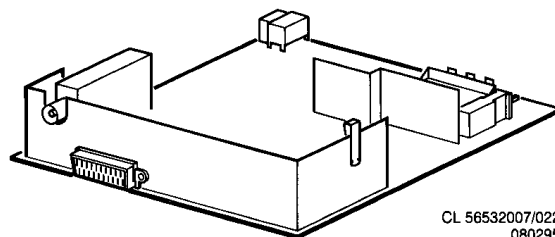


Service
Service
Service

L6.1
AA



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080295


Service Manual

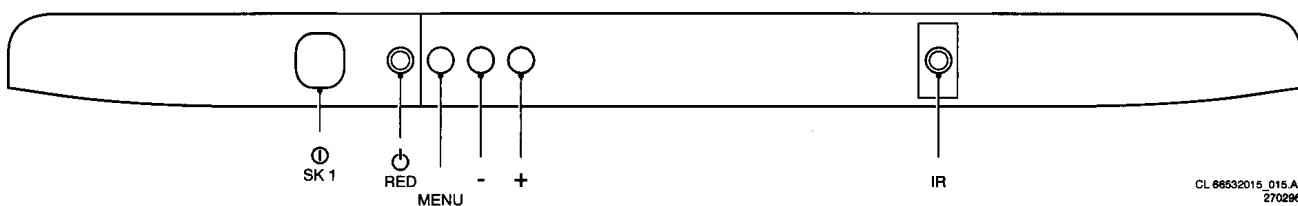
Table of contents

Page

1.	Technical specifications		2
2.	Connection facilities		2
3.	Safety instructions, maintenance instructions, warnings and notes		3
4.	Mechanical instructions		3
5.	Overview oscillograms		4
	Survey of testpoints		4
	Block diagram		5
	Fault finding tree		6
6.	Repair facilities		7
7.	<i>Electrical diagrams and print lay-outs</i>		<i>Diagram</i>
	Power supply & Line stage	(Diagram A1)	9 15
	Tuner & IF	(Diagram A2)	9 15
	Sound & Chroma	(Diagram A3)	9 15
	Controls & Teletext	(Diagram A4)	9 15
	CRT panel	(Diagram B)	10 16
	Controls		16 16
	Mains module		16 16
8.	Electrical adjustments		17
9.	Circuit description		18
10.	Directions for use		21
11.	List of abbreviations		23
12.	Spare parts list		24

1. Technical specifications















Mains voltage	: 220 - 240 V \pm 10% AC; 50 Hz \pm 5%
Power cons. at 220V~	: 14" 44 W (stand-by \leq 5 W) : 20" 60 W (stand-by \leq 5 W) : 21" 60 W (stand-by \leq 5 W)
Aerial input impedance TV	: 75 Ω - coax
Min. aerial input VHF	: 30 μ V
Min. aerial input UHF	: 40 μ V
Max. aerial input VHF/UHF	: 180mV
Pull-in range colour sync	: \pm 300Hz
Pull-in range horizontal sync	: \pm 600Hz
Pull-in range vertical sync	: \pm 5Hz
Picture tube range	: 14", 20", 21"
	: 1 W mono execution : 2 W mono execution
TV Systems	: PAL I : PAL BG : PAL BG / SECAM BGDK : PAL BG / SECAM BGLL'
Indications	: On Screen Display (OSD) green/red : 1 LED (\odot red high intensity, \ominus red low intensity, "RC5" and error code blinking red)
VCR programs	: 0
Tuning and operating system	:  VST
UV913 / IEC (VST)	: VHFa: 46 - 102 MHz : VHFb: 138 - 224 MHz : UHF: 471 - 855 MHz
UV915E / IEC (VST)	: VHFa: 48 - 168 MHz : VHFb: 175 - 448 MHz : UHF: 300 - 860 MHz
UV917E / IEC (VST)	: VHFa: 48 - 118 MHz : VHFb: 118 - 300 MHz : UHF: 470 - 861 MHz
U943 / IEC (VST)	: UHF: 470 - 861 MHz
Local operating functions	: MENU / - / +



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2. Connection facilities

Euroconnector:

	1 - Audio \odot R (0V5 RMS \leq 1k Ω)	15 - Red (0V7 _{pp} /75 Ω)
	2 - Audio \ominus R (0V2 - 2V RMS \geq 10k Ω)	16 - RGB-status (0-0V4 int.)(1-3V ext. 75 Ω)
	3 - Audio \odot L (0V5 RMS \leq 1k Ω)	17 - CVBS \perp
	4 - Audio \perp	18 - CVBS \perp
	5 - Blue \perp	19 - CVBS \odot (1V _{pp} /75 Ω)
	6 - Audio \ominus L (0V2 - 2V RMS \geq 10k Ω)	20 - CVBS \ominus (1V _{pp} /75 Ω)
	7 - Blue (0V7 _{pp} /75 Ω)	21 - Earthscreen
	8 - CVBS-status 1 \ominus (0-2V int., 10-12V ext.)	
	9 - Green \perp	
	10 - -	
	11 - Green (0V7 _{pp} /75 Ω)	
	12 - -	
	13 - Red \perp	
	14 - -	

Survey of testpoints / Übersicht über die Teststellen / Presentation des points à tester

Main carrier (Component side)

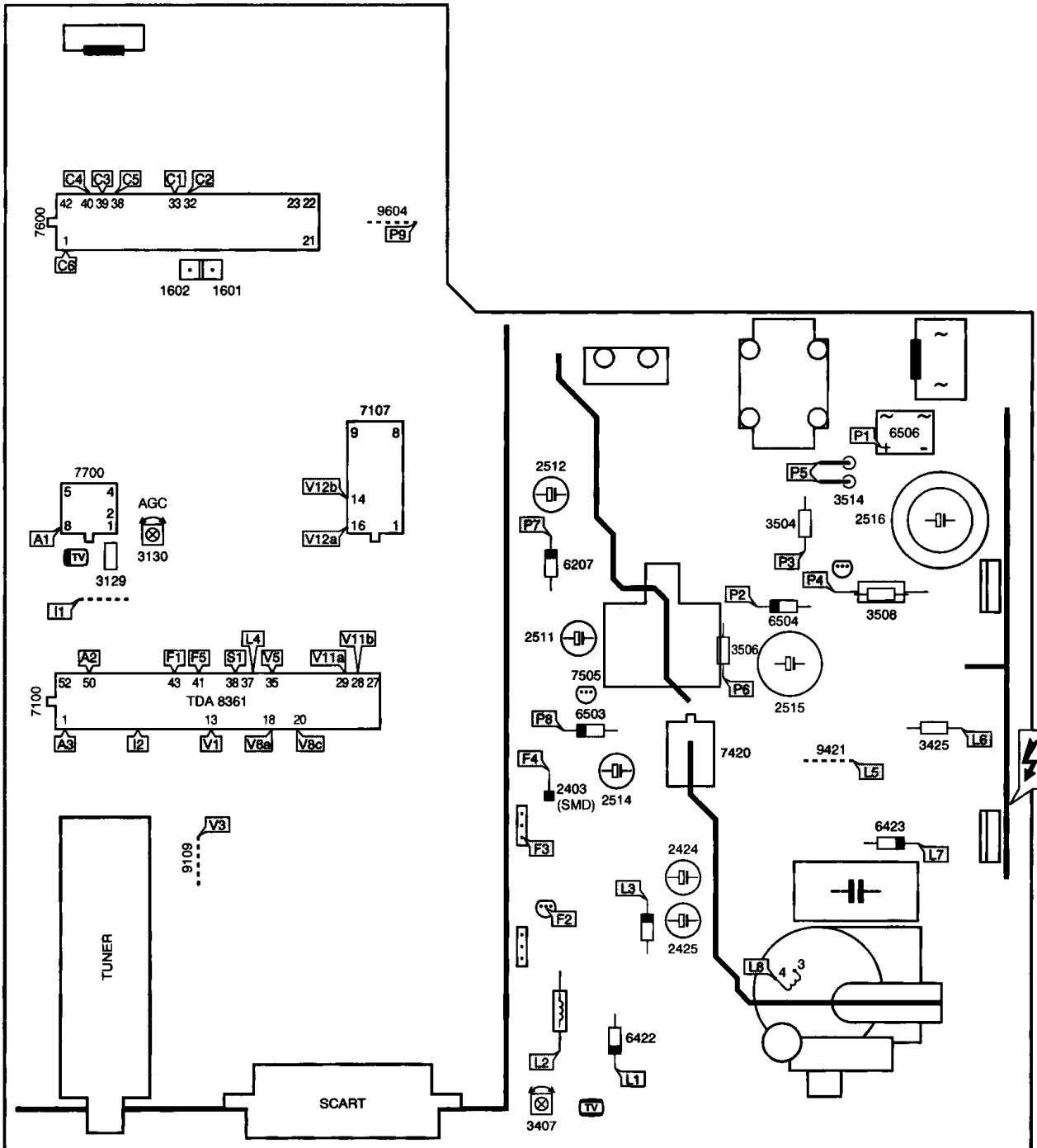
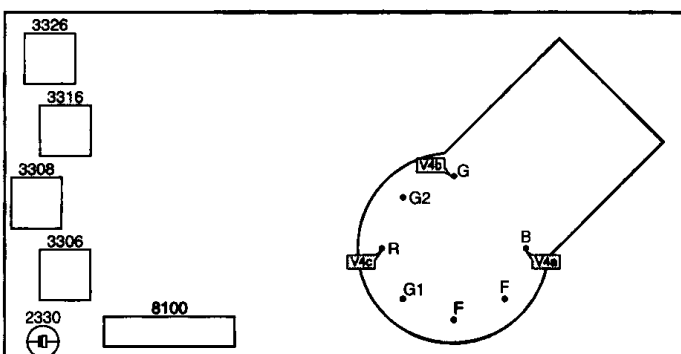


