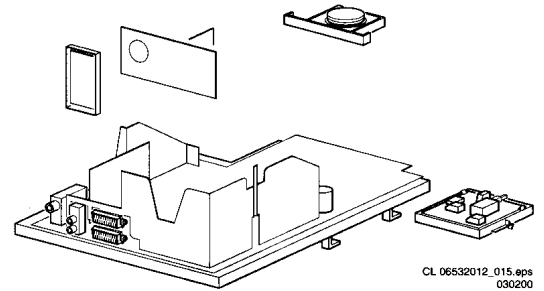


Service
Service
Service



CL 06532012_015.eps
030200

Service Manual

Contents

	Page
1. Technical Specifications	2
2. Safety- and maintenance instructions, warnings and notes.	4
3. Directions for use	6
4. Mechanical instructions	13
5. Faultfinding and repair tips	15
6. <i>Faultfinding trees</i>	
Supply voltage diagram	23
Blockdiagram	24-25
Testpointsoverview	26
Wiring diagram	27
7. <i>Electrical diagram's en PWB's</i>	<i>Diagram PWB</i>
Power supply (Diagram A1)	28 35-37
Horizontal deflection (Diagram A2)	29 35-37
Vertical deflection (Diagram A3)	30 35-37
SSP Tuner (Diagram A4)	31 35-37
SSP SCART (Diagram A5)	32 35-37
Audio (Diagram A6)	33 35-37
Front control/Rotation/Headphone (Diagram A7)	34 35-37
CRT panel (Diagram B)	38 39
IF & Sync. (Diagram C1)	40 47-48
Video processing (Diagram C2)	41 47-48
Video features (Diagram C3)	42 47-48
Diversity tables (SSB)	43
Micro controller (Diagram C4)	44 47-48
Memory (Diagram C5)	46 47-48
Audio processing (1) (Diagram C6)	45 47-48
Audio processing (2) (Diagram C7)	46 47-48
SSB connector (Diagram C8)	47 47-48
Side I/O panel (Diagram D)	49 50
Top control panel (Diagram E)	51 51
Front interface panel (Diagram J)	52 52

Contents

	Page
8. Alignments	53
9. Circuit description and list of abbreviations	58 68
10. Spareparts list	70

©Copyright reserved 2000 Philips Consumer Electronics B.V. Eindhoven, The Netherlands. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.



1. Technical specification, connection facilities and chassis overview

1.1 Supply

Mains Voltage	: 230 Vac ± 15 %
Power Consumption	: 160 W max.
Stand By consumption (220V)	: ≤ 3 W
Mains Frequency	: 50 - 60 Hz (5 %
Tuning System	: PLL
Reception	: Western Europe - PAL B/G/D/K/I, SECAM B/G/D/K/L/L'
	: Eastern Europe - PAL B/G/D/K, SECAM B/ G/D/K
Sound System	: Western Europe - 2CS BG, NICAM I/B/ G/D/K/L,

Sound Output	: Eastern Europe - 2CS, NICAM B/G/D/K : 2 x 5 W - 24" and 28" : 2 x 10 W - 32"
Ambient temperature :	: + 5 oC to +45 °C
Frequency ranges - tuner	: Off air - 45.25 - 855.25 MHz : Cable - 69.25 - 463.25 MHz
Aerial input	: Coaxial 75 Ω
Synchronization	: Horizontal Pull-In range (+200-300Hz) : Vertical pull-in Range (± 5 Hz)
Teletext	: 10 / 100 pages
Remote Control	: Type - RCA10E82B

1.2 Connection Diagram

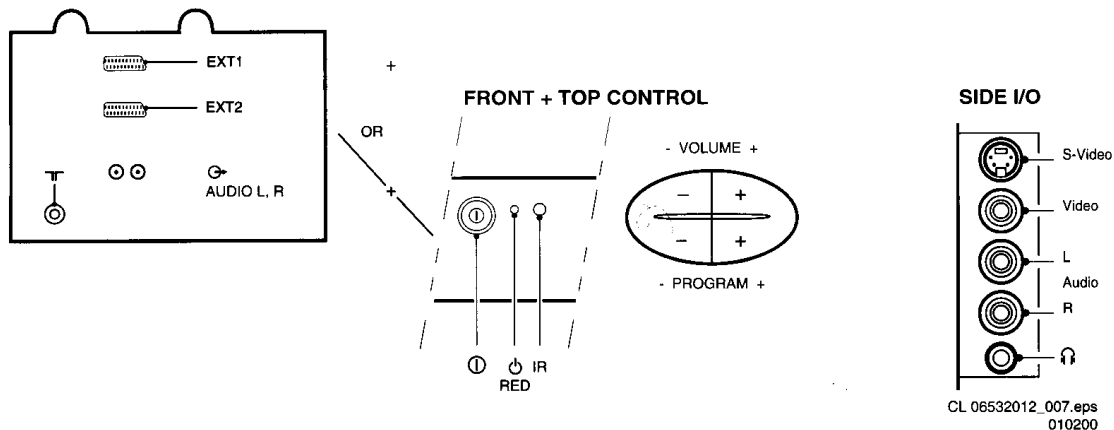


Figure 1-1

1.2.1 EXT1: CVBS (in/out) + RGB (in) - Tuner at output

1 - Audio R	(0.5 V _{RMS} / 1 kΩ)	⊕
2 - Audio R	(0.2 - 2 V _{RMS} / 10 kΩ)	⊕
3 - Audio L	(0.5 V _{RMS} / 1kΩ)	⊕
4 - Audio	GND	⊥
5 - Blue	GND	⊥
6 - Audio L	(0.2 - 2 V _{RMS} / 10kΩ)	⊕
7 - Blue	(0.7 V _{PP} / 75 Ω)	⊕
8 - CVBS status	(0-2V: INT; 4.5-7V: EXT1-16/9; 9.5-12V:EXT1-4/3)	⊕
9 - Green	GND	⊥
10-		
11- Green	(0.7 V _{PP} / 75 Ω)	⊕
12-		
13- Red	GND	⊥
14- RGB status	GND	⊥
15- Red	(0.7 V _{PP} / 75Ω)	⊕
16- RGB status	(0-0.4V: INT;1-3V: EXT1/75Ω)	⊕
17- CVBS	GND	⊥
18- CVBS	GND	⊥
19- CVBS	(1 V _{PP} /75Ω)	⊕
20- CVBS	(1 V _{PP} /75Ω)	⊕
21- Earth screen	GND	⊥

1.2.2 EXT2: CVBS (in/out) + SVHS (in)

Input: EXT2 then output = tuner; input: other then output = input		
1 - Audio R	(0.5 V _{RMS} / 1kΩ)	⊕
2 - Audio R	(0.2 - 2 V _{RMS} / 10kΩ)	⊕
3 - Audio L	(0.5 V _{RMS} / 1kΩ)	⊕
4 - Audio	GND	⊥
5 -		
6 - Audio L	(0.2 - 2 V _{RMS} / 10kΩ)	⊕
7 -		
8 - CVBS status	(0 - 2 V: INT, 4.5 - 7 V: EXT1 16:9, 9.5 - 12 V: EXT1 4:3)	⊕
9 -		
10-		
11-		
12-		
13- C	GND	⊥
14-		
15- C	(300 mV _{PP} / 75 Ω)	⊕
16-		
17- CVBS	GND	⊥
18- CVBS	GND	⊥
19- CVBS	(1 V _{PP} / 75 Ω)	⊕
20- CVBS/Y	(1 V _{PP} / 75 Ω)	⊕
21- Earth screen	GND	⊥



1.2.3 Cinch - audio out

- L - Audio (red) (0.5 V_{RMS} / 1 kΩ)
- R - Audio (white) (0.5 V_{RMS} / 1 kΩ)



1.2.5 Headphone

- - Jack 32 - 2000 Ω.(10 mW)

1.2.6 SVHS

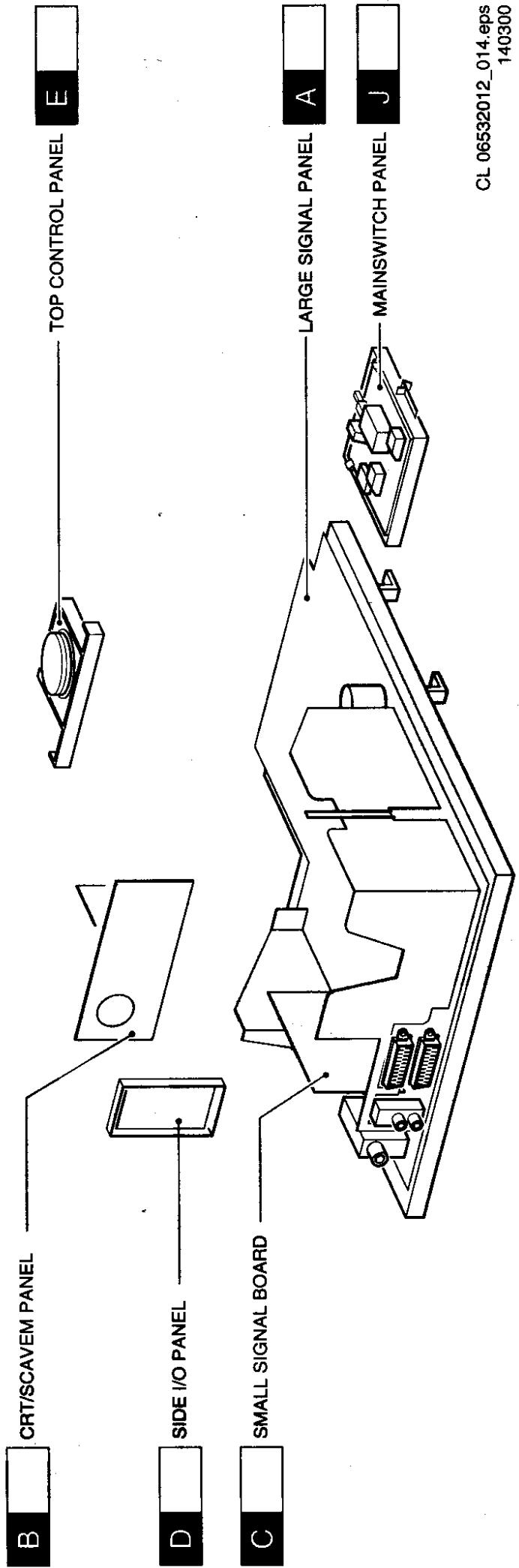
- 1 - (1 V_{PP} / 75 Ω)
- 2 - (0.3 V_{PP} / 75 Ω)
- 3 - Y
- 4 - C



1.2.4 Cinch - audio/video in


- - CVBS (yellow) (1 V)
- L - Audio (red) (0.2 - 2 V_{RMS} / 10 kΩ)
- R - Audio (white) (0.2 - 2 V_{RMS} / 10 kΩ)

1.3 PCB location drawing



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.

2.4 Notes

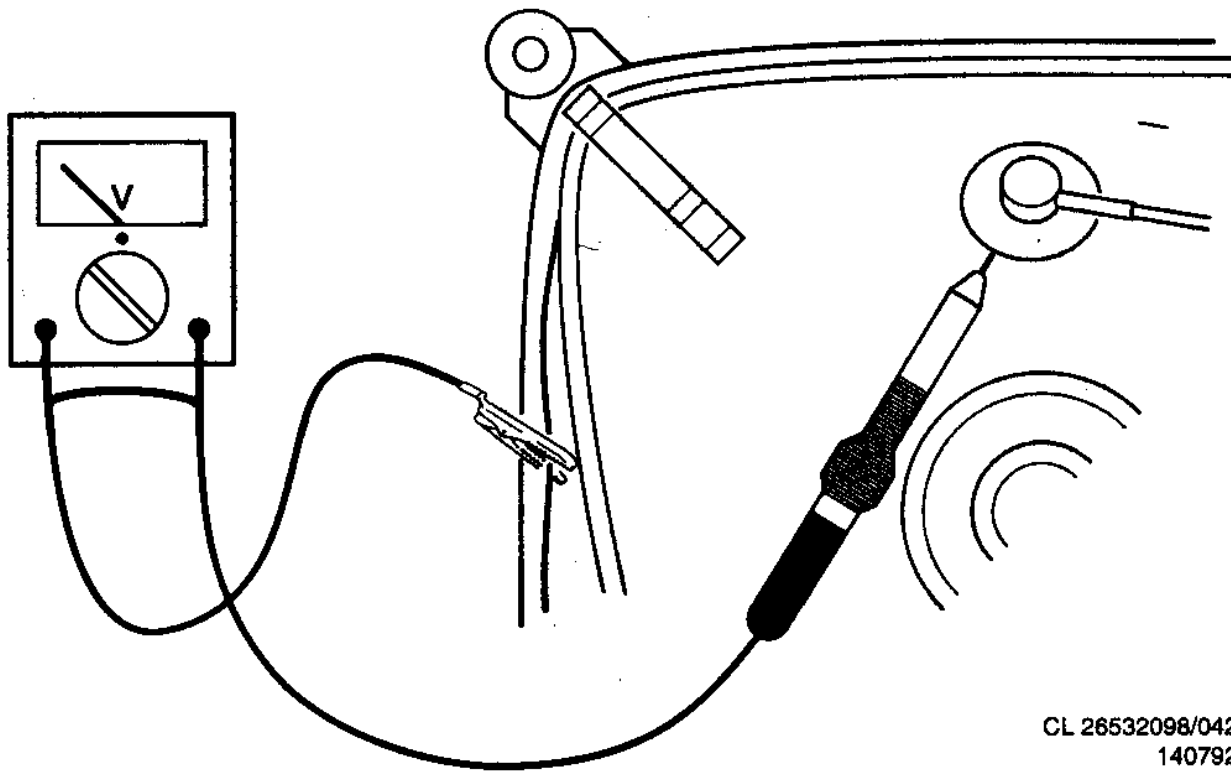
The direct voltages and oscillograms should be measured with regard to the tuner earth (\oplus), or hot earth (\ominus) as this is called. The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 8) with a colour bar signal 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.

Safety instructions, maintenance instruction, warnings and Notes



CL 26532098/042
140792

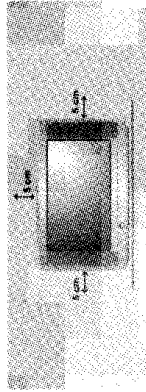
Figure 2-1

3. Directions for use

Installing your television set

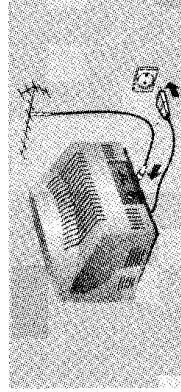
1 Positioning the television set

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



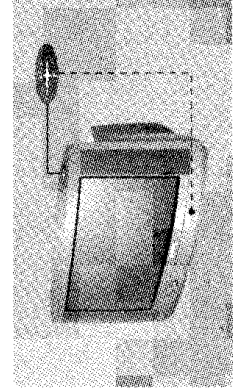
2 Connections

- Insert the aerial plug into the **T** socket at the rear of the set.
- Insert the mains plug into a wall socket (220-240 V / 50 Hz).



The keys on the TV set

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



Introduction

Thank you for purchasing this television set. This handbook has been designed to help you install and operate your TV set. We would strongly recommend that you read it thoroughly. We hope our technology meets entirely with your satisfaction.

Table of Contents

Installation	
Installing your television set	2
The keys on the TV set	2
The remote control keys	3
Quick installation	4
Sorting programmes	4
Using other menus	5
Choosing a language and country	5
Automatic tuning	5
Manual tuning	6
Programme name	6
Operation	
Adjusting the picture	7
Adjusting the sound	7
Rotating the picture	7
Timer function	8
Locking the set	8
Teletext	9
16:9 Formats	10
Peripherals	
Video recorder	12
Other equipment	12
To select connected equipment	12
Connecting other appliances	13
TV / VCR / DVD mode selector	13
Practical information	
Tips	14
Glossary	14

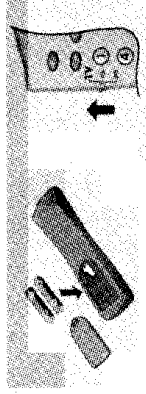
Recycling

The materials used in your set are either reusable or can be recycled. To minimise environmental waste, specialist companies collect used appliances and dismantle them after retrieving any materials that can be used again (ask your dealer for further details).



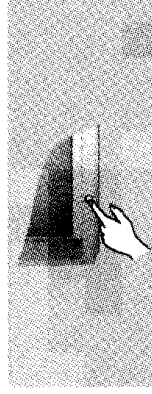
3 Remote control

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



4 Switching on

To switch on the set, press the on/off key. A red indicator comes on and the screen lights up. Go straight to the chapter Quick installation on page 4.



If the television remains in standby mode, press **P** on the remote control.

The indicator will flash when you use the remote control.

The **VOLUME** - + (- \blacktriangleleft \blacktriangleright +) keys are used to adjust sound levels.

The **PROGRAM** - + (- P +) keys are used to select the required programmes.

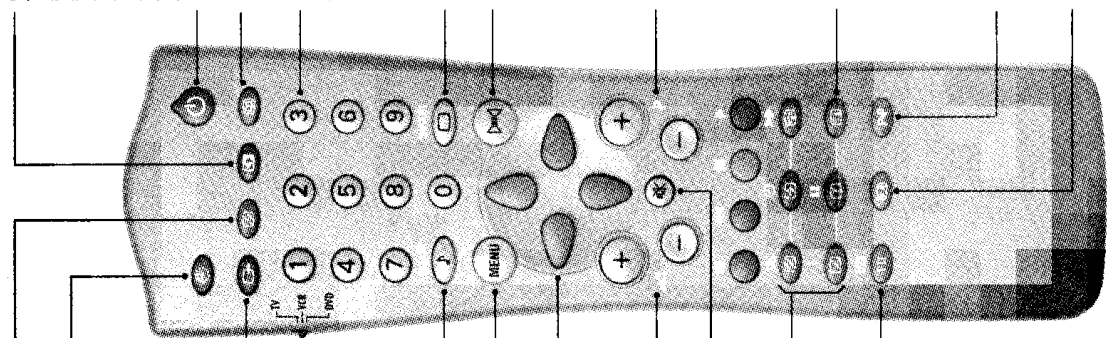
To access the menus, simultaneously hold down the \blacktriangleleft - and \blacktriangleright + keys. The

PROGRAM - + keys may then be used to select an adjustment and the - \blacktriangleleft + keys to make that adjustment.

To exit from the menus, hold down the 2 \blacktriangleleft - and \blacktriangleright + keys.

Note: when the **CHILD LOCK** function is activated, these keys are unavailable (refer to **FEATURES** menu on page 8).

The remote control keys

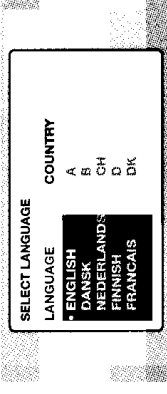


- key not used**
- Sleep timer**
To select the length of time before the set automatically switches to standby (from 0 to 240 minutes)
- Select EXT sockets**
Press several times to select EXT1, EXT2 and on certain models EXT3 and S-VHS2.
- Mode selector (p. 13)**
To activate the remote control in TV, VCR (video recorder) or DVD mode.
- Smart sound controls**
To access a series of settings: VOICE, MUSIC, THEATRE and return to PERSONAL
- Menu**
To display or exit from the menus
- Cursor**
These 4 keys are used to move within the menus or to have direct access to the 16:9 formats (p. 10).
- Volume**
To adjust the sound level
- Mute**
To disable or enable the sound.
- Teletext features (p. 9)**
- Sound mode**
To switch from STEREO to MONO or to choose between Dual I and Dual II for bilingual transmissions. For TV sets fitted with NICAM reception, depending on the transmission, you can switch from NICAM STEREO to MONO or choose between NICAM DUAL I, NICAM DUAL II and MONO. When the sound mode is switched to MONO, the indication is displayed in red.

- Contrast +**
To activate / de-activate the automatic contrast adjustment system (the dark areas are made darker whilst maintaining the detail).
- Standby**
To set the TV to standby mode. To switch the TV set on again, press P (+) or (Ⓞ).
- key not used**
- Numerical keys**
For direct access to programmes. For a 2 digit programme number, the 2nd digit must be entered before the dash disappears.
- Smart picture controls**
To access a series of settings: RICH, NATURAL, SOFT, MULTIMEDIA and return to PERSONAL.
- Incredible Surround**
To activate / deactivate the surround sound effect. In stereo, this gives the impression that the speakers are further apart. In mono, a stereo spatial effect is simulated.
- Selecting TV programmes**
To move up or down a programme. The number (the name) and the sound mode are displayed for a few seconds. For some programmes equipped with teletext, the title of the programme appears at the bottom of the screen.
- Screen information**
To display / remove the programme number, the name (if it exists), the time, the sound mode and the time remaining on the timer. Hold down for 5 seconds to permanently display the programme number on the screen
- Previous programme**
To access the previously viewed programme.
- 16:9 formats (p. 10)**

Quick installation

The first time you switch on the television, a menu appears on the screen. This menu asks you to choose the language of the menus :



If the menu does not appear, hold down the \blacktriangle and \blacktriangleright + keys on the set for 5 seconds to bring it up.

- Use the \blacktriangle keys on the remote control to choose your language then confirm with \blacktriangleright .
- Then select your country using the \blacktriangle keys and confirm with \blacktriangleright .

If your country does not appear in the list, select "...".

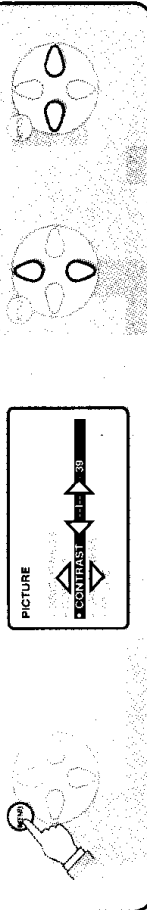
- Tuning starts automatically. The operation takes several minutes. A display shows the search status and the number of programmes found. When it has finished the menu disappears. To exit or interrupt the search, press the stop key. If no programmes are found, refer to the chapter entitled *Tips* on p. 14.
 - If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered. If not, the programmes found will be numbered in descending order starting at 99, 98, 97, etc. (or 79, 78, ...).
- Use the SORT menu to renumber them. Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). Where this is the case, make your choice using the \blacktriangle keys and confirm with \blacktriangleright .

Plug & Play

Sorting programmes

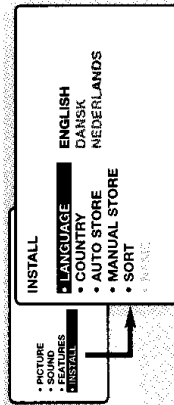
- Press the stop key. The main menu is displayed.
 - Select INSTALL (stop), then press \blacktriangleright . The INSTALL menu appears.
-
- Using the \blacktriangle key, select SORT then press \blacktriangleright . The SORT menu appears. The FROM option is activated.
 - Change "FROM" (enter the current programme number).
 - "TO" (enter the new number).
 - EXCHANGE numbers" (the operation is carried out).
 - Select the programme you wish to renumber using \blacktriangle keys or stop to stop . Example: to renumber programme 78 as 2 press stop stop .
 - Select TO (using \blacktriangle key) and enter the new number with \blacktriangle keys or stop to stop (for the example given, enter stop).
 - Select EXCHANGE (stop key) and press \blacktriangleright . The message EXCHANGED appears, the exchange takes place. In our example, programme 78 is renumbered as 2 (and programme 2 as 78).
 - Select the option FROM (\blacktriangle key) and repeat stages stop to stop as many times as there are programmes to renumber.
 - To exit from the menus, press stop .

Using other menus



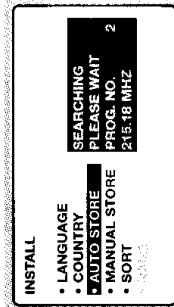
Choosing a language and country

- Press the **MENU** key to display the main menu.
- Select **INSTALL** (I), then press **ENTER**. The **INSTALL** menu appears. The **LANGUAGE** option is activated.
- Press **ENTER** to go into the **LANGUAGE** menu.
- Select your language with the **UP** and **DOWN** keys. The menu will appear in the chosen language.
- Press **ENTER** to exit the **LANGUAGE** menu.
- Select the option **COUNTRY** and press **ENTER**.
- Select your country with **UP** and **DOWN** keys (GB).
- If your country does not appear in the list, select "...".
- Press **ENTER** to exit the **COUNTRY** menu.
- To exit from the menus, press **EXIT**.



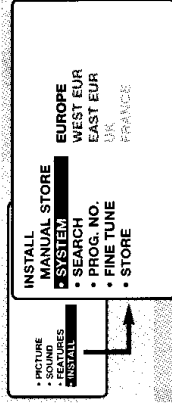
Automatic tuning

- This menu allows you to automatically search for all the programmes available in your region (or on your cable network).
- First carry out operations 1 to 3 above, then:
 - Press **ENTER** once to select **AUTO STORE** then press **ENTER**. The search begins. After several minutes, the **INSTALL** menu reappears automatically.
 - If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered. If not, the programmes found will be numbered in descending order starting at 99, 98, 97, etc. (or 79, 78, ...).
 - Use the **ENTER** menu to **renumber** them. Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). Where this is the case, make your choice using the **UP** and **DOWN** keys and confirm with **ENTER**. To exit or interrupt the search, press the **EXIT** key. If no picture is found, refer to the chapter entitled **Tips** on p. 14.
 - To exit from the menus, press **EXIT**.



Manual tuning

- This menu allows you to store the programmes one by one.
- Press **MENU**.
 - Select **INSTALL** (I), then press **ENTER**.
 - Select **MANUAL STORE** (M) then press **ENTER**. The menu appears:



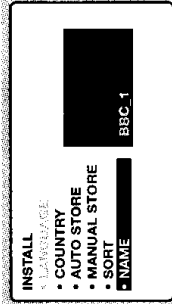
- Press **ENTER** to go to the **SYSTEM** menu. Use **UP** and **DOWN** to choose **EUROPE** (automatic detection*) or manual detection with **WEST EUR** (standard BG reception), **EAST EUR** (standard DK reception), **UK** (standard I reception) or **FRANCE** (standard LL). Then press **ENTER** to exit from the menu. * Except for France (standard LL): select the option **FRANCE**.

- Select **SEARCH** and press **ENTER**. The search begins. As soon as a programme is found, the search will stop. If you know the frequency of the programme required, enter its number directly using the **UP** and **DOWN** keys and go to step 7.
- If no programme is found, refer to the **Tips** chapter on page 14.
- If reception is unsatisfactory, select **FINE TUNE** and hold down **UP** or **DOWN** key.
- Select **PROG. NO.** (programme number) and use the **UP** and **DOWN** keys to enter the desired number.
- Select **STORE** and press **ENTER**. The message **STORED** appears. The programme is stored.
- Repeat steps 5 to 8 for each programme to be stored.
- To exit: press the **EXIT** key.

Programme name

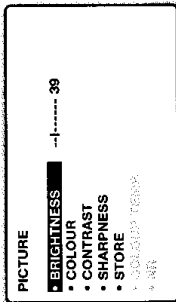
You may, if you wish, give a name to the first 40 programmes (from 1 to 40).

- Press **MENU**.
- Select **INSTALL** (I), then press **ENTER**. The **INSTALL** menu appears.
- Press **ENTER** 5 times to select **NAME** (concealed at the bottom of the screen), then press **ENTER**. The menu appears:



- Select the programme you wish to name using the keys **UP** and **DOWN** or **P** and **+**. *Note: at the time of installation, the programmes are automatically named when the identification signal is transmitted.*
- Use the keys **UP** and **DOWN** to move within the name display area (5 characters).
- Use keys **UP** and **DOWN** to choose the characters.
- Press **MENU** when the name has been entered. The programme name is stored.
- Repeat steps 4 to 7 for each programme to be named.
- To exit from the menus, press **EXIT**.

Adjusting the picture

- Press **MENU** then **○**. The PICTURE menu appears:
 
- Use **○** keys to select a setting and **○** keys to adjust.

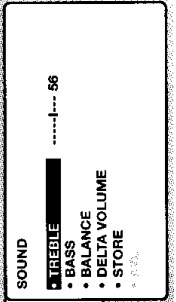
Note: the menu is a scroll-down menu. Keep the key **○** held down to access the settings hidden at the bottom of the screen.
- Once the necessary adjustments have been made, select the option STORE and press **○** to store them.

- To exit from the menu, press **EXIT**.

Description of the settings:

 - BRIGHTNESS:** alters the brightness of the image.
 - COLOUR:** alters the colour intensity.
 - CONTRAST:** alters the variation between light and dark tones.
 - SHARPNESS:** alters the crispness of the image.
 - STORE:** stores the picture settings.
 - COLOUR TEMP (colour temperature):** adjusts the colour temperature of the picture. Three options are available here: COOL (blue white), NORMAL (balanced) or WARM (red white).
 - NR (Noise Reduction):** alleviates fuzziness (snowy picture). This setting is useful when reception is difficult.

Adjusting the sound

- Press **MENU**, select the SOUND option **○** and press **○**. The SOUND menu appears:
 
- Use **○** keys to select a setting and keys **○** to adjust.

Note: to access the AVL setting (hidden at the bottom of the screen) hold down **○** key.
- Once the necessary adjustments have been made, select the option STORE and press **○** to store them.
- To exit from the menu, press **EXIT**.

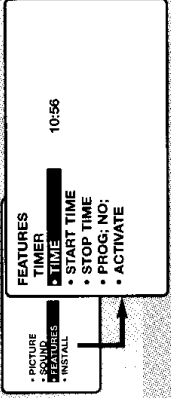
- Description of the settings:**
- TREBLE:** alters the level of the high frequency sound.
 - BASS:** alters the level of the low frequency sound.
 - BALANCE:** to balance the sound between the left and right speakers.
 - DELTA VOLUME (volume difference):** allows you to compensate for the volume differences between the different programmes or the EXT sockets. This setting is available for programmes 1 - 40 and the EXT sockets.
 - STORE:** stores the sound settings.
 - AVL (Automatic Volume Leveller):** automatic volume control used to avoid sudden increases in volume, particularly when changing programmes or during advertisements
- (only available on certain versions)*

Rotating the picture

- Larger screens are sensitive to variations in the earth's magnetic field. This setting makes it possible to compensate for this phenomenon.
- Press **MENU**.
 - Select FEATURES **○** and press **○**.

- The FEATURES menu appears.
- Use **○** key to select ROTATION and use **○** keys to alter the angle of the image.
 - Press **EXIT** to exit from the menu.

Timer function

- This menu allows you to use your TV as an alarm clock.
- Press **MENU**.
 - Select FEATURES **○** and press **○** twice. The TIMER menu appears:
 
 - Press **○** to enter and exit the sub-menus and use keys **○** or **○** to adjust.
 - TIME:** enter current time.

Note: the time is updated automatically each time the set is switched on using teletext information taken from programme 1. If programme 1 does

- not have teletext, the update will not take place.
- START TIME:** enter the start time.
 - STOP TIME:** enter the stop time.
 - PROG; NO:** enter the number of the programme required.
 - ACTIVATE:** you can set the alarm to be activated:
 - ONCE ONLY for a one-off alarm,
 - DAILY for a daily alarm or
 - STOP to cancel.
 - Press **EXIT** to set the TV to standby. It will automatically switch on at the time programmed. If you leave the TV switched on, it will only change programme at the time indicated.

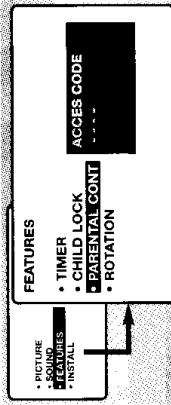
The combination of the CHILD LOCK and TIMER functions may be used to limit the length of time your television is in use, for example, by your children.

Locking the set

You can bar access to certain programmes or completely lock the set by locking the keys.

Locking programmes

- Press **MENU**.
- Select FEATURES **○** and press **○**.
- Select PARENTAL CONT. **○** and press **○**.



- Enter your confidential access code. The first time, enter the code 0711 then confirm by re-entering 0711. The menu appears.
- Press **○** to go into the menu.
- Use keys **○** to select the required programme and confirm with **○**. The symbol **Ⓛ** is displayed alongside the programmes or sockets that have been locked.
- Press **EXIT** to exit.
- To watch a programme which has been locked you will now need to enter the confidential

code; otherwise the screen will remain blank.

Caution: in the case of encrypted programmes which use an external decoder, it is necessary to lock the corresponding EXT socket.

To unlock all programmes

Repeat stages 1 to 4 above, then select CLEAR ALL and press **○**.

To change the confidential code

- Repeat stages 1 to 4 above, then:
 - Select CHANGE CODE and enter your own 4-digit number.
 - Confirm by entering it again.
 - Your new code will be stored.
- Press **EXIT** to exit from the menus.

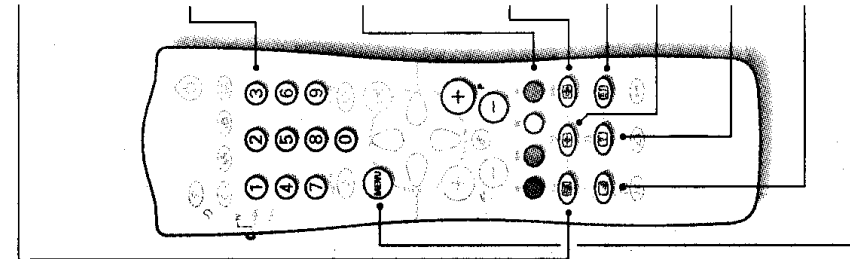
Locking the keys

- Press **MENU**, select FEATURES **○** and press **○**.
- Select CHILD LOCK **○** and press **○**.
- Enter your confidential access code.
- Press **○** to set the lock to ON.
- Switch off the set and put the remote control out of sight.

The set cannot be used (it can only be switched on using the remote control).
- To cancel: switch CHILD LOCK to OFF.

Teletext

Teletext is an information system, broadcast by certain channels, which can be read like a newspaper. It also provides subtitles for people with hearing difficulties or those who are unfamiliar with the language in which a particular programme is being broadcast (cable networks, satellite channels, etc.).



Switch teletext on/off

To call up or exit from teletext. At first, the main index page appears with a list of the items available. Each page has a corresponding 3-figure number.

If the selected channel does not broadcast teletext, 100 will appear and the screen will remain blank (in this case, exit from teletext and choose another channel).

Selecting a teletext page

Use keys 0 to 9 or P to enter the page number required. For example: for page 120, press 1 2 0.

The number is displayed in the top left-hand corner, the page counter starts searching and the page is displayed. Repeat the procedure to consult another page.

If the counter continues searching, this means that the selected page is not broadcast. Choose another number.

Direct access to subject headings

Coloured zones are displayed at the bottom of the screen. The 4 coloured keys give access to the corresponding subjects or pages. The coloured zones flash when the subject or the page is not yet available.

Stop the sequence of sub-pages

Some pages contain sub-pages which follow on automatically from one another. This key allows sub-page sequence to be enabled or disabled. The sign appears in the top left hand corner.

Table of contents

To return to the table of contents (normally page 100).

Page enlargement

Press this key to display the upper, then lower part of the screen, and then to return to the normal page size.

Reveal

Use this key to reveal/conceal hidden information (answers to puzzles).

Overlaying text on the TV picture

To activate or deactivate screen overlay.

Favourite pages

(available only on certain models)

For teletext programmes 1 to 40, you can store 4 favourite pages which you can then access via the coloured keys.

- 1 Press .
- 2 Enter the number of the page required.
- 3 Press then the coloured key of your choice. The page is stored.
- 4 Repeat steps 2 and 3 for the other coloured keys.
- 5 From now on, when you consult teletext, your favourite pages appear in colour at the bottom of the screen.

To get back to the normal subject headings, press .

To remove these settings, hold down for 5 seconds.

16:9 Formats

The pictures you receive may be transmitted in 16:9 format (wide screen) or 4:3 format (conventional screen). 4:3 pictures sometimes have a black band at the top and bottom of the screen (letterbox format). This function allows you to optimise the picture display on screen.

Automatic switching

This TV set is also equipped with automatic switching which will select the correct-screen format, provided the specific signals are transmitted with the programmes.

This automatic format can also be modified manually.

Using the different screen formats

Press the key (or) to select the different modes:

4:3, ZOOM 14:9, ZOOM 16:9, SUBTITLE ZOOM, SUPER ZOOM and WIDE SCREEN.

You can also access these settings with key .



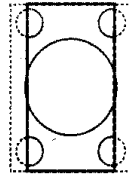
4:3 Mode

The picture is reproduced in 4:3 format and a black band is displayed on either side of the picture. The picture may be progressively enlarged using the keys.



ZOOM 14:9 Mode

The picture is enlarged to 14:9 format; a thin black band remains on both sides of the picture. The keys allow you to move the image up or down to view subtitles.



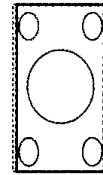
ZOOM 16:9 Mode

The picture is enlarged to 16:9 format. This mode is recommended when displaying pictures which have black bands at the top and bottom (letterbox format). Use the keys if you wish to display sub-titles.



SUBTITLE ZOOM Mode

This mode is used to display 4:3 pictures using the full surface of the screen leaving the sub-titles visible. Use the keys to increase or decrease the section at the bottom of the picture.



SUPERWIDE Mode

This mode is used to display 4:3 pictures using the full surface of the screen by enlarging the sides of the picture. The keys allow you to move the image up or down to view subtitles.



WIDE SCREEN Mode

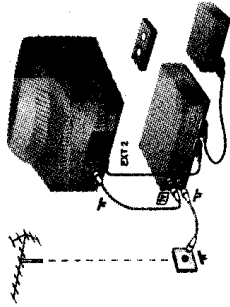
This mode restores the correct proportions of pictures transmitted in 16:9 using full screen display. *Note: If you display a 4:3 picture in this mode, it will be enlarged horizontally.*

Connecting peripheral equipment

The television has 2 external sockets situated at the back of the set (EXT1 and EXT2). The EXT1 socket has audio and video inputs/outputs and RGB inputs. The EXT2 socket has audio and video inputs/outputs and S-VHS inputs.

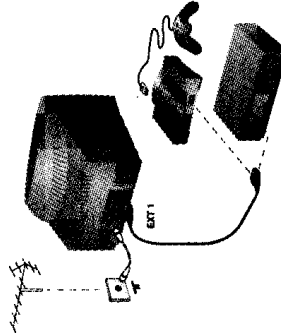
Video recorder

Video recorder (only)
Carry out the connections featured opposite. Use a good quality euroconnector cable. If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder's test signal and assign it programme number 0 (refer to manual store, p. 6).
Video recorder with decoder
Connect the decoder to the second euroconnector socket of the video recorder. You will then be able to record scrambled transmissions.



Other equipment

Satellite receiver, decoder, CDV, games, etc.
Carry out the connections featured opposite. To optimise picture quality, connect the equipment which produces the RGB signals (digital decoder, games, etc.) to EXT1, and the equipment which produces the S-VHS signals (S-VHS and Hi-8 video recorders, certain CDV drives) to EXT2 and all other equipment to either EXT1 or EXT2.



To select connected equipment
Press the  key to select EXT1, EXT2, S-VHS2 (S-VHS signals from the EXT2 socket) and EXT3 for connections on the front panel. Most equipment (decoder, video recorder) comes out the switching itself.

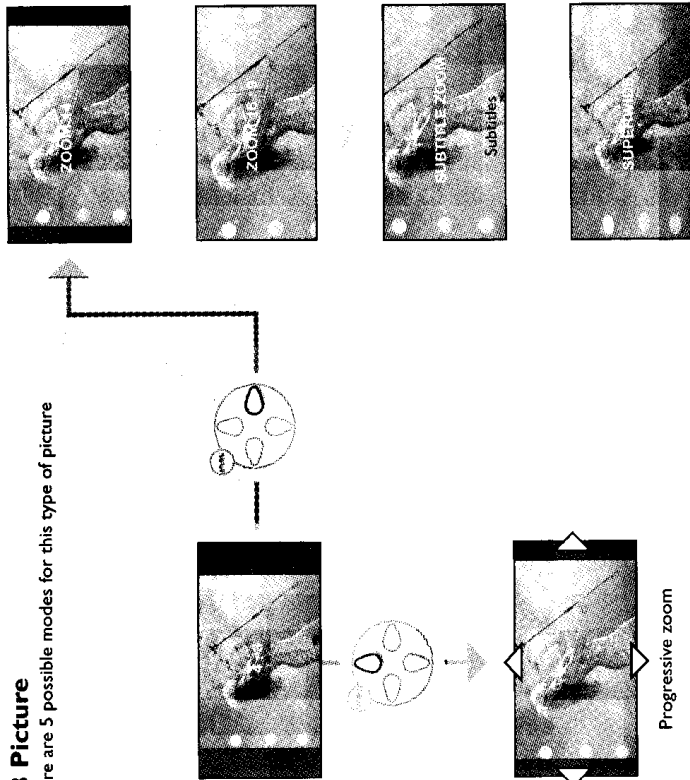


Selecting the correct mode

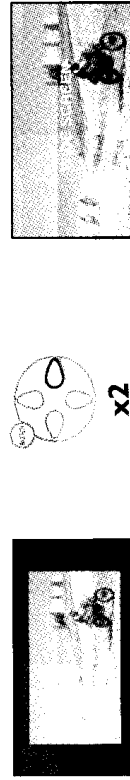
Different modes can be selected to suit different picture formats, use the following diagrams as a guide to which mode to use.

1 4:3 Picture

There are 5 possible modes for this type of picture



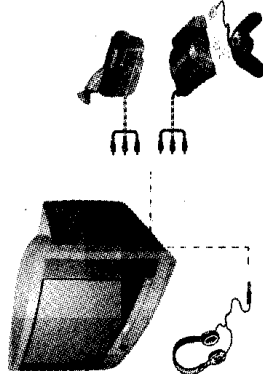
2 4:3 Picture Letterbox




3 16:9 Picture




Connecting other appliances





Connect other appliances as shown opposite.

Select EXT 3 by pressing .

For a monophonic camera, connect the sound signal to the AUDIO L input. Use the  key to reproduce the sound through the left and right TV speakers.

Headphones

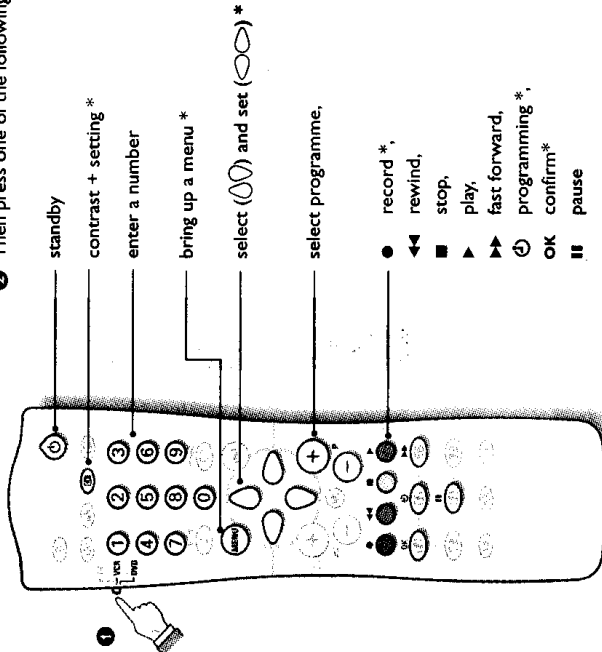
Keys  allow you to adjust the volume on the headphones and on the set. Press  if you want to cut off the sound on the set.

The headphones must have an impedance of between 32 and 600 ohms.

TV / VCR / DVD mode selector

The remote control allows you to control the main functions of your video recorder or DVD.

- 1 Set the switch on the side of the remote control to the required mode: TV/VCR (video recorder) or DVD.
- 2 Then press one of the following keys:



* Some programming functions are not available on all models (cursors, menu, OK key, etc.).

The remote control is compatible with all the video recorders in our range as well as models which use the RCS signalling standard.


Tips

Poor reception


The proximity of mountains or high buildings may be responsible for ghost pictures, echoing or shadows. In this case, try manually adjusting your picture: see "fine tuning" (p.6) or modify the orientation of the outside aerial. Does your antenna enable you to receive broadcasts in this frequency range (UHF or VHF band)?

In the event of difficult reception (snowy picture) switch the NR on the PICTURE menu to ON. (p. 7).

No picture

Have you connected the aerial socket properly? Have you chosen the right system? (p. 6) Is the contrast or the brightness badly adjusted? Press  and readjust the PICTURE menu. Poorly connected euroconnector cables or aerial sockets are often the cause of picture or sound problems (sometimes the connectors can become half disconnected if the TV set is moved or turned). Check all connections.

Peripheral equipment gives a black and white picture

You have not selected the right socket with the  key: S-VHS2 instead of EXT2. To play a video cassette, check that it has been recorded under the same standard (PAL, SECAM, NTSC) which can be replayed by the video recorder.

The remote control no longer works.

Check that the mode selector on the side of the remote control is set to TV.

No sound

If on certain channels you receive a picture but no sound, this means that you do not have the correct TV system. Modify the SYSTEM setting (p. 6).

Remote control

The TV set does not react to the remote control; the indicator on the set no longer flashes when you use the remote control? Replace the batteries.

Standby

When you switch the TV set on it remains in standby mode and the indication LOCKED is displayed when you use the keys on the TV set? The CHILL LOCK function is switched on (p. 8). If the set receives no signal for 15 mins, it automatically goes into standby mode.

