Colour television

Chassis

GR2.3

Service
Service
Service

Repair Manual

Contents

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The SOPS (Self Oscillating Power Supply) on the primary side includes the following main functions:

1. **Start-up circuitry**

   * **If pin 7 CNR50 is more than 2,9 V and pin 8 CNR50 is more than 14,8V, then the starting current is supplied to TS7625**
   * **After start up, supply voltage at pin 7 CNR50 is taken over by pin 9-10 of T5625**

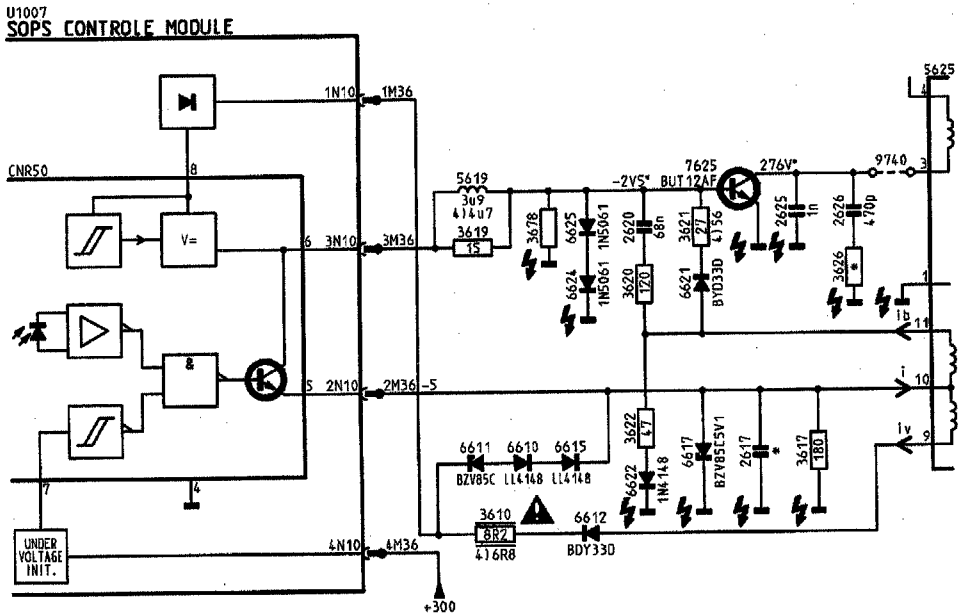
2. **Switch-off circuitry**

   * **Iff V_{REF} is less than 2.3V at pin 7 CNR50 then TS7625 is switched off**
   * **V_{REF} is determined by D6621, R3622, R3617, C2617 and D6617**
   * **R3621 and R3619 determine $I_{TURN-OFF}$ of TS7625**

3. **Undervoltage protection**

   If pin 7 CNR50 is less than 2,35 V or pin 8 CNR50 is less than 3,9 V, then CNR50 switches-off the power supply

GR2.3 POWER SUPPLY 1.1
Primary side



(..V)

1) 16/9-110°-BM-CRT
2) 25"/28"-BL-CRT
3) 21"-NN-CRT
4) 21"-MN-CRT

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Block diagram Secondary side

1. The self oscillating power supply (SOPS) supplies several DC voltages:

   * +148 (line output supply):

     - +148 V for 110°
     - +137,5 V for 16/9
     - +95 V for 90° 21"

   * +16/-16 (sound supply)

   * +5 (control supply)

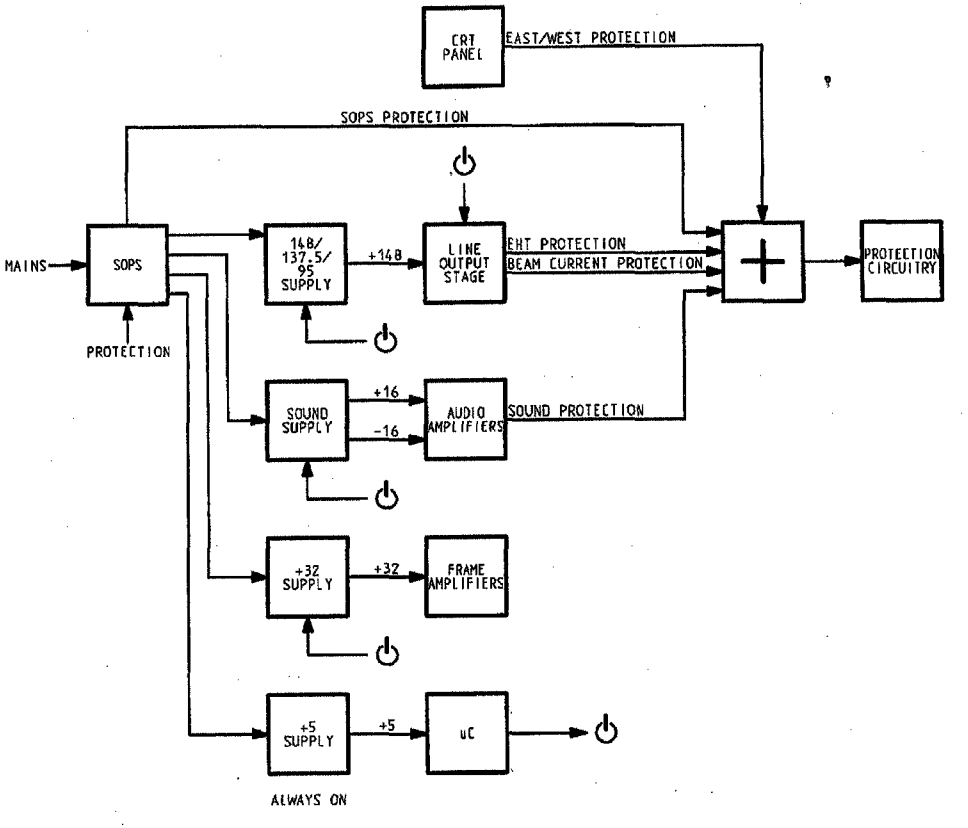
   * +32 V (start-up + frame supply)

2. Protection circuitry in the TDA8385 switches the set into "hick-up" mode (see section 1.3)

3. In "stand-by" the +5 V remains active

GR2.3 POWER SUPPLY 1.2

Block diagram Secondary side



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- If pin 8 TDA8385 is more than 2,5 V, then the TDA8385 will switch power supply in protection. The secondary voltage will drop, power supply will try to start-up again, switch to protection, start up again, protection, etc:

