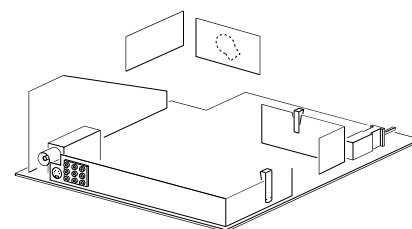


Service
Service
Service

14PT314A/78
14PT316A/78
14PT414A/78
14PT616A/78
20PT324A/78

20PT326A/78
20PT424A/78
20PT524A/78
21PT434A/78
21PT534A/78

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AA

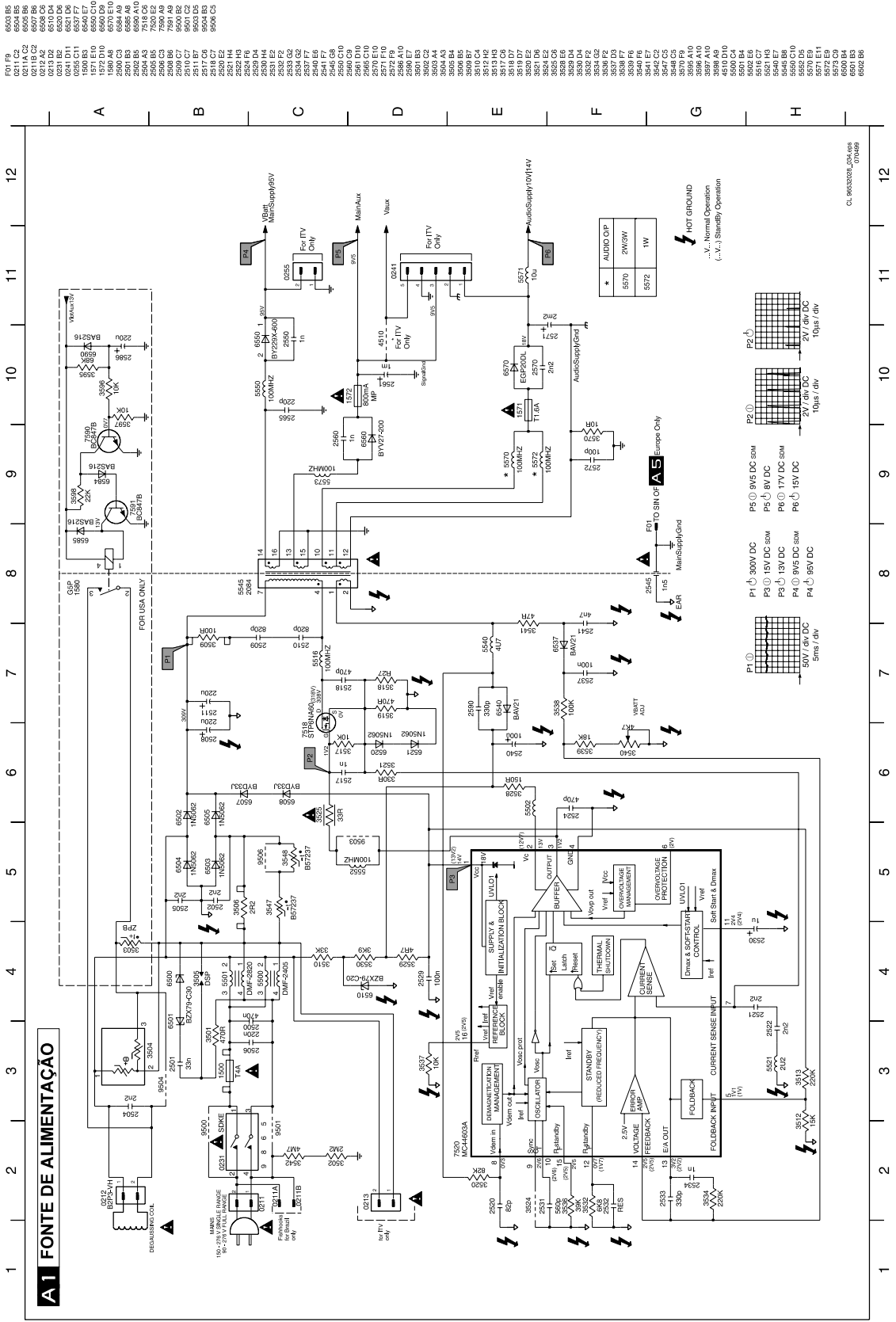


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Service Manual



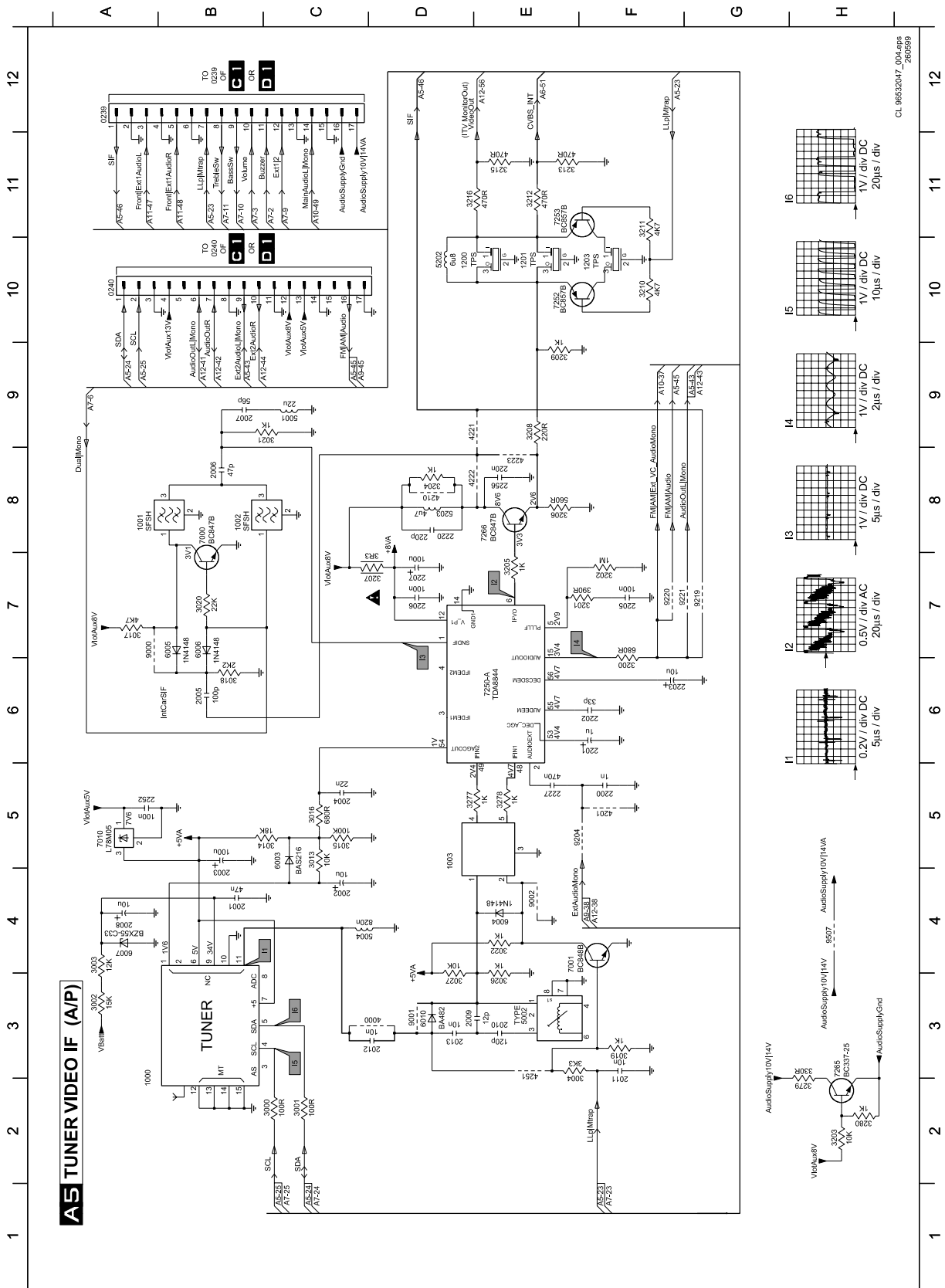
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Lista de diversidade para A1

ITEM NO.	FR20/21 AP/LA	HR20/21 EU	LR20/21 US	LR14 US	HR14 EU	HR20/21 AP	HR14 AP	FR20/21 US	FR14 US	FR20/21 INDIA	FR14 INDIA	FR14 INDO	FR20 INDO	LR14 US(no relay)	HR21 CHINA	FR14 AP/LA
5500	DMF 2820F	-	DMF 2820F	DMF 2820F	-	-	-	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	-	-	DMF 2820F
5501	-	DMF 2430F	-	-	DMF 2430F	DMF 2430F	DMF 2430F	-	-	-	-	-	-	-	DMF 2430F	-
3504	PTC 9R	PTC 9R	-	PTC 9R	PTC 9R	PTC 9R	PTC 9R	-	PTC 9R	PTC 9R	PTC 9R	PTC 9R	PTC 9R	-	PTC 9R	PTC 9R
3503	-	-	ZPB 10R	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	-	2R2	2R2
3506	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	-	2R2	2R2
3547	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3548	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9506	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3538	82K	100K	100K	100K	100K	82K	82K	100K	82K	82K	82K	82K	82K	-	82K	82K
3539	15K	18K	18K	18K	18K	15K	15K	18K	15K	15K	15K	15K	15K	-	15K	15K
5552	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	JUMPER
7518	6NA60FI	6NA60FI	6NA60FI	6NA60FI	4NA60FI	6NA60FI	4NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	-	6NA60FI	6NA60FI
2508	220u/400	100u/400	220u/200	220u/200	100u/400	220u/400	100u/400	220u/400	220u/400	220u/450	220u/450	100u/400	220u/400	220u/200	100u/450	220u/400
2518	220p	220p	470p	470p	220p	330p	330p	220p	220p	330p	330p	330p	330p	470p	330p	330p
2509	820p	820p	1n	1n	1n	820p	820p	820p	820p	820p	820p	820p	820p	1n	820p	820p
2510	820p	820p	1n	1n	1n	820p	820p	820p	820p	820p	820p	820p	820p	1n	820p	820p
3518	OR27	OR33	OR33	OR33	OR33	OR33	OR33	OR27	OR27	OR27	OR27	OR27	OR27	OR33	OR33	OR27
2510	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN5602	-	-
3518	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN5602	-	-
5545	DASUNG BLACK H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	DASUNG BLACK H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	DASUNG BLACK H.SINK	DASUNG BLACK H.SINK	DASUNG BLACK H.SINK	DASUNG BLACK H.SINK	DASUNG BLACK H.SINK	ELDOR WHITE H.SINK	DASUNG BLACK H.SINK	DASUNG BLACK H.SINK
113	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK	ELDOR WHITE H.SINK
2550	680p	1n	1n	1n	1n	680p	680p	1n	1n	680p	680p	680p	680p	1n	680p	680p
3528	150E	270E	150E	150E	270E	150E	150E	270E	150E	150E	150E	150E	150E	150E	150E	150E
3536	27K	27K	27K	27K	27K	47K	47K	27K	39K	27K	27K	27K	27K	27K	27K	27K
5521	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2
2522	4n7	4n7	4n7	4n7	4n7	4n7	4n7	4n7	3n3	4n7	3n3	3n3	3n3	3n3	4n7	3n3
2521	4n7	4n7	4n7	4n7	4n7	4n7	4n7	4n7	3n3	4n7	3n3	3n3	3n3	3n3	4n7	3n3
2586	-	-	220u/25	-	-	-	-	220u/25	220u/25	-	-	-	-	-	-	-
1580	-	-	RELAY GS-51A	RELAY GS-51A	RELAY GS-51A	RELAY GS-51A	RELAY GS-51A	RELAY GS-51A	RELAY GS-51A	-	-	-	-	-	-	-
6585	-	-	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	-	-	-	-	-	-	-
6584	-	-	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	-	-	-	-	-	-	-
6590	-	-	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	BAS216	-	-	-	-	-	-	-
7591	-	-	BC847B	BC847B	BC847B	BC847B	BC847B	BC847B	BC847B	-	-	-	-	-	-	-
7590	-	-	BC847B	BC847B	BC847B	BC847B	BC847B	BC847B	BC847B	-	-	-	-	-	-	-
3598	-	-	22K	22K	22K	22K	22K	22K	22K	-	-	-	-	-	-	-
3597	-	-	10K	10K	10K	10K	10K	10K	10K	-	-	-	-	-	-	-
3596	-	-	10K	10K	10K	10K	10K	10K	10K	-	-	-	-	-	-	-
3595	-	-	68K	68K	68K	68K	68K	68K	68K	-	-	-	-	-	-	-
9504	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER
9500	-	-	JUMPER	JUMPER	-	-	-	JUMPER	JUMPER	-	-	-	-	JUMPER	JUMPER	-
9501	-	-	-	-	-	-	-	JUMPER	JUMPER	-	-	-	-	JUMPER	-	-

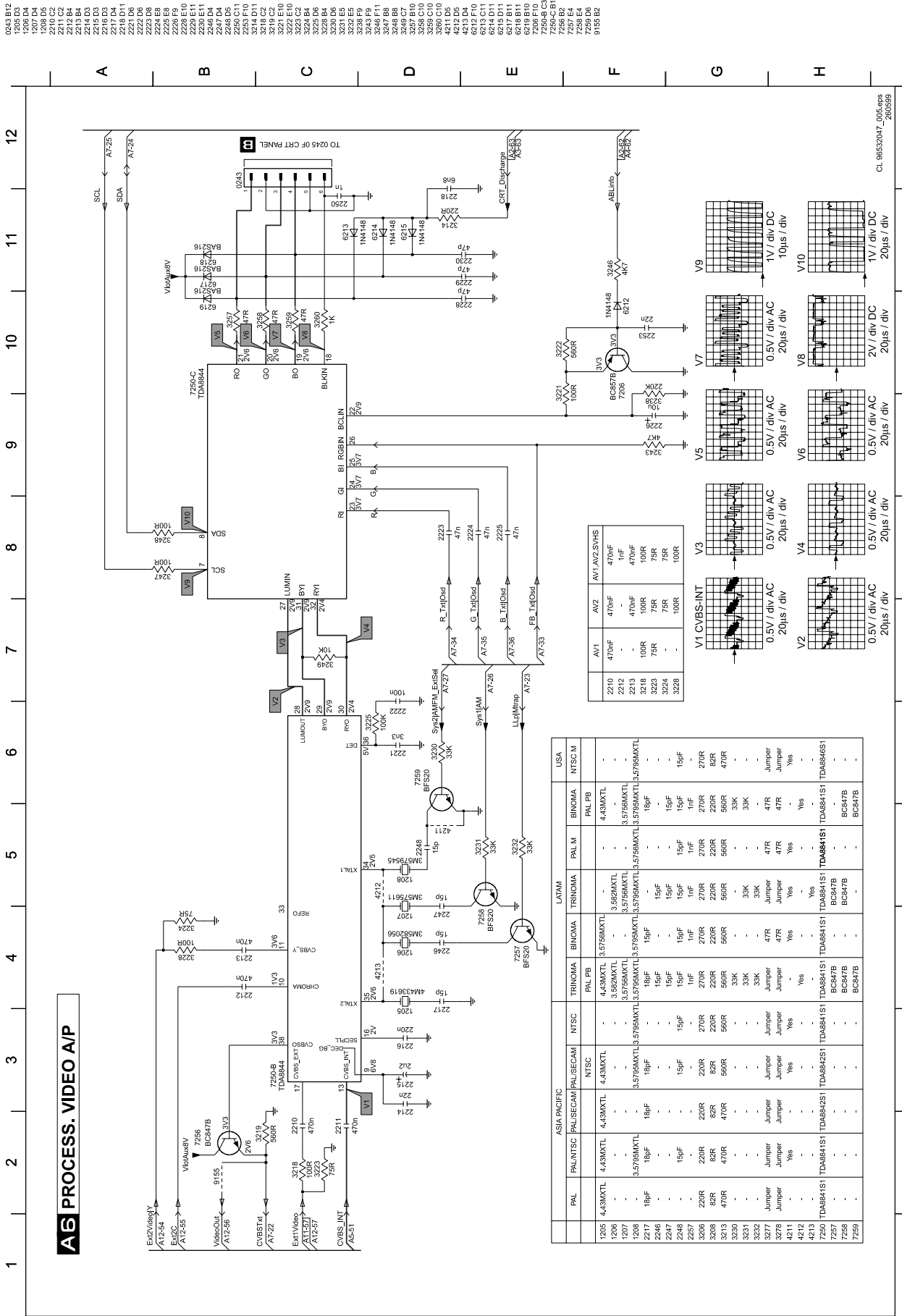
0239 A12
1000 A2
1000 A3
1002 B6
1003 D4
1200 D10
1200 D11
1203 F10
2001 B4
2002 B5
2004 C4
2005 B6
2007 B8
2008 A4
2009 D3
2011 F3
2012 D3
2013 D5
2015 F5
2202 F8
2205 F7
2206 D7
2207 D7
2207 E5
2252 A5
2256 E8
3000 A3
3001 C2
3003 A4
3013 C5
3014 C5
3016 C5
3017 A7
3018 B6
3020 B7
3021 C9
3022 E4
3027 D3
3200 F8
3201 F7
3203 H2
3203 H2
3204 D9
3205 E8
3207 D7
3208 E9
3210 F10
3211 F11
3212 E11
3215 E11
3216 D11
3278 E5
3279 G2
3280 H2
3281 D5
4201 F5
4210 D8
4221 E8
4223 E8
4251 E2
4252 E2
5002 E3
5004 C4
5002 D10
6004 E4
6003 C5
6005 B7
6007 A4
6010 D3
7000 B4
7010 A5
7250-A E6
7250-A E7
7253 E11
7255 H3
7266 E8
9001 D3
9002 E4
9218 G1



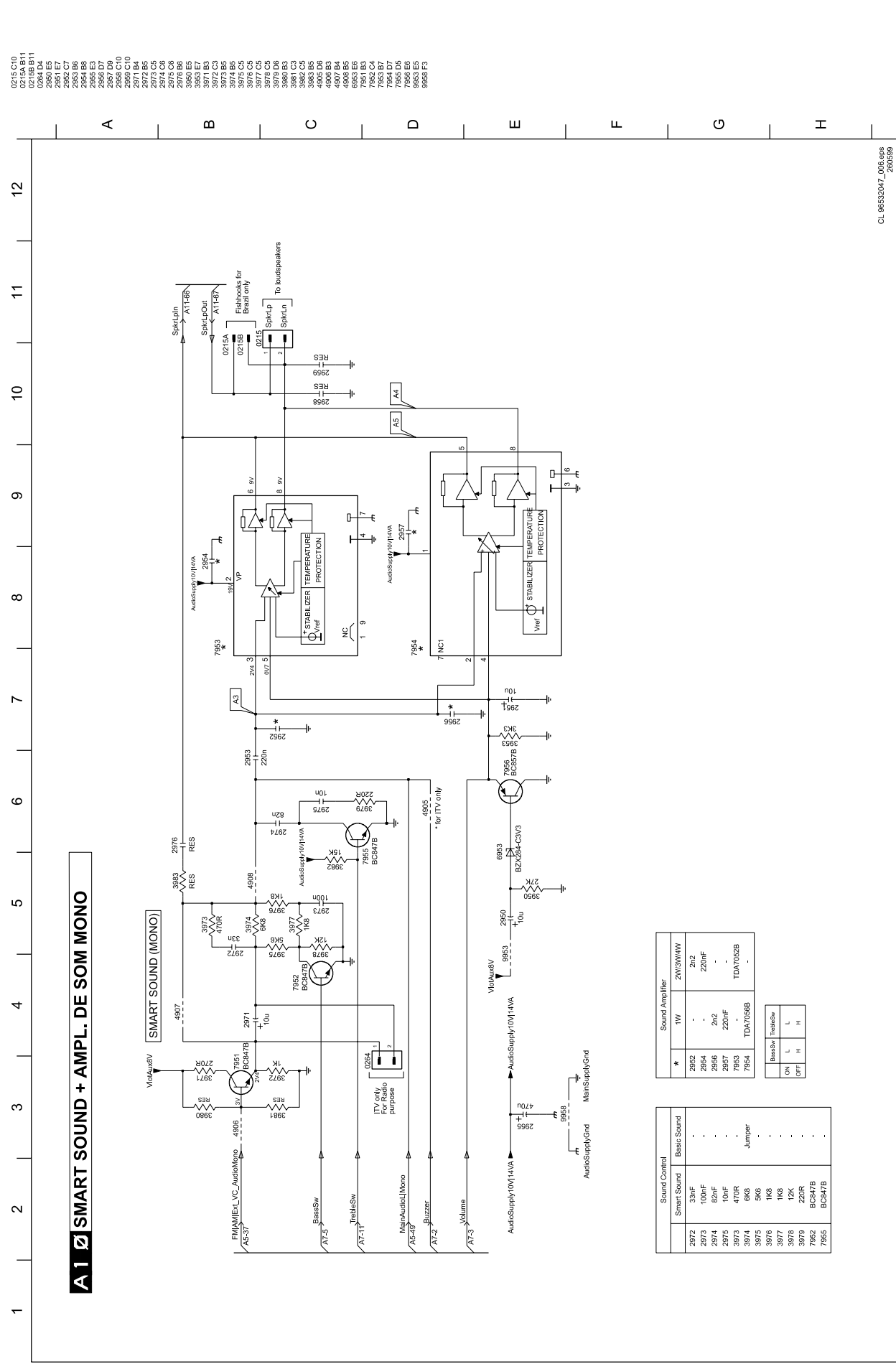
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7 Esquemas Eléctricos e Guias de Placas

A6 PROCESS. VIDEO A/P



7 Esquemas Eléctricos e Guias de Placas



A1 SMART SOUND + AMPL. DE SOM MONO

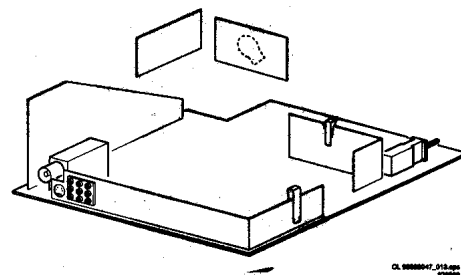
Sound Control		Sound Amplifier	
Smart Sound	Basic Sound	1W	2W/3W/4W
2972	33nF	-	2n2
2973	100nF	-	220nF
2974	82nF	-	-
2975	10nF	-	-
2976	470R	-	-
2977	5K6	-	-
2978	1K8	-	-
2979	12K	-	-
2980	220R	-	-
2981	BC847B	-	-
2982	BC847B	-	-
2983	BC847B	-	-

BasicSw	TrickleSw
ON	L
OFF	H

Service Service Service

L9.2A

AA



Service Manual

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1. Technical Specifications

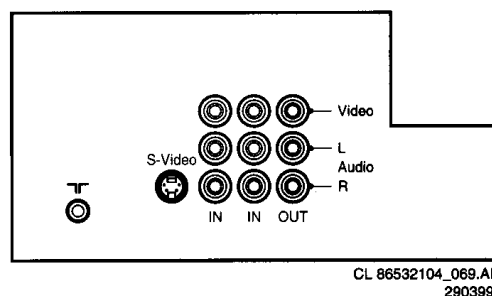
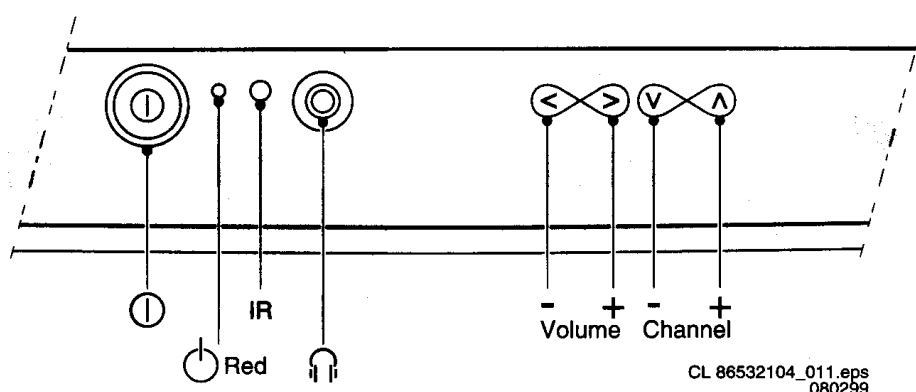
1.1 Specifications

Mains voltage	: 150V - 276Vac;
Mains frequency	: 50 - 60Hz
Maximum power consumption	:
• 14" : 40W +/- 10%	
• 20" : 56W +/- 10%	
• 21" : 58W +/- 10%	
Standby power consumption	: 10W +/- 10%
Max. Antenne-input	:

Off air	: 100dBV
On air	: 90dBV
Audio output	:
• Stereo : 2 * 3W; 2 * 1W	
• Mono : 2 * 2W; 4W; 3W; 2W; 1W	

Tuners	:
• UV 1316/AI-2 (PAL)	
• UV 1316/AIU-2 (PAL)	
• UV 1356C/AI (PAL)	

1.2 Specification of the terminal sockets



1.3 Specification of the terminal sockets

1.3.1 Inputs (AV1, AV2 and Side AV)

- Cinch	CVBS (yellow) (1Vpp +/- 3dB 75Ω)	⊙
- Cinch	Audio R (red) (0.2-2VRMS 10kΩ)	⊙
- Cinch	Audio L (white) (0.2-2VRMS 10kΩ)	⊙

1.3.2 Outputs (MONITOR out)

- Cinch	CVBS (yellow) (1Vpp +/- 3dB 75Ω)	⊙
- Cinch	Audio R (red) (0.5VRMS < 1kΩ)	⊙
- Cinch	Audio L (white) (0.5VRMS < 1kΩ)	⊙

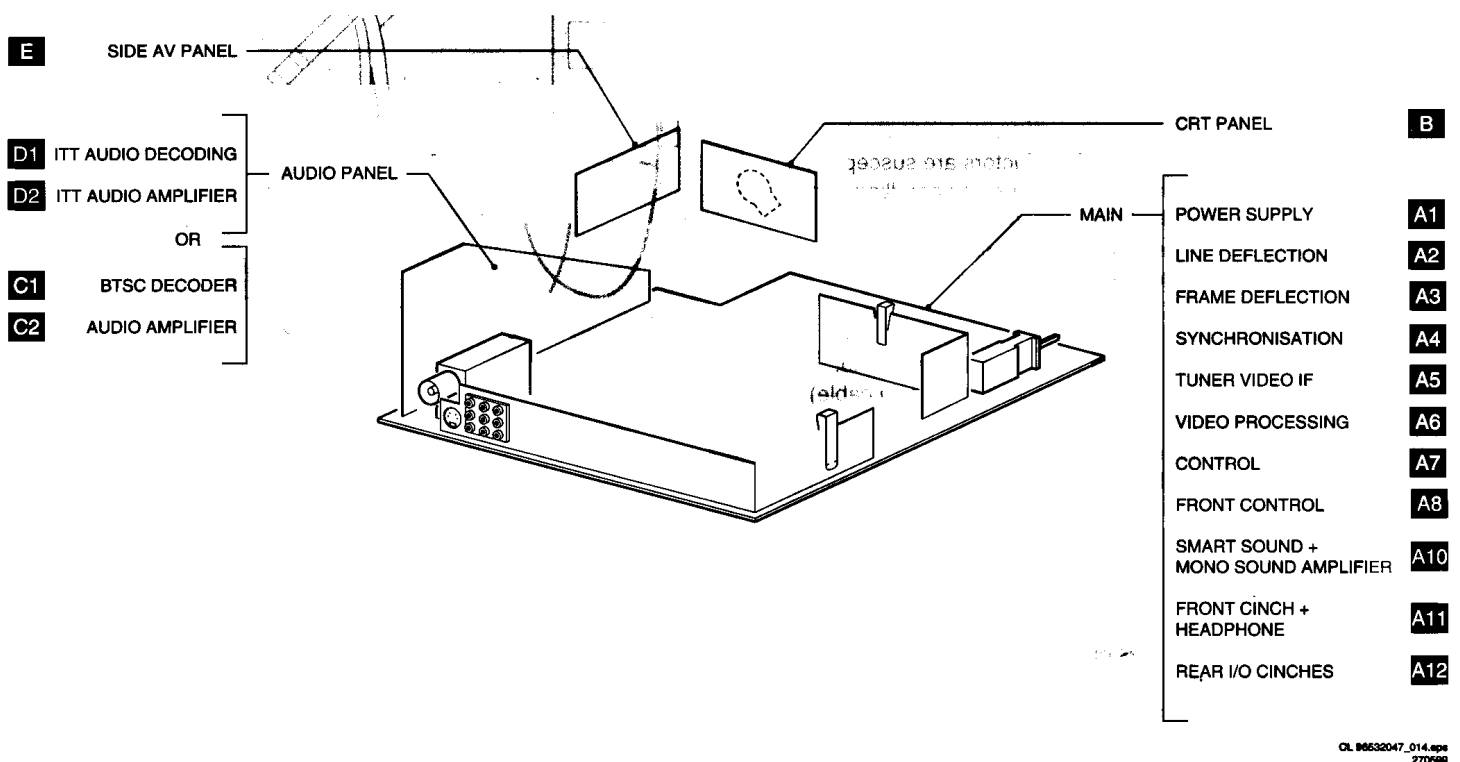
1.3.3 Headphone

- Jack	8-600 (4mW)	🎧
--------	-------------	---

1.3.4 SVHS

1 -	Ground	⊥
2 -	Ground	⊥
3 -	Y (1Vpp +/- 3dB 75Ω)	⊙
4 -	C (0.3Vpp +/- 3dB 75Ω)	⊙

1.4 PCB location drawing



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2. Safety instructions, maintenance instruction, warnings and Notes

2.1 Safety instructions for repairs ▲

1. Safety regulations require that during a repair:
 - The set should be connected to the mains via an isolating transformer;
 - Safety components, indicated by the symbol ▲, should be replaced by components identical to the original ones;
 - When replacing the CRT, safety goggles must be worn.
2. 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.
 - As a strict precaution, we advise you to resolder the solder joints through which the horizontal deflection current is flowing, in particular ('general repair instruction'):
 - 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 instruction

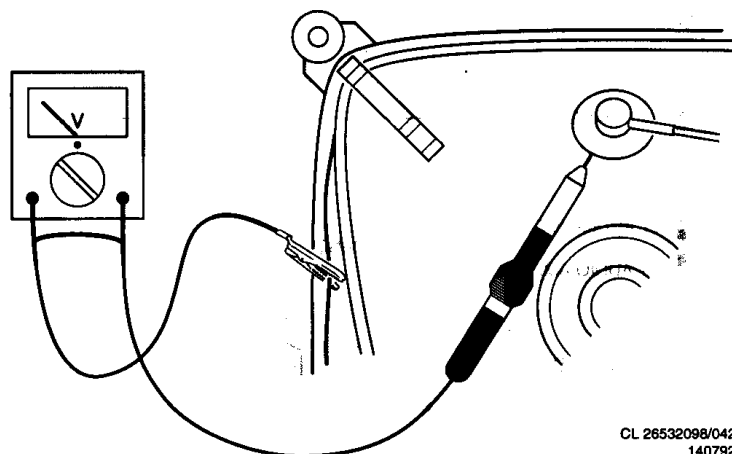
It is recommended to have a maintenance inspection carried out by a qualified service employee. The interval depends on the usage conditions:

- 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

1. ESD 
2. All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
3. 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
4. In order to prevent damage to ICs 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 DC-V). Discharge until the meter reading is 0V (after approx. 30s).
5. Together with the deflection unit and any multipole unit, the flat square picture tubes used 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.
6. Be careful during measurements in the high-voltage section and on the picture tube.
7. Never replace modules or other components while the unit is switched on.
8. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.
9. Wear safety goggles during replacement of the picture tube.



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Figure 2-1

2.4 Notes

The direct voltages and oscillograms should be measured with regard to the tuner earth () or hot earth () 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 8) 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 () and without 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.

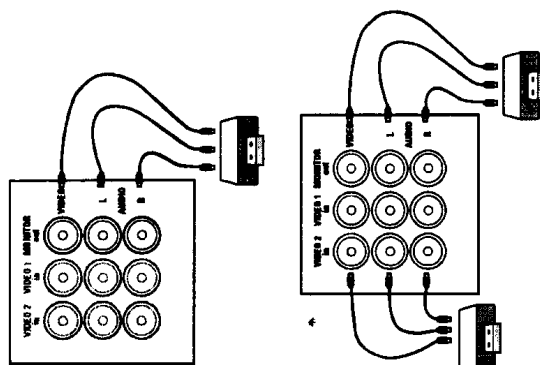
The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

3. Directions for use



...connecting peripheral equipment

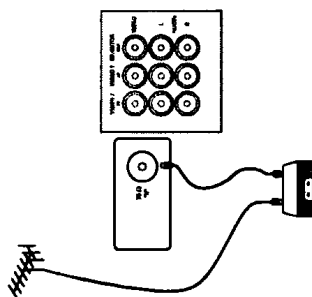
Connection for recording



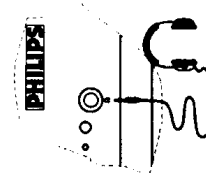
1. **From the TV channel you are watching**
 - connect the corresponding sockets of the VCR to the sockets at MONITOR out.

2. **From one VCR to another VCR**
 - connect the sockets of the VCR which you wish to record from to the corresponding sockets at either VIDEO in 1 or VIDEO in 2.
 - connect the sockets of the receiving VCR to the corresponding sockets at MONITOR out.

3. **From the TV antenna**
 - connect the RF cable to the VCR's "RF in" and the "RF out" of the VCR to the aerial socket of the TV.



Connection for headphones



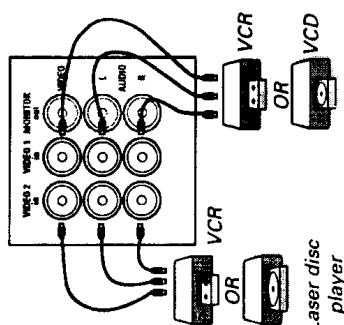
- connect the headphones to the socket at the front of the TV.
The headphones impedance must be between 8 and 4000 ohms.



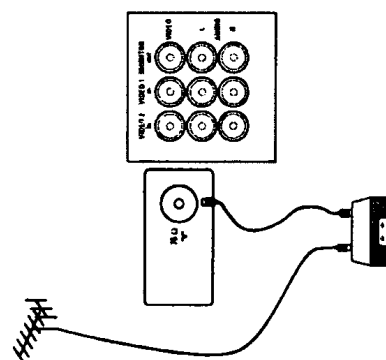
4 Connecting peripheral equipment

Equipment such as VCR, Laser disc player, VCD etc. could be connected to the video and audio (AV) sockets at the back of the TV. Switch off the TV and equipment before making any connection.

Connection for playback



1. **Connect to AV sockets**
You may choose to connect up VIDEO 1 in or VIDEO 2 in or both.
 - connect the corresponding sockets of the equipment to that of the TV.
 - to view the playback, select the first AV channel (if connection is made to sockets at VIDEO 1 in) or the second AV channel (if connection is made to sockets at VIDEO 2 in).



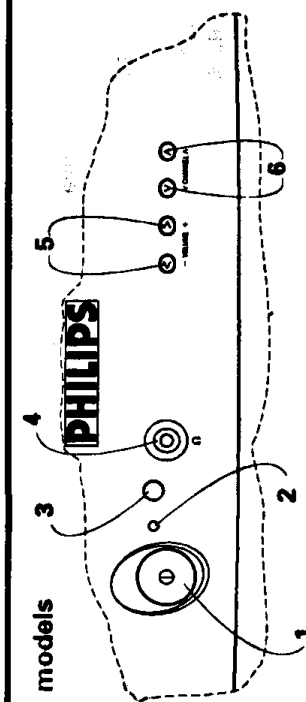
2. **Connect to aerial socket (only for VCR)**
The playback on your VCR is considered a TV channel by your TV if you connect via the aerial socket. You must tune in to your VCR's test signal and assign the channel number 0 to it. Refer to your VCR's instruction manual for more details.
 - connect the RF cable to the VCR's "RF in" and connect the "RF out" of the VCR to the aerial socket of the TV.
 - select channel 0 and tune in to your VCR's signal.
 - to view the playback, select channel 0.



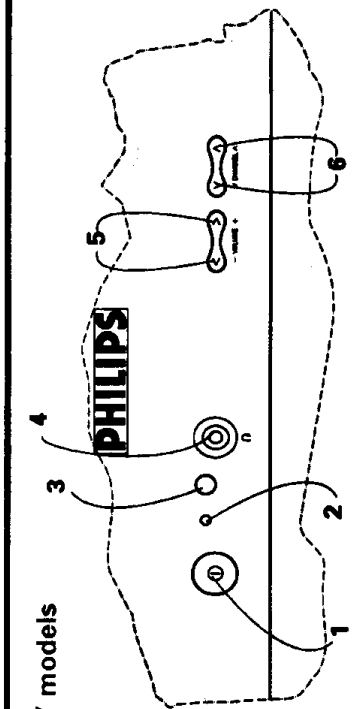
...using the remote control

6 The TV's controls

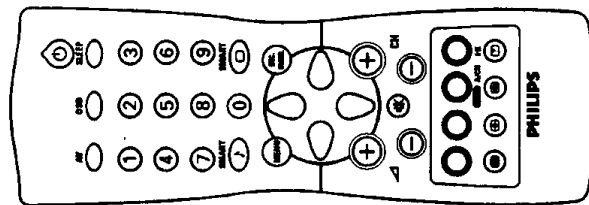
For 25" models



For 29" models



1. Mains power Switch on or off the TV.
2. Red light indicator When light is on, it indicates that the TV is on standby. Note :if no signal is detected by the TV after 10 minutes, it will switch to standby automatically.
3. Remote control sensor For the remote control to work, it must be activated within the operating range of this sensor.
4. Headphone socket For connection of headphones.
5. Volume adjustment To adjust volume level. Press these 2 keys simultaneously will call up the 1st level menu. Press these 2 keys again will exit menu. Works as cursor left (VOLUME —) or right (VOLUME +) in a menu.
6. Channel selection To select a lower or higher channel number. Works as cursor up (CHANNEL ^) or down (CHANNEL v) in a menu.



Press :



Menu

Result :

Call up the main menu. If there is an existing menu, pressing this key will bring you back to the previous level menu. If you are in the 1st level menu, pressing this will exit the menu.



Incredible Surround

Switch on to enhance stereo sound from your TV.



Mute

Switch off the sound of the TV. Press again to switch on the sound.



Channel selection

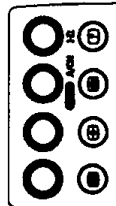
Select a higher or lower channel number.



Volume adjustment

Adjust the volume of the TV set.

Teletext function:



Refer to the section on "Teletext".



Surf or alternate channel

Surf mode : Add or delete channel from the surf list. View channel in the surf list.
A/CH mode : Return to the previous channel.



Sound mode

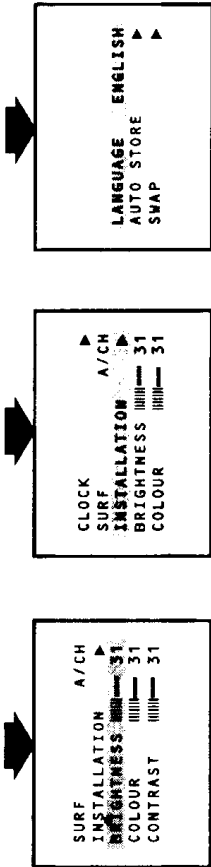
Switch from stereo to mono sound (for stereo transmission) or choose between first language or second language (for bilingual transmission).

1 0 Installing the TV

In order to view the programmes broadcasted, you have to do some simple installation on the TV. Go into the INSTALLATION menu by using the keys on your remote control.

Follow the following steps to enter **INSTALLATION** menu.

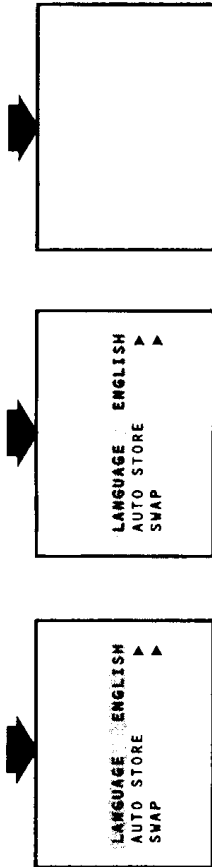
- 1 Call up 1st level menu with the key.
- 2 Press the key to highlight **INSTALLATION**.
- 3 Select **INSTALLATION** with the or key.