To save power, your set is fitted with components that give it a very low power consumption when in standby mode (less than 3 W).

Cleaning the set

Only use a clean, soft and lint-free cloth to clean the screen and the casing of your set. Do not use alcohol-based or solvent-based products.

Still no results?

If your TV set breaks down, never attempt to repair it yourself: contact your dealer's after-sales service.

Glossary

RGB Signals: These are 3 Red, Green and Blue video signals which directly drive the red, green and blue emitters in the cathode ray tube. Using these signals provides better picture quality.

S-VHS Signals: These are 2 separate Y/C video signals from the S-VHS and Hi-8 recording standards. The luminance signals Y (black and white) and chrominance signals C (colour) are recorded separately on the tape. This provides better picture quality than with standard video (VHS and 8 mm) where the Y/C signals are combined to provide only one video signal.

NICAM sound: Process by which digital sound can be transmitted.

System: Television pictures are not broadcast in the same way in all countries. There are different standards: BG, DK, I, and L. The SYSTEM setting (p.4) is used to select these different standards. This is not to be confused with PAL or SECAM colour coding. Pal is used in the majority of European countries, Secam in France, the CIS and the majority of African countries. The United States and Japan use a different system called NTSC. The inputs EXT1 and EXT2 are used to read NTSC coded recordings.

16:9: Refers to the ratio between the length and height of the screen.

Wide screen televisions have a ration of 16/9, conventional screen TV sets have a ration of 4/3.

4. Mechanical instructions

4.1 Accessing the service connector (for ComPair)

1. Connect the ComPair cable to connector 0229 (in front of the Tuner).
2. Start ComPair and perform the diagnosis (for more info see chapter 5).

4.2 Removing the Rear Cover

1. Remove all the fixation screws of the rear cover.
2. Now the rear cover can be removed.

4.3 Service position

The following PWB's are present in this chassis (see also 'Chassis overview', chapter 1):

1. Large Signal Panel (LSP)
2. Small Signal Board (SSB)
3. Top Control panel
4. CRT panel (or PTP)
5. Side I/O panel
6. Mains Switch/LED panel

4.3.1 Service position LSP

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

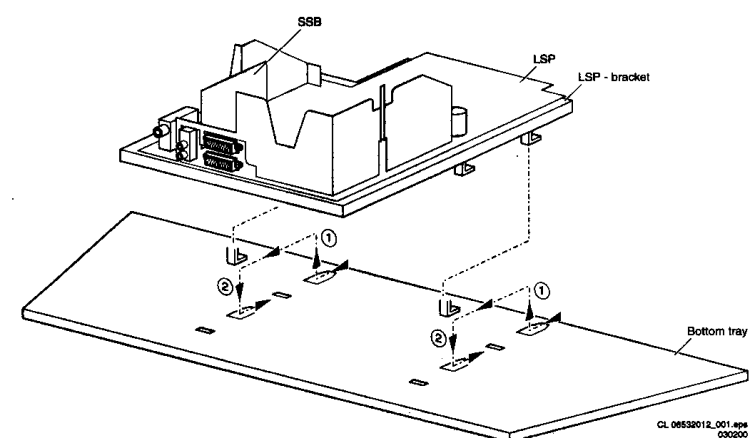


Figure 4-1

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

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

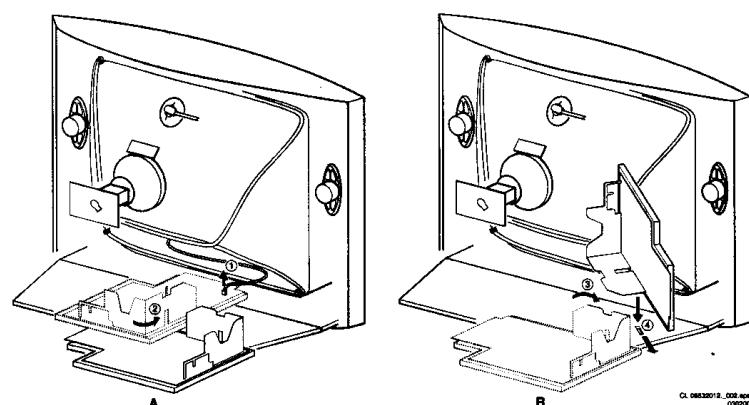


Figure 4-2

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

4.3.2 Service position SSB

In fact there is no predefined service position for the bottom (B) side of the SSB. All relevant test points can be accessed in both service positions.

If IC's must be replaced: take the complete panel out of the SIMM-connector.

1. Put the LSP in service position 1 (as described above).
2. Release the 2 metal clamps at both sides of the SIMM-connector and the complete SSB can be taken out. It 'hinges' in the SIM-connector.

4.3.3 Accessing the Top Control panel

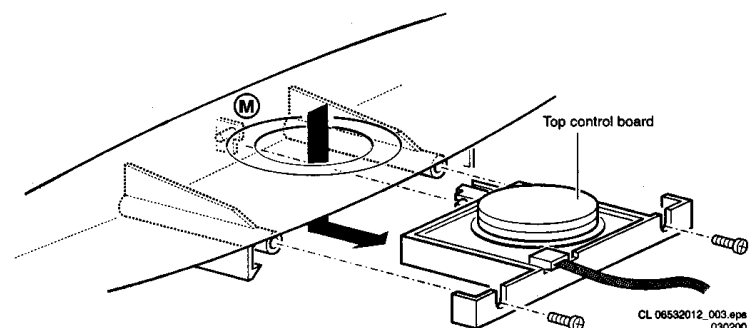


Figure 4-3

1. Remove the two fixation screws, which hold the panel.
2. Pull the board backward (w.o.w. release it from the front hinge).

4.3.4 Accessing the Side I/O panel

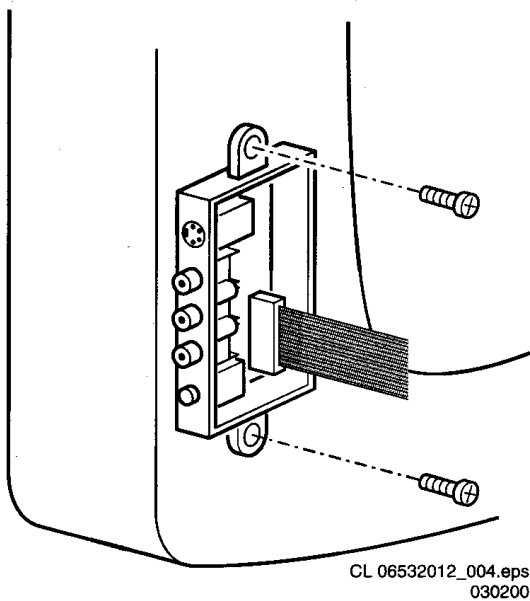


Figure 4-4

1. The complete Side I/O-assembly can easily be removed by unscrewing the 2 fixation screws.
2. The board can easily be lifted out of the bracket after releasing the 2 fixation clamps.

4.3.5 Accessing the Mains Switch/LED panel

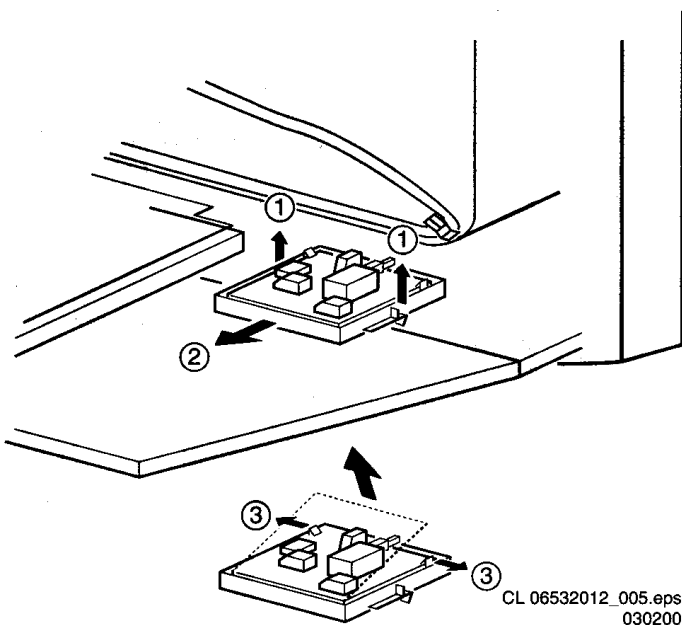


Figure 4-5

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

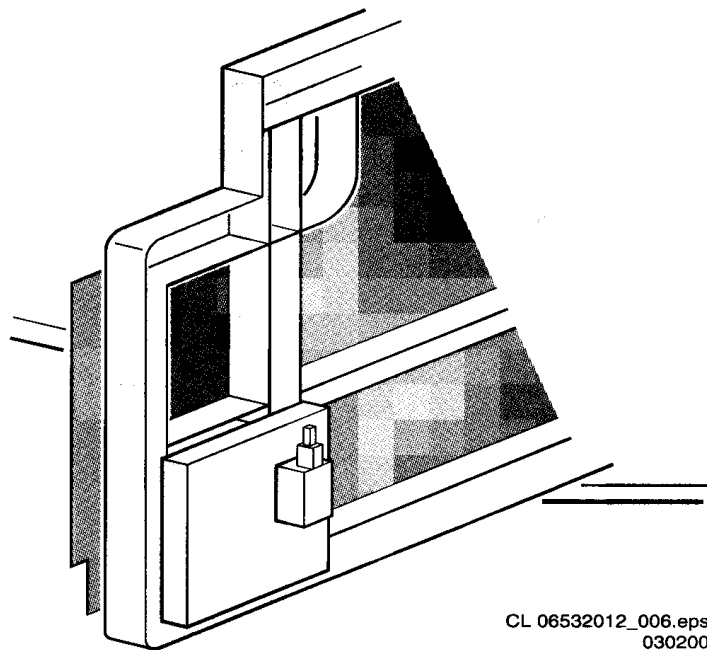


Figure 4-6

1. For easy measurements, panel can be clicked to the LSP bracket.

4.4 Mounting the Rear Cover

Before mounting the Rear Cover, some checks has to be performed:

- Check whether the Mains Cord is mounted correctly in the guiding brackets.
- Check whether all cables are replaced in their original position.

5. Service Modes, error messages 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 Error code buffer and error codes
- 5.4 The "blinking LED" procedure
- 5.5 Trouble shooting tips
- 5.6 Customer Service Mode

5.1 Test points

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

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

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.

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. For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the A10 chassis, download code 4 should be used).

5.2.2 Diagnose features for the service engineer

A10 sets can be put in the two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM). SDM can also be entered by short circuiting the jumpers 9261 and 9262 on the chassis with a screwdriver.

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
- start the blinking LED procedure
- have the possibility to override the 5V protection

Entering the SDM:

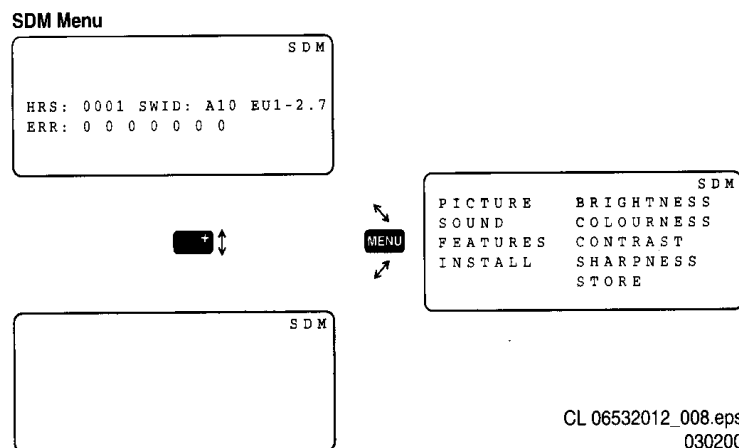
- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 0-6-2-5-9-6 followed by pressing the "MENU"-button

- By shorting jumpers 9261 and 9262 on the monocarrier while switching on the set

By temporarily shorting jumper 9261 and 9262 when switching on the set, the 5V protection is disabled.

CAUTION ! Overriding the 5V protection should only be used for a short period of time. In case of S/W protections (error 1-4) the set will shutdown after 15 sec.

For recognition of the SDM, "SDM" is displayed at the upper right side of the screen.



CL 06532012_008.eps
030200

Figure 5-1

Exit the SDM:

- Press the "EXIT"-button on the DST
 - Switch the set to Standby (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 SDM sets the following pre-defined conditions:

- PAL/Secam sets: tuning at 475.25 MHz PAL
- NTSC sets: tuning at channel 3 (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 switched off in SDM (and after leaving SDM):

- Timer
- Sleep timer

The following functions are disabled during SDM (and enabled after leaving SDM)

- Parental lock
- Blue mute
- Hospitality Mode
- No-ident Timer (normally the set is automatically switched off when no video signal (IDENT) was received for 15 minutes).

All other controls operate normally.

Special functions in SDM

Access to normal user menu

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

Channel search

Pressing the "P+" button of the remote control starts a tuning search. Search is indicated by a blinking LED (this stops when a transmitter is found; the transmitter is stored on the highest channel number, typically this is 99 and the TV switches to this preset)

Error buffer

Pressing the "OSD" button of the remote control shows/hides the error buffer. OSD can be hidden to prevent interference with oscillogram measurements.

Access to SAM

By pressing the "VOLUME +" and "VOLUME -" buttons on the local keyboard simultaneously the set switches from SDM to SAM.

Service Alignment Mode (SAM)

The purpose of the SAM is:

- to do alignments
- Change option settings
- display/clear the error code buffer values.

Entering SAM:

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SDM)
- By pressing the "VOLUME +" and "VOLUME -" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 0-6-2-5-9-6 followed by pressing the "OSD"-button

Exit SAM:

Switch the set to Standby (the error buffer will be erased)

Note: When the mains power is switched off while the set is in SAM, the set will enter to SAM immediately when the mains is switched on again.

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

SAM Menu

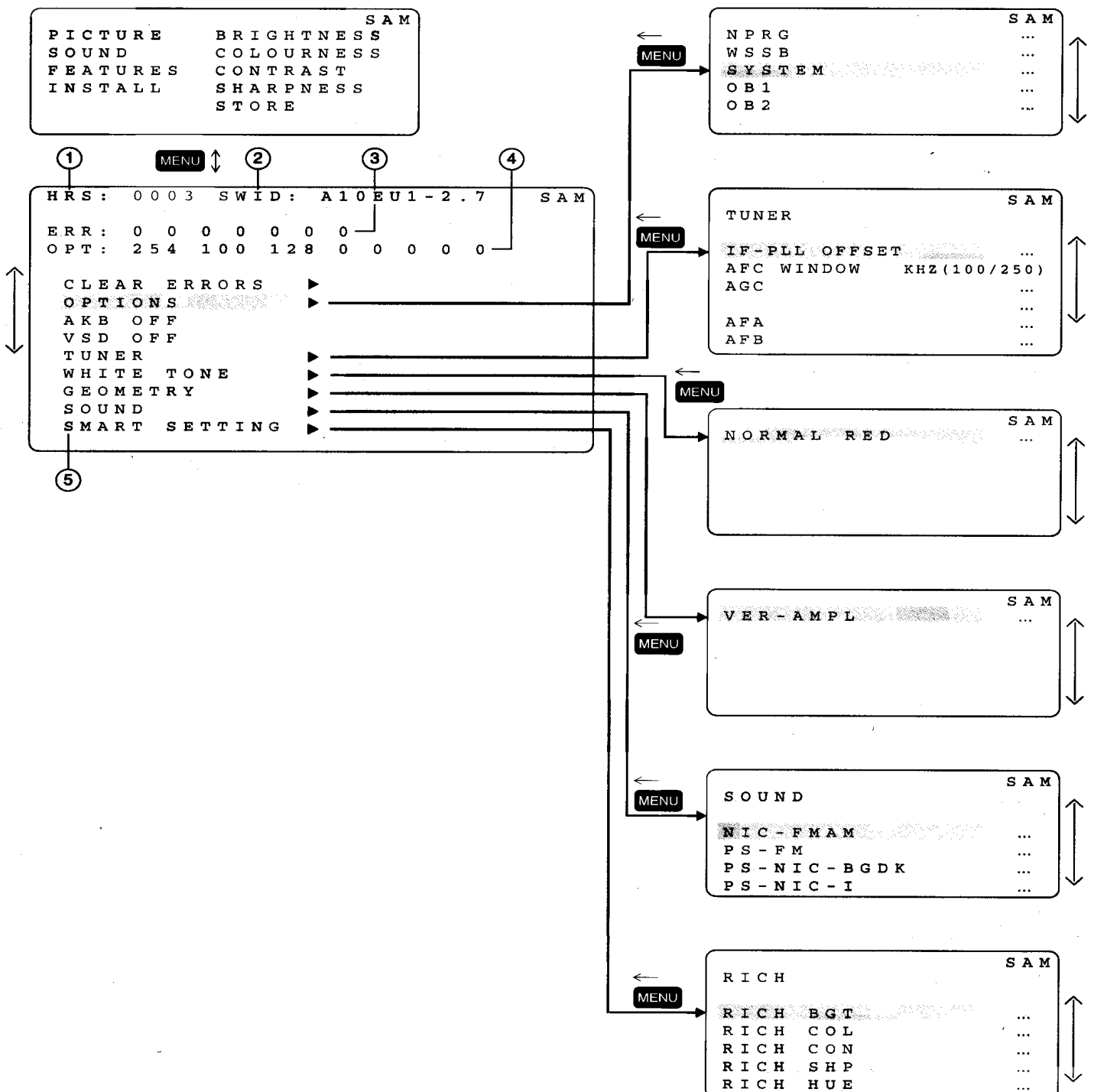


Figure 5-2

Explanation notes/references:

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

SAM menu control

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

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

- (de)activate the selected menu item (e.g. GEOMETRY)
- change the value of the selected menu item (e.g VER-SLOPE)
- activate the selected submenu (e.g SERV-BLK)

Access to normal user menu

Pressing the "MENU" button on the remote control switches between the SDM and the normal user menus (with the SAM mode still active in the background). Pressing the "MENU" key in a submenu will go to the previous menu.

The menus and submenus**CLEAR ERRORS**

Erasing the contents of the error buffer. Select the CLEAR ERRORS menu item and press the MENU RIGHT key. The contents of the error buffer is cleared.

The functionality of the OPTIONS and ALIGNMENTS (TUNER, WHITE TONE, GEOMETRY, SOUND and SMART SETTING) sub menus is described in chapter 8.

5.3 Error code buffer and error codes**5.3.1 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:

- by activating the "CLEAR ERRORS" in SAM menu
 - exiting SDM or SAM with the "Standby" command on the remote control
 - transmitting the commands "DIAGNOSE 99 OK" with the DST (RC7150) or with ComPair
- Automatically reset if its contents has not changed for 50 hours

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

Examples:

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

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

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

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. See paragraph 5.4 "The blinking LED procedure".

5.3.2 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.

Error 0 = No error

Error 1 = X-ray protection, E/W protection and/or IBeam X-ray protection, E/W protection and/or IBeam; set is switched to protection; error code 1 is placed in the error buffer; the LED will blink 1 time (repeatedly). If this happens, isolate each circuit to determine the cause. These circuits are:

- X-Ray protection - PROT N

If this protection is active, the most likely cause is the LOT. Detection via pin 3 of the BOCMA - item 7301.

- EW protection - PROT-UP

If this protection is active, the causes could be one of the following;

- bad contacts of:
 - horizontal deflection coil
 - linearity coil 5417
 - S-correction capacitor 2418/2419
 - flyback capacitor 2414/2416
 - line output stage
- short circuit of:
 - flyback diode 6414
 - EW transformer (bridge coil) 5478/5479 or 5474/5475/5476 (version dependent)
 - EW driver 7470
- High beam current protection - IBeam

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +200V supply to the CRT panel is present. If the voltage is present, the most like cause is the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +200V voltage is not present, check R3840 at CRT-panel and R3445 & D6445 at main panel.

Error 2 = Vertical protection - VFB

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

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

Error 3 = Reserved

Error 4 = +5V protection

5V protection active; set is switched to protection; error code 4 is placed in the error buffer; the LED will blink 4 times (repeatedly). A 5V failure can cause a drop in the 5V supply output, resulting in an undefined behaviour of the set.

Therefore, all I²C devices connected to the 5V supply are constantly monitored. When none of these devices responds to the micro controller for a prolonged time, the micro controller assumes that there is a failure in the 5V supply.

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

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

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

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

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

Error 5 = Reserved

Error 6 = 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.

Error 7 = BC-loop not stabilised (BCF = 1) Black current loop instability protection. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.

Error 8 = BOCMA IC TDA888xx I²C communication failure. BOCMA (item 7301 on SSB) is corrupted or the I²C line to the BOCMA is low or no supply voltage present at pin 14 and/or pin 60 (3V3)

Error 9 = BOCMA IC TDA888xx 8V failure (SUP bit). No supply voltage at pin 53. Check NFR 3331 and coil 5333.

Error 10 =NVM I²C error. NV memory (EEPROM - item 7066) does not respond to the micro controller.

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

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

Error 13 =Main Tuner I²C failure UV13xx. Tuner (item 1225) is corrupted or the I²C line to the Tuner is low or not supply vottage at pin 9, pin 6 or 7 of the tuner.

Error 14 =Sound processor I²C error (MSP34xx -). Sound controller MSP3400 or MSP3410 does not respond to the micro controller.

Error 15 =SRAM IC uPD431000A-B test failure (item - 7070).

Error 16 =PIP/DW Tuner I²C error. The Tuner (TEDE9 - item 1900) on the PIP-panel does not respond to the micro controller.

Error 17 = PIP IC M65669SP I²C failure (item 7803) or Double Window IC SAB9081 I²C failure.

Error18 = I/O expander IC 62320P I²C failure (item 7910 on PIP panel).

Error 19 = Guide+ I²C failure (LC27016B - item 7005). USA only.

Error 20 = V-chip for PIP, IC ZILOG 86130 I²C failure USA only.

Error 21 = NV clock IC MK41T56 I²C failure at mono board - Item 7011 at A7.

Error 22 = Reserved.

Error 23 = Second BOCMA IC TDA888xx (on DW panel) I²C communication failure.

Error 24/29 = Reserved.

- Error codes 1,2, and 4 are protection codes and in this case supplies of some circuits will be switched off. Also in protection, the LED will blink the number of times equivalent to the most recent error code.

5.3.3 Error code table

Error code	Error description	Possible defective components
0	No error detected	-
1	X-ray protection/ EW and/or High beam protection active	LOT, Line deflection circuit, EW-circuit or CRT amplifier circuit, picture tube or +200V missing
2	Vertical protection	Vertical circuit is defective
3	Reserved	
4	5V protection active	+5V supply line is low or short circuit
5	Reserved	
6	General I ² C bus error	I ² C bus s/c or o/c on uP
7	BC-loop not stabilised	RGB amplifiers, RGB guns or RGB driving signals of BOCMA
8	BOCMA I ² C error	IC 7301
9	BOCMA 8V supply failure	IC 7301 and R3331
10	NVM I ² C error	IC7066
11	NVM identification failure	IC7066
12	uProcessor internal RAM test failure	IC 7064
13	Main Tuner I ² C error	IC 1225 - UV13xx
14	Sound processor I ² C error	IC 7 (2CS/Nicam)
15	SRAM I ² C error	IC 7070
16	PIP tuner I ² C error	IC 1900 - TEDE9
17	PIP IC I ² C error or DW IC I ² C error	IC M656695P or IC SAB9081
18	I/O expander IC 62320P I ² C error	IC 62320P - item 7910
19	Guide+ I ² C error	IC LC27016B - item 7005
20	V-chip for PIP - I ² C error	IC ZILOG 86130 -
21	NV clock - I ² C error	IC MK41T56 - item 7011
22	Reserved	
23	Second BOCMA IC on DW panel - I ² C error	IC TDA888xx - item

5.4 The “blinking LED” procedure

The contents of the error buffer can also be made visible through the “blinking LED” procedure. This is especially useful when there is no picture.

- When the SDM is entered, the LED will blink the number of times, equal to the value of the error code.

When the SDM is entered, the LED will blink the contents of the error-buffer. Error-codes ≥ 10 are shown as followed. A long blink of 750 msec. which is an indication of the decimal digit, followed by a pause of 1500 msec. followed by n short blinks. When all the error-codes are displayed, the sequence is finished with a LED display of 3 seconds. The sequence starts again.

Example:

Error code position 1 2 3 4 5

Error buffer: 12 9 6 0 0

- after entering SDM: 1 long blink of 750 msec. + pause of 1500 msec + 2 short blinks - pause of 3 sec. - 9 short blinks - pause of 3 sec. - 6 short blinks - pause of 3 sec. - long blink of 3 sec. -- etc.

NOTE: If errors 1, 2 or 4 occurs the LED ALWAYS blinks the last occurred error, even if the set in NOT in service mode.

5.5 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.

5.5.1 THE DEFLECTION CIRCUIT:

- Measure if the VBAT (140V) is present across 2939/2940 (A1 POWER SUPPLY). If the voltage is not present, disconnect jumper 9936 and 9937 (see A1 Power Supply) The whole Line Deflection stage is now disconnected. If the voltage is present then the problem might be caused by the deflection circuit. Possibilities:
 - Transistor 7410 is defective
 - The driver circuit around transistor 7481 is faulty
 - No horizontal drive signal coming from the BOCMA IC 7301 pin 56 on the SSB
- 1. Note: If the C and E of 7410 are shorted, hick-up noise can be heard from the power supply circuit.
- 2. To determine whether the fault is present in the line deflection circuit (A2 LINE DEFLECTION) or in the EW circuit/panel (screen size above 21”), insert jumper into position numbers 9409 (in this case the EW protection is disabled). If the basic deflection is working (picture is parabolic distorted), then the fault is located in the EW circuit/panel. If there is no hor. deflection, the fault is present in the basic deflection circuitry.
- 3. 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 protections, the LED will blink according to the fault defined. In order to determine which protection circuit is active, isolation of circuits is necessary. These protection circuits are:
 4. High beam protection. See error 1 - IBeam.
 5. X-ray protection : See error 1
 If the high beam protection or the X-ray protection is active, it will switch the set to protection and the SDM is activated. The service LED blinks repetitively 1 time. If this happen, isolate each circuit to determine the cause

5.5.2 THE POWER SUPPLY.

To trouble shoot the A10 SMPS, first check the +5V_STBY voltage on IC7968, pin 3/4. If this voltage is not present, check fuse 1961 and D6961. If 1906 or D6917 is not open circuit, the

problem might be caused on the primary side of the switching supply. Check the output of the bridge diodes on the cathode side of D6912/D6913 or D6915 - pin 1 for approximately 300V DC. If this voltage is missing, check the bridge diodes and the fuse. If fuse F1900 is found open, check IC7921 (circuit A1) between pins 3 and 2 to make sure that there is no short circuit present. If the 300V DC is present on pin 3 of IC7902, check for a startup voltage of 16V on pin 4 of IC7921. If startup voltage is not present, check if R3914 is open; a short circuit between pin 4 and 5 will also cause this problem. It is necessary to have a feedback signal from the hot secondary side of switch mode transformer T5912 at pin 8 and pin 9 for the power supply to oscillate. If this startup voltage is present on pin 4 of IC7902 and the supply is not oscillating, check R3929 and D6929.

The A10 power supply has been designed with Over Voltage Protection (OVP). To determined whether OVP is active, check whether VBAT - 141V is present at IC7971 pin 1. If not, check the components D6938, C2939 and C2940 and L5941. If these components are O.K., then check voltage at pin 3 of IC 7942. If this voltage is not present check fuse 1941 and fuse 1942. Replace if necessary. If dc-voltage is present at pin 3, replace opto-coupler 7929.


Another way to confirm whether OVP is active, is to measure the voltage with an oscilloscope at IC7902 pin 4. If the voltage is fluctuating between 11-14V, then check the components as described in the above mentioned paragraph.

5.6 Customer Service Mode (CSM)

All A10.0 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.

5.6.1 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
- modes that interfere with the behaviour of the set are switched off (sleep timer, auto standby, etc.)

5.6.2 Exit the Customer Service Mode.

The Customer Service Mode will be switched 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

5.6.3 The Customer Service Mode information screen

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

CSM Menu

		C S M	
1	HRS: 0005	SWID: A10EU1-2.7	
2	CODES: 0 0 0 0 0 0 0		
3	OPT: 254 100 128 0 0 0 0		
4	SYSTEM: EUROPE	11 SOUND: MONO	
5	NO SIGNAL	12 VOLUME: ...	
6		13 BALANCE: + / - ...	
7		14 HUE: + / - ...	
8		15 COLOUR: ...	
9		16 BRIGHTNESS: ...	
10	SOURCE: 1	17 CONTRAST: ...	

CL 06532012_010.eps
070200

Figure 5-3

The Customer Service Menu shows the following information:

- Line 1: "HRS: nnnnn" and SWID: "A10BBC-X.Y"
HRS: Hexadecimal counter of operating hours. (Standby hours are not counted as operating hours).
SWID: (Software identification of the main micro controller)
See paragraph 5.2. Details on available software versions can be found in the chapter "Software Survey" of the publication "Product Survey - Colour Television".

- Line 2: "CODES: xx xx xx xx xx xx xx"
Error code buffer (see paragraph 5.3). Displays the last 7 errors of the error code buffer.

- Line 3: "OPT xxx xxx xxx xxx xxx xxx xxx"
Option bytes. Software and hardware functionality of the A10.0 is controlled by option bits. An option byte or option number represents 8 of those bits. Each option number is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8 for more information on correct option settings

- Line 4: "SYSTEM: EUROPE"
Indicates which colour and sound system is installed for this preset:

- PAL BG
- PAL I
- PAL DK
- SECAM BG
- SECAM DK
- SECAM LL'

Complaints that may be caused by an incorrect system setting:

- no colours
- colours not correct
- unstable picture
- noise in picture

To change the system setting of a preset:

1. press the "MENU" button on the remote control
 2. select the INSTALL sub menu
 3. select the MANUAL STORE sub menu
 4. select and change the SYSTEM setting until picture and sound are correct
 5. select the STORE menu item
- Line 5: "NO SIGNAL"

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

- no or bad antenna signal; connect a proper antenna signal
- antenna not connected; connect the antenna
- no channel / preset is stored at this program number; go to the INSTALL menu and store a proper channel at this program number
- the tuner is faulty (in this case the CODES line will contain number 13 or 16); check the tuner and replace/repair if necessary

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

- Line 6: "TIMER ON"

Indicates that the on/off timer is running. Complaints that may be caused by the activation of the sleep timer.

Without using the remote control of the local keypad the set is switching:

- on from standby:
- to a different channel

To switch off the activation timer:

1. select "TIMER" in the "FEATURE" menu
 2. select "ACTIVATE" in the "TIMER" menu
 3. set to "OFF" with the left/right cursor keys
- Line 7: "CHANNEL BLOCKED"

Indicates that all channels are locked except the selected channel. Complaint that may be caused by locked channels:

- TV cannot be switched on from standby with the local keyboard buttons
- "P+" and "P-" buttons on local keyboard do not function

To disable the LOCK feature:

1. select "FEATURE" menu (with the Remote Control)
 2. select "LOCK" (with the RC)
 3. set to "OFF"
- Line 8: "NOT PREFERRED"

Indicates that at least one channel is deleted as a preferred channel (by default, all channels are skipped. Note that "SKIPPED" will always be displayed in CSM unless all the channels are not skipped. A channel can be added as a selected channel to the list of preferred channels:

1. select "INSTALL" menu
 2. select "CHANNEL EDIT"
 3. select "ADD/DELETE"
 4. set to "ADD" with the left/right cursor keys
- Line 9: "HOTEL MODE ON"

Indicates that the Hotel mode has been activated.

- Line 10: "SOURCE"
Indicates which SOURCE is installed for this preset.
EXT1, SVHS2, EXT2, Tuner.

- Line 11: "SOUND"
Indicates which sound mode is installed for this preset.
Mono, NICAM, Stereo, L1, L2, SAP, Virtual and Digital

- Line 12: "VOLUME"
Value indicates level at entry CSM.

- Line 13: "BALANCE"
Value indicates level at entry CSM.

- Line 14: "HUE"
Value indicates level at entry CSM.

- Line 15: "COLOR"
Value indicates level at entry CSM.

- Line 16: "BRIGHTNESS"
Value indicates level at entry CSM.

- Line 17: "CONTRAST"
Value indicates level at entry CSM.

5.6.4 Solving other problems

TV switched off or changed channel without any user action
Set switches off after "TV SWITCHING OFF" was displayed
Auto standby switched the set off because:

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

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

Picture problems

Picture too dark or too bright

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

Service Modes, error messages and repair tips

White line around picture elements and text

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

Snowy picture

- check the “NOT TUNED” section of the Customer Service Mode screen

Snowy picture and/or unstable picture

- a scrambled or decoded signal is received

Black and white picture

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

Menu text not sharp enough

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

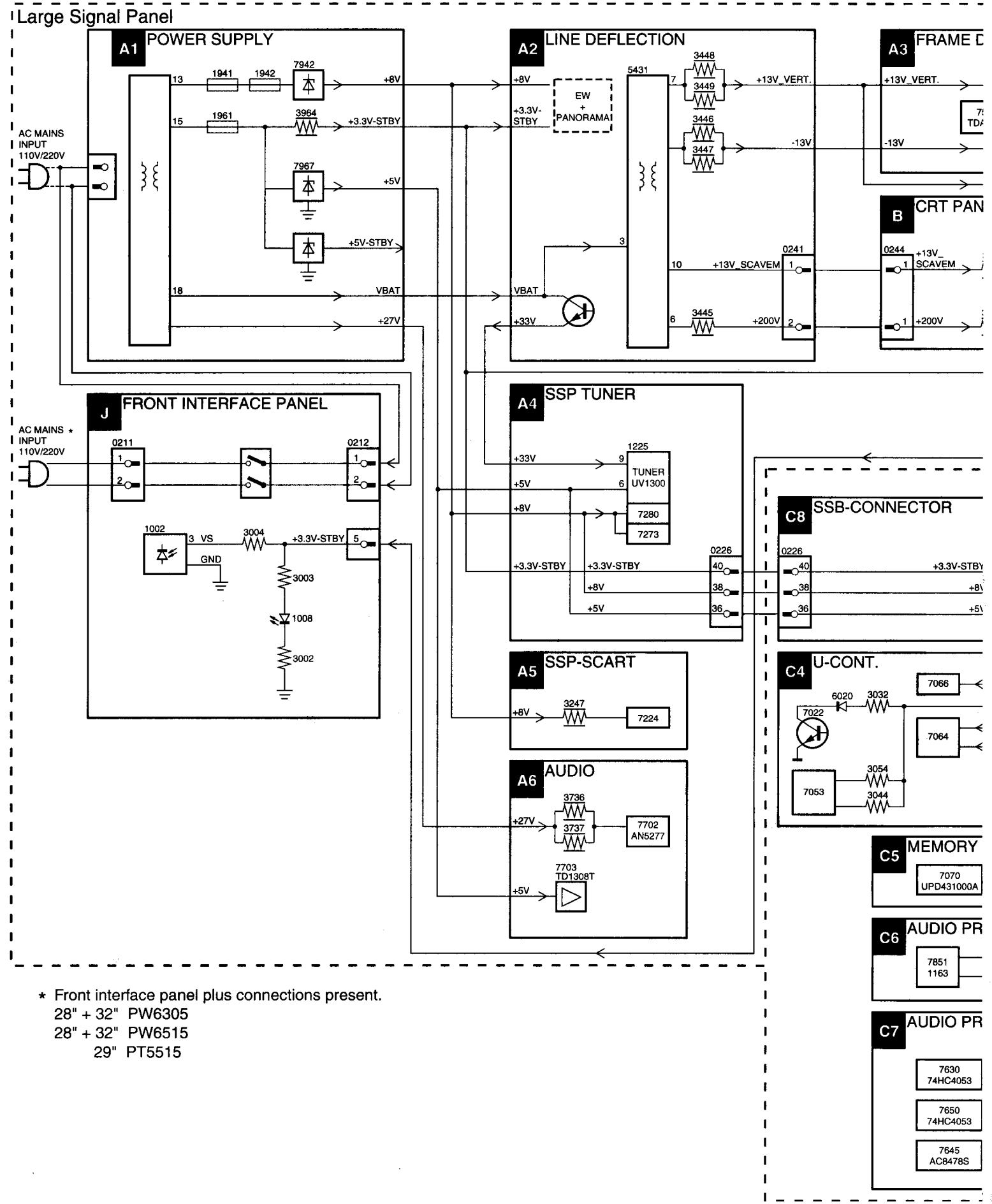
Sound problems

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

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

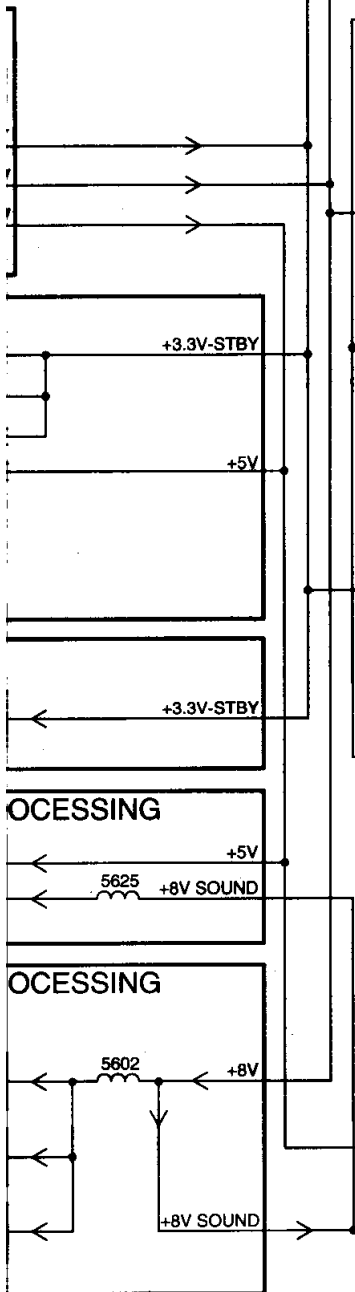
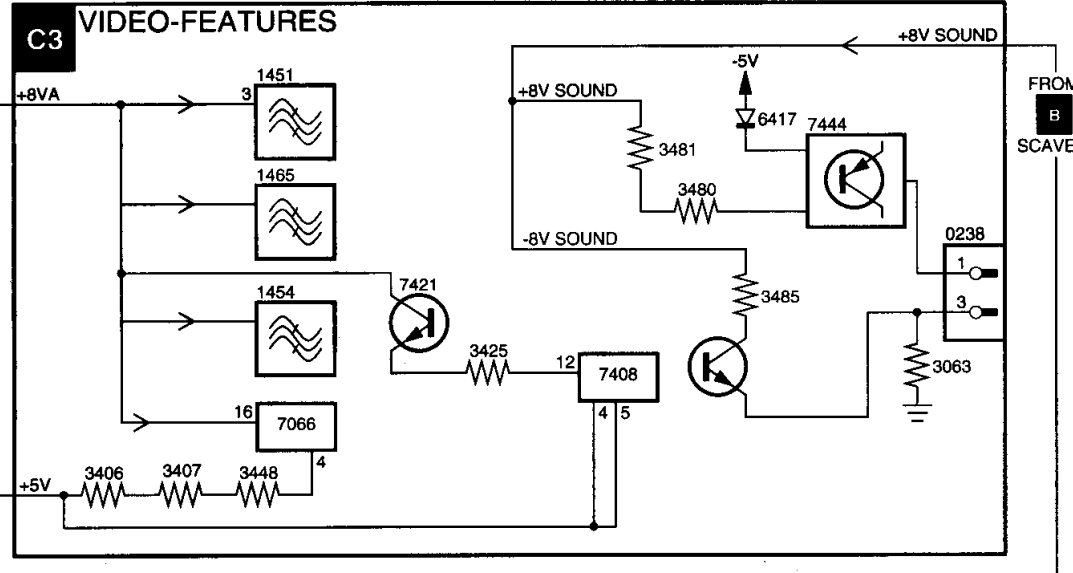
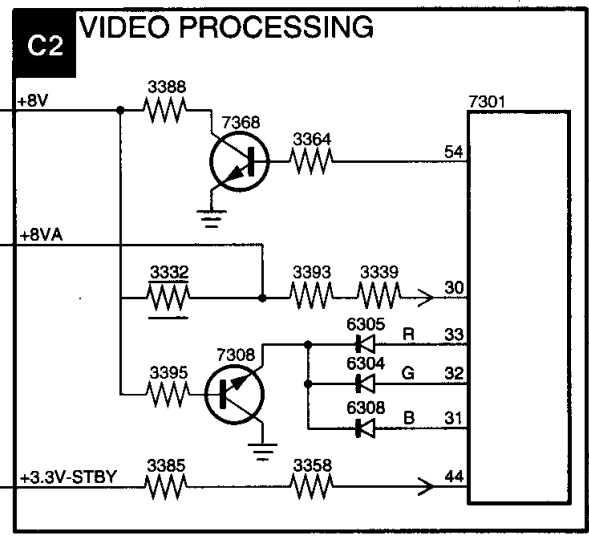
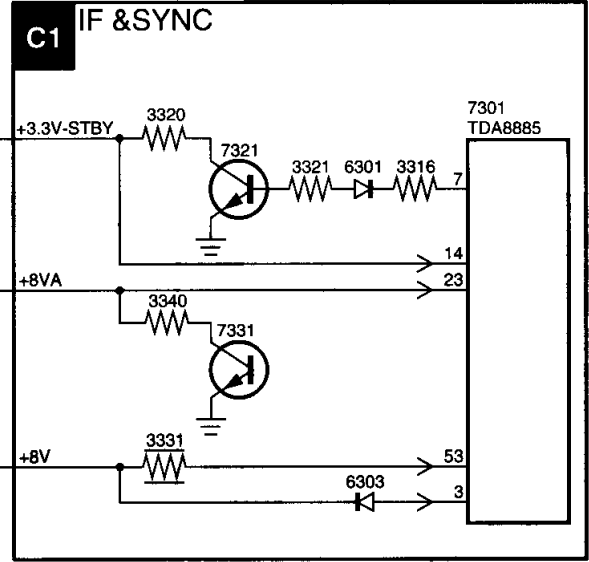
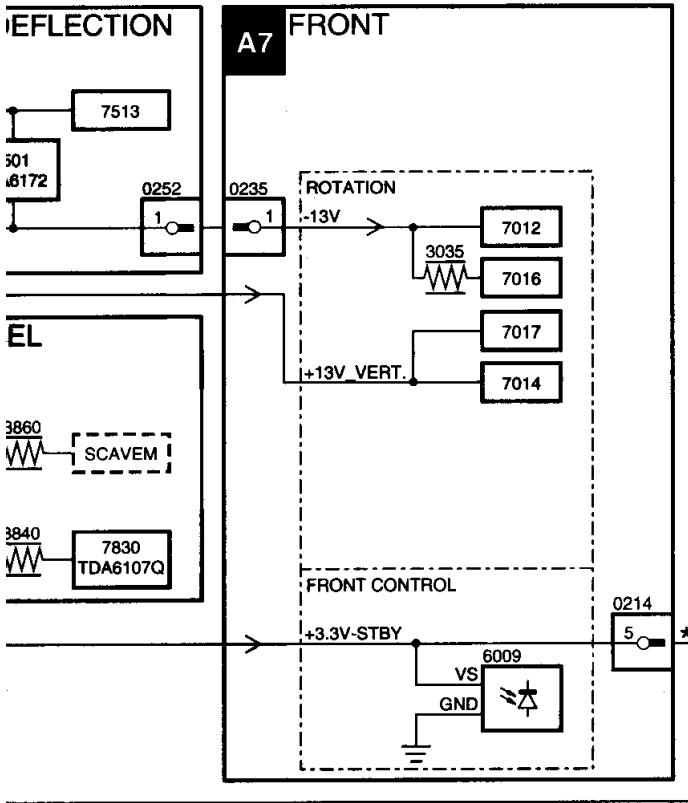
6. Blockdiagram, supply diagram and testpointoverviews.

