menu from screen.

Repeat steps 1 - 3 to add more channels to the surf list.

Result on TV Screen



Note : To view the the selected channels in the surf list, press the **SURF** button repeatedly to cycle through the channels.

How to delete a channel from the surf list

1. Press the **SURF** button to display surf list.
2. Press the **SURF** button repeatedly to cycle through the surf list and select the channel you want to delete.
3. Press the **CURSOR RIGHT** button to delete channel from the surf list.
4. Repeat all the above steps if you want to delete more channels from the surf list.

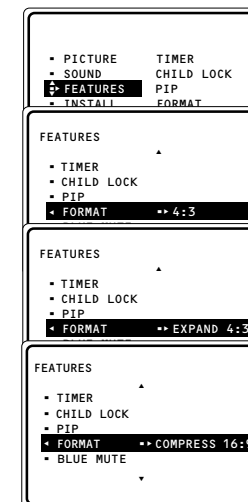
USING THE SCREEN FORMAT

You can have a choice of different formats for your viewing pleasure, namely :- **4:3** mode, **EXPAND 4:3** mode and **COMPRESS 16:9** mode through the **FORMAT** menu.

How to access the Screen Format

1. Press the **MENU** button to enter main menu and press the **CURSOR DOWN** button repeatedly until **FEATURES** is selected.
2. Press the **CURSOR RIGHT** button to enter **FEATURES** menu.
3. Press the **CURSOR DOWN** button repeatedly until **FORMAT** is selected.
4. Press the **CURSOR RIGHT** button repeatedly to cycle through the different formats (**4:3**, **Expand 4:3** or **Compress 16:9**) and select your desired format.

Note : You can also select your desired Screen Format by the **CURSOR UP** and **CURSOR DOWN** buttons.



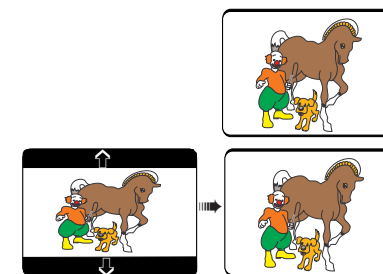
When to use the Screen Formats

4:3 format

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

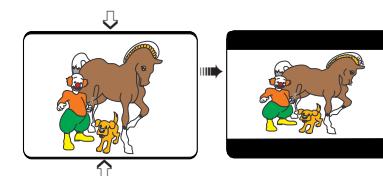
Expand 4:3 format

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.



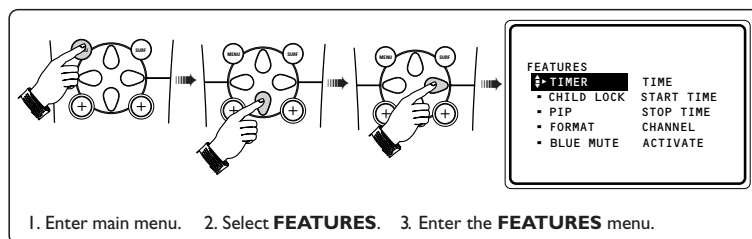
Compress 16:9 format

Select the Compress 16:9 format if you want to compress full screen movie images into letterbox format. When this format is selected, black horizontal bars can be seen at the top and bottom of the TV screen.

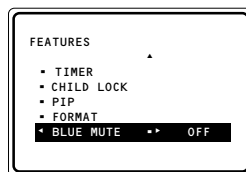


ACTIVATING THE BLUE MUTE CONTROL

The Blue Mute feature indicates to you the absence of signal in the transmission when the "ON" option is activated. Upon the detection of absence of signal, the TV screen will turn blue in colour.



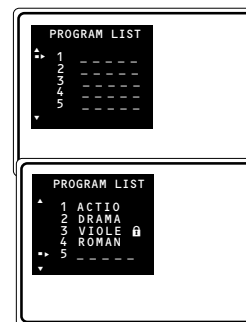
- Press the (**CURSOR DOWN**) button repeatedly until **BLUE MUTE** is selected.
- Press the (**CURSOR RIGHT**) button to select **ON** to activate blue mute feature.
- Press the (**OSD**) button to exit menu from screen.



USING THE PROGRAMME LISTING FEATURE

Programme listing feature allows you to navigate through a list of installed programmes for a quick overview of the channels and activate the channel you have selected.

- Press the (**PROGRAMME LIST**) button to display the list of installed programmes. The current channel is highlighted.
- Press the (**CURSOR UP**) or (**CURSOR DOWN**) button to cycle through the programme list and highlight the channel number you want to activate.
- Press the (**CURSOR RIGHT**) button to activate the channel you have selected.
- Press the (**OSD**) button to exit menu from screen.



SMART PICTURE AND SMART SOUND CONTROL

SMART PICTURE feature offers you a choice of 5 picture settings, namely, **RICH**, **NATURAL**, **SOFT**, **PERSONAL** and **MULTIMEDIA**.

SMART SOUND feature offers you a choice of 4 sound settings, namely, **THEATRE**, **MUSIC**, **VOICE** and **PERSONAL**.

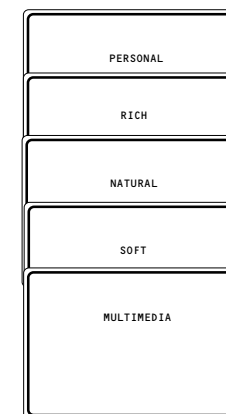
Note : If you want to view the pre-set settings for Brightness, Colour, Contrast and Sharpness levels, for Smart Picture and pre-set settings for Treble and Bass levels for Smart Sound, you must press the (**OSD**) button for 5 seconds.

Press (**SMART PICTURE**) or (**SMART SOUND**) button repeatedly to cycle through the settings to select your desired mode.

Definition of Picture Settings

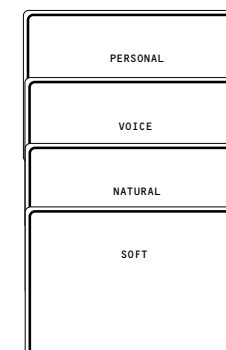
- PERSONAL** : Picture settings are set to your preference.
- RICH** : Emphasize very vibrant colours.
(Suitable for AV mode in brightly-lit room)
- NATURAL** : Emphasize original colours.
- SOFT** : Emphasize "warm" colours.
(Suitable for dimly-lit room condition and gives cinema-like effect when light is switched off).
- MULTIMEDIA** : Emphasize "soft" colours. (Suitable for playing computer games, surfing, etc.)

Note : The **PERSONAL** setting is the setting that you set up using the Picture menu in the main menu. This is the only setting in the Smart Picture settings that can be changed. All the other settings are pre-set at the factory.



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)



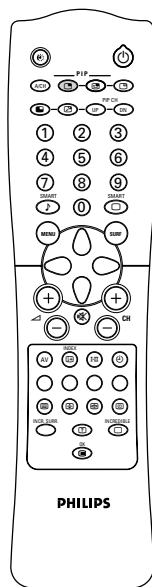
ACTIVATING THE PIP (PICTURE-IN-PICTURE) AND DOUBLE WINDOW CONTROL

Picture-in-Picture feature allows you to call up a subscreen within your main screen enabling you to watch two channels at the same time.

Double Window feature allows you to divide the main screen into two sub-screens enabling two channels to be watched simultaneously.

Note : PIP and Double Window features cannot be activated when teletext mode is on.

How to switch on the PIP/Double Window screen



- Press the **PIP On/Off** button to switch on PIP mode. (A normal size PIP screen appears).



- Press the **PIP On/Off** button the second time to change the normal size PIP screen to a smaller size.



- Press the **PIP On/Off** button the third time to switch to Double Window screens in 4:3 format.



- Press the **PIP On/Off** button the fourth time to switch to Double Window screens in 16:9 format.



Note : When the programme on the PIP screen is in NTSC mode or transmission, the picture size appears smaller. Likewise, when programme on the main screen is in NTSC mode or transmission, the picture size appears smaller.

- Press the **PIP On/Off** button the fifth time to switch off 16:9 Double Window screens.



16:9 format (NTSC mode)



4:3 format (NTSC mode)

ACTIVATING THE PIP (PICTURE-IN-PICTURE) CONTROL

How to select the various external sources

- Press the **PIP On/Off** button to switch on PIP screen.



- Press the **PIP Source** button repeatedly to cycle through the various external connections and select the desired PIP source.

How to select a PIP channel

- Press the **PIP On/Off** button to switch on PIP screen.



- Press the **PIP Up** or **PIP Down** button to select a PIP channel in ascending or descending order.

How to freeze the PIP screen

- Press the **PIP On/Off** button to switch on PIP screen.
- Press the **PIP Freeze** button once to freeze the PIP screen. Freezing the PIP screen allows you to view a programme in the still mode. For example, you may want to write down some information from the PIP screen, freezing the screen will allow you time to do so.
- Press the **PIP Freeze** button the second time to unfreeze the PIP screen.

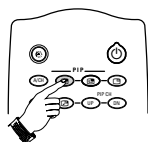


PIP Freeze



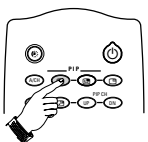
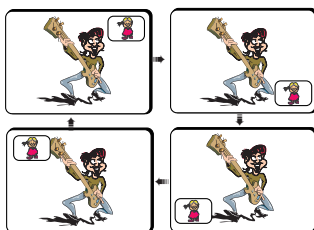
PIP Unfreeze

ACTIVATING THE PIP (PICTURE-IN-PICTURE) CONTROL



How to position the PIP screen

- Press the **PIP On/Off** button to switch on PIP screen.
- Press the **PIP Position** button repeatedly to your desired position. (You can choose the PIP screen to be on the top left corner, top right corner, bottom right corner or the top bottom left corner).



How to swap the PIP screen and the main screen

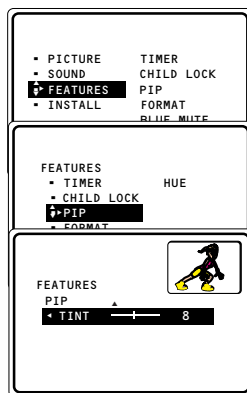
- Press the **PIP On/Off** button to switch on PIP screen.
- Press the **PIP Swap** button to swap the programme in the PIP screen and the programme in the main screen.



How to adjust the PIP Hue setting

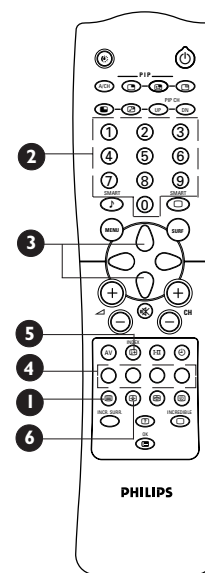
- Press the **MENU** button to enter main menu.
- Press the **CURSOR DOWN** button repeatedly until **FEATURES** is selected.
- Press the **CURSOR RIGHT** button to enter the **FEATURES** menu.
- Press the **CURSOR DOWN** button repeatedly until **PIP** is selected.
- Press the **CURSOR RIGHT** button to enter **PIP** menu.
- Press the **CURSOR LEFT** or **CURSOR RIGHT** button to adjust **HUE** setting to your desired level.
- Press the **OSD** button to exit menu from screen.

Note : Hue adjustments in the PIP programmes will only take effect if programmes are in NTSC mode.



USING THE TELETEXT

If a TV channel broadcast contains teletext information, each channel that broadcasts teletext transmits a page (index page) with information on how to use the teletext system, usually on page 100. The system transmitted is indicated in the option line at the bottom of the screen.



Press button

Result on TV Screen

- On/Off teletext and Superimpose teletext page over TV programme

Press the button once to switch on teletext display. (A channel in which teletext is being transmitted must be selected). Press the button the second time superimpose the teletext page over the TV programme. Press the button the third time to exit teletext mode.

- Selecting a teletext page

1 2 3
4 5 6
7 8 9
0

Key in the required teletext page (3 digits). The page number is displayed at the top left corner of the screen. When the teletext page is located, the counter stops searching. If the counter keeps searching, it means that the page is not available for selection. If you make a mistake in keying the page number, you have to complete keying the 3-digit number before re-keying the correct page number.

- Accessing a teletext page

Press the **CURSOR UP** button to display the next page and the **CURSOR DOWN** button to display the previous page.

- Direct Access to an item or corresponding pages

0 0 0 0

The 4-colour buttons allow you to access directly an item or corresponding pages.

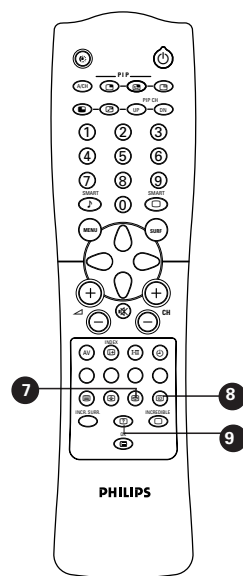
- Main Index

Press the button to return to the main index page.

- Enlarge

Press the button once to enlarge and view the top half of the page. Press the button the second time to enlarge and view the bottom half of the page. Press the button the third time to return to normal size page.

USING THE TELETEXT (CONTINUE)



Press button

7 Hold

8 Subcode/Time Display

9 Reveal/Conceal

Result on TV Screen

A selected page sometimes contains a few sub-pages. The sub-page will automatically move to the next sub-page after about 20 seconds. The total number of sub-pages are indicated at the top right hand corner of the screen. Press the button once to hold page and the second time to release holding of page.

By adding a sub-code, you can call up a sub-page and hold it. Enter the teletext page number (the teletext page must have sub-pages in it). Press the button and "— — —" is displayed at the upper left hand corner. Enter the subpage with 4 digits : e.g. 0003 for 3/4 (third of 4 pages). You can also use the Cursor Left and Right buttons to access the sub-page. To cancel the subcode, press button again.

Pressing this button during normal viewing (only applicable to those channels that is broadcasting teletext), the time will be displayed at the top right hand corner of the screen.

Press the button once to reveal hidden information (solutions to puzzles, riddles, etc). Press the button the second time to conceal information. This button is applicable only to teletext page with puzzles, riddles, etc.)

How to select your favourite page

This feature allows you select 4 of your favourite or most commonly viewed page and stored them in the favourite page selection. You can then access directly your favourite page by the colour buttons without having to key in the page number.

1. Press the **TELETEXT ON/OFF** button to enter teletext mode.
2. Press the **(MENU)** button to enter favourite page selection. **Note** :The colour alphabets at the bottom of the screen is now changed to page numbers.
3. Key in your favourite page by the **(DIGIT 0-9)** buttons.
4. Press the **(INDEX/OSD)** button to highlight pager numbers.
5. Select the colour button on your remote control you want your favourite page to be stored.
6. Repeat **step 3 to 5** to select and store other favourite pages.

SPECIFICATIONS

	29PT6361	34PT6361
Picture tube screen size	72 cm	85 cm
Picture tube visible area	68 cm	80 cm
Audio Output Speaker Subwoofer	2 x 10 W 10 W	
Set Dimensions Width Depth Height	79 cm 50 cm 59 cm	89 cm 56 cm 69 cm
Net Weight of Set	approximate 45 kg	approximate 64 kg

TV System

Colour	Sound
PAL	B/G
PAL	D/K
PAL	I
NTSC (4.43)	B/G
NTSC (3.58)	M
SECAM	B/G
SECAM	D/K

Suggested Colour / Sound Systems

Destination	Colour System	Sound System
Singapore	PAL	B/G
Hong Kong	PAL	I
Middle East	SECAM	B/G, D/K
New Zealand	PAL	B/G
Australia	PAL	B/G
India	PAL	B/G
South Africa	PAL	I

Note

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

4. Mechanical instructions

4.1 Connect the ComPair cable

1. Connect the ComPair cable to connector 0229 (located left from the 'rear cinch connectors').
2. Start ComPair and perform the diagnosis (for more info see chapter 5).

4.2 Remove the rear cover

1. Remove all the fixation screws of the rear cover.
2. Now remove the rear cover.

4.3 Service positions

4.3.1 Service positions of the Large Signal Panel (LSP)

Position 1: For better accessibility of the LSP, do the following:

1. Remove the LSP-bracket from the bottom tray by pulling it backwards.
2. Hook the bracket in the first row of fixation holes of the cabinet bottom. In other words reposition the bracket from [1] to [2].

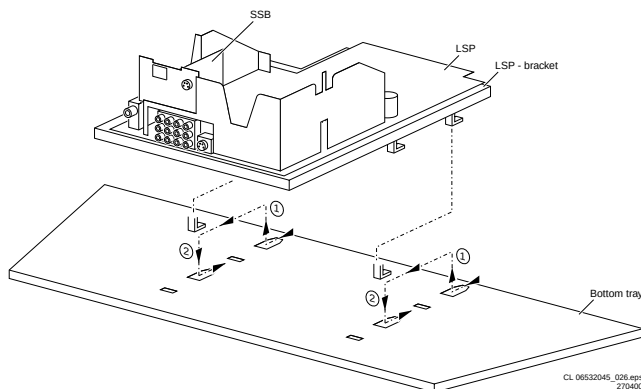


Figure 4-1

Position 2: To get access to the bottom side (solder side) of the LSP, do the following:

1. Disconnect the degaussing coil from the LSP by removing the cable from connector 0211 [1].
2. Release some of the wiring from their fixation clamps, in order to get room for repositioning the LSP.
3. Turn the chassis tray 90 degrees counter clockwise [2].
4. Flip the tray with the rear I/O panel towards the CRT [3].
5. Place the hook of the tray in the fixation hole at the right side of the cabinet bottom [4] and pull the chassis tray forward.

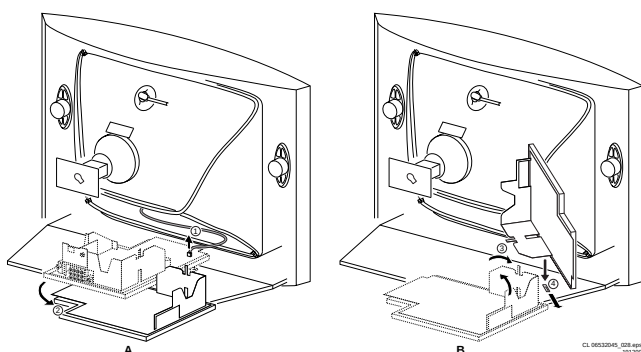


Figure 4-2

4.3.2 Service position of the Small Signal Board (SSB)

All relevant test points can be accessed with the SSB in its original position, but for ease of use a 'SSB extension board' is available under number 9965 000 05769.

Before usage of this board, first the 'SSB top-bracket' has to be taken out:

1. Put the LSP in service position 1 (as described earlier).
2. **Carefully** release the 2 fixation clamps [1].
3. Lift the 'SSB top-bracket' from the cooling plate [2].

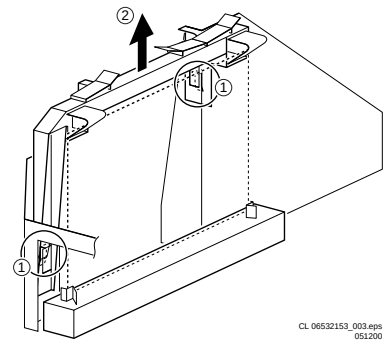


Figure 4-3

Then the complete panel must be taken out from the SIMM-connector.

Therefor release the 2 metal clamps [2] at both sides of the SIMM-connector and take the complete SSB out (it 'hinges' in the SIMM-connector).

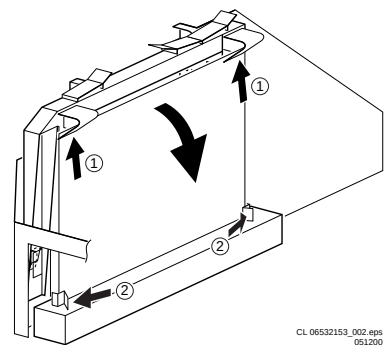


Figure 4-4

4.3.3 Removing the Top Control panel

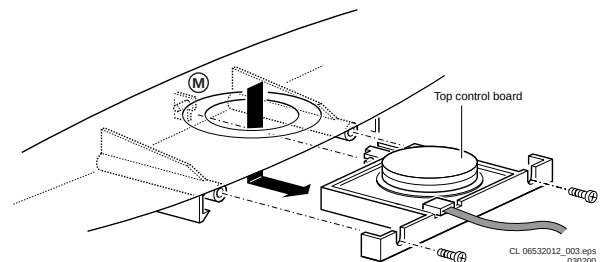


Figure 4-5

1. Remove the two fixation screws, which hold the panel.
2. Pull the board backward (w.o.w. release it from the front hinge).
3. Lift the board out of its bracket after releasing the 2 fixation clamps (at the connector side).

4.3.4 Removing the Side I/O module

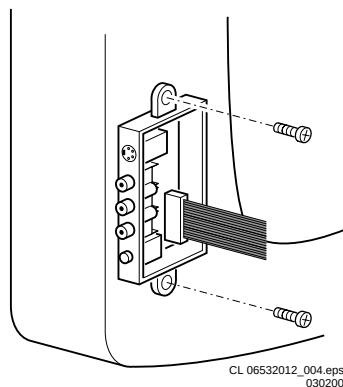


Figure 4-6

1. Remove the complete Side I/O-assembly after unscrewing the 2 fixation screws.
2. Lift the board from its bracket after releasing the 2 fixation clamps.

4.3.5 Removing front interface

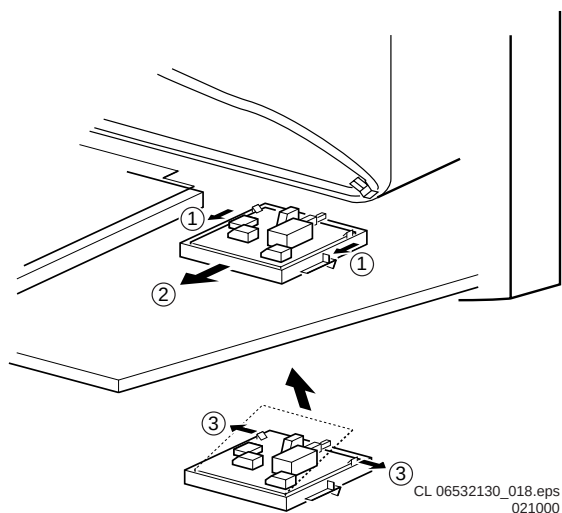


Figure 4-7

1. Release the two fixation clamps [1] by pushing them upward.
2. At the same time, the complete assy must be pulled backward [2].
3. If the board has to be removed, release the 2 clamps at the sides of the bracket and lift panel out [3].

Note: In case the clamps break off, the module can be mounted to the cabinet with 2 standard cabinet screws

4.3.6 Removing the PIP/DW/Guide+ module

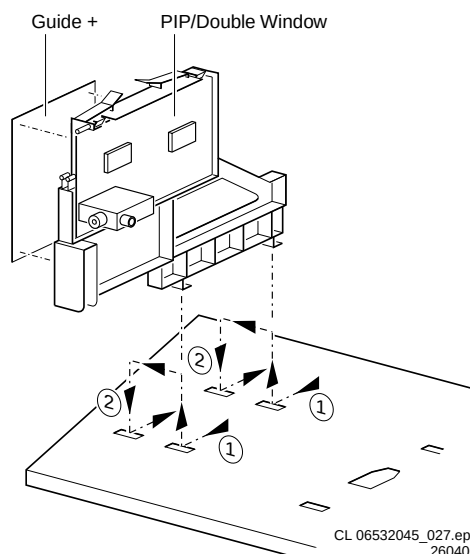


Figure 4-8

1. Remove the module bracket from the bottom tray by pulling it backward.
2. Hook the bracket in the first row of the cabinet bottom. In other words reposition the bracket from [1] to [2] (see figure above).

4.3.7 Removing the PIP/DW-panel

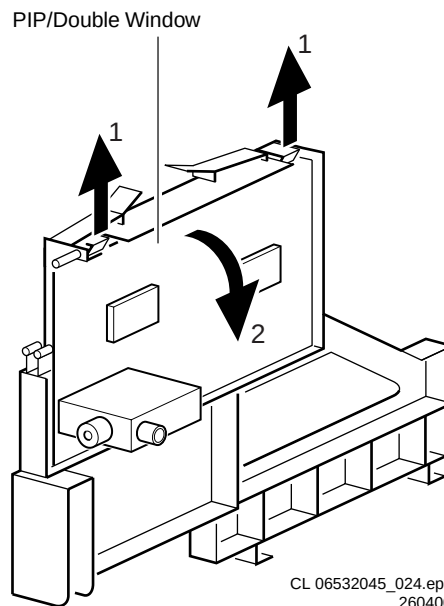


Figure 4-9

Lift the board out of its bracket after releasing the 2 fixation clamps.

4.3.8 Removing the DC-shift/DAF panel

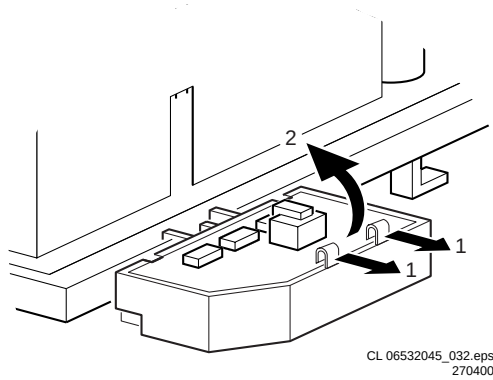


Figure 4-10

1. The complete module can be removed from the LSP-bracket by pressing its fixation clamp (located at the height of connector 0233, **on the LSP-bracket**), while sliding the module in the direction of the CRT.
2. The board can easily be lifted out [2] of the bracket after releasing the 2 fixation clamps [1].

4.3.9 Removing the Mains Harmonic panel (if present)

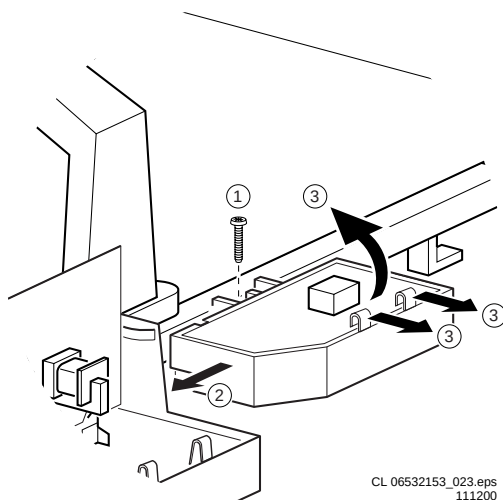


Figure 4-11 (figure can deviate slightly)

1. Remove the complete module from the LSP-bracket after removal of the fixation screw [1] and slide it in the opposite direction of the CRT [2].
2. Lift the board from its bracket after releasing the 2 fixation clamps [3].

4.4 Mounting the rear cover

Before mounting the rear cover, perform the following checks:

- Check whether the mains-cord is mounted correctly in its guiding brackets.
- Check whether all cables are in their original position.

5. Fault finding and repair tips

This chapter consists of the following paragraphs:

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. Repair tips.

5.1 Test points

The A10 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:

- A1-A2-A3, etc.: Test points for the audio processing circuitry [A6, C6]
- C1-C2-C3, etc.: Test points for the control circuitry [C8]
- F1-F2-F3, etc.: Test points for the frame drive and frame output circuitry [A3] and Double Window
- I1-I2-I3, etc.: Test points for the intermediate frequency circuitry [A4, C1]
- L1-L2-L3, etc.: Test points for the line drive and line output circuitry [A2]
- P1-P2-P3, etc.: Test points for the power supply [A1]
- S1, S2, S3, etc.: Test points for the synchronisation circuitry [C1]
- V1-V2-V3, etc.: Test points for the video processing circuitry [B, C2, C3]

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

Measurements are performed under the following conditions:

- Service mode: SDM.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service modes

5.2.1 Service Default Mode (SDM)

Purpose

- To provide a situation with predefined settings to get the same measurement results as given in this manual.
- Start the 'Blinking LED' procedure.
- Have the possibility to override the 5V-protection.

Specification

- Tuning frequency 475.25 MHz for PAL/SECAM sets or at channel 3 (61.25 MHz) for NTSC-sets.
- All picture settings at 50 % (brightness, colour, contrast, hue).
- All sound settings at 50 % except volume at 25 % (so bass, treble, balance at 50 %, volume at 25 %).
- All service-unfriendly modes are disabled, like timer, sleep timer, parental lock, blue mute, hospitality mode and no-ident timer (normally the set is automatically switched off when no video signal - IDENT - was received for 15 minutes).

Entering

- Enter via a standard RC-handset the code '062596' followed by the 'MENU' button.
- Via ComPair.
- Via grounding the 'Front Detect'-line **during switch ON** (shorting pins 1 and 7 of the Side I/O connector 0936 or jumpers 9261 and 9262 on the LSP).

- By the 'DEFAULT' button on the DST while the set is in the normal operation mode.

CAUTION: Entering SDM by grounding the 'Front Detect'-line will override the 5V-protection. **This should only be done for a short period of time.** In case of SW-protections (errors 1 - 4), the set will shutdown in 15 s.

When doing this, the service-engineer must know what he is doing as it could lead to damaging the set.

After entering SDM, the following screen will be shown with 'SDM' at the upper right side for recognition.

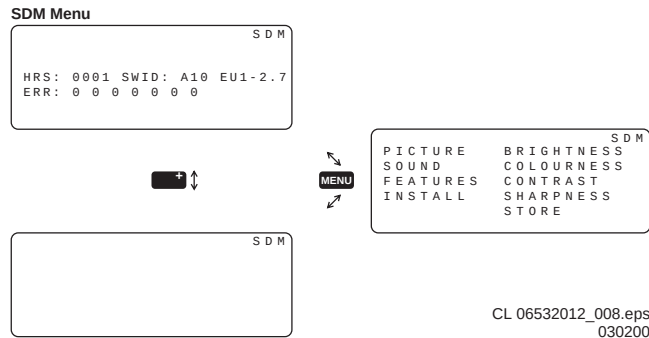


Figure 5-1

Explanation

Access to normal user menu

Pressing the 'MENU' button on the remote control, switches between the SDM and the normal user menus (with the SDM mode still active in the background).

Error buffer

Pressing the 'OSD' button [i+] of the remote control, shows / hides the error buffer. OSD can be hidden to prevent interference with oscillogram measurements.

Access to SAM

By pressing the 'VOLUME +' and 'VOLUME -' buttons on the local keyboard **simultaneously for a few seconds**, the set toggles from SDM to SAM.

Exiting

There are 2 ways to exit this mode:

- Switch the set to 'STANDBY', the error buffer will also be cleared (by switching the set OFF-ON with the mains switch, the set will come up again in the SDM).
- By pressing the 'EXIT' button on the DST.

5.2.2 Service Alignment Mode (SAM)

Purpose

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

Specification

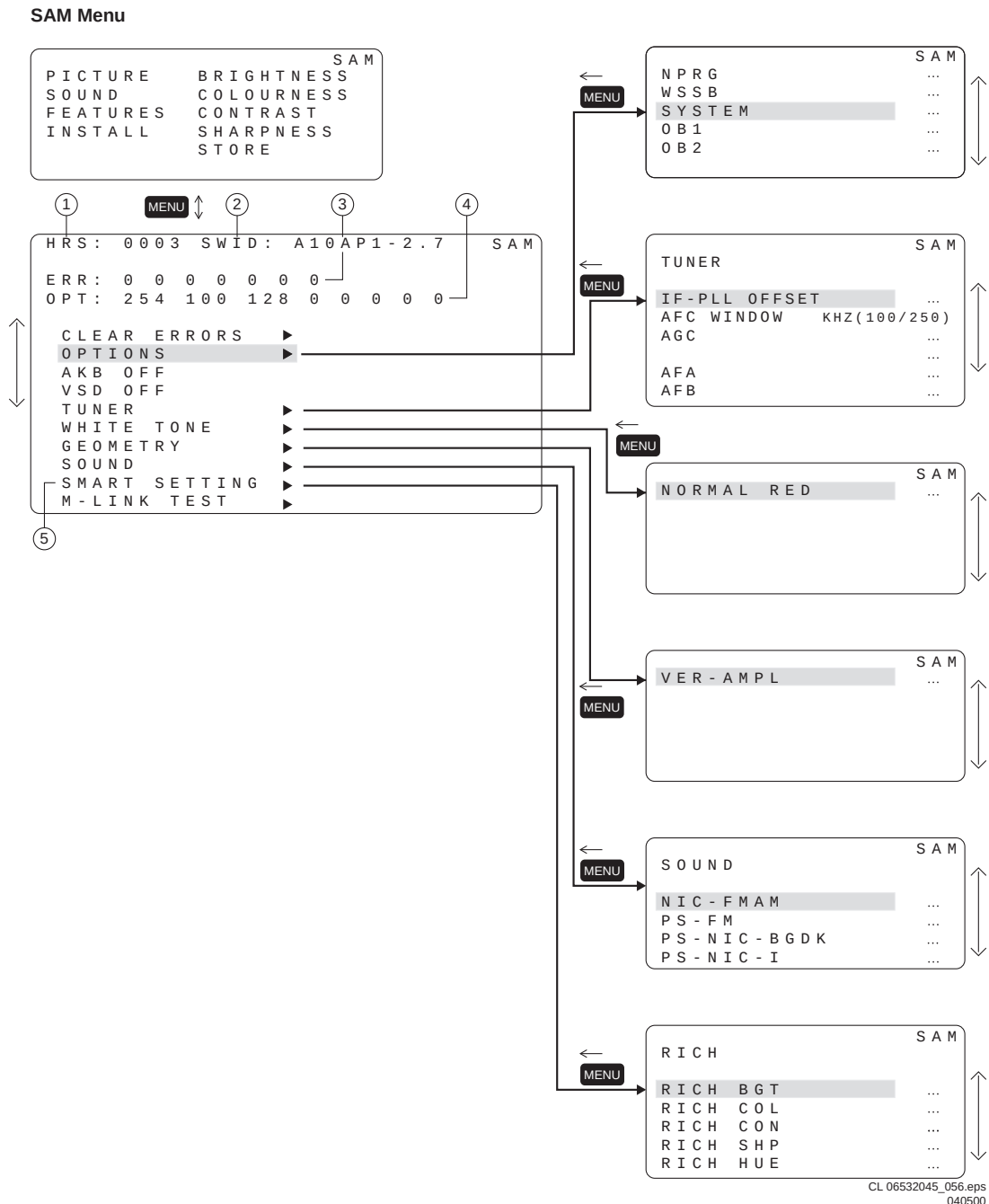
- Software alignments (see chapter 8).
- Option settings (see chapter 8).
- Error buffer reading and erasing. The most recent error code is displayed on the left side.
- Operation counter.
- Software version.

Entering

- Enter via a standard RC-handset the code '062596' followed by the 'OSD' button [i+].
- Via ComPair.

- By the 'ALIGN' button on the DST while the set is in the normal operation mode.

The following screen will be shown, with 'SAM' at the upper right side for recognition.



CL 06532045_056.eps
040500

Figure 5-2

Explanation

The Service Alignment Mode menu will now appear on the screen. The following information is displayed:

- Operation hours timer (hexadecimal).
- Software identification of the main micro controller (A10BBC-X.Y).
 - A10 is the chassis name.
 - BBC is 2 letter and 1 digit combination to indicate the software type and the supported languages.
 - X = main version number.
 - Y = subversion number.
- Error buffer (7 errors possible).
- Option bytes (8 codes possible), summary of options are explained further on.
- Sub menus are listed in a scroll-menu.

Menu control

Menu items can be selected with the 'CURSOR UP/DOWN' key. The selected item will be highlighted. When not all menu items fit on the screen, moving the 'CURSOR UP/DOWN' will display the next/previous menu items.

With the 'CURSOR LEFT/RIGHT' keys, it is possible to:

- (De)activate the selected menu item (e.g. GEOMETRY).
- Change the value of the selected menu item (e.g. VER-SLOPE).
- Activate the selected submenu (e.g. SERV-BLK).

Access to normal user menu

Pressing the 'MENU' button on the remote control switches between the SDM and the normal user menus (with the SAM

mode still active in the background). Pressing the 'MENU' key in a submenu will go to the previous menu.

The menus and submenus

- CLEAR ERRORS. Erasing the contents of the error buffer. Select the CLEAR ERRORS menu item and press the 'CURSOR RIGHT' key. The content of the error buffer is cleared.
- The functionality of the OPTIONS and ALIGNMENTS (TUNER, WHITE TONE, SOUND, GEOMETRY and SMART SETTING) sub menus is described in chapter 8.

Exiting

There are 2 ways to exit this mode:

- Switch the set to 'STANDBY', the error buffer will NOT be cleared (by switching the set OFF-ON with the mains switch, the set will come up again in the SAM).
- By pressing the 'EXIT' button on the DST.

5.2.3 Customer Service Mode (CSM)

Purpose

The 'Customer Service Mode' is a special service mode, which can be activated and deactivated by the customer upon request of the service technician/dealer during a telephone conversation, in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.

Entering

The Customer Service Mode will switch ON after pressing the 'MUTE' key on the remote control handset and any of the top control buttons on the TV for at least 4 seconds simultaneously. This activation only works if there is no menu on the screen.

Explanation

After switching on the Customer Service Mode the following screen will appear:

CSM Menu

```

1  HRS: 0005 SWID: A10US1-2.7
2  CODES: 0 0 0 0 0 0 0
3  OPT: 254 100 128 0 0 0 0 0
4  SYSTEM: EUROPE 11 SOUND: MONO
5  NO SIGNAL      12 VOLUME: ...
6                  13 BALANCE: + / - ...
7                  14 HUE: + / - ...
8                  15 COLOUR: ...
9                  16 BRIGHTNESS: ...
10 SOURCE: 1      17 CONTRAST: ...
  
```

CL 06532045_041.eps
020500

Figure 5-3

Line 1:

HRS: Hexadecimal counter of operating hours.

Example: 1B (hex) => 0001 1011 (bin) => 27 hrs. (dec).

Standby hours are not counted as operating hours.

SWID: Software identification of the main micro controller (see paragraph 5.2.2). Details on available software versions can be found in the chapter 'Software Survey' of the quarterly publication 'Product Survey - Colour Television'.

Line 2:

Error code buffer (for more details see paragraph 5.5).

Displays the last 7 errors of the error code buffer.

Line 3:

Software and hardware functionality is controlled by option bits. An option byte or option number represents 8 of those bits. Each option number is displayed as a decimal number between 0 and 255. The set may not work properly when an incorrect option code is set. See chapter 8.4 for more information on correct option settings

Line 4:

Indicates which colour and sound system is installed for the selected pre-set:

Line 5:

Indicates that the set is not receiving an 'ident' signal on the selected source.

Note: On some models, BLUE MUTE is displayed (if the BM option is ON) when no signal is received.

Line 6:

Indicates whether the SLEEPTIMER function is ON/OFF.

Line 7:

Indicates whether the CHILD LOCK function is ON/OFF.

Line 8:

Indicates whether the current pre-set is defined as SKIPPED or NON-PREFERRED.

Line 9:

Indicates whether the HOTEL MODE is activated (when present).

Line 10:

Indicates which SOURCE is installed for this pre-set: EXT1, SVHS2, EXT2 or Tuner.

Line 11:

Indicates which sound mode is installed for this pre-set: Mono, NICAM, Stereo, L1, L2, SAP, Virtual or Digital.

Line 12 to 17:

Value indicates parameter levels at CSM entry.

Exiting

The Customer Service Mode will switch OFF after pressing any key of the remote control handset (with exception of the 'P+' and 'P-' keys) and switching OFF the TV set with the mains switch.