  → "Hick-up" mode

- The following protections can activate the protection circuitry of the TDA8385

1. Sound protection

   If the sum of the DC voltage over the loudspeaker is not 0:
   → TS7248 conducts if DC voltage is more than +0,6 V or TS7249 conducts if DC voltage is less than -0,6 V
   → TS7243 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

   If +16 OR -16 supply voltage drops
   → D6246 or D6247 conducts
   → TS7248 conducts if DC voltage is more than +0,6 V or TS7249 conducts if DC voltage is less than -0,6 V
   → TS7243 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

   If +16 AND -16 both drop
   → D6248 conduct
   → TS7243 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

2. Beam current protection

   If beam current too high
   → Zener D6590 conducts so current through R3591
   → TS7591 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

3. East/west protection

   If frame current through TS7533 and so voltage over C2533 too high OR if no frame current, C2533 will be charged by the line
   → Voltage at anode of D6560 is more than (0,6 + 0,68) V
   → Zener D6561 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

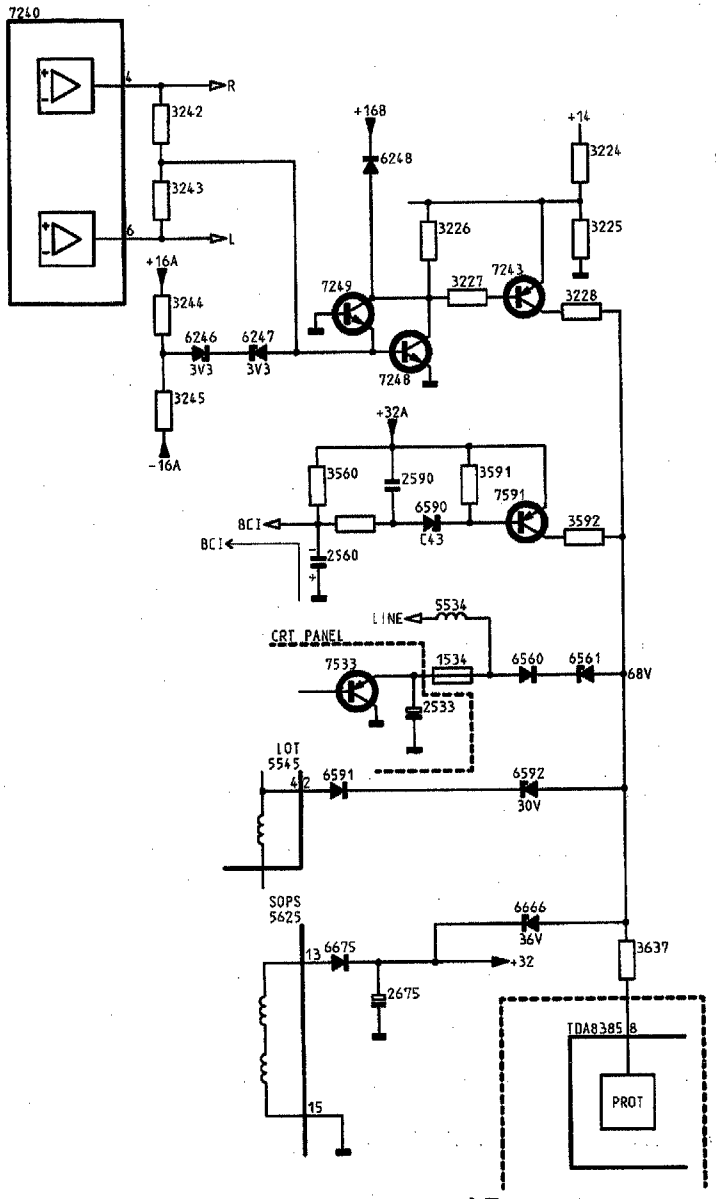
4. Line protection

   If EHT is more than (0,6 + 30) V
   → Zener D6592 starts conducting
   → If pin 8 TDA8385 > 2,5 V
   → Protection on

5. SOPS over voltage protection

   If +32 across C2675 is more than 39,5 V
   → Zener D6666 starts conducting
   → If pin 8 TDA8385 is more than 2,5 V
   → Protection on

Protection



SOUND PROTECTION

BEAM CURRENT PROTECTION

EAST/WEST PROTECTION

LOT OVERVOLTAGE PROTECTION

SOPS OVERVOLTAGE PROTECTION

SOPS CONTROL MODULE

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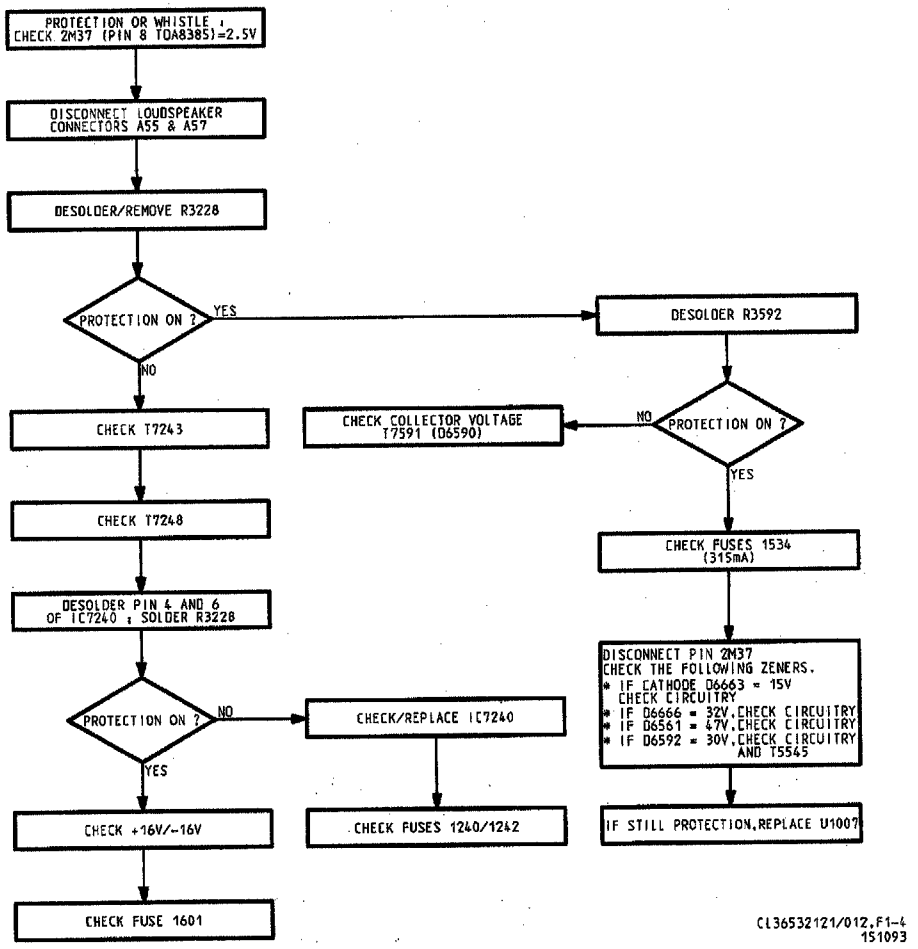
Fault finding tree "overvoltage protection"