Supply voltage diagram

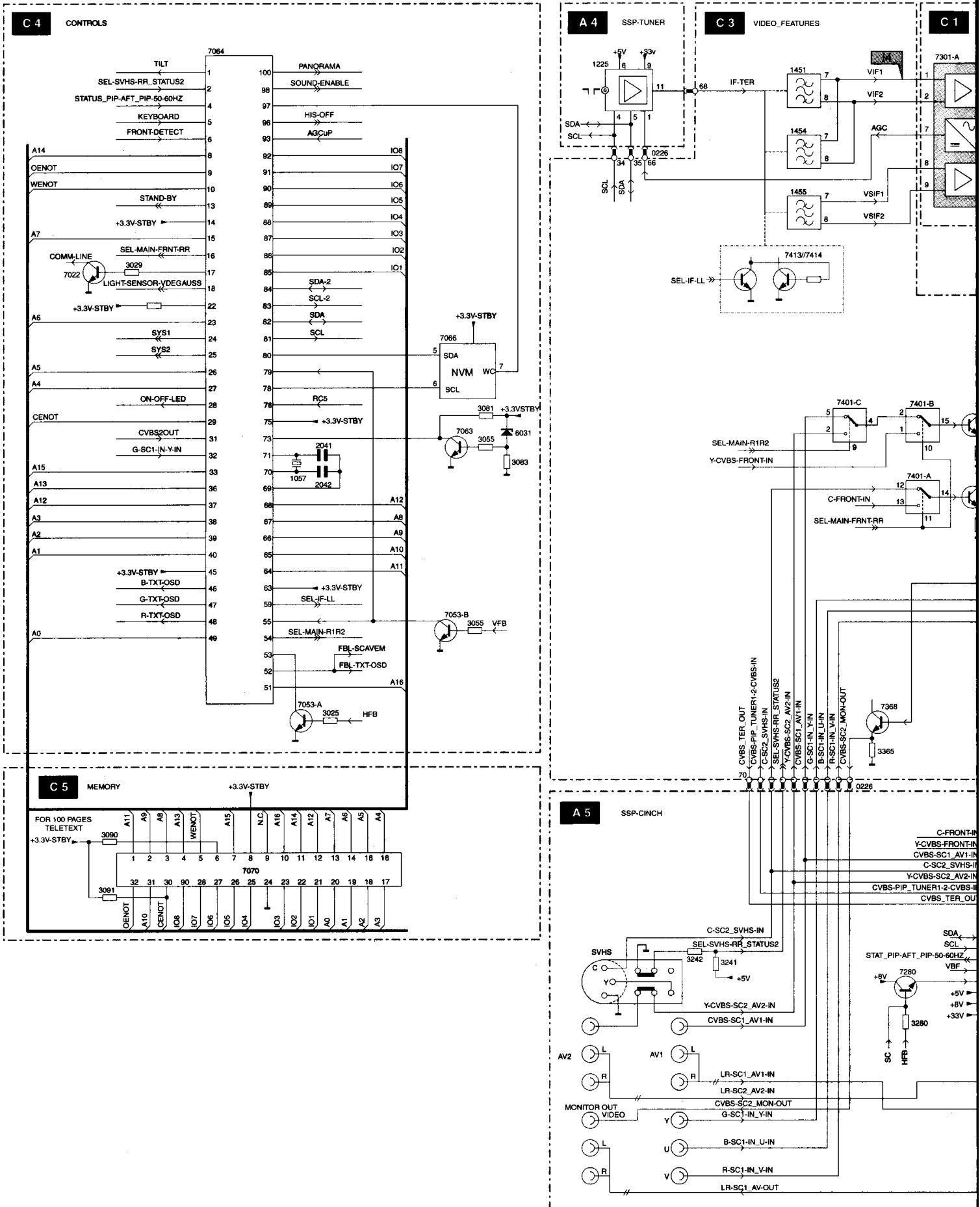


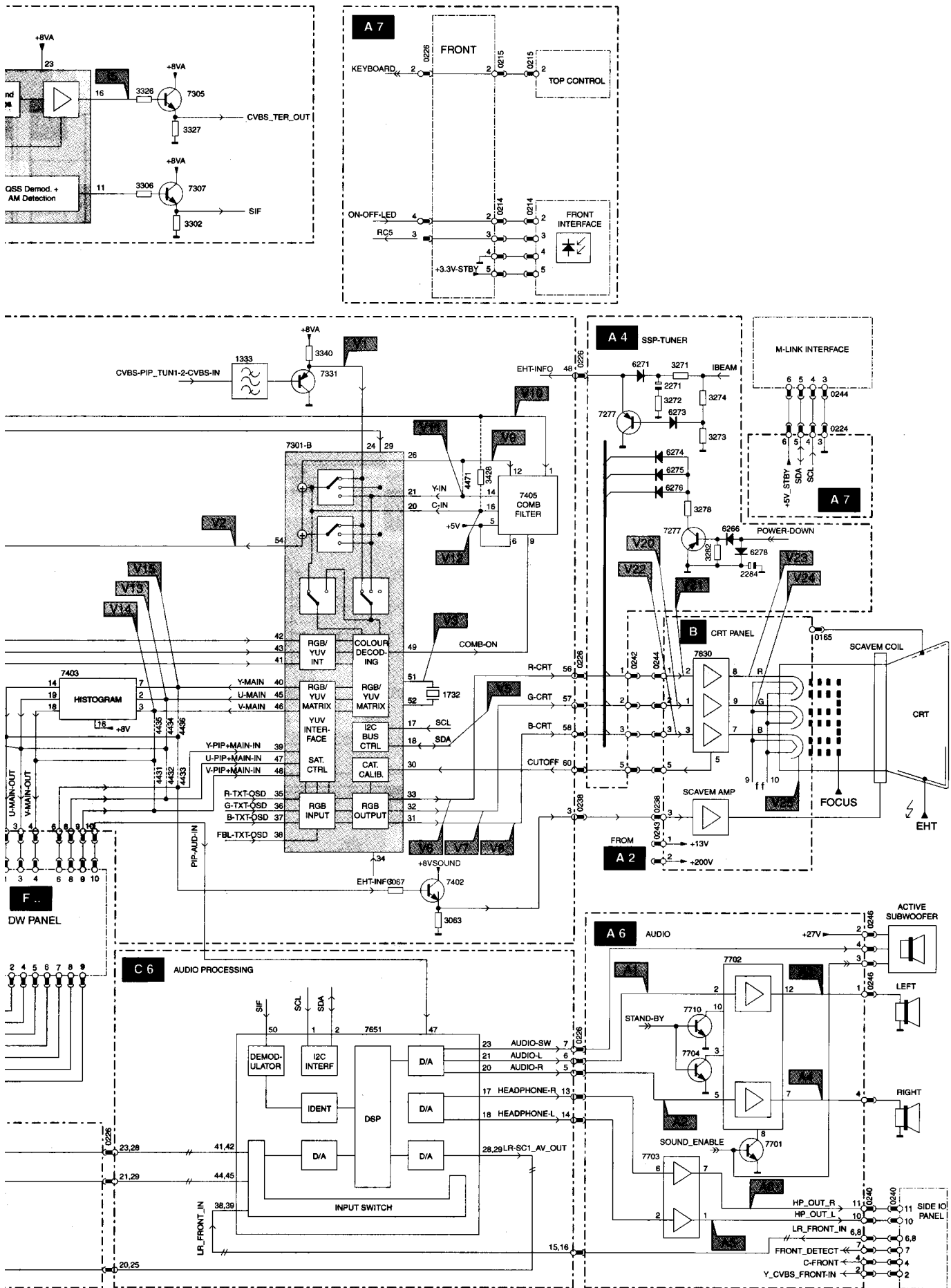
* Front interface panel plus connections present.
 28" + 32" PW6305
 28" + 32" PW6515
 29" PT5515

Small Signal Panel

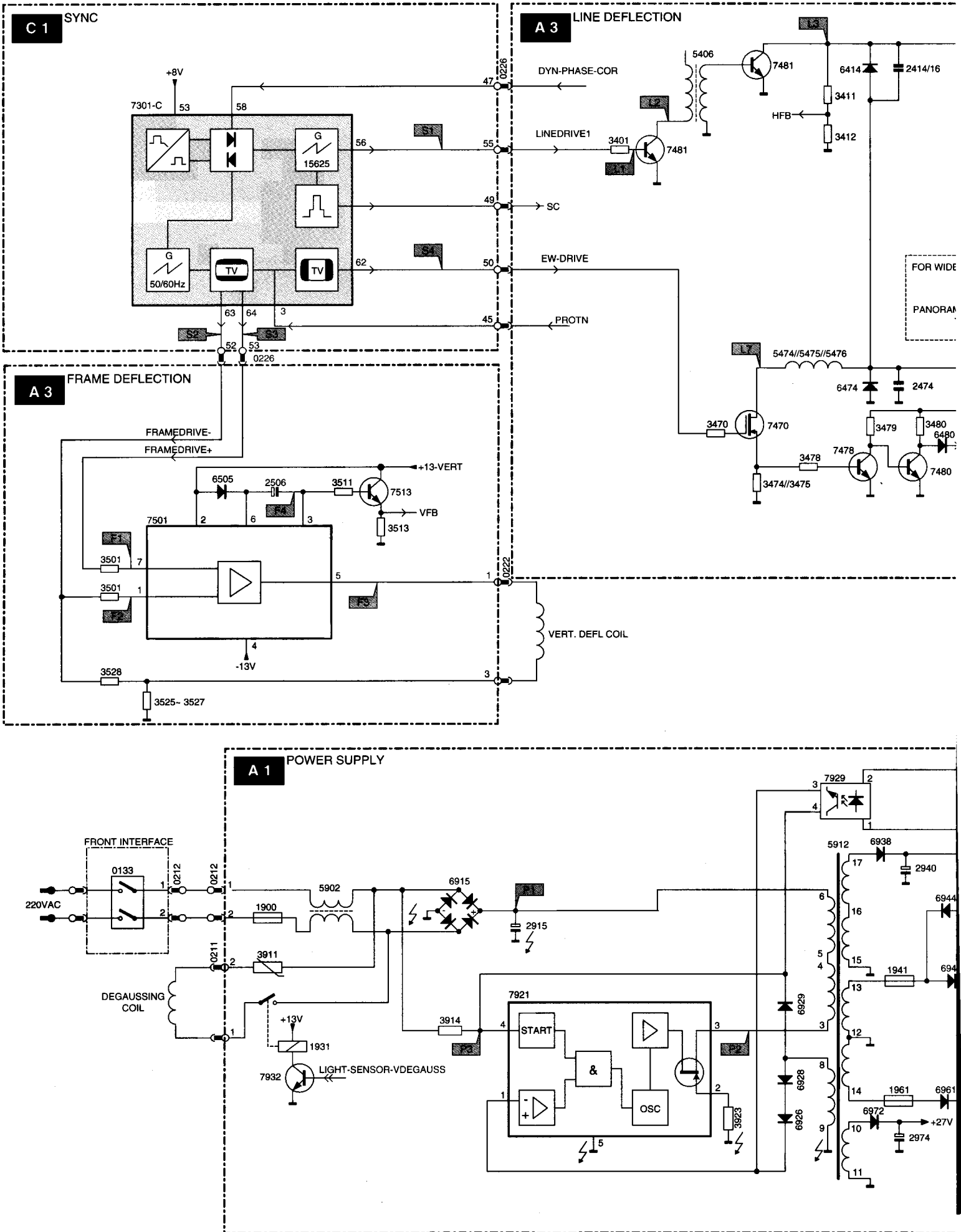


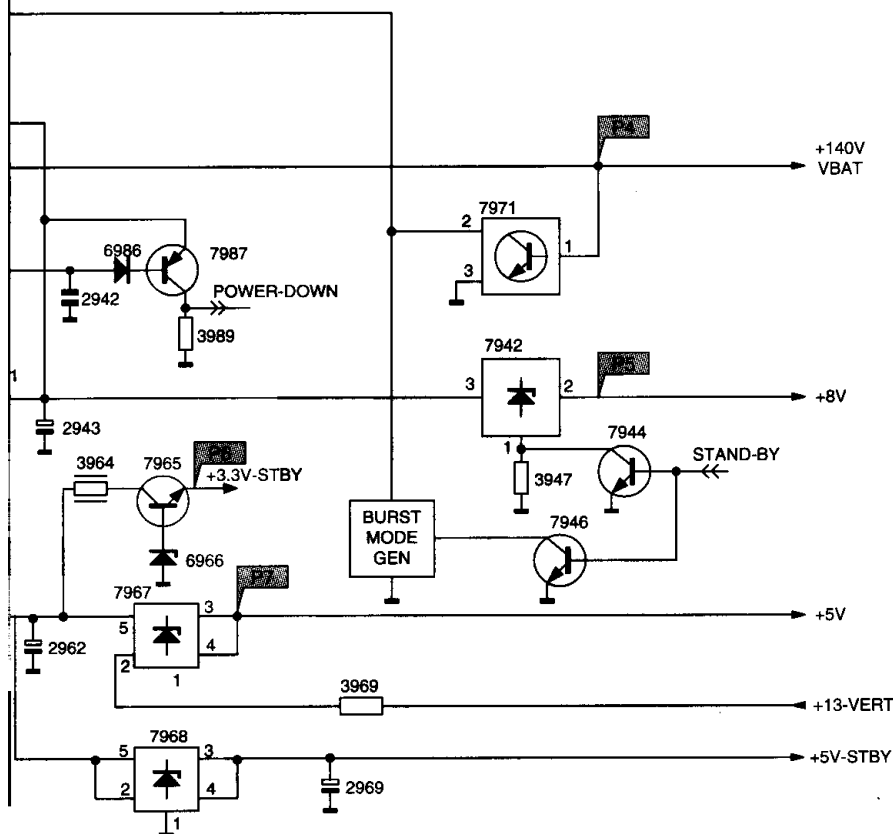
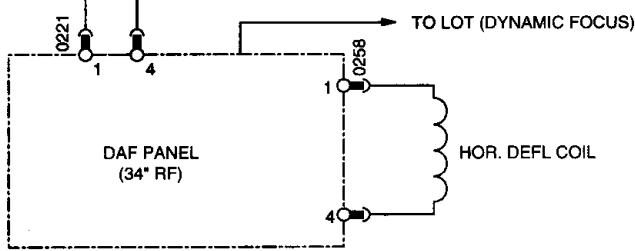
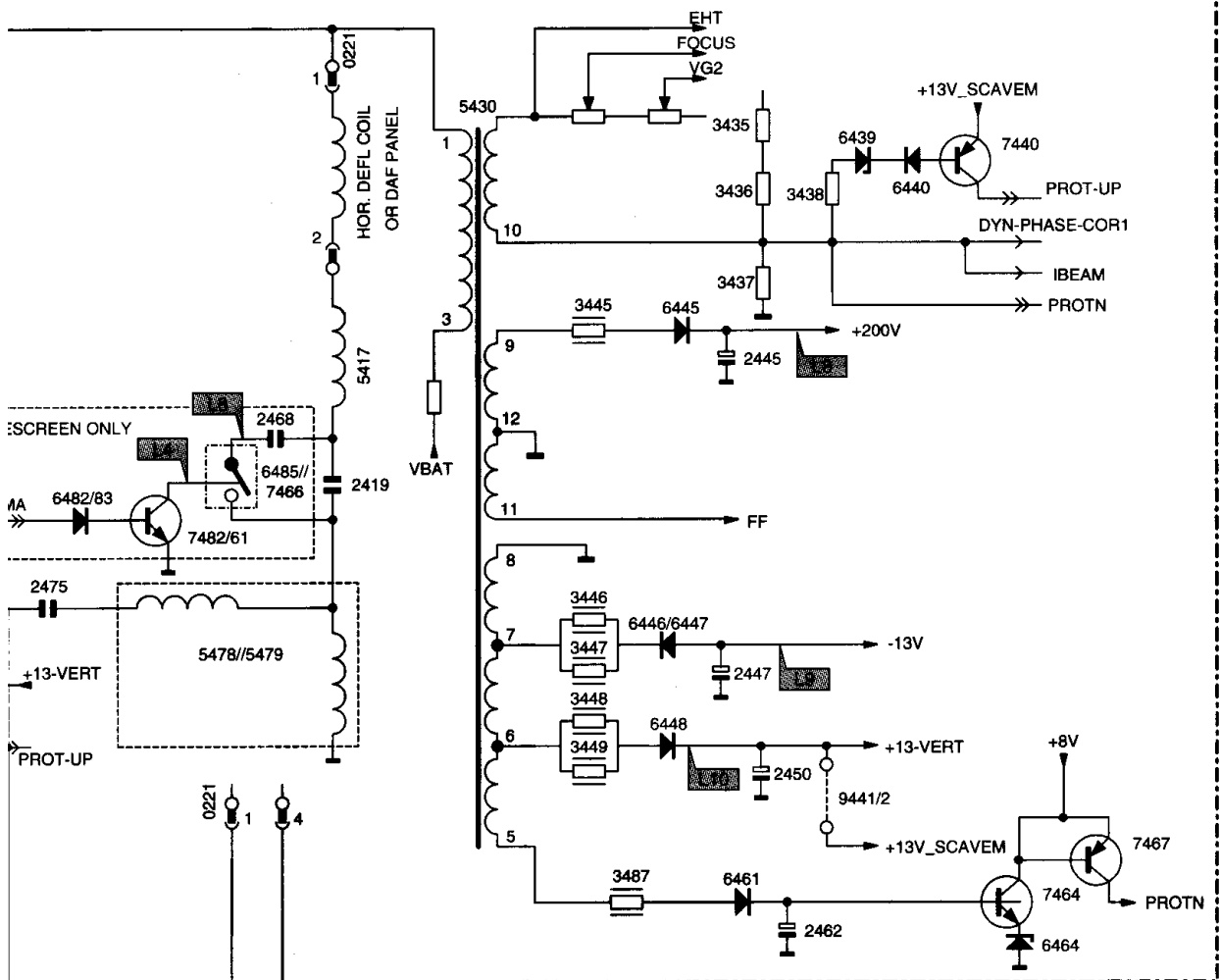
Blockdiagram



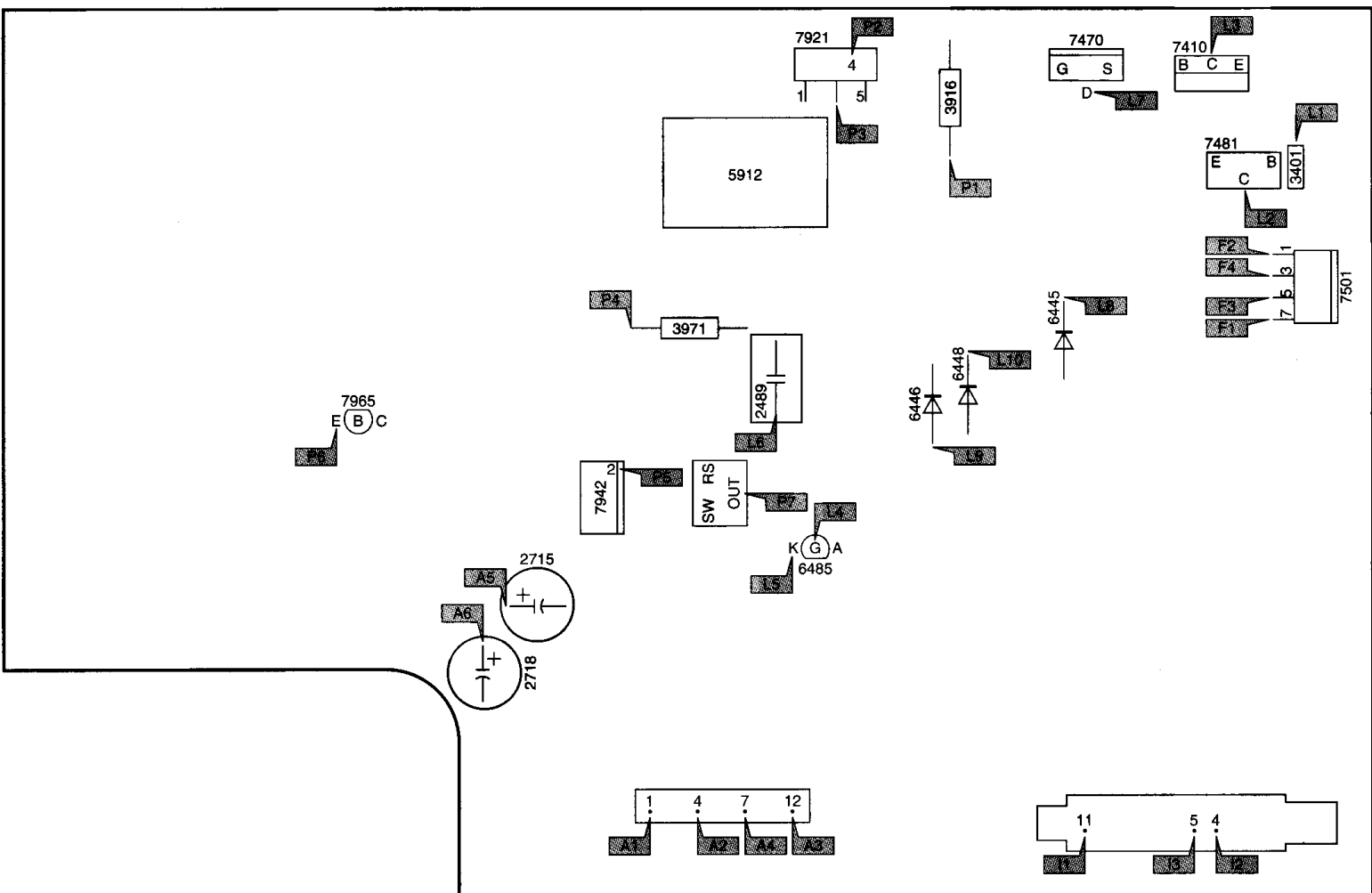


Blockdiagram



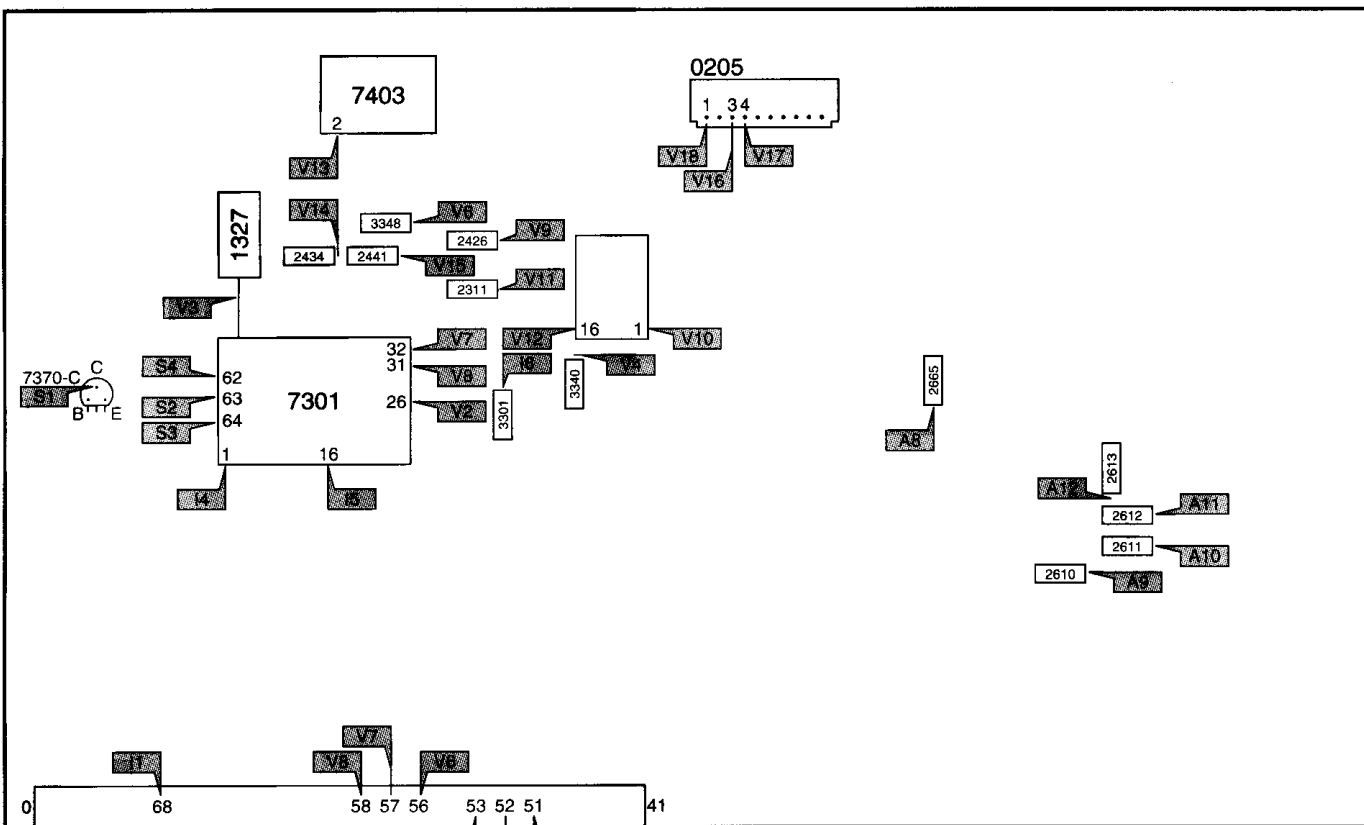


Testpointoverview LSP (comp.side)



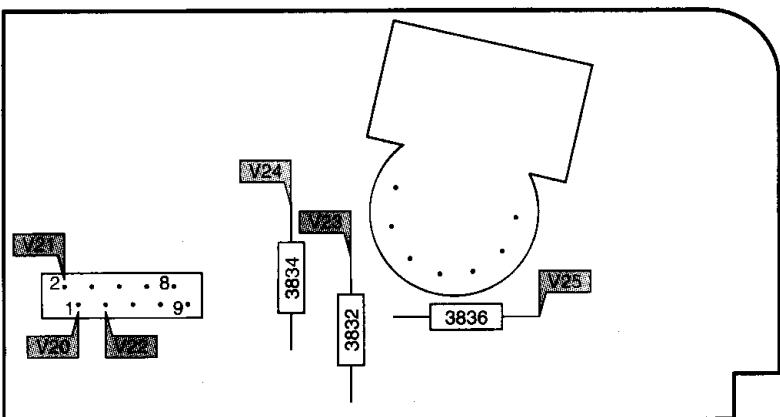
CL 06532012_039.eps
220200

Testpointoverview SSB (comp.side)



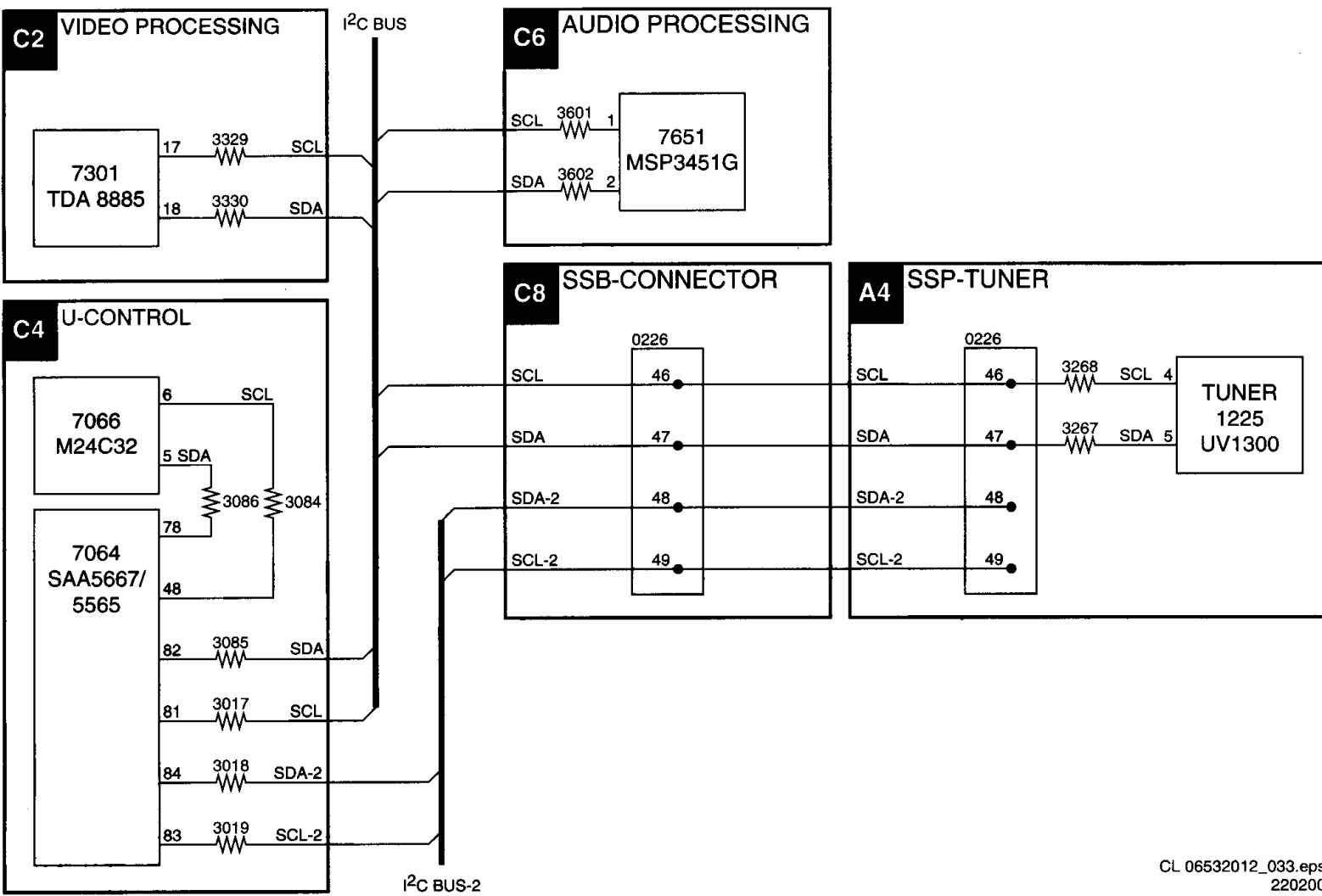
CL 06532012_038.eps
220200

Testpointoverview CRT (comp.side)



CL 06532012_037.eps
220200

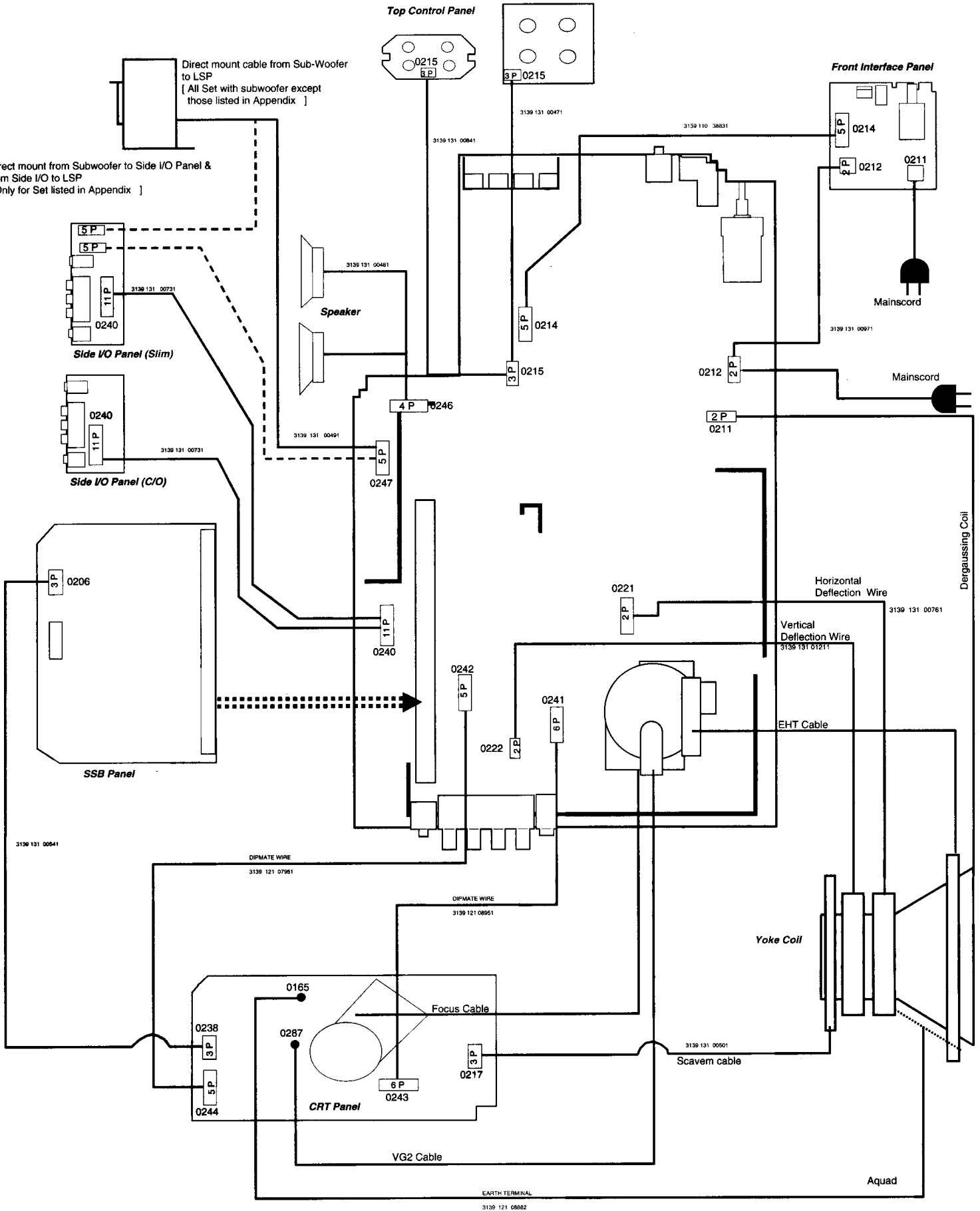
IC overview



CL 06532012_033.eps
220200

Wiringdiagram

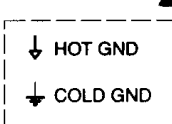
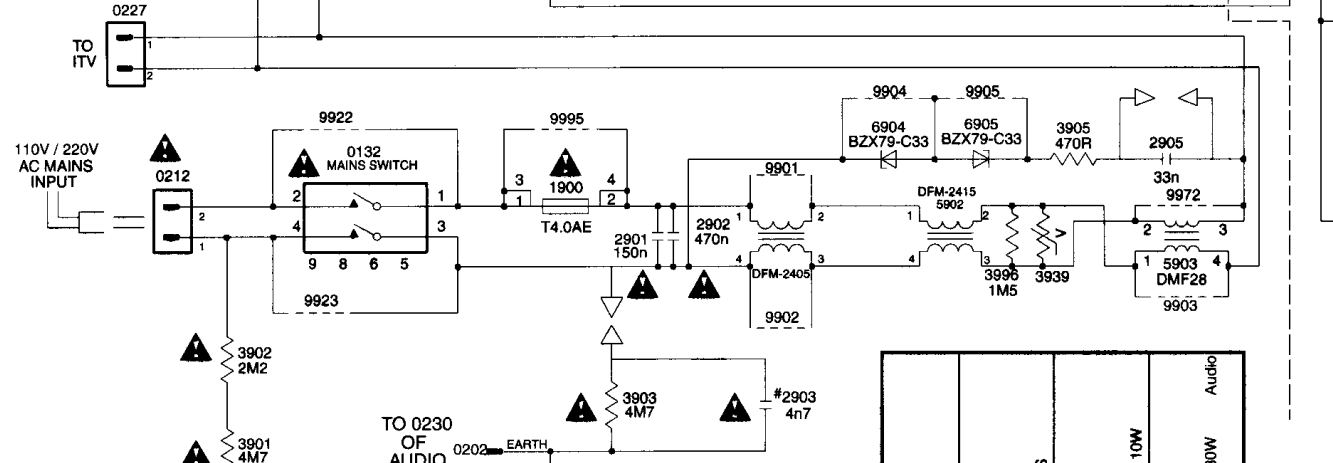
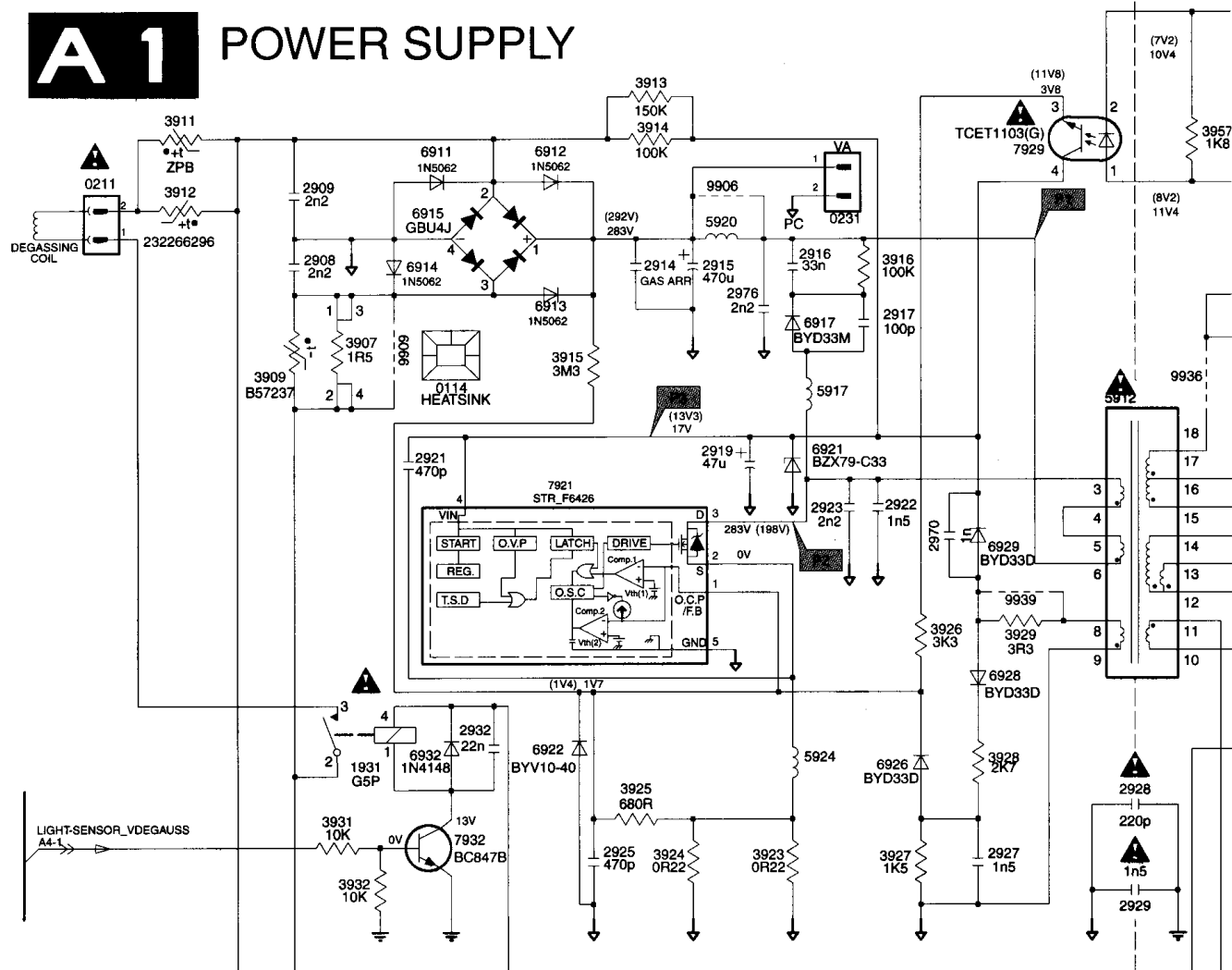
A10 - Wire Diagram (Basic Configuration)



7. Schematics and PWB's

Power supply

A1 POWER SUPPLY

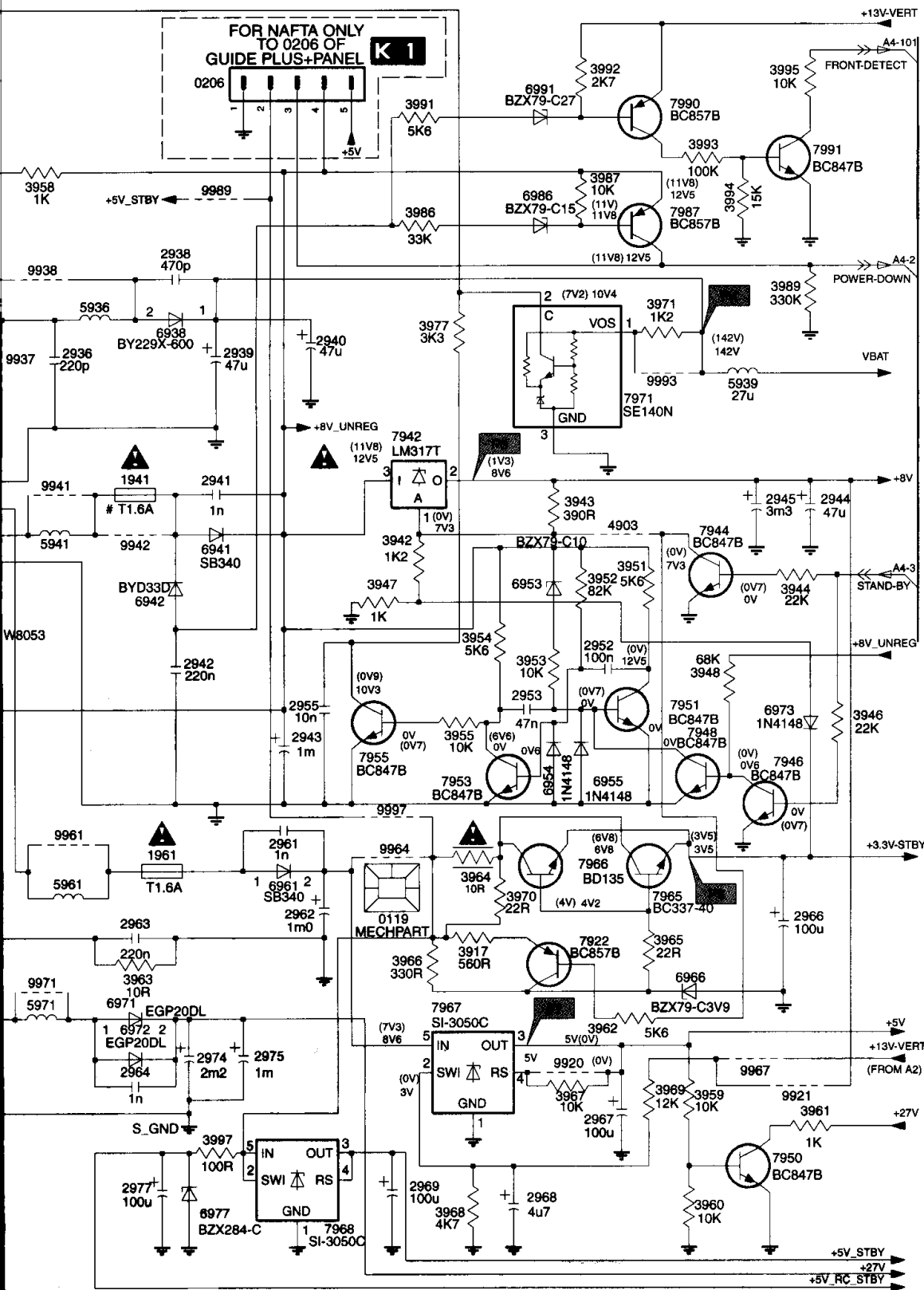
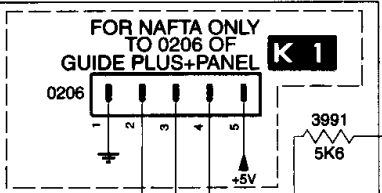


TO 0230 OF AUDIO 0202 EARTH

A6

FOR ITV TESTING 0250

Item#	140V RFWS	140V Audio 10W	130V Subwoofer	Audio
2974		1000U 35V		
2974	2200U 35V		2200U 35V	
3901		4M7		
3902		2M2		
7971	SE140N	SE140N		
7971				SE130N
9922	jumper		jumper	
9923	jumper		jumper	