5.3 Problems and solving tips (related to CSM)

5.3.1 Picture problems

Picture too dark or too bright

- Press "Smart Picture" button on the remote control. In case the picture improves, increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes
- After switching on the Customer Service Mode the picture is OK. Increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes

White line around picture elements and text

- press "Smart Picture" button on the remote control. In case the picture improves, decrease the sharpness value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Decrease the sharpness value. The new "Personal Preference" value is automatically stored after 3 minutes

Snowy picture

Check CSM line 5. If this line indicates NO SIGNAL, check 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 number 13 or 16); 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

- press "Smart Picture" button on the remote control. In case picture improves, increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes

Menu text not sharp enough

- press "Smart Picture" button on the remote control. In case the picture improves, decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes
- after switching on the Customer Service Mode the picture is OK. Decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes

5.3.2 Sound problems

No sound or sound too loud (after channel change or switching on)

- after switching on the Customer Service Mode the volume is OK. Increase / decrease the volume level. The new "Personal Preference" value is automatically stored after 3 minutes

5.3.3 Other problems

TV switched off or changed without any user action

Set switches off after "TV SWITCHING OFF" was displayed. Auto standby switched the set off because:

- there was no ident signal for more than 15 minutes
- there was no remote control signal received or local key pressed for > 2 hours

See chapter 8 for a description on the options to enable/disable auto standby.

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 DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

1. ComPair helps you to quickly get an understanding how to repair the TV-set in a short time, by guiding you step by step through the repair procedures.
2. ComPair allows very detailed diagnostics (on I²C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I²C commands yourself; ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the TV (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together

with the SearchMan electronic manual, schematics and PWBs are only a mouse-click away.

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 A10A chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector at the rear side of the set (located at the left side of the rear cinch connectors, see also figure 1-2, chapter 1).

The ComPair faultfinding program is able to determine the problem of the defective television. It can gather diagnostic information in 2 ways:

1. Communication with the television (automatic).
2. Asking questions to you (manually).

ComPair combines this information with the repair information in its database to find out how to repair the TV-set.

Automatic information gathering

ComPair can automatically read out the contents of the entire error buffer.

Diagnosis is done on I²C level. ComPair can access the I²C bus of the television. ComPair can send and receive I²C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I²C busses of the TV-set.

Manual information gathering

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 and showing you examples. 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.

A question could be: *Does the screen give a picture? (Click on the correct answer) YES / NO.*

An example can be: *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*

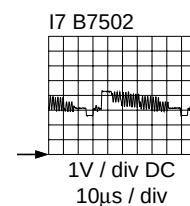


Figure 5-4

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.

Additional features

Beside fault finding, ComPair provides some additional features like:

- Uploading/downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool.

5.4.2 SearchMan (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the schematics and the PWBs of the faulty set are available when clicking on the hyper-link of a schematic or a PWB in ComPair.

Example: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.*

Clicking on the PWB hyper-link automatically shows the PWB with a highlighted capacitor C2568. Clicking on the schematic hyper-link automatically shows the position of a highlighted capacitor at the schematic.

5.4.3 Connecting the ComPair interface

The ComPair Browser software should be installed and set-up before connecting the ComPair interface to the TV-set (see the ComPair Browser Quick Reference Card for installation instructions).

1. Connect the RS232 interface cable to a free serial (COM) port on the PC and the ComPair interface PC connector (connector marked with 'PC').
2. Connect the mains adapter to the connector marked 'POWER 9V DC' on the ComPair interface.
3. Switch the ComPair interface 'OFF'.
4. Switch the television set 'OFF' with the mains switch.
5. Connect the interface cable to the connector on the rear side of the ComPair interface that is marked 'I²C' (see figure below).
6. Connect the other end of the interface cable to the ComPair connector on the monocarrier (left to the rear cinch connectors).
7. Plug the mains adapter in the mains outlet and switch 'ON' the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
8. Start-up ComPair and select 'File' menu, 'Open....'; select 'A10A Fault finding' and click 'OK'.
9. Click on the icon to switch 'ON' the communication mode (the red LED on the ComPair interface will light up).
10. Switch 'ON' the TV-set with the mains switch.
11. When the set is in standby, click on 'Start-up in ComPair mode from standby' in the ComPair A10A faultfinding tree, otherwise continue.

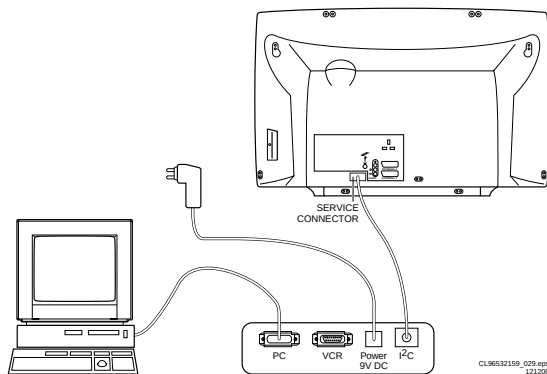


Figure 5-5

The set has now started up in ComPair mode. Follow the instructions in the faultfinding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled.

5.4.4 Pre-set installation

Pre-sets can be installed via the service cable:

- 'sending to' and 'reading from' the television.
- the rear cover does NOT have to be removed.

Click on 'File', 'Open' and select **A10A fault finding** to use the cable.

Pre-sets can be installed via menu 'Tools', 'Installation' and 'Pre-sets'.

5.4.5 Ordering ComPair

ComPair order codes:

- Starter kit ComPair- + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629.
- ComPair interface (excl. transformer): 4822 727 21631.
- Starter kit ComPair software: 4822 727 21634.
- Starter kit SearchMan software: 4822 727 21635.
- Starter kit ComPair- + SearchMan SW: 4822 727 21636.
- ComPair CD (update): 4822 727 21637.
- SearchMan CD (update): 4822 727 21638.
- ComPair interface cable (for A10A): 4822 727 21641.

5.5 Error codes

5.5.1 Error buffer

The error buffer contains all errors detected since the last time the buffer was erased and is written from left to right. When an error occurs that is not yet in the buffer, the error is written at the left side and all other errors shift one position to the right.

The error buffer will be cleared in the following cases:

- By activating 'CLEAR ERRORS' in SAM menu.
- Exiting SDM or SAM with the 'Standby' command on the remote control.
- Transmitting the commands 'DIAGNOSE' '99' 'OK' with the DST (RC7150) or with ComPair.
- Automatic reset if the contents have not changed for 50 hours.

By leaving SDM or SAM with the mains switch, the error buffer is not reset.

Examples:

ERROR: 0 0 0 0 0 0 0 : No errors detected

ERROR: 6 0 0 0 0 0 0 : Error code 6 is the last and only detected error

ERROR: 9 6 0 0 0 0 0 : Error code 6 was first detected and error code 9 is the last detected (newest) error

The contents of the error buffer can also be made visible through the 'blinking LED' procedure. This is especially useful when there is no picture (explained further on).

5.5.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair, this to prevent that 'old' error codes are present.

If possible check the entire content of the error buffers. In some situations an error code is only the result of another error code (and not the actual cause).

Note: a fault in the protection detection circuitry can also lead to a protection.

Error code	Error description	Possible defective components
0	No error detected	-
1	EW and/or High beam protection active	LOT, Line deflection circuit, EW-circuit or CRT amplifier circuit, picture tube or +200V missing
2	Vertical protection	Vertical circuit is defective
3	X-ray protection active	USA only
4	5V protection active	+5V supply line is low or short circuit
5	Reserved	-
6	General I ² C bus error	I ² C-bus short- or open circuit on uP
7	BC-loop not stabilised	RGB amplifiers, RGB guns or RGB driving signals of BOCMA
8	BOCMA - I ² C error	item 7301 on diagram C1 (IC TDA888x)
9	BOCMA 8V supply failure	item 7301 on diagram C1 and/or R3331
10	NVM I ² C error	item 7066 on diagram C3 (IC M24C32)
11	NVM identification failure	item 7066 on diagram C3 (IC M24C32)
12	uProcessor internal RAM test failure	item 7064 on diagram C3 (IC SAA5667)
13	Main Tuner - I ² C error	Item 1225 on diagram A4 (UV13xx)
14	Sound processor - I ² C error	item 7651 on diagram C5 (IC MSP34xxx)
15	SRAM test error	item 7070 on diagram C4 (IC UPD431000A)
16	Second Tuner - I ² C error	Item 1900 on diagram L1 (USA only) or 7201 on diagram F2
17	PIP IC I ² C error or DW IC - I ² C error	item 7803 on diagram L2 (USA only) or 7801 on diagram F1
18	I/O expander IC- I ² C error	item 7910 on diagram L1 (USA only) or 7403 on diagram F3
19	Guide ⁺ - I ² C error	item 7005 on diagram K1 (IC LC27016B) - USA only
20	V-chip for PIP - I ² C error	item 7501 on diagram F5 (IC Z86130) - USA only
21	NV clock - I ² C error	item 7011 (IC MK41T56) - LATAM only
22	Reserved	-
23	Second BOCMA IC on DW panel - I ² C error	item 7301 on diagram F4 (IC TDA888x)

Explanation of the error codes:

Error 0

No error

the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +200 V voltage is not present, check R3840 at the CRT-panel and R3445 & D6445 at the main panel.

Error 1

Set is switched to protection; error code 1 is placed in the error buffer; the LED will blink 1 time (repeatedly). If this happens, isolate each circuit to determine the cause:

- EW protection - PROT-UP
 - If this protection is active, the causes could be one of the following;
 - bad contacts of:
 - horizontal deflection coil
 - linearity coil 5417
 - S-correction capacitor 2418/2419
 - flyback capacitor 2414/2416
 - line output stage
 - short circuit of:
 - flyback diode 6414
 - EW transformer (bridge coil) 5478/5479 or 5474/5475/5476 (version dependent)
 - EW driver 7470
 - High beam current protection - IBeam

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +200 V supply to the CRT panel is present. If the voltage is present, the most likely cause is

Error 2

If this protection is active, the cause could be one of the following (most likely in the vertical output stage):

- 7501 is faulty.
- poor contact or open circuit of deflection coil.
- +13V-VERT and/or -13V not present.

Error 3

X-Ray protection - PROTN

If this protection is active, the most likely cause is the LOT. Detection via pin 3 of the BOCMA (7301) AND pin 5 of the uP (7064)

Error 4

The 5V-protection active and error code 4 is placed in the error buffer. The LED will blink 4 times (repeatedly). A 5 V failure can cause a drop in the 5 V supply output, resulting in an undefined behaviour of the set. Therefore, all I²C devices connected to the 5V-supply are constantly monitored. When none of these devices respond to the micro controller for a prolonged time, the micro controller assumes that there is a failure in the 5V-supply.

By starting up the set with the service jumpers shorted, the 5V-protection is disabled and it is easier to determine the cause. +5V protection will be activated when these I²C devices fail (no I²C communication):

- Main Tuner 1125 on main panel.
- ITT sound processor MSP34xx (7064) on the SSB.

The following tips are useful to isolate the problem area after overriding the +5V-protection. Determine whether:

1. The +5V source is working properly; isolate coil 5430 and jumper 9044 and measure the +5V.
2. ITT sound processor circuit is loading the +5V; isolate coil 5430.
3. The tuner is loading the +5V source; isolate jumper 9044.
4. Main tuner circuit is loading the +5V source; isolate coil 5261.

Caution! Overriding the 5V-protection when there is a 5V failure can increase the temperature in the set and may cause permanent damage to components. Do not override the 5V-protection for a prolonged time.

Error 5
Reserved.

Error 6
This will occur in the following cases:

- SCL or SDA is shorted to ground.
- SCL is shorted to SDA.
- SDA or SCL connection at the micro controller is open circuit.

Error 7
Black current loop instability protection.
The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals. The detection is via the black current feedback loop to pin 30 of the BOCMA (item 7301).

Error 8
BOCMA (item 7301 on SSB) is corrupted, the I²C line to the BOCMA is low or no supply voltage is present at pin 14 and/or pin 60 (3V3).

Error 9
No supply voltage at pin 53. Check NFR 3331 and coil 5333.

Error 10
NV memory (EEPROM - item 7066) does not respond to the micro controller.

Error 11
During the last start-up, the NVM and the micro controller did not recognize each other (e.g. one of them was replaced or the NV memory has been changed, adapted or lost). Therefore the NVM was loaded with default values.

Error 12
Microprocessor (Painter - item 7064) internal RAM test failure.

Error 13
Tuner (item 1225) is corrupted, the I²C line to the tuner is low or no supply voltage at pin 6, 7 or 9 of the tuner.

Error 14
Sound controller MSP34xx does not respond to the micro controller.

Error 15
SRAM IC test failure (item 7070).

Error 16
PIP/DW Tuner I²C error. The tuner (TEDE9 - item 7201) on DW-panel does not respond to the micro controller.

Error 17
PIP IC I²C failure (item 7801) or Double Window IC I²C failure.

Error 18
I/O expander IC I²C failure (item 7910 on PIP panel or item 7403 on DW panel).

Error 19
Guide+ I²C failure (item 7005). Only for USA.

Error 20
V-chip IC I²C failure. Only for USA.

Error 21
NV clock IC I²C failure at mono board (item 7011). Only for LATAM.

Error 22
Reserved.

Error 23
2nd BOCMA IC (item 7301 on DW panel) I²C communication failure.

Error 24 - 29
Reserved.

Note: Error codes 1, 2 and 4 are protections, so in these cases, the voltage supply to some circuits will be switched off. Also the LED will blink the number of times equivalent to the most recent error code.

5.6 The 'blinking LED' procedure

The contents of the error buffer can also be made visible through the 'blinking LED' procedure. 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 msec. which is an indication of the decimal digit, followed by a pause of 1500 msec, followed by n short blinks.

When all the error-codes are displayed, the sequence is finished with a LED display of 3 seconds. Then the sequence starts again.

Example:
Error code position 1 2 3 4 5
Error buffer: 12 9 6 0 0

After entering SDM: 1 long blink (750 ms) - pause (1.5 s) - 2 short blinks - pause (3 s) - 9 short blinks - pause (3 s) - 6 short blinks - pause (3 s) - long blink (3 s) - etc.

Note: If errors 1, 2 or 4 occur, the LED *always* gives the last occurred error, even if the set is NOT in service mode.

5.7 Repair tips

In this paragraph some trouble shooting tips for the deflection and power supply circuitry are described.

5.7.1 The deflection circuit

Measure if the V_{BAT} (140 V) is present across components 2939 and/or 2940 (diagram A1).

If the voltage is not present, disconnect jumpers 9936 and 9937. The whole 'Line Deflection' stage is now disconnected. If the voltage is present then the problem might be caused by the deflection circuit. Either transistor 7410 is defective or the driver circuit around transistor 7481 is faulty or the 'horizontal drive' signal coming from the BOCMA IC 7301-pin 56 on the SSB is missing.

Note:

- When you short the collector and emitter of transistor 7410, hickup noise can be heard from the power supply circuit.
- To determine whether the fault is caused by the line deflection circuit (diagram A2) or by the E/W circuit (present when screen size > 21"), insert jumper into position number 9409 (in this case the E/W protection is disabled).
If the basic deflection is working (picture is parabolic distorted), the fault must be searched for in the E/W circuit. If there is no horizontal deflection, the fault must be searched for in the deflection circuit.
- If any of the protection circuits in the 'Line output' stage are activated, the set will shut down. Depending on the protections, the LED will blink according to the fault defined.
In order to determine which protection circuit is active, isolation of circuits is necessary.
These protection circuits are:
 - High beam protection, see error 1.
 - X-ray protection, see error 1.
- If the 'High beam'- or 'X-ray' protection is active, the set will go to protection and the SDM will be activated. The 'service LED' blinks repetitively 1 time.
If this happens, isolate each circuit to determine the cause.

5.7.2 The power supply

To trouble shoot the A10 SMPS, first check the +5V_STBY voltage on item 7968-pin 3 and 4. If this voltage is not present, check fuse 1961 and diode 6961.

If they are working properly, the problem might be caused by the circuit on the primary side of the switching transformer. Check in this case the output of the bridge diodes at the cathode of diode 6912, 6913 or 6915 for approximately 300 Vdc.

If this voltage is missing, check the bridge diodes and the fuse. If fuse 1900 is blown, measure IC7921 (diagram A1) between pins 3 and 2 to make sure that there is no short circuit present.

If the 300 Vdc is present on pin 3 of IC7902, check for a start-up voltage of 16 V on pin 4 of IC7921. If this voltage is not present, check if R3914 is open (a short circuit between pin 4 and 5 will also cause this problem). It is necessary, for the power supply, to have a feedback signal from the hot secondary side of the switch mode transformer (T5912-pin 8 and 9) to oscillate.

If this start-up voltage is present on pin 4 of IC7902 and the supply is not oscillating, check R3929 and D6929.

The A10 power supply has been designed with an Over Voltage Protection (OVP). To determine whether the OVP is active, check whether V_{BAT} (141 V) is present at IC7971 pin 1.

If not, check components D6938, C2939 and C2940 and L5941.

If they are OK, check the voltage at pin 3 of IC 7942.

If this voltage is not present, check fuse 1941 and fuse 1942.

If the voltage is present at pin 3, replace opto-coupler 7929.

Another way to confirm whether the OVP is active, is to measure the voltage with an oscilloscope at IC7902 pin 4.

If the voltage is fluctuating between 11 and 14 V, then check the components as described above.

Personal notes:

8. Alignments

Note: The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5.

8.1 General alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage: 110 / 220 V ($\pm 10\%$); 50 / 60 Hz ($\pm 5\%$)
- Warm-up time: ≈ 20 minutes
- The voltages and oscillograms are measured in relation to the tuner earth (with exception of the voltages on the primary side of the power supply). Never use the cooling fins / plates as ground.
- Test probe: $R_i > 10\text{ M}\Omega$; $C_i < 2.5\text{ pF}$.
- Use an **isolated** trimmer / screwdriver for the alignments.

8.2 Electrical alignments

8.2.1 Vg2

Rough alignment

Using a pattern-generator displaying a black pattern.

1. Set brightness and contrast to minimum in a black room (OSD still visible). Select any of the AV-sources.
2. Go to the SAM.
3. Set VSD to ON.
4. Adjust Vg2 potmeter of LOT until the horizontal line is just visible.
5. Set VSD to OFF.
6. Exit SAM.

Fine adjustment

1. Activate the SAM-menu (see chapter 5.2.2). Go to the sub-menu 'WHITE TONE' and adjust the value of NORMAL RED, GREEN and BLUE to 40 (or 42 for 29" RF)
2. Go, via the MENU key, temporarily to the normal user menu and set the values of BRIGHTNESS and CONTRAST to 0.
3. Return to the SAM-menu via the MENU-key. Disable the black current loop by changing 'AKB' to 'OFF'.
4. Connect the RF-output of the pattern generator to the antenna-input. Test pattern is a 'black' pattern (blank screen on CRT **without** any OSD info). Set the time base of the oscilloscope to 0.5 ms with external triggering on the vertical pulse. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.

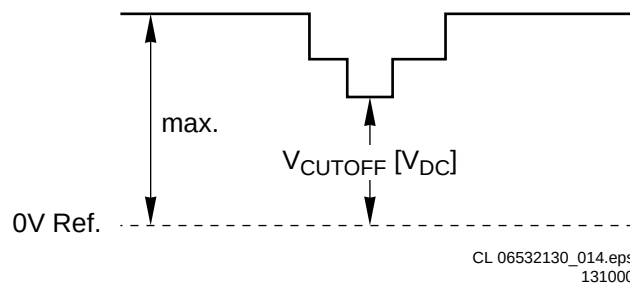


Figure 8-1

Adjust V_{cutoff} of the highest of the three guns (with the Vg2 potmeter of the LOT) to 165 V_{DC} .

8.2.2 Focus

1. Tune the set to a circle or crosshatch test pattern (use an external video pattern generator).
2. Adjust the 1st Focus potmeter (upper LOT potmeter) until the horizontal and vertical lines at 1/4 from east and west, at the height of the centre line, are of minimum width without visible haze.
3. Adjust the 2nd Focus potmeter (middle LOT potmeter) until the horizontal and vertical lines at 1/4 from north and south, at the height of the centre line, are of minimum width without visible haze.

Note:

For sets without Double Astigmatic Focus (DAF) panel, there is only one Focus-potmeter on the LOT.

Adjust according to paragraph 8.2.2 point 2.

8.3 Alignments and settings in the SAM.

8.3.1 General

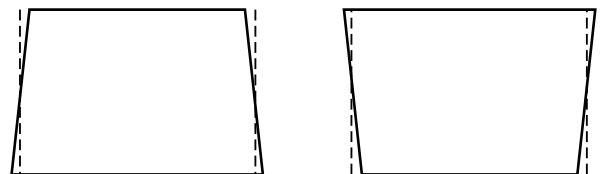
With the software alignments of the Service Alignment Mode the Geometry, White tone and Tuner (IF) can be aligned. Put the set in the SAM mode. The SAM menu will now appear on the screen (see chapter 5).

Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the RC-handset.

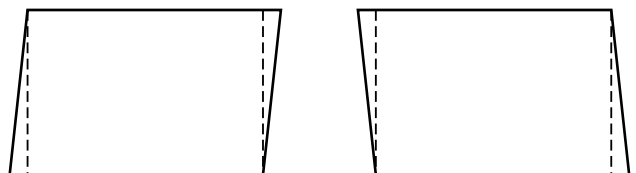
8.3.2 Geometry

The geometry alignments menu contains several items to align the set, in order to obtain a correct picture geometry. In widescreen sets, the 'GEOMETRY SW' menu is available for separate alignments of the superwide (panorama) mode.

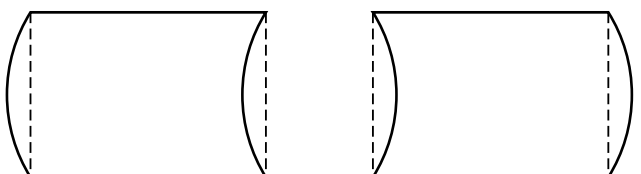
East/West Trapezium



Horizontal Parallel



Horizontal Bow



CL 96532156_012.eps
190101

Figure 8-2

Initial set-up

1. Connect an external video pattern generator (PAL-475.25 MHz or NTSC-63.25 MHz) to the aerial input of the TV-set with a crosshatch test pattern.
2. Set 'Smart Picture' to NATURAL.
3. Activate the SAM-menu (see chapter 5).
4. Go to sub-menu GEOMETRY. Now the following alignments can be performed (dependent on execution):

Service blanking (SERV. BLK)

Switch the blanking of the lower half of the screen ON/OFF (to be used in combination with the vertical slope alignment).

Vertical slope (VER. SLOPE)

Align the vertical centre of the picture to the vertical centre of the CRT. This is the first alignment to be performed of the vertical alignments. For an easy alignment set SERV.BLK to ON.

Vertical S-correction (VER. SCOR)

Align the vertical linearity, meaning that vertical intervals of a grid-pattern must be equal over the entire height.

Vertical amplitude (VER. AMPL)

Align the picture height so that the complete test pattern is visible. Note that other vertical alignments are not compensated.

Vertical shift (VER. SHIFT)

Align the vertical centering so that the test pattern is located vertically in the middle. Repeat the 'vertical amplitude' alignment if necessary.

Horizontal shift (HOR. SHIFT)

Align the horizontal centre of the picture to the horizontal centre of the CRT.

Horizontal parallelogram (HOR. PARALLEL)

Align straight vertical lines in the top and the bottom; vertical rotation around the centre.

East West width (EW. WIDTH)

Align the picture width until the complete test pattern is visible.

East West Upper Corner (EW. UCORN)

Align straight vertical lines in the upper corners of the screen.

East West Lower Corner (EW. LCORN)

Align straight vertical lines in the lower corners of the screen.

East West Trapezium (EW. TRAP)

Align straight vertical lines in the middle of the screen.

East West parabola (EW. PARA)

Align straight vertical lines at the sides of the screen.

Horizontal bow (HOR. BOW)

Align straight horizontal lines in the top and the bottom; horizontal rotation around the centre.

8.3.3 Tuner (Large Signal Panel and Double Window)**IF PLL OFFSET and AFC WINDOW**

No adjustments needed for these alignments. The default values for these options are:

- IF PLL OFFSET: 32
- AFC WINDOW: 100 kHz

AGC

Set an external pattern generator (e.g. PM5418) to a grey scale video signal and connect it to the aerial input with RF

signal. Set the signal amplitude to at least 1 mV and to a frequency of 475.25 MHz for PAL or 63.25 MHz for NTSC.

- Activate the SAM-menu. Go to the sub-menu TUNER, select the sub-menu option AFC WINDOW and adjust the value to 100kHz.
- Select the AGC sub-menu
- Connect a DC multi-meter to pin 1 of the tuner 1225 (LSP) or 7200 (DW).
- Adjust the AGC until the voltage at pin 1 of the tuner is within $2.5\text{ V} < \text{AGC takeover voltage} < 3.8\text{ V}$
- The value can be incremented or decremented by pressing the RIGHT/LEFT cursor keys on the RC.
- Switch the set to standby.

8.3.4 White tone

In the WHITE TONE sub menu, the colour values for the colour temperature values can be changed.

The colour temperature mode (NORMAL, DELTA COOL, DELTA WARM) or the colour (R, G, B) can be selected with the UP/DOWN cursor keys. The mode or value can be changed with the RIGHT/LEFT cursor keys.

First the values for the NORMAL colour temperature should be selected. Then the offset values for the DELTA COOL and DELTA WARM mode can be selected. Note that the alignment values are non-linear

0 represents the middle value (no offset difference).

- +1 to +63 represent a positive offset (63 is the maximum positive offset).
- -63 to -1 represent a negative offset (-63 is the minimum negative offset).

8.4 Options**8.4.1 Introduction**

Options are used to control the presence/absence of certain features and hardware. The correct option values can be found on a sticker on the picture tube (after removal of the rear cover).

There are two ways to change the option settings (see also chapter 5):

1. Changing a single option:
An option can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/RIGHT keys.
2. Changing multiple options by changing Option Bytes:
Changing the option bytes directly, makes it possible to set all options very fast. An option byte (OB1..8) can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/RIGHT keys. An option byte represents a number of different options. All options are controlled via 8 option bytes. Select the option byte (OB1..OB8) and key in the new value.

Note:

Changes in the option byte settings are saved by selecting STORE and pressing the MENU RIGHT key. All changes are disregarded when the OPTION submenu is left without using the STORE command.

Some changes will only take effect after the set has been switched OFF and ON with the mains switch (cold start).

8.4.2 List of options

In the table below an overview is given of the possible options (in alphabetical order).

These option bits can be set ON (= 1) or OFF (= 0). If an option is set ON, it represents a certain value.

To calculate the Option Byte value (OB), add the values of the 8 option bits (see 8.4.3).

Option abbreviation	Feature description
AAVL	Automatic Volume Level
APC	Auto Picture Control
ASBY	Auto switch to STDBY after 2 hrs.
AUSB	Auto switch to STDBY after 2 hrs.
AV3	External 3 (Side I/O)
BLMU	Blue Mute
C169	Picture setting for Compress 16:9
CBFL	Comb Filter
CCAP	Closed Captioning
CHLK	Child Lock
CHNA	China
CVI	Ext. source selection for DW/PIP
DNRM	DNR Noise Reduction
DTXT	Dual page Teletext available
E149	Picture setting for Expand 14:9
FAPG	Favorite Page
HOSP	Hospitality mode
INCF	Internal Comb Filter
IPIX	Incredible Picture
IPMU	Incredible Picture via menu
ISUR	Incredible Surround
MLNK	M-Link
NTSC	NTSC playback
NVM	Power down circuit to protect NVM
PIPC	PIP Control
PIPS	PIP Surf
PIPT	PIP Tuner
PLST	Program List
ROTI	Rotation
SBNP	Auto Standby with no picture
SMCK	Smart clock
SNIC	Sound IC 3451
SOSD	Smart OSD
SURF	Surf
TIME	Timer
TWIN	Time Window
VDBY	Virtual Dolby
VMUT	Video Mute
VSLC	Vertical Slicing
W169	Double Window 16:9
W4X3	Double Window 4:3

8.4.3 Option bits/bytes

An option byte value is calculated in the following way:

```

Value 'option bit 1' x 1 =
Value 'option bit 2' x 2 =
Value 'option bit 3' x 4 =
Value 'option bit 4' x 8 =
Value 'option bit 5' x 16 =
Value 'option bit 6' x 32 =
Value 'option bit 7' x 64 =
Value 'option bit 8' x 128 =
===== +
Total value 'option byte' =

```

9. Circuit descriptions and abbreviation list

9.1 Circuit descriptions

The following circuits are described:

1. Introduction
2. Block diagram
3. Power supply (see A8 TM: 4822 727 21613)
4. Control
5. Tuner & IF
6. Video processing
7. Synchronisation
8. Horizontal deflection (see A8 TM: 4822 727 21613)
9. Vertical deflection (see A8 TM: 4822 727 21613)
10. Audio processing
11. OSD / Teletext
12. CRT / SCAVEM / Rotation
13. Double Window (DW)

9.1.1 Introduction

The A10A is the successor of the A8-chassis. A10 is the chassis name, A = Asian Pacific.

9.1.2 Block diagram

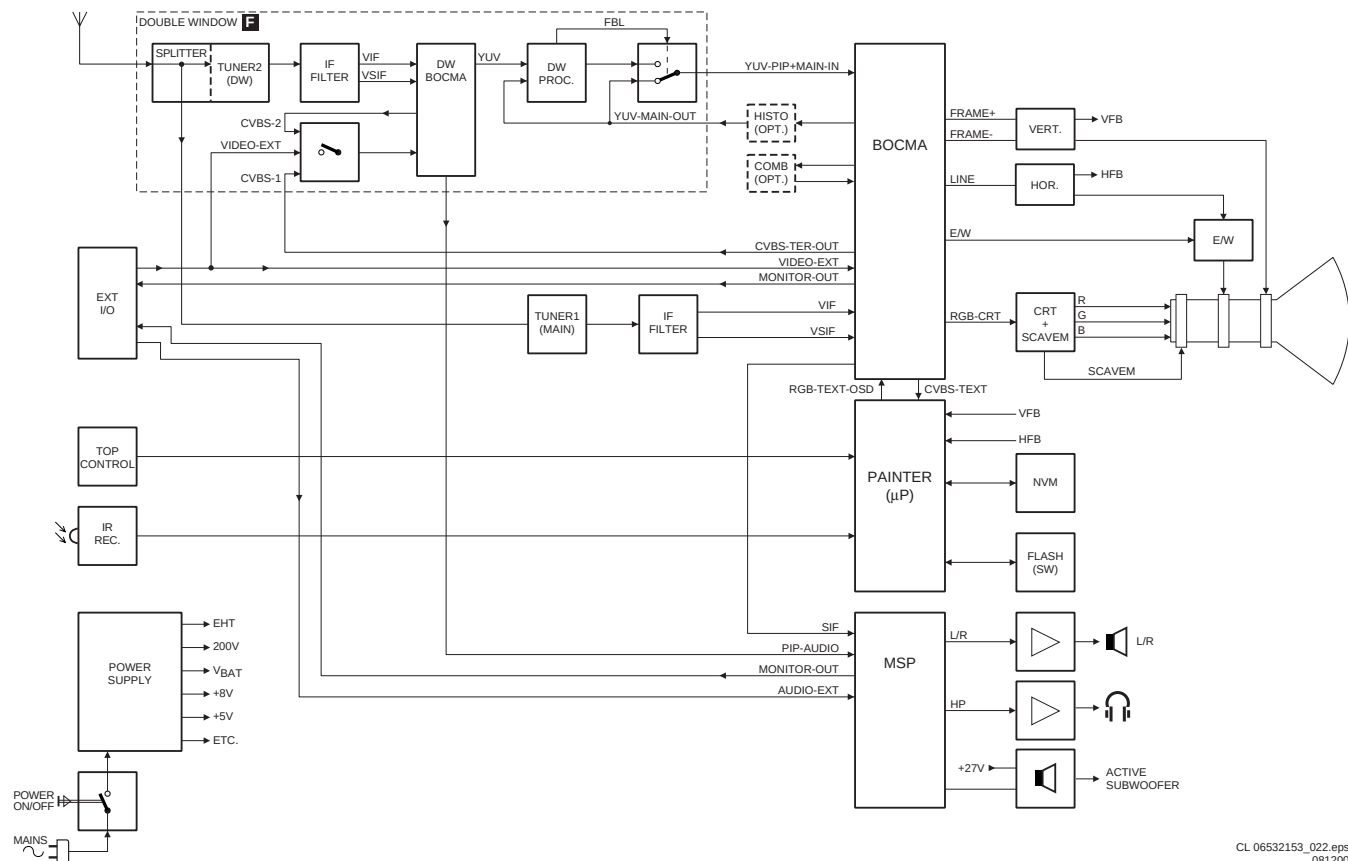


Figure 9-1

The Tuner is a PLL tuner and delivers the IF-signal, via audio & video SAW-filters, to the Multi-system TV processor (TDA888x, IC7301 also called BOCMA), which has the following functions:

- Multi-system decoder.
- Video source- and record select.
- Colour decoder.
- RGB output.

Where the A8 used a lot of different panels, the A10 architecture consist of 1 conventional Large Signal Panel (LSP) and 1 Small Signal Board (SSB) module, placed into a so called SIMM-connector (Standard Interface, 80 pins):

- The LSP is built up very conventional, with hardly any surface mounted components on the copper side. It incorporates the Power Supply, the Deflection, the Tuner, the I/O and the Audio Amplifier circuits.
- The SSB is a high tech module (2 sides reflow technology, full SMT) with very high component density. Despite this, it is designed in such a way, that repair on component level will be possible. To achieve this extensive diagnostic possibilities are provided via Service Modes and/or ComPair. The SSB incorporates the IF-, Video / Audio-processing, Control and OSD/TXT circuits.

In this 'circuit description' chapter, sometimes will be referred to the Training Manual of the A8 (4822 727 21613). This is done for the following circuits: the Power supply, the Horizontal (Line) Deflection and the Vertical (Frame) deflection parts. The electrical principle of these circuits are also applicable on the A10.

- Sound demodulator.
- Geometry control.
- Picture improvement.
- Synchronisation.

The BOCMA has 1 input for the internal CVBS signal and 2 inputs for external CVBS or Y signals. It has only one Chroma input so that it is not possible to apply 2 separate Y/C inputs. The selection is made via the I²C-bus.

It has 2 independently switchable CVBS outputs for e.g. TXT, Comb-filter, CVBS-monitor or PIP/DW (optional).

Two AV-connectors (cinch) are used: AV1 is fully equipped and AV2 is meant for VCR. The Monitor-out of AV2 can be used for WYSIWYR (What You See Is What You Record).

Internal video processing is done in the BOCMA with YUV-signals. It also handles the video control, geometry part and the insertion of the TXT/OSD RGB-signals. The video part delivers the RGB signals to the CRT-panel and the geometry part delivers the H-drive, V-drive (differential output), and E/ W-drive.

Both deflection circuits are located on the LSP and are driven by the BOCMA. The horizontal output stage generates also some supply voltages and the EHT-, focus- and Vg2-voltages.

Picture In Picture (PIP) and Double Window (DW) are both optional (PIP is only used in the NAFTA-region).

Double Window (DW) models are always equipped with 2 tuners. The IF signal from the 2nd tuner is processed by a 2nd BOCMA video processor.

For AP, China and LATAM regions, the TV uses one RF-signal, which is splitted and fed to the main tuner on the LSP. Due to this construction, the main tuner (on the LSP) always processes the main picture and the 2nd tuner always processes the DW picture. If the picture needs to be swapped, then the tuner RF frequency is swapped, rather than the 'baseband-signal switching' as done in the NAFTA region.

The V-chip data slicer is not present in these regions.

The RGB amplifiers on the CRT-panel are integrated in one IC (TDA6107Q) and are supplied with 200 V from the LOT. The SCAVEM circuit modulates transitions of the Luminance (Y) signal on the horizontal deflection current, giving a sharper picture.

The sound part is built up around the MSP34xx (Multi-channel Sound Processor) for IF sound detection, sound control and source selection. Dolby decoding is also done by the MSP. Amplification is done via an integrated power amplifier IC, the AN5277.

The microprocessor, called Painter (SAA55XX, IC7064), takes care of the set control, error generation and analogue TXT/OSD input- and output processing.

The Painter, ROM and RAM are supplied with 3.3 V, which is also present during STANDBY.

The NVM (Non Volatile Memory) is used to store the settings, the flash-RAM contains the set software and the DRAM (located inside the μ P) is capable for storing 10 Teletext pages or 100 pages (software version dependent).

The power supply is a Switch Mode Power Supply (SMPS) with minimum voltage switch. It is a flyback converter with primary current sensing, secondary voltage sensing and mains input measuring. It is built around IC7921 (which has a built-in MOSFET and control circuit) and generates a.o. the 140 V (V_{BAT}) and the 27 V (for the audio part).

During Standby, the power supply is switched to a 'low power burst mode' via TS7946 and the following burst mode generator, in order to reduce the power consumption.

A relay is used to switch the degaussing circuit for several seconds during switching 'ON' of the set.

9.1.3 Power supply (diagram A1)

For a circuit description see A8 Training Manual: 4822 727 21613. Differences with the A8 are:

- Item-numbers are different from the one mentioned in the text.
- Degaussing circuit

- Output voltages

Degaussing circuit (diagram A1: section A1 - D3)

The degaussing circuit is activated whenever the TV set is turned on. So from normal 'off' to 'on' and from 'stand-by' to 'on' the degaussing circuit is activated. During start-up the signal LIGHT_SENSOR_VDEGAUS (A4-1) is low. After start-up of the μ P this becomes high for 2 seconds which forces TS7932 in conduction. Now the coil of the relay is activated and switch 1931 is closed. The mains voltage is now connected to the degaussing coil. The degaussing current passes through the degaussing coil and through PTC 3911 and PTC 3912, which limit the inrush-current. After these 2 seconds, the signal LIGHT_SENSOR_VDEGAUS goes low, 7900 turns off, the coil of relay 1931 is de-energised and the 220 V_{AC} is disconnected from the degaussing coil. During normal operation, no current passes through the degaussing coil due to the fact that switch 1931 is opened.

Output voltages

- +8V_UNREG (Input voltage for stabiliser 7942 and supply voltage for the circuit to activate the degaussing coil).
- +33V (For Tuner at Mono-carrier and PIP-panel). Created via R3409 and zenerdiode 6481.
- V_{BAT} (Battery Voltage for Line Output Stage): +140 V.
- +8V (BOCMA Supply, Video at SSB). Output voltage from stabiliser 7942. This voltage is decreased in standby to 2.3 V. In standby TS7944 is conducting and switching R3945 parallel to R3942 and R3947.
- +5V_STBY. This voltage is also present during standby. If this voltage and +5 V are missing check Fuse 1961. If the voltage at pin 2 & 5 of 7968 is present replace 7907.
- +5V (For Tuner, NV_CLOCK, Video at SSB, PIP-panel). This voltage is disabled when the +13V-VERT is not present at pin 2 of IC7967. +13V -VERT is generated by the line-output circuit. So when the line-output circuit is working correctly the +5V is enabled to start the set.
- +27V (Audio Supply). If this voltage is missing check D6971/6972 and/or sound-amplifier IC7702.
- 3V3_STBY (μ P Supply, NVM, BOCMA supply, Receiver LED): This voltage is also present during standby. If this voltage is missing check NFR 3964.

9.1.4 Control (diagram C4)

Micro-processor

The microprocessor (SAA55XX, IC7064 called Painter) provides:

- Control functions for the TV-set.
- On Screen Display (OSD).
- Teletext functions.
- I/O-ports for I²C, RC5, LED, and service modes.
- Error code generation.

For 10 pages TXT-data can be stored internally. The Non Volatile Memory IC7066 is a 4 kB version M24C32W6.

All ICs in this part are supplied with 3V3, which is also present during Standby. For this voltage a zenerdiode is used (D6966).

For stable OSD and TXT, the display is synchronised to the TV signal processing device by way of horizontal and vertical sync signals provided by external circuits (HFB and VFB). From these signals all display timings are derived. The OSD/TXT RGB-outputs (46/47/48) and fastblanking (52) are fed to the BOCMA (pins 35 - 38). Below find the pinning description of the Painter (IC7064).

