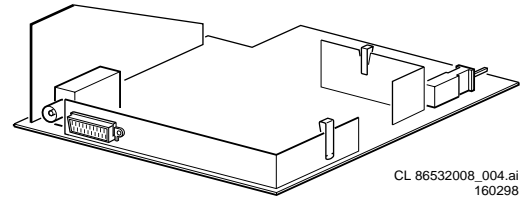


Service  
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# Service Manual

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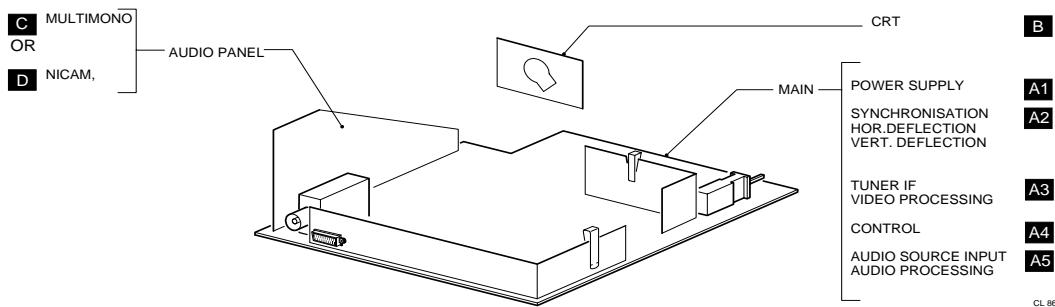
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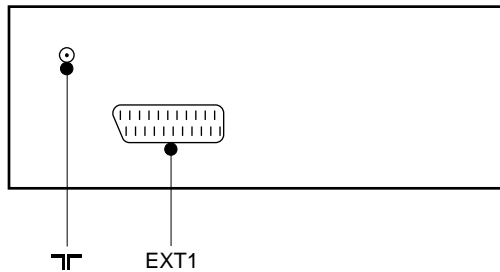
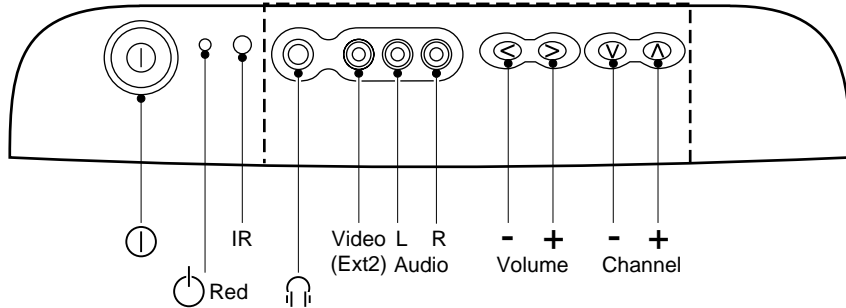


## 1 Technical specifications

Mains Voltage:	: 220 - 240 V AC
	: (+/- 10%)
Power consumption	: 17" 50 W
	: (stand by < 7 W)
	: 21" 57 W
	: (stand by < 7 W)
Pull in range colour sync	: +/- 300 Hz
Pull in range horizontal sync	: +/- 600 Hz
Pull in range vertical sync	: 45 - 64.5 Hz

## Location of panels





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## 2.1 Cinch

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



4.5-7V:EXT 16:9

9.5-12V:EXT 4:3

(0.7Vpp/75Ω)

## 2.2 Head phone

- (32-600Ω ≥10mW)



9- Green

10-

11- Green

12-

13- Red

14- RGB-

status

15- Red

16- RGB-

status

1-3V:EXT/75Ω)

17- CVBS

18- CVBS

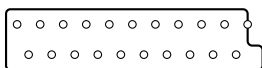
19- CVBS

20- CVBS

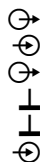
21- Earth

socket

## 2.3 Euroconnector



- 1- Audio R (0.5Vrms ≤1kΩ)
- 2- Audio R (0.5Vrms ≥10kΩ)
- 3- Audio L (0.5Vrms ≤1kΩ)
- 4- Audio L (0.5Vrms ≥10kΩ)
- 5- Blue (0.7Vpp/75Ω)
- 6- Audio L (0.5Vrms ≥10kΩ)
- 7- Blue (0.7Vpp/75Ω)
- 8- CVBS-status 0-1.3V:INT



## 3 Safety instructions, Maintenance instruction,

### 3.1 Safety instructions for repairs



**Figure 3-1**

1. Safety regulations require that during a repair:
  - the set should be connected to the mains via an isolating transformer;
  - safety components, indicated by the symbol (see fig. 3.1), should be replaced by components identical to the original ones;
  - when replacing the CRT, safety goggles must be worn.

2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.

- As a strict precaution, we advise you to resolder the solder joints through which the horizontal deflection current is flowing, in particular:
  - 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 MW and 12 MW;
  - 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.

- 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.

### 3.3 Warnings



1. 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:
  - anti-static table mat (large 1200x650x1.25mm) 4822 466 10953
  - anti-static table mat (small 600x650x1.25mm) 4822 466 10958
  - anti-static wristband 4822 395 10223
  - connection box (3 press stud connections, 1 M ohm) 4822 320 11307
  - extension cable (2 m, 2 M ohm; to connect wristband to connection box) 4822 320 11305
  - connecting cable (3 m, 2 M ohm; to connect table mat to connection box) 4822 320 11306
  - earth cable (1 M ohm; to connect any product to mat or connection box) 4822 320 11308
  - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
  - wristband tester 4822 344 13999

2. 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. 3.2 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).
3. Together with the deflection unit and any multipole unit, the flat square picture tubes used from 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.
4. Be careful during measurements in the high-voltage section and on the picture tube.
5. Never replace modules or other components while the unit is switched on.
6. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.
7. Wear safety goggles during replacement of the picture tube

### 3.2 Maintenance instruction

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

- When the set is used under normal circumstances, for example in a living room, the recommended interval is 3 to 5 years.

### 3.4 Notes

1. The direct voltages and oscillograms should be measured with regard to the tuner earth, or hot earth as this is called (see fig. 3.3)
2. The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 8) with a colour bar signal and stereo sound (L:3 kHz, R:1 kHz unless stated otherwise) and picture carrier at 475.25 MHz.

3. 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 (see fig. 3.3).
4. The picture tube PWB has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
5. 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.

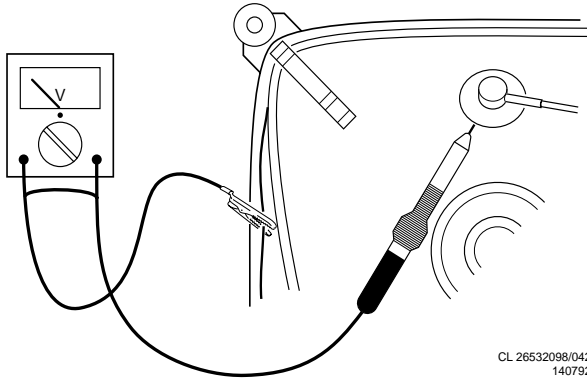


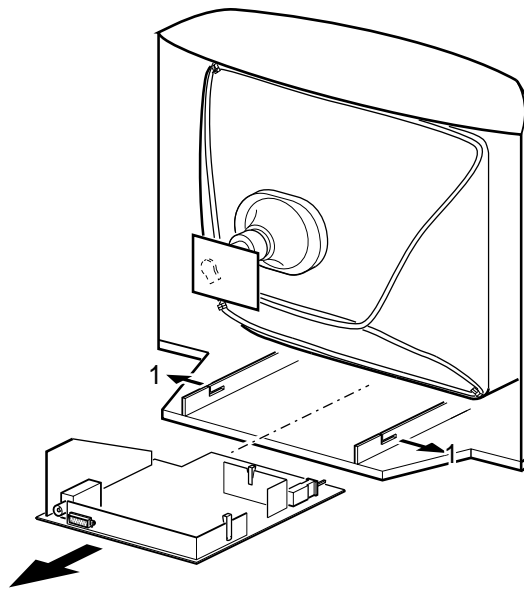
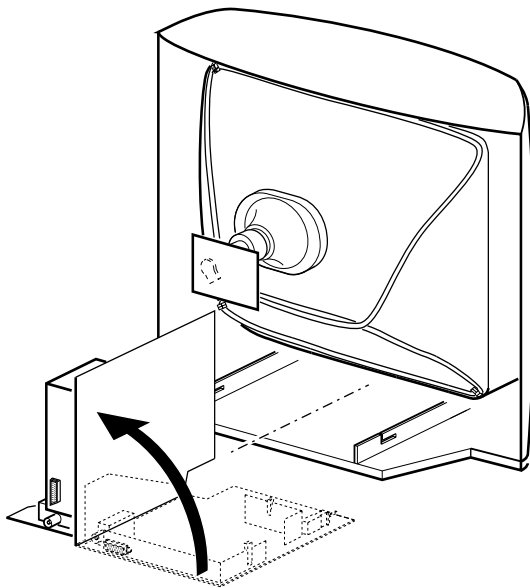
Figure 3-2

<p>⊥ tuner earth tuner aarde la masse du tuner Tuner-Erde massa del tuner tierra del sintonizador</p>	<p>⚡ hot earth hete aarde la terre directe heißen Erde massa calda tierra caliente</p>
<p>⊏ with aerial signal met antenne signaal avec signal d'antenne mit Antennensignal con segnale d'antenna con la señal de antena</p>	<p>✖ without aerial signal zonder antenne signaal sans signal d'antenne ohne Antennensignal senza segnale d'antenna sin la señal de antena</p>
<p>ⓘ normal condition normaal bedrijf fonctionnement normal normaler Betrieb funcionamiento normale funcionamiento normal</p>	<p>⏻ stand by stand by position de veille in Bereitschaft modo di attesa posición de espera</p>

Figure 3-3

## 4 Mechanical instructions

For the service position of the main carrier see Fig. 4.1.  
The main carrier can be removed by releasing the 2 carrier blocking lips (1) and pulling the carrier panel backwards.

**A****B**

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Figure 4-1

## 5.1 Test points

The PWB boards have service printing on both sides. In the service printing test points are included. These test points are referring to the electrical function as mentioned below:

Test point Electrical function

- A1,A2, etc.: Audio
- C1,C2, etc.: Control
- F1,F2, etc.: Frame drive and frame output
- L1,L2, etc.: Line drive and line output
- P1, P2, etc.: Power supply
- S1,S2- etc.: Synchronisation
- V1,V2, etc.: Video

The numbering is done in a for diagnostics logical sequence.

Example: Checking the power supply, start with test point P1, P2 etc.).

## 5.2 Service mode

The service mode is split into two parts:

- Service Default Mode (SDM).
- Service Alignment Mode (SAM).

### 5.2.1 Entering and leaving SDM and SAM

1. Entering SDM
  - To enter the SDM, there are two possibilities:
    - Via the "DEFAULT" button on the DST (Dealer Service Tool)
    - Via short circuiting the service pins 0025 and 0024 (mass), while switching on the set via the mains switch. For 0025 and 0024 see Diagram A4 and the PWB drawing of the main panel.
  - In the SDM mode a S (in green) and the SDM menu (in red) is displayed.(see Fig.6.1).
2. Entering SAM
  - To enter the SAM, there are two possibilities.
    - Via the "ALIGN" button on the DST (Dealer Service Tool)
    - Via short circuiting the Service pins M28 and M29 (mass), while switching on the set via the mains switch. For M28 and M29 see Diagram A4 and the PWB drawing of the main panel.
  - In the SAM mode a S (in green) and the SAM main menu (in red) is displayed.(see Fig.6.2).

Remark: After the set is in the SDM or SAM mode the short circuit can be removed.

### 5.2.2 Leaving SDM or SAM

To leave the SDM or SAM mode, push the stand-by button on the remote control

Remark: After switching off and on by the mains switch, the set remains in the SDM or SAM mode.

## 5.3 Initial states

The initial state after switching on in the SDM or SAM mode is:

System:

- For Multi-Europe sets PAL-BG
- For Multi-France sets SECAM-L

Tuning:

- For sets with VST tuner: Programme number 1 is selected.

Further settings:

- The automatic switch off (no IDENT) timer and the sleep timer will be ignored.
- The child lock will be disabled.
- If the TV set was in hotel mode, this mode is disabled as long as the TV is in SDM or SAM mode.
- Brightness, saturation, sharpness, contrast and balance are initialised on 50% level.
- The volume is set to 25% level.
- The TV set is normally controllable.
- All displayed text in SDM and SAM menu are in English.

## 5.4 SDM (Service Default Mode)

### 5.4.1 SDM menu

Below in Fig.6.1 an example of the SDM menu is shown.

Between clamps a short explanation of each item is added.

001E	2.17.6	S
(life timer)	(software indication)	(service mode indication)
AS		ON
(option abbreviation)		(option status)
ERR		0 0 0 0 0
(error)		(error buffer)
OPT	36C8 B805 2401	
(option)	(12 digit option code)	

Fig.6.1

Below a more detailed information of each item is given

### 5.4.2 Life timer

The indication is in hexadecimal notation. Each hour the set is switched on (not standby) the number is incremented by 1. Also each time the set is switched on the number is incremented by 1.

**5.4.3 Software indication number.**

For each software change this number will be changed.

**5.4.4 Service mode indication.**

The S indicates that the set is in SDM or SAM mode.

**5.4.5 ERROR and ERROR buffer**

(ERR refers to the "ERROR BUFFER")

00000 represent the contents of the so called "ERROR BUFFER". This buffer consist of 5 digits. In each digit an ERROR code can be displayed. The last five errors, are stored in the EEPROM, and are shown in this buffer. An error will be added to the buffer if this error differs from the last error in the buffer. The last detected error is displayed on the most left digit.

Example: Suppose the display shows: 3 4 1 3 1. This means the last found error is error code 3; the last found error but one is error code 4, etc.

Remark: The ERROR BUFFER is erased when the set is switched from SDM or SAM in stand by, or via code 99 via DST.(Dealer service Tool).

The following error codes have been defined:

Error code	Error description	Possible defective component
0	No error	
1	Internal RAM error of æC	IC7600
2	General I2C error	
3	EEPROM Configuration error (Checksum error)	Set not correct configured
4	I2C error audio processor	MSP3410 on NICAM panel
5	I2C error TV processor	TDA8373/74
6	EEPROM error	ST24C04
7	I2C error PLL tuner	PLL tuner
8	POR bit high (43-IC7600)	

**5.4.6 ERROR code indication via blinking stand by LED**

The ERROR codes 2, 5 and 8 are also indicated via blinking of the stand by LED. This is important if no OSD function or picture is available.

The method is to show LED blinks as many as the error code.

Example: Error code 5 will result in five blinks ( 0.25 seconds ON and 0.25 seconds OFF).

After this sequence the LED will be OFF for 3 seconds.

**5.4.7 Option abbreviation and Option status.**

To select another option abbreviation use the MENU UP/DOWN buttons and to change the status use the MENU LEFT/RIGHT buttons.

Elucidation:

With above items the option statuses stored in the EEPROM can be changed.

This is necessary if the EEPROM is replaced by a fresh EEPROM, because a fresh EEPROM is initial loaded with default options and statuses by the microcomputer. The options stored in the factory can differ per type and stroke number. Therefore it is necessary to load the EEPROM with the correct statuses These options with statuses are indicated on a sticker glued on the CRT. For an example of the sticker see table 6.1 (this table is valid for 21PT1663/00).

Table 6.1

Option abbreviation	Status
AT	ON
AV	ON
BA	ON
BL	ON
CO	OFF
GM	ON
HO	ON
MT	PH
PG	ON
PR	99
SA	ON
SB	IN
SP	ON
SS	ON
SU	ON
SY	EW
TR	ON
UH	OFF
VI	OFF
XT	ON

(Table only valid for 21PT1663/00)

**Loading a fresh EEPROM**

- Switch on the TV via the power switch.
- Audio mute the TV (to get no big noise).
- Change the option statuses as indicated on the sticker on the CRT.
- Put TV in stand by via the remote control.
- Switch on the TV again via the remote control.



- Switch OFF the TV via the power switch
- Switch on the TV again via the power switch.

In table 2 all the possible option abbreviation with full option name and possible statuses for "Europe" sets are listed. The status can be "ON", "OFF" or can have another indication.

Table 2 : Options

Option abbr	Option full name	Status possibilities
AT	Auto tuning system	ON/OFF
AV	AVL	ON/OFF
BA	Bass	ON/OFF
BL	Balance	ON/OFF
CO	Clock In Menu	ON/OFF
GM	Game mode	ON/OFF
HO	Hotel mode	ON/OFF
MT	Menu type	PH = Philips
		NB = National brand
		MV = Magnavox
PG	Program guide	ON/OFF
PR	Presets	99
		59
		79
SA	Spatial	ON/OFF
SB	Sound Board	IN = ITT NICAM
		IT = ITT 2CS
		MA = MONO ALL
		MM = Multi Mono
SP	Smart picture	ON/OFF
SS	Smart Sound Full	ON/OFF
SU	Surf	ON/OFF
SY	System Cluster	EW = Europe West
		EE = Europe East
		EM = Europe Manual
		SS = Single System
TR	Treble	ON/OFF
UH	UHF only	ON/OFF
VI	Virgin Mode	ON/OFF
XT	EXT 2 Available	ON/OFF

### 5.4.8 OPTION code

OPT is the abbreviation of OPTION, this abbreviation refers to the following 12 digit hexadecimal option codes (36C8 B805 2401)

The option code can not be selected. It only give a quick indication in hexadecimal form of the options settings of the relevant set.

## 5.5 SAM (Service Alignment Mode)

Via the SAM, service software alignments can be executed.

When entering SAM a main menu is displayed Via the main menu sub menus can be selected.

### 5.5.1 SAM main menu (see Fig. 6.2)

In the main menu the items of the basic software alignments are indicated.

The items can be selected with the UP(+)/DOWN(-) arrow keys on the remote control. Entry into the sub menu is executed with the VOL.(+)/VOL.(-) arrow keys.

#### SAM MAIN MENU

	S
AKB	ON
TUN.FOA	ON
TUN.FOB	ON
EXT.FOA	ON
EXT.FOB	OFF
TUNER	>
WHITE TONE	>
GEOMETRY	>

Fig.6.2

Below each item is explained.

### 5.5.2 AKB (Auto Kine Biasing)

With the option AKB the "black current loop" can be enabled or disabled

ON =enabled, OFF = disabled.

### 5.5.3 TUNER Speed setting.

With the items TUN.FAO and TUN.FOB the speed ( time constant) for internal signals is set. The speed can be set to normal, slow or fast.

Table 3: Options for Tuner Speed settings

## 5 Repair facilities

TUN.FOA	TUN.FOB	Speed
OFF	OFF	Normal
OFF	ON	Slow
ON	X	Fast

### 5.5.4 EXTERNAL A/V Speed setting

With the items EXT.FAO and EXT.FOB the speed ( time constant) for external signals is set. The speed can be set normal, slow and fast.

Table 4: Options for External AV Speed settings

EXT.FOA	EXT.FOB	Speed
OFF	OFF	Normal
OFF	ON	Slow
ON	X	Fast

### 5.5.5 Tuner

Below an example of the sub menu Tuner is shown.

Tuner	S
AGC	23
F-PLL	3
IF PLL L'	0
AFW	240 KHz
AFA	0
AFB	1

Item AGC:

For the setting of the item AGC see RF AGC adjustment paragraph 8.1.4 of chapter 8.

Item IF-PLL, IF-PLL L ACCENT, AFW, AFA and AFB,

When the main signal processor IC TDA8373/74 is changed, the IF-PLL and IF-PLL L ACCENT need to be realigned

For the settings of IF-PLL, IF-PLL L ACCENT and AFW see the picture demodulator adjustments paragraph 8.1.5 of chapter 8.

Remark: AFA and AFB are adjusting indicators and therefore not selectable.

### 5.5.6 White tone

Below an example of the white tone sub menu and the derived "WARM", "COOL" and "NORMAL" sub menus are given. With these menus the WARM, COOL and NORMAL colour temperatures can be changed.

#### MAIN WHITE TONE MENU

	S
WARM	<
COOL	<
NORMAL	<

#### WARM TEMPERATURE SUB MENU

WARM	S
RED	39
GREEN	39
BLUE	25

#### COOL TEMPERATURE SUB MENU

COOL	S
RED	39
GREEN	39
BLUE	25

#### NORMAL TEMPERATURE SUB MENU

NORMAL	S
RED	39
GREEN	39
BLUE	25

Remark:

Only one of the 3 items (RED, GREEN or BLUE) will be displayed on the screen. Via "scrolling with the UP/DOWN keys the items can be changed.

The item's red, green or blue can be changed by first pressing the control left/right keys to highlight the desired setting. With the desired setting high lighted, the user can increment or decrement the setting by using the control up/down key. All

changed data are stored into the EEPROM after returning to the SAM main menu via the OK key.

The initial default value for all setting is 37.