A

B

C

D

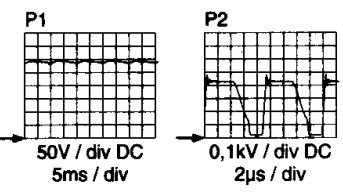
E

F

G

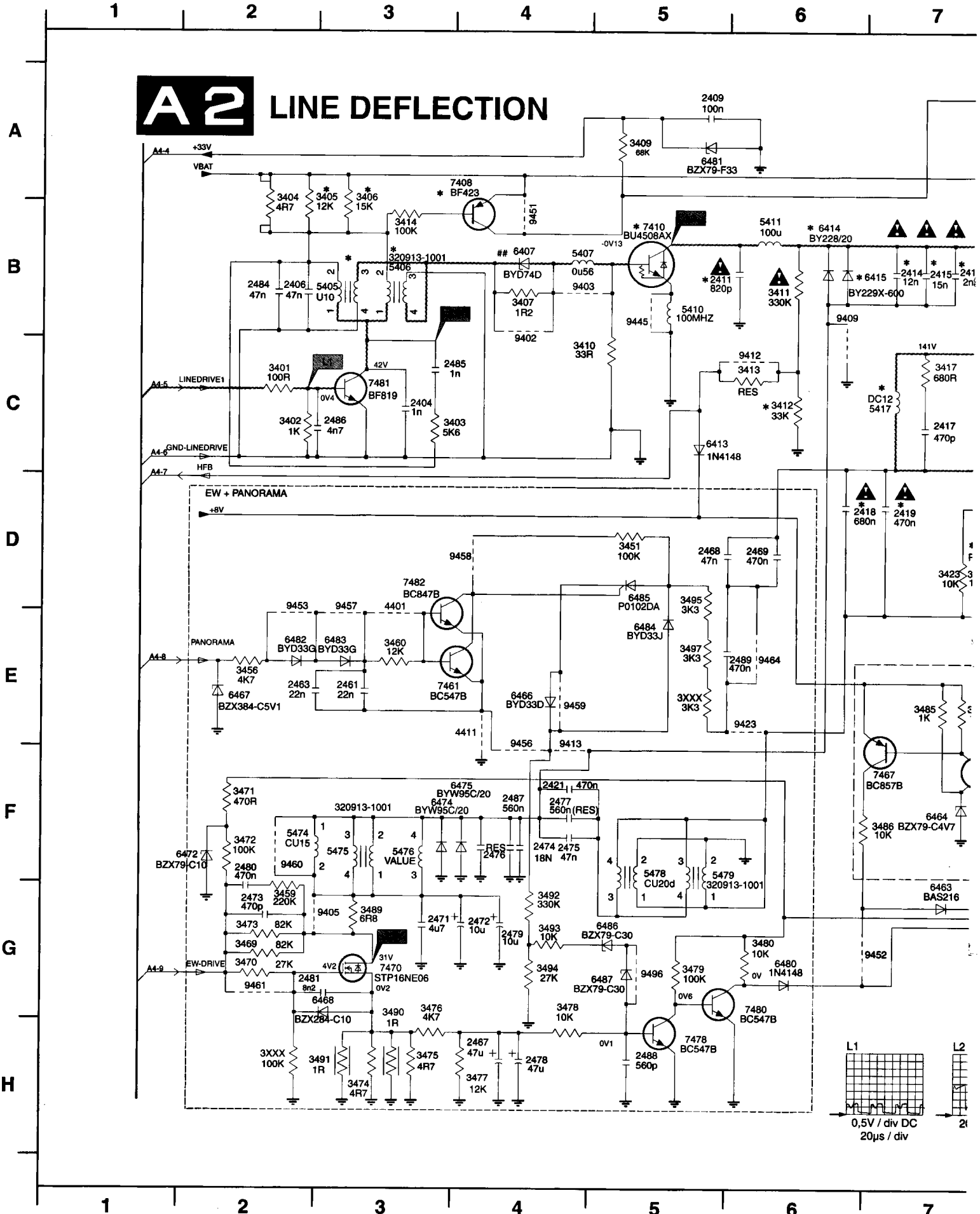
H

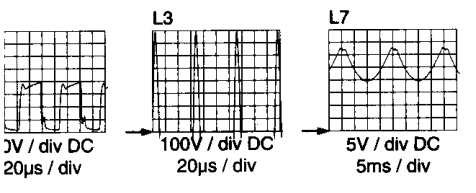
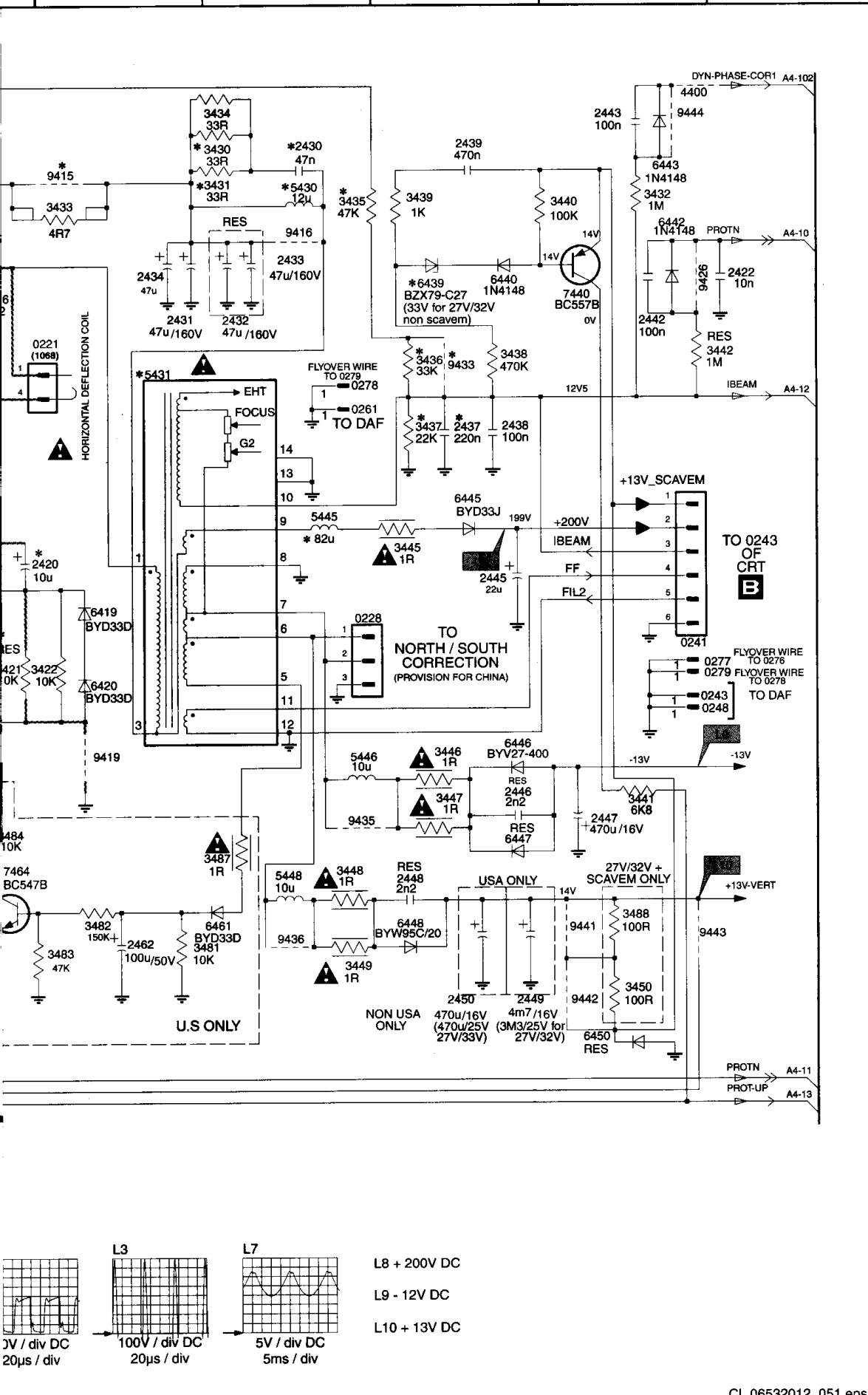
0114 C3	3969 F11
0119 E9	3970 E10
0132 F3	3971 B11
0202 G3	3977 B10
0206 A8	3986 B10
0211 A2	3987 A10
0212 F2	3989 B11
0227 E2	3991 A10
0231 B5	3992 A10
0250 H3	3993 A11
1900 F4	3994 B11
1931 D3	3995 A11
1941 C8	3996 G6
1961 E8	3997 G8
2901 G4	4903 C11
2902 F4	5902 F5
2903 G5	5903 G7
2905 F6	5912 C7
2908 B3	5917 B5
2909 A3	5920 B5
2914 B4	5924 D5
2915 B5	5936 B8
2916 B5	5939 C11
2917 B6	5941 C8
2919 C5	5961 E8
2921 C3	5971 F7
2922 C6	6904 F5
2923 C5	6905 F6
2925 E4	6911 A3
2927 E6	6912 A4
2928 E7	6913 B4
2929 E7	6914 B3
2932 D3	6915 B3
2936 B8	6917 B5
2938 B8	6921 C5
2939 B9	6922 D4
2940 B9	6926 D6
2941 C8	6928 D6
2942 D8	6929 C6
2943 D9	6932 D3
2944 C12	6938 B8
2945 C11	6941 C8
2952 D10	6942 D8
2953 D10	6953 D10
2955 D9	6954 E10
2961 E9	6955 E10
2962 E9	6961 E9
2963 E8	6966 F11
2964 F8	6971 F8
2966 E12	6972 F8
2967 F10	6973 D11
2968 G10	6977 G8
2969 G10	6986 B10
2970 C6	6991 A10
2974 F8	7921 C4
2975 F9	7922 F11
2976 B5	7929 A6
2977 G8	7932 E3
3901 H2	7942 C9
3902 G2	7944 C11
3903 G4	7946 E12
3905 F6	7948 D11
3907 B3	7950 G11
3909 B2	7951 D11
3911 A2	7953 E10
3912 B2	7955 E9
3913 A4	7965 E11
3914 A4	7966 E10
3915 B4	7967 F10
3916 B6	7968 G9
3917 F10	7971 C11
3923 E5	7987 B11
3924 E4	7990 A11
3925 D4	7991 A12
3926 D6	9901 F5
3927 E6	9902 G5
3928 D6	9903 G7
3929 D6	9904 F5
3931 E3	9905 F6
3932 E3	9906 B5
3939 G6	9909 B3
3942 C9	9920 F10
3943 C10	9921 F11
3944 D11	9922 F3
3946 D12	9923 G3
3947 D9	9936 B7
3948 D11	9937 B7
3951 D11	9938 B8
3952 D10	9939 D6
3953 D10	9941 C8
3954 D10	9942 C8
3955 D10	9961 E8
3957 A7	9964 E9
3958 B7	9967 F11
3959 F11	9971 F8
3960 G11	9972 F7
3961 F12	9989 B8
3962 F10	9993 C11
3963 F8	9995 F4
3964 E10	9997 E9
3965 F11	
3966 F9	
3967 F10	
3968 G10	



Line deflection

A2 LINE DEFLECTION





L8 + 200V DC
 L9 - 12V DC
 L10 + 13V DC

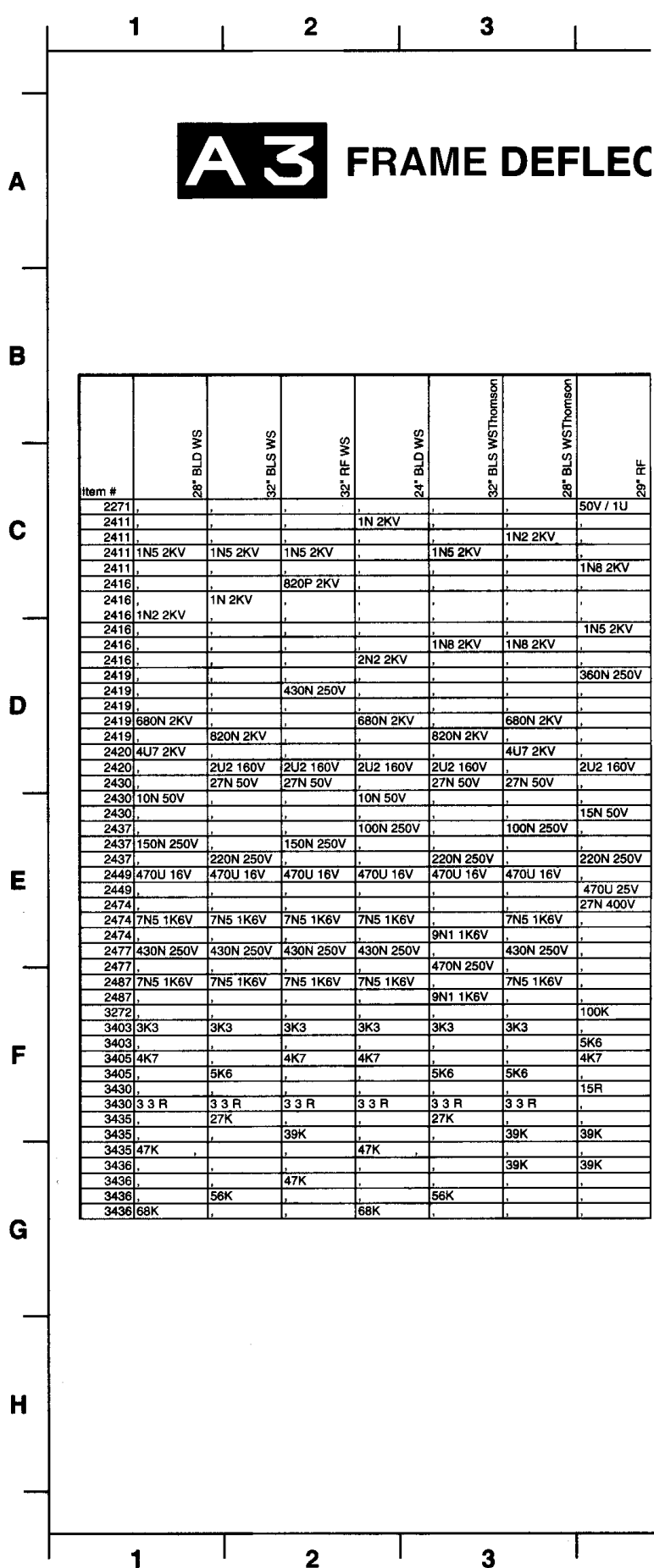
0221 B7	3469 G2	9423 E6
0228 D9	3470 G2	9426 B11
0241 D11	3471 F2	9431 B10
0243 D12	3472 F2	9435 E9
0248 D12	3473 G2	9436 F9
0261 C10	3474 H3	9441 F11
0277 D12	3475 H3	9442 F11
0278 C10	3476 G3	9443 F12
0279 D12	3477 H4	9444 A11
2404 C3	3478 G4	9445 B5
2406 B2	3479 G5	9451 B4
2409 A5	3480 G6	9452 G7
2411 B5	3481 F9	9453 E2
2414 B7	3482 F8	9456 F4
2415 B7	3483 F8	9457 E3
2416 B7	3484 E7	9458 D4
2417 C7	3485 E7	9459 E4
2418 D6	3486 F7	9460 F2
2419 D7	3487 E9	9461 G2
2420 D8	3488 F11	9464 E6
2421 F4	3489 G3	9496 G5
2422 B12	3490 G3	
2430 A9	3491 H3	
2431 B8	3492 G4	
2432 B9	3493 G4	
2433 B9	3494 G4	
2434 B8	3495 D5	
2437 C10	3497 E5	
2438 C10	3498 H2	
2439 A10	3XXX E5	
2442 B11	4400 A11	
2443 A11	4401 E3	
2445 D10	4411 E4	
2446 E10	5405 B3	
2447 E11	5406 B3	
2448 E10	5407 B4	
2449 F10	5410 B5	
2450 F10	5411 B6	
2461 E3	5417 C7	
2462 F8	5430 A9	
2463 E2	5431 B8	
2467 H4	5445 C9	
2468 D5	5446 E9	
2469 D6	5448 E9	
2471 G3	5474 F2	
2472 G4	5475 F3	
2473 G2	5476 F3	
2474 F4	5478 F5	
2475 F4	5479 F5	
2476 F4	6407 B4	
2477 F4	6413 C5	
2478 H4	6414 B6	
2479 G4	6415 B7	
2480 F2	6419 D8	
2481 G2	6420 D8	
2484 B2	6439 B10	
2485 C3	6440 B10	
2486 C3	6442 B11	
2487 F4	6443 A11	
2488 H5	6445 C10	
2489 E6	6446 E10	
3401 C2	6447 E10	
3402 C2	6448 F10	
3403 C3	6450 F11	
3404 A2	6461 F9	
3405 A3	6463 F7	
3406 A3	6464 F7	
3407 B4	6466 E4	
3409 A5	6467 E2	
3410 C4	6468 G3	
3411 B6	6472 F2	
3412 C6	6474 F3	
3413 C6	6475 F4	
3414 B3	6480 G6	
3417 C7	6481 A5	
3421 D7	6482 E2	
3422 D8	6483 E3	
3423 D7	6484 E5	
3430 A9	6485 D5	
3431 A9	6486 G5	
3432 A11	6487 G5	
3433 A8	7408 A3	
3434 A9	7410 B5	
3435 A9	7440 B11	
3436 B10	7461 E3	
3437 C10	7464 E7	
3438 B10	7467 F7	
3439 A10	7470 G3	
3440 A11	7478 H5	
3441 E11	7480 G6	
3442 B12	7481 C3	
3445 D10	7482 D3	
3446 E10	9402 C4	
3447 E10	9403 B4	
3448 E9	9405 G3	
3449 F9	9409 B6	
3450 F11	9412 C6	
3451 D5	9413 F4	
3456 E2	9415 A8	
3459 G2	9416 B9	
3460 E3	9419 E8	

A
 B
 C
 D
 E
 F
 G
 H

Diversity table diagram A2

Item #	28" BLD WS	32" BLS WS	32" RF WS	24" BLD WS	32" BLS WSThompson	28" BLS WSThompson	29" RF
2271							50V / 1U
2411				1N 2KV			
2411						1N2 2KV	
2411	1N5 2KV	1N5 2KV	1N5 2KV		1N5 2KV		
2411							1N8 2KV
2416			820P 2KV				
2416		1N 2KV					
2416	1N2 2KV						
2416							1N5 2KV
2416					1N8 2KV	1N8 2KV	
2416				2N2 2KV			
2419							360N 250V
2419			430N 250V				
2419							
2419	680N 2KV			680N 2KV		680N 2KV	
2419		820N 2KV			820N 2KV		
2420	4U7 2KV					4U7 2KV	
2420		2U2 160V	2U2 160V	2U2 160V	2U2 160V		2U2 160V
2430		27N 50V	27N 50V		27N 50V	27N 50V	
2430	10N 50V			10N 50V			
2430							15N 50V
2437				100N 250V		100N 250V	
2437	150N 250V		150N 250V				
2437		220N 250V			220N 250V		220N 250V
2449	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	
2449							470U 25V
2474							27N 400V
2474	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	
2474					9N1 1K6V		
2477	430N 250V	430N 250V	430N 250V	430N 250V		430N 250V	
2477					470N 250V		
2487					9N1 1K6V		
3272							100K
3403	3K3	3K3	3K3	3K3	3K3	3K3	
3403							5K6
3405	4K7		4K7	4K7			4K7
3405		5K6			5K6	5K6	
3430							15R
3430	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	
3435		27K			27K		
3435			39K			39K	39K
3435	47K			47K			
3436					39K	39K	
3436				47K			
3436		56K			56K		
3436	68K			68K			

CL 06532012_058.eps
140300



Item #	28" BLD WS	32" BLS WS	32" RF WS	24" BLD WS	32" BLS WSThompson	28" BLS WSThompson	29" RF
2271							50V / 1U
2411				1N 2KV			
2411						1N2 2KV	
2411	1N5 2KV	1N5 2KV	1N5 2KV		1N5 2KV		
2411							1N8 2KV
2416			820P 2KV				
2416		1N 2KV					
2416	1N2 2KV						
2416							1N5 2KV
2416					1N8 2KV	1N8 2KV	
2416				2N2 2KV			
2419							360N 250V
2419			430N 250V				
2419							
2419	680N 2KV			680N 2KV		680N 2KV	
2419		820N 2KV			820N 2KV		
2420	4U7 2KV					4U7 2KV	
2420		2U2 160V	2U2 160V	2U2 160V	2U2 160V		2U2 160V
2430		27N 50V	27N 50V		27N 50V	27N 50V	
2430	10N 50V			10N 50V			
2430							15N 50V
2437				100N 250V		100N 250V	
2437	150N 250V		150N 250V				
2437		220N 250V			220N 250V		220N 250V
2449	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	470U 16V	
2449							470U 25V
2474							27N 400V
2474	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	7N5 1K6V	
2474					9N1 1K6V		
2477	430N 250V	430N 250V	430N 250V	430N 250V		430N 250V	
2477					470N 250V		
2487					9N1 1K6V		
3272							100K
3403	3K3	3K3	3K3	3K3	3K3	3K3	
3403							5K6
3405	4K7		4K7	4K7			4K7
3405		5K6			5K6	5K6	
3430							15R
3430	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	3 3 R	
3435		27K			27K		
3435			39K			39K	39K
3435	47K			47K			
3436					39K	39K	
3436				47K			
3436		56K			56K		
3436	68K			68K			

Frame

deflection

4 5 6 7 8 9 10

CTION

A

B

C

D

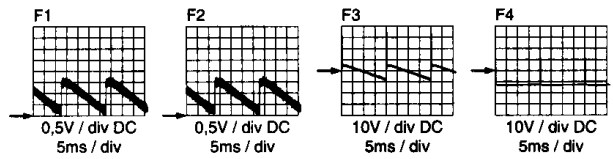
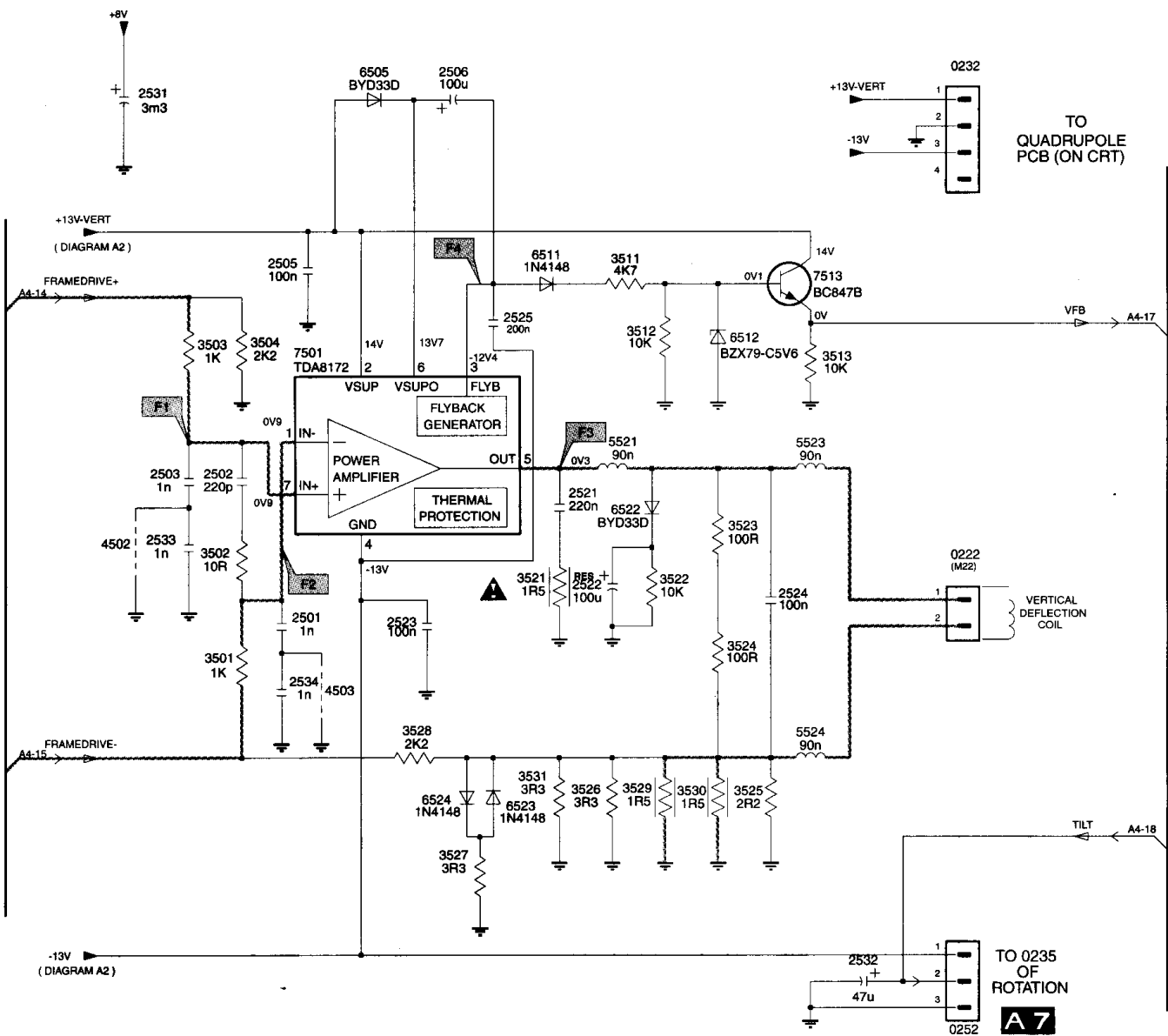
E

F

G

H

- 0222 D9
- 0232 B9
- 0252 G9
- 2501 E6
- 2502 D5
- 2503 D5
- 2505 C6
- 2506 B6
- 2521 D7
- 2522 D7
- 2523 E6
- 2524 E8
- 2525 C7
- 2531 B4
- 2532 F9
- 2533 D5
- 2534 E6
- 3501 E5
- 3502 D5
- 3503 C5
- 3504 C5
- 3511 C7
- 3512 C8
- 3513 C9
- 3521 D7
- 3522 D8
- 3523 D8
- 3524 E8
- 3525 F8
- 3526 F7
- 3527 F7
- 3528 E7
- 3529 F7
- 3530 F8
- 4502 D5
- 4503 E6
- 5521 D7
- 5523 D8
- 5524 E8
- 6505 B6
- 6511 C7
- 6512 C8
- 6522 D7
- 7501 C6
- 7513 C8

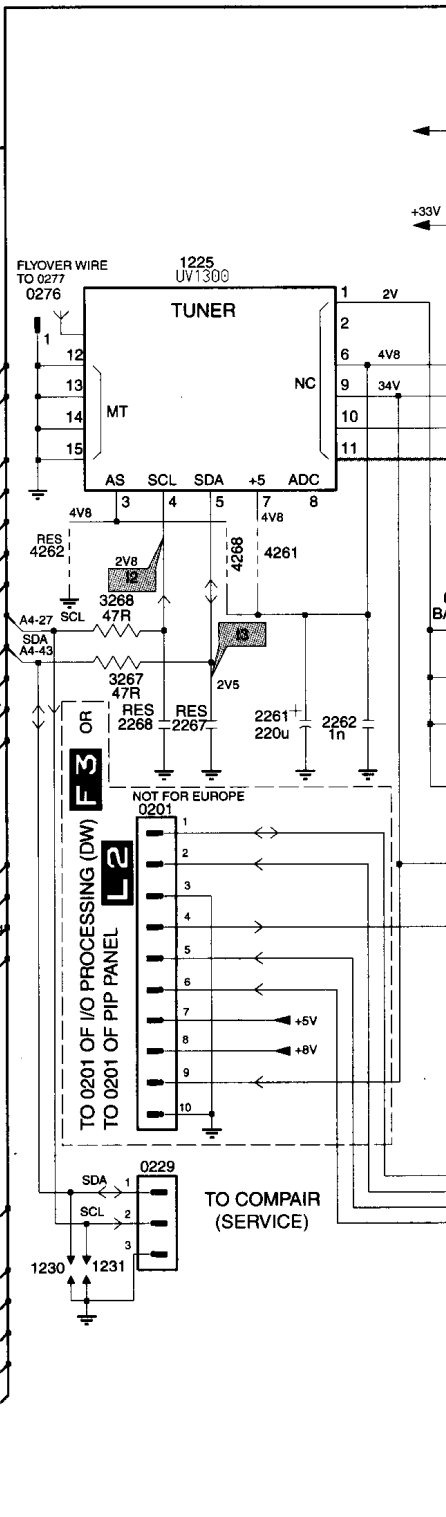
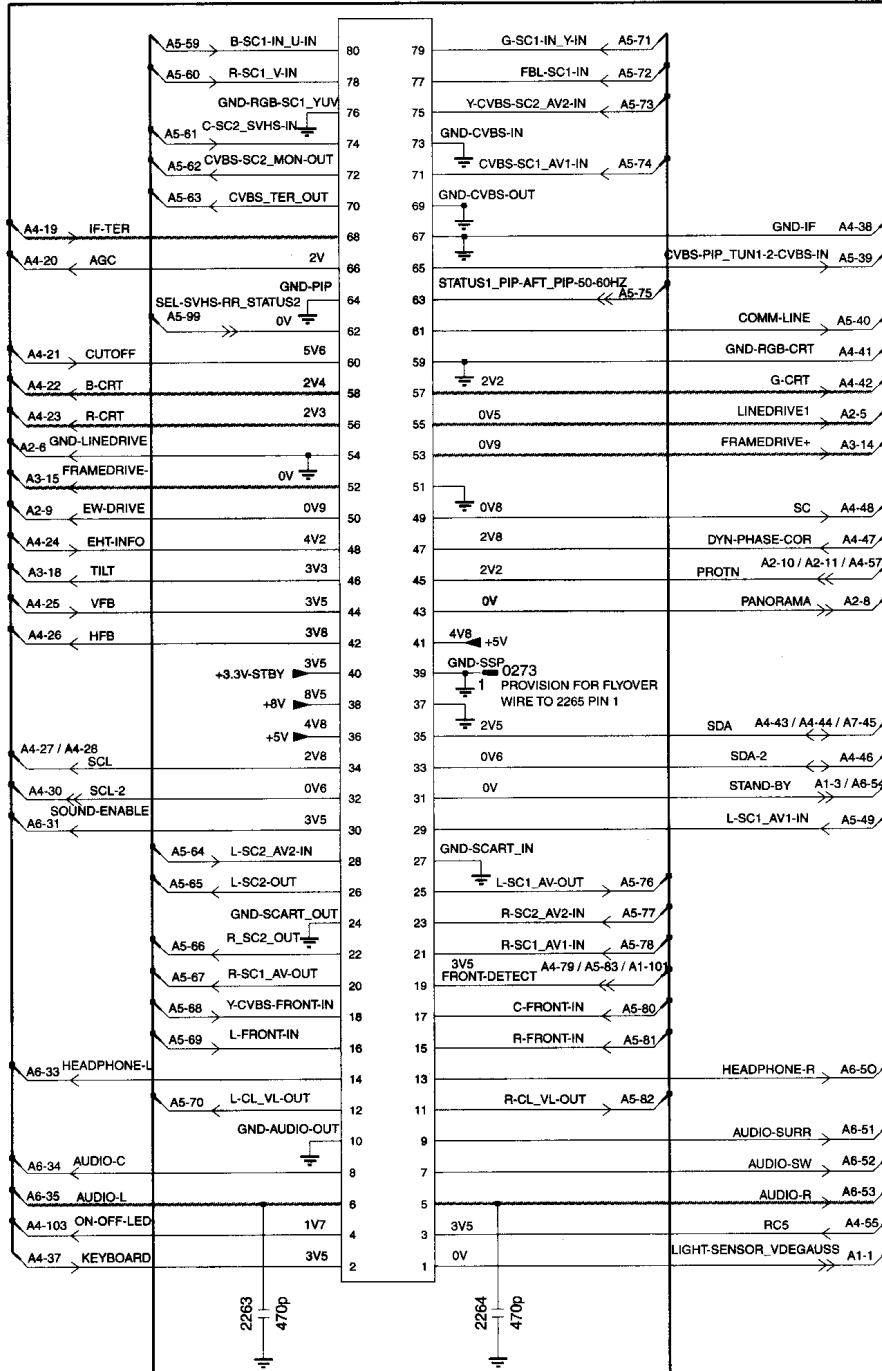


SSP-Tuner

A 4 SSP-TUNER

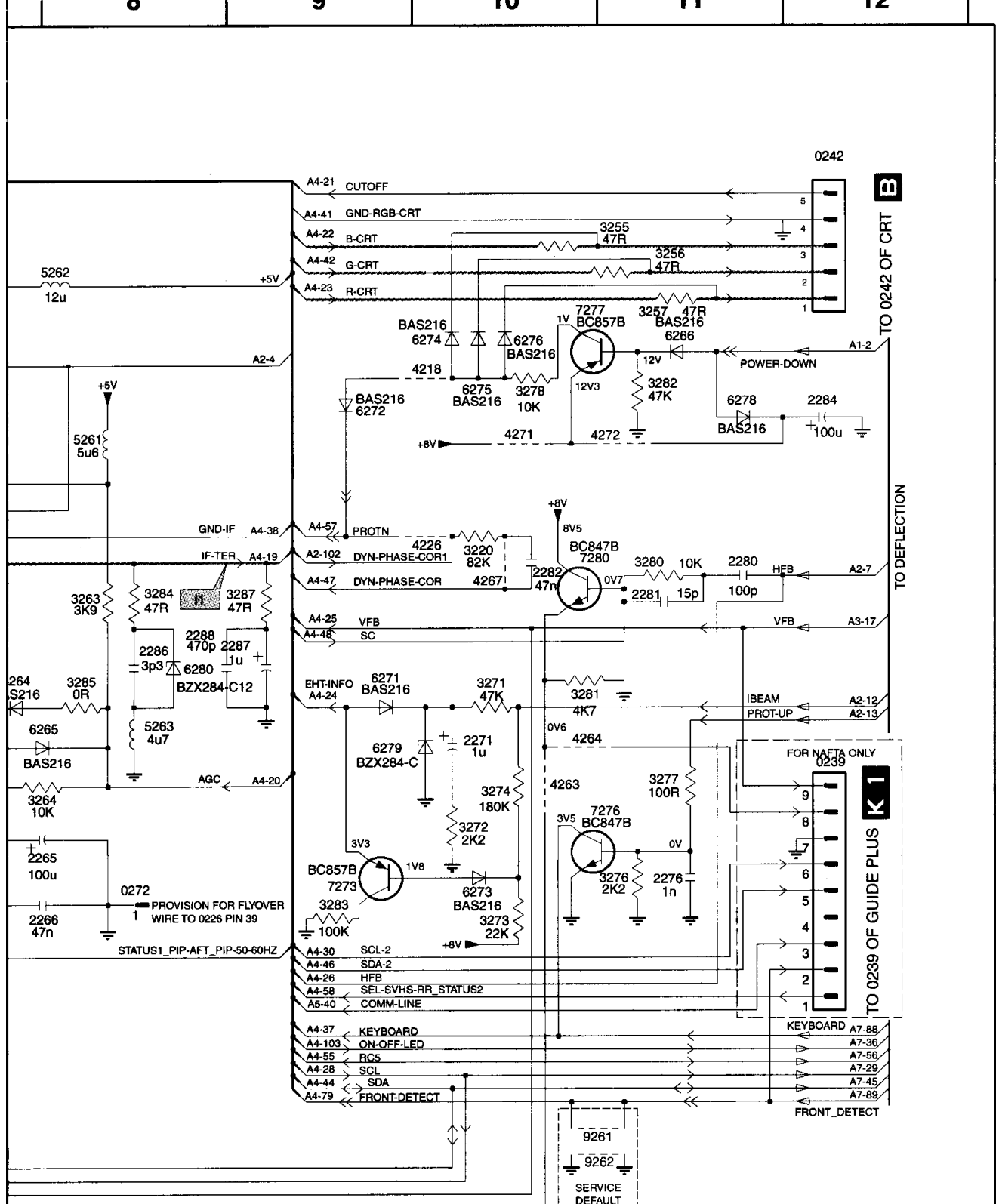
TO 0226
OF SSB-CONNECTOR
C6

0226
80 PINS

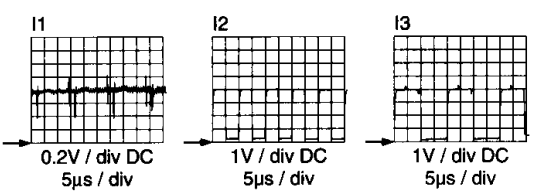


0201 E6
 0226 A3
 0229 F6
 0239 D12
 0242 A12
 0272 E8
 0273 E4
 0276 B5
 1225 B6
 1230 G5
 1231 G6
 2261 D6
 2262 D7
 2263 H2
 2264 H3
 2265 E7
 2266 E8
 2267 D6
 2268 D6
 2271 D10
 2276 E11
 2280 C11
 2281 C11
 2282 C10
 2284 B12
 2286 C8
 2287 C9
 3220 C10
 3255 A11
 3256 A11
 3257 B11
 3263 C8
 3264 D7
 3267 D6
 3268 D6
 3271 D10
 3272 D10
 3273 E10
 3274 D10
 3276 E11
 3277 D11
 3278 B10
 3280 C11
 3281 D10
 3282 B11
 3283 E9
 3284 C8
 3285 D8
 3287 C9
 4218 B10
 4226 C10
 4261 C7
 4262 C5
 4263 D10
 4264 D10
 4267 C10
 4268 C6
 4271 B10
 4272 B11
 5261 B8
 5262 A8
 5263 D8
 6264 D7
 6265 D8
 6266 B11
 6271 D9
 6272 B9
 6273 E10
 6274 B10
 6275 B10
 6276 B10
 6278 B11
 6279 D9
 6280 D8
 7273 E9
 7276 D11
 7277 B11
 7280 C11
 9261 F10
 9262 F11

A
 B
 C
 D
 E
 F
 G
 H



TO 0242 OF CRT
 TO DEFLECTION
 TO 0239 OF GUIDE PLUS
 KEYBOARD



SSP-SCART

1 2 3 4 5 6 7

A

B

C

D

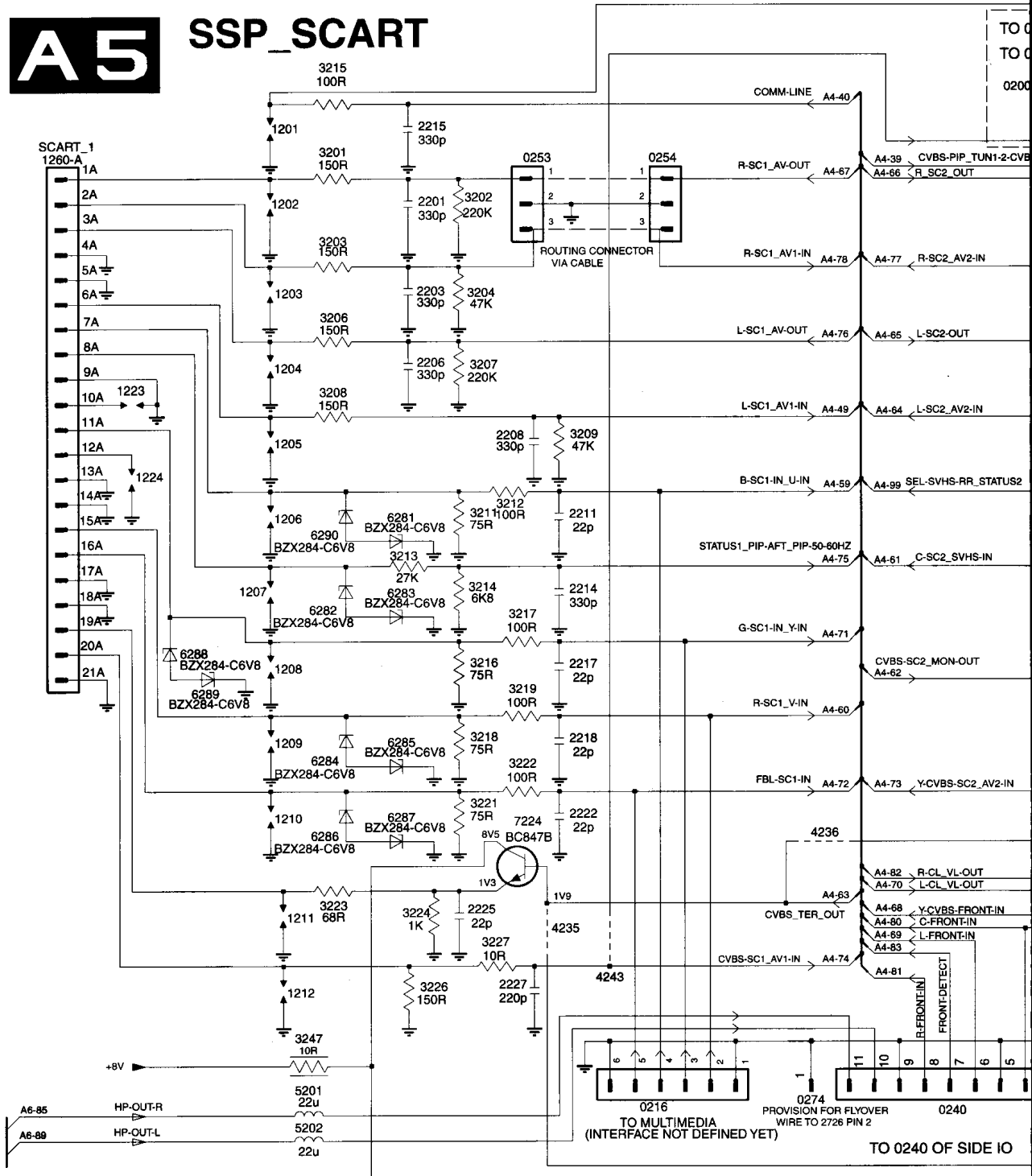
E

F

G

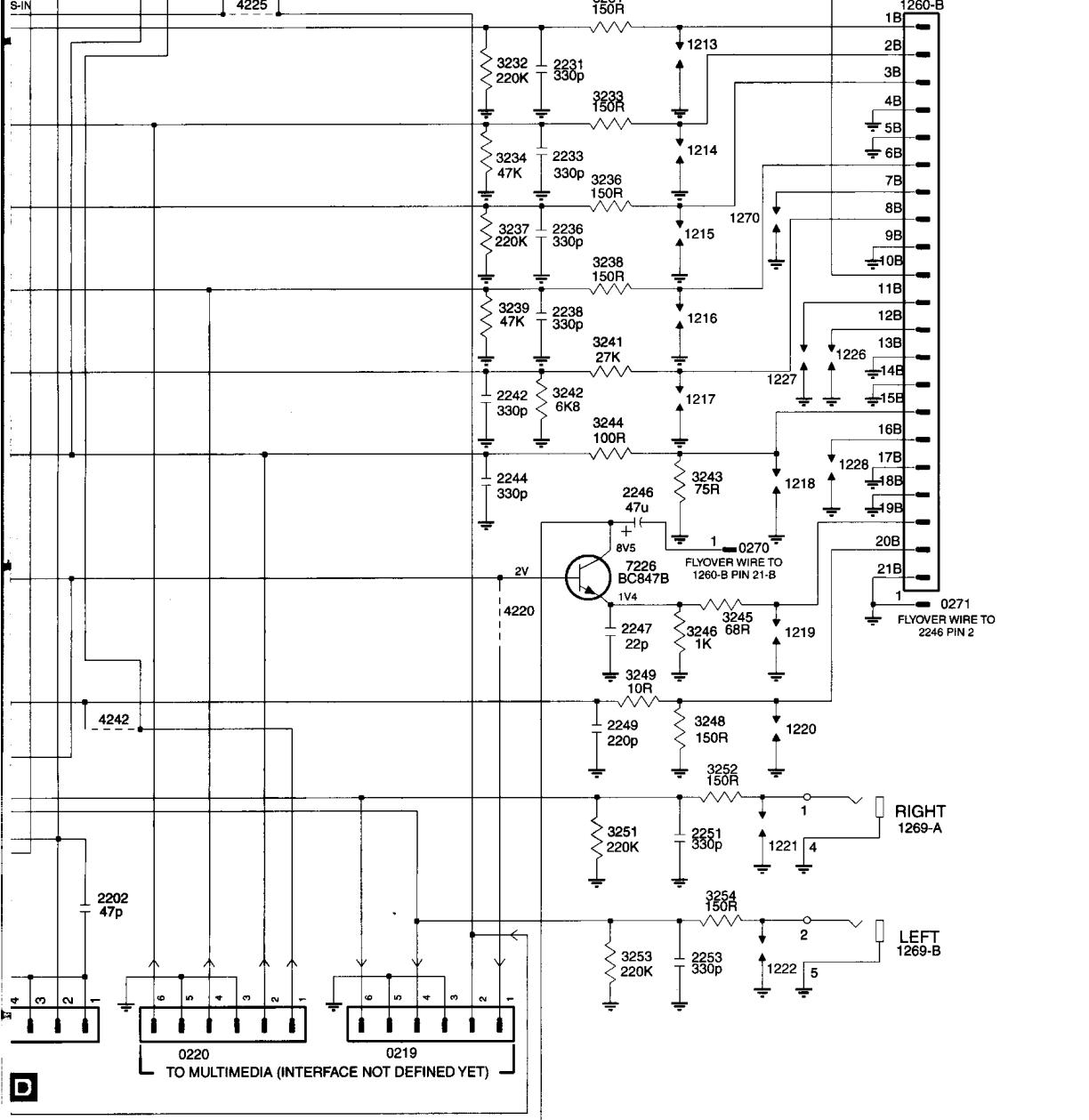
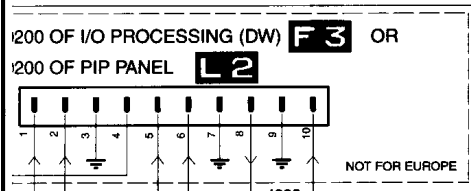
H