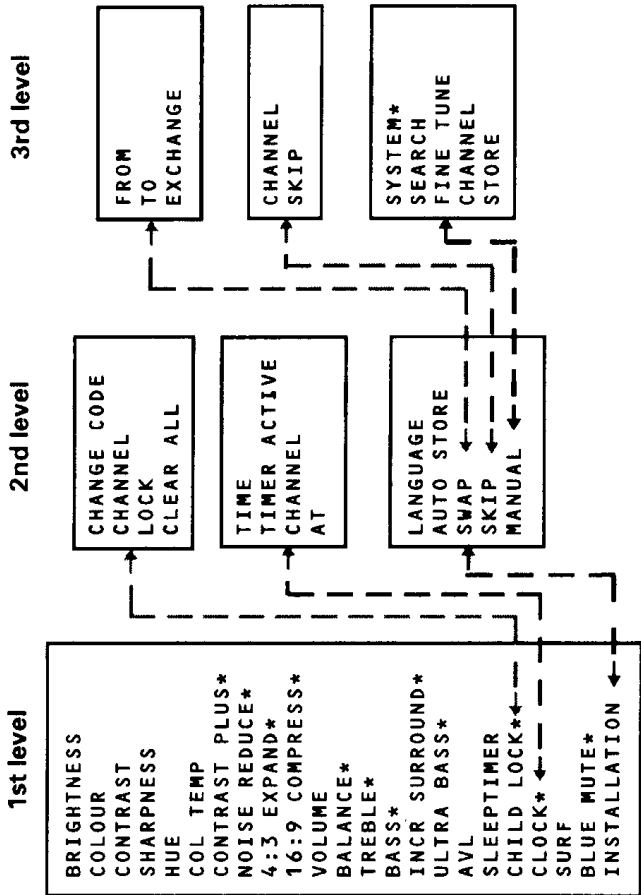
Selecting the menu language

The TV is pre-set to a language for display of menus and screen information. You may change it to another available language.

- 1 Go into **INSTALLATION** menu. **LANGUAGE** is highlighted.
- 2 Select a language with the or key.
- 3 Exit with the key.



9 Menus



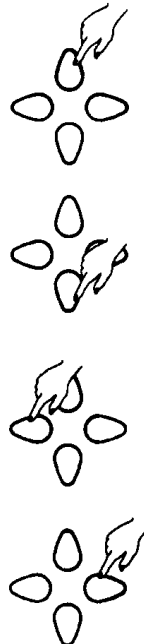
Note *: You may not see these items on your menu because it is applicable to certain models only.

To call up the 1st level menu :

- Press key.

To use the menus:

- Press the cursor keys.

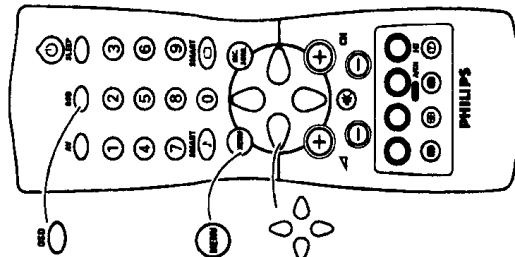


to highlight

go down to the next level or to select or to execute

To exit from a menu:

- Press key to go back to the previous level.
- OR
- Press key to exit.



1 1

...installing the tv – system selection

System selection (not applicable for single system sets)

For multi-system sets:

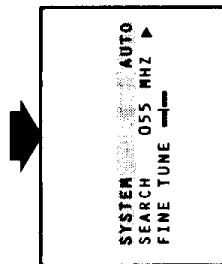
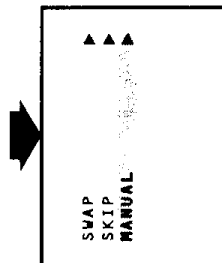
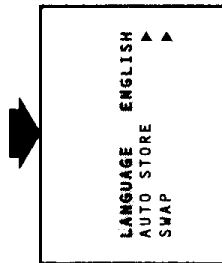
It is possible to select either PAL-BG, PAL-I, PAL-DK, SECAM-BG, SECAM-DK, NTSC M or AUTO. AUTO means that the TV automatically selects the current system in transmission.

For dual-system sets:

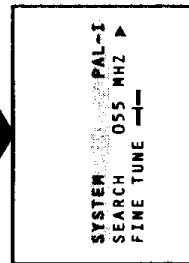
PAL-DK or PAL-I is selectable.

General steps to enter SYSTEM menu:

- 1 Go into INSTALLATION
- 2 Press the  key to highlight MANUAL.
- 3 Select MANUAL with the  or  key. SYSTEM is highlighted.



- 4 Press the  or  key to select a system for transmission.



- 5 Exit with the  key.



1 b
v w
x y
z

1 2

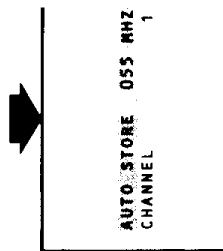
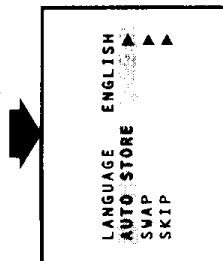
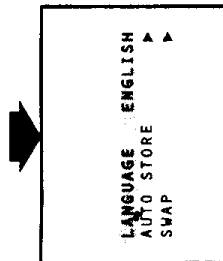
Tuning in TV channels

There are 2 ways to tune in channels : automatically (by AUTO STORE) or manually (by MANUAL menu).

Auto store

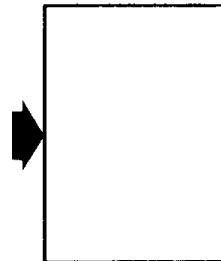
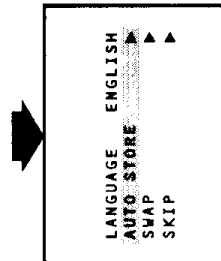
Use to tune in channels automatically.

- 1 Enter INSTALLATION
- 2 Press the  key to highlight AUTO STORE.
- 3 Select AUTO STORE with the  or  key.



The TV will automatically search and store all available channels starting from channel number 1.

- 4 Press the  key once will bring you back to the previous level menu. You can continue with other installation.
- OR
- Press the  key to exit.



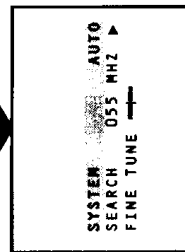
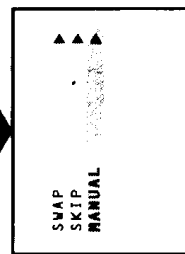
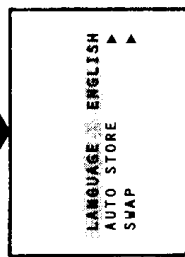
13

...installing the tv - manual

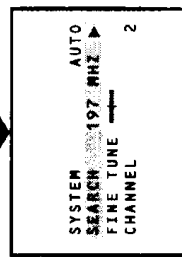
Manual

This menu enables you to search and store every available channel manually.

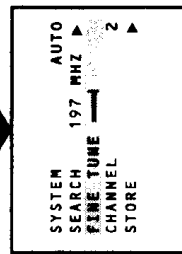
- 1 Enter **INSTALLATION** menu.
- 2 Press the **OK** key to highlight **MANUAL**.
- 3 Select **MANUAL** with the **OK** or **EXIT** key.



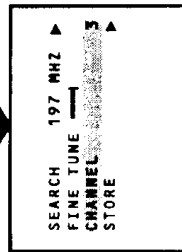
- 4 Press the **OK** key to highlight **SEARCH** and the **OK** key to start searching. Searching stops once a channel is available.



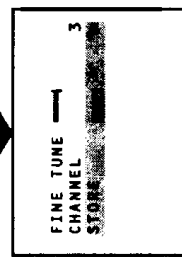
- 5 If you wish to fine tune the channel, scroll down to highlight **FINE TUNE**. Press the **OK** or **EXIT** key to fine tune.



- 6 Press the **OK** key to highlight **CHANNEL** and assign a number to the channel that you found.



- 7 Press the **OK** key to highlight **STORE** and press the **OK** or **EXIT** key to store the channel.



- 8 Exit with the **EXIT** key.



17

Picture settings

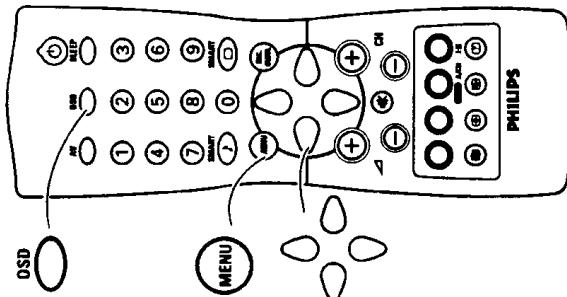
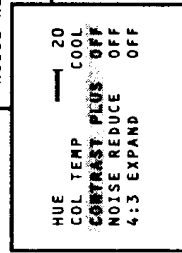
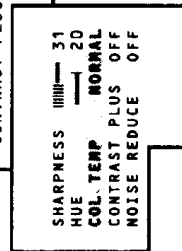
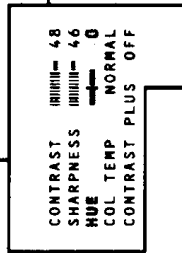
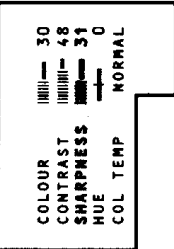
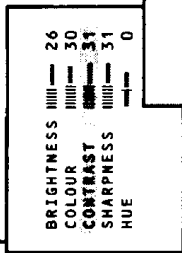
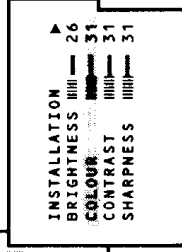
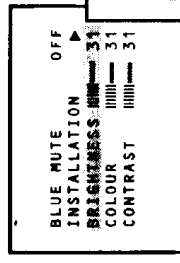
Personal settings

You can do adjustment on **BRIGHTNESS**, **COLOUR**, **CONTRAST**, **SHARPNESS**, **HUE***, **COLOUR TEMP** and **CONTRAST PLUS** of a picture via the 1st level menu. This adjustment will automatically be stored in the **PERSONAL** mode of the **SMART PICTURE** feature.

(*for NTSC programmes only)

How to do adjustment

- 1 Call up 1st level menu with the **OK** key.
- 2 Press the **OK** or **EXIT** key to highlight the item that you wish to adjust.
- 3 Select or adjust with the **OK** or **EXIT** key.
- 4 Exit with the **EXIT** key.



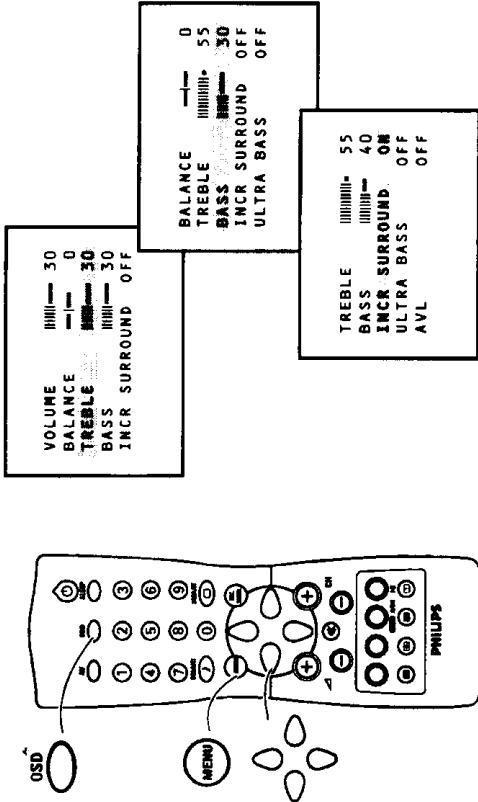
1 9 Sound settings

Personal settings

You can do adjustment on TREBLE , BASS and INCREDIBLE SURROUND* of a picture via the 1st level menu. These adjustment will automatically be stored in the PERSONAL mode of the SMART SOUND feature.

How to do adjustment

- Call up 1st level menu with the key.
 - Press the or key to highlight the item that you wish to adjust.
 - Select or adjust with the or key.
 - Exit with the key.
- *Switch on this feature and you will feel the incredible depth and unbelievable three-dimensional effect of stereo sound.*



Other sound settings

Volume

Adjusts the volume level of the TV. You can also do adjustment via the buttons on the front of the TV or remote control.

Balance

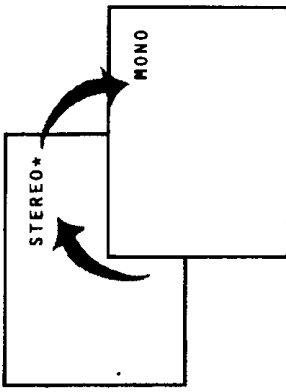
Balances the stereo sound output of speakers in the TV.

2 1 Off air stereo sound (only available in certain models)

If a TV programme is transmitted in NICAM* or STEREO*, you can switch to MONO and back again. When there are two languages in simultaneous transmission, you are able to select either one.
*(*Dependant on the sound system in transmission)*

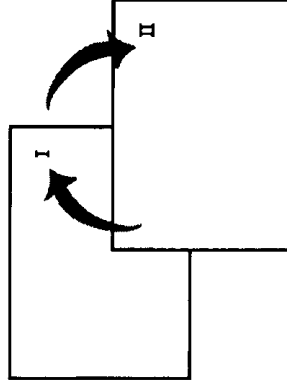
Switch to mono

Press the key to switch between stereo and mono.



Select first or second language

Press the key to select first or second language.



Personal preference

This built in feature of the TV automatically store the picture and sound settings that you last made to a particular channel in the PERSONAL mode of Smart Picture or Smart Sound.

Personal preference settings

Group 1 :

For channel number 0 to 11, each channel has its own personal preference.

Group 2:

For channel number 12 to 99, one personal preference applies to all. If you make changes to the picture or sound settings of any channel in this group, this will be stored as the personal preference for all.

Group 3:

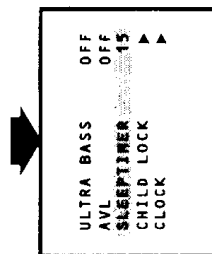
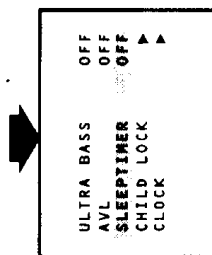
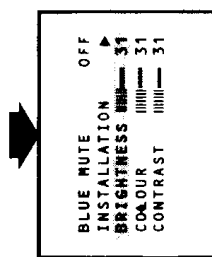
For the two AV channels, each channel has its own personal preference.

22 Sleep timer

Sets timer to switch TV to standby in steps of 15 minutes (from 0 to 60 minutes) and in steps of 30 minutes (from 60 to 240 minutes). To disable timer, set to "OFF".

To set timer

- 1 Call up 1st level menu with the key.
- 2 Press the key to highlight SLEEPTIMER.
- 3 Select time period with the or key.



- 4 Exit with the key.



Child Lock

This feature enables you to lock channels which you do not wish others e.g. children to watch. You have a choice to lock all channels (inclusive of the two AV channels) or individual channel (up to a maximum of 5 channels). If one try to lock the 6th channel, a message "FULL" appears. Once a channel is locked:

- if you call channels up with the CHANNEL or keys on the TV, there will be no picture and sound.
- access to the INSTALLATION sub-menu is disabled, unless you key in the access code.

You can only call up channels with your remote control. A message "ACCESS CODE - - - -" appears on the screen each time you try to call up a channel with the controls on the TV. To bypass the lock mode, you will need to use your remote control to key in the 4-digit confidential code that you have entered when you locked it.

Tips: If you have forgotten your confidential code, key in the universal code 0711 TWICE.

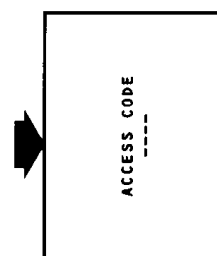
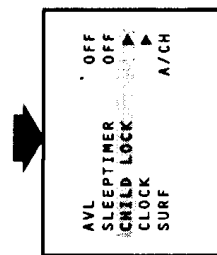
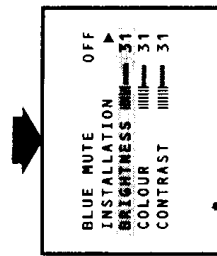
23

...child lock – lock channels, change code

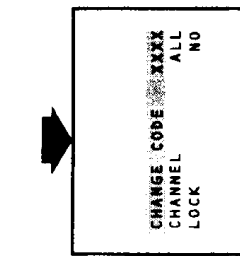
To change code

It is possible to change the pre-set universal code by the following steps.

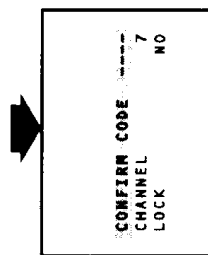
- 1 Call up 1st level menu with the key.
- 2 Press the key to highlight CHILD LOCK.
- 3 Key in the universal access code 0711.



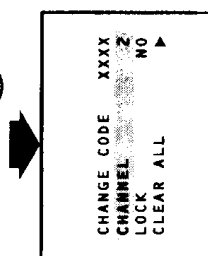
- 4 Key in the new 4-digit code once to enter.



- 5 Key in again to confirm change. CHANNEL is highlighted.

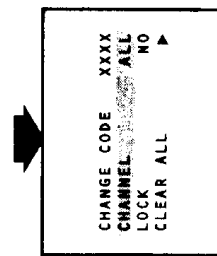


- 6 Proceed to the next section if you wish to lock channels, otherwise press to exit.

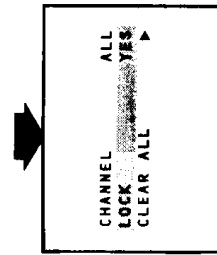


To lock channels

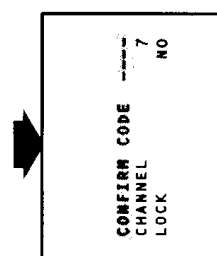
- 1 Press or key to select ALL (to lock all channels) or enter a channel number (to lock individual channels).



- 2 Press the key to highlight LOCK and the or key to select YES to lock the channel/channels selected in step 1.



- 3 Repeat steps 1 to 2 for other channels which you wish to lock. Exit with the key.

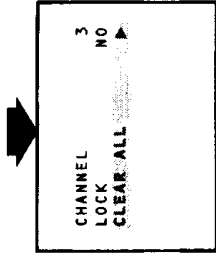
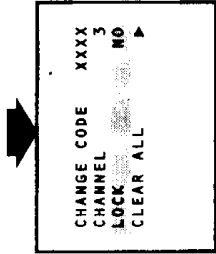
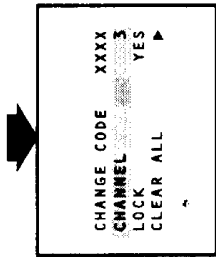


24

...child lock – unlock channels, surf

To unlock channels

- Press the key to highlight CHANNEL and key in the channel you wish to unlock.
- Press the key to highlight LOCK. Select NO.
- To unlock all channels, press the key to highlight CLEAR ALL. Press the key to confirm.

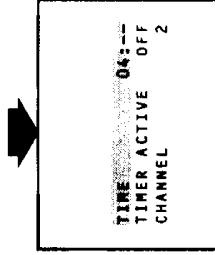
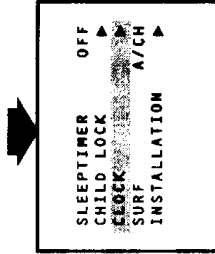
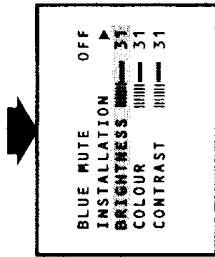


Repeat steps 1 to 3 for other channels which you wish to lock. Exit with the key.

Clock

Sets timer to switch to another channel at a specified time when the TV is switched on or on standby.

- Call up 1st level menu with the key.
- Press the key to highlight CLOCK.
- Key in the present time with digit key. Start with the hour (2 digits) and then the minutes (2 digits).



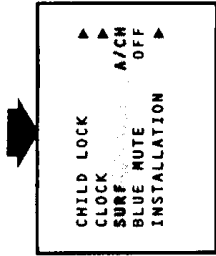
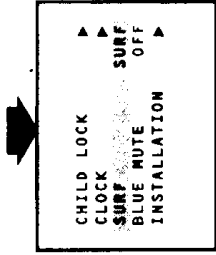
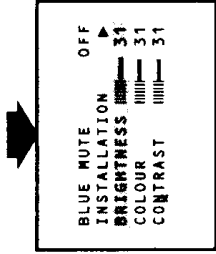
28

Alternate channel (A/CH)

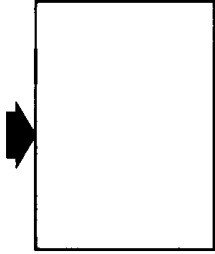
Use this feature to alternate between the current and previous channel.

Select Alternate Channel

- Call up 1st level menu with the key.
- Press the key to highlight SURF.
- Select A/CH with the or key.



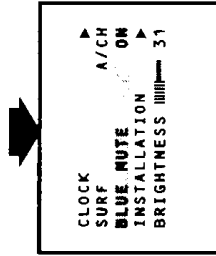
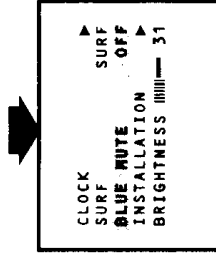
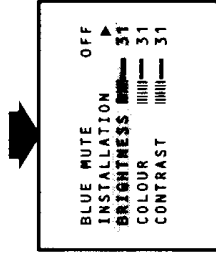
- Exit with the key.
- When you are viewing a channel (e.g. channel number 6) and if you wish to go back to the previous channel (e.g. channel number 3), press the key once. If you wish to go back to channel number 6 again, press the key again.



Blue Mute

The TV screen will turn blue whenever there is no signal detected.

- Call up 1st level menu with the key.
- Press the key to highlight BLUE MUTE.
- Select ON with the or key.



Exit with the key.

29 Teletext (only available in certain models)

Press:

 on/off teletext

Result:
Press once to switch on teletext. Press again to switch off.
The main index page is displayed. Each subject has a 3 digit page number. If the selected TV channel does not broadcast teletext, page 100 is displayed and the screen remains black. When this occurs, switch off teletext and select another channel.

Direct access to a subject. Subjects are displayed in 4 coloured bars at the bottom of the page. The coloured keys allow access to the subject in the corresponding colours.

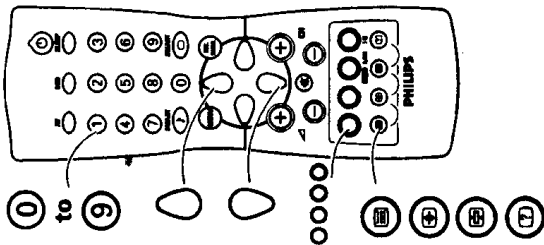
The number (3 digits) is displayed at the top left hand corner of the screen and the counter starts searching. The counter will stop searching once the page is found. If the counter continue searching, this means the page is not available. Select another page.

Displays the previous  or the next  teletext page.

Press once will reveal hidden information (solutions to puzzles, riddles). Press again to conceal.

Press once to enlarge the top half of a page. Press again to enlarge the bottom half. Press the third time to return to normal size.

Press once to hold a rotating sub page. Press again to resume rotating. The total number of sub pages is indicated on the top right corner, e.g. 1/2 which means this is page 1 of a total of 2 pages.



coloured keys


teletext page
 to 

previous/next page


reveal


enlarge page


hold page


30 Before calling for service

Please make these simple checks before calling for service as problems pertaining to TV installation and adjustment are not covered under your warranty.

Symptoms

Colour patch (unevenness)

What you should do

- Switch off the TV with the mains power button and wait for at least 20 minutes before switching on again.
- Keep your TV away from any speakers or magnetic objects.

"Ghosts" or double images or Teletext garbled (for sets with Teletext only)

- Use of a highly directional antenna may improve the picture as this symptom may be due to obstruction by high rise buildings or hills.

No picture

- Check that the antenna at the back of the TV is properly connected.
- Possible TV station problem. Try another channel.

Good picture but no sound

- Increase the volume.
- Check that the TV is not muted. If it is, press the  key on the remote control to cancel mute.

Good sound but poor colour or no picture

- Adjust the contrast and brightness setting.

Snowish picture and noise

- Check the antenna connection.

Horizontal dotted lines

- Switch off any nearby electrical appliances e.g. hairdryer, vacuum cleaner etc. as these may have caused interference.

One white line across

- Switch off the TV immediately and call for after sales service.

TV not responding to remote control

- Check batteries and replace them if necessary.
- Check that the remote control is operating within the recommended range.

Message "ACCESS CODE"

- The child lock function is switched on. Key in your 4-digit access code to go into TV mode. If you do not know the access code, key in 0711. If you wish to switch off the child lock, refer to the section on "Child Lock-To unlock channels".

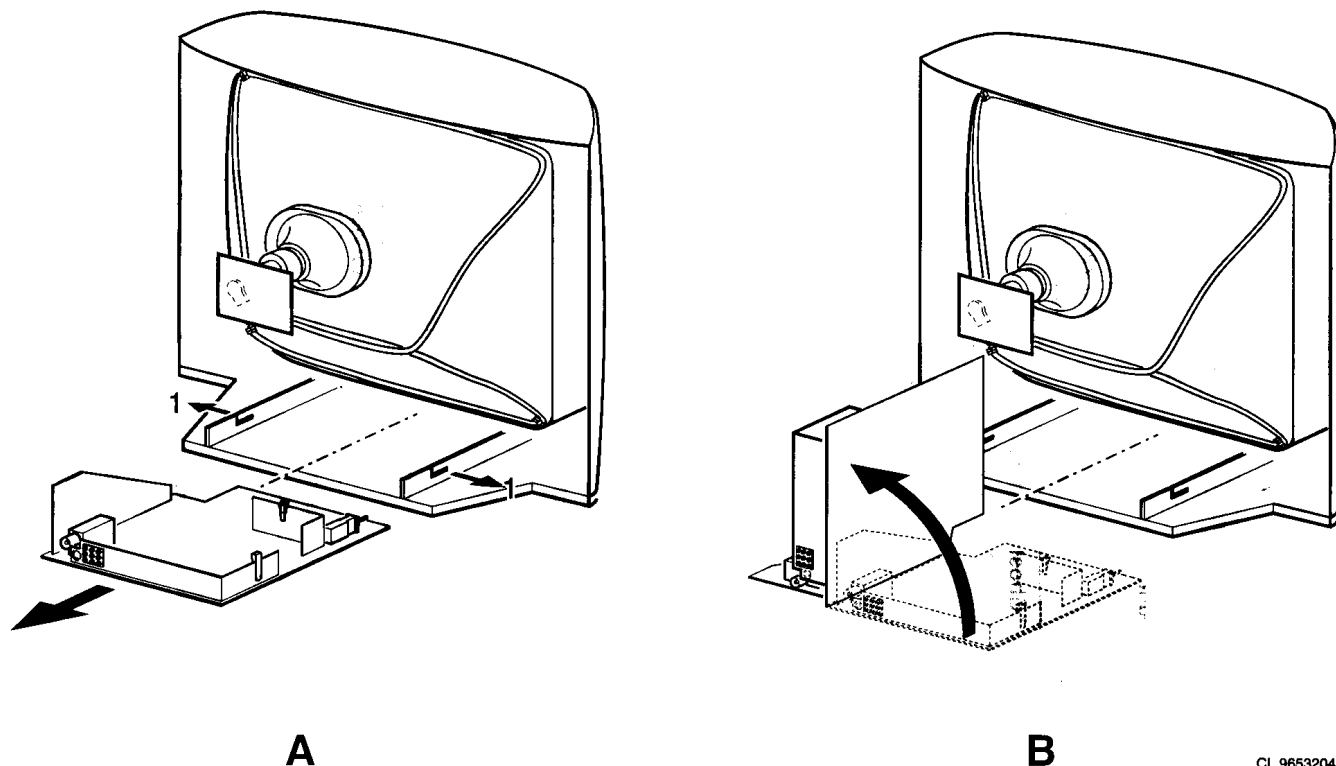
4. Mechanical instructions

4.1 Service positions

See figure 4.2 for the service position.

Disconnect the connecting cable feeding the right-hand and the left-hand speaker, also disconnect the degaussing cable.

The mono-carrier is removed by pushing the two centre clips at both chassis brackets outwards and pulling the panel forward.



CL 96532047_015.eps
280599

Figure 4-2

5. Service Modes, fault finding and repair tips

In this chapter the following paragraphs are included:

5.1 Test points

5.2 Service Modes and Dealer Service Tool (DST)

5.3 The menus and submenus

5.4 Error code buffer and error codes

5.5 The "blinking LED" procedure

5.6 Trouble shooting tips

5.7 Customer service mode (CSM)

5.8 ComPair

5.9 Ordering compare

- S1-S2-S3, etc.: Test points for the synchronisation circuit (A4)

- V1-V2-V3, etc.: Test points for the video processing circuit / CRT panel(A6) / CRT panel (B)

Measurements are performed under the following conditions:

- Video: colour bar signal;
- audio: 3kHz left, 1kHz right

5.2 Service modes and Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure, see also paragraph 5.5. The ordering number of the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with presets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the

5.1 Test points

The L9 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 Smart Sound + Mono Sound amplifier (A10), BTSC decoder (C1), Audio amplifier (C2), ITT panel (D1) and Sound amplifier (D2)
- C1-C2-C3, etc.: Test points for the control circuit (A7) and the front control (A8)
- F1-F2-F3, etc.: Test points for the frame deflection circuit (A3)
- I1-I2-I3, etc.: Test points for the Tuner Video IF circuit (A5)
- L1-L2-L3, etc.: Test points for the Line deflection circuit (A2)
- P1-P2-P3, etc.: Test points for the power supply (A1)

DST are recommended (For the L9 chassis, download code X should be used).

5.2.2 Diagnose features for service

L9 sets can be put in two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.2.3 Service Default Mode (SDM)

The purpose of the SDM is:

- provide a situation with predefined settings to get the same measurements as in this manual
- override 5V protections in case of short circuiting pin 0228 and pin 0224 at A7.
- start the blinking LED procedure
- Setting of options controls
- Inspect the error buffer

Entering the SDM:

- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 062596 followed by the key "MENU"
- By shorting pin 0228 and 0224 on the mono-carrier (A7) while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections).

Exit the SDM:

Switch the set to Standby or press EXIT on the DST (the error buffer is also cleared).

Note: When the mains power is switched off while the set is in SDM, the set will switch to SDM immediately when the mains is switched on again. (The error buffer will not be cleared).

The SDM sets the following pre-defined conditions:

- Pal sets: tuning at 475.25 PAL (BTSC sets tuning of channel 3 at 61,25MHz)
- Volume level is set to 25% (of the maximum volume level).
- Other picture and sound settings are set to 50%.

The following functions are "ignored" in SDM since they interfere with diagnosing/repairing a set. "Ignoring" means that the event that is triggered is not executed, the setting remains unchanged.

- (Sleep)Timer
- Blue mute
- Auto switch off
- Hotel or Hospitality Mode
- Child lock or Parental lock
- Skipping, blanking of "Not favourite" present/channels
- Automatic storing of Personal Preset settings
- Automatic user menu time-out

All other controls operate normally.

5.2.4 Special functions in SDM

Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu (TV lock, Installation, Brightness, colour and contrast) while "SDM" remains displayed in top of screen. Pressing the "MENU" key again will return to the last SDM status.

Error buffer

Pressing the "OSD" button on the remote control shows all OSD (incl. error buffer).

Access to SAM

By pressing the "CHANNEL DOWN" and "VOLUME DOWN" buttons on the local keyboard simultaneously or pressing "ALIGN" on the DST

DST, the set switches from SDM to SAM

In the SDM the following information is displayed on the screen:

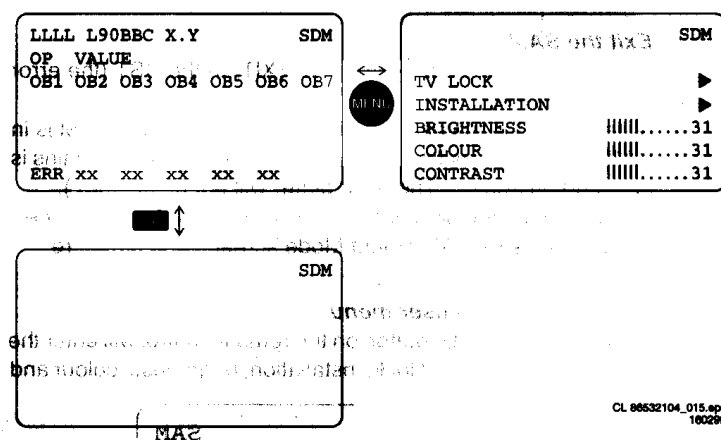


Figure 5-3 Service Default Mode screens and structure

Explanation notes/references:

- (1) "LLLL" Operation hours timer (hexadecimal)
- (2) Software identification of the main micro controller (L90BBC X.Y)
 - L90 is the chassis name for L9
 - BBC is 2 letter and 1 digit combination to indicate the software type and the supported languages:
 - X = (main version number)
 - Y = (subversion number) BB = (range specification)
- (3) "SDM" To indicate that the TV set is in the service default mode
- (4) "OP" Options Code which exists of 2 characters. It is possible to change each option code
- "VALUE" The value of the selected option (ON/OFF or a combination of 2 letters)
- "XXX" Value of the options bytes (OB1 .. OB7)
- "ERR" The last five detected errors; The left most number indicates the most recent error detected.

The MENU UP or MENU DOWN command can be used to select the next/previous option; The MENU LEFT and MENU RIGHT command can be used to change the option value. Remark: When the option-code RC = OFF, the P+ and the P- key have the same functions as the MENU UP/DOWN keys while the VOL+ and the VOL- key have the same function as the MENU LEFT/RIGHT keys. When the option RC = OFF it is not possible to change the channel preset or to adjust the volume when in SAM/SDM menu. Using a L9 remote control, option-code RC = ON, the P+, P-, VOL- and VOL+ can be used to change the preset and/or to adapt the volume, while the menu-cursor keys are used to select the option and to change its value.

For an extended overview of the option codes see Chapter 8 - Options

5.2.5 Service Alignment Mode (SAM)

The purpose of the SAM is to do tuning adjustments, align the white tone, adjust the picture geometry and do sound adjustments.

For recognition of the SAM, "SAM" is displayed at the top of the right side of the screen

Entering SAM:

- By pressing the "ALIGN" button command with the RC7150 Dealer Service Tool

- By pressing the "CHANNEL DOWN" and "VOLUME DOWN" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 062596 followed by the key "OSD"
- By shorting pin 0225 and 0226 on the mono-carrier (A7) while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections).

Exit the SAM:

Switch the set to standby or press EXIT on the DST (the error buffer is cleared).

Note: When the mains power is switched off while the set is in SAM, the set will switch to SAM immediately when the mains is switched on again. (The error buffer will not be cleared).

In the SAM the following information is displayed on the screen:

Figure 5.4 Service Alignment Mode screens and structure

Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu (TV lock, installation, brightness, colour and

contrast) while "SAM" remains displayed in top of screen.

Pressing the "MENU" key again will return to the last SAM status.

Pressing the "OSD" button of the remote control shows only "SAM" in the top of screen

Access to SDM

Pressing the "DEFAULT" button on the DST

SAM menu control

Menu items (AKB, VSD, Tuner, White tone, Geometry and Audio) can be selected with the MENU Up or MENU DOWN key. Entry into the selected items (sub menus) is done by the MENU LEFT or MENU RIGHT key. The selected item will be highlighted.

With the cursor LEFT/RIGHT keys, it is possible to increase/decrease the value of the selected item.

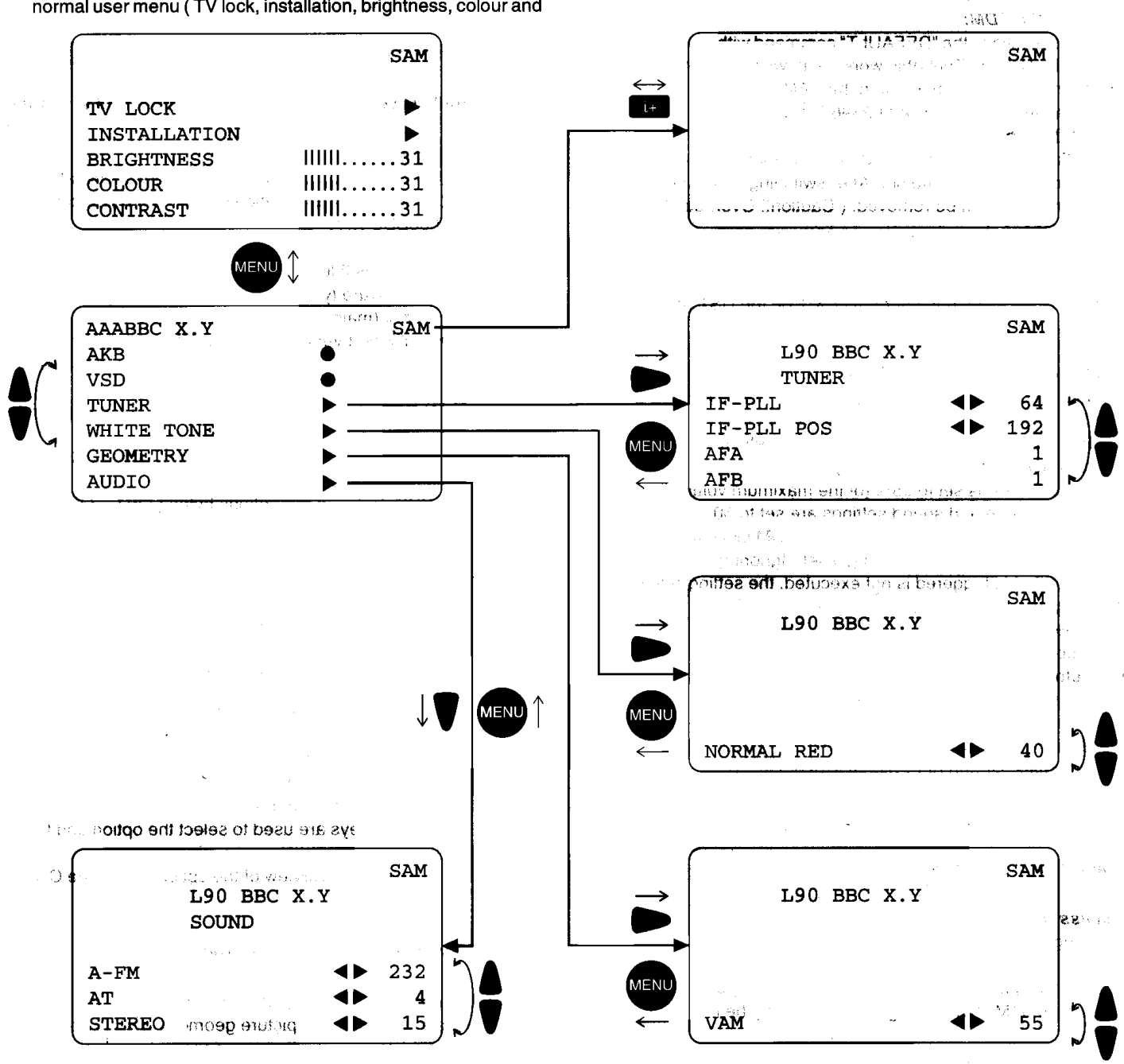


Figure 5-4 Service Alignment Mode screens and structure

5.3 The menus and submenus

5.3.1 Tuner sub menu

The tuner sub menu contains the following items:

- IF_PLL : PLL Alignment for all PAL/SECAM systems, excluding SECAM-LL'
- IF_PLL POS : PLL Alignment for SECAM-LL'
- IF_PLL OFFSET : Default value = 48 ; Do not align
- AFW : AFC Window
- AGC : AGC take-over point
- YD : Default value = 12 ; Do not align
- CL : Default value = 4 ; Do not align
- AFA
- AFB

The items AFA and AFB can not be selected, they are for monitoring purposes only.

The commands MENU UP and MENU DOWN are used to select the next/previous item.

The commands MENU LEFT and MENU RIGHT are used to increase/decrease the value of the selected item. The changed values will be send directly to the related hardware.

The item values are stored in NVM if this sub menu is left.

5.3.2 White tone sub menu

The commands MENU UP and MENU DOWN are used to select the next/previous item.

The commands MENU LEFT and MENU RIGHT are used to increase/decrease the value of the selected item. The changed values will be send directly to the related hardware.

The item values are stored in NVM if this sub menu is left.

The white tone sub menu contains the following items:

- NORMAL RED
- NORMAL GREEN
- NORMAL BLUE
- DELTA COOL RED
- DELTA COOL GREEN
- DELTA COOL BLUE
- DELTA WARM RED
- DELTA WARM GREEN
- DELTA WARM BLUE

OSD is kept to a minimum in this menu, in order to make white tone alignment possible.

The Contrast Plus feature (black stretch) is set to OFF when the white tone submenu is entered.

5.3.3 Audio sub menu

The tuner sub menu contains the following items:

- A-FM : Default value = 232 ; Do not align
- AT : Default value = 4 ; Do not align
- STEREO : Default value = 15 ; Do not align
- DUAL : Default value = 12 ; Do not align

The sound adjustments sub menu are not available in Mono sets.

The presence of an item in the menu strongly depends on the selected soundboard (option SB).

5.3.4 Geometry sub menu

The geometry sub menu contains the following items:

- VAM : Vertical amplitude
- VSL : Vertical slope
- SBL : Service blanking
- HSH : Horizontal shift
- H60 : Default value = 10 ; Do not align
- V60 : Default value = 12 ; Do not align
- VSC : Vertical S correction
- VSH : Vertical shift

5.4 Error code buffer and error codes

5.4.1 Error code buffer

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right.