The factory settings of the colour temperatures are:

WARM; R = 45, G = 32, B = 26

NORMAL; R = 37, G = X, B = Y

COOL; R = 37, G = 32, B = 31

Remark: In NORMAL position the values X (G) and Y (B) are adjusted for 8500K colour temperature.

### 5.5.7 GEOMETRY

The geometry menu contains the following information:

	S
HSH	25
VSL	32
VAM	23
SC	13
VSH	27

Upon enter into the picture geometry menu, the first item will be highlighted.

The value can be incremented or decremented by pressing the control right or left key.

The rest of the parameters can be scrolled through by using the control up/down keys.

All changed data will be stored into the EEPROM after returning to the service main menu via the OK key.

Abbreviation explanation

- HSH - Horizontal shift
- VSL - Vertical linearity
- VAM - Vertical amplitude
- SC - S-correction
- VSH - Vertical shift

### 5.6 Use of Dealer Service Tool (DST)

With the SDM, under mentioned extra service features can be executed

- Direct entering SDM via the "DEFAULT" button on the DST.
- Direct entering SAM via the "ALIGN" button on the DST.
- In case of no (OSD) picture the error buffer can be read out using the "BLINKING LED" procedure (see also paragraph 6.7) by pressing the "DIAGNOSE" button on the DST.

Remark:

- Entry of the SDM and SAM via the DST is possible in all states, except from stand-by.

- All software is suspended till the DST mode is left.
- The dealer mode status is left if the stand-by command is received

### 5.7 Hotel-mode

Entering the hotel-mode :

- Select channel 38
- Push the menu button on the local keyboard (vol. + & vol. - ) and the OSD-button of the RC simultaneously for 3 seconds.
- The screen shows the "HOTEL MODE SUB MENU "ON". Via this menu the wanted blanked channels can be selected.

Leaving the hotel mode :

- Same as entering the hotel mode.
- The screen shows the "HOTEL MODE SUB MENU "OFF".

Remarks:

- In the HOTEL mode the Installation menu cannot be entered.
- When entering the hotel mode the maximum volume will be the current value.
- The set will always switch to a selectable channel when set is switched on.

HOTEL MODE SUB MENU "ON"

38	HOTEL ON
EXIT	>
HOTEL CHANNEL	38

HOTEL MODE SUB MENU " OFF "

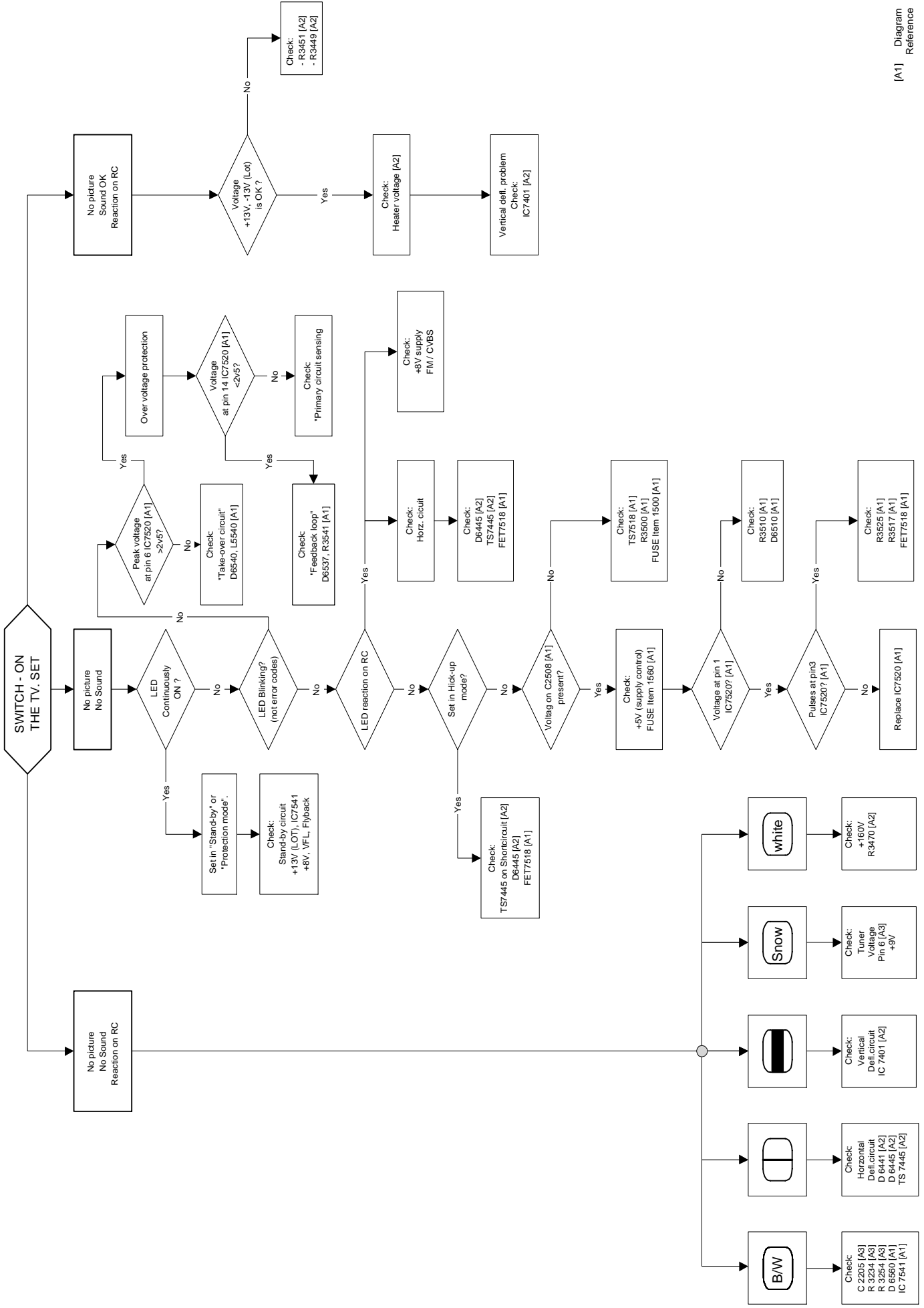
38	HOTEL OFF
----	-----------

Remark: The Hotel mode can only be activated if the Hotel mode option status (HO=ON), see table 2.

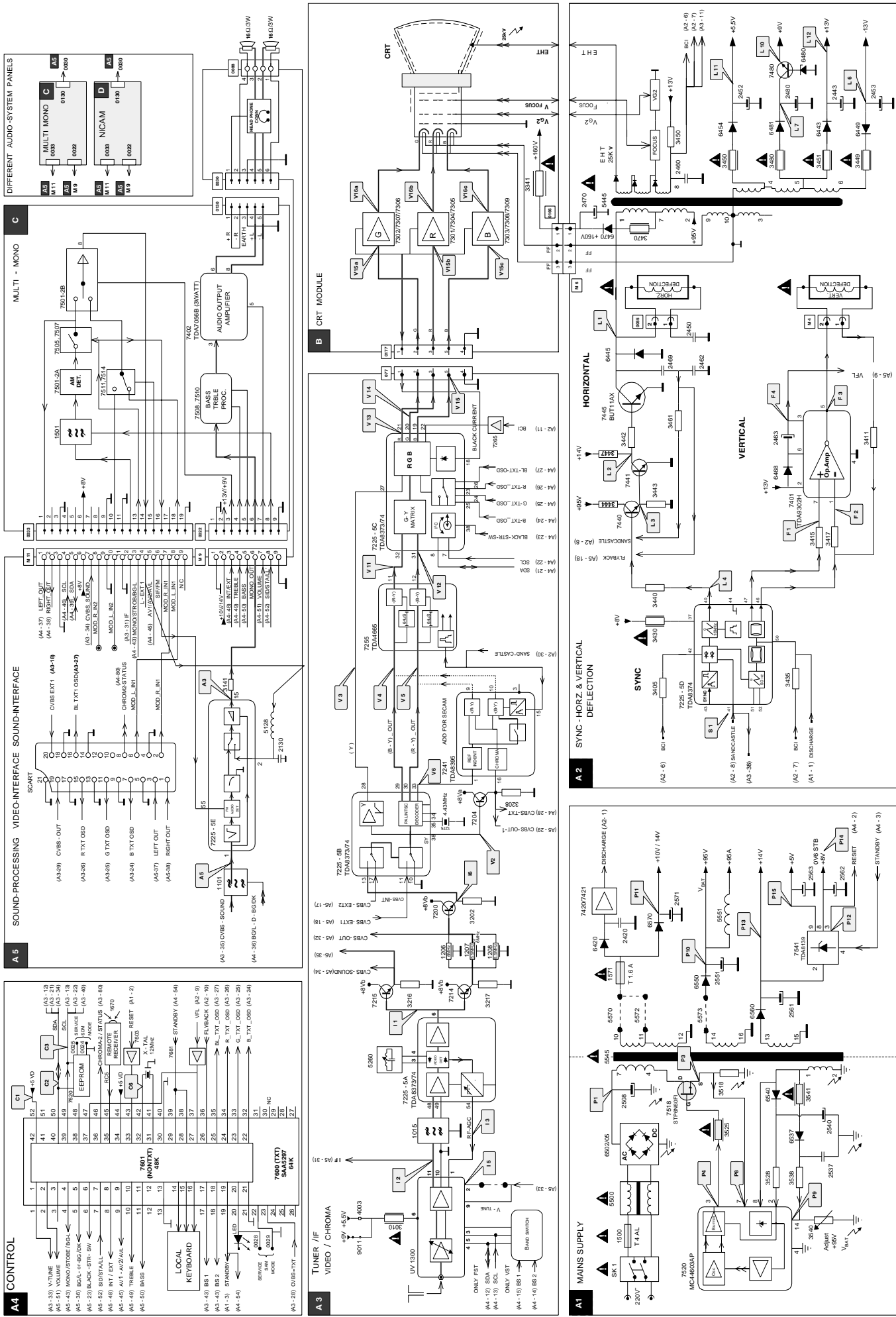


# 6 Fault finding, Block diagram

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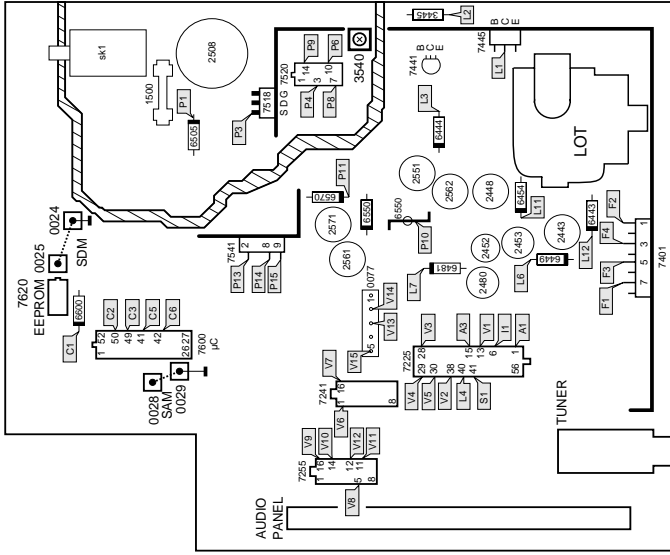


# 6 Fault finding, Block diagram

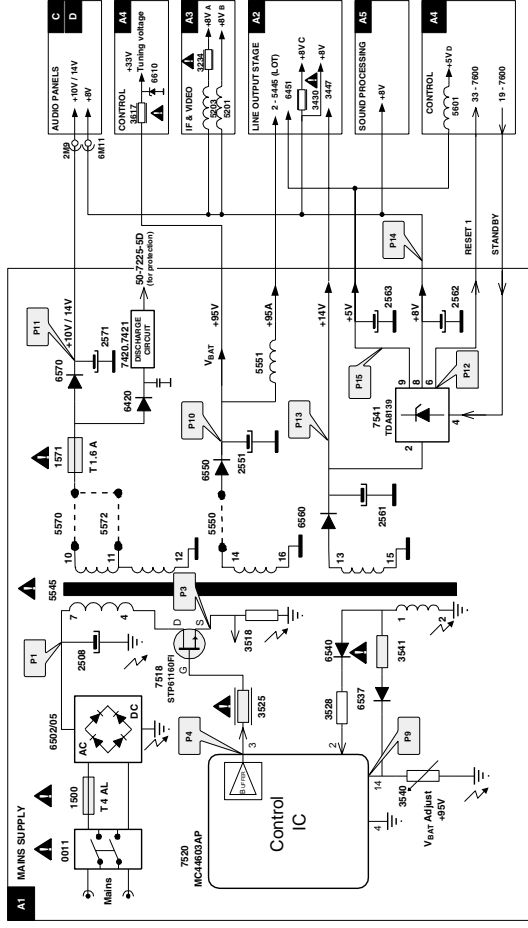
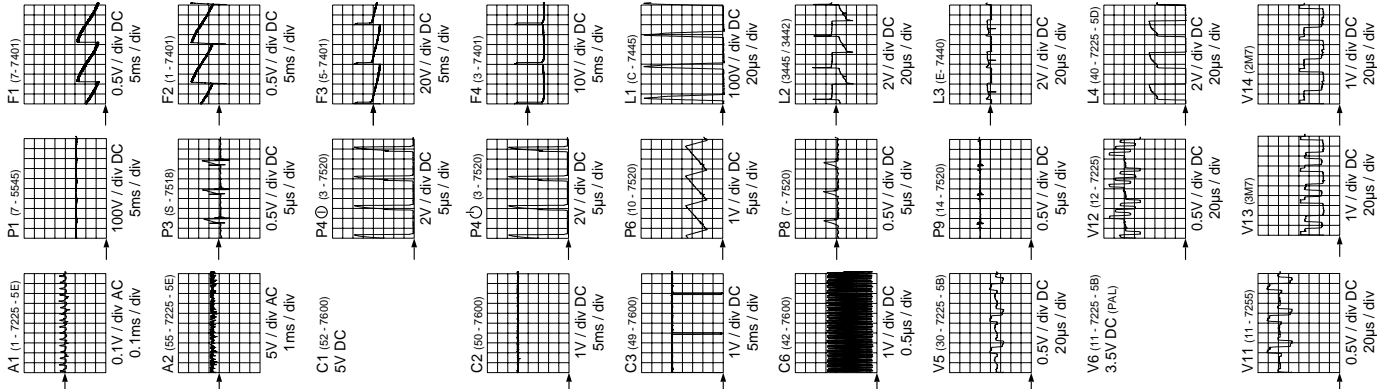
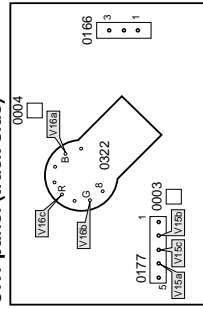


# 6 Fault finding, Block diagram

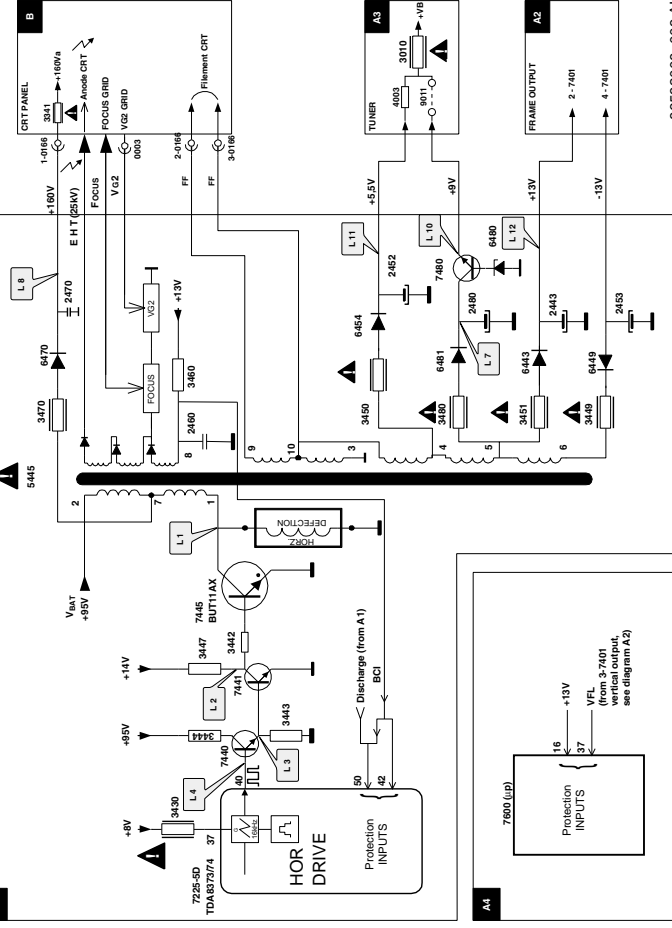
Main panel (component side)



CRT panel (track side)



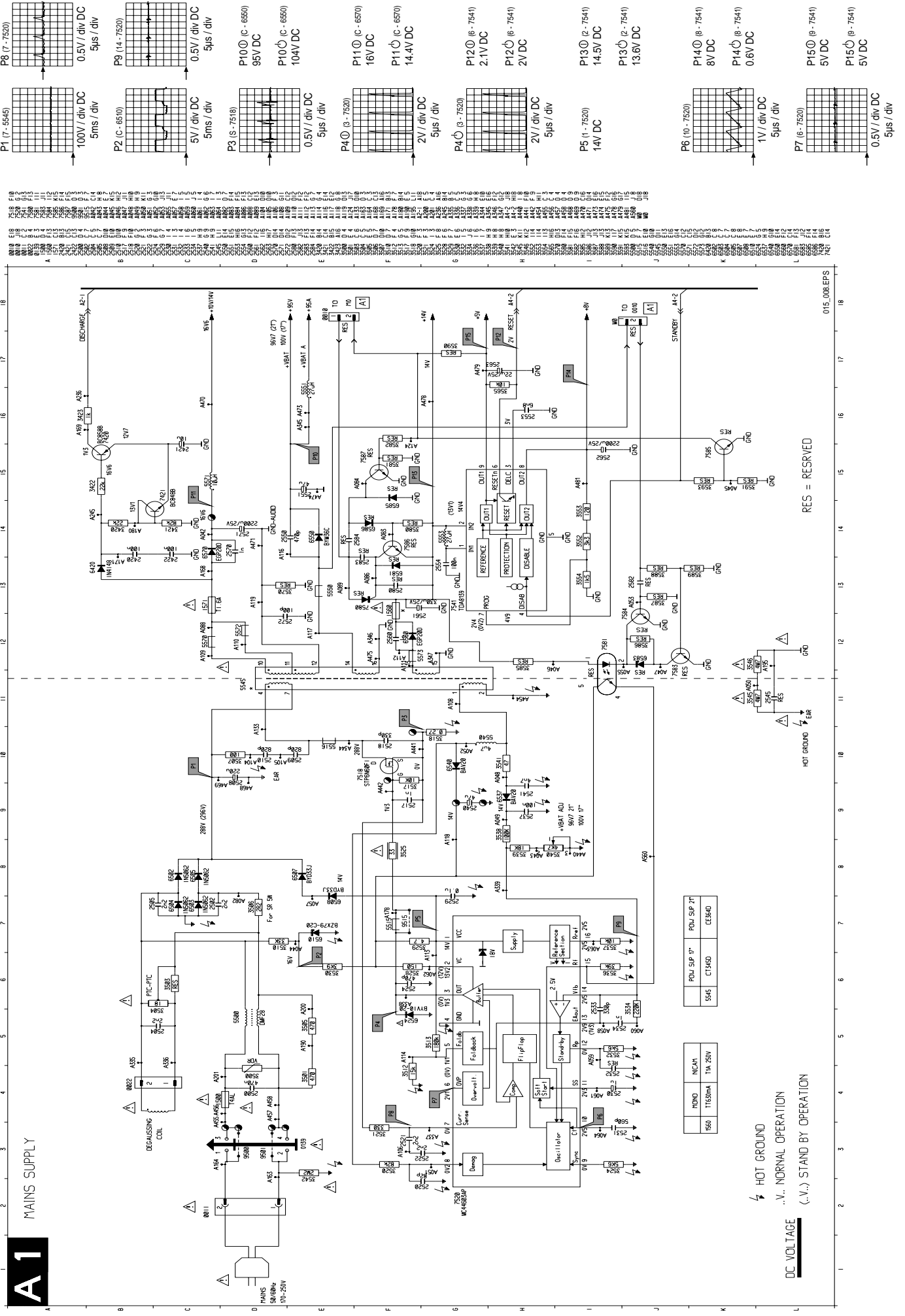
A2 SYNC - HORZ & VERTICAL DEF.