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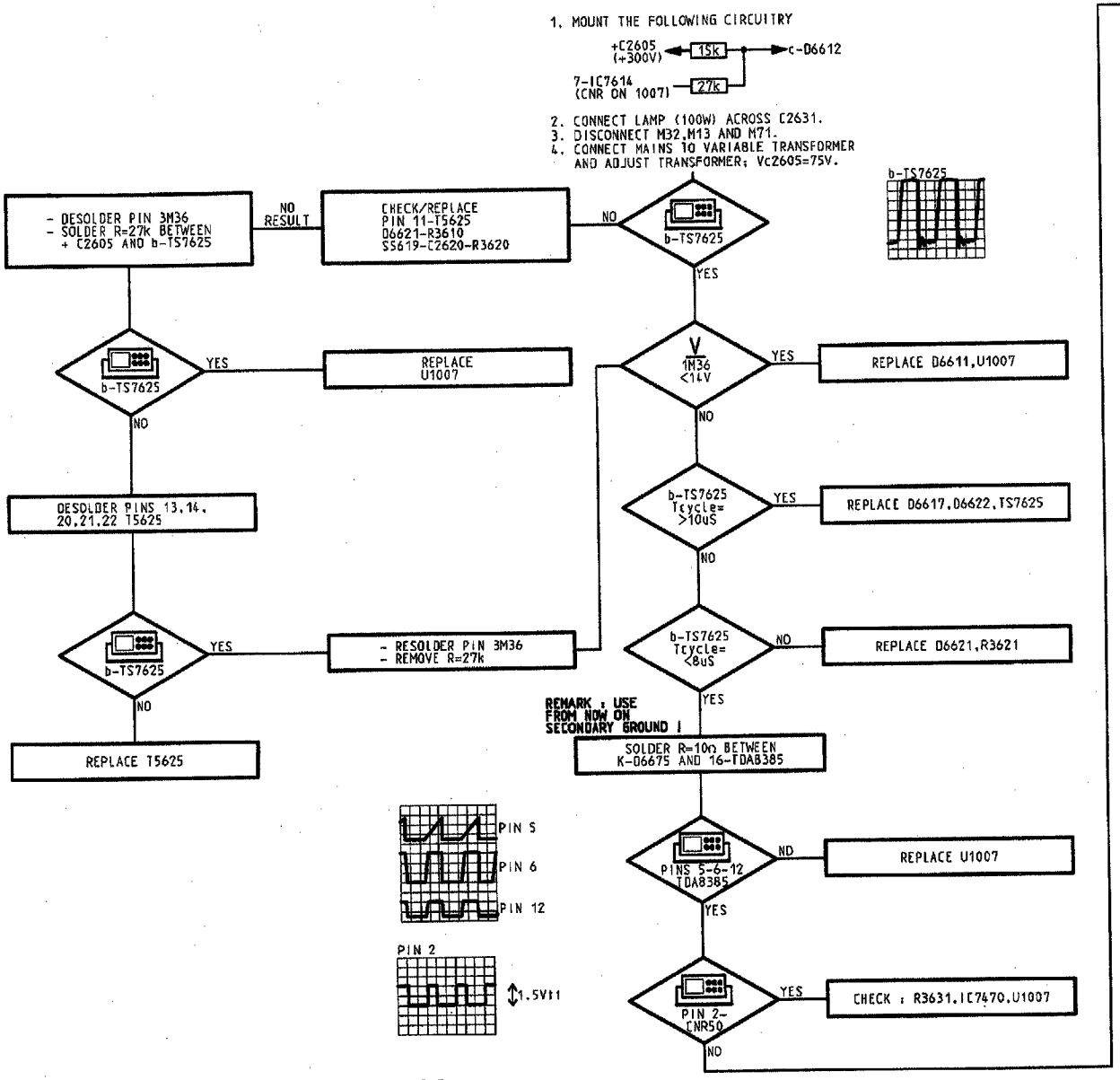
Fault finding tree "power supply"



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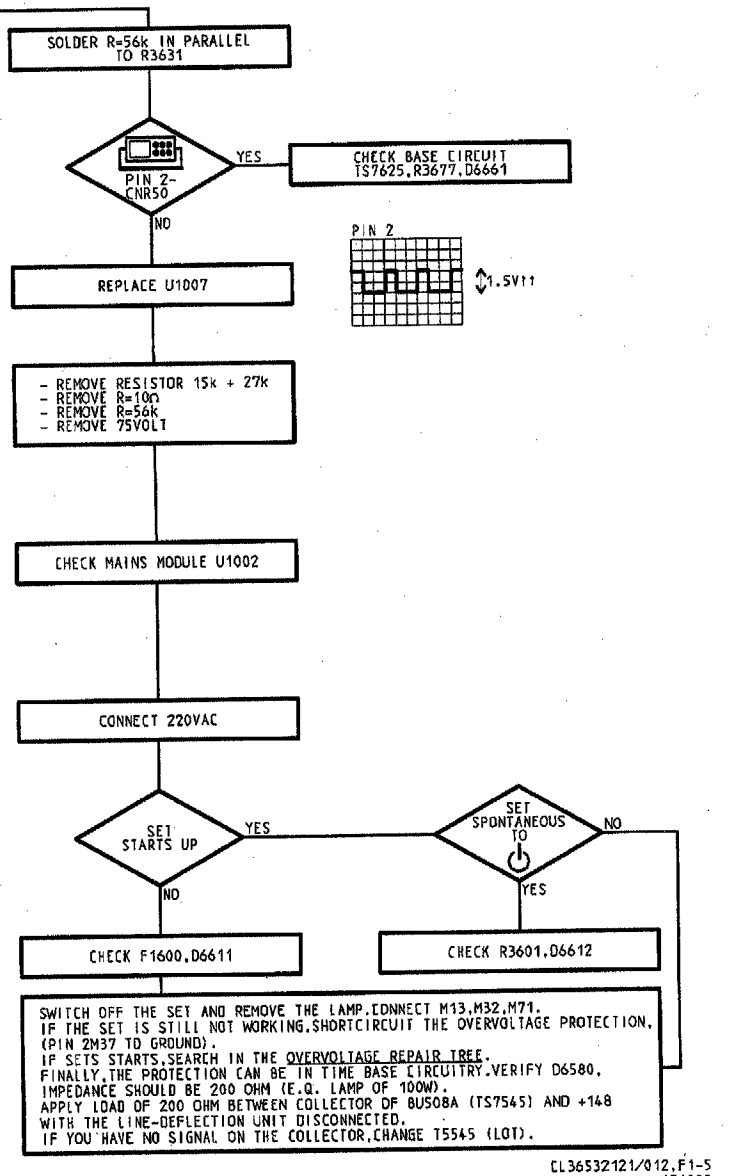
GR2.3 POWER SUPPLY 1.5