A5 SSP_SCART



1 2 3 4 5 6 7

8 9 10 11 12



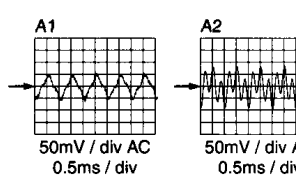
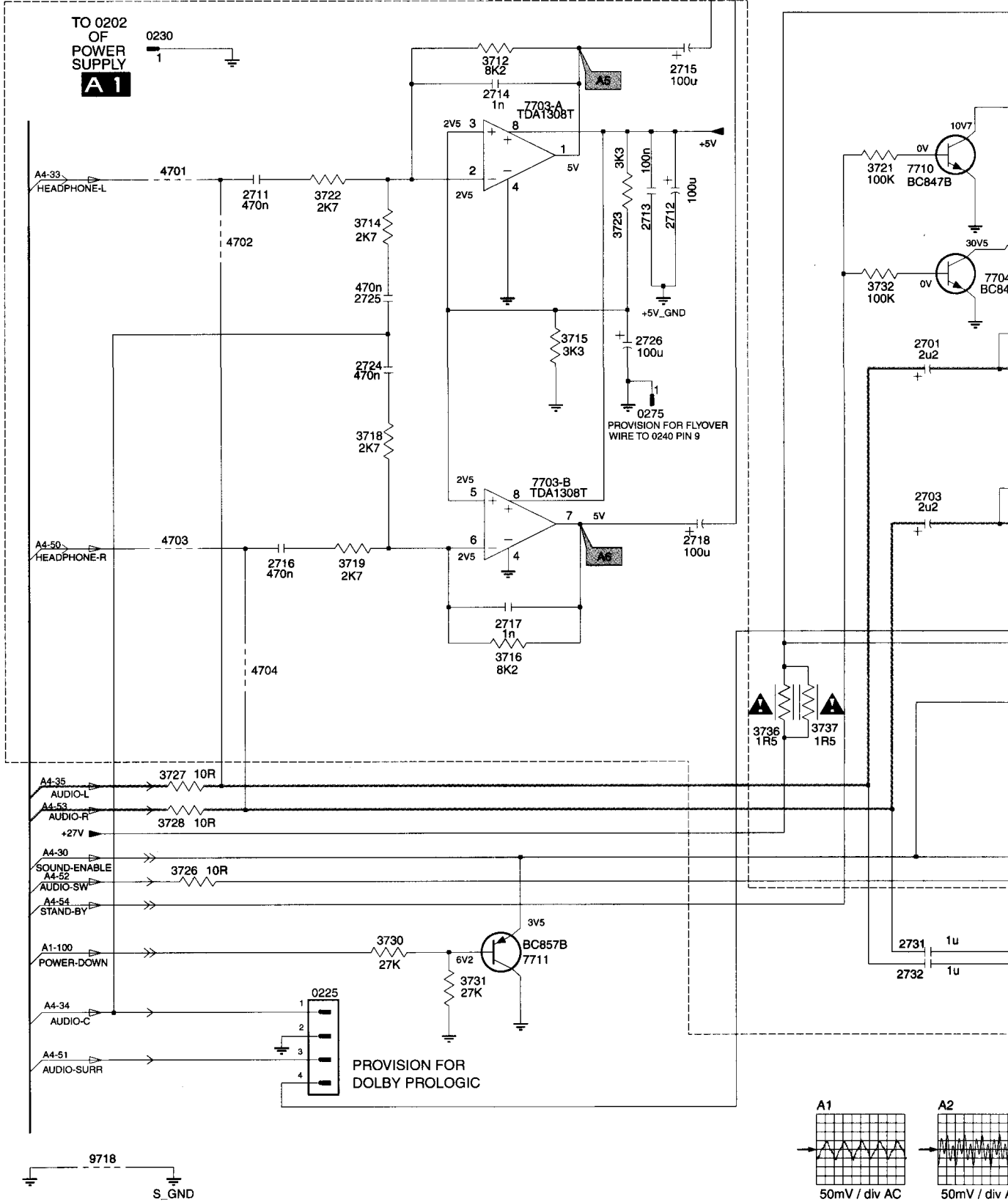
- 0200 A7
- 0216 G5
- 0219 G9
- 0220 G8
- 0240 G7
- 0253 B4
- 0254 B5
- 0270 D11
- 0271 E12
- 0274 G6
- 1201 A3
- 1202 B3
- 1203 B3
- 1204 C3
- 1205 C3
- 1206 D3
- 1207 D3
- 1208 D3
- 1209 E3
- 1210 E3
- 1211 F3
- 1212 F3
- 1213 B11
- 1214 B11
- 1215 C11
- 1216 C11
- 1217 D11
- 1218 D11
- 1219 E11
- 1220 E11
- 1221 F11
- 1222 G11
- 1223 C2
- 1224 C2
- 1226 C11
- 1227 C11
- 1228 D11
- 1260-A B2
- 1260-B B12
- 1269-A F12
- 1269-B F12
- 1270 C11
- 2201 B4
- 2202 F8
- 2203 B4
- 2206 C4
- 2208 C4
- 2211 D4
- 2214 D4
- 2215 A4
- 2217 D4
- 2218 E4
- 2222 E4
- 2225 F4
- 2227 F4
- 2231 B10
- 2233 B10
- 2236 C10
- 2238 C10
- 2242 D10
- 2244 D10
- 2246 D10
- 2247 E10
- 2249 E10
- 2251 F11
- 2253 F11
- 3201 A3
- 3202 B4
- 3203 B3
- 3204 B4
- 3206 B3
- 3207 C4
- 3208 C3
- 3209 C4
- 3211 D4
- 3212 C4
- 3213 D3
- 3214 D4
- 3215 A3
- 3216 D4
- 3217 D4
- 3218 E4
- 3219 E4
- 3221 E4
- 3222 E4
- 3223 F3
- 3224 F4
- 3226 F4
- 3227 F4
- 3231 A10
- 3232 B10
- 3233 B10
- 3234 B10
- 3236 B10
- 3237 C10
- 3238 C10
- 3239 C10
- 3241 C10
- 3242 D10
- 3243 D11
- 3244 D10
- 3245 E11
- 3246 E11
- 3247 G3
- 3248 E11
- 3249 E10
- 3251 F10
- 3252 E11
- 3253 F10
- 3254 F11
- 4220 E10
- 4225 F4
- 4235 F4
- 4236 E6
- 4242 E8
- 4243 F5
- 5201 G3
- 5202 G3
- 6280 D3
- 6281 D3
- 6282 D3
- 6283 D3
- 6284 E3
- 6285 E3
- 6286 E3
- 6287 E3
- 6288 D2
- 6289 E2
- 7224 E4
- 7226 D10

8 9 10 11 12

Audio

A6 AUDIO

HEADPHONE AMPLIFIER



0225 G3
 0230 A2
 0246 D11
 0247 F11
 0275 D5
 2701 C7
 2702 D8
 2703 D7
 2704 D9
 2705 F9
 2706 D11
 2707 D11
 2708 B8
 2709 D10
 2711 B3
 2712 B5
 2713 B5
 2714 B4
 2715 B5
 2716 E3
 2717 E4
 2718 D5
 2719 D8
 2720 E8
 2722 C7
 2723 D7
 2724 C3
 2725 C3
 2726 C5
 2727 D10
 2728 E10
 2729 D9
 2730 E9
 2731 G7
 2732 G7
 2733 G8
 3701 D8
 3702 E8
 3703 G10
 3704 E7
 3705 E8
 3706 E7
 3707 F8
 3708 B8
 3709 B7
 3710 G7
 3711 G7
 3712 B4
 3713 G8
 3714 C3
 3715 C5
 3716 E4
 3717 G9
 3718 D3
 3719 E3
 3720 G9
 3721 B6
 3722 B3
 3723 C5
 3724 C7
 3725 D7
 3726 F2
 3727 F2
 3728 F2
 3730 G4
 3731 G4
 3732 C6
 3733 C7
 3734 D10
 3735 D9
 3736 F6
 3737 F6
 4701 B2
 4702 C3
 4703 D2
 4704 E3
 6701 B8
 7701 E8
 7702 B8
 7703-A B4
 7703-B D4
 7704 C7
 7710 B7
 7711 G4
 7712 G8
 9718 H2

A

B

C

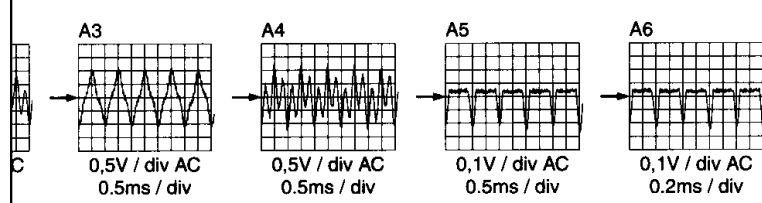
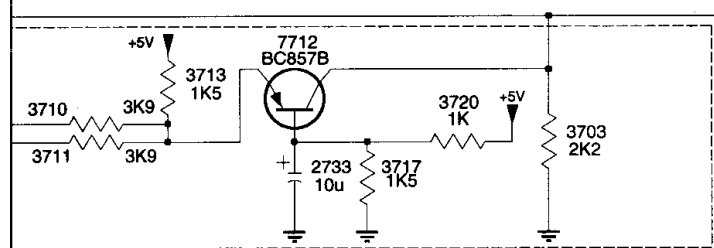
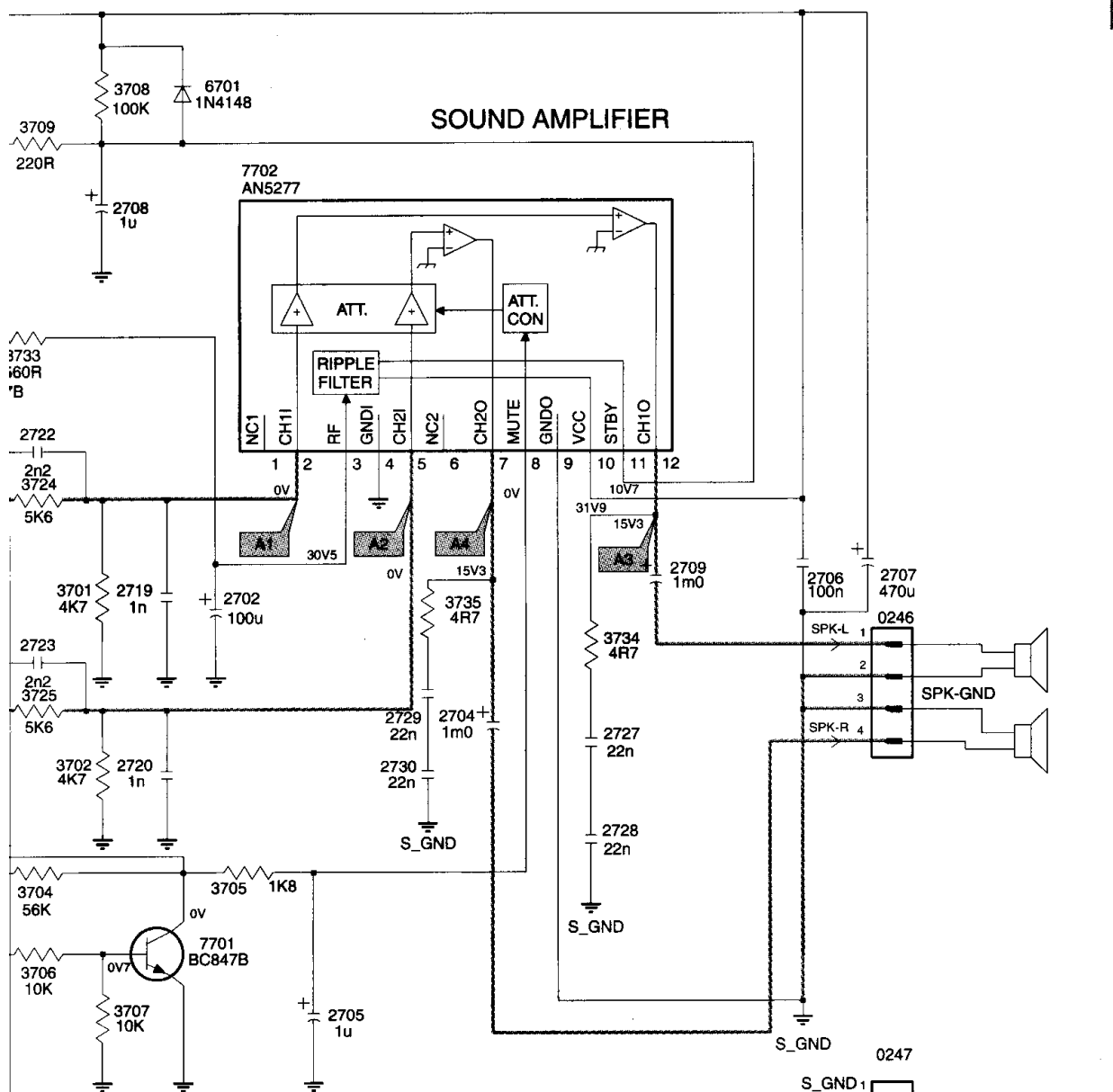
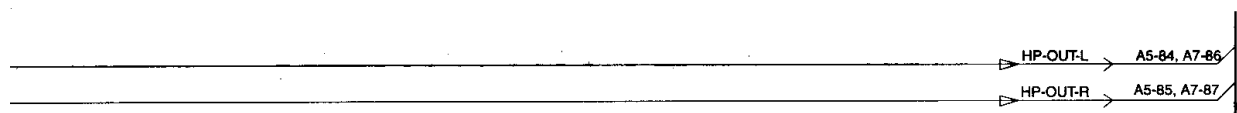
D

E

F

G

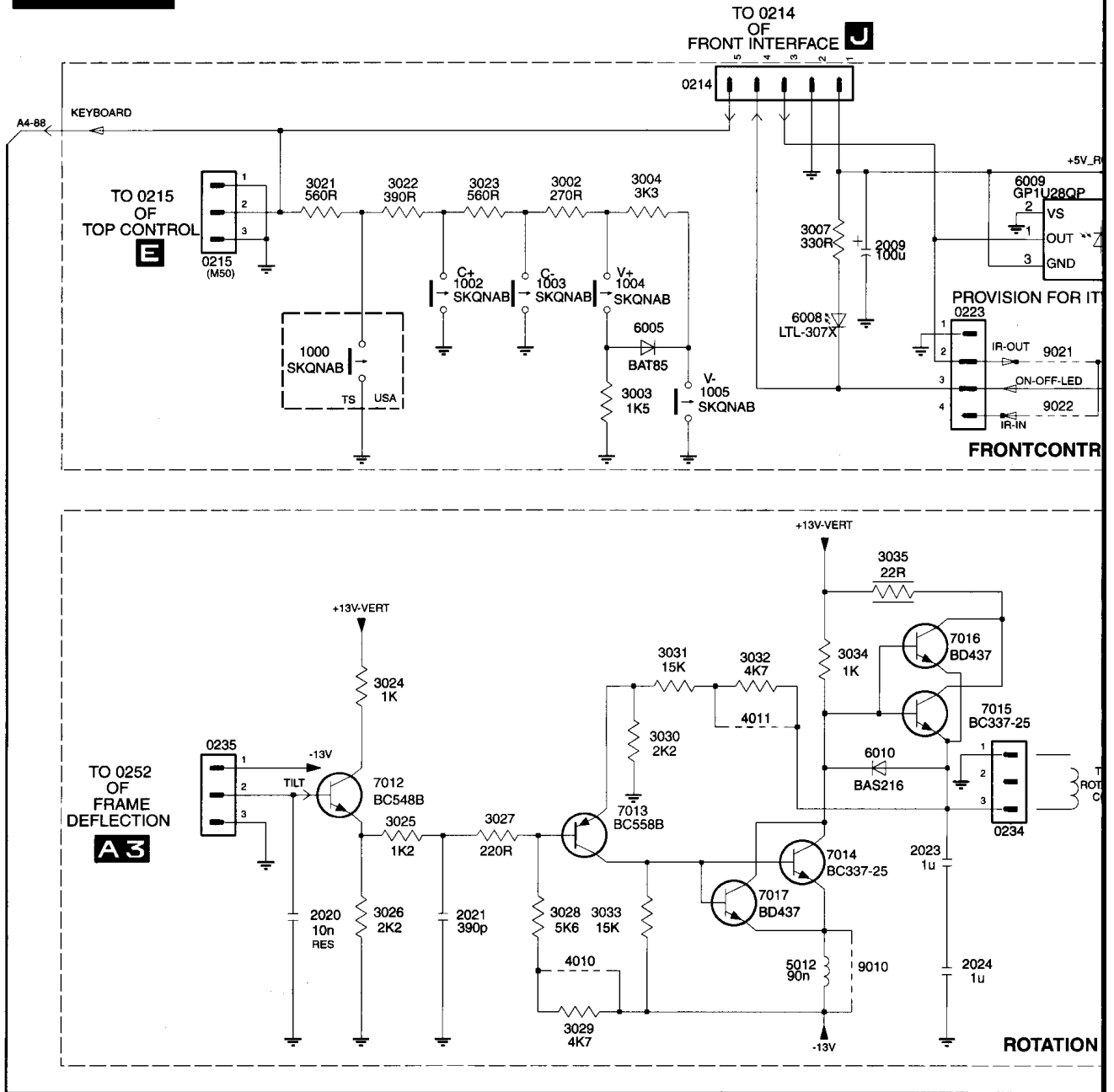
H



Front control / Rotation / Headphone

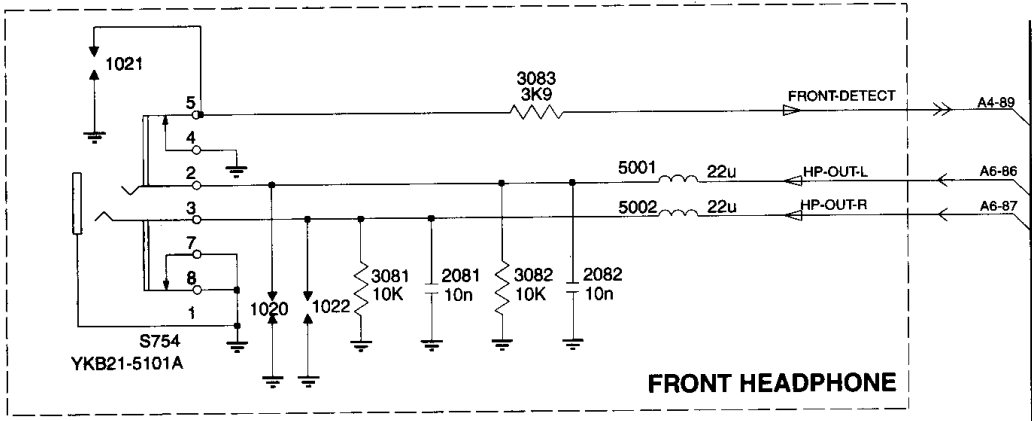
A7

FRONT CONTROL / ROTATION / HEAD



PHONE

STBY
RC5
DL
ATION
DIL



- 0214 B5
- 0215 B2
- 0223 C6
- 0234 E6
- 0235 E2
- 1000 C3
- 1002 C4
- 1003 C4
- 1004 C4
- 1005 C5
- 1020 F9
- 1021 E8
- 1022 F9
- 2009 B6
- 2020 F3
- 2021 F4
- 2023 F6
- 2024 F6
- 2081 F10
- 2082 F10
- 3002 B4
- 3003 C5
- 3004 B5
- 3007 B5
- 3021 B3
- 3022 B3
- 3023 B4
- 3024 E3
- 3025 E3
- 3026 F3
- 3027 E4
- 3028 F4
- 3029 F4
- 3030 E5
- 3031 D5
- 3032 E5
- 3033 F4
- 3034 D6
- 3035 D6
- 3081 F9
- 3082 F10
- 3083 E10
- 4010 F4
- 4011 E5
- 5001 E10
- 5002 F10
- 5012 F5
- 6005 C5
- 6008 C5
- 6009 B7
- 6010 E6
- 7012 E3
- 7013 E4
- 7014 F6
- 7015 E6
- 7016 D6
- 7017 F5
- 9010 F6
- 9021 C7
- 9022 C7
- S754 F9

A
B
C
D
E
F
G
H

CRT panel

1

2

3

4

5

6

7

A

B

C

D

E

F

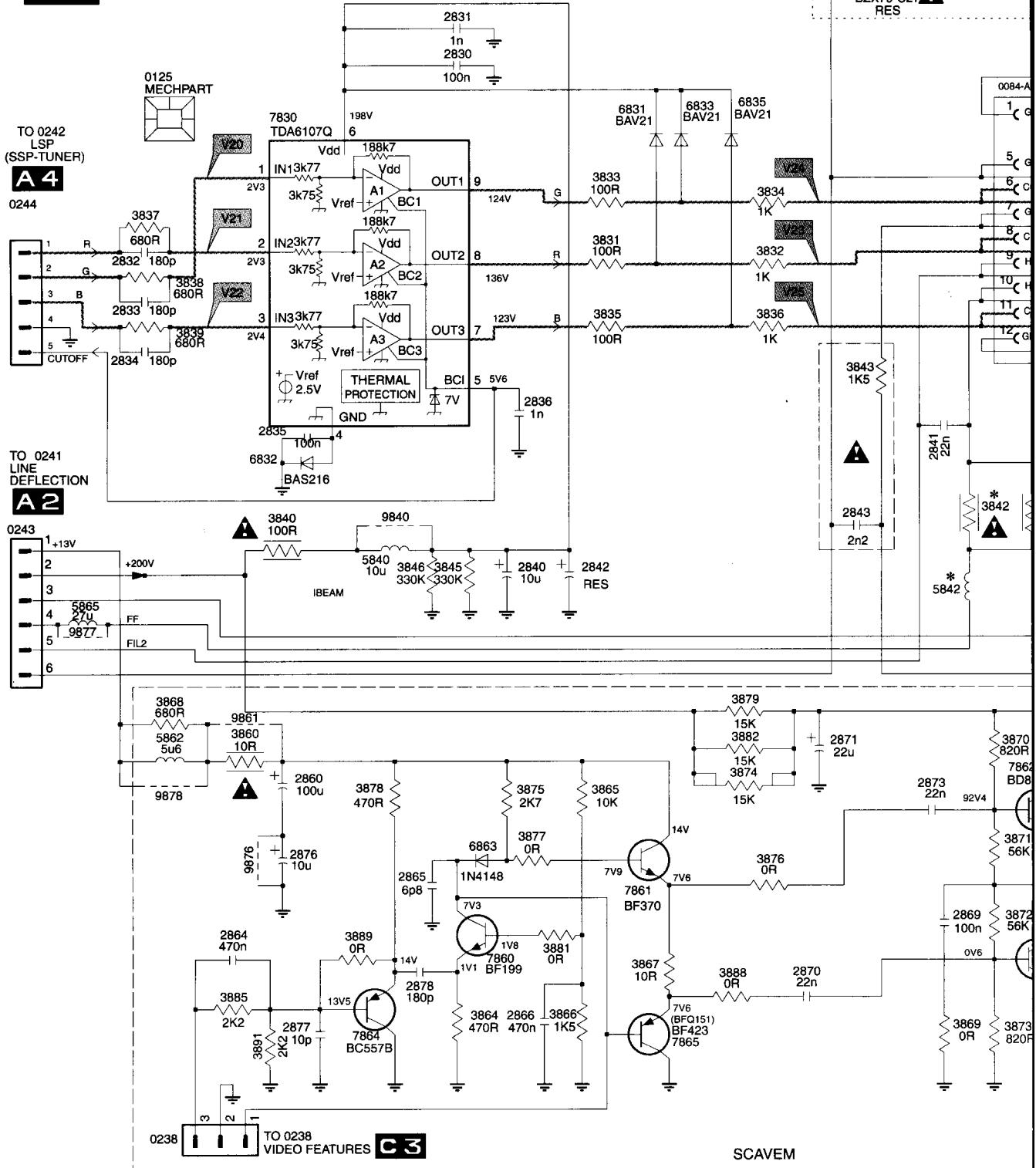
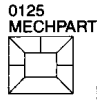
G

H

B CRT PANEL

TO 0242
LSP
(SSP-TUNER)
A 4
0244

TO 0241
LINE DEFLECTION
A 2
0243



TO 0238
VIDEO FEATURES
C 3

SCAVEM

1

2

3

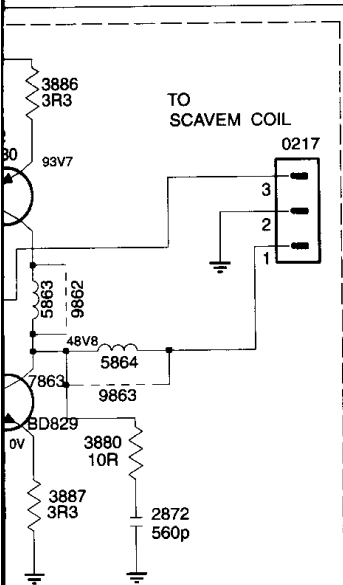
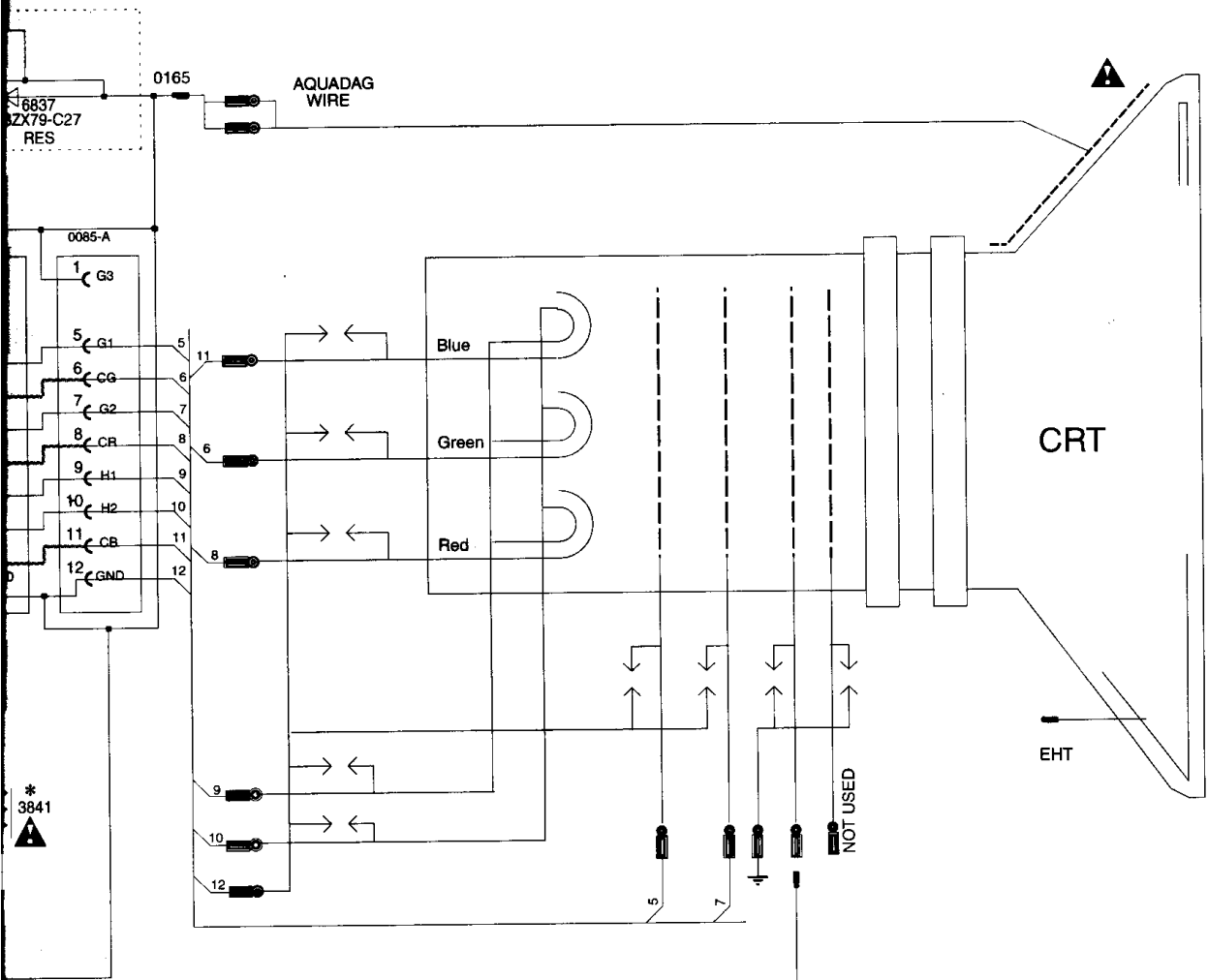
4

5

6

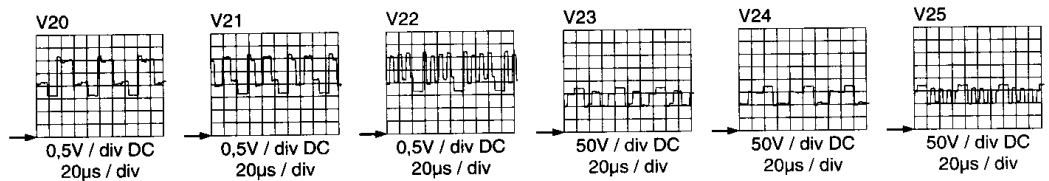
7

8 9 10 11 12



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

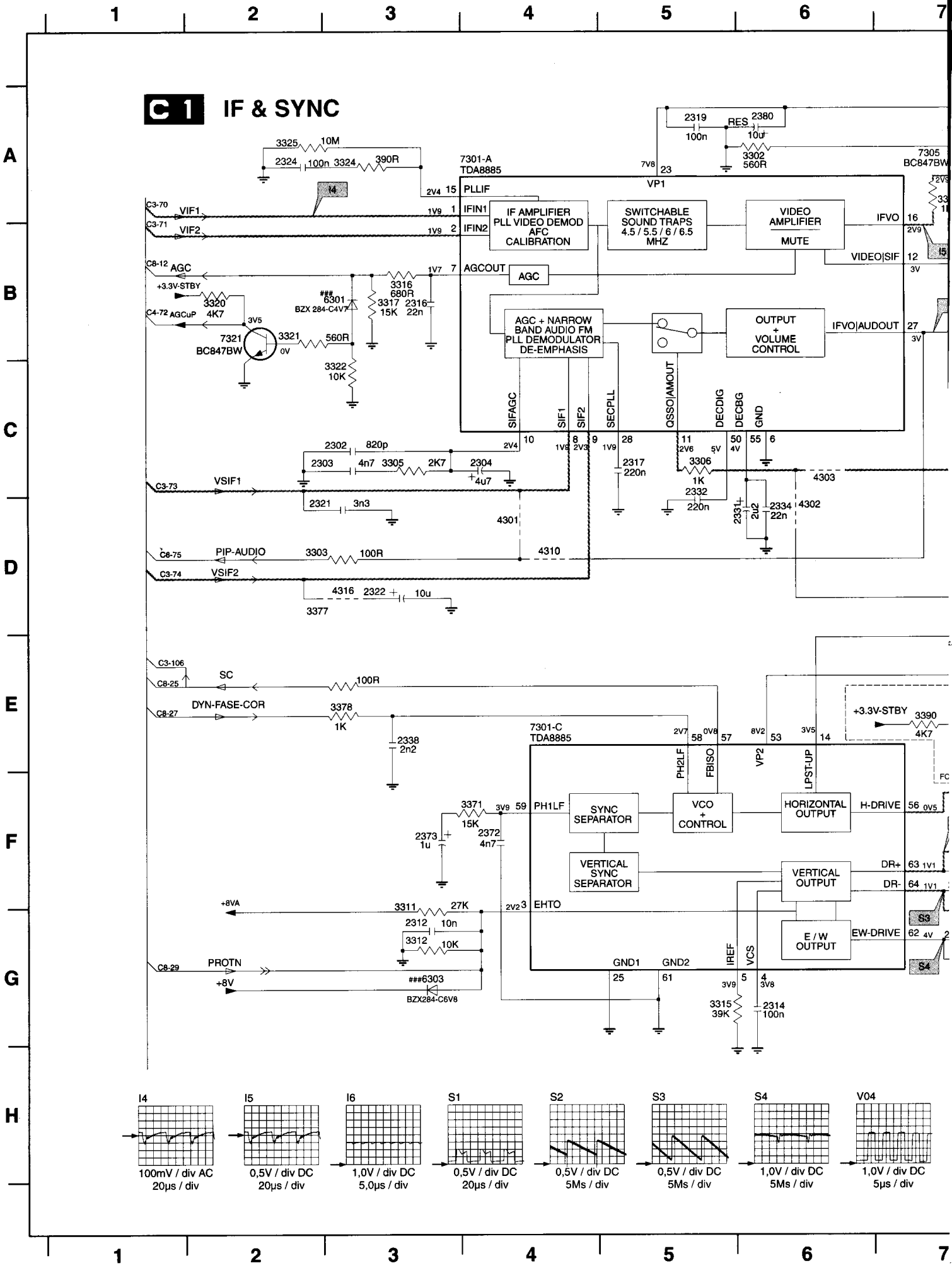
*	21"	25" BLS	25", 28" BLD	27V	32V	35V	29" SF	FROM LOT A2	
								BLD WIDE 24"/28"	BLS WIDE 28"
5842	47u	47u	33u	56u	82u	18u	56u	47u	56u
3841	1R	1R5	3R3	2R7	1R	1R	1R	1R	1R2
3842	1R	1R5	3R3	2R7	1R	1R	1R	1R	1R2
2838	1N	1N	1N	2N2	2N2	2N2	1N	1N	1N

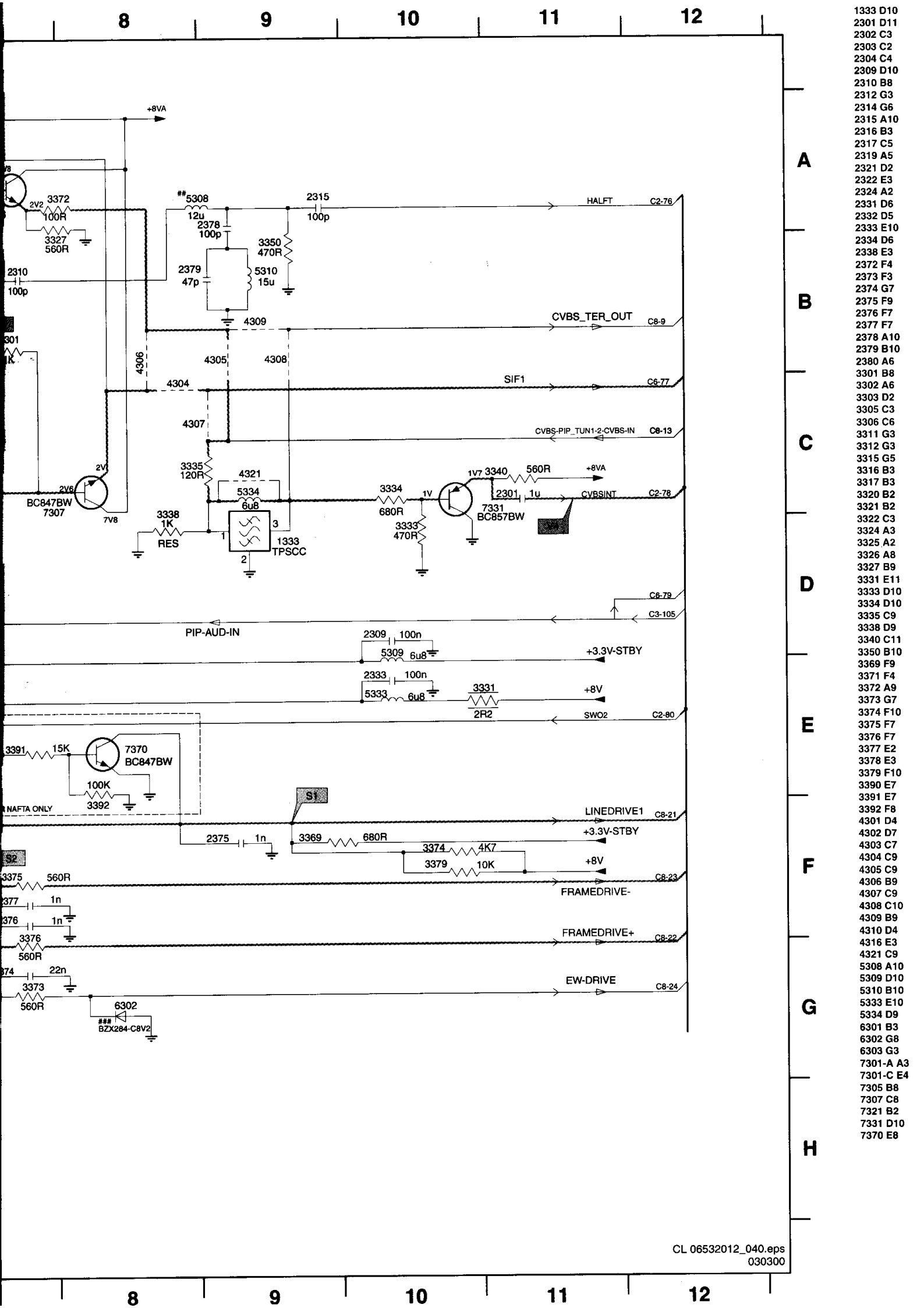


0084-A B7
0085-A B8
0125 B2
0165 A8
0217 F8
0238 H2
0243 D1
0244 B1
0287 E10
2830 A4
2831 A4
2832 C2
2833 C2
2834 C2
2835 D3
2836 C4
2838 A7
2840 D4
2841 D6
2842 D5
2843 D6
2860 F3
2864 F2
2865 F3
2866 G4
2869 F7
2870 G6
2871 E6
2872 G8
2873 F6
2876 F3
2877 G3
2878 G3
3831 B5
3832 C6
3833 B5
3834 B6
3835 C5
3836 C6
3837 B2
3838 C2
3839 C2
3840 D3
3841 D7
3842 D7
3843 C6
3845 D4
3846 D3
3860 E2
3864 G4
3865 F5
3866 G4
3867 G5
3868 E2
3869 G7
3870 E7
3871 F7
3872 F7
3873 G7
3875 F4
3876 F6
3877 F4
3878 F3
3879 E5
3880 G7
3881 G4
3882 F5
3885 G2
3886 E7
3887 G7
3888 G5
3889 F3
3891 G3
3892 A7
5840 D3
5842 D7
5862 E2
5863 F7
5864 F8
5865 E2
6831 B5
6832 D3
6833 B5
6835 B5
6837 A7
6838 A6
6863 F4
7830 B3
7860 G4
7861 F5
7862 E7
7863 G7
7864 G3
7865 G5
9840 D3
9861 E2
9862 F7
9863 G7
9876 F3
9877 E2
9878 F2

8 9 10 11 12

IF & SYNC

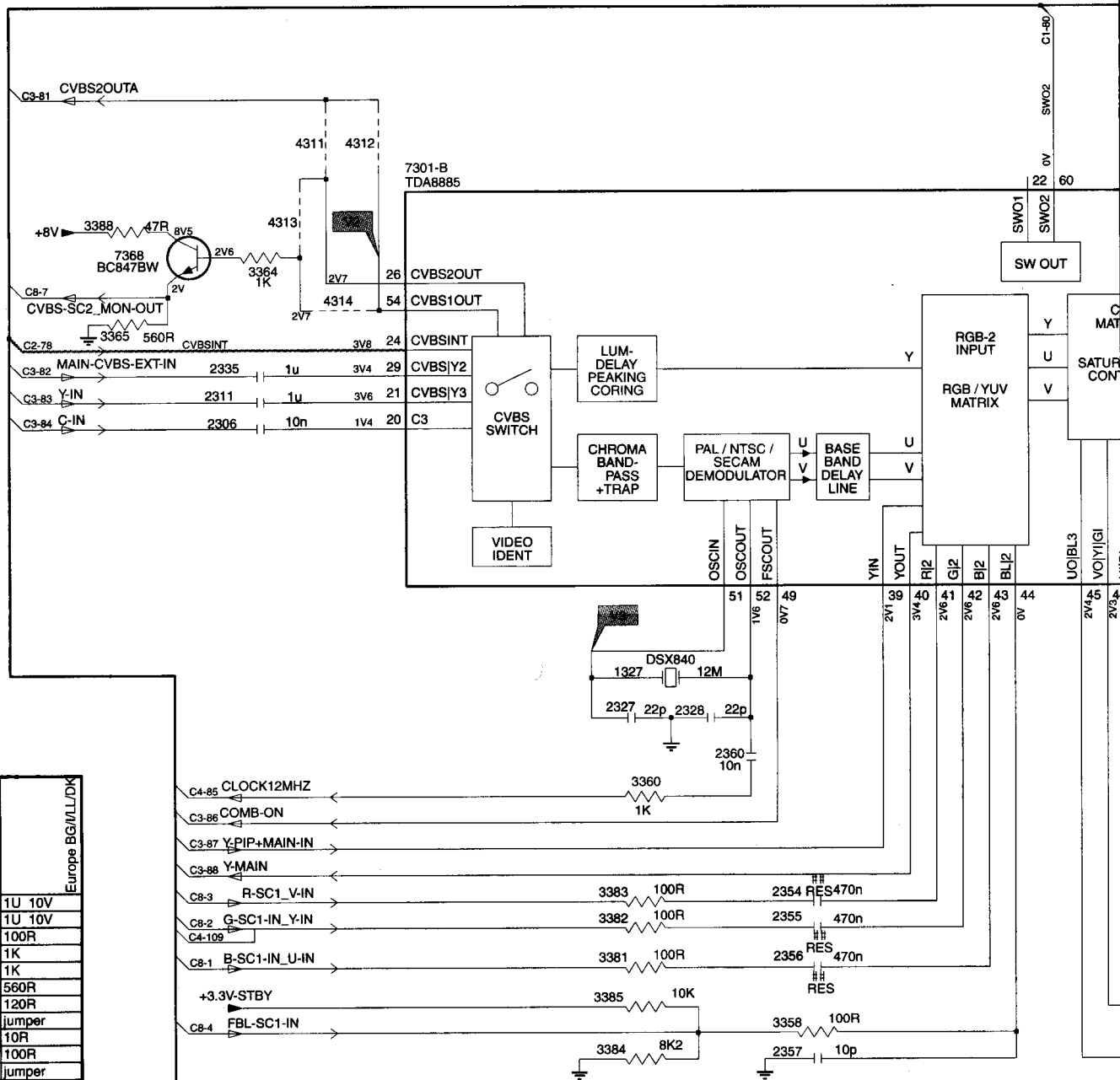




- 1333 D10
- 2301 D11
- 2302 C3
- 2303 C2
- 2304 C4
- 2309 D10
- 2310 B8
- 2312 G3
- 2314 G6
- 2315 A10
- 2316 B3
- 2317 C5
- 2319 A5
- 2321 D2
- 2322 E3
- 2324 A2
- 2331 D6
- 2332 D5
- 2333 E10
- 2334 D6
- 2338 E3
- 2372 F4
- 2373 F3
- 2374 G7
- 2375 F9
- 2376 F7
- 2377 F7
- 2378 A10
- 2379 B10
- 2380 A6
- 3301 B8
- 3302 A6
- 3303 D2
- 3305 C3
- 3306 C6
- 3311 G3
- 3312 G3
- 3315 G5
- 3316 B3
- 3317 B3
- 3320 B2
- 3321 B2
- 3322 C3
- 3324 A3
- 3325 A2
- 3326 A8
- 3327 B9
- 3331 E11
- 3333 D10
- 3334 D10
- 3335 C9
- 3338 D9
- 3340 C11
- 3350 B10
- 3369 F9
- 3371 F4
- 3372 A9
- 3373 G7
- 3374 F10
- 3375 F7
- 3376 F7
- 3377 E2
- 3378 E3
- 3379 F10
- 3390 E7
- 3391 E7
- 3392 F8
- 4301 D4
- 4302 D7
- 4303 C7
- 4304 C9
- 4305 C9
- 4306 B9
- 4307 C9
- 4308 C10
- 4309 B9
- 4310 D4
- 4316 E3
- 4321 C9
- 5308 A10
- 5309 D10
- 5310 B10
- 5333 E10
- 5334 D9
- 6301 B3
- 6302 G8
- 6303 G3
- 7301-A A3
- 7301-C E4
- 7305 B8
- 7307 C8
- 7321 B2
- 7331 D10
- 7370 E8

Video processing

C2 VIDEO PROCESSING



Item	Europe BG/LL/DK
2335	1U 10V
2678	1U 10V
3303	100R
3306	1K
3326	1K
3327	560R
3335	120R
3349	jumper
3372	10R
3373	100R
4303	jumper
4304	jumper
4305	jumper
4308	jumper
4310	jumper
5309	6U8
5334	6U8
7301	TDA 8885
7305	BC847B

A
B
C
D
E
F
G
H

1 2 3 4 5 6 7

1 2 3 4 5 6 7

1327 E5
 2306 D2
 2311 C2
 2313 E8
 2323 F10
 2325 F10
 2326 F10
 2327 E5
 2328 E5
 2335 C2
 2336 C11
 2342 C11
 2343 G10
 2344 G10
 2345 D12
 2348 C11
 2349 D10
 2350 D10
 2354 F5
 2355 F5
 2356 F5
 2357 G5
 2360 E5
 3329 B10
 3330 B10
 3332 E10
 3339 E9
 3341 C10
 3342 G9
 3343 G10
 3344 C10
 3345 G9
 3346 G10
 3348 C10
 3349 D10
 3358 G5
 3360 E3
 3361 F9
 3362 F9
 3363 F9
 3364 C3
 3365 C2
 3381 F4
 3382 F4
 3383 F4
 3384 G4
 3385 G4
 3387 F9
 3388 B2
 3393 E9
 3394 E9
 3395 E10
 3396 E10
 4311 B3
 4312 B3
 4313 B3
 4314 C3
 5332 E10
 6304 D10
 6305 D10
 6306 D11
 6307 F9
 7301-B B3
 7308 E10
 7368 C2