A3 7800 (UP) Protection INPUTS

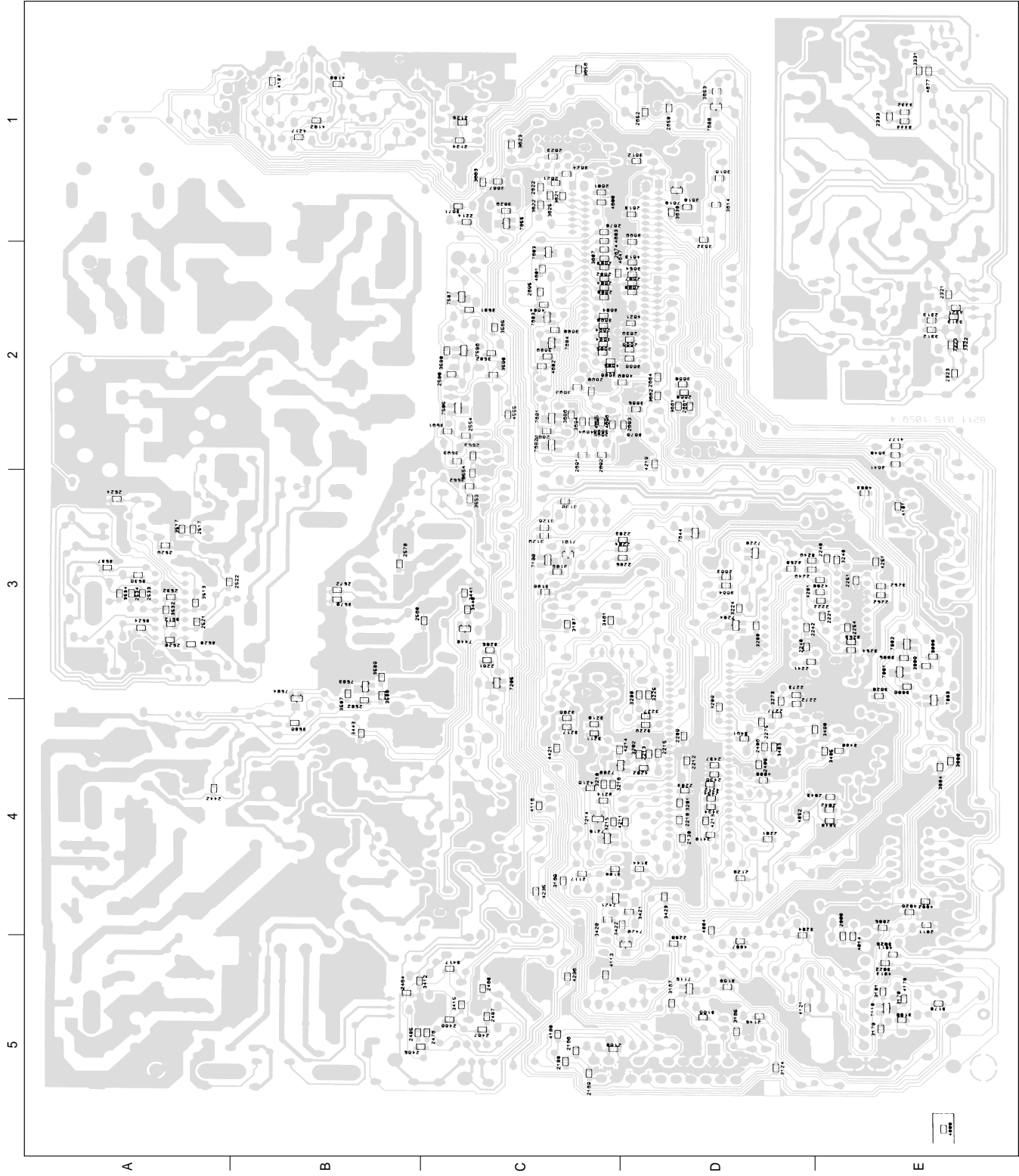
# 7 Diagrams and print lay-outs

L7.2E 16









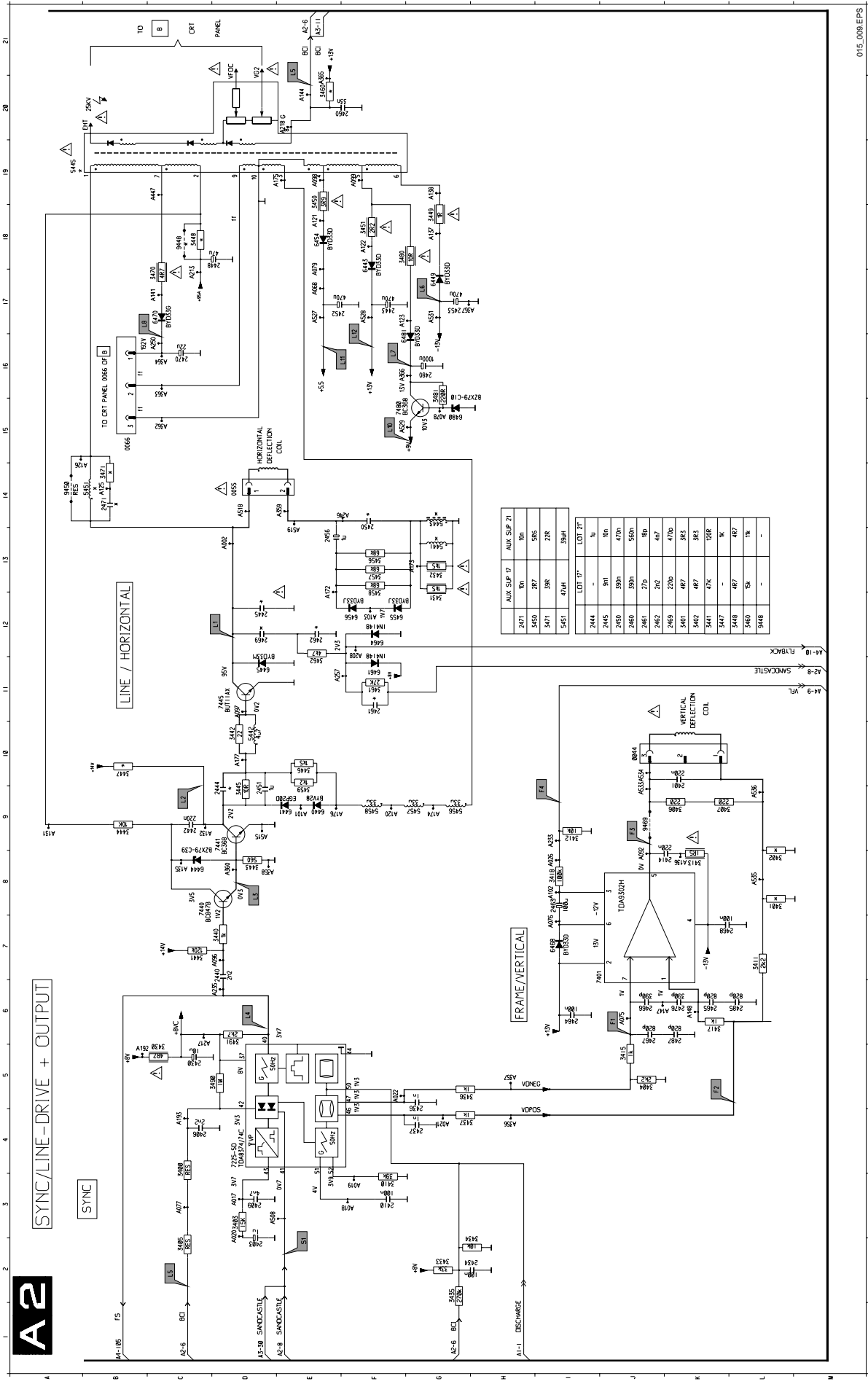
Component list table with columns for component ID and description. The list includes numerous alphanumeric identifiers such as 0003.E2, 0004.D1, 0010.C2, etc., and their corresponding descriptions, including various types of capacitors, resistors, and other electronic components.

# 7 Diagrams and print lay-outs

L7.2E 19

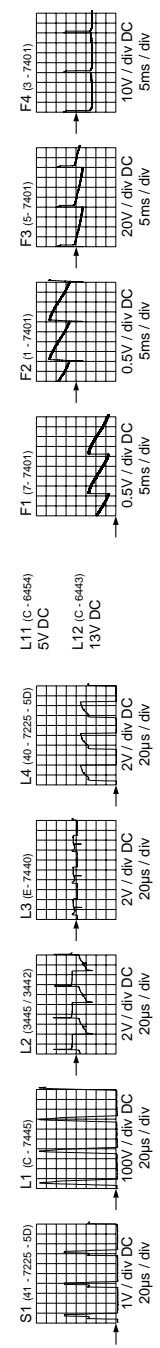
**A2**

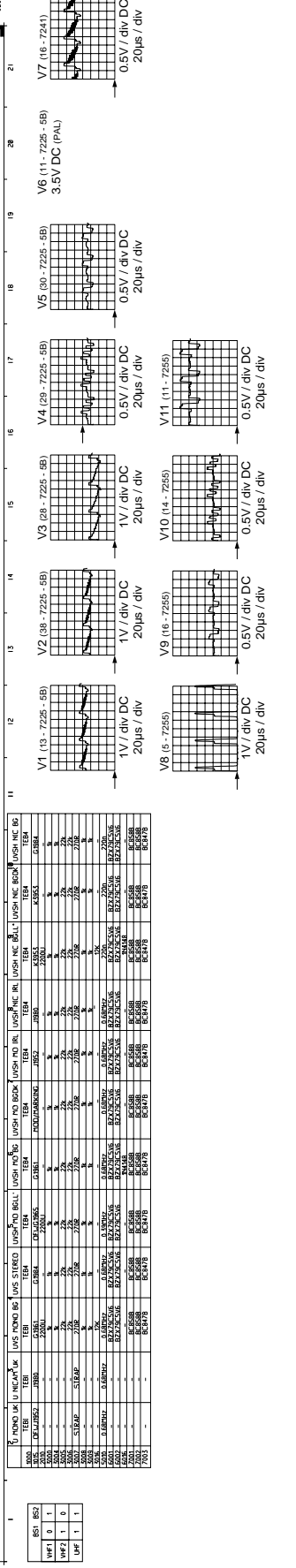
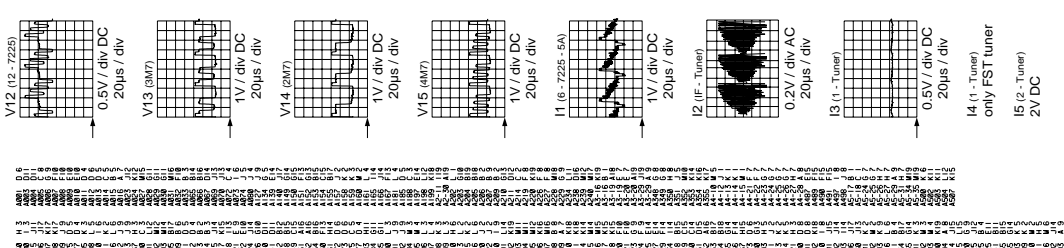
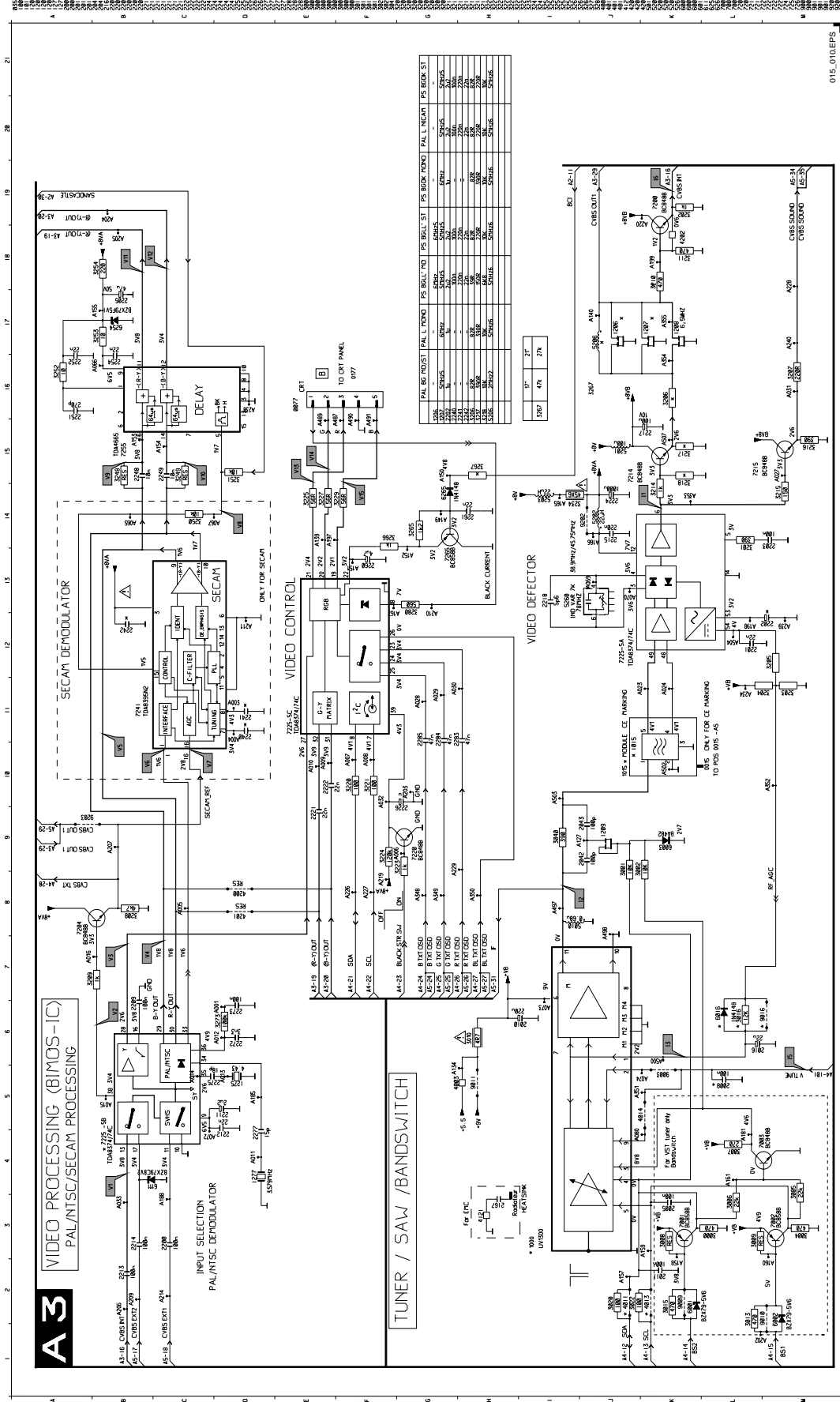
SYNCLINE-DRIVE + OUTPUT



015.009.EPS

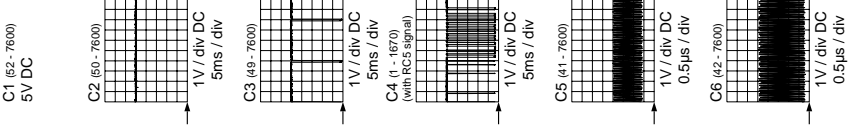
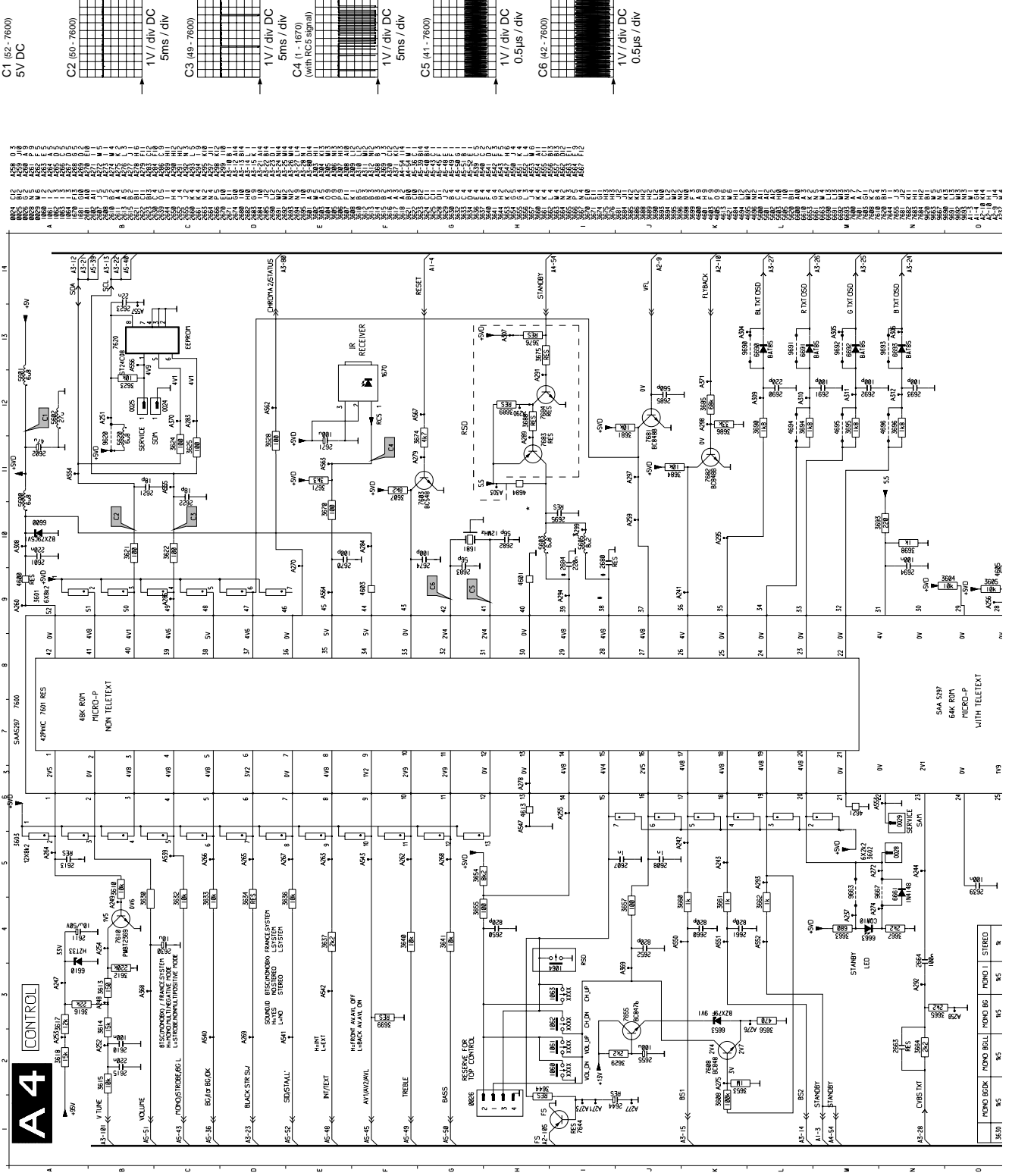
AUX SUP 17	AUX SUP 21
2471	10n
2453	20k
2471	59k
2451	470µF
2444	-
2445	91n
2450	590n
2460	590n
2461	27n
2462	20k
2463	320k
2464	48k
2462	47k
2447	-
2448	15k
2460	15k
2448	-



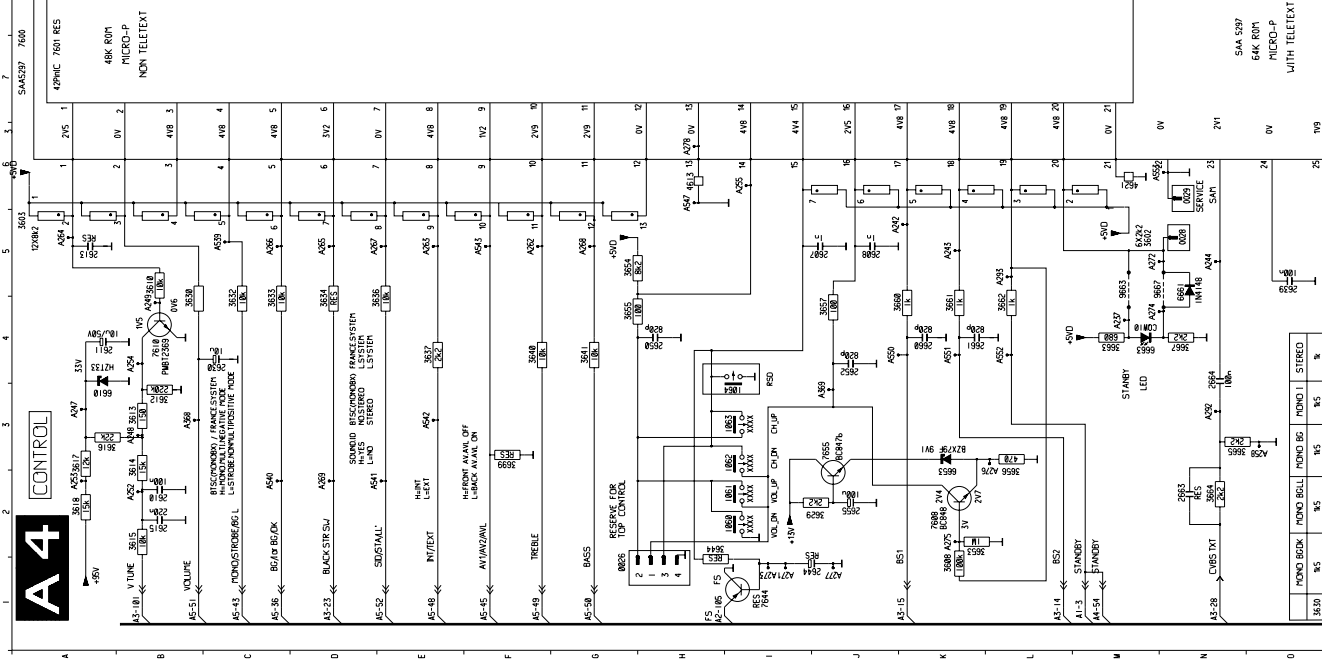


TEST POINT	WAVEFORM	VOLTS	PERIOD	REMARKS
V1	DC	1.0	-	TEST POINT
V2	DC	1.0	-	TEST POINT
V3	DC	1.0	-	TEST POINT
V4	DC	0.5	-	TEST POINT
V5	DC	0.5	-	TEST POINT
V6	DC	3.5	-	TEST POINT
V7	DC	0.5	-	TEST POINT
V8	DC	1.0	-	TEST POINT
V9	DC	0.5	-	TEST POINT
V10	DC	0.5	-	TEST POINT
V11	DC	0.5	-	TEST POINT