- when an error occurs that is not yet in the error code buffer, the error is written at the left side and all other errors shift one position to the right
- the error code buffer will be cleared in the following cases:
 1. exiting SDM or SAM with the "Standby" command on the remote control
 2. transmitting the commands "EXIT" with the DST (RC7150)
 3. transmitting the commands "DIAGNOSE-9-9-OK" with the DST.
- The error buffer is not reset by leaving SDM or SAM with the mains error buffer is not switch.

Examples:

- ERROR: 0 0 0 0 0 : No errors detected
- ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
- ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

5.4.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair 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.

- a. Error 0 = No error
- b. Error 1 = X-ray (Only for USA sets)
- c. Error 2 = High beam current protection
High beam protection active; set is switched to protection; error code 2 is placed in the error buffer; the LED will blink 2 times (repeatedly).
As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +160V supply to the CRT panel is present. If the voltage is present, the most likely cause is the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +160V voltage is not present, check R3416 and D6409 (Horizontal Deflection - A2)
EW protection:
If this protection is active, the cause could be one of the following items;
horizontal deflection coil 5445
S-correction capacitor 2407
flyback capacitor 2434
line output stage
short circuit of flyback diode 6434
EW power-transistor 7402 or driver-transistor 7400
- d. Error 3 = Vertical / Frame protection
There are no pulses detected at pin 37 of the main microprocessor 7600 (panel A7).
If this protection is active, the causes could be one of the following items;
IC 7460 is faulty (A3)
Open circuit of vertical deflection coil
Vlotaux +13V not present and/or Vlotaux -13V not present
Resistor 3463
Transistor 7609 is defect (A7)
- e. Error 4 = Sound processor (IC7803) I2C error (MSP3415D)
Sound processor does not respond to the micro controller
- f. Error 5 = Bimos (IC7250) start-up error (POR bit)

Bimos start-up register is corrupted or the I2C line to the Bimos is always low or no supply at pin 12 of the Bimos). This error is usually detected during start-up and hence will prevent the set from starting up.

- g. Error 6 = Bimos (TDA884x) I2C error
Note that this error may also be reported as a result of error codes 4 (in that case the Bimos might not be the actual problem)
- h. Error 7 = General I2C error. 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.
- i. Error 8 = Microprocessor (IC7600) internal RAM error (A7)
The micro controller internal RAM test indicated an error of the micro controller internal memory (tested during start-up);
- j. Error 9 = EEPROM Configuration error (Checksum error); EEPROM is corrupted.
- k. Error 10 = I2C error EEPROM . NV memory (EEPROM) does not respond to the micro controller
- l. Error 11 = I2C error PLL tuner. Tuner is corrupted or the I2C line to the Tuner is low or no supply voltage present at pin 9, pin 6 or pin 7 of the tuner.
- m. Error 12 = Black current loop instability protection. The black current could not be stabilised. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.

5.5 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. There are two methods:

- When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).
- With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 5 (the first error). The LED will operate in the same way as in point 1, but now for the error code on position x.

Example:

Error code position 1 2 3 4 5

Error buffer 8 9 5 0 0

- after entering SDM: blink (8x) - pause - blink (8x) - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST blink(5x) - pause - blink(5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST nothing happens

5.6 TROUBLE SHOOTING TIPS

In this paragraph some trouble shooting tips for the deflection and power supply circuitry are described. For detailed diagnostics, check the fault finding tree or use COMPAIR.

5.6.1 THE DEFLECTION CIRCUIT:

- Measure the +VBATT (95V) is present across 2551 (A2 - Line deflection). If the voltage is not present, disconnect coil 5551. (Horizontal deflection stage is disconnected). If the voltage is present then the problem might be caused by the deflection circuit. Possibilities:
 - Transistor 7402 is faulty

- The driver circuit around transistor 7400 is faulty
 - No horizontal drive signal coming from the BIMOS 7250-D pin 40 (A4 - Synchronisation)
 - Timer-IC 7607 or transistor 7608 is defect (A7 - Control)
- Note: If the Collector of 7402 is shorted to the Emitter, hick-up noise can be heard from the power supply. In this case the E/W protection is disabled. is correctly working (a parabolic picture)
 - Also take note of protection circuits in the line output stage. If any of these circuits are activated, the set will shut down. Depending on the protection, the led will blink according to the fault defined. In order to determine which protection circuit is active, isolation of each separate circuit is necessary. These protection circuits are:
 - High beam current protection (LED blinks repetitively 2 times) - CRT panel (B)
 - Vertical protection (LED blinks repetitively 3 times) - Vertical deflection (A3)

5.6.2 THE POWER SUPPLY

To trouble shoot the L9.2A SMPS, first check the Vaux voltage on C2561. If this voltage is not present, check fuse F1572 and D6560. If F1572 or D6560 is not open circuit, the problem might be caused on the primary side of the switching supply. Check the output of the bridge rectifier on C2508 for approximately 300V DC at an input voltage of 230Vac. If this voltage is missing, check the bridge diodes 6502 .. 6505 and the fuse 1500. If fuse F1500 is found open, check MOSFET 7518 to make sure that there is no short circuit present and check R3518. If the 300V DC is present on C2508, check for a start-up voltage of approx. 13V on pin 1 of IC7520. If no start-up voltage is present, check if R3510 is open or zener 6510 is a short-circuit. It is necessary to have a feedback signal from the hot primary side of switch mode transformer T5545 at pin 1 and pin 2 for the power supply to oscillate. If the start-up voltage of 13V is present on pin 1 of IC7520 and the supply is not oscillating, check R3529 and D6540.

Check for a drive signal at the gate of MOSFET 7518, square wave signal - P1. Check pin 3 of IC7520 and R3525.

To determined whether OVP is active, check the presence of Vaux at C2561.

5.6.3 Customer Service Mode (CSM)

All L9 sets are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that 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. The Customer Service Mode can be switched on by pressing simultaneously the button (MUTE) on the remote control and any key on the control buttons (P+, P-, VOL +, VOL -) on the TV for at least 4 seconds.

When the CSM is activated:

- picture and sound settings are set to nominal levels
- "Service unfriendly modes" are ignored

Exit the Customer Service Mode.

The Customer Service Mode will switch off after:

- pressing any key on the remote control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

5.6.4 The Customer Service Mode information screen

The following information is displayed on screen:

Text "CSM" on the first line

- Line number for every line (to make CSM language independent)
- Operating hours
- Software version L90BBC X.Y
- Text "CSM" on the first line
- Error buffer contents
- Option code information
- Configuration information
- Service unfriendly modes

1 HHHH L90BBC-X.Y CSM
2 CODES xx xx xx xx xx

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

1. Communication to 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 L9.2A.

Automatic information gathering

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

Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the microcontroller of the television. In this way it is possible for

1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the ComPair interface PC connector (connector marked with "PC").
2. Place the ComPair interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between ComPair interface and television should be between 0.3 and 0.6 meter. (Note: make sure that (also) in the service position, the ComPair interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam)
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the ComPair interface
4. Switch the ComPair interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the ComPair interface that is marked "I2C" (See Figure 5.8)
8. Connect the other end of the interface cable to the ComPair connector on the monocarrier (see figure 5.9)
9. 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).
10. Start-up Compair and select "File" menu, "Open...."; select "L9.2A Fault finding" and click "OK"
11. Click on the icon (fig 5.7) to switch ON the communication mode (the red LED on the Compair interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in ComPair mode from standby" in the ComPair L9.2A fault finding tree, otherwise continue.

The set has now started up in ComPair mode. Follow the instruction in the L9.2A fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

5.7.4 Preset installation

Presets can be installed in 2 ways with the L9.2A.

- Via infra red
 - only sending TO the television
 - the rearcover does NOT have to be removedClick on "File" "Open" and select "TV - use ComPair as DST" to use infra red
- Via cable
 - sending TO the television and reading FROM the television
 - the rearcover has to be removedClick on "File" "Open" and select "L9.2A fault finding" to use the cable

Presets can be installed via menu "Tools", "Installation", "Presets".

5.8 Ordering ComPair

- Compair order codes:
- Starterkit ComPair+SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
 - ComPair interface (excluding transformer): 4822 727 21631
 - ComPair transformer (continental) Europe: 4822 727 21632
 - ComPair transformer United Kingdom: 4822 727 21633
 - Starterkit ComPair software: 4822 727 21634
 - Starterkit SearchMan software: 4822 727 21635
 - Starterkit ComPair+SearchMan software: 4822 727 21636
 - Compair CD (update): 4822 727 21637
 - SearchMan CD (update): 4822 727 21638
 - ComPair interface cable (for L9): 4822 727 21641

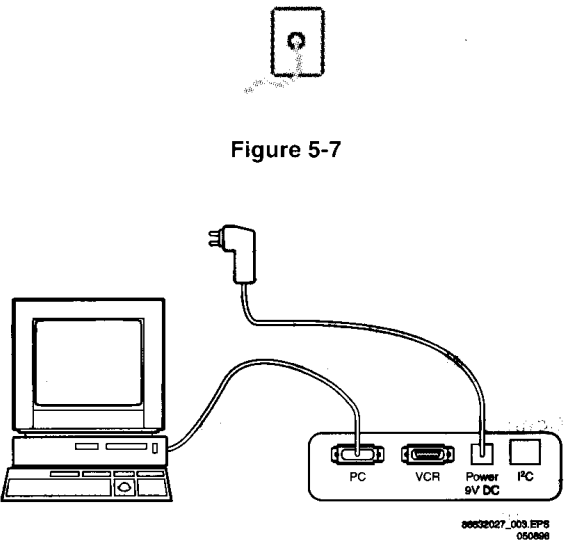


Figure 5-7

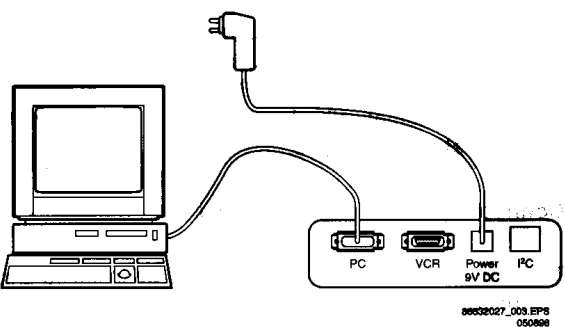


Figure 5-8

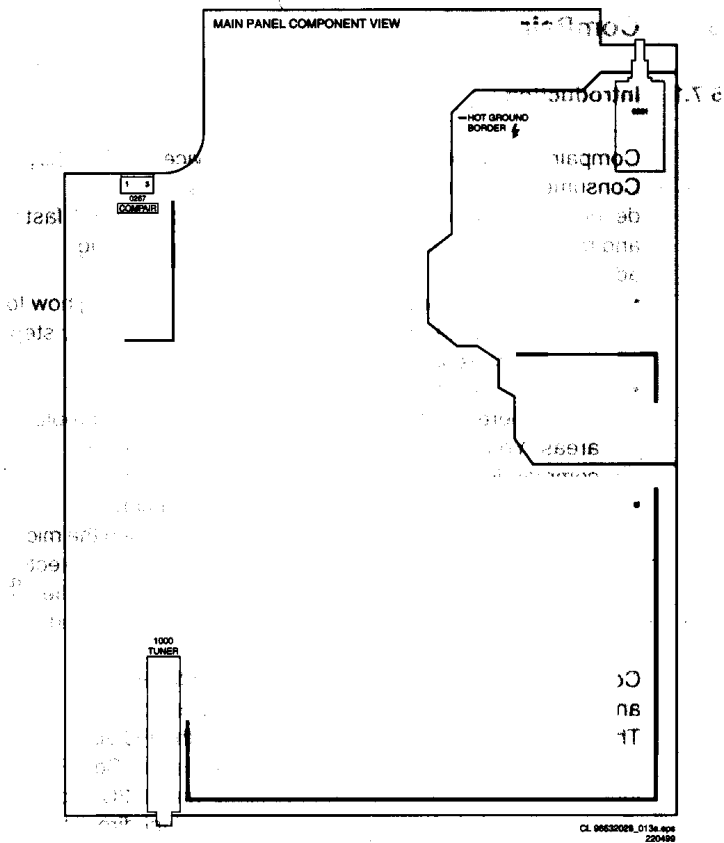
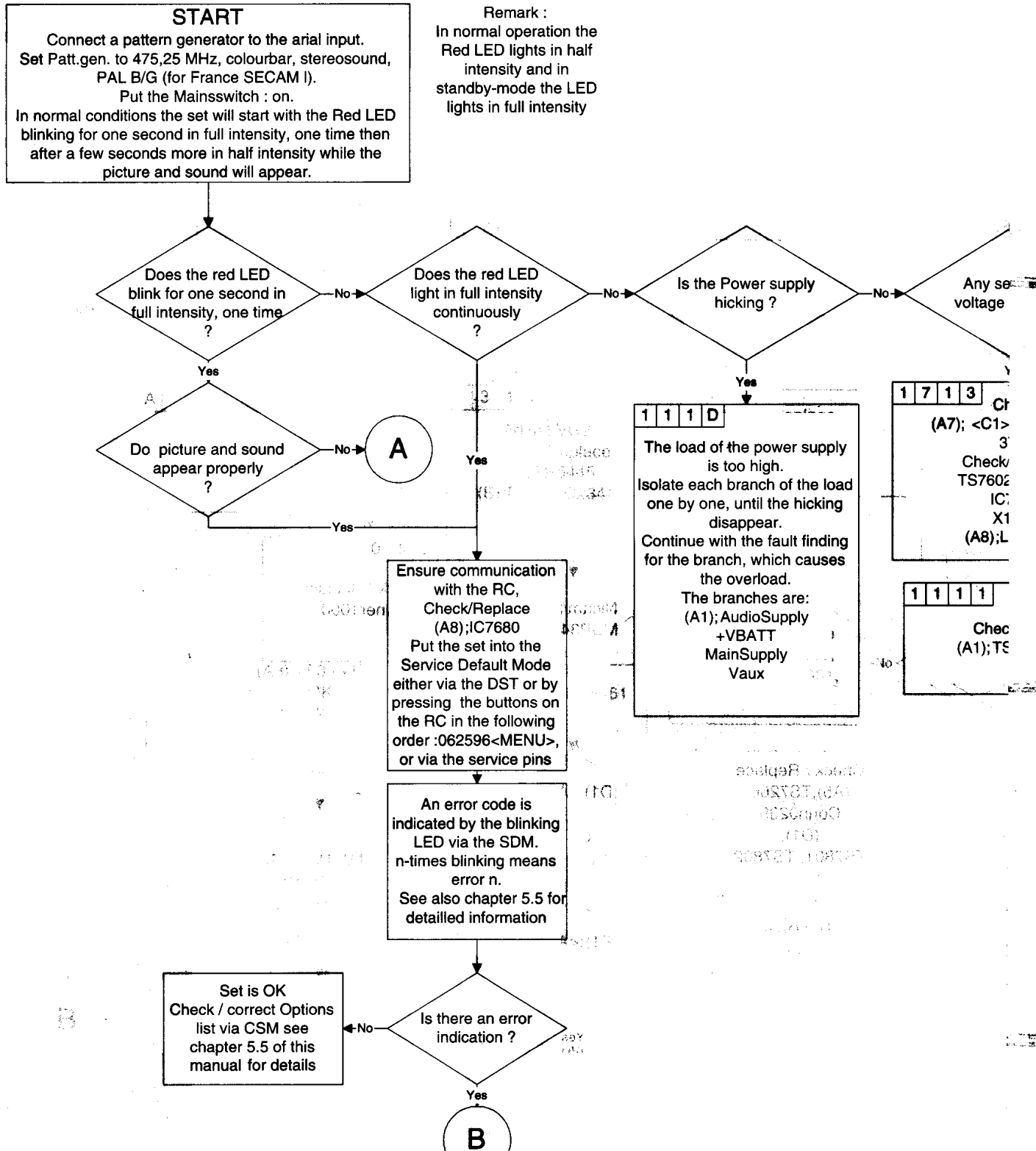
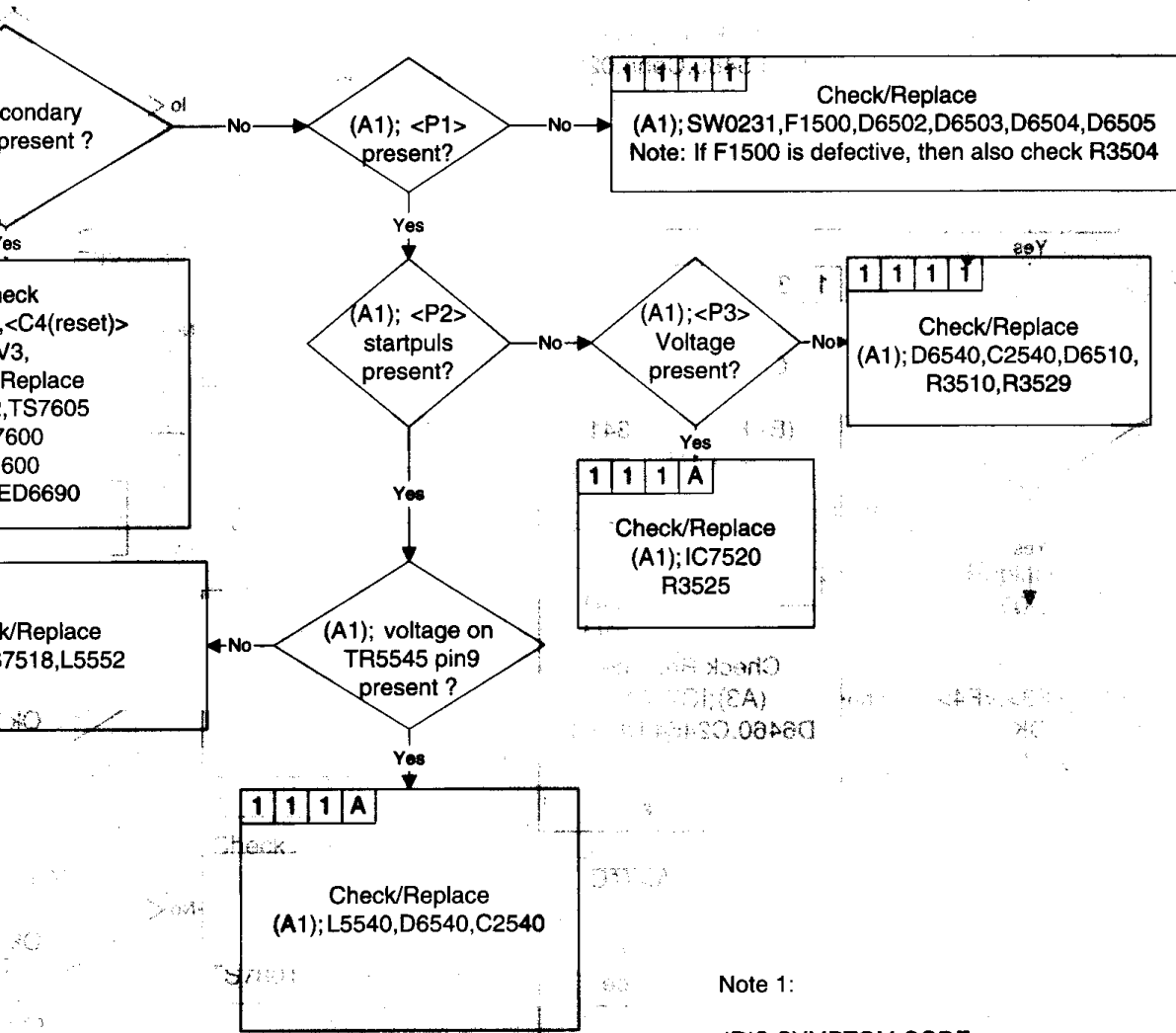


Figure 5-9

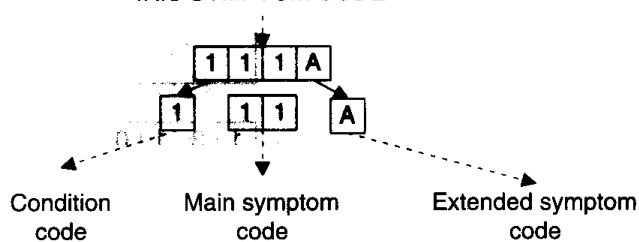
6. Faultfinding trees, blockdiagram, supply diagram and testpoints





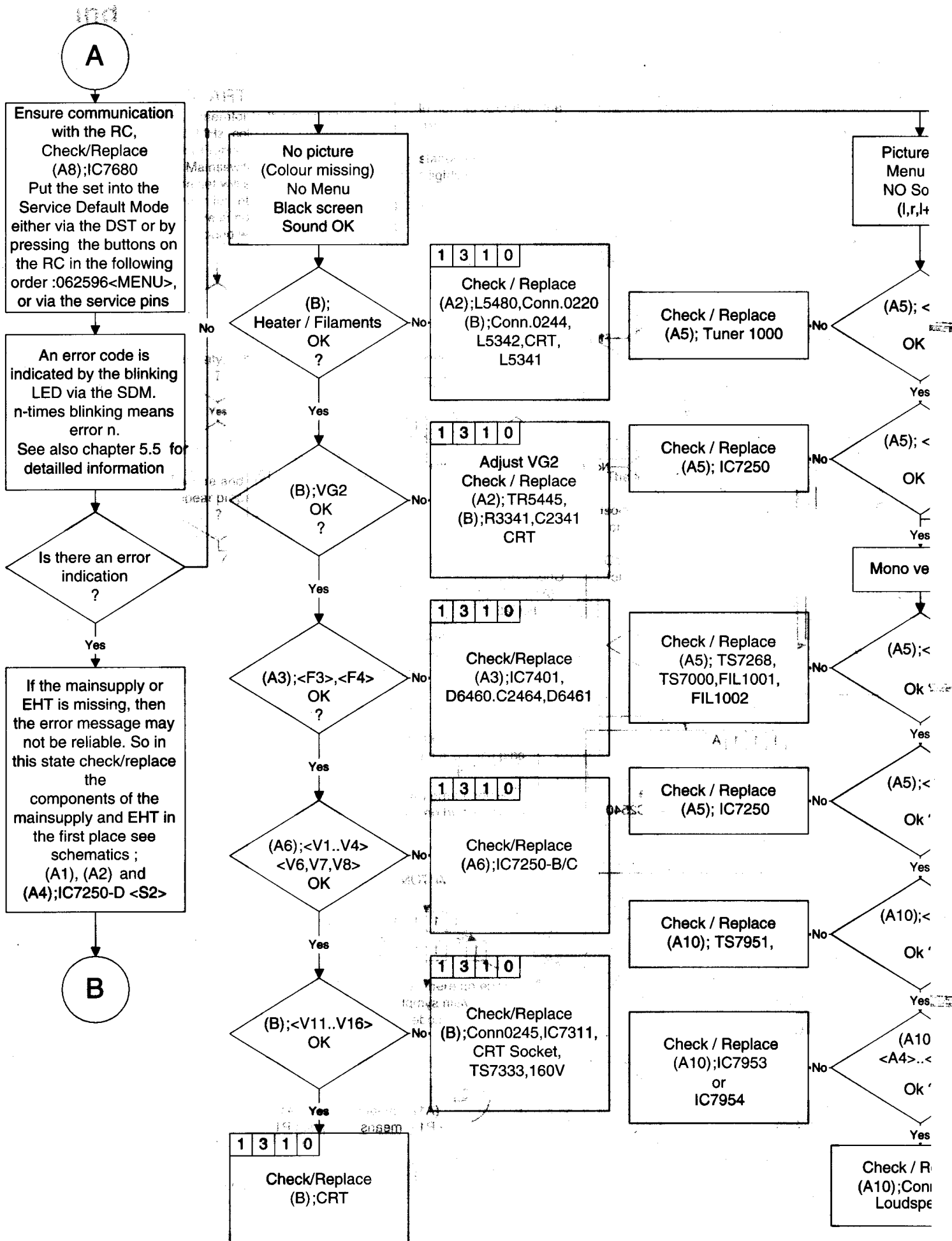
Note 1:

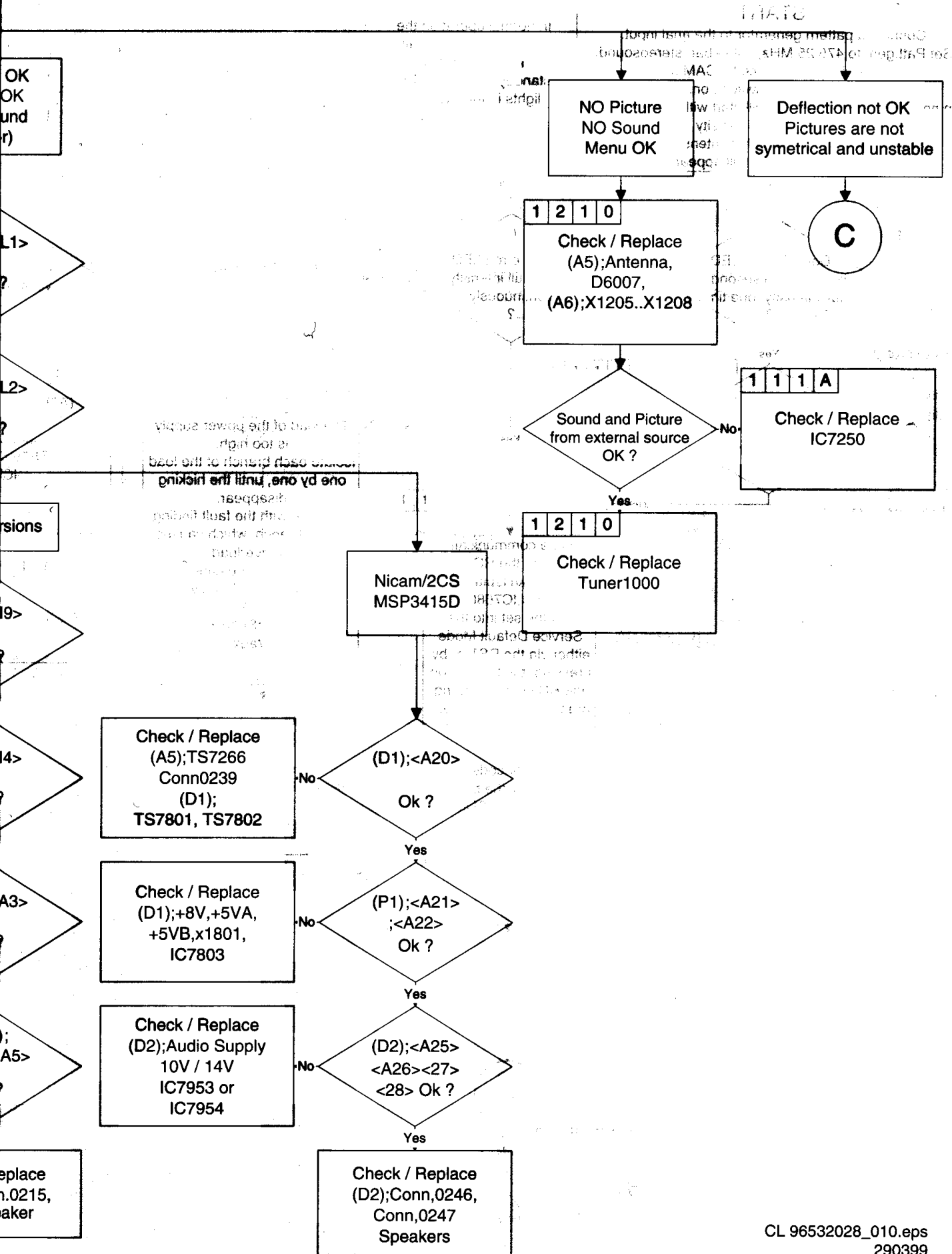
IRIS SYMPTOM CODE

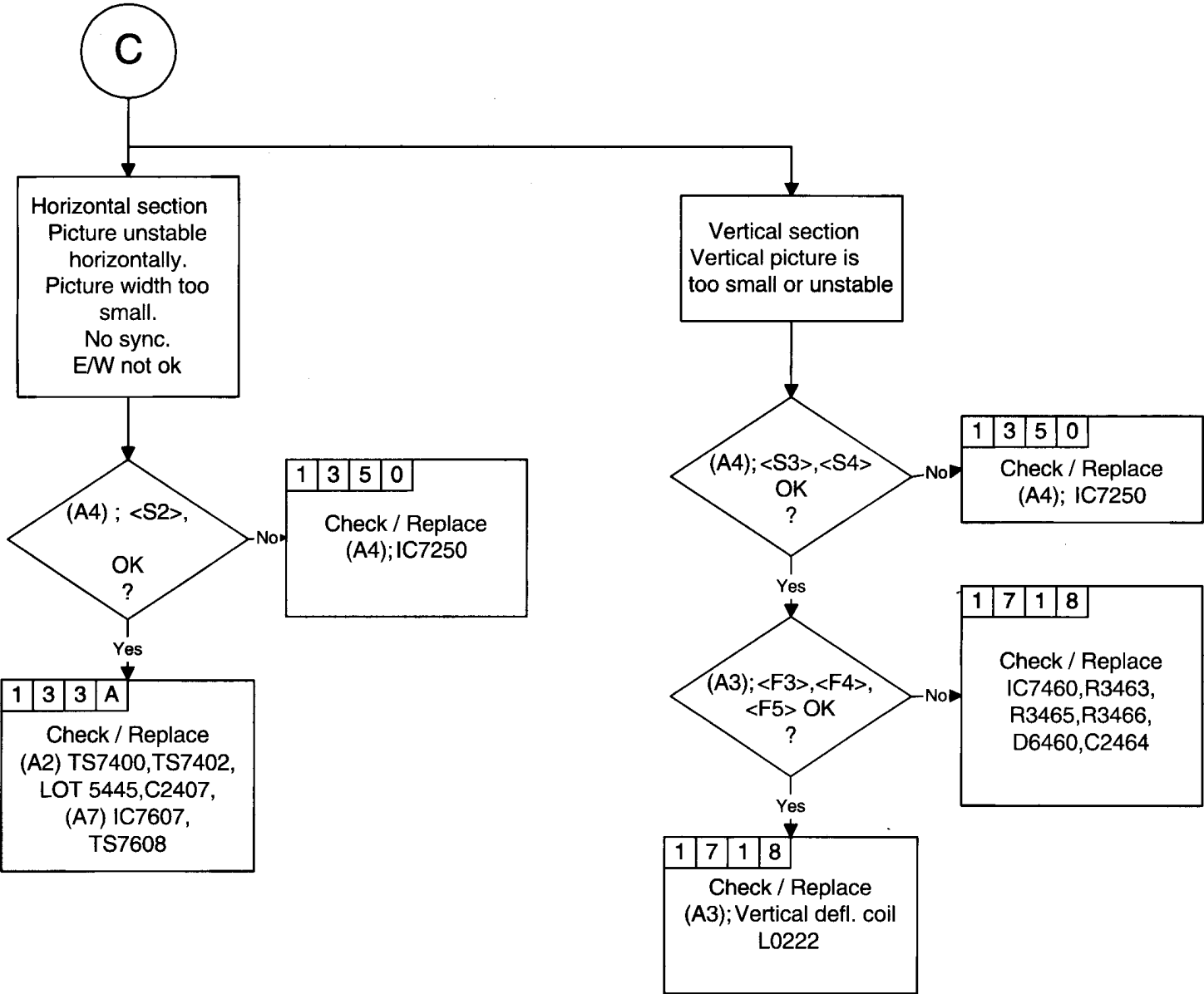


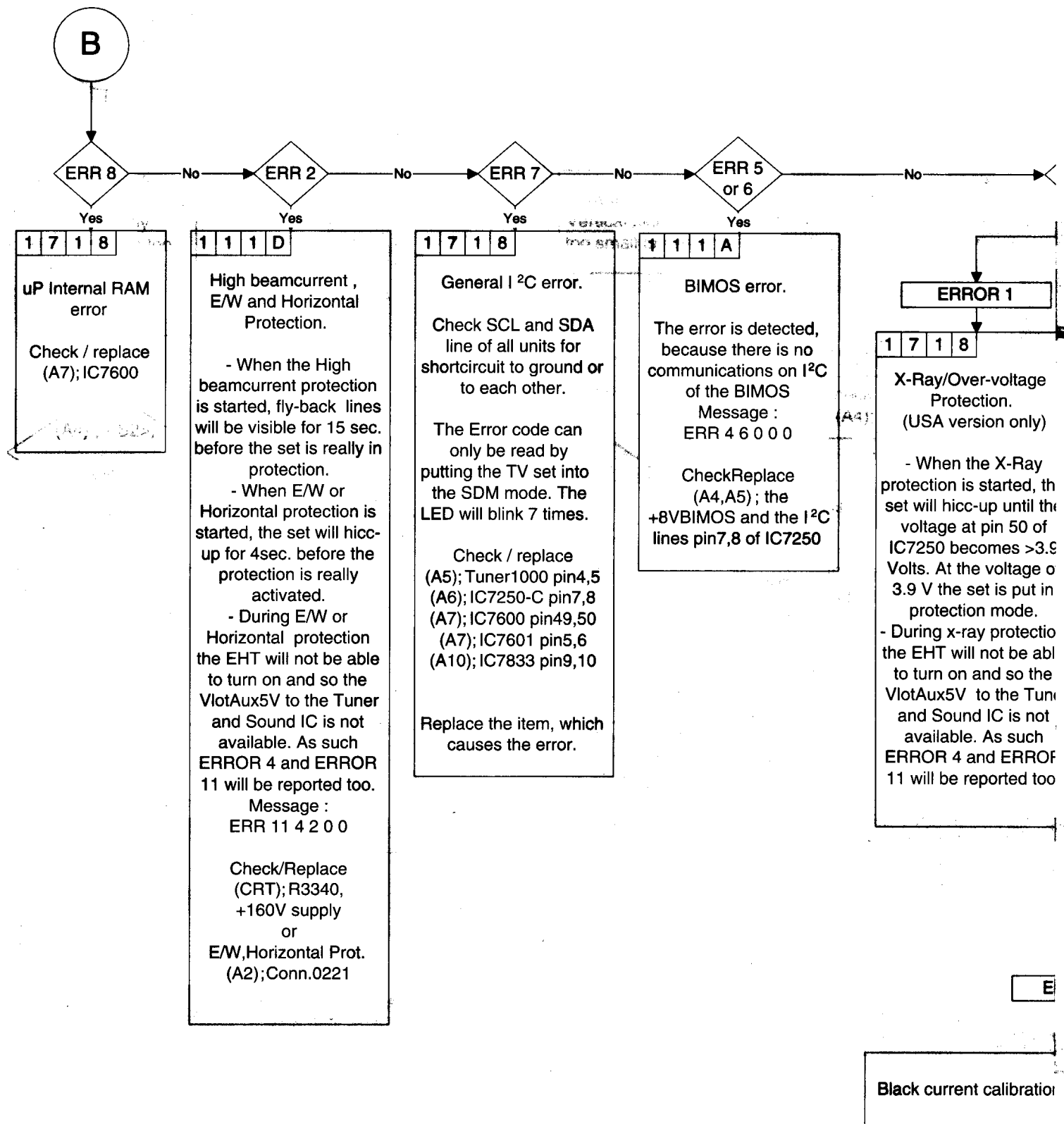
Note 2:

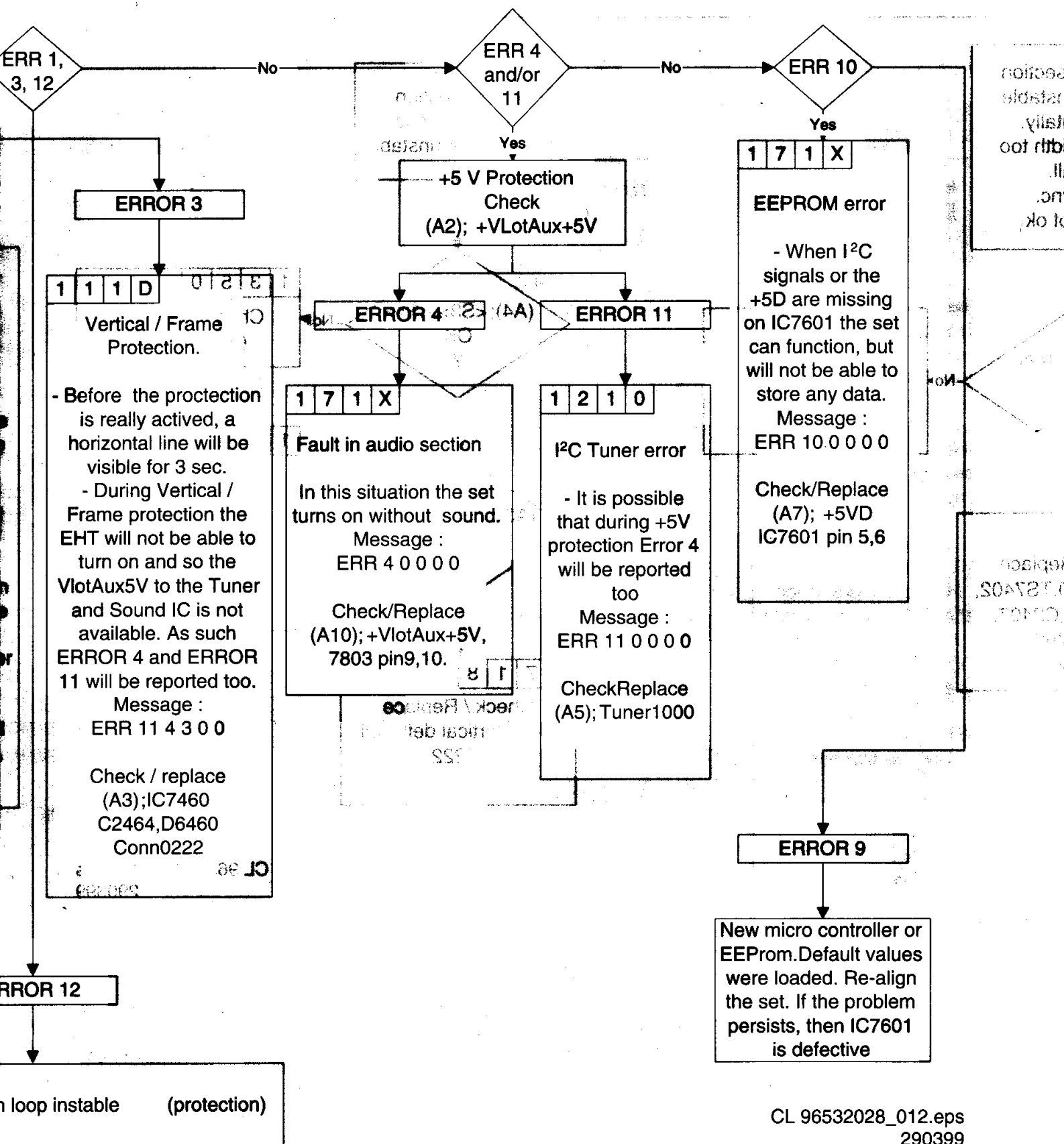
(A1) means Drawing A1
<P1> means Test point P1

