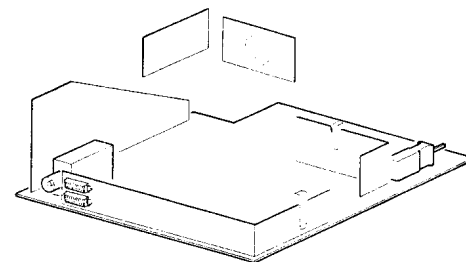


**Service**  
**Service**  
**Service**L. HETZEL-HORVAT  
1998

# Service Manual

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**PHILIPS**

## Hotel mode

All L9.2E sets are equipped with a hotel mode. The hotel mode is a special customer mode in which the customer can define some presettings.

The hotel mode can be switched on in the following way:

1. Switch on the television set.
2. Select channel 38.
3. Push the OSD button on the remote control (RC) for at least 3 seconds while the VOL+ and VOL- buttons on the local keyboard of the set are pushed simultaneously.

The television is now in the hotel mode.

By pushing the UP or DOWN key on the RC the text:

```
PROGRAM NO   39  
BLANK FROM   XX  
TO           XX
```

appears on the screen. Use the UP or DOWN button to scroll. With the LEFT or RIGHT button you can choose which channels can be blanked.

If the MENU button on the RC is pushed, the channels are adjusted and the text "HOTEL ON" is shown on the screen.

For the other presettings push the MENU button again. The following items appear on the screen:

```
BRIGHTNESS  
COLOUR  
CONTRAST  
SHARPNESS  
TINT  
NOISE RED  
DELTA VOL (to limit the maximum volume)  
BALANCE  
TREBLE  
BASS  
AVL
```

Each item can be selected by the UP or DOWN key on RC. The value of the items can be changed by pushing the LEFT or RIGHT button.

To leave the menu, simply push the MENU button again on the RC.

The hotel mode is now ready with the customers' own presets.

If you want to switch off the hotel mode please use the following procedure:

4. Switch on the television (if it hasn't been turned off after since installing the presettings please turn the set off first).
5. Select channel 38.
6. Push the OSD button on the RC and the VOL+ and VOL- on the local keyboard of the set simultaneously for 3 seconds.

The text "LOCKED" appears on the screen. After pushing any key on the RC the text "HOTEL OFF" shows on the screen which means that the hotel mode is now turned off.

# Technical Specifications

## Specifications

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

Off air : 100dBV  
 On air : 90dBV  
 Audio output :  
 • Stereo : 2 \* 3W; 2 \* 1W  
 • Mono : 2 \* 2W; 4W; 3W; 2W; 1W  
 Tuners :  
 • UV 1316/AI-2 (PAL)  
 • UV 1316/AIU-2 (PAL)  
 • UV 1356C/AI (PAL)

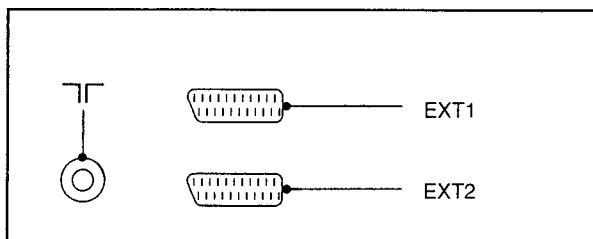
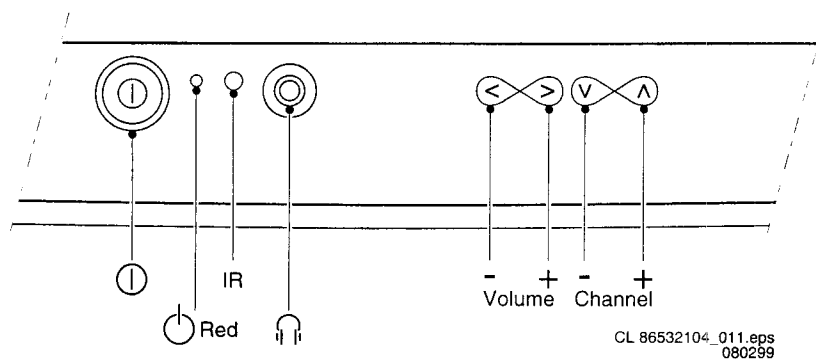
20- CVBS  
 21- Earth sc:

1.2.3 Cinch - audio

V - CVBS  
 (yellow)

1.3 PCB loca

## Specification of the terminal sockets



## 1 CVBS(in/out) + RGB(in) - tuner at output

Audio Out R (0.5VRMS ( 1kΩ)  
 Audio In R (0.2-2VRMS ( 10kΩ)  
 Audio Out L (0.5VRMS ( 1kΩ)  
 Earth screen  
 Earth screen  
 Audio In L (0.2-2VRMS ( 10kΩ)  
 Blue (0.7Vpp/75)  
 CVBS status (INT = 0-2V, EXT (16:9) = 4.5-7V,  
 EXT(4:3) = 9.5 -12V)  
 Earth screen  
 -  
 Green (0.7Vpp/75)  
 -  
 Earth screen  
 Earth screen  
 Red (0.7Vpp/75)  
 FBL (<0.9V RGB mode)  
 Earth screen  
 Earth screen  
 CVBS  
 CVBS (1Vpp/75)  
 Earth screen

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

Input = EXT2 => output = tuner  
 Input = tuner/EXT1 => output = tuner/EXT11  
 1 - Audio Out R (0.5VRMS ( 1kΩ)  
 2 - Audio In R (0.2-2VRMS ( 10kΩ)  
 3 - Audio Out L (0.5VRMS ( 1kΩ)  
 4 - Earth screen  
 5 - Earth screen  
 6 - Audio In L (0.2-2VRMS ( 10kΩ)  
 7 -  
 8 - CVBS status (INT = 0-2V, EXT (16:9) = 4.5-7V,  
 EXT(4:3) = 9.5 -12V)  
 9 - Earth screen  
 10- -  
 11- -  
 12- -  
 13- Earth screen  
 14- Earth screen  
 15- C (300mVpp/75)  
 16- -  
 17- Earth screen  
 18- Earth screen  
 19- CVBS

## 2. Safety

### 2.1 Safety ins

- Safety re
  - The
  - isola
  - Safe
  - shot
  - origi
  - Whe
  - worr
- Safety re
  - be return
  - should b
  - As a
  - sold
  - curre
  - instr
  - /
  - F
  - S
  - L
  - F
  - C

20- CVBS (1Vpp/75)  
21- Earth screen



L - Audio L (red) (0.2-2Vrms 10kΩ)  
R - Audio R (white) (0.2-2Vrms 10kΩ)



### 1.2.3 Cinch - audio/video in

V - CVBS (yellow) (1Vpp/75))

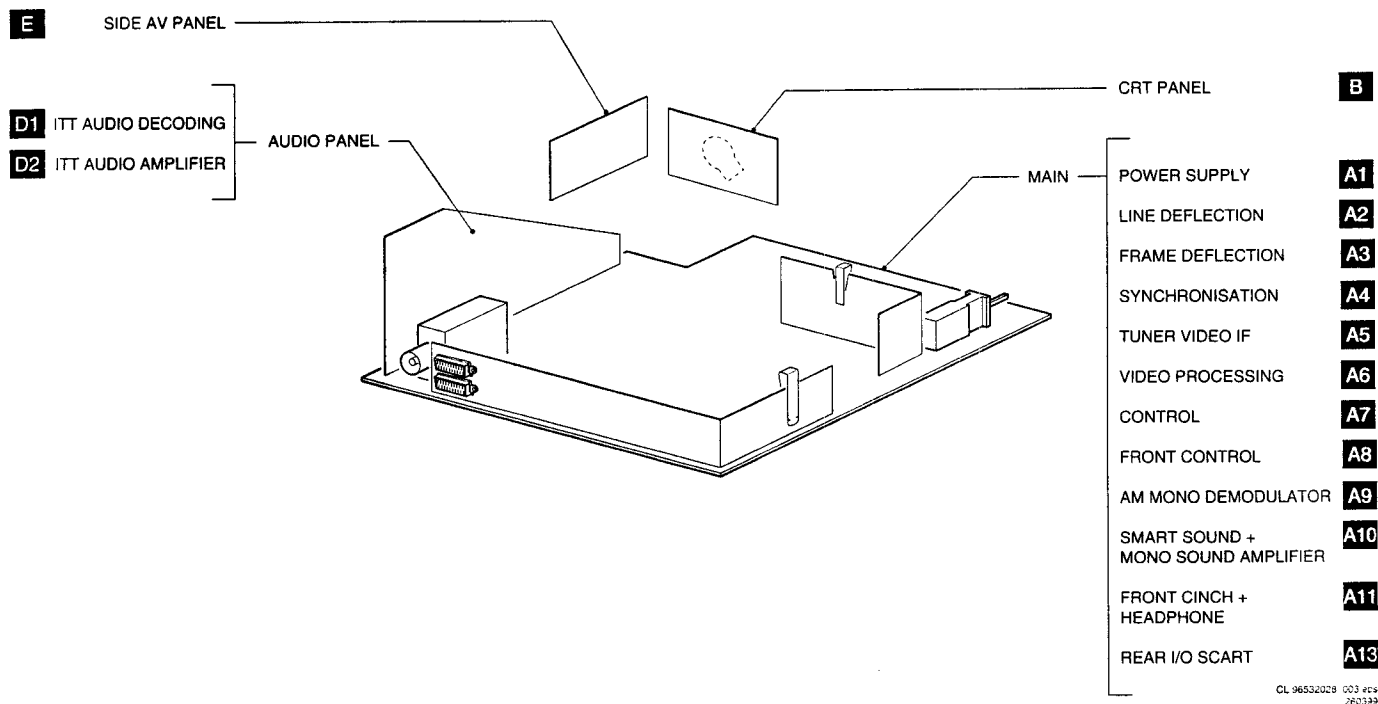


### 1.2.4 Headphone

- 8-600Ω (4mW)



## 1.3 PCB location drawing



## 2. Safety instructions, maintenance instruction, warnings and Notes

### 2.1 Safety instructions for repairs ⚠

- 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.
- 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 M $\Omega$  and 12 M $\Omega$

- 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.

## 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.

## Warnings

### ESD

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.

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

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).

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.

Be careful during measurements in the high-voltage section and on the picture tube.

Never replace modules or other components while the unit is switched on.

When making settings, use plastic rather than metal tools.

This will prevent any short circuits and the danger of a circuit becoming unstable.

Wear safety goggles during replacement of the picture tube.

## Notes

Direct voltages and oscillograms should be measured with regard to the tuner earth (⏏), or hot earth (⏏) as this is called.

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 (3 kHz, R:1 kHz unless stated otherwise) and picture carrier 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.

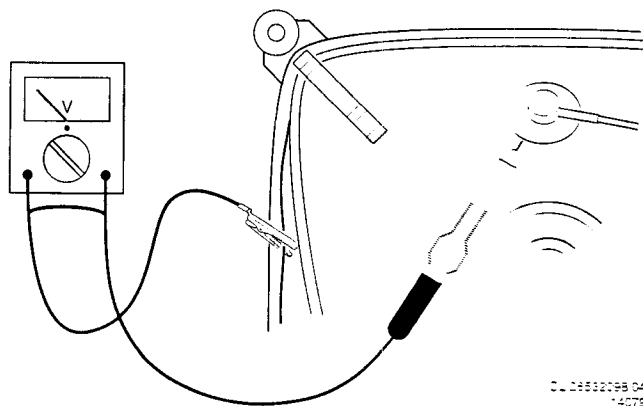


Figure 2-1

Manual tuning

This menu allows you to store the programmes one by one.  
Press **MAN**. The main menu comes up on the screen.

Tuning in to channels

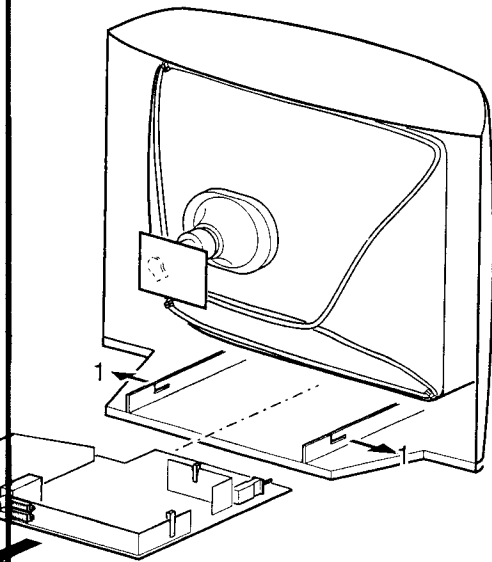
Quick installation (first use)

# Mechanical instructions

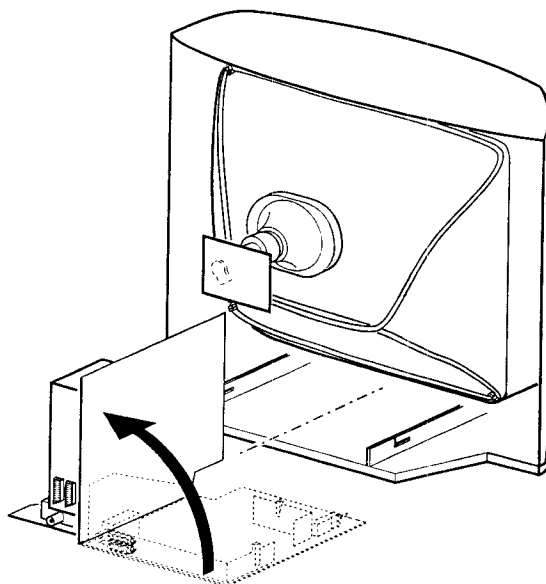
## Service positions

See figure 4.2 for the service position.

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



A



B

CL 96532028\_004.eps  
190499

Figure 4-2

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

## Service Modes, fault finding and repair tips

In this chapter the following paragraphs are included:

Test points  
Service Modes and Dealer Service Tool (DST)  
The menus and submenus  
Error code buffer and error codes  
The "blinking LED" procedure  
Trouble shooting tips  
Customer service mode (CSM)  
ComPair  
Ordering compare

### Test points

The L9 chassis is equipped with test points in the service position. These test points are referring to the functional blocks:  
A1-A2-A3, etc.: Test points for the AM Mono Demodulator (A9), ITT panel (D1) and Sound amplifier (D2)  
C1-C2-C3, etc.: Test points for the control circuit (A7) and the front control (A8)  
F1-F2-F3, etc.: Test points for the frame deflection circuit (A3)  
I1-I2-I3, etc.: Test points for the Tuner Video IF circuit (A5)  
L1-L2-L3, etc.: Test points for the Line deflection circuit (A2)  
P1-P2-P3, etc.: Test points for the power supply (A1)  
S1-S2-S3, etc.: Test points for the synchronisation circuit (A4)

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

Measurements are performed under the following conditions:

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

## 5.2 Service modes and Dealer Service Tool (DST)

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

### 5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with presets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the L9 chassis, download code X should be used).

### 5.2.2 Diagnose fea

L9 sets can be in the Service Mode (SAM).

### 5.2.3 Service Defa

The purpose is

- provide a measurement
- override E and pin25
- start the test
- Setting of
- Inspect th

### Entering the

- By transmitt the Dealer Service Mode
- Standard "MENU"
- By shorting the mono switching
- Caution!!

### Exit the SDM

Switch the set. The service buffer is also

Note: When the SDM is switched on, the set is switched on. The SDM set

- Pal/Secam
- the L'-sig
- Volume k
- Other pic

The following interfere with the event that the set is unchanged.

- (Sleep)T
- Blue mut
- Auto swit
- Hotel or l
- Child loc
- Skipping
- Automati
- Automati
- All other cont

### 5.2.4 Special func

#### Access to n

Pressing the normal user button and contrast. Pressing the status.

#### Error buffer

Pressing the OSD (incl. er

#### Access to S

By pressing the buttons on the "ALIGN" on the DST, the se



### 5.2.2 Diagnose features for service

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

### 5.2.3 Service Default Mode (SDM)

The purpose of the SDM is:

- provide a situation with predefined settings to get the same measurements as in this manual
- override 5V protections in case of short circuiting pin 24 and pin 25.0228 and pin 0224 at A7.
- start the blinking LED procedure
- Setting of options controls
- Inspect the error buffer

#### Entering the SDM:

- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 062596 followed by the key "MENU"
- By shorting test-point M25 and M24 pin 0228 and 0224 on the mono-carrier (A7) while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections ).

#### Exit the SDM:

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

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

The SDM sets the following pre-defined conditions:

- Pal/Secam sets: tuning at 475.25 PAL (For France select the L'-signal )
- Volume level is set to 25% (of the maximum volume level).
- Other picture and sound settings are set to 50%.

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

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

All other controls operate normally.

### 5.2.4 Special functions in SDM

#### Access to normal user menu

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

#### Error buffer

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

#### Access to SAM

By pressing the "CHANNEL DOWN" and "VOLUME DOWN" buttons on the local keyboard simultaneously or pressing "ALIGN" on the DST, the set switches from SDM to SAM

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

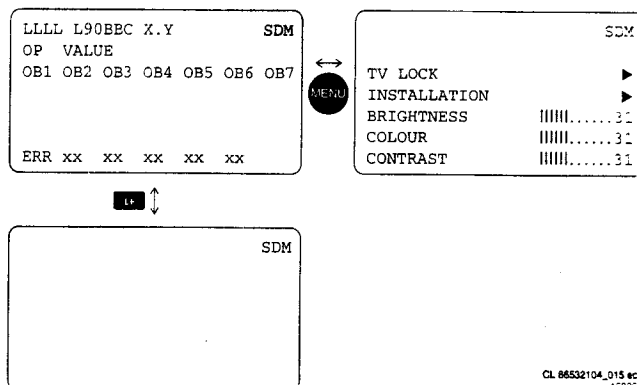


Figure 5-3 Service Default Mode screens and structure

Explanation notes/references:

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

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

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

### 5.2.5 Service Alignment Mode (SAM)

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

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

#### Entering SAM:

- By transmitting the "ALIGN" button command with the RC7150 Dealer Service Tool
- By pressing the "CHANNEL DOWN" and "VOLUME DOWN" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 062596 followed by the key "OSD"

By shorting pin 0225 and 0226 on the mono-carrier ( A7 ) while switching on the set. After switching on the set the short-circuit can be removed. ( Caution!! Override of 5V protections ).

#### Exit the SAM:

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

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

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

Figure 5.2 Service Alignment Mode screens and structure

#### Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu ( TV lock, installation, brightness, colour and contrast ) while "SAM" remains displayed in top of screen.

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

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

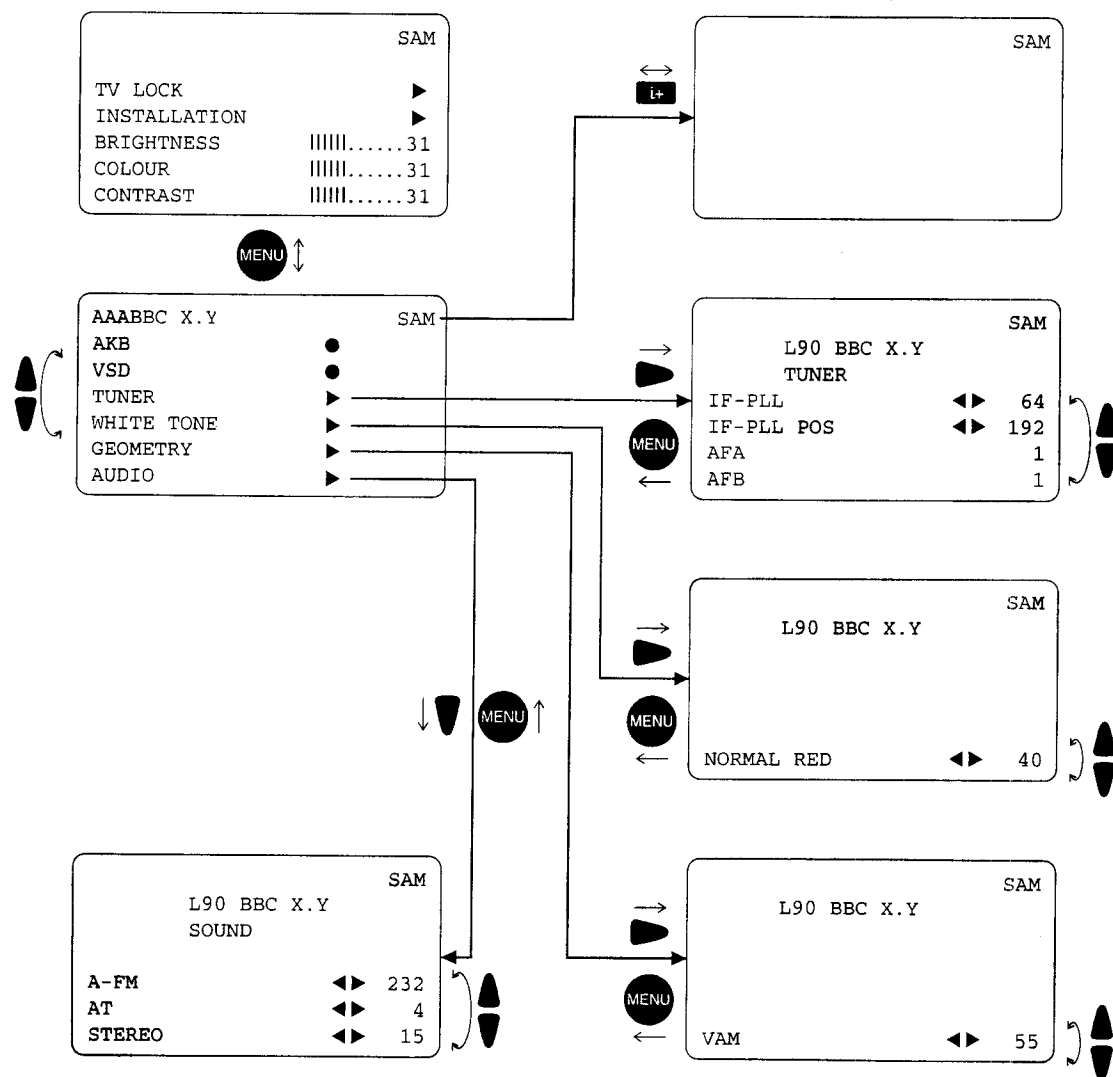
#### Access to SDM

Pressing the "DEFAULT" button on the DST

#### SAM menu control

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

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



### 5.3 The menus

#### 5.3.1 Tuner sub menu

The tuner sub

- IF\_PLL
- IF\_PLL POS
- IF\_PLL OFF
- AFW
- AGC
- YD
- CL
- AFA
- AFB

The items AF, monitoring pu  
The command select the nex  
The command increase/decr  
values will be  
The item valu

#### 5.3.2 White tone s

The command select the nex  
The command increase/decr  
values will be  
The item valu  
The white ton  
• NORMAL  
• NORMAL  
• NORMAL  
• DELTA C  
• DELTA C  
• DELTA C  
• DELTA W  
• DELTA W  
• DELTA W  
OSD is kept to  
tone alignmer  
The Contrast  
the white tone

#### 5.3.3 Audio sub m

The tuner sut  
• A-FM  
• AT  
• STEREO  
• DUAL  
The sound ac  
sets.  
The presence  
selected sour

#### 5.3.4 Geometry st

The geometr  
• VAM : Ve  
• VSL : Ve  
• SBL : Se  
• HSH : Hc  
• H60 : De  
• V60 : De  
• VSC : Ve  
• VSH : Ve

Figure 5-4 Service Alignment Mode screens and structure



### 5.3 The menus and submenus

#### 5.3.1 Tuner sub menu

The tuner sub menu contains the following items:

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

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

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

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

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

#### 5.3.2 White tone sub menu

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

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

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

The white tone sub menu contains the following items:

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

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

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

#### 5.3.3 Audio sub menu

The tuner sub menu contains the following items:

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

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

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

#### 5.3.4 Geometry sub menu

The geometry sub menu contains the following items:

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

### 5.4 Error code buffer and error codes

#### 5.4.1 Error code buffer

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

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

Examples:

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

#### 5.4.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present. If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).

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

- a. Error 0 = No error
- b. Error 1 = X-ray ( Only for USA sets )
- c. Error 2 = High beam current protection  
High beam protection active; set is switched to protection; error code 2 is placed in the error buffer; the LED will blink 2 times ( repeatedly ).

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +160V supply to the CRT panel is present. If the voltage is present, the most likely cause is the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +160V voltage is not present, check R3416 and D6409 ( Horizontal Deflection - A2 )

EW protection:

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

horizontal deflection coil 5445

S-correction capacitor 2407

flyback capacitor 2434

line output stage

short circuit of flyback diode 6434

EW power-transistor 7402 or driver-transistor 7400

- d. Error 3 = Vertical / Frame protection

There are no pulses detected at pin 37 of the main microprocessor 7600 ( panel A7 ).

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

IC 7460 is faulty ( A3 )

Open circuit of vertical deflection coil

Vlotaux +13V not present and/or Vlotaux -13V not present

Resistor 3463

Transistor 7609 is defect ( A7 )

- e. Error 4 = Sound processor ( IC7803 ) I2C error ( MSP3415D )

Sound processor does not respond to the micro controller

- f. Error 5 = Bimos ( IC7250 ) start-up error ( POR bit )

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

g. Error 6 = Bimos (TDA884x) I2C error

Note that this error may also be reported as a result of error codes 4 (in that case the Bimos might not be the actual problem)

h. Error 7 = General I2C error. This will occur in the following cases:

SCL or SDA is shorted to ground

SCL is shorted to SDA

SDA or SCL connection at the micro controller is open circuit.

i. Error 8 = Microprocessor (IC7600) internal RAM error (A7)

The micro controller internal RAM test indicated an error of the micro controller internal memory (tested during start-up);

j. Error 9 = EEPROM Configuration error (Checksum error); EEPROM is corrupted.

k. Error 10 = I2C error EEPROM. NV memory (EEPROM) does not respond to the micro controller

l. Error 11 = I2C error PLL tuner. Tuner is corrupted or the I2C line to the Tuner is low or no supply voltage present at pin 9, pin 6 or pin 7 of the tuner.

m. Error 12 = Black current loop instability protection. The black current could not be stabilised. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.

- The driver circuit around transistor 7400 is faulty
- No horizontal drive signal coming from the BIMOS 7250-D pin 40 (A4 - Synchronisation)
- Timer-IC 7607 or transistor 7608 is defect (A7 - Control)

2. Note: If the Collector of 7402 is shorted to the Emitter, hick-up noise can be heard from the power supply. In this case the E/W protection is disabled. Is correctly working (a parabolic picture)

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 the protection, the led will blink according to the fault defined. In order to determine which protection circuit is active, isolation of each separate circuit is necessary. These protection circuits are:

- High beam current protection (LED blinks repetitively 2 times) - CRT panel (B)
- Vertical protection (LED blinks repetitively 3 times) - Vertical deflection (A3)

Text "CSM

- Line n
- indepe
- Operat
- Softwa
- Text "C
- Error b
- Option
- Config
- Service

1 HHHH  
2 CODES  
3 OP xxx  
4 SYS:   
5 NOT TU  
6 TIMER  
7 LOCKED  
8 (HOSP  
9 VOL L

## 5.6.2 THE POWER SUPPLY

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

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

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

## 5.6.5 Exit

Any key (F down" (sta off, other k

## 5.7 ComPair

### 5.7.1 Introduction

Compair ( Consumer developm and more advantage

- Comp repair throug
- Comp and is areas. comm
- Comp autom proce: availa
- Searc PCBs

ComPair ( and an int The ComF or RS232 interface t directiona from Com

## 5.6.3 Customer Service Mode (CSM)

All L9 sets are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and deactivated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible. Entering the Customer Service Mode. The Customer Service Mode can be switched on by pressing simultaneously the button (MUTE) on the remote control and any key on the control buttons (P+, P-, VOL +, VOL -) on the TV for at least 4 seconds.

When the CSM is activated:

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

Exit the Customer Service Mode.

The Customer Service Mode will switch off after:

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

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

## 5.6.4 The Customer Service Mode information screen

The following information is displayed on screen:

www.rtv-horvat-dj.hr

## The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).

With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 5 (the first error). The LED will operate in the same way as in point 1, but now for the error code on position x.

Example:

Error code position 1 2 3 4 5

Error buffer: 8 9 5 0 0

after entering SDM: blink (8x) - pause - blink (8x) - etc.

after transmitting "DIAGNOSE- 2- OK" with the DST blink (9x) - pause - blink (9x) - etc.

after transmitting "DIAGNOSE- 3- OK" with the DST blink(5x) - pause - blink(5x) - etc.

after transmitting "DIAGNOSE- 4- OK" with the DST nothing happens

## TROUBLE SHOOTING TIPS

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

## THE DEFLECTION CIRCUIT:

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

- Transistor 7402 is faulty

Text "CSM" on the first line

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

```

1 HHHH L90BBC-X.Y          CSM
2 CODES xx xx xx xx xx
3 OP xxx xxx xxx xxx xxx xxx
4 SYS: xxxxxxxxxxxx
5 NOT TUNED
6 TIMER
7 LOCKED
8 (HOSPITAL) (HOTEL)
9 VOL LIM <value>

```

CL 86532104\_014-aps  
080299

Figure 5-5 Screen lay-out Customer Service Mode

SYS: xxxxxx = xxxxxx is the SYSTEM THAT IS SET FOR THIS PRESET

NOT TUNED = no ident signal present

TIMER = (SLEEP) TIMER is activated

LOCKED = Channel/preset locked via parental lock, child lock

HOTEL = HOTEL mode activated; HOSPITAL = HOSPITAL mode activated

VOL LIM = Volume limiter activated and set to the adjusted value

### 5.6.5 Exit

Any key (RC or local keyboard) except "channel up" / "channel down" (standby switched to standby, mains OFF switches set off, other keys switch to normal operation)

## 5.7 ComPair

### 5.7.1 Introduction

Compair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the L9.2E in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; Compair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the L9.2E (when the micro processor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan L9.2E electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the L9.2E chassis, the ComPair interface box and the L9 communicate via an I2C cable (bi-directional) and via infra red communication (uni-directional; from ComPair interface box to L9.2E)

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

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

ComPair combines this information with the repair information in its database to find out how to repair the L9.2E.

#### Automatic information gathering

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

Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the L9.2E.

#### Manual information gathering

Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an waveform pictures) that will bring you to the next step in the faultfinding process.

A question could be: Do you see snow? (Click on the correct answer)

YES / NO

An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

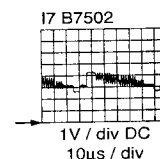


Figure 5-6

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

#### Additional features

Beside fault finding, ComPair provides some additional features like:

- Uploading/downloading of presets
- Managing of preset lists
- Emulation of the Dealer Service Tool

### 5.7.2 SearchMan (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the Schematics and PCBs of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair. Example: Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier. Clicking on the PCB hyper-link, automatically shows the PCB with a high-lighted capacitor C2568. Clicking on the schematic hyper-link, automatically shows the position of a high-lighted capacitor at the schematic.

### 5.7.3 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the L9.2E. (See the ComPair Browser Quick Reference Card for installation instructions.)

## 6. Fault

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



Figure 5-7

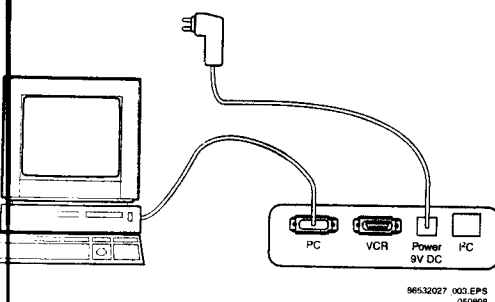


Figure 5-8

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

## 5.7.4 Preset installation

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

- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red

- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

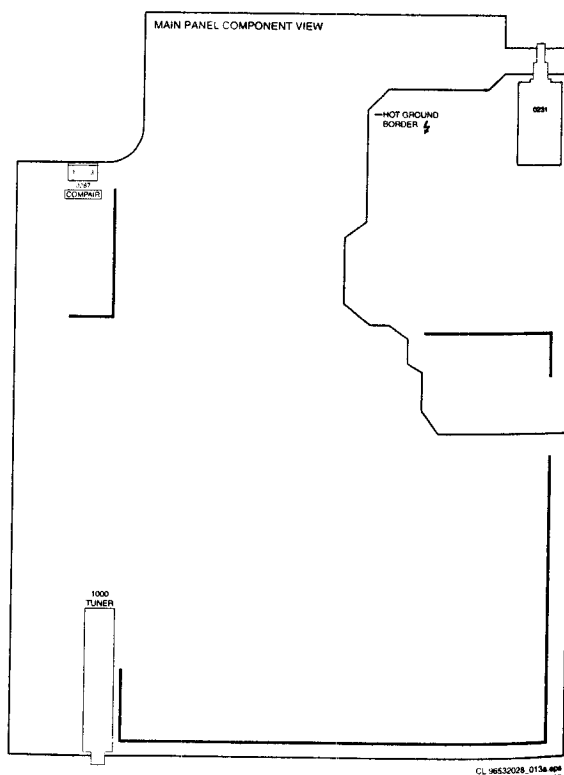
Click on "File" "Open" and select "L9.2E fault finding" to use the cable

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

## 5.8 Ordering ComPair

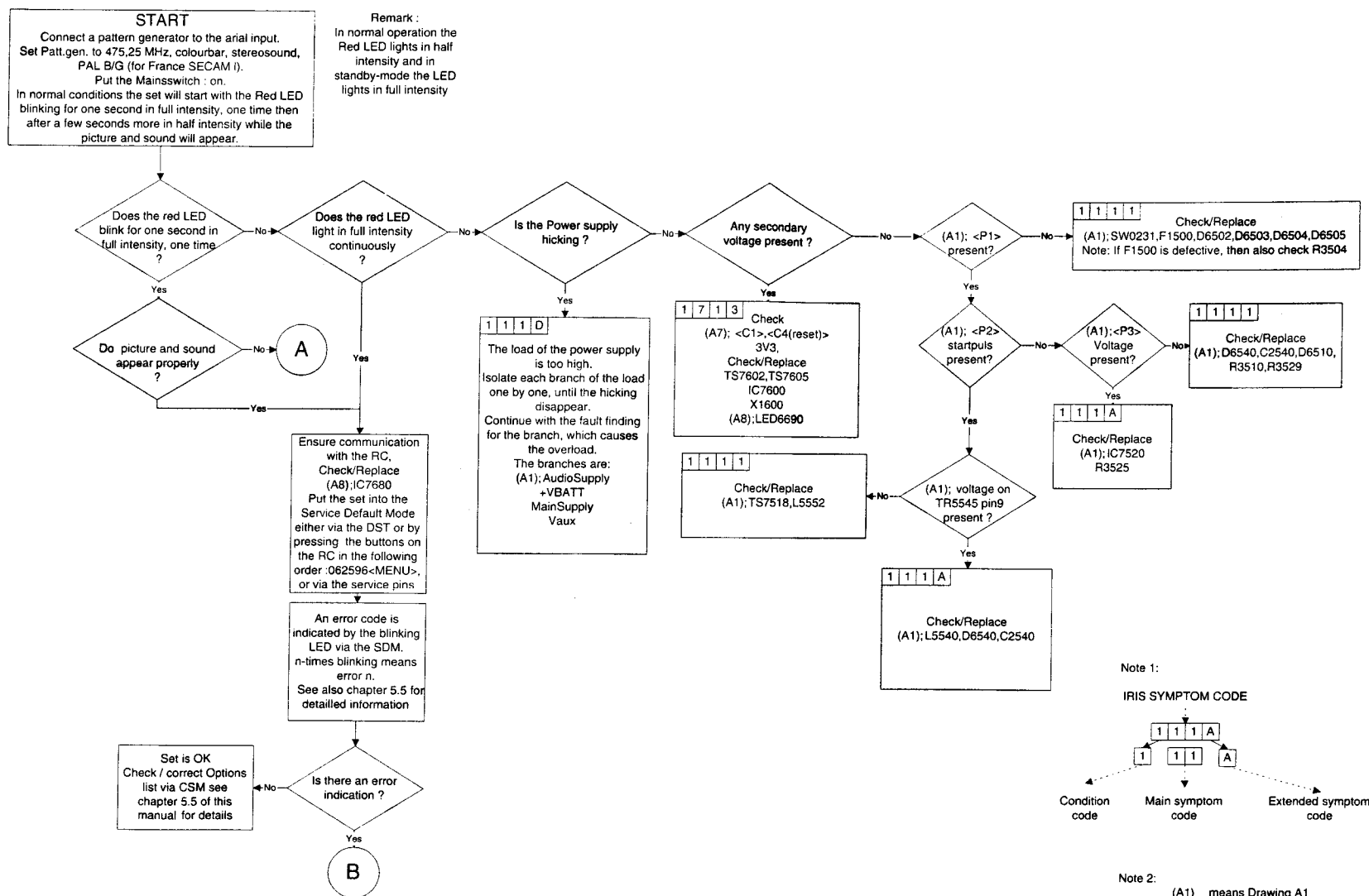
Compair order codes:

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

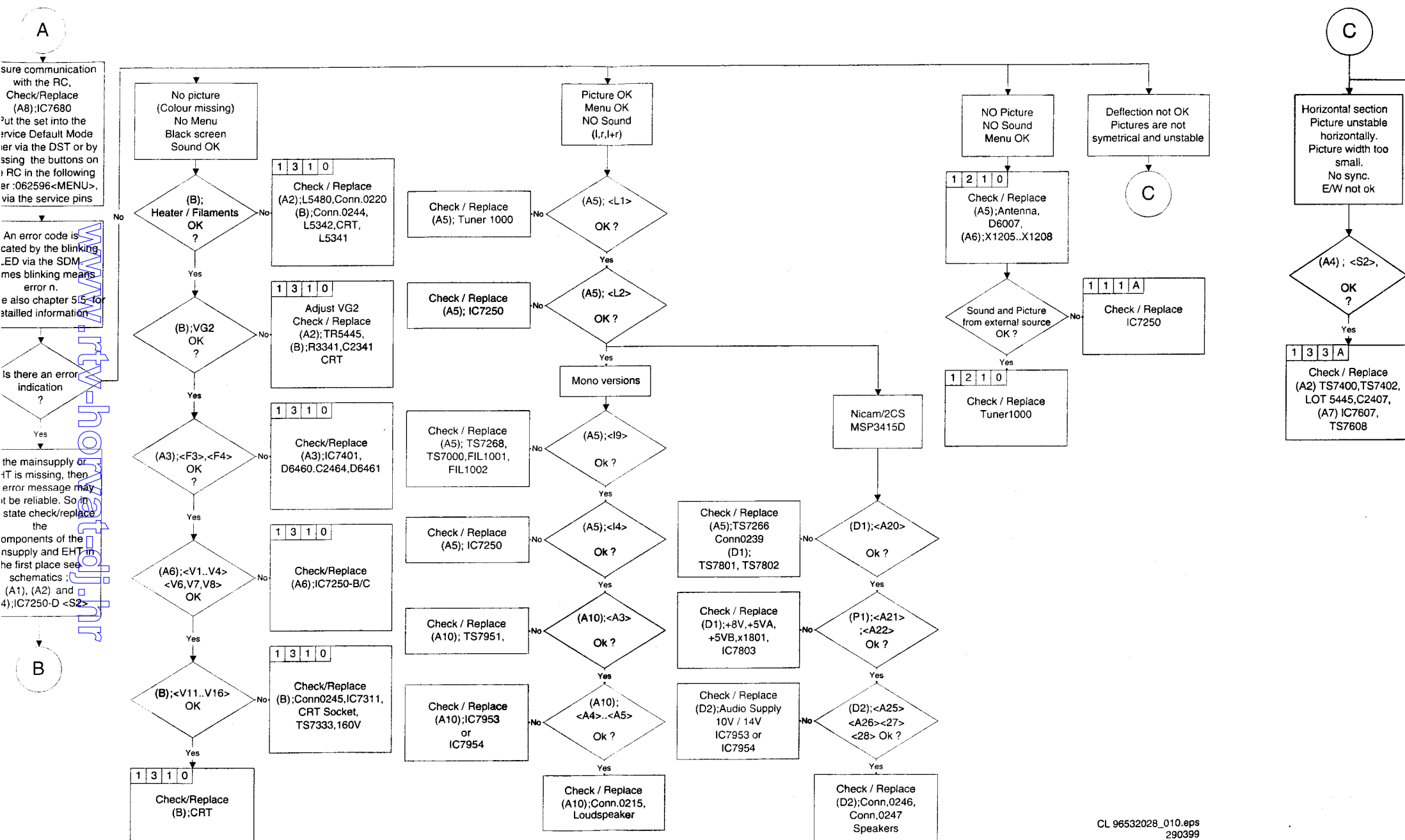


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## 6. Faultfinding trees, blockdiagram, supply diagram and testpoints.





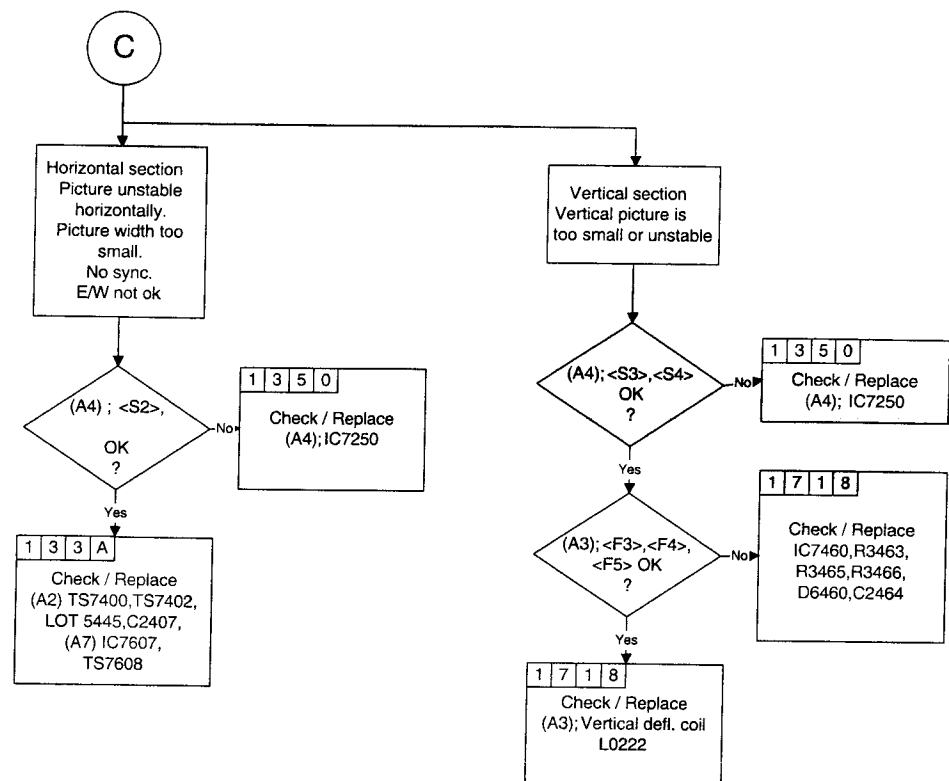




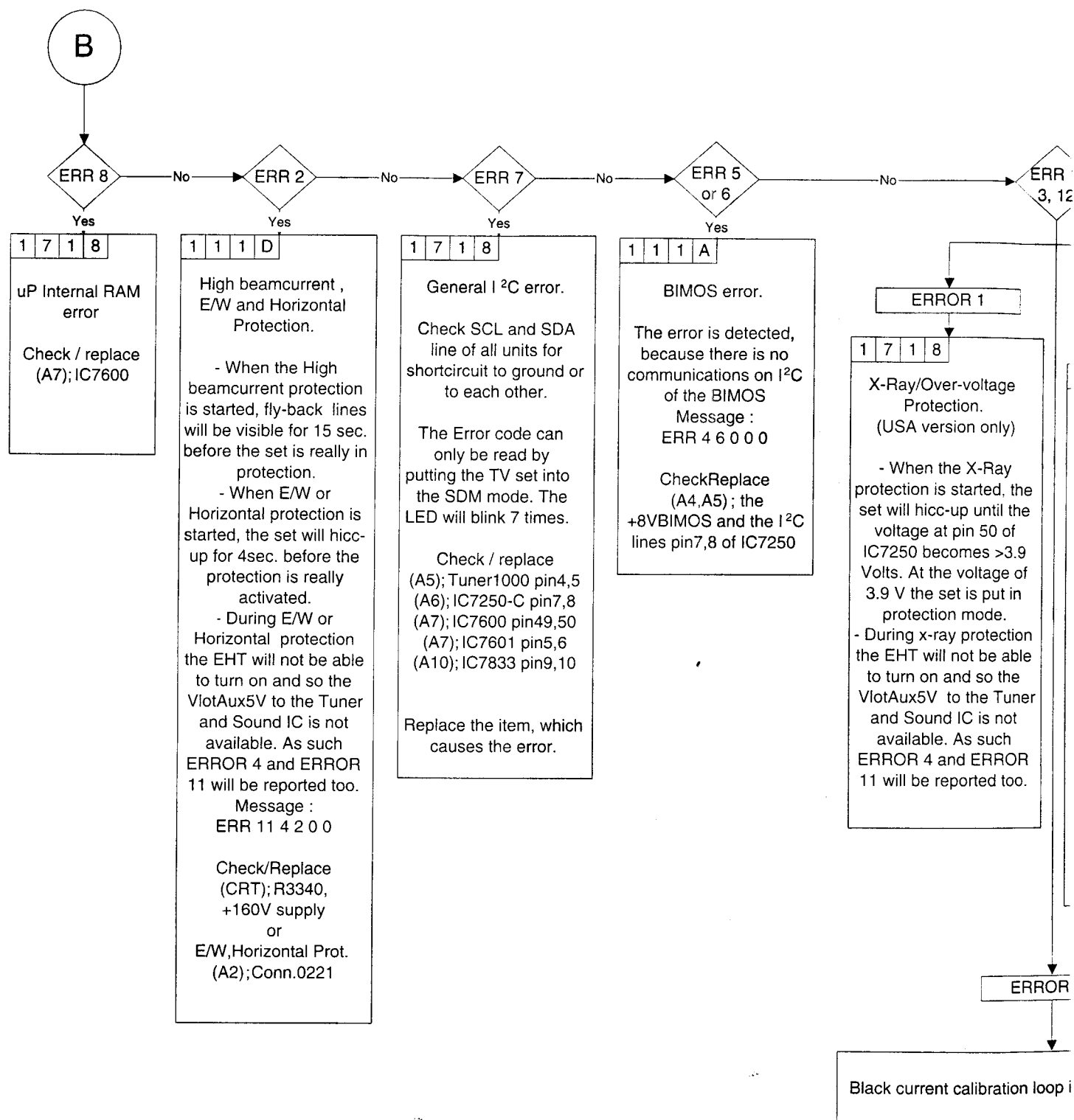
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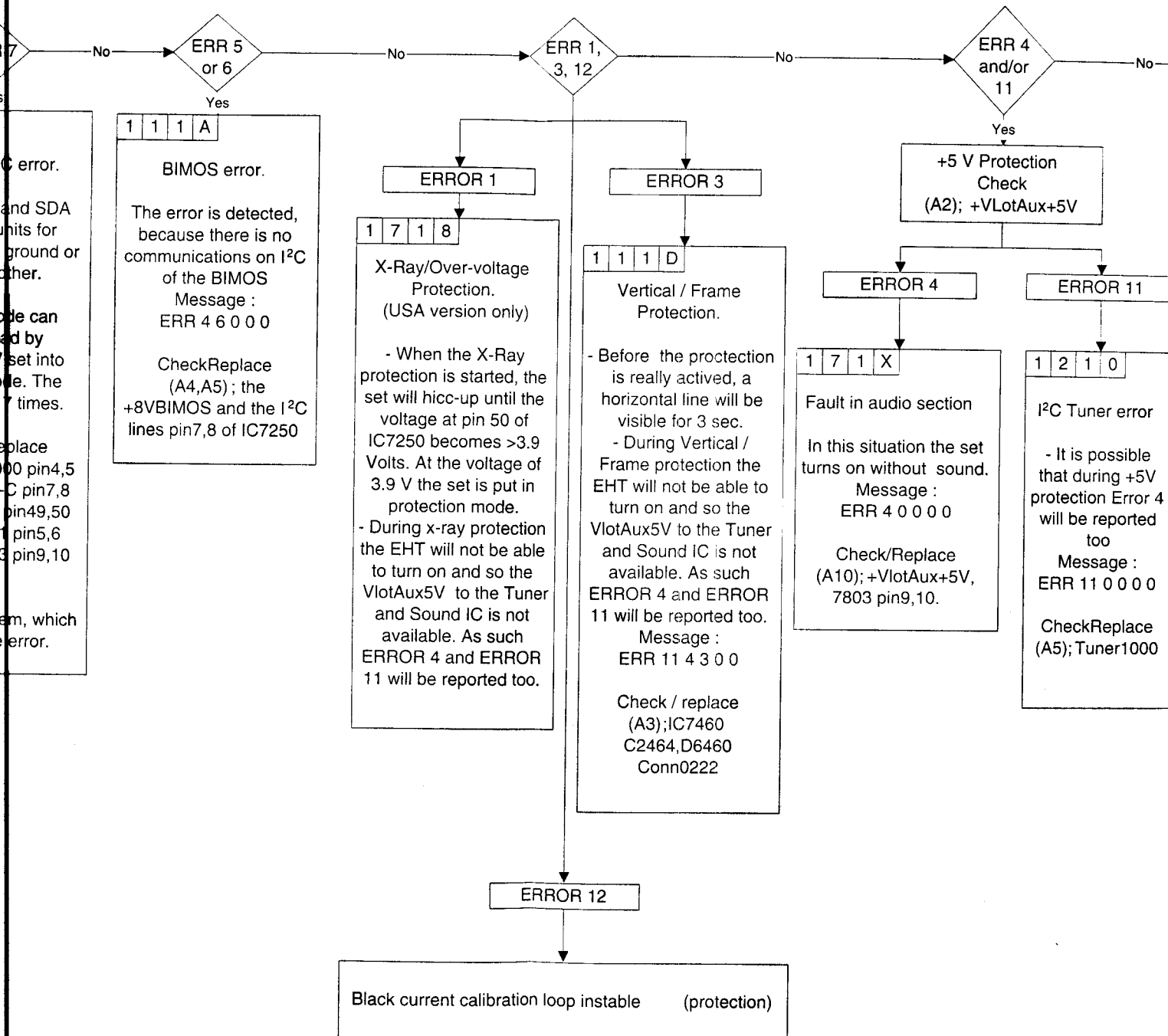
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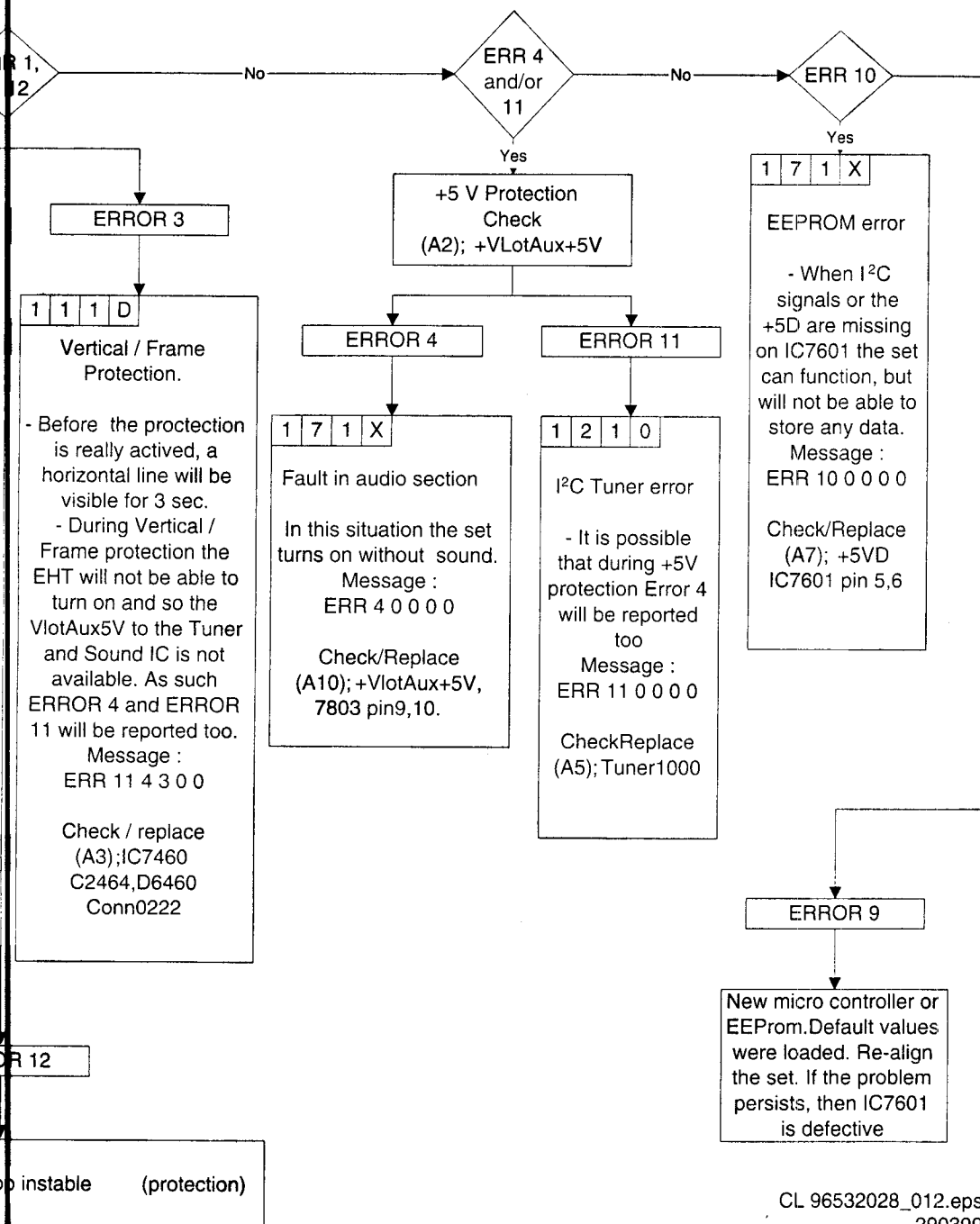
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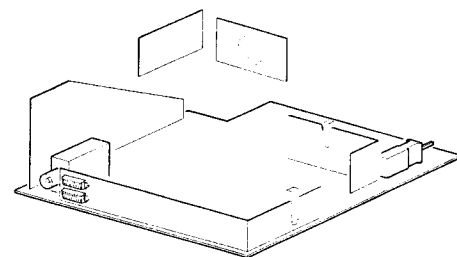
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# Service Service Service