# 7 Diagrams and print lay-outs

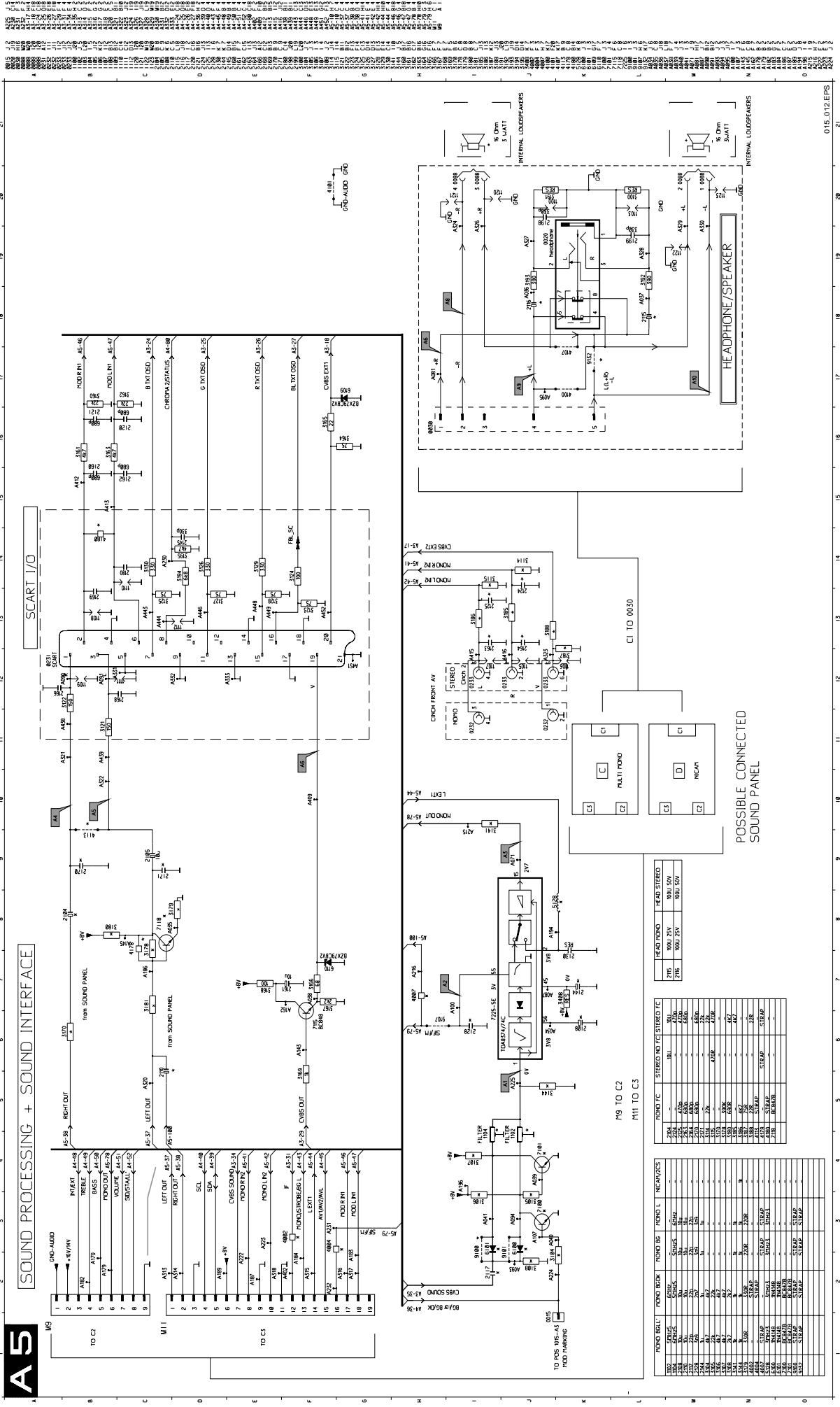


A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
C	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
E	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
F	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
G	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
H	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
J	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
K	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
N	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
O	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14



**A5**

**SOUND PROCESSING + SOUND INTERFACE**

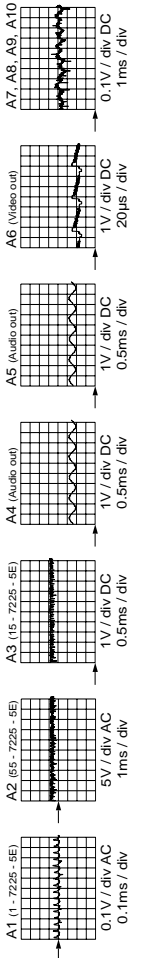


M9 TO C2  
M11 TO C3

UNIT	MONO BULK	MONO BS	MONO L	NEAR/EARS
100	500K	500K	500K	500K
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K

UNIT	MONO BULK	MONO BS	MONO L	NEAR/EARS
100	500K	500K	500K	500K
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K

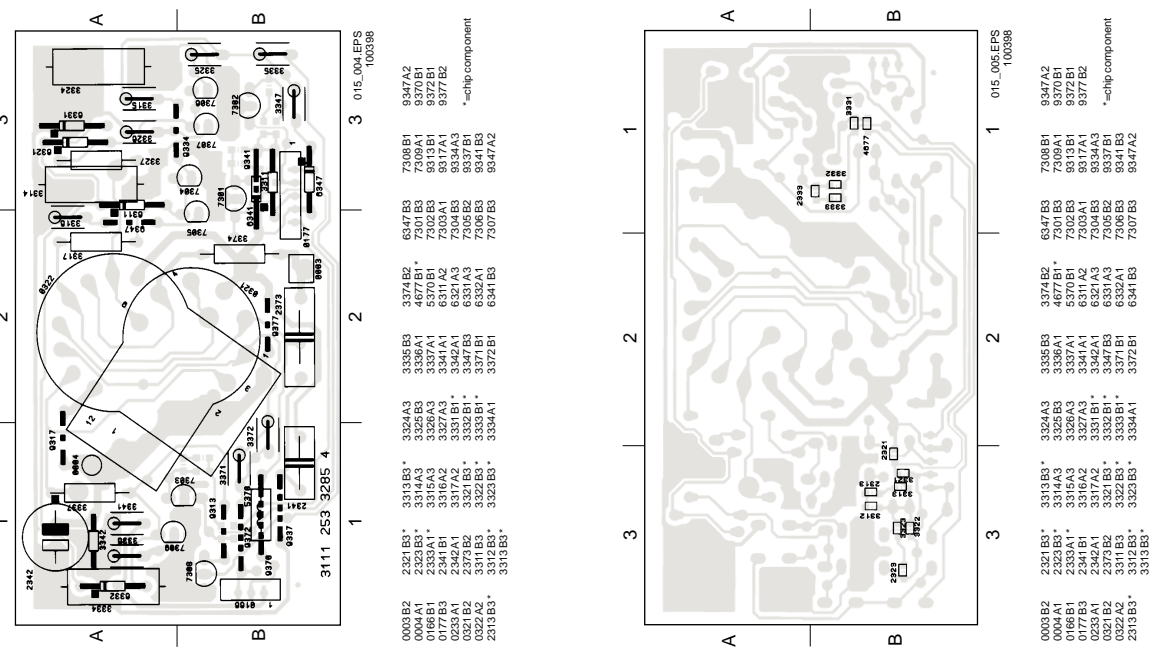
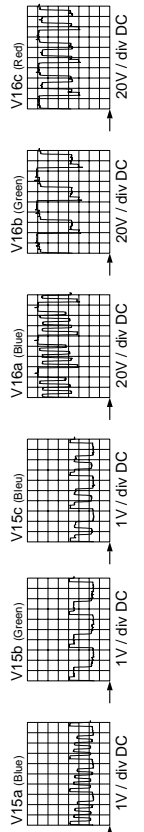
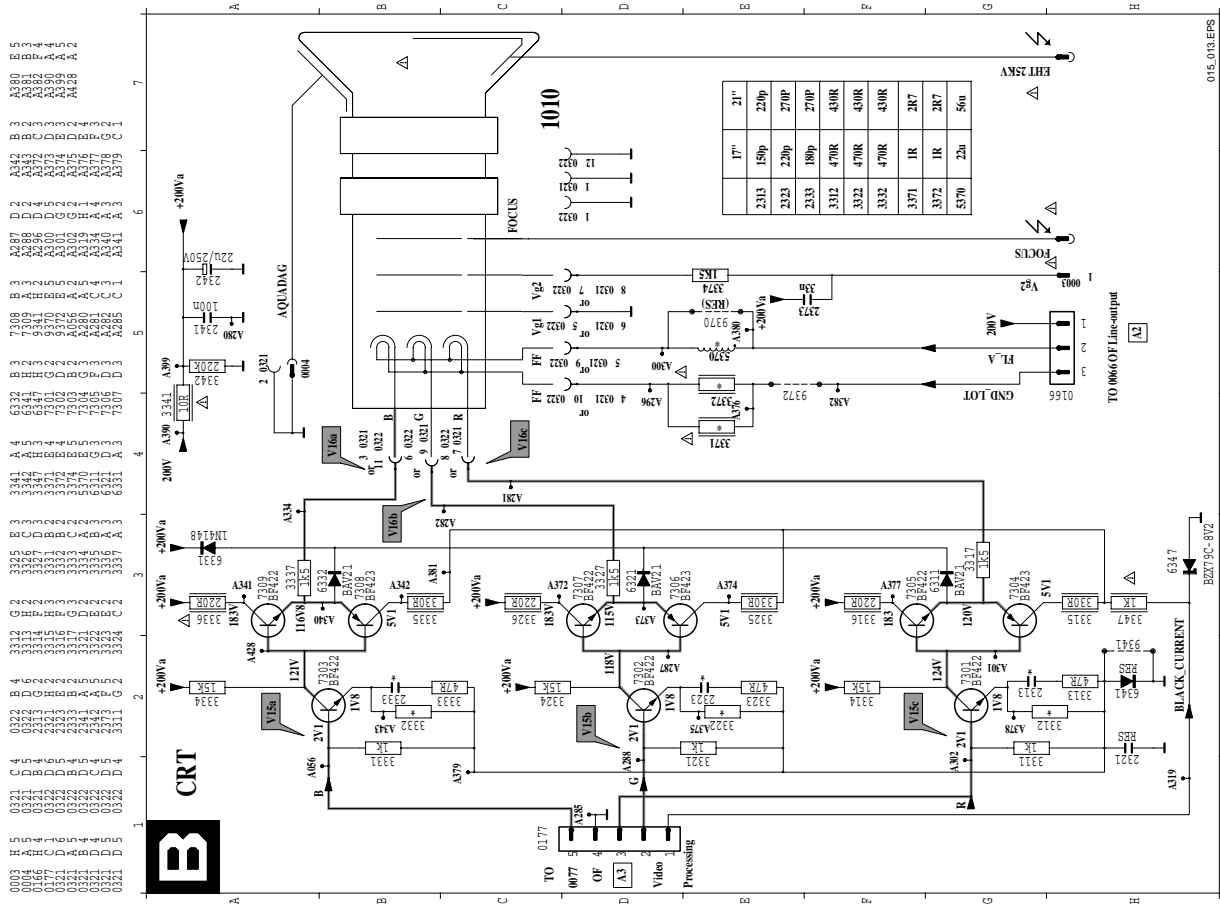
UNIT	MONO BULK	MONO BS	MONO L	NEAR/EARS
100	500K	500K	500K	500K
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K
100	100	100	100	100
10K	10K	10K	10K	10K
1K	1K	1K	1K	1K



POSSIBLE CONNECTED SOUND PANEL

015.012.EPS

# 7 Diagrams and print lay-outs

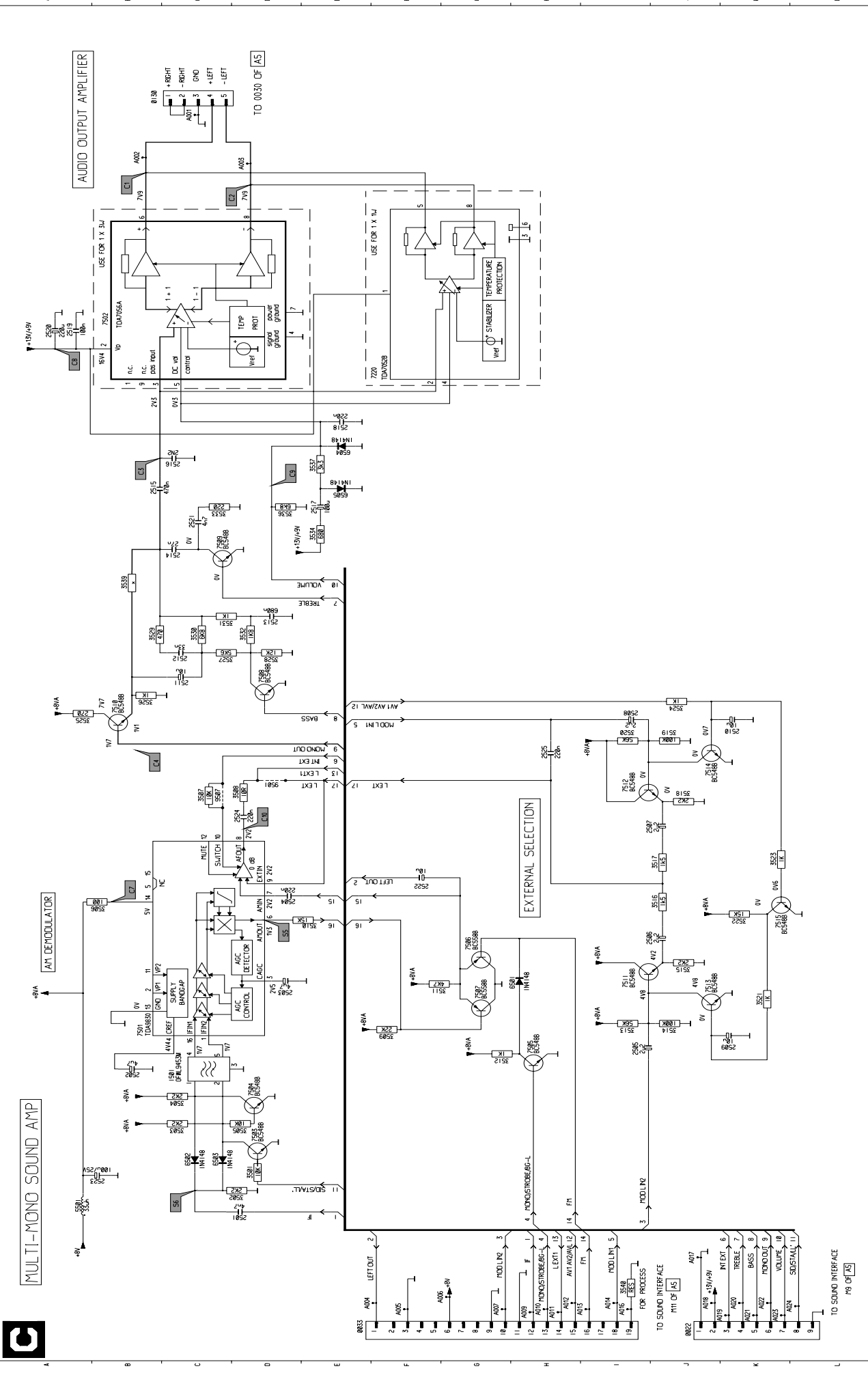


Diagrams and print lay-outs

# 7 Diagrams and print layouts

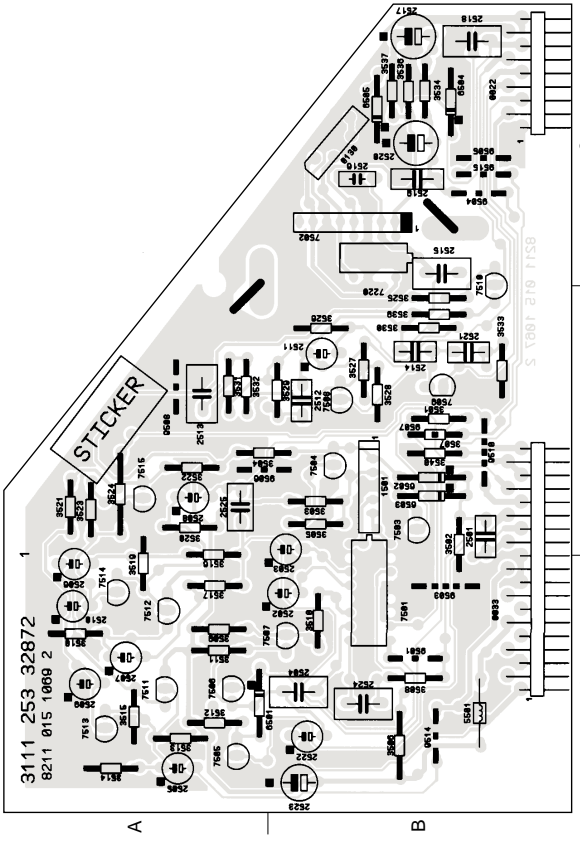
L7.2E 24

1	AE3	K 1
2	AE2	K 1
3	AE1	K 1
4	AE0	K 1
5	AE3	K 1
6	AE2	K 1
7	AE1	K 1
8	AE0	K 1
9	AE3	K 1
10	AE2	K 1
11	AE1	K 1
12	AE0	K 1
13	AE3	K 1
14	AE2	K 1
15	AE1	K 1
16	AE0	K 1
17	AE3	K 1
18	AE2	K 1
19	AE1	K 1
20	AE0	K 1
21	AE3	K 1
22	AE2	K 1





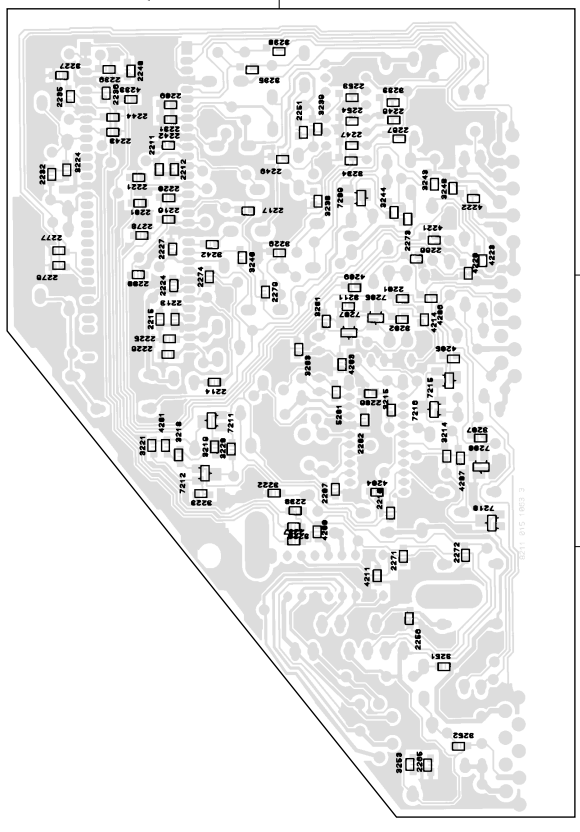
# 7 Diagrams and print lay-outs



002B3	2507 A1	2517 B3	3502 B2	3522 A2	3532 B2	6503 B2	7507 B1	9503 B1
003B1	2508 A2	2518 B3	3503 B2	3523 A2	3533 B2	6504 B3	7508 B2	9504 B3
0130 B3	2509 A1	2519 B3	3504 B2	3524 A2	3534 B3	6505 B3	7509 B2	9505 B3
022B2	2510 B2	2520 B1	3505 B1	3525 A2	3535 B2	6506 B3	7510 B1	9506 B3
2501 B2	2511 B2	2521 B1	3506 B1	3526 B2	3536 B3	6507 B2	7511 A1	9507 B2
2502 B1	2512 B2	2522 B1	3507 B2	3527 B2	3537 B2	6508 A2	7512 A1	9508 A2
2503 B1	2513 A2	2523 B1	3508 B1	3528 B2	3538 B2	6509 B2	7513 A1	9509 B2
2504 B1	2514 B2	2524 B1	3509 A1	3529 B2	3539 B2	6510 B2	7514 A1	9510 B2
2505 A1	2515 A2	2525 B1	3510 B1	3530 B2	3540 B2	6511 A1	7515 A1	9511 A1
2506 A1	2516 B3	2526 B3	3511 A1	3531 A2	3541 B2	6512 B1	7516 A1	9512 B1