A

B

C

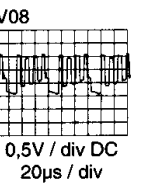
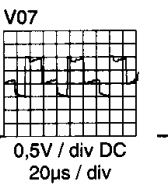
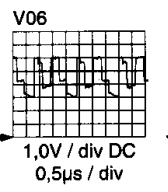
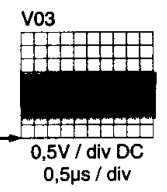
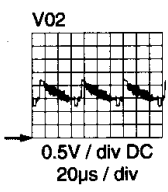
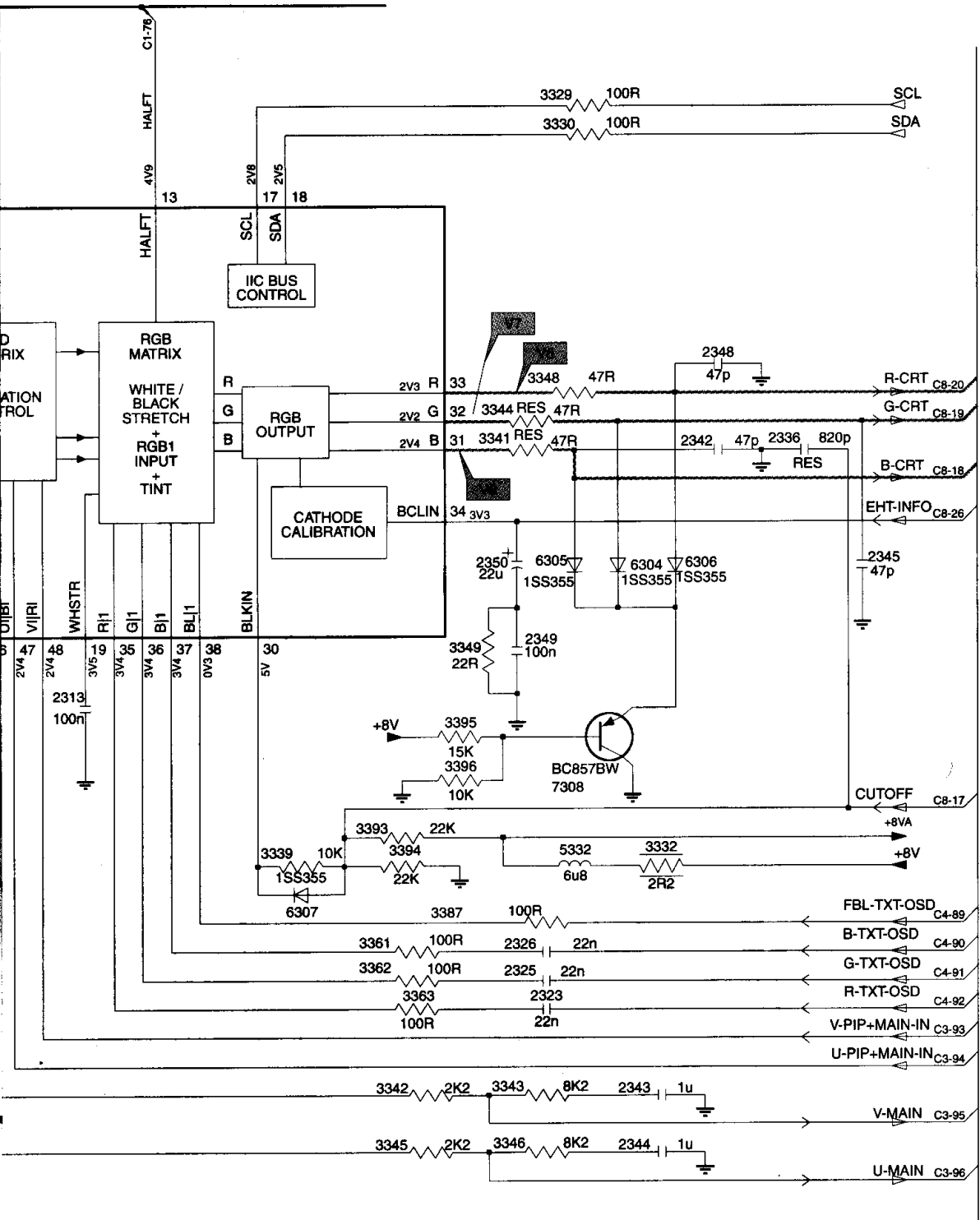
D

E

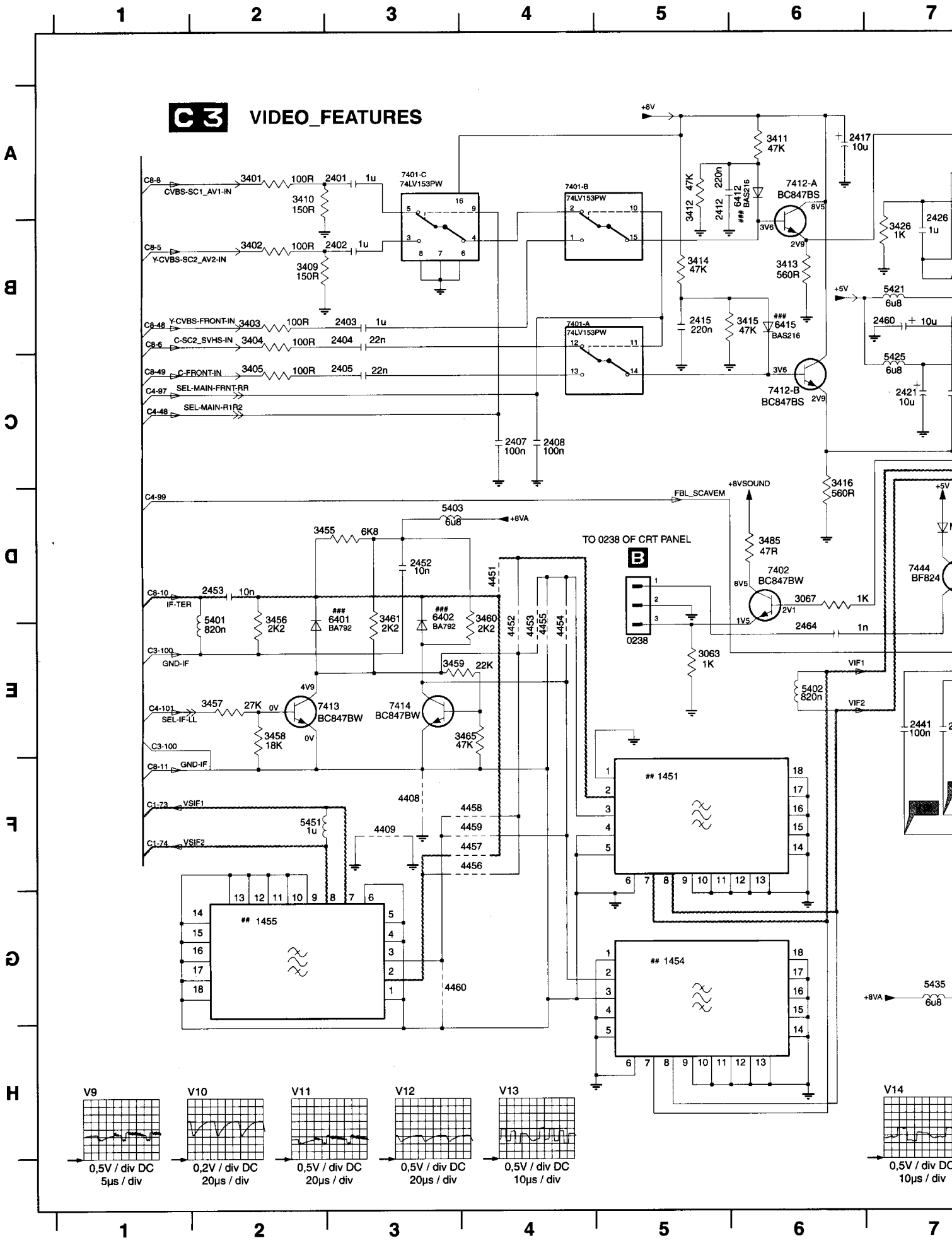
F

G

H



Video features



8

9

10

11

12

- 0205 D10
- 0238 E5
- 1451 F5
- 1454 G5
- 1455 G2
- 2401 A3
- 2402 B3
- 2403 B3
- 2404 B3
- 2405 C3
- 2407 C4
- 2408 C4
- 2412 A5
- 2415 B5
- 2417 A6
- 2420 G11
- 2421 C7
- 2422 C8
- 2423 C7
- 2424 C11
- 2425 C11
- 2426 A7
- 2428 B10
- 2433 E7
- 2434 E7
- 2441 E7
- 2442 E8
- 2443 G8
- 2444 G8
- 2445 G8
- 2446 G8
- 2447 G8
- 2449 G10
- 2450 G10
- 2451 G9
- 2452 D3
- 2453 D2
- 2460 B7
- 2464 E6
- 3063 E5
- 3067 D6
- 3401 A2
- 3402 B2
- 3403 B2
- 3404 B2
- 3405 C2
- 3406 G12
- 3407 G11
- 3408 G11
- 3409 B2
- 3410 A2
- 3411 A6
- 3412 A5
- 3413 B6
- 3414 B5
- 3415 B6
- 3416 C6
- 3417 A11
- 3418 A11
- 3419 C11
- 3420 C11
- 3423 C8
- 3427 B11
- 3428 C9
- 3431 E10
- 3432 E10
- 3435 G10
- 3436 G9
- 3439 F11
- 3440 F11
- 3441 F11
- 3442 F11
- 3443 E8
- 3444 E8
- 3449 G11
- 3452 E9
- 3453 E9
- 3455 D2
- 3456 D2
- 3457 E2
- 3458 E2
- 3459 E3
- 3460 D4
- 3461 D3
- 3465 F4
- 3471 D11
- 3472 E11
- 3473 E11
- 3474 E11
- 3477 F12
- 3480 D7
- 3481 D8
- 3482 D7
- 3485 D6
- 4408 F3
- 4409 F3
- 4431 D10
- 4432 E10
- 4433 E10
- 4434 E10
- 4435 E10
- 4436 E10

A

B

C

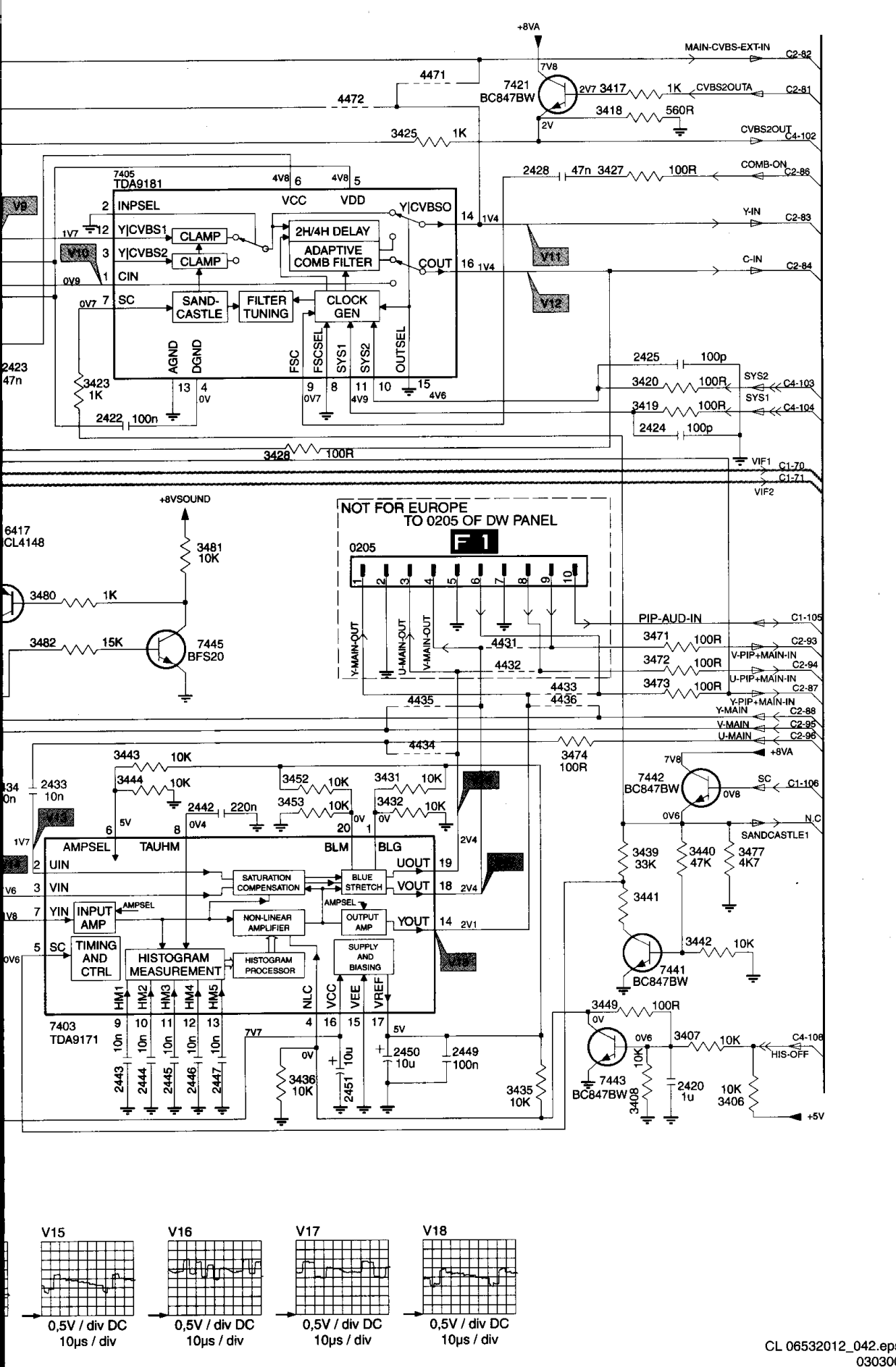
D

E

F

G

H



Diversity tables SSB panel

Diversity tables diagram C3

Item	Histogram No PIP/DW	No Histogram/PIP/DW
2420	100P 50V	,
2433	10N 50V	,
2434	10N 50V	,
2441	100N 16V	,
2442	220N 16V	,
2443	10N 50V	,
2444	10N 50V	,
2445	10N 50V	,
2446	10N 50V	,
2447	10N 50V	,
2449	100N 16V	,
2450	10U 16V	,
2451	10U 16V	,
3406	10K	,
3407	10K	,
3408	10K	,
3432	jumper	,
3435	22K	,
3436	33K	,
3439	10K	,
3443	jumper	,
3444	220K	,
3453	jumper	,
3477	4K7	,
3477	,	4K7
4434	,	jumper
4435	,	jumper
4436	,	jumper
5435	6U8	,
7403	TDA9171	,
7443	BC847	,

Item	SAW filter EU BG/MLL/DK
1451	OFWK3953L
1454	-
1455	OFWK9656L
2452	10N 50V
3455	6K8
3456	2K2
3457	27K
3458	18K
3459	-
3460	-
3461	2K2
3465	-
4451	jumper
4452	-
4453	-
4455	jumper
4457	jumper
4458	jumper
4460	-
5403	6U8
6401	1SS356
6402	-
7413	BC847BW
7414	-

Diversity table diagram C4

Item	West EU 100Pg Txt	West EU 10Pg Txt	East EU 10Pg Txt
2058	100N 16V	,	10
3028	47K	,	47
3029	10K	,	10
3032	10K	,	10
3033	10K	,	10
3090	10K	,	10
3091	10K	,	10
3094	10K	,	10
5050	5U6	,	5U
6020	1SS355	,	1S
7022	BC847	,	BC
7070	UPD431000	,	UP

Diversity table diagram C7

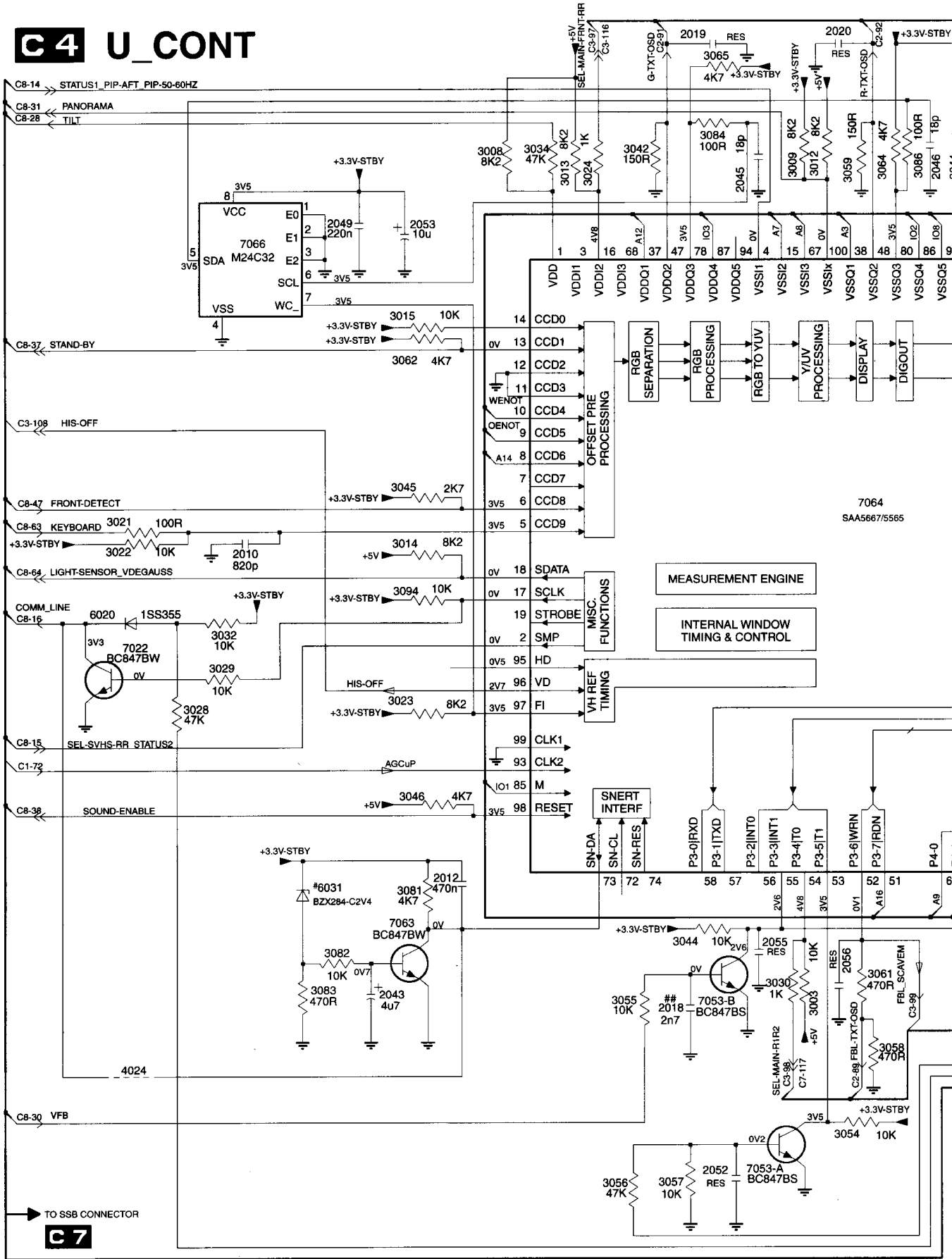
East EU 100Pg Txt	Item	Virtual Dolby EU	Incredible Surround E
	2631	1U 10V	,
	2633	1U 10V	,
	2643	,	1U 10V
	2646	,	1U 10V
	2679	,	100N 16V
	2682	,	1U 10V
	2683	,	1U 10V
	2684	,	1U 10V
	2685	,	1U 10V
	2686	,	1U 10V
	2687	,	1U 10V
00	2690	,	1U 10V
	2691	,	1U 10V
	3643	,	56K
	3644	,	100K
	3645	,	1K
	3646	,	56K
	3647	,	100K
	3648	,	1K
	3680	,	10R
	3681	,	10R
	4640	jumper	,
	4642	jumper	,
	7630	,	74HC4052
	7645	,	BC847B

U Cont

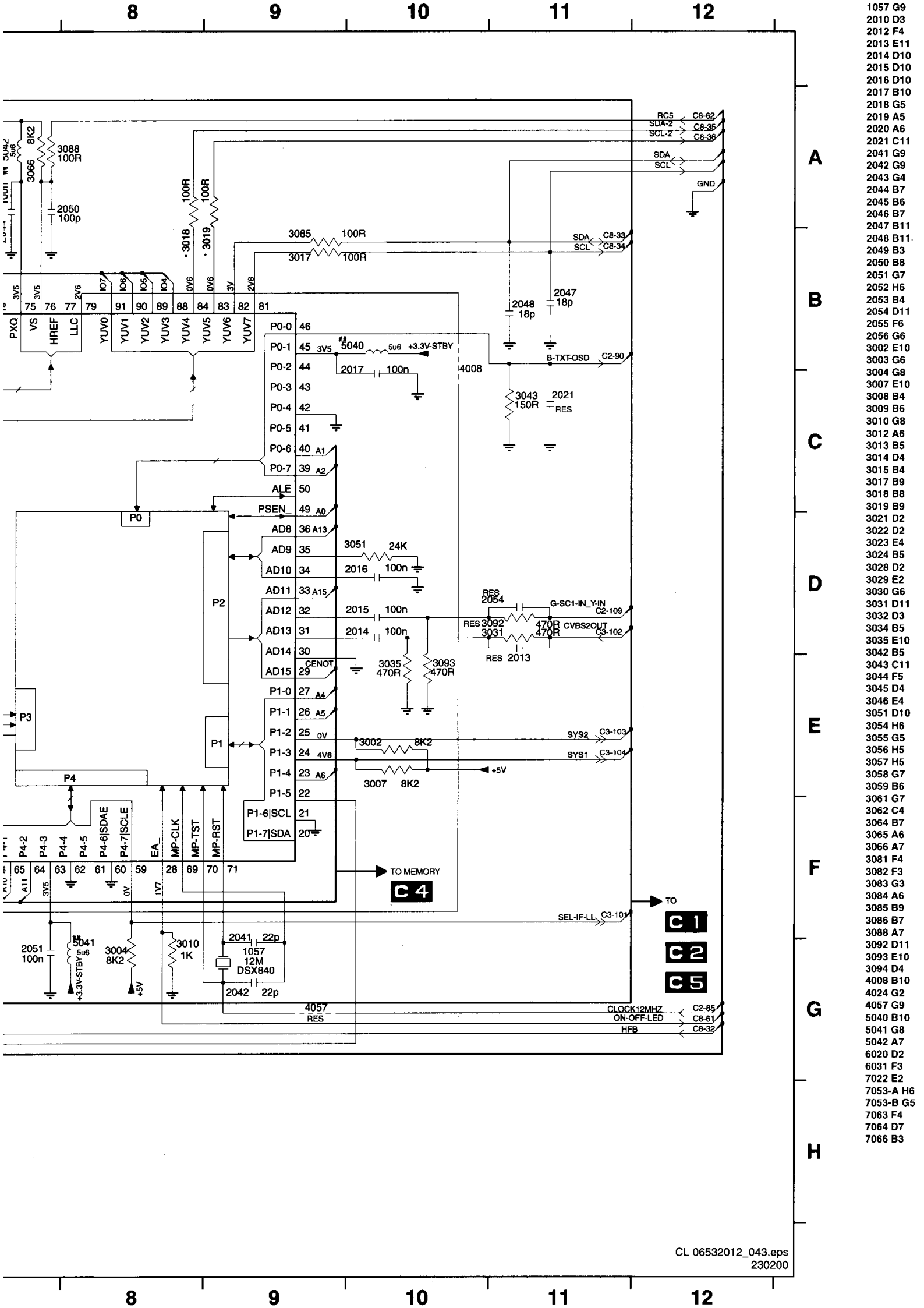
1 2 3 4 5 6 7

C4 U_CONT

A B C D E F G H

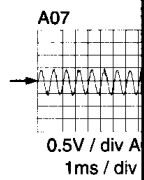
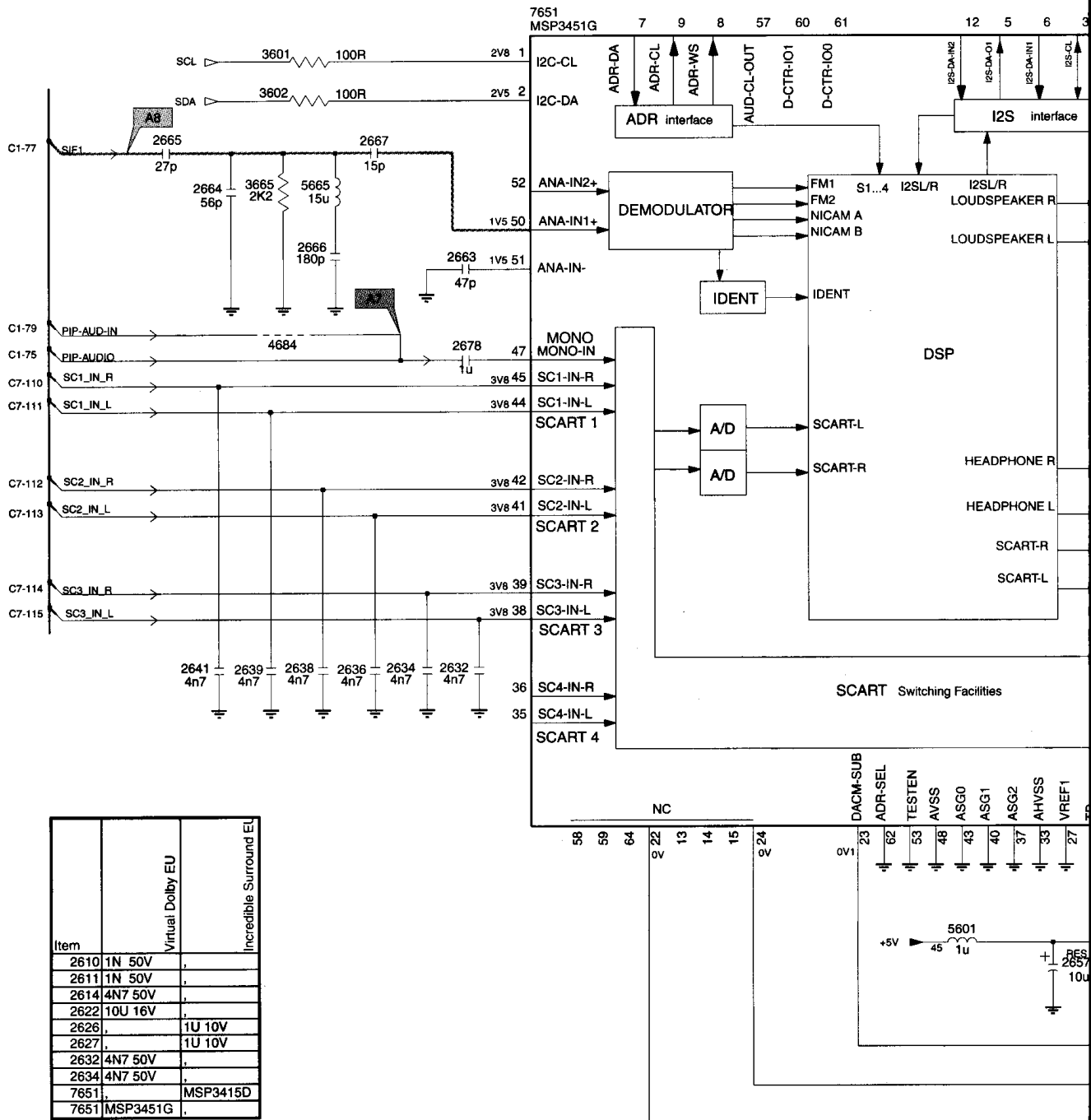


C7



Audio processing

C6 AUDIO PROCESSING



1630 F8
 2601 G7
 2602 G8
 2606 A9
 2607 A9
 2610 B11
 2611 B11
 2612 B11
 2613 B11
 2614 C11
 2616 F9
 2617 E11
 2618 E11
 2619 F10
 2620 E11
 2621 E11
 2622 C9
 2623 C9
 2624 C9
 2625 C10
 2628 C9
 2629 C9
 2632 E4
 2634 E3
 2636 E3
 2638 E3
 2639 E3
 2641 E2
 2655 F10
 2656 F9
 2657 F7
 2661 F8
 2662 C9
 2663 C4
 2664 B2
 2665 B2
 2666 B3
 2667 B3
 2675 F8
 2676 F8
 2678 C4
 2680 C11
 2681 C11
 3601 A3
 3602 B3
 3606 A10
 3616 E10
 3618 E10
 3619 E10
 3621 E10
 3622 E10
 3665 B3
 4643 E10
 4644 E9
 4684 C3
 5601 F6
 5625 C10
 5665 B3
 6605 B10
 7651 A4

A

B

C

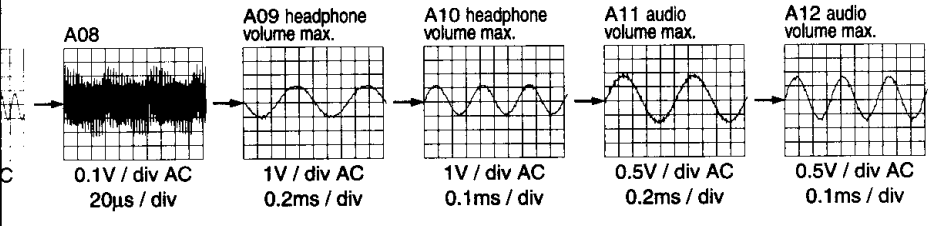
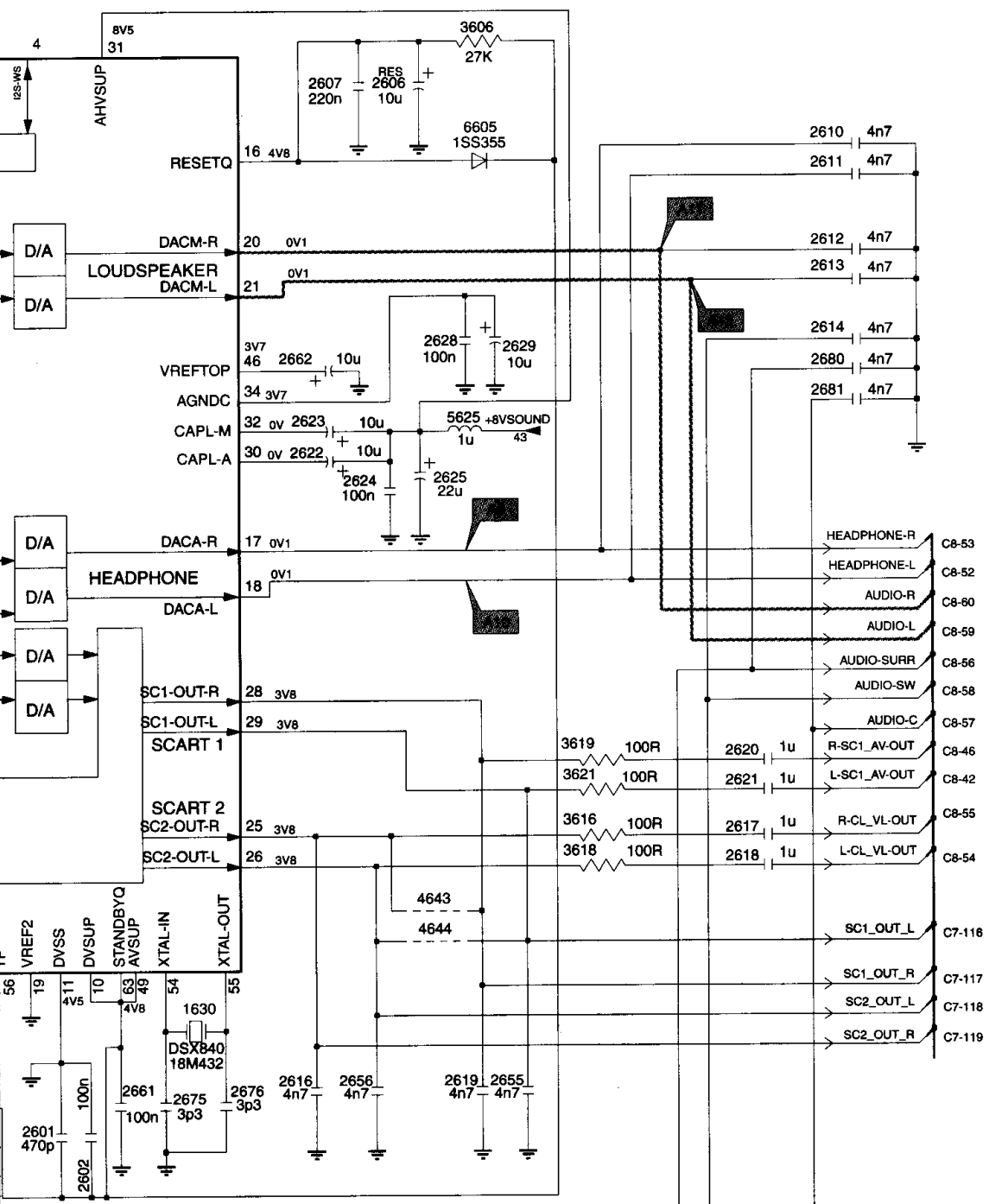
D

E

F

G

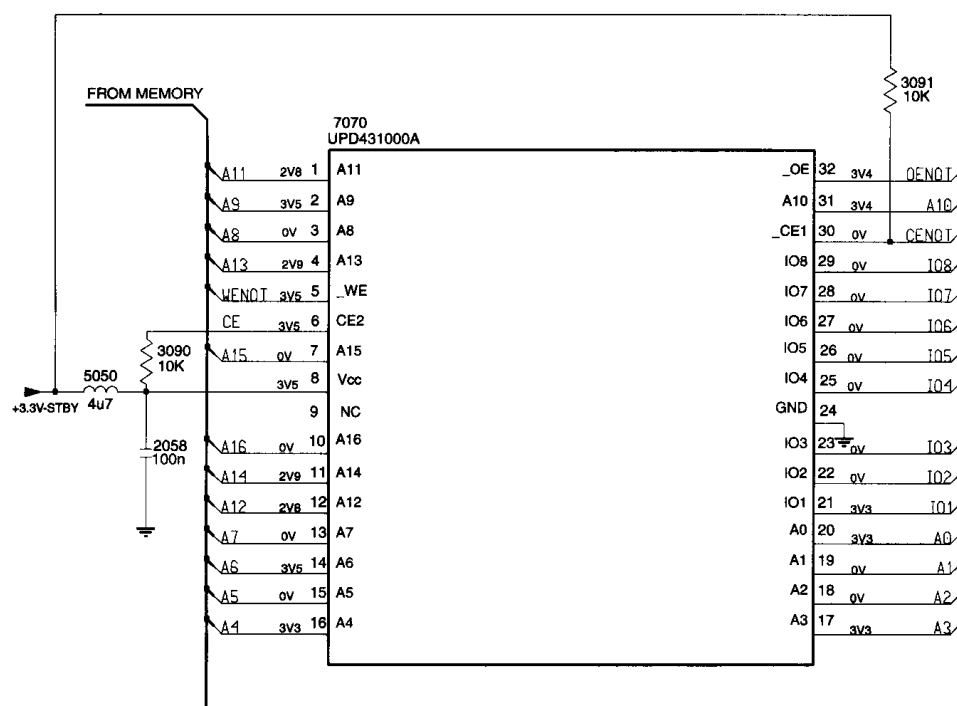
H



Memory

2058 D2
3090 D2
3091 C6
5050 D2
7070 C3

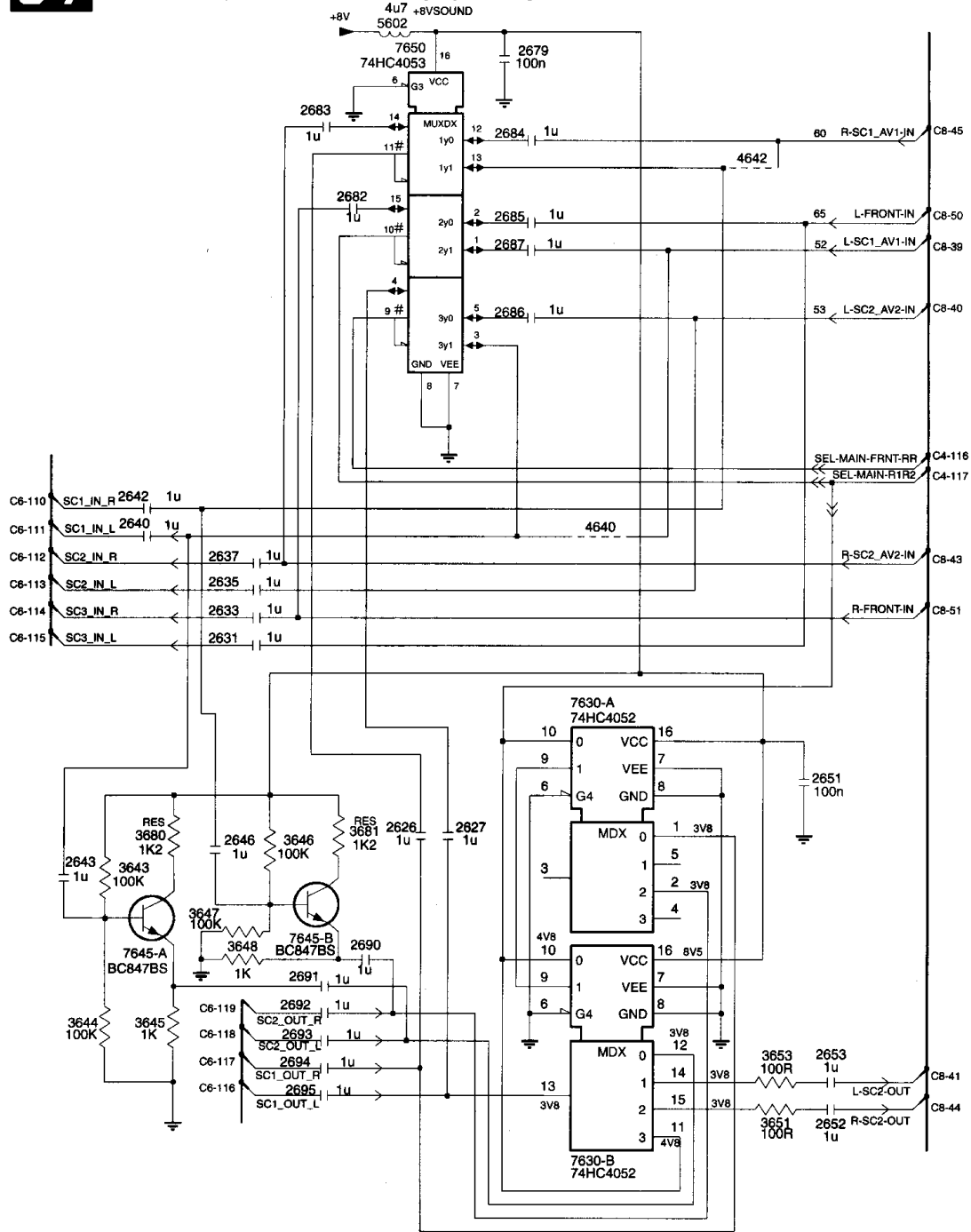
C5 MEMORY



Item	West EU 100Pg Txt	West EU 10Pg Txt	East EU 10Pg Txt	East EU 100Pg Txt
2058	100N 16V	,	,	100N 16V
3028	47K	,	,	47K
3029	10K	,	,	10K
3032	10K	,	,	10K
3033	10K	,	,	10K
3090	10K	,	,	10K
3091	10K	,	,	10K
3094	10K	,	,	10K
5050	5U6	,	,	5U6
6020	1SS355	,	,	1SS355
7022	BC847	,	,	BC847
7070	UPD431000	,	,	UPD431000

Audio processing

C7 AUDIO PROCESSING



- 2626 E3
- 2627 E3
- 2631 D2
- 2633 D2
- 2635 D2
- 2637 D2
- 2640 D2
- 2642 D2
- 2643 E2
- 2646 E2
- 2651 E5
- 2652 G5
- 2653 F5
- 2679 A4
- 2682 B3
- 2683 A3
- 2684 B4
- 2685 B4
- 2686 B4
- 2687 B4
- 2690 F3
- 2691 F3
- 2692 F3
- 2693 F3
- 2694 F3
- 2695 G3
- 3643 E2
- 3644 F2
- 3645 F2
- 3646 E3
- 3647 F2
- 3648 F2
- 3651 G5
- 3653 F5
- 3680 E2
- 3681 E3
- 4640 D4
- 4642 B5
- 5602 A3
- 7630-A F2
- 7645-A F2
- 7645-B F3
- 7650-A D4
- 7650-B G4

SSB connector

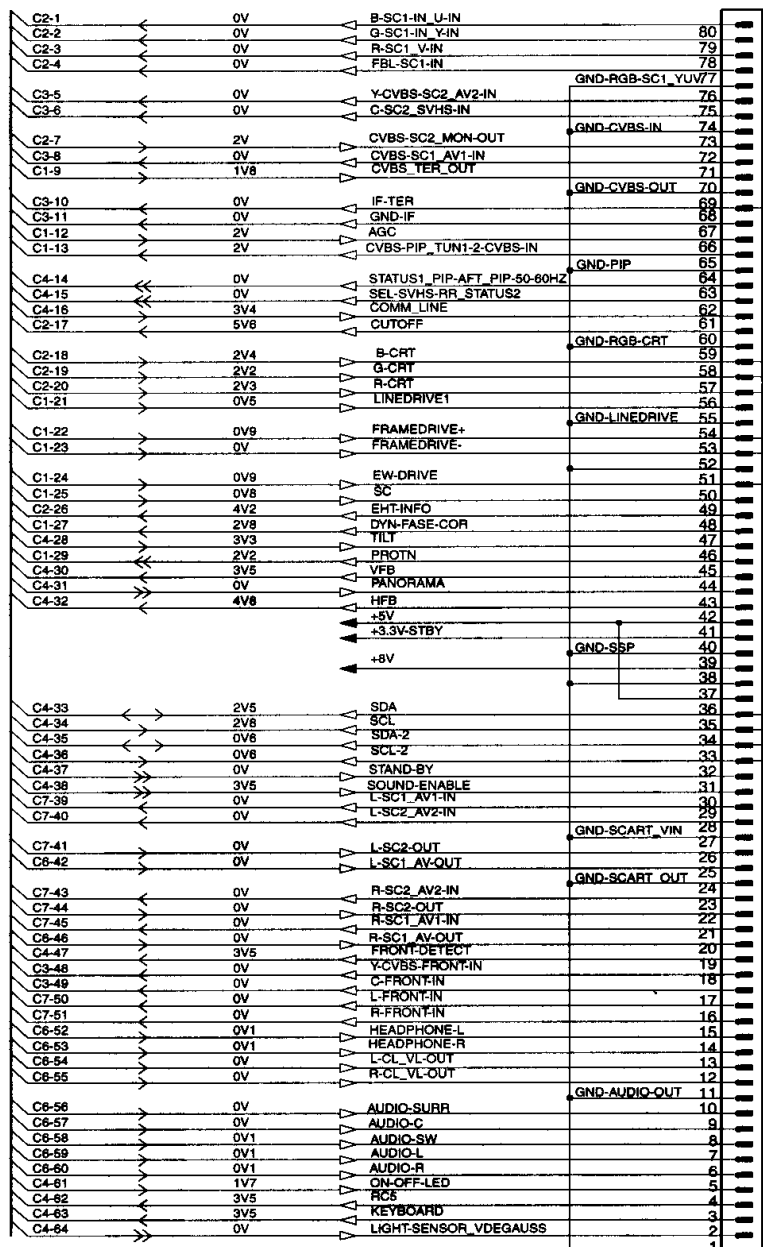
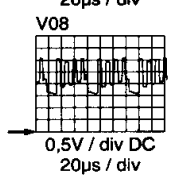
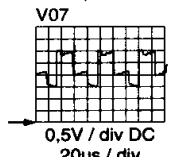
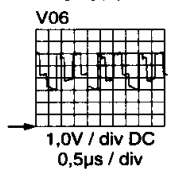
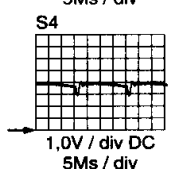
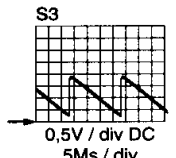
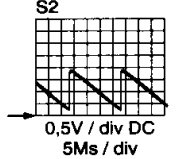
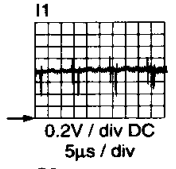
1 2 3 4 5 6

C8

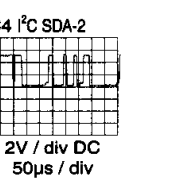
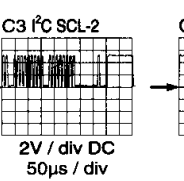
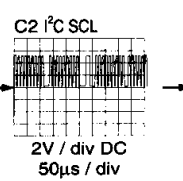
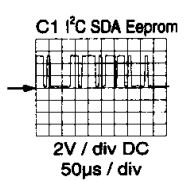
SSB_CONNECTOR

TO 0226 OF SSP TUNER **A4**
(S30)