Fig 5.1

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040396

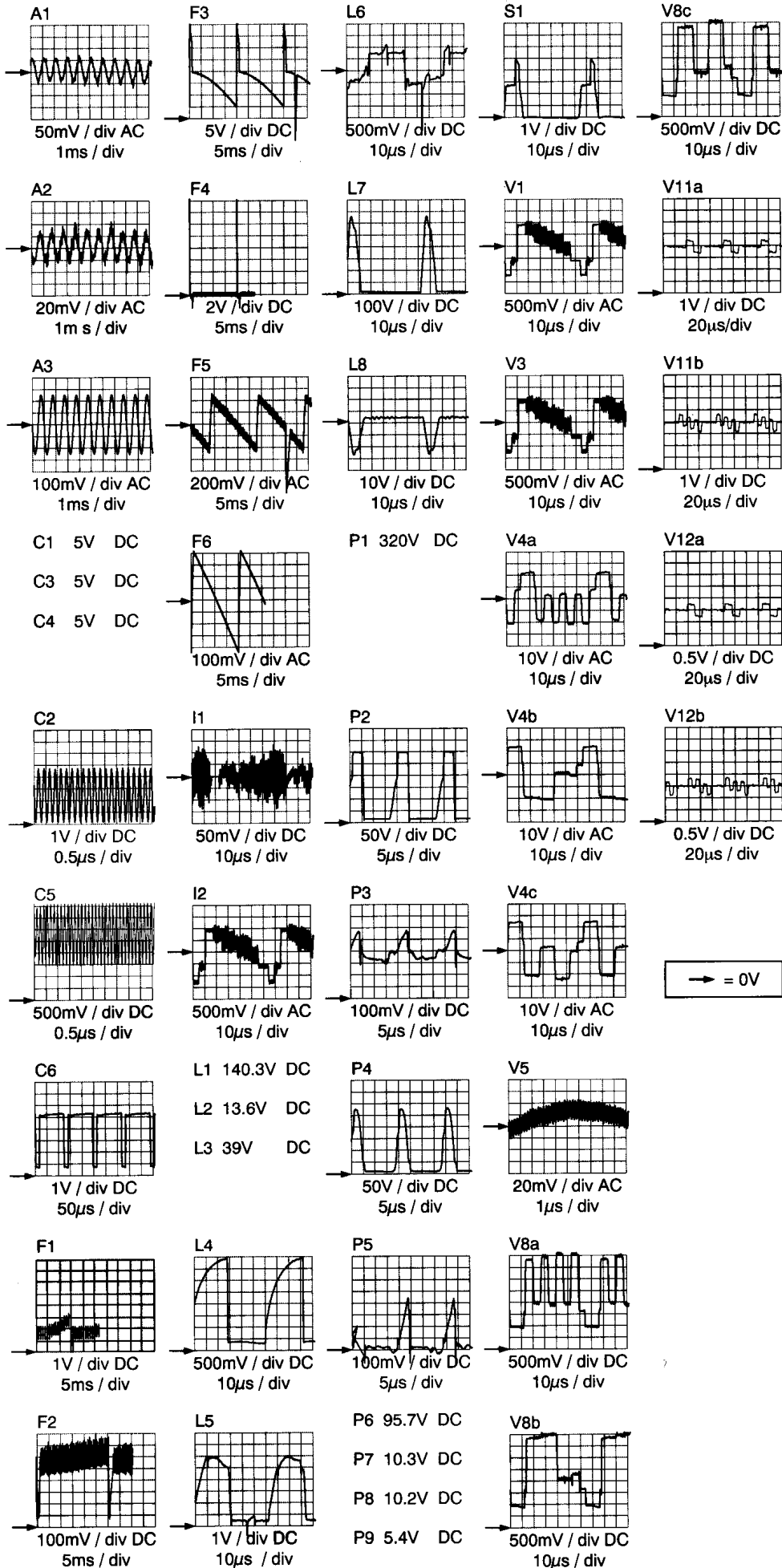
CRT panel



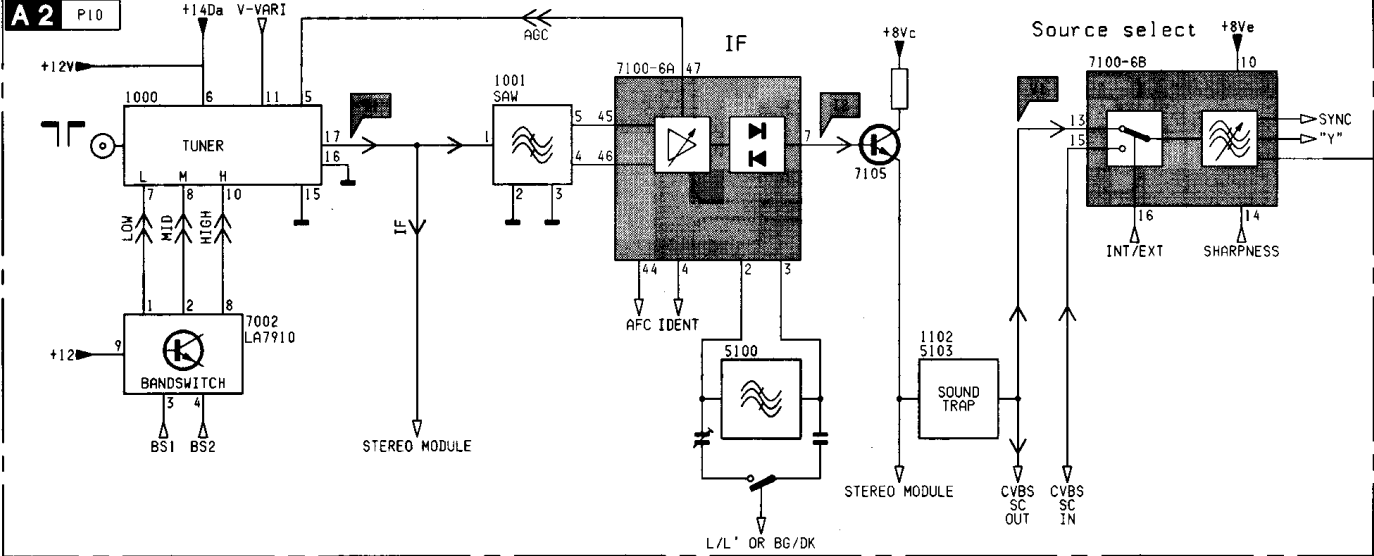
CL 66532008_013.AI
150226

Fig. 5.2

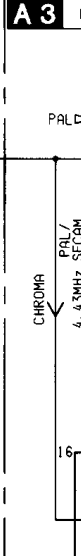
Overview oscillograms / Übersicht Oszillogramme / Vue d'ensemble des oscillogrammes



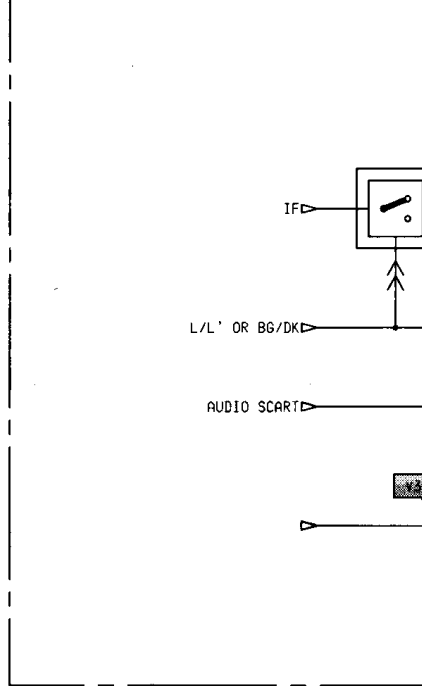
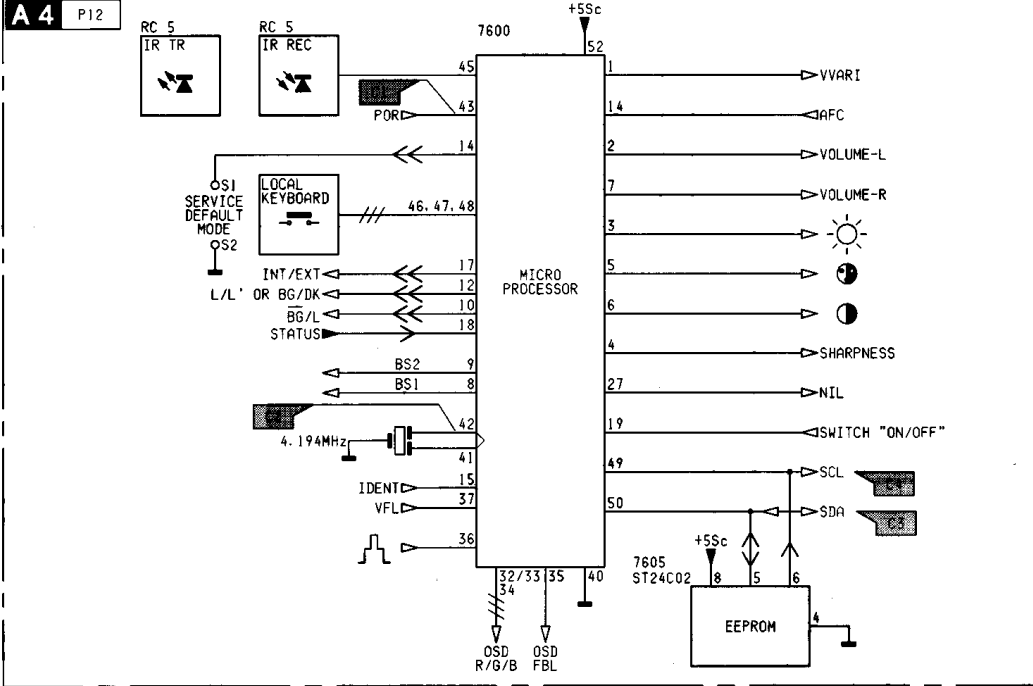
TUNING + IF/Abstimmereinheit/SYNTONISEUR



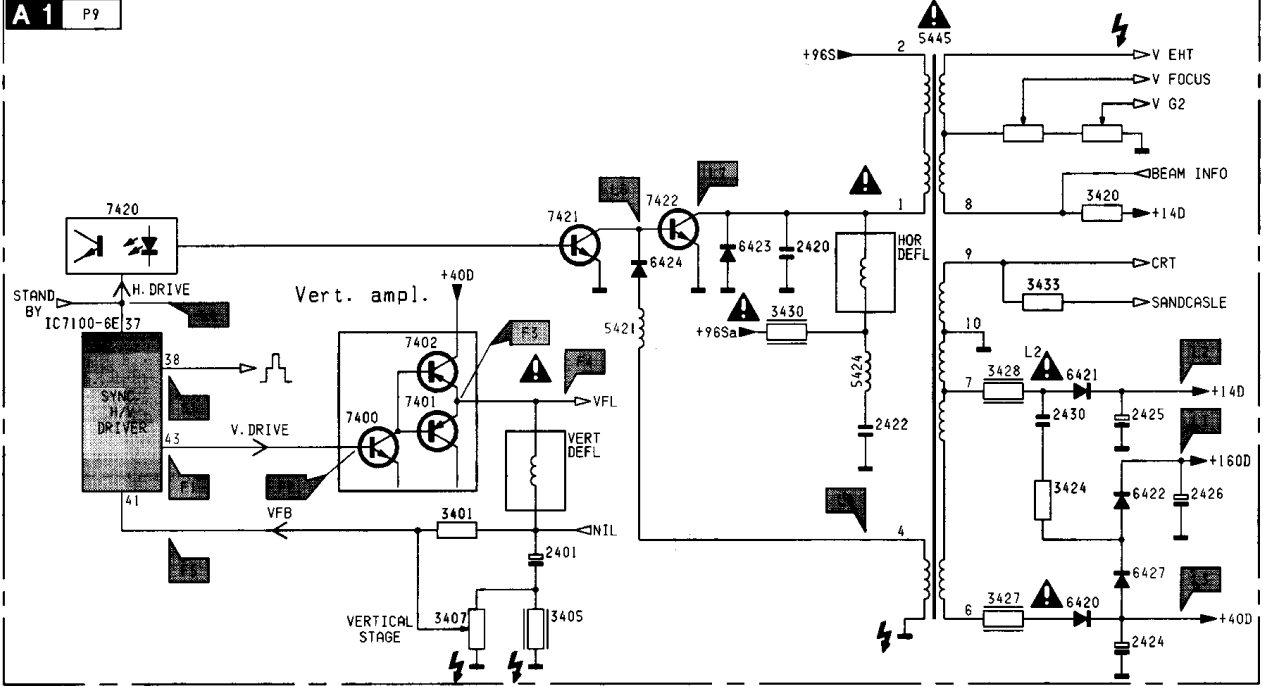
VIDEO +



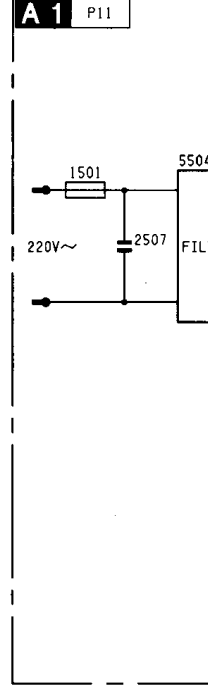
CONTROL/Bedienung/COMMANDE

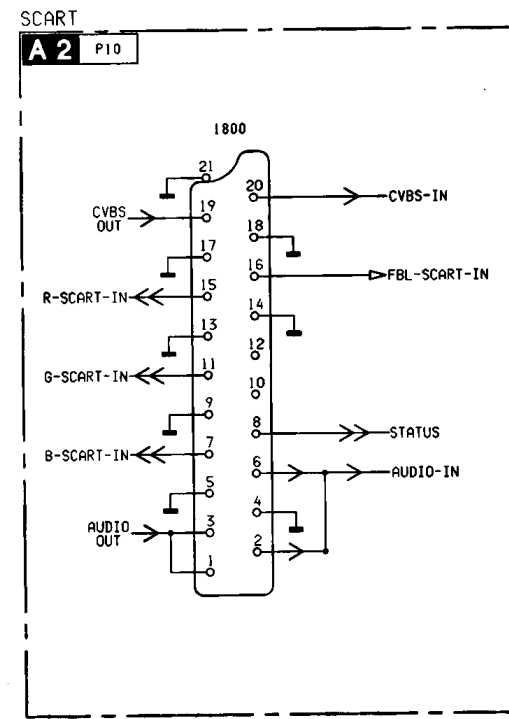
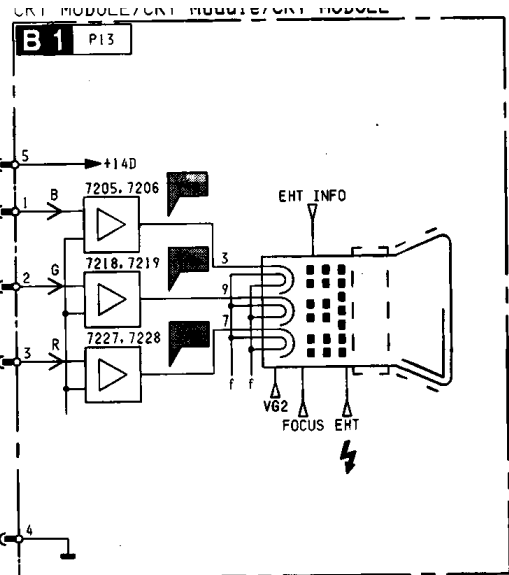
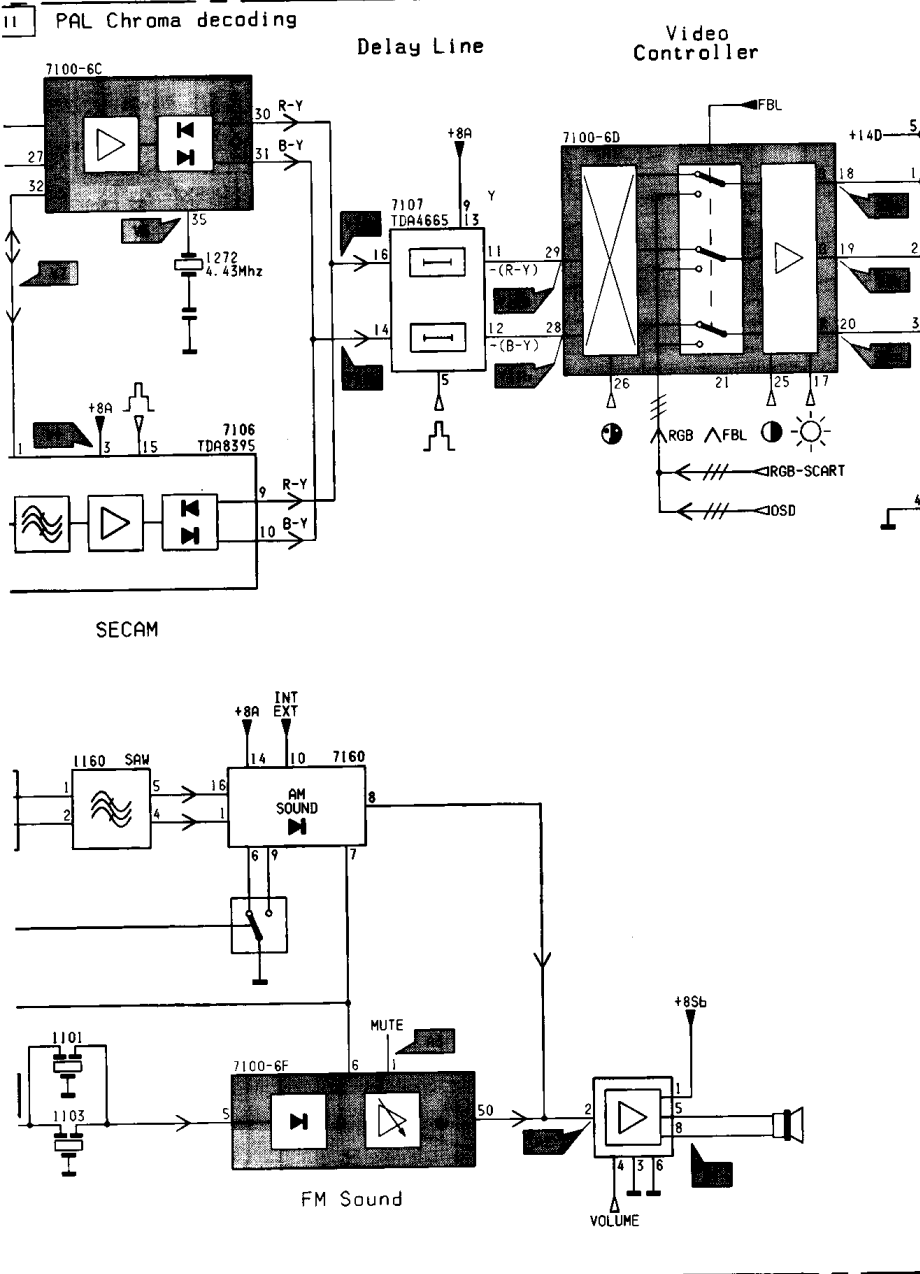