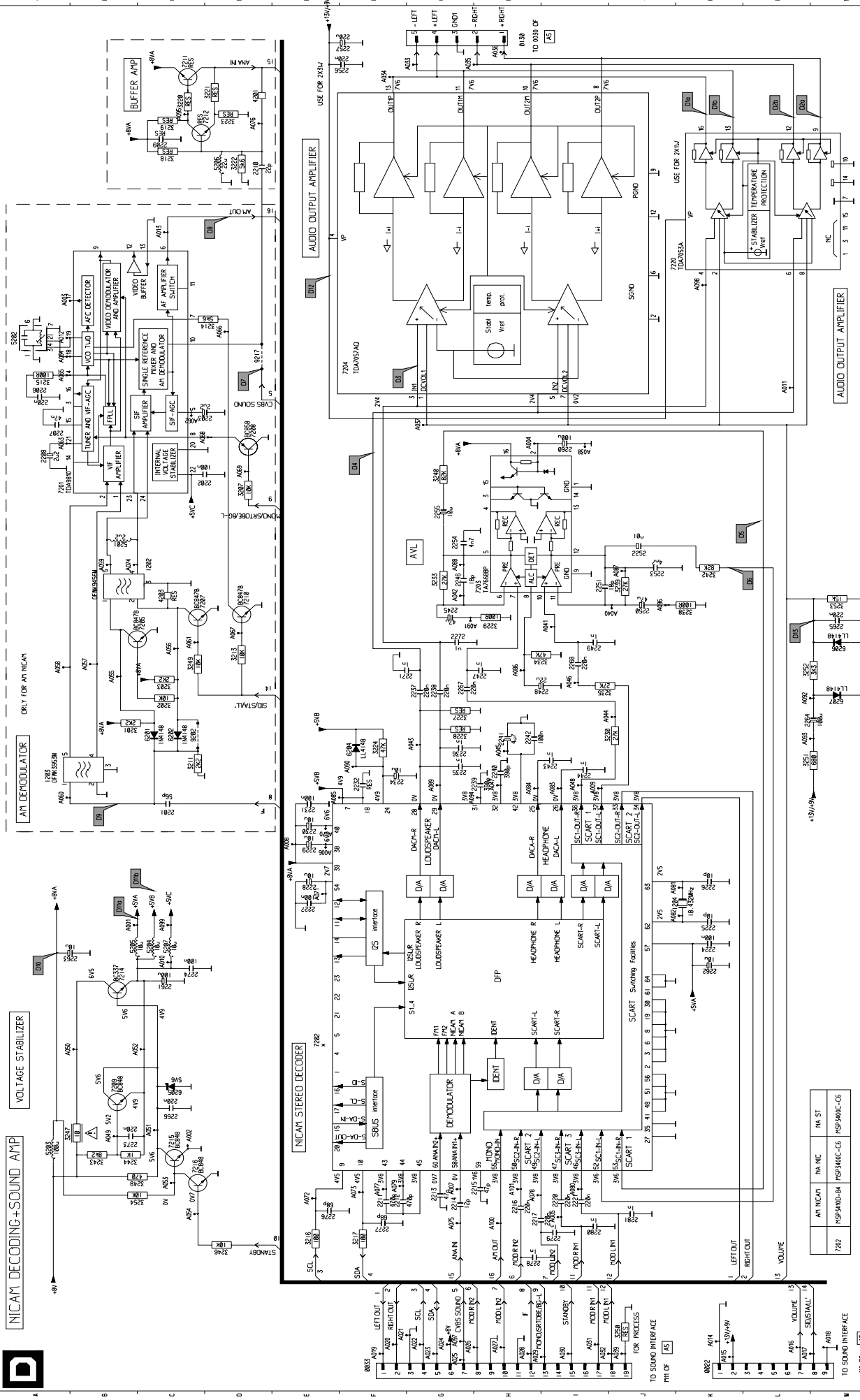
015 008 LEDS	7507 B1	9503 B1
170398	7508 B2	9504 B3
	7509 B2	9505 B3
	7510 B1	9506 B3
	7511 A1	9507 B2
	7512 A1	9508 A2
	7513 A1	9509 B2
	7514 A1	9510 B2
	7515 A1	9511 A1
	7516 A1	9512 B1



002B3	3229 B1*
003B1	3230 B1*
0130 B3	3233 B1*
1202 B2	3234 B1*
1205 B2	3235 B1*
1206 A2	3236 B1*
1206 B2	3237 B1*
1208 A2	3238 B1*
1208 B2	3239 B1*
2201 B2	3239 B1*
2202 B2	3240 A1*
2203 B2	3242 A1*
2204 B2	3242 B1*
2207 B2	3243 A1*
2208 A2	3244 B1*
2208 B2	3246 B2*
2209 A1*	3247 B1*
2210 B2*	3248 B1*
2211 A1*	3249 B2*
2212 A1*	3250 B2*
2212 B1*	3251 B3*
2214 A2*	3252 B3*
2215 A2*	3253 B3*
2217 A1*	4200 B2*
2220 A1*	4201 A2*
2221 A1*	4203 B2*
2224 A2*	4204 B2*
2225 A2*	4206 B2*
2227 A1*	4207 B2*
2228 A2	4209 B2*
2228 B1	4211 B3*
2229 A1*	4213 B3*
2231 A1*	4220 B1*
2232 A1*	4221 B1*
2234 A1*	4222 B1*
2238 A1*	4223 B1*
2237 B2*	5201 B2*
2238 B2*	5202 B2*
2239 A1*	5203 B1*
2240 A1*	5204 A1*
2242 A1*	5205 B2*
2243 A1*	5207 B2*
2244 A1*	6201 B2*
2248 B1*	6202 B2*
2249 B1*	6204 B2*
2249 B1*	6205 B1*
2248 B1*	6206 B3*
2249 B1*	6207 B3*
2250 B1*	7202 B2*
2250 B1*	7203 B1*
2252 A1*	7203 B1*
2253 B1*	7204 B3*
2254 B1*	7205 B2*
2255 B1*	7206 B2*
2255 B3*	7208 B2*
2257 B3*	7209 B1*
2260 A1	7210 B2*
2261 A2	7211 A2*
2262 A2	7212 B2*
2263 A2	7214 B1*
2264 B3*	7215 B2*
2265 B3*	7216 B2*
2266 B1*	7220 B3*
2268 B1*	7221 B3*
2269 B1*	9201 B2*
2270 B1*	9202 B2*
2271 B3*	9202 B3*
2272 B3*	9206 A2*
2273 B1*	9206 B2*
2274 B1*	9208 B1*
2275 A1*	9208 B1*
2277 A1*	9209 A2*
2278 A1*	9210 B1*
2279 A2*	9211 B1*
2280 A1*	9211 B1*
2281 A1*	9213 B3*
3201 B2*	9214 A2*
3202 B2*	9215 B2*
3203 B2*	9216 B1*
3204 B2*	9216 B2*
3205 B2*	9220 B2*
3211 B3*	9220 B2*
3213 B3*	9221 B1*
3214 B2*	9223 B1*
3215 B2*	9224 B2*
3217 B1*	9224 B2*
3218 A2*	9257 B1*
3219 A2*	9257 B1*
3220 A2*	
3221 B2*	
3222 B2*	
3223 A2*	
3224 A2*	
3225 A2*	
3226 A2*	
3227 A2*	
3228 A2*	

\*chip component

1	AV1	AV2	AV3	AV4	AV5	AV6	AV7	AV8	AV9	AV10	AV11	AV12	AV13	AV14	AV15	AV16	AV17	AV18	AV19	AV20	AV21	AV22	AV23	AV24	AV25	AV26	AV27	AV28	AV29	AV30	AV31	AV32	AV33	AV34	AV35	AV36	AV37	AV38	AV39	AV40	AV41	AV42	AV43	AV44	AV45	AV46	AV47	AV48	AV49	AV50	AV51	AV52	AV53	AV54	AV55	AV56	AV57	AV58	AV59	AV60	AV61	AV62	AV63	AV64	AV65	AV66	AV67	AV68	AV69	AV70	AV71	AV72	AV73	AV74	AV75	AV76	AV77	AV78	AV79	AV80	AV81	AV82	AV83	AV84	AV85	AV86	AV87	AV88	AV89	AV90	AV91	AV92	AV93	AV94	AV95	AV96	AV97	AV98	AV99	AV100
---	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------



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Note:

Unless stated otherwise, the supply voltage used is:  
220V to 240V +/- 10%, 50 - 60 Hz +/- 5%.

Voltage and wave forms are measured in respect to earth.

Remarks:

- Never use the heatsink as earth.
- Where in the adjustment a pattern generator is mentioned, a colour pattern generator PM5418 has been used with an RF output voltage of 1mV.
- For some adjustments the set has to be put in the SAM (Service Alignment Mode).
- When in the text "Enter SAM" is mentioned proceed as follows:
- Enter SAM by Dealer Service Tool (button "ALIGN"), or via short-circuit the service pins 0028 and 0029 on the main PCB while switching on the set via the mains switch.
- The SAM menu is displayed when the SAM mode is entered (see also chapter 5).

## 8.1 Settings on the main chassis panel

### 8.1.1 (95V supply voltage (17", 21"))

- Connect a multi meter (DC) across C2551.
- Set brightness and contrast to minimum
- Tune to a colour-bar test signal
- Apply a colour bar pattern.
- Adjust potentiometer R3540 to:
  - 96.7V +/- 1V for 21" sets
  - 100V +/- 1V for 17" sets.

### 8.1.2 Geometry adjustments (software adjustment)

- Apply a cross hatch pattern
- Enter SAM.
- Enter into GEOMETRY menu.
- The value of the geometry settings can be decrement or increment by pressing the right or left key on the remote control.

Remark: Before doing the geometry alignment HSH,VSH and VAM, set first item VS (vertical slope) to 25 and SC (Vertical S-correction) to 13 for 21" and to 15 for 17".

\* Horizontal centring

Select item HSH for horizontal shift.

\* Vertical centring

Select item VSH for vertical shift

\* Picture height

Select item VAM for vertical amplitude .

### 8.1.3 Focusing

- Apply a cross hatch pattern.
- Set brightness and contrast at maximum.
- Adjusted with focusing potentiometer (upper knob of LOT 5445 ) for maximum sharpness of the picture.

### 8.1.4 RF-AGC adjustment (software adjustment)

- Apply a PAL colour bar pattern and set RF-frequency on 189.25MHz (output voltage 1mV).
- Enter SAM

- Enter into TUNER menu, select item AGC for RF AGC adjustment.
- Connect a multi-meter (DC) at pin 1 of the tuner.
- The "AGC" value can be increment or decrement by pressing the remote control right or left key. Adjust so that the voltage at pin 1 of the tuner is 5V ( 0.5V DC

### 8.1.5 Picture demodulator adjustment.

- Enter SAM .
- Enter into TUNER menu
- Connect a signal generator (PM5326) to pin 11 of the tuner

\* IF-PLL setting (for all versions)

- Set generator signal to 38.9MHz (negative modulation).
- Set AFW = 80 and adjust IF PLL until AFA = 1 and AFB is just switching from 1 to 0 or 0 to 1.

\* IF-PLL L ACCENT setting

- Set generator signal to 33.9MHz (positive modulation) in Band I & System L for Mono BGLI version
- Set generator signal to 34.0MHz (positive modulation) in Band I & System L for Nicam BGLI version.
- Set AFW = 80 and adjust IF PLL ACCENT until AFA = 1 and AFB is just switching from 1 to 0 or 0 to 1.

Remark: For IF PLL ACCENT adjustment, the set has to be tuned on system France, VHF 1 and varicap voltage <9V.

## 8.2 Vg2 and white-D settings

### 8.2.1 Vg2 cut off alignment

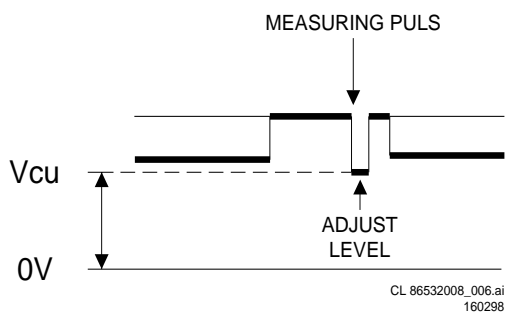
- Apply a black picture pattern.
- Connect an oscilloscope to the picture tube cathodes for red, green and blue. Set the oscilloscope to DC 50V/Div and 2ms/Div.
- Measure the DC level of the measuring pulses at the end of the frame blanking (see Fig 8.1)
- Adjust the VG2 potmeter (lower knob on the LOT) so that the measuring pulses with the highest level are:
  - 140V +/- 2V for 21"
  - 130V +/- 2V for 17"

### 8.2.2 White-D adjustment (software adjustment)

- Enter into WHITE TONE menu, select item WARN, COOL or NORMAL, only one of the three items Apply a white raster pattern.
- Enter SAM (see chapter 6).
- (R, G or B) will be displayed on the screen.
- The initial default value for all setting is 37.
- The factory settings of the colour temperatures are :
  - WARM(R = 45, G = 32, B = 26)
  - NORMAL(R = 37, G = X, B = Y)
  - COOL(R = 37, G = 32, B = 31)

Remark: X and Y values in NORMAL setting are adjusted for 8500K colour temperature.

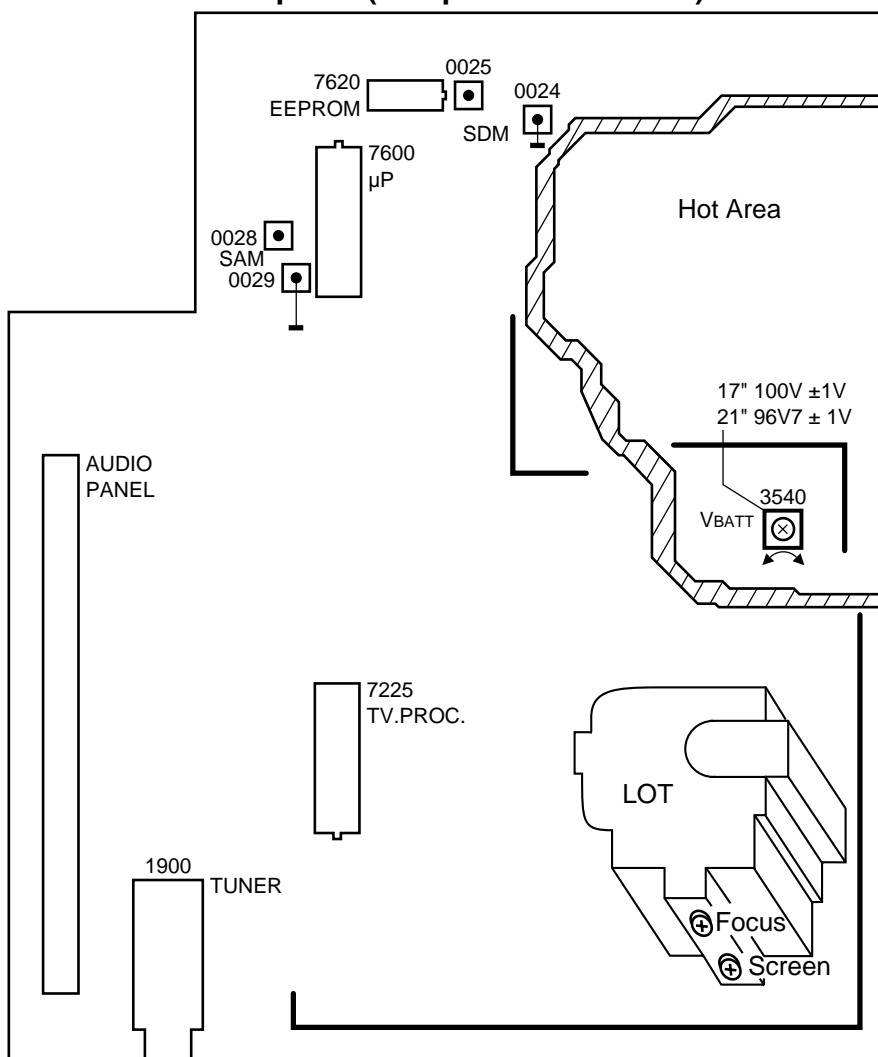
# 8 Electrical adjustments



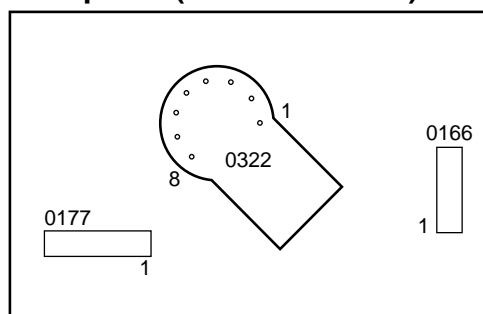
CL 86532008\_006.ai  
160298

Figure 8-1

## Main panel (component side view)



## CRT panel (track side view)



CL86532008\_010.ai  
170298

Figure 8-2

## Introduction

For a quick overall view of all diagrams see the block diagram on sheet 4.

This chassis is executed with:

- A mains isolated SMPS (switched mode power supply)
- A single chip TV processor with software controlled picture geometry adjustments
- Micro computer with teletext function (execution depended)-
- Separate audio module (multi mono or NICAM) with output amplifier

## 9.1 Power supply (Diagram A1)

### 9.1.1 Mains input and degaussing

The mains voltage is filtered by L5500, L5501 and L5502, full wave rectified by a diode bridge (6502-6505) and smoothed by C2508. The DC voltage for the SMPS is applied at pin 7 of T5545 (e.g. 300V DC for 220V AC mains).

The degaussing current is applied via dual PTC resistor R3504. After switching "on" the set, the PTC is cold so low-ohmic and therefore the degaussing current is very high. During degaussing, the PTC is heated up and is getting high-ohmic, as a result the current through the PTC becomes very low.

### 9.1.2 Switched mode power supply

The switched mode power supply (SMPS) is mains isolated. The control device IC7520 (MC44603AP) delivers duty cycle controlled pulses for driving switching FET 7518. The pulses have a fixed frequency of 70 kHz in normal operation.

For a detailed block diagram of IC7520 (MC44603) see Fig. 9.1.

### 9.1.3 Start up and take over circuitry.

Via the start-up circuitry R3530 and R3529 one side of the 220V AC mains is used to start-up IC7520 via the supply pin (Vpin 1). As long as Vpin 1 has not reached 14V5, IC7520 does not start up and only sinks 0.3mA. As soon as Vpin 1 reaches the 14V5, IC7520 starts driving FET 7518 into conduction and pin 1 sinks a typical supply current of 17mA. This supply current can not be delivered by the start-up circuit, so a take-over circuit has to be available. If no take-over takes place, the voltage on pin 1 will decrease and IC7520 switches off. In that case the restart will start again. During start-up a voltage across winding 1 - 2 is built up. At the moment the voltage across winding 1 - 2 reaches approx. 12V, D6540 starts conducting and takes over the supply voltage Vpin 1 of IC7520 (take over current is approx. 17mA).

### 9.1.4 Secondary output voltages sensing (pin 14 of IC7520)

Winding 1 - 2 has the same polarity as the secondary windings which are supplying the load. During the FET is not conducting the secondary windings and winding 1-2 are positive. D6537 conducts and charges C2537; the DC level across C2537 is a reference for the secondary output voltages e.g. the +95V(VBATT). This control voltage (feedback voltage) is applied via voltage divider R3538, R3539 and potentiometer R3540 (for adjusting the +VBATT) to the error amplifier input IC7520 pin 14.

### 9.1.5 Primary current (I-prim) sensing (pin 7 of IC7520)

The current sense voltage Vpin 7 is a measure for the I-prim through FET 7518. The I-prim is converted into a voltage by R3518. The current sense voltage Vpin 7 is used to control both the secondary output voltages and the maximum I-prim.

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

The voltage across winding 1 - 2 has the same polarity as the voltage across the secondary windings. As a result the voltage across this winding is negative during the FET is conducting, and positive during the FET is not conducting. The so called demagnetization "DEMAG" function in IC7520 (input pin 8) is used for blocking the output Vpin3 during the time that there is still energy in the transformer (Isec not zero). This is realized by delaying the switch "on" point of the FET until the demagnetization is completely finished.

### 9.1.7 Standby mode

In the standby mode the load decreases under a certain threshold level. The SMPS is then switching to the so called "reduced frequency mode". The switching frequency is then reduced to 20 kHz. The minimal load threshold level is determined by R3532 connected to pin 12.

In normal operation mode the internal oscillator is adjusted at 70 kHz. This frequency is determined by C2531 and R3537 connected to pin 10 and pin 16 respectively of the IC7520.