0226 G5



epc-11b-0002
0226



A

B

C

D

E

F

G

H

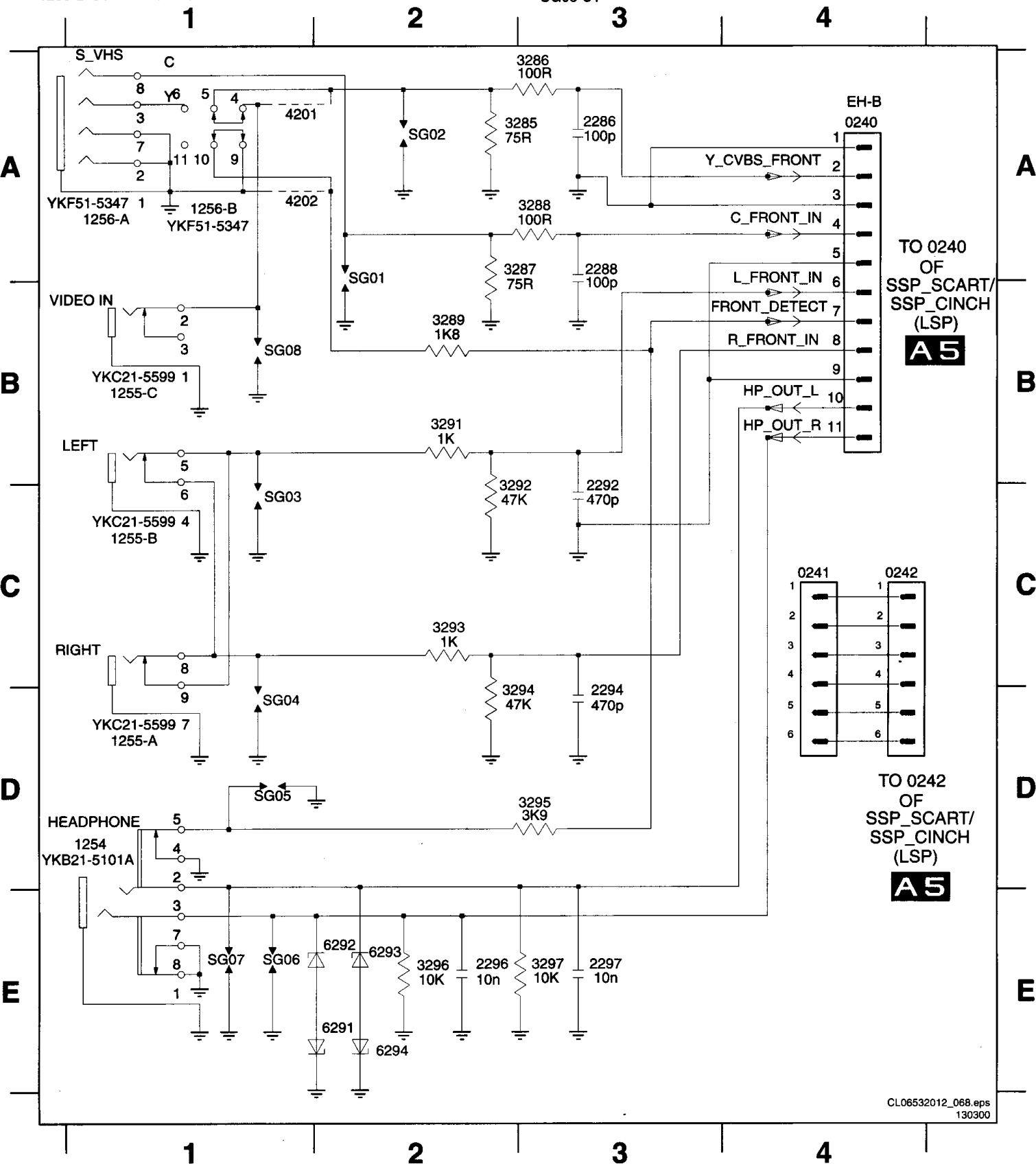
1 2 3 4 5 6

Side I/O



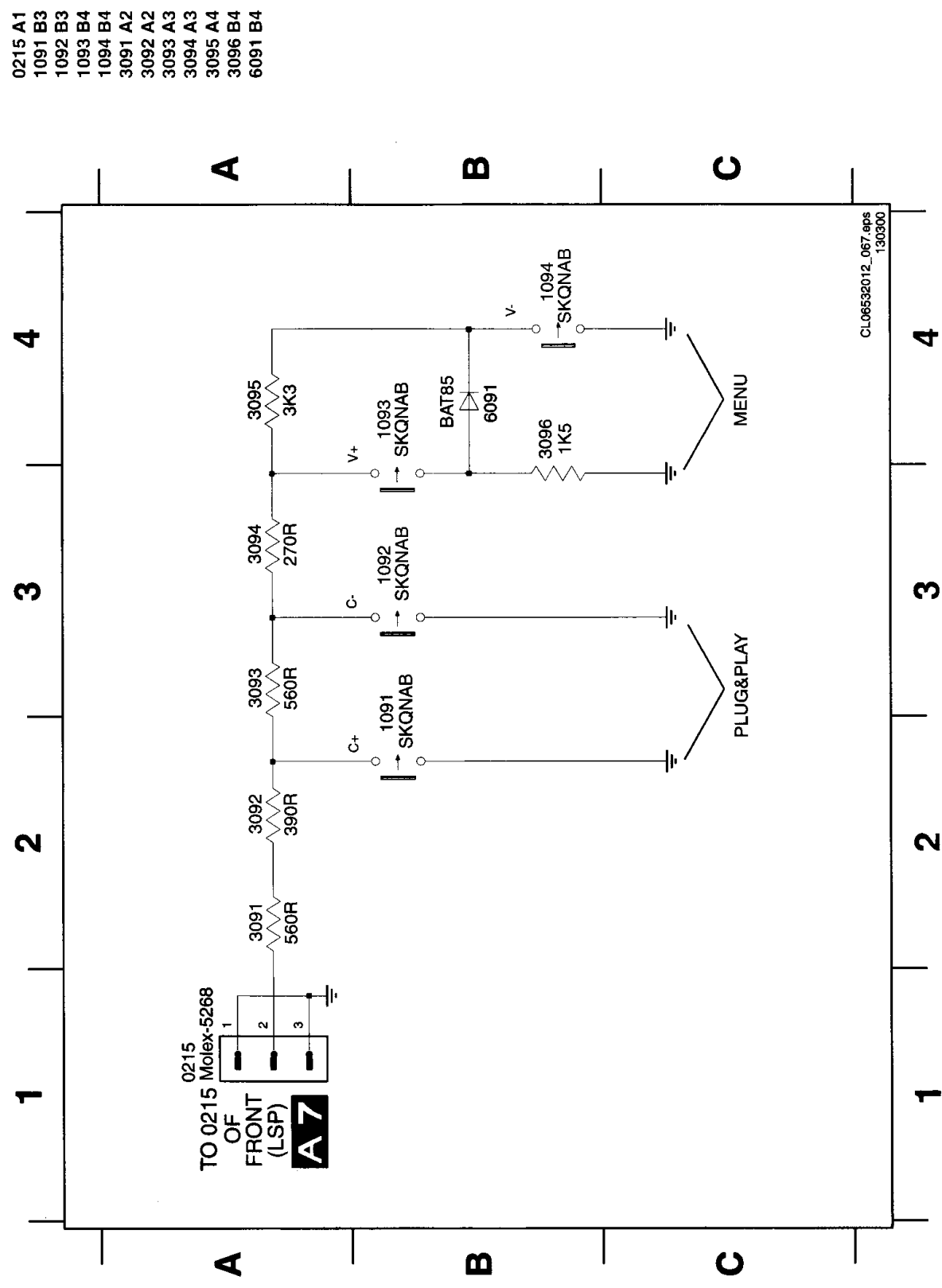
SIDE IO PANEL

0240 A4	1255-C B1	2294 C3	3288 A3	3295 D3	6292 E2	SG04 D1
0241 C4	1256-A A1	2296 E2	3289 B2	3296 E2	6293 E2	SG05 D1
0242 C4	1256-B A1	2297 E3	3291 B2	3297 E3	6294 E2	SG06 E1
1254 D1	2286 A3	3285 A3	3292 B2	4201 A1	SG01 B2	SG07 E1
1255-A D1	2288 A3	3286 A3	3293 C2	4202 A1	SG02 A2	SG08 B1
1255-B C1	2292 B3	3287 A3	3294 C3	6291 E2	SG03 C1	



Top control

TOP CONTROL PANEL



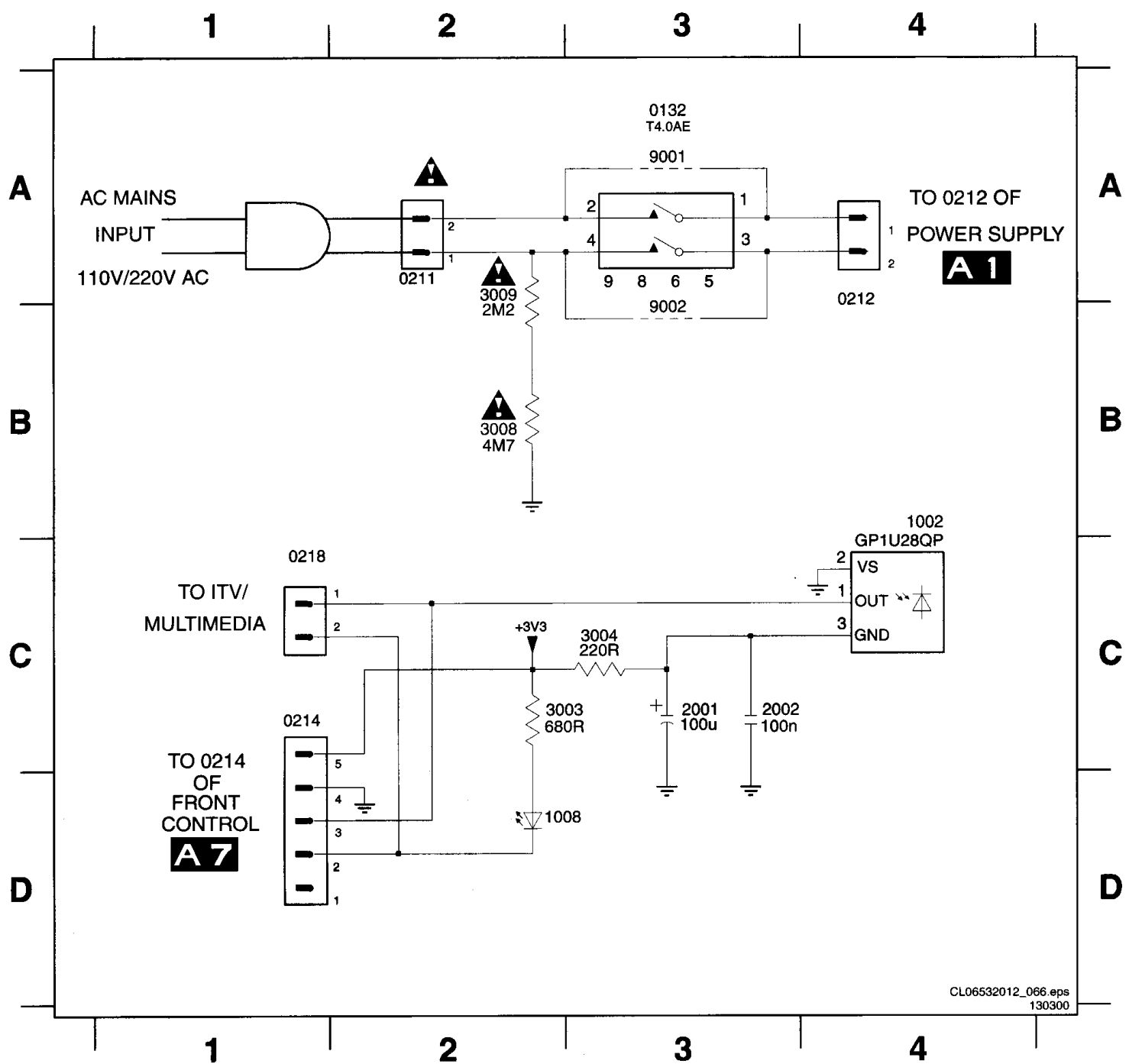
- 0215 A1
- 1091 B3
- 1092 B3
- 1093 B4
- 1094 B4
- 3091 A2
- 3092 A2
- 3093 A3
- 3094 A3
- 3095 A4
- 3096 B4
- 6091 B4

Front interface



FRONT INTERFACE PANEL

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



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: 220-240V +/- 10%
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: $R_i > 10M\Omega$ $C_i < 2.5$ pF.

8.2 Electrical alignments

8.2.1 VG2

Rough alignment

Using a pattern generator displaying a circle pattern, adjust the VG2 potmeter of LOT L5630 to obtain normal picture.

Fine adjustment

1. Activate the SAM-menu. Go to the sub-menu "WHITE TONE" and select the subsubmenu NORMAL.
 - Adjust the value of RED, GREEN and BLUE to 40
 - Adjust the value of RED, GREEN and BLUE to 42 for 29" RF.
2. Temporarily leave the SAM-menu and go to the normal user menu. Select sub-menu CONTRAST and set it to 0.
3. Switch OFF the normal user menu and return to the SAM-menu. Disable black current loop by changing the AKB bit. Connect RF output of the pattern generator to antenna. Test pattern: blank pattern (blank screen on CRT). Set the time base of the oscilloscope to 0.5ms with external triggering of the vertical pulse. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.

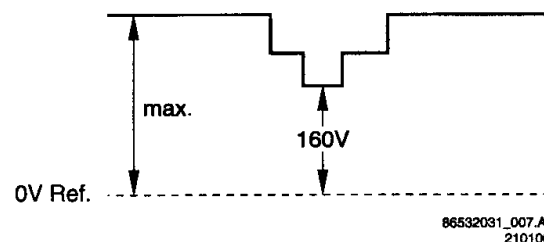


Figure 8-1 Black level pulse

Adjust the highest of the three guns with the VG2 pot meter of the LOT to 160Vdc for 24", 25" and 28" BLD WS" set, while the min. black level voltage 165Vdc is for 28" BLSW, 28" RFW, 29" RF and 32" BLSW picture tubes.

8.2.2 Focus

Set the "SMART" picture setting to "natural".

Using a pattern generator displaying a crosshatch pattern, adjust the focus potmeter of LOT L5431 in such a way that the haze on the vertical lines at 2/3 from the left and right edges of the screen (just) disappears.

8.3 Software alignments (Service Alignment Mode)

With the software alignments of the Service Alignment Mode the geometry, white tone and tuner (IF) can be aligned.

SAM Menu

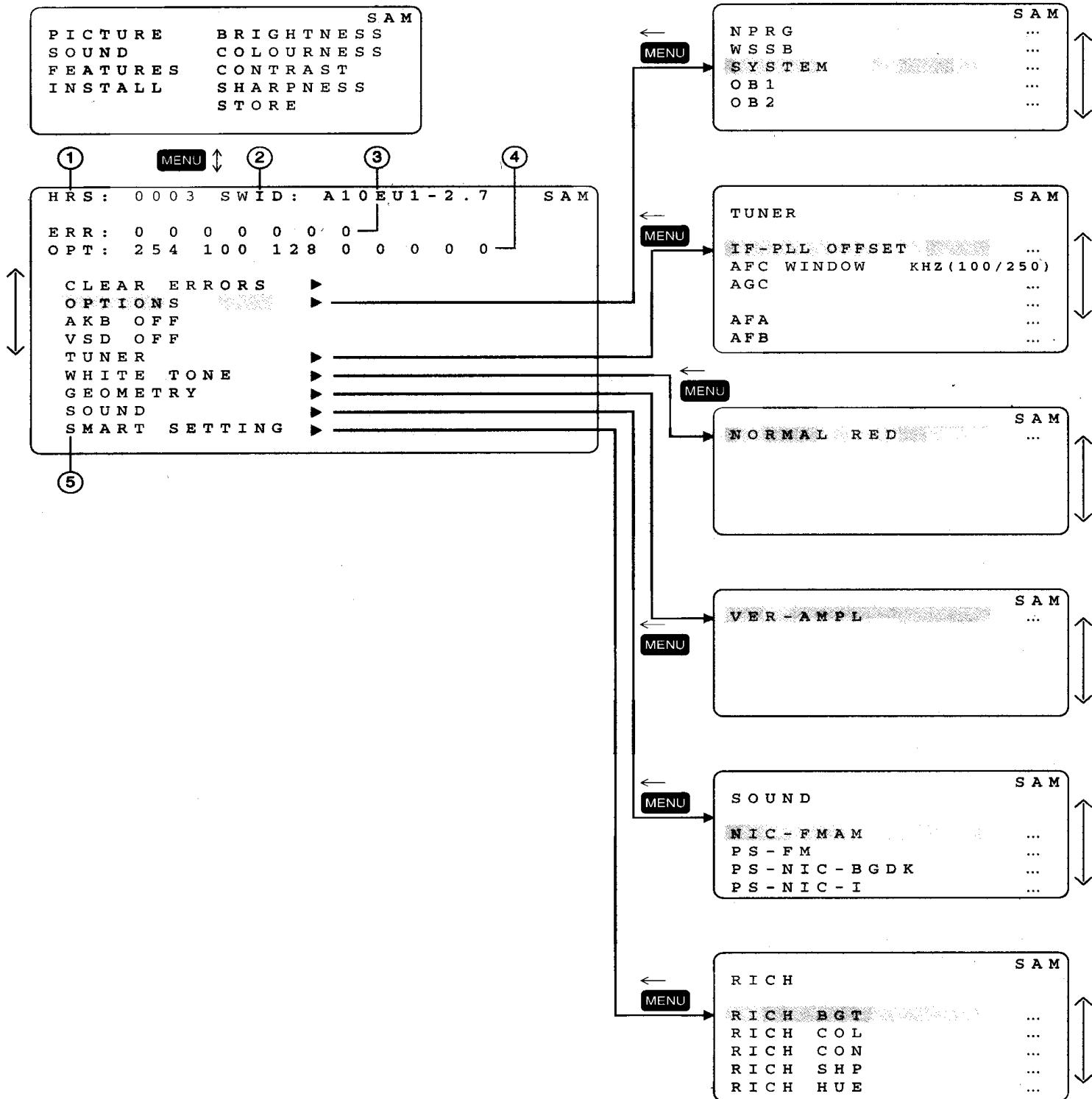


Figure 8-2 Service Alignments Mode screens and structure

8.3.1 Tuner

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. For France select the L'-signal.

- Activate the SAM-menu. Go to the sub-menu "TUNER", select the sub-menu option AFC WINDOW and adjust the value to 100kHz.
- Select the AGC sub-menu
- Connect a DC multi-meter to pin 1 of the tuner IC 1225.
- Adjust 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.

Tuner options - IF PLL OFFSET and AFC WINDOW

NO ADJUSTMENTS NEEDED FOR THESE ALIGNMENTS

The default values for these options are:

- IF PLL OFFSET :
- AFC WINDOW :

8.3.2 White tone

In the white tone sub menu the colour values for the colour temperature values can be changed.

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

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

0 represent the middle value (no offset difference)

+1 to +63 represent a positive offset (63 is the maximum positive offset)

-63 to -1 represent a negative offset (-63 is the minimum negative offset)

Negative <<< -63, -62, ..., -1, 0, 1, ..., 62, 63 >>> Positive (0 = no offset)

8.3.3 Geometry

The geometry alignments menu contains 13 items to align a correct picture geometry. In widescreen sets, the GEOMETRY SW is available for separate alignments of the superwide (panorama) mode. The geometry alignments are:

Initial set-up:

- Activate the SAM-menu. Go to the sub-menu "SMART SETTING" and change the setting to NATURAL.
- Exit the sub-menu "SMART SETTING" and go to sub-menu "GEOMETRY".
 - Adjust VER-SCOR to 8 for 28" WS-sets
 - Adjust VER-SCOR to 13 for 25", 28", 29" 32" and 34" picture tubes.
 - Adjust VER-SCOR to 23 for 29" SF- sets
- Vertical zoom is fixed at a default value of 25
- Vertical scroll is fixed at a default value of 32

VER-SCOR; align the vertical linearity, meaning that vertical intervals of a grid-pattern must be equal over the entire height. Extra Alignment for 4:3 sets and Widescreen sets (Widescreen mode)

- Set Service blanking on SERV-BLK ON
- Adjust Vertical slope VER-SLOPE xx
- Set Service blanking OFFSERV-BLKOFF

General Alignment (4:3 set, Widescreen and Superwide mode)

- Adjust Vertical amplitude VER-AMPL xx
- Adjust Vertical shift VER-SHIFT xx

- Adjust Horizontal shift HOR-SHIFT xx
- Adjust Horizontal width EW-WIDTH xx
- Adjust Parabola EW-PARA xx
- Adjust Up corner EW-UCORN xx
- Adjust low corner EW-LCORN xx
- Adjust Trapezium EW-TRAP xx
- Adjust Horizontal parrallogram EW-PARA xx
- Adjust Horizontal bow HOR-BOW xx

SERV.BLK: switch on/off the blanking of the lower half of the screen (To be used in combination with the vertical slope alignment)

VER-SLOPE; Align the vertical centre of the picture to the vertical centre of the CRT. (This is the first alignment to be performed of the vertical alignments)

VER-AMPL; align the picture height (other vertical alignments are NOT compensated)

VERSHIFT; align the vertical centre of the picture to the vertical centre of the CRT

HORSHIFT; align the horizontal centre of the picture to the horizontal centre of the CRT

EW-WIDTH; align the picture width (*)

EW PARA; align straight vertical lines at the sides of the screen (*)

EW-UCORN; align straight vertical lines in the upper corners of the screen (*)

EW-LCORN; align straight vertical lines in the lower corners of the screen (*)

EW TRAP; align straight vertical lines in the middle of the screen (*)

EW-PARA; align straight vertical lines in the top and in the bottom; vertical rotation around the centre (*)

HOR-BOW; align straight horizontal lines in the top and the bottom; horizontal rotation around the centre

Alignments indicated with (*) are not applicable for sets without East/West circuitry

8.3.4 Sound

NO ADJUSTMENTS NEEDED FOR SOUND

The default values for the audio alignments are:

- NIC-FMAM : 250 NICAM error rate threshold, the higher the more tolerance
- PS-FM: 38 Prescale for FM
- NIC BG/DK: 82 Prescale for NICAM in BG/DK system
- NIC I: 127 Prescale for NICAM in I system
- NIC L: 82 Prescale for NICAM in L system

8.4 Options

8.4.1 Options

Options are used to control the presence / absence of certain features and hardware. There are two ways to change the option settings, see Figure 2 : Service Alignments Mode screens and structure.

1. Changing a single option
An option can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/ RIGHT keys
2. Changing multiple options by changing option 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 A10 are controlled via 7 option bytes. Select the option byte (OB1, OB2, OB3, OB4, OB5, OB6 or OB7) and key in the new value.
3. Changes in the options and option bytes settings are saved by selecting STORE and pressing the MENU RIGHT key. All changes are disregarded when the OPTION submenu is left without using the STORE command. Some changes will only take affect after the set has been switched OFF and ON with the mains switch (cold start).

8.4.2 List of options

Unless otherwise stated Y(es) means present (or ON), N(o) means not present (or OFF).

Features	Abbreviations (A10)	Description
Auto Standby with no picture	SBNP	OFF = Disabled, no automatic switch to standby
		ON = Enabled, set switches to standby after 10 minutes when no ident
Side AV Source	AV3	OFF = Disabled, side AV source not available
		ON = Enabled, side AV source available
Picture Setting for compress 16:9	C169	OFF=Disabled, 16:9 COMPRESS setting is not available in FORMAT menu
		ON = Enabled, 16:9 COMPRESS setting is available in FORMAT menu item
Picture Setting for expand 14:9	E149	Note 1:
		OFF= Disabled, 14:9 EXPAND setting is not available in FORMAT menu
Wide screen	WSCR	ON= Enabled, 14:9 EXPAND setting is available in FORMAT menu item
		Note 2:
Hospitality mode	HOSP	OFF= Disabled, WIDESCREEN is replaced by FORMAT
		ON = Enabled, FORMAT is replaced by WIDESCREEN
Smart clock/Autochron	SMCK	OFF = Disabled, hospital mode cannot be entered
		ON = Enabled, hospital mode can be entered
Comb filter	CBFL	OFF= Disabled, menu item smart clock function not available
		ON = Enabled, menu item smart clock function available
Incredible picture	IPIX	Note 3:
		OFF= Disabled, no comb filter on the SSB
Incredible picture via menu	IPMU	ON = Enabled, comb filter on the SSB
		OFF= Disabled, INCR. PICT is replaced by CONTRAST+
Dynamic Noise Reduction/Noise Reduction	DNRM	ON = Enabled, CONTRAST+ is replaced by INCR.PICT
		Note 4:
Virtual dolby	VDBY	OFF = Disabled, menu item INCR. PICT not available
		ON = Enabled, menu item INCR. PICT available
NTSC playback hardware configuration	NTSC	Note 5:
		OFF=Disabled, menu item NOISE REDUCTION not available
System (*)	SYSTEM	ON= Enabled, menu item NOISE REDUCTION available
		Note 6:
Favorite page	FAPG	OFF = Disabled, menu item DOLBY VIRTUAL not available
		ON = Enabled, menu item DOLBY VIRTUAL available
Philips tuner	PITN	Note 7:
		OFF = Disabled, NTSC playback not possible
Automatic Channel Installation	ACI	ON = Enabled, NTSC playback possible
		EW - Select West Europe's colour and sound system
Automatic Volume Leveller	AAVL	EE - Select East Europe's colour and sound system
		EM - Select Central Europe's colour and sound system
Automatic Tuning System	ATS	OFF = Disabled favourite page in Teletext mode
		ON = Enabled favourite page in Teletext mode
Program List	PLST	OFF = Disabled, ALPS compatible tuner is used
		ON = Enabled, Philips compatible tuner is used
Virgin Mode	VMOD	OFF = Disabled Automatic Channel Installation
		ON = Enabled Automatic Channel Installation
		Note 8:
		OFF=Disabled, menu item AVL not available
		ON= Enabled, menu item AVL available
		Note 9:
		OFF= Disabled, automatic tuning system is ignored.
		ON = Enabled Automatic Tuning System,sort the program in an ascending order starting from Program 1
		OFF= Disabled, the access to Program List Command is ignored
		ON = Enabled, the access to Program List Command is processed
		OFF = Disabled, cannot access virgin mode
		ON = Enabled, can access virgin mode
		Note 10:

Features	Abbreviations (A10)	Description
Smart OSD (Picture and Sound)	SOSD	OFF = Disabled, full display of OSD not available
		ON = Enabled, full display of OSD available
		Note 11:
UK Plug aNd Play	UKPNP	OFF = Disabled, cannot access Play and Play"
		ON= Enabled, can access Plug and Play"
		Note 12:
Rotation tilt	ROTI	OFF = Disabled, menu item ROTATION not available
		ON = Enabled, menu item ROTATION available
		Note 13:
SoundBoard MSP3451	SNIC	OFF = Disabled,Sound IC MSP3451 is not present
		ON = Enabled, Sound IC MSP3451 is present
Time Window	TMWIN	OFF = Disabled, Time Window is set to 2 secs.
		ON = Enabled, Time Window is set to 5 secs.
Video Mute	VMUT	OFF = Disabled, no video blanking during channel/source change
		ON = Enabled, video blanking during channel/source change
Wide Screen Signal Bit	WSSB	OFF = disable the detection of off-air transmission widescreen signal bit
		ON = to enable the detection
Dual Page Teletext	DTXT	OFF = disable dual-page teletext
		ON = to enable
Auto Picture Control	APC	OFF = disable incredible picture and DNR/NR optimisation (user control)
		ON = enable incredible picture and DNR/NR optimisation (user no control)
Electronic Program Guide	EPG	OFF = Disabled, EPG feature is not available
		ON = Enabled, EPG feature is available
Easylink communication protocol between TV/VCR	P50	OFF = Disabled, P50 feature not available
		ON = Enabled, P50 feature is available
Internal Comb Filter	INCF	OFF = disable the BOCMA internal combfilter (for demo purpose)
		ON = to enable
Max no. of Programs	NPRG	OFF = Disabled, maximum no. of program 100
		ON = Enabled, maximum no. of program is 80

8.4.3 Option bits/bytes

Option bytes for West European sets with software naming : A10ET1-x.y. This software version contains only 10 pages of TXT.

OB1 bits 8, 7, ..., 1: SBNP, C169, E149, HOSP, SMCK, AV3, WSCR, CBFL

OB2 bits 8, 7, ..., 1: IPIX, IPMU, NTSC, PITN, ACI, ATS, PLST, VMOD

OB3 bits 8, 7, ..., 1: SOSD, FAPG, UKPNP, DNRM, VMUT, AAVL, ROTI, SNIC

OB4 bits 8, 7, ..., 1: TMWIN, NPRG, WSSB, INCF, (res), (res), (res), (res)

OB5 bits 8, 7, ..., 1: (RESERVED)

OB6 bits 8, 7, ..., 1: (RESERVED)

OB7 bits 8, 7, ..., 1: (RESERVED)

OB8 bits 8, 7, ..., 1: (res), (res), (res), (res), (res), (res), SYSTEM, SYSTEM

Option bytes for West European sets with software naming :

A10EP1-x.y. This software version contains 100 pages of TXT.

OB1 bits 8, 7, ..., 1: SBNP, C169, E149, HOSP, SMCK, AV3, WSCR, CBFL

OB2 bits 8, 7, ..., 1: IPIX, IPMU, NTSC, VDBY, EPG, P50, PITN, ACI

OB3 bits 8, 7, ..., 1: ATS, PLST, VMOD, SOSD, FAPG, UKPNP, DTXT, DNRM

OB4 bits 8, 7, ..., 1: VMUT, AAVL, ROTI, SNIC, TMWIN, NPRG, WSSB, INCF

OB5 bits 8, 7, ..., 1: APC, (res), (res), (res), (res), (res), (res), (res)

OB6 bits 8, 7, ..., 1: (RESERVED)

OB7 bits 8, 7, ..., 1: (RESERVED)

OB8 bits 8, 7, ..., 1: (res), (res), (res), (res), (res), (res), SYSTEM, SYSTEM

An option byte value is calculated in the following way:

value "option bit 1" x 1 =

value "option bit 2" x 2 =

value "option bit 3" x 4 =

value "option bit 4" x 8 =

value "option bit 5" x 16 =

value "option bit 6" x 32 =

value "option bit 7" x 64 =

value "option bit 8" x 128 =

Total : value "option byte" =

9. Circuit descriptions and abbreviation list

9.1 Circuit descriptions

The following circuits are described:

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

and a small signal board (SSB) module, placed into a so called SIMM-connector (Standard Interface, 80 pins):

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

Due to the low amount of cabling etc., expectation is that the FCR will be low.

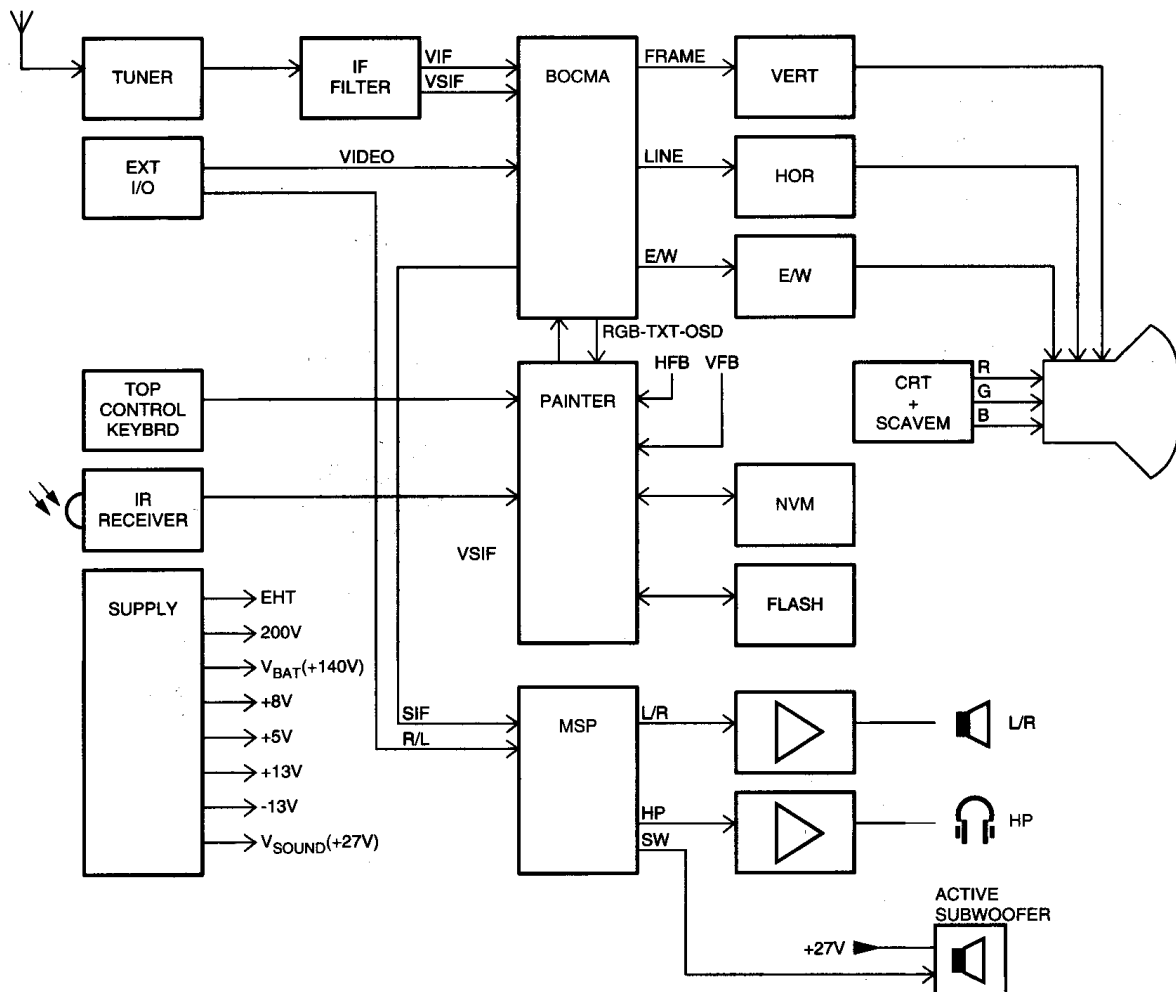
In this 'circuit description' chapter, sometimes will be referred to the Training Manual of the A8 (4822 727 21613). This is done for the following circuits: the Power supply, the Horizontal (Line) Deflection and the Vertical (Frame) deflection parts. The electrical principle of these circuits is also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

9.1.1 Introduction

The A10E is the successor of the A8-chassis. A10 is the chassis name, E stands for Europe.

Where the A8 used a lot of different panels, the A10 architecture consist of 1 conventional large signal panel (LSP)

9.1.2 Block diagram



CL 06532012_011.eps
180200

Figure 9-1

The tuner type UV1316 is a PLL tuner and delivers the IF-signal, via audio & video SAW-filters, to the Multi-system TV processor (TDA888x, IC7301 also called BOCMA), which has the following functions:

- Multi-system decoder.
- Video source- and record select.
- Colour decoder.
- RGB output.
- Sound demodulator.
- Geometry control.
- Picture improvement.
- Synchronisation.

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

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

Two SCART-connectors are used: SCART1 is fully equipped and SCART2 is meant for VCR. Pin 10 of SCART2 is used for Easylink and there is a possibility for Y/C in. The CVBS-out on pin 19 can be used for WYSIWYR (What You See Is What You Record).

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

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

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

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

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

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

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

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

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

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

9.1.3 Power supply (diagram A1)

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

Differences with the A8 are:

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

Degaussing circuit (diagram A1: section A1 - D3)

The degaussing circuit is activated whenever the TV set is turned on. So from normal 'off' to 'on' and from 'stand-by' to 'on' the degaussing circuit is activated. During start-up the signal LIGHT_SENSOR_VDEGAUS (A4-1) is low. After start-up of the μ P this becomes high for 2 seconds which forces TS7932 in conduction. Now the coil of the relay is activated and switch 1931 is closed. The mains voltage is now connected to the degaussing coil. The degaussing current passes through the degaussing coil and through PTC 3911 and PTC 3912 which limit the inrush-current.

After these 2 seconds, the signal

LIGHT_SENSOR_VDEGAUS goes low, 7900 turns off, the coil of relay 1931 is de-energised and the 220 Vac is disconnected from the degaussing coil. During normal operation, no current passes through the degaussing coil due to the fact that switch 1931 is opened.

Output voltages

- +8V_UNREG (Input voltage for stabiliser 7942 and supply voltage for the circuit to activate the degaussing coil) : +13.5 V. If +14 V and +8 V are not present check 1905.
- +33V (For Tuner at Mono-carrier and PIP-panel) : +33 V. Created via R3409 and zenerdiode 6481
- Vbat (Battery Voltage for Line Output Stage) : +140 V
- +8V (BOCMA Supply, Scart, Video at SSB) : +8.3 V. Output voltage from stabiliser 7942. This voltage is decreased in standby to 2.3 V. In standby TS7944 is conducting and switching R3945 parallel to R3942 and R3947.
- +5V_STBY : +5.1 V. This voltage is also present during standby. If this voltage and +5V are missing check Fuse 1961. If the voltage at pin 2 and 5 of IC7968 are present replace 7907.
- +5V (For Tuner, NV_CLOCK, Video at SSB, PIP-panel): +5.1 V. This voltage is disabled when the +13V-VERT is not present at pin 2 of IC7967. +13V -VERT is generated by the line-output circuit. So when the line-output circuit is working correctly the +5V is enabled to start the set.
- +27V (Audio Supply) : +27 V. If this voltage is missing check D6971/6972 and/or sound-amplifier IC7702.
- 3V3_STBY (μ P Supply, NVM, BOCMA supply, Receiver LED): This voltage is also present during standby. If this voltage is missing check NFR 3964.

9.1.4 Control (diagram C4)

Micro-processor

The microprocessor (SAA55XX, IC7064 called Painter) provides:

- Control functions for the TV-set.
- On Screen Display (OSD).
- Teletext functions.
- P50 (Easylink) communication.
- I/O-ports for I²C, RC5, LED, and service modes.
- Error code generation.

For 10 pages TXT-data can be stored internally.

The Non Volatile Memory IC7066 is a 4 kB version M24C32W6.

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

For stable OSD and TXT, the display is synchronised to the TV signal processing device by way of horizontal and vertical sync

signals provided by external circuits (HFB and VFB). From these signals all display timings are derived. The OSD/TXT RGB-outputs (46/47/48) and fastblinking (52) are fed to the BOCMA (pins 35 - 38).

Pin	Signal	Function
1	TILT	Generates drive signal for rotation circuit
2	SEL_SVHS_RR_ST ATUS2	Selects Y/C source from Side or Rear I/O and detects presence of EXT2 (CVBS) / 4:3 or 16:9
4	STATUS1_PIP- AFT_PIP-50-60HZ	Detects presence of EXT1 (CVBS) / 4:3 or 16:9
5	KEYBOARD	Input line from Top Control keyboard
6	FRONT_DETECT	Detects presence of Headphone at FRONT
13	STAND-BY	To switch between Standby and Normal operation
16	SEL_MAIN_FRNT_ RR	Selects main video source from Rear or Front
17	COMM_LINE	P50 in/output (Easylink)
18	LIGHT- SENSOR_VDEGAU SS	Activates the degaussing relay at switch on
24	SYS1	Selects Combfilter
25	SYS2	Selects Combfilter
28	ON_OFF_LED	LED driver output
31	CVBS2OUT	CVBS input for TXT data
32	G_SC1-IN_Y-IN	
46	B_TXT_OSD	Blue output for OSD/TXT
47	G_TXT_OSD	Green output for OSD/TXT
48	R_TXT_OSD	Red output for OSD/TXT
52	FBL_TXT_OSD	Fast blanking output for TXT and OSD
52	FBL_SCAVEM	Fast blanking output for SCAVEM
53	HFB	H-sync input for stable OSD/TXT
54	SEL_MAIN_R1R2	Selects main video source from EXT1 or EXT2
55	VFB	V-sync input for stable OSD/TXT
59	SEL_IF_LL	Switches the appropriate SAW filter for LL'
70	CLOCK12MHZ	Clock output for external IC's
76	RC5	Input line from Remote Control
81	SCL	Clock output of master I ² C bus
82	SDA	Data in/out of master I ² C bus
83	SCL_2	Clock output of NVM I ² C bus
84	SDA_2	Data in/out of NVM I ² C bus
93	AGCuP	
96	HIS_OFF	To activate the optional Histogram IC TDA9171
98	SOUND_ENABLE	Mutes the audio amplifier
100	PANORAMA	Activates 16:9 feature

I²C-busses

In the A10E-chassis with Painter-processor there are two I²C-busses used:

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

NVM

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

- Software identification.
- Operational hours.

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

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

Tuner

The tuner UV1316 is I²C-controlled and is capable of receiving off-air, S- (cable) and Hyperband channels:

- Low 44.25 - 157.25 MHz
- Mid 157.25 - 442.5 MHz
- High 142.5 - 890.0 MHz

Tuning is done via I²C. The reference voltage on pin 9 is 33 V. This voltage is derived from the V-BAT via a resistor of 68 k Ω and a zenerdiode.

Video IF amplifier

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

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

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

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

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

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

QSS sound circuit

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

The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output (pin 27) via the volume control.

9.1.6 Video processing (diagram C2 & C3)

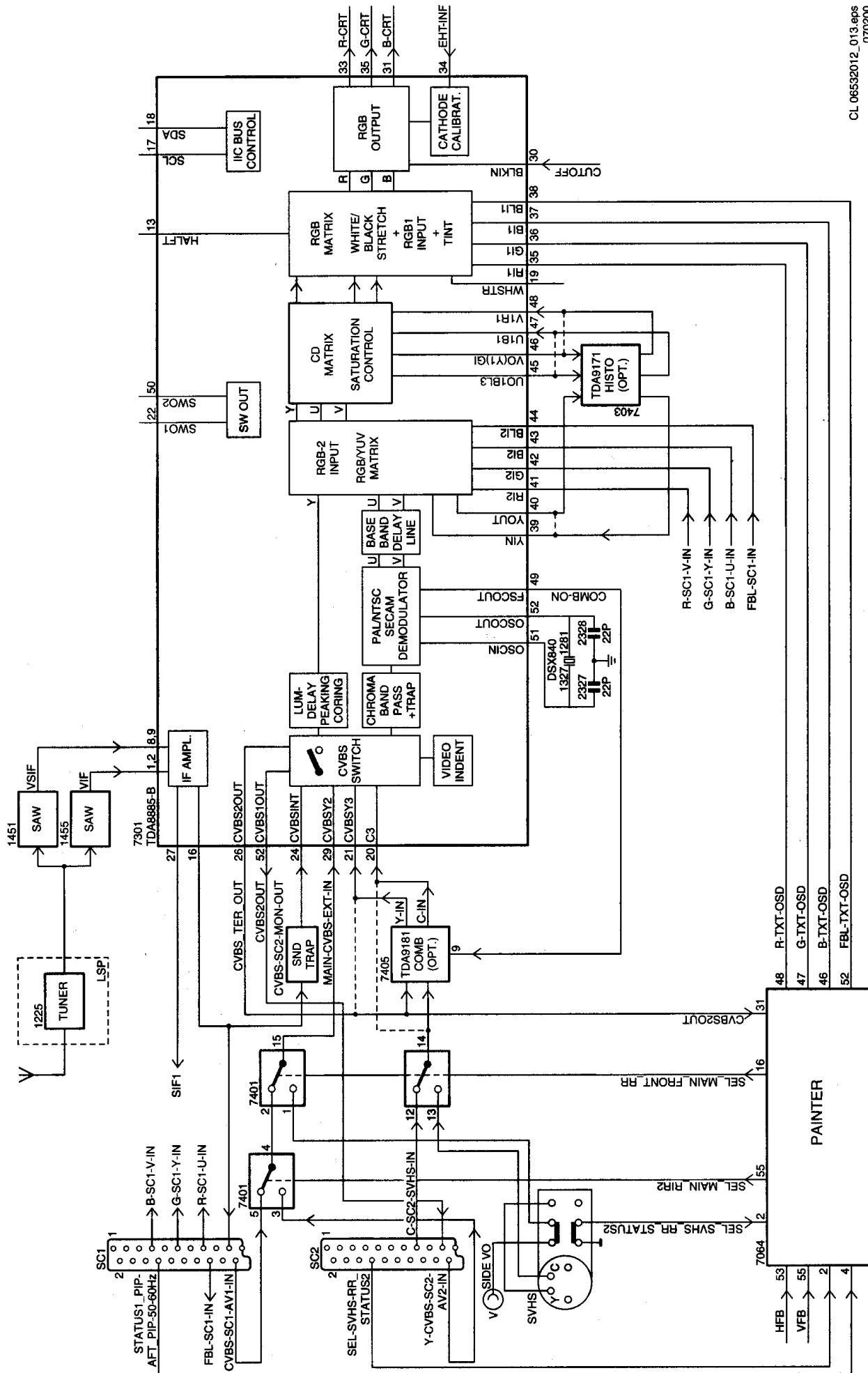


Figure 9-2

CL 06532012_013.eps 070200

Introduction

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

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

It has also build in features like:

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

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

Source selection

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

The selection of the various sources is made via the I²C-bus. The used IC version has 2 independently switchable outputs:

- The CVBS1 output (pin 54) is identical to the selected signal that is supplied to the internal video processing circuit and is used as source signal for the teletext decoder (Painter). Both CVBS outputs have an amplitude of 2.0 V-PP.
- The CVBS2 output (pin 26) is fed to pin 19 of SCART2 for WYSIWYR (What You See Is What You Record).