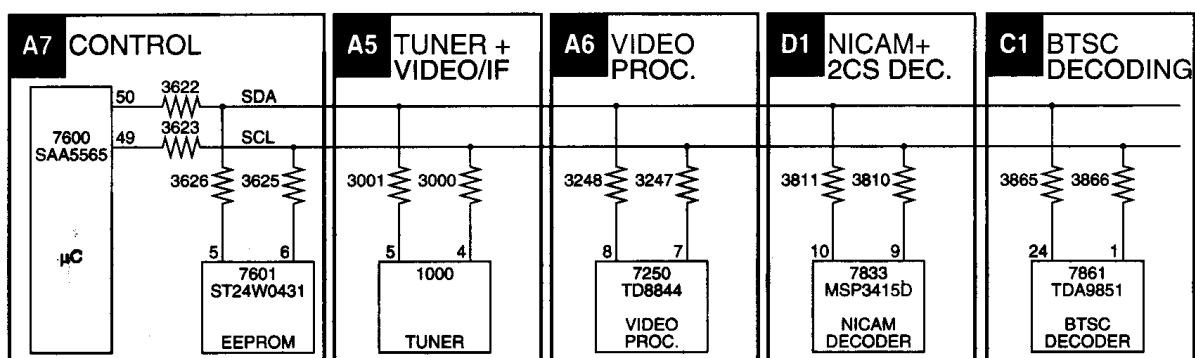




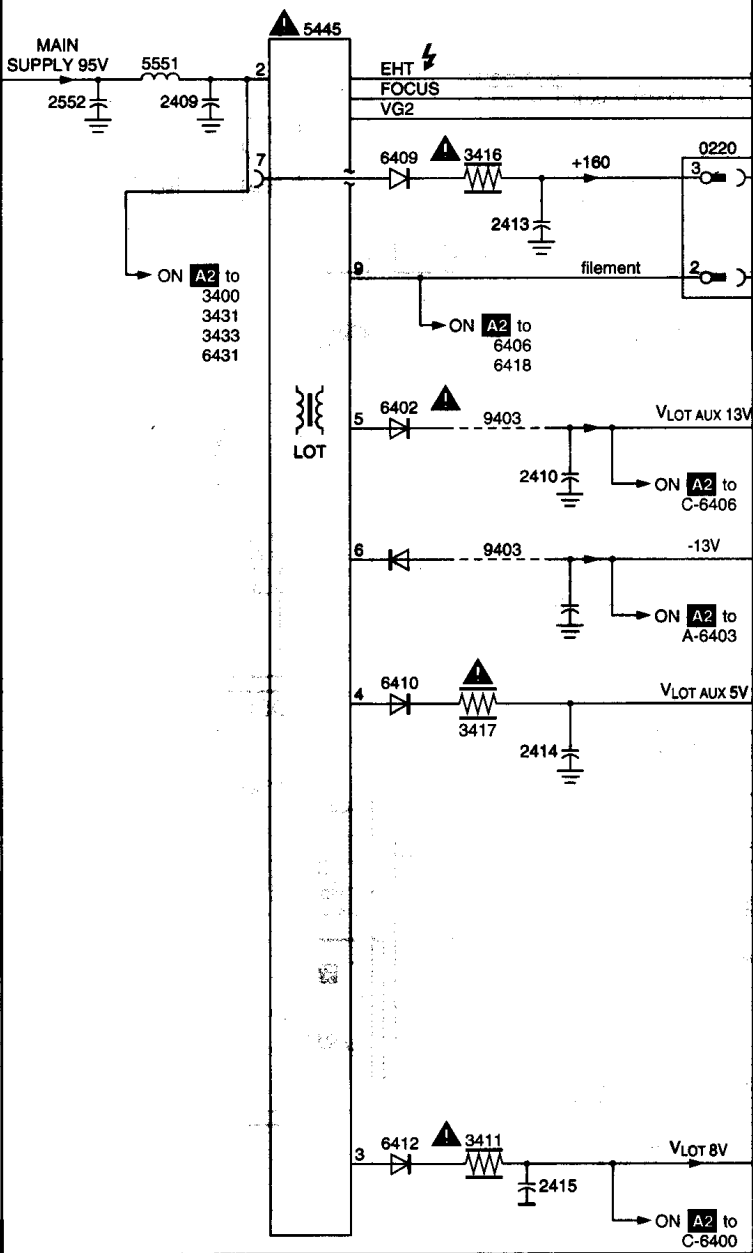




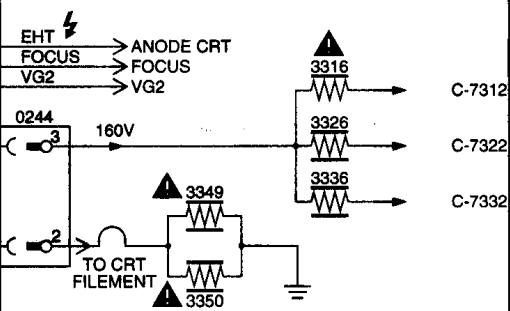




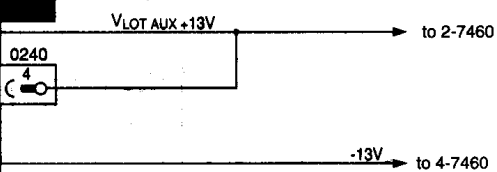
A2 HORIZONTAL DEFLECTION



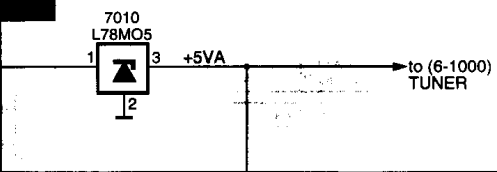
B CRT



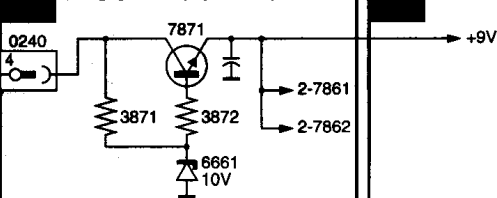
A3 VERTICAL DEFLECTION



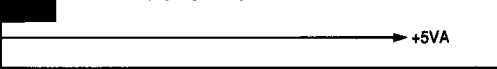
A5 TUNER + VIDEO IF



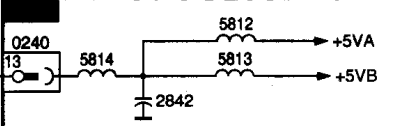
C1 BTSC DECODING



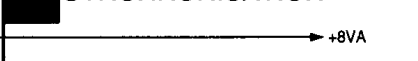
A12 REAR I/O CINCH



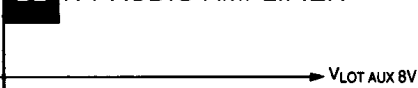
D1 ITT AUDIO DECODING



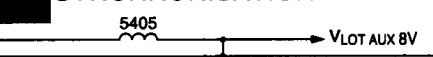
A4 SYNCHRONISATION



D2 ITT AUDIO AMPLIFIER



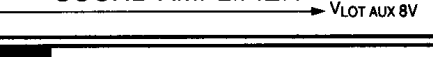
A4 SYNCHRONISATION



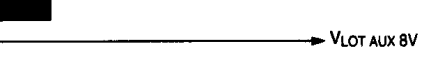
A6 VIDEO PROCESSING



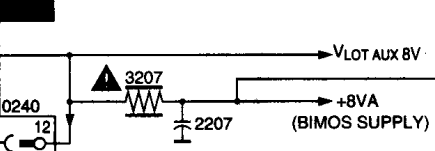
A10 SMART SOUND + MONO SOUND AMPLIFIER



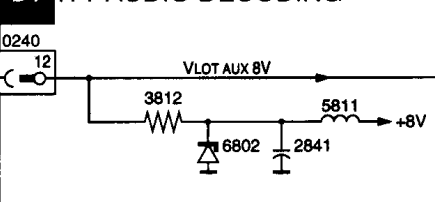
A12 REAR I/O CINCH

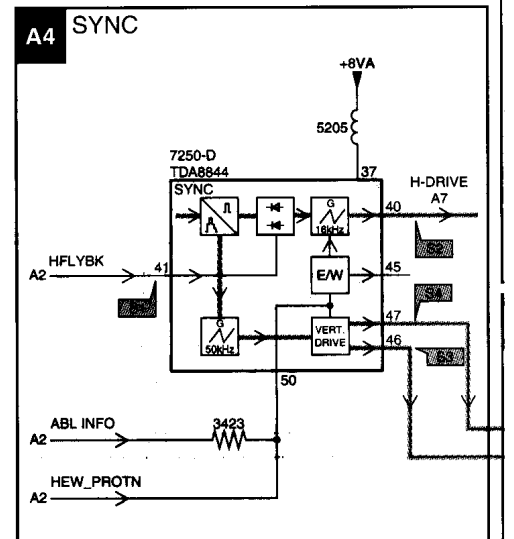


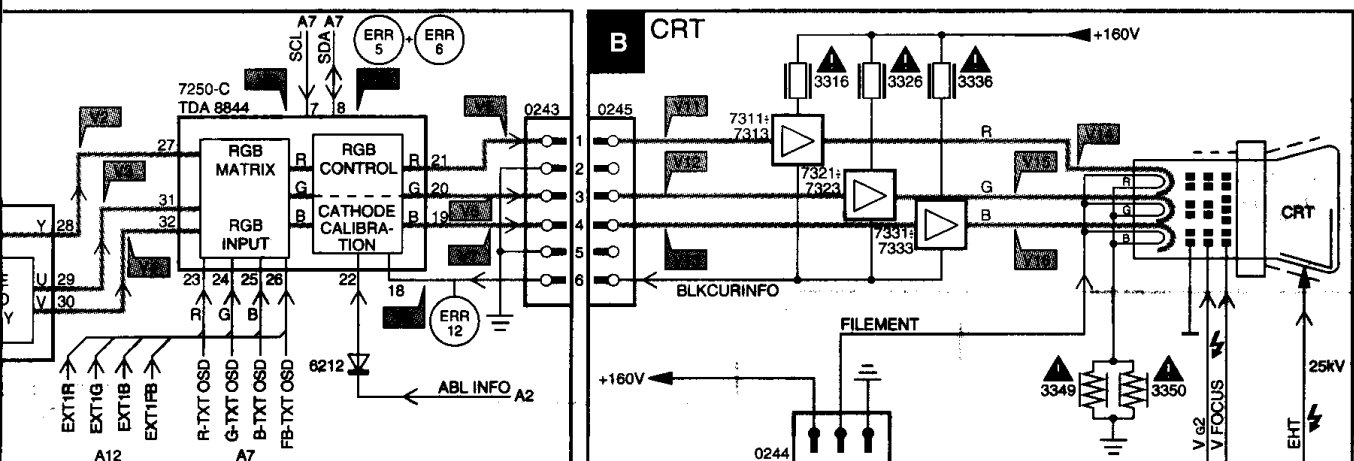
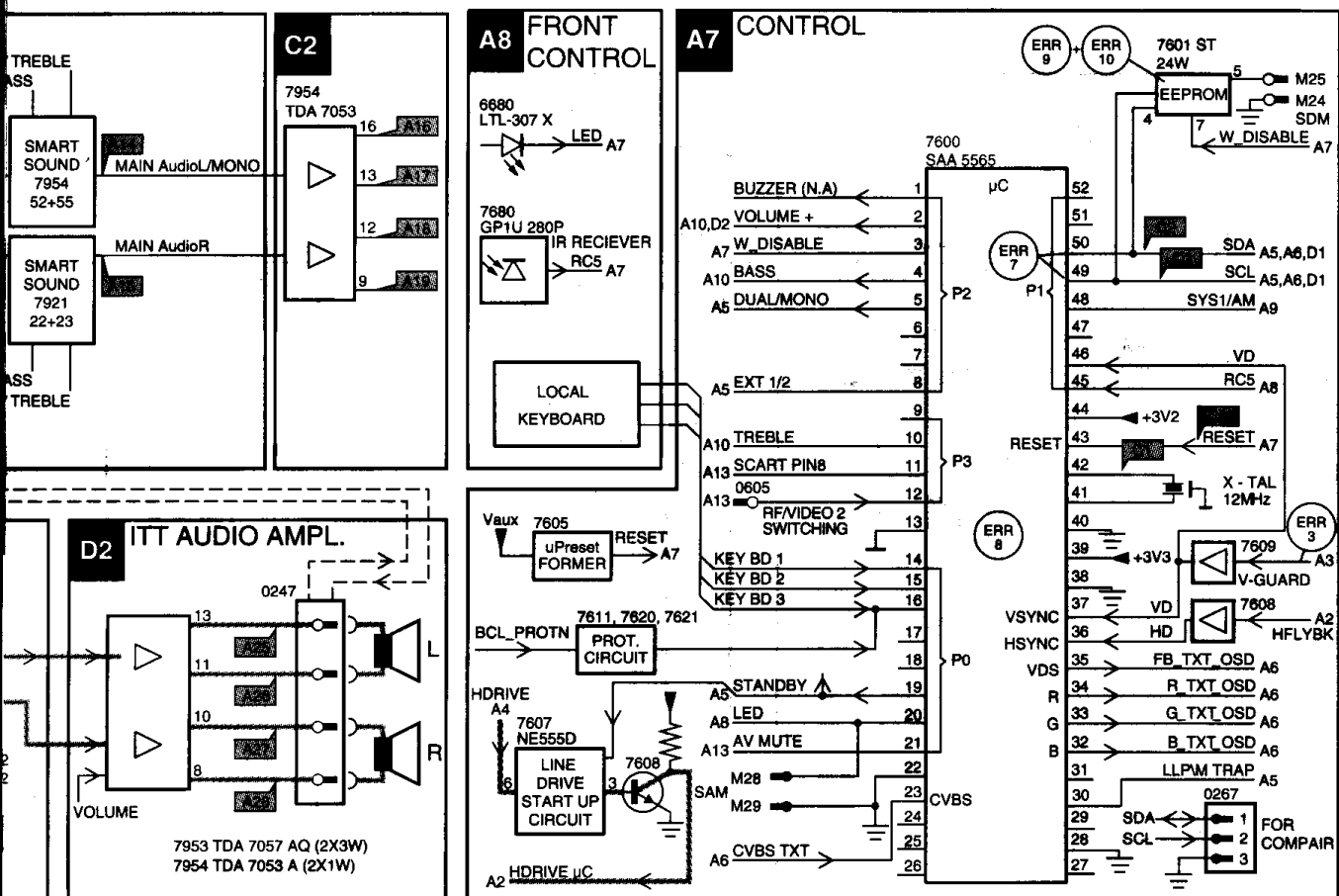
A5 TUNER + VIDEO IF

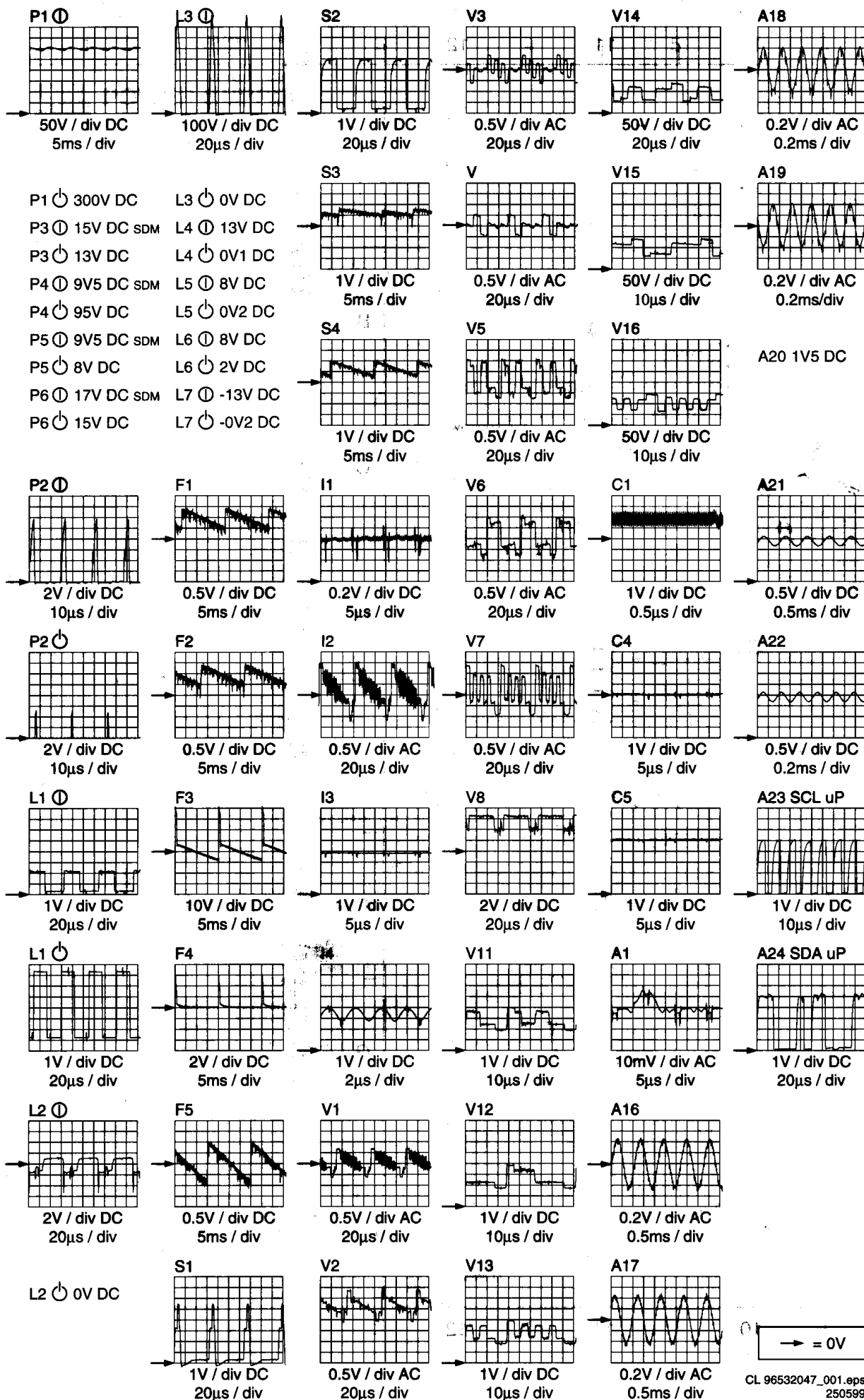


D1 ITT AUDIO DECODING

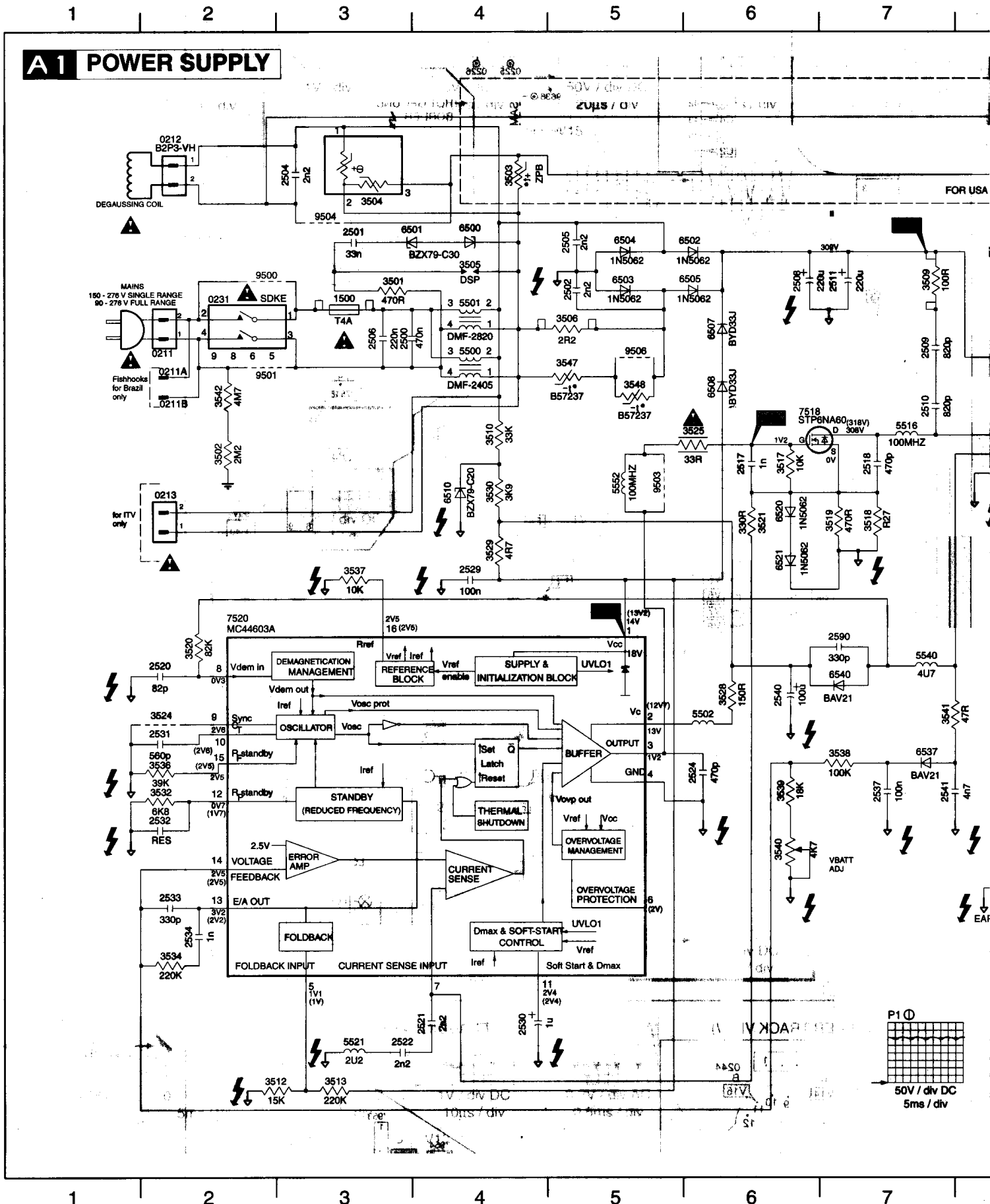








7. Schematics and PWB's

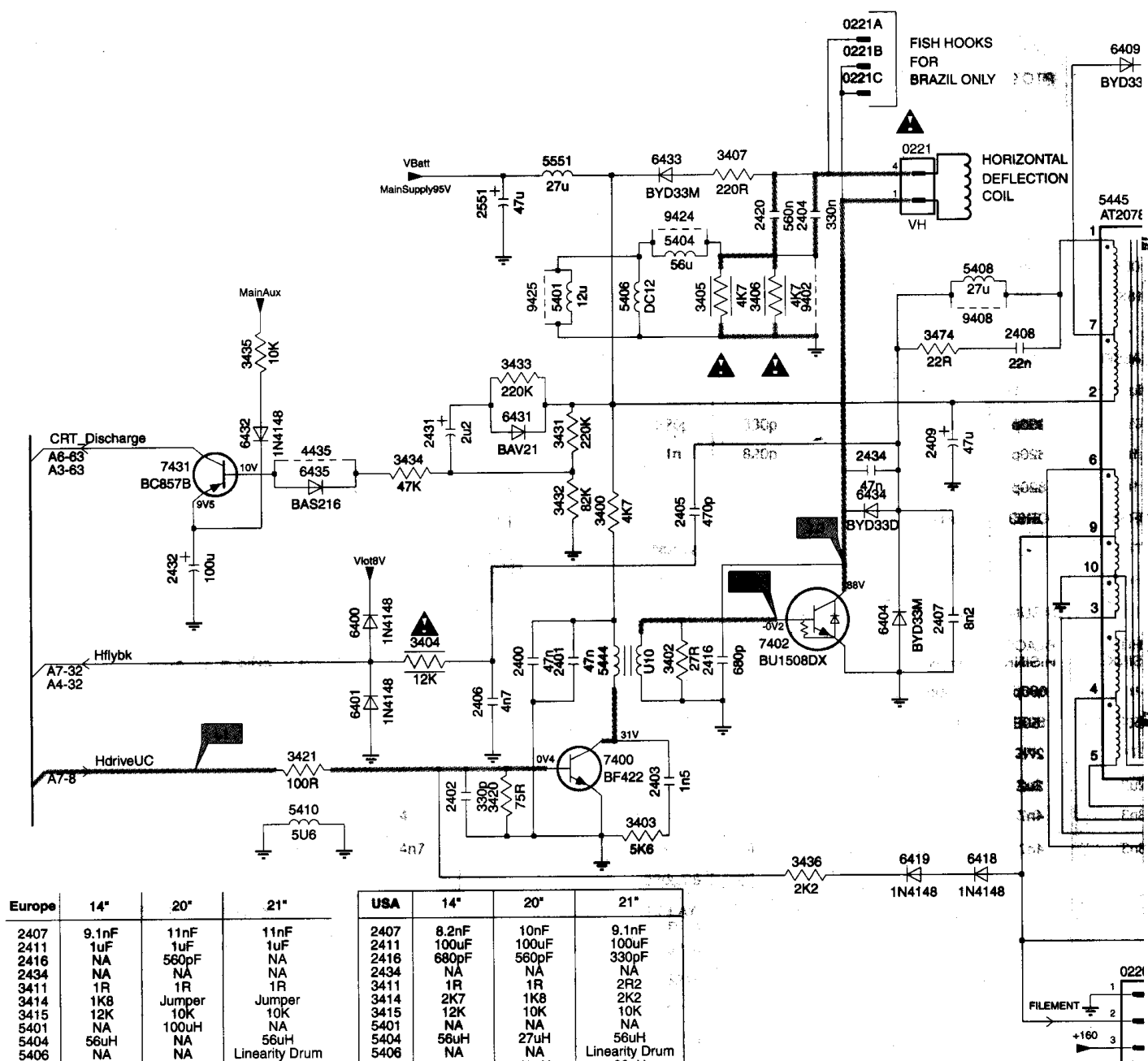


DIVERSITY LIST FOR A1

ITEM NO.	FR20/21 AP/LA	HR20/21 EU	LR20/21 US	LR14 US	HR14 EU	HR20/21 AP	HR14 AP	FR20/21 US	FR14 US	FR20/21 INDIA	FR14 INDIA	FR14 INDO	FR20 INDO	FR14 US(n)
5500	DMF 2820F	-	DMF 2820F	DMF 2820F	-	-	-	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	1 2
5501	-	DMF 2430F	-	-	DMF 2430F	DMF 2430F	DMF 2430F	-	-	-	-	-	-	
3504	PTC 9R	PTC 9R	-	-	PTC 9R	PTC 9R	PTC 9R	-	-	PTC 9R	PTC 9R	PTC 9R	PTC 9R	
3503	-	-	ZPB 10R	ZPB 10R	-	-	-	ZPB 9R	ZPB 9R	-	-	-	-	ZF
3506	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	-	-	
3547	-	-	-	-	-	-	-	-	-	-	-	NTC 10R	NTC 4R7	
3548	-	-	-	-	-	-	-	-	-	-	-	-	NTC 4R7	
9506	-	-	-	-	-	-	-	-	-	-	-	JUMPER	-	
3538	82K	100K	100K	100K	100K	82K	82K	100K	82K	82K	82K	82K	82K	1
3539	15K	18K	18K	18K	18K	15K	15K	18K	18K	15K	15K	15K	15K	
5552	-	-	-	-	-	-	-	-	-	-	-	-	-	
7518	6NA60FI	6NA60FI	6NA60FI	6NA60FI	4NA60FI	6NA60FI	4NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6N
2508	220u/400	100u/400	220u/200	220u/200	100u/400	100u/400	100u/400	220u/400	220u/400	220u/450	220u/450	100u/400	220u/400	22K
2518	220p	220p	470p	470p	220p	330p	330p	220p	220p	330p	330p	330p	330p	4
2509	820p	820p	1n	1n	1n	820p	820p	820p	1n	820p	820p	820p	820p	
2510	820p	820p	1n	1n	1n	820p	820p	820p	1n	820p	820p	820p	820p	
3518	OR27	OR33	OR33	OR33	OR33	OR33	OR33	OR27	OR27	OR27	OR27	OR27	OR27	C
2510	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN
3518	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN
5545	DASUNG	ELDOR	ELDOR	ELDOR	ELDOR	DASUNG	DASUNG	ELDOR	ELDOR	DASUNG	DASUNG	DASUNG	DASUNG	EL
113	BLACK H.SINK	BLACK H.SINK	WHITE H.SINK	WHITE H.SINK	WHITE H.SINK	BLACK H.SINK	WHITE H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	W H.
2550	680p	1n	1n	1n	1n	680p	680p	1n	1n	680p	680p	680p	680p	
3528	150E	220E	150E	150E	270E	150E	150E	270E	150E	150E	150E	150E	150E	1
3536	27K	27K	27K	27K	27K	47K	27K	27K	39K	27K	27K	27K	27K	
5521	2u2	2u2	2u2	2u2	2u2	2u2	2u2	3u3	2u2	2u2	2u2	2u2	2u2	
2522	4n7	4n7	4n7	3n3	5n6	4n7	3n3	4n7	3n3	4n7	3n3	3n3	3n3	
2521	4n7	4n7	4n7	3n3	5n6	4n7	3n3	4n7	3n3	4n7	3n3	3n3	3n3	
2586	-	-	220u/25	220u/25	-	-	-	220u/25	220u/25	-	-	-	-	
1580	-	-	RELAY G5P-1A	RELAY G5P-1A	-	-	-	RELAY G5P-1A	RELAY G5P-1A	-	-	-	-	
6585	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	
6584	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	
6590	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	
7591	-	-	BC847B	BC847B	-	-	-	BC847B	BC847B	-	-	-	-	
7590	-	-	BC847B	BC847B	-	-	-	BC847B	BC847B	-	-	-	-	
3598	-	-	22K	22K	-	-	-	22K	22K	-	-	-	-	
3597	-	-	10K	10K	-	-	-	10K	10K	-	-	-	-	
3596	-	-	10K	10K	-	-	-	10K	10K	-	-	-	-	
3595	-	-	68K	68K	-	-	-	68K	68K	-	-	-	-	
9504	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	JUMPER	JU
9500	-	-	JUMPER	JUMPER	-	-	-	JUMPER	JUMPER	-	-	-	-	JU
9501	-	-	JUMPER	JUMPER	-	-	-	JUMPER	JUMPER	-	-	-	-	JU

CL 96532028_035.eps
070499

A2 LINE DEFLECTION



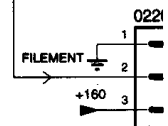
Europe	14"	20"	21"
2407	9.1nF	11nF	11nF
2411	1uF	1uF	1uF
2416	NA	560pF	NA
2434	NA	NA	NA
3411	1R	1R	1R
3414	1K8	Jumper	Jumper
3415	12K	10K	10K
5401	NA	100uH	NA
5404	56uH	NA	56uH
5406	NA	NA	Linearity Drum
5408	27uH	27uH	27uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	Yes	NA
9424	NA	NA	NA
9425	Yes	NA	NA

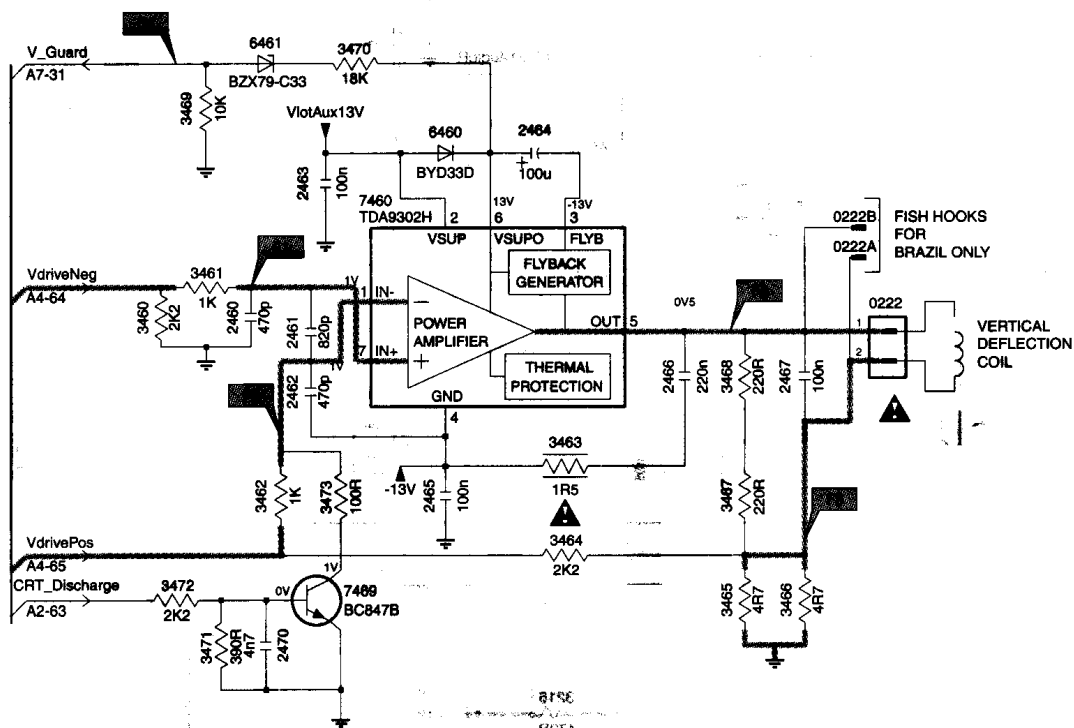
USA	14"	20"	21"
2407	8.2nF	10nF	9.1nF
2411	100uF	100uF	100uF
2416	680pF	560pF	330pF
2434	NA	NA	NA
3411	1R	1R	2R2
3414	2K7	1K8	2K2
3415	12K	10K	10K
5401	NA	NA	NA
5404	56uH	27uH	56uH
5406	NA	NA	Linearity Drum
5408	15uH	15uH	22uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	NA	NA
9424	NA	NA	NA
9425	Yes	Yes	NA

BRAZIL	14"	20"	21"
2407	8.2nF	10nF	11nF
2411	100uF	100uF	100uF
2416	680pF	680pF	330pF
2434	NA	NA	NA
3411	1R	1R	2R2
3414	1K	1K8	2K2
3415	15K	10K	10K
5401	NA	NA	NA
5404	56 uH	56uH	NA
5406	NA	NA	Linearity Drum
5408	15uH	15uH	22uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	NA	NA
9424	NA	NA	Yes
9425	Yes	Yes	NA

AP	14"	20"	21"
2407	9.1nF	11nF	10nF
2411	100uF	100uF	100uF
2416	680pF	680pF	330pF
2434	NA	NA	NA
3411	1R	1R	2R2
3414	1K	1K8	2K2
3415	15K	10K	10K
5401	NA	100uH	NA
5404	56 uH	NA	NA
5406	NA	NA	Linearity Drum
5408	15uH	15uH	22uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	NA	NA
9424	NA	NA	Yes
9425	Yes	NA	NA

CHINA	21"
2407	11nF
2411	100uF
2416	NA
2434	NA
3411	2R2
3414	2K2
3415	10K
5401	NA
5404	56uH
5406	Linearity Drum
5408	22uH
6434	Jumper
9402	NA
9408	NA
9424	NA
9425	NA



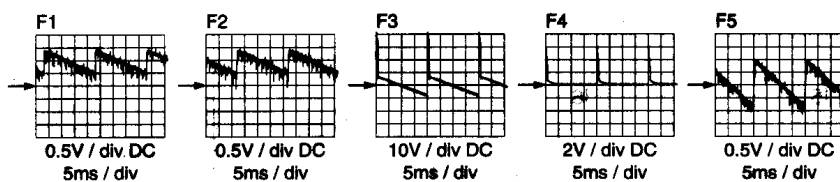
A3 FRAME DEFLECTION

Europe	14"	20"	21"
3465	5R6	4R7	3R3
3466	5R6	4R7	4R7

USA	14"	20"	21"
3465	5R6	3R9	4R7
3466	5R6	4R7	8R3

Brazil	14"	20"	21"
3465	5R6	4R7	3R3
3466	5R6	3R9	4R7

AP	14"	20"	21"
3465	6R8	4R7	3R3
3466	5R6	4R7	3R3



0222 C5
0222A C5
0222B C5
2460 C2
2461 C2
2462 C2
2463 B3
2464 B4
2465 D3
2466 C4
2467 C5
2470 E2
3460 C2
3461 C2
3462 D2
3463 D4
3464 D4
3465 D5
3466 D5
3467 D5
3468 C5
3469 B2
3470 B3
3471 E2
3472 D2
3473 D3
6460 B3
6461 B2
7460 B3
7469 D3

8

9

10

11

12

0239 A12
0240 A10
1000 A2
1001 A8
1002 B8
1003 D4
1200 D10
1201 E10
1203 F10
2001 B4
2002 C4
2003 B4
2004 C5
2005 B6
2006 B8
2007 B9
2008 A4
2008 D3
2010 E3
2011 F3
2012 D3
2013 D3
2200 F5
2201 F6
2202 F6
2203 F6
2205 F7
2206 D7
2207 D7
2220 D8
2227 E5
2252 A5
2256 E8
3000 C2
3001 C2
3002 A3
3003 A4
3004 E3
3013 C5
3014 C5
3015 C5
3016 C5
3017 A7
3018 B6
3019 F3
3020 B7
3021 C9
3022 E4
3026 E3
3027 D3
3200 F6
3201 F7
3202 F7
3203 H2
3204 D8
3205 E7
3206 E8
3207 D7
3208 E9
3209 E9
3210 F10
3211 F11
3212 E11
3213 E11
3215 E11
3216 D11
3277 D5
3278 E5
3279 G2
3280 H2
4000 D3
4201 F5
4210 D8
4221 E9
4222 E8
4223 E8
4251 E2
5001 C9
5002 E3
5004 C4
5202 D10
5203 D8
6003 C5
6004 E4
6005 B7
6006 B7
6007 A4
6010 D3
7000 B8
7001 E4
7010 A5
7250-A E6
7252 E10
7253 E11
7265 H3
7266 E8
9000 A7
9001 D3
9002 E4
9204 F5
9219 G7

9220 F7
9221 G7
9507 H4

A

B

C

D

E

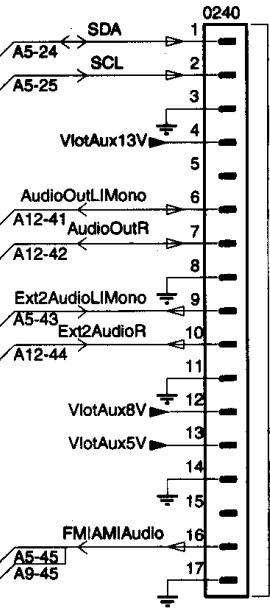
F

G

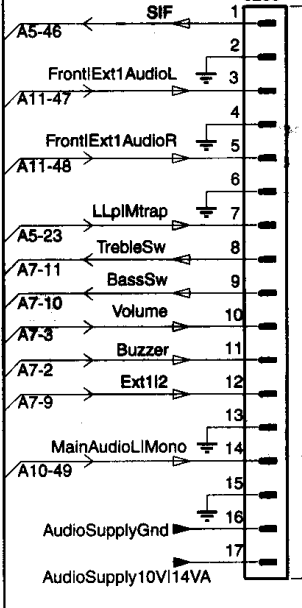
H

DualMono

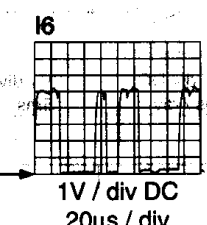
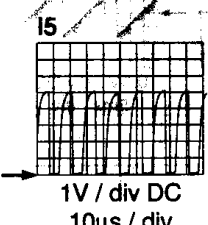
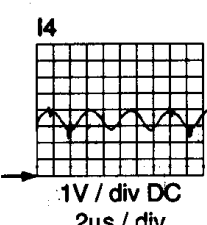
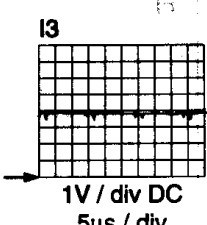
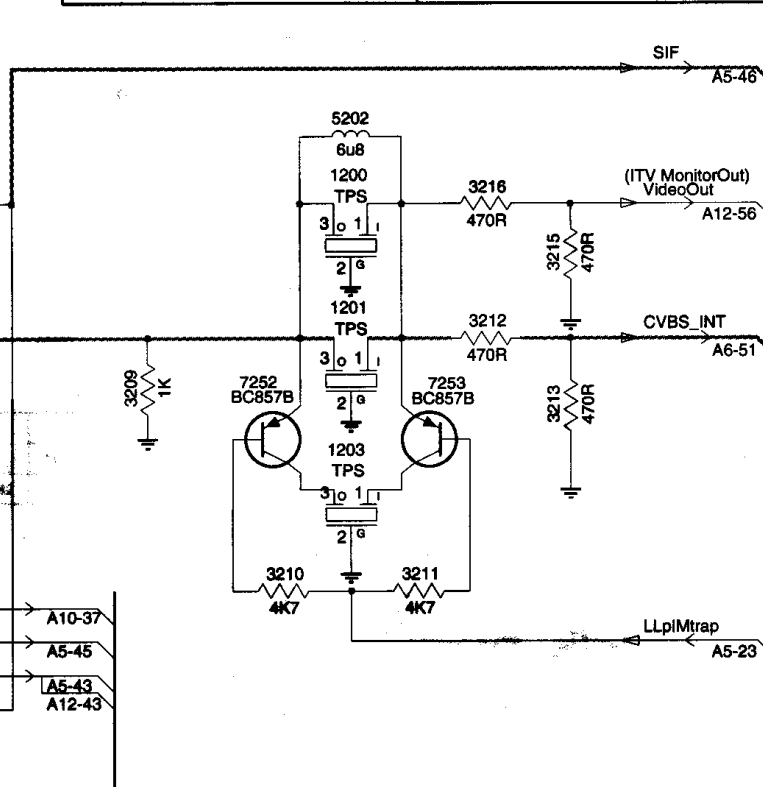
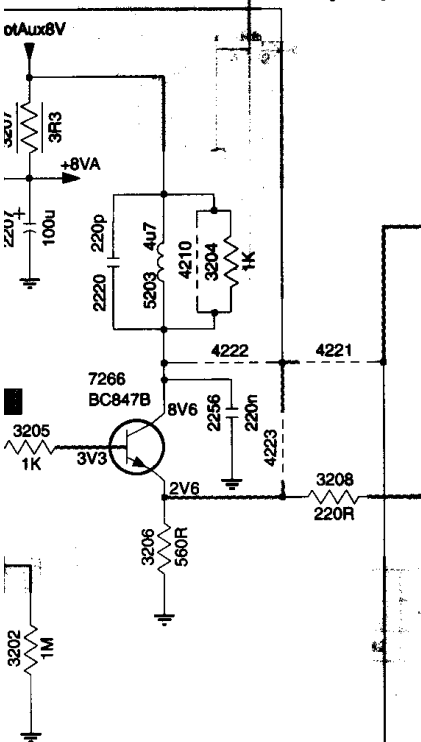
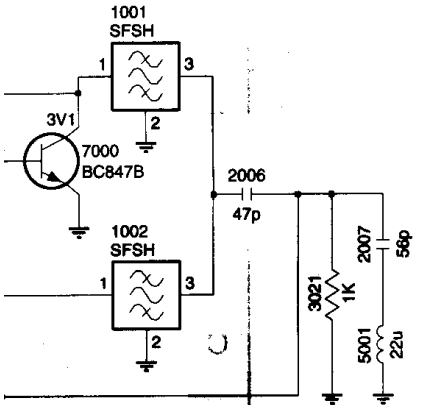
A7-6



