5. Service Modes, Error Codes and Fault Finding

Index of this chapter:
1. Test points.
2. Service Modes.
3. Problems and Solving Tips (related to CSM).
4. ComPair.
5. Error Codes.
6. The Blinking LED Procedure.
7. Protections.
8. Repair Tips.

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. These test points refer to the functional blocks:

TEST POINT OVERVIEW L01		
Test point	Circuit	Diagram
A1-A2-A3-…..	Audio processing	A8, A9 / A11
C1-C2-C3-…..	Control	A7
F1-F2-F3-…..	Frame drive	A3
I1-I2-I3-…..	Tuner & IF	A4
L1-L2-L3-….	Line drive	A2
P1-P2-P3-…..	Power supply	A1
S1-S2-S3-…..	Synchronisation	A6
V1-V2-V3-…..	Video processing	A5, B1

CL 16532008_044.eps
210501

Figure 5-1

The numbering is in a logical sequence for diagnostics. Always start diagnosing within a functional block in the sequence of the relevant test points for that block. Perform measurements under the following conditions:
* Service Default Mode.
* Video: colour bar signal.
* Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Menu (CSM) is used for communication between dealer and customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all L01 chassis.
Minimum requirements: a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are also acceptable (see also paragraph 5.4).

SW cluster	SW name	UOC-type	Diversity	Remark
1EU0	L01EM0-x.y	TDA9570/71/72	E/W-Europe, Mono, non-TXT	All Service Modes
2EU0	L01ET0-x.y	TDA9550/52	West-Europe, 1 page TXT	All Service Modes
2EU9	L01ET9-x.y	TDA9551	East-Europe, 1 page TXT	All Service Modes
3EU1	L01EF1-x.y	TDA9567	West-Europe, 10 page TXT	All Service Modes
3EU2	L01EF2-x.y	TDA9561	East-Europe, 10 page TXT	All Service Modes
Abbreviations: E= Europe, F= Full TXT, M= mono, T= 1 page TXT				

CL 16532008_057.pdf
220501

Figure 5-2

5.2.1 Service Default Mode (SDM)

Purpose
* To create a predefined setting to get the same measurement results as given in this manual.
* To override SW protections.
* To start the blinking LED procedure.

Specifications
* Tuning frequency:
  – 475.25 MHz for PAL/SECAM (Europe and AP-PAL).
  – 61.25 MHz (channel 3) for NTSC-sets (AP-NTSC).
* Colour system:
  – SECAM L for France.
  – NTSC for NAFTA and AP-NTSC.
  – PAL-BG for Europe and AP-PAL.
* All picture settings at 50 % (brightness, colour contrast, hue).
* Bass, treble and balance at 50 %; volume at 25 %.
* All service-unfriendly modes (if present) are disabled, like:
  – (sleep) timer,
  – child/parental lock,
  – blue mute,
  – hotel/hospitality mode
  – auto switch-off (when no 'IDENT' video signal is received for 15 minutes),
  – skip/blank of non-favourite pre-sets/channels,
  – auto store of personal pre-sets,
  – auto user menu time-out.

How to enter SDM
Use one of the following methods:
* Use a standard customer RC-transmitter and key in the code '062596' directly followed by the MENU button or
* Short wires 9631 and 9641 on the mono carrier (see Fig. 8-1) and apply Mains voltage. Then press the power button (remove the short after start-up).
  Caution: Entering SDM by shorten wires 9631 and 9641 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could lead to damaging the set.
* Or via ComPair.

After entering SDM, the following screen is visible, with SDM at the upper right side for recognition.
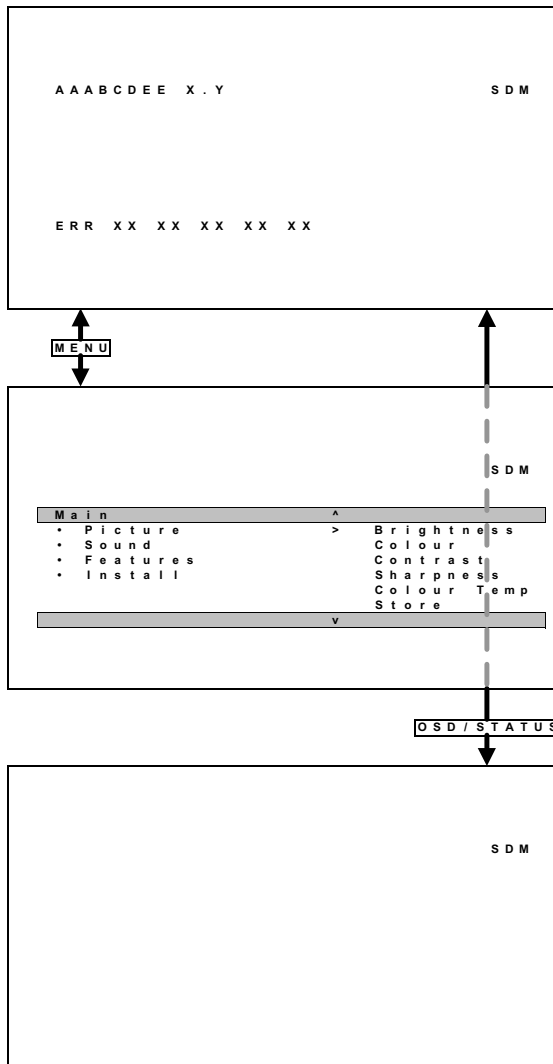
CL 16532020_060.pdf
220501

Figure 5-3

How to navigate
Use one of the following methods:
- When you press the MENU button on the remote control, the set will switch between the SDM and the normal user menu (with the SDM mode still active in the background). Return to the SDM screen with the OSD/STATUS button.
- When you press the OSD/STATUS button on the remote control, the menu will show or hide the error buffer. This feature is available to prevent interference during waveform measurements.
- On the TV, press and hold the 'VOLUME down' and press the 'CHANNEL down' for a few seconds, to switch from SDM to SAM and reverse.