In standby mode the internal oscillator is adjusted at 20 KHz. This frequency is determined by R3536 connected to pin 15 IC7520.

### 9.1.8 FET 7518 gate regulation

D6524 prevents pin 3 of IC7520 from becoming negative (this will destroy the IC) due to stray inductance in the gate part of the FET. The safety resistor R3525 limits the drive current to the gate of the FET 7518

### 9.1.9 Over voltage protection of the secondary voltages

After start-up is the supply voltage Vpin 1 taken over by positive winding 1 - 2, and so after start up Vpin 1 is a measuring point for the secondary output voltages. After start-up (via an internal switch) this Vpin 1 is internally tapped (voltage divided) to a voltage which can be measured at pin 6 (so Vpin 6 is also a measuring point for the secondary output voltages). As soon as the voltage Vpin 6 > 2V5 the logic in IC 7520 will shut down the output at pin 3. This 2V5 threshold at Vpin 6 is equivalent to a Vpin1 of 16V DC which is equivalent to a voltage at the supply voltage (VBATT of approx. 95V DC (normal operation) and 102V DC (standby). After switching "off" because of over voltage protection, the IC starts up again. In case an over voltage situation is sensed at the secondary output voltages, the SMPS will go in over voltage protection. In case the over voltage situation remains present, the SMPS will give over voltage protection slow-start, over voltage protection slow-start, etc. ( a very good audible hick-up mode).

### 9.1.10 Undervoltage protection of the secondary voltages

If the supply voltage Vpin 1 < 9V DC the output pulse at pin 3 will be shut down. As soon as Vpin 1 < 7V5, the IC7520 will be totally shut "off". Vpin 1 of 9V DC is equivalent to a voltage at (VBATT of approx. 70V DC (normal operation) and 95V DC(standby). Vpin 1 of 7V5 is equivalent to a voltage at

## 9 Circuit diagram description

(VBATT of approx. 55V DC (normal operation) and 65V DC (standby)).

In case an under voltage situation is sensed at the secondary output voltages, the SMPS will first switch "off" the pulse and then switch "off" the complete IC 7520.

In case the IC 7520 is switched "off", the SMPS will switch "off". In case the under voltage situation remains present, the SMPS will give under voltage protection, slow-start, under-voltage protection, slow-start, etc. ( a very good audible hick-up mode).

### 9.1.11 Unload protection

In case the load goes down (e.g. the line deflection goes down because of standby mode or some failure in the line deflection circuit) this is detected by IC7520 via I-prim and secondary output voltages sensing. In case the load decreases below a certain threshold the SMPS will switch in "reduced frequency mode" of 20 kHz (this threshold is determined by the voltage level at pin 12 IC7520);

In case of an unload situation the set will switch to "low frequency mode" or standby mode. Whether this unload situation of the SMPS is caused by the standby command or by a failure (e.g. in the line circuit), can only be determined by switching on the set again which the remote control, in case of standby mode the TV will switch "on" again, in case of unload situation the set will not switch "on".

### 9.1.12 Overload (short-circuit) protection

If the secondary load becomes too high, I-prim becomes too high which is sensed by the current sense voltage Vpin 7. This voltage Vpin 7 is not allowed to exceed 1V DC by IC 7520 and so gives current limiting.

As the I-prim is limited, the secondary output voltages will also drop and so supply voltage Vpin 1 will drop. As soon as Vpin 1 < 9V DC the driving pulse at pin 3 will stop.

As a result of these 2 mechanism in case of an overload the secondary voltages will drop very fast. This is called the fold-back mechanism, the fold-back point can be adjusted by pin 5 IC7520 this point is adjusted to a maximum tolerable output power of 85W at 90V AC and 165W at 276VAC.

After this fold-back, the IC starts up again. In case the overload situation remains present, the SMPS will give fold back again, slow-start, fold-back, slow-start, etc.;

As a result in case of short-circuit (or overload) the TV will be in a very good audible hick-up mode.

### 9.1.13 Output voltages

- +VBATT (95V) used for the line output stage and the tuning system.
- 10V / 14V used for the audio amplifier.
- 14V used for the horizontal synchronization circuit and as input voltage for IC7541.
- +5V (pin 9 of IC7541). used for the control circuit The 5V is also available in the standby mode).
- +8V (pin 8 of IC7541) used for the video processing. The +8V output is determined by the voltage on pin 7 of IC 7541 This voltage is adjusted via voltage divider 3552 and 3554.

### 9.1.14 DC Output Voltages Protections

- +5V protection :When any overload for the +5V supply occurs (pin 1 of IC7541 < 6.5V) the protection circuit in IC7541 turns on. and shuts down the +5V supply. and also +8V supply.
- +8V protection : When any overload for the +8V supply occurs (pin 1 of IC7541 < 6.5V) the protection circuit in IC7541 turns on and shut down the output +8V supply. If the voltage on pin 7 is < 2.4V the +8V will also shut down.

## 9.2 Single chip TV-processor IC7225 (TDA8374)

Introduction :

In this chip most of the video, audio and sync circuits are integrated.

In the diagrams the IC is split up in next 5 parts (5A,5B,5C,5D and 5E).

- IC7225-5A, video detector (see diagram A3).
- IC7225-5B, source select en PAL demodulator (see diagram A3).
- IC7225-5C, video control (see diagram A3).
- IC7225-5D, horizontal and vertical synchronization (see diagram A2)
- IC7225-5E, mono sound FM demodulator (see diagram A5)

## 9.3 Micro computer (Diagram A4)

Two kinds of microprocessors are used, one with and one without teletext function The (C with teletext (IC7600) is drawn in the diagram with the outer pin numbering. In case of no TXT a (C (IC7601) is used with fewer pins. This (C is drawn in the diagrams with the internal pin numbering. In case of the (C with integrated teletext function, the CVBS-TXT signal is fed to pin 23. The TXT and OSD information are combined at pins 32-33-34.

## 9.4 The line output circuitry (see diagram A2)

Pin 40 IC 7225-5D delivers the drive signal for the line output stage. Via TS7440 and TS7441 the drive signal is applied to the line output transistor 7445 and line output transformer (LOT) 5445. The line output stage supplies the line deflection current. Via secondary windings of the LOT the following supply voltages are generated:

- EHT voltage (25kV)
- Vg2 voltage
- Focus voltage
- Filament supply voltage (ff)
- (160V for RGB amplifiers on the CRT panel
- +5.5V for the control circuit and tuner supply
- + 9V for the tuner supply
- +13V for the control and vertical drive output circuit
- -13V for the vertical drive output circuit

## 9.5 Frame output circuitry

IC 7401 (TDA9302) is used for the vertical deflection. This IC is controlled on pins 1 and 3 by the vertical drive signal delivered by IC 7225-5D. The deflection current is generated on pin 5. The vertical fly-back voltage is generated on pin 3 of the IC.

## 9.6 Protections

General: In the set next protections are build in:

### 9.6.1 Fast discharge circuit.

TS7420 and TS7421 (see diagram A1) formed a fast discharge circuit. When the voltage on the collector of TS7421 is  $>6V$  the circuit will switch off the horizontal drive immediately via pin 50 IC7225-5D (see diagram A2).

### 9.6.2 CRT flash protection.

The BCI information is applied to pin 42 of IC7225-5D. (diagram A2) If due to a flash in the picture tube the voltage on pin 42 is  $>6V$ , the horizontal drive is switched off immediately. If the voltage is again  $<6V$  the horizontal drive is switched on again.

### 9.6.3 EHT over voltage protection.

The BCI information is also applied to pin 50-IC7225-5D (diagram A2). First the BCI compensate vertical picture

amplitude variations due to beam current variations. The control range is between 1.2V and 2.8V. However if the voltage on pin 50 exceeds 3.9V the EHT over voltage protection is activated and the horizontal drive is switched off.

### 9.6.4 +13V protection

Protection input pin 16 of IC7600 (see diagram A4). If this pin is connected to ground, the set is switched in protection. At this pin the +13V is monitored via the circuit 7655,7608. The emitter of 7608 becomes "low" (0V7 lower than the base voltage) if the +13V drops. This will force pin 16 of the (C "low" and will switches the set in protection.

### 9.6.5 +13V and -13V protection

Vertical deflection output IC7401(see diagram A2) is supplied by +13V and -13V. When the current delivered by the +13V or 13V is increasing to much will this result in a voltage drop of  $<6.5V$ .at pin 3 of the IC (VFL) . This voltage drop is applied to pin 37-IC7600 (micro computer). The micro-computer will place the set in the standby mode.

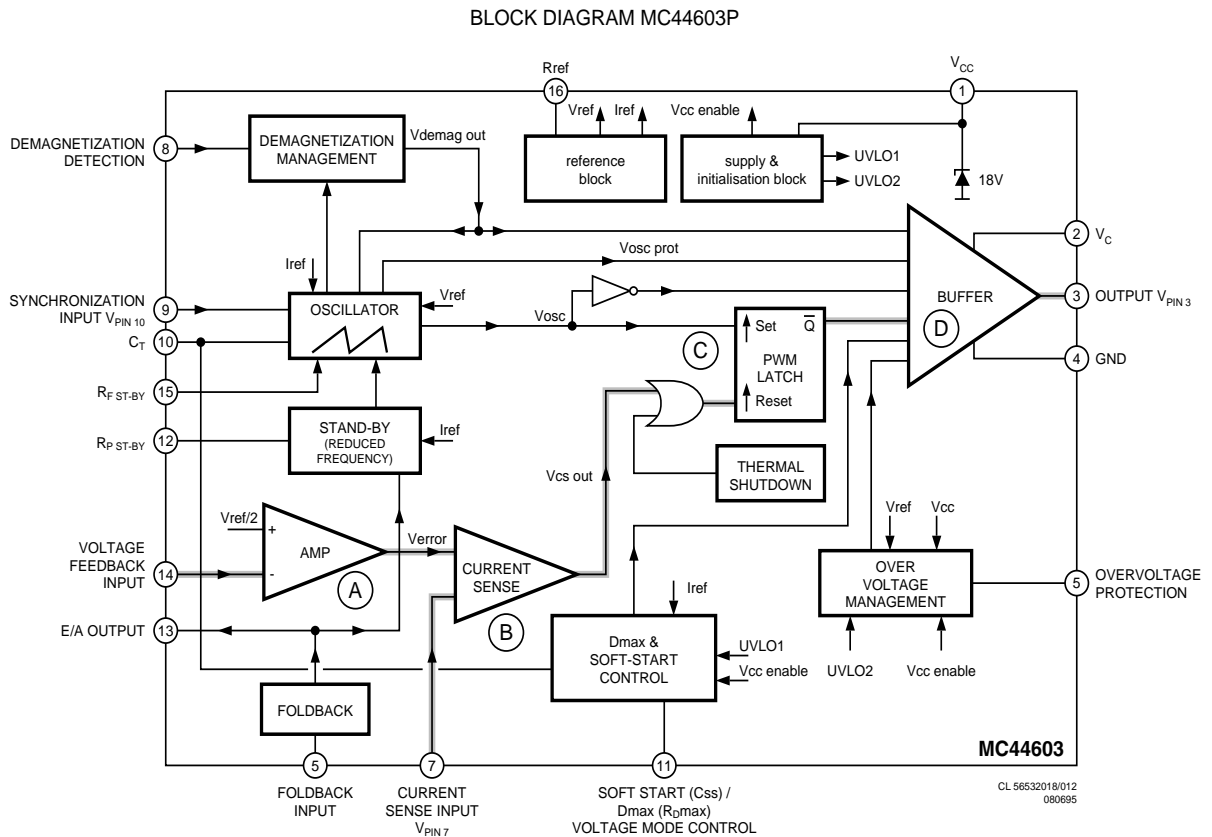
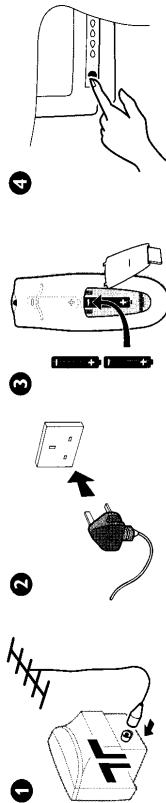


Figure 9-1

### Introduction

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

### Installation



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

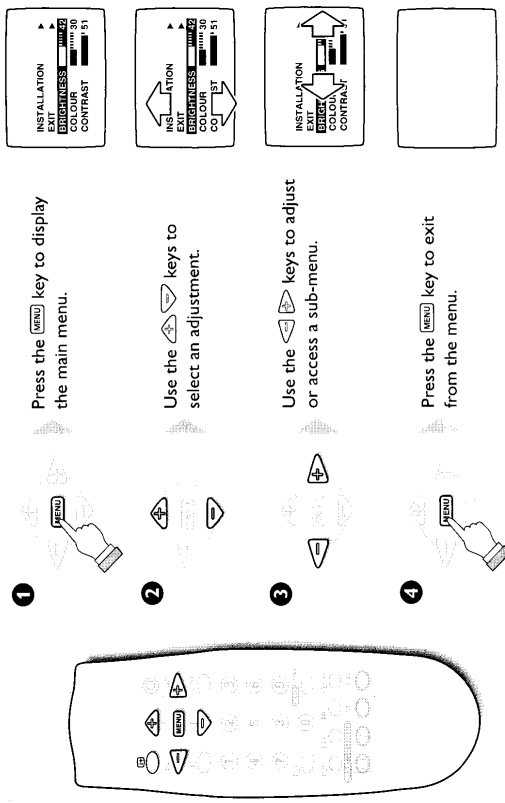
Insert the 2 LR03-type batteries (supplied) making sure they are the right way around.

Press the on/off key to switch on the television. If the television remains in standby mode, press the P key on the remote control.

Remark: When you switch on the TV set for the first time, the INSTALLATION menu automatically appears on the screen.

### Using the menus

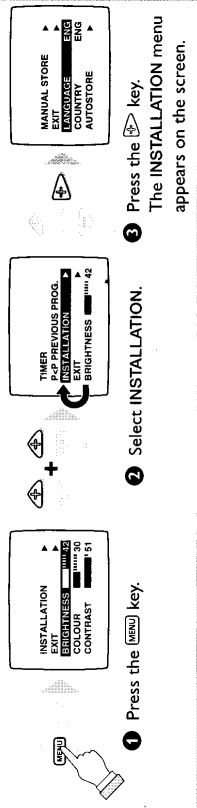
The menus are displayed on the television screen. They are used to tune in the channels and to access all settings. They are used in the following way:



N.B.: The main menu automatically disappears after 30 seconds if no action is taken. The [EXIT] key also allows you to exit the menus.

### Tuning-in the TV channels

#### To call-up the Installation menu

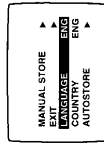


N.B.: If the INSTALLATION menu is not displayed the childlock function is enabled

#### Selecting the menu language and the country

From the INSTALLATION menu:

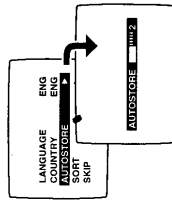
- 1 Select LANGUAGE and choose the language you wish to use (OK key). The text for all the menus will appear in the language you have chosen.
- 2 Select COUNTRY (OK key) and choose the country (GB for Great Britain).



#### Automatic store

From the INSTALLATION menu (once the COUNTRY has been selected):

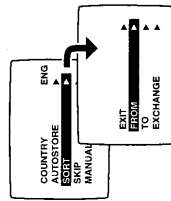
- 1 Press the [OK] key.
  - 2 Select AUTOSTORE (OK key) and press [OK].
- The TV set searches and stores all the programmes it finds. The search operation takes a few minutes. When the search is complete, the INSTALLATION menu reappears automatically.
- The programmes found will be numbered in ascending order starting from 1, 2, 3, 4, .... Use the SORT menu to re-number the programmes correctly. The search starts from the programme number displayed on the screen. If the transmitter emits the automatic sort signal, the programmes are correctly numbered. If some programme have no sound, check that you have the correct SYSTEM (see MANUAL STORE p.3). If no programme is found, refer to the chapter entitled 'Tips' (p.8). To exit or interrupt the search, press the [MENU] key.



#### Programme sort

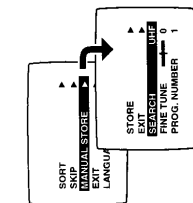
This menu allows you to re-number the programmes in the order you prefer.

- From the INSTALLATION menu:
- 1 Select SORT using the [OK] key and press [OK].
  - 2 The SORT menu is displayed.
  - 3 Select FROM (OK key) and choose the programme to be re-numbered using the [LEFT] or [RIGHT] key or using keys [0] to [9]. If, for example, you want to re-number programme 10 as 2: Type [0] [2].
  - 4 Select TO (OK key) and enter the new number using the [LEFT] or [RIGHT] keys or using keys [0] to [9] (in our example, type [2]).
  - 5 Select EXCHANGE (OK key) and press [OK].
- The message OK appears and the exchange is made (OK can be used to cancel). In our example programme 10 is re-numbered as programme 2 (and programme 2 is re-numbered as programme 10). Repeat this operation for as many programmes as you wish to re-number.
- To exit from the SORT menu, press the [MENU] key several times.





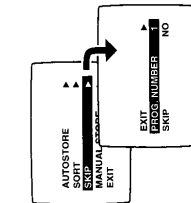
**Manual store**



This menu allows you to store each programme manually.

- 1 From the **INSTALLATION** menu:  
Select **MANUAL STORE** (key) and press (key).
- 2 The **MANUAL STORE** menu appears.  
Select **SYSTEM** (according to model). Use the (key) to select the standard reception, **FRANCE** (standard LL), **EUR. W (BG)** or **UK (I)**.  
Select **SEARCH** and press (key). The search begins.  
As soon as a programme is found, the search will stop.  
The frequency band is displayed (**VHF1, VHF3** or **UHF**).  
Use the (key) to select the frequency band.  
*If no programme is found, refer to the «Tips» chapter (page 8).*
- 4 If the reception is not satisfactory, select **FINE TUNE** and hold down key (key) or (key) to adjust.
- 5 Select **PROG. NUMBER** and enter the required programme number using the (key) keys or using keys (key) to (key).
- 6 Select **STORE** and press (key).
- 7 The message **OK** appears. The programme is stored.
- 8 Repeat steps 3 to 6 for each programme to be stored.
- 9 To exit from the **MANUAL STORE** menu, press the (key) key several times.

**Skip the programmes**



- This menu allows you to skip programmes which can be accessed using the P (key) keys on the remote control.
- From the **INSTALLATION** menu:  
1 Select **SKIP** (key) and press (key).  
2 The **SKIP** menu appears.  
3 Select **PROG. NUMBER** (key) and use the (key) keys or keys (key) to (key) to select the programme you wish to skip.  
4 Select **SKIP** and use the (key) keys to choose **YES** to skip the programme or **NO** so that it remains accessible.  
*Only the programmes found during the search are set to NO (all other programmes are set to YES by default).*
- 4 Repeat steps 2 and 3 for as many programmes as you wish to skip.
  - 5 Press the (key) key 3 times to exit from the **INSTALLATION** menu.  
The P (key) keys on the remote control can now be used to access those programmes and **EXT** sockets which are set to **NO** in the list.  
*The programmes skipped can always be accessed using keys (key) to (key).*

**To exit from the menus ...**

Press the (key) key several times.

**The remote control keys**

**Selecting TV programmes**

Use the P (key) and (key) keys to move up or down a programme. To sequentially display all of the programmes hold the key down for 3 seconds. Press again to cancel.  
*For some programmes equipped with teletext, the title of the programme appears briefly at the bottom of the screen.  
NB: Programmes which have been skipped or locked are not accessible (refer to SKIP and CHILDLOCK menus, pages 3 and 7).*

**Screen information**

To briefly display the programme number and the sound mode (stereo models).

**Volume**

Use keys (key) and (key) to adjust the volume.

**Mute key**

To disable or enable the sound.

**Numerical keys**

For direct access to programmes. For a 2 figure programme number, the second figure must be entered before the dash disappears.

**Switch teletext on/off**

To call-up or exit from teletext.

**Teletext features**

Refer to next page.

**Smart controls**

Press the (key) key to obtain the following picture settings: **RICH, SOFT, NATURAL** and return to **MANUAL**.  
Press the (key) key to obtain the following sound settings: **THEATRE, MUSIC, SPEECH** and **NORMAL** (or **MANUAL** for stereo models).

**Menu**  
To call-up or exit from the menus. Use the (key) keys for selection and the (key) keys for adjustment.

**Standby**

To set the TV to standby mode. The red indicator lights up. To switch the TV set on again, press P (key) or keys (key) to (key).

**Select EXT sockets**

This key is used to select **EXT(1)** (rear socket), **EXT2** (front socket: on certain versions) and to return to the TV programme.

**Surf P-P**

Use this key to return to the previous programme or to display the surf list (page 6).