Pin	Signal	Function
1	TILT	Generates drive signal for rotation circuit
2	SEL_SVHS_RR_STAT US2	Selects Y/C source from Side or Rear I/O and detects presence of EXT2 (CVBS) / 4:3 or 16:9
4	STATUS1_PIP-AFT_PIP-50-60HZ	Detects presence of EXT1 (CVBS) / 4:3 or 16:9
5	KEYBOARD	Input line from Top Control keyboard
6	FRONT_DETECT	Detects presence of Head-phone at FRONT
13	STAND-BY	To switch between Standby and Normal operation
16	SEL_MAIN_FRNT_RR	Selects main video source from Rear or Front
17	COMM_LINE	P50 in/output (Easylink)
18	LIGHT-SENSOR_VDEGAUSS	Activates the degaussing relay at switch on
24	SYS1	Selects Combfilter
25	SYS2	Selects Combfilter
28	ON_OFF_LED	LED driver output
31	CVBS2OUT	CVBS input for TXT data
32	G_SC1-IN_Y-IN	
46	B_TXT_OSD	Blue output for OSD/TXT
47	G_TXT_OSD	Green output for OSD/TXT
48	R_TXT_OSD	Red output for OSD/TXT
52	FBL_TXT_OSD	Fast blanking output for TXT and OSD
52	FBL_SCAVEM	Fast blanking output for SCAVEM
53	HFB	H-sync input for stable OSD/TXT
54	SEL_MAIN_R1R2	Selects main video source from EXT1 or EXT2
55	VFB	V-sync input for stable OSD/TXT
59	SEL_IF_LL	Switches the appropriate SAW filter for LL'
70	CLOCK12MHz	Clock input
76	RC5	Input line from Remote Control
81	SCL	Clock output of master I ² C bus
82	SDA	Data in/out of master I ² C bus
83	SCL_2	Clock output of NVM I ² C bus
84	SDA_2	Data in/out of NVM I ² C bus
93	AGCuP	
96	HIS_OFF	To activate the optional Histogram IC TDA9171
98	SOUND_ENABLE	Mutes the audio amplifier
100	PANORAMA	Activates 16:9 feature

I²C-busses

In the A10A-chassis with Painter-processor there are two I²C-busses used:

- Hardware I²C-bus, used for all IC communication.
- Separate short bus for the Non Volatile Memory (NVM), to avoid data corruption.

NVM

The Non Volatile Memory IC7066 contains all set related data that must be kept permanently, such as:

- Software identification.
- Operational hours.
- Error-codes.
- Option codes.

- All factory alignments.
- Last Status items for the customer + a complete factory recall.

9.1.5 Tuner & IF (diagram A4, C1 & C3)

Tuner

Tuning is done via I²C. The reference voltage on pin 9 is 33 V. This voltage is derived from the V_{BAT} via a resistor of 68 kΩ and a zenerdiode.

Video IF amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1451 or 1454 in case of system L/L') and one for IF-audio (1455). The type of these filters is depending on the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 7 of the BOCMA to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode 'Tuner' - 'AGC'. If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

An (alignment free) PLL carrier regenerator with an internal VCO demodulates the video signal. This VCO is calibrated by means of a digital control circuit, which uses the clock frequency of the μP as a reference. The frequency setting for the various standards (33.4, 33.9, 38.0, 38.9, 45.75 and 58.75 MHz) is realised via the I²C-bus.

The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I²C-bus.

The video identification circuit is used to identify the selected CBVS or Y/C signal.

The IC contains a group delay correction circuit, which can be switched between the BG and a flat group delay response characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter. Also the sound trap is integrated. The centre frequency of the trap can be switched via the I²C-bus. The signal is available on pin 27.

QSS sound circuit

The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved.

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Introduction

The video processing is completely handled by a one-chip video processor the TDA888X. This IC contains:

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, and this is different with the used TDA884x in the A8, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

Source selection

The BOCMA has an input for the internal CVBS signal and 2 inputs for external CVBS or Y signals. The circuit has only 1 Chroma input so that it is not possible to apply 2 separate Y/C inputs.

The selection of the various sources is made via the $\bar{P}$ C-bus.

The used IC version has 2 independently switchable outputs:

- The CVBS1 output (pin 26) is identical to the selected signal that is supplied to the internal video processing circuit and is used as source signal for the teletext decoder (Painter). Both CVBS outputs have an amplitude of 2.0 V_{pp}.
- The CVBS2 output (pin 52) is fed to monitor-out of AV2 for WYSIWYR (What You See Is What You Record).

If the Y/C-3 signal is selected for one of the outputs, the luminance and chrominance signals are added so that a CVBS signal is obtained again.

I/O

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has 2 AV inputs, the side has one AV-input. The I/O signals are routed via the LSP to the SSB panel.

- AV1: The input of AV1 is CVBS or YUV and L/R audio.
- AV2: The input of AV2 is Y/C or CVBS and L/R audio. The output signal is CVBS_SC2_MON_OUT (+ sound). It is meant for VCR and has therefore an additional signal in relation to AV1 (but no RGB): it has the possibility for Y/C_{in}.
- AV3: The input is SVHS or CVBS and L/R audio.

Double Window (DW)

For a detailed circuit description see paragraph 13.

Protections

Overvoltage conditions (X-ray protection) can be detected via the EHT tracking pin (pin 3). When an overvoltage condition is detected the vertical output drive signal will be switched-off via the slow stop procedure but it is also possible that the drive is not switched-off and that just a protection indication is given in the $\bar{P}$ C-bus.

This pin can also be used to switch off the TV-receiver in a correct way when it is switched off via the mains switch or when the power supply is interrupted by pulling the mains plug. It is possible to place the vertical deflection in an overscan position.

The IC has a second protection input on pin 58 used as 'flash' protection. When this input is activated the horizontal drive signal is switched-off immediately and switched-on again via the slow start procedure.

The selection of the external I/O's is controlled by the μ P (pins 16 & 55) and handled via IC7401:

- SEL-FRNT-R1R2 is the selection between AV1 (R1) and AV2 (R2).
- SEL-MAIN-FRNT-RR selection is made between Side(Front) and Rear I/O.

Combfilter

After the selection of the external signals, AV1, AV2 or Side I/O (AV3), is made, the Y/CVBS signal is fed to the TDA888X (pin 29) along with the Front-end signal (pin 24). The selection between the 2 is made in the BOCMA and the output (pin 26) is fed to the (optional) Comb Filter, whose output is again fed to the BOCMA (pin 21) for further processing. The external colour signals are also fed to the Comb filter. In SVHS mode the Comb filter is bypassed and the external signals are directly fed to the BOCMA.

Switching the Comb filter is done via pin 49 of IC7301. Video standard selection is done via the SYS1 and SYS2 signals from the microprocessor.

If the Combfilter is not used then the jumper (4472 diagram C3) is present and the external Y/C signals are directly fed to the pins 20, 21 of IC7301.

After this stage we add the external RGB signals (from AV1) to pins 40 - 44.

Histogram IC (YUV picture improvement)

The demodulated video-signal can be checked on pins 40, 45 and 46 of IC7301 and is fed to pins 39, 47 and 48. In this path the Histogram IC TDA9171 can be inserted. Without this IC, the jumpers 4436 & 4433 (Y), 4434 & 4432 (U) and 4435 & 4431 (V) are used.

This TDA9178 can control various picture improvements: histogram processing, colour transient improvement and luminance transient improvement.

- Sets without TDA9178: for sets without TDA9178, the Dynamic Skin Tone Control, Blue Stretch and Green Enhancement are controlled by the BOCMA.
- Sets with TDA9178: for sets with TDA9178 the Dynamic Skin Tone Control and Green Enhancement are controlled in the TDA9178. The Blue Stretch is controlled by the BOCMA and the Blue Stretch of the TDA9178 is switched off.

When the TDA9178 is used, noise reduction is also available. The action of the noise reduction has also influence on the sharpness control: if a noisy signal is received then the noise reduction should be high and sharpness low and also vice versa.

Chroma and Luminance processing

The circuit contains a chroma bandpass and trap circuit (including a luminance delay line and the delay for the peaking circuit). The centre frequency of the chroma bandpass filter is switchable via the $\bar{P}$ C-bus so that the performance can be optimised for 'front-end' signals and external CVBS signals.

Colour decoder

The colour decoder can decode PAL, NTSC and SECAM signals. The internal clock signals for the various colour standards are generated by means of an internal VCO, which uses the 12 MHz crystal frequency as a reference.

Under bad signal conditions (e.g. VCR-playback), it may occur that the colour killer is activated although the colour PLL is still in lock. When this killing action is not wanted it is possible to overrule it.

The IC contains an Automatic Colour Limiting (ACL) circuit which is switchable via the $\bar{P}$ C-bus and which prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received.

The reference frequency of the colour decoder is fed to the Fsc output (pin 49) and can be used to tune an external comb filter.

The base-band delay line is integrated. The demodulated colour difference signals are internally supplied to the delay line. The colour difference matrix switches automatically between PAL/SECAM and NTSC.

Picture improvement features

In the BOCMA various picture improvement features have been integrated. These features are:

- Video dependent coring in the peaking circuit. The coring can be activated only in the low-light parts of the screen. This effectively reduces noise while having maximum peaking in the bright parts of the picture.
- Colour Transient Improvement (CTI). This circuit improves the rise and fall times of the colour difference signals.
- Black-stretch. This circuit corrects the black level for incoming video signals, which have a deviation between the black level and the blanking level (back porch).
- Blue-stretch. This circuit is intended to shift colour near 'white' with sufficient contrast values towards more blue to obtain a brighter impression of the picture.
- White-stretch. This function adapts the transfer characteristic of the luminance amplifier in a non-linear way dependent on the picture content. The system operates such that maximum stretching is obtained when signals with a low video level are received. For bright pictures the stretching is not active.
- Dynamic skin tone (flesh) control. This function is realised in the YUV domain by detecting the colours near to the skin tone. The correction angle can be controlled via the I²C-bus.

RGB output

The IC's have a flexible control circuit for RGB and YUV input signals which has the following features:

- Input which can be used for YUV or RGB input signals and as YUV interface. The selection of the various modes can be realised via the I²C-bus. For the YUV input 2 different input signal conditions can be chosen. It is also possible to connect the synchronisation circuit to the incoming Y input signal. This input signal can be controlled on saturation, contrast and brightness.
- The RGB-1 input which is intended for OSD/text signals and which can be controlled on contrast and brightness. By means of software the insertion blanking can be switched on or off. It is also possible to convert the incoming RGB-1 signal to a YUV signal. The resulting signal is supplied to the YUV outputs.
- The TDA888X versions have an additional YUV or RGB input which can be controlled on contrast, saturation and brightness. This signal is supplied to the control circuit via the YUV interface so that an external picture improvement IC will also have effect on this signal.

Geometry control

The deflection processor of the TDA888X series offers several control parameters for picture alignment:

- S-correction
 - vertical amplitude
 - vertical slope
 - vertical shift
 - vertical zoom
 - vertical scroll
- for vertical picture alignment, and
- horizontal shift.
 - EW width with extended range because of the "zoom" function
 - EW parabola width
 - EW upper/lower corner parabola
 - EW trapezium correction.
 - horizontal parallelogram and bow correction

for the horizontal picture alignment.

The IC is designed for use with a DC-coupled vertical deflection stage. This is the reason why a vertical linearity alignment is not necessary (and therefore not available). All geometry control is done via I²C and the data is stored in the NVM (IC7066) of the SSB.

Cut-off control / white drive

The picture tube is continuously adjusted to prevent visible ageing of the picture tube. In this way the customer has always a perfect picture. This is so-called 'Continuous Cathode Calibration'. The function is realised by means of 2-point black level stabilisation. By inserting two levels for each gun and comparing the result with 2 different reference circuits the drive is controlled. With two different reference currents the influence of picture tube parameters like the spread in cut-off voltage can be eliminated.

The measurement of the 'high' and the 'low' current of the 2-point stabilisation circuit is carried out in 2 consecutive fields. The leakage current is measured in each field. The maximum allowable leakage current is 100 µA. The current is measured via Black Current Input (BLKIN) that is fed back to pin 30 of IC7301.

When the TV is switched-on the RGB output signals are blanked and the black current loop will try to set the right picture tube bias levels and then there is RGB-drive.

Peak White Limiting

If the beam current becomes too high, the picture tube could be damaged. The control circuit contains a Peak White Limiting circuit (pin 34): if the beam current increases, the EHT-info voltage will decrease. Now the contrast will be reduced. The peak white level is adjustable via the I²C-bus. The circuit also contains a soft-clipper, which prevents that the high frequency peaks in the output signal become too high. The difference between the PWL level and the soft clipping level is adjustable via the I²C-bus in a few steps.

Switch-off control

During switch-off of the TV receiver a fixed beam current is generated by the black current control circuit. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection is placed in an overscan position so that the discharge is not visible on the screen.

9.1.7 Synchronisation (diagram C1)

Horizontal synchronisation

Before the video processor IC7301 can generate horizontal drive pulses, the supply voltages on both pins 23 and 53 must be present. After the start-up command of the µP (via the I²C) the BOCMA starts giving horizontal pulses.

To obtain a smooth switch-on/off behaviour the horizontal drive signal is switched-on/off via the soft-start/soft-stop procedure. This function is realised by means of a variation of the T-ON of the horizontal drive pulse. When the soft-start procedure is completed the horizontal output is gated with the flyback pulse so that the horizontal output transistor cannot be switched-on during the flyback time.

An additional function of the IC is the 'low-power start-up' feature. For this function a supply voltage with a value between 3 and 5 V must be available at the start-up pin (required current 5 mA typical).

In this condition the horizontal drive signal has the nominal T-OFF and the T-ON grows gradually from zero to the nominal value as indicated in the soft-start behaviour. As soon as the 8 V supply is present, the switch-on procedure (e.g. closing of the second loop) is continued.

The horizontal drive signal is generated by an internal VCO, which is running at a frequency of 25 MHz. This oscillator is stabilised to that frequency by using the 12 MHz frequency of

the crystal oscillator as a reference. The horizontal sawtooth oscillator signal is converted into a square wave voltage. This square wave LINEDRIVE1 signal at pin 56 is fed to the line output stage. The time constant of the sync. circuit (different for VCR and weak terrestrial signals) is automatically internally determined by the BOCMA.

On pin 57 of IC7301 the sandcastle pulse (SC) is available. This is a 2-state pulse that is used for the synchronisation of the (optional) IC's 7405 and 7403.

The dynamic phase-correction signal at pin 58 of IC7301 gives horizontal shift corrections during beam current changes. If the beam current increases (more white), the EHT voltage decreases so the picture will become off-centre. This signal takes care that the picture remains in the middle of the screen by adapting the timing of the horizontal drive pulse (LINEDRIVE1).

Vertical synchronisation

The vertical sawtooth generator drives the vertical output drive circuit. On pins 63 & 64 are 2 differential voltages FRAMEDRIVE+ and FRAMEDRIVE-. These create differential currents, which are fed to the vertical output stage. Via the I²C-bus adjustments can be made of the horizontal and vertical geometry.

E/W correction

The EW_DRIVE signal at pin 62 takes care of the correct pincushion correction for 110° tubes. It also corrects breathing of the picture due to beam current variations (EHT varies dependent of the beam current: e.g. for widescreen without load this is 31.5 kV and with load (1.5 mA) 29.5 kV). This correction is derived from the signal on pin 34

(EHT_INFO) which "measures" the beam-current. This signal has two functions:

- To correct the pincushion due to beam current variations.
- As protection signal. As the beam current is too high (voltage on pin 34 > 3.5 V) the set is forced into protection.

9.1.8 Horizontal (line) deflection (diagram A2)

For circuit description see A8 Training Manual: 4822 727 21613.

Differences with the A8 are:

- Item-numbers are different from the one mentioned in the text.
- Additional Panorama circuit
- Output voltages: absence of the +30 V for the East-West protection.

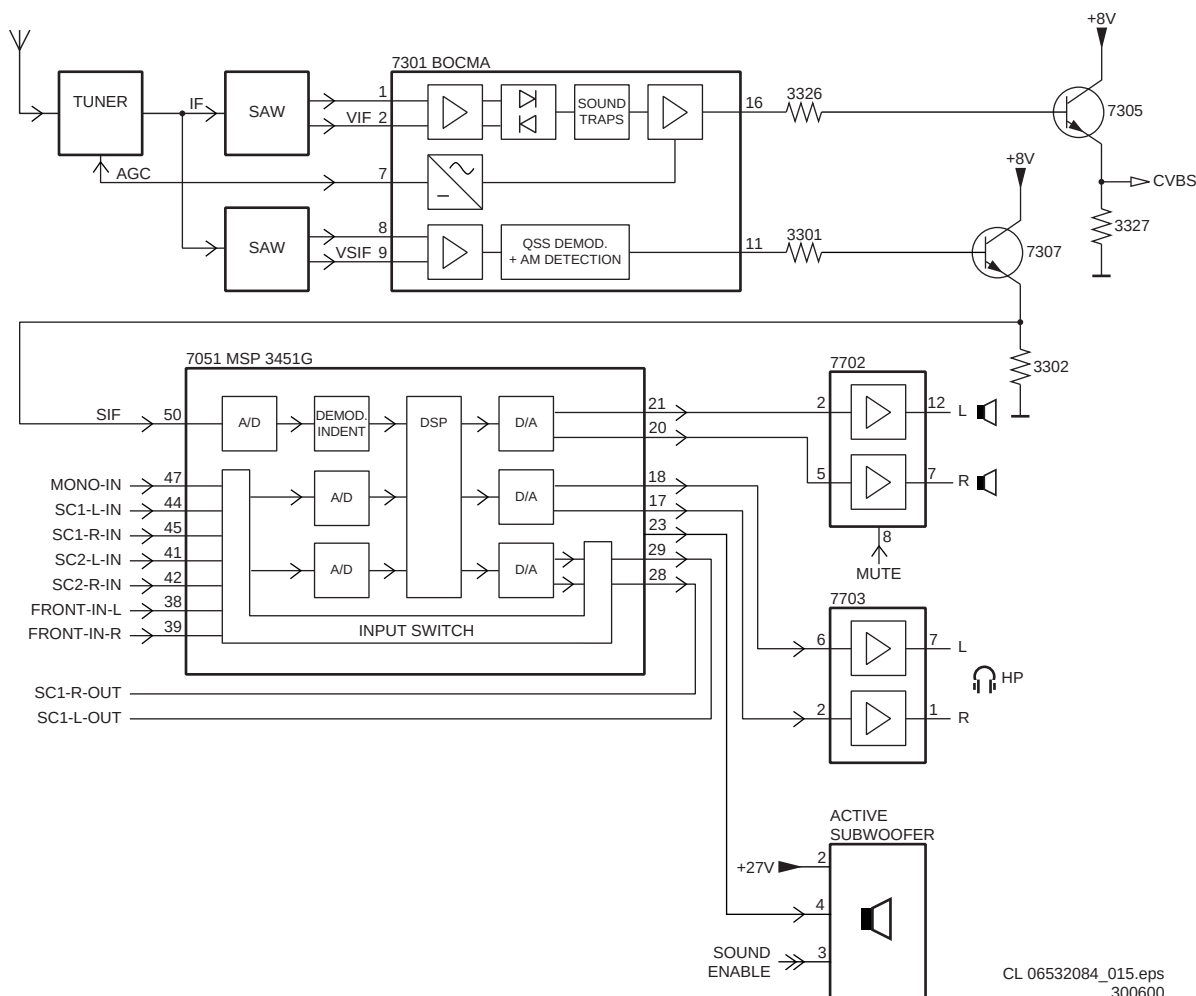
9.1.9 Vertical (frame) deflection (diagram A3)

For circuit description see A8 Training Manual: 4822 727 21613.

Differences with the A8 are:

- Item-numbers are different from the one mentioned in the text.
- Additional protection circuit "Prot E-W" has been removed.

9.1.10 Audio processing (diagram C6 & A6)



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Figure 9-3

Introduction

The following systems are available:

- Basic : FM/AM mono (all standards).
- NICAM : FM stereo / NICAM B/G, D/K, I, L/L'.
- 2CS : FM stereo / dual language (all standards 4.5, 5.5, 6.5 MHz).
- BTSC: Mono/Stereo, Mono/Stereo and SAP.

All A10 sets contain one of ITT's Multistandard Sound

Processing IC's for sound decoding:

- MSP3415D: All global sound standards, except BTSC.
- MSP3435G: Only BTSC
- MSP3451G: All global sound standards with Virtual Dolby and more I/O's.

This IC takes care of the main FM, AM, NICAM and BTSC sound decoding.

The analogue input and output sections of MSP offer wide range of switching facilities such that it is possible to distribute all possible source signals (internal and external) to the desired output channels (main, headphone or AV outputs).

All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial and source selection (SIF-signal, AV1 or AV2).

In addition to that, the MSP3451 is also able to perform Virtual Dolby, a Dolby approved sound mode for surround sound reproduction with left/right speakers only.

Basic

The MSP is used as sound decoder in all cases of transmission.

NICAM

The IF output from the tuner is filtered by SAW filters. AM sound is directly demodulated from the SIF. The L/L' switching is done for the BOCMA and also on the SAW filter to select the appropriate filter (SEL_IF_LL signal from μ P). The SIF from the BOCMA (pin 11) passes through the high pass filter and amplifier into the MSP input (pin 50) for further demodulation.

2CS

This analogue FM stereo audio standard is predominately used in Germany and The Netherlands. It is also used on some cable television networks.

The SIF from the BOCMA is available at its CVBS output (pin 11) and passes through the high pass filter and amplifier and fed into the MSP input (pin 50) for further demodulation. Signals of all standards of 2CS and MONO are demodulated by MSP.

BTSC

For this system the MSP3435G is used, an alignment-free BTSC-stereo/SAP/DBX decoder. It is a sound processor for stereo/second audio program (SAP) baseband signals, in accordance with the BTSC standard for television receivers. It is controlled via I²C.

The SIF from the BOCMA (pin 11) passes through the high pass filter and amplifier into the MSP input (pin 50) for further demodulation.

Source selection

- MSP3415D (stereo)
 - This IC is an economised version of the MSP3410 that is used in the MG-chassis. It can cover 2 stereo and 1 mono (AM) input. Since more inputs are required, separate source selectors are used (HEF4052, IC7650 and HEF4053, IC7630). This selector has AV1, AV2, FRONT and SC1-OUT (Tuner) as input and is connected to the AV1 input of the MSP3415. The AV2 input is not used.

- Since the MSP3415 has only one AV output, which is connected to the AV1, a constant level output and connection to AV2 is not available. This is fixed by connecting the HEF4052 input selector to the constant level output and to AV2.
- To get a constant level output if the Tuner is selected, the AV1 output (Tuner at any time), has to be fed back to the input selector and selected as input for the MSP (AV1 input).
- The MSP3415 has no separate output to drive a headphone. Therefore the speaker outputs are hardwired (on the LSP) to the headphone amplifier.
- MSP3435G (BTSC)
 - See MSP3415.
 - BTSC: Demodulation of the BTSC multiplex signal.
 - SAP (Second Audio Program). This mode is available for BTSC sets and can be toggled 'on' or 'off'. The matrix of the relevant MSP-outputs must be switched appropriately to obtain SAP.
 - Alignment-free digital DBX noise reduction.
- MSP3451G (Virtual Dolby)
 - The MSP3451, which is used in all versions supporting Virtual Dolby, is capable of supporting 4 stereo inputs and 1 mono (AM) input. Therefore the extra input selector (HEF4052) is not needed.
 - The MSP3451 is also capable of supporting 2 AV outputs, so the trick used in the MSP3415 set-up to get a constant level output is not needed.
 - The MSP3451 has a separate headphone output, so sound control be done separate from the speakers.

Audio decoding

At the input a choice can be made between two IF-signals; SIF and SIFM. The selected signal is fed to the AGC. After this, an ADC converts the IF-signal to digital.

This digital signal can be processed by 2 demodulation channels. The first one is able to handle FM and NICAM signals. The second one can handle FM and AM signals. Each channel contains a mixer to shift the incoming signal in the frequency domain. This shift is determined by the value of a DCO (Digital Controlled Oscillator).

After the down-mix, the signal is fed, via a filter, to a discriminator. From here the AM, FM or NICAM demodulation can be performed.

Both channels contain an 'automatic carrier mute' function, which automatically mutes the output of the analogue section when no carrier is detected.

After demodulation, the FM-signals are subjected to a de-emphasis operation. After that the matrix of the stereo system is applied.

Audio processing

The sound processing is completely done by the MSP-family:

- Volume control is done by the user via the SOUND menu.
- Tone control in 'Stereo' sets is done via the BASS/TREBLE control.
- Headphone control in 'Stereo'-sets is done via the loudspeaker output of the MSP, no sound control possible. In 'Virtual Dolby'-sets, the MSP has a separate Headphone output so separate sound control is possible.
- Mute control can be done in different ways:
 - System muting: via the SOUND_ENABLE line of the Painter. Used during start-up/switch-off conditions, in order to avoid audible pops.
 - Headphone muting: the presence of a headphone is detected by the FRONT_DETECT line. If present the main speakers will be muted.

Automatic Volume Level (AVL)

One of the features of the MSP-family is AVL. If used, it limits the big volume differences in the broadcast between e.g. news transmissions and commercials or within a movie.

To be able to get a Dolby approval (for the Virtual Dolby sets), the AVL feature must be switchable. Therefore, the AVL feature is customer switchable via the menu.

Audio amplification (diagram A6)

The audio output stage is built around IC7702, which is a balanced amplifier, and is located on the LSP. It uses an monolithic integrated power amplifier IC, the AN5277. The gain of the amplifier is constant. This means that volume control has to be done via the MSP.

The supply voltage is +27 V, generated by the power supply via L5912

The AN5277 delivers an output of 2 x 10 W_{RMS} to 2 full range speakers. A subwoofer is not implemented.

Muting

There are 3 types of muting available: system mute, headphone status mute and user mute.

- **System muting** - System muting is implemented for "special events" such as channel/source change event, loss of identification signal, on/off of set, during search and auto store/program, sound mode change. This muting is transparent to the user. Audio output should be muted before the above "special events" occurred, to prevent problems such as audible pop. Muting is done via the SOUND-ENABLE line connected (via TS7701) to pin 8 of the amplifier-IC and coming from the Painter. This signal is inverted by TS7701, as a result of which at a low level of the SOUND-ENABLE signal the IC will mute.
- **Headphone status mute** - A headphone status is available to detect the presence of the headphone and mute the main speakers if the headphone is detected. The microprocessor will read the FRONT-DETECT status.
- **User muting** - This is a mute option available to the user. The user select the MUTE option on the remote control to switched off/on the sound output to the main loudspeaker and the subwoofer.

Headphone amplifier (diagram A6)

The headphone amplifier is built around IC7703 (TDA1308T), which is an integrated class AB stereo headphone driver.

9.1.11 OSD / Teletext (diagram C2 / C4)

OSD

The On Screen Display information is generated by the microprocessor IC7064. The RGB and blanking signals for the OSD are fed to the RGB/blanking input of the Video Processing section of IC7301 via the same path as the teletext RGB/blanking signals.

The control circuit of the BOCMA has a half tone input (pin 13) which is used to reduce the contrast setting during mixed mode operation for teletext and OSD signals. The output signal has an amplitude of about 2 V black-to-white at nominal input signals and nominal settings of the controls. To increase the flexibility of the IC it is possible to insert OSD and/or teletext signals directly at the RGB outputs. This insertion mode is controlled via the Fast Blanking insertion input (pin 38).

Teletext

Sets with the SAA55XX microprocessor have the capability of decoding and displaying both 525-line and 625-line World System Teletext and offer a 10 (or 100) page Teletext memory.

The teletext function can be divided into the functions described below:

- The Data Capture section takes in the analogue Composite Video and Blanking Signal (CVBS), and from

this extracts the required data, which is then decoded and stored in memory.

- The extraction of the data is performed in the digital domain. The first stage is to convert the analogue CVBS-signal into a digital form. This is done using an ADC sampling at 12 MHz.
- The data slicer extracts the digital teletext data from the incoming CVBS signal. This is performed by sampling the CVBS signal and processing the samples to extract the teletext data and clock.
- The data and clock recovery is then performed by a Multi-rate Video Input Processor (MuVIP). From the recovered data and clock the following data types are extracted: WST Teletext (625/525), Closed Caption, VPS and WSS. The extracted data is stored in on-chip DRAM via the Memory interface.

The capabilities of the display block are based on level 1.5 teletext. It consists of 25 rows each of 40 characters, with the characters displayed being those from rows 0 to 24 of the page memory. The display block supplies the RGB output signals.

For the display timing the signals VFB and HFB from the LSP are used. The display timing arranges the timing of the RGB signal in order to ensure a stable teletext picture:

- The VFB signal (pin 55) is derived from the vertical deflection circuitry. This is a signal with active 'Low' sync pulses.
- The HFB signal (pin 53) is derived from the horizontal output stage. The HFB signal is a signal with active 'HIGH' sync pulses.

Via the pins 46, 47 and 48 of IC7064 the B, G, R colour signals are supplied respectively to the RGB switch of the TDA888X. The output polarity of all these pins is active 'High'. Via pin 52 of IC7064 the FBL (fast blanking) signal is supplied to the RGB switch. Via the fast blanking signal the R, G, B signals are inserted in the television picture.

9.1.12 CRT / SCAVEM / Rotation (diagram B / B / A7)

RGB amplifiers

The integrated RGB video amplifier (IC7830 located on the CRT-panel) has three amplifier channels inside and drives the three cathodes of the colour CRT. The main features of this IC (TDA6107Q) are:

- This amplifier is connected to 200 V only (13 V reference is generated internally).
- Black current stabilisation output is also generated internally and this signal goes directly to the BOCMA feedback input.
- Thermal protection.

The amplifiers are basically 'negative feedback OpAmps' located inside the IC. Pins 1, 2 and 3 are inverting inputs for Green, Red and Blue; pins 7, 8 and 9 are cathode outputs for Blue, Red and Green. Pin 5 is the black current stabilisation output.

Cut-off stabilisation is an auto-tuning loop (active during a four-line period prior to the end of a field blanking pulse) which stabilises the black current of each RGB-channel sequentially and independently. This is a new concept known as 'Continuous Cathode Calibration', provided by the BOCMA. In this concept the cathode drive is adjusted at two points and hence provides better accuracy of black level.

To protect the RGB-amplifier against picture tube flashover discharge, an external protection circuit consisting of D6831, D6833 and D6835 combined with 100 Ohm resistors R3831, R3833 and R3835 is implemented. These diodes clamp the cathode output voltage to VDD. To limit the diode current, external resistors R3832, R3834 and R3836 of 1 kOhm are connected in series with the cathode input of each gun, in conjunction with the 2 kV sparkgaps in the CRT socket.

SCAVEM

The SCAVEM-circuitry is implemented in the layout of the picture tube panel. It is thus not an extra module. SCAVEM means SCAn VELOCITY Modulation. This means that the horizontal deflection is influenced by the picture content. In an ideal square wave, the sides are limited in slope by a limited bandwidth (5 MHz).

SCAVEM will improve the slope as follows: At a positive slope, a SCAVEM-current is generated which supports the deflection current. The first half of the slope the spot is accelerated and the picture is darker, while at the second half of the slope, the spot is delayed and the slope becomes steeper.

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

During the first half of the slope, the spot is delayed, the slope becomes steeper.

During the second half the spot accelerates, the SCAVEM-current is zero at the end of the slope.

Via connector 0238, signal 'Y_MAIN_IN' is added to the emitter of TS7864. Via the emitter follower formed with TS7860, this signal is conveyed to the differentiator C2878 and R3864. Only the high frequencies are differentiated (small RC-time). The positive and negative pulses of this signal drive respectively TS7861 and TS7865 into conductivity. The DC setting of the output stage is set by R3870, R3871, R3872 and R3873. The working voltage of the transistors is settled at half the supply voltage.

At the positive section of the pulse, the current flows through R3887 and C2869, the SCAVEM-coil and TS7863. At the negative section of the pulse, the current flows through R3886 and C2869, the SCAVEM-coil and TS7862.

Rotation

In sets with a rotation coil (widescreen sets $\geq 32"$), the amount of frame rotation is adjusted with the TILT-output of the Painter (pin 1).

- IF + Video processor (7301):
 - AP NTSC TDA8887H
 - AP / China TDA8889H
- Switching IC's HEF4053 (7401 & 7402) TDA8601 (7803),
- IO expander (7403) M62320P

9.1.13 Double Window (DW)**Introduction**

The Double Window (DW) panel provides the option for viewer to see two pictures or programs on the displayed area of a TV screen. The displayed pictures can be in PIP mode or DW mode. The viewer can also select the size and position of the 'second' picture. The DW panel is only applicable to NAFTA, LATAM & AP.

The DW-models always have two tuners, however with different front-end executions depending on the region: For AP, China and LATAM regions, the TV uses one RF signal which is connected to the tuner with splitter located on the DW panel. The 2nd tuner on the main panel is fed with the signal from this splitter. Due to this connection, the Main PCB tuner (Tuner 1) always processes the Main Picture, and the tuner located on the DW panel (Tuner 2) always process the DW picture. If the picture between the two tuners need to be swapped, then the tuner RF frequency is swapped rather than the base-band signal switching as done in the USA execution.

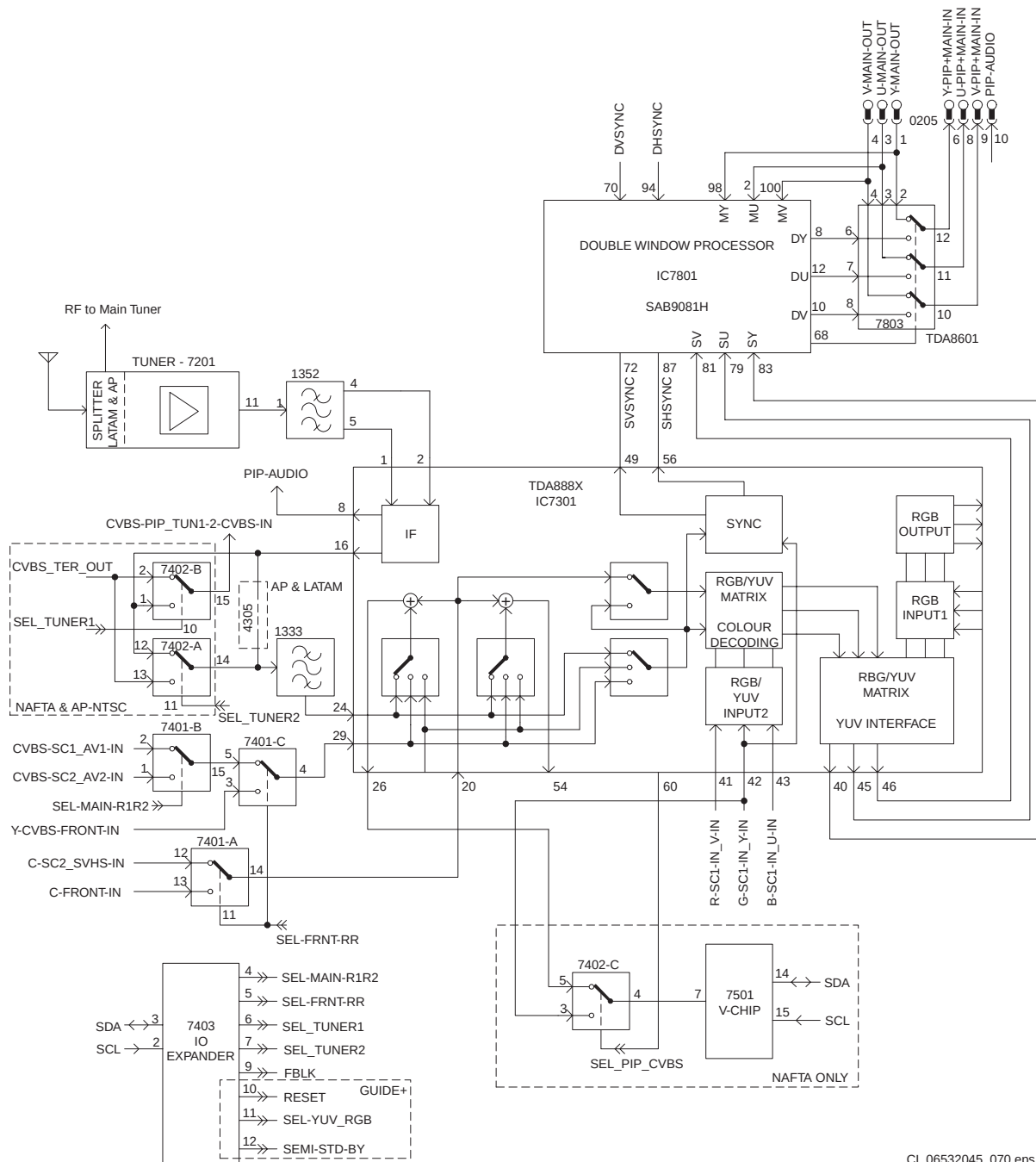
The V-Chip data slicer is not present in these regions.

Key components

- Tuner (7201):
 - AP Non-China TEDE9X700A
 - China TEDE9X701A
 - AP NTSC TEDH9X700A
- SAW Filter (1352):
 - AP Non-China K7260M (39.8 MHz)
 - China K6287K (38 MHz)

Block Diagram

There are basically two types of configurations. One for NAFTA (2 antenna inputs) and one for AP/China and LATAM (1 antenna input) as shown below.



CL 06532045_070.eps
010800

Figure 9-4

Circuit Description

IF & Video section

Basically the IF & Video processing part is quite similar to the circuits used in the main board, except it has a DW processor.

For AP and China execution, the TV uses one RF input to the DW's tuner with a splitter. The tuner on the main board receives RF from the splitter. Due to this configuration, the main board tuner always processes the Main picture while the DW tuner always processes the Sub picture. If the picture between the two tuners needs to be swapped, then the tuners' RF frequencies are swapped.

IF_TER from the tuner is fed to pin-1 & 2, IF circuits of TDA888x IC7301 via a SAW filter. The AGC voltage for the tuner can be adjusted in the SAM's tuner menu.

Depending of region execution, a different SAW filter is applied. Therefore circuit diversity is unavoidable as shown below. The RESET signal is used to set the SAW filter to a different IF frequency mode. The table below shows the IF frequency setting by RESET signal.

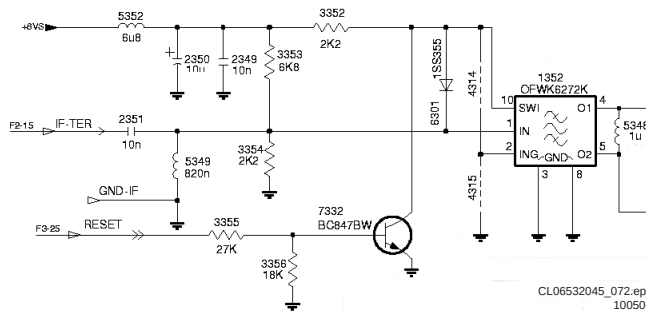


Figure 9-5

SAW-filter (1352)	RESET = Low	RESET = High
AP P/M (38.9MHz)	NTSC-M/N	PAL BG/DK/I
China (38.0MHz)	NTSC-M/N	PAL BG/DK/I

After IF demodulation, the CVBS_PIP_OUT is fed back to the TDA888x pin-24 via with or without video switching circuit comprises of 7402 HEF4053. This video switching circuit is only applicable to the AP-NTSC execution. Due to this construction, two independent RF signal pictures can be selectively displayed on the CRT's screen. The table below shows the switching logic.

For other executions (AP/China & LATAM) the switching circuit is bypassed using jumper 4305 & 4308 respectively.

SEL_TUNER1 (IC7403-pin 6)	SELTUNER2 (IC7403-pin 7)	Selected CVBS signals
0	0	Main Picture=Tuner 1 DW/PIP Picture=Tuner 2
0	1	Main Picture =Tuner 1 DW/PIP Picture=Tuner 1
1	0	Main Picture=Tuner 2 DW/PIP Picture=Tuner 2
1	1	Main Picture=Tuner 2 DW/PIP Picture=Tuner 1

In order to display the external AV sources by the DW panel, a source selection circuit is incorporated on the panel. In A10, 4 external AV sources are possible (AV1, AV2/S-VHS1,

AV3/S-VHS2 & YUV). The selection between these sources is done by IC7401 HEF4053.