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PAGE 01

# Service Manual

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# Technical Specifications

## Specifications

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

Off air : 100dBV  
 On air : 90dBV  
 Audio output :  
 • Stereo : 2 \* 3W; 2 \* 1W  
 • Mono : 2 \* 2W; 4W; 3W; 2W; 1W  
 Tuners :  
 • UV 1316/AI-2 (PAL)  
 • UV 1316/AIU-2 (PAL)  
 • UV 1356C/AI (PAL)

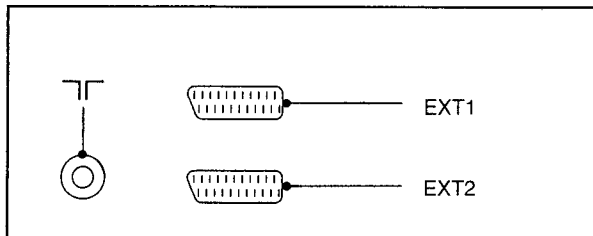
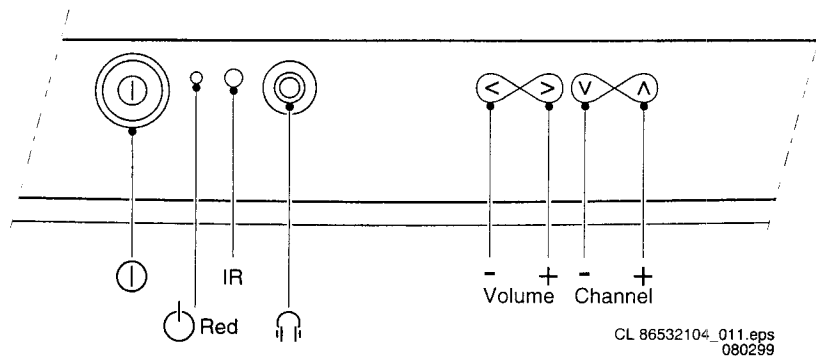
20- CVBS  
 21- Earth sc:

1.2.3 Cinch - audio

V - CVBS  
 (yellow)

1.3 PCB loca

## Specification of the terminal sockets



## 1 CVBS(in/out) + RGB(in) - tuner at output

Audio Out R (0.5VRMS ( 1kΩ)  
 Audio In R (0.2-2VRMS ( 10kΩ)  
 Audio Out L (0.5VRMS ( 1kΩ)  
 Earth screen  
 Earth screen  
 Audio In L (0.2-2VRMS ( 10kΩ)  
 Blue (0.7Vpp/75)  
 CVBS status (INT = 0-2V, EXT (16:9) = 4.5-7V,  
 EXT(4:3) = 9.5 -12V)  
 Earth screen  
 -  
 Green (0.7Vpp/75)  
 -  
 Earth screen  
 Earth screen  
 Red (0.7Vpp/75)  
 FBL (<0.9V RGB mode)  
 Earth screen  
 Earth screen  
 CVBS  
 CVBS (1Vpp/75)  
 Earth screen

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

Input = EXT2 => output = tuner  
 Input = tuner/EXT1 => output = tuner/EXT11  
 1 - Audio Out R (0.5VRMS ( 1kΩ)  
 2 - Audio In R (0.2-2VRMS ( 10kΩ)  
 3 - Audio Out L (0.5VRMS ( 1kΩ)  
 4 - Earth screen  
 5 - Earth screen  
 6 - Audio In L (0.2-2VRMS ( 10kΩ)  
 7 -  
 8 - CVBS status (INT = 0-2V, EXT (16:9) = 4.5-7V,  
 EXT(4:3) = 9.5 -12V)  
 9 - Earth screen  
 10- -  
 11- -  
 12- -  
 13- Earth screen  
 14- Earth screen  
 15- C (300mVpp/75)  
 16- -  
 17- Earth screen  
 18- Earth screen  
 19- CVBS

## 2. Safety

### 2.1 Safety ins

- Safety re
  - The
  - isola
  - Safe
  - shot
  - origi
  - Whe
  - worr
- Safety re
  - be return
  - should b
  - As a
  - sold
  - curre
  - instr
  - /
  - F
  - S
  - L
  - F
  - C



20- CVBS (1Vpp/75)  
21- Earth screen



L - Audio L (red) (0.2-2Vrms 10kΩ)  
R - Audio R (white) (0.2-2Vrms 10kΩ)



### 1.2.3 Cinch - audio/video in

V - CVBS (yellow) (1Vpp/75))

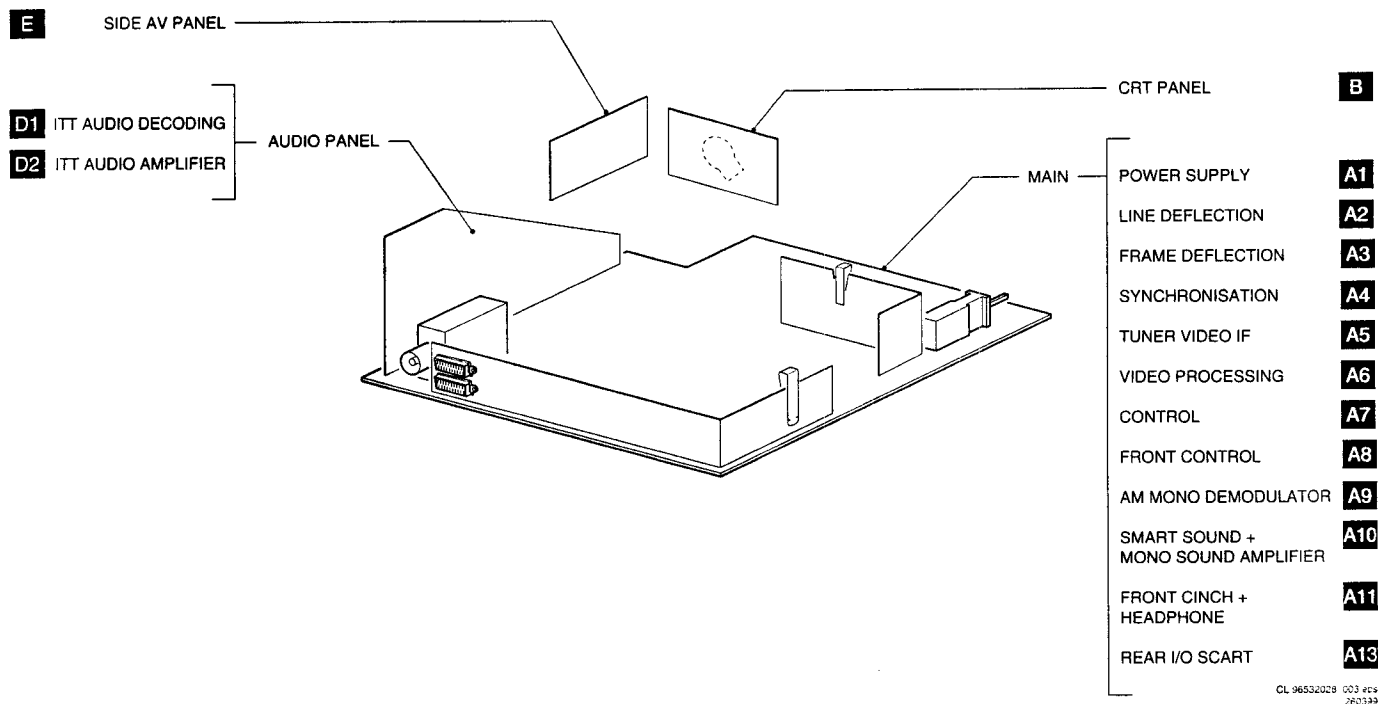


### 1.2.4 Headphone

- 8-600Ω (4mW)



## 1.3 PCB location drawing



## 2. Safety instructions, maintenance instruction, warnings and Notes

### 2.1 Safety instructions for repairs ⚠

- 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.
- 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 M $\Omega$  and 12 M $\Omega$

- 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.

## 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.

## Warnings

### ESD

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.

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

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).

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.

Be careful during measurements in the high-voltage section and on the picture tube.

Never replace modules or other components while the unit is switched on.

When making settings, use plastic rather than metal tools.

This will prevent any short circuits and the danger of a circuit becoming unstable.

Wear safety goggles during replacement of the picture tube.

## Notes

Direct voltages and oscillograms should be measured with regard to the tuner earth (⏏), or hot earth (⏏) as this is called.

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 (3 kHz, R:1 kHz unless stated otherwise) and picture carrier 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.

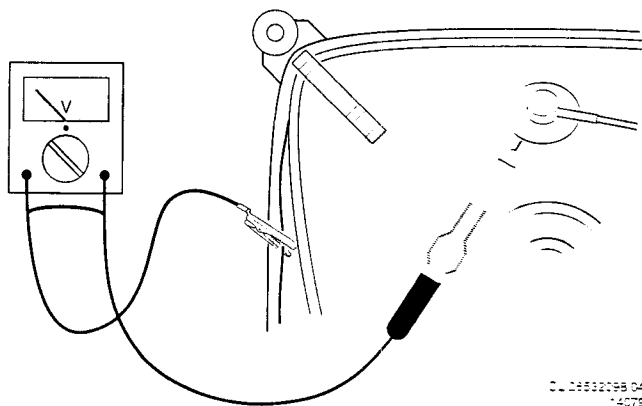


Figure 2-1

Manual tuning

This menu allows you to store the programmes one by one.  
Press . The main menu comes up on the screen.

Tuning in to channels

Quick installation (first use)

### 3. Directions for use

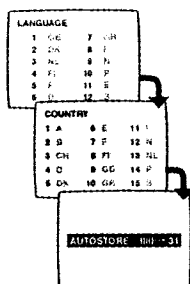
#### Tuning in to channels

##### Quick installation (first use)

The following operations are all described in the enclosed quick installation guide. We advise you to use it.

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

If the menu does not appear, hold down the PROGRAM- and PROGRAM+ keys on the set for 4 seconds to bring it up.



- 1 Use the keys numbered from 0 to 9 on the remote control to choose your language (for English, press 1). Another menu appears.

- 2 Select your country (for GB, press 9).

- 3 As soon as your country is entered, tuning in starts automatically. The operation takes a few minutes. A display shows the search status and the number of programmes found. When it has finished, the menu disappears and the last programme is displayed.

If no programmes are found, refer to the chapter entitled Tips on p. 10.

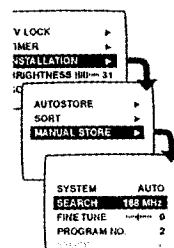
- 4 If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered.

- 5 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 0/1 keys and confirm with 0.

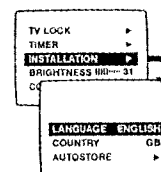
##### Manual tuning



This menu allows you to store the programmes one by one.

- 1 Press 0. The main menu comes up on the screen.
- 2 Press 0 once to select INSTALLATION then press 0.
- 3 Select MANUAL STORE (0) and press 0. The MANUAL STORE menu appears.
- 4 Select SYSTEM (only available on certain models). Use 0 to choose UK (standard I), FRANCE (standard LL) or WEST-EU (standard BG reception).
- 5 Select SEARCH and press 0. The search begins. As soon as a programme is found, the search will stop. If you know the frequency of the programme required, simply enter its number using keys 0 to 9. If no programme is found, refer to the Tips chapter on p. 10.
- 6 If reception is unsatisfactory, select FINE TUNE and press 0 or 0 to fine tune.
- 7 Select PROGRAM NO. and enter the required programme number using 0 or 0 to 9.
- 8 Select STORE and press 0. The message STORED appears. The programme has been stored.
- 9 Repeat steps 5 to 8 as many times as there are programmes to store. To exit the menus, press 0.

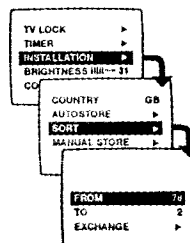
##### Other settings on the INSTALLATION menu



- 1 Press 0. The main menu is displayed on-screen.
- 2 Press 0 once to select INSTALLATION and press 0. The INSTALLATION menu appears.
- 3 Use 0 to select a setting and 0 to adjust.
  - LANGUAGE: to change the menu language.
  - COUNTRY: to select the country you are in (GB for Great Britain). This setting affects the automatic programme sort.
  - AUTOSTORE: press 0 to begin storing. The operation takes a few minutes. When it is complete, the INSTALLATION menu reappears automatically. For more information, see the Quick Installation chapter, steps 1 to 5 on the previous page. To exit or interrupt the search, press 0.
  - EXTERNAL: press 0 to bring up the menu. You have access to a series of names which allow you to customise the names of the external sockets. When you next select an external socket, its chosen name will be displayed for a few seconds.

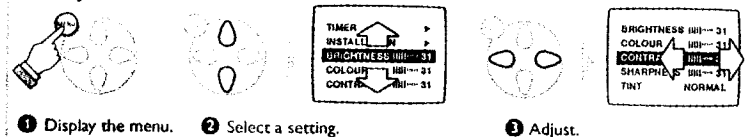
- 4 To exit from the menus, press 0.

##### To renumber the programmes found



- 1 Press the 0 key. The main menu is displayed.
- 2 Press 0 once to select INSTALLATION, then press 0. The INSTALLATION menu appears. The LANGUAGE option is activated.
- 3 Press 0 3 times to select SORT then press 0. The SORT menu appears. The FROM option is activated.
- 4 Select the programme you wish to renumber using keys 0 or 0 to 9. Example: to renumber programme 78 as 2, press 7 8.
- 5 Select option A (key 0) and enter the new number with keys 0 or 0 to 9 (for the example given, enter 2).
- 6 Select EXCHANGE (key 0) and press 0. The message EXCHANGED appears, the exchange takes place (0 to cancel). In our example, programme 78 is renumbered as 2 (and programme 2 as 78).
- 7 Select the option FROM (key 0) and repeat stages 4 to 6 as many times as there are programmes to renumber.
- 8 To exit from the menus, press 0.

## To adjust a menu:



Note: the menus disappear automatically after 30 seconds if no further adjustments are made. To exit from the menus, press (or to come back to the previous stage).

## Adjusting the picture



Press . You can adjust **BRIGHTNESS, COLOUR, CONTRAST, SHARPNESS, TINT, CONTRAST+ and NOISE RED.**

- **SHARPNESS:** alters the crispness of the image.
- **TINT:** alters the colour balance. There are 3 options: COLD (blue tint), NORMAL (balanced) or WARM (red tint).
- **CONTRAST+:** automatically adjusts the image contrast according to content (the darkest part of the image is always black).
- **NOISE RED:** alleviates fuzziness (snowy picture). This setting is useful when reception is difficult.

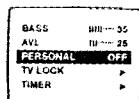
## Adjusting the sound



Press . You can adjust **VOLUME** and, for stereo models only, **BALANCE, TREBLE, BASS and AVL.**

- **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.
- **AVL (Automatic Volume Leveller):** automatic volume control used to avoid sudden increases in volume, particularly when changing programme or during advertisements.

## Storing settings



You can store your own sound and picture settings.

- 1 First carry out your menu settings.**
- 2 Next, select PERSONAL and press .** The message STORED is displayed. The settings are stored.

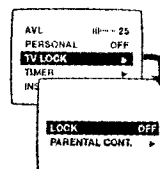
Values are saved under PERSONAL in the Smart sound and picture controls ( and .

Note: volume and **VOLUME** are automatically stored and do not need to be stored in the PERSONAL menu.

## 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

## Locking the set



This function (only available on certain models) allows you to lock the set in order to limit its use completely or partially.

## Key lock

- 1 Press , select TV LOCK () and press .**
- 2 Set the LOCK to ON.** The keys are locked.
- 3 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 LOCK to OFF.

## Programme lock

- 1 Press , select TV LOCK () and press .**
- 2 Select PARENTAL CONT. and press .**
- 3 Enter your confidential access code.** The first time, enter the code 0711 then confirm by re-entering 0711. The menu appears.
- 4 Select PROGRAM NO. and use keys or to enter the number of the programme or socket you wish to lock.**

To lock all of them, select ALL.

- 5 Select LOCK then YES.**
- 6 Repeat stages 4 and 5 for each programme to be locked.** You can lock 5 programmes separately.
- 7 Press 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. When a locked programme is displayed, use the keys to access other programmes (the keys are used to enter the code). Caution: in the case of encrypted programmes which use an external decoder, it is necessary to lock the corresponding EXT socket (and not the programme number).

## To unlock all programmes

- Repeat stages **1** - **3** above, then:
- 4 Select CLEAR ALL and press .** All programmes are unlocked.

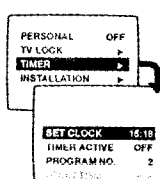
## To change the confidential code

- Repeat stages **1** - **3** above, then:
- 4 Select CHANGE CODE and enter your own 4-digit number.**
- 5 Confirm by entering it again.** Your new code will be stored.

If you have forgotten your confidential code, enter the universal code 0711 twice.

To exit: press .

## Timer function



This function (only available on certain models) allows you to use your TV as an alarm clock.

- 1 Press , select TIMER () and press .**
- 2 The SET CLOCK menu appears.** Enter the time ( or .
- Important:** 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.
- 3 Select TIMER ACTIVE and press to switch the timer on or off.**
- 4 Select PROGRAM NO. and enter the number of the programme required.**
- 5 Select START TIME and enter the time at which the set is to switch on.**
- 6 Press to put the set into standby mode.** It will switch on automatically at the programmed time. If you leave the set switched on, it will merely change programmes at the set time.

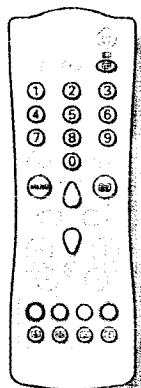
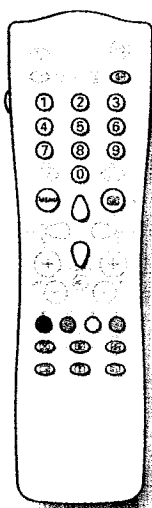
The set switches off automatically after 4 hours if no further commands are given.

## Connecting other appliances

Depending on the model, the TV is equipped with 1 or 2 euroconnector sockets, EXT1 and EXT2. The EXT1 socket controls audio video input/output and RGB input.

## 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.).



### Press:



Switch teletext on/off



Selecting a teletext page



Direct access to subject headings



\*Temporary on/off



Page enlargement



Stop the sequence of sub-pages



Overlaying text on the TV picture



Reveal



\*Table of contents



Favourite pages (available only on certain models)

### To obtain:

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).

Use keys 0 to 9 or 1 to 9 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.

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.

To switch teletext temporarily on or off.

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

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.

To activate or deactivate screen overlay.

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

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

For teletext programmes 1 to 41, you can store 4 favourite pages which you can then access via the coloured keys.

- 1 Press 1.
- 2 Enter the number of the page required.
- 3 Press 1 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 1. To remove these settings, hold 1 down for 3 seconds.

\* Only available with the remote control shown above.

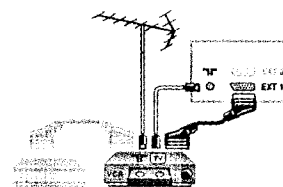
## Connecting other appliances

Depending on the model, the TV is equipped with 1 or 2 euroconnector sockets, EXT1 and EXT2.

The EXT1 socket controls audio video input/output and RGB input.

The EXT2 socket (if available) controls audio video input/output and S-VHS input.

### Video recorder



### Video recorder (only)

Connect as shown using a good quality euroconnector cable.

If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder test signal and assign it programme number 0 (see manual store, p. 4). To reproduce the video recorder picture, press 0.

### Video recorder with decoder

Connect the decoder to the second euroconnector on the video recorder. You can then record scrambled transmissions.

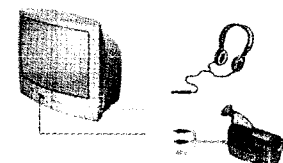
### Other equipment



### Satellite receiver, decoder, DVD, games, etc.

For sets equipped with two euroconnector sockets, it is best to connect the equipment which produces RGB signals (digital decoder, DVD drives, games, etc.) to EXT1 and the equipment which produces S-VHS signals (S-VHS and Hi-8 video recorders) to EXT2.

### Front panel connections



Depending on the model, sockets are on the front (sometimes under a flap) or on the right-hand side of the set.

### Headphones

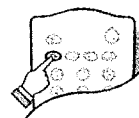
When the earphones are plugged in, the sound on the set is cut off. Adjust the volume using the 1/2 keys.

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

### Camcorder

Certain models are equipped with AUDIO/VIDEO connections. You will find 1 video input + 1 sound input (mono versions) or 2 sound inputs left (L) and right (R) on stereo versions. Make the connections, then use the 0 key to select EXT (or EXT2 for models with 2 euroconnector sockets). The switch between the front and rear sockets is automatic with priority on front sockets.

For a monophonic camera, connect the sound signal to the AUDIO L input. Use the 0 key to reproduce the sound through the left and right TV speakers.



### To select connected equipment

Press 0 to select EXT(1) and, on models with 2 euroconnector sockets: EXT2 and Y/C2 (S-VHS signal on EXT2).

The switch is automatic on most appliances (decoders, etc.).

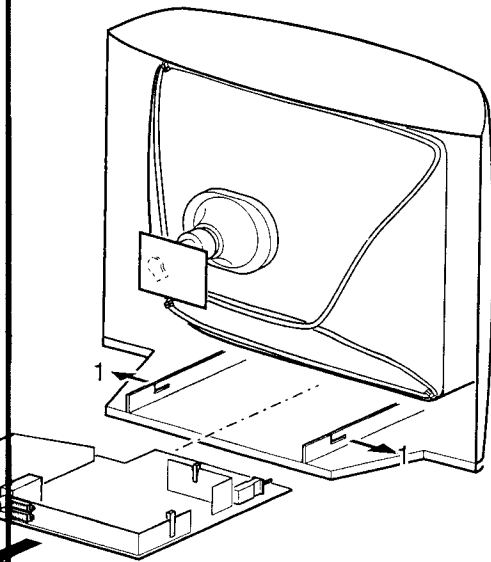


# Mechanical instructions

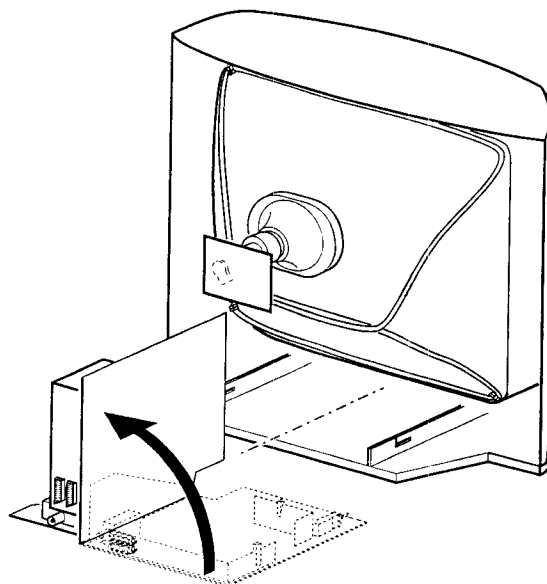
## Service positions

See figure 4.2 for the service position.

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



A



B

CL 96532028\_004.eps  
190499

Figure 4-2

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

## Service Modes, fault finding and repair tips

In this chapter the following paragraphs are included:

Test points  
Service Modes and Dealer Service Tool (DST)  
The menus and submenus  
Error code buffer and error codes  
The "blinking LED" procedure  
Trouble shooting tips  
Customer service mode (CSM)  
ComPair  
Ordering compare

### Test points

The L9 chassis is equipped with test points in the service position. These test points are referring to the functional blocks:  
A1-A2-A3, etc.: Test points for the AM Mono Demodulator (A9), ITT panel (D1) and Sound amplifier (D2)  
C1-C2-C3, etc.: Test points for the control circuit (A7) and the front control (A8)  
F1-F2-F3, etc.: Test points for the frame deflection circuit (A3)  
I1-I2-I3, etc.: Test points for the Tuner Video IF circuit (A5)  
L1-L2-L3, etc.: Test points for the Line deflection circuit (A2)  
P1-P2-P3, etc.: Test points for the power supply (A1)  
S1-S2-S3, etc.: Test points for the synchronisation circuit (A4)

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

Measurements are performed under the following conditions:

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

## 5.2 Service modes and Dealer Service Tool (DST)

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

### 5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with presets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the L9 chassis, download code X should be used).

### 5.2.2 Diagnose fea

L9 sets can be in the Service Mode (SAM).

### 5.2.3 Service Defa

The purpose is

- provide a measurement
- override E and pin25
- start the test
- Setting of
- Inspect th

### Entering the

- By transmitt the Dealer Service Mode
- Standard "MENU"
- By shorting the mono switching
- Caution!!

### Exit the SDM

Switch the set to normal operation.

Note: When the SDM is switched on, the set is switched on.

The SDM set

- Pal/Secam
- the L'-sig
- Volume k
- Other pic

The following interfere with the event that the set is unchanged.

- (Sleep)T
- Blue mut
- Auto swit
- Hotel or l
- Child lock
- Skipping
- Automati
- Automati
- All other cont

### 5.2.4 Special func

#### Access to n

Pressing the normal user button and contrast button. Pressing the status button.

#### Error buffer

Pressing the OSD (incl. error code buffer).

#### Access to S

By pressing the buttons on the "ALIGN" on the DST, the set



### 5.2.2 Diagnose features for service

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

### 5.2.3 Service Default Mode (SDM)

The purpose of the SDM is:

- provide a situation with predefined settings to get the same measurements as in this manual
- override 5V protections in case of short circuiting pin 24 and pin25.0228 and pin 0224 at A7.
- start the blinking LED procedure
- Setting of options controls
- Inspect the error buffer

#### Entering the SDM:

- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM)
- Standard RC sequence 062596 followed by the key "MENU"
- By shorting test-point M25 and M24pin 0228 and 0224 on the mono-carrier ( A7 ) while switching on the set. After switching on the set the short-circuit can be removed. ( Caution!! Override of 5V protections ).

#### Exit the SDM:

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

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

The SDM sets the following pre-defined conditions:

- Pal/Secam sets: tuning at 475.25 PAL (For France select the L'-signal )
- Volume level is set to 25% (of the maximum volume level).
- Other picture and sound settings are set to 50%.

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

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

All other controls operate normally.

### 5.2.4 Special functions in SDM

#### Access to normal user menu

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

#### Error buffer

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

#### Access to SAM

By pressing the "CHANNEL DOWN" and "VOLUME DOWN" buttons on the local keyboard simultaneously or pressing "ALIGN" on theDST  
DST, the set switches from SDM to SAM

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

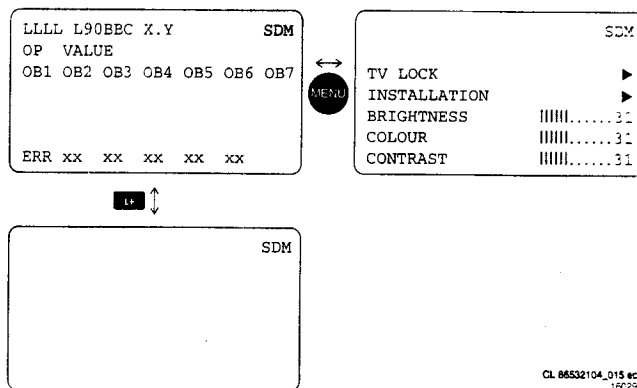


Figure 5-3 Service Default Mode screens and structure

Explanation notes/references:

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

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

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

### 5.2.5 Service Alignment Mode (SAM)

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

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

#### Entering SAM:

- By transmitting the "ALIGN" button command with the RC7150 Dealer Service Tool
- By pressing the "CHANNEL DOWN" and "VOLUME DOWN" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 062596 followed by the key "OSD"

By shorting pin 0225 and 0226 on the mono-carrier ( A7 ) while switching on the set. After switching on the set the short-circuit can be removed. ( Caution!! Override of 5V protections ).

#### Exit the SAM:

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

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

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

Figure 5.2 Service Alignment Mode screens and structure

#### Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu ( TV lock, installation, brightness, colour and contrast ) while "SAM" remains displayed in top of screen.

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

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

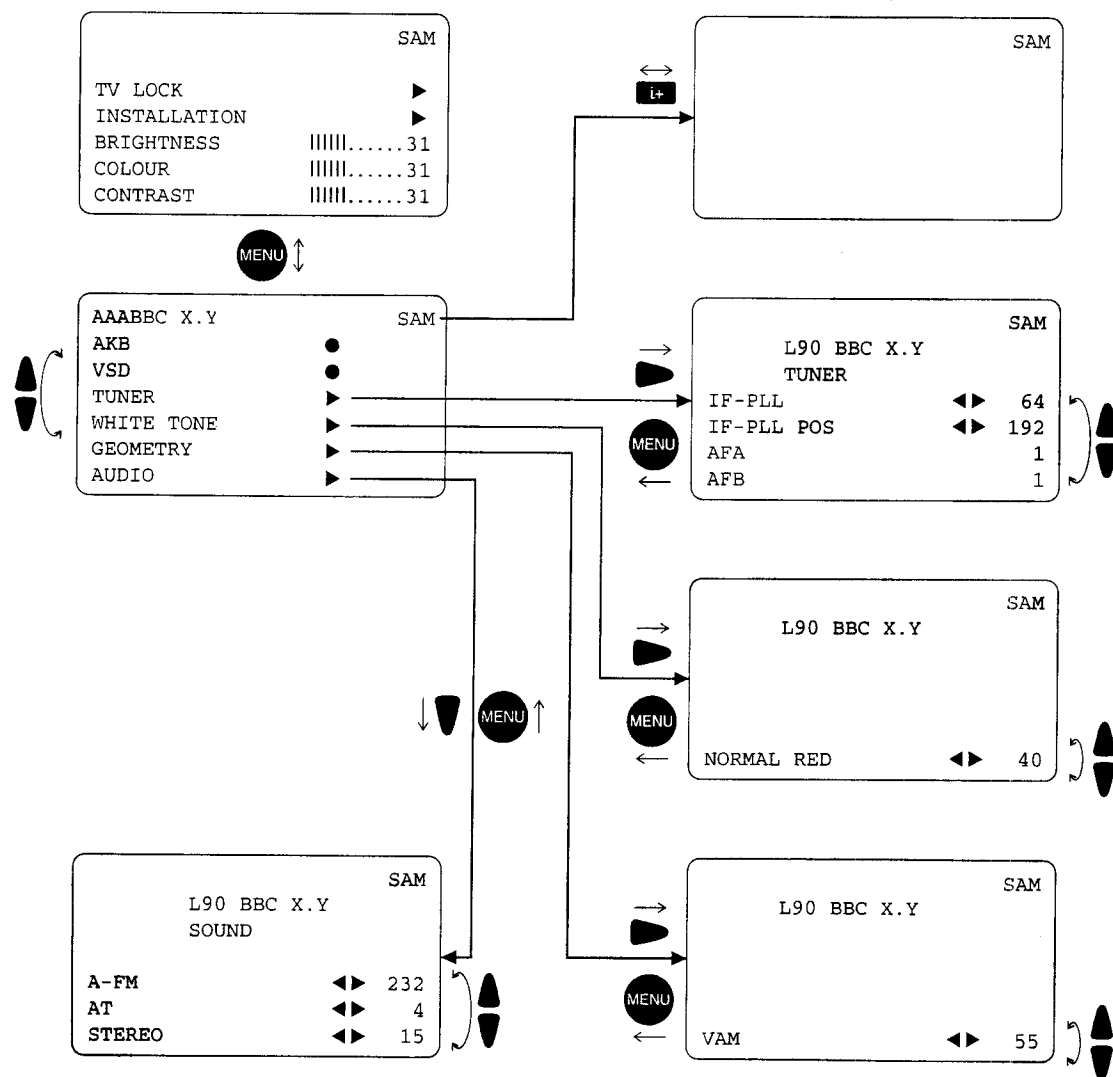
#### Access to SDM

Pressing the "DEFAULT" button on the DST

#### SAM menu control

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

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



### 5.3 The menus

#### 5.3.1 Tuner sub menu

The tuner sub

- IF\_PLL
- systems, c
- IF\_PLL PC
- IF\_PLL OI
- AFW
- AGC
- YD
- CL
- AFA
- AFB

The items AF, monitoring pu  
The command select the nex  
The command increase/decr  
values will be  
The item valu

#### 5.3.2 White tone s

The command select the nex  
The command increase/decr  
values will be  
The item valu  
The white ton  
• NORMAL  
• NORMAL  
• NORMAL  
• DELTA C  
• DELTA C  
• DELTA C  
• DELTA W  
• DELTA W  
• DELTA W  
OSD is kept t  
tone alignmer  
The Contrast  
the white tone

#### 5.3.3 Audio sub m

The tuner sut  
• A-FM  
• AT  
• STEREO  
• DUAL  
The sound ac  
sets.  
The presence  
selected sour

#### 5.3.4 Geometry st

The geometr  
• VAM : Ve  
• VSL : Ve  
• SBL : Se  
• HSH : Hc  
• H60 : De  
• V60 : De  
• VSC : Ve  
• VSH : Ve

Figure 5-4 Service Alignment Mode screens and structure

### 5.3 The menus and submenus

#### 5.3.1 Tuner sub menu

The tuner sub menu contains the following items:

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

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

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

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

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

#### 5.3.2 White tone sub menu

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

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

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

The white tone sub menu contains the following items:

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

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

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

#### 5.3.3 Audio sub menu

The tuner sub menu contains the following items:

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

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

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

#### 5.3.4 Geometry sub menu

The geometry sub menu contains the following items:

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

### 5.4 Error code buffer and error codes

#### 5.4.1 Error code buffer

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

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

Examples:

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

#### 5.4.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present. If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).

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

- a. Error 0 = No error
- b. Error 1 = X-ray ( Only for USA sets )
- c. Error 2 = High beam current protection  
High beam protection active; set is switched to protection; error code 2 is placed in the error buffer; the LED will blink 2 times ( repeatedly ).

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +160V supply to the CRT panel is present. If the voltage is present, the most likely cause is the CRT panel or the picture tube. Disconnect the CRT panel to determine the cause. If the +160V voltage is not present, check R3416 and D6409 ( Horizontal Deflection - A2 )

EW protection:

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

horizontal deflection coil 5445

S-correction capacitor 2407

flyback capacitor 2434

line output stage

short circuit of flyback diode 6434

EW power-transistor 7402 or driver-transistor 7400

- d. Error 3 = Vertical / Frame protection

There are no pulses detected at pin 37 of the main microprocessor 7600 ( panel A7 ).

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

IC 7460 is faulty ( A3 )

Open circuit of vertical deflection coil

Vlotaux +13V not present and/or Vlotaux -13V not present

Resistor 3463

Transistor 7609 is defect ( A7 )

- e. Error 4 = Sound processor ( IC7803 ) I2C error ( MSP3415D )

Sound processor does not respond to the micro controller

- f. Error 5 = Bimos ( IC7250 ) start-up error ( POR bit )

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

g. Error 6 = Bimos (TDA884x) I2C error

Note that this error may also be reported as a result of error codes 4 (in that case the Bimos might not be the actual problem)

h. Error 7 = General I2C error. This will occur in the following cases:

SCL or SDA is shorted to ground

SCL is shorted to SDA

SDA or SCL connection at the micro controller is open circuit.

i. Error 8 = Microprocessor (IC7600) internal RAM error (A7)

The micro controller internal RAM test indicated an error of the micro controller internal memory (tested during start-up);

j. Error 9 = EEPROM Configuration error (Checksum error); EEPROM is corrupted.

k. Error 10 = I2C error EEPROM. NV memory (EEPROM) does not respond to the micro controller

l. Error 11 = I2C error PLL tuner. Tuner is corrupted or the I2C line to the Tuner is low or no supply voltage present at pin 9, pin 6 or pin 7 of the tuner.

m. Error 12 = Black current loop instability protection. The black current could not be stabilised. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.

- The driver circuit around transistor 7400 is faulty
- No horizontal drive signal coming from the BIMOS 7250-D pin 40 (A4 - Synchronisation)
- Timer-IC 7607 or transistor 7608 is defect (A7 - Control)

2. Note: If the Collector of 7402 is shorted to the Emitter, hick-up noise can be heard from the power supply. In this case the E/W protection is disabled. Is correctly working (a parabolic picture)

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 the protection, the led will blink according to the fault defined. In order to determine which protection circuit is active, isolation of each separate circuit is necessary. These protection circuits are:

- High beam current protection (LED blinks repetitively 2 times) - CRT panel (B)
- Vertical protection (LED blinks repetitively 3 times) - Vertical deflection (A3)

Text "CSM

- Line n
- indepe
- Operai
- Softwa
- Text "C
- Error b
- Option
- Config
- Service

1 HHHH  
2 CODES  
3 OP xxx  
4 SYS:   
5 NOT TU  
6 TIMER  
7 LOCKED  
8 (HOSP  
9 VOL L

## 5.6.2 THE POWER SUPPLY

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

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

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

## 5.6.5 Exit

Any key (F down" (sta off, other k

## 5.7 ComPair

### 5.7.1 Introduction

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- Comp autom proce: availa
- Searc PCBs

ComPair ( and an int The ComF or RS232 interface t directiona from Com

## 5.6.3 Customer Service Mode (CSM)

All L9 sets are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and deactivated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible. Entering the Customer Service Mode. The Customer Service Mode can be switched on by pressing simultaneously the button (MUTE) on the remote control and any key on the control buttons (P+, P-, VOL +, VOL -) on the TV for at least 4 seconds.

When the CSM is activated:

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

Exit the Customer Service Mode.

The Customer Service Mode will switch off after:

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

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

## 5.6.4 The Customer Service Mode information screen

The following information is displayed on screen:

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## The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).

With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 5 (the first error). The LED will operate in the same way as in point 1, but now for the error code on position x.

Example:

Error code position 1 2 3 4 5

Error buffer: 8 9 5 0 0

after entering SDM: blink (8x) - pause - blink (8x) - etc.

after transmitting "DIAGNOSE- 2- OK" with the DST blink (9x) - pause - blink (9x) - etc.

after transmitting "DIAGNOSE- 3- OK" with the DST blink(5x) - pause - blink(5x) - etc.

after transmitting "DIAGNOSE- 4- OK" with the DST nothing happens

## TROUBLE SHOOTING TIPS

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

## THE DEFLECTION CIRCUIT:

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

- Transistor 7402 is faulty



Text "CSM" on the first line

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

```

1 HHHH L90BBC-X.Y          CSM
2 CODES xx xx xx xx xx
3 OP xxx xxx xxx xxx xxx xxx
4 SYS: xxxxxxxxxxxx
5 NOT TUNED
6 TIMER
7 LOCKED
8 (HOSPITAL) (HOTEL)
9 VOL LIM <value>

```

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080299

Figure 5-5 Screen lay-out Customer Service Mode

SYS: xxxxxx = xxxxxx is the SYSTEM THAT IS SET FOR THIS PRESET

NOT TUNED = no ident signal present

TIMER = (SLEEP) TIMER is activated

LOCKED = Channel/preset locked via parental lock, child lock

HOTEL = HOTEL mode activated; HOSPITAL = HOSPITAL mode activated

VOL LIM = Volume limiter activated and set to the adjusted value

### 5.6.5 Exit

Any key (RC or local keyboard) except "channel up" / "channel down" (standby switched to standby, mains OFF switches set off, other keys switch to normal operation)

## 5.7 ComPair

### 5.7.1 Introduction

Compair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the L9.2E in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; Compair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the L9.2E (when the micro processor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan L9.2E electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the L9.2E chassis, the ComPair interface box and the L9 communicate via an I2C cable (bi-directional) and via infra red communication (uni-directional; from ComPair interface box to L9.2E)

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

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

ComPair combines this information with the repair information in its database to find out how to repair the L9.2E.

#### Automatic information gathering

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

Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the L9.2E.

#### Manual information gathering

Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an waveform pictures) that will bring you to the next step in the faultfinding process.

A question could be: Do you see snow? (Click on the correct answer)

YES / NO

An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

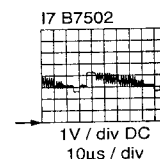


Figure 5-6

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

#### Additional features

Beside fault finding, ComPair provides some additional features like:

- Uploading/downloading of presets
- Managing of preset lists
- Emulation of the Dealer Service Tool

### 5.7.2 SearchMan (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the Schematics and PCBs of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair. Example: Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier. Clicking on the PCB hyper-link, automatically shows the PCB with a high-lighted capacitor C2568. Clicking on the schematic hyper-link, automatically shows the position of a high-lighted capacitor at the schematic.

### 5.7.3 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the L9.2E. (See the ComPair Browser Quick Reference Card for installation instructions.)