Fault finding tree "power supply"



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1.10

Survey voltages

GENERATED		+200	+190 A	+190 B	+148	+148 B	+32	+32 A	+32 B	+16	-16	+16 A	+16 B	-16 A	-16 B	+14	+14 A	+14 B	+14 C	+14 D	+14 E	+14 F	+13	+12	+12 A	+12 B	+12 C	+12 D	+12 E	+12 F	+12 G	+9	+8 A	+8 B	+6	+5	+5 A	+5 B	+5 C	+5 D	+5 E	+5 F	+5 G	+32 V	-26	+9 A	+9 B	+9 V
	PART OF MANUAL	D	E	E	D	D	D	D	D	D	D	B	B	B	B	D	K	C	C	D	D	A	K	F/G	E	E	E	E	J	J	J		D	D	C	D	A	G	G	I	I	I	I		D	K	K	K
	GRID SQUARE	A14	C4	D5	I22	I22	J14	A24	I24	M12	N12	B6	B6	A6	A6	F13	F19	M5	L5	F13	G13	G3	L20	J18 D8	B6	B6	C6	C6	F3	G3	H3		C25	C25	B16	N14	G7	F8	G8	C3	E3	C4	I10		B14	L15	L14	L15
CONTROLS	(A)				X											X						X														X	X										
TUNER	(B)															X																X			X	X											
AUDIO	(B)									X	X	X	X	X	X	X																																
VIDEO	(C)															X				X												X	X		X												
SYNC	(D)							X								X					X																											
SOPS MODULE	(D)						X																																									
LINE	(D)				X	X	X	X																																								
FRAME	(D)						X		X																																							
CRT	(E)	X	X	X																				X	X		X	X																	X			
STEREO MODULE	(F)															X								X																								
NICAM MODULE	(G)															X								X														X	X	X								
AUDIO AMP	(H)									X				X																																		
TXT	(I)																							X															X	X	X	X	X	X					
PIP	(J)																						X	X			X		X	X	X					X		X										
SECOND SCART PANEL	(K)															X	X															X														X	X	X
SCAVEM AMP	(M)																																												X			
SCAVEM FILTER	(L)																						X																									

1.6 POWER SUPPLY GR2.3

Survey voltages

Introduction

In the microprocessor IC7708, the following service software features are implemented:

- Self test of the internal RAM
- Error reporting of defective I^2C bus controlled IC's
- Default settings after mounting an empty EEPROM

SELF TEST

After every hardware reset, all RAM locations are tested. If the test result is negative, the "LED" is blinking fast.

ERROR CODES

"Error codes" are indicated by:

- blinking "ON" LED
- displaying an "Error message"

DEFAULT SETTINGS

As soon as the microprocessor IC7708 starts up, default values are stored in the EEPROM. These default settings can be changed in the service mode.

Error table

Priority level	Error	Device	Error message
1	Pip module		"ER PIP"
2	Chroma 1	IC7309 IC7308	"ER 4680" + LED 1s on/1s off
3	Chroma 2		"ER 4670"
4	PLL tuner	U1000	"ER TUNER"
5	Eeprom	IC7710	"ER EEPROM"
6	Sound processor	IC7220/ IC7215	"ER 8425"
7	Sound decoder	IC7200	"ER 8415/8417"
8	Nicam decoder	IC7150	"ER NICAM"
9	TXT	IC7880	"ER TXT"
10	TDA8444 (16:9)	IC8444	"ER 8444"
11	SAA5246	IC7800	"ER 5246"
12	TEA6415	IC7820	"ER 6415"
13	Bus hanging		"ER BUS" + LED 1s on/2s off
14	RAM		LED fast blinking

DISPLAY OF THE ERROR CODE

In the service-default-mode, error messages will be displayed after switch on the set or after changing program. The error message will be displayed for 3 seconds.

Only the last detected error code will be displayed.

Note: Leaving the service-default-mode is only possible with the "stand-by" command.