Note: When S-VHS is inserted from the rear, AV2 source will be disabled. Likewise when S-VHS is inserted from the side-AV. The YUV is fed directly to video processor IC7301. This source selection is done internally by the IC.

The switching logic of AV sources is shown in Table-below.

Device IC7403	pin	Func- tion	RF CVBS	AV1	YUV	AV2	AV2 S- VHS	AV3	AV3 S- VHS
IO Ex- pander	5	SEL- PIP- FRNT- RR	1	0	0	0	0	1	1
	4	SEL- PIP- R1R2	1	0	0	1	1	0	0

The video processor IC7301 will decode the CVBS at pin-24 or pin-29 into YC signal and further process it into YUV signal and output at pin-40, 45 & 46. For AP/China & LATAM, the IC7301 internal FM demodulator is used to produce mono audio and is available at the pin-8 of IC7301. This audio signal PIP-AUDIO is fed to the SSB sound processor as such that DW sound appeared at the headphone. For NTSC execution, PIP-AUDIO is fed to pin-11 of SSB VIF processor IC7301-A.

DW/PIP processing

IC7801 SAB9081 is a multi-standard PIP controller, which can be used in double window or PIP applications. The YUV from the video processor IC7301 is fed to pin-79, 81 & 83. IC7801 will inserts YUV from the IC7301 with reduced size into the main picture YUV source in PIP environment. The main picture YUV is fed to pin-100, 2 & 98 respectively. These signals are mainly used during the DW mode.

Inside IC7801, the conversion to the digital environment is done on chip with ADCs. Processing and storage (1 MB DRAM) of the video data is done entirely in the digital domain. The conversion back to the analogue domain is done by DACs. Internal clocks are generated by PLLs, which lock on to the applied horizontal and vertical syncs from the main & sub pictures. The main picture syncs are applied to pin-70 (vert.) & pin-94 (hor.) and the sub picture syncs are applied to pin-72 (vert.) and pin-87 (hor.).

For DW mode, the main picture is compressed horizontally by a factor of two and directly fed to the output. After compression, a horizontal expansion of two is possible for the main picture. The sub picture is also compressed horizontally by a factor of two but stored in memory before it is fed to the outputs.

Post-processed YUV signals are fed to fast switching IC7803 TDA8601 pin-6, 7 & 8. In normal operation (w/o DW), the main picture YUV signals (at pin-2, 3 & 4) are bypassed by IC7803, and returned back to the main video processor. When DW mode is active, the compressed YUV signals (main & sub pictures) are used and fed to main video processor. During the PIP mode, only sub-picture YUV signals are used. The insertion control is made possible by fast blanking signal from IC7801 pin-68.

Power supplies

The power supplies used by DW panel are from the main board 5V, 8V and 33V (fortuner only). The 5V is regulated to +3.3V, +3V & +3VD by IC7802 LM317T. These voltages are mainly used by DW processor circuitry. The 8V is mainly supplied to IC7301 TDA888x IF + video processing circuitry and also to fast switching IC7803.

9.2 Abbreviation list

2CS	2 Carrier Stereo	FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page	G-SC1-IN	Green AV1 in
ADC	Analogue Digital Converter	G-SC2-IN	Green AV2 in
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	G-TXT	Green teletext
AGC	Automatic Gain Control: algorithm that controls the gain of tuner	HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA
AM	Amplitude Modulation	HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
AR	Aspect Ratio: 4 by 3 or 16 by 9	BOCMA	High-end video Input Processor: video and chroma decoder of A10A/C/U
Artistic	see Painter 2.5: main processor	HP	Headphone
AVL	Automatic Volume Level	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.
BG	System B and G	IO-BUS	In/Out - Bus
BLKIN	Black current information	Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes
B-SC1-IN	Blue AV1 in	LATAM	LATIn American countries (Brasil, Argentina, etc.)
B-SC2-IN	Blue AV2 in	LED	Light Emitting Diode
B-TXT	Blue teletext	LINE-DRIVE	Line drive signal
BOCMA	BiMOS one Chip Mid-end Architecture	LSP	Large signal panel
BTSC	Broadcast Television Standard Committee (sound)	MSP	Multistandard Sound Processor: ITT sound decoder of A10A/C/U
C-FRONT	Chrominance front input	MUTE	Mute-Line
CL	Constant Level: audio output to connect with an external amplifier	NAFTA	North American Free Trade Agreement (Canada, USA and Mexico).
ComPair	Computer aided rePair	NC	Not Connected
CRT	Cathode Ray Tube or picture tube	NICAM	Near Instantaneously Companded Audio Multiplexing
CSM	Customer Service Mode	NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
CTI	Colour Transient Improvement: manipulates steepness of chroma transients	O/C	Open Circuit
CVBS	Composite Video Blanking and Synchronisation	ON/OFF LED	On/Off control signal for the LED
CVBS-AV	CVBS signal from external source (VCR, VCD, etc.)	OSD	On Screen Display
CVBS-INT	CVBS signal from Tuner	Painter	On Screen Display, Teletext and Control; also named Artistic (SAA5565)
CVBS-MON	CVBS monitor signal	P50	Project 50 communication: protocol between TV and peripherals
CVBS-TER-OUT	CVBS terrestrial out	PCB	Printed Circuit board
DBX	Dynamic Bass eXpander	PTP	Picture Tube Panel
DFU	Direction For Use: description for the end user	QSS	Quasi Split Sound
DNR	Digital Noise Reduction: noise reduction feature of the box	RAM	Random Access Memory
DSP	Digital Signal Processing	RC	Remote Control
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode	RC5	RC5 signal from the remote control receiver
DVD	Digital Versatile Disc	RESET	Reset signal
DYN-PHASE-CORR	Dynamic phase correction	ROM	Read Only Memory
EHT	Extra High Tension	SAM	Service Alignment Mode
EHT-INFO	Extra High Tension information	SAP	Second Audio Program
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)	SC	Sandcastle: pulse derived from sync signals
EW	East West, related to horizontal deflection of the set	SCAVEM	Scan Velocity Modulation
AV	External (source), entering the set via AV or via cinches	S/C	Short Circuit
FBL	Fast Blanking: DC signal accompanying RGB signals	SC1-OUT	AV output of the MSP audio IC
FBL-SC1-IN	Fast blanking signal for AV1 in	SC2-B-IN	AV2 Blue in
FBL-SC2-IN	Fast blanking signal for AV2 in	SC2-C-IN	AV2 chrominance in
FBL-TXT	Fast Blanking Teletext	SC2-OUT	AV output of the MSP audio IC
FIL	Filament supply voltage	SIF	Sound Intermediate Frequency
FM	Field Memory or Frequency Modulation	SIMM	80-fold connector between LSP and SSB
FRONT-C	Front input chrominance (SVHS)	SMPS	Switch Mode Power Supply
FRONT-DETECT	Front input detection	SNDL-SC1-IN	Sound left AV1 in
		SNDL-SC1-OUT	Sound left AV1 out

SNDL-SC2-IN	Sound left AV2 in
SNDL-SC2-OUT	Sound left AV2 out
SNDR-SC1-IN	Sound right AV1 in
SNDR-SC1-OUT	Sound right AV1 out
SNDR-SC2-IN	Sound right AV2 out
SNDR-SC2-OUT	Sound right AV2 out
SNDL-VL-OUT	Surround sound left variable level out
SNDL-VR-OUT	Surround sound right variable level out
SNERT	Synchronous No parity Eight bit Reception and Transmit
SSB	Small Signal Board
STBY	Standby
SW	Subwoofer
TXT	Teletext
μP	microprocessor
VA	Vertical Acquisition
V-BAT	main supply for deflection (mostly 141 V)
VCO	Voltage Controlled Oscillator
VFB	Vertical Flyback Pulse: vertical sync pulse coming from the feature box
VL	Variable Level out: processed audio output towards external amplifier
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
Y-OUT	Luminance-signal

CHASSIS

xxx0	3122 785 90160	Power supply kit A10
xxx1	3122 785 90170	Line deflection kit A10
xxx2	9965 000 05769	SSB extension board A10

Various

0127▲	4822 265 11253	FUSE HOLDER
0128	4822 255 70281	NTC
0188	4822 404 21262	CLAMPING HEATSINK
0189	3139 124 30531	SSB BRACKET AP/CHINA
0200	4822 267 10734	CON 5P
0201	4822 267 10557	CON 10P
0207	4822 267 10565	CON 4P
0211▲	4822 267 10774	CON 2P
0212▲	4822 267 10775	CON 2P
0214	4822 267 10734	CON 5P
0215	2422 025 16382	CON 3P
0215	4822 267 10735	CON 3P
0226	2422 025 16599	SIMM 80P
0229▲	4822 267 10748	CON 3P
0232	4822 267 10565	CON 4P
0233	4822 267 10735	CON 3P
0234	4822 267 10735	CON 3P
0236	4822 267 10735	CON 3P
0240	2422 025 12485	CON 11P
0240	4822 267 10734	CON 5P
0246	4822 267 10565	CON 4P
0247	4822 267 10734	CON 5P
0272	4822 267 10735	CON 3P
1225▲	2422 542 90066	TUNER TEDE9X002A IEC
1225▲	2422 542 90072	TUNER TEDE9-031A

1225▲ 2422 542 90057 TUNER TEDH9X001A IEC
1225▲ 4822 210 10854 TUNER TEDH9X001A F-

1225▲ 2422 542 90079 TUNER TEDH9X022A
PHONO

1262	2422 026 05036	CINCH 9P
1262	2422 026 05064	CINCH 12P
1264	2422 026 04926	SOC 4P
1900▲	2422 086 10905	FUSE 4A
1931	4822 280 10367	CON 1P
1941▲	4822 071 51602	FUSE 1.6A
1941▲	2422 086 10784	FUSE 2.5A
1961▲	4822 071 51602	FUSE 1.6A
1961▲	2422 086 10784	FUSE 2.5A

2012	4822	126	14585	100nF	10%	50V
2020	4822	122	33177	10nF	20%	50V
2021	4822	122	33172	10nF	5%	50V
2023	4822	126	14043	1μF	20%	16V
2024	4822	126	14043	1μF	20%	16V
2201	5322	122	31863	330pF	5%	63V
2203	5322	122	31863	330pF	5%	63V
2204	4822	126	14043	1μF	20%	16V
2206	5322	122	31863	330pF	5%	63V
2208	5322	122	31863	330pF	5%	63V
2211	5322	122	32658	22pF	5%	50V
2217	5322	122	32658	22pF	5%	50V
2219	5322	122	32658	22pF	5%	50V
2224	4822	124	81286	47μF	20%	16V
2225	5322	122	32658	22pF	5%	50V
2227	4822	122	33575	220pF	5%	63V
2233	5322	122	31863	330pF	5%	63V
2239	5322	122	31863	330pF	5%	63V
2242	5322	122	31863	330pF	5%	63V
2244	5322	122	32658	22pF	5%	50V
2249	4822	122	33575	220pF	5%	63V
2261	4822	124	40196	220μF	20%	16V
2262	5322	122	31647	1nF	10%	63V
2265	4822	124	40207	100μF	20%	25V
2265	4822	124	41643	100μF	20%	16V
2266	2238	580	15645	47nF	10%	50V
2271	4822	124	21913	1μF	20%	63V
2276	5322	126	10511	1nF	5%	50V
2280	5322	122	32531	100pF	5%	50V
2281	4822	126	13486	15pF	2%	63V
2281	4822	122	33575	220pF	2%	50V

2282	4822 126 13751	47nF 10% 63V
2284	4822 124 42027	100µF 20% 25V
2404▲	4822 122 31177	470pF 10% 500V
2406	4822 121 43526	47nF 5% 250V
2409	5322 121 42386	100nF 5% 63V
2411▲	4822 126 13865	390pF 10% 2KV
2414▲	4822 121 70434	11nF 5% 1.6KV
2414▲	4822 121 70618	12nF 5% 1.6KV
2415▲	4822 121 70434	11nF 5% 1.6KV
2415▲	4822 121 70618	12nF 5% 1.6KV
2416▲	4822 126 13865	390pF 10% 2KV
2416▲	4822 126 14138	680pF 10% 2KV
2416▲	4822 126 13435	1.2nF 10% 2KV
2417▲	4822 122 31177	470pF 10% 500V
2419	4822 121 43888	360nF 5% 250V
2420	4822 124 47141	2.2µF 20% 350V
2422	4822 126 13751	47nF 10% 63V
2422	4822 126 13838	100nF 20% 50V
2430	4822 121 51305	15nF 10% 50V
2434▲	2020 021 91543	47µF 20% 160V
2437	4822 121 10619	220nF 10% 250V
2439	4822 121 51252	470pF 5% 63V
2442	4822 126 13838	100nF 20% 50V
2445	2020 012 93596	22µF 20% 250V
2447	4822 124 80791	470µF 20% 16V
2449	4822 124 11767	470µF 20% 25V
2450	4822 124 80791	470µF 20% 16V
2471	4822 121 42035	4.7µF 10% 100V
2473▲	4822 122 31177	470pF 10% 500V
2474▲	2222 347 90232	12nF 10% 400V
2478	5322 121 10472	47µF 25V
2484	4822 121 43526	47nF 5% 250V
2485▲	4822 126 10206	2.2nF 10% 500V
2501	5322 122 32268	470pF 10% 50V
2503	5322 122 32268	470pF 10% 50V
2505	5322 121 42386	100nF 5% 63V
2506	4822 124 40255	100µF 20% 63V
2521	4822 121 42408	220nF 5% 63V
2522	4822 124 40255	100µF 20% 63V
2523	5322 121 42386	100nF 5% 63V
2524	5322 121 42386	100nF 5% 63V
2531	4822 124 40784	3300µF 20% 16V
2532	4822 124 21913	1µF 20% 63V
2536	4822 126 14335	1nF 10% 100V
2701	5322 124 41379	2.2µF 20% 50V
2701	5322 121 42386	100nF 50V
2702	4822 124 40255	100µF 20% 63V
2703	5322 124 41379	2.2µF 20% 50V
2703	5322 124 42386	100nF 50V
2704	4822 124 12056	1000µF 20% 35V
2705	4822 124 21913	1µF 20% 63V
2706	4822 126 13838	100nF 20% 50V
2707	4822 123 14026	35V 470µF 20%
2707	4822 124 12056	35V 1000µF 20%
2708	4822 124 21913	1µF 20% 63V
2709	4822 124 12056	1000µF 20% 35V
2711	4822 126 14491	2.2µF 10V
2712	4822 124 40255	100µF 20% 63V
2713	4822 126 13838	100nF 50V 20%
2714	5322 122 32531	100pF 5% 50V
2715	4822 124 40255	100µF 20% 63V
2716	4822 126 14491	2.2µF 10V
2717	5322 122 32531	100pF 5% 50V
2718	4822 124 40255	100µF 20% 63V
2719	5322 122 31647	1nF 10% 63V
2720	5322 122 31647	1nF 10% 63V
2722	4822 122 33127	2.2nF 10% 63V
2722	4822 122 33177	10nF 50V 0805 X
2723	4822 122 33127	2.2nF 10% 63V
2723	4822 122 33177	10nF 50V 0805 X
2726	4822 124 40255	100µF 20% 63V
2727	5322 122 32654	22nF 10% 63V
2728	5322 122 32654	22nF 10% 63V
2729	5322 122 32654	22nF 10% 63V
2730	5322 122 32654	22nF 10% 63V
2731	4822 126 14043	1µF 20% 16V
2732	4822 126 14043	1µF 20% 16V
2733	4822 124 11947	10µF 20% 16V
2734	4822 126 13751	47nF 10% 63V
2735	4822 126 13751	47nF 10% 63V
2736	4822 126 13751	47nF 10% 63V
2902▲	4822 126 13589	470nF 275V
2905	4822 121 70141	33nF

2919	4822 124 80604	47μF 20% 50V
2921	5322 122 32311	470pF 10% 100V
2922	4822 126 13862	1.5nF 10% 2KV
2925	5322 122 32311	470pF 10% 100V
2927	3198 014 01520	1N5 10% 50V
2929▲	4822 126 14049	1.5nF 20% 250V
2932	5322 122 32654	22nF 10% 63V
2936▲	3198 019 62210	220P 10% 1KV
2938▲	3198 019 64710	470P 10% 1KV
2939	4822 124 42336	47μF 20% 160V
2940▲	2020 021 91543	47μF 20% 160V
2941	4822 122 31175	1nF 10% 500V
2942	4822 121 42408	220nF 5% 63V
2943	4822 124 40784	3300μF 20% 16V
2945	4822 124 40784	3300μF 20% 16V
2945	4822 124 81144	1000μF 16V
2952	4822 126 14585	100nF 10% 50V
2953	4822 126 13751	47nF 10% 63V
2955	2238 580 15645	47nF 10% 50V
2955	4822 122 33336	8.2nF 10% 50V
2961	4822 122 31175	1nF 10% 500V
2962	4822 124 12056	1000μF 20% 35V
2963	2238 780 15654	220nF 10% 16V
2964	4822 122 31175	1nF 10% 500V
2966	4822 124 41584	100μF 20% 10V
2967	4822 124 41584	100μF 20% 10V
2970	5322 122 32331	1nF 10% 100V
2974	4822 124 11583	2200μF 20% 35V
2974	4822 124 12056	1000μF 20% 35V
2976▲	4822 126 14153	2.2nF 10% 1KV
2977	4822 124 41584	100μF 20% 10V



3024	4822 051 10102	1k 2% 0.25W
3025	4822 051 20391	390Ω 5% 0.1W
3026	4822 117 11449	2k2 5% 0.1W
3027	4822 051 20391	390Ω 5% 0.1W
3028	4822 051 20562	5k6 5% 0.1W
3029	4822 051 20472	4k7 5% 0.1W
3030	4822 051 20122	1k2 5% 0.1W
3031	4822 116 83933	15k 1% 0.1W
3032	4822 051 20472	4k7 5% 0.1W
3033	4822 116 83933	15k 1% 0.1W
3034	4822 117 10833	10k 1% 0.1W
3035▲	4822 052 10229	222Ω 5% 0.33W
3037	4822 051 20182	1k8 5% 0.1W
3038	4822 051 20121	1k8 5% 0.1W
3201	4822 116 83868	150Ω 5% 0.5W
3202	4822 117 13579	220k 1% 0.1W
3203	4822 050 11002	1k 1% 0.4W
3204	4822 117 10834	47k 1% 0.1W
3206	4822 116 83868	150Ω 5% 0.5W
3207	4822 117 13579	220k 1% 0.1W
3208	4822 050 11002	1k 1% 0.4W
3209	4822 117 10834	47k 1% 0.1W
3211	4822 116 52201	75Ω 5% 0.5W
3212	4822 116 52175	100Ω 5% 0.5W
3216	4822 116 52201	75Ω 5% 0.5W
3217	4822 116 52175	100Ω 5% 0.5W
3218	4822 116 52201	75Ω 5% 0.5W
3219	4822 116 52175	100Ω 5% 0.5W
3223	4822 116 52199	68Ω 5% 0.5W
3224	4822 051 10102	1k 2% 0.25W
3225	4822 051 10102	1k 2% 0.25W
3226	4822 116 52201	75Ω 5% 0.5W
3227	4822 116 52176	10Ω 5% 0.5W
3233	4822 050 11002	1k 1% 0.4W
3234	4822 117 10834	47k 1% 0.1W
3238	4822 050 11002	1k 1% 0.4W
3239	4822 117 10834	47k 1% 0.1W
3241	4822 117 10833	10k 1% 0.1W
3242	4822 050 11002	1k 1% 0.4W
3243	4822 117 11927	75Ω 1% 0.1W
3244	4822 116 52175	100Ω 5% 0.5W
3247▲	5322 117 11726	10Ω 5W
3248	4822 117 11927	75Ω 1% 0.1W
3249	4822 116 52176	10Ω 5% 0.5W
3255	4822 051 20479	47Ω 5% 0.1W
3256	4822 051 20479	47Ω 5% 0.1W
3257	4822 051 20479	47Ω 5% 0.1W
3263	4822 117 11449	2k2 5% 0.1W
3264	4822 051 20008	0Ω jumper (0805)
3267	4822 051 20479	47Ω 5% 0.1W
3268	4822 051 20479	47Ω 5% 0.1W
3271	4822 051 20333	33k 5% 0.1W
3272	4822 117 10833	10k 1% 0.1W
3272	4822 117 10837	100k 1% 0.1W
3273	4822 051 20223	22k 5% 0.1W

7277	4822 130 60373	BC856B
7280	5322 130 60159	BC846B
7408	4822 130 41646	BF423
7410▲	9340 547 93127	BU4522AX
7440	4822 130 44568	BC557B
7470	4822 130 11336	STP16NE06FP
7478	4822 130 40959	BC547B
7480	4822 130 40959	BC547B
7481	4822 130 42159	BF819
7501	4822 209 61117	TDA8172
7513	5322 130 60159	BC846B
7701	5322 130 60159	BC846B
7702	9322 148 81667	AN5277
7703	4822 209 33165	TDA1308T/N1
7704	5322 130 60159	BC846B
7710	5322 130 60159	BC846B
7711	4822 130 60373	BC856B
7712	4822 130 60373	BC856B
7921▲	9322 140 38682	STR-F6454
7922	4822 130 60373	BC856B
7929▲	8238 274 02070	TCET1103G
7932	5322 130 60159	BC846B
7942	4822 209 80591	LM317T
7944	5322 130 60159	BC846B
7946	5322 130 60159	BC846B
7948	5322 130 60159	BC846B
7951	5322 130 60159	BC846B
7953	5322 130 60159	BC846B
7955	5322 130 60159	BC846B
7965	4822 130 40855	BC337
7967	9322 137 01682	SI-3050C
7971	4822 209 17243	SE130N(LF12)
7987	4822 130 60373	BC856B

CRT [B]

Various

0084▲	2422 500 80053	CON 9P
0084▲	2422 500 80058	CON 9P
0217	4822 267 10735	con 3P
0238	4822 267 10735	con 3P
0243	2422 025 12482	CON 6P
0244	4822 267 10734	con 5P

-II-

2830	4822 121 51473	470nF 20% 63V
2831	4822 126 13599	3.3nF 10% 500V
2835	4822 126 13838	100nF 20% 50V
2836	4822 121 43897	1nF 5% 400V
2840	4822 124 11565	10μF 20% 250V
2843▲	4822 126 13451	2.2nF 10% 2kV
2844▲	4822 126 13692	47pF 1% 63V 0805
2845▲	4822 126 13692	47pF 1% 63V 0805
2846▲	4822 126 13692	47pF 1% 63V 0805
2860	4822 124 40207	100μF 20% 25V
2861	5322 122 32658	22pF 5% 50V
2862	4822 126 13689	18pF 1% 63V
2863	4822 126 13486	15pF 2% 63V
2864	4822 121 51252	470nF 5% 63V
2865	5322 122 32448	10pF 5% 63V
2866	4822 126 13482	470nF 20% 16V
2867	5322 126 10733	680pF 5% 50V
2868	5322 122 32531	100pF 5% 50V
2869	4822 121 40334	100nF 10% 100V
2870	5322 122 32654	22nF 10% 63V
2871	4822 124 40764	22μF 100 V
2872	4822 122 31177	470pF 10% 500V
2872▲	4822 126 13829	120P 10% 500V
2873	4822 121 40516	22nF 10% 250V
2874	4822 126 13693	56pF 1% 63V
2876	4822 124 40248	10μF 20% 63V
2877	4822 051 20008	OR00 JUMP
2877	5322 122 32658	22pF 5% 50V
2878	4822 122 33172	390pF 5% 50V

□

3831	4822 116 52175	100Ω 5% 0.5W
3832	3198 013 01020	1k 2% 0.5W
3833	4822 116 52175	100Ω 5% 0.5W
3834	3198 013 01020	1k 2% 0.5W
3835	4822 116 52175	100Ω 5% 0.5W
3836	3198 013 01020	1k 2% 0.5W
3837	4822 051 20561	560Ω 5% 0.1W 0805
3837	4822 051 20008	JUMPER 0805
3838	4822 051 20561	560Ω 5% 0.1W 0805
3838	4822 051 20008	JUMPER 0805
3839	4822 051 20561	560Ω 5% 0.1W 0805
3839	4822 051 20008	JUMPER 0805

3840▲	4822 052 10101	100Ω 5% 0.33W
3841▲	4822 052 10108	1Ω 5% 0.33W
3841▲	4822 052 10128	1Ω2 5% 0.33W
3842▲	4822 052 10108	1Ω 5% 0.33W
3842▲	4822 052 10128	1Ω2 5% 0.33W
3843	3198 013 01520	1k 2% 0.5W
3845	4822 116 52272	330k 5% 0.5W
3860▲	4822 052 10109	10Ω 5% 0.33W
3861	4822 051 20332	3k3 5% 0.1W
3862	4822 051 20332	3k3 5% 0.1W
3863	4822 051 20332	3k3 5% 0.1W
3864	4822 051 20561	560Ω 5% 0.1W
3864	4822 117 11503	220Ω 1% 0.1W
3865	4822 117 10833	10k 1% 0.1W
3865	4822 117 10965	18k 1% 0.1W
3866	4822 117 11139	1k5 1% 0.1W
3866	4822 117 11449	2k2 5% 0.1W
3867	4822 116 52176	10Ω 5% 0.5W
3869	4822 051 20008	0Ω jumper (0805)
3869	4822 051 20109	10Ω 5% 0.1W
3870	4822 116 52231	820Ω 5% 0.5W
3870	4822 117 11454	820Ω 1% 0.1W
3871	4822 116 52291	56k 5% 0.5W
3871	4822 117 11148	56k 1% 0.1W
3872	4822 117 11148	56k 1% 0.1W
3873	4822 117 11454	820Ω 1% 0.1W
3874	4822 117 13424	8k2 5% 5W
3875	4822 051 20122	1k2 5% 0.1W
3875	4822 051 20562	5k6 5% 0.1W
3875	4822 051 20562	5k6 5% 0.1W
3875	4822 117 11449	2k2 5% 0.1W 0805
3876	4822 051 20109	10Ω 5% 0.1W
3877	4822 051 20008	0Ω jumper (0805)
3877	4822 051 20101	100Ω 5% 0.1W
3878	4822 051 20471	470Ω 5% 0.1W
3880	4822 116 52176	10Ω 5% 0.5W
3880	4822 116 52195	47Ω 5% 0.5W
3880	4822 116 52199	68Ω 5% 0.5W
3881	4822 051 20008	0Ω jumper (0805)
3882	4822 116 83872	220Ω 5% 0.5W
3885	4822 117 11449	2k2 5% 0.1W
3886	2322 194 63338	3Ω3 5%
3886	4822 051 20561	560Ω 5% 0.1W
3887	2322 194 63338	3Ω3 5%
3888	4822 051 20008	0Ω jumper (0805)
3888	4822 051 20561	560Ω 5% 0.1W
3890	4822 051 20561	560Ω 5% 0.1W
4xxx	4822 051 10008	0Ω 5% 0.25W (1206)
4xxx	4822 051 20008	0Ω 5% 0.25W (0805)



5842	4822 157 63788	18μH 10%
5860	4822 157 63507	0.18μH
5861	4822 157 63507	0.18μH
5862	4822 157 51216	5.6μH
5886	4822 320 40309	coil SDL102201B3B
5888	4822 320 40309	coil SDL102201B3B
5890	4822 320 40309	coil SDL102201B3B



6831	4822 130 30842	BAV21
6832	4822 130 83757	BAS216
6833	4822 130 30842	BAV21
6835	4822 130 30842	BAV21
6837	4822 130 82969	BZD23-C24
6838	4822 130 82969	BZD23-C24
6861	4822 130 83757	BAS216
6862	4822 130 83757	BAS216
6863	4822 130 30621	1N4148
6867	4822 130 30621	1N4148
6868	4822 130 30621	1N4148
6869	4822 130 31981	BZX79-B3V9



7830	9352 561 40112	TDA6108
7860	4822 130 44154	BF199
7861	4822 130 42589	BF370
7862	4822 130 41617	BD830
7863	4822 130 41616	BD829
7864	4822 130 44568	BC557B
7865	9340 350 20116	BFQ151

SSB [C]

Various

0205	2422 025 16677	CON 10P
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0238	2422 025 16835	CON 3P
1327	2422 543 01095	XTAL 12MHz
1333	2422 549 44311	FIL 5M8/6M5 TPWCC16B
1451	2422 549 44388	FIL SAW 38.9MHz
		OFWK7265L
1451	2422 549 44377	FIL SAW 45.75MHz
		OFWM1967L
1455	2422 549 44389	FIL SAW 38.9MHz
		OFWK9361L
1630	2422 543 01059	X-tal 18.432MHz

-II-

2010	3198 016 38210	820pF 25V
2014	3198 017 41050	1μF 10V
2015	3198 017 41050	1μF 10V
2016	4822 126 14305	100nF 10% 16V
2017	4822 126 14305	100nF 10% 16V
2018	4822 126 14238	2n2 50V
2043	3198 030 74780	4U7 20% 35V
2044	4822 126 14305	100nF 10% 16V
2045	4822 126 14507	18pF 5% 50V
2046	4822 126 14507	18pF 5% 50V
2049	4822 126 13879	220nF 20% 16V
2050	4822 122 31765	100pF 2% 63V
2051	4822 126 14305	100nF 10% 16V
2053	4822 124 23002	10μF 16V
2058	4822 126 14305	100nF 10% 16V
2301	3198 017 41050	1μF 10V
2302	4822 126 14241	330pF 0603
2303	4822 126 13193	4.7nF 0603
2304	3198 030 74780	4u7 20% 35V
2306	5322 126 11583	10nF 10% 50V
2309	4822 126 14305	100nF 10% 16V
2311	3198 017 41050	1μF 10V
2312	5322 126 11583	10nF 10% 50V
2313	4822 126 14305	100nF 10% 16V
2314	4822 121 70159	0.1μF 16V
2316	4822 126 14494	22nF 10% 25V
2317	4822 126 13879	220nF 20% 16V
2319	4822 126 14305	100nF 10% 16V
2321	4822 126 13193	4.7nF 0603
2322	4822 124 23002	10μF 16V
2323	3198 017 42230	22nF 50V
2324	4822 126 14305	100nF 10% 16V
2325	3198 017 42230	22nF 50V
2326	3198 017 42230	22nF 50V
2327	4822 126 11671	33pF
2328	4822 126 11671	33pF
2332	4822 126 13879	220nF 20% 16V
2333	4822 126 14305	100nF 10% 16V
2334	4822 126 14305	100nF 10% 16V
2335	3198 017 41050	1μF 10V
2338	4822 126 14238	2n2 50V
2342	4822 122 33752	15pF 5% 50V
2345	4822 122 33752	15pF 5% 50V
2348	4822 122 33752	15pF 5% 50V
2350	3198 030 74780	4u7 20% 35V
2354	3198 017 44740	470nF 10V
2355	3198 017 44740	470nF 10V
2356	3198 017 44740	470nF 10V
2357	4822 122 33741	10pF 10% 50V
2360	5322 126 11583	10nF 10% 50V
2372	4822 126 13193	4.7nF 10% 63V
2373	5322 124 90403	1μF 50V
2374	4822 126 14494	22nF 10% 25V
2375	3198 016 31020	1nF 25V
2376	3198 016 31020	1nF 25V
2377	3198 016 31020	1nF 25V
2380	4822 124 23002	10μF 16V
2401	3198 017 41050	1μF 10V
2402	3198 017 41050	1μF 10V
2403	3198 017 41050	1μF 10V
2404	4822 126 14494	22nF 10% 25V
2405	4822 126 14494	22nF 10% 25V
2407	4822 126 14305	100nF 10% 16V
2408	4822 126 14305	100nF 10% 16V
2412	4822 126 13879	220nF 20% 16V
2415	4822 126 13879	220nF 20% 16V
2417	4822 124 23002	10μF 16V
2420	4822 122 31765	100pF 2% 63V
2421	4822 124 23002	10μF 16V
2422	4822 126 14305	100nF 10% 16V
2423	3198 017 34730	47nF 16V
2424	4822 122 31765	100pF 2% 63V
2425	4822 122 31765	100pF 2% 63V
2426	3198 017 41050	1μF 10V
2428	3198 017 34730	47nF 16V
2433	5322 126 11583	10nF 10% 50V
2434	5322 126 11583	10nF 10% 50V
2441	4822 126 14305	100nF 10% 16V
2442	4822 126 13879	220nF 20% 16V
2443	5322 126 11583	10nF 10% 50V

2444	5322 126 11583	10nF 10% 50V
2445	5322 126 11583	10nF 10% 50V
2446	5322 126 11583	10nF 10% 50V
2447	5322 126 11583	10nF 10% 50V
2449	4822 126 14305	100nF 10% 16V
2450	4822 124 23002	10μF 16V
2451	4822 124 23002	10μF 16V
2452	5322 126 11583	10nF 10% 50V
2453	5322 126 11583	10nF 10% 50V
2460	4822 124 23002	10μF 16V
2464	5322 126 11578	1nF 10% 50V
2601	4822 126 13881	470pF 5% 50V
2602	4822 126 14305	100nF 10% 16V
2606	4822 124 23002	10μF 16V
2607	4822 126 13879	220nF 20% 16V
2610	5322 126 11578	1nF 10% 50V
2611	5322 126 11578	1nF 10% 50V
2612	5322 126 11578	1nF 10% 50V
2613	5322 126 11578	1nF 10% 50V
2614	4822 126 13193	4.7nF 10% 63V
2619	4822 126 13193	4.7nF 10% 63V
2620	3198 017 41050	1μF 10V
2621	3198 017 41050	1μF 10V
2622	4822 124 23002	10μF 16V
2623	4822 124 23002	10μF 16V
2624	4822 126 14305	100nF 10% 16V
2625	5322 124 41945	22μF 20% 35V
2628	4822 126 14305	100nF 10% 16V
2629	4822 124 23002	10μF 16V
2631	3198 017 41050	1μF 10V
2632	4822 126 13193	4.7nF 10% 63V
2633	3198 017 41050	1μF 10V
2634	4822 126 13193	4.7nF 10% 63V
2635	3198 017 41050	1μF 10V
2636	4822 126 14241	330pF 50V
2637	3198 017 41050	1μF 10V
2638	4822 126 14241	330pF 50V
2639	4822 126 14241	330pF 50V
2640	3198 017 41050	1μF 10V
2641	4822 126 14241	330pF 50V
2642	3198 017 41050	1μF 10V
2655	4822 126 13193	4.7nF 10% 63V
2657	4822 124 23002	10μF 16V
2661	4822 126 14305	100nF 10% 16V
2662	4822 124 23002	10μF 16V
2663	4822 122 33777	47pF 5% 63V
2664	4822 126 14225	56pF 5% 50V
2665	4822 126 11669	27pF
2666	4822 126 14508	100pF 5% 50V
2667	4822 122 33752	15pF 5% 50V
2675	3198 016 33380	3.3pF 50V
2676	3198 016 33380	3.3pF 50V
2678	3198 017 41050	1μF 10V
2679	4822 126 14305	100nF 10% 16V
2682	3198 017 41050	1μF 10V
2683	3198 017 41050	1μF 10V
2684	3198 017 41050	1μF 10V
2685	3198 017 41050	1μF 10V
2686	3198 017 41050	1μF 10V
2687	3198 017 41050	1μF 10V



3002	4822 117 12902	8k2 1% 0.063W
3003	4822 051 30103	10k 5% 0.062W
3004	4822 117 12902	8k2 1% 0.063W
3007	4822 117 12902	8k2 1% 0.063W
3008	4822 117 12902	8k2 1% 0.063W
3009	4822 117 12902	8k2 1% 0.063W
3013	4822 117 12902	8k2 1% 0.063W
3014	4822 117 12902	8k2 1% 0.063W
3015	4822 051 30103	10k 5% 0.062W
3017	4822 051 30101	100Ω 5% 0.062W
3018	4822 051 30101	100Ω 5% 0.062W
3019	4822 051 30101	100Ω 5% 0.062W
3021	4822 051 30101	100Ω 5% 0.062W
3022	4822 051 30222	2k2 5% 0.062W
3023	4822 117 12902	8k2 1% 0.063W
3024	4822 051 30102	1k 5% 0.062W
3028	4822 117 12925	47k 1% 0.063W
3029	4822 051 30103	10k 5% 0.062W
3030	4822 051 30102	1k 5% 0.062W
3031	4822 051 30471	470Ω 5% 0.062W
3032	4822 051 30103	10k 5% 0.062W
3034	4822 117 12925	47k 1% 0.063W
3035	4822 051 30471	470Ω 5% 0.062W
3042	4822 051 30151	150Ω 5% 0.062W
3043	4822 051 30151	150Ω 5% 0.062W
3044	4822 051 30103	10k 5% 0.062W
3045	4822 051 30272	2k7 5% 0.062W
3046	4822 051 30472	4k7 5% 0.062W
3051	4822 117 13525	24k 1% 0.62W
3054	4822 051 30103	10k 5% 0.062W

3055	4822 051 30103	10k 5% 0.062W
3056	4822 117 12925	47k 1% 0.063W
3057	4822 051 30103	10k 5% 0.062W
3058	4822 051 30471	470Ω 5% 0.062W
3059	4822 051 30151	150Ω 5% 0.062W
3061	4822 051 30471	470Ω 5% 0.062W
3062	4822 051 30472	4k7 5% 0.062W
3063	4822 051 30102	1k 5% 0.062W
3064	4822 051 30472	4k7 5% 0.062W
3065	4822 051 30472	4k7 5% 0.062W
3066	4822 117 12902	8k2 1% 0.063W
3067	4822 051 30102	1k 5% 0.062W
3081	4822 051 30472	4k7 5% 0.062W
3082	4822 051 30103	10k 5% 0.062W
3083	4822 051 30471	470Ω 5% 0.062W
3084	4822 051 30101	100Ω 5% 0.062W
3085	4822 051 30101	100Ω 5% 0.062W
3086	4822 051 30101	100Ω 5% 0.062W
3088	4822 051 30101	100Ω 5% 0.062W
3090	4822 051 30103	10k 5% 0.062W
3091	4822 051 30103	10k 5% 0.062W
3092	4822 051 30101	100Ω 5% 0.062W
3094	4822 051 30103	10k 5% 0.062W
3301	4822 051 30102	1kΩ 0603
3302	4822 051 20561	560Ω 5% 0.1W
3306	4822 051 30102	1k 5% 0.062W
3311	4822 051 30273	27k 5% 0.062W
3312	4822 051 30103	10k 5% 0.062W
3315	4822 051 30393	39k 5% 0.062W
3316	4822 051 30681	680Ω 5% 0.062W
3324	4822 051 30391	390Ω 5% 0.062W
3326	4822 051 30102	1k 5% 0.062W
3327	4822 051 20561	560Ω 5% 0.1W
3329	4822 051 30101	100Ω 5% 0.062W
3330	4822 051 30101	100Ω 5% 0.062W
3331▲	4822 117 11748	NFR 2Ω2 5%
3332▲	4822 117 11748	NFR 2Ω2 5%
3333	4822 051 30681	680Ω 5% 0.062W
3334	4822 051 30471	470Ω 5% 0.062W
3335	4822 051 30121	120Ω 5% 0.062W
3339	4822 051 30103	10k 5% 0.062W
3340	4822 051 20561	560Ω 5% 0.1W
3341	4822 051 30151	150Ω 5% 0.062W
3342	4822 051 30008	0Ω jumper
3344	4822 051 30151	150Ω 5% 0.062W
3345	4822 051 30008	0Ω jumper
3348	4822 051 30151	150Ω 5% 0.062W
3349	4822 051 30008	0Ω jumper
3358	4822 051 30101	100Ω 5% 0.062W
3360	4822 051 30101	100Ω 5% 0.062W
3361	4822 051 30101	100Ω 5% 0.062W
3362	4822 051 30101	100Ω 5% 0.062W
3363	4822 051 30101	100Ω 5% 0.062W
3364	4822 051 30102	1k 5% 0.062W
3365	4822 051 20561	560Ω 5% 0.1W
3371	4822 051 30153	15k 5% 0.062W
3372	4822 051 30109	10Ω 5% 0.062W
3373	4822 051 30101	100Ω 5% 0.062W
3374	4822 051 30332	3k3 5% 0.062W
3375	4822 051 30102	1k 5% 0.062W
3376	4822 051 30102	1k 5% 0.062W
3377	4822 051 30101	100Ω 5% 0.062W
3378	4822 051 30102	1k 5% 0.062W
3381	4822 051 30101	100Ω 5% 0.062W
3382	4822 051 30101	100Ω 5% 0.062W
3383	4822 051 30101	100Ω 5% 0.062W
3384	4822 117 12902	8k2 1% 0.063W
3385	4822 051 30103	10k 5% 0.062W
3387	4822 051 30101	100Ω 5% 0.062W
3388	4822 051 30479	47Ω 5% 0.062W
3393	4822 051 20273	27k 5% 0.1W
3394	4822 051 30183	18k 5% 0.062W
3401	4822 051 30008	0Ω jumper
3402	4822 051 30008	0Ω jumper
3403	4822 051 30008	0Ω jumper
3404	4822 051 30101	100Ω 5% 0.062W
3405	4822 051 30101	100Ω 5% 0.062W
3406	4822 051 30103	10k 5% 0.062W
3407	4822 051 30103	10k 5% 0.062W
3408	4822 051 30103	10k 5% 0.062W
3411	4822 051 30152	1k5 5% 0.062W
3412	4822 051 30152	1k5 5% 0.062W
3413	4822 051 20561	560Ω 5% 0.1W
3414	4822 051 30152	1k5 5% 0.062W
3415	4822 051 30152	1k5 5% 0.062W
3416	4822 051 20561	560Ω 5% 0.1W
3417	4822 051 30102	1k 5% 0.062W
3418	4822 051 20561	560Ω 5% 0.1W
3419	4822 051 30101	100Ω 5% 0.062W
3420	4822 051 30101	100Ω 5% 0.062W
3423	4822 051 30102	1k 5% 0.062W
3425	4822 051 30102	1k 5% 0.062W
3426	4822 051 30102	1k 5% 0.062W
3427	4822 051 30101	100Ω 5% 0.062W