## 6. Fault

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



Figure 5-7

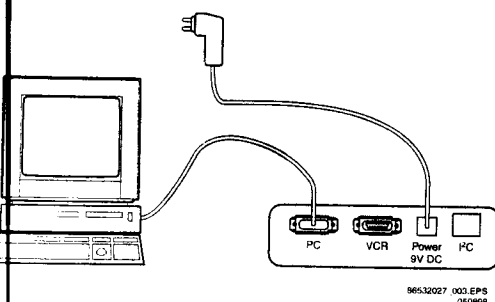


Figure 5-8

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

## 5.7.4 Preset installation

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

- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red

- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

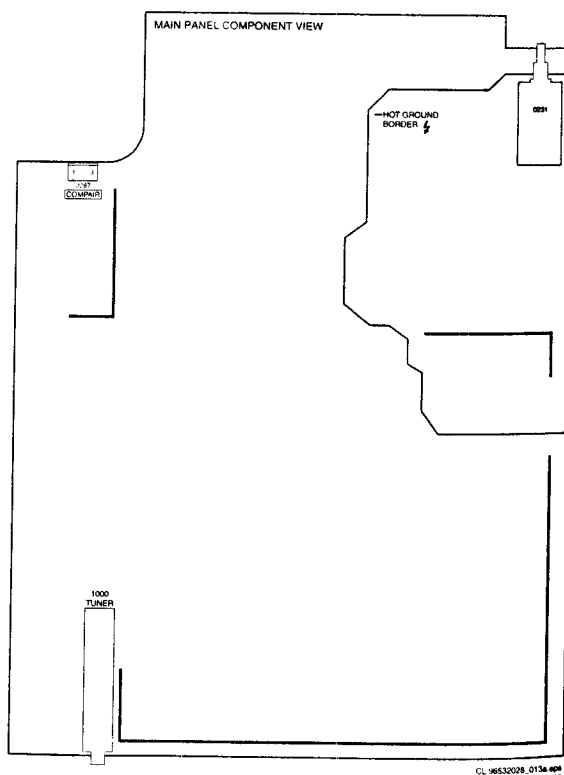
Click on "File" "Open" and select "L9.2E fault finding" to use the cable

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

## 5.8 Ordering ComPair

Compair order codes:

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



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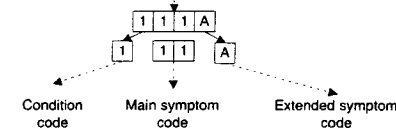


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e to diagnose the set.  
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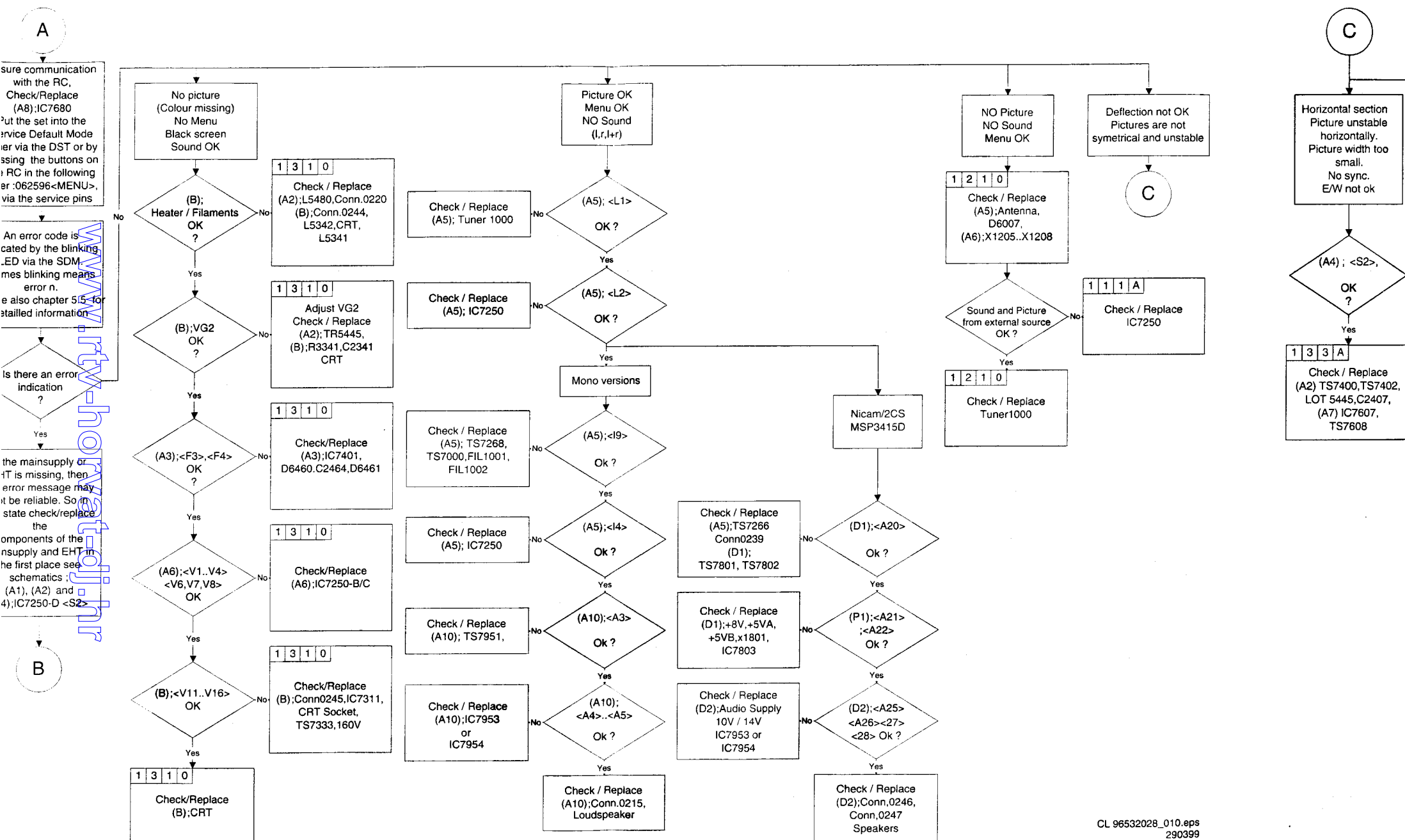


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IRIS SYMPTOM CODE



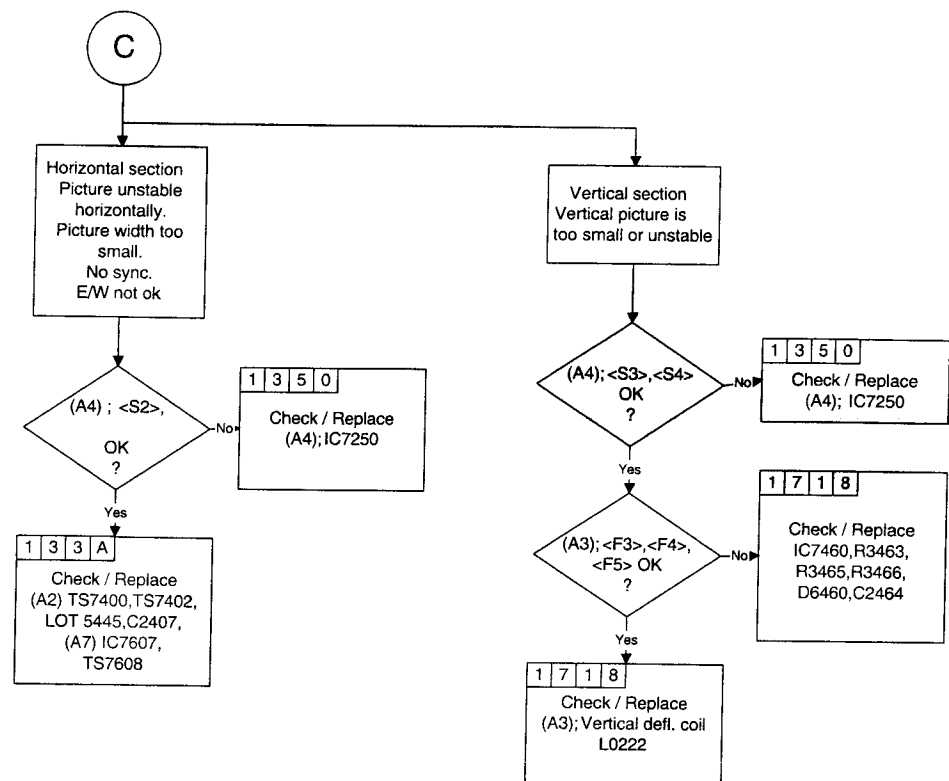
(A1) means Drawing A1  
<P1> means Test point P1



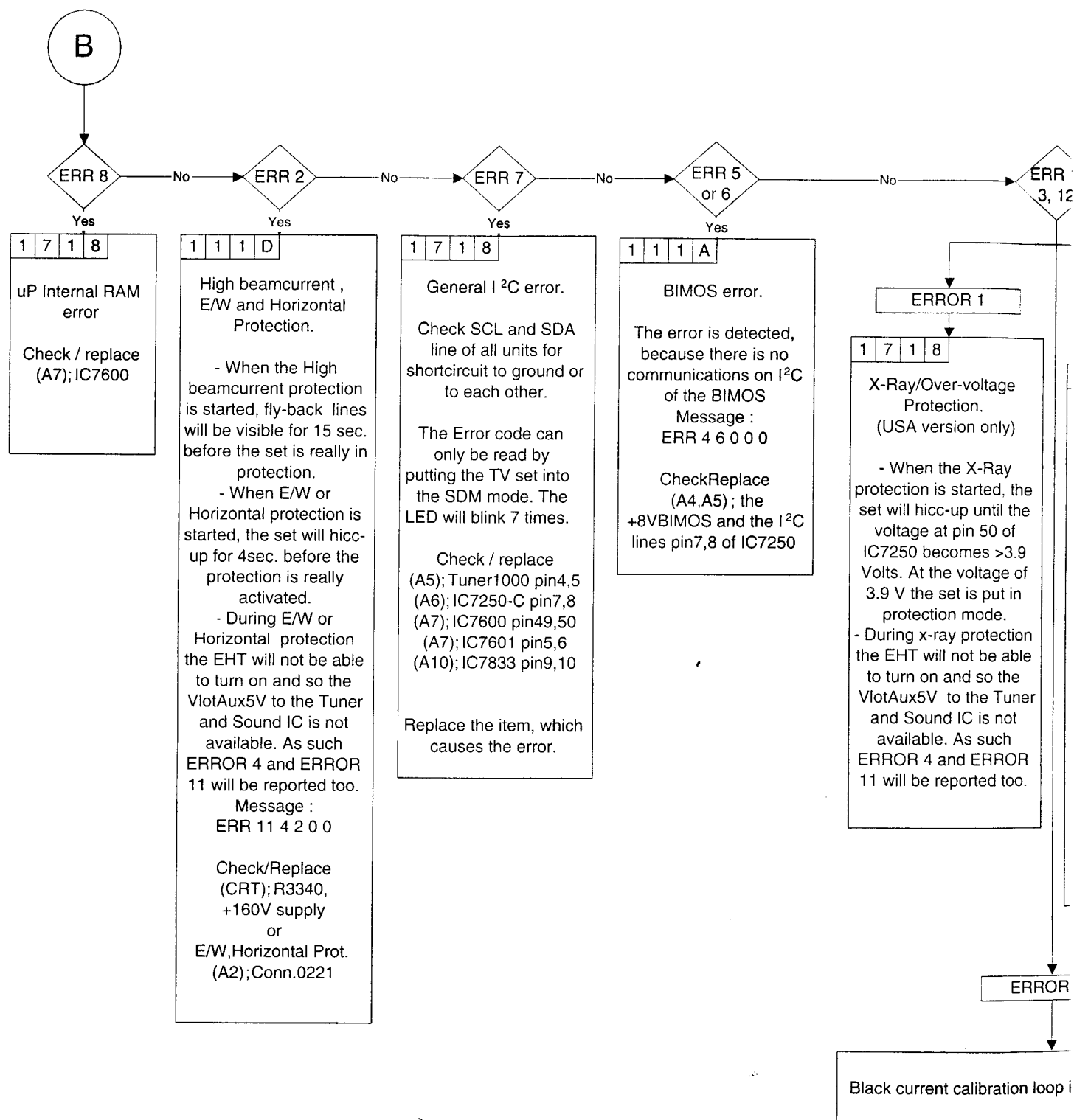
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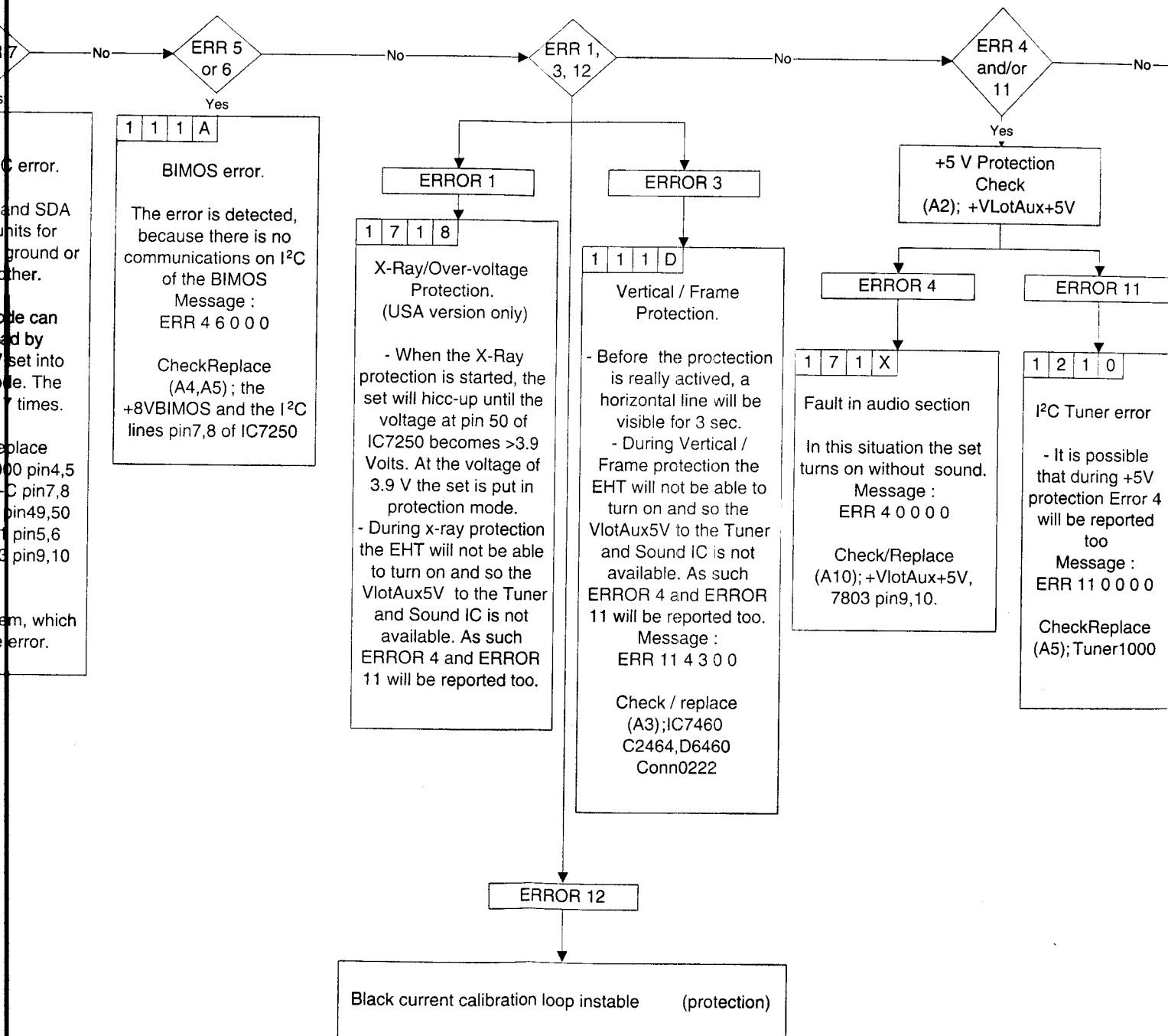
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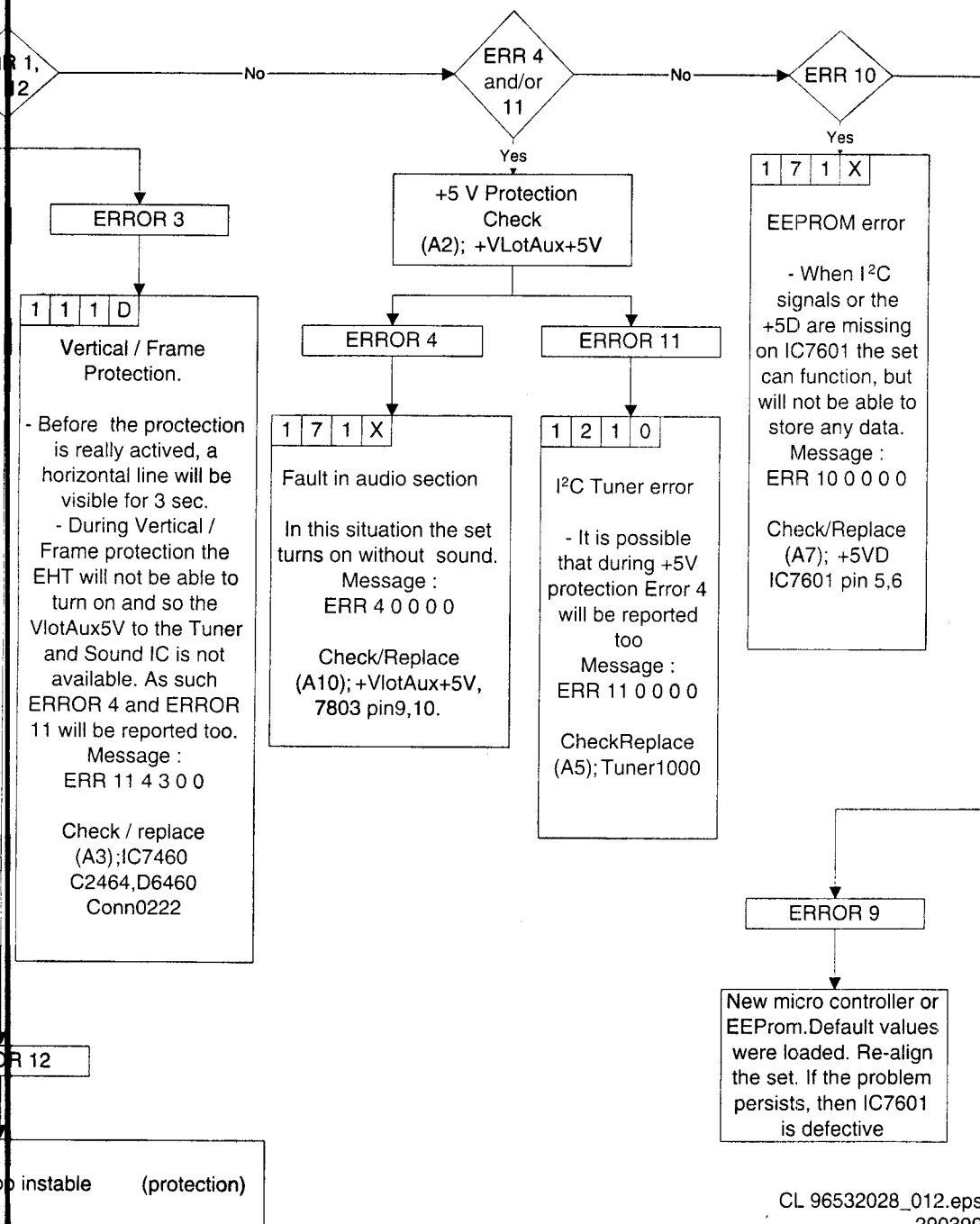
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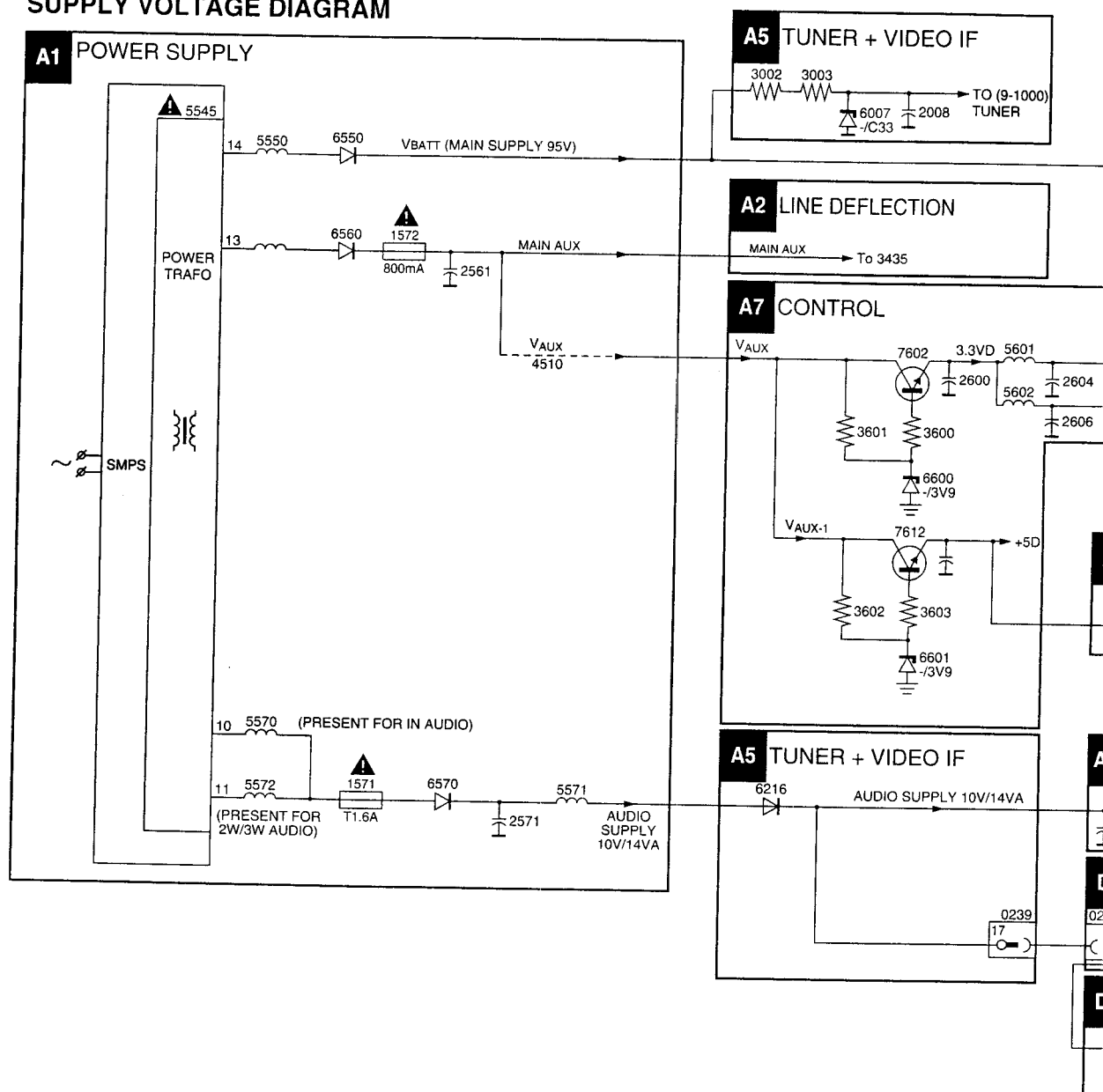




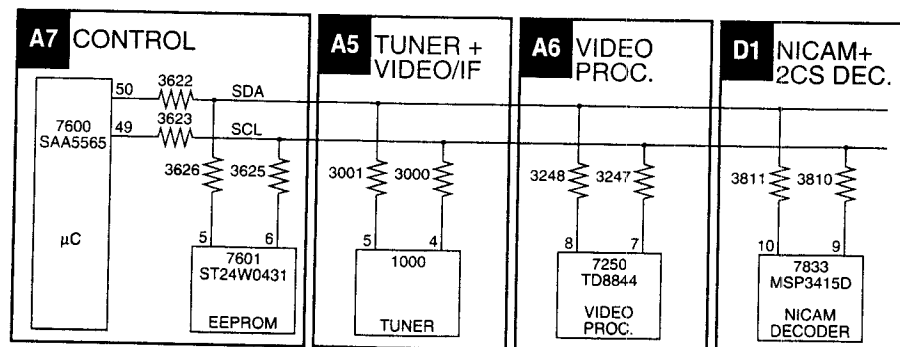
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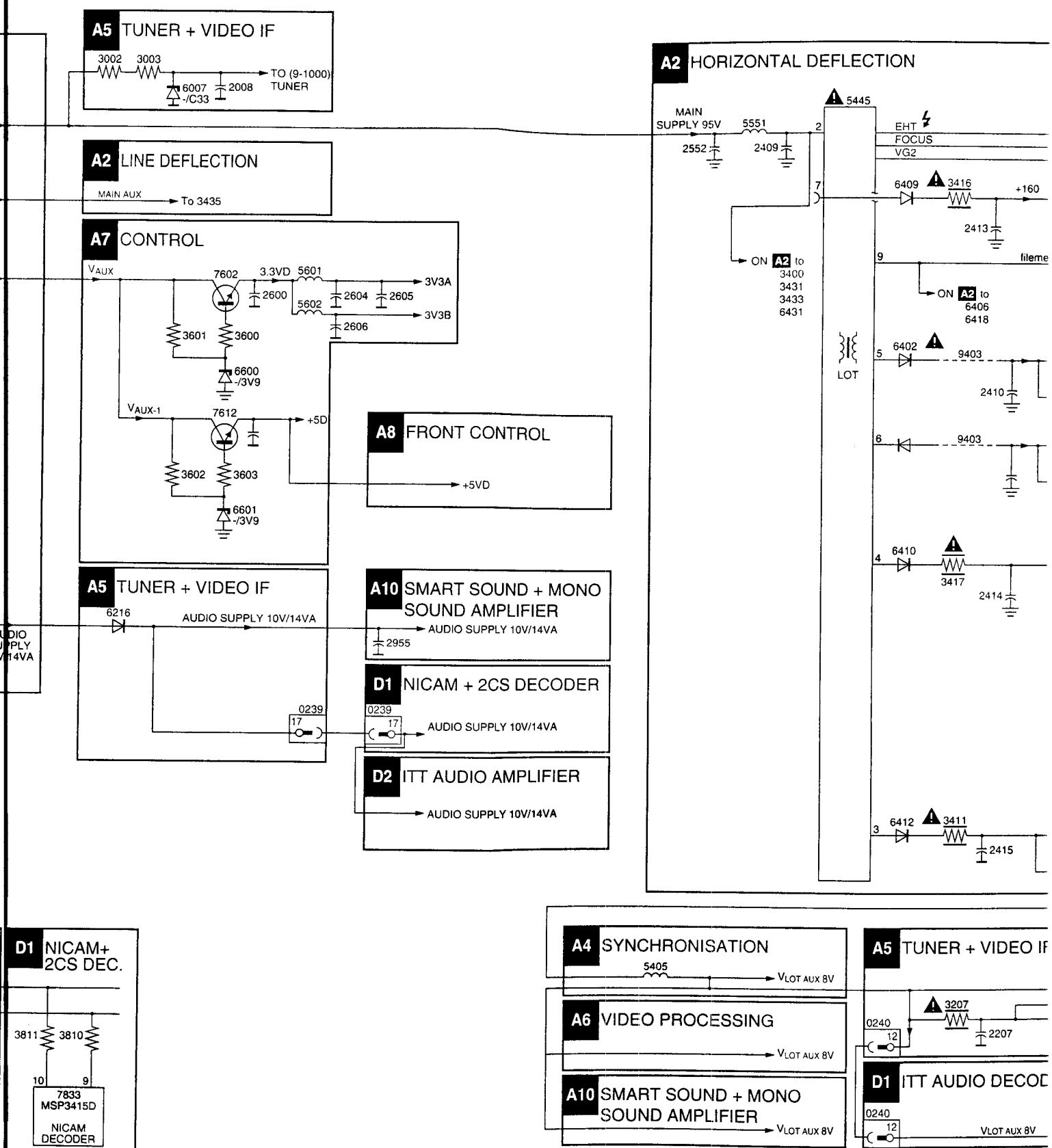


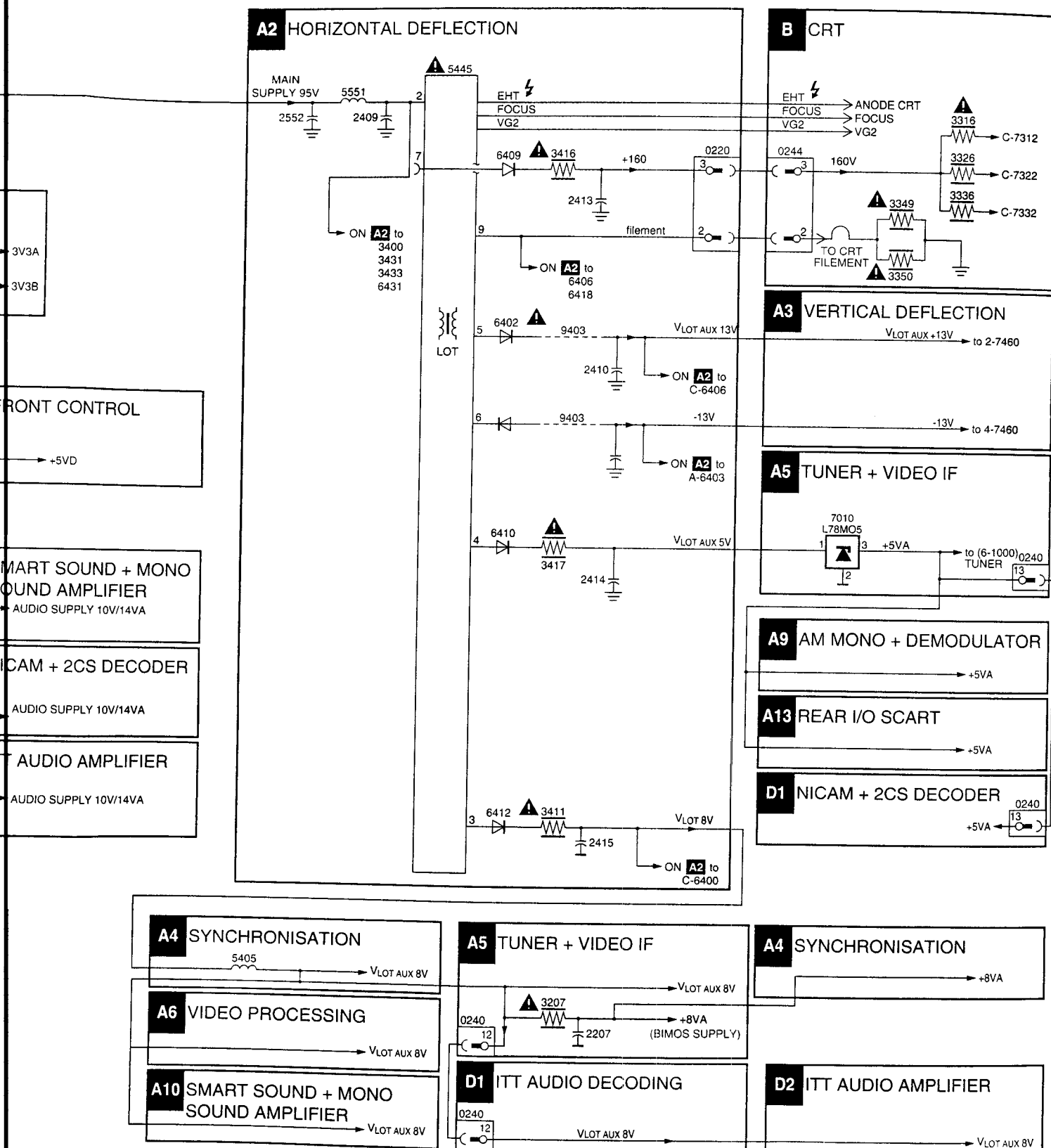
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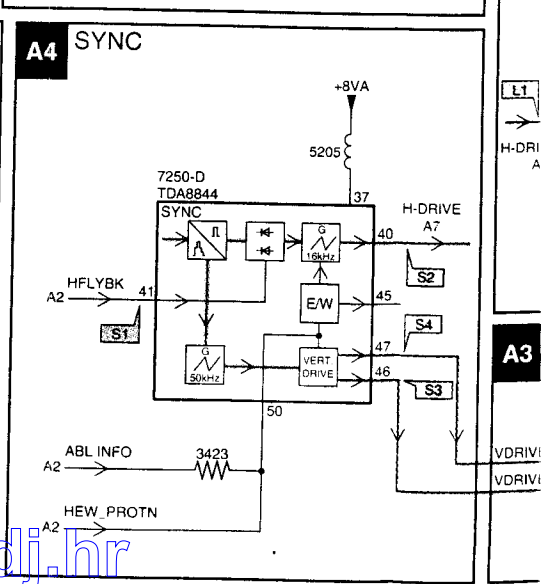
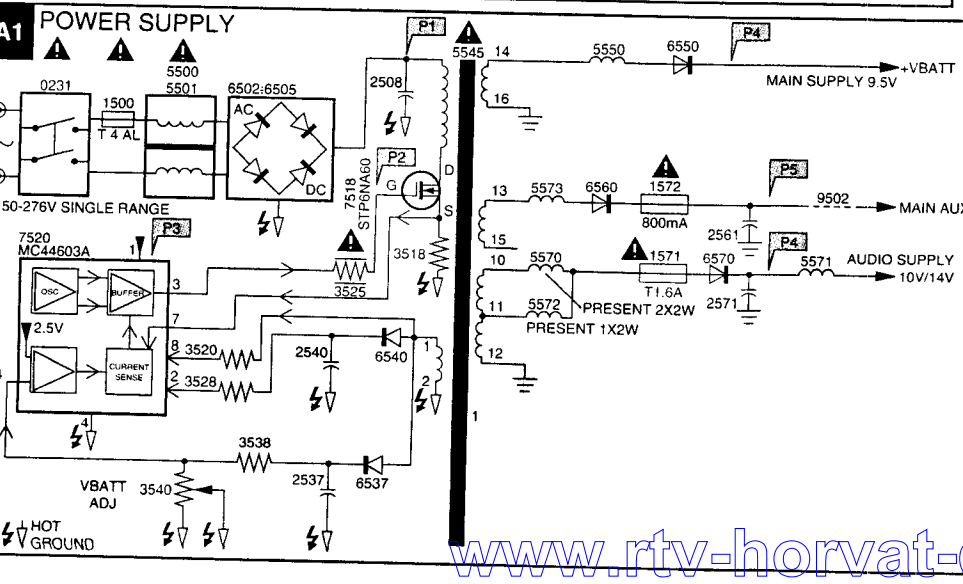
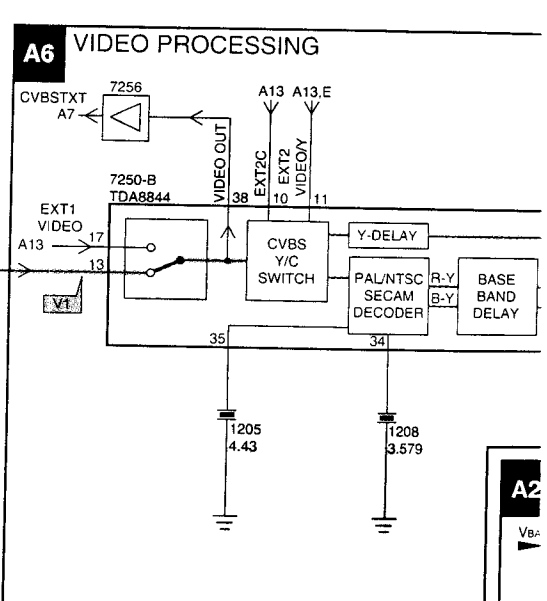
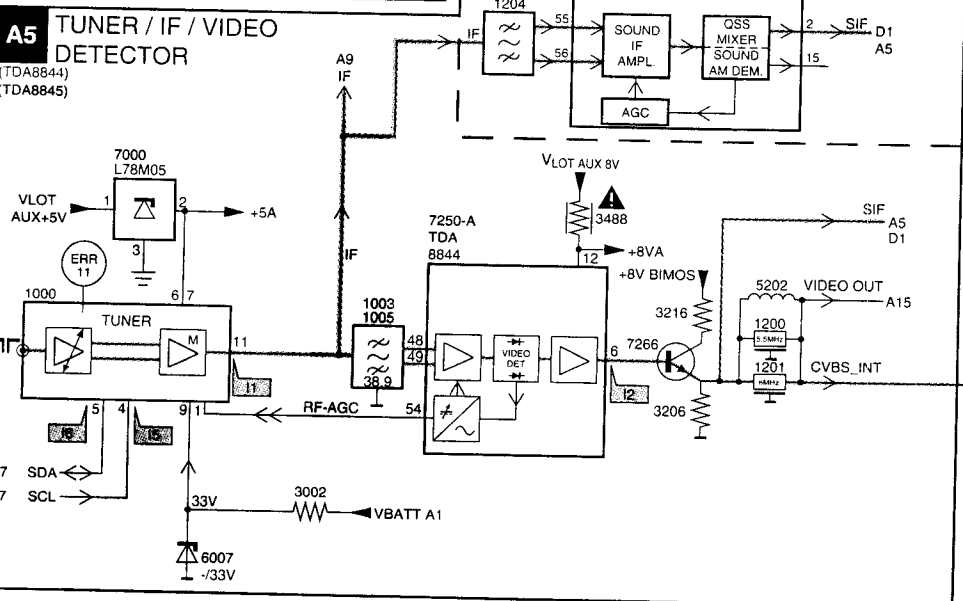
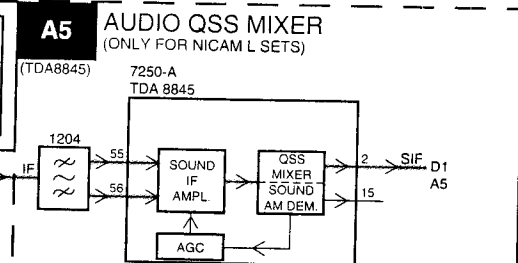
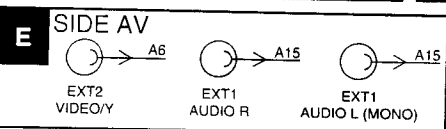
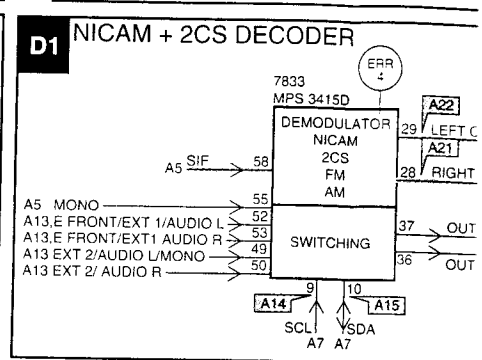
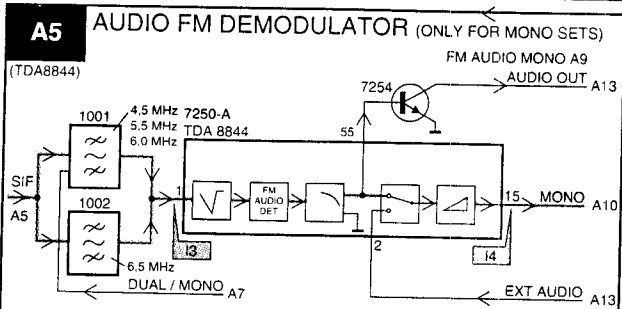
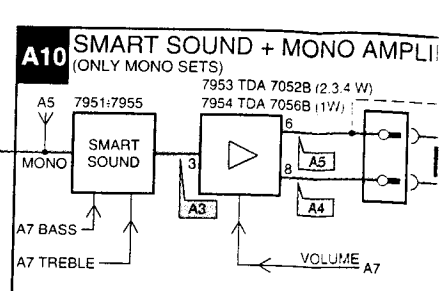
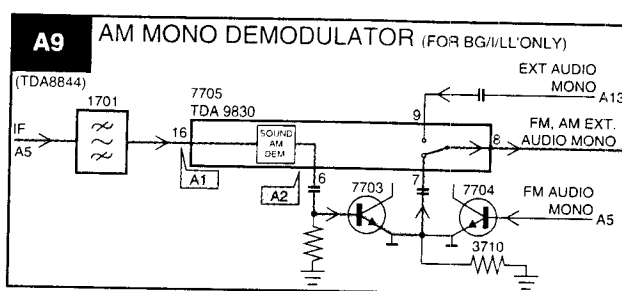
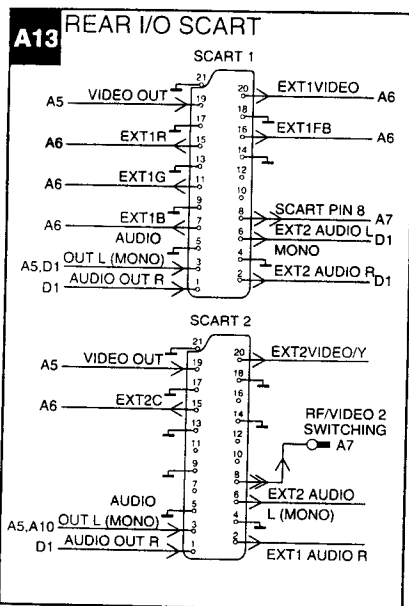


# IIC BUS INTERCONNECTION DIAGRAM

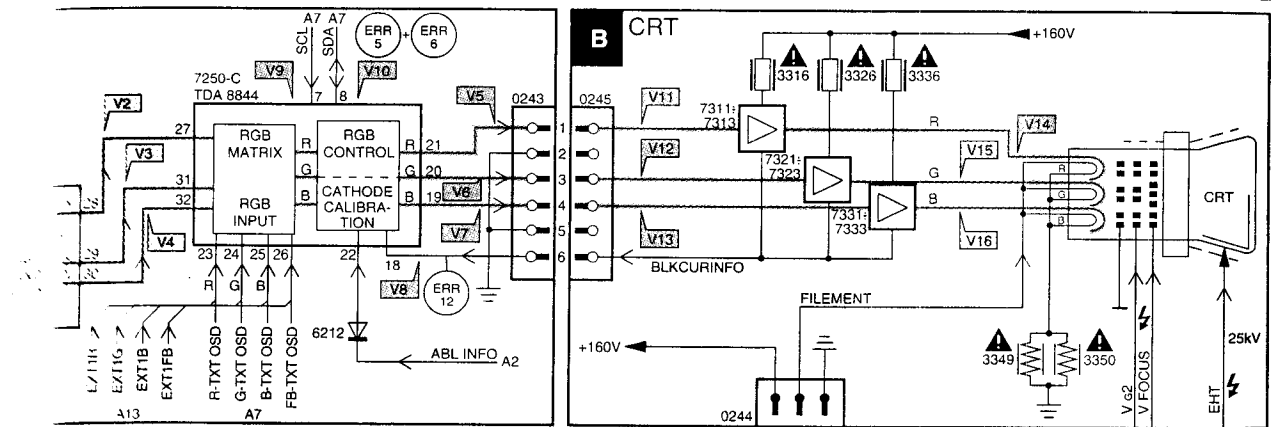
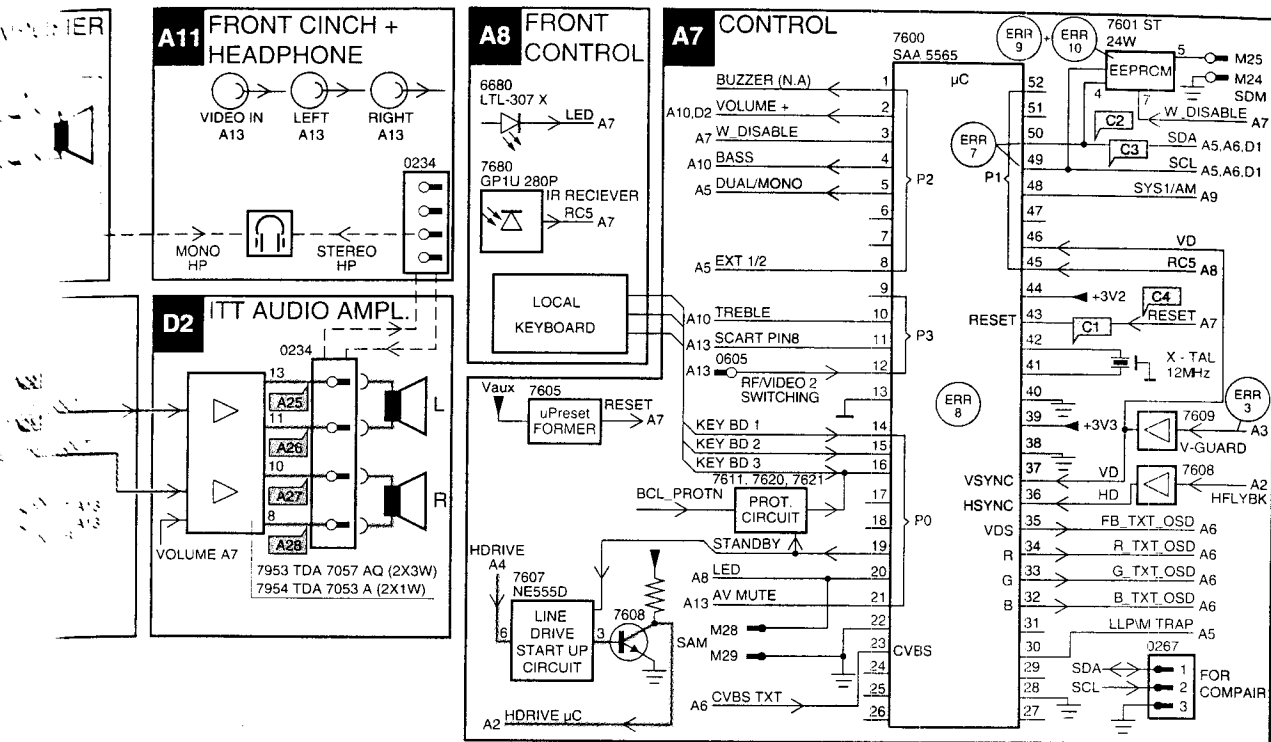






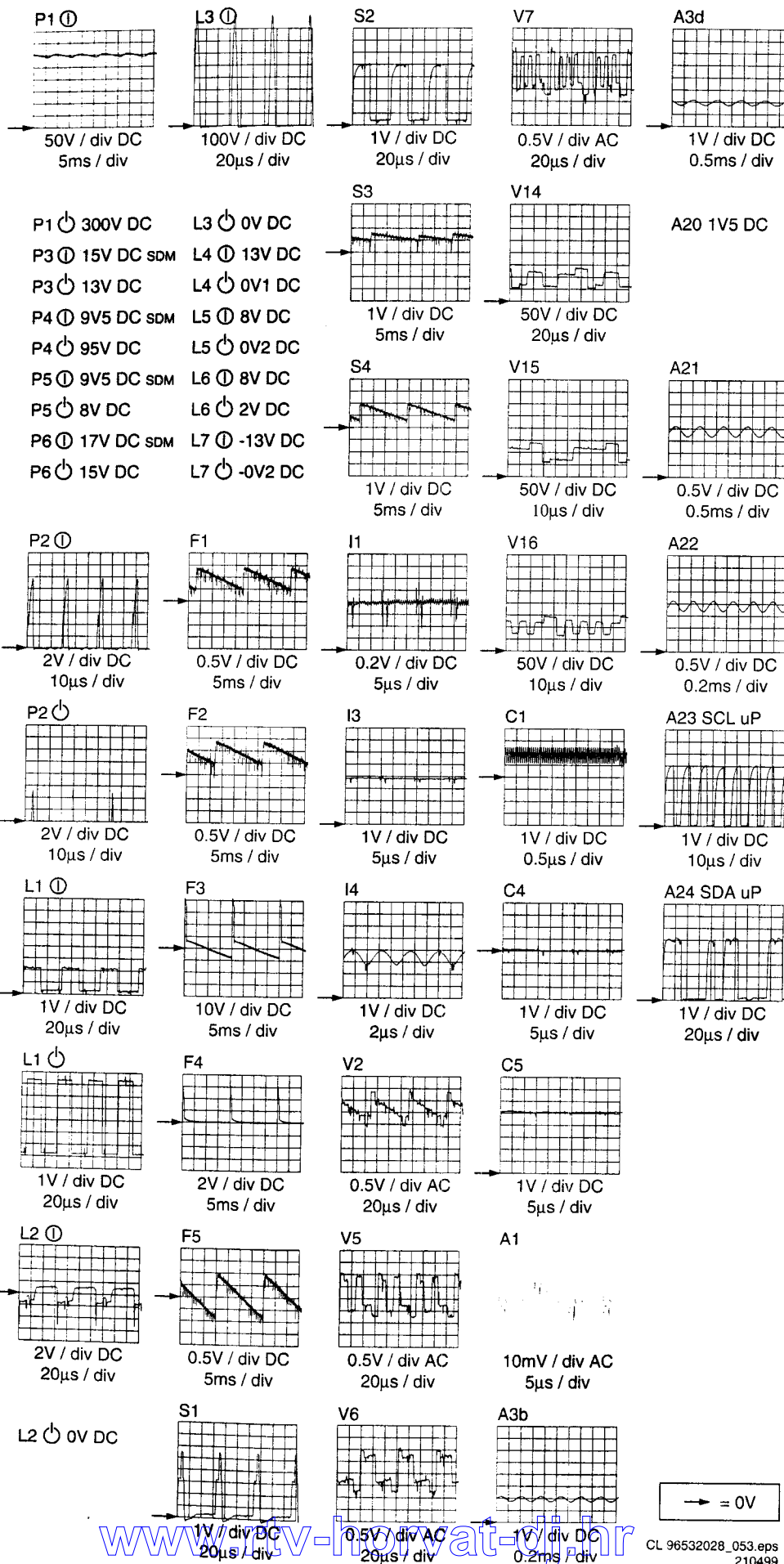






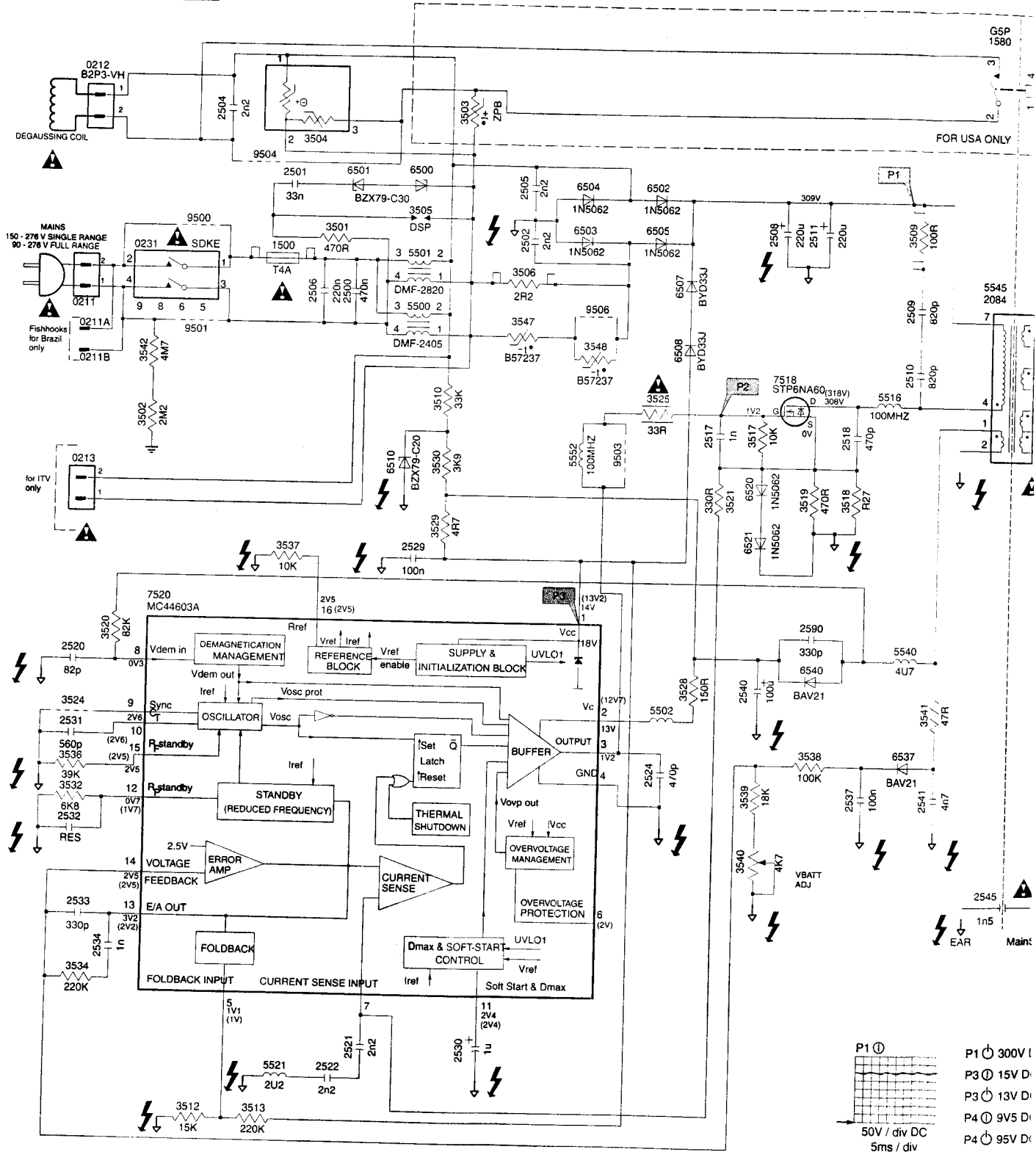






7. Schematics and PWB's

A1 POWER SUPPLY







ITEM NO.	FF A
5500	2
5501	
3504	PT
3503	
3506	
3547	
3548	
9506	
3538	8
3539	1
5552	
7518	6N
2508	22C
2518	2
2509	8
2510	8
3518	O
2510	
3518	
5545	DAE
113	BL H.S
2550	6E
3528	1E
3536	2
5521	2
2522	4
2521	4
786	
80	
85	
84	
90	
91	
90	
98	
97	
3596	
3595	
9504	JUM
9500	
9501	