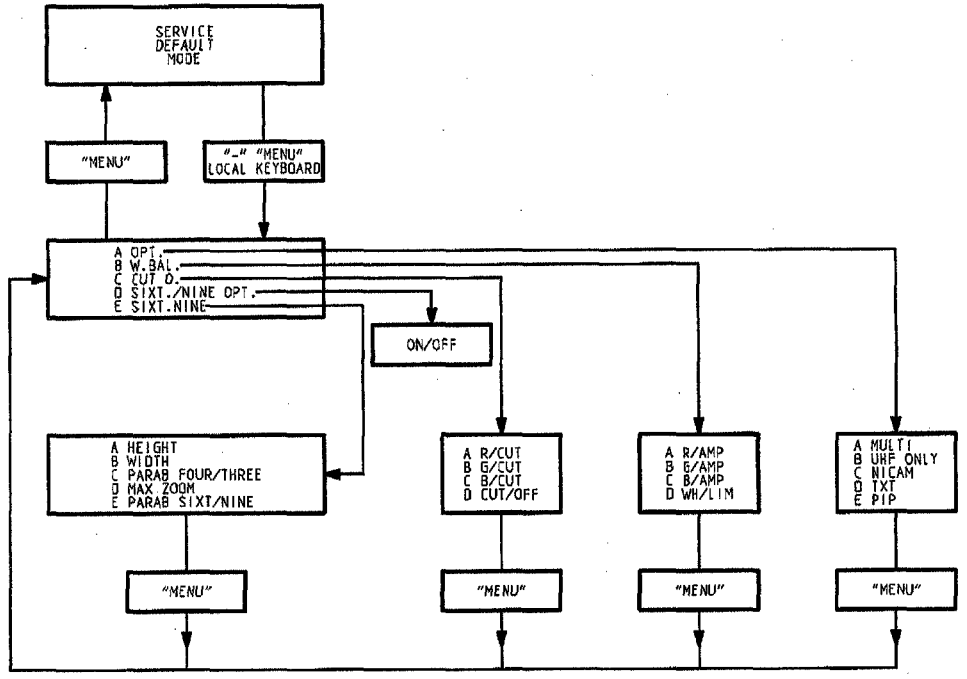
SERVICE MENU

1. **The service menu is entered by pushing simultaneously the "menu" button and the "-" button on the local keyboard.**

2. **Items can be selected by pushing the corresponding coloured buttons (on the remote control). Now a new menu will appear and other items can be chosen. These items can be set to "on" (available) by means of the "+" button or set to "off" (not available) by means of the "-" button.**

3. **By pushing the "menu" button, the first menu will be entered again.**

4. **By pushing the "menu" button again, the service-menu will be left and the service-default-mode will be entered again. All parameters will be stored in memory.**



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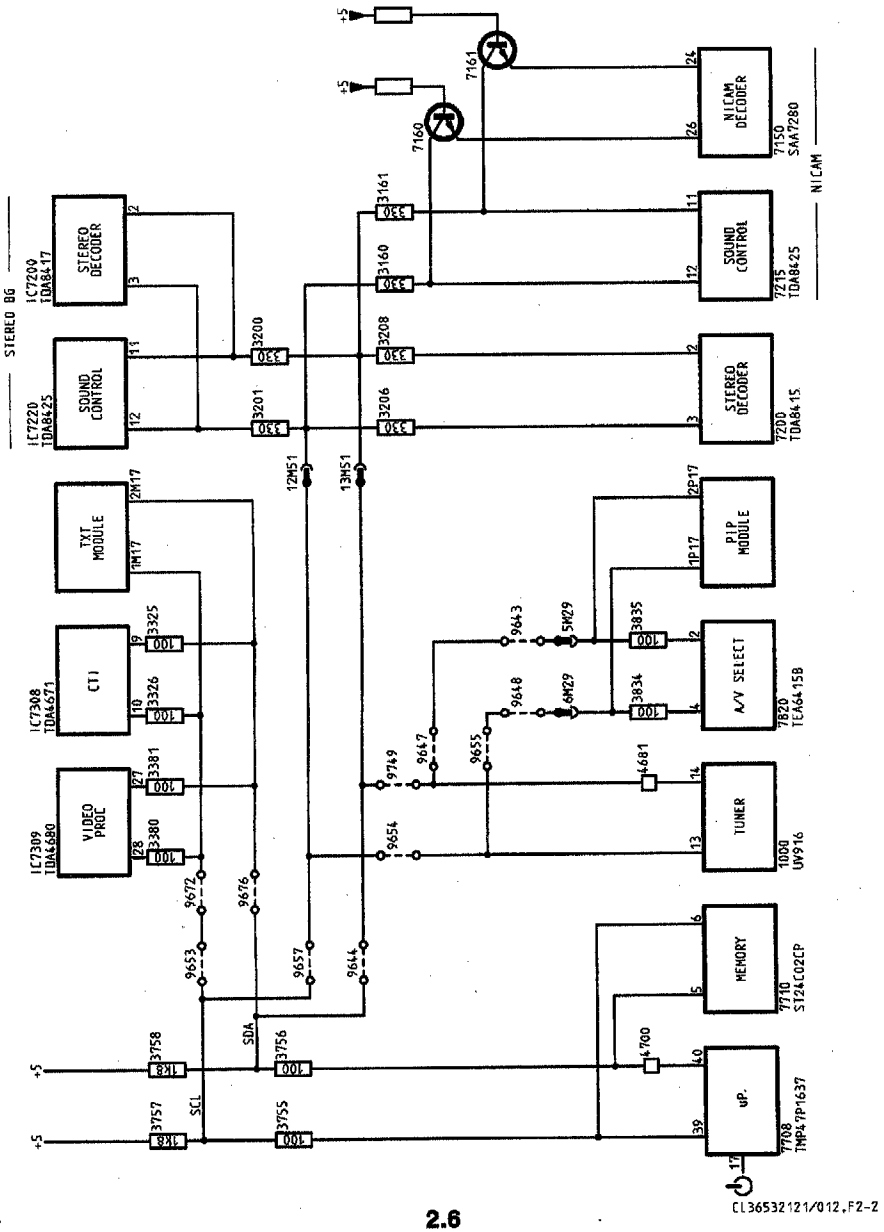
SERVICE TIPS

1. The I^2C connected IC's are separated via resistors (except tuner U1000, memory IC7710 and the TXT (U1003) and PIP (U1004) module).
   If, due to a defective IC, the I^2C bus is kept at a zero potential, the defective IC can be detected via DC voltage measurements.

   The IC with the lowest DC potential is the defective one.

2. If the menu on the screen is in french language only, it may be caused by an error on the TXT-module concerning microprocessor IC7880.



I^2C fault example

SYMPTOMS

After switching on with the mains switch the set gives:

- **no picture, no sound (screen is dark)**
- **"ON" LED is blinking.**
- **after pressing a RC key the "ON" LED blinks.**

FAULT FINDING

DIAGNOSE 1:

- **Power supply does not start (+148 not present; CRT filament not burning)**
- **"ON" LED is blinking after pressing RC key means; µC is receiving command but cannot execute**
- **Pin 17 µC (IC7708) is "low". This means power supply is in stand-by mode without indicating stand-by**
- **The fault has to be looked for in the I^2C bus system**

I^2C fault example

STEP 1: **Disconnect pin 17 µC IC7708 to avoid stand-by mode**

MEASUREMENT 1: **Measure with a multi meter the levels of Pin 39 (SCL) and Pin 40 (SDA) of µC IC7708 (I^2C bus)**

RESULT 1: **SCL = 5 V; SDA = 0 V**

MEASUREMENT 2: **Measure with an oscilloscope the levels at pin 27 (SDA) and pin 28 (SCL) of the video processor IC7309**

RESULT 2: **SCL = 5 V; SDA = 0 V**

DIAGNOSE 2: **The short circuit on the DATA line is caused by a device not connected via a series resistor to the I^2C bus.**
Otherwise both measurements on the SDA line are not equal. According to the survey of I^2C connections the tuner (U1000), the memory IC7710 and the TXT (U1003) and PIP (U1004) modules are connected without series resistors.