3428	4822 051 30101	100Ω 5% 0.062W
3431	4822 051 30223	22k 5% 0.062W
3432	4822 051 30393	39k 5% 0.062W
3432	4822 051 30223	22k 5% 0.062W
3435	4822 051 30223	22k 5% 0.062W
3435	4822 051 30183	18k 5% 0.062W
3436	4822 051 30273	27k 5% 0.062W
3436	4822 051 30153	15k 5% 0.062W
3439	4822 051 30103	10k 5% 0.062W
3443	4822 051 30008	0Ω jumper
3444	4822 117 12891	220k 1%
3452	4822 051 30223	22k 5% 0.062W
3453	4822 051 30183	18k 5% 0.062W
3455	4822 051 30682	6k8 5% 0.062W
3456	4822 051 30222	2k2 5% 0.062W
3457	4822 051 30273	27k 5% 0.062W
3458	4822 051 30183	18k 5% 0.062W
3461	4822 051 30222	2k2 5% 0.062W
3471	4822 051 30008	0Ω jumper
3472	4822 051 30008	0Ω jumper
3473	4822 051 30008	0Ω jumper
3474	4822 051 30008	0Ω jumper
3477	4822 051 30472	4k7 5% 0.062W
3480	4822 051 30102	1k 5% 0.062W
3481	4822 051 30103	10k 5% 0.062W
3482	4822 051 30153	15k 5% 0.062W
3485	4822 051 30479	47Ω 5% 0.062W
3601	4822 051 30101	100Ω 5% 0.062W
3602	4822 051 30101	100Ω 5% 0.062W
3606	4822 051 30273	27k 5% 0.062W
3619	4822 051 30101	100Ω 5% 0.062W
3621	4822 051 30101	100Ω 5% 0.062W
3665	4822 051 30222	2k2 5% 0.062W
4xxx	4822 051 10008	0Ω 5% 0.25W (1206)
4xxx	4822 051 20008	0Ω 5% 0.25W (0805)



5040	3198 018 64780	4u7 5%
5041	3198 018 64780	4u7 5%
5042	3198 018 64780	4u7 5%
5050	4822 157 11778	5U6 10%
5309	4822 157 71334	0.68μH
5332	4822 157 71334	0.68μH
5333	4822 157 71334	0.68μH
5334	4822 157 71334	0.68μH
5401	4822 157 71694	0U82 10%
5403	4822 157 71334	0.68μH
5421	4822 157 71334	0.68μH
5425	4822 157 71334	0.68μH
5435	4822 157 71334	0.68μH
5601	3198 018 61080	1U 5%
5602	3198 018 64780	4u7 5%
5625	3198 018 61080	1U 5%
5665	3198 018 61590	15U 5%



6020	4822 130 83649	1SS355
6031	4822 130 11518	UDZ2.4B
6302	4822 130 10837	UDZS8.2B
6303	9322 137 65685	UDZS6.8B
6307	4822 130 83649	1SS355
6401	4822 130 11525	1SS356
6412	4822 130 83649	1SS355

7442	3198 010 42310	BC847BW
7443	3198 010 42310	BC847BW description>
7444	4822 130 60383	BF824
7445	5322 130 42718	BFS20
7630	9351 874 90118	74HC4052PW
7651	9322 143 53671	MSP3415D-FH-B3
7651	9322 149 63671	MSP3451G-FH-A1
7651	9322 143 55671	MSP3435G-FH-B5

SIDE I/O [D]

Various

0240	2422 025 12485	CON 11P
0306	3139 124 30421	SIDE AV BRACKET
1254	4822 267 31014	HEADPHONE SOCKET
1255	4822 265 11606	CON 3P
1256	2422 026 04926	SOC 4P

—II—

2286	4822 122 33642	150pF 5% 50V
2288	4822 122 33642	150pF 5% 50V
2292	5322 122 32311	470pF 10% 100V
2294	5322 122 32311	470pF 10% 100V
2296	4822 122 31125	4.7nF 20% 63V
2297	4822 122 31125	4.7nF 20% 63V

□

3285	4822 116 52201	75Ω 5% 0.5W
3286	4822 116 52176	10Ω 5% 0.5W
3287	4822 116 52201	75Ω 5% 0.5W
3288	4822 116 52176	10Ω 5% 0.5W
3289	4822 116 52249	1k8 5% 0.5W
3291	4822 050 11002	1k 1% 0.4W
3292	4822 117 10834	47k 1% 0.1W
3293	4822 050 11002	1k 1% 0.4W
3294	4822 117 10834	47k 1% 0.1W
3295	4822 116 52276	3k9 5% 0.5W
3296	4822 117 10833	10k 1% 0.1W
3297	4822 117 10833	10k 1% 0.1W

→I←

6291	9340 548 61115	PDZ12B
6292	9340 548 61115	PDZ12B
6293	9340 548 61115	PDZ12B
6294	9340 548 61115	PDZ12B

TOP CONTROL [E]

Various

0027▲	3139 124 30381	TOP CONTROL BRACKET
0080	3139 137 66921	TOP CONTROL BUTTON
0215	4822 267 10748	CON 3P
1091	4822 276 13775	SWITCH
1092	4822 276 13775	SWITCH
1093	4822 276 13775	SWITCH
1094	4822 276 13775	SWITCH

□

3091	4822 051 20561	560Ω 5% 0.1W
3092	4822 051 20391	390Ω 5% 0.1W
3093	4822 051 20561	560Ω 5% 0.1W
3094	4822 117 11504	270Ω 1% 0.1W
3095	4822 051 20332	3k3 5% 0.1W
3096	4822 117 11139	1k5 1% 0.1W

→I←

6091	4822 130 31983	BAT85
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DW [F]

Various

0171	3139 121 07981	PHONO TO PHONO
0174▲	3139 124 31671	PIP BRACKET
0200	4822 267 10734	CON 5P
0201	4822 267 10557	CON 10P
0205	2422 025 16587	CON 10P
0207	4822 267 10565	CON 4P
0209	2422 025 12482	CON 6P

0236	4822 267 10735	CON 3P
0272	4822 267 10735	CON 3P
1327	4822 242 10694	XTAL 12 MHz
1333	2422 549 44311	FIL 5M8/6M5 TPWCC16B
1352	2422 549 43074	FIL SAW 45M75
		OFVWM1962M
1352	2422 549 44223	FIL SAW 38M90
		OFVWK7260M

—II—

2261	4822 124 40207	100μF 20% 25V
2262	5322 126 10511	1nF 5% 50V
2265	4822 124 40207	100μF 20% 25V
2269	4822 126 13751	47nF 10% 63V
2301	3198 017 41050	1μF 10V 0603
2302	5322 126 10184	820P 5% 50V
2303	5322 126 10223	4.7nF 10% 63V
2306	5322 126 11583	10nF 10% 50V 0603
2309	4822 126 14585	100nF 10% 50V
2311	3198 017 41050	1μF 10V 0603
2312	4822 122 33177	10nF 20% 50V
2313	4822 126 14585	100nF 10% 50V
2314	4822 126 14585	100nF 10% 50V
2316	4822 126 14494	22nF 10% 25V 0603
2317	4822 126 13879	220nF 20% 16V
2319	4822 126 14305	100nF 10% 16V 0603
2321	5322 126 10223	4.7nF 10% 63V
2321	5322 126 10465	3.9nF 10% 50V
2322	4822 124 40248	10μF 20% 63V
2324	4822 126 14585	100nF 10% 50V
2327	4822 126 11671	33pF
2328	4822 126 11671	33pF
2331	4822 124 22652	2.2μF 20% 50V
2332	4822 126 14076	220nF 25V
2333	4822 126 14305	100nF 10% 16V 0603
2334	5322 122 32654	22nF 10% 63V
2335	4822 126 14043	1μF 20% 16V
2336	5322 126 10184	820P 5% 50V
2338	4822 122 33127	2.2nF 10% 63V
2342	4822 126 13692	47pF 1% 63V
2345	4822 126 13692	47pF 1% 63V
2348	4822 122 33777	47pF 5% 63V
2349	4822 122 33177	10nF 20% 50V
2350	4822 124 40248	10μF 20% 63V
2351	4822 122 33177	10nF 20% 50V
2354	4822 126 13482	470nF 80/20% 16V
2355	3198 017 41050	1μF 10V 0603
2356	4822 126 13482	470nF 80/20% 16V
2357	5322 122 32448	10pF 5% 63V
2372	5322 126 10223	4.7nF 10% 63V
2373	4822 124 21913	1μF 20% 63V
2374	5322 122 32654	22nF 10% 63V
2375	5322 126 10511	1nF 5% 50V
2376	5322 126 10511	1nF 5% 50V
2377	5322 126 10511	1nF 5% 50V
2380	4822 124 40248	10μF 20% 63V
2385	4822 126 13881	470pF 5% 50V
2386	4822 126 13881	470pF 5% 50V
2390	4822 122 33777	47pF 5% 63V
2391	4822 122 31765	100pF 2% 63V
2392	4822 122 33777	47pF 5% 63V
2393	3198 016 31020	1nF 25V 0603
2401	3198 017 41050	1μF 10V 0603
2402	3198 017 41050	1μF 10V 0603
2403	3198 017 41050	1μF 10V 0603
2404	3198 017 41050	1μF 10V 0603
2405	3198 017 41050	1μF 10V 0603
2411	4822 124 40248	10μF 20% 63V
2412	4822 126 13879	220nF 20% 16V
2415	4822 126 13879	220nF 20% 16V
2431	4822 126 14305	100nF 10% 16V 0603
2432	4822 126 14305	100nF 10% 16V 0603
2434	4822 126 14305	100nF 10% 16V 0603
2436	4822 124 40207	100μF 20% 25V
2437	3198 016 31020	1nF 25V 0603
2811	4822 126 14305	100nF 10% 16V 0603
2812	4822 126 14305	100nF 10% 16V 0603
2813	4822 122 33753	150pF 5% 50V
2814	4822 126 13838	100nF 50V 20%
2816	4822 124 40248	10μF 20% 63V
2817	4822 126 13838	100nF 50V 20%
2818	4822 126 13838	100nF 50V 20%
2819	4822 126 13838	100nF 50V 20%
2821	4822 124 40248	10μF 20% 63V
2822	4822 126 13838	100nF 50V 20%
2823	4822 126 14305	100nF 10% 16V 0603
2824	4822 126 14305	100nF 10% 16V 0603
2825	5322 122 33538	150pF 2% 63V
2826	4822 126 13838	100nF 20% 50V
2827	4822 124 40207	100μF 20% 25V
2828	4822 126 14305	100nF 10% 16V 0603
2829	4822 126 13838	100nF 20% 50V

2831	4822 126 14043	1μF 20% 16V CASE
2832	4822 126 14043	1μF 20% 16V CASE
2833	4822 126 14305	100nF 10% 16V 0603
2834	4822 124 40248	10μF 20% 63V
2836	4822 126 14305	100nF 10% 16V 0603
2837	4822 126 13838	100nF 50V 20%
2838	4822 124 11912	220μF 20% 6.3V
2838	4822 124 40248	10μF 20% 63V
2839	4822 126 13838	100nF 50V 20%
2841	4822 124 40248	10μF 20% 63V
2842	4822 122 33753	150pF 5% 50V
2843	4822 126 14305	100nF 10% 16V 0603
2844	4822 126 14305	100nF 10% 16V 0603
2846	4822 126 13838	100nF 50V 20%
2847	5322 122 33538	150pF 2% 63V
2848	4822 126 13838	100nF 50V 20%
2849	4822 126 13838	100nF 50V 20%
2851	4822 124 40248	10μF 20% 63V
2852	4822 126 14585	100nF 10% 50V
2853	4822 124 40248	10μF 20% 63V
2854	4822 126 13838	100nF 50V 20%
2856	5322 122 33538	150pF 2% 63V
2857	4822 122 33753	150pF 5% 50V
2861	4822 124 40248	10μF 20% 63V
2862	4822 126 14305	100nF 10% 16V 0603
2863	4822 124 81151	22μF 50V
2864	3198 017 34730	47nF 16V 0603
2866	3198 017 34730	47nF 16V 0603
2867	3198 017 41050	1μF 10V 0603
2868	4822 126 14305	100nF 10% 16V 0603
2869	4822 124 40207	100μF 20% 25V
2871	3198 017 41050	1μF 10V 0603
2872	3198 017 34730	47nF 16V 0603
2873	3198 017 34730	47nF 16V 0603
2874	4822 051 30008	0R00 JUMPER
2876	3198 017 34730	47nF 16V 0603
2877	3198 017 34730	47nF 16V 0603
2878	4822 126 13838	100nF 50V 20%
2891	5322 122 31647	1nF 10% 63V
2898	4822 124 40207	100μF 20% 25V
2899	4822 124 40207	100μF 20% 25V

□

3263	4822 117 11449	2k2 5% 0.1W 0805
3264	4822 117 10833	10k 1% 0.1W
3267	4822 051 20479	47Ω 5% 0.1W
3268	4822 051 20479	47Ω 5% 0.1W
3270	4822 051 20008	0Ω jumper 0805
3301	4822 051 30102	1k 5% 0.062W
3305	4822 117 12955	2k7 1% 0.1W 0805
3311	4822 051 20273	27k 5% 0.1W
3312	4822 117 10833	10k 1% 0.1W
3315	4822 117 12708	39k 1% 0.1W 0805 RC12G
3316	4822 051 30681	680Ω 5% 0.062W
3318	4822 051 30101	100Ω 5% 0.062W
3321	4822 051 30103	10k 5% 0.062W
3322	4822 117 12902	8k2 1% 0.063W 0603
3324	4822 051 20391	390Ω 5% 0.1W
3326	5322 117 12487	1k 1% 0.125W
3327	4822 051 30561	560Ω 5% 0.062W
3329	4822 051 20101	100Ω 5% 0.1W
3330	4822 051 20101	100Ω 5% 0.1W
3333	4822 051 30681	680Ω 5% 0.062W
3334	4822 051 30471	470Ω 5% 0.062W
3335	4822 051 20121	120Ω 5% 0.1W
3338	4822 051 20008	0Ω jumper 0805
3338	4822 051 20391	390Ω 5% 0.1W
3339	4822 117 10833	10k 1% 0.1W
3340	4822 051 30222	2k2 5% 0.062W
3341	4822 051 20479	47Ω 5% 0.1W
3344	4822 051 20479	47Ω 5% 0.1W
3345	4822 051 30479	47Ω 5% 0.062W
3346	4822 051 30561	560Ω 5% 0.062W
3348	4822 051 30008	0Ω jumper
3349	4822 051 30479	47Ω 5% 0.062W
3352	4822 051 30222	2k2 5% 0.062W
3353	4822 051 30682	6k8 5% 0.062W
3354	4822 051 30222	2k2 5% 0.062W
3355	4822 051 30273	27k 5% 0.062W
3356	4822 051 30183	18k 5% 0.062W
3364	4822 051 30102	1k 5% 0.062W
3365	5322 117 12487	1k 1% 0.125W
3370	4822 051 20101	100Ω 5% 0.1W
3371	4822 116 83933	15k 1% 0.1W
3372	4822 051 30008	0Ω jumper
3372	4822 051 30101	100Ω 5% 0.062W
3374	4822 051 30472	4k7 5% 0.062W
3381	4822 051 20101	100Ω 5% 0.1W
3382	4822 051 20101	100Ω 5% 0.1W
3383	4822 051 20101	100Ω 5% 0.1W
3384	4822 051 30103	10k 5% 0.062W
3385	4822 051 30472	4k7 5% 0.062W

3386	4822 051 30103	10k 5% 0.062W
3387	4822 051 30393	39k 5% 0.062W
3388	4822 051 30103	10k 5% 0.062W
3389	4822 051 30472	4k7 5% 0.062W
3390	4822 051 30471	470Ω 5% 0.062W
3401	4822 051 30101	100Ω 5% 0.062W
3402	4822 051 30101	100Ω 5% 0.062W
3403	4822 051 20101	100Ω 5% 0.1W
3404	4822 051 30101	100Ω 5% 0.062W
3405	4822 051 20101	100Ω 5% 0.1W
3411	4822 117 12925	47k 1% 0.063W 0603
3412	4822 117 12925	47k 1% 0.063W 0603
3413	4822 051 30102	1k 5% 0.062W
3414	4822 117 12925	47k 1% 0.063W 0603
3415	4822 117 12925	47k 1% 0.063W 0603
3416	4822 051 30102	1k 5% 0.062W
3417	4822 051 20101	100Ω 5% 0.1W
3418	4822 051 20101	100Ω 5% 0.1W
3419	4822 051 20561	560Ω 5% 0.1W
3422	4822 051 20561	560Ω 5% 0.1W
3423	4822 051 20561	560Ω 5% 0.1W
3424	4822 051 20561	560Ω 5% 0.1W
3431	4822 051 30101	100Ω 5% 0.062W
3432	4822 051 30101	100Ω 5% 0.062W
3451	4822 051 30472	4k7 5% 0.062W
3453	4822 051 30472	4k7 5% 0.062W
3456	4822 051 30472	4k7 5% 0.062W
3457	4822 051 30472	4k7 5% 0.062W
3460	4822 051 30472	4k7 5% 0.062W
3461	4822 051 30472	4k7 5% 0.062W
3462	4822 052 10228	2Ω2 5% 0.33W
3801	4822 117 11503	220Ω 1% 0.1W
3802	4822 117 10361	680Ω 1% 0.1W
3803	4822 117 11503	220Ω 1% 0.1W
3804	4822 051 30681	680Ω 5% 0.062W
3805	4822 051 30221	220Ω 5% 0.062W
3806	4822 051 30681	680Ω 5% 0.062W
3807	4822 051 30221	220Ω 5% 0.062W
3808	4822 117 10361	680Ω 1% 0.1W
3809	4822 051 30221	220Ω 5% 0.062W
3810	4822 051 30681	680Ω 5% 0.062W
3811	4822 117 11503	220Ω 1% 0.1W
3812	4822 051 30479	47Ω 5% 0.062W
3813	4822 051 30151	150Ω 5% 0.062W
3814	4822 051 30223	22k 5% 0.062W
3816	4822 051 30479	47Ω 5% 0.062W
3817	4822 051 30151	150Ω 5% 0.062W
3818	4822 051 30479	47Ω 5% 0.062W
3821	4822 051 30151	150Ω 5% 0.062W
3822	4822 051 30472	4k7 5% 0.062W
3823	4822 117 10361	680Ω 1% 0.1W
3824	4822 051 30008	0Ω jumper
3825	4822 051 30221	220Ω 5% 0.062W
3826	4822 051 30332	3k3 5% 0.062W
3827	4822 117 12903	1k8 1% 0.063W 0603
3828	4822 051 30221	220Ω 5% 0.062W
3829	4822 051 30221	220Ω 5% 0.062W
3831	4822 051 30221	220Ω 5% 0.062W
3832	4822 051 30393	39k 5% 0.062W
3833	4822 051 30332	3k3 5% 0.062W
3834	4822 117 12903	1k8 1% 0.063W 0603
3836	4822 051 30332	3k3 5% 0.062W
3837	4822 117 12903	1k8 1% 0.063W 0603
3838	4822 051 30393	39k 5% 0.062W
3839	4822 117 11503	220Ω 1% 0.1W
3846	4822 117 11503	220Ω 1% 0.1W
3852	4822 051 30101	100Ω 5% 0.062W
3854	4822 051 30101	100Ω 5% 0.062W
3856	4822 051 20562	5k6 5% 0.1W 0805
3857	4822 117 10833	10k 1% 0.1W
3858	4822 051 20562	5k6 5% 0.1W 0805
3860	4822 051 30008	0Ω jumper
3862	4822 052 10108	1Ω 5% 0.33W
3863	4822 052 10108	1Ω 5% 0.33W
3866	4822 051 30102	1k 5% 0.062W
3868	4822 117 12903	1k8 1% 0.063W 0603
3869	4822 051 30332	3k3 5% 0.062W
3871	4822 051 30222	2k2 5% 0.062W
3872	4822 051 30471	470Ω 5% 0.062W
3873	4822 051 30152	1k5 5% 0.062W
3874	4822 051 30152	1k5 5% 0.062W
3876	4822 051 20472	4k7 5% 0.1W
3878	4822 051 30102	1k 5% 0.062W
3879	4822 051 30221	220Ω 5% 0.062W
3880	4822 051 30221	220Ω 5% 0.062W
3881	4822 051 30391	390Ω 5% 0.062W
3884	4822 117 10361	680Ω 1% 0.1W
3886	4822 051 30008	0Ω jumper
3887	4822 051 30008	0Ω jumper
3888	4822 051 30008	0Ω jumper
3889	4822 051 30008	0Ω jumper
3890	4822 051 30008	0Ω jumper
3891	4822 051 30008	0Ω jumper
3892	4822 051 20472	4k7 5% 0.1W

3893	4822 051 30152	1k5 5% 0.062W
3894	4822 051 30222	2k2 5% 0.062W
3895	4822 051 30471	470Ω 5% 0.062W
3896	4822 051 30152	1k5 5% 0.062W
3897	4822 051 30221	220Ω 5% 0.062W
3898	4822 051 30102	1k 5% 0.062W
4xxx	4822 051 10008	0Ω 5% 0.25W (1206)
4xxx	4822 051 20008	0Ω 5% 0.25W (0805)

5261	4822 157 11778	5U6 10% 0805
5309	4822 157 71334	0.68μH
5332	4822 157 71334	0.68μH
5333	4822 157 71334	0.68μH
5334	4822 157 71334	0.68μH
5349	4822 157 71694	0U82 10%
5350	3198 018 61590	15U 5% 1008
5351	3198 018 61590	15U 5% 1008
5352	4822 157 71334	0.68μH
5401	3198 018 74780	4U7 20%
5401	4822 157 53139	4.7μH
5816	4822 157 11506	BLM21A121SPT
5818	4822 157 11506	BLM21A121SPT
5827	4822 157 11506	BLM21A121SPT
5834	4822 157 11506	BLM21A121SPT
5839	4822 157 11506	BLM21A121SPT
5848	4822 157 11506	BLM21A121SPT
5849	4822 157 11506	BLM21A121SPT
5851	4822 157 11506	BLM21A121SPT
5853	4822 157 11506	BLM21A121SPT

6301	4822 130 11525	1SS356
6412	4822 130 83649	1SS355
6415	4822 130 83649	1SS355
6801	4822 130 11564	UDZ3.9B
6802	4822 130 11564	UDZ3.9B



7201	2422 542 90075	TUNER TEDE9X700A ALPS
7201	2422 542 90077	TUNER TEDH9X700A ALPS
7301	9352 638 72557	TDA8887H/N1
7301	9352 638 73557	TDA8889H/N1
7305	3198 010 42310	BC847BW
7307	3198 010 42310	BC847BW
7331	5322 130 42756	BC857C
7332	3198 010 42310	BC847BW
7368	3198 010 42310	BC847BW
7385	3198 010 42310	BC847BW
7386	3198 010 42310	BC847BW
7401	5322 209 14481	HEF4053BT
7403	4822 209 17345	M62320FP
7411	3198 010 42310	BC847BW
7412	3198 010 42310	BC847BW
7801	9352 639 81557	SAB9081H/N4
7802	4822 209 80591	LM317T
7803	4822 209 12776	TDA8601T/C1
7804	9352 457 50115	74HC1G32GW
7805	3198 010 42310	BC847BW
7806	3198 010 42310	BC847BW
7807	3198 010 42310	BC847BW
7808	3198 010 42310	BC847BW
7809	3198 010 42310	BC847BW
7810	3198 010 42310	BC847BW
7824	3198 010 42310	BC847BW
7828	3198 010 42310	BC847BW
7871	3198 010 42310	BC847BW
7874	3198 010 42310	BC847BW
7876	5322 130 42756	BC857C
7891	3198 010 42310	BC847BW
7892	3198 010 42310	BC847BW
7893	3198 010 42310	BC847BW
7894	5322 130 42756	BC857C
7895	3198 010 42310	BC847BW

DAF [G]

Various

0301	4822 402 11113	MAINS FILTER BRACKET
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2492▲	4822 126 13865	390pF 10% 2KV
2493▲	4822 126 13865	390pF 10% 2KV



3498	2322 592 13017	VDR 1M4/23V
3499	2322 592 13017	VDR 1M4/23V



5493▲	4822 148 81425	DAF
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FRONT INTERFACE [J]

Various

0132▲	4822 276 14024	POWER SWITCH
0214	2422 025 06353	CON 5P
1002	9322 127 54667	TSOP1836UH1
1008▲	9322 050 99682	LED 10224WHCR



2001	4822 124 40207	100μF 20% 25V
2002	4822 122 30043	10nF 80% 63V



3003	4822 116 52228	680Ω 5% 0.5W
3004	4822 116 80176	1Ω 5% 0.5W
3008	4822 053 21475	4M7 5% 0.5W
3009	4822 053 21225	2M2 5% 0.5W

FRONT INTERFACE [Q]

Various

0132▲	4822 276 14024	POWER SWITCH
0187▲	3139 124 30431	FRONT INTERFACE BRACKET
0187▲	3139 124 33461	FRONT INTERFACE BRACKET
0214	2422 025 06353	CON 5P
0240	2422 025 10738	CON 6P
1002	9322 127 54667	TSOP1836UH1
1003	4822 276 13775	SWITCH
1004	4822 276 13775	SWITCH
1005	4822 276 13775	SWITCH
1006	4822 276 13775	SWITCH
1008▲	9322 050 99682	LED 10224WHCR
1254	4822 267 31014	HEADPHONE SOCKET



2001	4822 124 40207	100μF 20% 25V
2081	5322 122 34098	10nF 10% 63V
2082	5322 122 34098	10nF 10% 63V



3002	4822 116 52228	680Ω 5% 0.5W
3003	4822 117 10361	680Ω 1% 0.1W
3004	4822 116 80176	1Ω 5% 0.5W
3008	4822 053 21475	4M7 5% 0.5W
3009	4822 053 21225	2M2 5% 0.5W
3021	4822 051 20561	560Ω 5% 0.1W
3022	4822 051 20391	390Ω 5% 0.1W
3023	4822 051 20561	560Ω 5% 0.1W
3024	4822 117 11504	270Ω 1% 0.1W
3025	4822 051 20332	3k3 5% 0.1W
3026	4822 117 11139	1k5 1% 0.1W
3081	4822 117 10833	10k 1% 0.1W
3082	4822 117 10833	10k 1% 0.1W
3083	4822 051 20392	3k9 5% 0.1W



6005	4822 130 31983	BAT85
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GEOMAGNETIC [R]

Various

0225	4822 267 10565	CON 4P
0239	4822 267 10748	CON 3P
0249	4822 267 10567	CON 4P



2420	4822 124 40207	100μF 20% 25V
2421	4822 124 40207	100μF 20% 25V
2422	5322 121 42386	100nF 5% 63V
2423	5322 121 42386	100nF 5% 63V



3420▲	4822 052 10478	4Ω7 5% 0.33W
3421▲	4822 052 10478	4Ω7 5% 0.33W
3425	4822 050 23303	33k 1% 0.6W
3426	4822 050 23303	33k 1% 0.6W
3427	4822 116 52304	82k 5% 0.5W
3428	4822 116 52234	100k 5% 0.5W
3429	4822 116 52234	100k 5% 0.5W
3430	4822 116 83961	6k8 5%
3431	4822 050 21003	10k 1% 0.6W
3432	4822 101 11191	10k 30% 0.1W
3433	4822 116 52234	100k 5% 0.5W
3434	4822 050 11002	1k 1% 0.4W
3435	4822 116 52234	100k 5% 0.5W
3436	4822 050 11002	1k 1% 0.4W
3437	4822 050 11002	1k 1% 0.4W
3438	4822 116 52175	100Ω 5% 0.5W
3439	4822 116 52175	100Ω 5% 0.5W
3440	4822 050 24708	4Ω7 1% 0.6W
3441	4822 050 24708	4Ω7 1% 0.6W
3442	4822 050 24708	4Ω7 1% 0.6W
3443	4822 050 24708	4Ω7 1% 0.6W
3450	4822 050 23303	33k 1% 0.6W
3451	4822 050 23303	33k 1% 0.6W
3452	4822 116 52291	56k 5% 0.5W
3453	4822 116 52234	100k 5% 0.5W
3454	4822 116 52234	100k 5% 0.5W
3455	4822 116 83961	6k8 5%
3456	4822 050 21003	10k 1% 0.6W
3457	4822 101 11191	10k 30% 0.1W
3458	4822 116 52234	100k 5% 0.5W
3459	4822 050 11002	1k 1% 0.4W
3460	4822 116 52234	100k 5% 0.5W
3461	4822 050 11002	1k 1% 0.4W
3462	4822 050 11002	1k 1% 0.4W
3463	4822 116 52175	100Ω 5% 0.5W
3464	4822 116 52175	100Ω 5% 0.5W
3465	4822 050 24708	4Ω7 1% 0.6W
3466	4822 050 24708	4Ω7 1% 0.6W
3467	4822 050 24708	4Ω7 1% 0.6W
3468	4822 050 24708	4Ω7 1% 0.6W



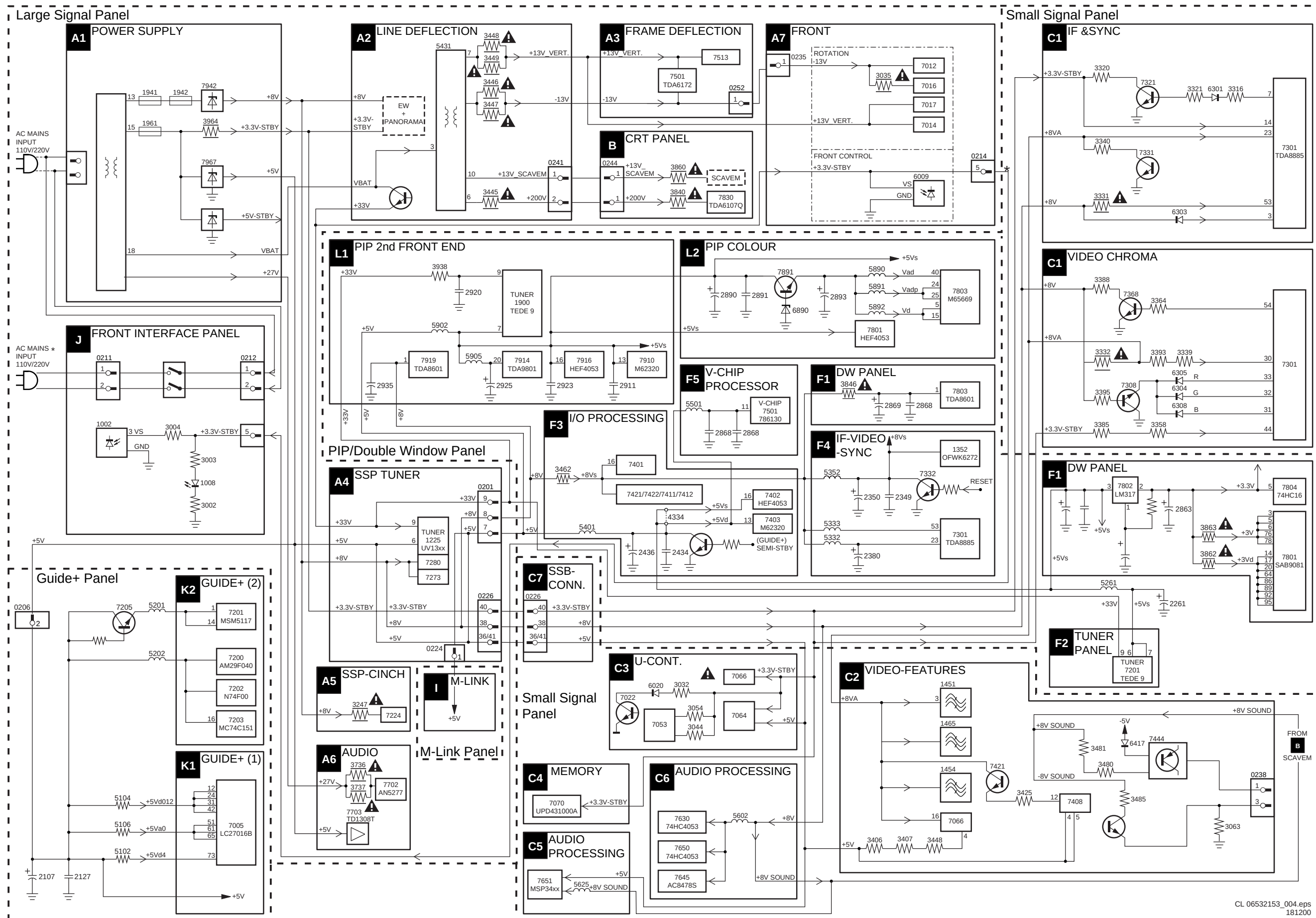
6430	5322 130 34563	BZX79-C2V7
6431	5322 130 34563	BZX79-C2V7
6432	5322 130 34563	BZX79-C2V7
6433	5322 130 34563	BZX79-C2V7
6455	5322 130 34563	BZX79-C2V7
6456	5322 130 34563	BZX79-C2V7
6457	5322 130 34563	BZX79-C2V7
6458	5322 130 34563	BZX79-C2V7



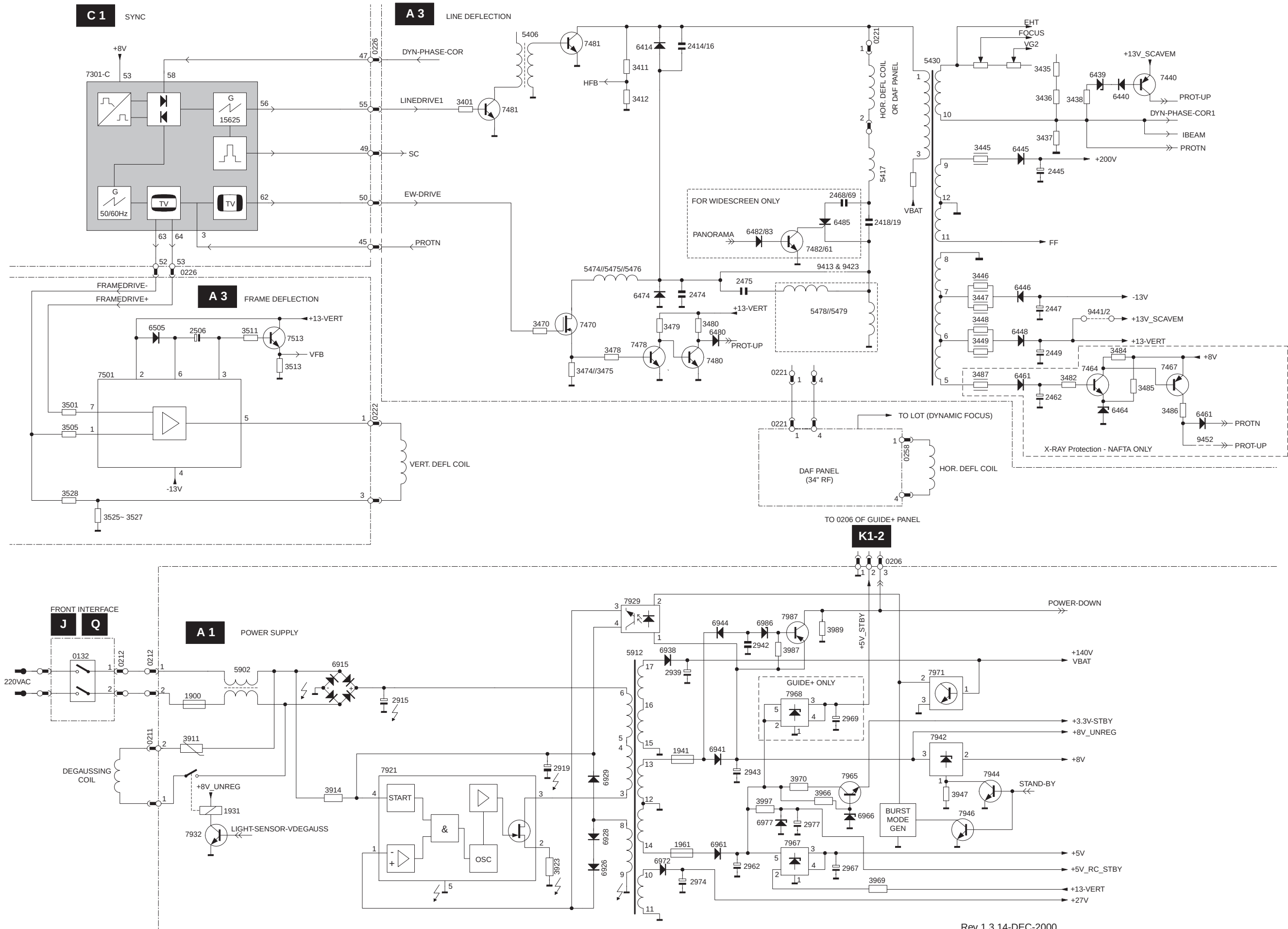
7420	9322 156 70682	MIU-212A
7421	4822 209 80587	LM324N
7422	4822 130 44568	BC557B
7423	4822 130 40959	BC547B
7424	4822 130 41109	BD135-16
7425	4822 130 41194	BD136-16
7426	4822 130 44568	BC557B
7427	4822 130 40959	BC547B
7428	4822 130 41109	BD135-16
7429	4822 130 41194	BD136-16