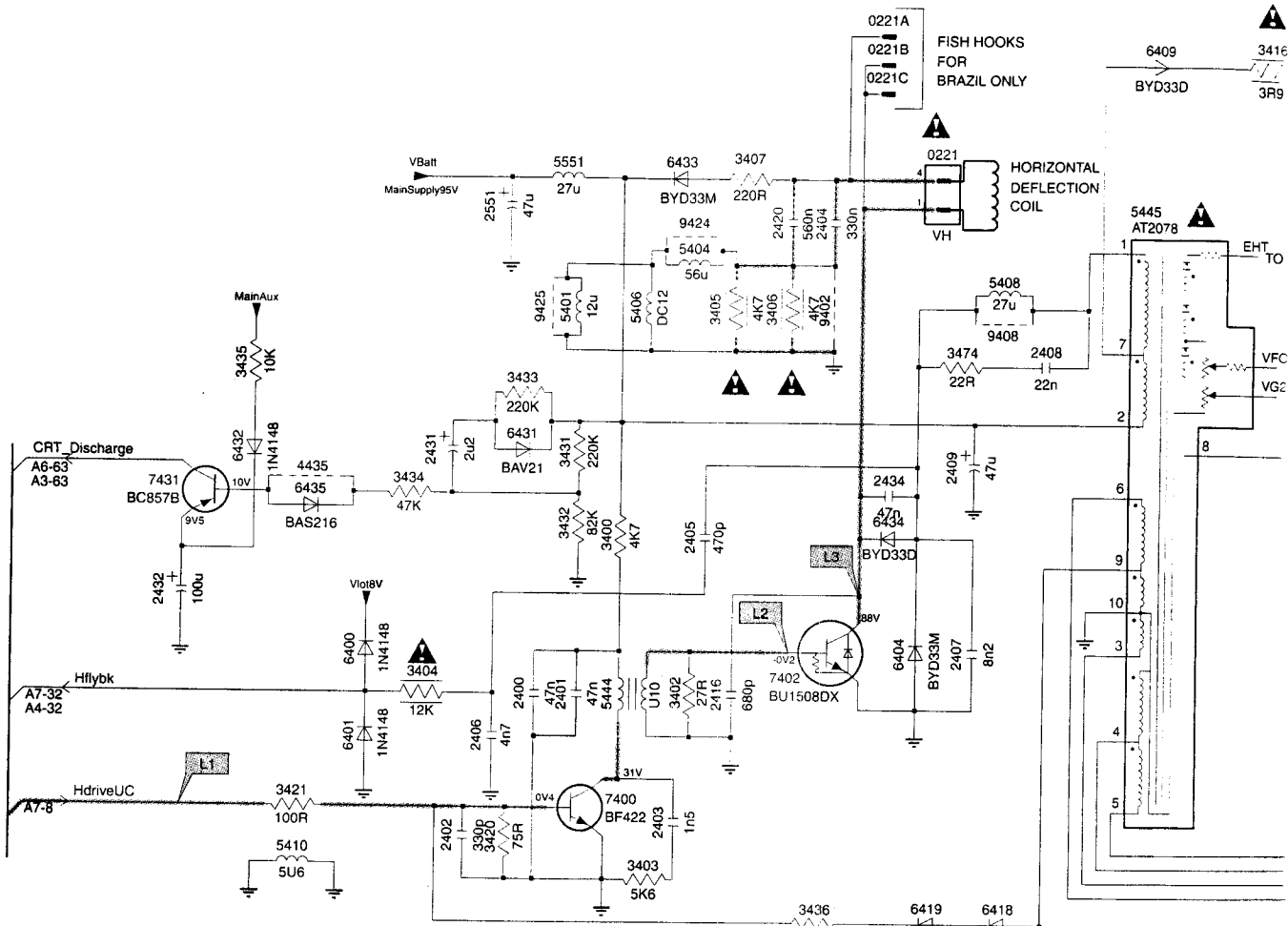
## DIVERSITY LIST FOR A1

ITEM NO.	FR20/21 AP/LA	HR20/21 EU	LR20/21 US	LR14 US	HR14 EU	HR20/21 AP	HR14 AP	FR20/21 US	FR14 US	FR20/21 INDIA	FR14 INDIA	FR14 INDO	FR20 INDO	LR14 US(no relay)	HR2 CHIN
5500	DMF 2820F	-	DMF 2820F	DMF 2820F	-	-	-	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	-
5501	-	DMF 2430F	-	-	DMF 2430F	DMF 2430F	DMF 2430F	-	-	-	-	-	-	-	DMF 2430F
3504	PTC 9R	PTC 9R	-	-	PTC 9R	PTC 9R	PTC 9R	-	-	PTC 9R	PTC 9R	PTC 9R	PTC 9R	-	PTC 9R
3503	-	-	ZPB 10R	ZPB 10R	-	-	-	ZPB 9R	ZPB 9R	-	-	-	-	ZPB 10R	-
3506	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	2R2	-	-	2R2	2R2
3547	-	-	-	-	-	-	-	-	-	-	-	NTC 10R	NTC 4R7	-	-
3548	-	-	-	-	-	-	-	-	-	-	-	-	NTC 4R7	-	-
9506	-	-	-	-	-	-	-	-	-	-	-	JUMPER	-	-	-
3538	82K	100K	100K	100K	100K	82K	82K	100K	82K	82K	82K	82K	82K	100K	82K
3539	15K	18K	18K	18K	18K	15K	15K	18K	18K	15K	15K	15K	15K	18K	15K
5552	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7518	6NA60FI	6NA60FI	6NA60FI	6NA60FI	4NA60FI	6NA60FI	4NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI
2508	220u/400	100u/400	220u/200	220u/200	100u/400	100u/400	100u/400	220u/400	220u/400	220u/450	220u/450	100u/400	220u/400	220u/200	100u/400
2518	220p	220p	470p	470p	220p	330p	330p	220p	220p	330p	330p	330p	330p	470p	330p
2509	820p	820p	1n	1n	1n	820p	820p	820p	1n	820p	820p	820p	820p	1n	820p
2510	820p	820p	1n	1n	1n	820p	820p	820p	1n	820p	820p	820p	820p	1n	820p
3518	OR27	OR33	OR33	OR33	OR33	OR33	OR33	OR27	OR27	OR27	OR27	OR27	OR27	OR33	OR33
2510	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN5602	-
3518	-	-	IN5602	IN5602	-	-	-	IN5602	IN5602	-	-	-	-	IN5602	-
5545	DASUNG	ELDOR	ELDOR	ELDOR	ELDOR	DASUNG	DASUNG	ELDOR	ELDOR	DASUNG	DASUNG	DASUNG	DASUNG	ELDOR	DASUNG
113	BLACK H.SINK	BLACK H.SINK	WHITE H.SINK	WHITE H.SINK	WHITE H.SINK	BLACK H.SINK	WHITE H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	WHITE H.SINK	BLACK H.SINK
2550	680p	1n	1n	1n	1n	680p	680p	1n	1n	680p	680p	680p	680p	1n	680p
3528	150E	220E	150E	150E	270E	150E	150E	270E	150E	150E	150E	150E	150E	150E	150E
3536	27K	27K	27K	27K	27K	47K	27K	27K	39K	27K	27K	27K	27K	27K	27K
5521	2u2	2u2	2u2	2u2	2u2	2u2	2u2	3u3	2u2	2u2	2u2	2u2	2u2	2u2	2u2
2522	4n7	4n7	4n7	3n3	5n6	4n7	3n3	4n7	3n3	4n7	3n3	3n3	3n3	3n3	4n7
2521	4n7	4n7	4n7	3n3	5n6	4n7	3n3	4n7	3n3	4n7	3n3	3n3	3n3	3n3	4n7
2586	-	-	220u/25	220u/25	-	-	-	220u/25	220u/25	-	-	-	-	-	-
3580	-	-	RELAY G5P-1A	RELAY G5P-1A	-	-	-	RELAY G5P-1A	RELAY G5P-1A	-	-	-	-	-	-
3585	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	-	-
3584	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	-	-
3590	-	-	BAS216	BAS216	-	-	-	BAS216	BAS216	-	-	-	-	-	-
7591	-	-	BC847B	BC847B	-	-	-	BC847B	BC847B	-	-	-	-	-	-
7590	-	-	BC847B	BC847B	-	-	-	BC847B	BC847B	-	-	-	-	-	-
5598	-	-	22K	22K	-	-	-	22K	22K	-	-	-	-	-	-
5597	-	-	10K	10K	-	-	-	10K	10K	-	-	-	-	-	-
5596	-	-	10K	10K	-	-	-	10K	10K	-	-	-	-	-	-
5595	-	-	68K	68K	-	-	-	68K	68K	-	-	-	-	-	-
5504	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	-	-	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER
5500	-	-	JUMPER	JUMPER	-	-	-	JUMPER	JUMPER	-	-	-	-	JUMPER	-
5501	-	-	JUMPER	JUMPER	-	-	-	JUMPER	JUMPER	-	-	-	-	JUMPER	-



	HR14 AP	FR20/21 US	FR14 US	FR20/21 INDIA	FR14 INDIA	FR14 INDO	FR20 INDO	LR14 US(no relay)	HR21 CHINA	FR14 AP/LA
	-	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	DMF 2820F	-	DMF 2820F
DMF 2430F	DMF 2430F	-	-	-	-	-	-	-	DMF 2430F	-
PTC 9R	PTC 9R	-	-	PTC 9R	PTC 9R	PTC 9R	PTC 9R	-	PTC 9R	PTC 9R
-	ZPB 9R	ZPB 9R	-	-	-	-	-	ZPB 10R	-	-
2R2	2R2	2R2	2R2	2R2	2R2	-	-	2R2	2R2	2R2
-	-	-	-	-	-	NTC 10R	NTC 4R7	-	-	-
-	-	-	-	-	-	-	NTC 4R7	-	-	-
-	-	-	-	-	-	JUMPER	-	-	-	-
82K	100K	82K	82K	82K	82K	82K	82K	100K	82K	82K
15K	18K	18K	15K	15K	15K	15K	15K	18K	15K	15K
-	-	-	-	-	-	-	-	-	-	JUMPER
4NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI	6NA60FI
100u/400	100u/400	220u/400	220u/400	220u/450	220u/450	100u/400	220u/400	220u/200	100u/450	220u/400
330p	220p	220p	330p	330p	330p	330p	330p	470p	330p	330p
820p	820p	1n	820p	820p	820p	820p	820p	1n	820p	820p
820p	820p	1n	820p	820p	820p	820p	820p	1n	820p	820p
OR33	OR27	OR27	OR27	OR27	OR27	OR27	OR27	OR33	OR33	OR27
-	IN5602	IN5602	-	-	-	-	-	IN5602	-	-
-	IN5602	IN5602	-	-	-	-	-	IN5602	-	-
DASUNG	ELDOR	ELDOR	DASUNG	DASUNG	DASUNG	DASUNG	DASUNG	ELDOR	DASUNG	DASUNG
WHITE H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	BLACK H.SINK	WHITE H.SINK	BLACK H.SINK	BLACK H.SINK
680p	1n	1n	680p	680p	680p	680p	680p	1n	680p	680p
150E	270E	150E	150E	150E	150E	150E	150E	150E	150E	150E
27K	27K	39K	27K	27K	27K	27K	27K	27K	27K	27K
2u2	3u3	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2	2u2
3n3	4n7	3n3	4n7	3n3	3n3	3n3	3n3	3n3	4n7	3n3
3n3	4n7	3n3	4n7	3n3	3n3	3n3	3n3	3n3	4n7	3n3
-	220u/25	220u/25	-	-	-	-	-	-	-	-
-	RELAY G5P-1A	RELAY G5P-1A	-	-	-	-	-	-	-	-
-	BAS216	BAS216	-	-	-	-	-	-	-	-
-	BAS216	BAS216	-	-	-	-	-	-	-	-
-	BAS216	BAS216	-	-	-	-	-	-	-	-
-	BC847B	BC847B	-	-	-	-	-	-	-	-
-	BC847B	BC847B	-	-	-	-	-	-	-	-
-	22K	22K	-	-	-	-	-	-	-	-
-	10K	10K	-	-	-	-	-	-	-	-
-	10K	10K	-	-	-	-	-	-	-	-
-	68K	68K	-	-	-	-	-	-	-	-
JUMPER	JUMPER	-	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER	JUMPER
-	JUMPER	JUMPER	-	-	-	-	-	JUMPER	-	-
-	JUMPER	JUMPER	-	-	-	-	-	JUMPER	-	-

A2 LINE DEFLECTION



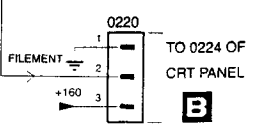
Europe	14"	20"	21"
2407	9.1nF	11nF	11nF
2411	1uF	1uF	1uF
2416	NA	560pF	NA
2434	NA	NA	NA
3411	1R	1R	NA
3414	1K8	Jumper	Jumper
3415	12K	10K	10K
5401	NA	100uH	NA
5404	56uH	NA	56uH
5406	NA	NA	Linearity Drum
5408	27uH	27uH	27uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	Yes	NA
9424	NA	NA	NA
9425	Yes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

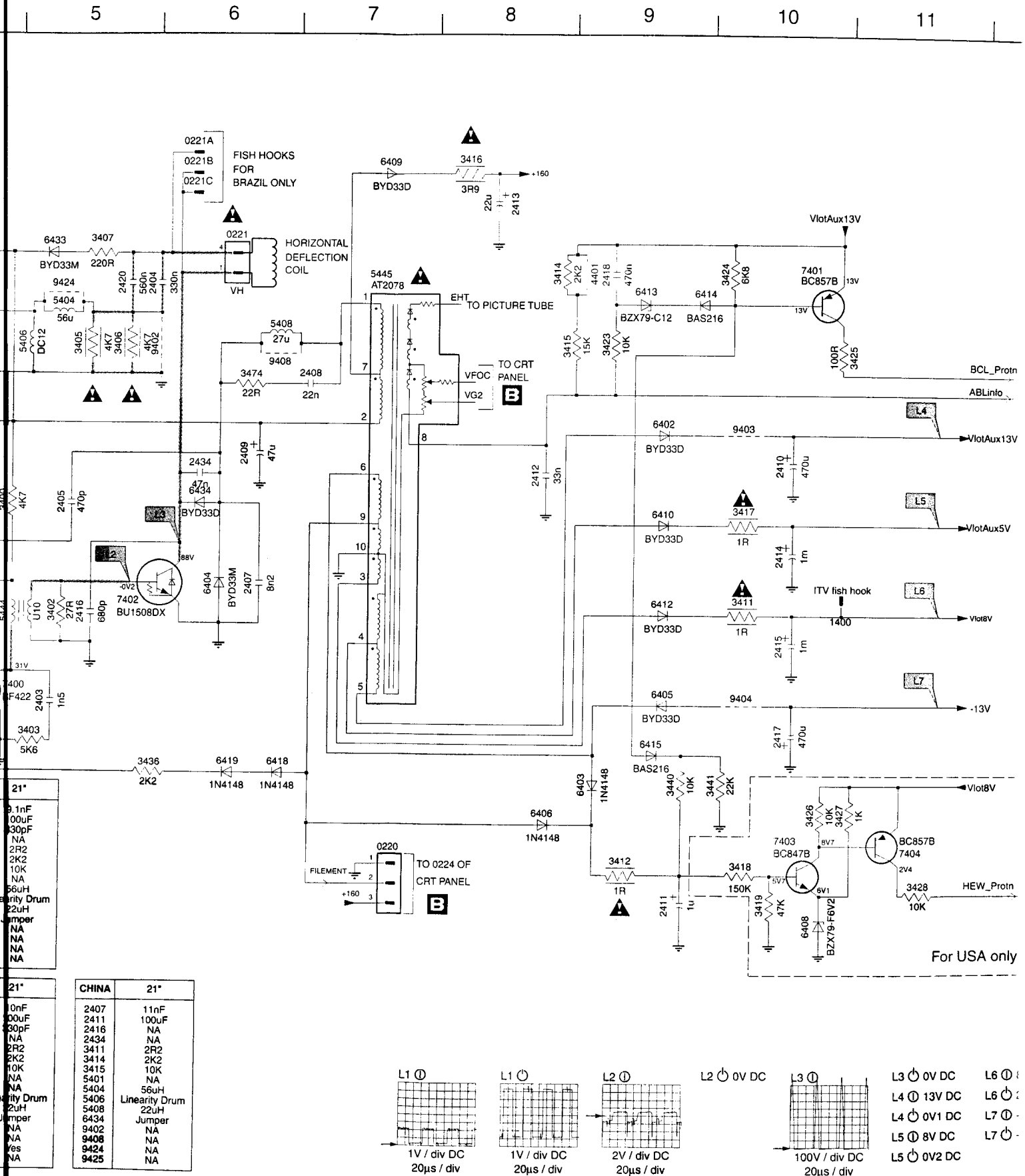
USA	14"	20"	21"
2407	8.2nF	10nF	9.1nF
2411	100uF	100uF	100uF
2416	680pF	560pF	330pF
2434	NA	NA	NA
3411	1R	1R	2R2
3414	1K	1K8	2K2
3415	15K	10K	10K
5401	NA	NA	NA
5404	56uH	27uH	56uH
5406	NA	NA	Linearity Drum
5408	15uH	15uH	22uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	NA	NA
9424	NA	NA	NA
9425	Yes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

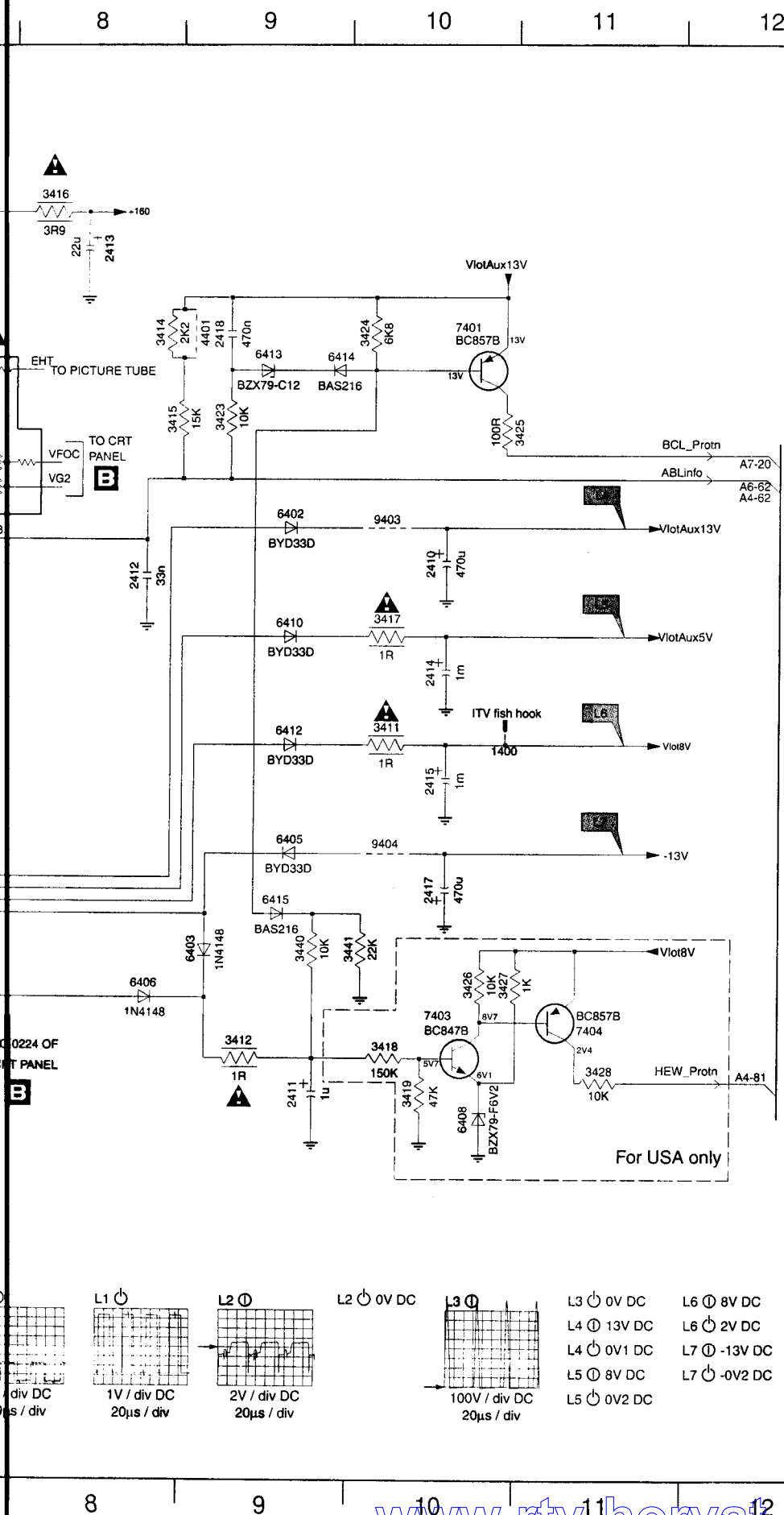
BRAZIL	14"	20"	21"
2407	8.2nF	10nF	11nF
2411	100uF	100uF	100uF
2416	680pF	680pF	330pF
2434	NA	NA	NA
3411	1R	1R	2R2
3414	1K	1K8	2K2
3415	15K	10K	10K
5401	NA	NA	NA
5404	56 uH	56uH	NA
5406	NA	NA	Linearity Drum
5408	15uH	15uH	22uH
6434	Jumper	Jumper	Jumper
9402	NA	NA	NA
9408	NA	NA	Yes
9424	NA	NA	Yes
9425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

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

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

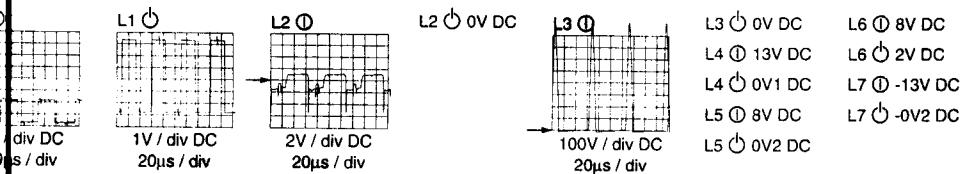






0220 F7  
0221 B6  
0221A A6  
0221B A6  
0221C A6  
1400 D10  
2400 D4  
2401 D4  
2402 E4  
2403 E5  
2404 B5  
2405 D5  
2406 E4  
2407 D6  
2408 C7  
2409 C6  
2410 C10  
2411 F9  
2412 C8  
2413 A8  
2414 D10  
2415 E10  
2416 D5  
2417 E10  
2418 B9  
2420 B5  
2431 C3  
2432 D2  
2434 C6  
2551 B4  
3400 D4  
3402 D5  
3403 E5  
3404 D3  
3405 B5  
3406 B5  
3407 B5  
3411 D10  
3412 F9  
3414 B8  
3415 B8  
3416 A8  
3417 D10  
3418 F10  
3419 F10  
3420 E4  
3421 E3  
3423 B9  
3424 B10  
3425 C10  
3426 F10  
3427 F10  
3428 F11  
3431 C4  
3432 D4  
3433 C4  
3434 C3  
3435 C3  
3436 E5  
3440 F9  
3441 F10  
3474 C6  
4401 B9  
4435 C3  
5401 B4  
5404 B5  
5406 B5  
5408 B6  
5410 E3  
5444 D4  
5445 B7  
5551 B4  
6400 D3  
6401 E3  
6402 C9  
6403 F9  
6404 D6  
6405 E9  
6406 F8  
6408 G10  
6409 A7  
6410 D9  
6412 D9  
6413 B9  
6414 B9  
6415 E9  
6418 E6  
6419 E6  
6431 C4  
6432 C3  
6433 B5  
6434 C6  
6435 C3  
7400 E4  
7401 B10  
7402 D5  
7403 F10  
7404 F11  
7431 C2  
9402 B5  
9403 C10

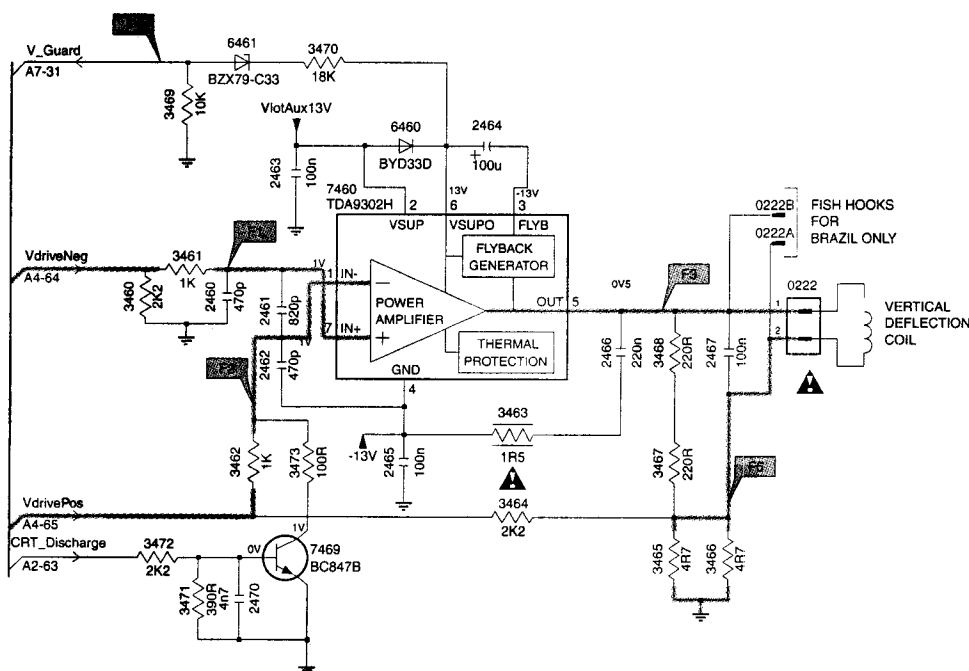
9404 E10  
9408 C6  
9424 B5  
9425 B4



# A3 FRAME DEFLECTION

# A4 TDA 8

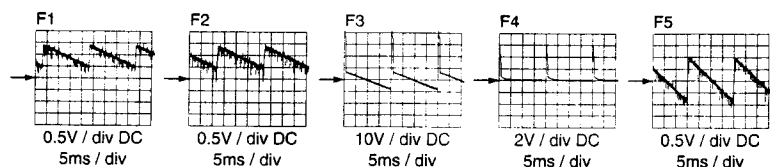
0222 C5  
0222A C5  
0222B C5  
2460 C2  
2461 C2  
2462 C2  
2463 B3  
2464 B4  
2465 D3  
2466 C4  
2467 C5  
2470 E2  
3460 C2  
3461 C2  
3462 D2  
3463 D4  
3464 D4  
3465 D5  
3466 D5  
3467 D5  
3468 C5  
3469 B2  
3470 B3  
3471 E2  
3472 D2  
3473 D3  
6460 B3  
6461 B2  
7460 B3  
7469 D3



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

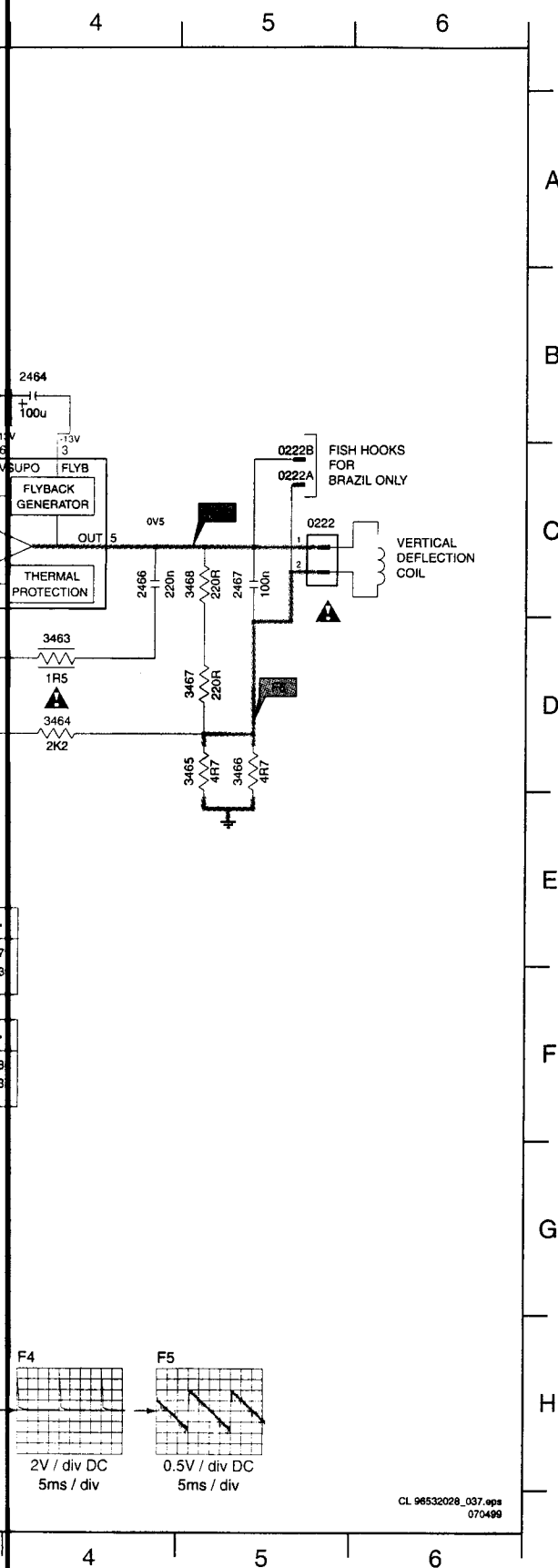
  

Brazil	14"	20"	21"	AP	14"	20"	21"
3465	5R6	4R7	3R3	3465	6R8	4R7	3R3
3466	5R6	3R9	4R7	3466	5R6	4R7	3R3



CL 96532028\_037 eps  
070499

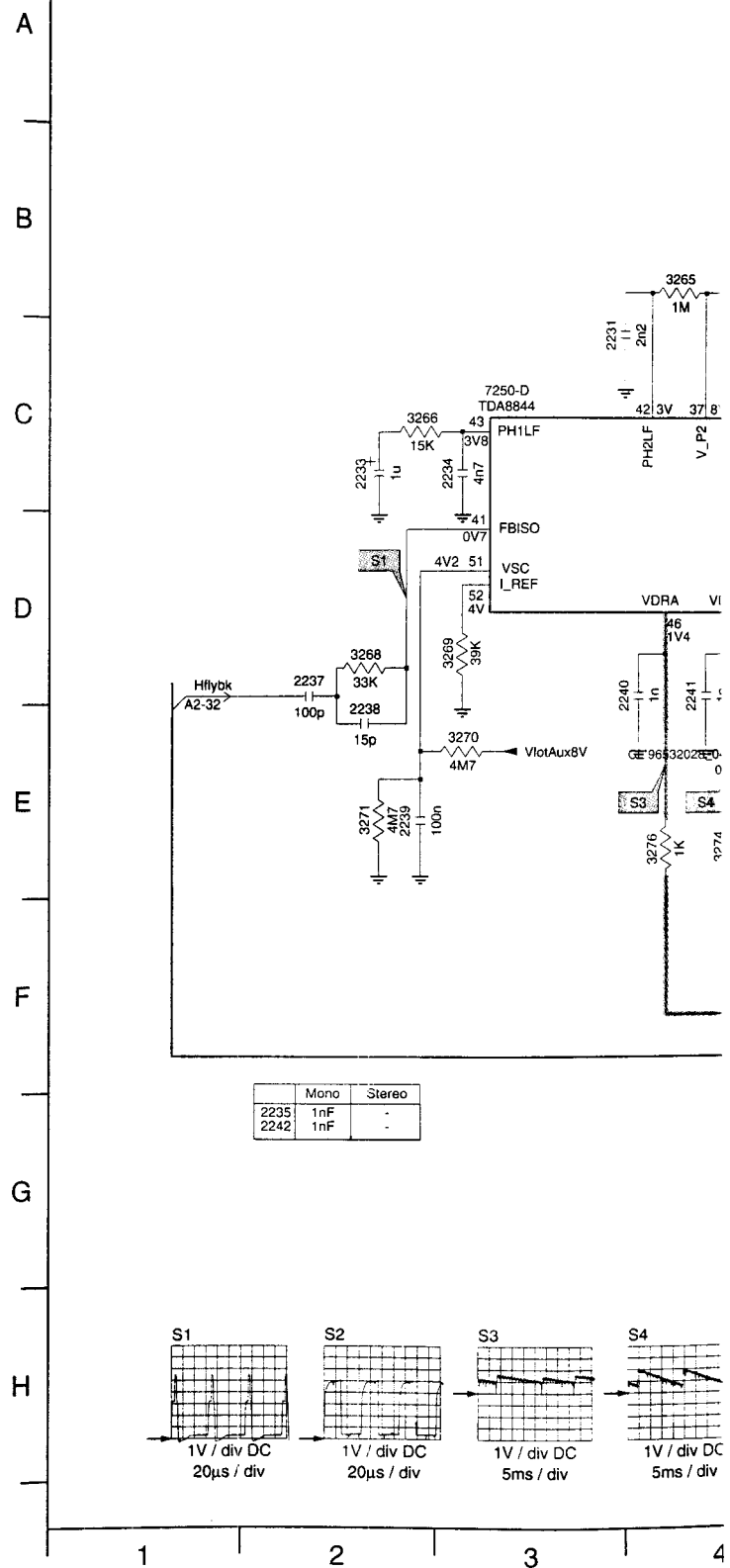




0222 C5  
0222A C5  
0222B C5  
2460 C2  
2461 C2  
2462 C2  
2463 B3  
2464 B4  
2465 D3  
2466 C4  
2467 C5  
2470 E2  
3460 C2  
3461 C2  
3462 D2  
3463 D4  
3464 D4  
3465 D5  
3466 D5  
3467 D5  
3468 C5  
3469 B2  
3470 B3  
3471 E2  
3472 D2  
3473 D3  
6460 B3  
6461 B2  
7460 B3  
7469 D3

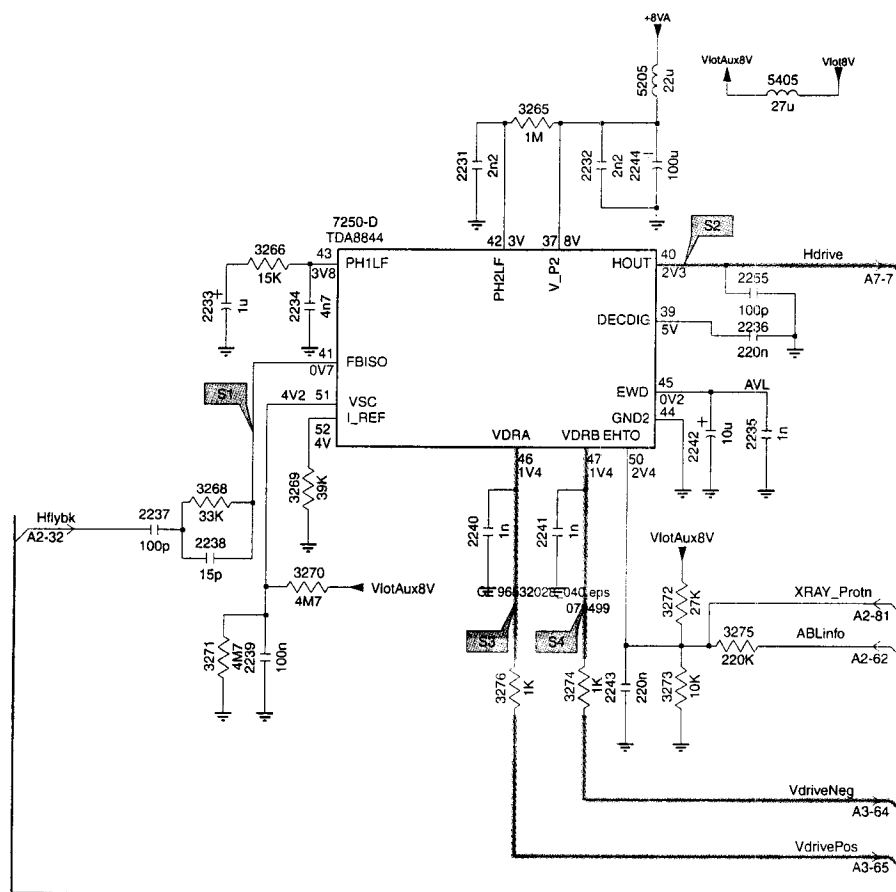
# A4 SYNCHRONISATION

TDA 8844, 8845

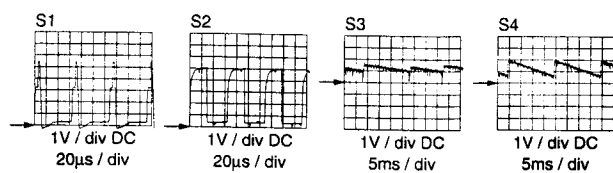


**TDA 8844, 8845**

**[www.rtv-horvat-dj.hr](http://www.rtv-horvat-dj.hr)**

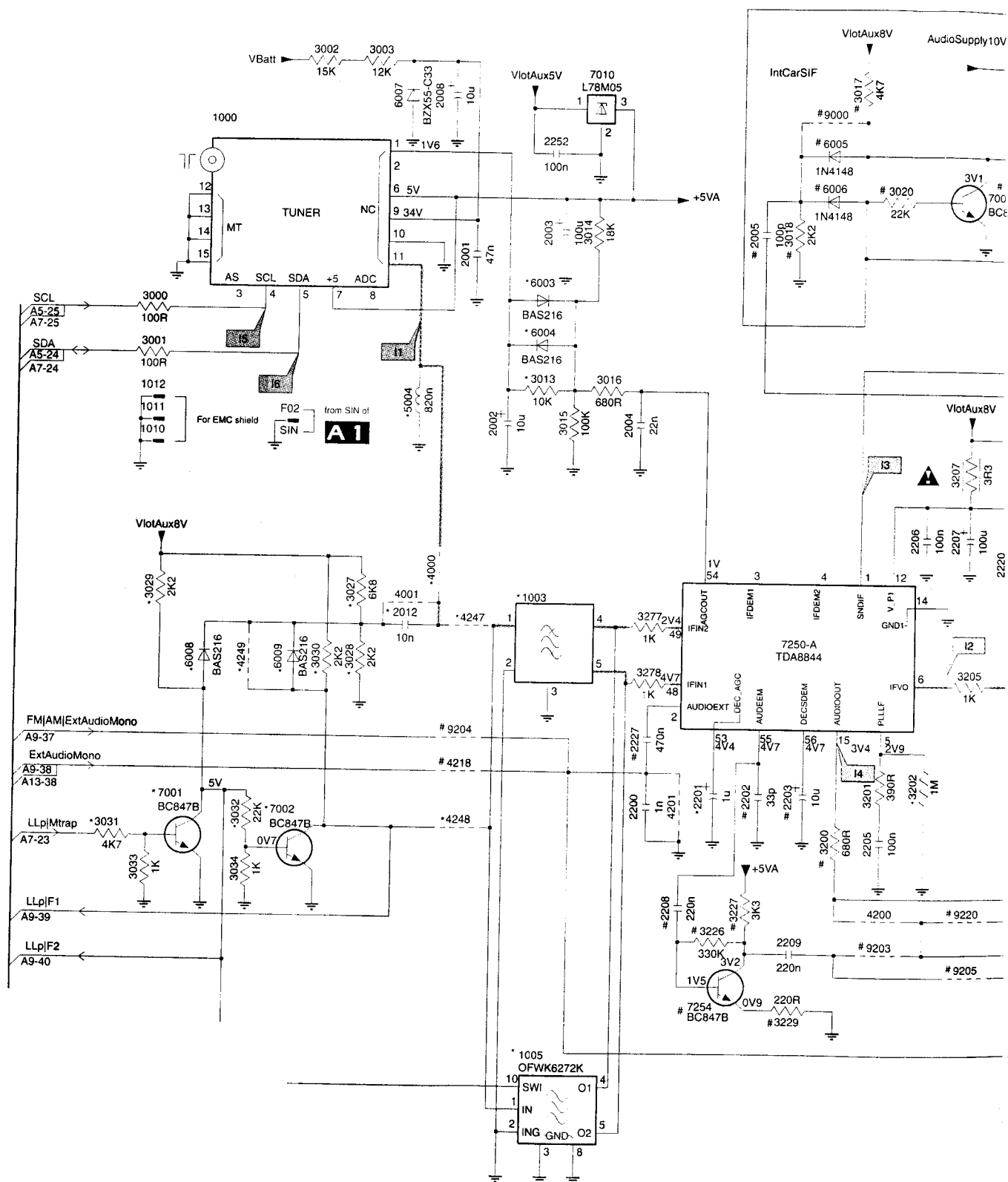


	Mono	Stereo
2235	1nF	-
2242	1nF	-

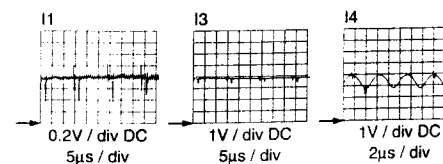


# A5 TUNER, VIDEO IF, VIDEO DET, FM-AUDIO DET.

## TDA8844



# SEE DIVERSITY LIST FOR A5



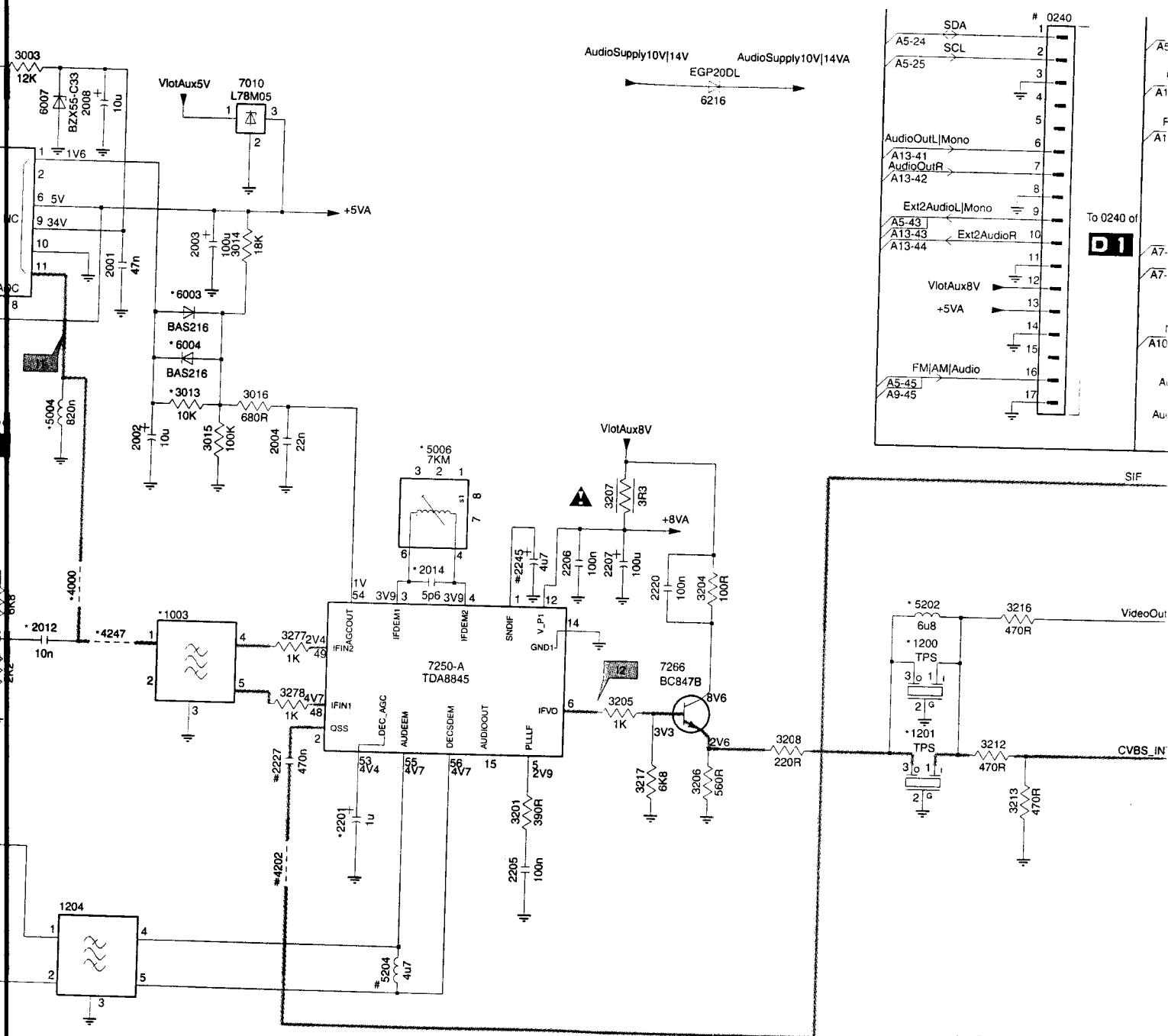


F02 C3	9000 B6
0239 A11	9203 G6
0240 A9	9204 E4
1000 B2	9205 G7
1001 A7	9220 G7
1002 B7	9279 A7
1003 E4	
1005 G4	
1010 D2	
1011 C2	
1012 C2	
1200 E9	
1201 E9	
2001 B4	
2002 C4	
2003 B4	
2004 C5	
2005 B5	
2006 B8	
2008 A3	
2012 E3	
2200 F5	
2201 F5	
2202 F5	
2203 F6	
2205 F6	
2206 D7	
2207 D7	
2208 G5	
2209 G6	
2220 D7	
2227 E5	
2252 B4	
2256 E8	
3000 C2	
3001 C2	
3002 A3	
3003 A3	
3013 C4	
3014 B4	
3015 C4	
3016 C5	
3017 A6	
3018 B6	
3020 B6	
3021 B8	
3027 E3	
3028 E3	
3029 E2	
3030 E3	
3031 F1	
3032 F2	
3033 F2	
3034 F2	
3200 F6	
3201 F6	
3202 F7	
3204 D7	
3205 E7	
3206 F7	
3207 D7	
3208 E8	
3209 F8	
3212 E9	
3213 F9	
3216 D9	
3226 G5	
3227 G5	
3229 G6	
3277 E5	
3278 E5	
4000 D3	
4001 E3	
4200 G6	
4201 F5	
4210 D8	
4215 C8	
4218 F4	
4221 D8	
4222 E8	
4223 E8	
4247 E4	
4248 F4	
4249 E2	
5004 C3	
5202 D9	
6003 C4	
6004 C4	
6005 B6	
6006 B6	
6007 A3	
6008 E2	
6009 E2	
6216 A7	
7000 B7	
7001 F2	
7002 F2	
7010 A4	
7250-A E6	
7254 G5	
7265 E7	