TO 0240 OF
C1
OR
D1



TO 0239 OF
C1
OR
D1



8

9

10

11

12

TUNER VIDEO IF (AP/INDIA/LATAM/USA)

TUNER

	ASIA PACIFIC				INDIA				USA	LATAM
	BG/I/DK	PAL/NTSC	I/DK	BG/DK	BG	BG/I	BG	PAL/NTSC	M	M
1003	K2960M	K2960M	K2960M	K2960M	G1984M	K2960M	G1984M	K2960M	M1967M	M1967M
1200	TPT02	TPT02	6MTPS	TPWA04	TPWA04	TPWA04	TPWA04	TPT02	4.5MTPS	4.5MTPS
1201	6MTPS	6MTPS	6.5MTPS	6.5MTPS	-	6MTPS	-	6MTPS	-	-
1203	-	4.5MTPS	-	-	-	-	-	4.5MTPS	-	-
2009	-	12pF	-	-	-	-	-	12pF	-	-
2010	-	120pF	-	-	-	-	-	120pF	-	-
2011	-	10nF	-	-	-	-	-	10nF	-	-
2012	-	10nF	-	-	-	-	-	10nF	-	-
2013	-	10nF	-	-	-	-	-	10nF	-	-
2201	1uF	1uF	1uF	1uF	1uF	1uF	1uF	1uF	220nF	1uF
2205	100nF	100nF	100nF	100nF	100nF	100nF	10nF	10nF	100nF	100nF
3004	-	1K5	-	-	-	-	-	1K5	-	-
3026	-	5K6	-	-	-	-	-	5K6	-	-
3027	-	22K	-	-	-	-	-	22K	-	-
3201	390R	390R	390R	390R	390R	390R	1K8	1K8	390R	390R
3202	1M5	1M5	1M5	1M5	1M5	1M5	1M5	1M5	-	1M
3210	-	4K7	-	-	-	-	-	4K7	-	-
3211	-	4K7	-	-	-	-	-	4K7	-	-
4000	Yes	-	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
4251	-	Yes	-	-	-	-	-	Yes	-	-
5002	-	MCOIL	-	-	-	-	-	MCOIL	-	-
5202	5u6	5u6	5u6	5u6	5u6	5u6	6u8	5u6	12uH	12uH
6010	-	BA482	-	-	-	-	-	BA482	-	-
7252	-	BC857B	-	-	-	-	-	BC857B	-	-
7253	-	BC857B	-	-	-	-	-	BC857B	-	-
9001	Yes	-	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes

0239	
0240	
1001	
1002	
2005	
2006	
2202	
2203	
2227	
3017	
3018	
3020	
3021	
3200	
4201	
4221	
4223	
6005	
6006	
7000	
9000	
9204	
9219	
9220	
9221	

TUNER	38.9MHz	45.75MHz
1000	UV1316	TEDH9

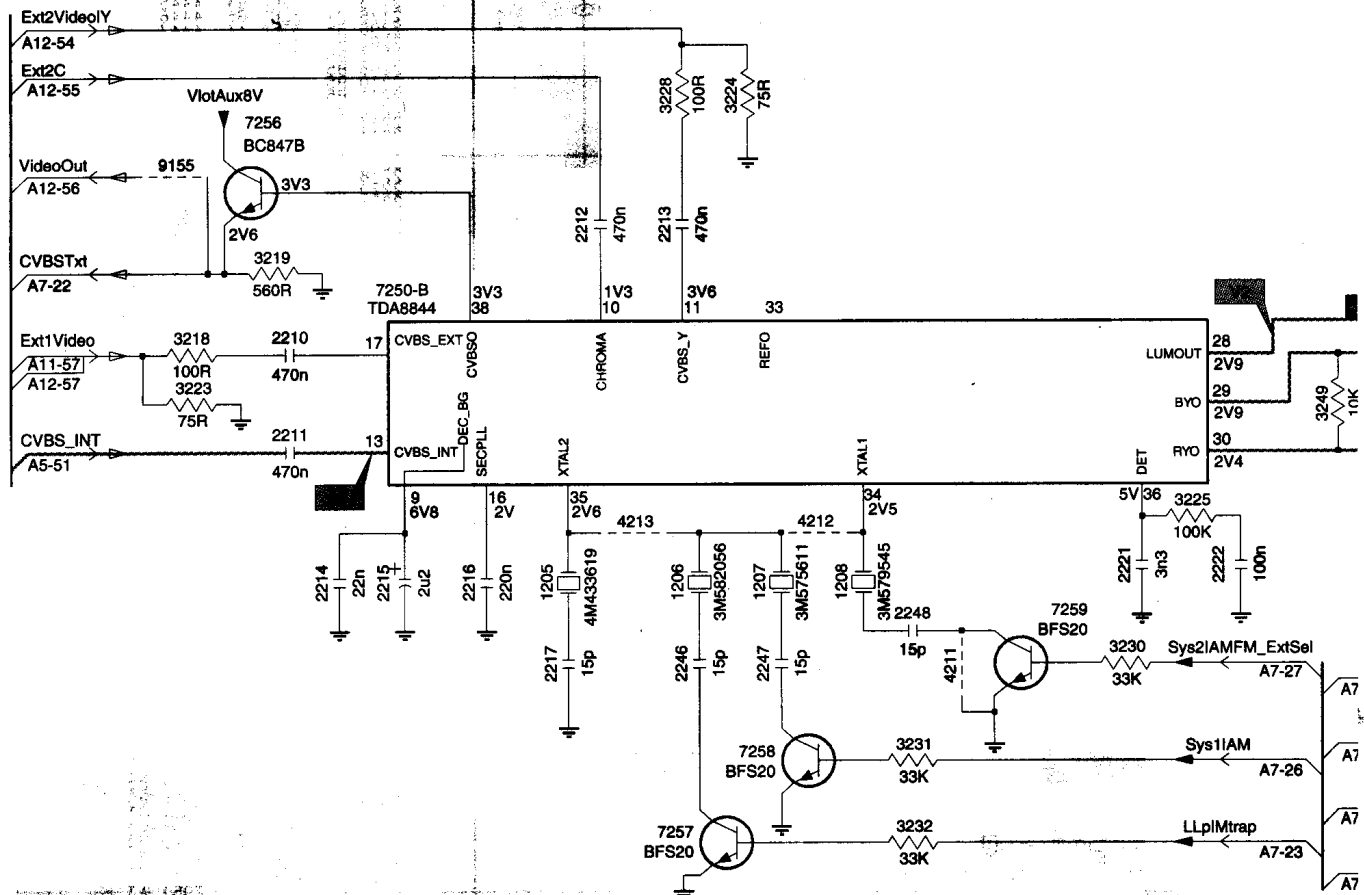
Sour
3203
3279
3280
7265

TUNER + VIDEO IF + SOUND IF (US/LA/AP)

Sound System									
	Mono(RF/AV)					Stereo(RF-non_DBX/AV)US only		Mono_RF/Stereo_AV	Stereo(RF/AV)
	M	BG	BG/I	BG/DK	I/DK	M		BG	BG/I/DK/M
0239	-	-	-	-	-	Yes		Yes	Yes
0240	-	-	-	-	-	Yes		Yes	Yes
1001	4.5	5.5	5.5	5.5	6.0	4.5		5.5	-
1002	-	-	6.0	6.5	6.5	-		-	-
2005	39pF	100pF	100pF	100pF	100pF	39pF		100pf	-
2006	47pF	82pF	82pF	82pF	82pF	47pF		82pF	-
2202	4n7	3n9	3n9	3n9	3n9	100pF		3n9	-
2203	10uF	10uF	10uF	10uF	10uF	10uF		10uF	-
2227	470nF	470nF	470nF	470nF	470nF	Jumper		Jumper	Jumper
3017	-	-	4K7	-	4K7	-		-	-
3018	-	-	2K2	-	2K2	-		-	-
3020	-	-	22K	-	22K	-		-	-
3021	1K	680R	680R	680R	680R	1K		680R	-
3200	680R	680R	680R	680R	680R	680R		680R	-
4201	-	-	-	-	-	Yes		Yes	Yes
4221	-	-	-	-	-	-		-	Yes
4223	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
6005	-	-	IN4148	-	IN4148	-		-	-
6006	-	-	IN4148	Jumper	IN4148	-		-	-
7000	-	-	BC847B	-	BC847B	-		-	-
9000	Yes	Yes	-	Yes	-	Yes		Yes	-
9204	Yes	Yes	Yes	Yes	Yes	-		-	-
9219	-	-	-	-	-	Yes		-	-
9220	-	-	-	-	-	-		Yes	-
9221	Yes	Yes	Yes	Yes	Yes	-		-	-

Sound Amplifier		
	1W	2W/3W/4W
3203	-	10K
3279	-	330R
3280	-	1K
7265	-	BC337-25

A6 VIDEO PROCESSING A/P



	ASIA PACIFIC					LATAM					USA
	PAL	PAL/NTSC	PAL/SECAM	PAL/SECAM	NTSC	TRINOMA	BINOMA	TRINOMA	PAL M	BINOMA	NTSC M
				NTSC		PAL PB				PAL PB	
1205	4.43MXTL	4.43MXTL	4.43MXTL	4.43MXTL	-	4.43MXTL	3.5756MXTL	-	-	4.43MXTL	-
1206	-	-	-	-	-	3.582MXTL	-	3.582MXTL	-	-	-
1207	-	-	-	-	-	3.5756MXTL	-	3.5756MXTL	-	3.5756MXTL	-
1208	-	3.5795MXTL	-	3.5795MXTL	3.5795MXTL	3.5795MXTL	3.5795MXTL	3.5795MXTL	3.5756MXTL	3.5795MXTL	3.5795MXTL
2217	18pF	18pF	18pF	18pF	-	18pF	15pF	-	-	18pF	-
2246	-	-	-	-	-	15pF	-	15pF	-	-	-
2247	-	-	-	-	-	15pF	-	15pF	-	15pF	-
2248	-	15pF	-	15pF	15pF	15pF	15pF	15pF	15pF	15pF	15pF
2257	-	-	-	-	-	1nF	1nF	1nF	1nF	1nF	-
3206	220R	220R	220R	220R	270R	270R	270R	270R	270R	270R	270R
3208	82R	82R	82R	82R	220R	220R	220R	220R	220R	220R	82R
3213	470R	470R	470R	560R	560R	560R	560R	560R	560R	560R	470R
3230	-	-	-	-	-	33K	-	-	-	33K	-
3231	-	-	-	-	-	33K	-	33K	-	33K	-
3232	-	-	-	-	-	33K	-	33K	-	-	-
3277	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper	47R	Jumper	47R	47R	Jumper
3278	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper	47R	Jumper	47R	47R	Jumper
4211	-	Yes	-	Yes	Yes	-	Yes	Yes	Yes	-	Yes
4212	-	-	-	-	-	Yes	-	-	-	Yes	-
4213	-	-	-	-	-	-	-	Yes	-	-	-
7250	TDA8841S1	TDA8841S1	TDA8842S1	TDA8842S1	TDA8841S1	TDA8841S1	TDA8841S1	TDA8841S1	TDA8841S1	TDA8841S1	TDA8846S1
7257	-	-	-	-	-	BC847B	-	BC847B	-	-	-
7258	-	-	-	-	-	BC847B	-	BC847B	-	BC847B	-
7259	-	-	-	-	-	BC847B	-	-	-	BC847B	-

	AV
2210	470
2212	-
2213	-
3218	100
3223	75
3224	-
3228	-

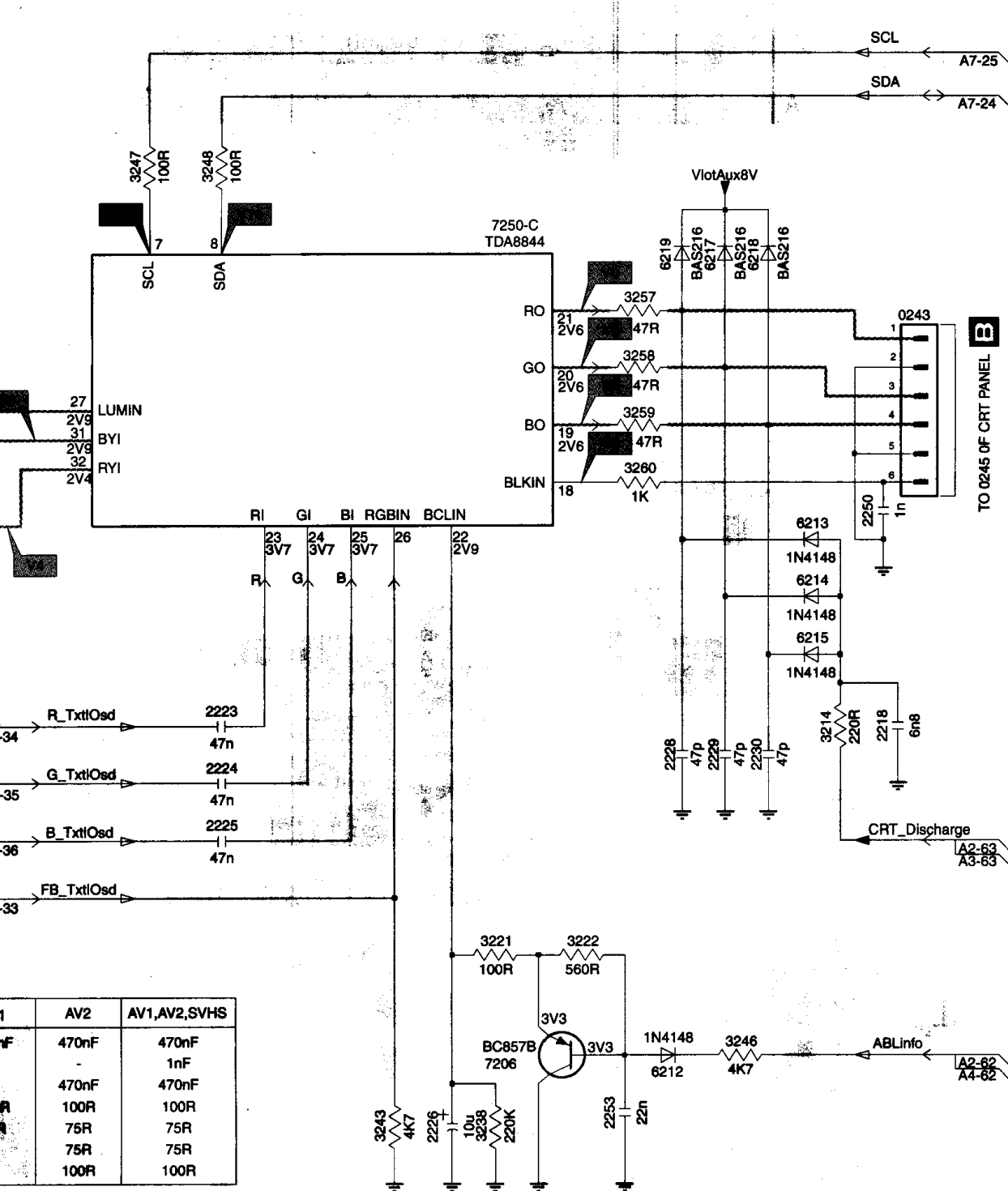
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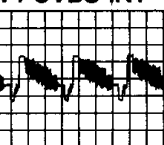
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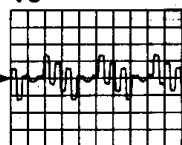
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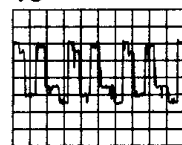
V1 CVBS-INT



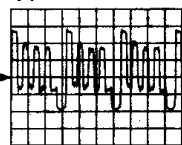
V3



V5



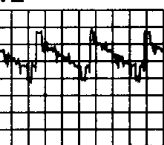
V7



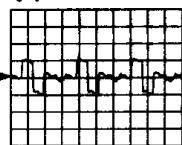
V9



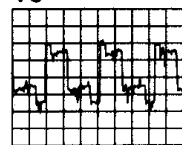
V2



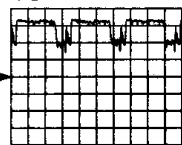
V4



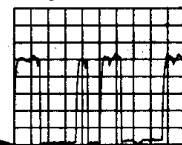
V6



V8

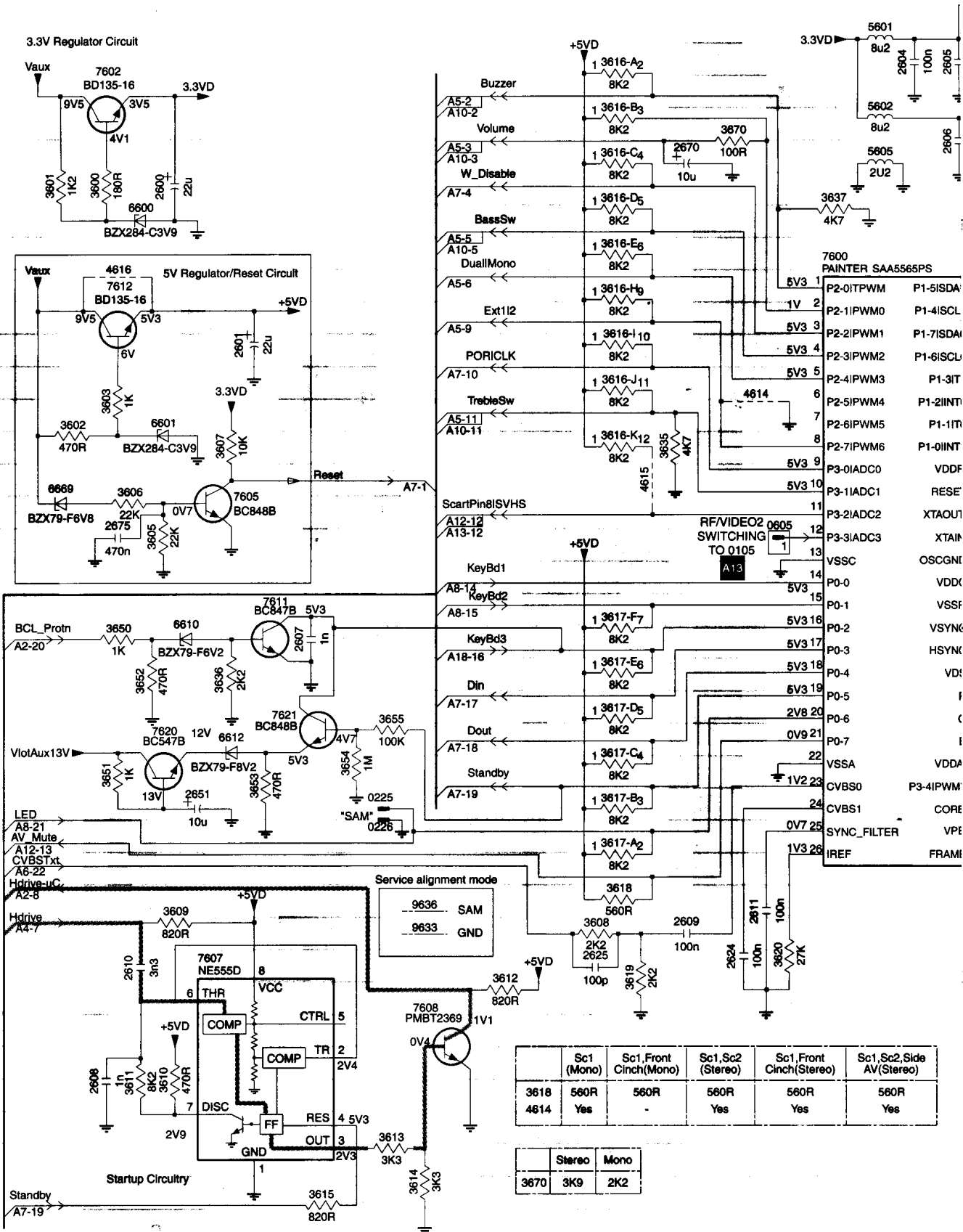


V10



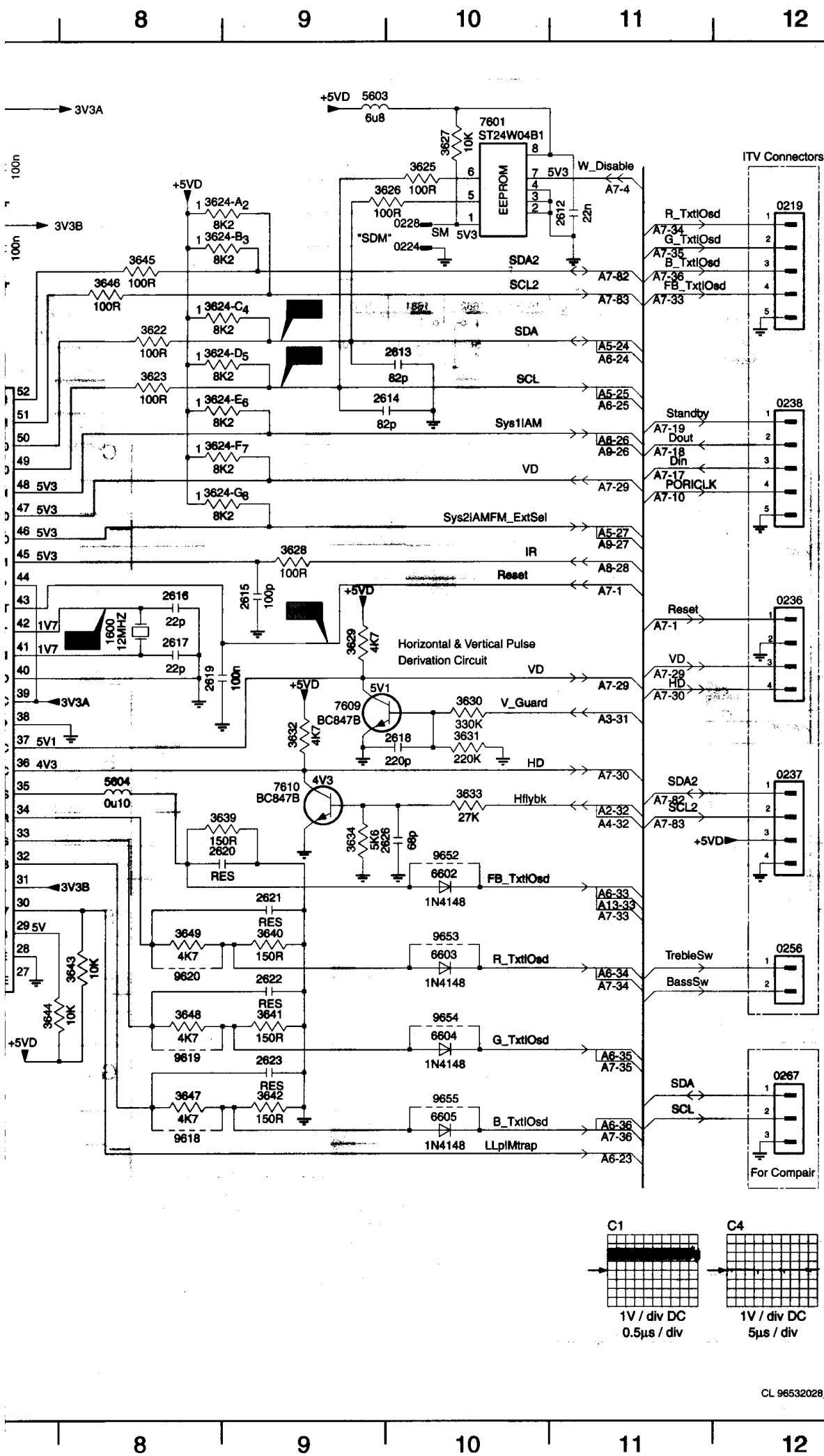
0243 B12
1205 D3
1206 D4
1207 D4
1208 D5
2210 C2
2211 C2
2212 B4
2213 B4
2214 D3
2215 D3
2216 D3
2217 D4
2218 D11
2221 D6
2222 D6
2223 D8
2224 E8
2225 E8
2226 F9
2228 E10
2229 E11
2230 E11
2246 D4
2247 D4
2248 D5
2250 C11
2253 F10
3214 D11
3218 C2
3219 C2
3221 E10
3222 E10
3223 C2
3224 B4
3225 D6
3228 B4
3230 D6
3231 E5
3232 E5
3238 F9
3243 F9
3246 F11
3247 B8
3248 B8
3249 C7
3257 B10
3258 C10
3259 C10
3260 C10
4211 D5
4212 D5
4213 D4
6212 F10
6213 C11
6214 D11
6215 D11
6217 B11
6218 B11
6219 B10
7206 F10
7250-B C3
7250-C B10
7256 B2
7257 E4
7258 E4
7259 D6
9155 B2

A7 CONTROL



	Sc1 (Mono)	Sc1,Front Cinch(Mono)	Sc1,Sc2 (Stereo)	Sc1,Front Cinch(Stereo)	Sc1,Sc2,Side AV(Stereo)
3618	Yes	-	Yes	Yes	Yes
4614	Yes	-	Yes	Yes	Yes

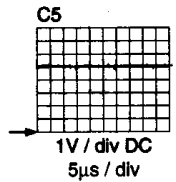
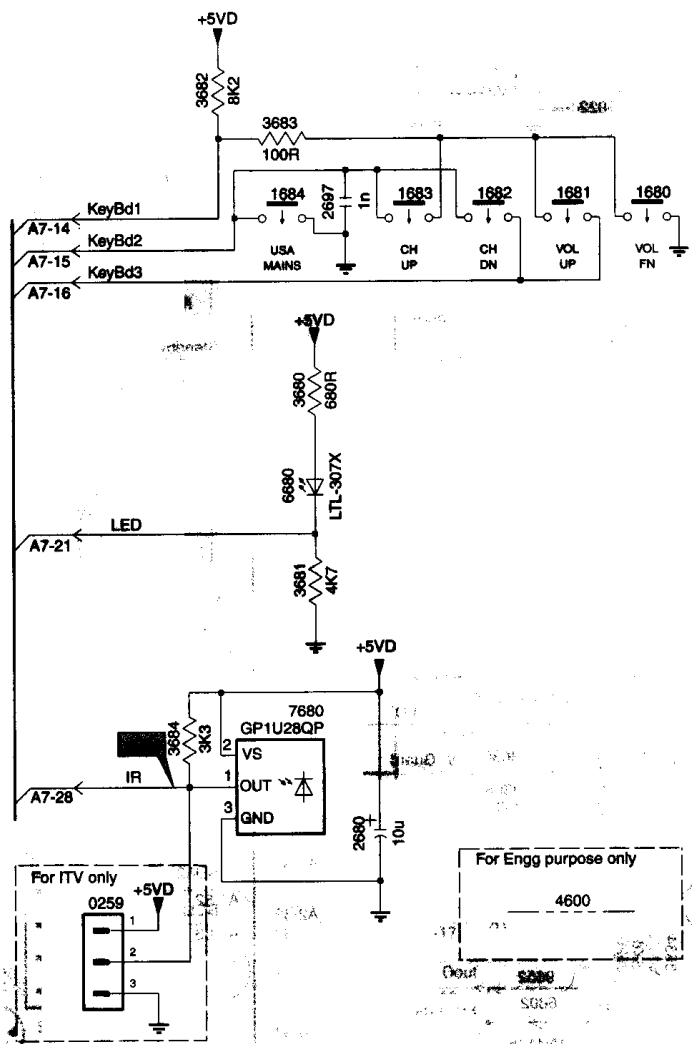
	Stereo	Mono
3670	3K9	2K2



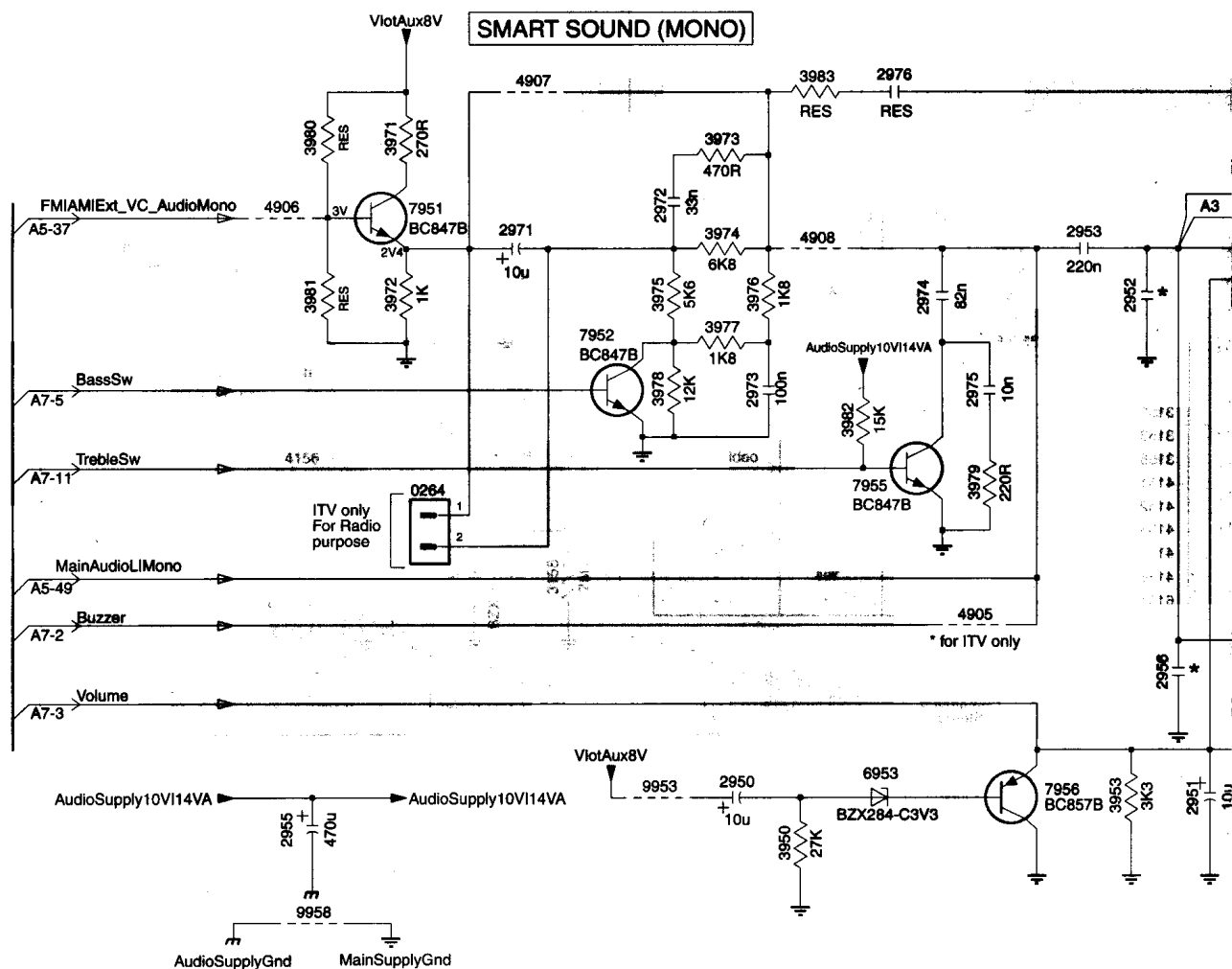
0219	A12	3645	B8
0224	A10	3646	B8
0225	F3	3647	G8
0226	F3	3648	F8
0228	A10	3649	F8
0236	D12	3650	E2
0237	E12	3651	F2
0238	C12	3652	E2
0256	F12	3653	F3
0267	G12	3654	E3
0605	D6	3655	E4
1600	D8	3670	A6
2600	B2	4614	C6
2601	C3	4615	D5
2604	A7	4616	B2
2605	A7	5601	A7
2606	B7	5602	A7
2607	E3	5603	A9
2608	G2	5604	E8
2609	F5	5605	F7
2610	G2	6600	B2
2611	F6	6601	C2
2612	A11	6602	E10
2613	B10	6603	F10
2614	B10	6604	F10
2615	D9	6605	G10
2616	D8	6610	E2
2617	D8	6612	E3
2618	E10	6669	D2
2619	D8	7600	B6
2620	E9	7601	A10
2621	F9	7602	A2
2622	F9	7605	D3
2623	G9	7607	G2
2624	G6	7608	G4
2625	G6	7609	D9
2626	E10	7610	E9
2651	F2	7611	D3
2670	B5	7612	B2
2675	D2	7620	E2
3600	B2	7621	E3
3601	B1	9618	G8
3602	C2	9619	G8
3603	C2	9620	F8
3605	D2	9652	E10
3606	D2	9653	F10
3607	C3	9654	F10
3608	F5	9655	G10
3609	F2		
3610	G2		
3611	G2		
3612	G4		
3613	H4		
3614	H4		
3615	H3		
3616-A	A5		
3616-B	A5		
3616-C	B5		
3616-D	B5		
3616-E	B5		
3616-H	B5		
3616-I	C5		
3616-J	C5		
3616-K	C5		
3617-A	F5		
3617-B	F5		
3617-C	E5		
3617-D	E5		
3617-E	E5		
3617-F	E5		
3618	F5		
3619	G5		
3620	G6		
3622	B8		
3623	B8		
3624-A	A9		
3624-B	A9		
3624-C	B9		
3624-D	B9		
3624-E	B9		
3624-F	C9		
3624-G	C9		
3625	A10		
3626	A10		
3627	A10		
3628	C9		
3629	D9		
3630	D10		
3631	E10		
3632	E9		
3633	E10		
3634	E9		
3635	C5		
3636	E3		
3637	B6		
3639	E9		
3640	F9		
3641	F9		
3642	G9		
3643	F8		
3644	F7		

0259 E3
1680 B5
1681 B5
1682 B4
1683 B4
1684 B3
2680 E4
2697 B4
3680 C3
3681 D3
3682 B3
3683 B3
3684 E3
4600 E5
6680 C3
7680 D4

A8 FRONT CONTROL



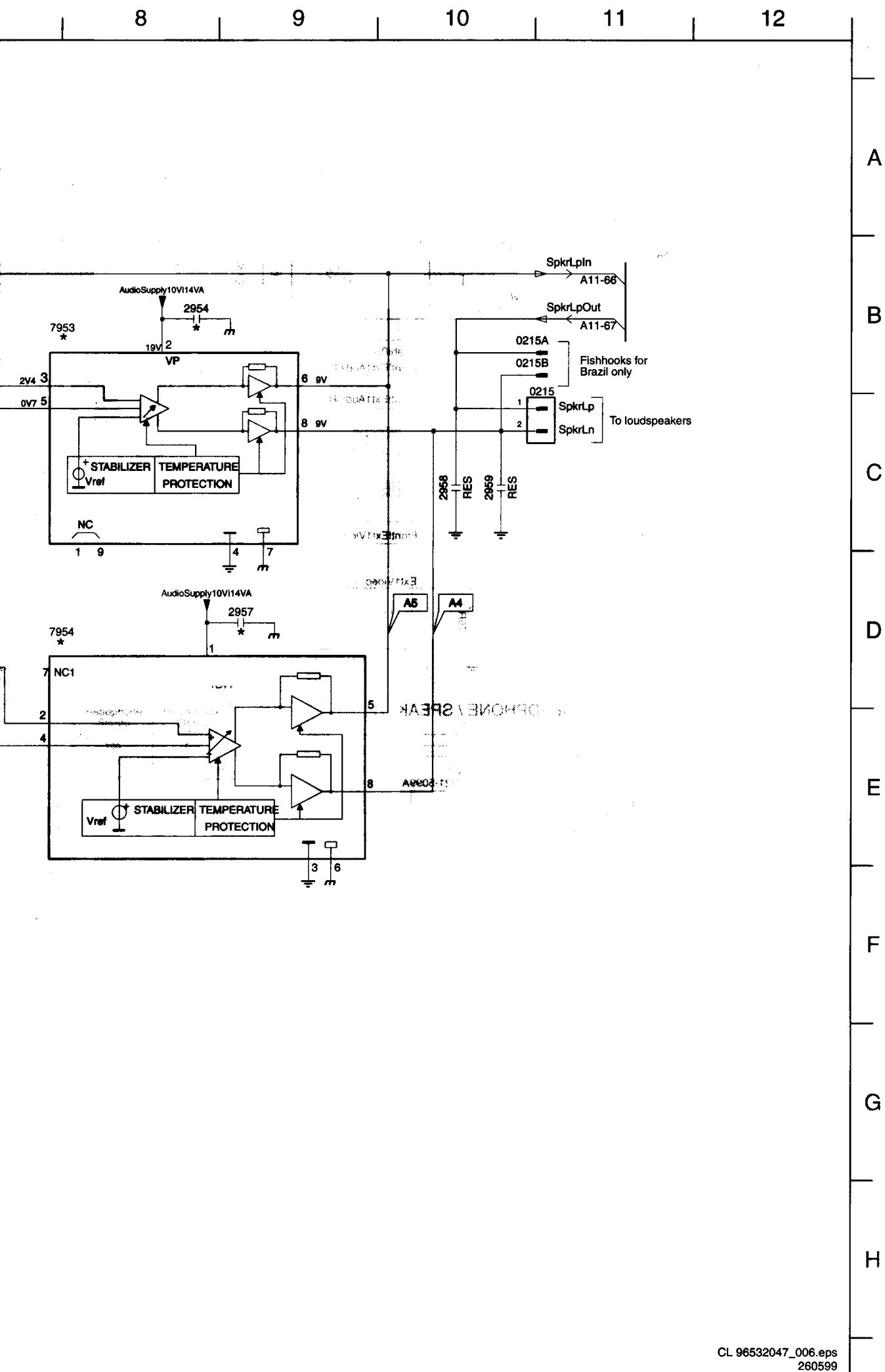
A1 Ø SMART SOUND + MONO SOUND AMPLIFIER



Sound Control		
	Smart Sound	Basic Sound
2972	33nF	-
2973	100nF	-
2974	82nF	-
2975	10nF	-
3973	470R	-
3974	6K8	Jumper
3975	5K6	-
3976	1K8	-
3977	1K8	-
3978	12K	-
3979	220R	-
7952	BC847B	-
7955	BC847B	-

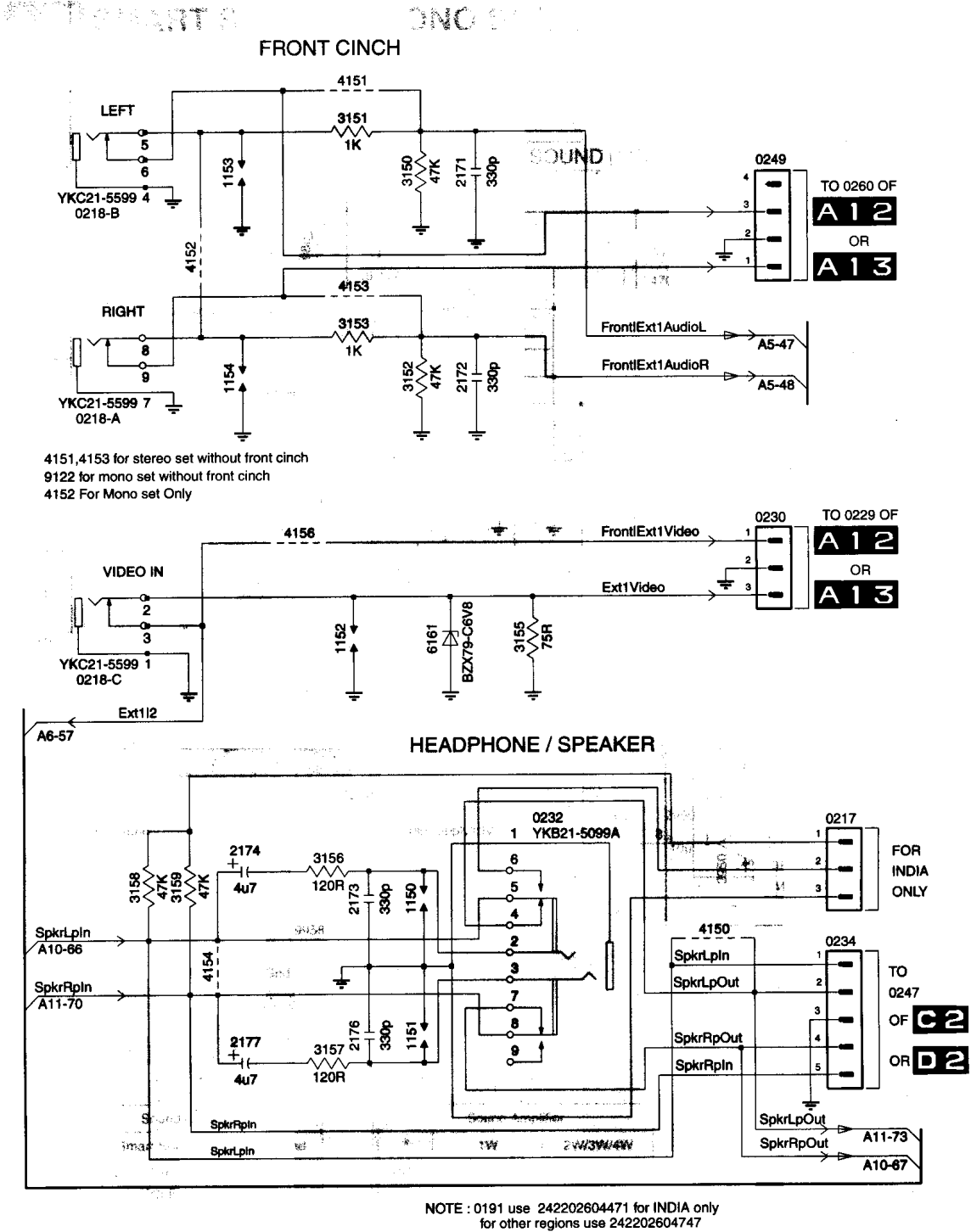
Sound Amplifier		
*	1W	2W/3W/4W
2952	-	2n2
2954	-	220nF
2956	2n2	-
2957	220nF	-
7953	-	TDA7052B
7954	TDA7056B	-