6. Block diagrams, wiring diagram and overviews

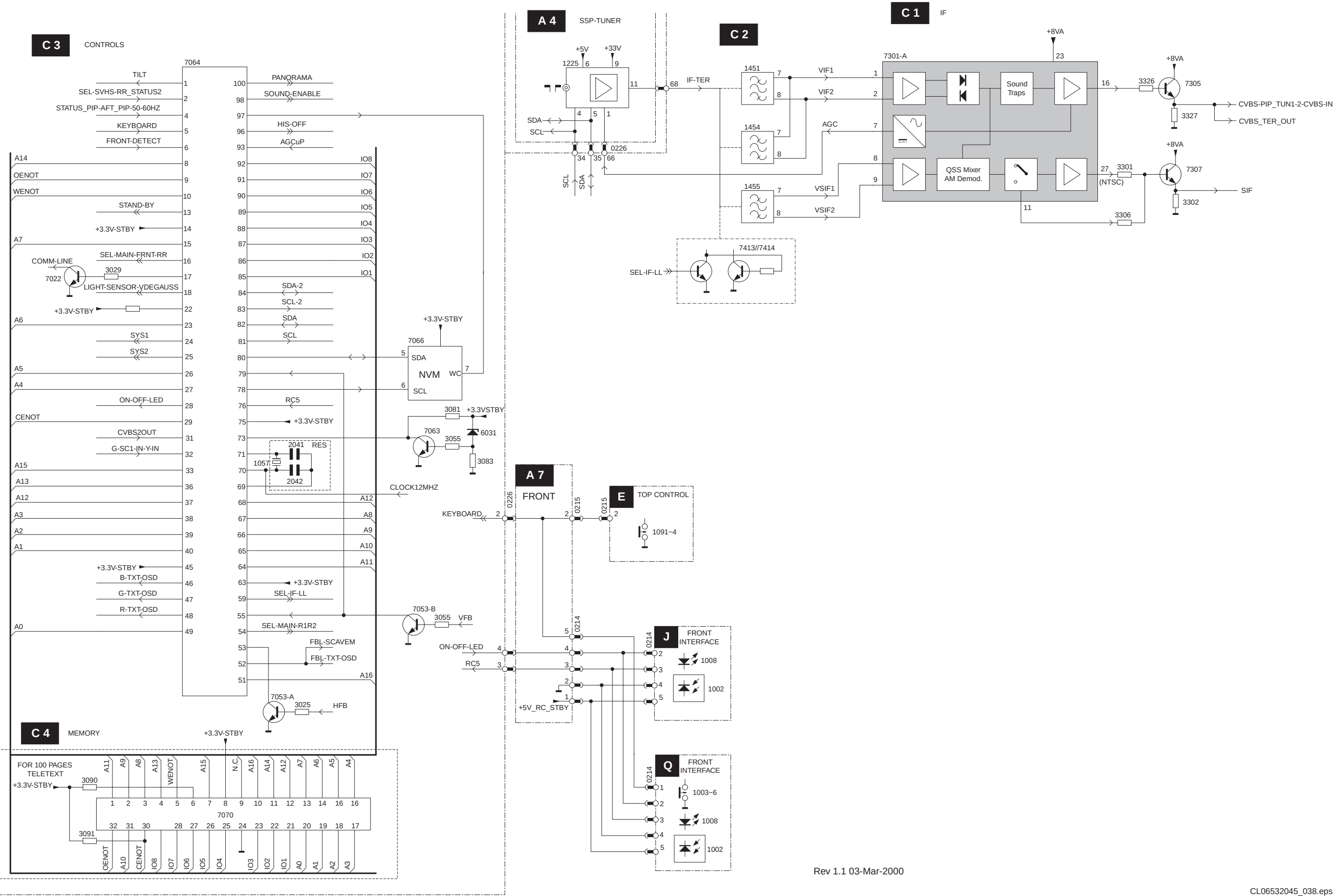
Supply voltage diagram



Blockdiagram (Deflection-power supply)

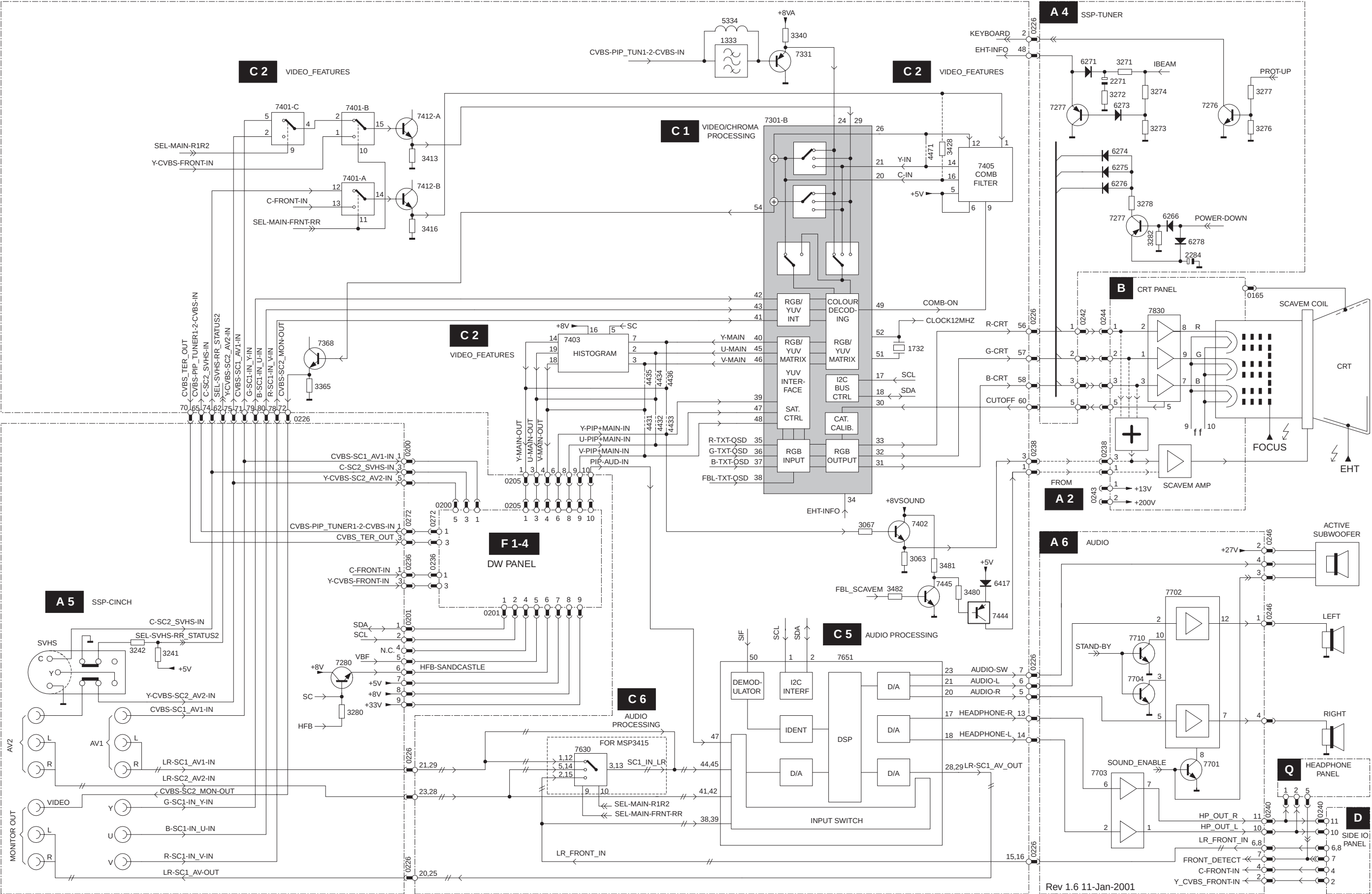


Blockdiagram (Tuner-IF-video)



Rev 1.1 03-Mar-2000

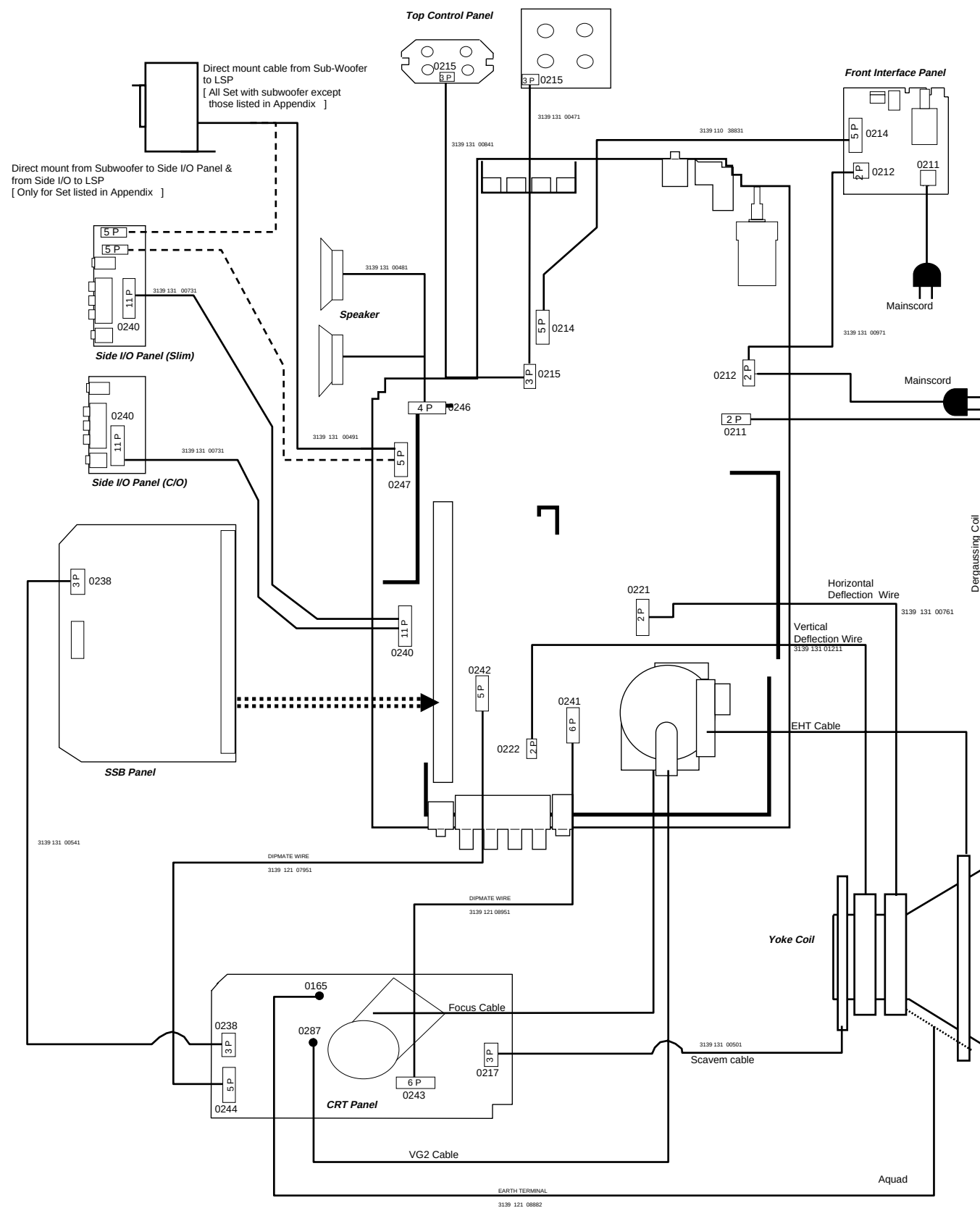
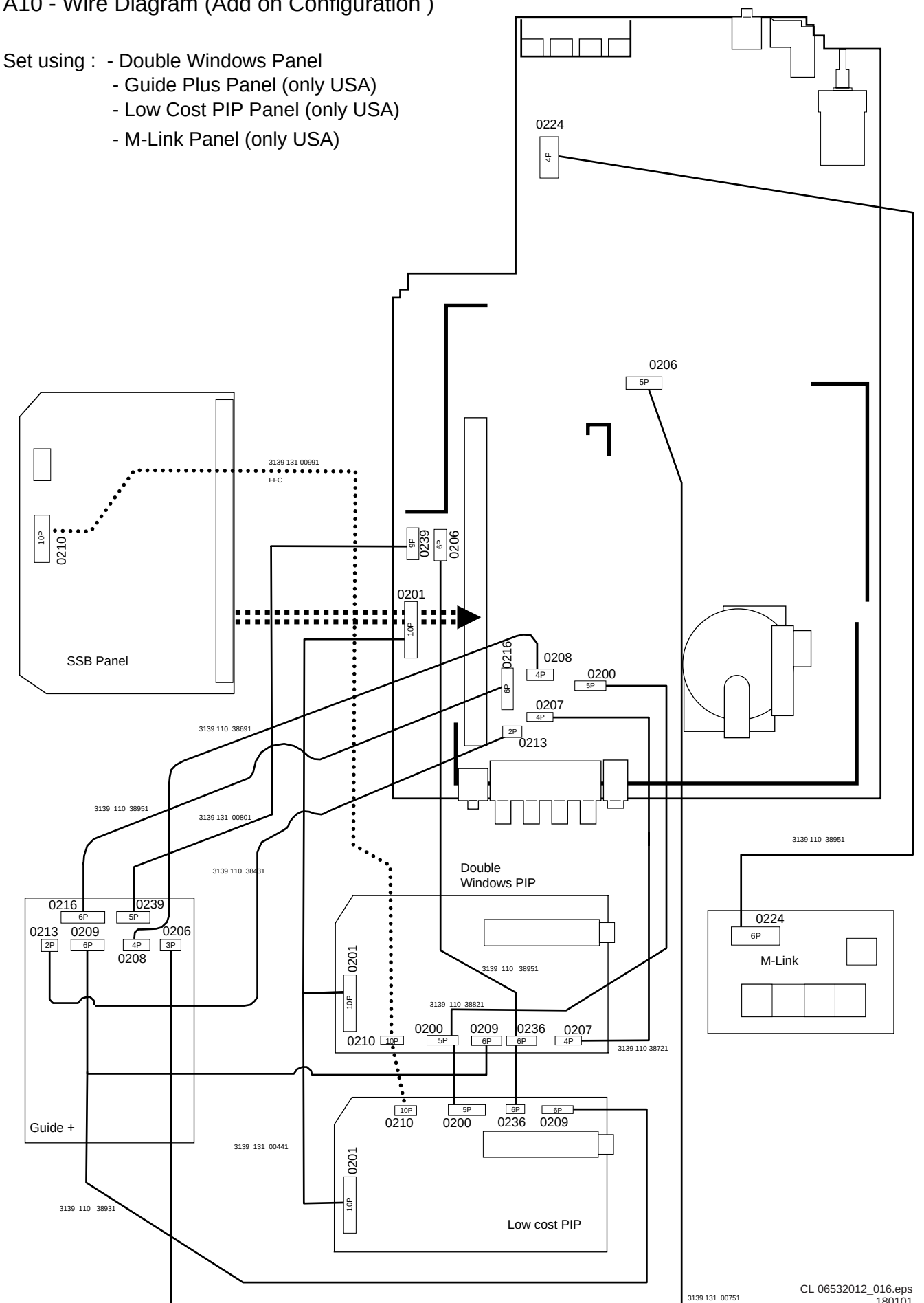
Blockdiagram (RGB-sound AV)



Rev 1.6 11-Jan-2001

Wiringdiagram

A10 - Wire Diagram (Add on Configuration)

CL 06532012_017.eps
110101

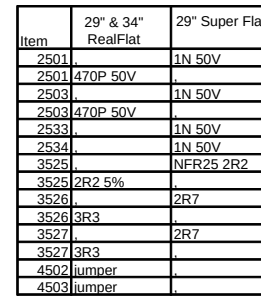
CL 06532012_016.eps
180101

A 2 LINE DEFLECTION

CL 06532153_007.eps
110101

0209 B1	3450 F11	9410 D6
0221 B7	3451 D5	9412 C6
0228 D9	3452 G6	9413 F4
0241 D11	3456 E2	9415 A8
0248 D12	3459 G2	9416 B9
0251 B8	3460 E3	9419 E8
0261 C10	3469 G2	9423 E5
0277 D12	3470 G2	9426 B11
0278 C10	3471 F2	9433 B10
0279 D12	3472 F2	9435 E9
0282 D2	3473 G2	9436 F9
0284 A6	3474 H3	9441 F11
0404 C3	3475 H3	9442 F11
0406 B2	3476 G3	9443 F12
0409 A5	3477 H4	9444 A11
0411 B5	3478 G4	9445 B5
0414 B7	3479 G5	9446 E5
0415 B7	3480 G6	9447 C6
0416 B7	3481 F9	9452 G7
0417 C7	3482 F8	9453 E2
0418 D6	3483 F7	9456 F4
0419 D7	3484 E7	9457 E3
0420 D8	3485 E7	9459 E4
0421 F4	3486 F6	9460 F2
0422 B12	3487 E9	9461 G2
0430 A9	3488 F11	9464 E6
0431 B8	3489 G3	9465 D6
0432 B9	3490 G3	9466 E6
0433 B9	3491 H3	9467 D5
0434 B8	3492 G4	9496 G5
0437 C10	3493 G4	9497 F7
0438 C10	3494 G4	
0439 A10	3495 D5	
0442 B11	3496 D6	
0443 A11	3497 D6	
0445 D10	3498 H2	
0446 E10	3499 A11	
0447 E11	4400 A11	
0448 E10	4401 E3	
0449 F10	4411 E4	
0450 F10	5405 B3	
0461 E3	5406 B3	
0462 F8	5407 B4	
0463 E2	5409 C6	
0467 H4	5410 B5	
0468 D6	5411 B6	
0469 D6	5417 C7	
0471 G3	5430 A9	
0472 G4	5431 B8	
0473 G2	5445 C9	
0474 F4	5446 E9	
0475 F4	5448 E9	
0476 F4	5474 F2	
0477 F4	5475 F3	
0478 H4	5476 F3	
0479 G4	5478 F5	
0480 F2	5479 F5	
0481 G2	6407 B4	
0484 B2	6413 C5	
0485 C3	6414 B6	
0486 C3	6415 B7	
0487 F4	6419 D8	
0488 H5	6420 D8	
0489 E6	6439 B10	
0490 F7	6440 B10	
0491 A11	6442 B11	
0492 F8	6443 A11	
0401 C2	6445 C10	
0402 C2	6446 E10	
0403 C3	6447 E10	
0404 A2	6448 F10	
0405 A3	6450 F11	
0406 A3	6461 F9	
0407 B4	6463 F7	
0408 G3	6464 F7	
0409 A5	6466 E4	
0410 C4	6467 E2	
0411 B6	6468 G3	
0412 C6	6472 F2	
0413 C6	6474 F3	
0414 B3	6475 F4	
0417 C7	6480 G6	
0421 D7	6481 A5	
0422 D8	6482 E2	
0423 D7	6483 E3	
0424 D7	6484 E5	
0430 A9	6485 D5	
0431 A9	6486 G5	
0432 A11	6487 G5	
0433 A8	7408 A3	
0434 A9	7410 B5	
0435 A9	7440 B11	
0436 B10	7461 C3	
0437 C10	7464 E7	
0438 B10	7467 E7	
0439 A10	7470 G3	
0440 A11	7478 H5	
0441 E11	7480 G6	
0442 B12	7481 C3	
0445 D10	7482 D3	
0446 E10	9402 C4	
0447 E10	9403 B4	
0448 E9	9405 G3	
0449 F9	9409 C6	

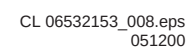
A 3 FRAME DEFLECTION



TO
0225
OF
R

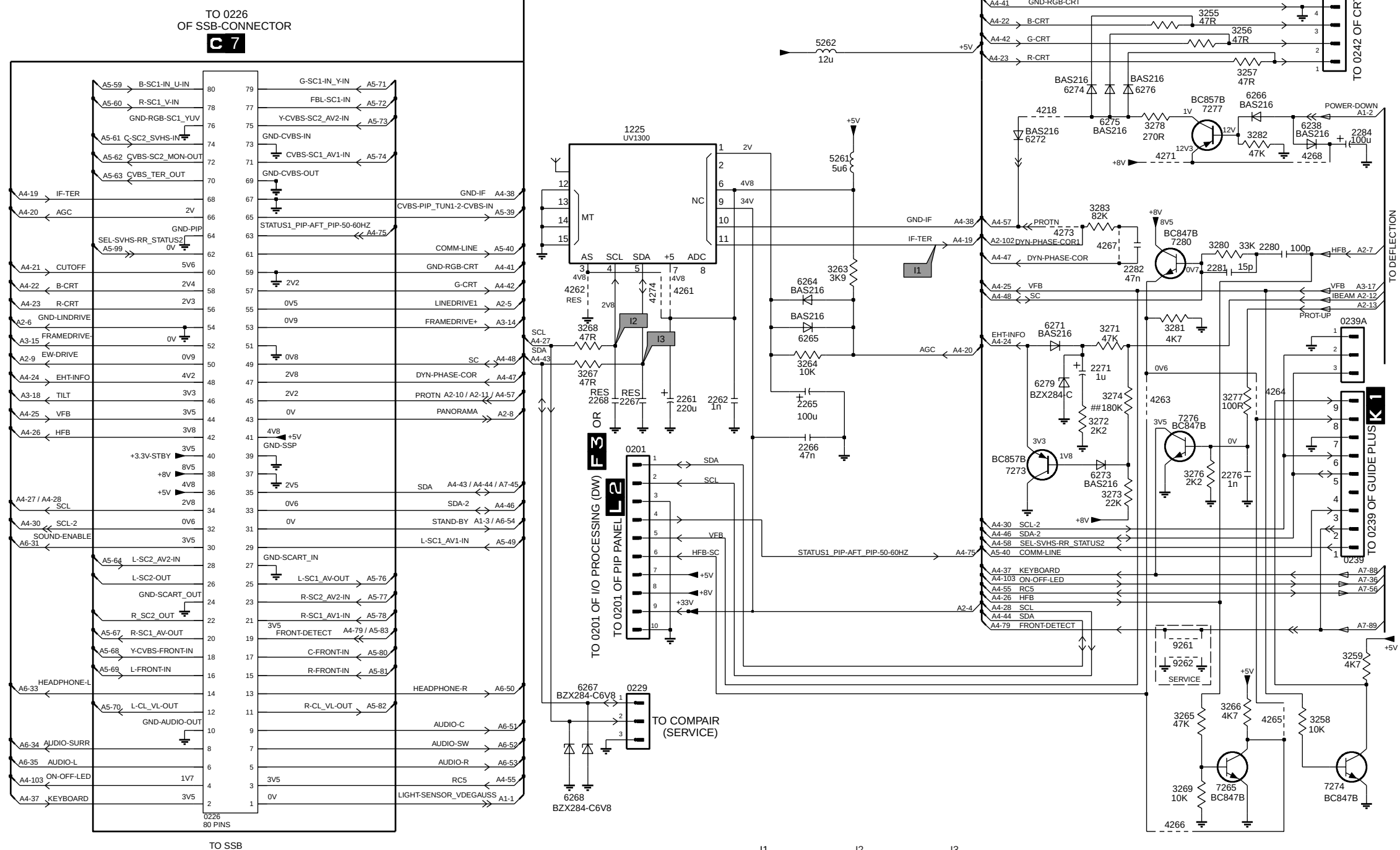
TO 0235
OF
ROTATION

A 7

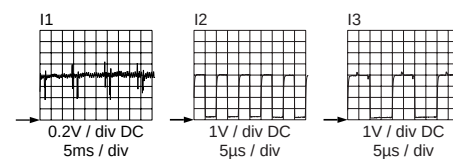


A 4 SSP-TUNER

A —
B —
C —
D —
E —
F —
G —
H

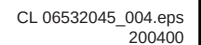


Item	AP PAL/Multi No DW	China No DW	China DW	AP NTSC/LATAM DW	AP PAL/Multi DW
1225		TEDE9X003A			
1226	TEDE9X002A				
1227		TEDE9X029A PHONO			
1228					
1229			TEDEH9X022A PHONO		TEDE9-031A PHONO

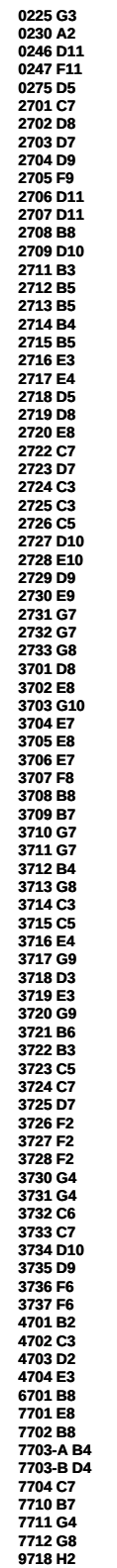


- 0201 D6
0226 G3
0229 F6
0239 E12
0239A C12
0242 A12
1225 B6
2261 D7
2262 D7
2265 D8
2266 D8
2267 D6
2268 D6
2271 D10
2276 E11
2280 C11
2281 C11
2282 C10
2284 B12
3255 A11
3256 A11
3257 A11
3258 F12
3259 F12
3263 C8
3264 D8
3265 F11
3266 F11
3267 D6
3268 C6
3269 G10
3271 C10
3272 D10
3273 D10
3274 D10
3276 E11
3277 D11
3278 B10
3280 C11
3281 C10
3282 B11
3283 C10
4218 B9
4261 C7
4262 C6
4263 D10
4264 D11
4265 F11
4266 G10
4267 C10
4268 B12
4271 B10
4273 C10
4274 C6
5261 B8
5262 A8
6238 B11
6264 C8
6265 D8
6266 B11
6267 F6
6268 G6
6271 C9
6272 B9
6273 E10
6274 B10
6275 B10
6276 B10
6279 D9
7265 G11
7273 E9
7274 G12
7276 D11
7277 B11
7280 C11
9261 F10
9262 F10

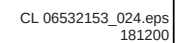
A5 SSP_CINCH



A 6 AUDIO

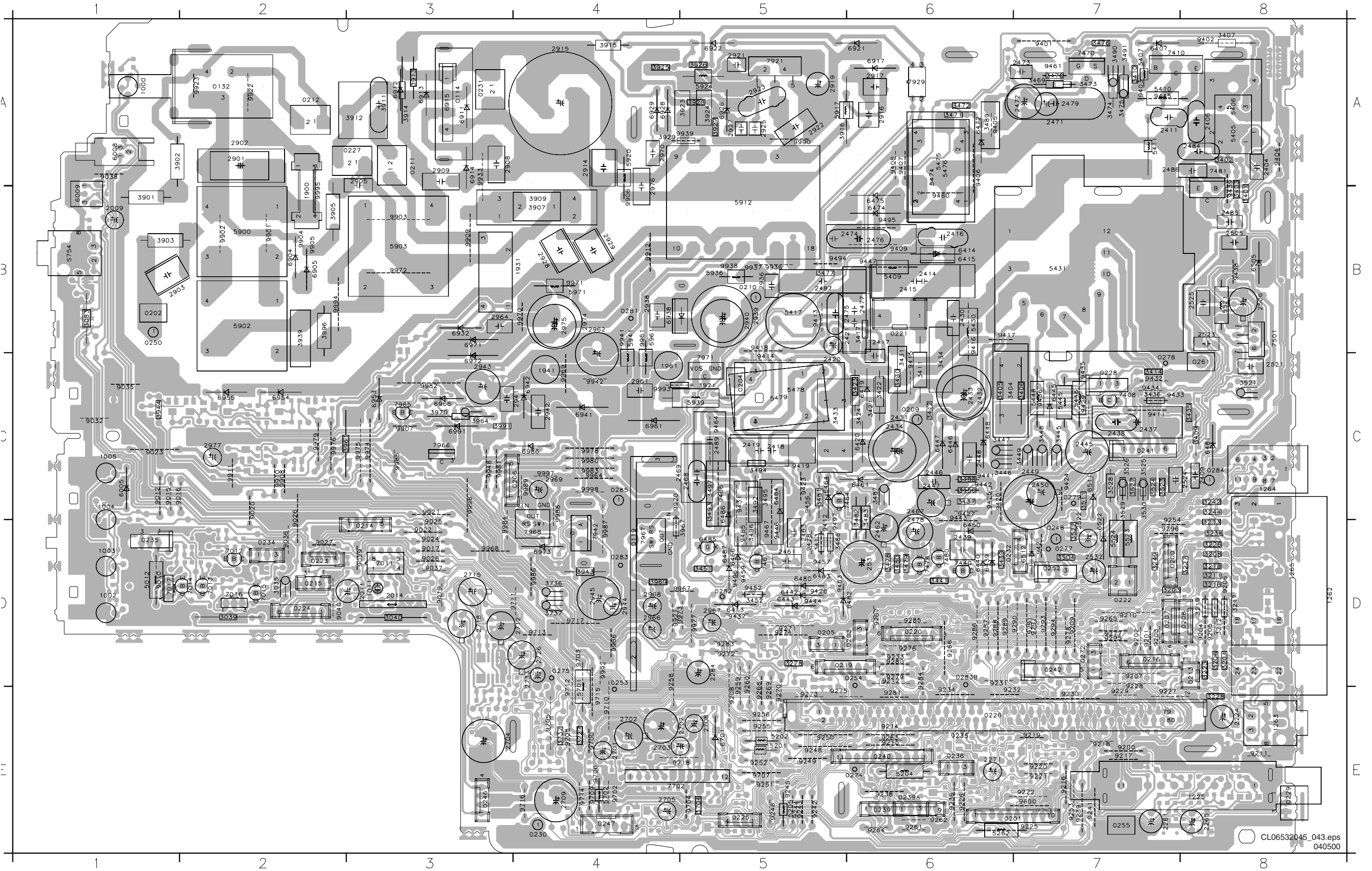


A 7 FRONT CONTROL / ROTATION / HEADPHONE

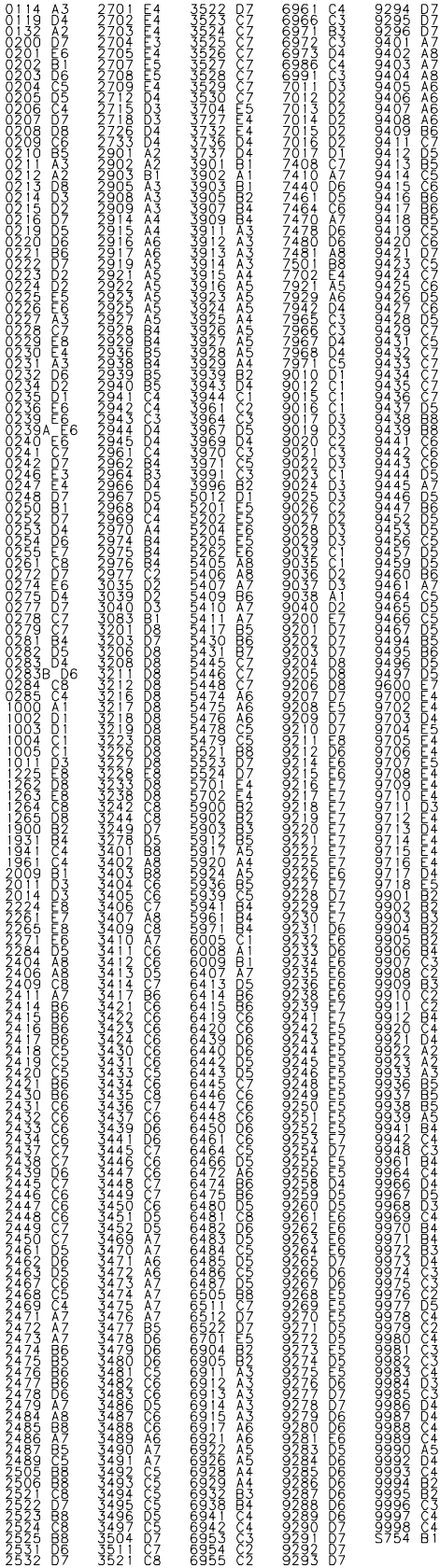


0214 B5
0215 B2
0223 C6
0224 C8
0234 E6
0235 E2
1000 C3
1002 C4
1003 C4
1004 C4
1005 C5
1008 B5
1009 B7
1020 F9
1021 E8
1022 F9
2009 B6
2012 B5
2020 F3
2021 F4
2023 F6
2024 F6
2081 F10
2082 F10
3002 B4
3003 C5
3004 B5
3007 B5
3021 B3
3022 B3
3023 B4
3024 E3
3025 E3
3026 F3
3027 E4
3028 F4
3029 F4
3030 E5
3031 D5
3032 E5
3033 F4
3034 D6
3035 D6
3037 C9
3038 C9
3039 D9
3040 D9
3081 F9
3082 F10
3083 E10
4010 F4
4011 E5
5001 E10
5002 F10
5012 F5
6005 C5
6010 E6
7012 E3
7013 E4
7014 F6
7015 E6
7016 D6
7017 F5
9010 F6
9021 C7
9022 C7
S754 F9

Layout LSP (component side)

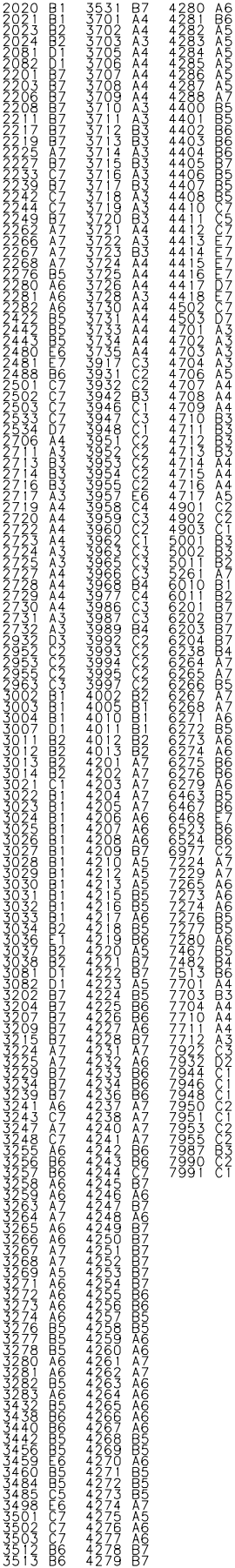


Mapping LSP (component side)



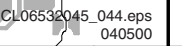
CL06532045-043map.eps
090500

Mapping LSP (copper side)

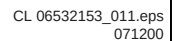


CL06532045-044map.eps
090500

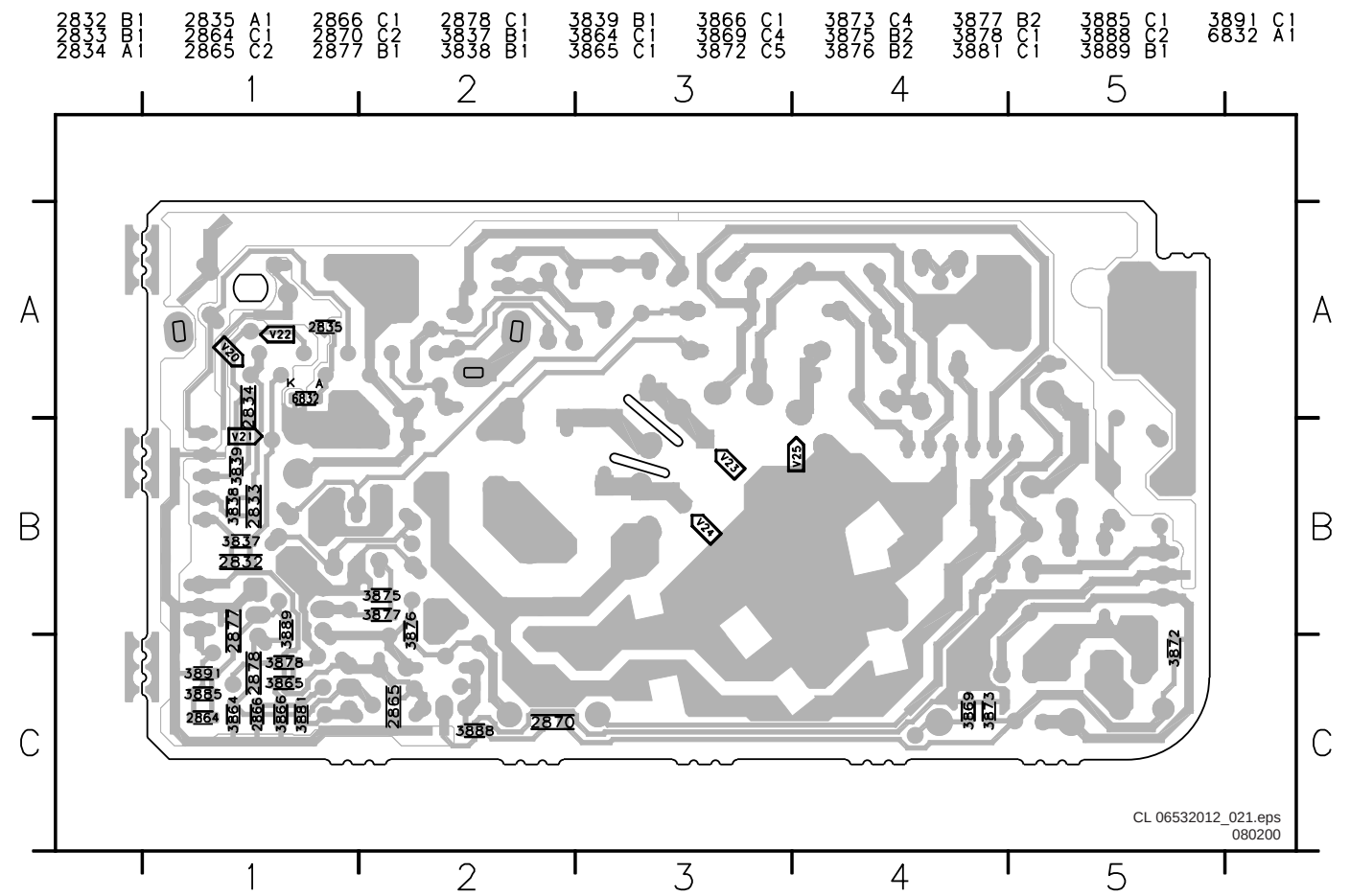
3130 153-2554-1



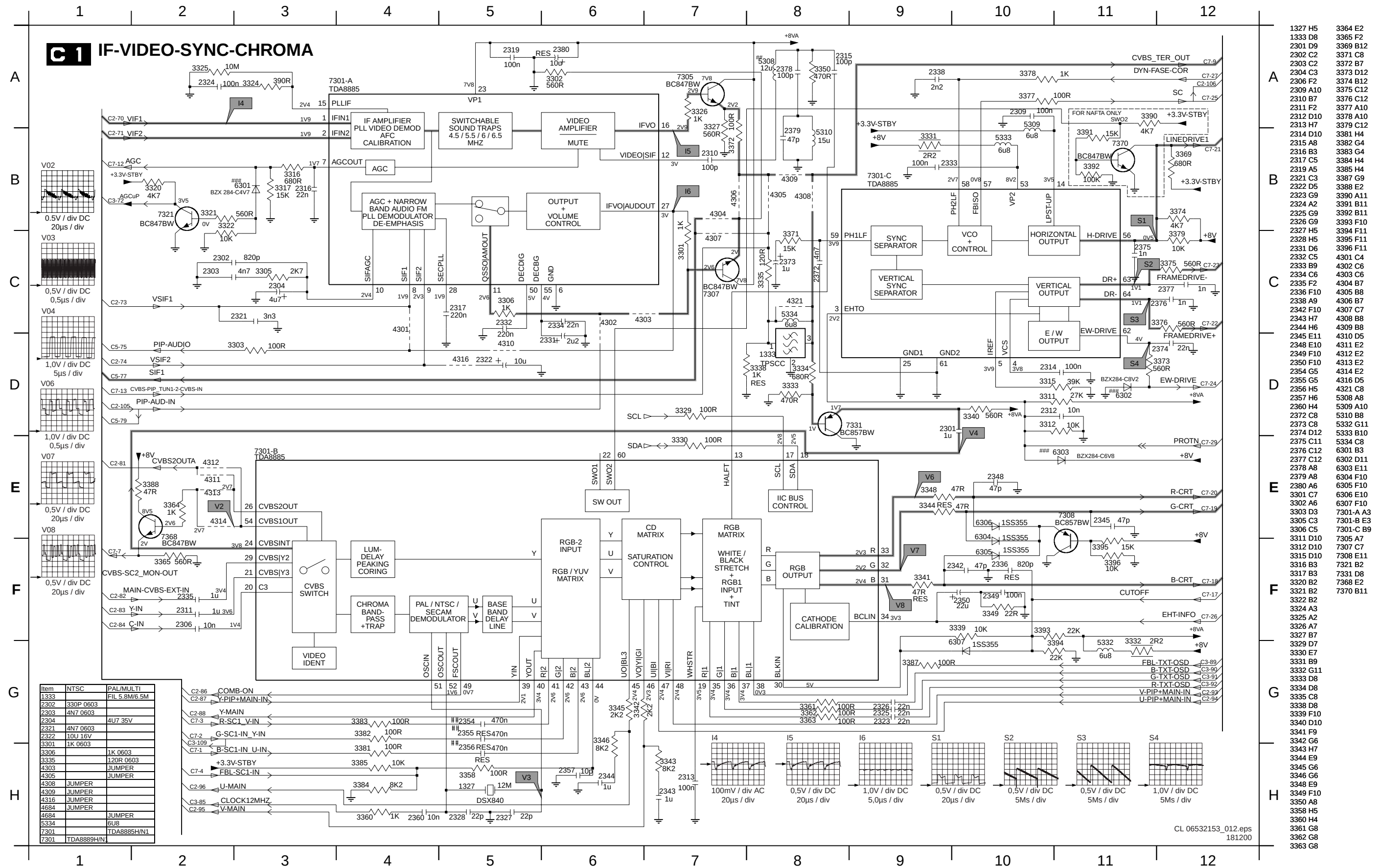
B CRT PANEL



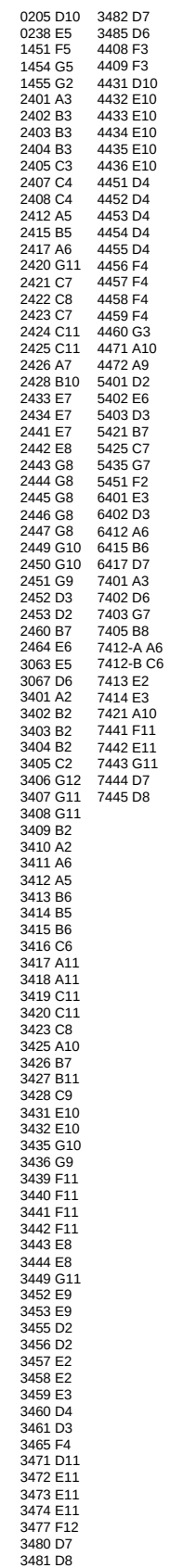
Layout CRT panel (copper side)