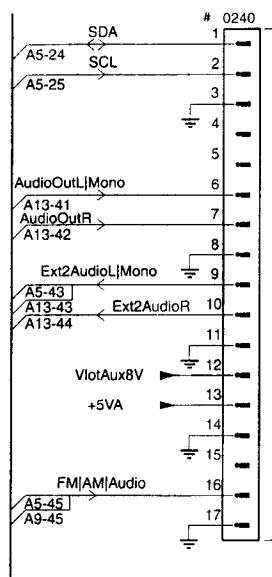
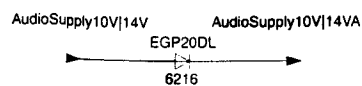


**QSS-AUDIO DET.**



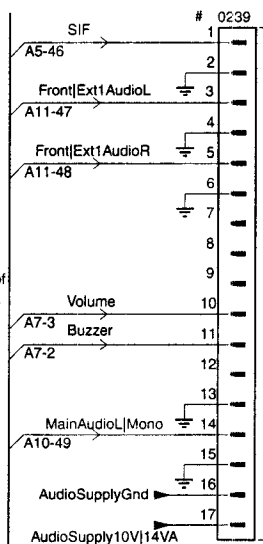
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7 8 9 10 11 12



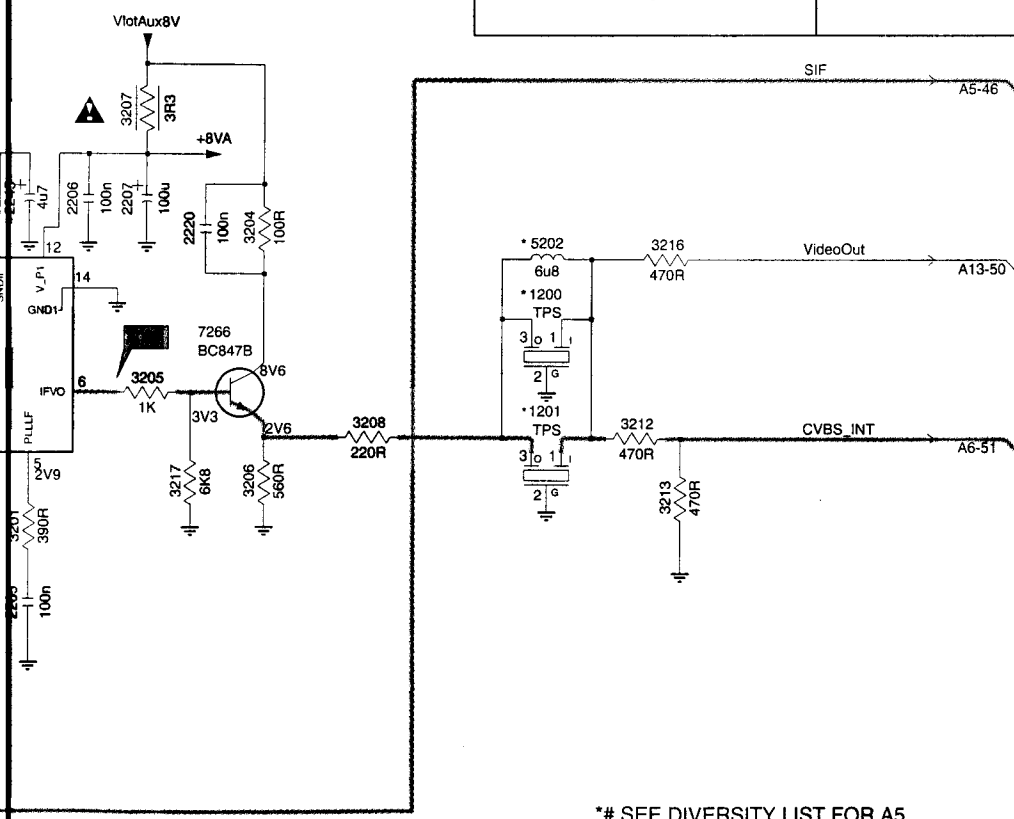
To 0240 of

D1

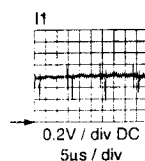


To 0239 of

D1



\*# SEE DIVERSITY LIST FOR A5

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F02 C3  
0239 A12  
0240 A10  
1000 B2  
1003 E4  
1010 D2  
1011 C2  
1012 C2  
1200 E9  
1201 E9  
1204 G4  
2001 B4  
2002 C4  
2003 B5  
2004 C5  
2008 A4  
2012 E4  
2014 D6  
2201 F6  
2205 F7  
2206 D7  
2207 D7  
2220 D8  
2227 E5  
2245 D7  
3000 C2  
3001 C2  
3002 A3  
3003 A4  
3013 C5  
3014 B5  
3015 C5  
3016 C5  
3027 E3  
3028 E3  
3029 E2  
3030 E3  
3031 F2  
3032 F3  
3201 F7  
3204 D8  
3205 E7  
3206 F8  
3207 D7  
3208 E8  
3212 E10  
3213 F10  
3216 D10  
3217 F8  
3277 E5  
3278 E5  
4000 D4  
4202 F5  
4247 E4  
5004 C4  
5006 D6  
5202 D9  
5204 G6  
6003 C5  
6004 C5  
6007 A4  
6008 E2  
6009 E3  
6216 A8  
7001 F2  
7002 F3  
7010 A5  
7250-A E6  
7266 E8

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## DIVERSITY TABLE FOR A5

TUNER VIDEO IF (Europe)

#	LL'ST	LL'MN	B/G, D/K SW	BG	I
1003	K3953M	G1965M	-	G1984M	J1980M
1005	-	-	K6289K	-	-
1200	TPT02	TPT02	TPWA04	TPWA04	6MHZTPS
1201	-	6MHZTPS	6.5MHZTPS	-	-
2012	10 n	10 n	Jumper	-	-
2014	5p6	-	-	-	-
2201	2u2	2u2	1u	1u	1u
3013	10k	10k	Jumper	Jumper	Jumper
3027	6k8	6k8	-	-	-
3028	2k2	2k2	2k2	-	-
3029	2k2	2k2	2k2	-	-
3030	2k2	2k2	-	-	-
3031	4k7	4k7	4k7	-	-
3032	22k	22k	-	-	-
3202	-	-	1M5	1M5	1M5
4000	Jumper	Jumper	10n	Jumper	Jumper
4247	Jumper	Jumper	-	Jumper	Jumper
4248	-	-	Jumper	-	-
4249	-	-	Jumper	-	-
5004	0u22	0u82	0u82	0u82	0u82
5006	78MHzVCO	-	-	-	-
5202	3u3	3u9	3u9	6u8	6u8
6003	Bas216	Bas216	-	-	-
6004	Bas216	Bas216	-	-	-
6008	BA792	BA792	BA792	-	-
6009	BA792	BA792	-	-	-
7001	BC847B	BC847B	BC847B	-	-
7002	BC847B	BC847B	-	-	-
9207	Jumper	Jumper	-	Jumper	Jumper

TUNER SOUND IF (Europe)

#	Mono				Stereo	
	BG	I	BG/DK	BG/I/LL'	BG/I/DK	BG/I/LL'
0239	-	-	-	-	Yes	Yes
0240	-	-	-	-	Yes	Yes
1001	5.5	6.0	5.5	5.5	-	-
1002	-	-	6.5	6.0	-	-
1204	-	-	-	-	-	K9456M
2005	100p	100p	100p	100p	-	-
2006	82p	82p	82p	82p	-	-
2202	3n9	3n9	3n9	3n9	-	-
2203	10u	10u	10u	10u	-	-
2208	220n	220n	220n	220n	-	-
2209	Jumper	Jumper	Jumper	Jumper	-	-
2227	470n	470n	470n	470n	Jumper	Jumper
2245	-	-	-	-	-	4u7
3017	-	-	4k7	4k7	-	-
3018	-	-	2k2	2k2	-	-
3020	-	-	22k	22k	-	-
3200	680R	680R	680R	680R	-	-
3226	330k	330k	330k	330k	-	-
3227	680R	680R	680R	680R	-	-
3229	270R	270R	270R	270R	-	-
4202	-	-	-	-	-	Jumper
4218	Jumper	Jumper	Jumper	-	-	-
4221	-	-	-	-	Jumper	-
4223	Jumper	Jumper	Jumper	Jumper	Jumper	-
4283	Jumper	Jumper	Jumper	Jumper	Jumper	-
4284	Jumper	Jumper	Jumper	Jumper	Jumper	-
5204	-	-	-	-	-	1u8
6005	-	-	1N4148	1N4148	-	-
6006	-	-	1N4148	1N4148	-	-
7000	-	-	BC847B	BC847B	-	-
7254	BC847C	BC847C	BC847C	BC847C	-	-
9000	Jumper	Jumper	-	-	-	-
9203	Jumper	Jumper	Jumper	-	-	-
9204	-	-	-	Jumper	-	-
9205	-	-	-	Jumper	-	-
9220	-	-	-	Jumper	-	-
9253	Jumper	Jumper	Jumper	-	Jumper	Jumper

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## TABLE FOR A5

AND IF (Europe)

Mono			Stereo		
BG	I	BG/DK	BG//LL'	BG//DK	BG//LL'
-	-	-	-	Yes	Yes
-	-	-	-	Yes	Yes
5.5	6.0	5.5	5.5	-	-
-	-	6.5	6.0	-	-
-	-	-	-	-	K9456M
100p	100p	100p	100p	-	-
82p	82p	82p	82p	-	-
3n9	3n9	3n9	3n9	-	-
10u	10u	10u	10u	-	-
220n	220n	220n	220n	-	-
Jumper	Jumper	Jumper	Jumper	-	-
470n	470n	470n	470n	Jumper	Jumper
-	-	-	-	-	4u7
-	-	4k7	4k7	-	-
-	-	2k2	2k2	-	-
-	-	22k	22k	-	-
680R	680R	680R	680R	-	-
330k	330k	330k	330k	-	-
680R	680R	680R	680R	-	-
270R	270R	270R	270R	-	-
-	-	-	-	-	Jumper
Jumper	Jumper	Jumper	-	Jumper	-
Jumper	Jumper	Jumper	Jumper	Jumper	-
Jumper	Jumper	Jumper	Jumper	Jumper	-
Jumper	Jumper	Jumper	Jumper	Jumper	-
-	-	1N4148	1N4148	-	1u8
-	-	1N4148	1N4148	-	-
-	-	BC847B	BC847B	-	-
BC847C	BC847C	BC847C	BC847C	-	-
Jumper	Jumper	-	-	-	-
Jumper	Jumper	Jumper	-	-	-
-	-	-	Jumper	-	-
-	-	-	Jumper	-	-
-	-	-	Jumper	-	-
Jumper	Jumper	Jumper	-	Jumper	Jumper

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## A8 FRONT CONTROL

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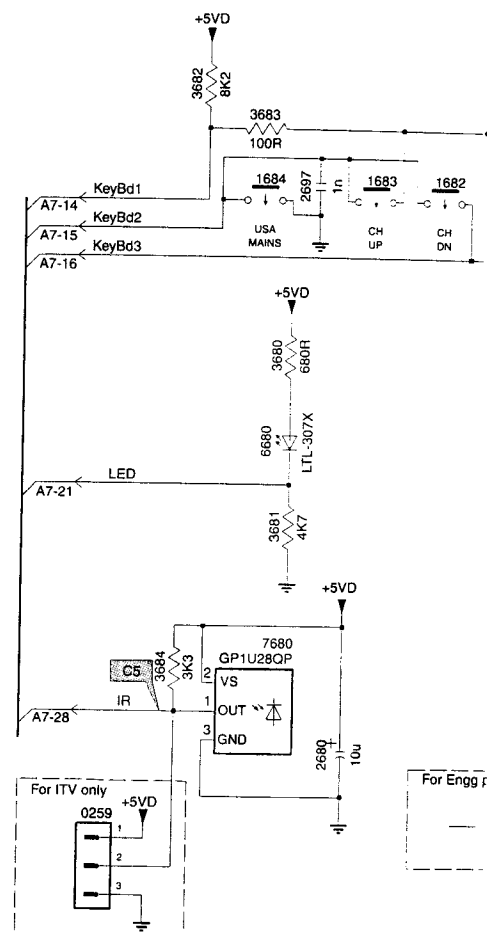
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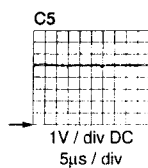
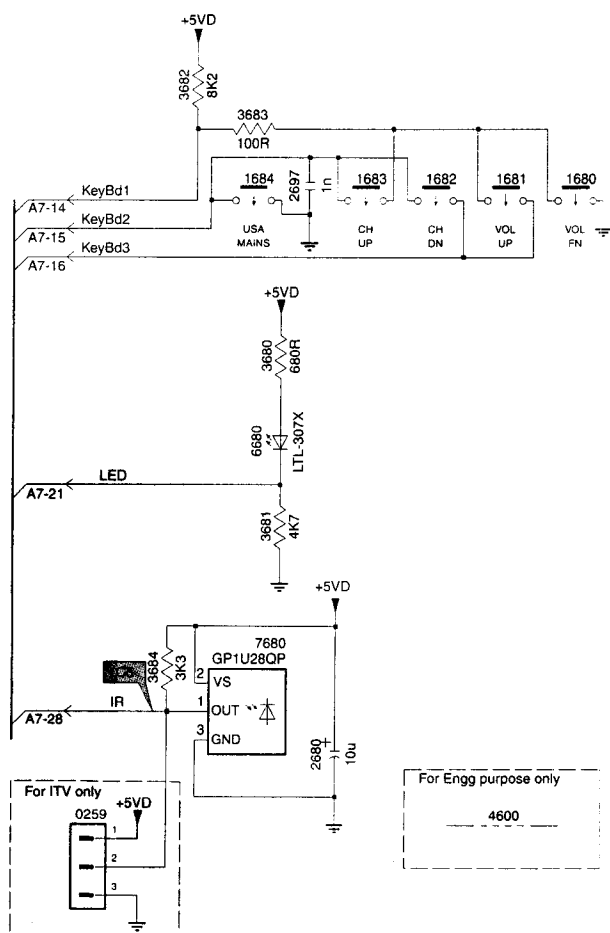
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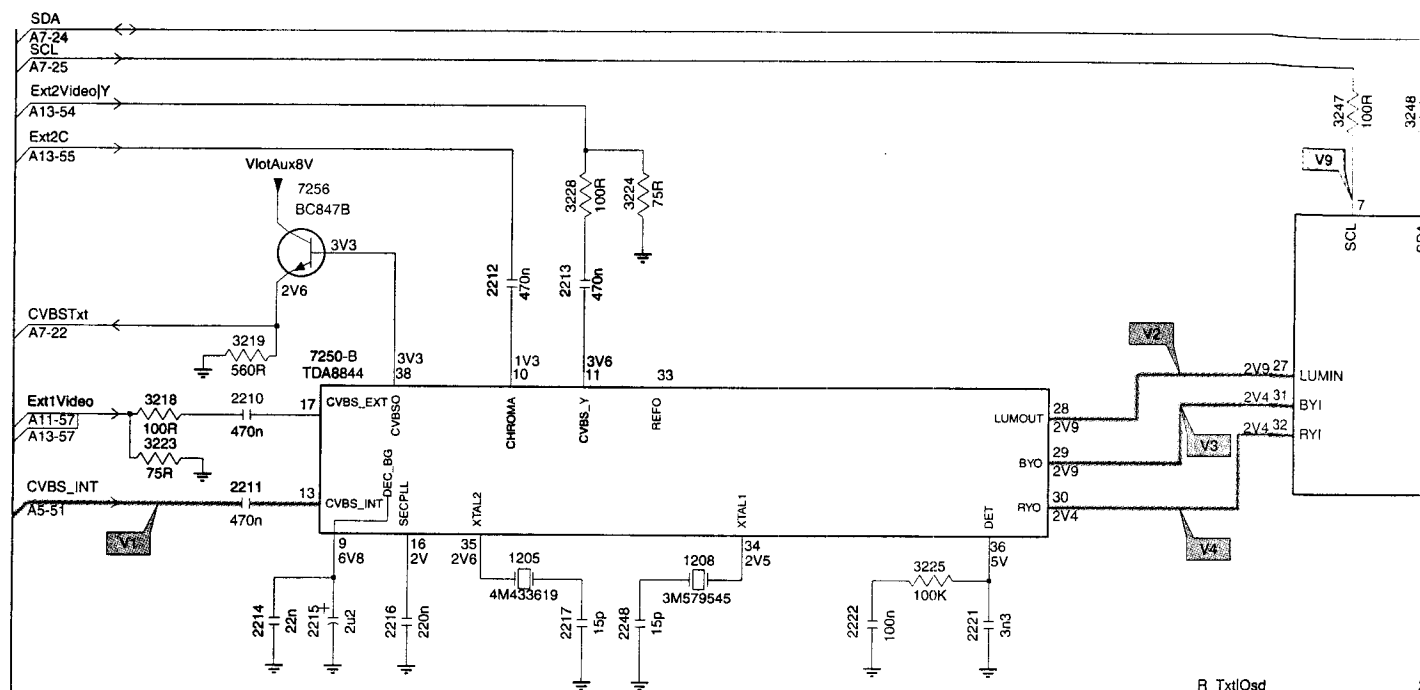
**A8 FRONT CONTROL**CL 96532028\_044.eps  
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0259 E3  
1680 B5  
1681 B5  
1682 B4  
1683 B4  
1684 B3  
2680 E4  
2697 B4  
3680 C3  
3681 D3  
3682 B3  
3683 B3  
3684 E3  
4600 E5  
6680 C3  
7680 D4

**A6**  
TDA 8

# VIDEO PROCESSING (EUROPE)

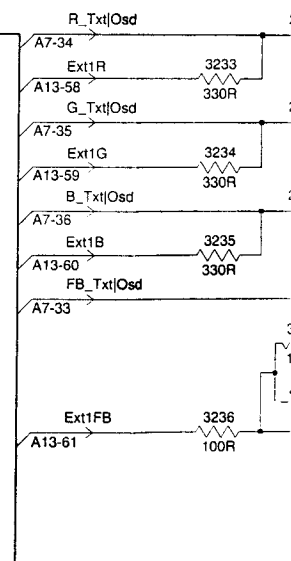
TDA 8844, 8845



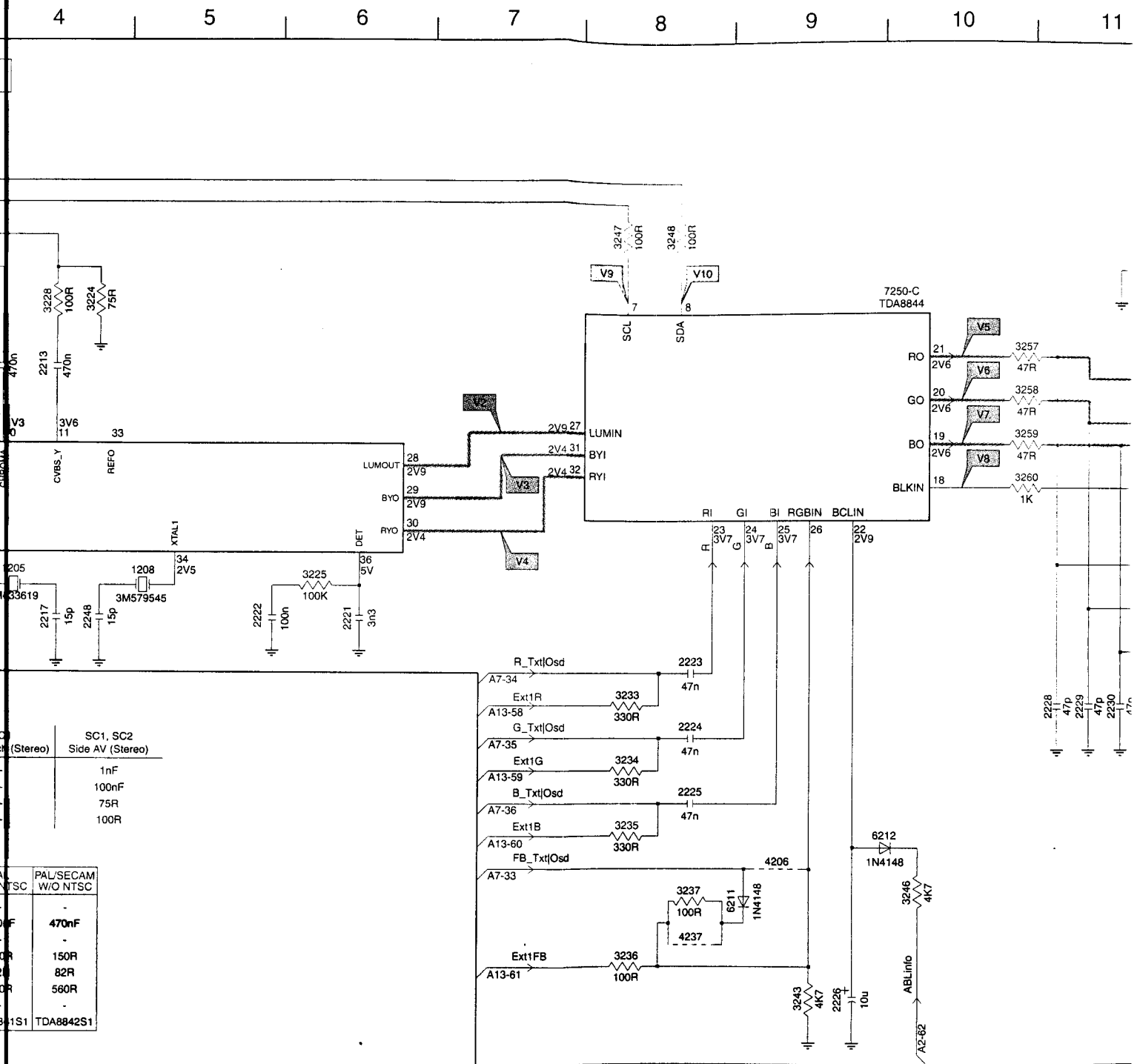
DIVERSITY TABLE

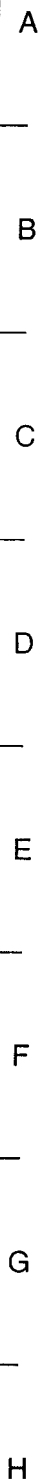
	SC1 (Mono)	SC1 Front Cinch (Mono)	SC1, SC2 (Stereo)	SC1 Front Cinch (Stereo)	SC1, SC2 Side AV (Stereo)
2212	-	-	1nF	-	1nF
2213	-	100nF	100nF	-	100nF
3224	-	75R	75R	-	75R
3228	-	100R	100R	-	100R

	LL'ST	LL'MN	PAL/SECAM NTSC	PAL NTSC	PAL W/O NTSC	PAL/SECAM W/O NTSC
1208	3.58MhzXtl	3.58MhzXtl	3.58MhzXtl	3.58MhzXtl	-	-
2211	100nF	470nF	100nF	470nF	470nF	470nF
2248	15pF	15pF	15pF	15pF	-	-
3206	270R	270R	150R	270R	150R	150R
3208	68R	68R	82R	82R	82R	82R
3213	470R	560R	560R	470R	560R	560R
3217	6K8	-	-	-	-	-
7250	TDA8845N1	TDA8842S1	TDA8842S1	TDA8841S1	TDA8841S1	TDA8842S1

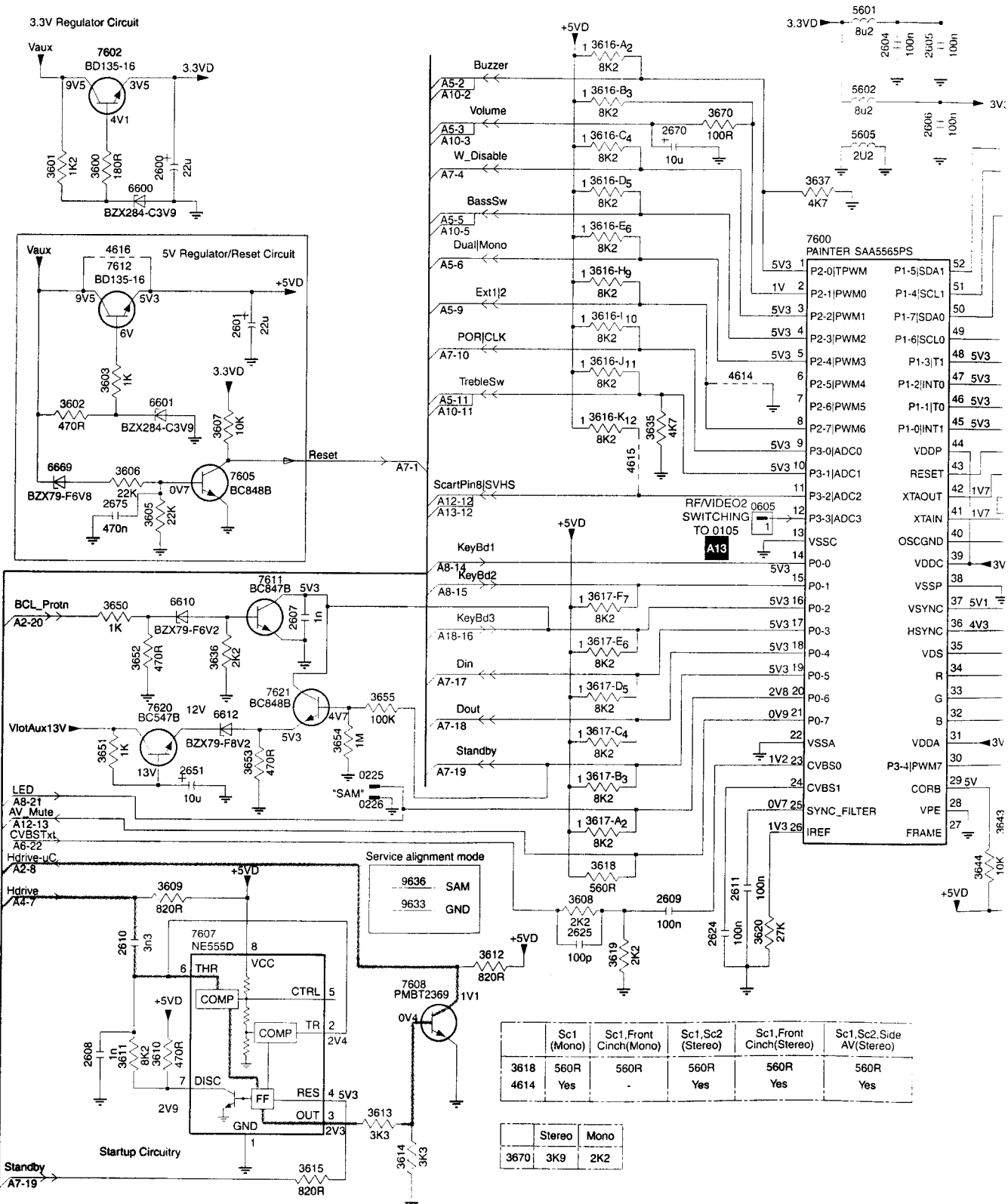









A7 CONTROL

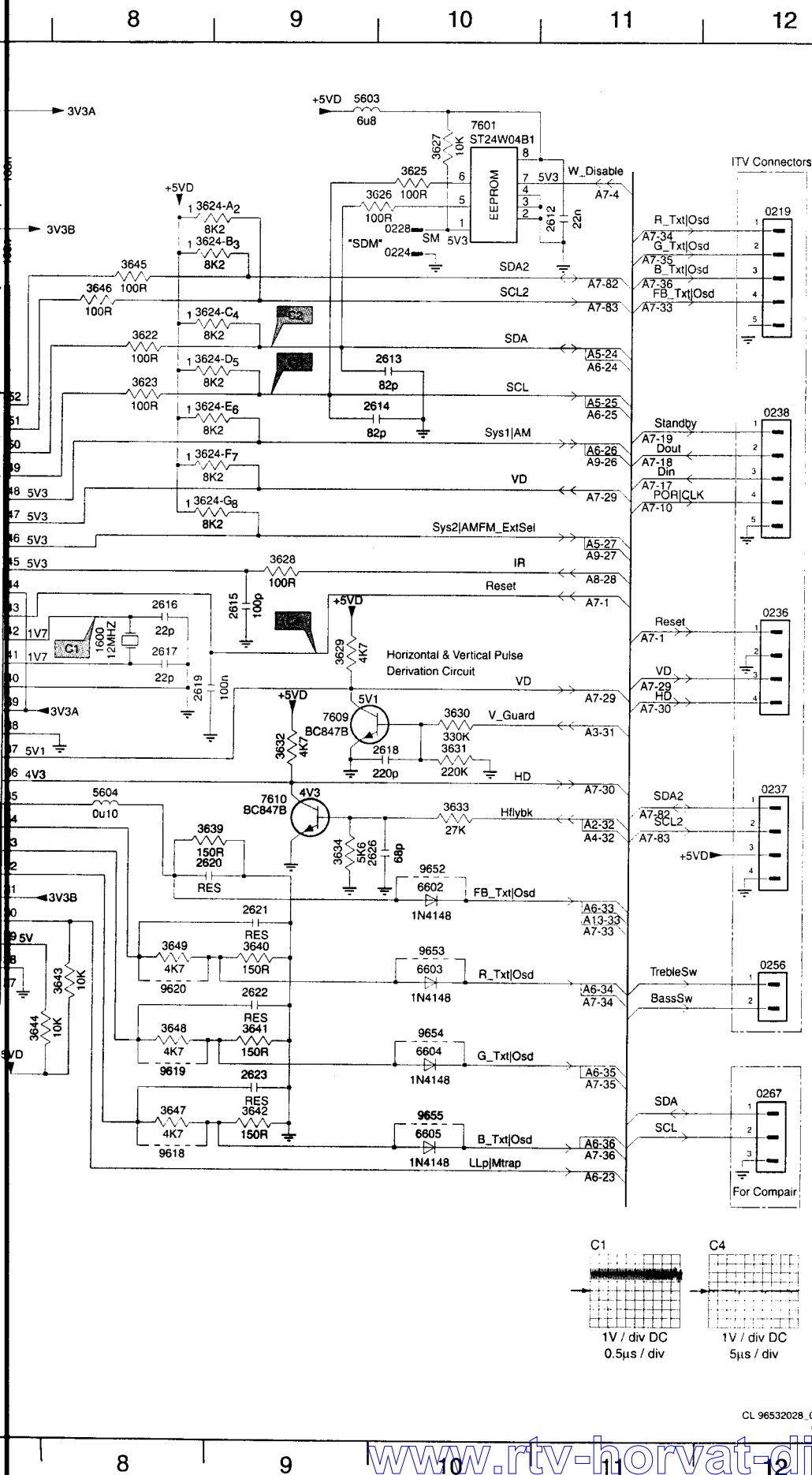




C1



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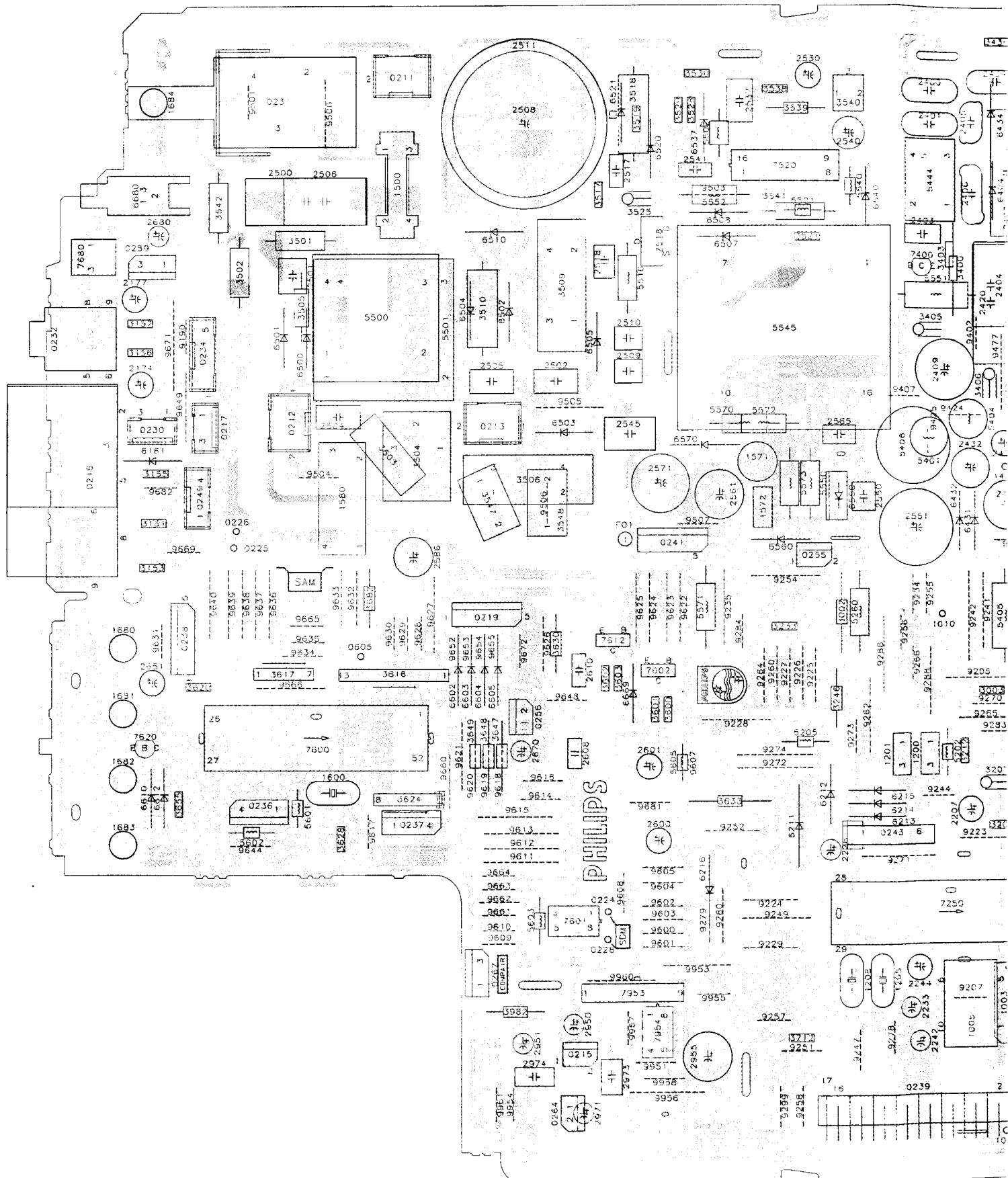
0219 A12	3645 B8
0224 A10	3646 B8
0225 F3	3647 G8
0226 F3	3648 F8
0228 A10	3649 F8
0236 D12	3650 E2
0237 E12	3651 F2
0238 C12	3652 E2
0256 F12	3653 F3
0267 G12	3654 E3
0605 D6	3655 E4
1600 D8	3670 A6
2600 B2	4614 C6
2601 C3	4615 D5
2604 A7	4616 B2
2605 A7	5601 A7
2606 B7	5602 A7
2607 E3	5603 A9
2608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

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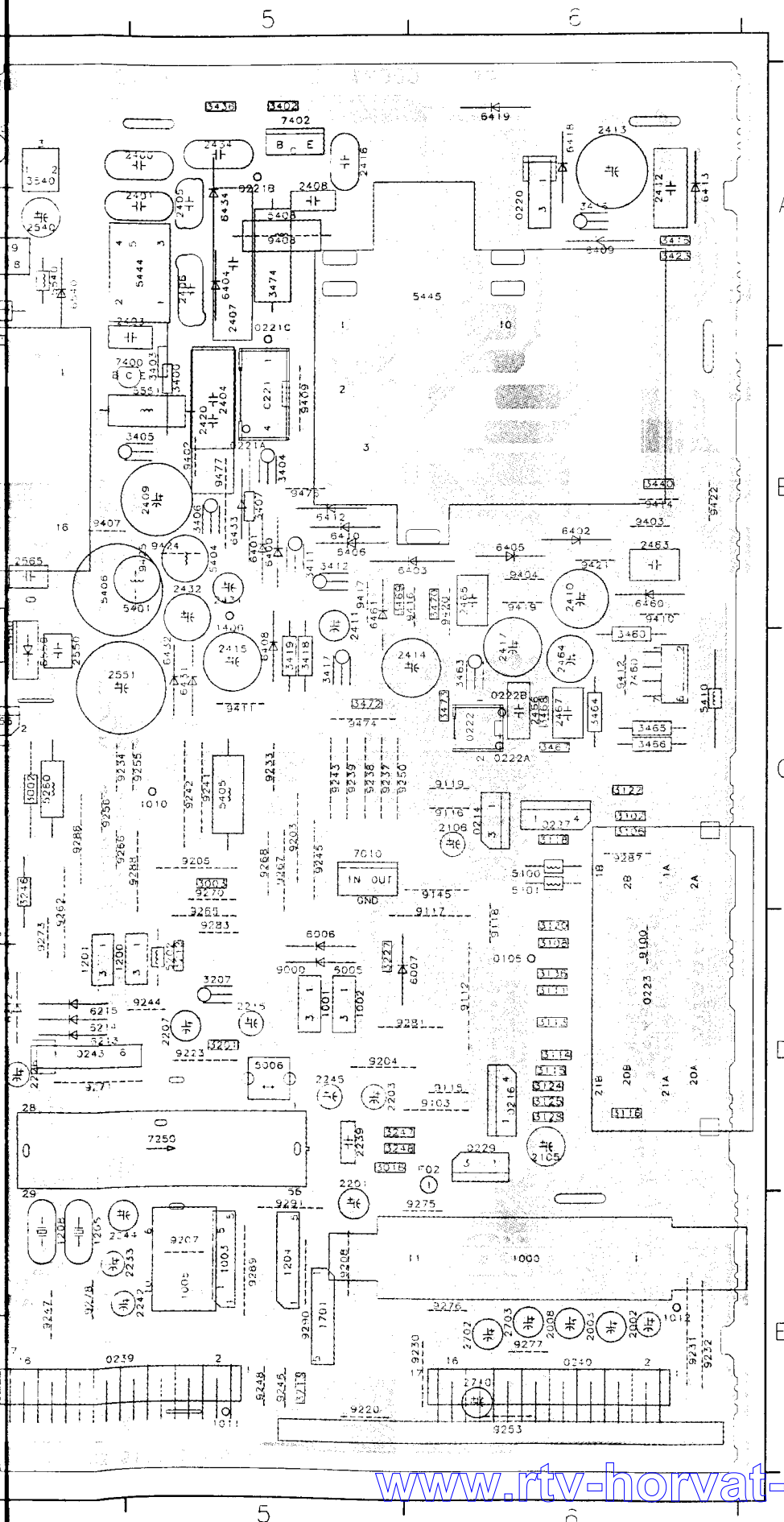
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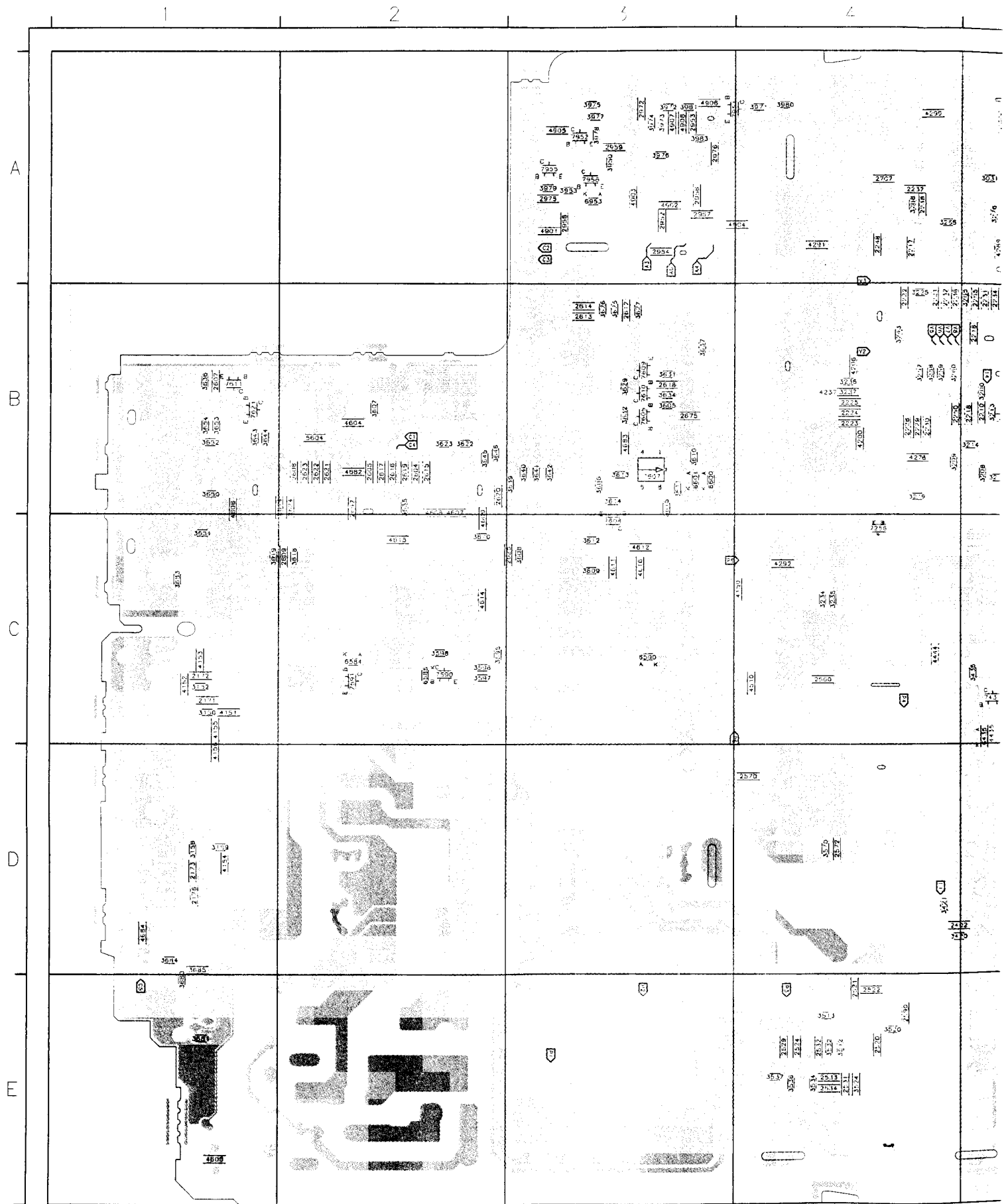




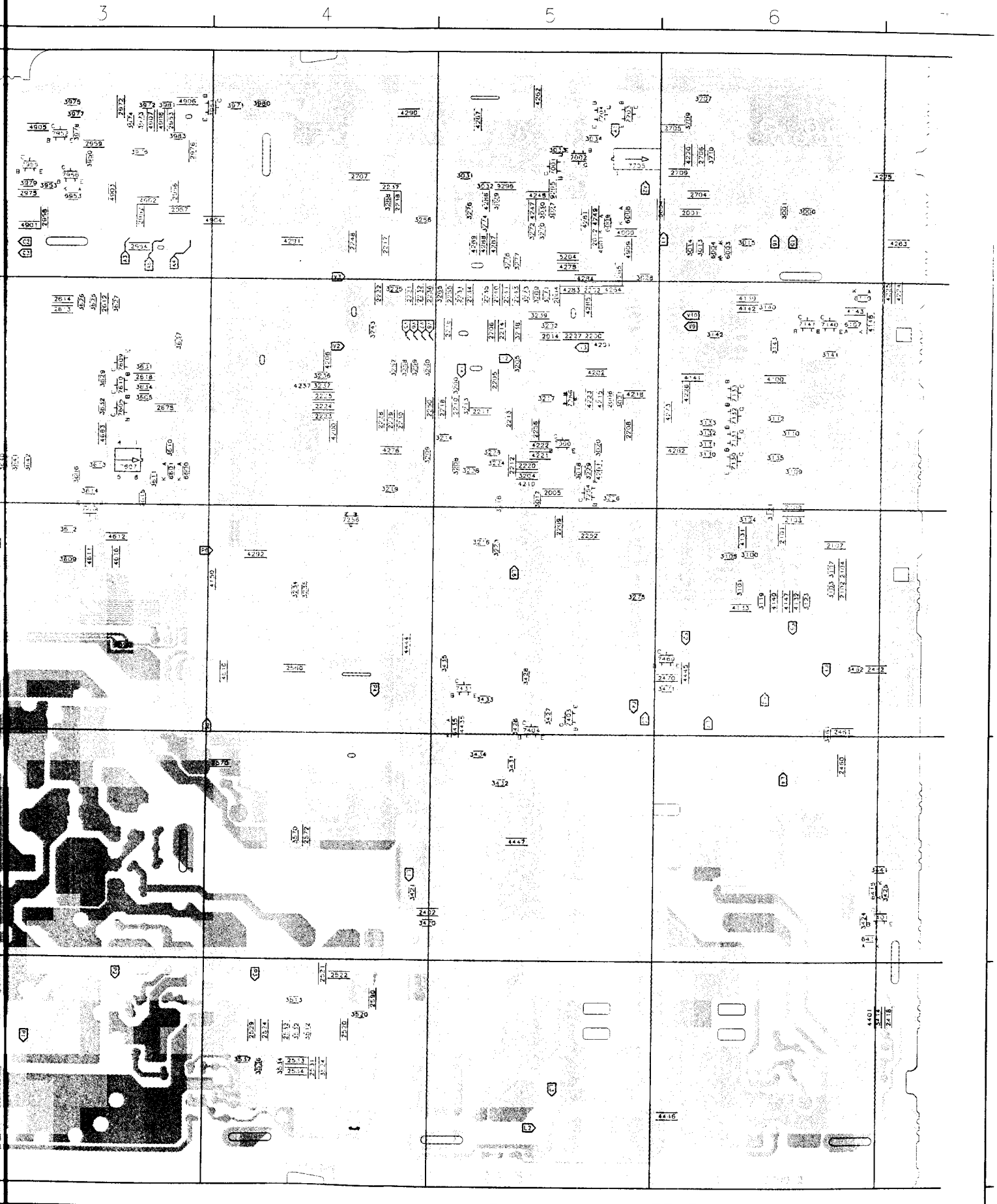


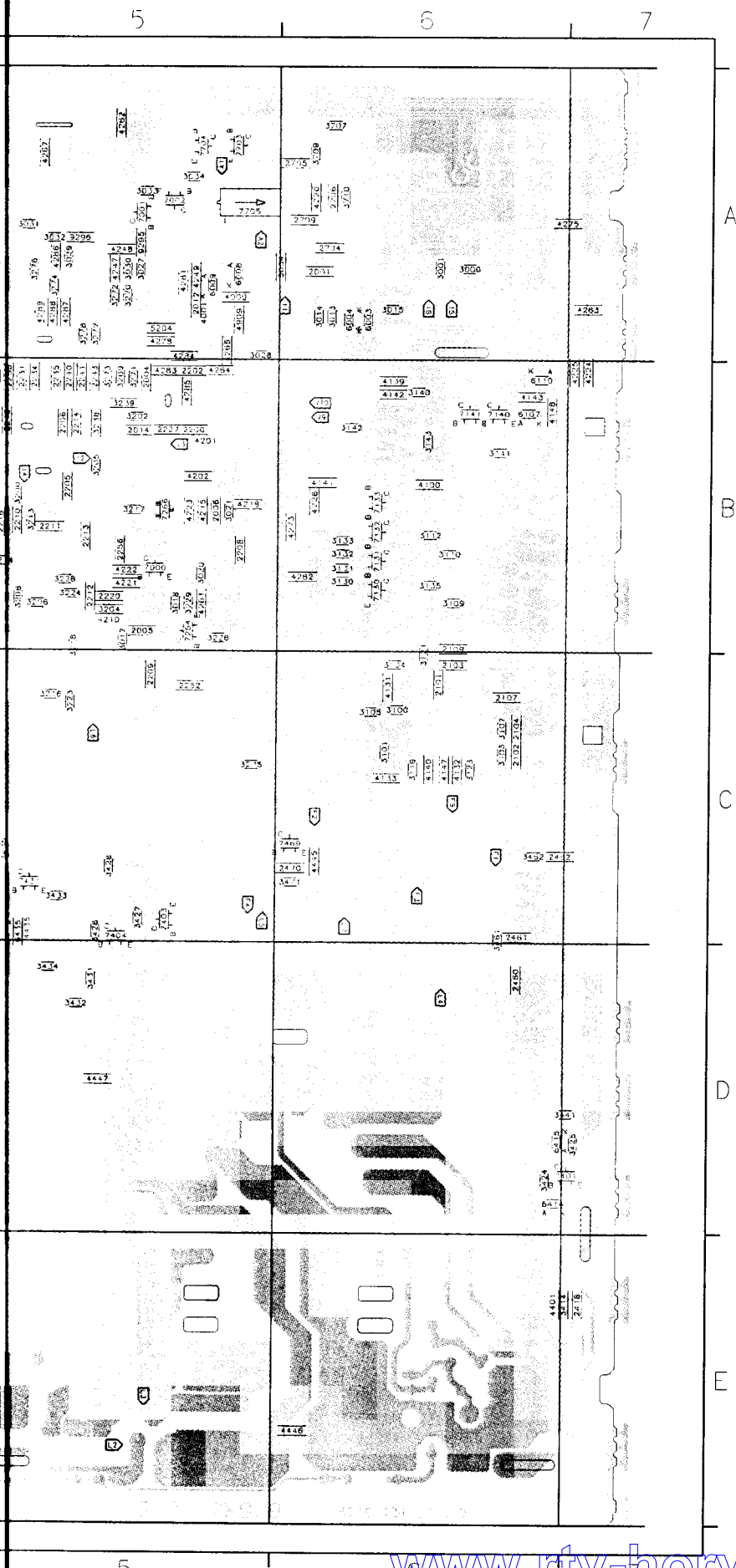


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**A9 AM**

(for BG)