SYNC & DEFLECTION

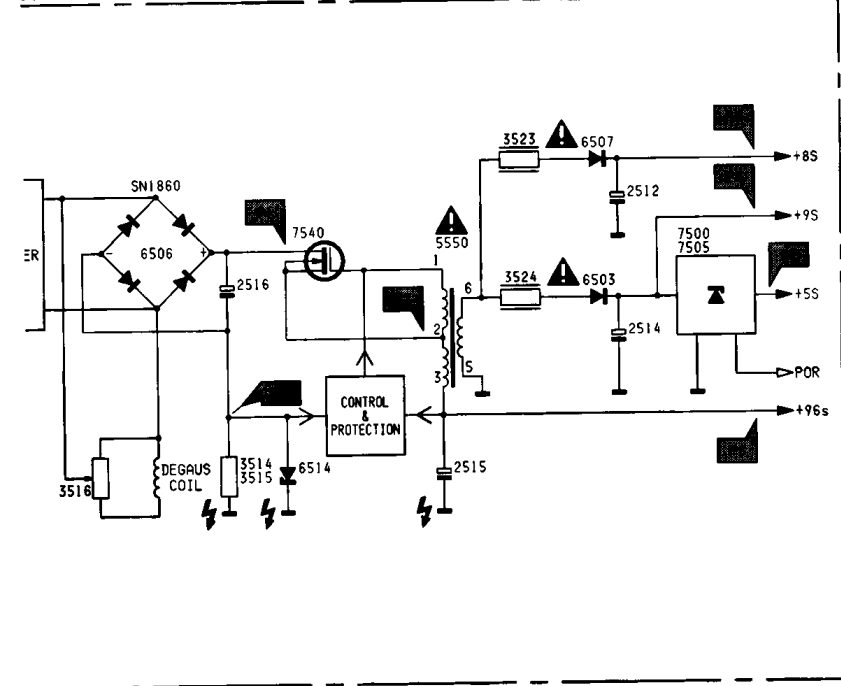


POWER SUPPLY/Netz



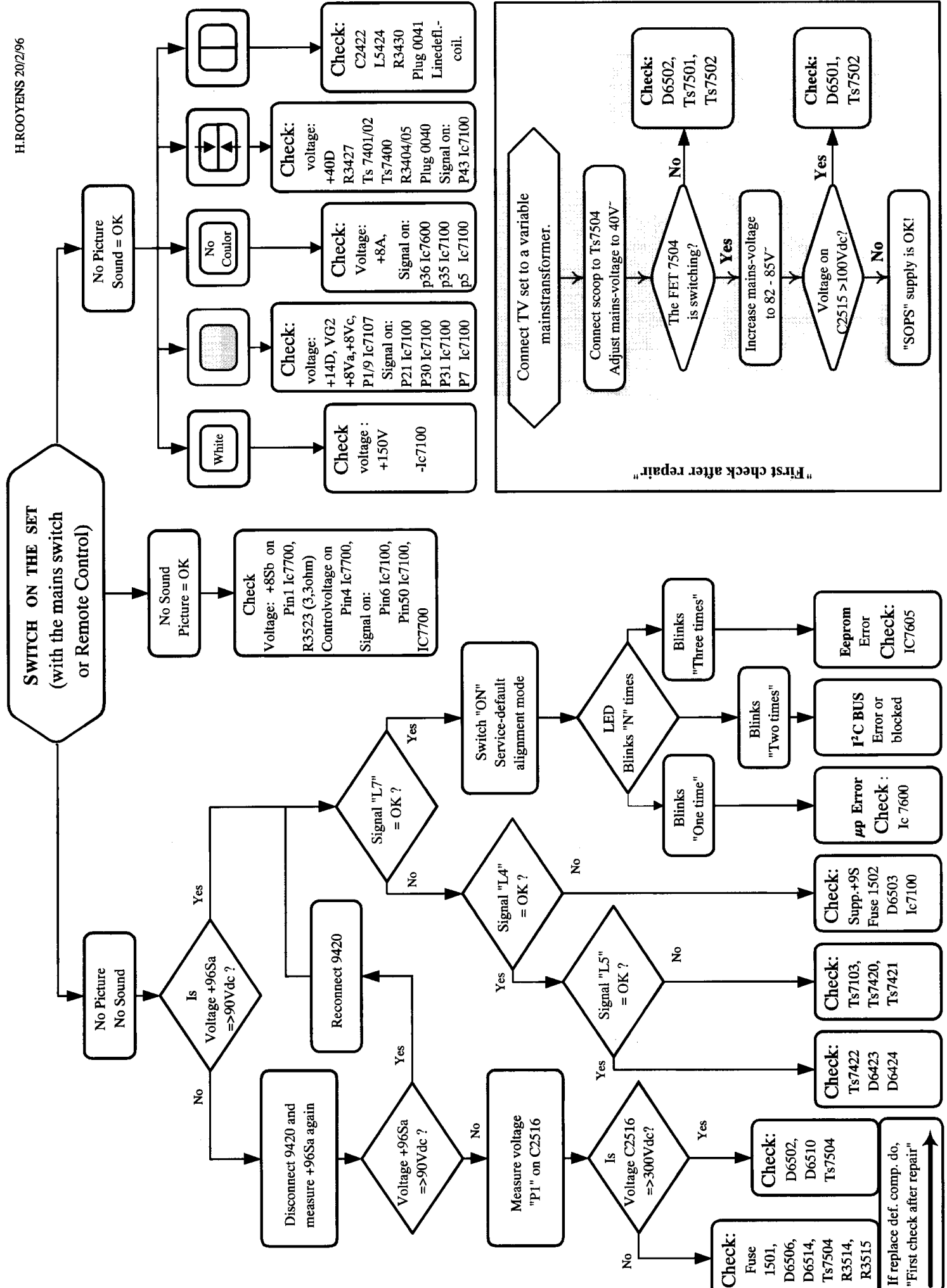


teil/ALIMENTATION



6. Fault finding tree & Repair facilities / Fehlersuchbaum & Reparaturhinweise / Aide au depannage & Conseils pour la réparations

HLROOYENS 20/2/96



6. Repair facilities

1. Functional blocks

On both the service printing on the copper and the component side, functional blocks are indicated by lines and text.

2. Test points

The L6 chassis is equipped with test points in the service printing on both sides of mono-board. These test points are referring to the functional blocks as mentioned above:

- * P1-P2-P3, etc: Test points for the power supply
- * L1-L2-L3, etc: Test points for the line drive and line output circuitry
- * F1-F2-F3, etc: Test points for the frame drive and frame output circuitry
- * S1-S2-S3, etc: Test points for the synchronisation circuitry
- * V1-V2-V3, etc: Test points for the video processing circuitry
- * A1-A2-A3, etc: Test points for the audio processing circuitry
- * C1-C2-C3, etc: Test points for the control circuitry
- * T1-T2-T3, etc: Test points for the teletext processing circuitry

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

3. Service default-alignment mode (SDAM)

The service default-alignment mode is a pre-defined mode which can be used for faultfinding (especially when the TV gives no picture at all). All oscillograms and DC voltages in this service manual are measured in the service default-alignment mode.

Activate the service default-alignment mode can be done in 2 ways:

1. By short-circuiting the service pins S1 and S2 of the microcomputer (pin 14 of IC7600).
2. From normal operation mode by pressing the button "DEFAULT" or "ALIGN" on the DST (Dealer Service Tool) RC7150.

Leaving the service default-alignment mode to normal operation can only be done by the stand-by on the remote control or by pressing diagnose 99 followed by the OK-button on the DST (so not via mains switch "off"; after mains switch "off" and then "on" again the set will start up in the service default-alignment mode again to enable easy faultfinding).

Functions of the service default-alignment mode:

1. All analogue settings (volume, contrast, brightness and saturation) are in the mid position.
2. Set is tuned to program number 1
3. Delta volume settings are not used (delta volume setting = a delta on the volume setting)
4. OSD error message (present available error code) is displayed continuously
5. The OSD-key will act as search and auto store on the maximum program number.
6. Automatic switch off function (set switches "off" after 15 minutes no IDENT) will be switched off
7. Hotel mode will be disabled
8. All other functions remain normal controllable

Service default-alignment menu:

New option settings are activated immediately.

1. Software version of the microprocessor used in that typical set is displayed in the right top corner
2. A counter in the middle of the screen indicate the normal operation hours of the set in a hexadecimal code (every time the set is switched "on" the counter is incremented by 1 hour, so +1 at the counter).
3. The "S" in the middle of the screen next to the counter indicate that the set is in the service default-alignment mode
4. Option code
This code indicates the Options setting of the set.
5. Error code history:
The 5 last different error codes occurred are stored in the EEPROM memory; last error code detected will be displayed on the left side (see for an overview of all possible error codes Fig. 6.3), so e.g.:

0 0 0 0 0	means no error codes present in the buffer
3 0 0 0 0	means one error code present in the buffer; error code 3
2 3 0 0 0	means two error codes present in the buffer; last detected error code is error code 2, previous detected error code is error code 3

The error code history buffer is cleared when the Service Menu is left by the stand-by command or by diagnose 99 command. In case the Service Menu is left by the mains switch "off" the error code history buffer will not be cleared.

Option code + Counter + "S" for
Service Menu active + software version →

Error code history →

Option setting row →

001	0023S	1.0
	23000	
-	SYSTEM BG+I	+

Fig. 6.1

6. Option setting:

In the bottom line the options are given.
Control of the options is with the following keys on the remote control:

- * PROGRAM +/- Select the option to be changed:
Via the "PROGRAM +/-" button the option to be changed can be selected. The selected option is implemented immediately.
- * CONTROL up/down Changes the setting of the option.

* MENU +/-

Changes to a submenu: via "MENU +/-" buttons a submenu is selected in which in a stereo version the sound/sync alignment can be done.

The options are stored immediately in the EEPROM. The following table indicates the possible hardware and software options and their technical consequences:

Text displayed in the option row in the Service Menu	The technical consequence for the selected option
SINGLE	→ For a PAL BG only or PAL BG/SECAM BGDK set
SYSTEM I:UK	→ For a PAL I only set
SYSTEM BG+LL'	→ For a PAL BG/SECAM LL' set
SYSTEM BG+DK	→ For a PAL BGI/SECAM LL' set
NATIONAL BRAND MAxxxxx→	Selects MENU-Layout National Brand styling

Fig. 6.2

4. Error messages

The microcomputer also detects errors in circuits connected to the I²C (Inter IC) bus. These error messages are communicated via OSD (On Screen Display) and a flashing LED in the service default-alignment mode. (error code history buffer):

1. In normal operation:
In normal operation no errors are indicated.
2. In the service default-alignment mode:
In the service default-alignment mode both the "OSD error message" and the "LED error" indication will display the present detected error continuously.