	BassSw	TrebleSw
ON	L	L
OFF	H	H



0215 C10
0215A B11
0215B B11
0264 D4
2950 E5
2951 E7
2952 C7
2953 B6
2954 B8
2955 E3
2956 D7
2957 D9
2958 C10
2959 C10
2971 B4
2972 B5
2973 C5
2974 C6
2975 C6
2976 B6
3950 E5
3953 E7
3971 B3
3972 C3
3973 B5
3974 B5
3975 C5
3976 C5
3977 C5
3978 C5
3979 D6
3980 B3
3981 C3
3982 C5
3983 B5
4905 D6
4906 B3
4907 B4
4908 B5
6953 E6
7951 B3
7952 C4
7953 B7
7954 D7
7955 D5
7956 E6
9953 E5
9958 F3

A 11 FRONT CINCH + HEADPHONE



8

9

10

11

12

0217 E6
 0218-A C2
 0218-B B2
 0218-C D2
 0230 C5
 0232 E4
 0234 F6
 0249 B5
 1150 E3
 1151 F3
 1152 D3
 1153 B3
 1154 C3
 2171 B4
 2172 C4
 2173 E3
 2174 E3
 2176 F3
 2177 F3
 3150 B3
 3151 A3
 3152 C3
 3153 B3
 3155 D4
 3156 E3
 3157 F3
 3158 E2
 3159 E2
 4150 F5
 4151 A3
 4152 B2
 4153 B3
 4154 F2
 4156 D3
 6161 D4

A

B

C

D

E

F

G

H

Front I/O Configuration

	SC1 Mono	SC1,Front Cinch Mono	SC1,SC2 Stereo	SC1,Front Cinch Stereo	SC1,SC2,Side AV Stereo
0218	-	B,C	-	A,B,C	-
0230	-	Yes	-	Yes	-
0249	-	Yes	Yes	Yes	-
2171	-	-	-	330pF	-
2172	-	330pF	-	330pF	-
3150	-	-	-	47K	-
3151	-	-	-	1K	-
3152	-	47K	-	47K	-
3153	-	1K	-	1K	-
3155	-	-	-	-	-
4151	-	-	Yes	-	-
4152	-	Yes	-	-	-
4153	-	Yes	Yes	-	-
4155	-	Yes	-	-	-
4156	-	-	-	Yes	-
6161	-	-	-	-	-

Headphone Configuration

	Headphone Stereo	Headphone Stereo
0232	Yes	Yes
0234	Yes	-
2173	330pF	330pF
2174	10uF	10uF
2176	330pF	330pF
2177	10uF	10uF
3156	270R	270R
3157	270R	270R
4154	-	Yes

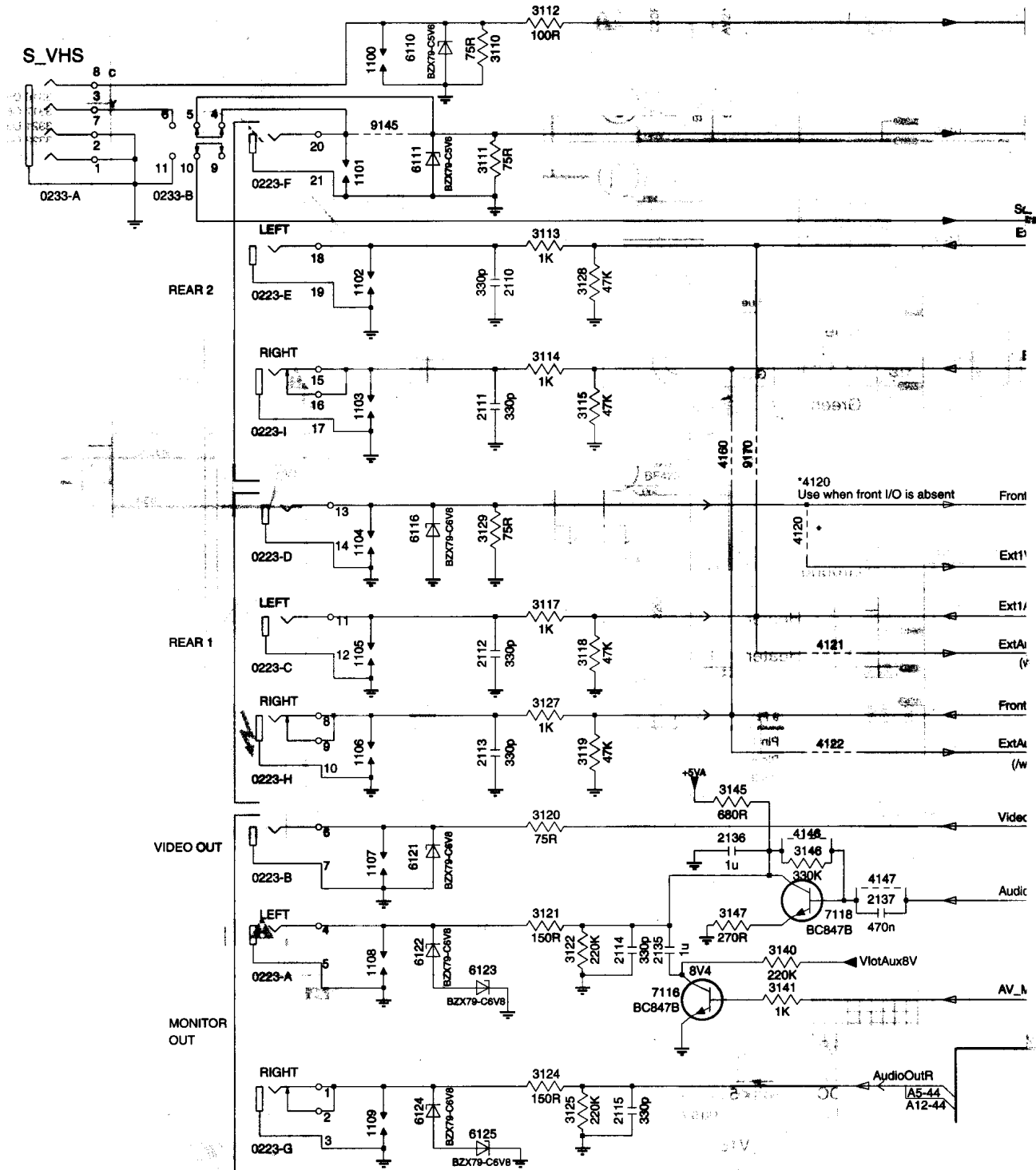
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12

A12 REAR I/O CINCH

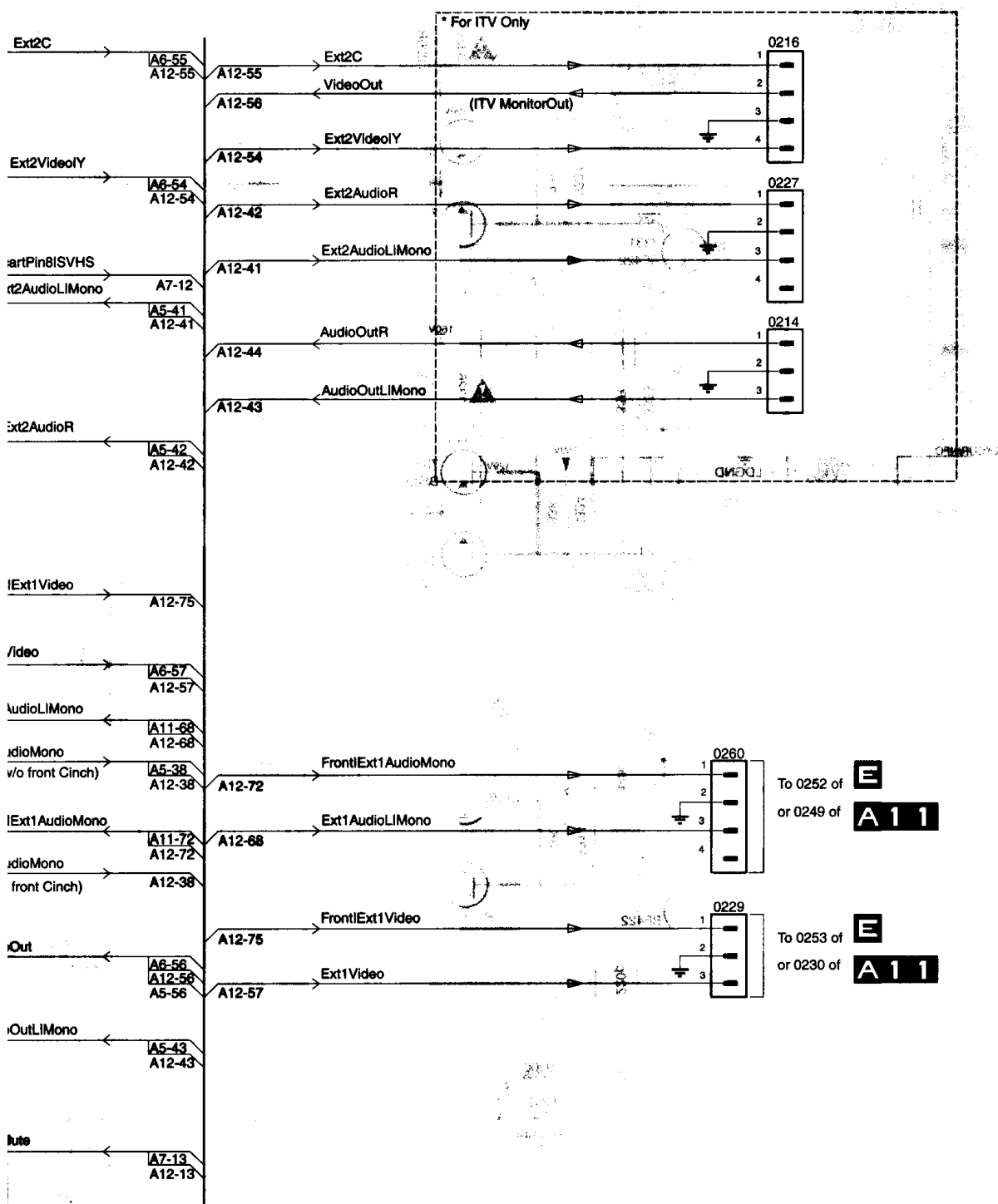
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12



0214 B11
0216 A11
0223-A G3
0223-B F3
0223-C E3
0223-D D3
0223-E C3
0223-F B3
0223-G H3
0223-H E3
0223-I C3
0227 B11
0229 E11
0233-A B2
0233-B B2
0260 E11
1100 A4
1101 B3
1102 C3
1103 C3
1104 D3
1105 E3
1106 E3
1107 F4
1108 F4
1109 G4
2110 C4
2111 C4
2112 E4
2113 E4
2114 F5
2115 G5
2135 F5
2136 F6
2137 F6
3110 A4
3111 B4
3112 A5
3113 B5
3114 C5
3115 C5
3117 D5
3118 E5
3119 E5
3120 F5
3121 F5
3122 F5
3124 G5
3125 G5
3127 E5
3128 C5
3129 D4
3140 F6
3141 G6
3145 E6
3146 F6
3147 F6
4120 D6
4121 E6
4122 E6
4146 F6
4147 F6
4160 D6
6110 A4
6111 B4
6116 D4
6121 F4
6122 F4
6123 F4
6124 G4
6125 G4
7116 G5
7118 F6
9145 B4
9170 D6

7

7

8

9

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11

12

VG2 F10

0165 B8

0244 G3

0245 C2

0254 D8

1300 B8

2313 F4

2323 D4

2331 B4

2341 F6

2342 H3

2343 H4

3311 F3

3312 F4

3313 F4

3314 E4

3316 D5

3317 C6

3321 D3

3322 D4

3323 E4

3324 C4

3326 C5

3327 C6

3331 C3

3332 C4

3333 C4

3334 B4

3336 A5

3337 B7

3341 E6

3347 F5

3348 E6

3349 F7

3350 F7

5341 G3

5342 H3

6311 E5

6321 C5

6331 B5

6341 A5

6342 G4

6343 G6

7311 F4

7312 E5

7313 E5

7321 D4

7322 C5

7323 D5

7331 B4

7332 B5

7333 B5

9300 F4

A

B

C

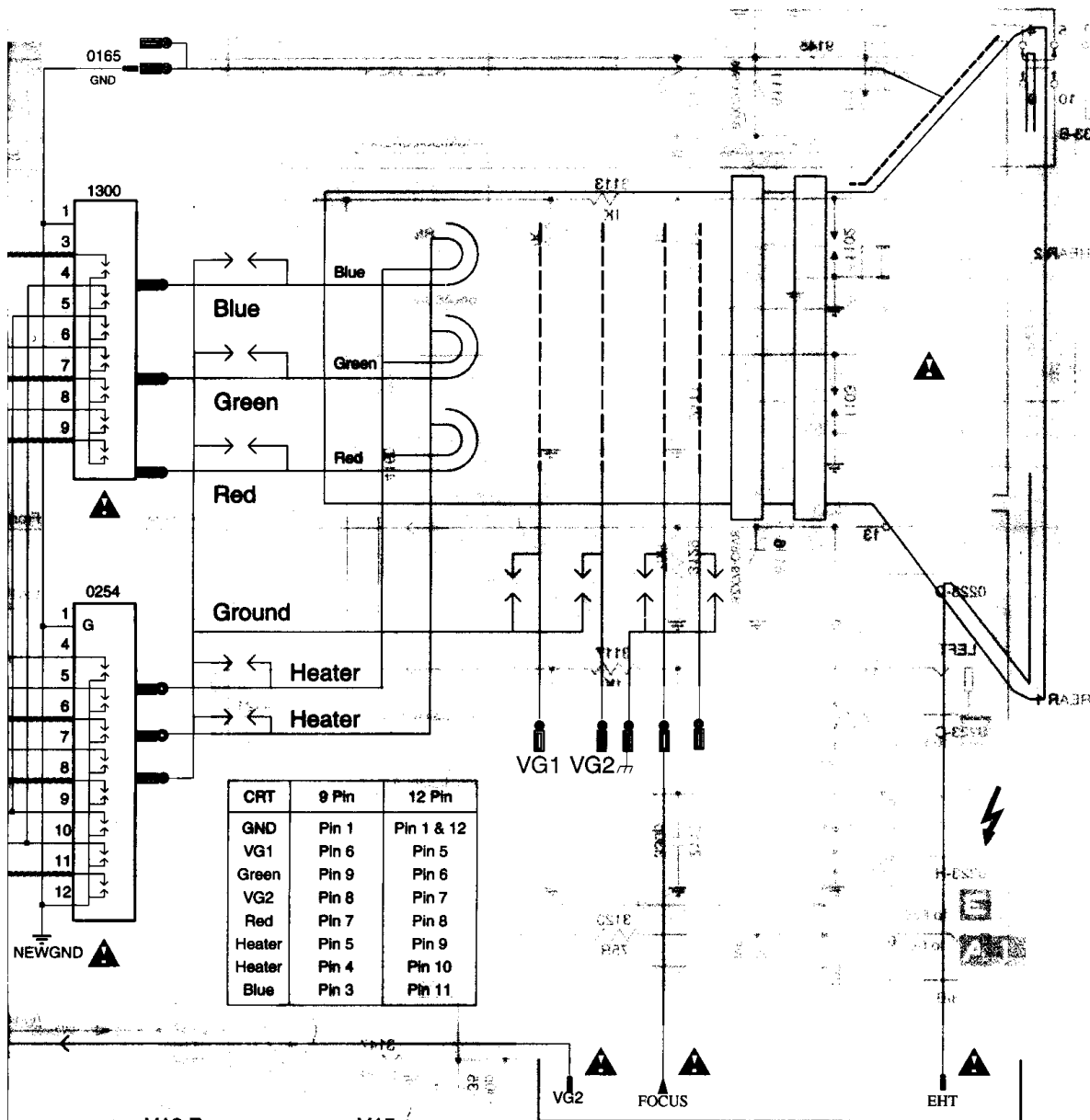
D

E

F

G

H



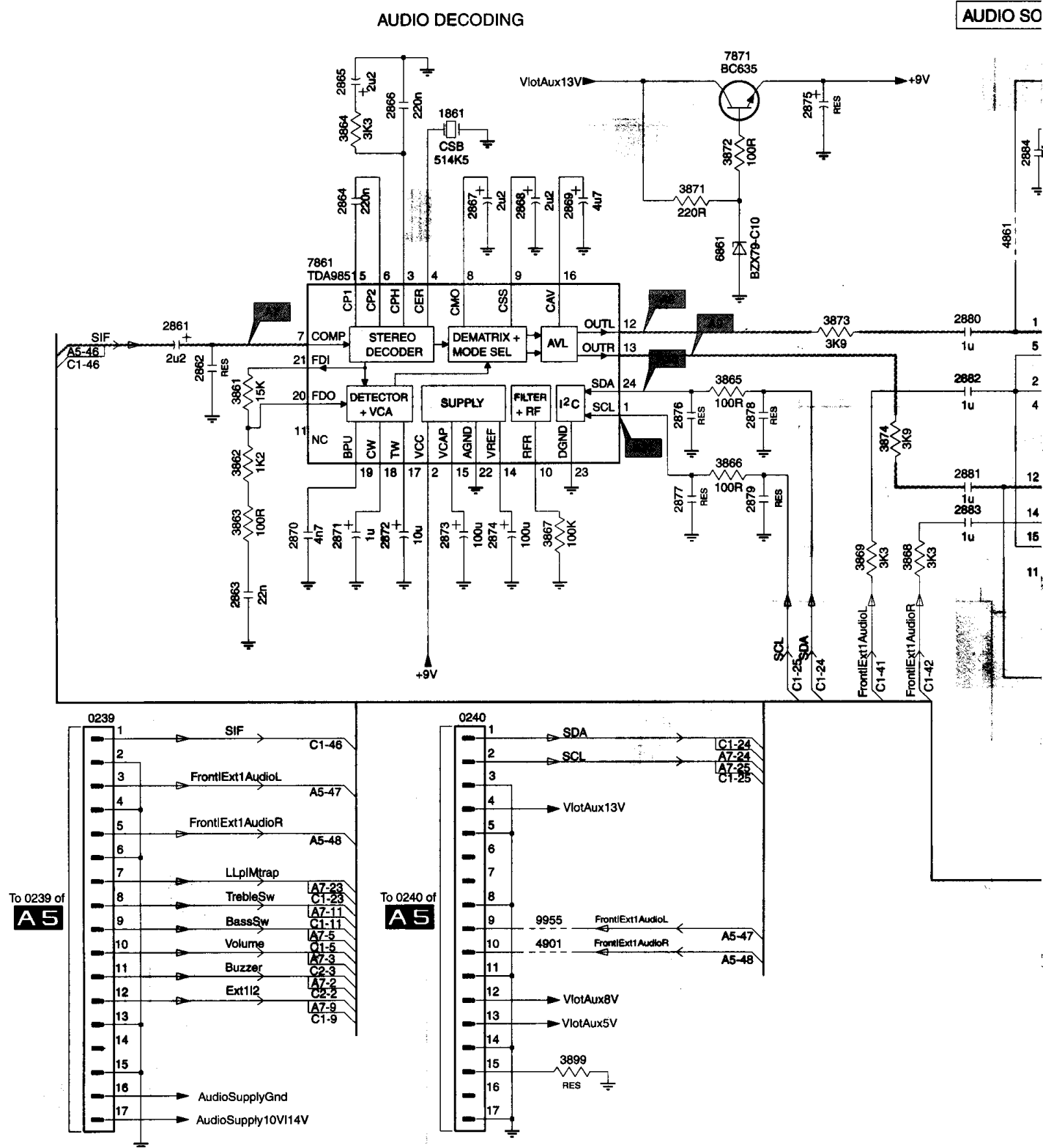
V13 B

V15

FROM MAIN CHASSIS LOT OF A2

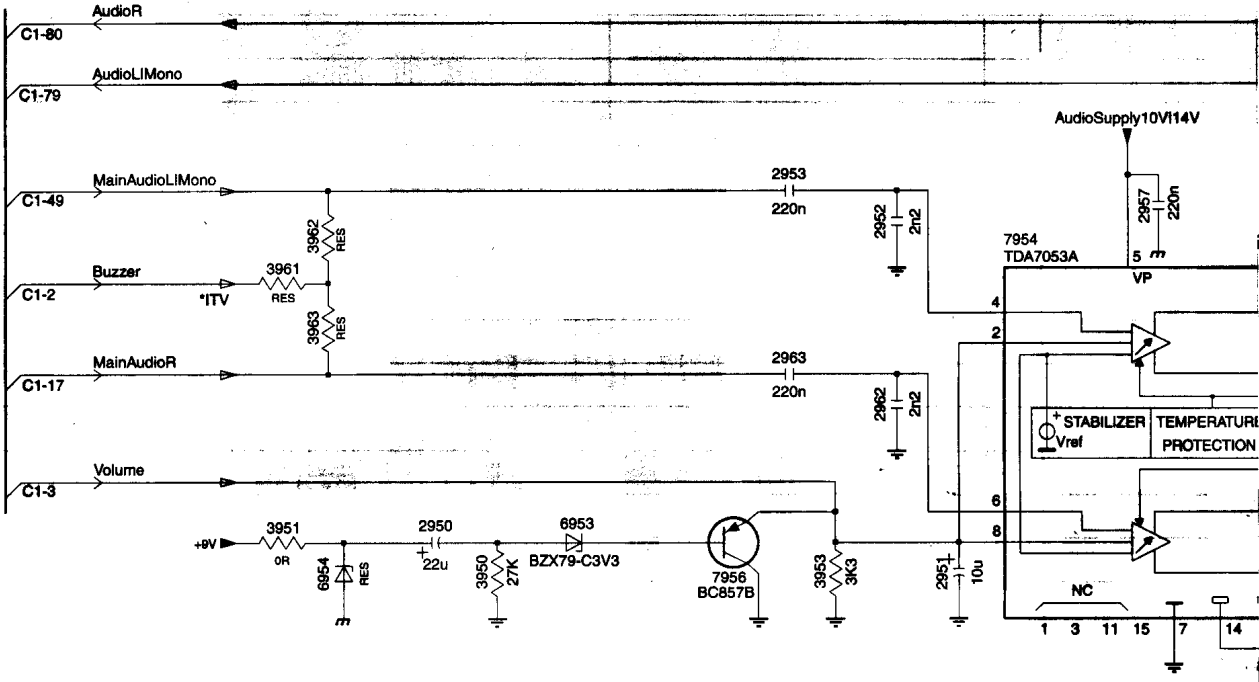
V14

V16

C 1 BTSC DECODING + SOURCE SELECT + SMART SOUND (STEREO)

1 2 3 4 5 6 7

C2 SOUND AMPLIFIER



BTSC DECODING + SOURCE SELECT + SMART SOUND SOUND AMPLIFIER

	Smart Sound	Basic Sound
2922	33nF	-
2923	100nF	-
2924	82nF	-
2925	10nF	-
2972	33nF	-
2973	100nF	-
2974	82nF	-
2975	10nF	-
3923	470R	-
3924	6K8	Jumper
3925	5K6	-
3926	1K8	-
3927	1K8	-
3928	12K	-
3929	220R	-
3973	470R	-
3974	6K8	Jumper
3975	5K6	-
3976	1K8	-
3977	1K8	-
3978	12K	-
3979	220R	-
7922	BC847B	-
7923	BC847B	-
7952	BC847B	-
7955	BC847B	-

	AV	No AV
2882	1uF	-
2883	1uF	-
2884	100nF	-
3868	3K3	-
3869	3K3	-
4861	-	Yes
4862	-	Yes
7862	HEF4052BT	-

	Headphone	No Headphone
0247	Yes	-
4905	-	Yes
4906	-	Yes

1 2 3 4 5 6 7

8

9

10

11

12

0246 C9
0247 C11
2950 C3
2951 D6
2952 B6
2953 B5
2955 E10
2957 B7
2958 D9
2959 D9
2960 D9
2961 D9
2962 C6
2963 C5
2964 A8
2965 A8
3950 D4
3951 C3
3953 D5
3954 A8
3955 A8
3961 B3
3962 B3
3963 C3
4905 C8
4906 C8
6953 C4
6954 D3
7954 B6
7956 D5
9958 E10

A

B

C

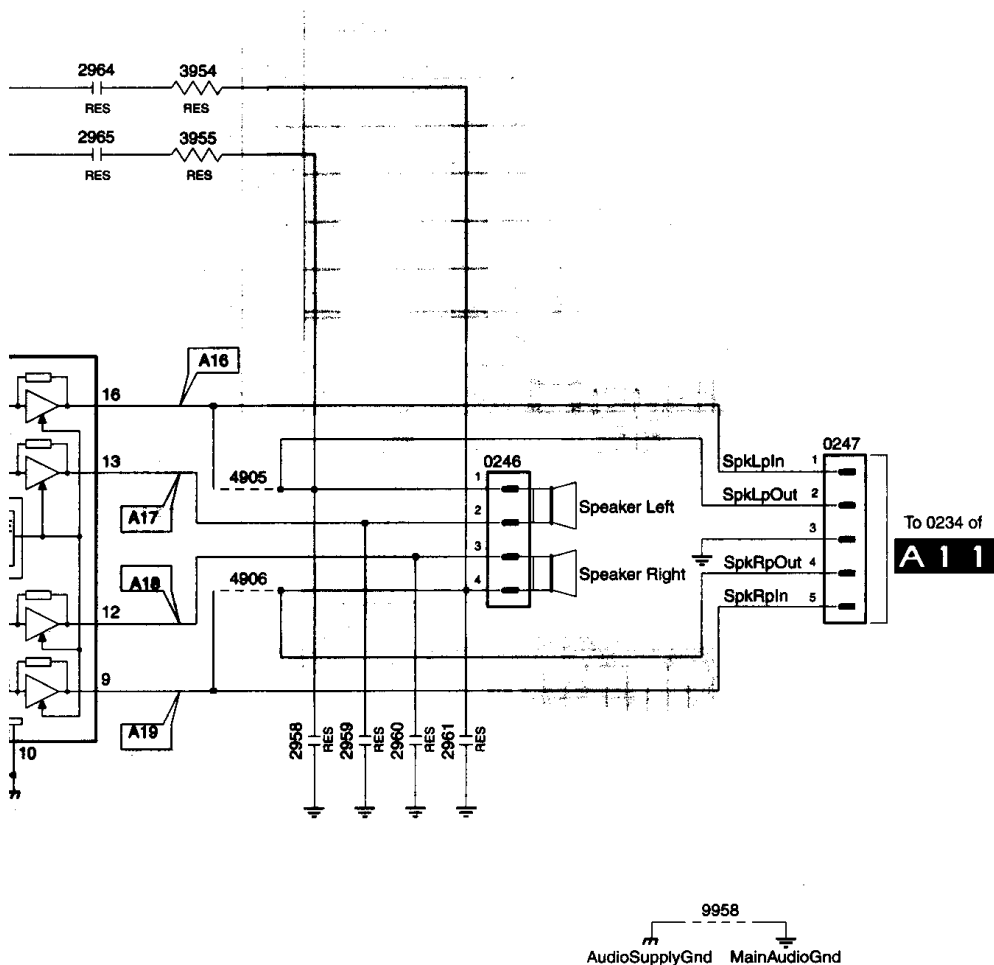
D

E

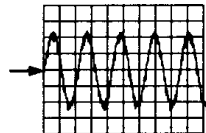
F

G

H

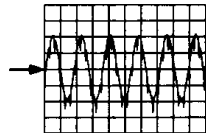


A16 R+



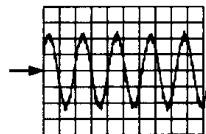
0.2V / div AC
0.5ms / div

A18 L+



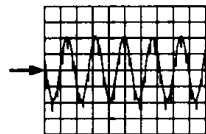
0.2V / div AC
0.2ms / div

A17 R-



0.2V / div AC
0.5ms / div

A19 L-



0.2V / div AC
0.2ms / div

8

9

10

11

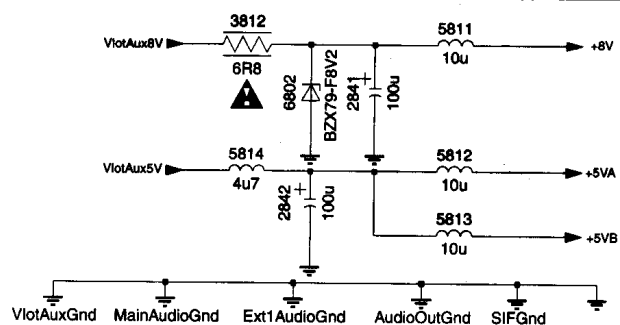
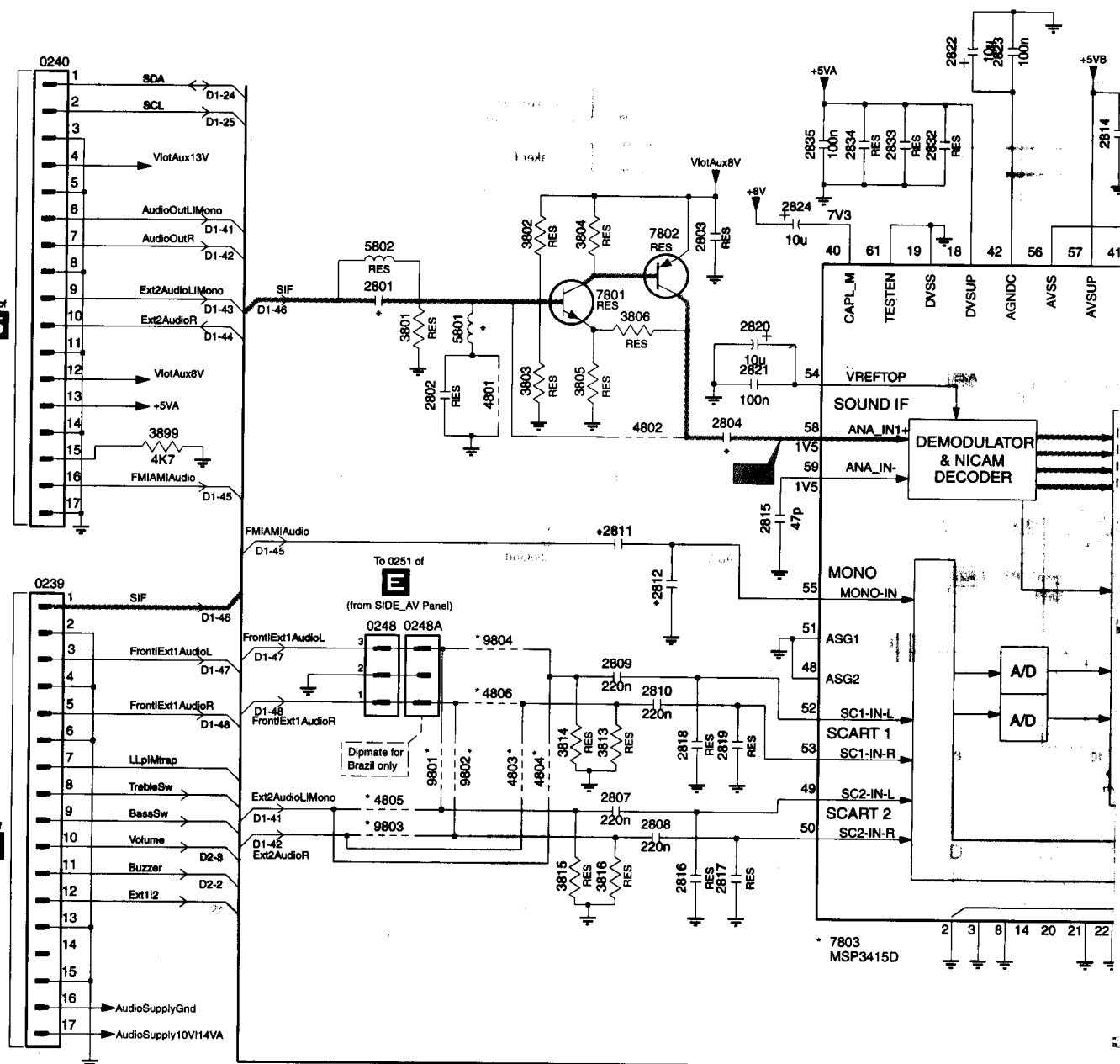
12

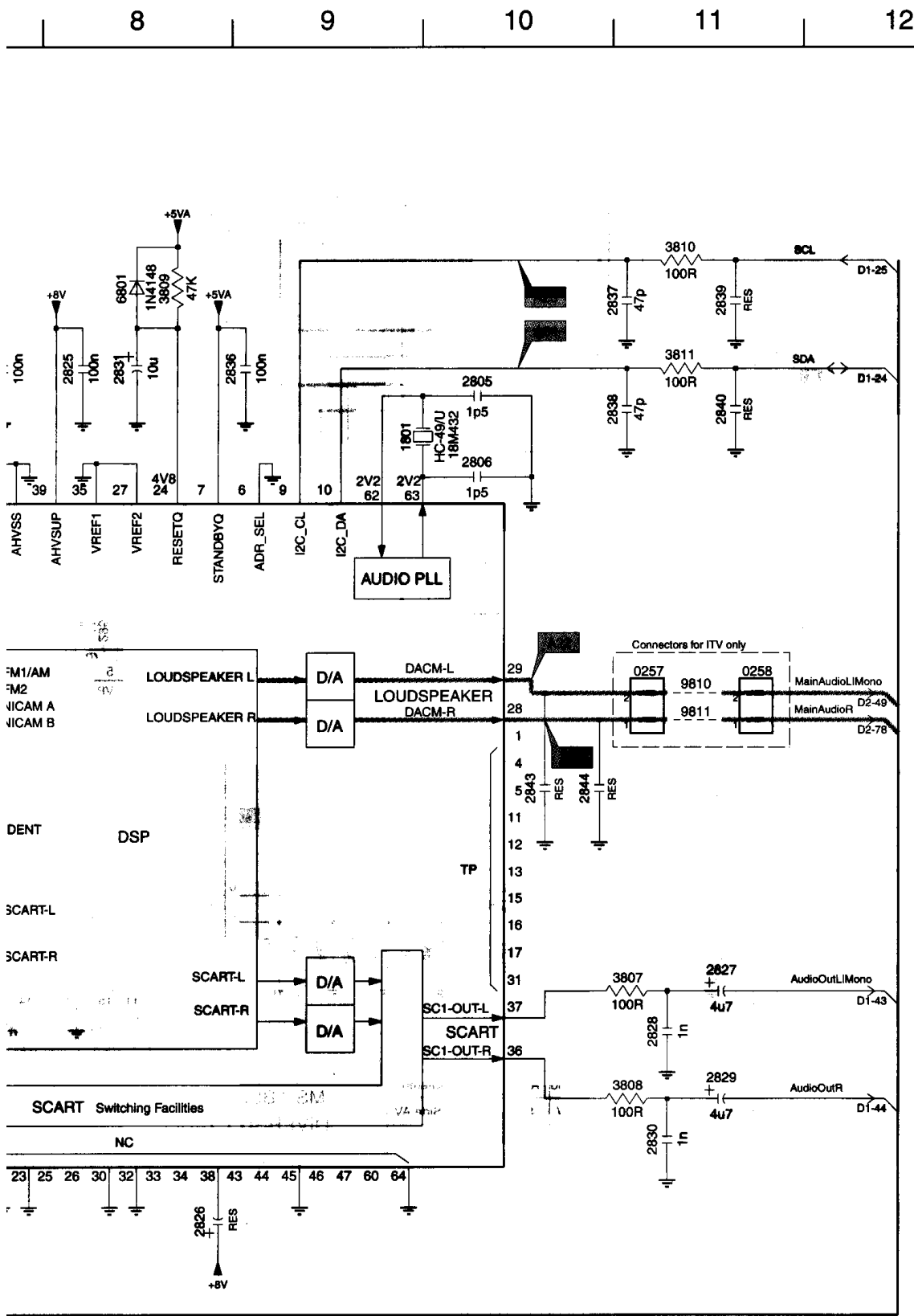
D 1 ITT AUDIO DECODING

0240
1 SDA
2 SCL
3
4 VlotAux13V
5
6 AudioOutLIMono
7 AudioOutR
8
9 Ext2AudioLIMono
10 Ext2AudioR
11
12 VlotAux8V
13 +5VA
14 3899
15 4K7
16 FMIAMIAudio
17

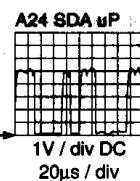
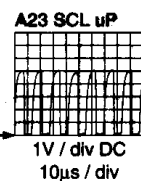
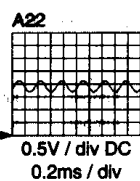
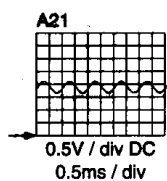
To 0240 of
A5

To 0239 of
A5

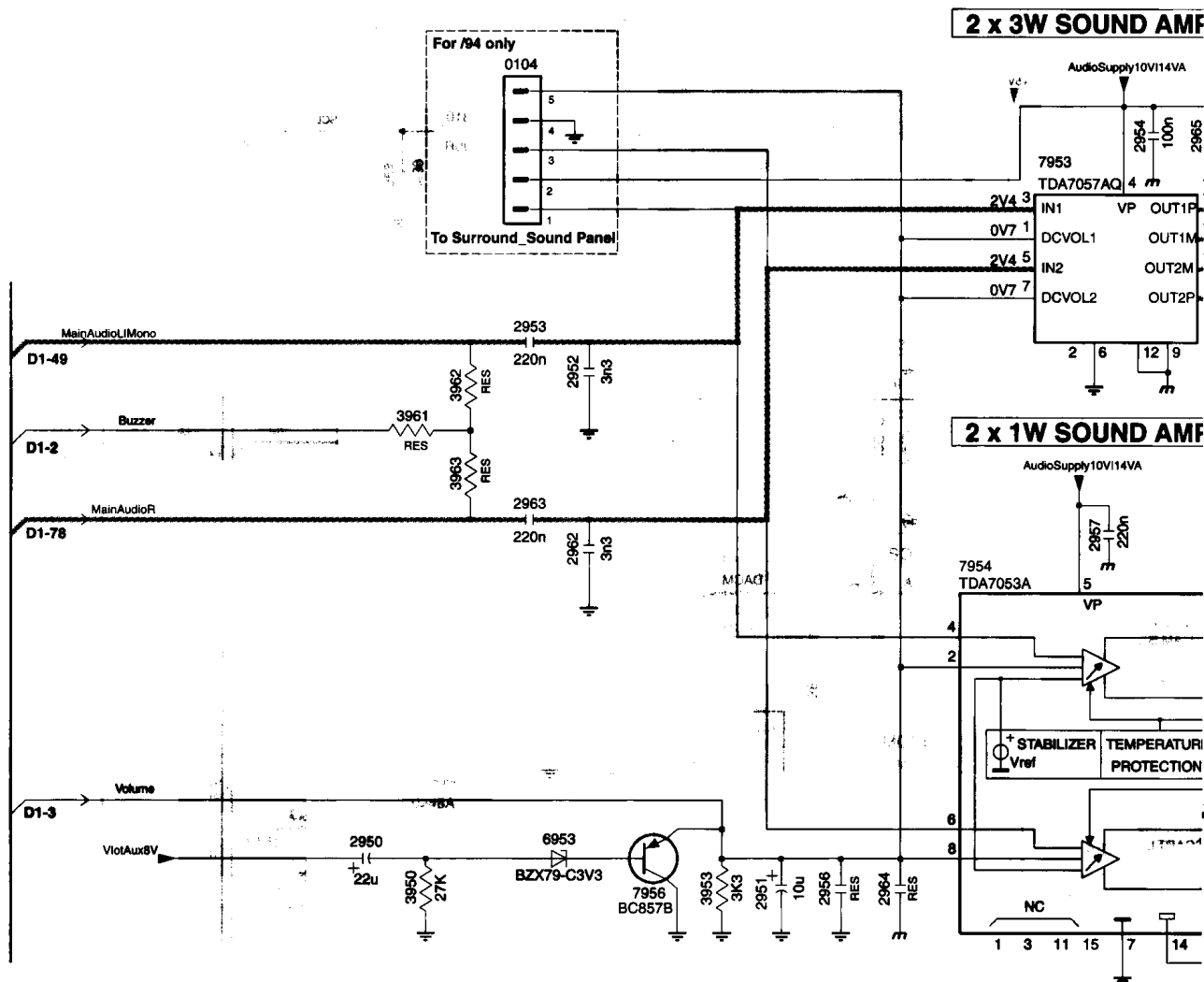




A20 1V5 DC



0239 D2
0240 B2
0248 E3
0248A E4
0257 D11
0258 D11
1801 B9
2801 C3
2802 C4
2803 C5
2804 D5
2805 B10
2806 B10
2807 E5
2808 F5
2809 E5
2810 E5
2811 D5
2812 D5
2814 B7
2815 D5
2816 F5
2817 F5
2818 E5
2819 E5
2820 C5
2821 C5
2822 B6
2823 B7
2824 B6
2825 B8
2826 F8
2827 E11
2828 E11
2829 F11
2830 F11
2831 B8
2832 B6
2833 B6
2834 B6
2835 B6
2836 B9
2837 B11
2838 B11
2839 B11
2840 B11
2841 G6
2842 H5
2843 D10
2844 D10
3801 C4
3802 C4
3803 C4
3804 C4
3805 C4
3806 C5
3807 E11
3808 F11
3809 B8
3810 A11
3811 B11
3812 G5
3813 E5
3814 E4
3815 F4
3816 F5
3899 D2
4801 C4
4802 D5
4803 E4
4804 E4
4805 F3
4806 E4
5801 C4
5802 C3
5811 G6
5812 H6
5813 H6
5814 H5
6801 B8
6802 G5
7801 C5
7802 B5
7803 F6
9801 E4
9802 E4
9803 F3
9804 E4
9810 D11
9811 D11