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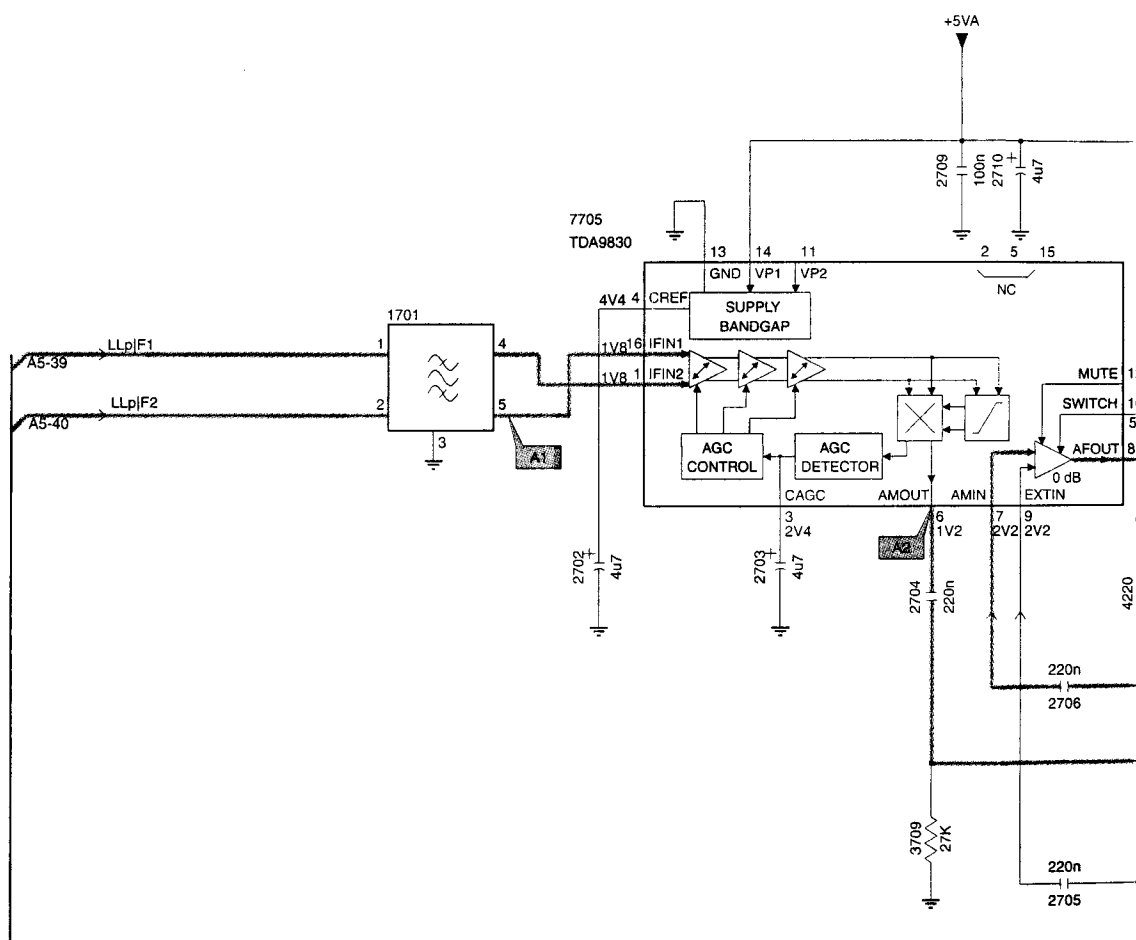
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7

# **A9 AM MONO DEMODULATOR**

(for BG/LL Mono sets only)



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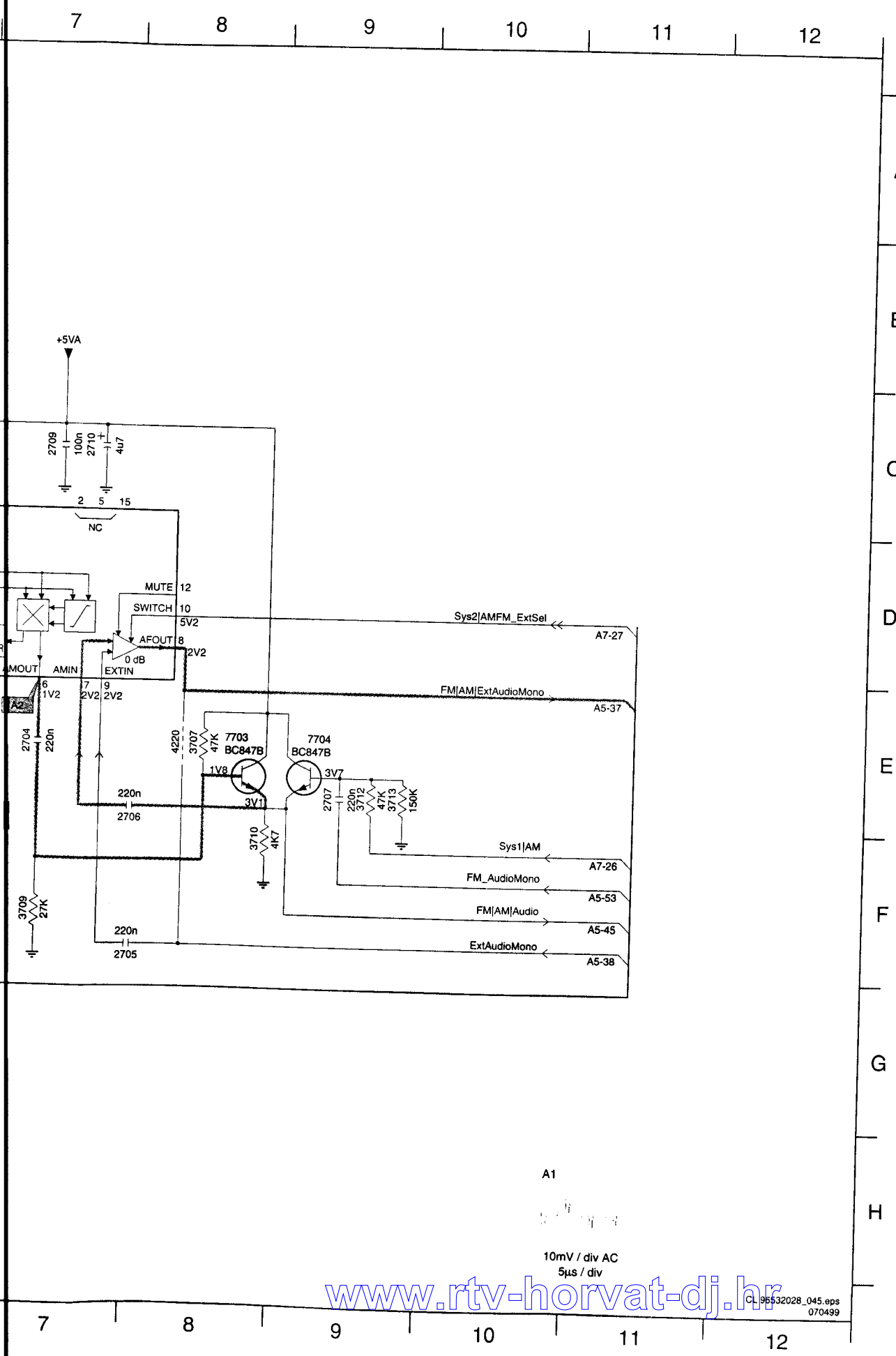
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6

7





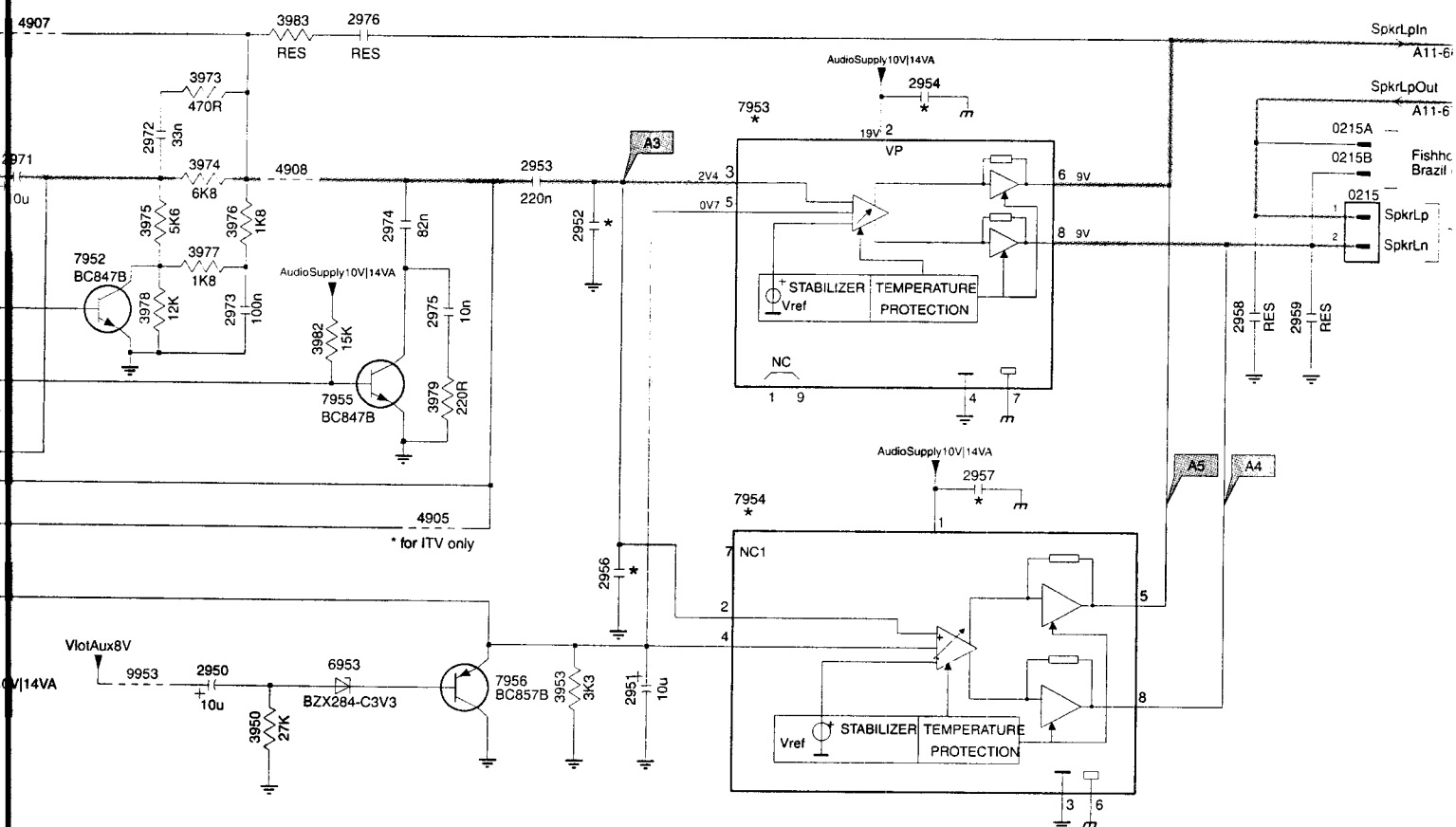


- 1701 D4
- 2702 E5
- 2703 E6
- 2704 E7
- 2705 F7
- 2706 E7
- 2707 E9
- 2709 C7
- 2710 C7
- 3707 E8
- 3709 F7
- 3710 F8
- 3712 E9
- 3713 E9
- 4220 E8
- 7703 E8
- 7704 E9
- 7705 C5

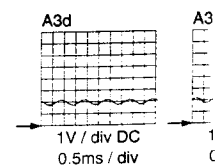


## AMP AMPLIFIER

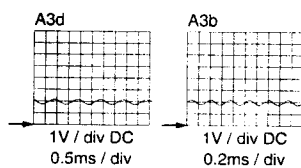
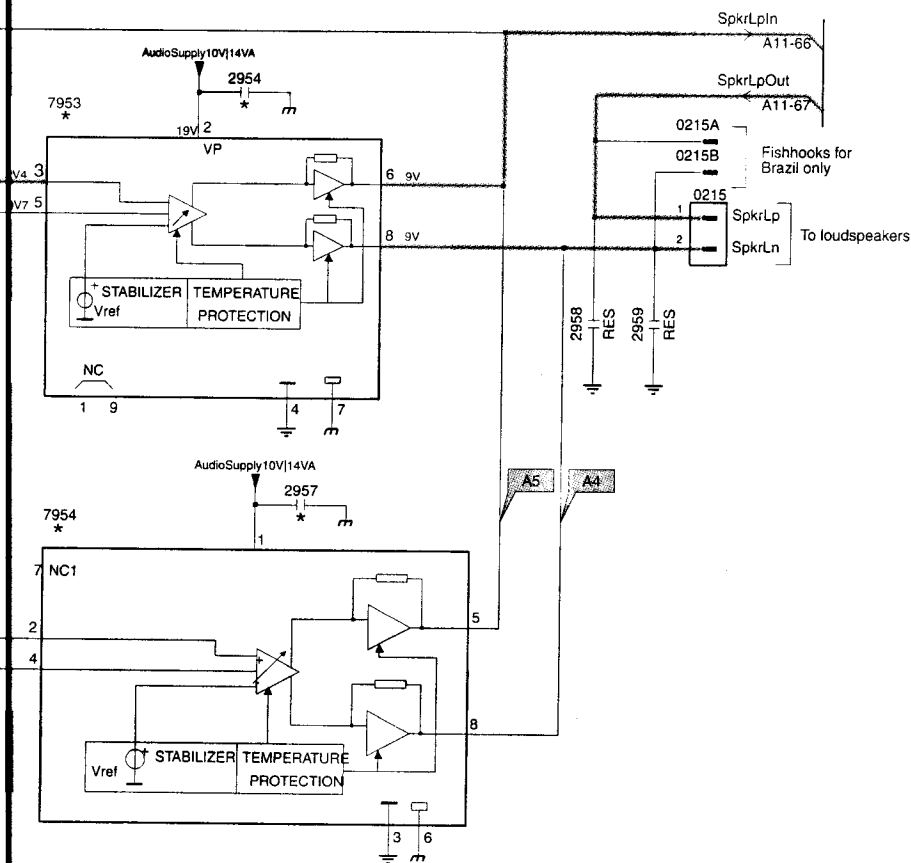
SMART SOUND (MONO)



Sound Amplifier	
1W	2W/3W/4W
	2n2
	220nF
	-
	-
	TDA7052B
7056B	-

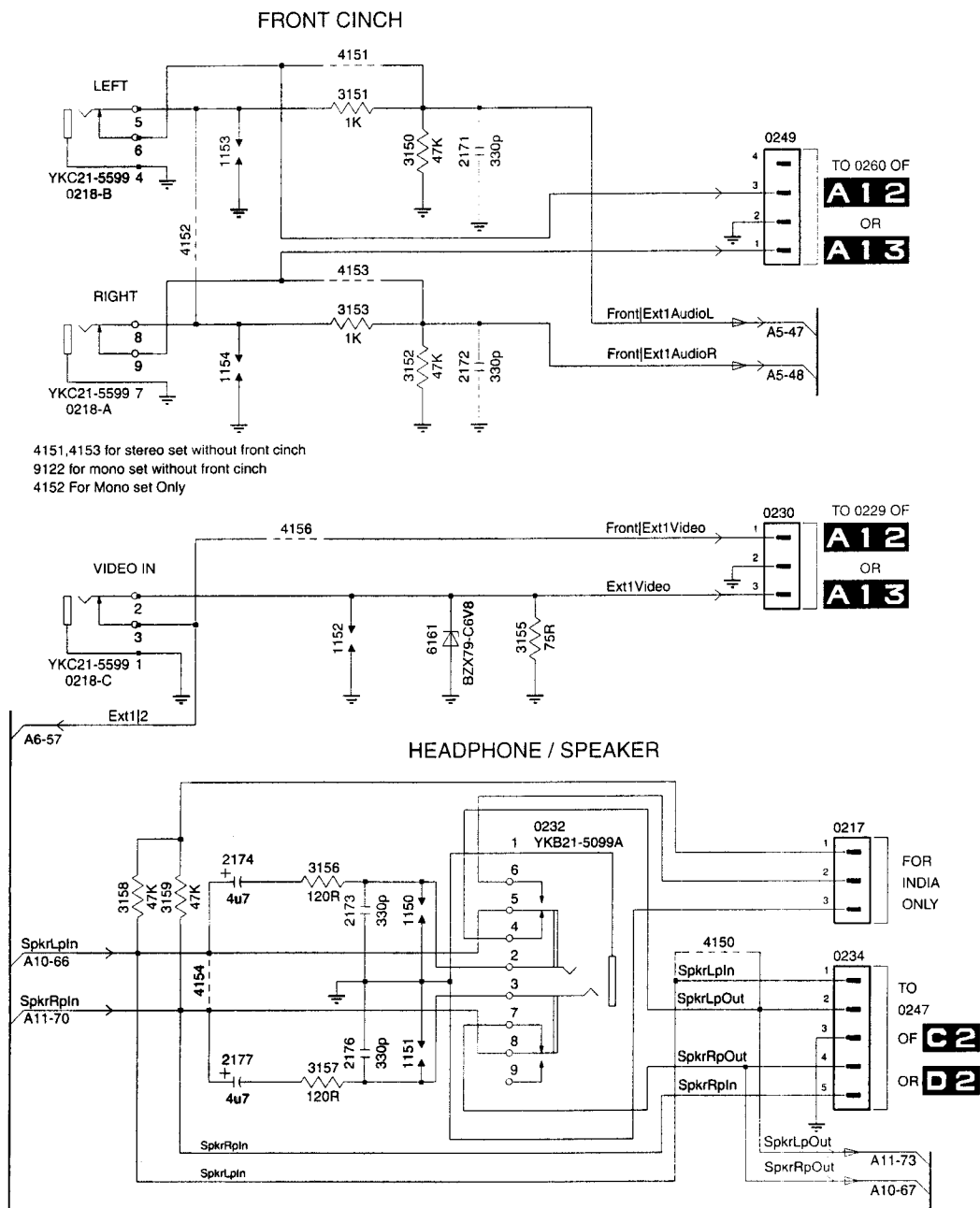


0215 C10  
0215A B11  
0215B B11  
0264 D4  
2950 E5  
2951 E7  
2952 C7  
2953 B6  
2954 B8  
2955 E3  
2956 D7  
2957 D9  
2958 C10  
2959 C10  
2971 B4  
2972 B5  
2973 C5  
2974 C6  
2975 C6  
2976 B6  
3950 E5  
3953 E7  
3971 B3  
3972 C3  
3973 B5  
3974 B5  
3975 C5  
3976 C5  
3977 C5  
3978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



1      2      3      4      5      6      7

**A11 FRONT CINCH + HEADPHONE**



- Front
- 0218
  - 0230
  - 0249
  - 2171
  - 2172
  - 3150
  - 3151
  - 3152
  - 3153
  - 3155
  - 4151
  - 4152
  - 4153
  - 4155
  - 4156
  - 6161
- Head
- 0232
  - 0234
  - 2173
  - 2174
  - 2176
  - 2177
  - 3156
  - 3157
  - 4154

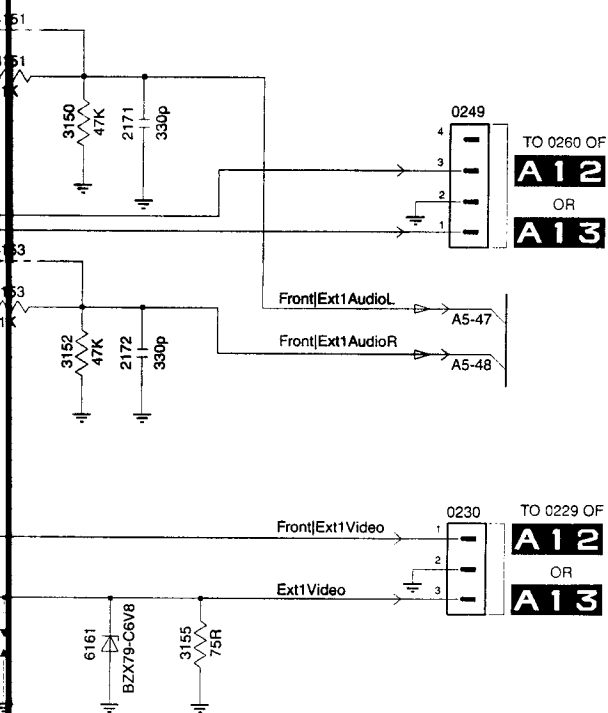
NOTE : 0191 use 242202604471 for INDIA only  
for other regions use 242202604747

1      2      3      4      5      6      7



PHONE

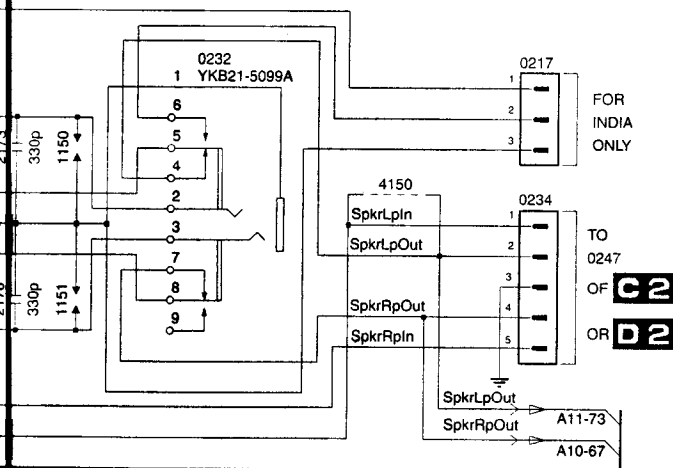
NCH



Front I/O Configuration

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

HEADPHONE / SPEAKER



NOTE : 0191 use 242202604471 for INDIA only  
for other regions use 242202604747

Headphone Configuration

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

7 8 9 10 11 12

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

Front I/O Configuration

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

Headphone Configuration

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

A

B

C

D

E

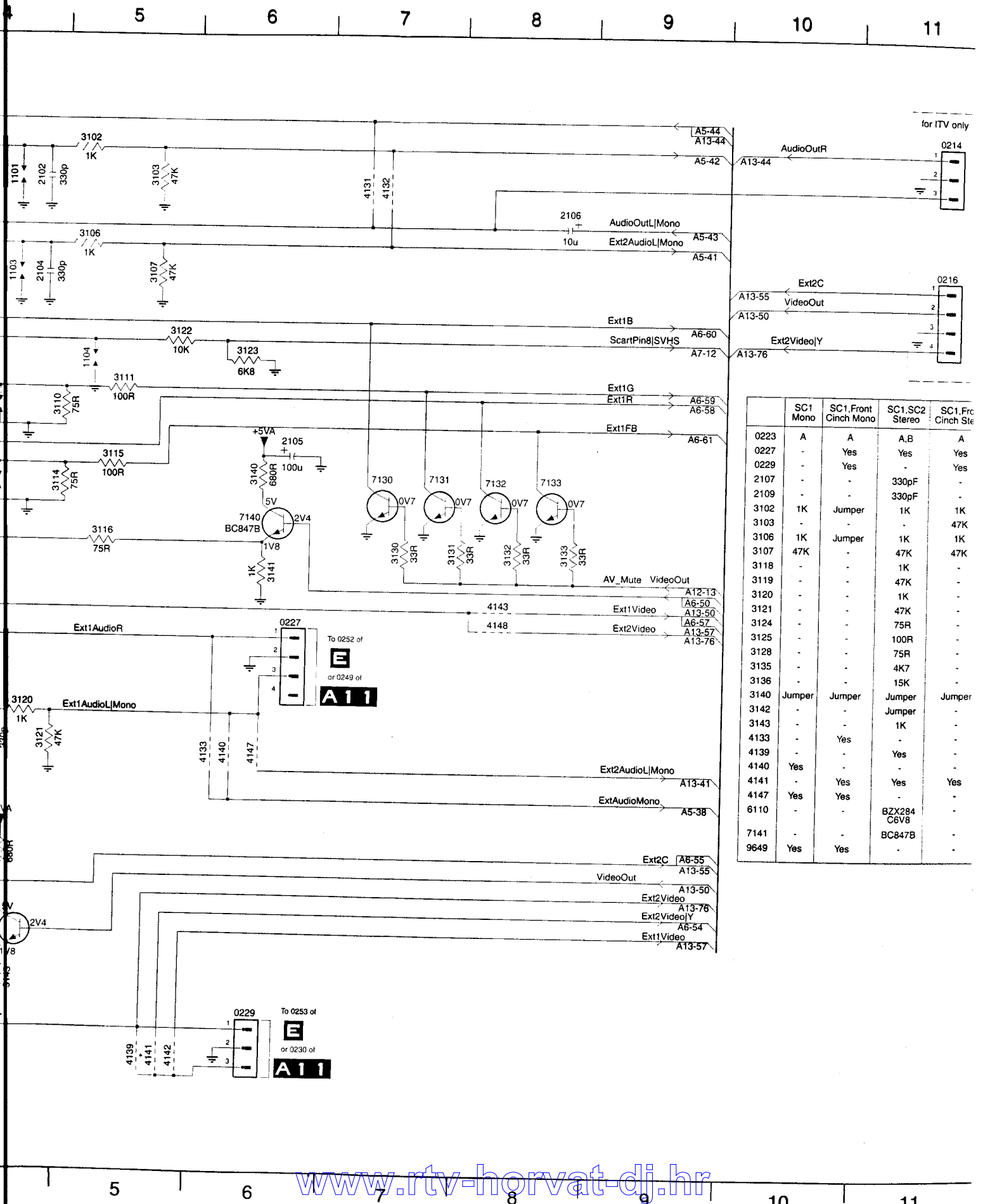
F

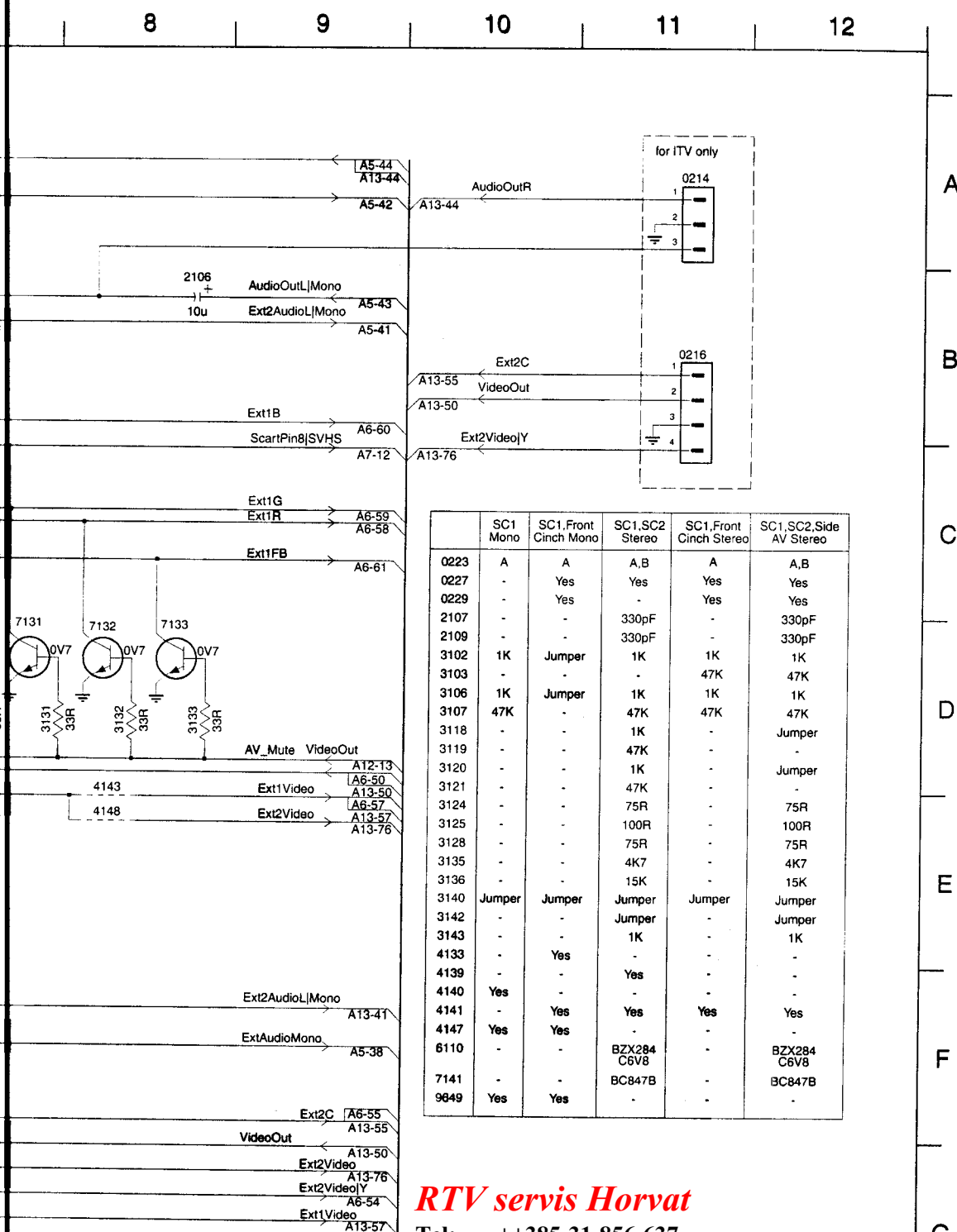
G

H

7 8 9 10 11 12







**RTV servis Horvat**

Tel: ++385-31-856-637

Tel/fax: ++385-31-856-139

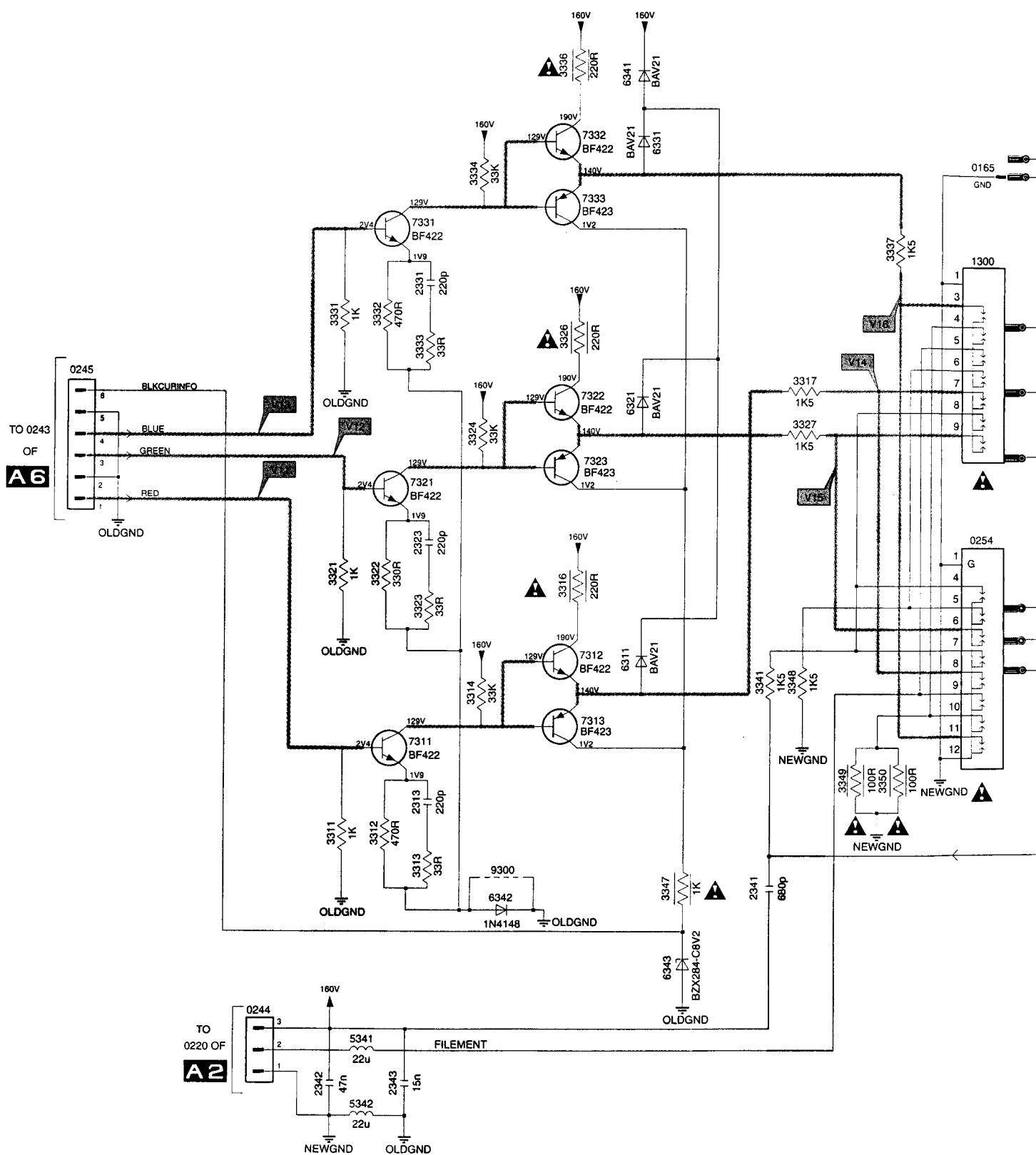
Mob: 098-788-319

[www.rtv-horvat-dj.hr](http://www.rtv-horvat-dj.hr)

0105 E3  
0214 A11  
0216 B11  
0223-A A2  
0223-B E2  
0227 E6  
0229 H6  
1101 A4  
1102 B3  
1103 B4  
1104 C5  
1105 C3  
1106 C3  
1107 C4  
1108 D4  
1109 D3  
1110 A3  
1111 E2  
1113 F3  
1115 G2  
1117 H2  
1118 G3  
1119 F2  
1132 D3  
2101 A3  
2102 A4  
2103 B3  
2104 B4  
2105 C6  
2106 B8  
2107 E2  
2109 F3  
3100 A3  
3101 A4  
3102 A5  
3103 A5  
3104 B3  
3105 B4  
3106 B5  
3107 B5  
3108 B3  
3109 C3  
3110 C4  
3111 C5  
3112 C3  
3113 C3  
3114 D4  
3115 C5  
3116 D5  
3118 E3  
3119 E3  
3120 E4  
3121 F4  
3122 B5  
3123 C6  
3124 G3  
3125 G3  
3128 G3  
3130 D7  
3131 D7  
3132 D8  
3133 D8  
3135 F3  
3136 F3  
3140 D6  
3141 D6  
3142 F4  
3143 G4  
4131 A7  
4132 A7  
4133 F6  
4139 H5  
4140 F6  
4141 H5  
4142 H5  
4143 E8  
4147 F6  
4148 E8  
5100 A3  
5101 B3  
6107 D3  
6110 H3  
7130 D7  
7131 D7  
7132 D8  
7133 D8  
7140 D6  
7141 G4

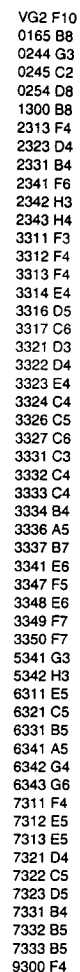
**B C**

3 www.rtv-horvat-dj.hr 6



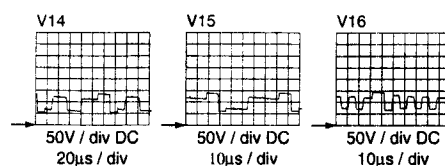


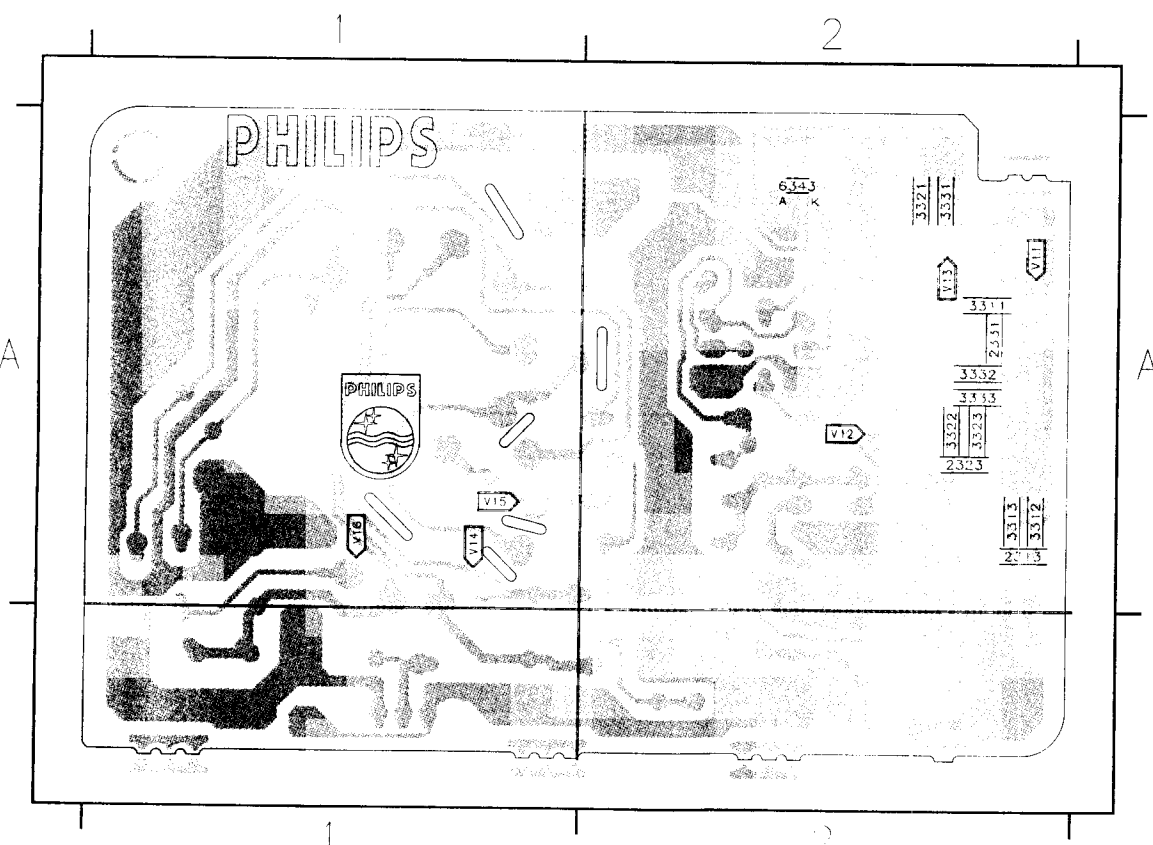
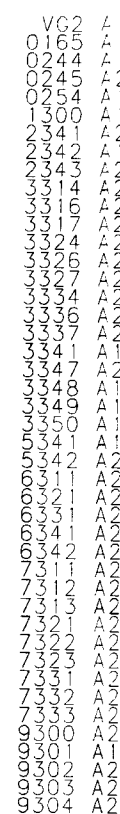




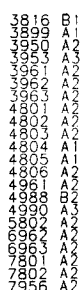
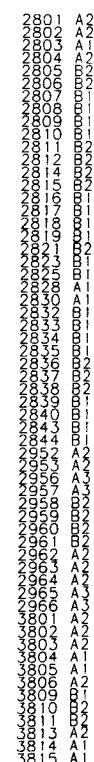
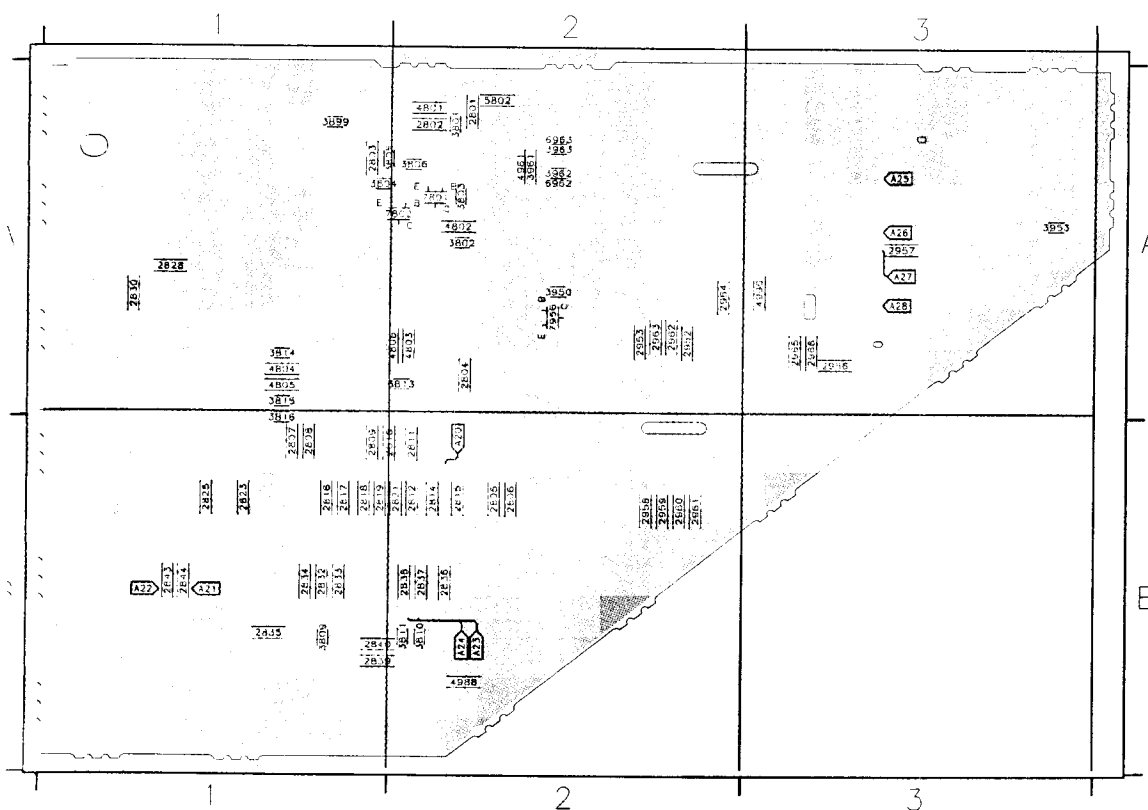
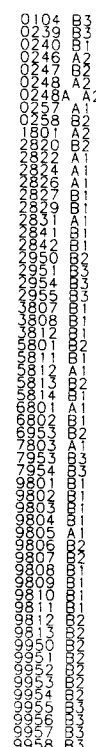
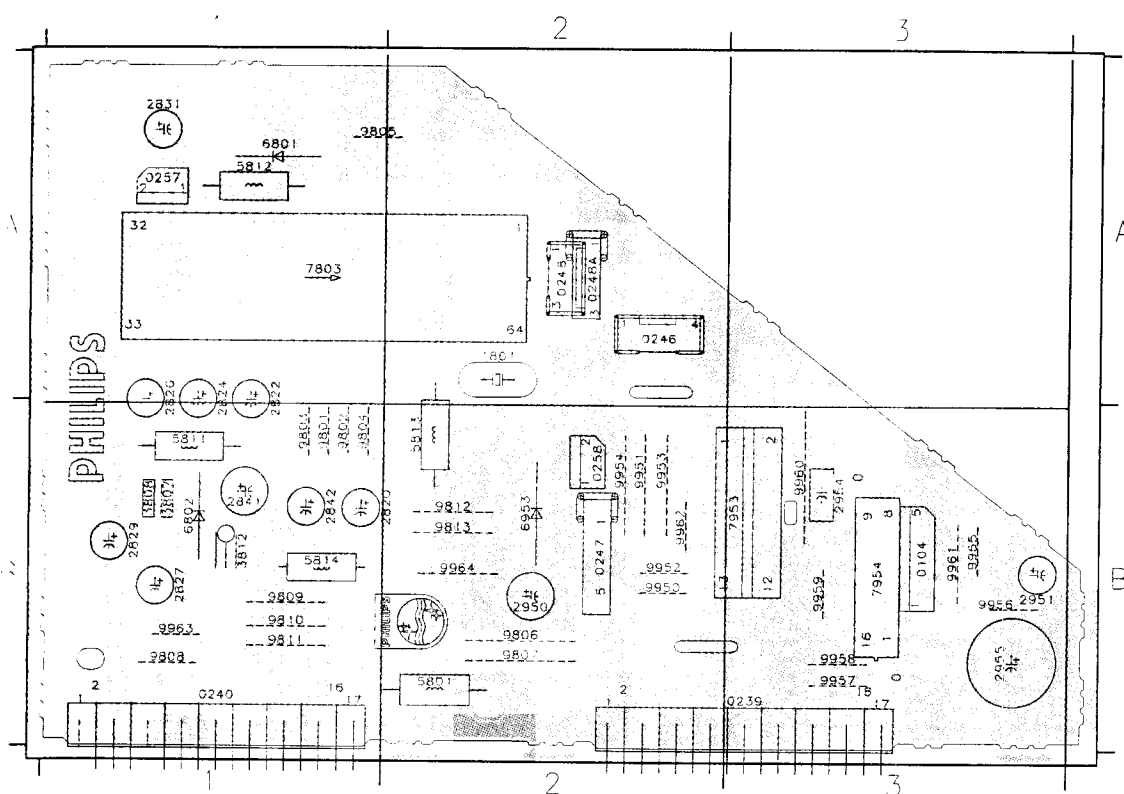
CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11