**Sound mode (stereo models)**

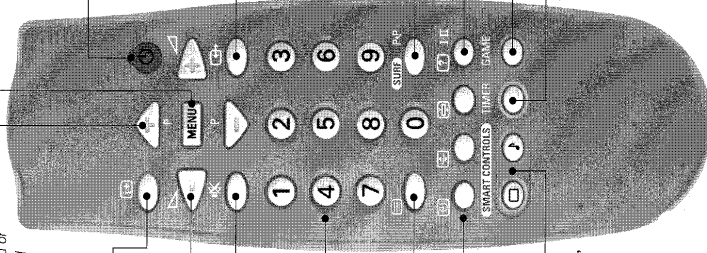
Pressing this key allows you to switch from **STEREO** to **MONO** sound or to choose between language **I** and language **II** in the event of bilingual transmissions.

**Game**

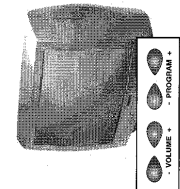
This key is used for the direct selection of the front (on certain versions) and rear **EXT** sockets with a picture preset that is adapted to game consoles.

**Timer**

This key provides direct access to the **TIMER** menu (page 7).  
To exit from this menu, press the (key) key twice.



**The keys on the TV set**



The TV set has 4 keys (on some models these are located behind a flap).  
The **VOLUME - +** keys are used to adjust sound levels.  
The **PROGRAMME - +** keys are used to select the required programmes.  
To access the menus, hold down the **VOLUME -** and **VOLUME +** keys.  
The **PROGRAMME - +** keys may then be used to select an adjustment and the **VOLUME - +** keys to make that adjustment.  
To exit from the menus, select the **EXIT** item (by using the **PROGRAMME - +** keys) and press the **VOLUME +** key.

# Using teletext

Teletext is an information system, broadcast by certain TV channels, which can be consulted in the same way as a newspaper. It also provides subtitles.

**Press:**



**Time display**

When the teletext is switched off, press this key to display the time in the top right-hand corner of the screen.  
 The time is not displayed if the channel selected does not broadcast teletext.



**Switch teletext on/off**

To call-up or exit from teletext: The main index page presents a list of subjects to which you have access. Each subject has a corresponding 3 digit page number. If the selected TV channel does not broadcast teletext, 100 is displayed and the screen remains black (if this is the case, switch off teletext and choose another TV channel).



**Selecting a teletext page**

Use keys 0 to 9 to enter the page number required. E.g. page 120, type 1 2 0. The number is displayed in the top left-hand corner of the screen, the page counter starts searching and then the page selected is displayed. Keys P and > allow you to access previous or following pages. If > xxx < flashes briefly or the counter continues searching, this means that the selected page is not broadcast. If this is the case, choose another number.



**Direct access to a subject**

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



**Enlarging a page**

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



**Direct selection of a sub-page**

Certain pages have sub-pages which follow on automatically. To access a sub-page directly, press the 00 key. The page number is replaced by 4 dashes. Type the number of the sub-page required using 4 numbers, e.g. type 0002 to consult sub-page 2. The number of the current page reappears, the page counter searches and then the sub-page is displayed.



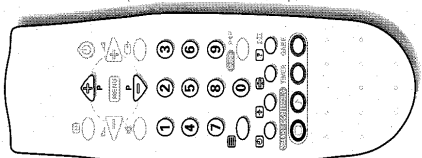
**Stop the sequence of sub-pages**

Pressing this key enables and disables the sequence of sub-pages. The message 0000 appears in the top left-hand corner of the screen.

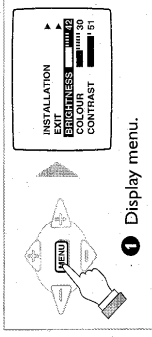


**Reveal**

Use this key to reveal/conceal hidden information (solutions to games).



# Other menu adjustments



1 Display menu.



2 Select.

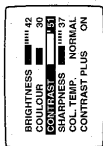


3 Adjust.



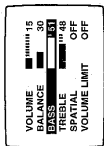
## Picture adjustment

Display the Picture menu. You can now access the adjustments for BRIGHTNESS, COLOUR, CONTRAST, SHARPNESS and COL. TEMP.: which adjusts the colour temperature of the picture; COOL (blue white), NORMAL (balanced) or WARM (red white). CONTRAST PLUS: which enables clarity of the contrast.



## Sound adjustment

Display the Sound menu. You can now set the VOLUME, and make the following adjustments for stereo equipment: BALANCE, TREBLE, BASS and SPATIAL: this function enhances the stereo effect, giving the impression that the speakers are positioned further apart. VOLUME LIMITER: this function is used for automatic level control in order to avoid sudden increases in volume (particularly when changing channels or during advertisements).



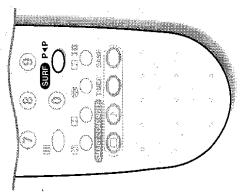
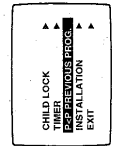
## Storing adjustments

Storing is automatic: once an adjustment is made using the menus, it is stored automatically (this happens after 1 minute if no action is taken or as soon as another programme is selected). The adjustments for the EXT sockets and for programmes 0 to 11 are stored individually; a different adjustment is possible for each of these programmes (except for the volume). The adjustments for programmes 12 to 99 are stored in the same way. To restore the factory picture adjustments, set the smart controls on NATURAL and modify one of the Picture menu items (this will automatically store the settings).

## Surf function

This menu is used to select the function to be attributed to the P-P key on the remote control. Display the menu, then:

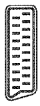
- 1 Select P-P and choose PREVIOUS PROG. or SURF LIST.
  - 2 Press the (MENU) key to exit the menu.
- PREVIOUS PROG. mode: the P-P key on the remote control is used to access the last programme watched.
- SURF LIST mode: the P-P key is used to display a list of favourite programmes (maximum of 8). To store this list:
- 1 Display one of your favourite programmes (e.g. number 4).
  - 2 Before the number disappears, press the P-P key.
  - 3 The SURF LIST message appears. The programme is stored.
  - 4 Repeat operations 1 and 2 for each programme to be stored (e.g. programme No. 9, 1 and 12).
- Use the P-P key to access your favourite programmes directly (in our example Nos. 4, 9, 1 and 12). To reset the surf list, set the P-P menu to PREVIOUS PROG and then to SURF LIST.



## Connecting peripheral equipment

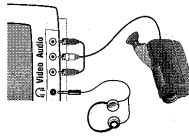
### Rear connection

You can connect any equipment that has a euroconnector socket to your TV set (video recorder, decoder, etc.).  
For further information on connecting a video recorder, refer to its user manual.



### Front connections

When the headphones are connected, the sound on the TV set is automatically muted. Press keys **⏮** and **⏭** to adjust the volume.  
Some models have AUDIO / VIDEO connections on the front of the TV set. There is 1 video input + 1 sound input (mono models) or 2 (L) and (R) sound inputs for stereo models. For a mono sound camcorder, connect the audio signal to the AUDIO L input. Use the **I-II** key to reproduce the sound on the left and right loudspeakers of the television.



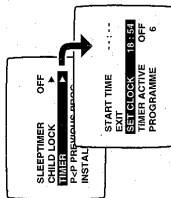
### To select the connected equipment

Use the **[3]** key on the remote control to select the **EXT(1)** (rear socket) or **EXT2** (front socket; on certain models).  
Most equipment (decoder, video recorder) carries out the switching itself. When a peripheral device provides RGB signals (game, satellite receiver, ...), it has priority over the TV programmes. The peripheral device has to be switched off if you want to watch the TV channels. If you wish to avoid this inconvenience, configure the peripheral equipment to provide composite video signals (CVBS PAL/SECAM) instead of RGB signals (refer to the peripherals user manual).

## Timer

This menu allows you to program the TV to automatically switch on with the programme of your choice.

- 1 Display the menu, select **TIMER** and then press **▶**.
- 2 The **TIMER** menu appears.
- 3 Select **SET CLOCK** and enter the time using keys **0** to **9**.  
*N.B.: Every time the TV is switched on the clock is automatically updated on the basis of the teletext information in programme No. 1. If the TV set does not feature teletext, this update will not occur.*
- 3 Select **START TIME** and enter the time at which you wish the TV to switch on.
- 4 Select **PROGRAMME** and enter the programme number required.
- 5 Select **TIMER ACTIVE** and set to **ON**. (**OFF** to disable).
- 6 Press twice on the **[MENU]** key to exit from the menu.



If you now switch the TV set to standby (**⏻** key), it will automatically switch on at the time programmed.

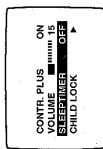
### To cancel: Switch TIMER ACTIVE back to OFF.

*N.B.: The programming will not function correctly if you use the on/off key on the front of the TV to switch off the TV set.*

## Sleeptimer

Display the menu, select **SLEEPTIMER** and use the **▶** key to enter the length of time after which the TV will switch to standby mode (up to 120 mins).

Press the **[120]** key on the remote control to display the length of time remaining.



## Childlock

This menu allows you to lock the TV set and to disable access to certain or all of the programmes.

*N.B.: When a programme is locked, the search function is no longer possible (the INSTALLATION menu is no longer accessible).*

- 1 Display the menu, select **CHILDLOCK** and press **▶**.
  - 2 The **CHILDLOCK** menu appears.
  - 2 Select **PROGRAMME** and enter the number of the programme you wish to lock. To lock all programmes, select **ALL** using the **◀** key (above programme No. 0).
  - 3 Select **LOCK** and then **YES**. The screen turns black. Repeat operations **2** and **3** for each programme to be locked (maximum of 5).
  - 4 Select **CODE** and enter your confidential 4 digit code.
  - 5 Select **CONFIRM CODE** and enter the same code number again. The **LOCK** menu is replaced by a **CODE** menu.
- The TV set is now locked. The locked programmes are no longer visible: a black screen appears with a **LOCKED** message.

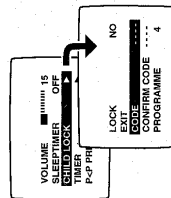
To cancel: Select **CODE** and enter your confidential number.

The **CHILDLOCK** menu reappears. Now repeat operations **2** to **5** by selecting **LOCK** and then **NO**.

6 Press the **[MENU]** key to exit from the menu.

*N.B.: The childlock will not function with EXT sockets that receive an RGB signal (most game consoles).*

*Should you forget your confidential code, enter the universal code 8888.*



## Tips

### Installation

To avoid any dangerous situations and operating faults, do not place anything on the TV set and leave a space of at least 5 cm around the appliance.

### Impossible to call up the INSTALLATION menu?

The **CHILDLOCK** function is enabled (refer to page 5). To rapidly unlock all programmes, call up the **CHILDLOCK** menu and enter your confidential code. Set the **PROGRAMME** item to **ALL**. Set the **LOCK** item to **YES** and then to **NO**. All the programmes are now unlocked.

### Poor reception or no picture

The proximity of mountains or high buildings may be responsible for ghost pictures, echoing or shadows. If this is the case, modify the orientation of the outside aerial and check that the TV channel is tuned in correctly (refer to **FINE TUNE** page 3). Does your antenna enable you to receive broadcasts in this frequency range? Have you chosen the correct system (page 3)? Are your aerial and euroconnector sockets correctly connected? If the peripheral equipment connected to the **EXT1** is on switch it off.

### Standby

To save electricity it is advisable to switch the TV set off using the on/off key on the front of the set. If the set receives no signal for 15 mins, it automatically switches to standby mode.

### Still no results?

If you have a problem with your TV set, never attempt to repair it yourself: contact your dealer's after-sales service.

### Recycling directive

Your TV set uses materials which are reusable or which can be recycled. To minimise the amount of waste in the environment, specialist companies recover used sets for dismantling and collection of reusable materials (consult your dealer).

## 11 Abbreviations

(R-Y)_OUT	R-Y output from chroma demodulator	RAM	Random Access Memory
uC	Microcomputer	RESET1	Reset signal for the uC
AQUA	Aquadag layer on the outside of the picture tube	RF_AGC	Automatic gain control signal I for tuner
AV_MUTE	Signal to mute the sound on the Audio-out cinch	RIGHT_OUT	Audio right out
AVL_AV2/AVL	Switching signal from UP to the Auto Volume leveller on the ITT on Panel	ROM	Read Only Memory
B_TXT_OSD	Blue TXT or OSD signal from (C to the video controller IC7225-5C	SAM	Service Alignment Mode
BASS	Control signal for BASS	SANDCASTLE	Sand castle signal from IC7225-5D to delay line IC7255 and SECAM chrominance decoder IC7241.
BCI	Beam Current information	SCL	Clock line of the 12C-bus
BG/1_or_BG/0 K	Monochrome TV system sound carrier + 5.5MHz (BG), Sound carrier + 6MHz(I), Sound carrier + 6.5MHz(DK)	SDA	Data line of the 12C-bus
BL_TXT_OSD	Fast blanking signal to IC7725-5C to display OSD and TXT	SDM	Service Default Mode; predefined mode for faultfinding
BLACKSTR_SW	Black stretch switch	SECAM_REF	SECAM reference
BS1	TV band selection 1 signal	SID/STA/LL	Sound identification / stereo available / France system "L"
BS2	TV band selection 2 signal	SIF	Sound IF signal for FM demodulator
CHROMA_O/ NTSC_SW	Switch on signal for NTSC chroma oscillator (3.575MHz)	STANDBY	Switching signal from microcomputer "low" for standby (power supply will be switched to stand-by mode), "high" for normal operation
CHROMA_1/BG/L	Switch on signal for BG/L chroma oscillator (3.582MHz)	TREBLE	Treble control signal
CHROMA_1/ STATUS	Switch on signal for NTSC chroma oscillator (3.579MHz)	V_TUNE	Tuning voltage for tuner
CHROMA_2/ STATUS	Signal to select the correct system in case of trinorma	VFB	Vertical flyback pulse
CVBS_EXT1	CVBS external 1 input signal	VFL	50 Hz vertical flyback pulse used to inform the microcomputer that flyback takes place. This is important for OSD and TXT
CVBS_EXT2	CVBS external 2 signal	VG2	Voltage on grid 2 of the picture tube
CVBS_IN	CVBS internal 1 (from tuner)	VOLUME	Control signal (from uC, but on DC level via RC network) for volume control of sound processing in sound panel
CVBS_OUT	CVBS output signal		
CVBS_OUT_1	CVBS output signal 1		
CVBS_SOUND	CVBS for inter carrier sound detector		
CVBS_TXT	CVBS for TXT processing in uC		
DISCHARGE	To have a fast discharge after switching off the set		
EAR	Earth		
EEPROM	Electrical Erasable Programmable Read Only Memory		
ESD	Electrical Static Discharge		
ff	Filament (heater voltage) from LOT to the picture tube		
FL_A	Filament voltage for CRT		
G_TXT_OSD	Green TXT or OSD signal from the microcomputer to IC7225-5C		
GND	Ground		
GRD_LOT	Ground of LOT		
HOR.FLYBACK	Horizontal flyback pulse used for looking the horizontal oscillator		
12C	Digital Control bus of the microcomputer		
IF	Intermediate frequency signal for sound processing		
INT/EXT	Switching signal for Internal or external audio + video switching		
L_EXT1	Audio left external 1		
LEFT_OUT	Audio left out		
MOD_L_1N1	SCART I/P 1 in left		
MOD_L_1N2	SCART I/P 2 in left		
MOD_R_1N1	SCART I/P 1 in right		
MOD_L_1N2	SCART I/P 2 in right		
MONO/STROBE/ BG_L	Strobe signal for HEF 4094 on multi-mono sound panel		
MONO_OUT	Audio mono out		
NTSC	NTSC colour system		
PAL/SECAM	PAL or SECAM colour system		
R_TXT_OSD	Blue TXT or OSD signal from the microcomputer to the video controller IC72255C		

# 12 Spareparts list

## Main carrier [A1-A5]

### Various

0024Δ	4822 267 31858	Con. 1P
0011Δ	4822 265 20723	Con. 2P
0022Δ	4822 267 10774	Con. 2P
0055	4822 267 10775	Con. 2P
0044	4822 267 10538	Con. 3P
0088	4822 267 10542	Con. 4P
0030	4822 267 10537	Con. 5P
M9	4822 265 10422	Con. 9P (F-pin)
M11	4822 267 10421	Con. 19P (F-pin)
0231Δ	4822 267 60243	21P scart
0232	4822 265 10392	2P Cinch
0233	4822 267 10687	3P Cinch
0020	4822 267 31014	Headphone socket
0138Δ	4822 276 13603	Mains switch
Δ	4822 492 70289	Spring fix. Ts
Δ	4822 265 11253	Fuse holder
Δ	4822 492 70788	Spring fix. IC
Δ	4822 492 62076	

### -II-

1000	4822 210 10812	VHF/UHF tuner
1000	4822 210 10815	UHF tuner
1002	4822 242 10743	OFWK6272K (38.9MHz)
1015	4822 242 10575	OFWJ1980M (38.9MHz)
1015	4822 242 70936	OFWJ1952 (38.9MHz)
1015	4822 242 81388	OFWG1961M (38.9MHz)
1015	4822 242 81436	OFWK3953M (38.9MHz)
1015	4822 242 81737	OFWG1965M (38.9MHz)
1015	4822 242 81964	OFWG1984M (38.9MHz)
1060	4822 276 13775	Switch
1061	4822 276 13775	Switch
1062	4822 276 13775	Switch
1063	4822 276 13775	Switch
1102	4822 242 10314	Filter 5.5MHz
1102	4822 242 10362	Filter 6.0MHz
1104	4822 242 10314	Filter 5.5MHz
1104Δ	4822 242 10316	Filter 5.5MHz
1104	4822 242 10362	Filter 6.0MHz
1204	4822 242 10434	X-tal 18.432MHz
1206	4822 242 81301	Filter 6.0MHz
1206	4822 242 81572	Filter 6.0MHz
1207	4822 242 81572	Filter 6.0MHz
1207	4822 242 81712	Filter 5.5/5.74MHz
1209	4822 242 10875	X-tal 40MHz
1275	4822 242 10356	X-tal 4.433619MHz
1277	4822 242 10355	X-tal 3.579545MHz
1500	4822 070 34002	Fuse 4A(desc<
1501	4822 242 81423	OFWL9453M (38.9MHz)
1560Δ	4822 071 51002	Fuse 1A
1560Δ	4822 071 56301	Fuse 3.60MA
1571Δ	4822 071 51602	Fuse 1.5A
1670	4822 218 11573	RC rec. GP1U28QP
1681	4822 242 10694	X-tal 12MHz

### -II-

2008Δ	4822 126 13838	100nF 50V 20%
2010Δ	4822 124 40196	220μF 20% 16V
2010	4822 124 41545	220μF 20% 16V
2016Δ	4822 124 40433	47μF 20% 25V
2042	5322 122 32531	100pF 5% 50V
2043	5322 122 32531	100pF 5% 50V
2104Δ	4822 124 41579	10μF 20% 50V
2105Δ	4822 124 41579	10μF 20% 50V
2108	4822 124 40248	10μF 20% 63V
2108Δ	4822 124 41579	10μF 20% 50V
2110Δ	4822 124 41579	10μF 20% 50V
2115	4822 124 40255	100μF 20% 63V
2115	4822 124 81029	100μF 20% 25V
2116	4822 124 40255	100μF 20% 63V
2116	4822 124 81029	100μF 20% 25V
2117	4822 126 13695	82pF 1% 63V
2120	4822 126 10334	470pF 10% 50V
2121	4822 126 10334	470pF 10% 50V
2124	5322 122 32268	470pF 10% 50V
2125	5322 122 32268	470pF 10% 50V
2128Δ	4822 122 32627	2.7nF 10% 50V
2128	5322 126 10465	3.9nF 10% 50V
2130	5322 126 10511	1nF 5% 50V
2144	4822 124 40242	1μF 20% 63V
2145	5322 122 31863	330pF 5% 50V
2161Δ	4822 124 41579	10μF 20% 50V
2163	4822 126 13461	680pF 10% 50V
2164	4822 126 13461	680pF 10% 50V
2166	5322 122 32268	470pF 10% 50V
2167	4822 126 13461	680pF 10% 50V
2168	5322 122 32268	470pF 10% 50V