STEP 2: **By removing the plugable "PIP" and "TXT" modules it can be checked whether these modules are causing the problems**

RESULT 2: The modules do not cause the problem

DIAGNOSE 3: The only device without series resistor is the tuner.
Disconnect jumper 9749 (to 13M51)

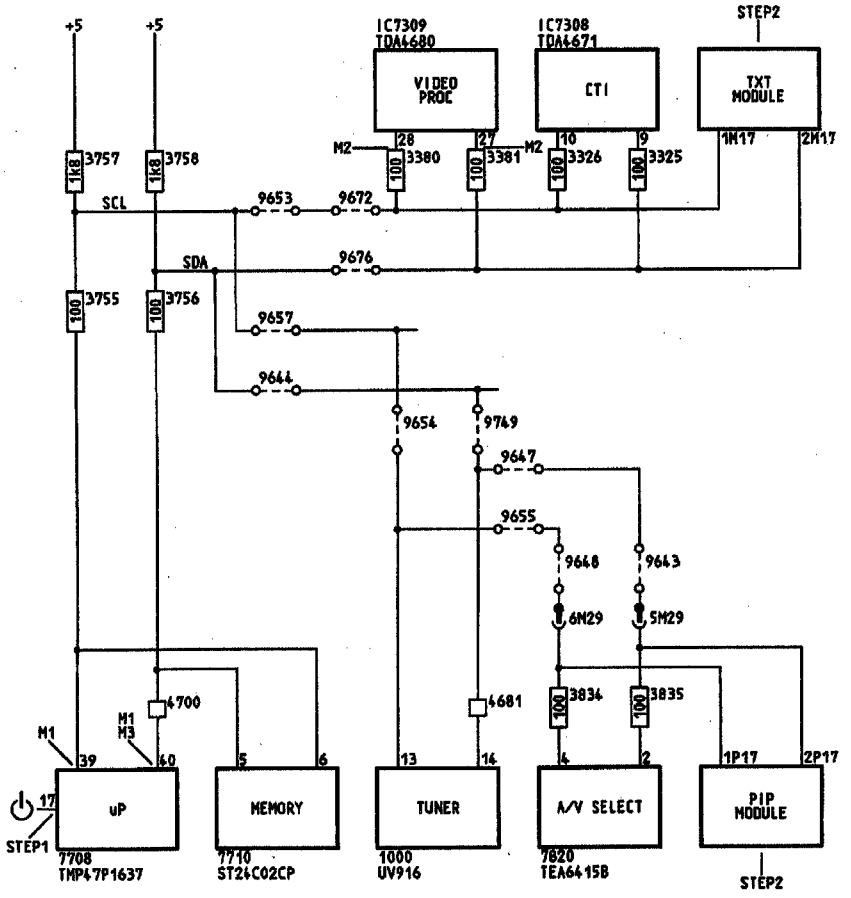
MEASUREMENT 3: Measure with multimeter or oscilloscope the level of Pin 40 (SDA) of IC7708

RESULT 3: SDA = 5 V
The disconnected tuner is causing the short circuit of the SDA line

REMARK:

In case a short circuit is present on the I^2C clock line (SCL), the set will produce the same symptoms

DIAGNOSE: Both SDA and SCL lines have a low level.
With an oscilloscope no data communication on the SDA line is measurable.
Proceed as indicated on previous sheets.