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

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

EXT1: The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (CVBS_TER_OUT).

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS_SC2_MON_OUT (+ sound).

SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C_in and Easylink-Plus (P50): Y_in on pin 20 and Chroma_in on pin 15. Easylink is handled via pin 10 of the SCART2 (this is a bi-directional communication with the μ P) and supports the next features:

- Signal quality and aspect ratio matching
- One touch play & text
- PIP
- Pre-set download
- WYSIWYR
- Automatic Standby
- Country and language installation
- System Standby
- Intelligent set top box features
- NextView download
- Timer record control
- VCR control feature

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

- SEL-MAIN-R1R2 is the selection between SCART1 (R1) and SCART2 (R2).

- SEL-FRNT-RR selection is made between Side and Rear I/O.

The status signals (SCART pin 8) and also Front detection is fed to the Painter (pins 2, 4 and 6).

Combfilter

After the selection of the external signals (EXT1, EXT2 or Side I/O) is made, the Y/CVBS signal is fed to the TDA888X (pin 29) along with the Front-end signal (pin 24). The selection between the 2 is made in the BOCMA and the output (pin 26) is fed to the (optional) Comb Filter, whose output is again fed to the BOCMA (pin 21) for further processing. The external colour signals are also fed to the Comb filter. In SVHS mode the Comb filter is bypassed and the external signals are directly fed to the BOCMA.

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

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

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

Histogram (YUV picture improvement) IC

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

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

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

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

Protections

Overvoltage conditions (X-ray protection) can be detected via the EHT tracking pin (pin 3). When an overvoltage condition is detected the horizontal output drive signal will be switched-off via the slow stop procedure but it is also possible that the drive is not switched-off and that just a protection indication is given in the I²C-bus.

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

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

Chroma and Luminance processing

The circuit contains a chroma bandpass and trap circuit (including a luminance delay line and the delay for the peaking circuit). The centre frequency of the chroma bandpass filter is switchable via the I²C-bus so that the performance can be optimised for 'front-end' signals and external CVBS signals.

Colour decoder

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

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

The IC contains an Automatic Colour Limiting (ACL) circuit which is switchable via the I²C-bus and which prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received.

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

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

Picture improvement features

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

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

RGB output

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

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

Geometry control

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

- S-correction

- vertical amplitude
- vertical slope
- vertical shift
- vertical zoom
- vertical scroll

for vertical picture alignment, and

- horizontal shift.
- EW width with extended range because of the "zoom" function
- EW parabola width
- EW upper/lower corner parabola
- EW trapezium correction.
- horizontal parallelogram and bow correction

for the horizontal picture alignment.

The IC is designed for use with a DC-coupled vertical deflection stage. This is the reason why a vertical linearity alignment is not necessary (and therefore not available).

All geometry control is done via I²C and the data is stored in the NVM (IC7066) of the SSB.

Cut-off control / white drive

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

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

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

Peak White Limiting

If the beam current becomes too high, the picture tube could be damaged. The control circuit contains a Peak White Limiting circuit (pin 34): if the beam current increases, the EHT-info voltage will decrease. Now the contrast will be reduced. The peak white level is adjustable via the I²C-bus.

The circuit also contains a soft-clipper, which prevents that the high frequency peaks in the output signal become too high. The difference between the PWL level and the soft clipping level is adjustable via the I²C-bus in a few steps.

Switch-off control

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

9.1.7 Synchronisation (diagram C1)**Horizontal synchronisation**

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

To obtain a smooth switch-on/off behaviour the horizontal drive signal is switched-on/off via the soft-start/soft-stop procedure. This function is realised by means of a variation of the T-ON of the horizontal drive pulse. When the soft-start procedure is completed the horizontal output is gated with the flyback pulse

so that the horizontal output transistor cannot be switched-on during the flyback time.

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

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

The horizontal drive signal is generated by an internal VCO, which is running at a frequency of 25 MHz. This oscillator is stabilised to that frequency by using the 12 MHz frequency of the crystal oscillator as a reference. The horizontal sawtooth oscillator signal is converted into a square wave voltage. This square wave LINEDRIVE1 signal at pin 56 is fed to the line output stage. The time constant of the sync. circuit (different for VCR and weak terrestrial signals) is automatically internally determined by the BOCMA.

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

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

Vertical synchronisation

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

EW correction

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

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

9.1.9 Vertical (frame) deflection (diagram A3)

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

Differences with the A8 are:

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

9.1.8 Horizontal (line) deflection (diagram A2)

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

Differences with the A8 are:

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

9.1.10 Audio processing (diagram C6 & A6)

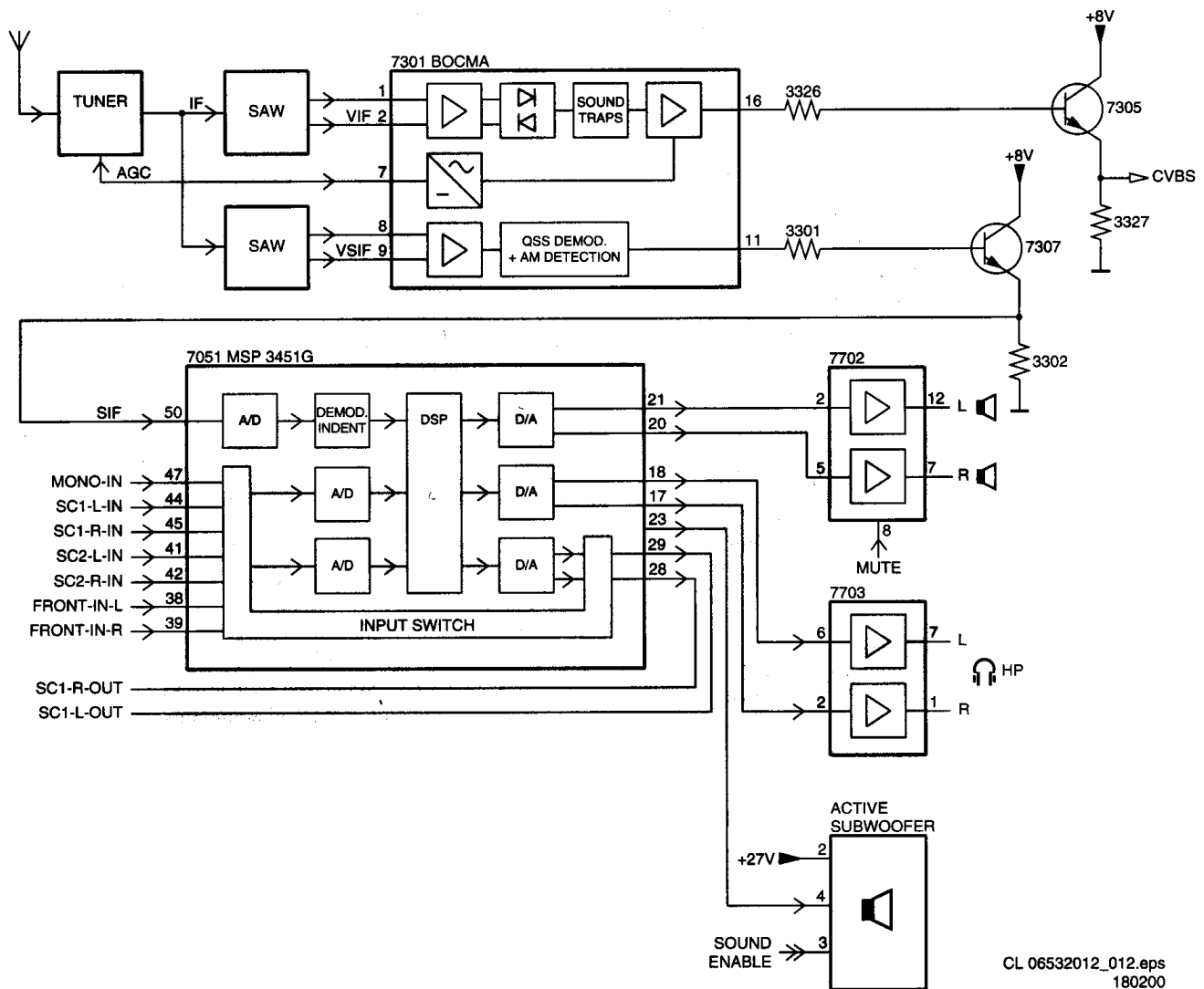
CL 06532012_012.eps
180200

Figure 9-3

Introduction

The following systems are available:

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

All A10E sets contain one of ITT's Multistandard Sound Processing IC's for sound decoding:

- MSP3415D: Europe & AP decoding, Stereo incl. NICAM.
- MSP3451G: Global decoding, Virtual Dolby.

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

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

All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial and source selection (SIF-signal, EXT1 or EXT2).

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

Basic

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

NICAM

This high quality digital audio format is used in Eastern Europe, Belgium, France, and UK, while NICAM LL' is being used in France.

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

2CS

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

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

Source selection

- MSP3451D (stereo)

This IC is an economised version of the MSP3410 that is used in the MG-chassis. It can cover 2 stereo and 1 mono (AM) input. Since more inputs are required, separate source selectors are used (HEF4052, IC7650 and HEF4053, IC7630). This selector has EXT1, EXT2, FRONT and SC1-OUT (Tuner) as input and is connected to the SCART1 input of the MSP3415. The SCART2 input is not used.

Since the MSP3415 has only one SCART output, which is connected to the SCART1, a constant level output and connection to SCART2 is not available. This is fixed by connecting the HEF4052 input selector to the constant level output and to SCART2.

To get a constant level output if the Tuner is selected, the SCART1 output (Tuner at any time), has to be fed back to the input selector and selected as input for the MSP (SCART1 input).

The MSP3415 has no separate output to drive a headphone. Therefore the speaker outputs are hardwired (on the LSP) to the headphone amplifier.

- **MSP3451G (Virtual Dolby)**

The MSP3451, which is used in all versions supporting Virtual Dolby, is capable of supporting 4 stereo inputs and 1 mono (AM) input. Therefore the extra input selector (HEF4052) is not needed.

The MSP3451 is also capable of supporting 2 SCART outputs, so the trick used in the MSP3415 set-up to get a constant level output is not needed.

The MSP3451 has a separate headphone output, so sound control be done separate from the speakers.

Audio decoding

At the input a choice can be made between two IF-signals; SIF and SIFM.

The selected signal is fed to the AGC. After this, an ADC converts the IF-signal to digital.

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

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

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

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

Audio processing

The sound processing in A10E is completely done by the MSP3415D for 'Stereo' sets and the MSP3451G for 'Virtual Dolby' sets:

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

- Headphone muting: the presence of a headphone is detected by the FRONT_DETECT line. If present the main speakers will be muted.

Automatic Volume Levelling (AVL)

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

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

Audio amplification (diagram A6)

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

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

The AN5277 delivers an output of 2 x 10 W-RMS to 2 full range speakers. A subwoofer is implemented, for 28" and 32" PW6515 and for 29" FT5515.

Muting

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

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

Headphone amplifier (diagram A6)

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

9.1.11 OSD / Teletext / NexTView (diagram C2 & C4)

OSD

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

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

Teletext

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

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

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

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

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

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

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

NextView (EPG)

The EPG in A10 provides the TV viewer with information on the programmes that are being broadcast that day by the first 20 pre-sets. Its functionality is based on the availability of broadcasters transmitting Teletext pages with NexTVView data. In regions where no NexTVView but still Teletext is broadcasted, the A10 EPG feature provides easy access to common Teletext pages with programme guide.

9.1.12 CRT / SCAVEM / Rotation (diagram B / B / A7)**RGB amplifiers**

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

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

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

Blue, Red and Green. Pin 5 is the black current stabilisation output.

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

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

SCAVEM

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

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

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

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

Via connector Q238, signal 'Y_MAIN_IN' is added to the emitter of TS7864. Via the emitter follower formed with TS7860, this signal is conveyed to the differentiator C2878 and R3864. Only the high frequencies are differentiated (small RC-time). The positive and negative pulses of this signal drive respectively TS7861 and TS7865 into conductivity. The DC setting of the output stage is set by R3870, R3871, R3872 and R3873. The working voltage of the transistors is settled at half the supply voltage.

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

Rotation

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

9.2 Abbreviation list

2CS	2 Carrier Stereo	G-SC2-IN	Green SCART2 in
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page	G-TXT	Green teletext
ADC	Analogue Digital Converter	HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
AGC	Automatic Gain Control: algorithm that controls the video input of the featurebox	BOCMA	High-end video Input Processor: video and chroma decoder of A10E
AM	Amplitude Modulation	HP	Headphone
AR	Aspect Ratio: 4 by 3 or 16 by 9	Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
Artistic	see Painter 2.5: main processor	IO-BUS	In/Out - Bus
AVL	Automatic Volume Level	Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customers wishes
BG	System B and G	LED	Light Emitting Diode
BLKIN	Black current information	LINE-DRIVE	Line drive signal
B-SC1-IN	Blue SCART1 in	LSP	Large signal panel
B-SC2-IN	Blue SCART2 in	MSP	Multistandard Sound Processor: ITT sound decoder of A10E
B-TXT	Blue teletext	MUTE	Mute-Line
BOCMA	Bimos one Chip Mid-end Architecture	NC	Not Connected
C-FRONT	Chrominance front input	NICAM	Near Instantaneously Companded Audio Multiplexing
CL	Constant Level: audio output to connect with an external amplifier	NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
ComPair	Computer aided rePair	O/C	Open Circuit
CRT	Cathode Ray Tube or picture tube	ON/OFF LED	On/Off control signal for the LED
CSM	Customer Service Mode	OSD	On Screen Display
CTI	Colour Transient Improvement: manipulates steepness of chroma transients	Painter	On Screen Display, Teletext and Control; also named Artistic (SAA5565)
CVBS	Composite Video Blanking and Synchronisation	P50	Project 50 communication: protocol between TV and peripherals
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)	PCB	Printed Circuit board
CVBS-INT	CVBS signal from Tuner	PTP	Picture Tube Panel
CVBS-MON	CVBS monitor signal	RAM	Random Access Memory
CVBS-TER-OUT	CVBS terrestrial out	RC	Remote Control
DFU	Direction For Use: description for the end user	RC5	RC5 signal from the remote control receiver
DNR	Digital Noise Reduction: noise reduction feature of the box	RESET	Reset signal
DSP	Digital Signal Processing	ROM	Read Only Memory
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode	SAM	Service Alignment Mode
DVD	Digital Versatile Disc	SC	Sandcastle: pulse derived from sync signals
DYN-PHASE-CORR	Dynamic phase correction	SCAVEM	Scan Velocity Modulation
EHT	Extra High Tension	S/C	Short Circuit
EHT-INFO	Extra High Tension information	SC1-OUT	SCART output of the MSP audio IC
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)	SC2-B-IN	SCART2 Blue in
EW	East West, related to horizontal deflection of the set	SC2-C-IN	SCART2 chrominance in
EXT	External (source), entering the set via SCART or via cinches	SC2-OUT	SCART output of the MSP audio IC
FBL	Fast Blanking: DC signal accompanying RGB signals	SIF	Sound Intermediate Frequency
FBL-SC1-IN	Fast blanking signal for SCART1 in	SIMM	80-fold connector between LSP and SSB
FBL-SC2-IN	Fast blanking signal for SCART2 in	SNDL-SC1-IN	Sound left SCART1 in
FBL-TXT	Fast Blanking Teletext	SNDL-SC1-OUT	Sound left SCART1 out
FIL	Filament supply voltage	SNDL-SC2-IN	Sound left SCART2 in
FM	Field Memory or Frequency Modulation	SNDL-SC2-OUT	Sound left SCART2 out
FRONT-C	Front input chrominance (SVHS)	SNDR-SC1-IN	Sound right SCART1 in
FRONT-DETECT	Front input detection	SNDR-SC1-OUT	Sound right SCART1 out
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)	SNDR-SC2-IN	Sound right SCART2 in
G-SC1-IN	Green SCART1 in	SNDR-SC2-OUT	Sound right SCART2 out
		SNDS-VL-OUT	Surround sound left variable level out
		SNDS-VR-OUT	Surround sound right variable level out
		SNERT	Synchronous No parity Eight bit Reception and Transmit
		SSB	Small Signal Board
		STBY	Standby

Circuit descriptions and abbreviation list

SW	Subwoofer
TXT	Teletext
μ P	microprocessor
V-BAT	main supply for deflection (mostly 141 V)
VFB	Vertical Flyback Pulse: vertical sync pulse coming from the feature box
VL	Variable Level out: processed audio output towards external amplifier
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal

10. Spare parts list

LSP [A]

Various

3122 785 90160	Power supply kit A10E
3122 785 90170	Line deflection kit A10E
0127▲	3122 358 72141 FUSE HOLDER
0132▲	4822 276 14024 Mains switch
0139	4822 492 70788 IC fixation
0141	4822 492 70788 IC fixation
0188	3122 224 04242 HEATSINK BRACKET
0189	3139 124 33361 SSB BRACKET
0211▲	4822 267 10774 Conn 2P
0212▲	4822 265 20723 Conn 3P
0212▲	4822 267 10775 Conn 2P
0214	4822 267 10734 Conn 5P
0215	4822 267 10735 Conn 3P
0226	2422 025 16599 Conn SIMM 80P
0229	4822 267 10748 Conn 3P
0232	4822 267 10565 Conn 4P
0234	4822 267 10735 Conn 3P
0240	2422 025 12485 Conn 11P
0246	4822 267 10565 Conn 4P
0247	4822 267 10734 Conn 5P
0253	4822 267 10735 Conn 5P
0254	4822 267 10735 Conn 3P
1009	9322 127 54667 RC5 rec. TSOP1836UH1
1225	4822 210 10848 Tuner UV1316/A
1225▲	4822 210 10853 Tuner TEDE9-004A
1260	2422 025 16745 Conn 42P
1269	4822 267 10982 Conn 2P
1900▲	2422 086 10905 FUSE 4A
1931	4822 280 10367 Conn 1P
1941▲	4822 071 51602 Fuse 1.6A
1961▲	4822 071 51602 Fuse 1.6A

—|—

2009	4822 124 40207	100µF 20% 25V
2020	4822 122 33177	10nF 20% 50V
2021	4822 122 33172	390pF 5% 50V
2023	4822 126 14043	1µF 20% 16V
2024	4822 126 14043	1µF 20% 16V
2201	5322 122 31863	330pF 5% 63V
2202	4822 126 13692	47pF 1% 63V
2203	5322 122 31863	330pF 5% 63V
2206	5322 122 31863	330pF 5% 63V
2208	5322 122 31863	330pF 5% 63V
2211	5322 122 32658	22pF 5% 50V
2214	5322 122 31863	330pF 5% 63V
2215	5322 122 31863	330pF 5% 63V
2217	5322 122 32658	22pF 5% 50V
2218	5322 122 32658	22pF 5% 50V
2222	5322 122 32658	22pF 5% 50V
2225	5322 122 32658	22pF 5% 50V
2227	4822 122 33575	220pF 5% 63V
2231	5322 122 31863	330pF 5% 63V
2233	5322 122 31863	330pF 5% 63V
2236	5322 122 31863	330pF 5% 63V
2238	5322 122 31863	330pF 5% 63V
2242	5322 122 31863	330pF 5% 63V
2244	5322 122 31863	330pF 5% 63V
2246	4822 124 81286	47µF 20% 16V
2247	5322 122 32658	22pF 5% 50V
2249	4822 122 33575	220pF 5% 63V
2251	5322 122 31863	330pF 5% 63V
2253	5322 122 31863	330pF 5% 63V
2261	4822 124 40196	220µF 20% 16V
2262	5322 122 31647	1nF 10% 63V
2265	4822 124 41643	100µF 20% 16V
2265	4822 124 81044	470µF 20% 6.3V
2266	2238 580 15645	47nF 10% 50V
2271	4822 124 21913	1µF 20% 63V
2276	5322 126 10511	1nF 5% 50V
2280	5322 122 32531	100pF 5% 50V
2281	4822 126 13486	15pF 2% 63V
2282	2238 580 15645	47nF 10% 50V
2284	4822 124 40207	100µF 20% 25V
2404▲	4822 122 31177	470pF 10% 500V
2406	4822 121 43526	47nF 5% 250V
2409	5322 121 42386	100nF 5% 63V
2411▲	2020 558 90491	1n8 10% 2KV

2411▲	4822 126 13435	1.2nF 10% 2KV
2411▲	4822 126 13862	1.5nF 10% 2KV
2411▲	4822 126 14053	1nF 10% 2KV
2414▲	4822 121 70618	12nF 5% 1600V
2416▲	2020 558 90491	1n8 10% 2KV
2416▲	4822 126 11503	820pF 10% 2KV
2416▲	4822 126 13435	1.2nF 10% 2KV
2416▲	4822 126 13451	2.2nF 10% 2KV
2416▲	4822 126 13862	1.5nF 10% 2KV
2416▲	4822 126 14053	1nF 10% 2KV
2417▲	4822 122 31177	470pF 10% 500V
2419	2222 479 90022	0.43µF 250V
2419	2222 479 90029	820nF 5% 250V
2419	4822 121 43888	360nF 5% 250V
2419	4822 126 14096	560nF 5% 250V
2419	4822 126 14097	680nF 5% 250V
2420	4822 124 12265	4.7µF 20% 250V
2420	4822 124 41741	2.2µF 20% 350V
2422	4822 126 13751	47nF 10% 63V
2430	4822 121 41857	10nF 5% 250V
2430	4822 121 51305	15nF 10% 50V
2430	4822 121 70676	27P 10% 50V
2434	2020 021 91543	47µF 20% 160V
2437	4822 121 10619	220nF 10% 250V
2437	4822 121 40472	150nF 10% 250V
2437	4822 121 40518	100nF 10% 250V
2439	4822 121 51252	470nF 5% 63V
2442	4822 126 13838	100nF 50V 20%
2445	2020 012 93596	22µF 20% 250V
2447	4822 124 80791	470µF 20% 16V
2449	4822 124 11767	470µF 20% 25V
2449	4822 124 80791	470µF 20% 16V
2450	4822 124 80791	470µF 20% 16V
2461	5322 121 42386	100nF 5% 63V
2463	5322 121 42386	100nF 5% 63V
2466	5322 121 40323	100nF 10% 100V
2471	4822 121 42035	4.7µF 10% 100V
2473▲	4822 122 31177	470pF 10% 500V
2474	2222 347 90232	27nF 10% 400V
2474▲	4822 121 70545	7.5nF 5% 1.6KV
2474▲	4822 121 70649	9.1nF 5% 1.6KV
2475	4822 121 43526	47nF 5% 250V
2477	2222 479 90022	0.43µF 250V
2477	4822 121 10781	470nF 5% 250V
2478	5322 121 10472	47µF /25
2479	4822 124 81043	10µF 20% 100V
2484	4822 121 43526	47nF 5% 250V
2485▲	4822 126 10206	2.2nF 10% 500V
2487▲	4822 121 70545	7.5nF 5% 1.6KV
2487▲	4822 121 70649	9.1nF 5% 1.6KV
2488	5322 126 10511	1nF 5% 50V
2501	5322 122 32268	470pF 10% 50V
2503	5322 122 32268	470pF 10% 50V
2505	5322 121 42386	100nF 5% 63V
2506	4822 124 40255	100µF 20% 63V
2521	4822 121 42408	220nF 5% 63V
2522	4822 124 40207	100µF 20% 25V
2523	5322 121 42386	100nF 5% 63V
2524	5322 121 42386	100nF 5% 63V
2531	4822 124 40784	3300µF 20% 16V
2532	4822 124 81286	47µF 20% 16V
2701	4822 124 22652	2.2µF 20% 50V
2702	4822 124 40255	100µF 20% 63V
2703	4822 124 22652	2.2µF 20% 50V
2704	4822 124 12056	1000µF 20% 35V
2705	4822 124 21913	1µF 20% 63V
2706	4822 126 13838	100nF 20% 50V
2707	4822 123 14026	470µF 20% 35V
2708	4822 124 21913	1µF 20% 63V
2709	4822 124 12056	1000µF 20% 35V
2711	4822 126 13482	470nF 20% 16V
2712	4822 124 40255	100µF 20% 63V
2713	4822 126 13838	100nF 20% 50V
2714	5322 122 32531	100pF 5% 50V
2714	5322 126 10511	1nF 5% 50V
2715	4822 124 40255	100µF 20% 63V
2716	4822 126 13482	470nF 20% 16V
2717	5322 122 32531	100pF 5% 50V
2717	5322 126 10511	1nF 5% 50V
2718	4822 124 40255	100µF 20% 63V
2719	5322 122 31647	1nF 10% 63V
2720	5322 122 31647	1nF 10% 63V
2722	4822 122 33127	2.2nF 10% 63V
2723	4822 122 33127	2.2nF 10% 63V
2726	4822 124 40255	100µF 20% 63V
2727	5322 122 32654	22nF 10% 63V

□

3007	4822 117 13577	330Ω 1% 0.1W
3008	4822 051 10102	1k 2% 0.25W
3024	4822 051 10102	1k 2% 0.25W
3025	4822 051 20391	390Ω 5% 0.1W
3026	4822 117 11449	2k2 1% 0.1W
3027	4822 051 20391	390Ω 5% 0.1W
3028	4822 051 20562	5k6 5% 0.1W
3029	4822 051 20472	4k7 5% 0.1W
3030	4822 051 20122	1k2 5% 0.1W
3031	4822 116 83933	15k 1% 0.1W
3032	4822 051 20472	4k7 5% 0.1W
3033	4822 116 83933	15k 1% 0.1W
3034	4822 051 10102	1k 2% 0.25W
3035▲	4822 052 10229	22Ω 5% 0.33W
3037	4822 051 20182	1k8 5% 0.1W
3038	4822 051 20182	1k8 5% 0.1W
3201	4822 116 83868	150Ω 5% 0.5W
3202	4822 117 13579	220k 1% 0.1W
3203	4822 116 83868	150Ω 5% 0.5W
3204	4822 117 10834	47k 5% 0.1W
3206	4822 116 83868	150Ω 5% 0.5W
3207	4822 117 13579	220k 1% 0.1W
3208	4822 116 83868	150Ω 5% 0.5W
3209	4822 117 10834	47k 1% 0.1W
3211	4822 116 52201	75Ω 5% 0.5W
3212	4822 116 52175	100Ω 5% 0.5W
3213	4822 116 52264	27k 5% 0.5W
3214	4822 117 11507	6k8 1% 0.1W
3215	4822 116 52175	100Ω 5% 0.5W
3216	4822 116 52201	75Ω 5% 0.5W
3217	4822 116 52175	100Ω 5% 0.5W
3218	4822 116 52201	75Ω 5% 0.5W
3219	4822 116 52175	100Ω 5% 0.5W
3220	4822 117 11149	82k 1% 0.1W
3221	4822 116 52201	75Ω 5% 0.5W
3222	4822 116 52175	100Ω 5% 0.5W
3223	4822 116 52199	68Ω 5% 0.5W
3224	4822 051 10102	1k 2% 0.25W
3226	4822 116 52201	75Ω 5% 0.5W
3227	4822 116 52176	10Ω 5% 0.5W
3231	4822 116 83868	150Ω 5% 0.5W
3232	4822 117 13579	220k 1% 0.1W
3233	4822 116 83868	150Ω 5% 0.5W
3234	4822 117 10834	47k 1% 0.1W

6419	4822 130 42488	BYD33D
6420	4822 130 31607	RGP10D
6420	4822 130 42488	BYD33D
6439	4822 130 34379	BZX79-B27
6440	4822 130 30621	1N4148
6442	4822 130 30621	1N4148
6445	4822 130 31393	BYT52J
6445	4822 130 42606	BYD33J
6447	4822 130 41602	BYW95C
6448	4822 130 41602	BYW95C
6467	4822 130 11148	UDZ4.7B
6468	9322 107 41685	UDZ10B
6472	4822 130 61219	BZX79-B10
6474	9340 559 53112	BYW95C-24
6475	9340 559 53112	BYW95C-24
6480	4822 130 30621	1N4148
6481	3198 010 53390	BZX79-B33
6482	4822 130 31393	BYT52J
6482	4822 130 42606	BYD33J
6483	4822 130 31393	BYT52J
6483	4822 130 42606	BYD33J
6484	4822 130 31393	BYT52J
6484	4822 130 42606	BYD33J
6485	4822 130 20299	P0102DA
6486	4822 130 34379	BZX79-B27
6487	4822 130 34142	BZX79-B33
6505	4822 130 31607	RGP10D
6505	4822 130 42488	BYD33D
6511	4822 130 30621	1N4148
6512	4822 130 34173	BZX79-B5V6
6522	4822 130 31607	RGP10D
6522	4822 130 42488	BYD33D
6701	4822 130 30621	1N4148
6904	4822 130 34142	BZX79-B33
6905	4822 130 34142	BZX79-B33
6911	4822 130 31083	BYW55
6912	4822 130 31083	BYW55
6913	4822 130 31083	BYW55
6914	4822 130 31083	BYW55
6921	4822 130 34142	BZX79-B33
6926	4822 130 31607	RGP10D
6926	4822 130 42488	BYD33D
6928	4822 130 31607	RGP10D
6928	4822 130 42488	BYD33D
6929	4822 130 31607	RGP10D
6929	4822 130 42488	BYD33D
6932	4822 130 30621	1N4148
6938	4822 130 10218	BY229X-800
6941	4822 130 32715	SB340
6942	4822 130 31607	RGP10D
6942	4822 130 42488	BYD33D
6953	4822 130 34382	BZX79-B8V2
6955	4822 130 30621	1N4148
6961	4822 130 32715	SB340
6966	4822 130 31981	BZX79-B3V9
6971	4822 130 10256	EGP20DL-5300
6973	4822 130 30621	1N4148
6986	4822 130 34281	BZX79-B15



7012	4822 130 40959	BC547B
7013	4822 130 44568	BC557B
7014	4822 130 40981	BC337-25
7015	4822 130 40981	BC337-25
7224	4822 130 60511	BC847B
7226	4822 130 60511	BC847B
7273	4822 130 60373	BC856B
7276	4822 130 60511	BC847B
7277	4822 130 60373	BC856B
7280	4822 130 60511	BC847B
7408	4822 130 41646	BF423
7410	9340 547 93127	BU4522AX
7410	9340 550 89127	BU4508AX
7440	4822 130 44568	BC557B
7470	4822 130 11336	STP16NE06FP
7478	4822 130 40959	BC547B
7480	4822 130 40959	BC547B
7481	4822 130 42159	BF819
7482	9340 547 00215	PDTC143ZT
7501	4822 209 61117	TDAB172
7513	4822 130 60511	BC847B
7701	4822 130 60511	BC847B
7702	9322 148 81667	AN5277
7703	4822 209 33165	TDA1308T/N1
7704	4822 130 60511	BC847B
7710	4822 130 60511	BC847B
7711	4822 130 60373	BC856B
7712	4822 130 60373	BC856B
7921	9322 140 38682	STR-F6454

7922	4822 130 60373	BC856B
7929▲	8238 274 02070	TCET1103G
7932	4822 130 60511	BC847B
7942	4822 209 80591	LM317T
7944	4822 130 60511	BC847B
7946	4822 130 60511	BC847B
7948	4822 130 60511	BC847B
7951	4822 130 60511	BC847B
7953	4822 130 60511	BC847B
7955	4822 130 60511	BC847B
7965	4822 130 40855	BC337
7967	9322 137 01682	SI-3050C
7971	4822 209 16707	SE140N
7971	4822 209 17243	SE130N
7987	4822 130 60373	BC856B

CRT [B]

Various

0084▲	2422 500 80052	Conn 9P
0084▲	2422 500 80053	Conn 9P
0084▲	2422 500 80061	Conn 9P
0217	4822 267 10735	Conn 3P



2830	4822 121 51473	470nF 20% 63V
2831	4822 126 13599	3.3nF 10% 500V
2835	4822 126 13838	100nF 20% 50V
2836	4822 121 43897	1nF 5% 400V
2840	4822 124 11565	10µF 20% 250V
2843▲	4822 126 13451	2.2nF 10% 2KV
2860	4822 124 40207	100µF 20% 25V
2866	4822 126 13482	470nF 20% 16V
2869	4822 121 40334	100nF 10% 100V
2870	5322 122 32654	22nF 10% 63V
2871	4822 124 40764	22µF 100 V
2872	4822 122 40112	560pF 10% 500V
2872▲	4822 126 13829	120pF 10% 500V
2873	4822 121 40516	22nF 10% 250V
2876	4822 124 40248	10µF 20% 63V
2877	5322 122 32448	10pF 5% 63V
2878	4822 122 33172	390pF 5% 50V



3831	4822 116 52175	100Ω 5% 0.5W
3832	3198 013 01020	1k 2% 0.5W
3833	4822 116 52175	100Ω 5% 0.5W
3834	3198 013 01020	1k 2% 0.5W
3835	4822 116 52175	100Ω 5% 0.5W
3836	3198 013 01020	1k 2% 0.5W
3837	4822 051 20561	560Ω 5% 0.1W
3837	4822 117 10361	680Ω 1% 0.1W
3838	4822 051 20561	560Ω 5% 0.1W
3838	4822 117 10361	680Ω 1% 0.1W
3839	4822 051 20561	560Ω 5% 0.1W
3839	4822 117 10361	680Ω 1% 0.1W
3840▲	4822 052 10101	100Ω 5% 0.33W
3841▲	4822 052 10108	1Ω 5% 0.33W
3841▲	4822 052 10128	1Ω 5% 0.33W
3842▲	4822 052 10108	1Ω 5% 0.33W
3842▲	4822 052 10128	1Ω 5% 0.33W
3843	3198 013 01520	1k5 2% 0.5W
3845	4822 116 52272	330k 5% 0.5W
3860▲	4822 052 10109	10Ω 5% 0.33W
3864	4822 117 11503	220Ω 1% 0.1W
3865	4822 117 10833	10k 1% 0.1W
3866	4822 117 11139	1k5 1% 0.1W
3867	4822 116 52176	10Ω 5% 0.5W
3869	4822 051 20008	jumper (0805)
3870	4822 116 52231	820Ω 5% 0.5W
3871	4822 116 52291	56k 5% 0.5W
3872	4822 117 11148	56k 1% 0.1W
3873	4822 117 11454	820Ω 1% 0.1W
3875	4822 051 20122	1k2 5% 0.1W
3876	4822 051 20008	jumper (0805)
3877	4822 051 20008	jumper (0805)
3878	4822 051 20471	470Ω 5% 0.1W
3879	4822 053 12183	18k 5% 3W
3880	4822 116 52176	10Ω 5% 0.5W
3881	4822 051 20008	jumper (0805)
3882	4822 053 12183	18k 5% 3W
3885	4822 117 11449	2k2 1% 0.1W
3886	2322 194 63338	3Ω3 5%
3887	2322 194 63338	3Ω3 5%
3888	4822 051 20008	jumper (0805)

3892	4822 117 13016	VDR 115V
------	----------------	----------



5842	4822 157 11447	56µH
5842	4822 157 71514	18u 5%
5842	4822 157 71515	68u
5862	4822 157 51216	5.6µH



7830	9352 561 40112	TDA6108
7830	9352 576 50112	TDA6107Q/N2
7860	4822 130 44154	BF199
7861	4822 130 42589	BF370
7862	4822 130 41617	BD830
7863	4822 130 41616	BD829
7864	4822 130 44568	BC557B
7865	9340 350 20116	BFQ151

SSB [C]

Various

0238	2422 025 12467	Conn 3P
1327	2422 543 01095	X-tal 12MHz
1333	2422 549 44311	cer fit TPWCC16B
1451	2422 549 44372	SAW fit OFWK3953L
1455	2422 549 44369	SAW fit OFWK9656L
1630	2422 543 01059	X-tal 18.432MHz



2010	3198 016 38210	820P 25V
2014	3198 017 41050	1µF 10V
2015	3198 017 41050	1µF 10V
2016	4822 126 14305	100nF 10% 16V
2017	4822 126 14305	100nF 10% 16V
2018	4822 126 14238	2N2 50V
2043	3198 030 74780	4U7 20% 35V
2044	4822 126 14305	100nF 10% 16V
2045	4822 126 14507	18pF 5% 50V
2046	4822 126 14507	18pF 5% 50V
2049	4822 126 13879	220nF 20% 16V
2050	4822 122 31765	100pF 2% 63V
2051	4822 126 14305	100nF 10% 16V
2053	4822 124 23002	10µF 16V
2058	4822 126 14305	100nF 10% 16V
2263	5322 122 32268	470pF 10% 50V
2264	5322 122 32268	470pF 10% 50V
2301	3198 017 41050	1µF 10V
2304	3198 030 74780	4U7 20% 35V
2306	5322 126 11583	10nF 10% 50V
2309	4822 126 14305	100nF 10% 16V
2311	3198 017 41050	1µF 10V
2312	5322 126 11583	10nF 10% 50V
2313	4822 126 14305	100nF 10% 16V
2314	4822 121 70159	0.1µF 16V
2316	4822 126 14494	22nF 10% 25V
2317	4822 126 13879	220pF 20% 16V
2319	4822 126 14305	100nF 10% 16V
2323	3198 017 42230	22nF 50V
2324	4822 126 14305	100nF 10% 16V
2325	3198 017 42230	22nF 50V
2326	3198 017 42230	22nF 50V
2327	4822 126 11671	33pF
2328	4822 126 11671	33pF
2331	3198 030 82280	2U2 20% 50V
2332	4822 126 13879	220nF 20% 16V
2333	4822 126 14305	100nF 10% 16V
2334	4822 126 14494	22nF 10% 25V
2335	3198 017 41050	1µF 10V
2338	4822 126 14238	2N2 50V
2342	4822 122 33752	15pF 5% 50V
2342	4822 122 33777	47pF 5% 63V
2345	4822 122 33752	15pF 5% 50V
2345	4822 122 33777	47pF 5% 63V

Spare parts list

Table with 3 columns: Part number, Description, Value/Unit. Rows include 2348, 2348, 2350, 2354, 2355, 2356, 2357, 2360, 2372, 2373, 2374, 2375, 2376, 2377, 2380, 2401, 2402, 2403, 2404, 2405, 2407, 2408, 2412, 2415, 2417, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2428, 2433, 2434, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2449, 2450, 2451, 2452, 2453, 2460, 2464, 2601, 2602, 2606, 2607, 2610, 2611, 2612, 2613, 2614, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2646, 2651, 2652, 2653, 2655, 2656.

Table with 3 columns: Part number, Description, Value/Unit. Rows include 2657, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2675, 2676, 2678, 2679, 2682, 2683, 2684, 2685, 2686, 2687, 2690, 2691, 2692, 2693, 2694, 2695.



Table with 3 columns: Part number, Description, Value/Unit. Rows include 3002, 3003, 3004, 3007, 3008, 3009, 3010, 3013, 3014, 3015, 3017, 3018, 3019, 3021, 3022, 3023, 3024, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3042, 3043, 3044, 3045, 3046, 3051, 3052, 3054, 3055, 3056, 3057, 3058, 3059, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3081, 3082, 3083, 3084, 3085, 3086, 3088, 3090, 3091, 3092, 3094, 3302, 3303, 3306, 3311, 3312, 3315, 3316.

Table with 3 columns: Part number, Description, Value/Unit. Rows include 3316, 3324, 3326, 3327, 3329, 3330, 3331A, 3332A, 3333, 3334, 3335, 3339, 3340, 3341, 3341, 3342, 3344, 3344, 3345, 3345, 3348, 3348, 3349, 3349, 3358, 3360, 3361, 3362, 3363, 3364, 3365, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3381, 3382, 3383, 3387, 3388, 3401, 3401, 3402, 3402, 3403, 3403, 3404, 3405, 3406, 3407, 3408, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3423, 3425, 3426, 3427, 3428, 3432, 3432, 3435, 3436, 3439, 3443, 3443, 3444, 3453, 3453, 3455, 3456, 3457, 3458, 3461, 3471, 3471, 3472, 3472, 3473.

3473	4822 051 30008	jumper
3474	3198 021 90030	jumper 0603
3474	4822 051 30008	jumper
3477	4822 051 30472	4k7 5% 0.062W
3480	4822 051 30102	1k 5% 0.062W
3481	4822 051 30103	10k 5% 0.062W
3482	4822 051 30153	15k 5% 0.062W
3485	4822 051 30479	47Ω 5% 0.062W
3601	4822 051 30101	100Ω 5% 0.062W
3602	4822 051 30101	100Ω 5% 0.062W
3606	4822 051 30273	27k 5% 0.062W
3616	4822 051 30101	100Ω 5% 0.062W
3618	4822 051 30101	100Ω 5% 0.062W
3619	4822 051 30101	100Ω 5% 0.062W
3621	4822 051 30101	100Ω 5% 0.062W
3643	4822 051 30563	56k 5% 0.062W
3644	4822 117 13632	100k 1% 0603 0.62W
3645	4822 051 30102	1k 5% 0.062W
3646	4822 051 30563	56k 5% 0.062W
3647	4822 117 13632	100k 1% 0603 0.62W
3648	4822 051 30102	1k 5% 0.062W
3651	4822 051 30101	100Ω 5% 0.062W
3653	4822 051 30101	100Ω 5% 0.062W
3665	4822 051 30222	2k2 5% 0.062W
3680	4822 051 30109	10Ω 5% 0.062W
3681	4822 051 30109	10Ω 5% 0.062W
4xxx	4822 051 10008	jumper (1206)
4xxx	4822 051 20008	jumper(0805)

5040	3198 018 64780	4U7 5%
5041	3198 018 64780	4U7 5%
5042	3198 018 64780	4U7 5%
5050	4822 157 11778	5U6 10%
5309	4822 157 71334	0.68μH
5332	4822 157 71334	0.68μH
5333	4822 157 71334	0.68μH
5334	3198 018 61080	1U 5%
5334	4822 157 71334	0.68μH
5401	4822 157 71694	0U82 10%
5403	4822 157 71334	0.68μH
5421	4822 157 71334	0.68μH
5425	4822 157 71334	0.68μH
5435	4822 157 71334	0.68μH
5601	3198 018 61080	1U 5%
5602	3198 018 64780	4U7 5%
5625	3198 018 61080	1U 5%
5665	3198 018 61590	15U 5%

6020	4822 130 83649	1SS355
6031	4822 130 11518	UDZ2.4B
6302	4822 130 10837	UDZS8.2B
6303	9322 137 65685	UDZS6.8B
6401	4822 130 11525	1SS356
6412	4822 130 83649	1SS355
6415	4822 130 83649	1SS355
6417	4822 130 83649	1SS355
6605	4822 130 83649	1SS355



7022	3198 010 42310	BC847BW
7053	9340 425 20115	BC847BS
7063	3198 010 42310	BC847BW
7064	9352 640 96557	SAA5565
7064	9352 641 92557	SAA5667
7066	4822 209 17377	M24C32-WMN6
7070	9322 143 59671	UPD431000AGU
7301	9352 626 19557	TDA 8885 QFP-64
7305	3198 010 42310	BC847BW
7307	3198 010 42310	BC847BW
7331	5322 130 42756	BC857C
7368	3198 010 42310	BC847BW
7401	9351 869 40118	74HC4053PW
7402	3198 010 42310	BC847BW
7403	9352 632 26118	TDA9171T/N1
7405	9352 630 99118	TDA9181
7412	9340 425 20115	BC847BS
7413	3198 010 42310	BC847BW
7421	3198 010 42310	BC847BW
7442	3198 010 42310	BC847BW
7443	3198 010 42310	BC847BW
7444	4822 130 60383	BF824
7445	5322 130 42718	BFS20
7630	9351 874 90118	74HC4052PW
7645	9340 425 20115	BC847BS

7650	9351 869 40118	74HC4053PW
7651	9322 143 53671	MSP3415D
7651	9322 149 63671	MSP3451G

SIDE I/O [D]

Various

0240	2422 025 12485	Conn 11P
1254	4822 267 31014	HEADPHONE SOCKET
1255	4822 265 11606	Conn 3P



2286	4822 122 33642	150pF 5% 50V
2288	4822 122 33642	150pF 5% 50V
2292	5322 122 32311	470pF 10% 100V
2294	5322 122 32311	470pF 10% 100V
2296	4822 122 30043	10nF 80% 63V
2297	4822 122 30043	10nF 80% 63V



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



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

TOP-CTRL [E]

Various

0027▲	3139 124 30381	TOP CONTROL BRACKET
0080▲	3139 137 52451	TOP CONTROL ASSY
0080	3139 137 66921	TOP CONTROL BUTTON
0215	4822 267 10748	Conn 3P
1091	4822 276 13775	SWITCH
1092	4822 276 13775	SWITCH
1093	4822 276 13775	SWITCH
1094	4822 276 13775	SWITCH



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



6091	4822 130 31983	BAT85
------	----------------	-------

MAINS- SW [J]

Various

0132▲	4822 276 14024	Mains switch
0214	2422 025 06353	Conn 5P
1002	9322 127 54667	RC5 rec. TSOP1836UH1
1008▲	9322 050 99682	LED LTL-10224WHCR



2001	4822 124 40207	100μF 20% 25V
------	----------------	---------------



3003	4822 116 52219	330Ω 5% 0.5W
3004	4822 116 83872	220Ω 5% 0.5W
3008	4822 053 21475	4M7 5% 0.5W
3009	4822 053 21225	2M2 5% 0.5W