IF - VIDEO - SYNC - CHROMA



C2 VIDEO_FEATURES



Diversity tables SSB panel

Diversity tables diagram C2

Item	HISTOGRAM WITH DW	WITHOUT HISTOGRAM & DW
0205	CON 10P	
2420	100P 50V	
2433	10N 50V	
2434	10N 50V	
2441	100N 16V	
2442	220N 16V	
2443	10N 50V	
2444	10N 50V	
2445	10N 50V	
2446	10N 50V	
2447	10N 50V	
2449	100N 16V	
2450	10U 16V	
2451	10U 16V	
3406	10K 0603	
3407	10K 0603	
3408	10K 0603	
3431	22K 0603	
3432	22K 0603	
3435	18K 0603	
3436	15K 0603	
3439	10K 0603	
3443	JUMPER	
3444	220K 0603	
3452	22K 0603	
3453	18K 0603	
4431		JUMPER
4432		JUMPER
4433		JUMPER
4434		JUMPER
4435		JUMPER
4436		JUMPER
5435	6U8	
6418	1SS355	
6419	1SS355	
6420	1SS355	
7403	TDA9171T/N1	
7443	BC847BW	

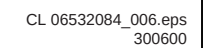
Item	Analog Combfilter - Multi (EU/AP/LT)	No Combfilter
2421	10U 16V	
2422	100N 16V	
2423	47N 16V	
2424	100P 50V	
2425	100P 50V	
2426	1U 10V	
2428	47N 16V	
2460	10U 16V	
3417	1K 5%	
3417		1K 5%
3418	560R 5%	560R 5%
3419	100R 5%	
3420	100R 5%	
3423	1K 5%	
3425	1K 5%	
3426	1K 5%	
3427	100R 5%	
3428		100R 5%
4471		JUMPER
5421	6U8 5%	
5425	6U8 5%	
7405	TDA9181	
7421	BC847BW	BC847BW

Diversity table diagram C3

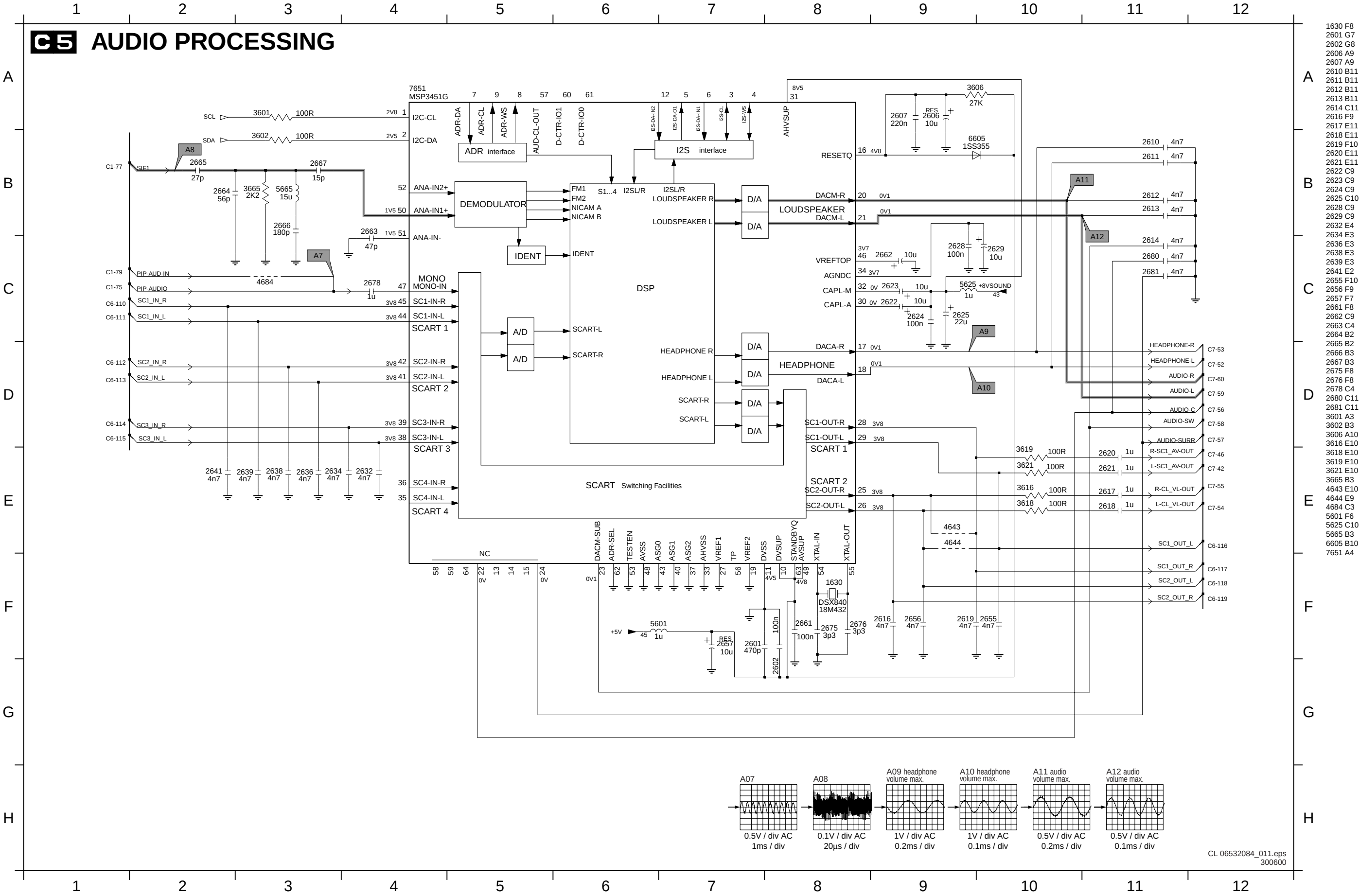
Item	AP - Taiwan	AP 100Pg Txt	China Non Txt	AP - Korea	AP - ME 100Pg Txt	AP 10Pg Txt	AP - ME 10Pg Txt
2058		100N 16V			100N 16V		
3010					1K 5%		
3028		47K 5%			47K 5%		
3029		10K 5%			10K 5%		
3032		10K 5%			10K 5%		
3033		10K 5%			10K 5%		
3090		10K 5%			10K 5%		
3091		10K 5%			10K 5%		
3094		10K 5%	10K 5%		10K 5%		
5050		5U6 10%			5U6 10%		
6020		1SS355			1SS355		
7022		BC847BW			BC847BW		
7070		UPD431000			UPD431000		

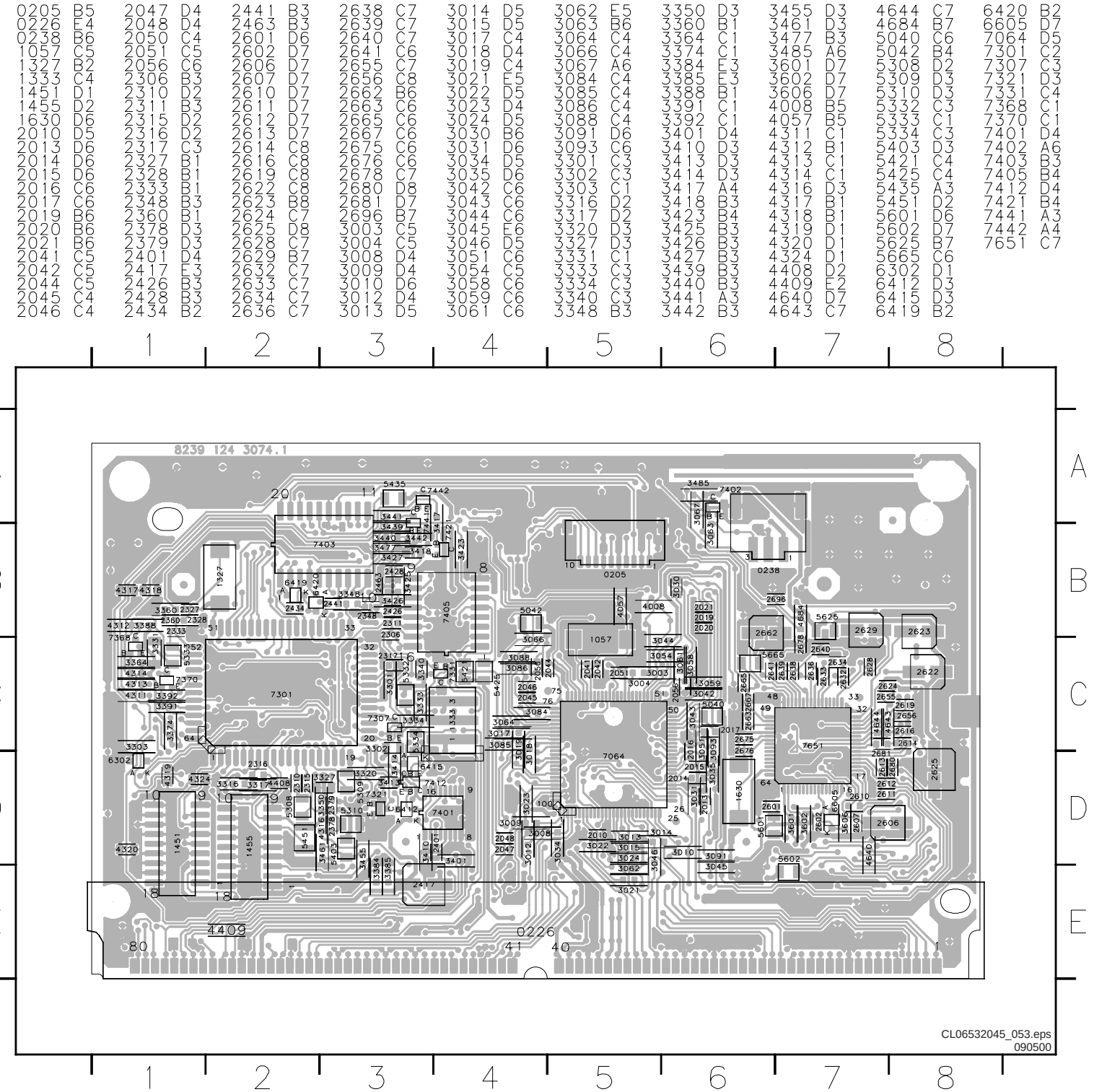
Item	NTSC-M	AP PAL/Multi	China Multi
1451			OFWM3956L 38MHz
1451	OFWM1967L 45,75MHz		
1451		OFWK7265L 38,9MHz	
1454			OFWK3955L 38MHz
1455			OFWK9352L 38MHz
1455		OFWK9361L 38,9MHz	
2452		10N 50V	10N 50V
3455		6K8 5%	6K8 5%
3456		2K2 5%	2K2 5%
3457		27K 5%	27K 5%
3458		18K 5%	18K 5%
3459			22K 5%
3460			2K2 5%
3461		2K2 5%	2K2 5%
3465			47K 5%
4451	iumper	iumper	
4452			iumper
4453		iumper	
4455	iumper		iumper
4457		iumper	iumper
4460		iumper	iumper
5403		6U8 5%	6U8 5%
6401		1SS356	1SS356
6402			1SS356
7413		BC847BW	BC847BW
7414			BC847BW

C3 U_CONT

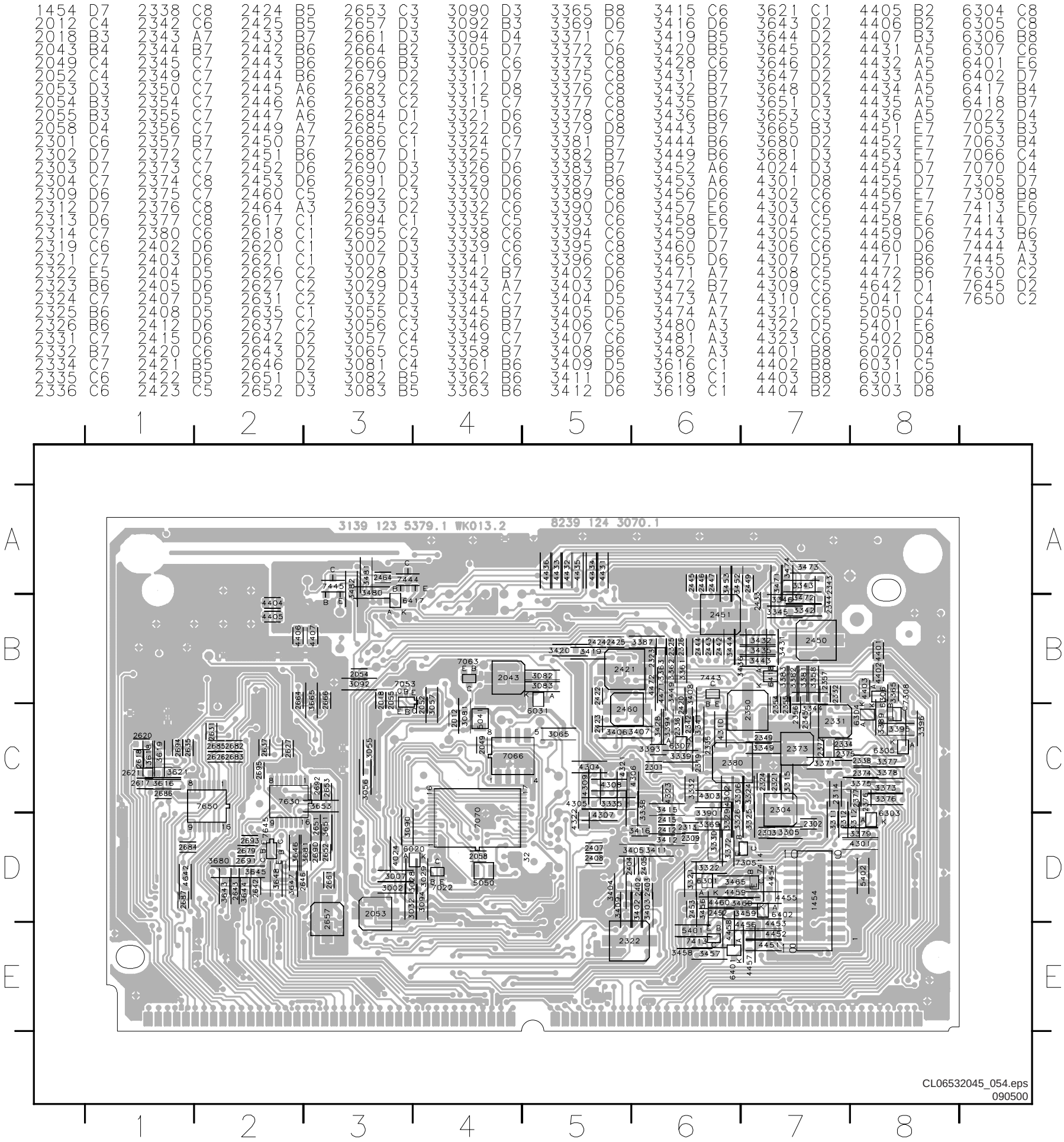


Audio processing

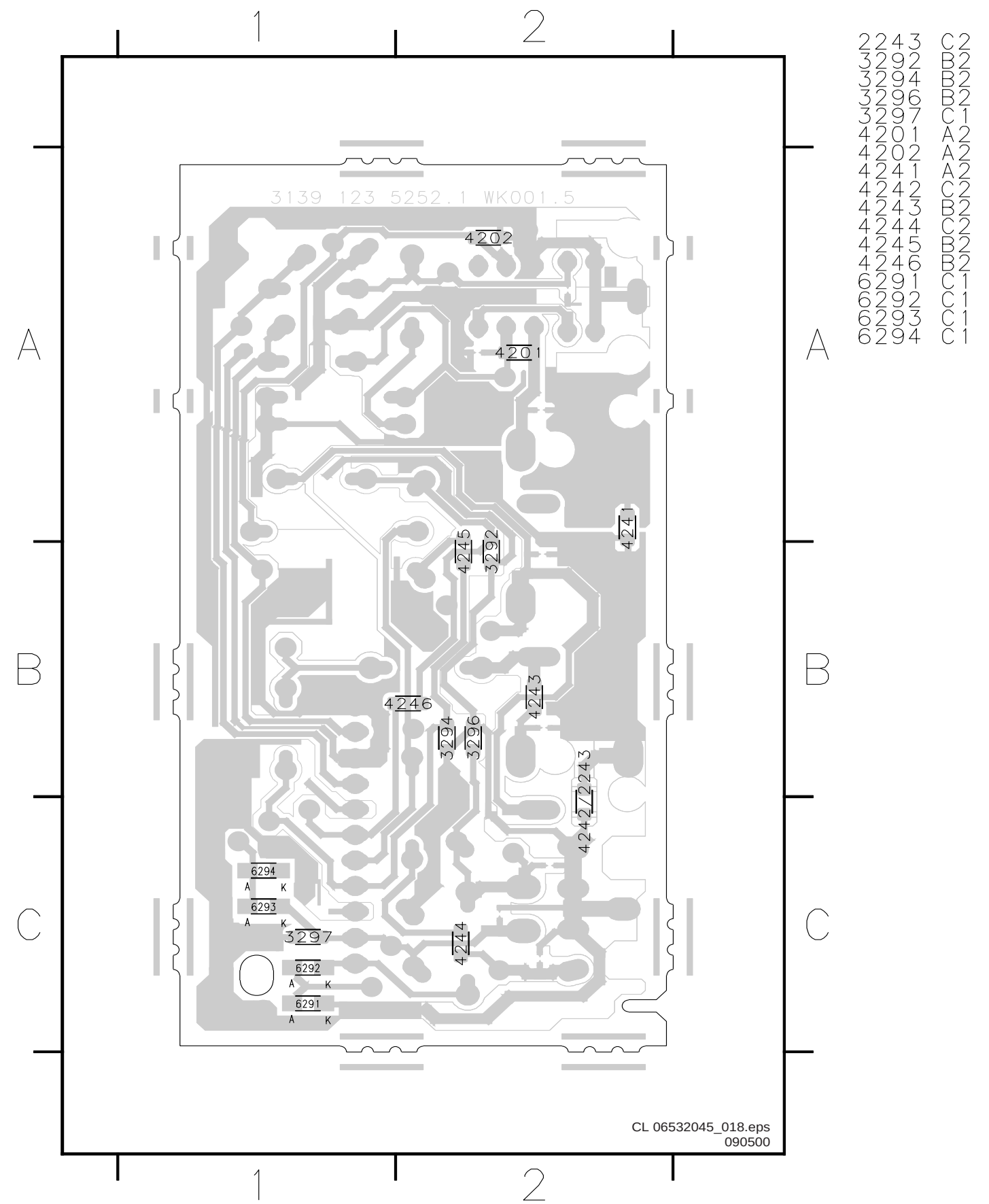
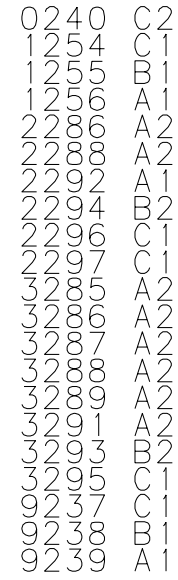




Layout SSB (copper side)

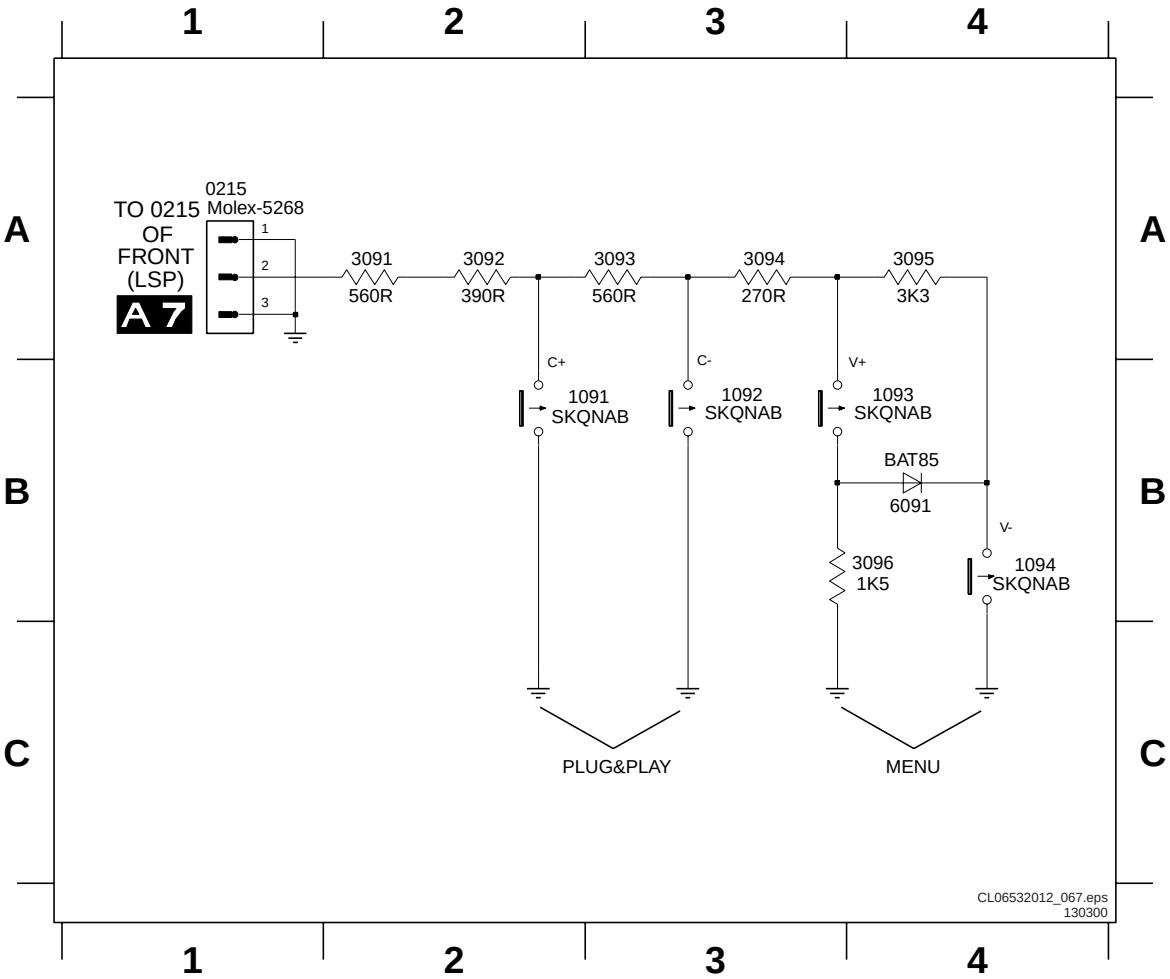


Layout Side I/O (copper side)

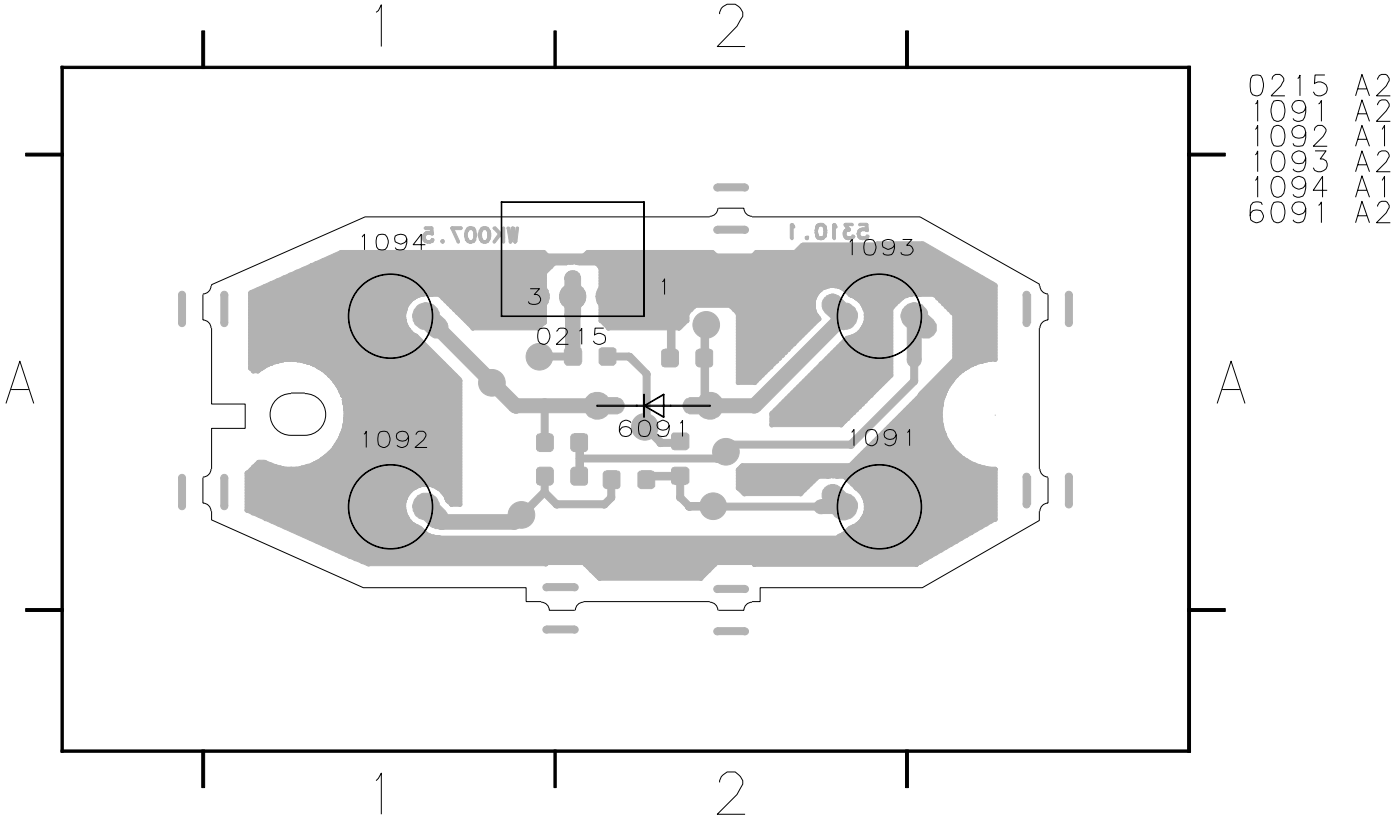


Top control

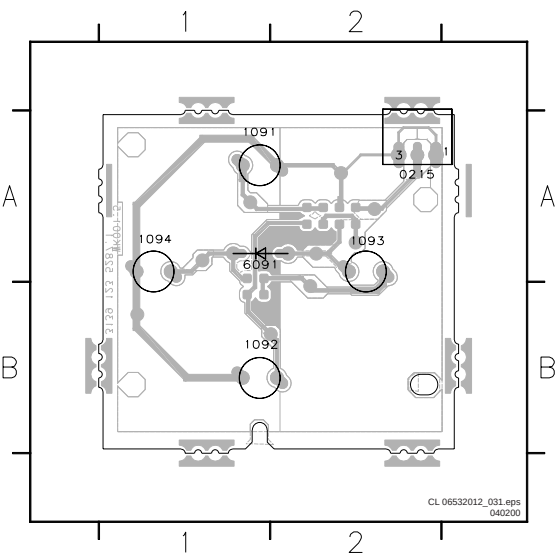
TOP CONTROL PANEL



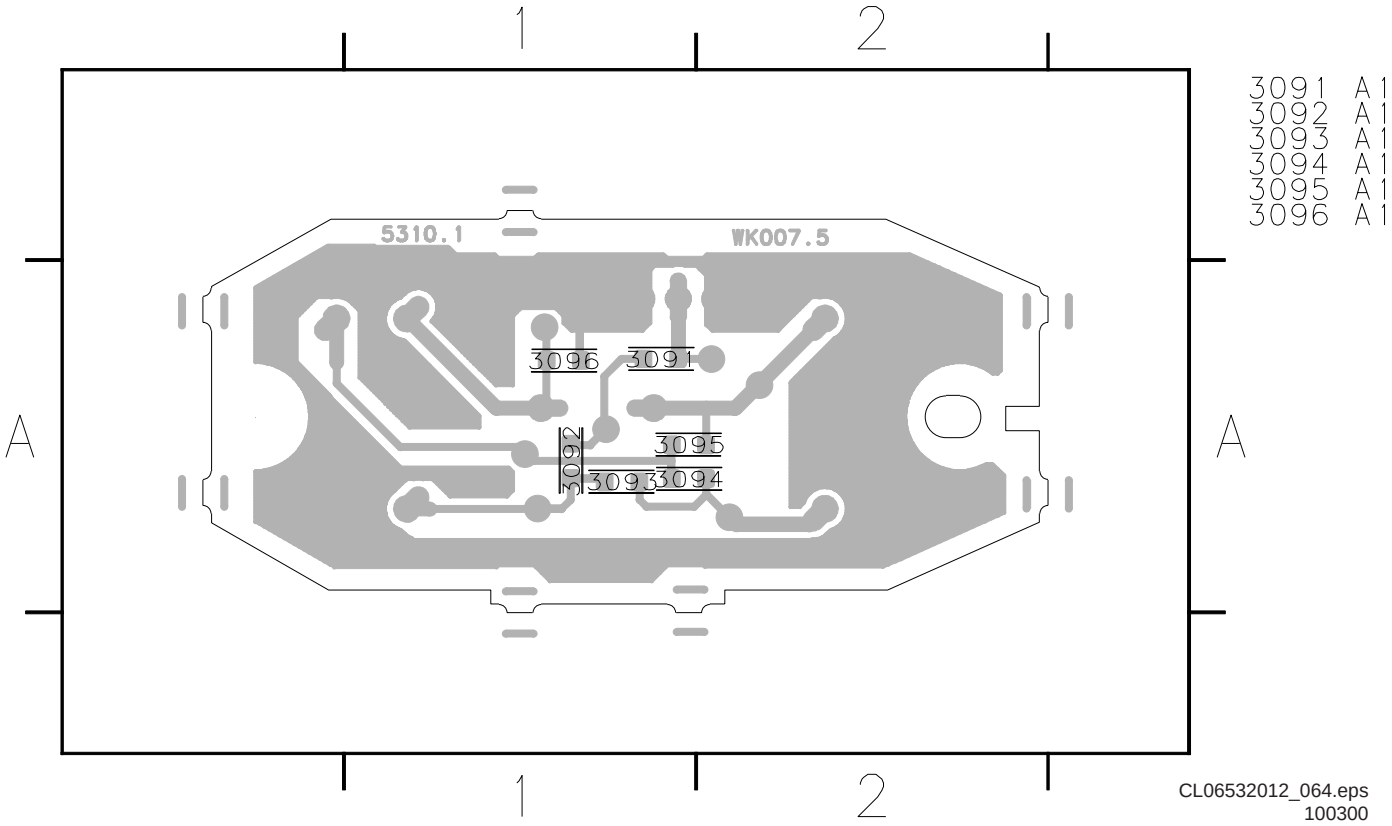
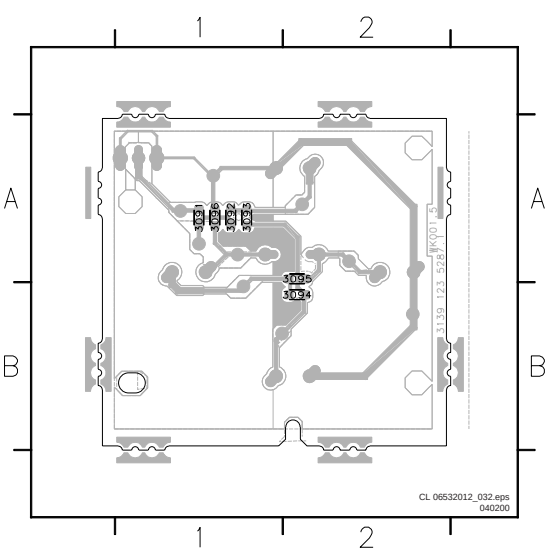
Layout Top control FSQ



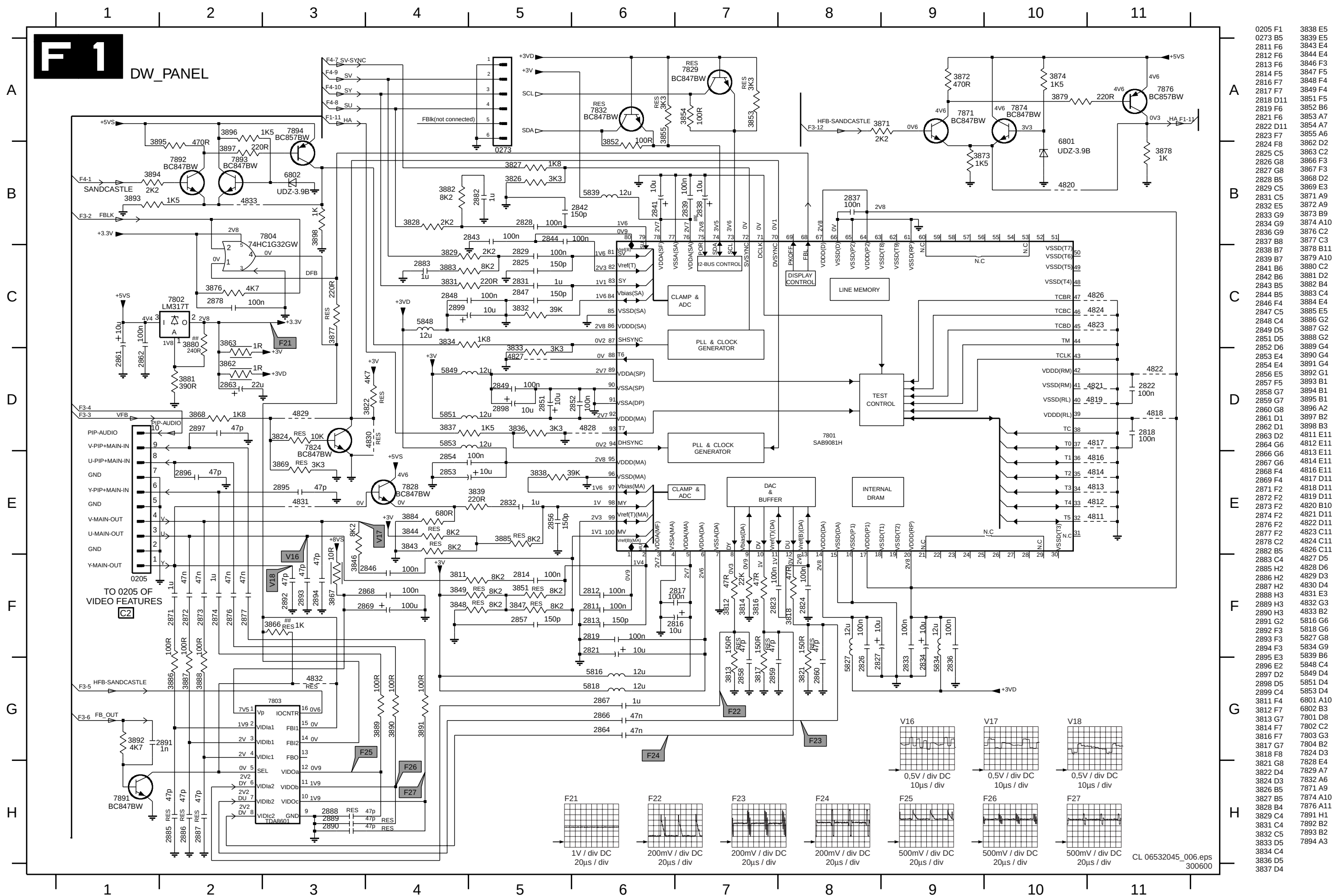
Top control RF (component side)



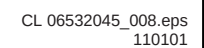
Top control RF (copper side)