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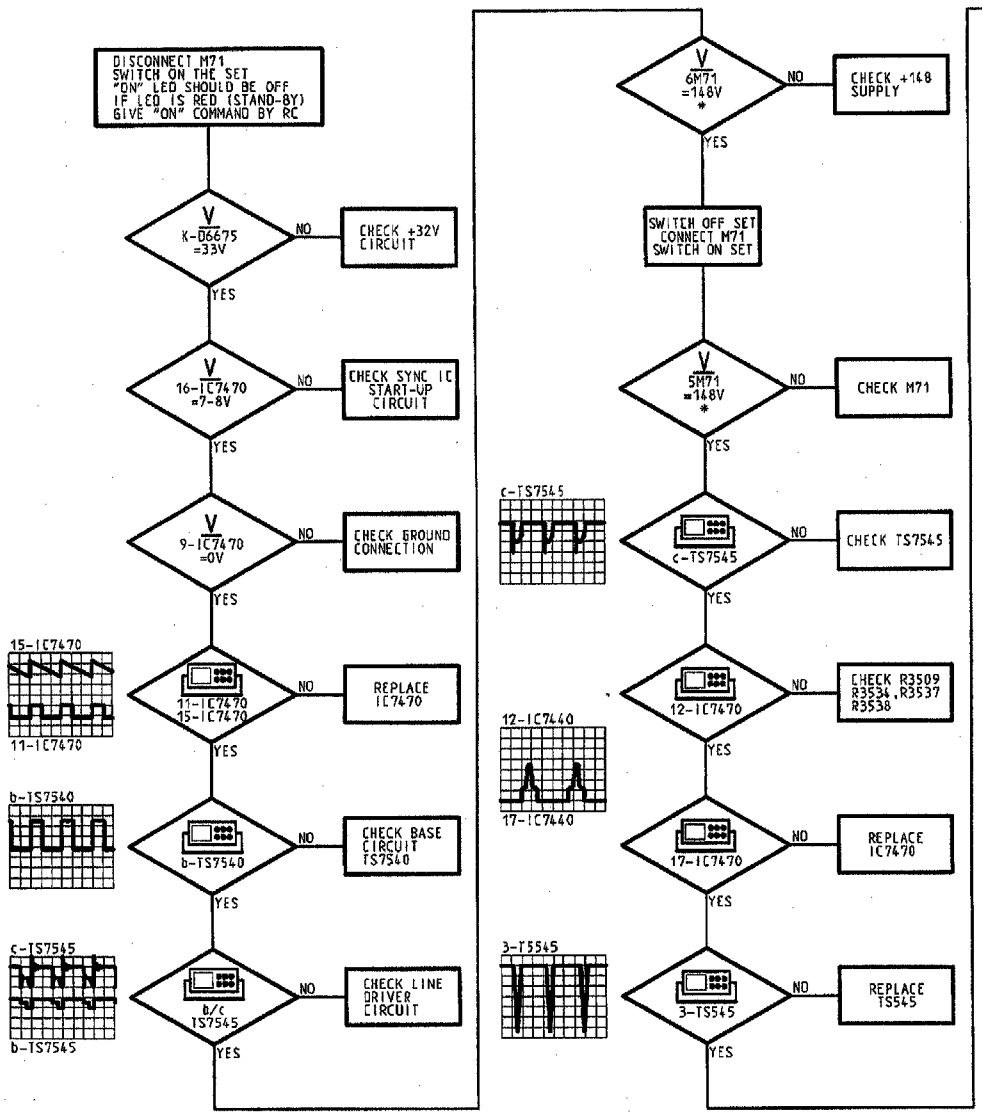
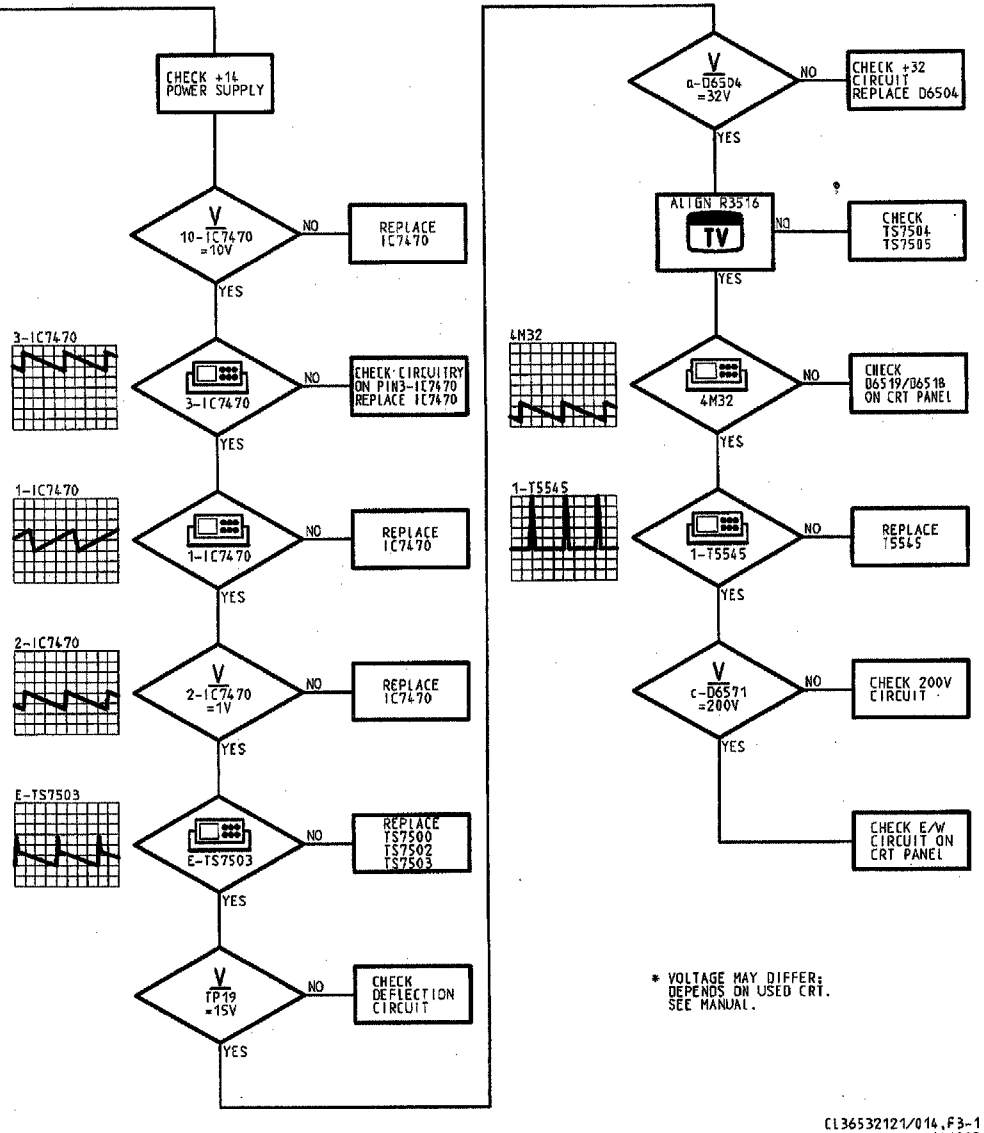
Fault finding tree



Fault finding tree



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Below a list is given of fault symptoms with the possible cause