D 2 ITT AUDIO AMPLIFIER**SOUND SYSTEM**

.	EUROPE-NICAM/2CS		NAFTA/LATAM-BTSC		AP-NICAM/2CS/Multi-Mono		AP-RF-Mono/AV-Stereo	
	Side AV	No Side AV	Side AV	No Side AV	Side AV	No Side AV	Side AV	No Side AV
0248	Yes	-	Yes	-	Yes	-	Yes	-
2801	22p	22p	22p	22p	22p	22p	-	-
2804	22p	22p	22p	22p	22p	22p	-	-
2811	-	-	-	-	-	-	220n	220n
2812	-	-	-	-	-	-	1n	1n
2827	10u	10u	4u7	4u7	4u7	4u7	4u7	4u7
2837	100p	100p	47p	47p	47p	47p	47p	47p
2838	100p	100p	47p	47p	47p	47p	47p	47p
3899	5k6	4k7	-	-	-	-	-	-
4801	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper	-	-
4802	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper	-	-
4803	Jumper	-	-	-	-	-	-	-
4804	Jumper	-	-	-	-	-	-	-
4805	-	-	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper
4806	-	-	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper
5801	15u	15u	22u	22u	15u	15u	-	-
7803	MSP3415D	MSP3415D	MSP3435G	MSP3435G	MSP3415D	MSP3415D	BSP3505D	BSP3505D
9801	Jumper	Jumper	-	-	-	-	-	-
9802	Jumper	Jumper	-	-	-	-	-	-
9803	-	-	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper
9804	-	-	Jumper	Jumper	Jumper	Jumper	Jumper	Jumper

MSP/BSP SOUND DIVERSITY TABLE**SOUND AMPLIFIER**

	2x1W	2x3W
2954	-	100n
2957	220n	-
2965	-	220n
7953	TDA7053A	-
7954	-	TDA7057AQ
9958	Jumper	-

HEADPHONE

	Headphone	No Headphone
0247	Yes	-
9950	-	Jumper
9952	-	Jumper

8

9

10

11

12

0104 A4
0246 B10
0247 B11
2950 E3
2951 E5
2952 C4
2953 B4
2954 A7
2955 D10
2956 E5
2957 C7
2958 C9
2959 C9
2960 C9
2961 C9
2962 C4
2963 C4
2964 E6
2965 A7
2966 A7
3950 E3
3953 E5
3961 C3
3962 C3
3963 C3
4988 E9
4990 D10
6953 E4
7953 B6
7954 C6
7956 E4
9950 B9
9952 B9
9958 D10

A

B

C

D

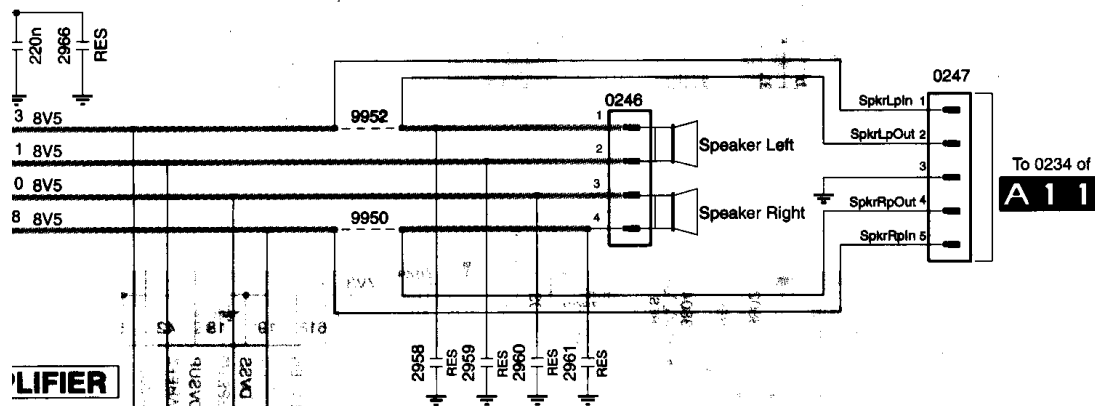
E

F

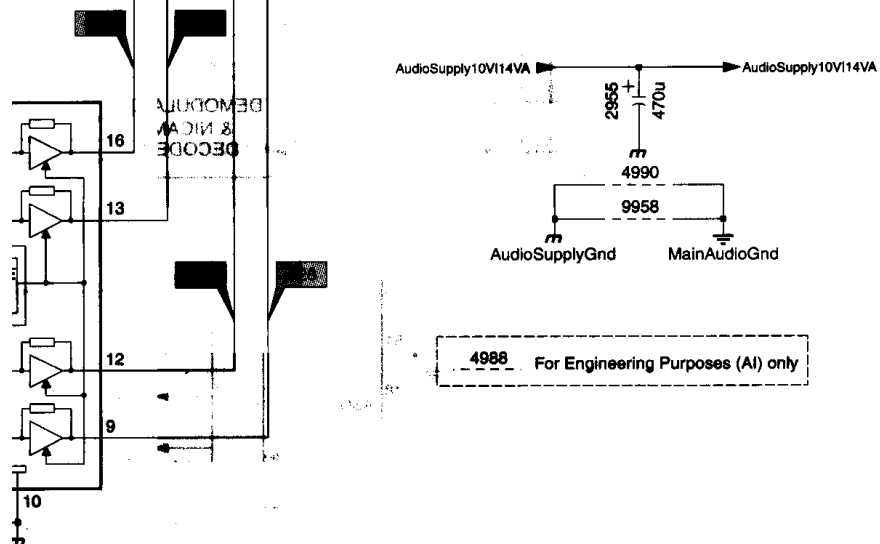
G

H

LIFIER



LIFIER



AudioSupply10V14VA

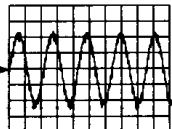
AudioSupply10V14VA

AudioSupplyGnd

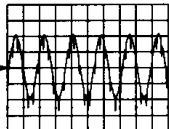
MainAudioGnd

4988 For Engineering Purposes (AI) only

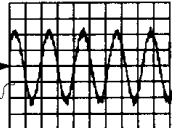
A25 L+

0.2V / div AC
0.5ms / div

A26 L-

0.2V / div AC
0.2ms / div

A27 R+

0.2V / div AC
0.5ms / div

A28 R-

0.2V / div AC
0.2ms/div

8

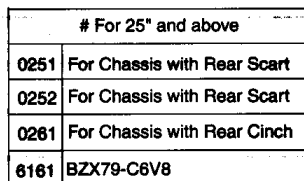
9

10

11

12

1 **2** **3** **4** **5**



8. Alignments

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

8.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220V - 240V (10%)
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: $R_i > 10M\Omega$ $C_i < 2,5\text{ pF}$.

8.1.1 Selection of the SDM-menu

- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 062596 (within OSD time-out) MENU
- By shorting test-point 0228 and 0224 on the mono-carrier while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections).

8.1.2 Selection of the SAM-menu

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool
- By pressing the "CHANNEL DOWN" and "VOLUME DOWN" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 062596 (within OSD time-out) OSD
- By shorting test-point 0225 and 0226 on the mono-carrier while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections).

8.2 Electrical Alignments

8.2.1 VG2

- Use a pattern generator to display a normal black picture.
- Program the pattern generator with a frequency of 475.25 MHz for PAL/SECAM or 61.25MHz for BTSC
- Switch on the TV set.
- Select the SDM-MENU. The tuner is set to a frequency of 475.25 MHz for PAL/SECAM or 61.25MHz for BTSC.
- Select the " SAM-MENU".
- Press the "MENU" key on the RC to leave the SAM-MENU and go to the normal user menu ("SAM" remains displayed at the top of the screen). Select with the MENU UP/DOWN command the sub-menu BRIGHTNESS. Change the default value from 31 to 50 with the MENU LEFT/RIGHT keys. Select the CONTRAST sub-menu and change the value from 31 to 0.
- Leave the normal user menu to return to the SAM-MENU, by pressing the MENU key on the RC.
- Select sub-menu VSD and change the value from 0 to 1 by pressing the MENU LEFT key. CAUTION!! Depending on the position of the VG2 potentiometer, the screen will turn completely black because the Vertical Scan has been disabled.
- Adjust with VG2 potentiometer (positioned at LOT 5545) the blue line at the middle of the screen till this line is just not visible.

- The alignment of the VG2 has been completed; Switch the set to Standby. The values adapted at the BRIGHTNESS- and the CONTRAST-menu during the alignment, will change back again to their default values.

8.2.2 Focusing

Set pattern generator (e.g. PM5418) with Circle and Small Squares pattern and connect to aerial input with RF signal amplitude - 10mv. Adjusted with focusing potentiometer (positioned at LOT 5545) for maximum sharpness of the picture.

8.2.3 Adjustment of the Power Supply

- Set pattern generator (e.g. PM5418) with Circle and Small Squares pattern and connect to aerial input with RF signal amplitude - 10mv.
- Switch on the set.
- Select the 300Vdc voltage range when using a normal multi-meter.
- Connect the DC multi-meter to capacitor 2409.
- Adjust potentiometer R3540 till the DC multi-meter indicates 95V.

8.3 SOFTWARE ADJUSTMENT

8.3.1 Geometry adjustments

- Set pattern generator (e.g. PM5418) with Circle and Small Squares pattern on 475.25 MHz for PAL/SECAM and connect to aerial input with RF signal amplitude - 10mV, France select L'-signal.
- First enter the SDM mode to set the tuner at 475.25 MHz.
- Enter the SAM mode and then select GEOMETRY with the up/down keys buttons on the RC the respective items can be selected. Use the left/right buttons to adjust the selected items to correct the picture geometry as stated below.

Vertical Amplitude and Position

- Select Vertical Slope "VSL" and shift the test pattern to the top. The text VSL and its value should be above the upper half of the screen
 - Select Service Blanking "SBL" and set it to 1. The lower half of the picture will be blanked.
 - Press the up button once to select Vertical Slope "VSL". Now align "VSL" to start the blanking exactly at the horizontal white line at the centre of the test circle. "VSL" has the correct value now and should not be changed anymore.
 - Press the down button once to select "SBL" and set it back to 0. The full picture reappears.
 - Now select Vertical Amplitude "VAM" and align the picture height to the top of the screen, so that the top horizontal line just disappears. This corresponds with an over scan of approx. 6%.
 - Select Vertical Shift "VSH" and align for vertical centring of the picture on the screen.
 - Repeat the last two steps if necessary.
- Select Vertical S-correction "VSC" to align the top/bottom squares till they have the same size as the squares in the middle of the screen.

Horizontal Amplitude and Phase

- Select Horizontal Shift "HSH" to horizontally centre the picture on the screen

To go back to the main SAM-menu , press the MENU key on the RC.

To leave the SAM-menu and store the alignments in the NVN, press the STANDBY-key on the RC.

8.3.2 AGC

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz or 61.25MHz for BTSC.

- Select the " SAM-MENU.
- Select at the TUNER sub-menu the option AFW and select the lowest value.
- Select the AGC subsub-menu
- Connect a DC multi-meter at pin 1 of the tuner IC 1000.
- Adjusting the AGC until the voltage at pin 1 of the tuner is 1.0V +/- 0.1V.
- The value can be incremented or decremented by pressing the right/left MENU-button on the RC.
- Switch the set to standby.

8.3.3 IF-PLL / IF-PLL POS

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz or 61.25MHz for BTSC.

- Select the " SAM-MENU".
- Select at the TUNER sub-menu the option AFW and select the lowest value.

Within the TUNER-menu we now have two options : IF-PLL and IF-PLL POS.

The IF-PLL option is used for all PAL/SECAM signal excluding SECAM L'.

The IF-PLL POS option is used for only the SECAM L' signal. For the IF-PLL option the following should be done:

- Select at the TUNER menu the IF-PLL subsubmenu
- Adjust the IF-PLL value until the AFA becomes "1" and AFB alternates between "0" and "1"
- Switch the set to Standby or go to the IF-PLL POS menu.

For the IF-PLL POS option the following should be done:

- Change the signal at the pattern generator from PAL to SECAM and select the L'-signal.
- Select at the TUNER menu the IF-PLL POS subsubmenu.
- Adjust the IF-PLL POS value until the AFA becomes "1" and AFB alternates between "0" and "1"
- Switch the set to Standby or go to the IF-PLL menu.

8.3.4 Tuner options CL, YD and IF-PLL OFFSET

NO ADJUSTMENTS NEEDED FOR THESE ALIGNMENTS.

The tuner option code IF-PLL-OFFSET is only used in combination with sets with the TDA8845 BiMOS (IC7250). (Typically this is for Secam LL'). The default values for these option codes are:

- CL : 4
- YD : 12
- IF-PLL-OFFSET : 48

8.3.5 White tone

- Connect a pattern generator (e.g. PM5418) and set it to colour bar and circle pattern.
- Set frequency for PAL 475.25MHz or 61.25MHz for BTSC with RF signal amplitude - 10mv and connect to tuner (aerial) input
- Enter the SAM -MENU.
- Enter into WHITE TONE menu, select item NORMAL, DELTAWARM, or DELTACOOOL depending on the item which has to be aligned. Only one of the three items (R, G or B) will be displayed on the screen.

The default values for the colour temperature as displayed in the table below:

NORMAL	11500K	R = 40	G = 40	B = 40
(DELTA)COOL	13500K	R = -2	G = 0	B = 6
(DELTA)WARM	8500K	R = 2	G = 0	B = -7

Switch the set to standby.

8.3.6 Audio

NO ADJUSTMENTS NEEDED FOR SOUND.

The default values for the audio alignments as displayed in the table below:

AUDIO Alignment Options	
A-FM	232
AT	4
STEREO	15
DUAL	15

8.4 Options

Options are used to control the presence / absence of certain features and hardware. There are two ways to change the option settings. The various option configurations and the descriptions of the two character-codes are explained below. Changing a single option:

A single option can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/RIGHT keys.

Changing multiple options by changing option byte values:

Option bytes make it possible to set very fast all options. An option byte represents a number of different options. All options of the L9 are controlled via 7 option bytes. Select the option byte (OB1, OB2, OB3, OB4, OB5, OB6 or OB7) and key in the new value.

Changes in the options and option bytes settings are saved when the set is switched to standby. Some changes will only take affect after the set has been switched OFF and ON with the mains switch (cold start).

The following options in SDM can be identified:

OP	OPTION (ON=enabled / present)	Explanation / Remark
AC	Alternate Channel	Alternate channel function (SWAP between last presets) enabled
AM	Animated menu	
2X	External 2	
AO	Audio out	Default value is OFF
AS	Auto startup/Micro controller startup	Default value is ON (ON = start-up via micro controller, OFF = auto start-up BiMOS)
AT	Automatic Tuning System (ATS)	

BM	Blue Mute (ON = enabled)	Enabled: blue mute background in case of no video ident /poor signal conditions
BS	BiMOS standby mode	Default value = ON
BT	Bass/Treble Control	Menu controls for BASS and TREBLE available when enabled
C8	Maximum Program (ON = 80 programmes)	C8 is OFF : Maximum of 100 programs
CD	Auto Cable Detect	Default value = OFF (Not applicable for European sets)
CI	Automatic Channel Installation (ACI)	
CK	Clock (Volatile)	Clock function available when enabled
CL	Child Lock	Menu item Child lock/Parental control when enabled
CP	Contrast Plus	Menu item Contrast Plus available when enabled
CT	Colour Temperature	Menu item Colour Temperature available when enabled
CX	16:9 Compress	Menu item 16:9 compress when enabled
DM	Demo Mode	Demonstration of TV functions on screen when enabled
DP	Slider Bar Value Display	Slider bar value displayed when enabled
DU	Dual I/II	Possibility of language selection when enabled
DV	Delta Volume	(Delta) Volume is stored separately for channel 0..40 and external sources when enabled; OFF = not available
EW	East-West Control	East-West Alignment in SAM GEOMETRY menu available when enabled
EX	4:3 Expand	4:3 expand mode available when enabled
FV	Favourite page	Favourite TXT-page feature present when enabled
FQ	Frequency display	Frequency displayed when enabled
GM	Games Mode	Optimisation of setting for games possible when enabled
HS	Hospital Mode	Possibility to block the local keyboard when enabled
HT	Hotel Mode	Possibility to pre-select the channel numbers when enabled
IS	Incredible Surround	Incredible surround function available when enabled
LV	Automatic Volume Leveller (AVL)	Menu item AVL available when enabled
NI	No Ident Auto Standby	Set switches to standby after 10min. when NI enabled
NR	Noise Reduction	Menu item Noise Reduction available when enabled
RC (*)	Separate preset/volume control on remote control (ON = separate control (A8 RC); OFF = combined control (L7 RC))	See note below table. Default value is OFF
SB	Sound Board (Set the sound hardware configuration)	MA = Mono ALL ND = Stereo/2CS/Nicam IT = German 2CS
SP	Smart Picture	Smart picture command is processed when enabled
SS	Smart Sound	Smart sound command is processed when enabled
ST	Sound systems supported	SS = BG, I, DK, M AD = BG/I, BG/DK, I/DK
SY	Systems supported	SS = Single system without NTSC Playback SP = Single system with NTSC Playback AD = Dual Mono ED = Europe Tri Mono EF = Europe Full Multi EL = Europe Full Multi with LL'
TN	Tuner (OFF: Philips tuner; ON: Alps tuner)	Default value = OFF
TW	Channel Select Time Window (OFF: 2 seconds; ON: 5 seconds)	Time interval for entering a second digit for channel selection
UB	Ultra Bass	Ultra bass function available when enabled
VI	Virgin Mode	OSD at very first installation when enabled
VL	Volume Limiter	Menu item Volume Limiter available when enabled
VM	Video Mute	Screen blanking during channel switching when enabled
WE	Europe West (ON: Western Europe; OFF: other)	

XS	External Source Colour Select	External source colour selection available when enabled
XT	External 1	External 1 source input available when enabled

(*) Remark: When option RC = OFF, the P+ and the P- key on the remote control have the same functions as the MENU UP/DOWN keys while the VOL+ and the VOL- key have the same function as the MENU LEFT/RIGHT keys. When RC=OFF, it is not possible to change the channel preset or to adjust the volume in SAM/SDM with the remote control.
RC = OFF for use with L7-based remote control (only cursor keys). RC = ON for use with A8-based remote control (cursor keys, P+/P- and Volume+/Volume-).

OB3 bits 8, 7, ..., 1: RC, WE, (res), (res), TW, AC, C8, VM
OB4 bits 8, 7, ..., 1: TN, FV,XT,2X, XS, CD, BM, NI
OB5 bits 8, 7, ..., 1: EX, CX, NR, CP, CT, EW, BS, AS
OB6 bits 8, 7, ..., 1: BT, IS, VL, DV, UB, LV, DU, AO
OB7 bits 8, 7, ..., 1: ST, ST, SB, SB, SB, SY, SY, SY
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" =

8.5 Option bits/bytes

Option bytes
OB1 bits 8, 7, ..., 1: DP, FQ, AM, HS, HT, DM, GM, VI
OB2 bits 8, 7, ..., 1: CK, CL, AT, Cl, (res), (res), SS, SP

9. Circuit description new circuits

Power supply (diagram A1)

9.1 Introduction

9.1.1 General

The switch mode power supply (SMPS) is mains isolated. The control IC7520 (MC44603A) produces pulses for driving FET 7518. Power supply regulation is achieved by using duty cycle control at a fixed frequency of nominal 40 kHz in normal operation. In stand-by, slow-start and overload situations the SMPS runs at frequencies other than 40 kHz.
Basic characteristics of this SMPS :

- Mains Isolated flyback Converter type
- Input range : 90 - 276 Volts AC
- Secondary Sensing by Opto-coupler
- IC7520 is Featured with Slow-Start circuitry
- Protection Circuits
- Degaussing circuit

9.1.2 Output voltages

- Audio Supply (+16.5V) for the AUDIO AMPLIFIER (Diagram A12)
- Mains Supply (+140V) for the HORIZONTAL DEFLECTION stage (A2) and the CRT discharge circuit (A3)
- Vaux (+11.3V) for the Video IF (A5), Video processing (A6) and Control circuit (A7)

9.1.3 The switching periods of TS7518

The power supply duty cycle is dependent on the T-on of FET 7518. The FET is driven by pin 3 of IC7520. This IC controls the secondary voltage (VBATT via opto-coupler 7581 and regulator 7570. The switching period of TS7518 can be divided into three main phases: Duty cycle T-on, T-off and T-dead.

- During T-on, FET 7518 conducts.
- Energy is stored in the primary winding (2-5) of transformer T5545 by using a linear increasing primary current. The slope depends on the rectified mains-voltage present across C2508. The T-on period is varied to provide regulation of the drive waveform at pin 3 of IC7520. By

- controlling the duty cycle of the SMPS in this way the (VBATT is controlled.
- During T-off, FET 7518 is switched off and therefore does not conduct. The energy is now transferred to the secondary side of the transformer and then supplied to the load via the secondary diodes (D6550, D6560 and D6570,D6590). The current through the secondary side of the transformer decreases until it reaches zero.
 - During T-dead FET 7518 does not conduct .The voltage at the drain of the FET decays and eventually reaches the input voltage of approximately 300V.

9.2 Primary side

9.2.1 Mains input and degaussing

- Mains voltage: this voltage is filtered by L5500 and L5502, rectified by a diode bridge rectifier 6505 and then smoothed by C2508 which provides a DC input voltage of 300V DC for an ac input voltage of 230V.
- Degaussing : R3503 is a PTC. When switching "on" the set, the PTC is cold and has a low-ohmic value. Relay 1580 is activated while the Reset signal, coming from the (P is present. This allows a very high degaussing current at initial power on. The PTC will then heat up due to the high current involved and becomes high-ohmic which reduces the degaussing-current. During normal operation, the degaussing current is zero, because relay 1580 is open due to the absence of the (P - Reset signal.

9.2.2 Start up and take over

- Start-up : The start-up circuitry consisting of 3510, 3530 and 3529 use the voltage coming from the 230V AC mains to start-up IC7520 via the supply pin 1. The output drive waveform (pin 3) is blocked by using the ICs internal logic until the voltage on pin 1 reaches 14.5 Volts however with less than 14.5 volts on Pin 1 the IC only consumes 0.3mA. Once pin 1 reaches the 14.5 Volts threshold, IC7520 will start up (FET 7518 will conduct) and pin 1 sinks a typical supply current of about 17 mA. This supply current cannot be delivered by the start-up circuitry, so a take-over circuit must be present. If take-over does not occur then the voltage on pin 1 will decrease below 9V and IC7520 will switch off. The supply begins a new Start-up cycle, see top

of this paragraph. This cycle will repeat itself and can be noticed by an audible hick-up sounding noise.

- Take for IC7520: During start-up a voltage across winding 8 - 9 is gradually built up. At the moment the voltage across winding 8 - 9 reaches approx. (14.5 Volts, D6540 start conducting and takes over the supply voltage Vpin 1 of IC7520 (take over current is approx. 17mA).

Note: This power supply is a SMPS (= Switched Mode Power Supply) and not a SOPS (= Self Oscillating Power Supply).

9.3 Control circuitry

9.3.1 IC7520 control mechanisms

IC7520 controls the T-on time of FET 7518 in four different ways:

- "Secondary-output-sensing" controls the secondary output voltages via the feedback voltage pin 14
- "Primary current sensing" control due to the mains voltage via the current sense voltage pin 7
- "Demagnetization control" prevents the transformer T5545 from going into saturation via the so-called "DEMAG" function at pin 8
- Mains voltage control via R3514 and R3516

9.3.2 Secondary voltage sensing (pin 14 of IC7520)

When the output voltage +VBATT increases (due to a reduction in the load) the current through the led in the opto-coupler 7581 will increase due to the fact that the series-resistor in regulator 7570 decreases. An increase in opto-coupler led-current (7581) results in a decrease in the Vce of transistor 7581, therefore the voltage across capacitor 2576 increases. This will reduce the on-time of FET 7518 due to an increase of the voltage present on pin 14.

In the event of an increase of the load (decrease of output voltage +VBATT), the control circuit will work in the opposite way to the explanation above.

9.3.3 Primary sensing (pin 7 of IC7520)

The current sense voltage at pin 7 is used to measure the primary current through FET7518. The primary current is converted into a voltage by R3518. R3514. 3516. couples a part of the main voltage to the same pin 7 of IC 7520 by dividing this sample of the voltage.

Hence the higher the input voltage the more the primary current is limited. In this way the maximum output power of the power-supply is limited.

9.3.4 Demagnetization control (pin 8 of IC7520)

Winding 8 - 9 has the same polarity as the secondary winding that supplies the load. When FET 7518 is turned off the voltage at winding 9 becomes positive. The power supply transfers the stored energy at the secondary side. Until the transformer is demagnetized the voltage on the winding remains positive. At the moment that the energy is fully transferred to the load, the voltage at pin 9 of the transformer becomes negative.

Additionally with a certain dead time the voltage at control pin 8 of IC 7520 also drops below zero which releases the output buffer (pin 3) and a new cycle starts.

9.3.5 Peak current limiting

An internal clamp at pin 7 allows peak current limiting to be achieved . This pin can never exceed 1V DC and so the maximum primary current through FET 7518, and also the maximum output power is determined. In case of an output being short-circuited or loaded excessively, the I-prim becomes

too high which is detected by pin 7. As a result the primary current is limited to its maximum value and the secondary voltages will drop. The voltage at pin 1, which is coupled with the output voltage, will also drop. When the voltage at pin 1 drops below the 9V, IC7520 will stop functioning and the output voltage will rapidly drop to zero.

Via start-up circuitry 3510, 3530 and 3529 the voltage originating from the 230V AC mains is used to start-up IC7520 via the supply pin 1. As soon as this voltage reaches the 14.5V, IC7520 starts functioning. If the load is still too much or the output is short-circuited the same cycle will happen again. This fault condition can be clearly identified as the power supply will be loudly tripping.

9.3.6 Slow-start

As soon as Vpin 1 > 14.5V the SMPS will start-up. During the slow-start procedure both the frequency and the duty cycle will be built up slowly. The duty cycle will initially slowly increase commencing with the absolute lowest possible duty cycle. The maximum duty cycle is determined by C2530 at pin 11 of IC7520, as C2530 is uncharged at start-up.

9.3.7 Standby mode

In standby mode the SMPS switches to the so-called "reduced frequency mode" and runs at about 20 kHz. During standby the SMPS only has to deliver a minimal level of output power. The minimal load threshold level is determined by R3532 at pin 12. In the L9 chassis the SMPS does not have a burst mode in standby but only a reduced frequency mode of about 20 kHz as stated above. In normal operation mode the internal oscillator is around 40 kHz. This frequency is controlled by C2531 at pin 10 of IC7520 and by R3537 at pin 16 of IC7520. In standby mode the frequency of operation is determined by R3536 at pin 15 of IC7520.

9.3.8 Protections

Over voltage protection of the secondary voltages.

After start-up the supply voltage pin 1 will be "taken over" by winding 8 - 9. Pin 1 of IC 7520 is used to detect an over voltage situation on the secondary side of the transformer. If this voltage exceeds 17V (typically the output buffer is disabled, and IC 7520 goes into over voltage protection and a complete restart sequence is required. Check in this case IC7520, IC7581 and the secondary voltage +VBATT (+140V).

REMARK: In the event of the over voltage situation remaining present, the SMPS will go in protection, start up cycle, protection, etc. The standby led on the front of the set starts flashing.

Under voltage protection of the secondary voltages

If the supply voltage at pin 1 of IC 7520 drops below 9V because of a short-circuit or excessive load, the drive pulse present at pin 3 will be disabled and IC7520 will switch off the complete SMPS. Capacitor C2450 is charged up via start-up resistors 3510, 3530 and 3529, however once the voltage exceeds 14.5V start up threshold, the SMPS will once again commence a re start cycle.

In the event of the under voltage situation remaining, the SMPS will again go in protection mode, start up cycle, protection, etc. and so the cycle repeats. This effect is highly audible.

9.4 Audio processing

The following systems are available:

- BASIC : MONO/AV STEREO (M,BG, I and DK : single or dual system)

- 2CS : FM STEREO / FM MONO (all standards 4.5, 5.5, 6.5 MHz)
- BTSC : MONO/STEREO/STEREO-AP

MONO/AV STEREO, BTSC DBX incorporating 2CS (two carrier stereo) use a TDA8841/42 BIMOS device (built-in Mono FM Demodulator circuit).

The Audio Module incorporates for each system a different multi digital sound processor.

- MONO /AV STEREO: BSP3505 & TDA884x
- NICAM / 2CS: MSP3415D
- BTSC: TDA8841, TDA9851 and HEF4052

These IC's have an incorporate digital audio processing for volume, bass, treble, balance, mute, spatial sound, incredible sound, smart sound and source selection (SIF-signal, EXT1 or EXT2).

9.4.1 MONO / AV STEREO

This set does have the digital sound processor BSP3505, IC7833.

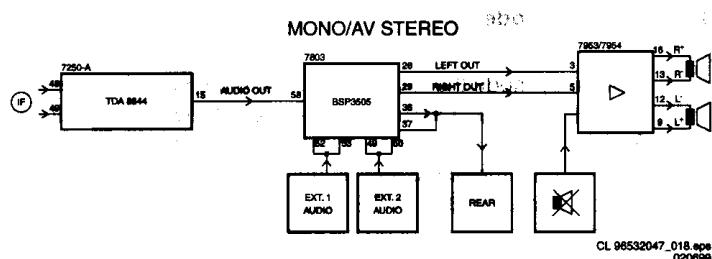


Figure 9-10 "MONO / AV STEREO SETS"

The video IF output is present at pin 11 of the tuner 1000. This signal goes through a sound SAW filter and is fed to the BIMOS via pins 48 and 49, where the signal is demodulated. At pin 6 of BIMOS IC 7250-A, the SIF signal is fed to another SAW filter. Signal Dual/Mono selects either SAW filter 1001 or SAW filter 1002.

The system hardware configuration, option code SY, is set at AD - Dual Mono for a Dual configuration, while option code SY is set at SS for the Mono configuration (BG,I, DK, M). Via Dual/Mono, a signal coming from the Micro-processor IC7600, is possible to switch between two Mono configurations (BG/DK or BG/I or DK/I).

This signal goes back to pin 1 of the BIMOS, for further demodulation. The demodulated FM signal or the REAR I/O audio signal, ExtAudioMono at pin 2, is switched by the BIMOS and is present at pin 15.

The signal at pin 15 is fed to pin 55 of IC 7833 - BSP3505 - at panel D1. IC 7833 performs source selection as well as audio processing such as volume, bass, treble, balance, tone control and spatial stereo. The audio output from IC 7833, pin 28 and pin 29, is fed to the power amplifier IC 7950 or IC7951. Pin 36 and 37 pass the same selected signal through to the Audio-cinches.

Signal Volume enables the output of the sound amplifier.

9.4.2 2CS

It is used on some cable television networks.

The diagram below indicates the AUDIO path for 2CS.

The CVBS + SIF signals present at pin 6 from BIMOS, - TDA8844-, are passed through a high pass filter and are then fed back into pin 58 of IC 7803 (MSP3415D) for further demodulation. All variants of 2CS are demodulated in this IC.

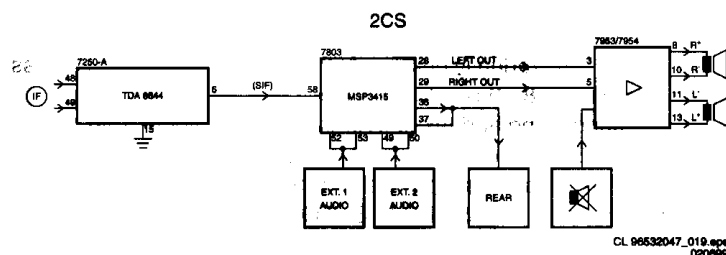


Figure 9-11 "2CS"

Audio signals coming from the frontpanel are connected to pin 49/50 of IC7803 for the Ext1Audio signals, while pin 52/53 of IC 7861 are used for the Ext2Audio signals. IC 7803 performs source selection as well as audio processing such as volume, balance, tone control, mute, spatial stereo, incredible surround sound and SMART sound. The audio output from IC 7803, pin 28 and pin 29, is fed to the power amplifier IC 7953 or IC7954. Pin 36 and 37 pass the same selected signal through to the audio-cinches. Signal Volume enables the output of the sound amplifier.

9.4.3 BTSC

The SIF signal from the BIMOS are passed through a high pass filter and are then fed back into pin 7 of IC 7861 (TDA9851) for further demodulation. This signal is present at pin 6 of BIMOS - TDA8841.

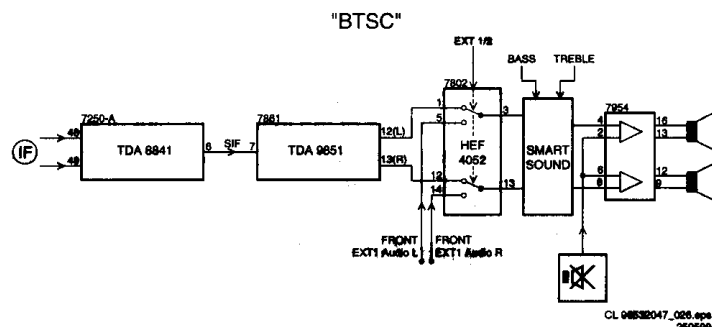


Figure 9-12 "BTSC"

Audio signals coming from the rear I/O panel are connected to pin 5/14 of IC7802 for the Ext1Audio signals. The audio output from IC 7802, performs the source selection via signal EXT 1 / 2. It is possible to switch between the demodulated BTSC signal on the FRONT/EXT signal. Pin 3 and pin 13, are fed to the power amplifier IC 7954. Signal Volume enables the output of the sound amplifier.

9.5 Tuner and Video IF (see circuit diagram A5)

9.5.1 Introduction:

In Figure 9.13 a simplified block diagram of the video path is shown. The main item in the block diagram shown in Fig.9.13 is the video processor item 7250. The IC performs the following functions, video IF demodulation, chroma processing and RGB processing. Additionally synchronisation processing, mono IF audio demodulation and audio selection takes place.

One version of video processor is used:

- TDA8844 N2 for SW CENELEC BG/DK, CENELEC I NICAM, CENELEC BG NICAM

For a detailed block diagram of the TDA8844/8845 see Figure 9.12.

9.5.2 Tuner

The PLL tuner (item 1000) is digitally controlled via the I2C-bus. The tuner is suitable to receive off-air, S-(cable) and hyper band channels.

Tuner pin description:

- Pin 1: AGC, Automatic gain control voltage input (0.3 - 4.0V)
- Pin 2: VT, tuning voltage input (not connected)
- Pin 3: AS, address select (not connected)
- Pin 4: SCL, IIC-bus serial clock
- Pin 5: SDA, IIC-bus serial data
- Pin 6: not connected
- Pin 7: Vs, PLL supply voltage +5V
- Pin 8: not connected
- Pin 9: Vst, tuning voltage +33V
- Pin 10: ground
- Pin 11: IF, asymmetrical IF output

Note: The +5V supply voltage and the +33V tuning voltage is derived from the line output stage, see diagram A2).

9.5.3 IF band pass filter (SAW FILTER)

Between the tuner output and the video IF input of the video processor the IF band pass filtering take place. Filter 5002 is tuned at 40.4MHz and serves as an extra suppression of the neighbour channel. For the IF band pass filtering SAW filters are used (item 1003 or 1004). 5 Types of SAW filters are used depending of the version of the set.

9.5.4 Video IF

General: Video IF-demodulation is achieved in combination with reference circuit L5006 connected at pin 3 and 4 of IC7250-A. The AGC control for the tuner is applied via pin 54 of IC7250-A. Internally the IC uses the top sync level as a reference for AGC control. The AGC adjustment can be readjusted via the SAM (service alignment menu). C2201 connected to pin 53 determines the time constant of the AGC. The Base band CVBS signal is present at pin 6 of IC7250-A (normal amplitude 3.2Vpp). From here the signal is fed via transistor 7266 to the sound trap filters and then on to the video source selection circuit.

The main functions of the video IF part are (see also figure 9.5):

- IF- amplifier
- PLL-demodulator
- Video buffer
- AFC
- IF-AGC
- Tuner AGC

9.5.5 IF- amplifier

The IF-amplifier incorporates symmetrical inputs (pins 48 and 49). By using IIC bus control (IFS) the AGC attenuation can be adjusted by up to -20db.

Remark: If the BIMOS is replaced the AGC value should be adjusted as part of the repair process. (see software alignment adjustments).

9.5.6 PLL-demodulator

The IF-signal is demodulated with the assistance of the PLL detector. The video IF-demodulator can handle both negative and positively modulated IF signals; selection is achieved via the IIC bus (bit MOD).

9.5.7 Video buffer

The video buffer is present to provide a low ohmic video output with the required signal amplitude. Additionally, it provides protection against (pin 6) the occurrence of noise peaks. The video buffer stage also contains a level shifter and a gain stage for both the positive and negative video modulation formats, so that the correct video amplitude and DC level are always present at pin 6 regardless of the input signal.

9.5.8 Video-IF AGC

An AGC system controls the gain of the IF amplifier such that the video output amplitude is constant. The demodulated video signal is supplied, via a low pass filter inside the IC to an AGC detector. External AGC de coupling is provided by capacitor 2201 at pin 53. The AGC detector voltage directly controls the IF amplification stages.

9.5.9 The tuner AGC

Tuner AGC is provided to reduce the tuner gain and thus the tuner output voltage when receiving to strong RF signal. The tuner AGC starts working when the video-IF input reaches a certain input level. This level can be adjusted via the IIC bus. The tuner AGC signal is applied to the tuner via the open collector output pin 54 of the BIMOS.

9.5.10 AFC

The AFC output information is available for search tuning. The AFC output is available via the I2C bus (AFA and AFB signals). For alignment purposes it is displayed in the TUNER submenu of the SAM (See chapter 8).

Figure 9-13 "BIMOS"

9.6 Video Signal Processing (see circuit diagram A6)

9.6.1 Introduction:

The video signal processing can be divided in the following parts:

- CVBS/Y/C input selection
- Luminance and chrominance signal processing
- PAL/NTSC and SECAM demodulation /Auto system manager
- YUV/RGB processing/ black stretcher
- Second RGB insertion
- RGB processing

- Black current calibration loop
- Beaming current limiting

Above mentioned processing circuits are integrated in the TV-processor (parts B and C). The surrounding components are for the adaptation of the selected application. The I2C bus is used for defining and controlling the signals.