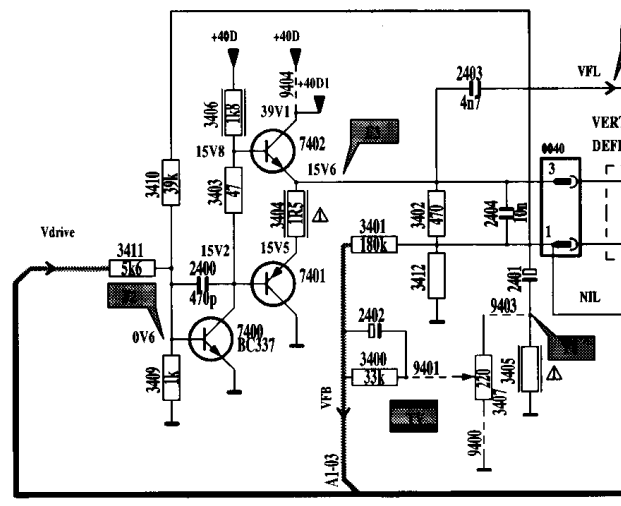
"OSD error number" (Service Menu)	"LED behaviour"	Error description	Possible defective component
0	No blinking LED	No error	—
1	LED blinks once	μC error	IC76002
2	LED blinks twice	General I ² C	I ² C bus is blocked
3	LED blinks three times	EEPROM error	IC7605

Fig. 6.3

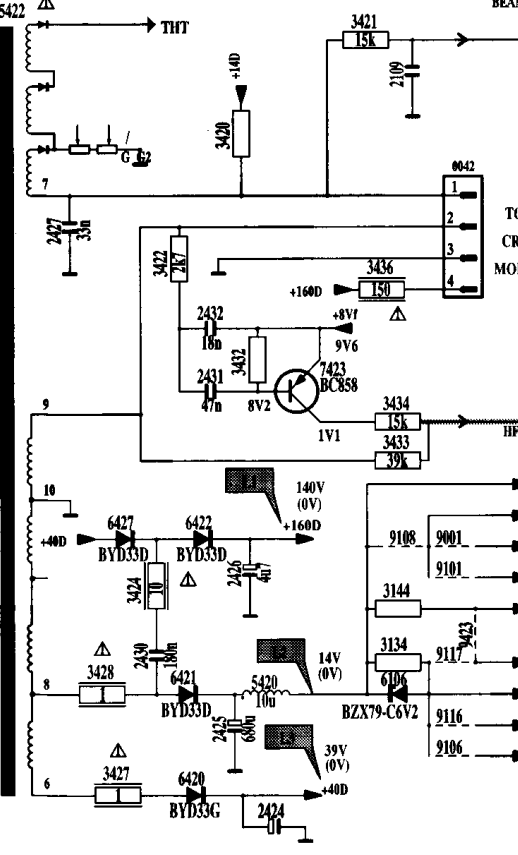
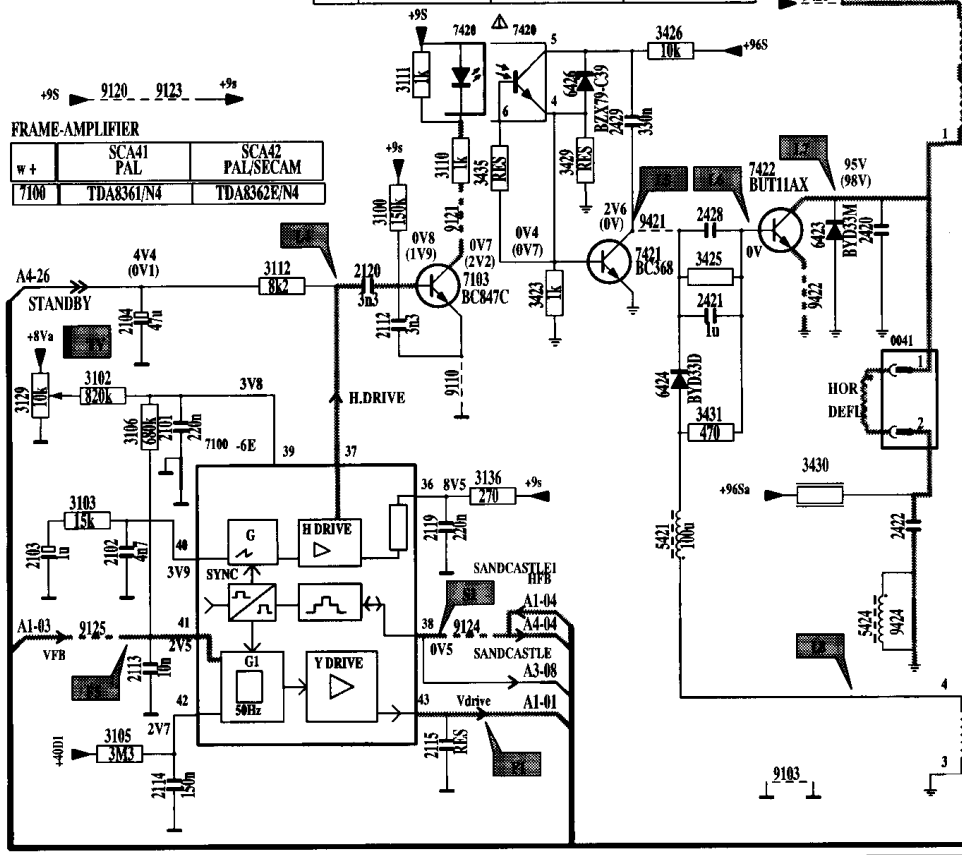
A1 SYNC

FRAME-AMPLIFIER			
w +	CRT10 14"	CRT11 21"	CRT12 20"
2109	---	270n	---
2401	680u	680u	680u
2402	1u5	1u5	1u
2420	7n5	10n	10n
2422	330n	470n	560n
2424	680u	1000u	1000u
2428	RES	1u	1u
2516	47u	68u	47u
3144	47u	47u	RES
3405	4R7	3R3	3R3
3412	2K2	2K2	2K2
3420	15k	15k	15k
3425	12	12	12
3430	1k	820	820
3432	560k	560k	2M2
3505	---	150	---
3507	1k5	1k2	1k2
3514	---	---	---
3515	---	---	---
5422	G5632-01	G7529.00 THCF	G7529.00 THCF
5424	---	LIN CORR	LIN CORR
7401	BD136	BD229	BD229
7402	BD137	BD228	BD228
9424	+++	---	---
9500	+++	---	---

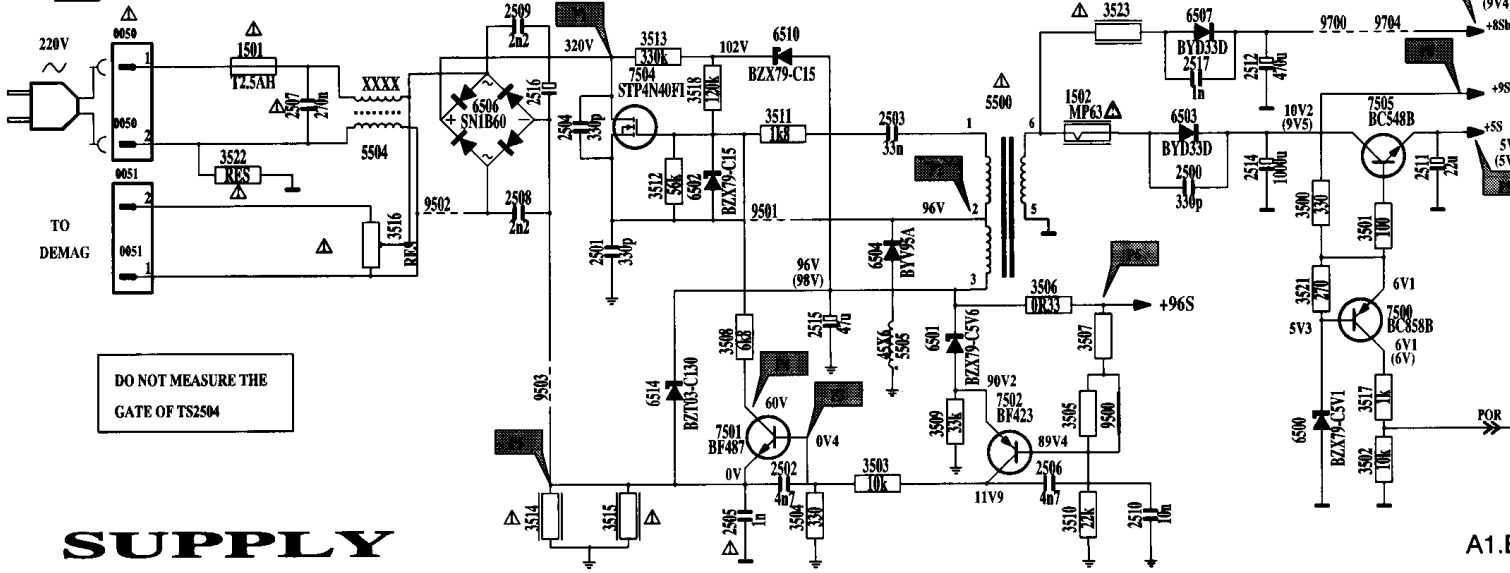
FRAME-AMPLIFIER



FRAME-AMPLIFIER		
w +	SCA41 PAL	SCA42 PAL/SECAM
7100	TDA8361/N4	TDA8362E/N4



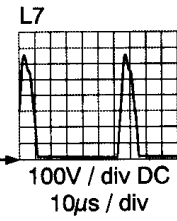
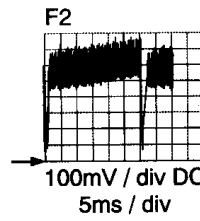
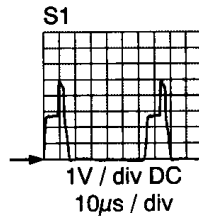
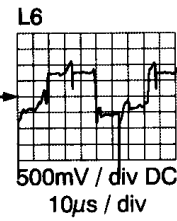
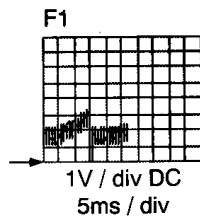
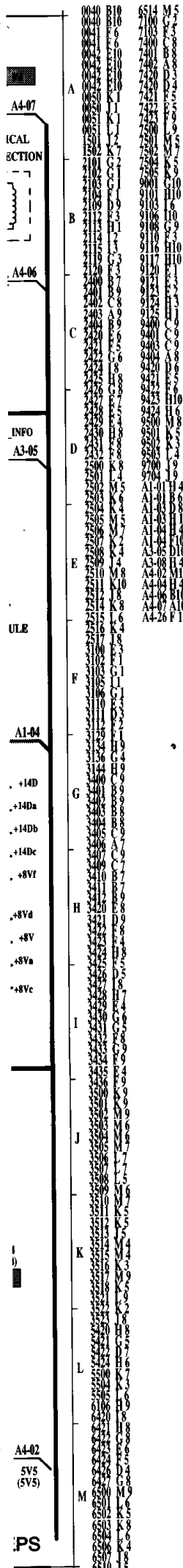
SYS70 BG mono	SYS71 BG/L/L mono	SYS72 l mono	SYS73 BG/DK mono	SYS74 BG(2Sc)	SYS75 BG/DK(2Sc)	SYS76 NIC BG	SYS77 NIC I	SYS78 NIC L
3134	47	27	33	47	39	47	47	33
3523	3R3	3R3	3R3	1R	1R	1R	1R	1R



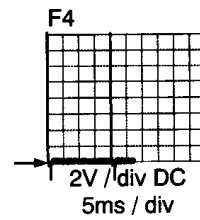
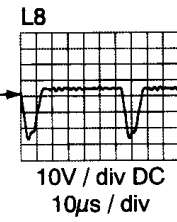
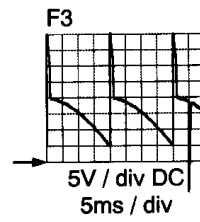
DO NOT MEASURE THE GATE OF TS2504

SUPPLY

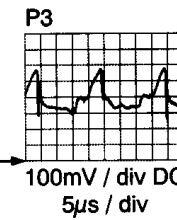
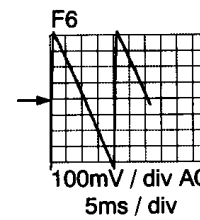
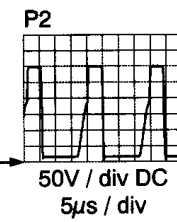
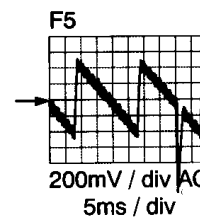
Module secteur & Étage de lignes



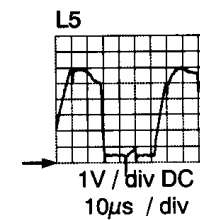
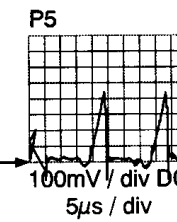
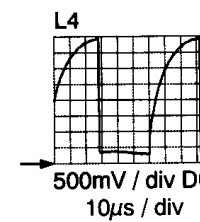
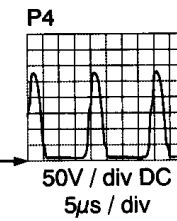
→ = 0V