Type of symptom	Analysis and description	Possible cause
OSD/menu	shifted to right	R3742 absent
	wrongly coloured	IC7309 (TDA4680)
	no menu	R3779 on front command panel
Frame amplitude zero	if oscillator frame (pin 3 of IC7470) = 0	C2471, C2473
	if not	TS7502 or R3503
Colour (chroma)	colour instability in blue	wrong filter 5.5 MHz at IF module L1042
	line instability between red and blue surfaces	IC7307 (TDA4661)
	at program switch, pinkish colour in white areas	IC7470 (frame too long) (TDA2579B)
	yellowish aureole	C2306, C2307
	green area at end of deflection	IC7305 (TDA4510)
	blue or yellow area at start deflection	IC7308 (TDA4661)
	left and right side alternating blue and green	value R3310
	colours RGB incorrect, check cut-off pulses	BAV103, D6301, D6331, D6361 on CRT panel
	no colour if warm	IC7305 (TDA4510)
	no red during fast changes, and TDA4680 is OK	EEPROM IC7710
	one of three colours not present; check if pins 21, 23 and 25 of TDA4680 < 4.7V	corresponding capacitors
	no colour with PAL	alignment oscillator
	saturation at 50% of warm saturation level	C2311
	discolouring	RGB connector too close to SOPS-trafo
	red at start-up (5 sec only)	IC7309 (TDA4680)
	greenish at end of deflection	C2355 inverse
	greenish, bad grey shades (filtering)	C2355, C2580
	discoloured half picture	value C2355
	colour rests; dragging	C2330
	colour instability in black/white: opening of colour	T7341, C2322, filter 5.5 MHz IF
No power	BUT12AF: base command > 10µs + PIC (voltage anode D6617 < -2V)	D6617
	zero (see repair tree)	CNR50, TDA8385, TA
	no base command BUT12AF, voltage pin 8 CNR50 = 9V	leakage D6612
	pin 8 CNR50 = 14V, pin 7 CNR50 = 3V	leakage D6611
	stop and short start-up, destruction T7625 and BUT12AF	leakage D6646
	wrong value D6547 (BYW95C iso BY228) or D6546	T7533, fuse 1534, D6547, D6546, D6561 (all!)
	no power when warm or alternating to stand-by	CNR50
	no power at 220V, OK at low voltage. See repair tree.	D6611
	voltage 148V < 93V; not in stand-by, pin 10 of TDA8385 = 1.1V, pin 33 of µP (reset) = 0.2V (D6665), alignment not possible and pin 7 of TDA8385 < 2.4V	leakage D6664
	voltage 148V = 75V, pin 8 of TDA8385 = 2.3V	see protection repair method
(geometric) Deformation	broken hor./vert. lines at right and left side, check L5534	L5549, shortcircuit C2539 and jumper 9670
	mode TXT or rapid switching	C2469
	seagull effect	TDA8385
	picture strangely shaped between hor. and vert. lines	R3560
	148V = 133V	value R3631
	shape: reversed pear	D6547, C2533, jumper 4505, shortcircuit of pin 7 LOT and 14V, R3533, C2532 or deflection unit
	curtain effect	T7533
Error messages	ERR 8415	IF NICAM IC8415
	ERR BUS	see section 2
	ERR CHROMA when warm	IC7470 (TDA2579B)
	ERR NICAM	IC7309 (TDA4680), 14V on IF, IC7470 (TDA2579B)
	ERR TUNER	link SDA and SCL broken
Picture quality	red drags, no voltage 200V	R3570, C2570

Type of symptom	Analysis and description	Possible cause
	bad colour, 148V = 160V, pin 8 of TDA8385 = -0.7V after CRT	leakage D6591
	ionised white line on right side	D6547
	flag effect on upper part of picture	IF: R3030, C2015
	extinxtion in stand-by (hor. line for a moment), 148V = 60V in stand-by	D6485
	misty (CRT AX). Look at contrast between chassis and CRT-panel: pin 15 of TDA4680 must be 3.8V If it is 4.7V, look at	TS7391 on the CRT-panel, or around jumper 9531
	instable in middle of picture	
	interference	C2703
	instable picture, followed by no picture	D6421
	no picture after TXT module is mounted (TXT is OK)	jumper 9850
	flyback lines	C2471, C2473
	'pumping' picture, check connector M13 and C19 (CRT-board)	C2526
	flyback lines in upper part visible	D6504, C2506
	black hor. lines	jumper 9806
	vertical instability	R3458
	instable in middle of screen	jumper 9531
	instable menu	IR-receiver
LED flicker	LED late after stand-by	leakage D6663
	orange after stand-by, later green	IC7470 (TDA2579B)
	orange, see repair method (no 14V)	
	orange or periodically zero with EXT3 and 16/9; 5V = 6 à 8V	D6662
	orange, 5V = 3.4V, ground = -1.4V	jumper 9850
	red: if pin 16 TDA2579B = 3V or pin 11 = zero	IC7470 (TDA2579B)
	if pin 16 = 0.7V	R3455
	red: no start-up after stand-by	R3663
	red: no 14V, see repair method	
	at start-up, 1 sec red, later green	D6705
	very weak green, if 148V < 93V, check pin 10 TDA8385 < 1.8V, pin 33 of µProc = 0.2V	TS7533
	no LED flicker, with deflection unit disconnected still no frame	IC7470 (TDA2579B)
	green; no lines, after hard reset µP OK	D6662
LED does not flicker with GR2.3: Brightness/contrast	no reaction on remote control; look if connector M41 is connected to connector T41 on TXT-panel and not on M56	connector inversion
	strong	CRT-panel R3370 and R3371; change also R3431, TS7362
	strong; pin 3 of TDA2579B = 0	C2471, C2473
	pumping after changing LOT	C2526; pin 7 bad contact
Install/search	does not stop	R3005
	can be in hotel mode	prog 38, push vol+ and prog- simultaneously
	code RC5 does not (or hardly) react	CRT - INTERFERENCE
Sound	no NICAM; pin 11 connector 51 on IF (power supply)	IF
	no sound, look at pin 13 of TDA2579B, OSD shifted on EXT	IC7470 (TDA2579B)
	no sound on right channel on EXT	bad contact pin 2 of peritel
	left 'plop' at start-up	D6249
	'plop' at start-up	IC7240 (TDA1521)
	'plop' en EXT 1.2.3	leakage C2800 or C2252
	diaphony (cross-talk over left and right)	broken mass in headphone
	'motor boating' in stand-by	2 diodes BYD33D, jumper 9697, 9699
TXT	TXT 3 sec too late	pin 20 IC7820
Protection	OK at 220V, protected at 240V	D6669
	protection on white picture, look if pin 15 of TDA4680 = 3.7V	D6367, D6590, D6315, R3560
	protection without antenna signal	leakage TS7246
	no LED flickering; 148V = 95V and with load 147V	LOT
General	no synchro; line frequency OK, probably defect mute video	IF D6043
	stays in service mode despite stand-by, check pin 18µP	µP, LED, D6705, EEPROM IC7710

	Measure with oscilloscope
V	Measure with multimeter
µC	Microprocessor
CNR50	Opto coupler on the SOPS control panel
CRT	Picture tube
EEPROM	Electrical Erasable Programable Read Only Memory
EHT	Extra High Tension
I^2C	Digital control/communication bus of the microprocessor
IF	Intermediate Frequency
LED	Light Emitting Diode
PIP	Picture In Picture
RAM	Random Access Memory
RC	Remote Control
SCL	Serial Clock Line of the I^2C bus
SDA	Serial Data Line of the I^2C bus
SOPS	Self Oscillating Power Supply
SYNC	Synchronisation
TDA8385	Control IC on the SOPS control panel
TXT	Teletext