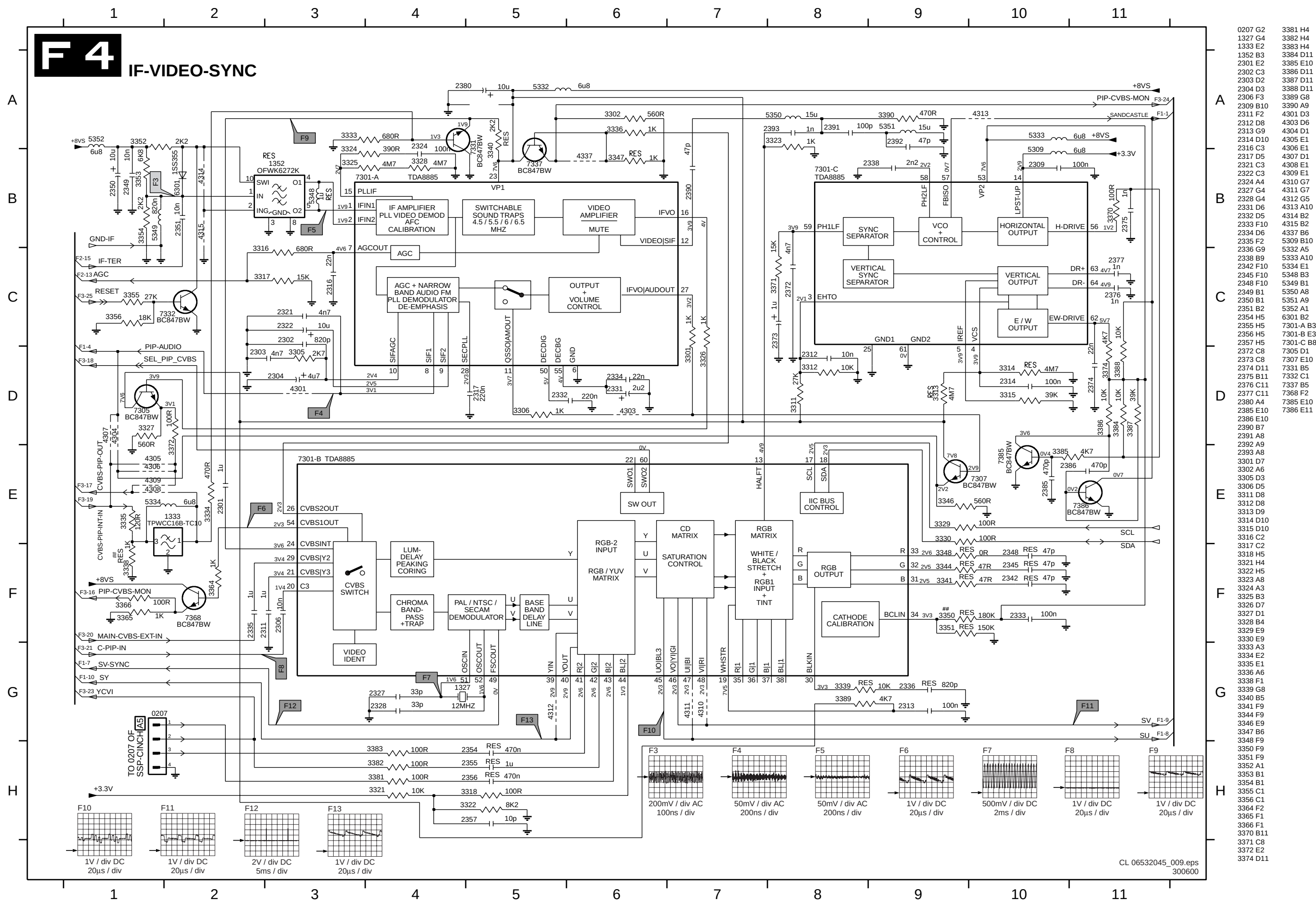
F1 DW PANEL



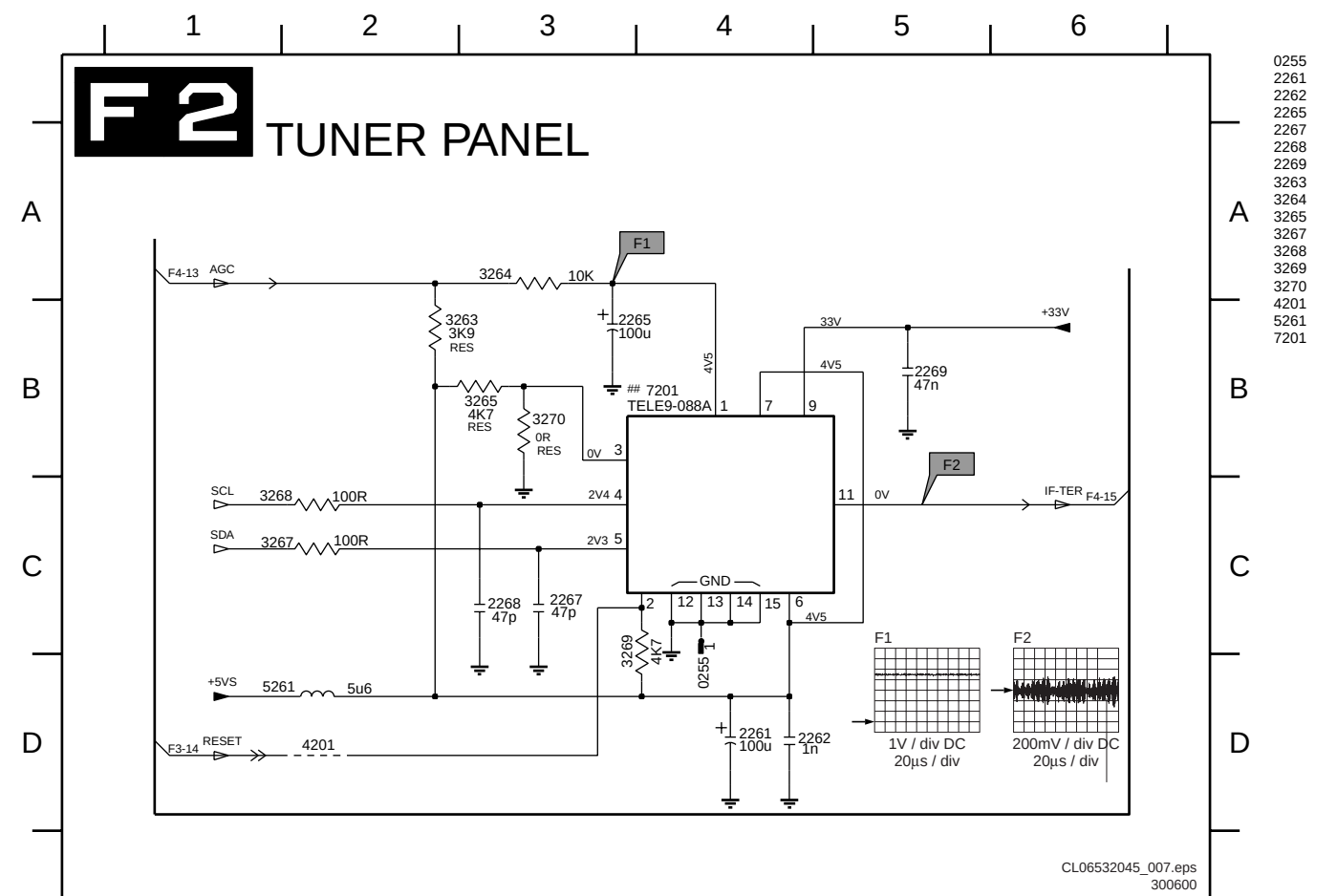
F 3 I/O PROCESSING

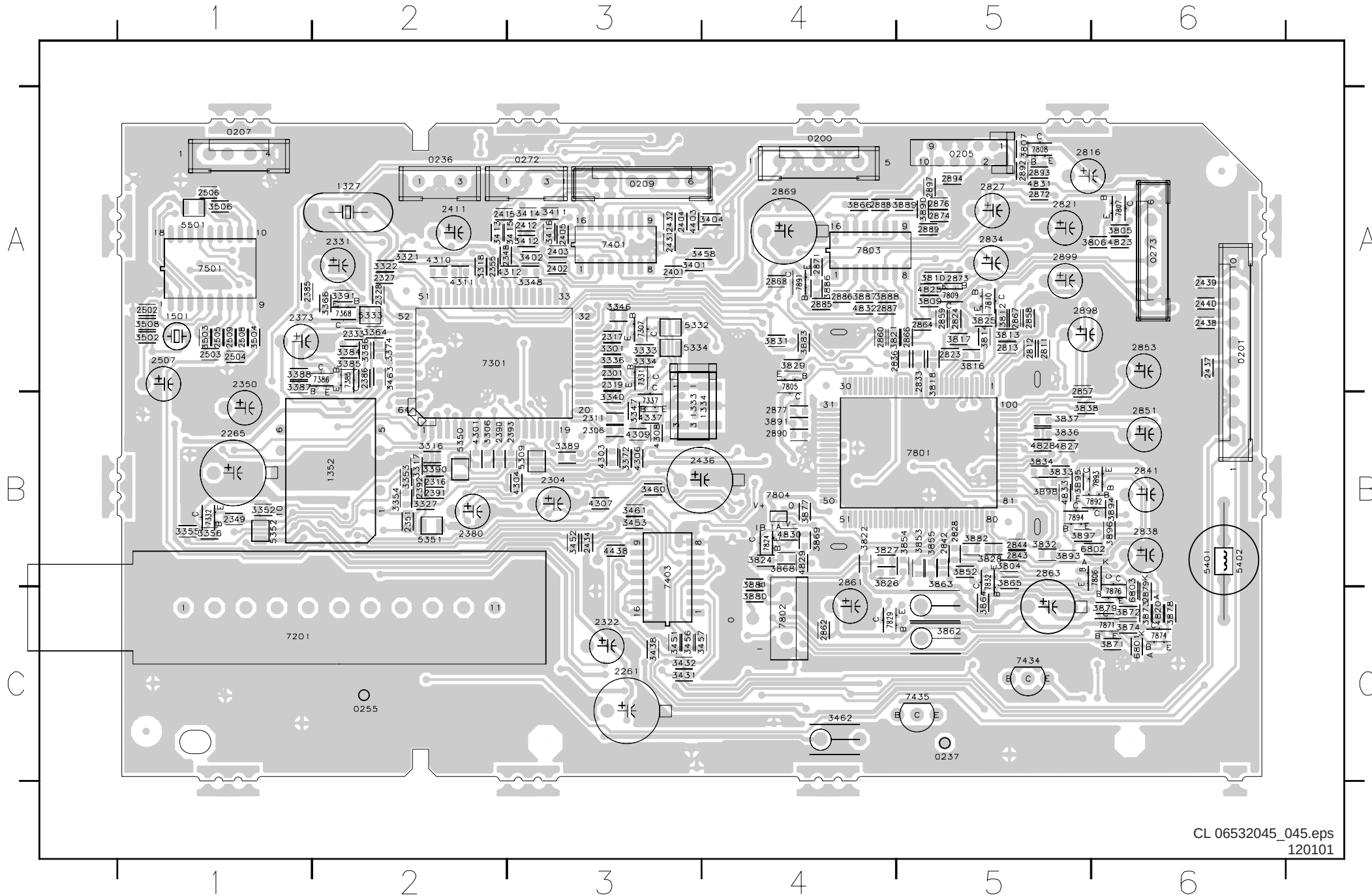


F 4 IF-VIDEO-SYNC

CL 06532045_009.eps
300600

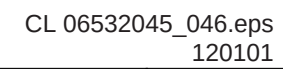
Double window tuner panel



[illegible]

Item	PAL/MULTI	NTSC
1333	FIL 5.8/6.5MHZ	
1352		45.75MHZ OFWM1962M
1352	38.9MHZ OFWK7260M	
2321	3N9 50V	
2321		4N7 50V
2349	10N 50V	
2350	10U 50V	
2392	18P 50V	
2392		47P 50V
2393	100P 50V	
2393		1N 25V
3335	120R 0805	
3352	2K2 0603	
3353	6K8 0603	
3354	2K2 0603	
3355	27K 0603	
3356	18K 0603	
3364		1K 0603
3365		1K 0805
3372		100R 0603
3372	JUMPER	
3417		100R 0805
3418		100R 0805
3419		560R 0805
3422		560R 0805
3423		560R 0805
3424		560R 0805
3451		4K7 0603
3461		4K7 0603
4305	JUMPER	
4308		JUMPER
4309		JUMPER
4314	JUMPER	
4315		JUMPER
5334	6U8	
5352	6U8	
6301	1S356	
7201	TEDE9X700A	
7201		TEDH9X700A
7301		TDA8887H/N1
7301	TDA8889H/N1	
7332	BC847BW	
7368		BC847BW

CL 06532153_019.eps
051200

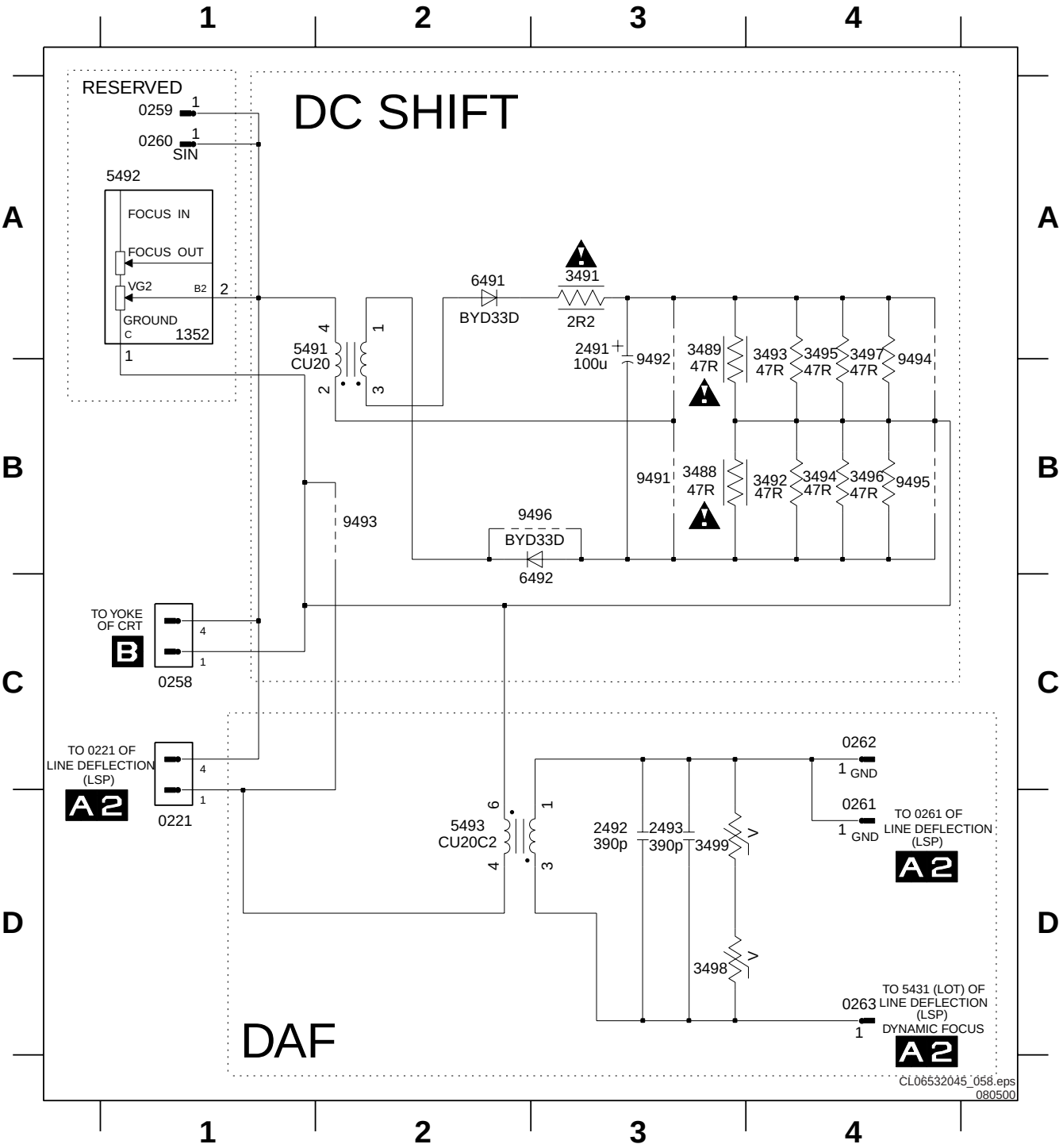
[illegible]

DC Shift / DAF panel

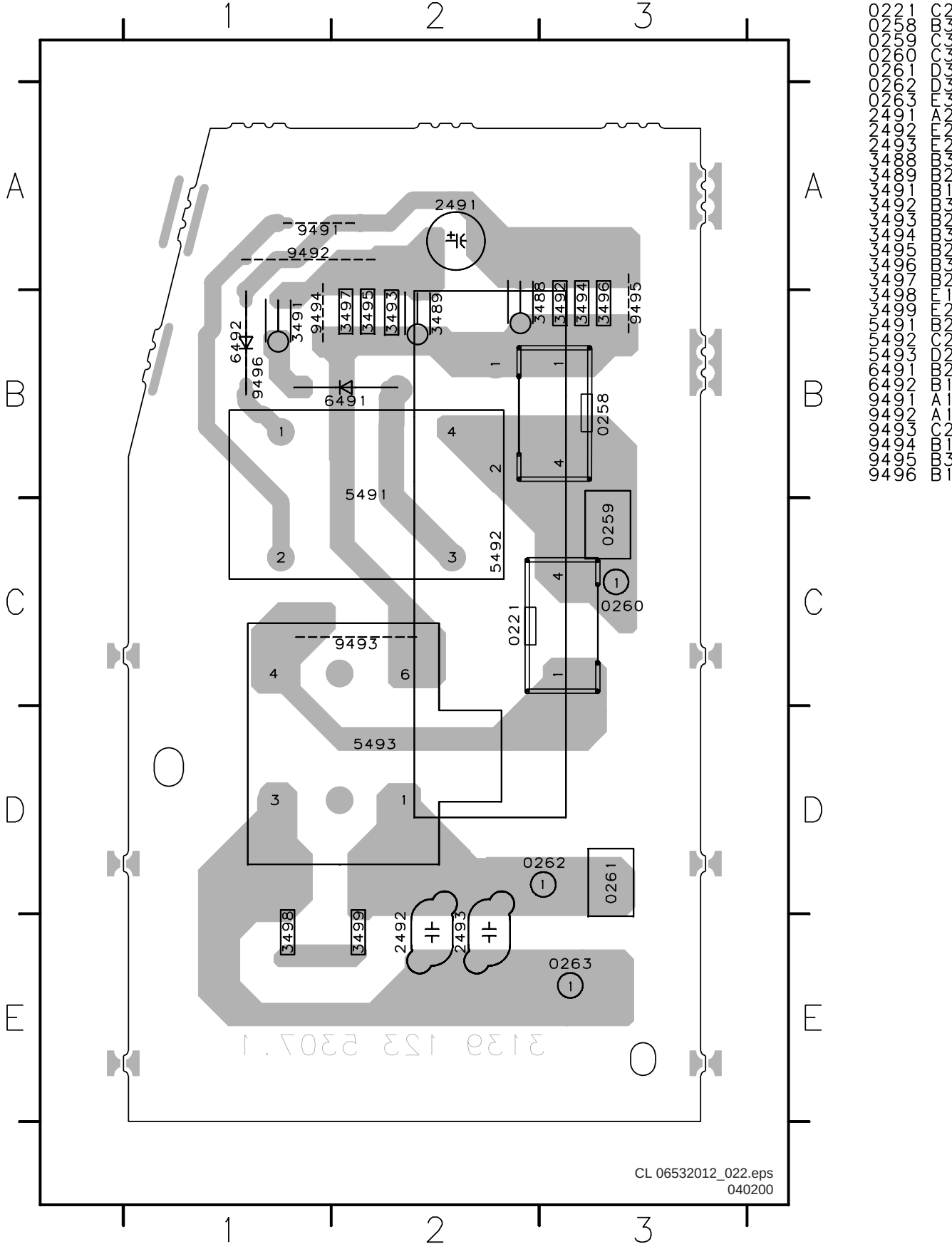
G

DC SHIFT & DAF PANEL

0221 D1	0261 D4	2492 D3	3491 A3	3495 B4	3499 D3	6491 A2	9493 B2
0258 C1	0262 C4	2493 D3	3492 B4	3496 B4	5491 A2	6492 B3	9494 A4
0259 A1	0263 D4	3488 B3	3493 B4	3497 B4	5492 A1	9491 B3	9495 B4
0260 A1	2491 B3	3489 B4	3494 B4	3498 D3	5493 D2	9492 A3	9496 B3



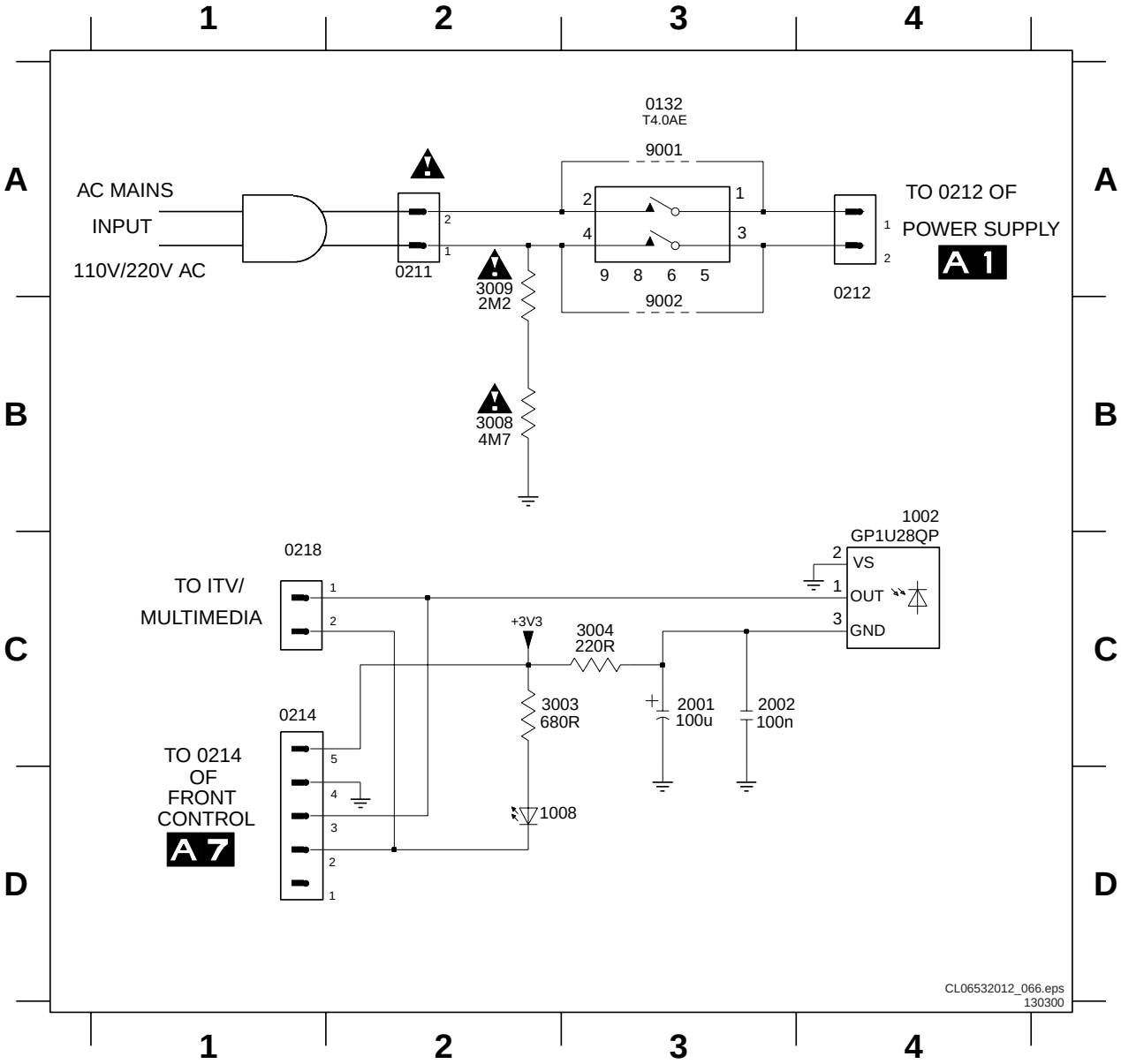
Layout DC Shift / DAF panel



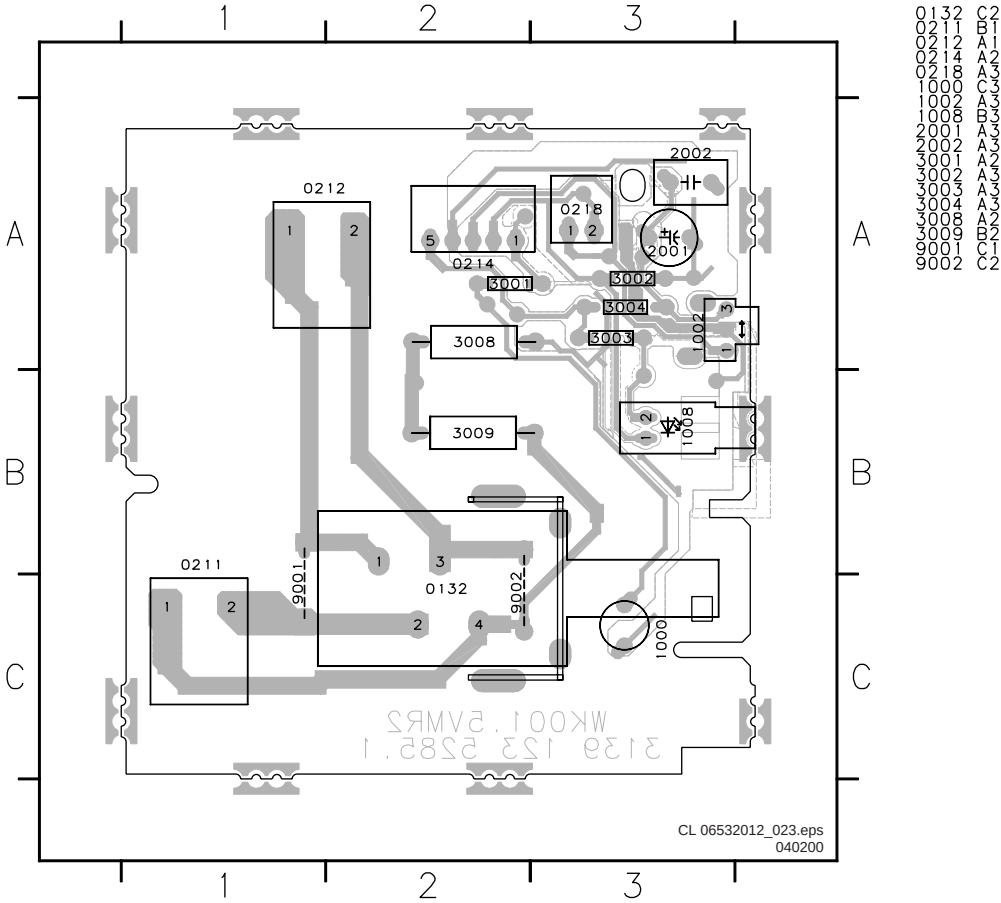
Front interface

FRONT INTERFACE PANEL

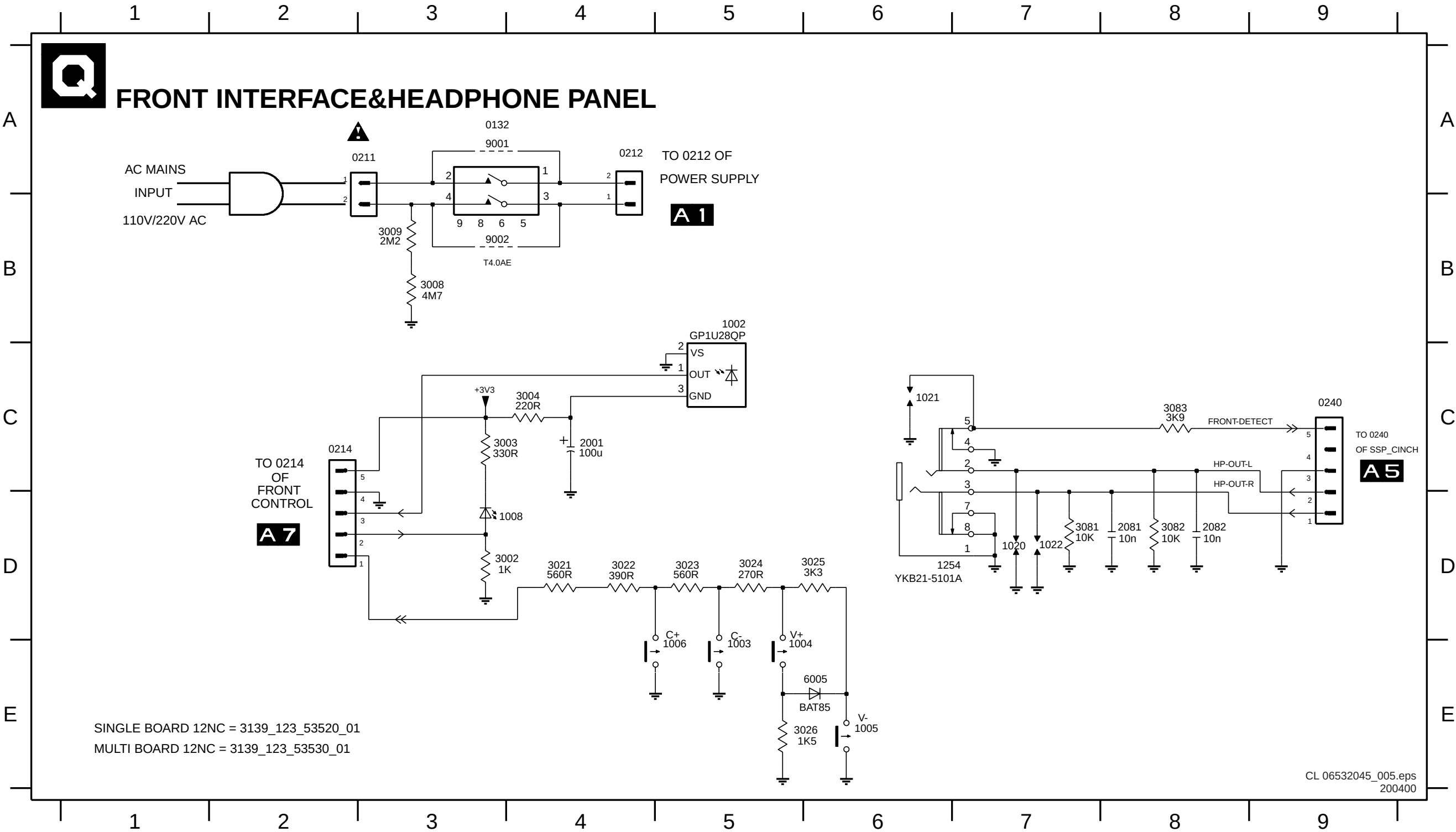
0132 A3	0214 C1	1002 B4	2002 C3	3003 C2	3009 A2
0211 A2	0218 C1	1008 D2	3001 D2	3004 C3	9001 A3
0212 B4	1000 D2	2001 C3	3002 D3	3008 B3	9002 B3



Layout Front interface (component side)



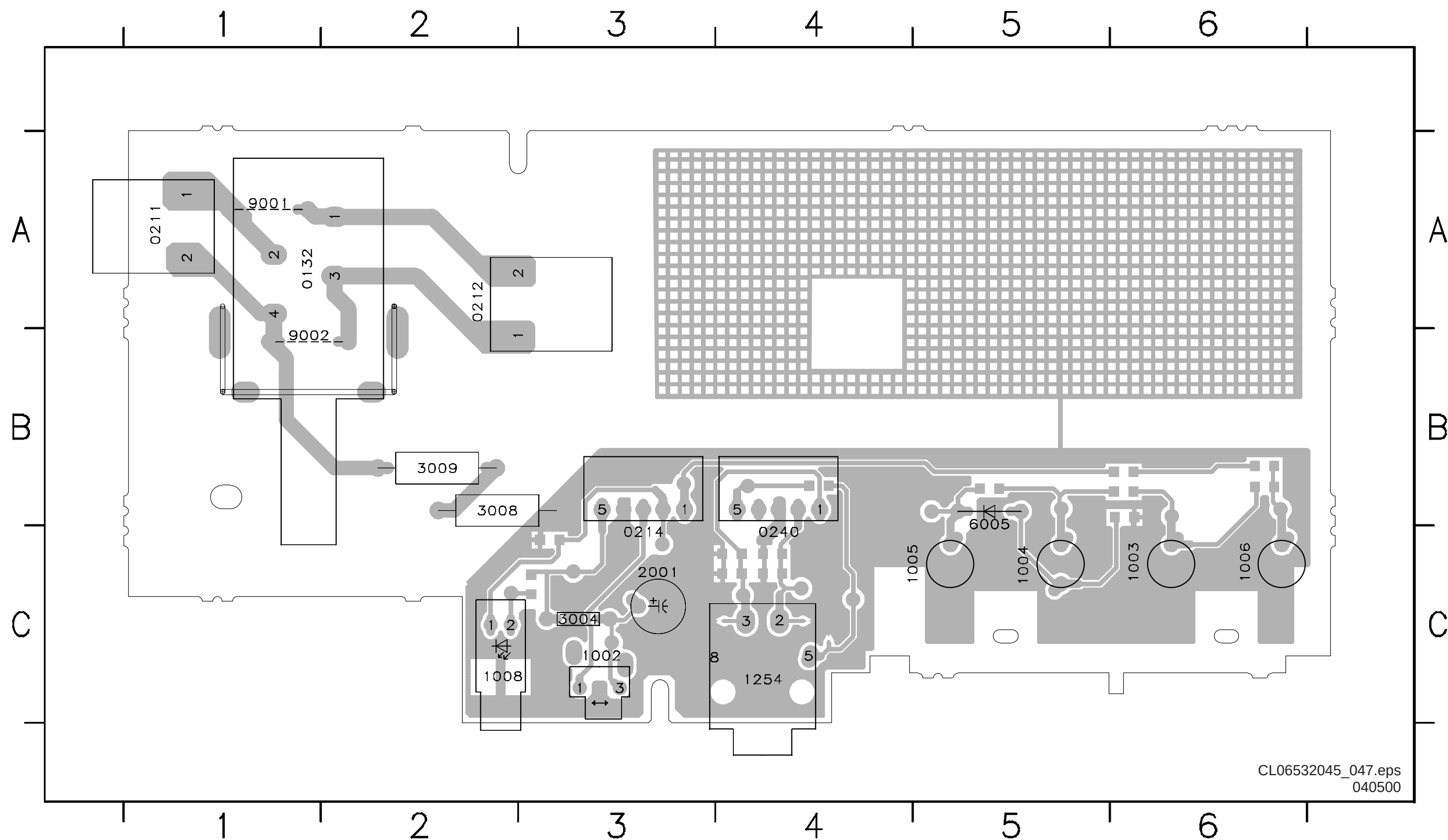
Front interface & Headphone panel



0132 A3
0211 A2
0212 A4
0214 C2
0240 C9
1002 B5
1003 D5
1004 D5
1005 E6
1006 D5
1008 D3
1020 D7
1021 C7
1022 D7
1024 E6
1254 D7
2001 C4
2081 D8
2082 D9
3002 D4
3003 C3
3004 C4
3008 B3
3009 A3
3021 D4
3022 D4
3023 D5
3024 D5
3025 D6
3026 E6
3081 D8
3082 D8
3083 C8
6005 E6
9001 A3
9002 B3

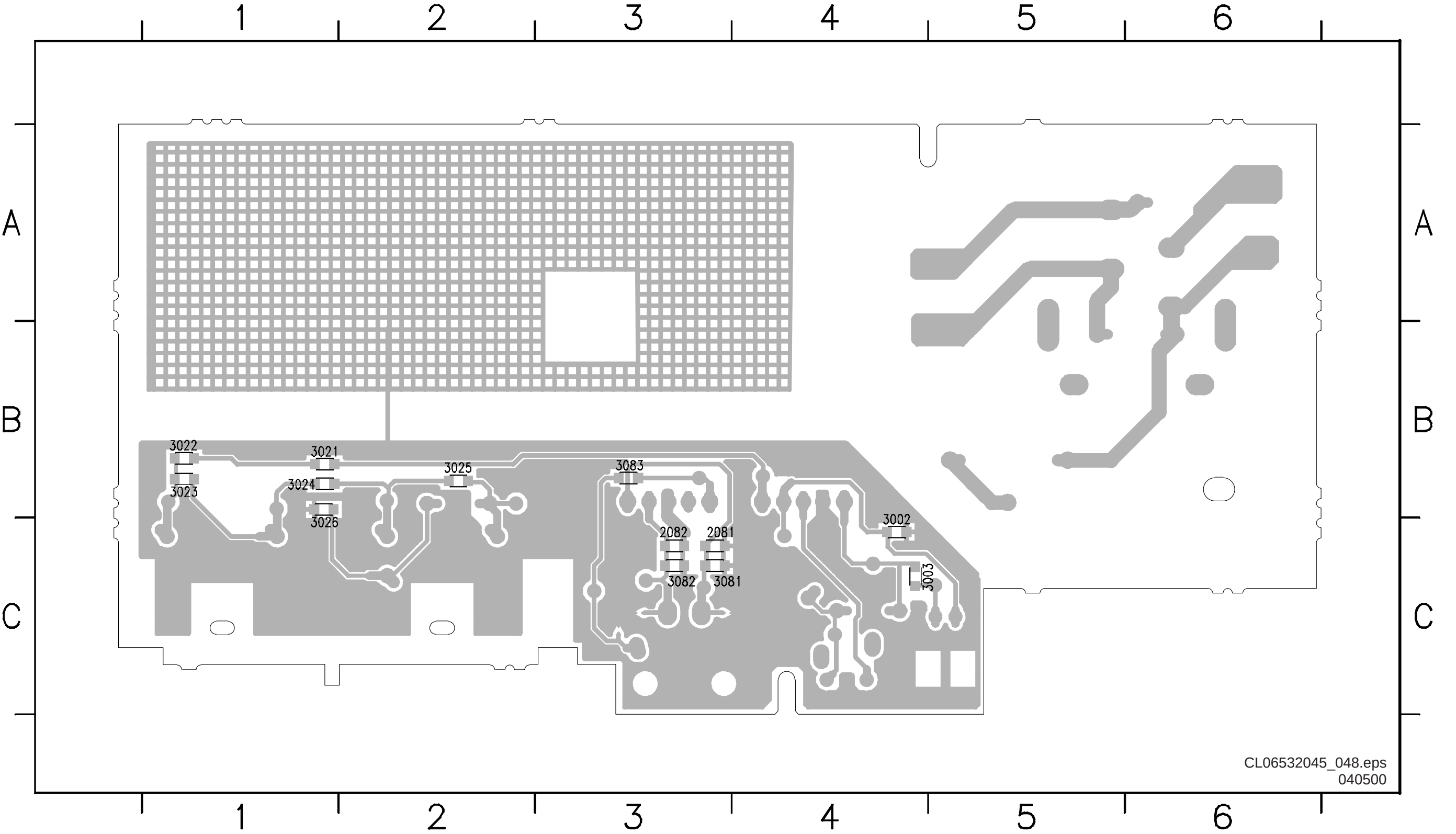
Layout Front interface & Headphone (component side)

0132 A1 0212 A2 0240 C4 1003 C6 1005 C4 1254 C4 3001 C3 3008 B2 6005 B5 9001 A1 9002 B1

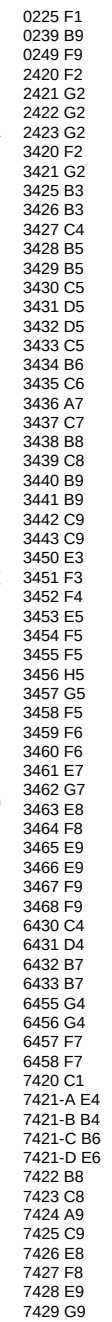


Layout Front interface & Headphone (copper side)

2081 C3 2082 C3 3002 C4 3003 C4 3021 B1 3022 B1 3023 B1 3024 B1 3025 B2 3026 C1 3081 C3 3082 C3 3083 B3



GEOMAGNETIC CORRECTION PANEL



0225	A1	3428	B2	3440	C1	3458	B3	6431	A3	7425	C2
0239	C3	3429	C2	3441	C1	3459	C3	6432	B1	7426	C2
0249	B3	3430	A3	3442	C1	3460	C3	6433	B1	7427	C3
2420	B2	3431	A3	3443	C1	3461	C3	6455	A3	7428	C2
2421	A3	3432	A3	3450	B3	3462	C3	6456	A3	7429	C3
2422	B2	3433	B3	3451	B3	3463	C2	6457	B3	9401	A2
2423	C3	3434	C2	3452	B3	3464	C3	6458	B3	9402	B1
3420	A1	3435	C2	3453	B3	3465	C2	7420	A2	9403	C2
3421	B1	3436	B1	3454	C3	3466	C2	7421	B2	9404	C3
3425	B3	3437	C1	3455	A3	3467	C3	7422	C1		
3426	B3	3438	C1	3456	A3	3468	C3	7423	C1		
3427	B2	3439	C2	3457	A3	6430	A3	7424	C1		