P1 320V DC



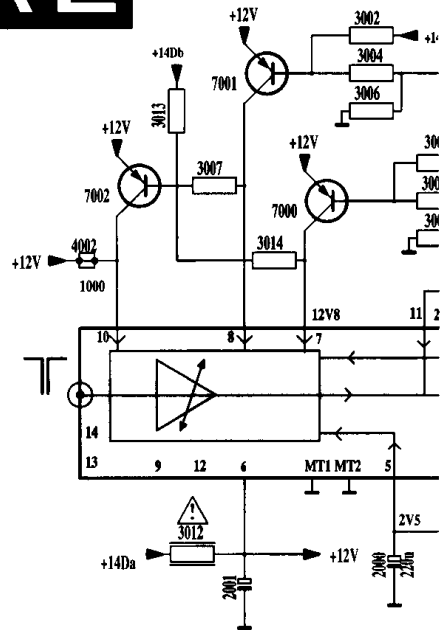
L1 140.3V DC
L2 13.6V DC
L3 39V DC



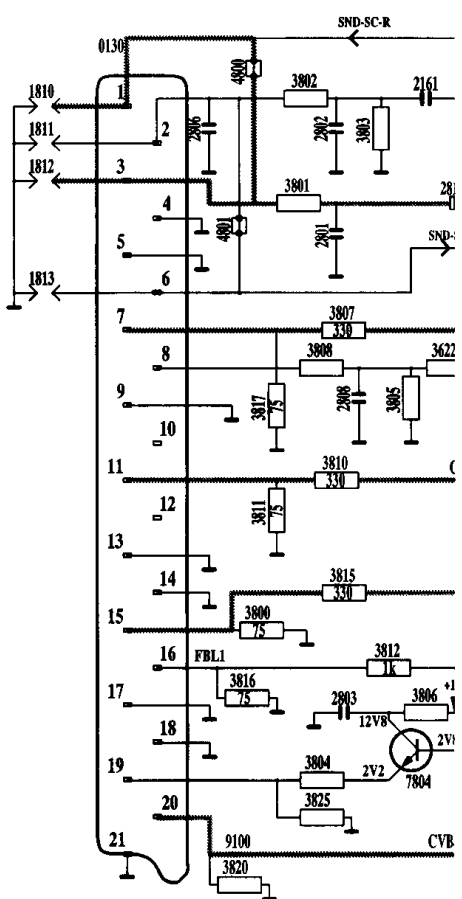
P6 95.7V DC
P7 10.3V DC
P8 10.2V DC
P9 5.4V DC

A2

A
B
C
D
E
F
G
H
I
J
K
L
M
N



	BS1	BS2
VHF1	"0"	"1"
VHF3	"1"	"0"
UHF	"1"	"1"

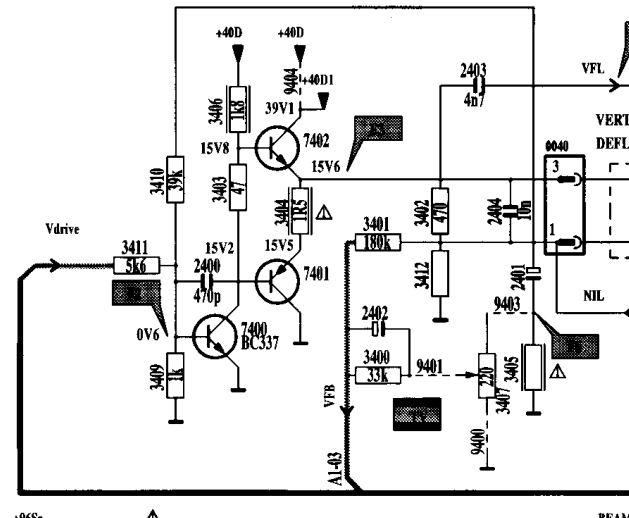


A1 SYNC

FRAME-AMPLIFIER

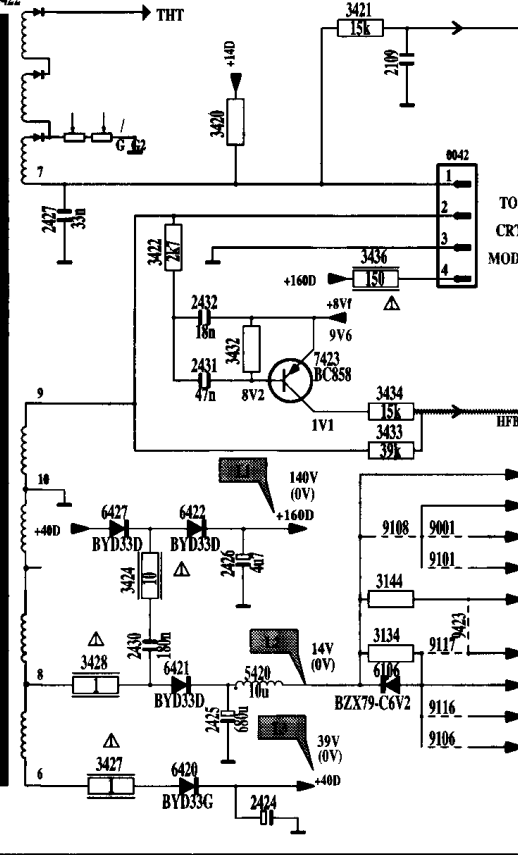
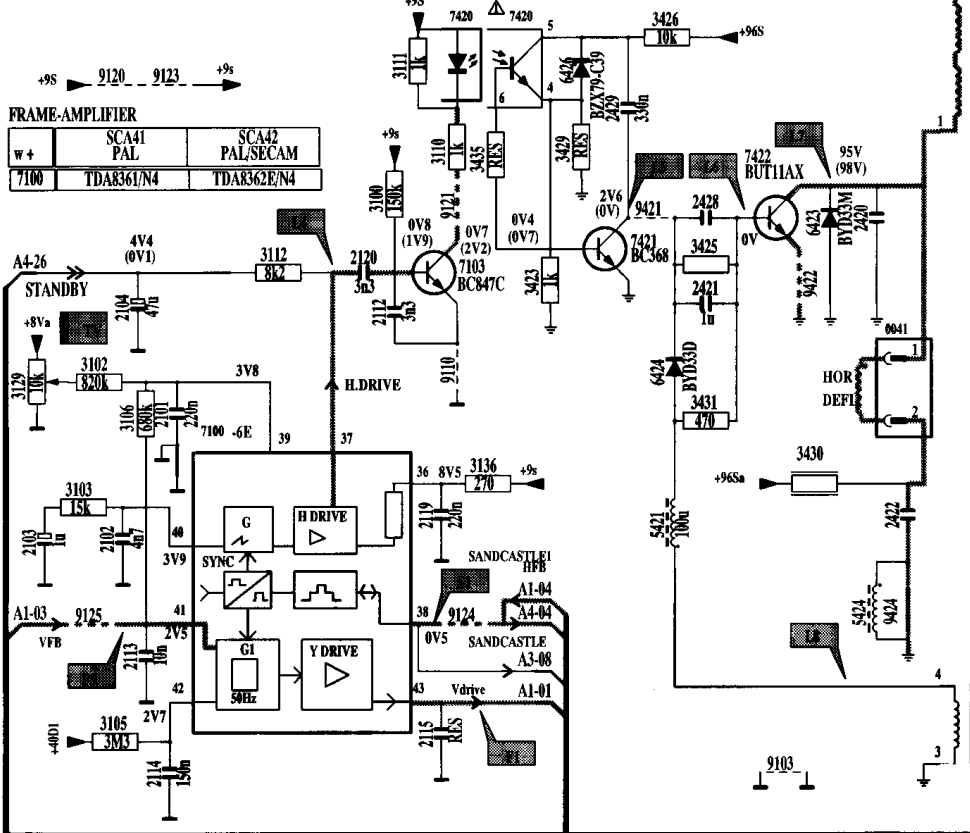
w +	CRT10 14"	CRT11 21"	CRT12 20"
2109	...	270n	...
2401	680u	680u	680u
2402	1u5	1u5	1u
2420	7n5	10n	10n
2422	330n	470n	560n
2424	680u	1000u	1000u
2428	RES	1u	1u
2516	47u	68u	47u
3144	470	470	RES
3405	4R7	3R3	3R3
3412	2K2	2K2	2K2
3420	15k	15k	15k
3425	12	12	12
3430	1k	820	820
3432	560k	560k	2M2
3505	...	150	...
3507	1k5	1k2	1k2
3514
3515
5422	G5632-01	G7529.00 THCF	G7529.00 THCF
5424	...	LIN CORR	LIN CORR
7401	BD136	BD229	BD229
7402	BD137	BD228	BD228
9424	+++
9580	+++	...	+++