FROM MAIN CHASSIS LOT OF **A2**

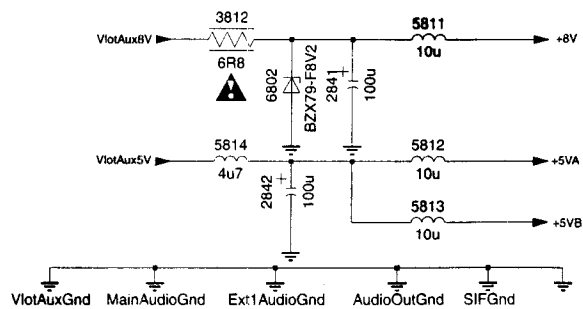
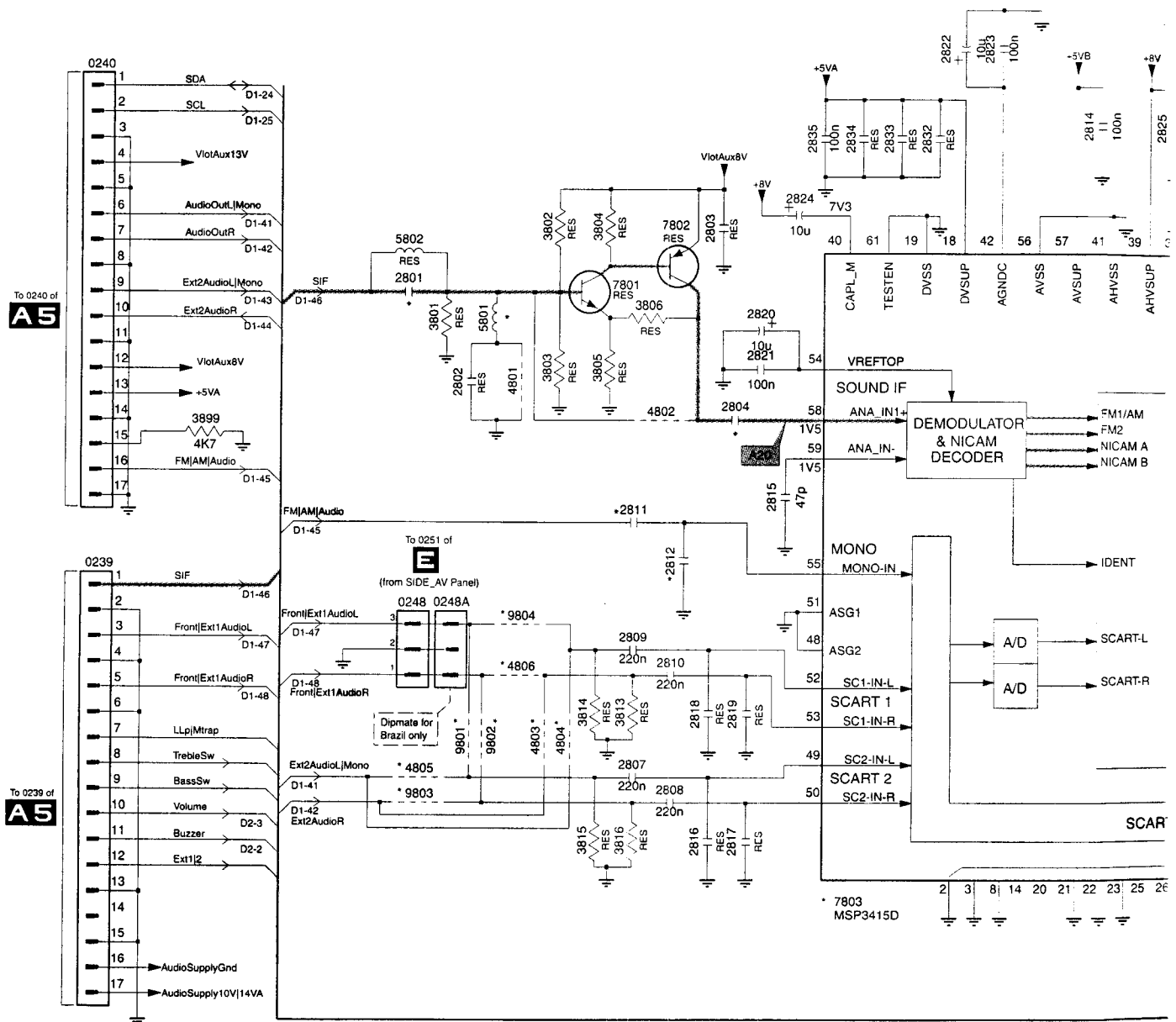




2	3	1	3	A	2
2	3	2	3	A	2
2	3	3	1	A	2
3	3	1	1	A	2
3	3	1	1	A	2
3	3	1	3	A	2
3	3	2	1	A	2
3	3	2	2	A	2
3	3	2	3	A	2
3	3	3	1	A	2
3	3	3	3	A	2
3	3	3	3	A	2
6	3	4	3	A	2

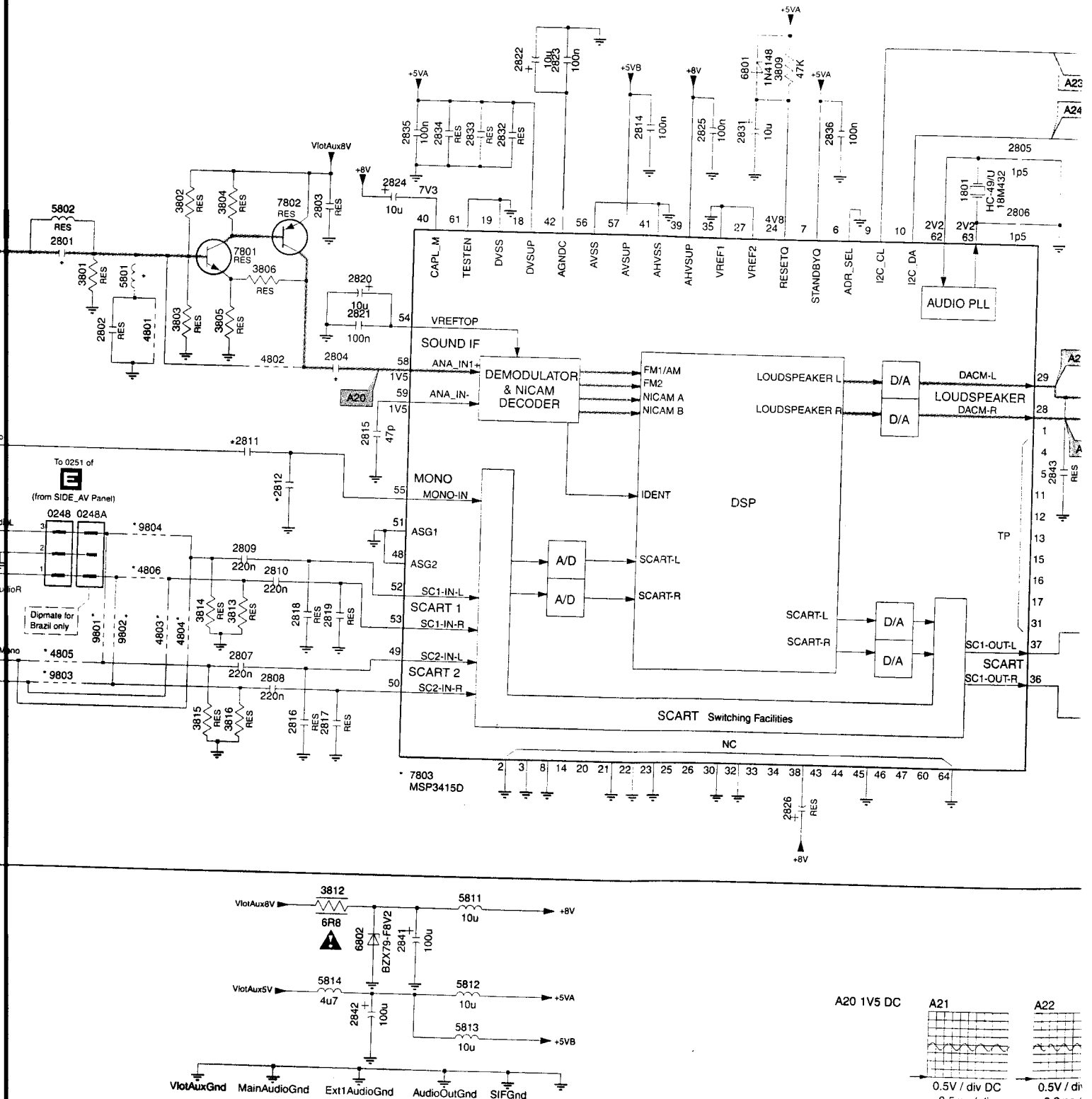


# D1 ITT AUDIO DECODING



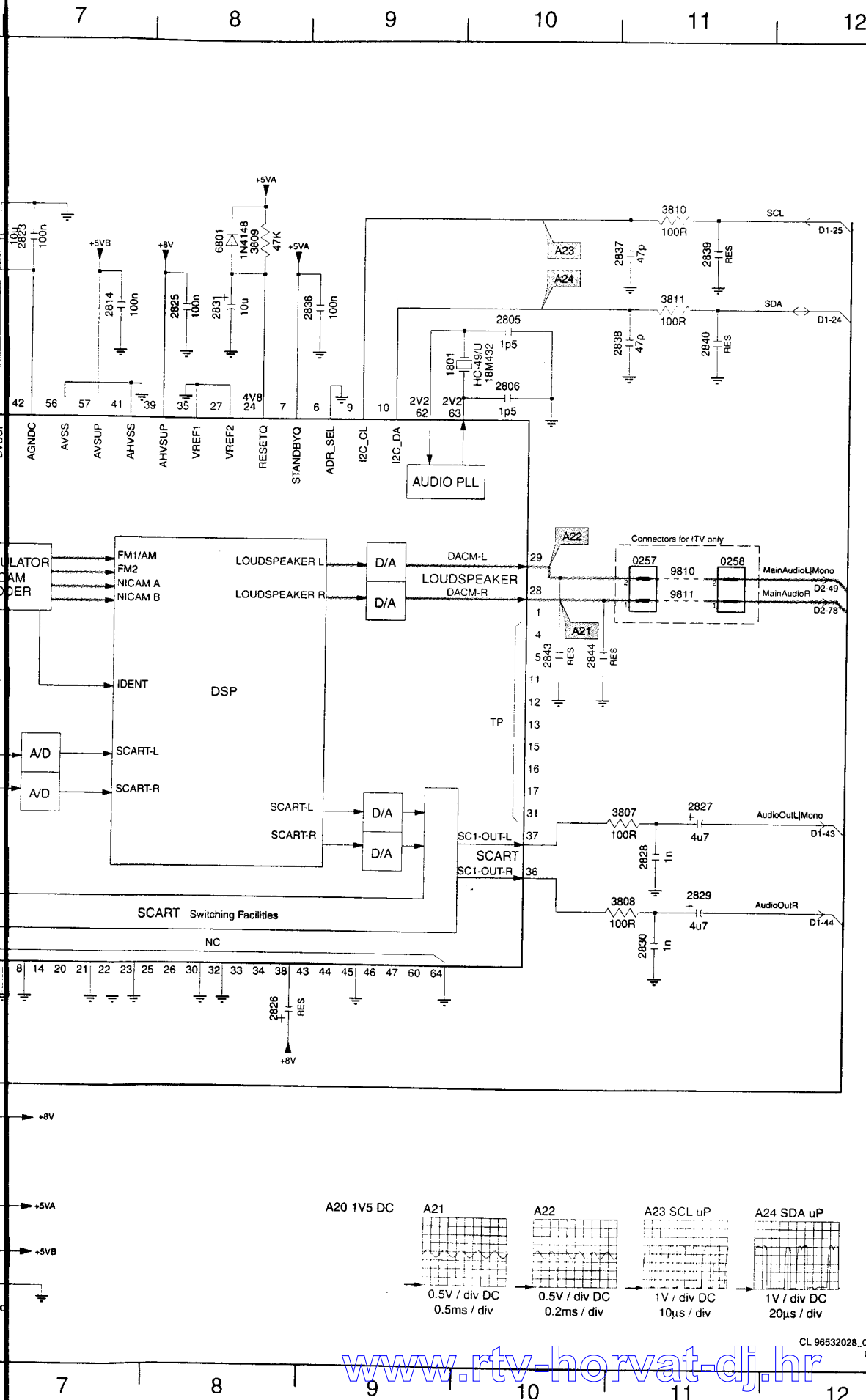
3 4 5 6 7 8 9 10

G

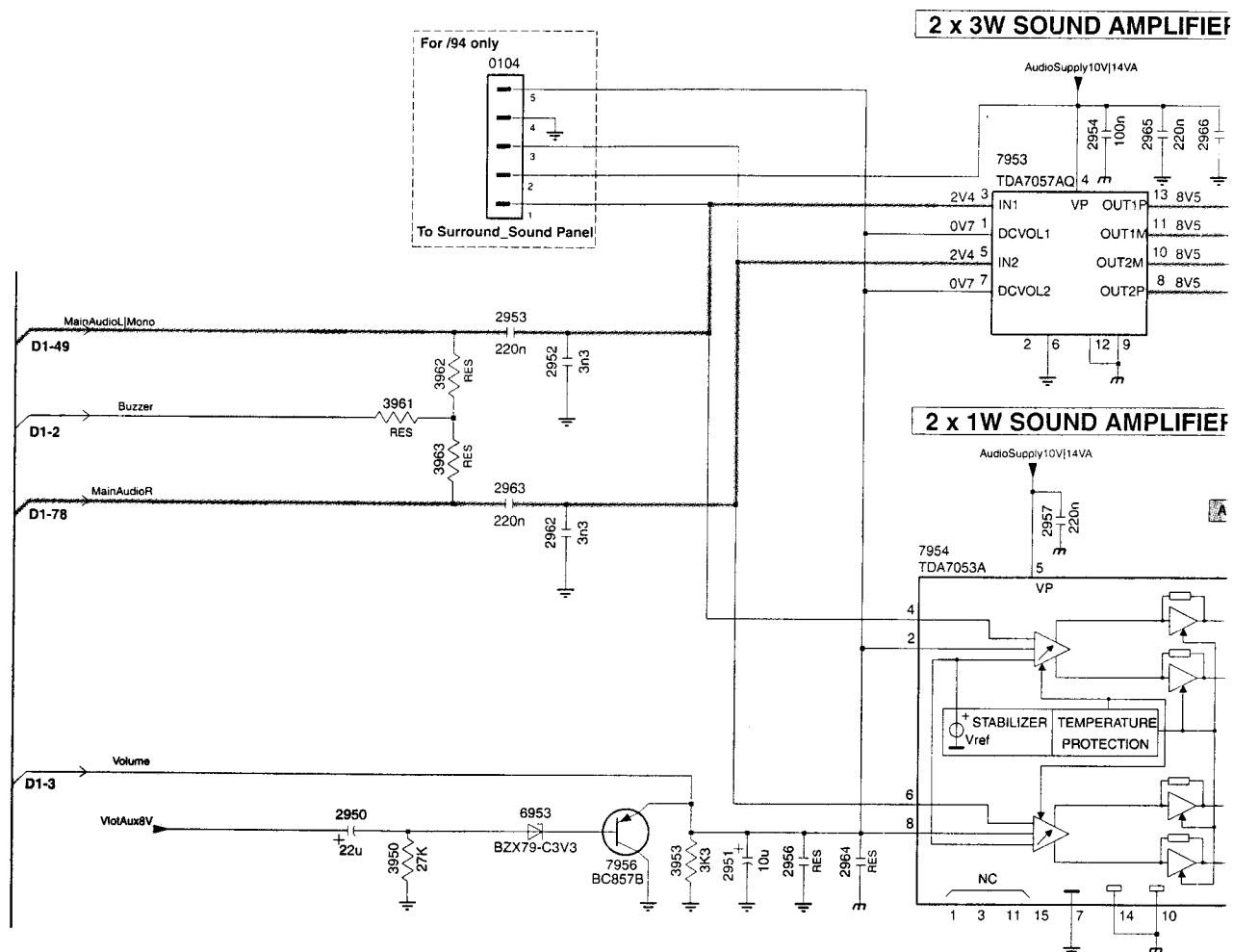


4 5 6 7 8 9 10





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

**D2 ITT AUDIO AMPLIFIER****SOUND SYSTEM**

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

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

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

**HEADPHONE**

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

8 9 10 11 12

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

0250-A C2  
 0250-B D2

A

B

C

D

E

F

G

H

A

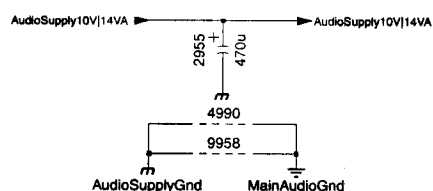
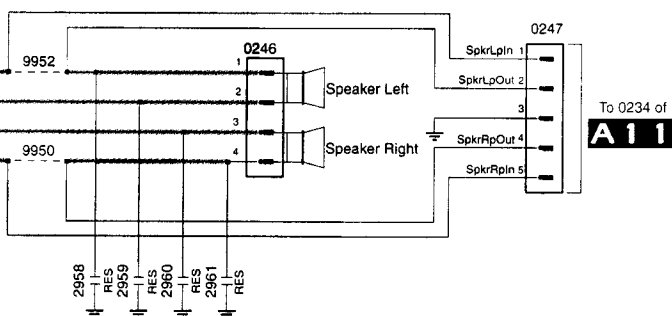
B

C

D

E

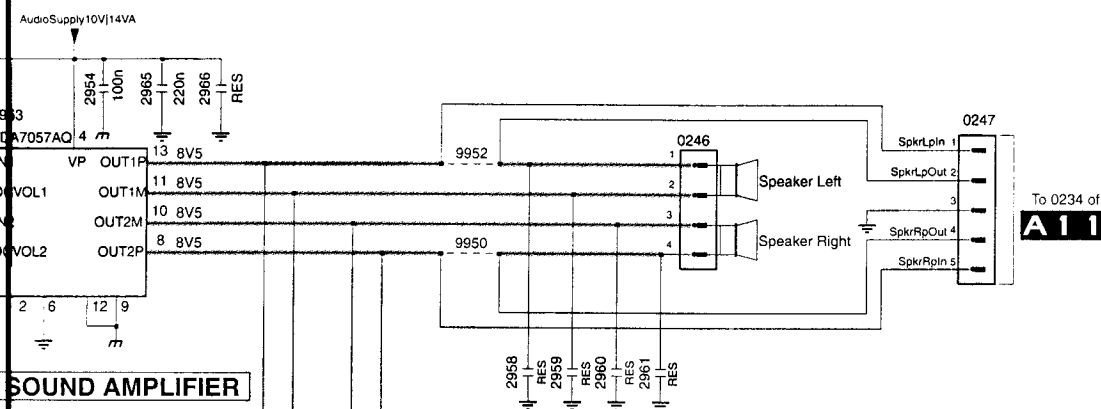
F



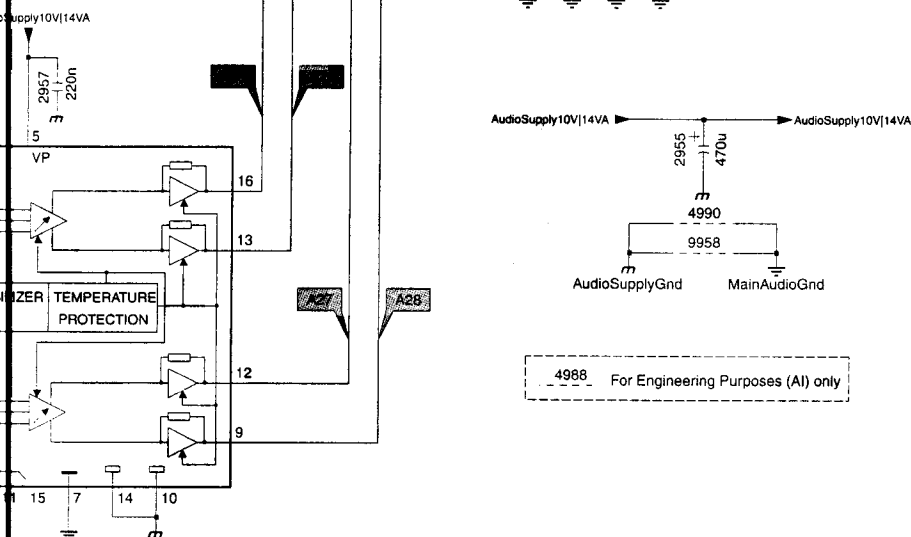
4988 For Engineering Purposes (A1) only

7 8 9 10 11 12

## SOUND AMPLIFIER



## SOUND AMPLIFIER



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

A

B

C

D

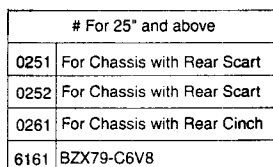
E

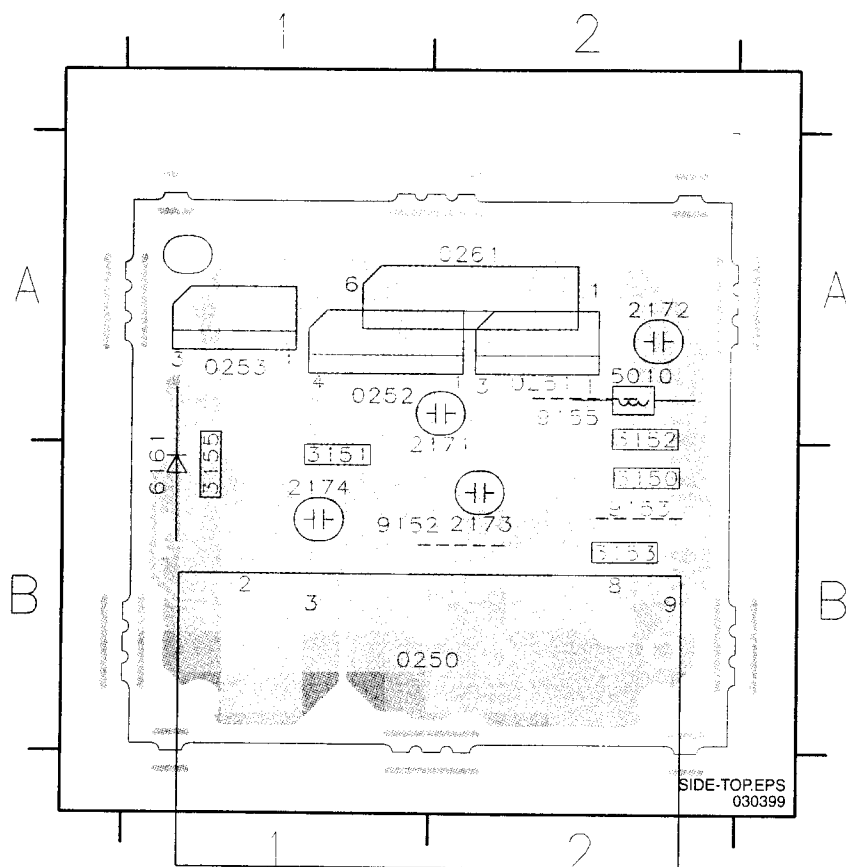
F

G

H

5

**F**



0250 B1  
0251 A2  
0252 A1  
0253 A1  
0261 A2  
2171 B2  
2172 A2  
2173 B2  
2174 A2  
3150 B1  
3151 B2  
3152 B1  
3153 B2  
5010 B1  
6161 B1  
9152 B1  
9153 B2  
9154 A2



# Alignments

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

## Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220V - 240V ( 10% )
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2,5 pF.

## Selection of the SDM-menu

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

## Selection of the SAM-menu

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

## Electrical Alignments

### VG2

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

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

### 8.2.2 Focusing

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

### 8.2.3 Adjustment of the Power Supply

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

## 8.3 SOFTWARE ADJUSTMENT

### 8.3.1 Geometry adjustments

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

#### Vertical Amplitude and Position

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

Select Vertical S-correction "VSC" to align the top/bottom squares till they have the same size as the squares in the middle of the screen.

#### Horizontal Amplitude and Phase

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

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

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

### 8.3.2 AGC

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.

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

### 8.3.3 IF-PLL / IF-PLL POS

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

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

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

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

The IF-PLL POS option is used for only the SECAM L' signal

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

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

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

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

### 8.3.4 Tuner options CL, YD and IF-PLL OFFSET

NO ADJUSTMENTS NEEDED FOR THESE ALIGNMENTS.

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

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

### 8.3.5 White tone

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

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

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

Switch the set to standby.

### 8.3.6 Audio

NO ADJUSTMENTS NEEDED FOR SOUND.

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

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

## 8.4 Options

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

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

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

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

The following options in SDM can be identified:

OP	OPTION (ON=enabled / present)	Explanation / Remark
AC	Alternate Channel	Alternate channel function (SWAP between last presets) enabled
AM	Animated menu	
2X	External 2	
AO	Audio out	Default value is OFF
AS	Auto startup/Micro controller startup	Default value is ON (ON = start-up via micro controller, OFF = auto start-up BiMOS)
AT	Automatic Tuning System (ATS)	
BM	Blue Mute (ON = enabled)	Enabled: blue mute background in case of no video ident / poor signal conditions

BS	BiMOS standby mode	Default value = ON
BT	Bass/Treble Control	Menu controls for BASS and TREBLE available when enabled
C8	Maximum Program ( ON = 80 programmes )	C8 is OFF : Maximum of 100 programs
CD	Auto Cable Detect	Default value = OFF (Not applicable for European sets)
CI	Automatic Channel Installation (ACI)	
CK	Clock (Volatile)	Clock function available when enabled
CL	Child Lock	Menu item Child lock/Parental control when enabled
CP	Contrast Plus	Menu item Contrast Plus available when enabled
CT	Colour Temperature	Menu item Colour Temperature available when enabled
CX	16:9 Compress	Menu item 16:9 compress when enabled
DM	Demo Mode	Demonstration of TV functions on screen when enabled
DP	Slider Bar Value Display	Slider bar value displayed when enabled
DU	Dual I/II	Possibility of language selection when enabled
DV	Delta Volume	(Delta) Volume is stored separately for channel 0..40 and external sources when enabled; OFF = not available
EW	East-West Control	East-West Alignment in SAM GEOMETRY menu available when enabled
EX	4:3 Expand	4:3 expand mode available when enabled
FV	Favourite page	Favourite TXT-page feature present when enabled
FQ	Frequency display	Frequency displayed when enabled
GM	Games Mode	Optimisation of setting for games possible when enabled
HS	Hospital Mode	Possibility to block the local keyboard when enabled
HT	Hotel Mode	Possibility to pre-select the channel numbers when enabled
IS	Incredible Surround	Incredible surround function available when enabled
LV	Automatic Volume Leveller (AVL)	Menu item AVL available when enabled
NI	No Ident Auto Standby	Set switches to standby after 10min. when NI enabled
NR	Noise Reduction	Menu item Noise Reduction available when enabled
RC (*)	Separate preset/volume control on remote control (ON = separate control (A8 RC); OFF = combined control (L7 RC))	See note below table. Default value is OFF
SB	Sound Board (Set the sound hardware configuration)	MA = Mono ALL
		ND = Stereo/2CS/Nicam
		IT = German 2CS
SP	Smart Picture	Smart picture command is processed when enabled
SS	Smart Sound	Smart sound command is processed when enabled
ST	Sound systems supported	SS = BG, I, DK, M
		AD = BG/I, BG/DK, I/DK
SY	Systems supported	SS = Single system without NTSC Playback
		SP = Single system with NTSC Playback
		AD = Dual Mono
		ED = Europe Tri Mono
		EF = Europe Full Multi
		EL = Europe Full Multi with LL'
TN	Tuner (OFF: Philips tuner; ON: Alps tuner)	Default value = OFF
TW	Channel Select Time Window (OFF: 2 seconds; ON: 5 seconds)	Time interval for entering a second digit for channel selection
UB	Ultra Bass	Ultra bass function available when enabled
VI	Virgin Mode	OSD at very first installation when enabled
VL	Volume Limiter	Menu item Volume Limiter available when enabled
VM	Video Mute	Screen blanking during channel switching when enabled
WE	Europe West (ON: Western Europe; OFF: other)	
XS	External Source Colour Select	External source colour selection available when enabled
XT	External 1	External 1 source input available when enabled
OB1	Option Byte 1	See option bits
OB2	Option Byte 2	See option bits
OB3	Option Byte 3	See option bits
OB4	Option Byte 4	See option bits
OB5	Option Byte 5	See option bits
OB6	Option Byte 6	See option bits
OB7	Option Byte 7	See option bits

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

RC = OFF for use with L7-based remote control (only cursor keys). RC = ON for use with A8-based remote control (cursor keys, P+/P- and Volume+/Volume-).

## 8.5 Option bits/bytes

Option bytes

OB1 bits 8, 7, ..., 1: DP, FQ, AM, HS, HT, DM, GM, VI

OB2 bits 8, 7, ..., 1: CK, CL, AT, CI, (res), (res), SS, SP

OB3 bits 8, 7, ..., 1: RC, WE, (res), (res), TW, AC, C8, VM

OB4 bits 8, 7, ..., 1: TN, FV, XT, 2X, XS, CD, BM, NI

OB5 bits 8, 7, ..., 1: EX, CX, NR, CP, CT, EW, BS, AS

OB6 bits 8, 7, ..., 1: BT, IS, VL, DV, UB, LV, DU, AO

OB7 bits 8, 7, ..., 1: ST, ST, SB, SB, SB, SY, SY, SY

An option byte value is calculated in the following way:

value "option bit 1" x 1 =

value "option bit 2" x 2 =

value "option bit 3" x 4 =

value "option bit 4" x 8 =

value "option bit 5" x 16 =

value "option bit 6" x 32 =

value "option bit 7" x 64 =

value "option bit 8" x 128 =

Total : value "option byte" =

## 9. Circuit description new circuits

Power supply (diagram A1)

### 9.1 Introduction

#### 9.1.1 General

The switch mode power supply (Fixed Frequency) is mains isolated. The control IC7520 (MC44603A) produces pulses for driving FET 7518. Power supply regulation is achieved by using duty cycle control at a fixed frequency of nominal 70 kHz in normal operation. In stand-by, slow-start and overload situations the SMPS runs at frequencies other than 70 kHz. Basic characteristics of this SMPS :

- Mains Isolated flyback Converter type
- Input range : 150 - 276 Volts AC
- Secondary voltage adjustment via potentiometer R3540 at the primary side
- IC7520 is featured with Slow-Start circuitry
- Protection Circuits
- Degaussing circuit

#### 9.1.2 Output voltages

- Audio Supply 10V/14V ( +18V ) for the Sound amplifier ( D2 )
- Vbatt/Main Supply ( +95V ) for the Line deflection stage (A2), Tuner video IF ( A5 )
- Vaux / MainAux ( +9.5V ) for the Line Deflection ( A2 ) and the Control (A7)

#### 9.1.3 The switching periods of TS7518

The power supply duty cycle is dependent on the T-on of FET 7518. The FET is driven by pin 3 of IC7520. This IC controls the secondary voltage (VBATT via potentiometer 3540). The primary voltage at pin 1-2 of transformer 5545 is rectified by D6537 and smoothed by C2537. The switching period of TS7518 can be divided into three main phases: Duty cycle T-on, T-off and T-dead.

- During T-on, FET 7518 conducts.
- Energy is stored in the primary winding (4-7) of transformer T5545 by using a linear increasing primary current. The slope depends on the rectified mains-voltage present across C2508. The T-on period is varied to provide regulation of the drive waveform at pin 3 of IC7520. By controlling the duty cycle of the SMPS in this way the (VBATT) is controlled.
- During T-off, FET 7518 is switched off and therefore does not conduct. The energy is now transferred to the secondary side of the transformer and then supplied to the load via the secondary diodes (D6550, D6560 and D6570). The current through the secondary side of the transformer decreases until it reaches zero.
- During T-dead FET 7518 does not conduct. The voltage at the drain of the FET decays and eventually reaches the input voltage of approximately 300V.

### 9.2 Primary side

#### 9.2.1 Mains input and degaussing

- Mains voltage: this voltage is filtered by L5500 and L5501, rectified by the bridge diode 6502 .. 6505 and then smoothed by C2508 which provides a DC input voltage of 300V DC for an ac input voltage of 230V.

- Degaussing : R3504 is a PTC. When switching "on" the set, the PTC is cold and has a low-ohmic value. This allows a very high degaussing current at initial power on. The PTC will then heat up due to the high current involved and becomes high-ohmic which reduces the degaussing-current. During normal operation, the degaussing current is signal.very small, because of the high impedance of PTC R3504.

#### 9.2.2 Start up and take over

- Start-up : The start-up circuitry consisting of 3510, 3530 and 3529 use the voltage coming from the 230V AC mains to start-up IC7520 via the supply pin 1. The output drive waveform (pin 3) is blocked by using the ICs internal logic until the voltage on pin 1 reaches 14.5 Volts however with less than 14.5 volts on Pin 1 the IC only consumes 0.3mA. Once pin 1 reaches the 14.5 Volts threshold, IC7520 will start up (FET 7518 will conduct) and pin 1 sinks a typical supply current of about 17 mA. This supply current cannot be delivered by the start-up circuitry, so a take-over circuit must be present. If take-over does not occur then the voltage on pin 1 will decrease below 9V and IC7520 will switch off. The supply begins a new Start-up cycle, see top of this paragraph. This cycle will repeat itself and can be noticed by an audible hick-up sounding noise.
- Take over : During start-up a voltage across winding 1-2 is gradually built up. At the moment the voltage across winding 1-2 reaches approx. (14.5 Volts, D6540 start conducting and takes over the supply voltage Vpin 1 of IC7520 (take over current is approx. 17mA).

Note: This power supply is a FFS (= Fixed Frequency Supply) and not a SOPS (= Self Oscillating Power Supply).

### 9.3 Control circuitry

#### 9.3.1 IC7520 control mechanisms

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

- "Primary-voltage-sensing" controls the secondary output voltages via the feedback voltage pin 14
- "Primary current sensing" controls the maximum primary current via the current sense voltage pin 7
- "Demagnetization control" prevents the transformer T5545 from going into saturation via the so-called "DEMAG" function at pin 8

#### 9.3.2 Secondary voltage sensing (pin 14 of IC7520)

When the output voltage +VBATT increases (due to a reduction in the load) the primary voltage at winding 1-2 will increase, therefore the voltage across capacitor 2537 increases. This will reduce the on-time of FET 7518 due to an increase of the voltage present on pin 14.

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

#### 9.3.3 Primary sensing (pin 7 of IC7520)

The current sense voltage at pin 7 is used to measure the primary current through FET7518. The primary current is converted into a voltage by R3518.



### 9.3.4 Demagnetization control (pin 8 of IC7520)

Winding 1-2 has the same polarity as the secondary winding that supplies the load. When FET 7518 is turned off the voltage at winding 1 becomes positive. The power supply transfers the stored energy at the secondary side. Until the transformer is demagnetized the voltage on the winding remains positive. At the moment that the energy is fully transferred to the load, the voltage at pin 9 of the transformer becomes negative. Additionally with a certain dead time the voltage at control pin 8 of IC 7520 also drops below zero which releases the output buffer (pin 3) and a new cycle starts.

### 9.3.5 Peak current limiting

An internal clamp at pin 7 allows peak current limiting to be achieved. This pin can never exceed 1V DC and so the maximum primary current through FET 7518, and also the maximum output power is determined. In case of an output being short-circuited or loaded excessively, the I-prim becomes too high which is detected by pin 7. As a result the primary current is limited to its maximum value and the secondary voltages will drop. The voltage at pin 1, which is coupled with the output voltage, will also drop. When the voltage at pin 1 drops below the 9V, IC7520 will stop functioning and the output voltage will rapidly drop to zero.

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

### 9.3.6 Slow-start

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

### 9.3.7 Standby mode

In standby mode the SMPS switches to the so-called "reduced frequency mode" and runs at about 20 kHz. During standby the SMPS only has to deliver a minimal level of output power. The minimal load threshold level is determined by R3532 at pin 12. In the L9 chassis the SMPS does not have a burst mode in standby but only a reduced frequency mode of about 20 kHz as stated above. In normal operation mode the internal oscillator is around 70 kHz. This frequency is controlled by C2531 at pin 10 of IC7520 and by R3537 at pin 16 of IC7520. In standby mode the frequency of operation is determined by R3536 at pin 15 of IC7520.

### 9.3.8 Protections

#### **Over voltage protection of the secondary voltages.**

After start-up the supply voltage pin 1 will be "taken over" by winding 1-2. Pin 1 of IC 7520 is used to detect an over voltage situation on the secondary side of the transformer. If this voltage exceeds 17V (typical), the output buffer is disabled, and IC 7520 goes into over voltage protection and a complete restart sequence is required. Check in this case IC7520, D6537 and the secondary voltage +VBATT (+95V).

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

#### **Under voltage protection of the secondary voltages**

If the supply voltage at pin 1 of IC 7520 drops below 9V because of a short-circuit or excessive load, the drive pulse present at pin 3 will be disabled and IC7520 will switch off the complete SMPS. Capacitor C2540 is charged up via start-up resistors 3529, 3510 and 3530, however once the voltage exceeds 14.5V start up threshold, the SMPS will once again commence a re start cycle.

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

## 9.4 Audio processing

The following systems are available:

- BASIC : FM MONO ( M, BG, I and DK : single or dual system )
- NICAM : FM STEREO / NICAM L/L', NICAM I, NICAM B/G, NICAM DK
- 2CS : FM STEREO / FM MONO ( all standards 4.5, 5.5, 6.5 MHz )

BASIC models incorporating 2CS (two carrier stereo) use a TDA8841/42 BIMOS device (built-in Mono FM Demodulator circuit)

NICAM LL', /BG, /I versions use a TDA8845 BIMOS (AM sound demodulator & QSS-IF circuit ; built-in)

The Audio Module incorporates the MSP3415 multi digital sound processor. This IC incorporates digital audio processing for volume, bass, Treble, balance, mute, spatial sound, incredible sound, smart sound and source selection (SIF-signal, EXT1 or EXT2).

### 9.4.1 Mono sets

The basic set, AM and FM, does not have the digital sound processor MSP3415 IC7833. Instead it is equipped with a SMART SOUND system. This circuit controls the bass and the treble via discrete components and two control signals (BASS and TREBLE) coming from the microprocessor.

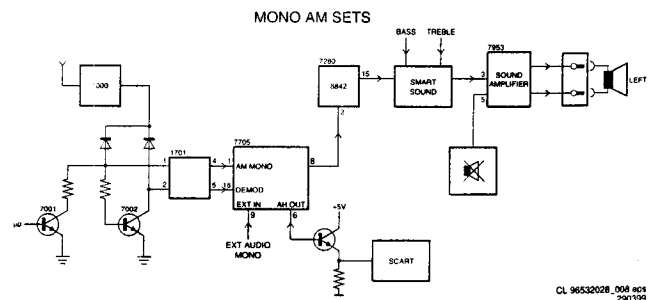


Figure 9-10 "Mono AM Sets"

The video IF output is present at pin 11 of the tuner 1000. This signal goes through a sound SAW filter and is fed to the AM Mono Amplifier ( Schematic A9 - IC7705 ) via pins 1 and 16, where the signal is demodulated. Mono Audio signals, ExtAudioMono, coming from the REAR I/O panel are fed to pin 9 of IC7705. The demodulated AM-signal or the REAR I/O signal is switched by IC7705. One of these signals is present at pin 6 for the I/O SCART, and present at pin 8 going to pin 2 of the BIMOS IC 7250-A. This signal is switched inside the BIMOS to pin 15.

The signal at pin 15 is fed to panel A10 - SMART SOUND + MONO SOUND AMPLIFIER. After adjustments of the bass and treble, the signal goes to sound amplifier 7953 ( 2W - Mono ).



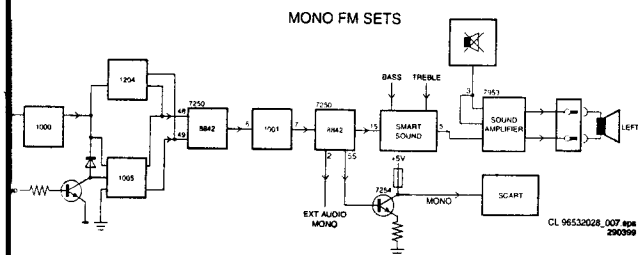


Figure 9-11 "Mono FM sets "

The video IF output is present at pin 11 of the tuner 1000. This signal goes through a sound SAW filter and is fed to the BIMOS via pins 48 and 49, where the signal is demodulated. Depending on the required Tuner frequency band, the appropriate filter is selected. Signal LLp/Mtrap is used to switch between NICAM I or L'. At pin 6 of BIMOS IC 7250-A, the CVBS + SIF signal is fed to another SAW filter.

The system hardware configuration, option code SY, is set at AD - Dual Mono for a Dual configuration, while option code SY is set at SS for the Mono configuration (BG, I, DK, M). Dual/Mono, a signal coming from the Micro-processor IC7600, switches between two Mono configurations (BG/DK or BG/I or DK/I) and selects SAW filter 1001 or SAW filter 1002.

This signal goes back to pin 1 of the BIMOS, for further demodulation. The demodulated FM-signal or the REAR I/O audio signal, EXTAudioMono, is switched by the Bimos and is present at pin 15 and pin 55.

Pin 55 goes directly to the I/O SCART - AudioOutL/Mono.

The signal at pin 15 is fed to panel A11 - SMART SOUND. After adjustments of the bass and treble, the signal goes to sound amplifier 7953 (2W - Mono). Signal Volume enables the output of the sound amplifier.

## 4.2 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 figure below shows the AUDIO path for NICAM..

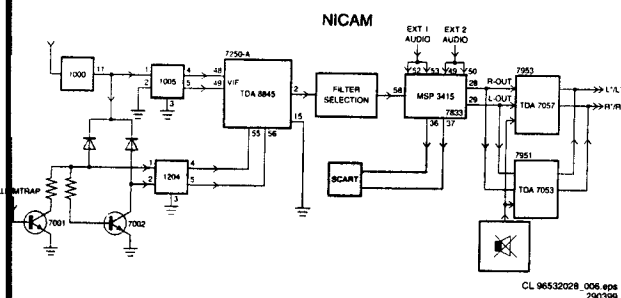


Figure 9-12 "NICAM"

Figure 9.2 "NICAM "

The video IF output is present at pin 11 of the tuner. Signal LLp/Mtrap is used to switch between NICAM L or L'. Depending on the required Tuner frequency band, the appropriate SAW filter is selected. The filtered signal is fed to SIF (sound I.F amplifier) input pin 55 and 56 of the BIMOS - TDA8845.

The QSS signal at pin 2 passes through a selected high pass filter, depending on the system used, and is fed to sound processor 7803, D1 - ITT panel. Audio signals coming from the REAR I/O panel are connected to pin 49/50 of IC7803 for the Ext1 Audio signals, while pin 52/53 of IC 7803 are used for the Ext2 Audio signals.

The QSS-signal, Ext1Audio or Ext2Audio is switched internally to the output pins 28 and 29 of the sound processor. Pin 36 and 37 pass the same selected signal through to the SCART. The audio output of the MSP3415 is fed to the power amplifier IC 7953. Signal Volume enables the output of the sound amplifier.

### 9.4.3 2CS

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

The diagram below indicates the AUDIO path for 2CS.

The CVBS + SIF signals present at pin 6 from BIMOS, - TDA884x-, are passed through a high pass filter and are then fed back into pin 58 of IC 7803 (MSP3415D) for further demodulation. All variants of 2CS are demodulated in this IC.

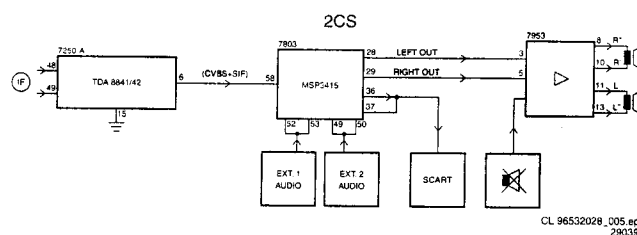


Figure 9-13 "2CS"

Audio signals coming from the REAR I/O panel are connected to pin 49/50 of IC7803 for the Ext1Audio signals, while pin 52/53 of IC 7803 are used for the Ext2Audio signals. IC 7803 performs source selection as well as audio processing such as volume, balance, tone control, mute, spatial stereo, incredible surround sound and SMART sound. The audio output from IC 7803, pin 28 and pin 29, is fed to the power amplifier IC 7953. Signal Volume enables the output of the sound amplifier.

## 9.5 Tuner and Video IF (see circuit diagram A5)

### 9.5.1 Introduction:

In Figure 9.15 a simplified block diagram of the video path is shown. The main item in the block diagram shown in Fig.9.14 is the video processor item 7250. The IC performs the following functions, video IF demodulation, chroma processing and RGB processing. Additionally synchronisation processing, mono IF audio demodulation and audio selection takes place.

Two versions of video processors are used:

- TDA8841/42 N2 for SW CENELEC BG/DK, CENELEC I NICAM, CENELEC BG NICAM
- TDA8845 N1 for CENELEC BG,LL',I

For a detailed block diagram of the TDA8844/8845 see Figure 9.14.

### 9.5.2 Tuner

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

Tuner pin description:

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

- Pin 8: not connected
- Pin 9: Vst, tuning voltage +33V
- Pin 10: ground
- Pin 11: IF, asymmetrical IF output

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

### 9.5.3 IF band pass filter (SAW FILTER)

Between the tuner output and the video IF input of the video processor the IF band pass filtering take place. For the IF band pass filtering SAW filters are used (item 1003 or 1005). 5 Types of SAW filters are used depending on the version of the set.

### 9.5.4 Video IF

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

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

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

### 9.5.6 PLL-demodulator

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

### 9.5.7 Video buffer

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

### 9.5.8 Video-IF AGC

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

### 9.5.9 The tuner AGC

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

### 9.5.5 IF- amplifier

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

Remark: If the BIMOS is replaced the AGC value should be adjusted as part of the repair process. ( see Ch 8 - Alignments ).

### 9.5.10 AFC

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

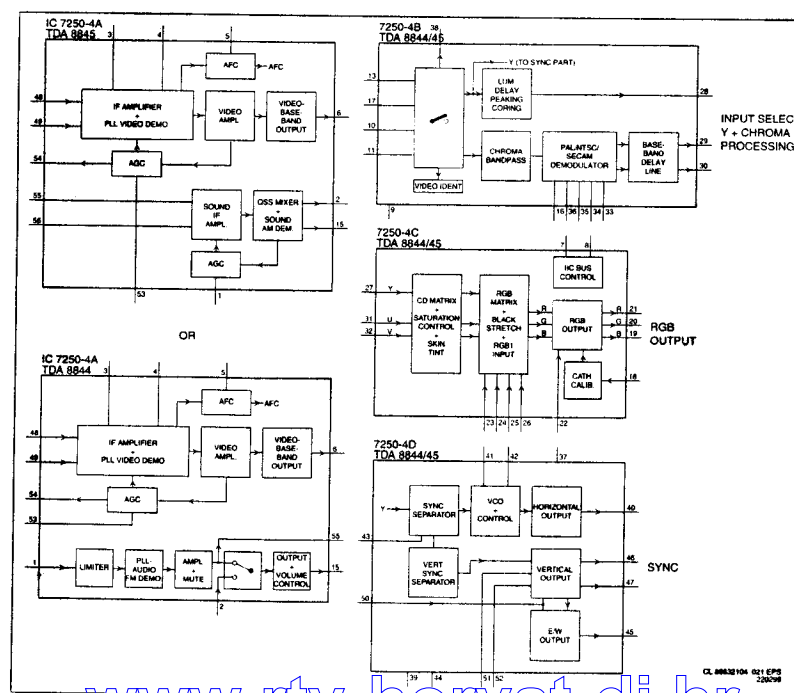


Figure 9-14 "BIMOS"

## Video Signal Processing (see circuit diagram A6)

### Introduction:

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

- CVBS/Y/C input selection
- Luminance and chrominance signal processing
- PAL and SECAM demodulation /Auto system manager
- YUV/RGB processing/ black stretcher
- Second RGB insertion
- RGB processing
- Black current calibration loop
- Beaming current limiting

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

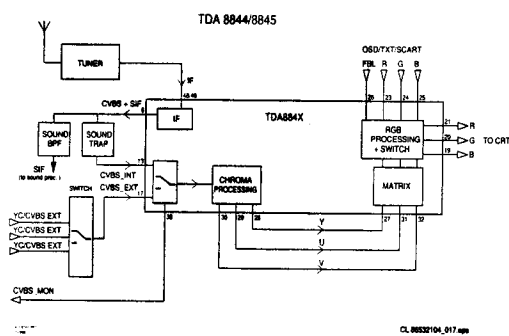


Figure 9-15 "Videopath"

### CVBS/Y/C selection

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

- Pin 13: terrestrial CVBS input.
- Pin 17: external AV1 input.
- Pin 10/11: external AV2-Y, CVBS/C input

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

### Luminance / Chroma signal processing

Once the signal source has been selected, CHROMA filter calibration is performed. The received colour burst-sub-carrier frequency is used for the calibration. Correspondingly, the CHROMA band-pass filter for PAL processing or the cloche filter for SECAM processing is switched on. Pins 34, 35 have the crystals connected to them. These crystals are used for multi-purpose calibration of the burst sub-carrier. The selected luminance signal is then supplied to the Horizontal and Vertical synchronisation processing circuits and to the luminance processing circuits. In the Luminance processing block, the luminance signal is applied to the CHROMA trap. This trap is switched on or off depending upon on the colour burst detection of the CHROMA calibration circuit. Before the luminance signal is applied to pin 28 of the TV-processor the signal is applied to a "peaking" and "coring" circuit. In these circuits the sharpness and noise level of the signal can be influenced via the remote control (control menu in the user menu).

### 9.6.4 PAL and SECAM demodulation via the Auto system manager

The colour decoder circuit detects whether the signal is a PAL signal. The result is made known to the auto system manager. The base-band delay line is activated when a PAL or SECAM signal is detected. For the SECAM colour standard a reference voltage is generated at pin 16 of the TV-processor.