2169	5322 122 32268	470pF 10% 50V
2170	4822 126 13461	680pF 10% 50V
2171	4822 126 13461	680pF 10% 50V
2180	5322 122 32268	470pF 10% 50V
2198	4822 126 13512	330pF 10% 50V
2199	4822 126 13512	330pF 10% 50V
2200Δ	4822 126 13838	100nF 50V 20%
2201Δ	5322 122 32654	22nF 10% 63V
2202	4822 124 40242	1μF 20% 63V
2202	4822 124 41576	2.2μF 20% 50V
2203	4822 126 14087	100nF 10% 63V
2205	4822 124 11566	47μF 20% 50V
2205	4822 124 41751	47μF 20% 50V
2209Δ	4822 126 13838	100nF 50V 20%
2210	5322 122 32658	22pF 5% 50V
2211	4822 124 41576	2.2μF 20% 50V
2212Δ	5322 122 32654	22nF 10% 63V
2213	4822 126 13061	220nF 20% 25V
2213	4822 126 13692	47pF 1% 63V
2214	4822 122 33926	12pF 50V
2214Δ	4822 126 13838	100nF 50V 20%
2215	4822 126 13061	220nF 20% 25V
2215	4822 126 13692	47pF 1% 63V
2216	4822 126 13473	220nF 80-20% 50V
2217	4822 124 41584	100μF 20% 10V
2217	4822 126 13473	220nF 80-20% 50V
2218	5322 122 32967	5.6pF 10% 63V
2220	4822 126 13473	220nF 80-20% 50V
2221	4822 126 13473	220nF 80-20% 50V
2221Δ	4822 126 13838	100nF 50V 20%
2222Δ	4822 126 13838	100nF 50V 20%
2224	4822 123 14024	1000μF 16V 20%
2224Δ	4822 126 13838	100nF 50V 20%
2225	5322 122 32448	10pF 5% 50V
2226	4822 124 40242	1μF 20% 63V
2226	5322 122 32448	10pF 5% 50V
2227Δ	4822 126 13838	100nF 50V 20%
2228Δ	4822 124 41579	10μF 20% 50V
2229Δ	4822 124 41579	10μF 20% 50V
2230Δ	4822 124 41579	10μF 20% 50V
2231Δ	4822 126 13838	100nF 50V 20%
2234Δ	4822 124 41579	10μF 20% 50V
2235	5322 126 10511	1nF 5% 50V
2236	5322 126 10511	1nF 5% 50V
2237	4822 126 13561	220nF 10% 16V
2238	4822 126 13561	220nF 10% 16V
2240	4822 126 14087	100nF 10% 63V
2241Δ	4822 124 40246	4.7μF 20% 63V
2241	4822 126 13561	220nF 10% 16V
2242Δ	4822 126 13838	100nF 50V 20%
2242Δ	5322 122 32654	22nF 10% 63V
2243	5322 126 10511	1nF 5% 50V
2244	5322 126 10511	1nF 5% 50V
2245	4822 124 41751	47μF 20% 50V
2246	5322 122 32448	10pF 5% 50V
2247	5322 126 10511	1nF 5% 50V
2248	4822 124 81151	22μF 50V
2248	5322 126 10511	1nF 5% 50V
2249	5322 126 10511	1nF 5% 50V
2250	4822 124 41751	47μF 20% 50V
2251	4822 122 33216	270pF 5% 50V
2251	5322 122 32448	10pF 5% 50V
2252Δ	4822 124 41579	10μF 20% 50V
2252Δ	5322 122 32654	22nF 10% 63V
2253Δ	5322 126 10223	4.7nF 10% 63V
2254Δ	5322 122 32654	22nF 10% 63V
2254Δ	5322 126 10223	4.7nF 10% 63V
2255Δ	4822 124 41579	10μF 20% 50V
2256	4822 126 13561	220nF 10% 16V
2257	4822 124 22263	220μF 20% 25V
2260Δ	4822 124 40246	4.7μF 20% 63V
2260	4822 124 40255	100μF 20% 63V
2260Δ	4822 124 41579	10μF 20% 50V
2261	4822 124 40255	100μF 20% 63V
2261Δ	5322 122 32654	22nF 10% 63V
2262Δ	4822 124 41579	10μF 20% 50V
2263Δ	4822 124 41579	10μF 20% 50V
2264	4822 124 81029	100μF 20% 25V
2265	4822 126 13561	220nF 10% 16V
2266	4822 126 13561	220nF 10% 16V
2267	4822 126 13561	220nF 10% 16V
2268	4822 121 42868	220nF 5% 50V
2271	5322 126 10511	1nF 5% 50V
2272	5322 122 33446	3.3nF 10% 63V
2272	5322 126 10511	1nF 5% 50V
2273	4822 126 13561	220nF 10% 16V
2273Δ	4822 126 14087	100nF 10% 63V
2274Δ	4822 126 13838	100nF 50V 20%
2275	4822 126 13486	15pF 2% 63V
2276	4822 126 13694	68pF 1% 63V
2277	4822 126 13486	15pF 2% 63V
2277	4822 126 13694	68pF 1% 63V
2278	5322 126 10511	1nF 5% 50V
2279	5322 126 10511	1nF 5% 50V
2280	5322 126 10511	1nF 5% 50V
2281	5322 126 10511	1nF 5% 50V
2283	4822 126 13751	47nF 10% 63V
2284	4822 126 13751	47nF 10% 63V
2285	4822 126 13751	47nF 10% 63V
2403	4822 124 40242	1μF 20% 63V
2406	4822 122 33127	2.2nF 10% 63V
2409Δ	5322 126 10223	4.7nF 10% 63V
2410	5322 121 42386	100nF 5% 63V
2414	4822 121 42868	220nF 5% 50V

2420	5322 121 42386	100nF 5% 63V
2421Δ	4822 124 41579	10μF 20% 50V
2422	5322 121 42386	100nF 5% 63V
2430Δ	4822 124 41579	10μF 20% 50V
2434Δ	4822 126 13838	100nF 50V 20%
2436	5322 126 10511	1nF 5% 50V
2437	5322 126 10511	1nF 5% 50V
2440	4822 121 70654	2N210 50V
2442	4822 126 13473	220nF 80-20% 50V
2443	4822 124 80791	470μF 16V 20%
2444	4822 121 51319	1μF 10% 63V
2445Δ	4822 121 70617	10nF 5% 1.6KV
2445Δ	4822 121 70649	9.1nF 5% 1.6KV
2447Δ	4822 126 14078	220pF 10% 2KV
2448	4822 121 43368	47μF 160V
2450	4822 121 10507	250V 470nF 5%
2450Δ	4822 121 10518	250V 390nF 5%
2451	4822 121 51319	1μF 10% 63V
2452	4822 124 80195	470μF 20% 10V
2453	4822 124 80791	470μF 16V 20%
2456	4822 124 80069	1μF 20% 160V
2460	4822 121 51385	33nF 20% 100V
2461	4822 126 11131	18pF 5% 50V
2461	4822 126 13645	27P 50V
2462	4822 126 13866	4.7nF 10% 1KV
2462	4822 126 14079	2.2nF 10% 1KV
2463	4822 124 40255	100μF 20% 63V
2464Δ	4822 126 13838	100nF 50V 20%
2465	5322 126 10184	680P 5% 50V.
2466Δ	4822 122 33172	390pF 5% 50V.
2467	5322 126 10184	680P 5% 50V.
2468Δ	4822 126 13838	100nF 50V 20%
2469	4822 126 14237	470pF 10% 2KV
2470	4822 124 11845	22μF 20% 250V
2471	4822 122 30043	10nF 80% 63V
2476Δ	4822 122 33172	390pF 5% 50V
2480	4822 123 14024	1000μF 16V 20%
2485	5322 126 10184	680P 5% 50V.
2487	5322 126 10184	680P 5% 50V.
2500Δ	4822 126 13589	470nF 275V
2501	4822 121 10686	4.7nF 10% 50V
2502Δ	4822 124 40246	4.7μF 20% 63V
2502Δ	4822 126 12793	2.2nF 10% 2KV
2503Δ	4822 124 40246	4.7μF 20% 63V
2504	4822 121 42868	220nF 5% 50V
2504Δ	4822 126 12793	2.2nF 10% 2KV
2505	4822 124 41576	2.2μF 20% 50V
2505Δ	4822 126 12793	2.2nF 10% 2KV
2506Δ	4822 124 41579	10μF 20% 50V
2507Δ	4822 124 41579	10μF 20% 50V
2508Δ	4822 124 41556	100μF 20% 385V
2508	4822 124 41576	2.2μF 20% 50V
2509Δ	4822 124 41579	10μF 20% 50V
2509	4822 126 13517	820pF 10% 1000V
2510Δ	4822 124 41579	10μF 20% 50V
2510	4822 126 13517	820pF 10% 1000V
2511		

12 Spareparts list

Table with 3 columns: Part number, description, and quantity. Rows include items like 3218 4822 117 10833 10k 1% 0.1W, 3219 4822 117 11507 6k8 1% 0.1W, etc.

Table with 3 columns: Part number, description, and quantity. Rows include items like 3504 4822 116 52256 2k2 5% 0.5W, 3505 4822 116 83864 10k 5% 0.5W, etc.

Table with 3 columns: Part number, description, and quantity. Rows include items like 3664A 4822 051 20008 0Ω jumper, 3666 4822 051 20273 27k 5% 0.1W, etc.

Table with 3 columns: Part number, description, and quantity. Rows include items like 5010 4822 157 11533 390µH 10%, 5010 4822 157 11615 220µH, etc.

Table with 3 columns: Part number, description, and quantity. Rows include items like 6001A 4822 130 34173 BZX79-B5V6, 6002A 4822 130 34173 BZX79-B5V6, etc.

Table with 3 columns: Part number, description, and quantity. Rows include items like 6503A 4822 130 31933 1N5061, 6504A 4822 130 30621 1N4148, etc.



Table with 3 columns: Part number, description, and quantity. Rows include items like 7001 5322 130 41983 BC858B, 7002 5322 130 41983 BC858B, etc.

CRT panel [B]

Various

Table with 3 columns: Part number, description, and quantity. Rows include items like CRT 4822 212 11703 CRTPanel 17", CRT 4822 212 11704 CRT Panel 21", etc.

2333	4822 126 10326	180pF 5% 63V
2341	4822 121 41689	100nF 10% 250V
2342△	4822 124 11508	22μF 250V 20%
2373	4822 121 41926	33nF 5% 630V

3311	4822 050 11002	1k 1% 0.4W
3313	4822 051 20479	47Ω 5% 0.1W
3314	4822 117 12818	18k 5% 3W
3315△	4822 052 10331	330Ω 5% 0.33W
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 20471	470Ω 5% 0.1W
3322	4822 117 11452	430Ω 1% 0.1W
3323	4822 051 20479	47Ω 5% 0.1W
3324	4822 117 12818	18k 5% 3W
3325△	4822 052 10331	330Ω 5% 0.33W
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 20471	470Ω 5% 0.1W
3332	4822 117 11452	430Ω 1% 0.1W
3333	4822 051 20479	47Ω 5% 0.1W
3334	4822 117 12818	18k 5% 3W
3335△	4822 052 10331	330Ω 5% 0.33W
3336△	4822 052 10221	220Ω 5% 0.33W
3337	4822 117 11896	1k5 20% 0.5W
3341△	4822 052 11109	10Ω 5% 0.5W
3342	4822 116 83874	220k 5% 0.5W
3347△	4822 052 10102	1k 5% 0.33W
3371△	4822 052 10108	1Ω 5% 0.33W
3371△	4822 052 10278	2Ω 5% 0.33W
3372△	4822 052 10108	1Ω 5% 0.33W
3372△	4822 052 10278	2Ω 5% 0.33W
3374	4822 117 11896	1k5 20% 0.5W
3312△	4822 051 20471	470Ω 5% 0.1W
3312	4822 117 11452	430Ω 1% 0.1W

5370	4822 157 50961	22μH
5370	4822 157 70468	56μH

6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331△	4822 130 30621	1N4148
6332	4822 130 30842	BAV21
6341△	4822 130 30621	1N4148
6347	4822 130 34382	BZX79-B8V2

7301	4822 130 41782	BF422
7302	4822 130 41782	BF422
7303	4822 130 41782	BF422
7304	4822 130 41646	BF423
7305	4822 130 41782	BF422
7306	4822 130 41646	BF423
7307	4822 130 41782	BF422
7308	4822 130 41646	BF423
7309	4822 130 41782	BF422

### Mono panel [C]

### Various

1020	4822 212 11558	Audio panel Mono + AM sound
1020	4822 212 11559	Audio panel Mono no AM sound
	4822 267 10755	Con 19P
	4822 267 10537	Con 5P
	4822 492 70788	Spring fix. IC
1501	4822 242 81423	Filter OFWL9453M (38.9MHz)

### -H-

2501	4822 121 10686	4.7nF 10% 50V
2502△	4822 124 40246	4.7μF 20% 63V
2503△	4822 124 40246	4.7μF 20% 63V
2504	4822 121 42868	220nF 5% 50V
2505	4822 124 41576	2.2μF 20% 50V
2506△	4822 124 41579	10μF 20% 50V
2507△	4822 124 41579	10μF 20% 50V
2508	4822 124 41576	2.2μF 20% 50V
2509△	4822 124 41579	10μF 20% 50V
2510△	4822 124 41579	10μF 20% 50V
2511△	4822 124 41579	10μF 20% 50V
2512△	4822 121 43996	33nF 5% 50V
2514	4822 121 51472	39nF 5% 250V
2515△	4822 121 43823	470nF 5% 50V

2516	4822 121 43925	2.2nF 5% 50V
2517	4822 124 81029	100μF 20% 25V
2518	4822 121 42868	220nF 5% 50V
2519	5322 121 42386	100nF 5% 63V
2520	4822 124 22263	220μF 20% 25V
2521	4822 121 10686	4.7nF 10% 50V
2522△	4822 124 41579	10μF 20% 50V
2523	4822 124 81029	100μF 20% 25V
2524	4822 121 42868	220nF 5% 50V

3501	4822 116 83864	10k 5% 0.5W
3502	4822 116 52256	2k2 5% 0.5W
3503	4822 116 52256	2k2 5% 0.5W
3504	4822 116 52256	2k2 5% 0.5W
3505	4822 116 83864	10k 5% 0.5W
3506	4822 116 52175	100Ω 5% 0.5W
3508	4822 116 52176	10Ω 5% 0.5W
3509	4822 116 52257	22k 5% 0.5W
3510	4822 116 52244	15k 5% 0.5W
3511	4822 116 52283	4k7 5% 0.5W
3512	4822 050 11002	1k 1% 0.4W
3513	4822 116 52291	56k 5% 0.5W
3514	4822 116 52234	100k 5% 0.5W
3515	4822 116 52256	2k2 5% 0.5W
3516	4822 116 52243	1k5 5% 0.5W
3517	4822 116 52243	1k5 5% 0.5W
3518	4822 116 52256	2k2 5% 0.5W
3519	4822 116 52234	100k 5% 0.5W
3520	4822 116 52291	56k 5% 0.5W
3521	4822 050 11002	1k 1% 0.4W
3522	4822 116 52244	15k 5% 0.5W
3523	4822 050 11002	1k 1% 0.4W
3524	4822 050 11002	1k 1% 0.4W
3525	4822 116 83876	270Ω 5% 0.5W
3526	4822 050 11002	1k 1% 0.4W
3527	4822 116 52289	5k6 5% 0.5W
3528	4822 116 52238	12k 5% 0.5W
3529	4822 116 83883	470Ω 5% 0.5W
3530	4822 116 83961	6k8 5%
3531	4822 116 52249	1k8 5% 0.5W
3532	4822 116 52249	1k8 5% 0.5W
3533	4822 116 83872	220Ω 5% 0.5W
3534	4822 116 52228	680Ω 5% 0.5W
3536	4822 116 83961	6k8 5%
3537	4822 116 52269	3k3 5% 0.5W
3539	4822 116 52276	3k9 5% 0.5W
3540	4822 116 52256	2k2 5% 0.5W
3540	4822 116 52257	22k 5% 0.5W

5501	4822 152 20678	33μH
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6501△	4822 130 30621	1N4148
6502△	4822 130 30621	1N4148
6503△	4822 130 30621	1N4148
6504△	4822 130 30621	1N4148
6505△	4822 130 30621	1N4148

7501	4822 209 31555	TDA9830/V1
7502	4822 209 90462	TDA7056B/N1
7503	4822 130 40937	BC548B
7504	4822 130 40937	BC548B
7505	4822 130 40937	BC548B
7506△	4822 130 44197	BC558B
7507△	4822 130 44197	BC558B
7508	4822 130 40937	BC548B
7509	4822 130 40937	BC548B
7510	4822 130 40937	BC548B
7511	4822 130 40937	BC548B
7512	4822 130 40937	BC548B
7513	4822 130 40937	BC548B
7514	4822 130 40937	BC548B
7515	4822 130 40937	BC548B

### Nicam +2CS panel [D]

### Various

1020	4822 212 11561	Nicam panel + AM Sound
1020	4822 212 11562	Nicam panel no AM sound
1020	4822 212 11563	2CS stereo panel
	4822 267 10755	Con. 19P
	4822 267 10537	Con. 5P
Δ	4822 492 62076	Spring fix IC
1202	4822 242 10688	OFWK9456M 38.9MHZ
1203	4822 242 81436	OFWK3953M 38.9MHZ

1204	4822 242 10434	X-tal 18,432MHz
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2201	4822 126 13693	56pF 1% 63V
2202△	4822 126 13838	100nF 50V 20%
2203	4822 124 41576	2.2μF 20% 50V
2206	4822 126 13473	220nF 80-20% 50V
2207	4822 126 13751	47nF 10% 63V
2208	4822 124 41576	2.2μF 20% 50V
2210	5322 122 32658	22pF 5% 50V
2213	4822 126 13692	47pF 1% 63V
2214	4822 122 33926	12pF 50V
2215	4822 126 13692	47pF 1% 63V
2216	4822 126 13473	220nF 80-20% 50V
2217	4822 126 13473	220nF 80-20% 50V
2220	4822 126 13473	220nF 80-20% 50V
2221	4822 126 13473	220nF 80-20% 50V
2224△	4822 126 13838	100nF 50V 20%
2225	5322 122 32448	10pF 5% 50V
2226	5322 122 32448	10pF 5% 50V
2227△	4822 126 13838	100nF 50V 20%
2228△	4822 124 41579	10μF 20% 50V
2229△	4822 124 41579	10μF 20% 50V
2230△	4822 124 41579	10μF 20% 50V
2231△	4822 126 13838	100nF 50V 20%
2234△	4822 124 41579	10μF 20% 50V
2235	5322 126 10511	1nF 5% 50V
2236	5322 126 10511	1nF 5% 50V
2237	4822 126 13561	220nF 10% 16V
2238	4822 126 13561	220nF 10% 16V
2241△	4822 124 40246	4.7μF 20% 63V
2242△	4822 126 13838	100nF 50V 20%
2243	5322 126 10511	1nF 5% 50V
2244	5322 126 10511	1nF 5% 50V
2245	4822 124 41751	47μF 20% 50V
2246	5322 122 32448	10pF 5% 50V
2247	5322 126 10511	1nF 5% 50V
2248	4822 124 81151	22μF 50V
2249	5322 126 10511	1nF 5% 50V
2250	4822 124 41751	47μF 20% 50V
2251	5322 122 32448	10pF 5% 50V
2252△	4822 124 41579	10μF 20% 50V
2253△	5322 126 10223	4.7nF 10% 63V
2254△	5322 126 10223	4.7nF 10% 63V
2255△	4822 124 41579	10μF 20% 50V
2256	4822 126 13561	220nF 10% 16V
2257	4822 124 22263	220μF 20% 25V
2260	4822 124 40255	100μF 20% 63V
2261	4822 124 40255	100μF 20% 63V
2262△	4822 124 41579	10μF 20% 50V
2263△	4822 124 41579	10μF 20% 50V
2264	4822 124 81029	100μF 20% 25V
2265	4822 126 13561	220nF 10% 16V
2266	4822 126 13561	220nF 10% 16V
2267	4822 126 13561	220nF 10% 16V
2268	4822 121 42868	220nF 5% 50V
2271	5322 126 10511	1nF 5% 50V
2272	5322 126 10511	1nF 5% 50V
2273	4822 126 13561	220nF 10% 16V
2274△	4822 126 13838	100nF 50V 20%
2276	4822 126 13694	68pF 1% 63V
2277	4822 126 13694	68pF 1% 63V
2278	5322 126 10511	1nF 5% 50V
2279	5322 126 10511	1nF 5% 50V
2280	5322 126 10511	1nF 5% 50V
2281	5322 126 10511	1nF 5% 50V

3201	4822 117 11449	2k2 1% 0.1W
3202	4822 117 10833	10k 1% 0.1W
3203	4822 117 11449	2k2 1% 0.1W
3207	4822 117 10833	10k 1% 0.1W
3211	4822 117 11449	2k2 1% 0.1W
3213	4822 116 83864	10k 5% 0.5W
3214	4822 051 20562	5k6 5% 0.1W
3215△	4822 051 20101	100Ω 5% 0.1W
3216	4822 116 52175	100Ω 5% 0.5W
3217	4822 116 52175	100Ω 5% 0.5W
3222	4822 051 20562	5k6 5% 0.1W
3224	4822 117 10834	47k 1% 0.1W
3229	4822 051 20561	560Ω 5% 0.1W
3230	4822 117 10834	47k 1% 0.1W
3233	4822 117 11449	2k2 1% 0.1W
3234	4822 117 10834	47k 1% 0.1W
3235	4822 117 10834	47k 1% 0.1W
3238	4822 051 20561	560Ω 5% 0.1W
3239	4822 117 11449	2k2 1% 0.1W
3240	4822 051 20333	33k 5% 0.1W
3242	4822 051 20333	33k 5% 0.1W
3243	4822 117 11437	8k2 1% 0.1W
3244	4822 117 11154	1k 1% 0.1W
3246	4822 11	