FRAME-AMPLIFIER

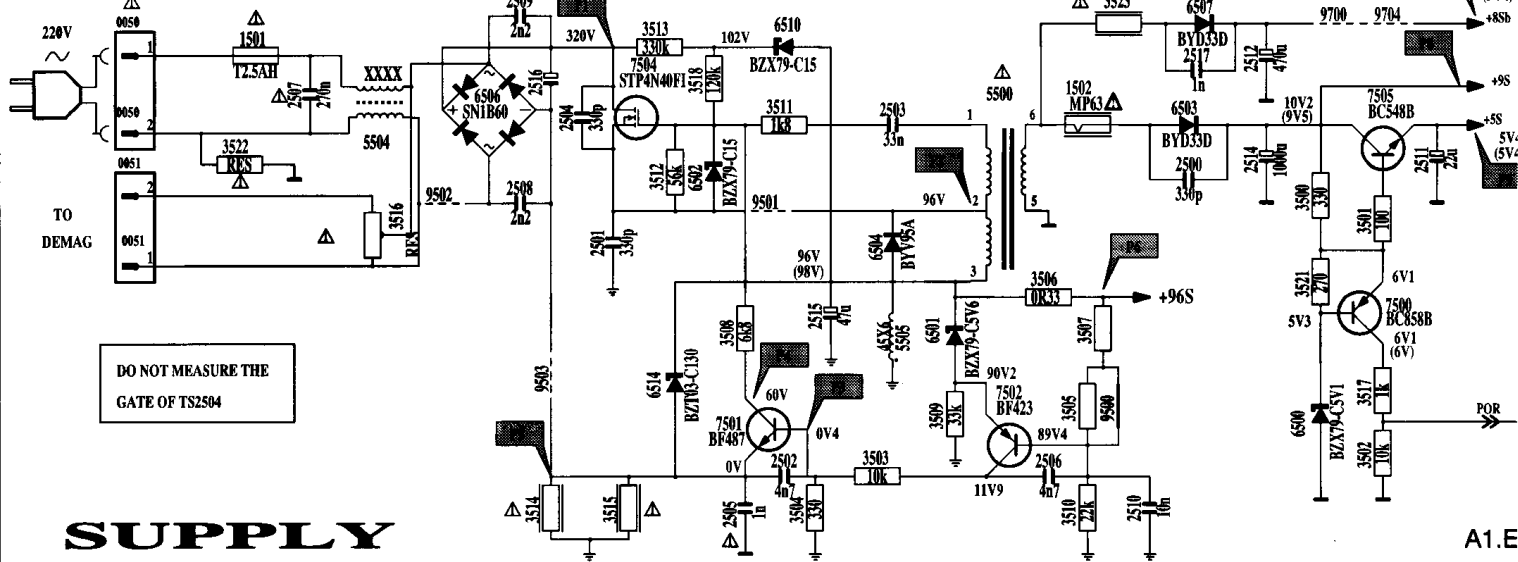


FRAME-AMPLIFIER

w +	SCA41 PAL	SCA42 PAL/SECAM
7100	TDA8361/N4	TDA8362E/N4



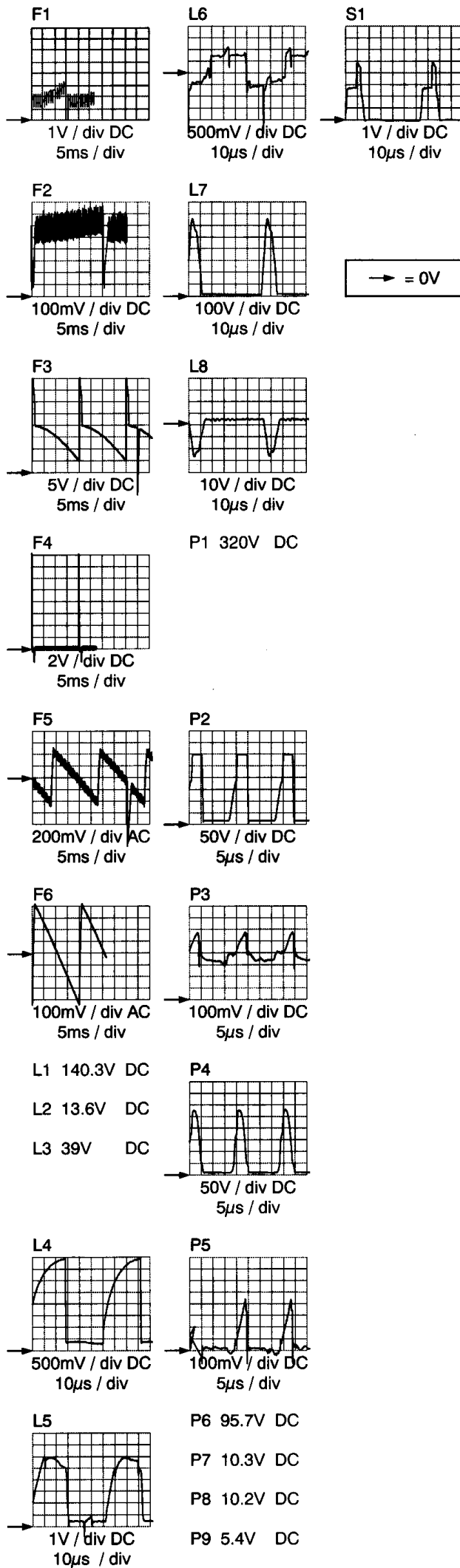
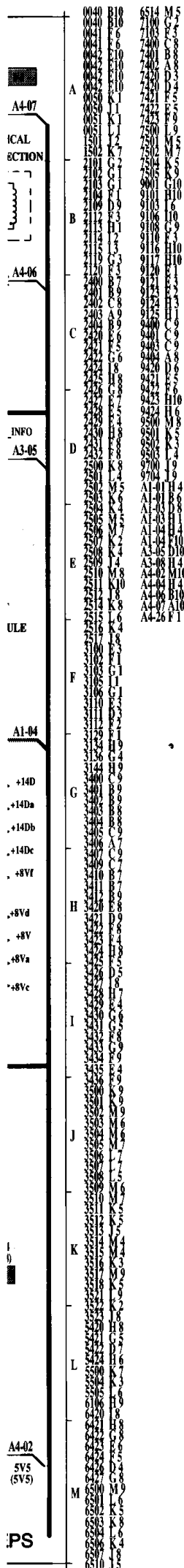
	SYS70 BG mono	SYS71 BG/L/L mono	SYS72 I mono	SYS73 BG/DK mono	SYS74 BG(2Sc)	SYS75 BG/DK(2Sc)	SYS76 NIC BG	SYS77 NIC I	SYS78 NIC L
3134	47	27	47	33	47	39	47	47	33
3523	3R3	3R3	3R3	3R3	1R	1R	1R	1R	1R



DO NOT MEASURE THE GATE OF TS2504

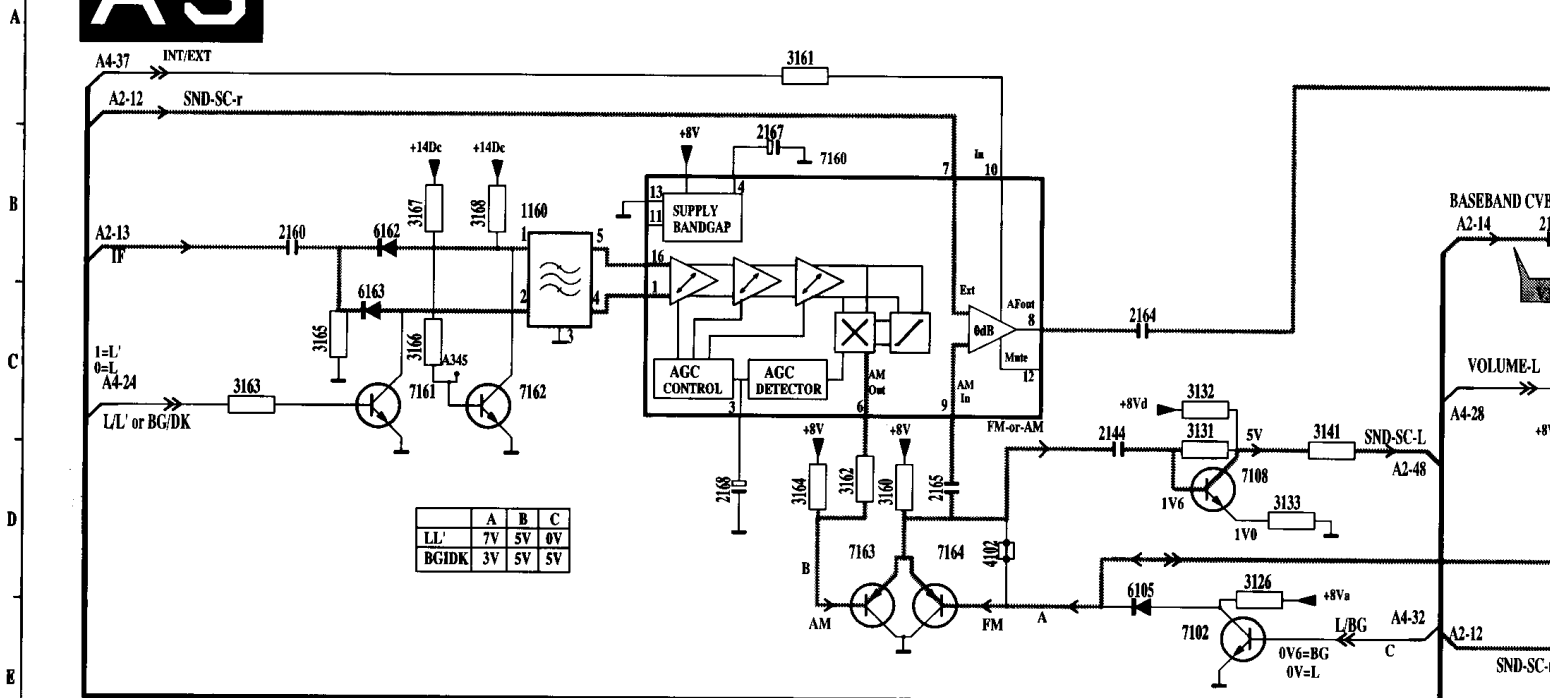
SUPPLY

Module secteur & Étage de lignes



A3

AM-SOUND

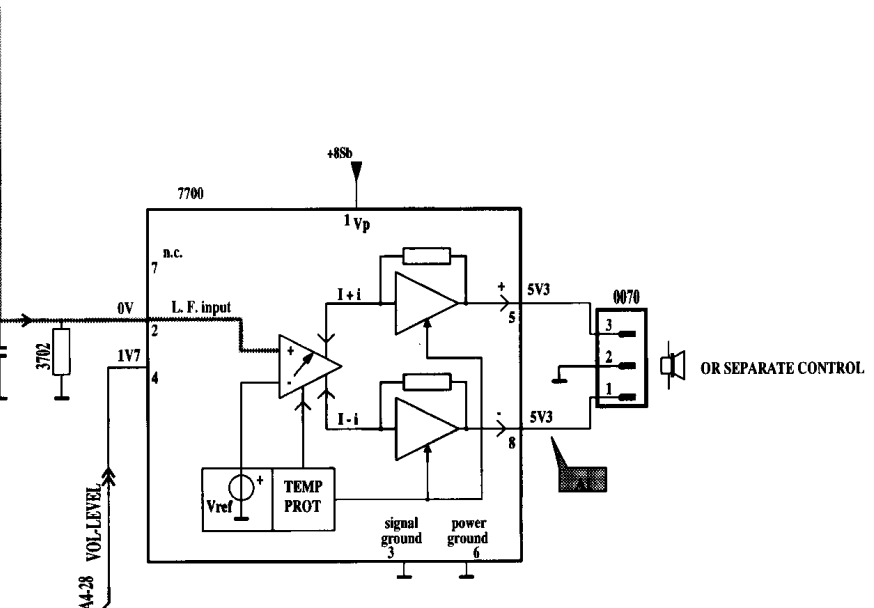
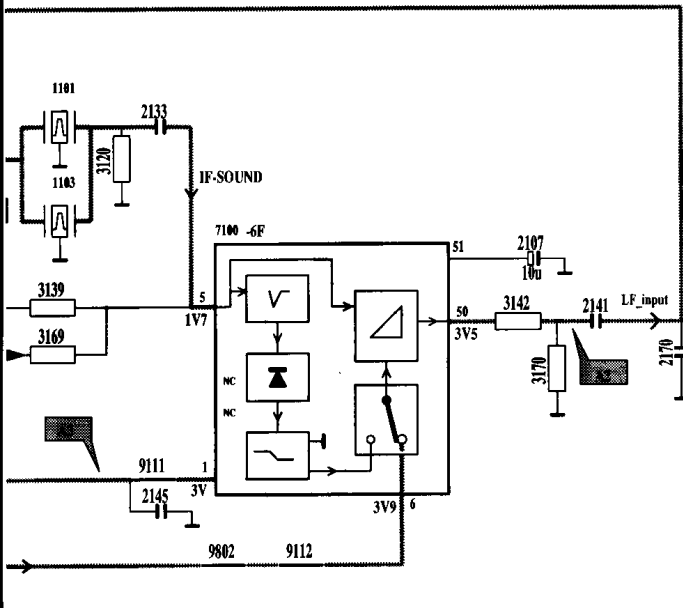


	A	B	C
LL'	7V	5V	0V
BGIDK	3V	5V	5V

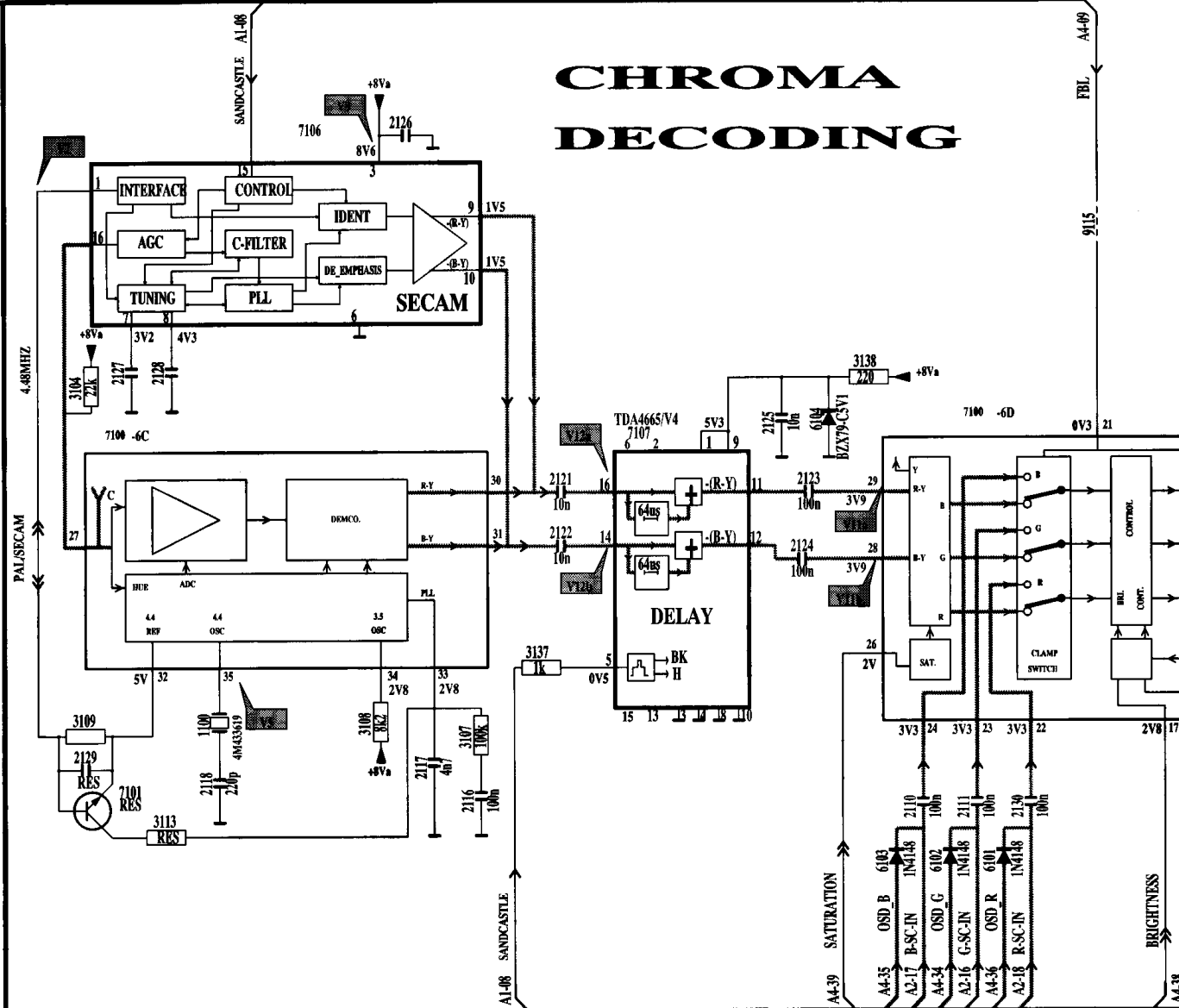
	SCA41 PAL	SCA42 PAL/SECAM	SYS70 BG mono	SYS71 BG/L/L' mono	SYS72 I mono	SYS73 BG/DK mono	SYS74 BG(2Sc)	SYS75 BG/DK(2Sc)	SYS76 NIC BG	SYS77 NIC I	SYS78 NIC L
2107											
00X0											
0070			+++	+++	+++	+++	+++	+++	+++	+++	+++
1101			5M5	5M5	6M	5M5	5M5	5M5	5M5	5M5	5M5
1103			---	---	---	6M5	---	---	---	---	---
1160			---	OFWL9453M	---	---	---	---	---	---	6M5
2126	---	100n	---	---	---	---	---	---	---	---	---
2127	---	100n	---	---	---	---	---	---	---	---	---
2128	---	220n	---	---	---	---	---	---	---	---	---
2133			1n	1n	1n	1n	---	---	---	---	---
2134			47p	47p	47p	47p	---	---	---	---	---
2141			100n	---	100n	100n	---	---	---	---	---
2144			220n	220n	220n	220n	---	---	---	---	---
2145			3n9	3n9	3n9	3n9	---	---	---	---	---
2160			---	4n7	---	---	---	---	---	---	---
2164			---	100n	---	---	---	---	---	---	---
2165			---	220n	---	---	---	---	---	---	---
2167			---	4n7	---	---	---	---	---	---	---
2168			---	4n7	---	---	---	---	---	---	---
2170			1n5	1n5	1n5	1n5	---	---	---	---	---
3109	---	0R	---	---	---	---	---	---	---	---	---
3120			1k	1k	1k	1k	---	---	---	---	---
3126			---	1k	---	---	---	---	---	---	---
3131			390k	390k	390k	390k	---	---	---	---	1k
3132			680	680	680	680	---	---	---	---	---
3133			180	220	180	180	---	---	---	---	---
3139			3k3	---	3k3	3k3	---	---	---	---	---
3141			150	150	150	150	---	---	---	---	---
3142			18k	---	18k	18k	---	---	---	---	---
3160			---	4k7	---	---	---	---	---	---	---
3161			---	10k	---	---	---	---	---	---	---
3162			---	39k	---	---	---	---	---	---	---
3163			---	22k	---	---	---	---	---	---	---
3164			---	22k	---	---	---	---	---	---	---
3165			---	2k2	---	---	---	---	---	---	---
3166			---	22k	---	---	---	---	---	---	---
3167			---	4k7	---	---	---	---	---	---	---
3168			---	4k7	---	---	---	---	---	---	---
3169			RES	---	RES	RES	---	---	---	---	---
3170			6k8	---	6k8	6k8	---	---	---	---	---
3702			15k	---	15k	15k	---	---	---	---	---
4102			50m	---	50m	50m	---	---	---	---	---
6105			---	1N4148	---	---	---	---	---	---	1N4148
6162			---	1N4148	---	---	---	---	---	---	---
6163			---	1N4148	---	---	---	---	---	---	---
7100	TDA8361/N4	TDA8362E/N4	---	---	---	---	---	---	---	---	---
7102	---	---	---	BC848B	---	---	---	---	---	---	BC848B
7106	---	TDA8395/N1	---	---	---	---	---	---	---	---	---
7108	---	---	BC848C	BC848C	BC848C	BC848C	---	---	---	---	---
7160	---	---	---	RES	---	---	---	---	---	---	---
7161	---	---	---	BC848B	---	---	---	---	---	---	---
7162	---	---	---	BC848B	---	---	---	---	---	---	---
7163	---	---	---	BC858B	---	---	---	---	---	---	---
7164	---	---	---	BC858B	---	---	---	---	---	---	---
7700	---	---	TDA7052	TDA7052A	TDA7052	TDA7052	---	---	---	---	---
9111	---	---	+++	+++	+++	+++	---	---	---	---	---
9112	---	---	+++	---	+++	+++	---	---	---	---	---
9802	---	---	+++	---	+++	+++	---	---	---	---	---