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

### 9.6.5 YUV / RGB processing/ black stretching

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

### 9.6.6 Second RGB insertion

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

### 9.6.7 RGB processing

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

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

### 9.6.8 Black current calibration loop

The black current calibration loop ensures that the white balance at low signal levels and low light white balance is skipped. By means of the inserted measuring pulses, the black current calibration loop, tracks the beam current feed back of the RGB signals at the cathodes of the picture tube. As a result of this calibration, the individual black level of the RGB output signals is shifted to a level which allocates around 10uAof beam current to each of the RGB signals. Pin 18 (BC\_info) of

the BIMOS is used as the feed back input from the CRT base panel.

### 9.6.9 Beam current limiting

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

The voltage on pin 22 is normally 3.3V (limitor not active). To enable correct operation however, an external adaptation to the circuit is required for the correct functioning of the limiting function. This is connected to Pin 22, the circuit therefore ensures that correct peak white limiting and the average beam current limiting takes place. Components 6212, 3246 are for the average beam current limiting. As a reference for the average beam current control the signal ABL\_info is used. This signal is a measurement of the picture contents. As the time constant of the filter is much bigger than the frame period time, the DC at the anode of 6212 represents the average value of the picture content. Via 6212 and 2226 the DC voltage at pin 22 is slowly. The RGB output signals are applied to the CRT panel via connector 0243. Via diodes 6213, 6214 and 6215 and series resistor 3214, the RGB signals are also connected to the CRT\_discharge signal. The level of this signal is only high during the time the set is switched off. And id due to the cathodes of the CRT are driven fully negative. That means that the beam current is increased. and consequently the CRT quickly discharged.

### 9.6.10 CRT panel (see circuit diagram B)

On the CRT panel the analog output amplifiers for the RGB signals are located.

The B-signal is amplified by the analog amplifier formed by a circuit build around the transistors 7331, 7332 and 7333.

The G- signal is amplified by the analog amplifier formed by a circuit build around the transistors 7321, 7322 and 7323. The R- signal is amplified by the analog amplifier formed by a circuit build around the transistors 7311, 7312 and 7313.

The supply voltage for the transistors is +160VA and is derived from the line output stage.

## 9.7 List of abbreviations

2CS	2 Carrier Stereo
A/P	Asia Pacific; schematic/PCB information (only) applicable for Asia Pacific sets
AFC	Automatic Frequency Control
AQUADAG	Aquadag coating on the (outside of the) picture tube
AudioOutR	Audio signal at Right output channel.
AudioOutL/Mono	Audio signal at Left output channel / Mono output channel.
AV_MUTE	Signal to mute the sound on the Audio-out of Cinch / Scart (Combined with RBG_Blanking)
Ext2Fun_SW (AV_Mute/ Ext2Fun_SW)	Switching signal from Scart2 to micro controller indicating the presence and type of signal on Scart2. (no signal / CVBS 16.9 / CVBS 4.3)
AV	Audio Video signal

AVL	Automatic Volume Level
B_TXT_OSD	Blue TXT or OSD signal from uC to the video controller IC7250 (BIMOS)
BASS	Control signal for BASS
BCI	Beam Current information
BTSC	Broadcast Television Standard Committee; sound standard for America and Asia Pacific
Buzzer	Buzzer (only used in L9-ITV)
CRT DISCHARGE	Fast drop of VBATT during after switch off the set. Which result in EHT voltage reducing to less than 18 kv within 5 sec.
CTI	Colour Transient Improvement
CVBS	Colour Video Blanking Synchronisation. Video signal containing colour, black/white, blanking and synchronisation information.
CVBS_EXT	CVBS external = CVBS signal form external source (VCR, DVD etc.)
CVBS_INT	CVBS internal = CVBS signal from the tuner
CVBS_MON	CVBS monitor (CVBS) signal to Cinch or Scart
CVBS_Terr	CVBS Terrestrial output signal
CVBS_TXT	CVBS for TXT processing in micro controller
Din	Digital input signal only used in L9-ITV)
Dout	Digital output signal (only used in L9-ITV)
DBX	Dynamic Bass Expander (only used for BTSC sound system)
DNR	Dynamic Noise Reduction
EAR	Earth (ground layer)
EEPROM	Electrically Erasable Programmable Read Only Memory (also called NVM; non-volatile memory)
EHT-INFO	Extra high tension information; Beam current related signal from CRT to BIMOS.
Ext1 B	RGB External 1 Blue input signal.
Ext1 FB	RGB External 1 Fast-blanking input signal.
Ext1 G	RGB External 1 Green input signal.
Ext1 R	RGB External 1 Red input signal.
Ext1 Video	RGB External 1 Video input signal.
Ext2 AudioL/Mono	External 2 Audio Left input signal / Mono input signal.
Ext Audio/Mono	External Audio input signal / Mono input signal.
Ext2 AudioR	External 2 Audio Right input signal.
Ext2C	External 2 SVHS Chrominance (C) input signal.
Ext2Video/Y	External 2 Video input signal or SVHS Luminance (Y) input signal.
ESD	Electrostatic Discharge
EURO	Europe; schematic/PCB information (only) applicable for European sets
EWD_dyn	Dynamic East-West correction to compensate for variations in EHT
EWDRIVE	East-West drive correction
FB_TXT_OSD	Fast blanking signal from micro controller to IC7250 (BIMOS) for inserting or displaying TXT and OSD information (generated by the micro processor)
Filament	Filament (heater voltage) from LOT to CRT
FBL	Fast Blanking
FFBL	Full screen Fast Blanking



FM/AM/ Ext_VC_AudioMono	FM, AM or external mono signal from BiMOS to audio processor input (only used in Mono and Nicam L sets)	P2LLp/Mtrap	Switching signal with several functions: M-trap (sound filtering) switching (only for A/P Pal Multi sets) BiMOS crystal selection (only for Latam sets), Selection of L or L' system (only for Europe sets)
Front/Ext1AudioL	Front audio Left input signal / External 1 Audio Left input signal.	P3Dual/Mono	Switching signal to select the sound filter in dual-system Mono sets (BG/I, BG/DK or I/DK).
Front/Ext1AudioR	Front audio Right input signal / External 1 Audio Right input signal.	P4ScartPin8/SVHS	Switching signal from I/O to micro controller with several functions: Scart1 I/O: detects signal type connected to Scart 1 (no signal, 16:9 signal, 4:3 signal) (only for Europe) Cinch I/O: detects signal type connected to cinch: SVHS or CVBS (not for Europe)
GND	Ground	P5BassSw	Bass switching signal (only for some mono sets)
GND_LOT	Ground of LOT	P6TrebleSw	Treble switching signal (only for some mono sets)
G_TXT_OSD	Green TXT or OSD signal from micro processor to the video controller IC7250 (BiMOS)	P7Ext1/2	Used in L9-ITV sets (Hotel TV)
HD	Horizontal pulse derivation	P9stbyon+protn	Signal from E-W and LOT output to micro controller to (de)activate the protection mode
HDRIVE	Horizontal output drive	P10Mute/Volume	Audio mute / Volume control signal pin
HEW_protn	Switching signal to (de)activate the XRAY protection which is measured via pin 50 of the BiMOS (only for USA sets)	POR/CLK	Power on reset (only used in L9-ITV sets)
Hflybk	Horizontal flyback pulse used to monitor the horizontal oscillator	R-	Power amplifier output " R- " to speaker
IF	Intermediate Frequency signal from the tuner	R+	Power amplifier output " R+ " to headphone and speaker
12C (or IIC)	2 Wire communication protocol between micro controller and integrated circuits	RAM	Random Access Memory
IC	Integrated Circuit	RESET	Reset signal to micro controller
I/O	Input/Output	RF_AGC	Automatic gain control signal from BiMOS output to tuner input.
INT	Audio internal output	RGB	Red-Green-Blue
IR	Output signal from infrared receiver to micro controller.	RGB_Blanking	Red Green Blue Blanking signal (combined with AV_MUTE)
KeyBd1	Local keyboard control signal to micro controller	RightOut	Audio right signal output
KeyBd2	Local keyboard control signal to micro controller (In protection mode KeyBd2 is Ground)	R_TXT_OSD	Red TXT or OSD signal from uC to the video controller IC7250 (BiMOS)
KeyBd3	Local keyboard control signal to micro controller	ROM	Read Only Memory
L-	Power amplifier output to headphone and speaker	SAM	Service Alignment Mode. Service mode for alignments and error buffer display
L+	Power amplifier output to speaker	SAP	Second audio program (only for USA & A/P sets)
LED	LED control signal from micro controller to LED	SCL	Clock line of the I2C-bus
LATAM	Latin America; schematic/PCB information (only) applicable for Latin American (incl. Brazilian) sets	SCL2	2nd Clock line of the IIC-bus (only used in L9-ITV sets)
LeftOut	Audio Left signal output	SDA	Data line of the I2C-bus
LTI	Luminance Transient Improvement (= steepness)	SDA2	2nd Data line of the I2C-bus (only used in L9-ITV sets)
MainAudioL/Mono	Audio Left/Mono signal to input power amplifier	SDM	Service Default Mode. Service mode with predefined settings for waveform and voltage measurements, error buffer display and option (byte) setting.
MainAudioR	Audio Right signal to input power amplifier	SIF	Sound IF signal for FM audio demodulator
MON	Audio monitor output	SMPS	Switching Mode Power Supply
NICAM	Near Instantaneous Companded Audio Muxplex (digital audio)	STANDBY	Switching signal from micro controller; "low" for standby (power supply will be switched to stand-by mode), "high" for normal operation
NR	Noise Reduction	SW_OUT	Selected Output signal from source
NTSC	NTSC colour system	SYNC	Synchronisation
OSD	On Screen Display	TBD	To Be Defined
P0Sys1/AM	Switching signal with several functions:	TREBLE	Control signal for treble
BiMOS crystal selection (only for Latam sets)	Selection of AM or FM signal (used in combination with P1Sys2/AMFM_ExtSel) (only for Europe)	TXT	Teletext
P1Sys2/ AMFM_ExtSel	Switching signal with several functions: BiMOS crystal selection (only for Latam sets) Selection of internal AM/FM signal or an external signal (used in combination with P0Sys1/AM)	uC	Micro controller

USA	United States; schematic/PCB information (only) applicable for North American sets
V_TUNE	Tuning voltage for tuner
Vdrive -	Negative Vertical drive pulse signal
Vdrive +	Positive Vertical drive pulse signal
VD	Vertical pulse derivation
VFL	Vertical flyback pulse used to inform the micro controller that flyback is occurring. This is critical for the correct OSD and TXT
Vflybk	Vertical flyback pulse
VG2	Voltage on grid 2 of the picture tube (screen control)
VideoOut	CVBS output signal
VOLUME	Control signal (from micro controller, but on DC level via RC network) for sound processing in sound IC
XRAY-PROT	XRAY protection (only for USA sets)
YC	Luminance (Y) and Chrominance (C)



## 10. Spareparts list

## MONO CARRIER [A]

## Various

0025	4822 256 10336	LED HOLDER
0127▲	4822 256 92053	FUSE HOLDER
0130	4822 325 10164	INSULATING PLATE
0139	4822 492 70788	IC fixation
0189▲	4822 402 10844	PCB RELIEF BRACKET
0211▲	4822 265 20723	Conn. 2p
0218	4822 265 10481	CINCH CONNECTOR 2P
0224	4822 267 10676	Conn. 1p
0228	4822 267 10676	Conn. 1p
0229	4822 267 10735	Conn. 3p
0230	4822 267 10735	Conn. 3p
0231▲	4822 276 14024	Mains switch
0232▲	4822 267 31014	HEADPHONE SOCKET
0234	4822 267 10928	Conn. 5P
0249	4822 267 10565	Conn. 4P
0260	4822 267 10565	Conn. 4P
0267	4822 267 31673	HEADPHONE PLUG
0001	4822 242 10314	filt. 5,5MHz
0001	4822 242 10362	filt. 6,0MHz
0002▲	4822 242 10316	filt. 6,5MHz
0002	4822 242 10362	filt. 6,0MHz
0003	4822 242 10575	SAW filter OFWJ1980M (38,9MHz)
0003	4822 242 81436	SAW filter OFWK3953M (38,9MHz)
0003	4822 242 81737	SAW filter OFWG1965M (38,9MHz)
0003	4822 242 81964	SAW filt. OFWG1984M (38,9MHz)
0005	4822 242 11055	SAW filt. OFWK6289K (38,9MHz)
0200	4822 242 10315	cer. filt. 5,5/5,7/6,5MHz
0200	4822 242 81572	filt. 6,0MHz
0200	4822 242 81712	filt. 5,5/5,74MHz
0201	4822 242 81301	filt. 6,5MHz
0201	4822 242 81572	filt. 6,0MHz
0204	4822 242 10688	SAW filt. OFWK9456M (38,9MHz)
0205	4822 242 10695	X-tal 4.433619 MHz
0208	4822 242 10776	X-tal 3.579545 MHz
0500	4822 070 34002	Fuse (4A)
0571▲	4822 071 51002	Fuse (1A)
0572▲	4822 252 11194	Fuse (0,8A)
0600	4822 242 10694	X-tal 12MHz
0680	4822 276 13775	SWITCH
0681	4822 276 13775	SWITCH
0682	4822 276 13775	SWITCH
0683	4822 276 13775	SWITCH
0701	4822 242 81423	filt. OFWL9453M (38,9MHz)

0001	4822 126 13751	47nF 10% 63V
0002	4822 124 81029	100µF 20% 25V
0003	4822 124 81029	100µF 20% 25V
0004	5322 122 32654	22nF 10% 63V
0005	5322 122 32531	100pF 5% 50V
0006	4822 126 13695	82pF 1% 63V
0008	4822 124 41579	10µF 20% 50V
0012▲	4822 051 20008	JUMPER (0805)
0012	4822 122 33177	10nF 20% 50V
0014	5322 122 32967	5.6pF 10% 63V
001	5322 122 31863	330pF 5% 63V
002	5322 122 31863	330pF 5% 63V
002	5322 122 32531	100pF 5% 50V
003	5322 122 31863	330pF 5% 63V
004	5322 122 31863	330pF 5% 63V
004	5322 122 32531	100pF 5% 50V
005	4822 124 81029	100µF 20% 25V
006	4822 124 40769	4.7µF 20% 100V
006	4822 124 41579	10µF 20% 50V
007	5322 122 31863	330pF 5% 63V
009	5322 122 31863	330pF 5% 63V
0071	5322 122 31863	330pF 5% 63V
0072	5322 122 31863	330pF 5% 63V
0073	4822 122 33805	330pF 10% 63V
0074	4822 124 41579	10µF 20% 50V
0076	4822 122 33805	330pF 10% 63V
0077	4822 124 41579	10µF 20% 50V
001	4822 124 40242	1µF 20% 63V
001	4822 124 41576	2.2µF 20% 50V

2202	5322 126 10465	3.9nF 10% 50V
2203	4822 124 41579	10µF 20% 50V
2205	4822 126 10002	100nF 20% 25V
2206	4822 122 33175	2.2nF 20% 50V
2207	4822 124 81029	100µF 20% 25V
2208	4822 126 13061	220nF 20% 25V
2209▲	4822 051 20008	JUMPER (0805)
2210	4822 126 10002	100nF 20% 25V
2211	4822 126 13196	100nF 10% 25V
2211	4822 126 13482	470nF 20% 16V
2212	5322 126 10511	1nF 5% 50V
2213	4822 126 10002	100nF 20% 25V
2214	5322 122 32654	22nF 10% 63V
2215	4822 124 41576	2.2µF 20% 50V
2216	4822 126 13061	220nF 20% 25V
2217	4822 126 13689	18pF 1% 63V
2218	5322 122 31866	6.8nF 10% 63V
2220	4822 126 10002	100nF 20% 25V
2221	5322 126 10511	1nF 5% 50V
2222	4822 126 10002	100nF 20% 25V
2223	4822 126 13751	47nF 10% 63V
2224	4822 126 13751	47nF 10% 63V
2225	4822 126 13751	47nF 10% 63V
2226	4822 124 41579	10µF 20% 50V
2227▲	4822 051 20008	JUMPER (0805)
2227	4822 126 13482	470nF 20% 16V
2228	4822 126 13692	47pF 1% 63V
2229	4822 126 13692	47pF 1% 63V
2230	4822 126 13692	47pF 1% 63V
2231	4822 122 33177	10nF 20% 50V
2232	4822 122 33175	2.2nF 20% 50V
2233	4822 124 40242	1µF 20% 63V
2234	5322 126 10223	4.7nF 10% 63V
2235	5322 126 10511	1nF 5% 50V
2236	4822 126 13061	220nF 20% 25V
2237	5322 122 32531	100pF 5% 50V
2238	4822 126 13486	15pF 2% 63V
2239	5322 121 42386	100nF 5% 63V
2240	5322 126 10511	1nF 5% 50V
2241	5322 126 10511	1nF 5% 50V
2242	4822 124 40242	1µF 20% 63V
2243	4822 126 13061	220nF 20% 25V
2244	4822 124 41579	10µF 20% 50V
2245	4822 124 40769	4.7µF 20% 100V
2248	4822 126 13486	15pF 2% 63V
2250	4822 122 33805	330pF 10% 63V
2255	5322 122 32531	100pF 5% 50V
2400	4822 121 43526	47nF 5% 250V
2401	4822 121 43526	47nF 5% 250V
2402	5322 122 31863	330pF 5% 63V
2403	4822 126 11501	1.5nF 10% 500V
2405▲	4822 126 14237	470pF 10% R 2KV
2406▲	4822 126 13866	4.7nF 10% 1KV
2407▲	4822 121 70434	11nF 5% 1.6KV
2407▲	4822 121 70637	8.2nF 5% 1600V
2407▲	4822 121 70649	9.1nF 5% 1.6KV
2408	4822 122 30103	22nF 80% 63V
2409	4822 124 11575	47µF 20% 160V
2410	4822 124 11767	470µF 20% 25V
2411	4822 124 40242	1µF 20% 63V
2412	4822 121 51385	33nF 20% 100V
2413	4822 124 11845	22µF 20% 250V
2414	4822 124 81145	1000µF 20% 16V
2415	4822 124 81145	1000µF 20% 16V
2416	4822 126 12239	560pF 10% 2KV
2417	4822 124 11767	470µF 20% 25V
2418	4822 126 13482	470nF 20% 16V
2420	4822 126 14096	560nF 5% 250V
2431	4822 124 12438	2.2µF 20% 100V
2432	4822 124 80059	100µF 20% 25V
2460	5322 122 32268	470pF 10% 50V
2461	5322 126 10184	820pF 5% 50V
2462	5322 122 32268	470pF 10% 50V
2463	5322 121 42386	100nF 5% 63V
2464	4822 124 40255	100µF 20% 63V
2465	5322 121 42386	100nF 5% 63V
2466	4822 121 42408	220nF 5% 63V
2467	5322 121 42386	100nF 5% 63V
2470	5322 126 10223	4.7nF 10% 63V
2500▲	4822 126 13589	470nF 275V
2502▲	4822 126 14153	2.2nF 10% 1KV
2504▲	4822 126 14153	2.2nF 10% 1KV
2505▲	4822 126 14153	2.2nF 10% 1KV
2508	4822 124 12439	100µF 20% 400V
2509▲	4822 126 11382	1nF 10% 1KV
2509▲	4822 126 13517	820pF 10% 1000V

2510▲	4822 126 11382	1nF 10% 1KV
2510▲	4822 126 13517	820pF 10% 1000V
2517	5322 122 32331	1nF 10% 100V
2518▲	4822 126 13337	220pF 10% 1KV
2520	4822 126 13695	82pF 1% 63V
2521	4822 122 32646	5.6nF 10% 50V
2521	5322 126 10223	4.7nF 10% 63V
2522	4822 122 32646	5.6nF 10% 50V
2522	5322 126 10223	4.7nF 10% 63V
2524	5322 122 32268	470pF 10% 50V
2529	4822 126 14118	100nF 20% 50V
2530	4822 124 11571	1µF 20% 50V
2531	4822 126 14587	560pF 2% 50V
2533	5322 122 31863	330pF 5% 63V
2534	5322 126 10511	1nF 5% 50V
2537	5322 121 42386	100nF 5% 63V
2540	4822 124 80059	100µF 20% 25V
2541	4822 121 10686	4.7nF 10% 50V
2545▲	4822 126 14049	1.5nF 20% 250V
2550▲	4822 126 11382	1nF 10% 1KV
2551	4822 124 42336	47µF 20% 160V
2560	5322 122 34123	1nF 10% 50V
2561	4822 124 81145	1000µF 20% 16V
2570	4822 122 33175	2.2nF 20% 50V
2571	4822 124 12417	2200µF 20% 25V
2572	5322 122 32531	100pF 5% 50V
2600	4822 124 81151	22µF 50V
2601	4822 124 81151	22µF 50V
2604	4822 126 10002	100nF 20% 25V
2605	4822 126 10002	100nF 20% 25V
2606	4822 126 10002	100nF 20% 25V
2607	5322 126 10511	1nF 5% 50V
2608	4822 121 43897	1nF 5% 400V
2609	4822 126 10002	100nF 20% 25V
2610	4822 121 42687	3.3nF 10% 63V
2611	4822 126 10002	100nF 20% 25V
2612	5322 122 32654	22nF 10% 63V
2613	4822 126 13695	82pF 1% 63V
2614	4822 126 13695	82pF 1% 63V
2615	5322 122 32531	100pF 5% 50V
2616	5322 122 32658	22pF 5% 50V
2617	5322 122 32658	22pF 5% 50V
2618	4822 122 33177	10nF 20% 50V
2619	4822 126 13061	220nF 20% 25V
2620	5322 122 32531	100pF 5% 50V
2621	5322 122 32531	100pF 5% 50V
2622	5322 122 32531	100pF 5% 50V
2623	5322 122 32531	100pF 5% 50V
2624	4822 126 10002	100nF 20% 25V
2625	4822 122 33575	220pF 5% 63V
2625	5322 122 32531	100pF 5% 50V
2651	4822 124 81029	100µF 20% 25V
2675	4822 126 13482	470nF 20% 16V
2680	4822 124 41579	10µF 20% 50V
2697	5322 126 10511	1nF 5% 50V
2702	4822 124 40769	4.7µF 20% 100V
2703	4822 124 40769	4.7µF 20% 100V
2704	4822 126 13061	220nF 20% 25V
2705	4822 126 13061	220nF 20% 25V
2706	4822 126 13061	220nF 20% 25V
2707	4822 126 13061	220nF 20% 25V
2709	4822 126 10002	100nF 20% 25V
2710	4822 124 41751	47µF 20% 50V
2950	4822 124 81151	22µF 50V
2951	4822 124 41579	10µF 20% 50V
2952	4822 122 33175	2.2nF 20% 50V
2953	4822 126 13061	220nF 20% 25V
2954	4822 126 13061	220nF 20% 25V
2955	4822 124 11767	470µF 20% 25V
2971	4822 121 51252	470nF 5% 63V
2972	4822 126 12105	33nF 5% 50V
2973	5322 121 42386	100nF 5% 63V
2974	4822 121 51379	82nF 5% 63V
2975	4822 122 33177	10nF 20% 50V



3000▲	4822 051 20101	100Ω 5% 0.1W
3001▲	4822 051 20101	100Ω 5% 0.1W
3002	4822 116 52244	15k 5% 0.5W
3003	4822 116 52238	12k 5% 0.5W
3013▲	4822 051 20008	jumper (0805)
3013	4822 117 10833	10k 1% 0.1W
3014	4822 051 20392	3k9 5% 0.1W
3015▲	4822 051 20153	15k 5% 0.1W
3016	4822 116 52228	680Ω 5% 0.5W

3017▲	4822 051 20472	4k7 5% 0.1W	3272	4822 051 20273	27k 5% 0.1W	3611	4822 051 20822	8k2 5% 0.1W
3018	4822 117 11449	2k2 1% 0.1W	3273	4822 117 10833	10k 1% 0.1W	3612	4822 117 11503	220Ω 1% 0.1W
3020	4822 051 20223	22k 5% 0.1W	3274	4822 051 10102	1k 2% 0.25W	3613▲	4822 051 20332	3k3 5% 0.1W
3027	4822 117 11507	6k8 1% 0.1W	3275	4822 117 13579	220k 1% 0.1W	3614▲	4822 051 20332	3k3 5% 0.1W
3028	4822 117 11449	2k2 1% 0.1W	3276	4822 051 10102	1k 2% 0.25W	3615	4822 117 11454	820Ω 1% 0.1W
3029	4822 117 11449	2k2 1% 0.1W	3277	4822 051 20479	47Ω 5% 0.1W	3616	4822 117 12167	8k2 X12
3030	4822 117 11449	2k2 1% 0.1W	3278	4822 051 20479	47Ω 5% 0.1W	3617	4822 116 90885	8k2 X6
3031▲	4822 051 20472	4k7 5% 0.1W	3400	4822 053 12472	4k7 5% 3W	3618	4822 051 20561	560Ω 5% 0.1W
3032	4822 051 20223	22k 5% 0.1W	3402	4822 050 12709	27Ω 1% 0.4W	3619	4822 051 20391	390Ω 5% 0.1W
3100	4822 117 10353	150Ω 1% 0.1W	3403	4822 116 52289	5k6 5% 0.5W	3619▲	4822 051 20471	470Ω 5% 0.1W
3101	4822 117 13579	220k 1% 0.1W	3404▲	4822 117 13671	12k 5% 0.33W	3620	4822 050 12403	24k 1% 0.4W
3102	4822 050 11002	1k 1% 0.4W	3405▲	4822 052 10472	4k7 5% 0.33W	3622▲	4822 051 20101	100Ω 5% 0.1W
3103	4822 117 10834	47k 1% 0.1W	3406▲	4822 052 10472	4k7 5% 0.33W	3623▲	4822 051 20101	100Ω 5% 0.1W
3104	4822 117 10353	150Ω 1% 0.1W	3407	4822 117 12172	220Ω 5% 3W	3624	4822 117 13649	2k2 5% 7X
3105	4822 117 13579	220k 1% 0.1W	3411▲	4822 052 10108	1Ω 5% 0.33W	3625▲	4822 051 20101	100Ω 5% 0.1W
3106	4822 050 11002	1k 1% 0.4W	3412▲	4822 052 10108	1Ω 5% 0.33W	3626▲	4822 051 20101	100Ω 5% 0.1W
3107	4822 117 10834	47k 1% 0.1W	3414	4822 051 20182	1k8 5% 0.1W	3627	4822 117 10833	10k 1% 0.1W
3108	4822 116 52175	100Ω 5% 0.5W	3415	4822 116 52238	1Ω 5% 0.5W	3628	4822 116 52175	100Ω 5% 0.5W
3109	4822 051 20759	75Ω 5% 0.1W	3415	4822 116 83864	10k 5% 0.5W	3629▲	4822 051 20472	4k7 5% 0.1W
3110	4822 051 20759	75Ω 5% 0.1W	3416▲	4822 052 11398	3Ω9 5% 0.5W	3630	4822 116 83884	47k 5% 0.5W
3111	4822 116 52175	100Ω 5% 0.5W	3417	4822 052 11108	1Ω 5% 0.5W	3631	4822 117 13579	220k 5% 0.1W
3112	4822 051 20759	75Ω 5% 0.1W	3420	4822 051 20759	75Ω 5% 0.1W	3632▲	4822 051 20472	4k7 5% 0.1W
3113	4822 116 52175	100Ω 5% 0.5W	3421▲	4822 051 20101	100Ω 5% 0.1W	3633	4822 116 52264	27k 5% 0.5W
3114	4822 116 52201	75Ω 5% 0.5W	3423	4822 116 83864	10k 5% 0.5W	3634	4822 051 20562	5k6 5% 0.1W
3115	4822 116 52175	100Ω 5% 0.5W	3424	4822 117 11507	6k8 1% 0.1W	3636	4822 117 11449	2k2 1% 0.1W
3116	4822 116 52201	75Ω 5% 0.5W	3425▲	4822 051 20101	100Ω 5% 0.1W	3639	4822 117 10353	150Ω 1% 0.1W
3118	4822 050 11002	1k 1% 0.4W	3431	4822 117 13579	220k 1% 0.1W	3640	4822 117 10353	150Ω 1% 0.1W
3119	4822 117 10834	47k 1% 0.1W	3432	4822 117 11149	82k 1% 0.1W	3641	4822 117 10353	150Ω 1% 0.1W
3120	4822 050 11002	1k 1% 0.4W	3433	4822 117 13579	220k 1% 0.1W	3642	4822 117 10353	150Ω 1% 0.1W
3121	4822 117 10834	47k 1% 0.1W	3434	4822 117 10834	47k 1% 0.1W	3643	4822 117 10833	10k 1% 0.1W
3122	4822 116 52244	15k 5% 0.5W	3435	4822 117 10833	10k 1% 0.1W	3644	4822 117 10833	10k 1% 0.1W
3123▲	4822 051 20472	4k7 5% 0.1W	3436	4822 116 52256	2k2 5% 0.5W	3650	4822 051 10102	1k 2% 0.25W
3124	4822 116 52201	75Ω 5% 0.5W	3440	4822 116 83864	10k 5% 0.5W	3651	4822 051 10102	1k 2% 0.25W
3125	4822 116 52175	100Ω 5% 0.5W	3441	4822 051 20223	22k 5% 0.1W	3652▲	4822 051 20471	470Ω 5% 0.1W
3128	4822 116 52201	75Ω 5% 0.5W	3460	4822 050 22202	2k2 1% 0.6W	3653▲	4822 051 20471	470Ω 5% 0.1W
3130▲	4822 051 20339	33Ω 5% 0.1W	3461	4822 051 10102	1k 2% 0.25W	3654	4822 051 20105	1M 5% 0.1W
3131▲	4822 051 20339	33Ω 5% 0.1W	3462	4822 051 10102	1k 2% 0.25W	3655	4822 116 52234	100k 5% 0.5W
3132▲	4822 051 20339	33Ω 5% 0.1W	3463▲	4822 052 10158	1Ω5 5% 0.33W	3670	4822 051 20392	3k9 5% 0.1W
3133▲	4822 051 20472	4k7 5% 0.1W	3464	4822 050 22202	2k2 1% 0.6W	3670	4822 117 11449	2k2 1% 0.1W
3135▲	4822 051 20472	4k7 5% 0.1W	3465	4822 050 23308	3Ω3 1% 0.6W	3680	4822 051 20681	680Ω 5% 0.1W
3136	4822 116 52244	15k 5% 0.5W	3465	4822 050 24708	4Ω7 1% 0.6W	3681	4822 117 11449	2k2 1% 0.1W
3140▲	4822 051 20008	jumper (0805)	3465	4822 050 25608	5Ω6 1% 0.6W	3682	4822 116 52303	8k2 5% 0.5W
3141	4822 051 10102	1k 2% 0.25W	3466	4822 050 24708	4Ω7 1% 0.6W	3683▲	4822 051 20101	100Ω 5% 0.1W
3142▲	4822 051 20008	jumper (0805)	3466	4822 050 25608	5Ω6 1% 0.6W	3684▲	4822 051 20332	3k3 5% 0.1W
3143	4822 051 10102	1k 2% 0.25W	3467	4822 116 83872	220Ω 5% 0.5W	3707	4822 117 10834	47k 1% 0.1W
3150	4822 117 10834	47k 1% 0.1W	3468	4822 116 83872	220Ω 5% 0.5W	3709	4822 051 20273	27k 5% 0.1W
3151	4822 050 11002	1k 1% 0.4W	3470	4822 116 52251	18k 5% 0.5W	3710▲	4822 051 20472	4k7 5% 0.1W
3152	4822 117 10834	47k 1% 0.1W	3471	4822 051 20391	390Ω 5% 0.1W	3712	4822 116 83884	47k 5% 0.5W
3153	4822 050 11002	1k 1% 0.4W	3472	4822 116 52256	2k2 5% 0.5W	3713	4822 116 52245	150k 5% 0.5W
3156	4822 116 83876	270Ω 5% 0.5W	3473	4822 116 52175	100Ω 5% 0.5W	3950	4822 051 20273	27k 5% 0.1W
3157	4822 116 83876	270Ω 5% 0.5W	3474	4822 053 12229	22Ω 5% 3W	3953▲	4822 051 20332	3k3 5% 0.1W
3200	4822 051 20681	680Ω 5% 0.1W	3501	4822 117 12181	470Ω 20% 0.5W	3971	4822 117 11504	270Ω 1% 0.1W
3201	4822 116 83881	390Ω 5% 0.5W	3502▲	4822 053 21225	2M2 5% 0.5W	3972	4822 051 10102	1k 2% 0.25W
3202	4822 051 20155	1M5 5% 0.1W	3504▲	4822 117 12728	9Ω 200V	3973▲	4822 051 20471	470Ω 5% 0.1W
3204	4822 117 10353	150Ω 1% 0.1W	3506	4822 116 82776	2Ω2	3974▲	4822 051 20008	jumper (0805)
3205	4822 051 10102	1k 2% 0.25W	3509	4822 117 12654	100Ω 5% 5W	3974	4822 117 11507	6k8 1% 0.1W
3206	4822 117 10353	150Ω 1% 0.1W	3510	4822 117 11488	33k 5% 3W	3975	4822 051 20562	5k6 5% 0.1W
3206	4822 117 11504	270Ω 1% 0.1W	3512	4822 117 10965	18k 1% 0.1W	3976	4822 051 20182	1k8 5% 0.1W
3207	4822 052 10338	3Ω3 5% 0.33W	3513	4822 117 13579	220k 1% 0.1W	3977	4822 051 20182	1k8 5% 0.1W
3208	4822 051 20829	82Ω 5% 0.1W	3517	4822 116 83864	100k 5% 0.5W	3978	4822 117 11383	12k 1% 0.1W
3208	4822 117 12521	68Ω 1% 0.1W	3518	4822 117 10422	0.33Ω 5% 3W	3979	4822 117 11503	220Ω 1% 0.1W
3212	4822 116 83883	470Ω 5% 0.5W	3520	4822 117 11149	82k 1% 0.1W	4xxx	4822 051 10008	0Ω 5% 0.25W
3213▲	4822 051 20471	470Ω 5% 0.1W	3521	4822 116 52219	330Ω 5% 0.5W	4xxx	4822 051 20008	0Ω 5% 0.25W
3213	4822 051 20561	560Ω 5% 0.1W	3524▲	4822 051 20008	jumper (0805)			
3214	4822 117 10353	150Ω 1% 0.1W	3525▲	4822 052 10229	22Ω 5% 0.33W			
3216▲	4822 051 20008	jumper (0805)	3528	4822 116 83872	220Ω 5% 0.5W			
3217	4822 117 11507	6k8 1% 0.1W	3528	4822 116 83876	270Ω 5% 0.5W			
3218▲	4822 051 20101	100Ω 5% 0.1W	3529	4822 050 24708	4Ω7 1% 0.6W			
3219	4822 051 10102	1k 2% 0.25W	3530	4822 116 52276	3k9 5% 0.5W			
3223	4822 051 20759	75Ω 5% 0.1W	3532	4822 117 11507	6k8 1% 0.1W			
3224	4822 051 20759	75Ω 5% 0.1W	3534	4822 117 13579	220k 1% 0.1W			
3225	4822 051 20104	100k 5% 0.1W	3536	4822 051 20273	27k 5% 0.1W			
3226	4822 051 20334	330k 5% 0.1W	3536	4822 117 10834	47k 1% 0.1W			
3227	4822 116 52228	680Ω 5% 0.5W	3537	4822 117 10833	10k 1% 0.1W			
3228▲	4822 051 20101	100Ω 5% 0.1W	3538	4822 116 52234	100k 5% 0.5W			
3229	4822 117 11504	270Ω 1% 0.1W	3539	4822 116 52251	18k 5% 0.5W			
3233	4822 116 52219	330Ω 5% 0.5W	3540	4822 100 12156	4k7 30%			
3234	4822 051 20331	330Ω 5% 0.1W	3541▲	4822 053 11479	47Ω 5% 2W			
3235	4822 051 20331	330Ω 5% 0.1W	3542▲	4822 053 21475	4M7 5% 0.5W			
3236▲	4822 051 20101	100Ω 5% 0.1W	3570▲	4822 051 20109	10Ω 5% 0.1W			
3243	4822 117 12955	2k7 1% 0.1W	3600	4822 116 52213	180Ω 5% 0.5W			
3246	4822 116 52283	4k7 5% 0.5W	3601	4822 116 83881	390Ω 5% 0.5W			
3247	4822 116 52175	100Ω 5% 0.5W	3602	4822 116 83883	470Ω 5% 0.5W			
3248	4822 116 52175	100Ω 5% 0.5W	3603	4822 116 52263	2k7 5% 0.5W			
3257	4822 051 20479	47Ω 5% 0.1W	3605	4822 117 11503	220Ω 1% 0.1W			
3258	4822 051 20479	47Ω 5% 0.1W	3606	4822 051 20561	560Ω 5% 0.1W			
3259	4822 051 20479	47Ω 5% 0.1W	3607	4822 117 10833	10k 1% 0.1W			
3260	4822 051 10102	1k 2% 0.25W	3608▲	4822 051 20471	470Ω 5% 0.1W			
3266▲	4822 051 20153	15k 5% 0.1W	3608	4822 117 11504	270Ω 5% 0.1W			
3268	4822 051 20333	33k 5% 0.1W	3609	4822 117 11451	820Ω 1% 0.1W			
3269	4822 051 20393	39k 5% 0.1W	3610▲	4822 051 20471	470Ω 5% 0.1W			
						5004	4822 157 11892	0U22 10%
						5004	4822 157 11694	0U82 10%
						5006	4822 157 11534	78mH
						5100	4822 157 11813	3.3μH 5%
						5101	4822 157 11813	3.3μH 5%
						5202	4822 157 11139	6.8μH 5%
						5202	4822 157 11813	3.3μH 5%
						5202	4822 157 11893	3U9 5%
						5204	4822	



5540	4822 157 11835	4.7μH 5%
5545▲	4822 140 10668	LOT 14"
5545▲	4822 140 10671	LOT 20"/21"
5550	4822 157 60171	Bead EMI 100MHz 83R
5551	4822 157 71401	27μH
5552	4822 526 10704	100mH
5570	4822 526 10704	100mH
5571	4822 157 50961	22μH
5573	4822 157 60171	Bead EMI 100MHz 83R
5603	4822 157 11139	6.8μH 5%
5604	4822 157 11895	4.7μH 10%



6003	4822 130 83757	BAS216
6004	4822 130 83757	BAS216
6005	4822 130 30621	1N4148
6006	4822 130 30621	1N4148
6007	4822 130 34142	BZX79-B33
6008	4822 130 10414	BA792
6009	4822 130 10414	BA792
6107	4822 130 10852	BZX284-C6V8
6110	4822 130 10852	BZX284-C6V8
6211	4822 130 31983	BAT85
6212	4822 130 30621	1N4148
6213	4822 130 30621	1N4148
6214	4822 130 30621	1N4148
6215	4822 130 30621	1N4148
6216	4822 130 10256	EGP20DL-5300
6400	4822 130 30621	1N4148
6401	4822 130 30621	1N4148
6402	4822 130 42488	BYD33D
6404	4822 130 32896	BYD33M
6405	4822 130 42488	BYD33D
6406	4822 130 30621	1N4148
6409	4822 130 42488	BYD33D
6410	4822 130 42488	BYD33D
6412	4822 130 42488	BYD33D
6413	4822 130 34197	BZX79-B12
6414	4822 130 83757	BAS216
6415	4822 130 83757	BAS216
6418	4822 130 30621	1N4148
6419	4822 130 30621	1N4148
6431	4822 130 30842	BAV21
6432	4822 130 30621	1N4148
6435	4822 130 83757	BAS216
6460	4822 130 42488	BYD33D
6461	4822 130 34142	BZX79-B33
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6504	4822 130 31083	BYW55
6505	4822 130 31083	BYW55
6507	4822 130 42606	BYD33J
6508	4822 130 42606	BYD33J
6537	4822 130 30842	BAV21
6540	4822 130 30842	BAV21
6550	4822 130 10218	BY229X-800
6560	4822 130 10871	SBYV27-200
6570	4822 130 10256	EGP20DL-5300
6600	4822 130 11366	BZX284-C3V9
6601	4822 130 10852	BZX284-C6V8
6603	4822 130 31983	BAT85
6604	4822 130 31983	BAT85
6605	4822 130 31983	BAT85
6612	4822 130 34278	BZX79-B6V8
6669	4822 130 34233	BZX79-B5V1
6680▲	4822 130 10859	TLD85400
6953	4822 130 11411	BZX284-C3V3



7000	4822 130 60511	BC847B
7001	4822 130 60511	BC847B
7002	4822 130 60511	BC847B
7010	4822 209 90008	L78M05CP
7030	5322 130 42755	BC847C
7031	5322 130 42755	BC847C
7032	5322 130 42755	BC847C
7033	5322 130 42755	BC847C
7040	4822 130 60511	BC847B
7041	4822 130 60511	BC847B
7050	4822 209 16775	TDA8842/N2/S1
7050	4822 209 17458	TDA8845PS/N1
7050	4822 209 17539	TDA8841/N2/S1
7054	5322 130 42755	BC847C
7056	4822 130 60511	BC847B
7066	4822 130 60511	BC847B
7080	4822 130 41782	BF422
7091	5322 130 60508	BC857B
7092▲	4822 130 11575	BUT11APX

7431	5322 130 60508	BC857B
7460	4822 209 13176	TDA9302H
7469	4822 130 60511	BC847B
7518▲	4822 130 10806	STP6NA60FI
7518	4822 130 63787	STP4NA60FI
7520	4822 209 15684	MC44603AP
7600	4822 209 17467	SA5564PS/M2A/0015
7600	4822 209 17468	SA5564PS/M2A/0016
7601▲	4822 209 15546	ST24W08B6
7602▲	4822 130 41109	BD135-16
7605	4822 130 60511	BC847B
7607	5322 209 60154	NE555D
7608▲	4822 209 73852	PMBT2369
7609	4822 130 60511	BC847B
7610	4822 130 60511	BC847B
7611	4822 130 60511	BC847B
7612▲	4822 130 41109	BD135-16
7620	4822 130 40959	BC547B
7621	4822 130 60511	BC847B
7680	4822 218 12055	TSOP2836UH1
7703	4822 130 60511	BC847B
7704	4822 130 60511	BC847B
7705	4822 209 31555	TDA9830/V1
7951	4822 130 60511	BC847B
7952	4822 130 60511	BC847B
7953	4822 209 90462	TDA7056B/N1
7955	4822 130 60511	BC847B
7956	5322 130 60508	BC857B
9103	4822 157 11235	LANO2TB220J
9245	4822 526 10704	Bead EMI 50MHz 45R

CRT[B]

Various

0254▲	4822 255 70293	CRT socket 14"
0254▲	4822 267 20466	Conn. 9P
1015	4822 212 11998	CRT PANEL



2313	4822 122 33216	270pF 5% 50V
2323	4822 122 33172	390pF 5% 50V
2331	4822 122 33805	330pF 10% 63V
2341▲	4822 126 14588	2.2nF 10% 1KV
2342	4822 121 43526	47nF 5% 250V
2343	4822 121 43526	47nF 5% 250V



3311	4822 051 10102	1k 2% 0.25W
3312	4822 051 20331	330Ω 5% 0.1W
3313▲	4822 051 20109	10Ω 5% 0.1W
3313	4822 051 20478	4Ω7 5% 0.1W
3314	4822 053 12183	18k 5% 3W
3316▲	4822 052 10221	220Ω 5% 0.33W
3317	4822 117 11896	1k5 20% 0.5W
3321	4822 051 10102	1k 2% 0.25W
3322	4822 051 20331	330Ω 5% 0.1W
3323▲	4822 051 20109	10Ω 5% 0.1W
3323	4822 051 20478	4Ω7 5% 0.1W
3324	4822 053 12183	18k 5% 3W
3326▲	4822 052 10221	220Ω 5% 0.33W
3327	4822 117 11896	1k5 20% 0.5W
3331	4822 051 10102	1k 2% 0.25W
3332	4822 051 20331	330Ω 5% 0.1W
3333▲	4822 051 20109	10Ω 5% 0.1W
3333	4822 051 20478	4Ω7 5% 0.1W
3334	4822 053 12183	18k 5% 3W
3336▲	4822 052 10221	220Ω 5% 0.33W
3337	4822 117 11896	1k5 20% 0.5W
3341	4822 117 11896	1k5 20% 0.5W
3347	4822 052 10102	1k 5% 0.33W
3348	4822 117 11896	1k5 20% 0.5W
3349▲	4822 052 10108	1Ω 5% 0.33W
3349▲	4822 052 10128	1Ω2 5% 0.33W
3349▲	4822 052 10158	1Ω5 5% 0.33W
3350▲	4822 052 10108	1Ω 5% 0.33W
3350▲	4822 052 10128	1Ω2 5% 0.33W
3350▲	4822 052 10158	1Ω5 5% 0.33W

5341	4822 157 50961	22μH
5341	4822 157 50965	15μH 10%
5341	4822 157 71915	5.6μH
5342	4822 526 10704	100mH



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



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

SOUND[D]

Various

0239	4822 267 11052	Conn. 17P
0240	4822 267 11052	Conn. 17P
0248	4822 267 10735	Conn. 3P
1040▲	4822 212 11994	Audio panel Nicam/2CS/ Headphone
1063▲	4822 212 11994	Audio panel Nicam/2Cs/ Headphone
1801	4822 242 10769	X-tal 18.432MHz



2801	5322 122 32658	22pF 5% 50V
2804	4822 122 33926	12pF 50V
2805	5322 126 10225	1P5 5%
2806	5322 126 10225	1P5 5%
2807	4822 126 13061	220nF 20% 25V
2808	4822 126 13061	220nF 20% 25V
2809	4822 126 13061	220nF 20% 25V
2810	4822 126 13061	220nF 20% 25V
2814	4822 126 10002	100nF 20% 25V
2815	4822 126 13692	47pF 1% 63V
2820	4822 124 41579	10μF 20% 50V
2821	4822 126 10002	100nF 20% 25V
2822	4822 124 41579	10μF 20% 50V
2823	4822 126 10002	100nF 20% 25V
2824	4822 124 41579	10μF 20% 50V
2825	4822 126 10002	100nF 20% 25V
2827	4822 124 41579	10μF 20% 50V
2828	5322 126 10511	1nF 5% 50V
2829	4822 124 40769	4.7μF 20% 100V
2830	5322 126 10511	1nF 5% 50V
2831	4822 124 41579	10μF 20% 50V
2835	4822 126 10002	100nF 20% 25V
2836	4822 126 10002	100nF 20% 25V
2837	5322 122 32531	100pF 5% 50V
2838	5322 122 32531	100pF 5% 50V
2841	4822 124 81029	100μF 20% 25V
2842	4822 124 81029	100μF 20% 25V
2950	4822 124 81151	22μF 50V
2951	4822 124 41579	10μF 20% 50V
2952	4822 122 33891	3.3nF 10% 63V
2953	4822 126 13061	220nF 20% 25V
2954	5322 121 42386	100nF 5% 63V
2955	4822 124 11767	470μF 20% 25V
2962	4822 122 33891	3.3nF 10% 63V
2963	4822 126 13061	220nF 20% 25V
2965	4822 126 13061	220nF 20% 25V



3807	4822 116 52175	100Ω 5% 0.5W
3808	4822 116 52175	100Ω 5% 0.5W
3809	4822 117 10834	47k 1% 0.1W
3810▲	4822 051 20101	100Ω 5% 0.1W
3811▲	4822 051 20101	100Ω 5% 0.1W
3812▲	4822 052 10688	6Ω8 5% 0.33W
3899▲	4822 051 20472	4k7 5% 0.1W
3899	4822 051 20562	5k6 5% 0.1W
3950	4822 051 20273	27k 5% 0.1W
3953▲	4822 051 20332	3k3 5% 0.1W
4xxx	4822 051 10008	0Ω 5% 0.25W

4xxx 4822 051 20008 0Ω 5% 0.25W

5801 4822 157 50965 15μH 10%  
5811 4822 157 51462 10μH 10%  
5812 4822 157 51462 10μH 10%  
5813 4822 157 51462 10μH 10%  
5814 4822 157 53139 4.7μH

→+

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

⊖

7803 4822 209 17461 MSP3415D-PP-A2  
7953 4822 209 13646 TDA7057AQ/N2  
7956 5322 130 60508 BC857B

### SIDE AV[E]

#### Various

0021 4822 402 11366 SIDE AV BRKT. 21"  
0250 4822 265 11606 Conn. 3P  
0251 4822 267 10735 Conn. 3P  
0252 4822 267 10565 Conn. 4P  
0253 4822 267 10735 Conn. 3P  
1050 4822 212 11996 SIDE AV PANEL

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

□

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

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