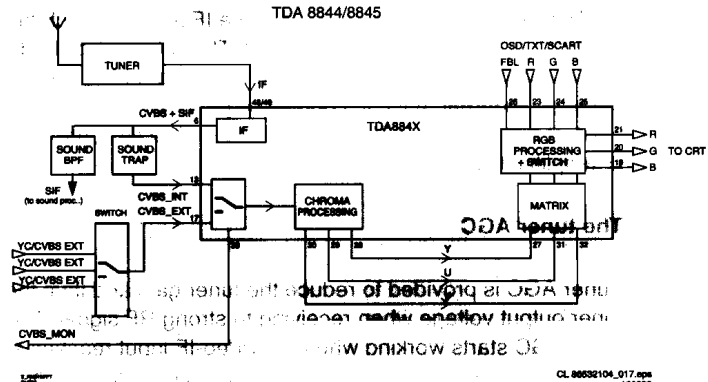
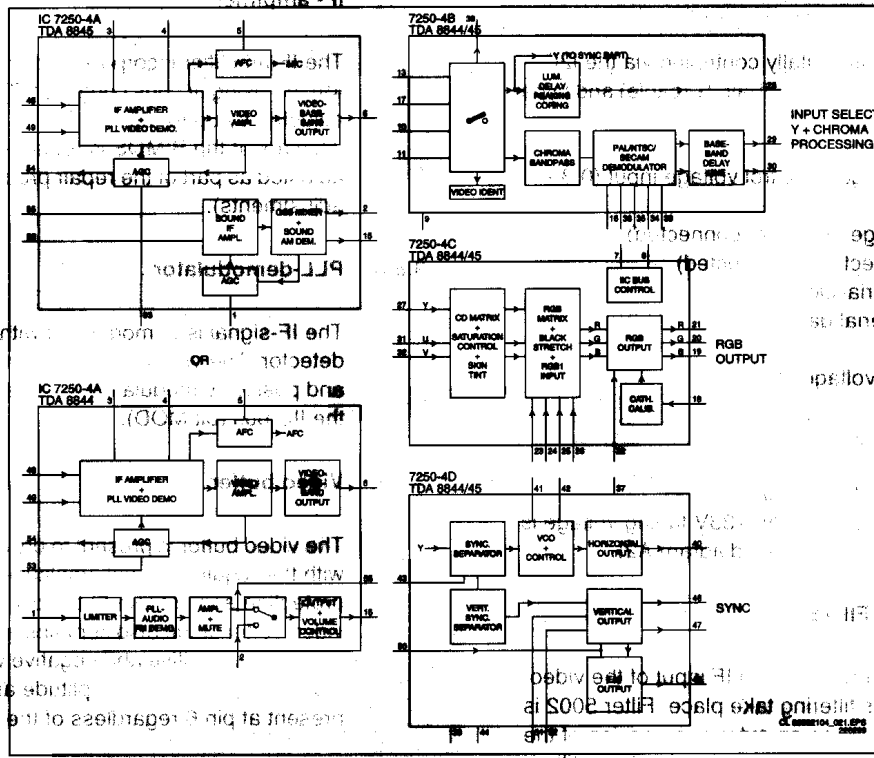


Figure 9-14 "VIDEOPATH"

9.6.2 CVBS/Y/C selection

The input switches are used for selection of the input signal. Three input signals can be selected:

- Pin 13: terrestrial CVBS input.
- Pin 17: external AV1 input.
- Pin10/11: external AV2-Y, CVBS/C input

When pin 11 is in the CVBS input mode then pin 10 is not used. When pin 11 is in the Y/C input mode then both pins are used and the CHROMA filter in the Y signal path is switched off.

9.6.3 Luminance / Chroma signal processing

Once the signal source has been selected, CHROMA filter calibration is performed. The received colour burst-sub-carrier frequency is used for the calibration. Correspondingly, the CHROMA band-pass filter for PAL/NTSC processing or the cloche filter for SECAM processing is switched on. Pins 34, 35 have the crystals connected to them. These crystals are used for multi-purpose calibration of the burst sub-carrier. The selected luminance signal is then supplied to the Horizontal and Vertical synchronisation processing circuits and to the luminance processing circuits. In the Luminance processing block, the luminance signal is applied to the CHROMA trap. This trap is switched on or off depending upon on the colour burst detection of the CHROMA calibration circuit. Before the

luminance signal is applied to pin 28 of the TV-processor the signal is applied to a "peaking" and "coring" circuit. In these circuits the sharpness and noise level of the signal can be influenced via the remote control (control menu in the user menu).

9.6.4 PAL, NTSC and SECAM demodulation via the Auto system manager

The colour decoder circuit detects whether the signal is a PAL or NTSC signal. The result is made known to the auto system manager. The base-band delay line is activated when a PAL or SECAM signal is detected. For the SECAM colour standard a reference voltage is generated at pin16 of the TV-processor. Connected at Pin 9 of the TV-processor, is the band-gap decoupling circuit, which consists of (2214,2215). The band-gap circuit provides a very stable and temperature independent reference voltage. It ensures optimal performance of the TV-processor and is used by almost all functional blocks inside the processor. The Y signal and the demodulator outputs R-Y and B-Y are present at pin 28, 29, 30 of the TV-processor. The auto system manager identifies PAL, NTSC and SECAM colour standards and is controllable via the IIC bus. Connected on pin 36 of the TV-processor is the Loop Filter for the phase detector. The filter chosen provides an optimal transient response, which ensures both an optimum for noise bandwidth and colour acquisition time.

9.6.5 YUV / RGB processing/ black stretching

The signal Y, R-Y and B-Y present on pins 27, 31, 32 of the TV-processor are used as the input signals for the colour decoding section of the BiMOS (IC7520-C). The YUV processor enables the colour saturation control and also converts the Y, B-Y and B-Y signals to the R, G, B signal format via the colour matrix circuit. The black stretcher circuit , initial stage of the matrix circuit, extends the Grey signal level towards the actual black level. The amount of extension depends upon the difference between actual black level and the darkest part of the incoming video signal level. This feature is fully integrated. The user can switch this circuit on or off by using the Contrast Plus option in the user menu.

9.6.6 Second RGB insertion

Pins 23, 24, 25 are used as the inputs for the second R, G, B signals insertion. Pin 26 of the TV-processor is the input for the insertion control signal which is called "FBL". When the FBL signal level becomes higher than 0.9V (but less than 3V) the R, G, B signals at pins 23,24,25 are inserted into the picture by using the internal switches incorporated in the TV-processor. This second insertion possibility is used for insertion of the on screen display signals, TXT or R. G. B signals from the CINCH socket..

9.6.7 RGB processing

The RGB processing circuit enables the picture parameters to be adjusted by using a combination of the user menus and the remote control. Additionally automatic gain control for the RGB signals via cut-off stabilisation is achieved in this functional block..

The block also inserts the cut off point "measuring pulses" into the RGB signals during vertical retrace period.. From outputs 19,20 and 21 the RGB signals are then applied to the output amplifiers on the CRT panel.

9.6.8 Black current calibration loop

The black current calibration loop ensures that the white balance at low signal levels and low light white balance is skipped. By means of the inserted measuring pulses, the black current calibration loop, tracks the beam current feed back of the RGB signals at the cathodes of the picture tube. As a result of this calibration, the individual black level of the RGB output signals is shifted to a level which allocates around 10uA of beam current to each of the RGB signals. Pin 18 (BC_info) of the BIMOS is used as the feed back input from the CRT base panel.

9.6.9 Beam current limiting

A beam current limiting circuit inside the BIMOS handles the contrast and brightness control for the RGB signals. This prevents the CRT tube being over driven, which may cause serious damage in the line output stage. The reference used for this purpose is the DC voltage on Pin 22 (BLCIN) of the TV-processor. Contrast and brightness reduction of the RGB output signals is therefore proportional to the voltage present on this pin. Contrast reduction starts when the voltage on pin 22 is lower than 3.0 V. Brightness reduction starts when the voltage on pin 22 is less than 2.0 V.

The voltage on pin 22 is normally 3.3V (limitor not active). To enable correct operation however, an external adaptation to the circuit is required for the correct functioning of the limiting function. This is connected to Pin 22, the circuit therefore ensures that correct peak white limiting and the average beam current limiting takes place. Components 6212, 2227, 3253, 3246 are for the average beam current limiting and the items connected to 7263 are for the peak white limiting. As a reference for the average beam current control the signal EHT_info is used. This signal is a measurement of the picture contents. It is filtered by 3253, 2227. As the time constant of the filter is much bigger than the frame period time, the DC at the anode of 6212 represents the average value of the picture content. Via 6212 and 2226 the DC voltage at pin 22 is slowly 'clamped'. For peak white limiting transistor 7263 is utilised. When peak white occurs, the DC voltage at the base of 7263 drops rapidly. 7263 starts conducting, which provides a path to discharge the capacitor 2226 very fast. The voltage bias at the base of 7263 is fixed via voltage divider 3251 and 3249. The RGB output signals are applied to the CRT panel via connector 0243. Via diodes 6263, 6264 and 6265 and series resistor 3253, the RGB signals are also connected to the

CRT_discharge signal. The level of this signal is only high during the time the set is switched off. And id due to the cathodes of the CRT are driven fully negative. That means that the beam current is increased. and consequently the CRT quickly discharged.

9.6.10 CRT panel (see circuit diagram B)

On the CRT panel the output amplifiers for the RGB signals (IC T7330, DA6107Q) are located. Via the outputs 9, 8 and 7 of the IC the cathodes of the CRT are driven. The supply voltage for the IC is +200VA and is derived from the line output stage.

9.7 List of abbreviations

2CS	2 Carrier Stereo
A/P	Asia Pacific; schematic/PCB information (only) applicable for Asia Pacific sets
AFC	Automatic Frequency Control
AQUADAG	Aquadag coating on the (outside of the) picture tube
AudioOutR	Audio signal at Right output channel.
AudioOutL/Mono	Audio signal at Left output channel / Mono output channel.
AV_MUTE	Signal to mute the sound on the Audio-out of Cinch / Scart (Combined with RBG_Blanking)
Ext2Fun_SW (AV_Mute/Ext2Fun_SW)	Switching signal from Scart2 to micro controller indicating the presence and type of signal on Scart2. (no signal / CVBS 16:9 / CVBS 4:3)
AV	Audio Video signal
AVL	Automatic Volume Level
B_TXT_OSD	Blue TXT or OSD signal from uC to the video controller IC7250 (BIMOS)
BASS	Control signal for BASS
BCI	Beam Current information
BTSC	Broadcast Television Standard Committee; sound standard for America and Asia Pacific
Buzzer	Buzzer (only used in L9-ITV)
CRT DISCHARGE	Fast drop of VBATT during after switch off the set. Which result in EHT voltage reducing to less than 18 kv within 5 sec.
CTI	Colour Transient Improvement
CVBS	Colour Video Blanking Synchronisation. Video signal containing colour, black/white, blanking and synchronisation information.
CVBS_EXT	CVBS external = CVBS signal form external source (VCR, DVD etc.)
CVBS_INT	CVBS internal = CVBS signal from the tuner
CVBS_MON	CVBS monitor (CVBS) signal to Cinch or Scart
CVBS_Terr	CVBS Terrestrial output signal
CVBS_TXT	CVBS for TXT processing in micro controller
Din	Digital input signal only used in L9-ITV)
Dout	Digital output signal (only used in L9-ITV)
DBX	Dynamic Bass Expander (only used for BTSC sound system)
DNR	Dynamic Noise Reduction
EAR	Earth (ground layer)

GB 62	9.	L9.2A	Circuit description new circuits	
EEPROM		Electrically Erasable Programmable Read Only Memory (also called NVM; non-volatile memory)	KeyBd3	Local keyboard control signal to micro controller
EHT-INFO		Extra high tension information; Beam current related signal from CRT to BIMOS.	L-	Power amplifier output to headphone and speaker
Ext1 B		RGB External 1 Blue input signal.	L+	Power amplifier output to speaker
Ext1 FB		RGB External 1 Fast-blanking input signal.	LED	LED control signal from micro controller to LED
Ext1 G		RGB External 1 Green input signal.	LATAM	Latin America; schematic/PCB information (only) applicable for Latin American (incl. Brazilian) sets
Ext1 R		RGB External 1 Red input signal.	LeftOut	Audio Left signal output
Ext1 Video		RGB External 1 Video input signal.	LTI	Luminance Transient Improvement (= steepness)
Ext2 AudioL/Mono		External 2 Audio Left input signal / Mono input signal.	MainAudioL/Mono	Audio Left/Mono signal to input power amplifier
Ext Audio/Mono		External Audio input signal / Mono input signal.	MainAudioR	Audio Right signal to input power amplifier
Ext2 AudioR		External 2 Audio Right input signal.	MON	Audio monitor output
Ext2C		External 2 SVHS Chrominance (C) input signal.	NICAM	Near Instantaneous Companded Audio Multiplex (digital audio)
Ext2Video/Y		External 2 Video input signal or SVHS Luminance (Y) input signal.	NR	Noise Reduction
ESD		Electrostatic Discharge	NTSC	NTSC colour system
EURO		Europe; schematic/PCB information (only) applicable for European sets	OSD	On Screen Display
EWD_dyn		Dynamic East-West correction to compensate for variations in EHT	P0Sys1/AM	Switching signal with several functions:
EWDRIVE		East-West drive correction	BiMOS crystal selection (only for Latam sets)	Selection of AM or FM signal (used in combination with P1Sys2/AMFM_ExtSel) (only for Europe)
FB_TXT_OSD		Fast blanking signal from micro controller to IC7250 (BIMOS) for inserting or displaying TXT and OSD information (generated by the micro processor)	Sys2/AMFM_ExtSel	Switching signal with several functions: BiMOS crystal selection (only for Latam sets) Selection of internal AM/FM signal or an external signal (used in combination with P0Sys1/AM)
Filament		Filament (heater voltage) from LOT to CRT	LLp/Mtrap	Switching signal with several functions: M-trap (sound filtering) switching (only for A/P Pal Multi sets) BiMOS crystal selection (only for Latam sets), Selection of L or L' system (only for Europe sets)
FBL		Fast Blanking	Dual/Mono	Switching signal to select the sound filter in dual-system Mono sets (BG/I, BG/DK or I/DK).
FFBL		Full screen Fast Blanking	ScartPin8/SVHS	Switching signal from I/O to micro controller with several functions: Scart1 I/O: detects signal type connected to Scart 1 (no signal, 16:9 signal, 4:3 signal) (only for Europe) Cinch I/O: detects signal type connected to cinch: SVHS or CVBS (not for Europe)
FM/AM/Ext_VC_AudioMono		FM, AM or external mono signal from BiMOS to audio processor input (only used in Mono and Nicam L sets)	BassSw	Bass switching signal (only for some mono sets)
Front/Ext1AudioL		Front audio Left input signal / External 1 Audio Left input signal.	TrebleSw	Treble switching signal (only for some mono sets)
Front/Ext1AudioR		Front audio Right input signal / External 1 Audio Right input signal.	Ext1/2 stbyon+protn	Used in L9-ITV sets (Hotel TV) Signal from E-W and LOT output to micro controller to (de)activate the protection mode
GND		Ground	Mute/Volume POR/CLK	Audio mute / Volume control signal pin
GND_LOT		Ground of LOT	R-	Power amplifier output " R- " to speaker
G_TXT_OSD		Green TXT or OSD signal from micro processor to the video controller IC7250 (BIMOS)	R+	Power amplifier output " R+ " to headphone and speaker
HD		Horizontal pulse derivation	RAM	Random Access Memory
HDRIVE		Horizontal output drive	RESET	Reset signal to micro controller
HEW_protn		Switching signal to (de)activate the XRAY protection which is measured via pin 50 of the BIMOS (only for USA sets)	RF_AGC	Automatic gain control signal from BiMOS output to tuner input.
Hflybk		Horizontal flyback pulse used to monitor the horizontal oscillator	RGB	Red-Green-Blue
IF		Intermediate Frequency signal from the tuner		
12C (or IIC)		2 Wire communication protocol between micro controller and integrated circuits		
IC		Integrated Circuit		
I/O		Input/Output		
INT		Audio internal output		
IR		Output signal from infrared receiver to micro controller.		
KeyBd1		Local keyboard control signal to micro controller		
KeyBd2		Local keyboard control signal to micro controller (In protection mode KeyBd2 is Ground)		

RGB_Blanking	Red Green Blue Blanking signal (combined with AV_MUTE)
RightOut	Audio right signal output
R_TXT_OSD	Red TXT or OSD signal from uC to the video controller IC7250 (BIMOS)
ROM	Read Only Memory
SAM	Service Alignment Mode. Service mode for alignments and error buffer display
SAP	Second audio program (only for USA & A/P sets)
SCL	Clock line of the I2C-bus
SCL2	2nd Clock line of the IIC-bus (only used in L9-ITV sets)
SDA	Data line of the I2C-bus
SDA2	2nd Data line of the I2C-bus (only used in L9-ITV sets)
SDM	Service Default Mode. Service mode with predefined settings for waveform and voltage measurements, error buffer display and option (byte) setting.
SIF	Sound IF signal for FM audio demodulator
SMPS	Switching Mode Power Supply
STANDBY	Switching signal from micro controller; "low" for standby (power supply will be switched to stand-by mode), "high" for normal operation
SW_OUT	Selected Output signal from source
SYNC	Synchronisation
TBD	To Be Defined
TREBLE	Control signal for treble
TXT	Teletext
µC	Micro controller
USA	United States; schematic/PCB information (only) applicable for North American sets
V_TUNE	Tuning voltage for tuner
Vdrive -	Negative Vertical drive pulse signal
Vdrive +	Positive Vertical drive pulse signal
VD	Vertical pulse derivation
VFL	Vertical flyback pulse used to inform the micro controller that flyback is occurring. This is critical for the correct OSD and TXT
Vflybk	Vertical flyback pulse
VG2	Voltage on grid 2 of the picture tube (screen control)
VideoOut	CVBS output signal
VOLUME	Control signal (from micro controller, but on DC level via RC network) for sound processing in sound IC
XRAY-PROT	XRAY protection (only for USA sets)
YC	Luminance (Y) and Chrominance (C)

10. Spare parts list

Mono Carrier [A]								
Various								
0127	3122 358 72141	FUSE HOLDER CLICK	2222	4822 126 13838	100nF 20% 50V	2531	4822 126 14587	560pF 2% 50V
0130	3139 123 21331	INSULATING PLATE	2223	4822 126 13751	47nF 10% 63V	2533	5322 122 31863	330pF 5% 63V
0139	4822 492 70788	IC fixation	2224	4822 126 13751	47nF 10% 63V	2534	5322 126 10511	1nF 5% 50V
0189	3139 124 24322	PCB RELIEF BRACKET	2225	4822 126 13751	47nF 10% 63V	2537	5322 121 42386	100nF 5% 63V
0211▲	4822 265 20723	Conn. 2p	2226	4822 124 40248	10µF 20% 63V	2540	4822 124 81188	100µF 20% 25V
0218	4822 265 10481	CINCH CONNECTOR 2P	2227	4822 051 20008	jumper (0805)	2541	4822 121 10686	4.7nF 10% 50V
0223	4822 265 10495	Cinch block	2227	4822 126 13482	470nF 20% 16V	2545▲	4822 126 14049	1.5nF 20% 250V
0224	4822 267 10676	Conn. 1p	2228	4822 126 13692	47pF 1% 63V	2550▲	4822 126 14152	680pF 10% 1KV
0228	4822 267 10676	Conn. 1p	2229	4822 126 13692	47pF 1% 63V	2551	4822 124 42336	47µF 20% 160V
0229	4822 267 31673	Headphone plug	2230	4822 126 13692	47pF 1% 63V	2560	5322 122 31647	1nF 10% 63V
0230	4822 267 31673	Headphone plug	2231	4822 122 33177	10nF 20% 50V	2561	4822 124 81145	1000µF 20% 16V
0231▲	4822 276 14024	Mains switch	2232	4822 122 33127	2.2nF 10% 63V	2570	4822 122 33127	2.2nF 10% 63V
0232▲	4822 267 31014	HEADPHONE SOCKET	2233	4822 124 21913	1µF 20% 63V	2571	4822 124 12417	2200µF 20% 25V
0234	4822 267 10928	Conn. 5p	2234	5322 126 10223	4.7nF 10% 63V	2572	4822 122 33177	10nF 20% 50V
0267	4822 267 31673	Headphone plug	2236	4822 126 14076	220nF 20% 25V	2600	4822 124 81151	22µF 50V
1000▲	4822 210 10841	Tuner UV1316/A	2237	5322 122 32531	100pF 5% 50V	2601	4822 124 81151	22µF 50V
1001	4822 242 10314	filter 5,5MHz	2238	4822 126 13486	15pF 2% 63V	2604	4822 126 13838	100nF 20% 50V
1002	4822 242 10316	filter 6,5MHz	2239	5322 121 42386	100nF 5% 63V	2605	4822 126 13838	100nF 20% 50V
1003	4822 242 10357	SAW filter OFWK2960M	2240	5322 126 10511	1nF 5% 50V	2606	4822 126 13838	100nF 20% 50V
1200	4822 242 10315	cer. filter 5,5/5,7/6,5MHz	2241	5322 126 10511	1nF 5% 50V	2607	5322 126 10511	1nF 5% 50V
1200	4822 242 81712	filter 5,5/5,74MHz	2242	4822 124 21913	1µF 20% 63V	2608	4822 121 43897	1nF 5% 400V
1201	4822 242 81301	filter 6,5MHz	2243	4822 126 14076	220nF 20% 25V	2609	4822 126 13838	100nF 20% 50V
1201	4822 242 81572	filter 6,0MHz	2244	4822 124 40248	10µF 20% 63V	2610	4822 121 42687	3.3nF 10% 63V
1203	4822 242 81978	filter 4,5MHz	2248	4822 126 13486	15pF 2% 63V	2611	4822 126 13838	100nF 20% 50V
1205	4822 242 10695	crystal 4.433619 MHz	2250	5322 122 31863	330pF 5% 63V	2612	5322 122 32654	22nF 10% 63V
1208	4822 242 10776	crystal 3.579545 MHz	2253	5322 122 32654	22nF 10% 63V	2613	4822 126 13695	82pF 1% 63V
1500▲	4822 070 34002	fuse (4A)	2255	5322 122 32531	100pF 5% 50V	2614	4822 126 13695	82pF 1% 63V
1571▲	4822 071 51002	fuse (1A)	2313	4822 122 33216	270pF 5% 50V	2615	5322 122 32531	100pF 5% 50V
1572▲	4822 252 11194	fuse (0,800A)	2323	4822 122 33172	390pF 5% 50V	2616	5322 122 32658	22pF 5% 50V
1600	4822 242 10694	crystal 12.000MHz	2331	5322 122 31863	330pF 5% 63V	2617	5322 122 32658	22pF 5% 50V
1680	4822 276 13775	SWITCH	2341▲	4822 126 14588	2.2nF 10% 1KV	2618	4822 122 33177	10nF 20% 50V
1681	4822 276 13775	SWITCH	2342	4822 121 43526	47nF 5% 250V	2619	4822 126 14076	220nF 20% 25V
1682	4822 276 13775	SWITCH	2343	4822 121 43526	47nF 5% 250V	2620	5322 122 32531	100pF 5% 50V
1683	4822 276 13775	SWITCH	2400	4822 121 43526	47nF 5% 250V	2621	5322 122 32531	100pF 5% 50V
-II-			2401	4822 121 43526	47nF 5% 250V	2622	5322 122 32531	100pF 5% 50V
2001	4822 126 13751	47nF 10% 63V	2402	5322 122 31863	330pF 5% 63V	2623	5322 122 32531	100pF 5% 50V
2002	4822 124 40207	100µF 20% 25V	2403	4822 122 31169	1.5nF 10% 500V	2624	4822 126 13838	100nF 20% 50V
2003	4822 124 40207	100µF 20% 25V	2405▲	4822 126 14237	470pF 10% R 2KV	2625	5322 122 32531	100pF 5% 50V
2004	5322 122 32654	22nF 10% 63V	2406▲	4822 126 13866	4.7nF 10% 1KV	2651	4822 124 40207	100µF 20% 25V
2005	5322 122 32531	100pF 5% 50V	2407▲	4822 121 70434	11nF 5% 1.6KV	2675	4822 126 13482	470nF 20% 16V
2006	4822 126 13695	82pF 1% 63V	2407▲	4822 121 70617	10nF 5% 1.6KV	2680	4822 124 40248	10µF 20% 63V
2008	4822 124 40248	10µF 20% 63V	2407▲	4822 121 70637	8.2nF 5% 1600V	2697	5322 126 10511	1nF 5% 50V
2009	4822 122 33926	12pF 50V	2408	4822 122 30103	22nF 20% 63V	2950	4822 124 81151	22µF 50V
2010	5322 122 33861	120pF 10% 50V	2409	4822 124 11575	47µF 20% 160V	2951	4822 124 40248	10µF 20% 63V
2011	4822 122 33177	10nF 20% 50V	2410	4822 124 11767	470µF 20% 25V	2952	4822 122 33127	2.2nF 10% 63V
2012	4822 122 33177	10nF 20% 50V	2411	4822 124 40255	100µF 20% 63V	2953	4822 126 14076	220nF 20% 25V
2013	4822 122 33177	10nF 20% 50V	2412	4822 121 51385	33nF 20% 100V	2954	4822 126 14076	220nF 20% 25V
2110	5322 122 31863	330pF 5% 63V	2413	4822 124 11845	22µF 20% 250V	2955	4822 124 11767	470µF 20% 25V
2111	5322 122 31863	330pF 5% 63V	2414	4822 124 81145	1000µF 20% 16V	2971	4822 121 51252	470nF 5% 63V
2112	5322 122 31863	330pF 5% 63V	2415	4822 124 81145	1000µF 20% 16V	2972	4822 126 12105	33nF 5% 50V
2113	5322 122 31863	330pF 5% 63V	2416▲	4822 126 11503	820pF 10% 2KV	2973	5322 121 42386	100nF 5% 63V
2114	5322 122 31863	330pF 5% 63V	2416▲	4822 126 12263	220pF 10% 2KV	2974	4822 121 51379	82nF 5% 63V
2115	5322 122 31863	330pF 5% 63V	2416▲	4822 126 13864	330pF 10% 2KV	2975	4822 122 33177	10nF 20% 50V
2135	4822 126 14043	1µF 20% 16V	2417	4822 124 11767	470µF 20% 25V			
2136	4822 126 14043	1µF 20% 16V	2418	4822 126 13482	470nF 20% 16V			
2137	4822 126 13482	470nF 20% 16V	2420	4822 121 10781	470nF 5% 250V			
2172	5322 122 31863	330pF 5% 63V	2420	4822 126 14097	680nF 5% 250V	3000	4822 051 20101	100Ω 5% 0.1W
2173	5322 122 31863	330pF 5% 63V	2431	4822 124 12438	2.2µF 20% 100V	3001	4822 051 20101	100Ω 5% 0.1W
2174	4822 124 40248	10µF 20% 63V	2432	4822 124 81188	100µF 20% 25V	3002	4822 116 52244	15k 5% 0.5W
2176	5322 122 31863	330pF 5% 63V	2460	5322 122 32268	470pF 10% 50V	3003	4822 116 52238	12k 5% 0.5W
2177	4822 124 40248	10µF 20% 63V	2461	5322 126 10184	820P 5% 50V	3004	4822 116 52243	1k5 5% 0.5W
2201	4822 124 21913	1µF 20% 63V	2462	5322 122 32268	470pF 10% 50V	3013	4822 051 20008	jumper (0805)
2202	5322 126 10465	3.9nF 10% 50V	2463	5322 121 42386	100nF 5% 63V	3014	4822 051 20392	3k9 5% 0.1W
2203	4822 124 40248	10µF 20% 63V	2464	4822 124 40255	100µF 20% 63V	3015	4822 116 83933	15k 1% 0.1W
2205	4822 126 13838	100nF 50V 20%	2465	5322 121 42386	100nF 5% 63V	3016	4822 117 10361	680Ω 1% 0.1W
2206	4822 122 33127	2.2nF 10% 63V	2466	4822 121 42408	220nF 5% 63V	3021	4822 117 10361	680Ω 1% 0.1W
2207	4822 124 40207	100µF 20% 25V	2467	5322 121 42386	100nF 5% 63V	3026	4822 051 20562	5k6 5% 0.1W
2210	4822 126 13482	470nF 20% 16V	2470	5322 126 10223	4.7nF 10% 63V	3027	4822 051 20223	22k 5% 0.1W
2211	4822 126 13482	470nF 20% 16V	2500▲	4822 126 13589	470nF 275V	3110	4822 117 11927	75Ω 1% 0.1W
2212	5322 126 10511	1nF 5% 50V	2502▲	4822 126 14153	2.2nF 10% 1KV	3112	4822 051 20101	100Ω 5% 0.1W
2213	4822 126 13482	470nF 20% 16V	2504▲	4822 126 14153	2.2nF 10% 1KV	3113	4822 051 10102	1k 2% 0.25W
2214	5322 122 32654	22nF 10% 63V	2505▲	4822 126 14153	2.2nF 10% 1KV	3114	4822 050 11002	1k 1% 0.4W
2215	4822 124 22652	2.2µF 20% 50V	2508	4822 124 12415	220µF 20% 400V	3115	4822 117 10834	47k 1% 0.1W
2216	4822 126 14076	220nF 20% 25V	2509▲	4822 126 13517	820pF 10% 1000V	3117	4822 051 20008	jumper (0805)
2217	4822 126 13689	18pF 1% 63V	2510▲	4822 126 13517	820pF 10% 1000V	3120	4822 117 11927	75Ω 1% 0.1W
2218	5322 122 31866	6.8nF 10% 63V	2517	5322 122 32331	1nF 10% 100V	3121	4822 117 10353	150Ω 1% 0.1W
2220	4822 126 13838	100nF 20% 50V	2518▲	4822 126 13337	220pF 10% 1KV	3122	4822 117 13579	220k 1% 0.1W
2221	5322 126 10511	1nF 5% 50V	2518▲	4822 126 14149	330pF 10% 1KV	3124	4822 117 10353	150Ω 1% 0.1W
			2520	4822 126 13695	82pF 1% 63V	3125	4822 117 13579	220k 1% 0.1W
			2521	4822 122 33891	3.3nF 10% 63V	3127	4822 051 20008	jumper (0805)
			2521	5322 126 10223	4.7nF 10% 63V	3128	4822 117 10834	47k 1% 0.1W
			2522	4822 122 33891	3.3nF 10% 63V	3140	4822 116 83874	220k 5% 0.5W
			2522	5322 126 10223	4.7nF 10% 63V	3141	4822 050 11002	1k 1% 0.4W
			2524	5322 122 32268	470pF 10% 50V	3145	4822 116 52228	680Ω 5% 0.5W
			2529	4822 126 13838	100nF 20% 50V	3146	4822 051 20334	330k 5% 0.1W
			2530	4822 124 22776	1µF 50V	3147	4822 051 20391	390Ω 5% 0.1W

GB 65

5002	3139 128 22371	COIL
5004	3198 018 18270	820N 10%
5202	4822 157 11867	5.6μH 5%
5341	4822 157 71401	27μH
5342	4822 526 10704	100mH
5404	4822 157 11869	33μH 10%
5404	4822 157 11894	56μH 10%
5405	4822 157 52392	27μH
5405	4822 157 71401	27μH
5406	2422 535 94864	Linearity coil
5408	4822 157 11213	22μH
5408	4822 157 50965	15μH 10%
5408	4822 157 71403	15μH
5410	4822 157 71401	27μH
5444	2422 531 02321	Line drive trafo
5445	3128 138 20661	LOT
5445	3128 138 20671	LOT
5545	2422 531 02312	FLYBACK TRANSFORMER
5545	2422 531 02313	FLYBACK TRANSFORMER
5500▲	4822 157 10476	DMF-2820H
5502	4822 526 10704	100mH
5516	4822 157 60171	Bead EMI 100Mhz 83R
5521	4822 157 62552	2.2μH
5540	4822 157 11835	4.7μH 5%
5550	4822 157 60171	Bead EMI 100Mhz 83R
5551	4822 157 71401	27μH
5552	4822 526 10704	100mH
5570	4822 526 10704	100mH
5571	4822 157 50961	22μH
5573	4822 157 60171	Bead EMI 100Mhz 83R
5603	4822 157 11139	6.8μH 5%
5604	4822 157 11895	4.7μH 10%

6007	4822 130 34142	BZX79-B33
6010	5322 130 34955	BA482
6111	4822 130 34278	BZX79-B6V8
6116	4822 130 34278	BZX79-B6V8
6161	4822 130 34278	BZX79-B6V8
6212	4822 130 30621	1N4148
6213	4822 130 30621	1N4148
6214	4822 130 30621	1N4148
6215	4822 130 30621	1N4148
6217	4822 130 83757	BAS216
6218	4822 130 83757	BAS216
6219	4822 130 83757	BAS216
6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	4822 130 30621	1N4148
6343	4822 130 11666	BZX284-C8V2
6400	4822 130 30621	1N4148

6401	4822 130 30621	1N4148
6402	4822 130 42488	BYD33D
6404	4822 130 32896	BYD33M
6405	4822 130 42488	BYD33D
6406	4822 130 30621	1N4148
6409	4822 130 42488	BYD33D
6410	4822 130 42488	BYD33D
6412	4822 130 42488	BYD33D
6413	4822 130 34197	BZX79-B12
6414	4822 130 83757	BAS216
6415	4822 130 83757	BAS216
6418	4822 130 30621	1N4148
6419	4822 130 30621	1N4148
6431	4822 130 30842	BAV21
6432	4822 130 30621	1N4148
6435	4822 130 83757	BAS216
6460	4822 130 42488	BYD33D
6461	4822 130 34142	BZX79-B33
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6504	4822 130 31083	BYW55
6505	4822 130 31083	BYW55
6507	4822 130 31393	BYT52J
6507	4822 130 42606	BYD33J
6508	4822 130 31393	BYT52J
6508	4822 130 42606	BYD33J
6537	4822 130 30842	BAV21
6540	4822 130 30842	BAV21
6550	4822 130 10218	BY229X-800
6560	4822 130 10871	SBVY27-200
6570	4822 130 10256	EGP20DL-5300
6600	4822 130 11366	BZX284-C3V9
6601	4822 130 10852	BZX284-C6V8
6612	4822 130 34278	BZX79-B6V8
6669	4822 130 34233	BZX79-B5V1
6953	4822 130 10756	BZX284-C2V7



7010	4822 209 90008	L78M05CP
7116	4822 130 60511	BC847B
7118	4822 130 60511	BC847B
7206	4822 130 60373	BC856B
7250	4822 209 16775	TDA8842/N2/S1
7252	4822 130 60373	BC856B
7253	4822 130 60373	BC856B
7256	4822 130 60511	BC847B
7265	4822 130 40981	BC337-25
7266	4822 130 60511	BC847B
7311	4822 130 41782	BF422
7312	4822 130 41782	BF422
7313	4822 130 41646	BF423
7321	4822 130 41782	BF422
7322	4822 130 41782	BF422
7323	4822 130 41646	BF423
7331	4822 130 41782	BF422
7332	4822 130 41782	BF422
7333	4822 130 41646	BF423
7400	4822 130 41782	BF422
7401	4822 130 60373	BC856B
7402	4822 130 11575	BUT11APX
7431	4822 130 60373	BC856B
7460	4822 209 13176	TDA9302H
7469	4822 130 60511	BC847B
7518	4822 130 10806	STP6NA60FI
7520	4822 209 15684	MC44603AP
7600	4822 209 17537	SAAS5563/M2A/0018
7600	4822 209 17538	SAAS5542PS/M2A/0017
7600	9352 636 28112	IC SAA5563PS/M2/0037
7601	4822 209 15546	ST24W08B6
7602	4822 130 41109	BD135-16
7605	4822 130 60511	BC847B
7607	5322 209 60154	NE555D
7608	4822 209 73852	PMBT2369
7609	4822 130 60511	BC847B
7610	4822 130 60511	BC847B
7611	4822 130 60511	BC847B
7612	4822 130 41109	BD135-16
7620	4822 130 40959	BC547B
7621	4822 130 60511	BC847B
7680	4822 218 12055	TSOP2836UH1
7951	4822 130 60511	BC847B
7952	4822 130 60511	BC847B
7953	4822 209 90462	TDA7056B/N1
7955	4822 130 60511	BC847B
7956	4822 130 60373	BC856B

CRT[B]

Various

0254▲	4822 267 20466	Conn. 9p
0254▲	4822 255 70293	CRT socket 14" ANS
1015	3139 178 03401	CRT PANEL 14 "
1015	3139 178 03391	CRT PANEL 20"
1015	3139 177 19321	CRT PANEL 21"



2313	4822 122 33216	270pF 5% 50V
2323	4822 122 33172	390pF 5% 50V
2331	5322 122 31863	330pF 5% 63V
2341▲	4822 126 14588	2.2nF 10% 1KV
2342	4822 121 43526	47nF 5% 250V
2343	4822 121 43526	47nF 5% 250V



3311	4822 051 10102	1k 2% 0.25W
3312	4822 117 13577	330Ω 1% 1.25W
3313	4822 051 20109	10Ω 5% 0.1W
3314	4822 053 12183	18k 5% 3W
3316▲	4822 052 10221	220Ω 5% 0.33W
3317	4822 052 11152	1k5 5% 0.5W
3321	4822 051 10102	1k 2% 0.25W
3322	4822 117 13577	330Ω 1% 1.25W
3323	4822 051 20109	10Ω 5% 0.1W
3324	4822 053 12183	18k 5% 3W
3326▲	4822 052 10221	220Ω 5% 0.33W
3327	4822 052 11152	1k5 5% 0.5W
3331	4822 051 10102	1k 2% 0.25W
3332	4822 117 13577	330Ω 1% 1.25W
3333	4822 051 20109	10Ω 5% 0.1W
3334	4822 053 12183	18k 5% 3W
3336▲	4822 052 10221	220Ω 5% 0.33W
3337	4822 052 11152	1k5 5% 0.5W
3341	4822 052 11152	1k5 5% 0.5W
3347▲	4822 052 10102	1k 5% 0.33W
3348	4822 052 11152	1k5 5% 0.5W
3349▲	4822 052 10108	1Ω 5% 0.33W
3349▲	4822 052 10128	1Ω 5% 0.33W
3349▲	4822 052 10158	1Ω 5% 0.33W
3350▲	4822 052 10108	1Ω 5% 0.33W
3350▲	4822 052 10128	1Ω 5% 0.33W
3350▲	4822 052 10158	1Ω 5% 0.33W



5341	4822 157 51157	3.3μH
5341	4822 157 71401	27μH
5341	4822 158 10604	6.8 μH
5342	4822 526 10704	100mH z



6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	4822 130 30621	1N4148
6343	4822 130 11666	BZX284-C8V2



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

Sound[D]

Various

0239	4822 267 11052	Conn. 17P
0240	4822 267 11052	Conn. 17P

0248	4822 267 31673	HEADPHONE PLUG
1801	4822 242 10769	crystal 18.432MHz



2801	5322 122 32658	22pF 5% 50V
2804	4822 122 33926	12pF 50V
2805	5322 126 10225	1P5 5%
2806	5322 126 10225	1P5 5%
2807	4822 126 14076	220nF 20% 25V
2808	4822 126 14076	220nF 20% 25V
2809	4822 126 14076	220nF 20% 25V
2810	4822 126 14076	220nF 20% 25V
2814	4822 126 13838	100nF 20% 50V
2815	4822 126 13692	47pF 1% 63V
2820	4822 124 40248	10μF 20% 63V
2821	4822 126 13838	100nF 20% 50V
2822	4822 124 40248	10μF 20% 63V
2823	4822 126 13838	100nF 20% 50V
2824	4822 124 40248	10μF 20% 63V
2825	4822 126 13838	100nF 20% 50V
2827	4822 124 40769	4.7μF 20% 100V
2828	5322 126 10511	1nF 5% 50V
2829	4822 124 40769	4.7μF 20% 100V
2830	5322 126 10511	1nF 5% 50V
2831	4822 124 40248	10μF 20% 63V
2835	4822 126 13838	100nF 20% 50V
2836	4822 126 13838	100nF 20% 50V
2837	4822 126 13692	47pF 1% 63V
2838	4822 126 13692	47pF 1% 63V
2841	4822 124 40207	100μF 20% 25V
2842	4822 124 40207	100μF 20% 25V
2950	4822 124 81151	22μF 50V
2951	4822 124 40248	10μF 20% 63V
2952	4822 122 33891	3.3nF 10% 63V
2953	4822 126 14076	220nF 20% 25V
2954	5322 121 42386	100nF 5% 63V
2955	4822 124 11767	470μF 20% 25V
2958	4822 126 13692	47pF 1% 63V
2959	4822 126 13692	47pF 1% 63V
2960	4822 126 13692	47pF 1% 63V
2961	4822 126 13692	47pF 1% 63V
2962	4822 122 33891	3.3nF 10% 63V
2963	4822 126 14076	220nF 20% 25V
2965	4822 126 14076	220nF 20% 25V



3807	4822 116 52175	100Ω 5% 0.5W
3808	4822 116 52175	100Ω 5% 0.5W
3809	4822 117 10834	47k 1% 0.1W
3810	4822 051 20101	100Ω 5% 0.1W
3811	4822 051 20101	100Ω 5% 0.1W
3812▲	4822 052 10688	6Ω 5% 0.33W
3950	4822 051 20273	27k 5% 0.1W
3953	4822 051 20332	3k3 5% 0.1W
4xxx	4822 051 10008	0Ω 5% 0.25W
4xxx	4822 051 20008	0Ω 5% 0.25W



5801	4822 157 50965	
5811	4822 157 51462	10μH 10%
5812	4822 157 51462	10μH 10%
5813	4822 157 51462	10μH 10%
5814	4822 157 53139	4.7μH



6801	4822 130 30621	1N4148
6802	4822 130 34382	BZX79-B8V2
6953	5322 130 31504	BZX79-B3V3



7803	4822 209 17461	MSP3415D-PP-A2
7953	4822 209 13646	TDA7057AQ/N2
7956	4822 130 60373	BC856B

Side AV [E]

Various

0021	3139 124 26931	SIDE AV Bracket
0250	4822 265 11606	Conn. 3P

Spare parts list

0251	4822 267 31673	HEADPHONE PLUG
0253	4822 267 31673	HEADPHONE PLUG



2171	4822 126 13512	330pF 10% 50V
2172	4822 126 13512	330pF 10% 50V



3150	4822 116 83884	47k 5% 0.5W
3151	4822 050 11002	1k 1% 0.4W
3152	4822 116 83884	47k 5% 0.5W
3153	4822 050 11002	1k 1% 0.4W