FM-SOUND

AUDIO AMPL.



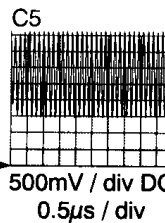
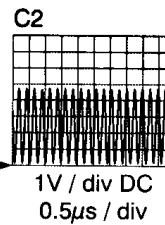
CHROMA DECODING



Commande & Télétexe

N52 TXT/16k	CON53 MONO TXT/16k	CON54 STEREO TXT/16k	CON55 NICAM TXT/16k
0n	100n	100n	100n
0n	100n	100n	100n
0n	100n	100n	100n
ES	RES	RES	RES
0n	10p	10p	10p
0n	10p	10p	10p
p	RES	RES	RES
p	RES	RES	RES
.	---	---	---
2	2u2	2u2	2u2
ES	RES	RES	RES
2	2k2	2k2	2k2
0k	180k	180k	180k
0k	390k	390k	390k
.	---	---	---
.	---	---	---
k	1k	1k	1k
0	470	470	470
0	470	470	470
k	27k	27k	27k
k	1k	1k	1k
0	150	150	150
k	1k	1k	1k
.	---	---	---
.	---	---	---
.	---	---	---
0	100	100	100
2	2k2	2k2	2k2
2	2k2	2k2	2k2
2	2k2	2k2	2k2
2	2k2	2k2	2k2
2	2k2	2k2	2k2
2	2k2	2k2	2k2
2	2k2	2k2	2k2
m	50m	50m	50m
m	50m	50m	50m
.	---	---	---
m	50m	50m	50m
M	12M	12M	12M
.	---	---	---
5290	TMP47C1637N	TMP47C1637N	TMP47C1637N
46B	BC846B	BC846B	BC846B
48B	BC848B	BC848B	BC848B
+	+++	+++	+++

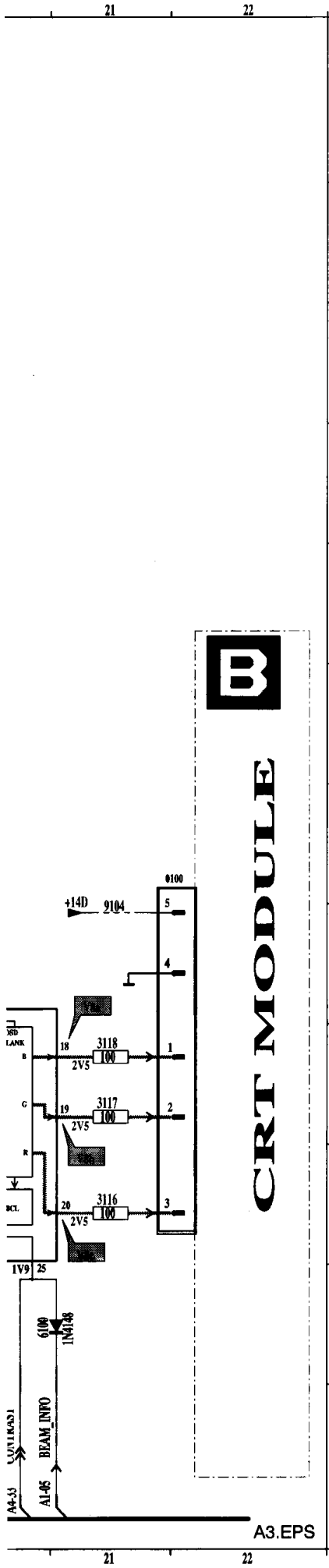
C1 5V DC
C3 5V DC
C4 5V DC



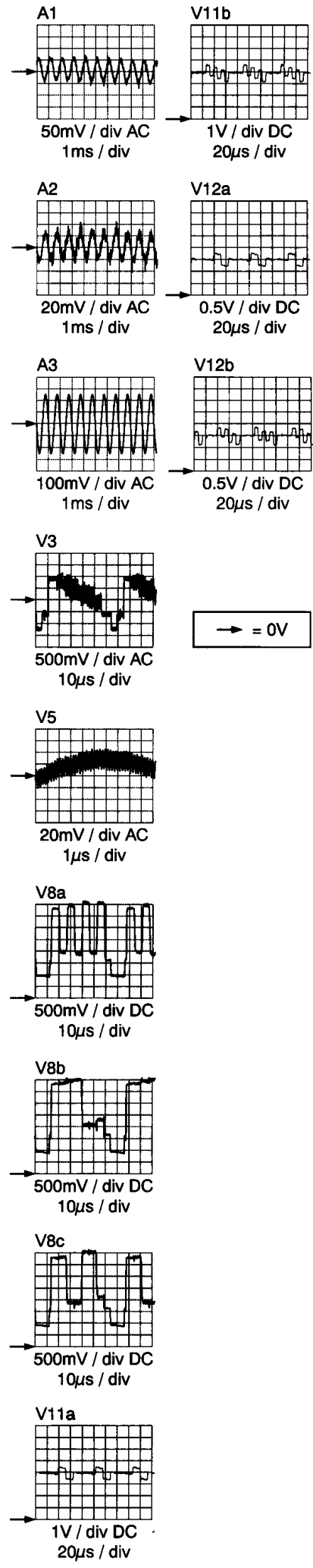
→ = 0V

CL OSC. A4.A1
040396

S72 no	SYS73 BG/DK mono	SYS74 BG(2Sc)	SYS75 BG/DK(2Sc)	SYS76 NIC BG	SYS77 NIC I	SYS78 NIC L
7	4u7	4u7	4u7	---	---	---
.	---	4u7	4u7	---	---	---
k	10k	10k	10k	---	---	---
.	---	5k6	5k6	---	---	---
.	---	10k	10k	---	---	---
.	---	5k6	5k6	---	---	---
0	100	100	100	---	---	---
.	---	100	100	---	---	---



0070 C18
 0070 C18
 0100 G21
 0100 G21
 0100 G21
 0100 G21
 0100 G21
 1100 J13
 1103 R10
 1100 R3
 2107 C13
 2110 K18
 2111 K18
 2116 K15
 2117 K14
 2118 K13
 2121 K15
 2122 H15
 2123 H7
 2124 H7
 2125 H7
 2127 H12
 2128 H12
 2129 H12
 2130 K19
 2133 R11
 2134 R10
 2141 C13
 2144 C7
 2145 D11
 2160 R27
 2164 R7
 2165 R6
 2168 R3
 2170 C14
 3104 H12
 3107 K15
 3108 H4
 3109 J12
 3113 K12
 3116 J21
 3117 J1
 3118 J1
 3120 R11
 3126 D18
 3133 C18
 3134 R8
 3137 H5
 3138 H8
 3139 C10
 3141 C8
 3142 C13
 3160 D6
 3161 A5
 3162 D5
 3163 C2
 3164 C2
 3165 C4
 3166 C4
 3168 R3
 3169 R3
 3170 D13
 3702 C15
 4102 D6
 6100 K20
 6101 K19
 6102 K18
 6103 K18
 6104 R9
 6105 D7
 6162 R3
 6163 C1
 7100 H12
 7101 H18
 7102 K12
 7106 F13
 7107 H16
 7108 D8
 7160 C3
 7161 R10
 7162 C3
 7163 D10
 7164 R15
 9104 H21
 9111 D11
 9112 E12
 9115 C19
 9802 E11
 A1-05 L20
 A1-08 E13
 A1-08 L15
 A2-12 E9
 A2-13 A1
 A2-13 B0
 A3-16 L18
 A3-17 L18
 A2-18 L19
 A2-48 D9
 A4-09 E19
 A4-24 C1
 A4-28 C0
 A4-28 E15
 A4-32 E9
 A4-33 L20
 A4-34 L18
 A4-35 L18
 A4-36 L19
 A4-37 A1
 A4-39 L20
 A345 C3



CL OSC_A3.A1
 040396

8. Electrical adjustments

1. Adjustments on the main panel

1.1 Horizontal centring

Is adjusted with potentiometer R3129

1.2 Picture height

Is adjusted with potentiometer R3407

1.3 Focusing

Is adjusted with the focusing potentiometer in the line output transformer

1.4 AFC

- a) Adjustment of the AFC and picture demodulator (all versions).
Select a non secam L/L' system in the SDAM mode (negative modulation). Switch the tuner to HIGH BAND (pin 11 of tuner 1100 grounded). Connect a pattern generator to pin 17 of the tuner via a capacitor of 4.7nF and put a 82W resistor from the output of the generator to ground. Connect a DC voltmeter to pin 44 of IC7100. Adjust coil 5100 to get 3V5 on pin 44 of IC7100. The signal of the generator has to be 38.9 Mhz.
- b) Adjustment of the AFC and picture demodulator. (BAND 1 L. France versions only).
Same story as a) only the frequency of the generator has to be 33.9Mhz with positive modulation.

1.5 RF AGC

If the picture of a strong local transmitter is reproduced distorted, adjust potentiometer R3130 until the picture is undistorted.

or: Connect a pattern generator (e.g. PM5518) to the aerial input with RF signal amplitude = 1mV. Connect a multimeter (DC) at pin 5 of the tuner. Adjust R3130 so that voltage at pin 5 of the tuner is 8V5 +/- 0V5 DC.

Adjustments on the CRT panel (Fig 5.2)

VG2 cut-off points of picture tube

Apply a black CVBS signal at the input pin 20 of scart. Adjust the brightness in order to have 1.6V during the line at the R,G,B outputs of the BIMOS pin 18,19,20 of IC7100. Put potentiometers R3326, R3316 and R3306 to the minimum value (maximum voltage on the crt cathodes). Adjust now VG2 till the colour that lumines first is not visible anymore. Adjust now the other two potentiometers in such a way that they just don't luminate. Potentiometer R3308 should always be in the mid-position.

9. Circuit description

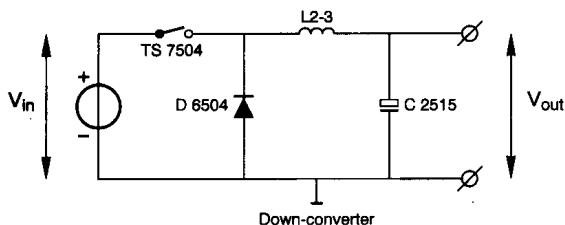
For the description of the audio and video processing see the description in the AA5 AA service manual.

1. Description of the power supply of the L6.1

Note: The voltages +96S and +96s are not mains isolated.

The power-supply used in the L6.1 chassis is a self-oscillating down converter with an auxiliary winding to help the FET to switch.

1.1 Principle of the down-converter



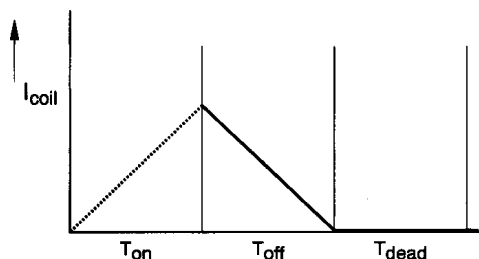
CL 66532015_013.AI
150296

When switch TS7504 is closed, the voltage on L2-3 is $V_{in} - V_{out}$. During this time, energy is stored in the coil and energy is delivered to the load. When switch TS7504 opens, the energy stored in the coil will be stored in the output capacitor (C2515). This is due to the fact that the current through the coil has to decrease linear. When the switch is open the current is flowing through D6504, L2-3 and C2515. By controlling the duty-cycle of the switch, the output voltage can be regulated.

1.2 Start-up (see diagram A1)

When the switch TS7504 is closed, the input voltage is placed over winding 2-3 of transformer 5500, which acts as coil L2-3 in Fig 9.1. Via resistors R3513, R3518 and R3512 the switch is turned on for the first time. Zener diode D6502 prevents that the U_{gs} of the FET becomes higher than 15V. When the input voltage is on winding 2-3, there is also a voltage on winding 1-2. Via winding 1-2 the correct switching voltage is obtained. The DC-part of this voltage is blocked by capacitor C2503. Diode D6510 acts as a protection in start-up and in short-circuit situations. During start-up the output capacitor C2515 is empty. It takes a relative long time to charge the gate to a voltage high enough to switch on the FET. This is due to the fact the diode D6510 is conducting. When this diode is conducting, the current that would normally flow into the gate of the fet to switch on the FET, is now flowing into C2515. In this way a smooth start-up is guaranteed.

1.3 General way of working



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260296

The state of the power-supply can be divided into three areas:

- *T-on*; In this state the FET is conducting and energy is stored in the coil and in the output capacitor.
- *T-off*; In this state the fet is non conducting and the energy stored in the coil is fed to the output capacitor.
- *Tdead*; Fet is out of conduction and there is no energy in the coil.

T-on; In the T-on state, switch TS7540 is switched on. When the switch is on the voltage over resistors R3514-R3515 is a direct measure for the current through winding 2-3. This is a negative voltage. When this voltage becomes below a certain level, TS7501 starts conducting and will switch off the fet. In this way it is prevented that the coil can go into saturation. This could be the case when the output voltage is very low. (long on time of the FET). When the output-voltage becomes too high during T-on the FET will be switched off. (see Output-voltage regulation)

T-off; Due to the stored energy a current will start to flow through D6504, C2515 and winding 2-3. Due to the fact that the current is flowing through this circuit, a voltage with reverse polarity is on winding 1-2. In this way the fet remains off until the current through winding 2-3 reaches zero. Now a new cycle will start. The fet will be switched on and all starts over again.

T-dead; If the output voltage is too high (for example in a low load situation) the FET remains off till the output-voltage is not to high anymore.

1.4 Output voltage regulation

This is done by the circuit D6501, R3509, TS7502, R3505, R3507, R3510. Transistor TS7502 can only conduct when the voltage on the base is 0V7 lower than the voltage the voltage on the emitter. This means that the voltage drop over resistors R3505 and R3507 should be 5V6(zenerdiode) + 0V7(base-emitter). This is reached when the output voltage exceeds the 100V. Now transistor TS7502 starts conducting, which brings transistor TS7501 in conduction. As a consequence the gate voltage of the fet becomes very low and the fet stops conducting. As long as the output voltage is too high the fet stays out of conduction.

2. Protections

2.1 Overvoltage protection

A disadvantage of a down converter is that if the switch becomes a short-circuit, the output voltage will increase to the input voltage. This could damage circuits. In this power-supply there is a protection to prevent this. If the output voltage becomes higher than 130V, zenerdiode D6514 starts to conduct. The V_{in} will be short circuited. This will blow the main fuse 1501 and protect in this way all the other circuits.

2.2 Short-circuit and start-up protection

The short-circuit protection works the same as the start-up protection. If the output-voltage is very low in case of a start-up or a short-circuit condition, The gate will be charged very slowly due to the fact that zenerdiode D6510 is conducting. So the current is not only charging the gate but is also flowing into the output capacitor. In this way it takes a few milliseconds to switch on the fet. Diode D6510 takes also care that the fet never remains in his power consuming (linear) area. If the output voltage is very low, it also takes a large time before the current through winding 2-3 reaches zero. The power supplied to the circuit is in this way very low and protects in this way the circuit.

2.3 Other output voltages

The output voltages +8S, +9S and +5S are made by winding 5-6. During the time that the fet TS7504 is not conducting, energy is transformed to this winding (flyback principle) and the voltages mentioned above are created. From the +9S, the +5S voltage is derived. This voltage is stabilized by transistors TS7505, TS7500 and zenerdiode D6500. D6500 is the reference voltage and TS7505 is delivering the current. When zenerdiode D6500 starts conducting, the voltage over resistor R3502 becomes high and a POR signal is created.

3. Degaussing

R3516 is a dual PTC (2 PTC's in one housing). After switching "on" the set, the PTC is cold, so low ohmic. This makes the degaussing current high. After degaussing the PTC is heated, so high ohmic. This makes the degaussing current low. After degaussing the PTC remains heated by the mains.

4. Line-circuit (Diagram A1)

The primary side of the line-circuit and the deflection coil are connected to the hot earth. The driver-circuit contains an opto-coupler to create isolation between the low-signal parts and the mains. The optocoupler is driven by pin 37 of IC7100-6E via transistor TS7103.

When TS7103 is not conducting, (the LED of the optocoupler is also out of conduction) TS7421 is also not conducting. In this way TS7422 will conduct and the 96V is placed over winding 2-1 of the LOT. A voltage over winding 2-1 of the LOT will cause a voltage over the windings 8-10, 6-10 and 9-10. Now energy will be transformed from the primary to the secondary-side and charge capacitors C2424 and C2425.

C2430 will be charged to the difference of the +40D and +14D (=26V) when TS7422 is conducting. When TS7422 stops conducting, the voltage of pin 8 of the LOT will become very negative. This forces C2430 to be charged to 26V plus the absolute value of pin 8. When TS7422 starts conducting again the voltage of pin 8 of the LOT will increase and so the voltage on the anode of D6422. In this way the 160V is created. This means that during the off-time of TS7422, C2430 is charged and during the on-time of TS7422, the energy in C2430 is given to C2426.

When transistor TS7103 conducts, the LED of the opto-coupler will be activated. This causes the transistor of the opto-coupler to conduct, which drives TS7421 in conduction. This brings TS7422 out of conduction. Due to this construction, this circuit is protected against missing line-drive pulses. When a line-drive pulse is missed, the line-transistor stays out of conduction, due to the fact that the diode of the opto-coupler is forced into conduction by TS7103. In this way nothing can be damaged when there is no line-drive.

Winding 4-3 is an extra winding to help TS7422 to switch.

On the secondary-side of the LOT there is a circuit consisting of TS7423, R3422, R3433, R3434, C2431 and C2432. This circuit creates a pulse when TS7422 switches off. This pulse indicates that horizontal flyback takes place. This information is fed to IC7100-6E to blank the picture.

4.1 Stand-by

The standby signal from the μ C is low in case of stand-by. Now TS7103 is brought into conduction by R3100. As mentioned before this will switch off the line-output stage completely.

5. Deflection

5.1 Horizontal deflection

The voltage over capacitor C2422 is the same as the voltage over C2515 (96V). When TS7422 is conducting this voltage is placed over the horizontal deflection coil. This causes a linear increasing current through this coil. In this way deflection is created. When TS7422 switches of flyback takes place and it starts all over again. L5424 is used for linearity correction.

5.2 Vertical deflection

Vertical deflection is based on a balance amplifier. Or TS7401 or TS7402 is conducting. This depends on the signal V-drive. If V-drive is high TS7401 conducts and the voltage of C2401 is placed over the deflection coil. Now the picture is written. When V-drive is low, TS7402 conducts and the +40V supply voltage minus the voltage over C2401 is placed over the deflection coil. Flyback takes now place. In this way deflection is generated. R3407 is used to adjust the vertical shift. With this resistor the level of the signal VFB is adjusted. R3402 and C2404 are used to damp oscillation of the deflection coil with his parasitic capacitance.

The signal NIL from the μ C is used to create a non-interlaced mode. This is done by creating a small DC current through the deflection coil.

5.3 Control and teletext (Diagram A4)

Teletext:

Control and teletext are integrated in the same μC . If there is no TXT another μC is used with less pins. In the story below, the numbers mentioned are the numbers mentioned outside the housing of IC7600..

The CVBS-signal is fed to pin 23 or 24 depending on the fact if it is the internal or external CVBS-signal. In this way teletext can be used on the ext- and the int-signal. The teletext information and OSD-information is present at pin 32-33-34.

Control:

μC -connections.

supply voltage (pin 52):

If this voltage is present and the power-on signal is high the μC will start.

I²C-Bus (pin 50-49):

This bus is used to communicate with the EEPROM in which the settings are stored.

local keyboard (pin 48-47-46):

These three inputs are present as an input for the local keyboard. The inputs become connected to ground if a key is pressed.

IR-input (pin 45):

Input for the remote-control commands

TXT / no TXT (pin 44):

Depending on the fact if jumper 4600 or 4603 is placed, the μC is told if the set is a TXT or no-TXT set.

POR (pin 43):

If the POR-signal is low the μC will not start. The μC waits until this signal becomes high. In this way the μC knows that the supply-voltage is high enough.

4Mhz oscillator (pin 42-41):

The frequency of the oscillator of the μP is determined by this crystal 5600. In the TXT execution this frequency is 12Mhz.

Ground (pin 40):

Ground of the power-supply.

OSD-Generator (pin 39-38):

The components connected these pins determine the frequency of the OSD-generator. This is 6.5 Mhz.

VFL (pin 37):

This pin is used to tell the μP that vertical flyback takes place. This information is used for determine the location of the OSD.

Horizontal flyback (pin 36):

Pin to inform the μC that horizontal flyback takes place. Also information required for OSD.

Fast-blanking signal (pin 35):

This signal (FBL) is used to indicate the video controller that there is OSD or Teletext information. So this signal blanks the video information.

OSD-signals (pin 34-33-32):

These three signals are used to create OSD information in different colours.

Nil (pin 27):

Signal to generate a DC-current through the deflection coil to create a non interlaced mode during TXT-mode.

CVBS-inputs (pin 24-23):

These pins are used as input for teletext-sources. Pin 24 is input for the CVBS-signal of the scart-input and Pin 23 or the internal CVBS of the set.

LED-drive (pin 20):

Signal to drive the LED when the set is on. With TS7607 it is possible to light the LED with a higher luminance during stand-by.

Functional switch (pin 19):

In the future the switch connected to this pin could be used instead of a mains-switch.

Status (pin 18):

Input-pin to tell the μC that there is an external-signal present. Pin 18 high is external and pin 18 low is internal signal.

Int/Ext (pin17):

Control signal to select between internal and external(scart) signal. If pin 17 is "high" the internal signal is selected, else the external.

Standby/AFC (pin 16):

This pin acts as an input for AFC-control and as an output for standby command. This pin is only used in TXT-versions.

Ident (pin 15):

This signal is high if a CVBS signal is present and low if no CVBS-signal is present. This signal is created by IC7100-6A.

Service (pin 14):

When this pin is connected to ground the service-mode is entered. Use of mains-switch not necessary.

L/L' or BG/DK (pin 12):

In case of a LL' set, selection is made between L and L'. In case of a BGDK set, selection is made between BG and DK. If this pin is "high" then L' or DK is selected.

Standby/AFC (pin 11):

This pin acts as an input for AFC-control and as an output for standby command. This pin is only used in non TXT-versions.

L/BG (pin 10):

To make a selection between AM and FM sound. When this signal is high, than FM sound is selected.

BS1-BS2 (pin 8-9):

Signal lines to select the correct band of the tuner.

	BS1	BS2
VHF1	0	1
VHF2	1	0
UHF	1	1

Control-voltage outputs (pin 7-1):

These pins are used to control volume-right, contrast, saturation, sharpness, brightness, volume-left and the tuning voltage for the VST. In case of a mono BG set, volume is controlled by signal "volume-L" connected to pin 5 of IC7100-6F. In case of a mono multi-france set, volume is controlled by signal "vol-level" connected to pin 4 of IC7700 (output amplifier).