How to exit
Switch the set to STANDBY by pressing the power button on the remote control transmitter (if you switch the set 'off' by removing the Mains voltage, the set will return in SDM when Mains voltage is re-applied). The error buffer is cleared.

5.2.2   Service Alignment Mode (SAM)

Purpose
- To perform alignments.
- To change option settings.

- To display/clear the error code buffer.

Specifications
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter
Use one of the following methods:
- Use a standard customer RC-transmitter and key in the code '062596' directly followed by the OSD/STATUS button [i+] or
- Via ComPair.

The following screen is visible, with SAM at the upper right side for recognition.
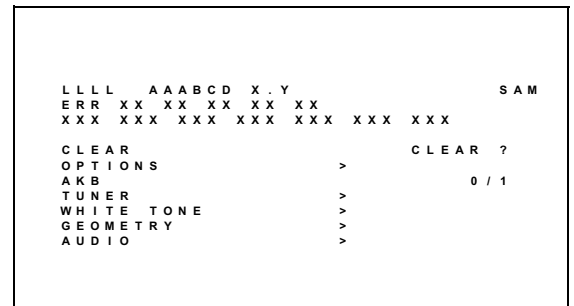
CL 16532020_061.eps
150401

Figure 5-4

1. **LLLL** This is the operation hours counter. It counts the normal operation hours, not the standby hours.
2. **AAABCD-X.Y** This is the software identification of the main micro controller
   - A = the project name (L01).
   - B = the region: E = Europe, A = Asia Pacific, U = NAFTA, L = LATAM.
   - C = the software diversity: D= DVD, F= full TXT, M= mono, T= 1 page TXT.
   - D = the language cluster number.
   - X = the main software version number.
   - Y = the sub software version number.
3. **SAM** Indication of the actual mode.
4. **Error buffer** Five errors possible.
5. **Option bytes** Seven codes possible.
6. **Clear** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
7. **Options** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
8. **AKB** Disable (0) or enable (1) the 'black current loop' (AKB = Auto Kine Bias).
9. **Tuner** To align the Tuner. See chapter 8.3.2 for a detailed description.
10. **White Tone** To align the White Tone. See chapter 8.3.3 for a detailed description.
11. **Geometry** To align the Geometry. See chapter 8.3.4 for a detailed description.
12. **Audio** To align the Audio. See chapter 8.3.5 for a detailed description.

How to navigate
Use one of the following methods:
- In SAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next/previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:

–   (De)activate the selected menu item.
–   Change the value of the selected menu item.
–   Activate the selected submenu.
• When you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the OSD/STATUS button [i+].
• When you press the MENU key in a submenu, you will return to the previous menu.

How to exit
Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the Mains voltage, the set will return in SAM when Mains voltage is re-applied). The error buffer is **not** cleared.
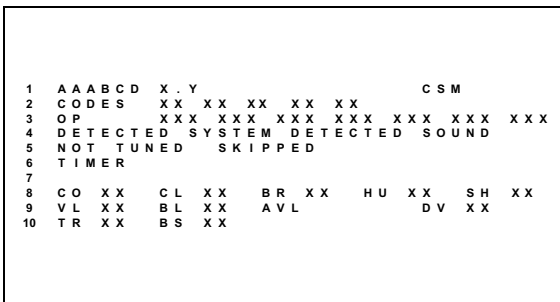
5.2.3   Customer Service Mode (CSM)

Purpose
When a customer is having problems with his TV-set, he can call his dealer. The service technician can than ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severeness of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a read only mode, therefore modifications in this mode are not possible.

How to enter

```
1   A A A B C D   X . Y                         C S M
2   C O D E S     X X  X X  X X  X X  X X
3   O P           X X X  X X X  X X X  X X X  X X X  X X X  X X X
4   D E T E C T E D   S Y S T E M   D E T E C T E D   S O U N D
5   N O T   T U N E D     S K I P P E D
6   T I M E R
7
8   C O   X X     C L   X X     B R   X X     H U   X X     S H   X X
9   V L   X X     B L   X X     A V L                 D V   X X
10  T R   X X     B S   X X
```

CL 16532008_046.eps
220501

Figure 5-5

The CSM will be turned on after pressing the MUTE key on the remote control transmitter and any of the control buttons on the TV for at least 4 seconds **simultaneously**. This activation only works if there is no menu on the screen.

After switching ON the Customer Service Mode, the following screen will appear:

1. Software identification of the main micro controller (see paragraph 5.2.2 for an explanation).
2. Error code buffer (see paragraph 5.5 for more details). Displays the last seven errors of the error code buffer.
3. In this line, the Option Bytes (OP) are visible. Each Option Byte is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8.3.1 for more information on the option settings.
4. Indicates which colour and sound system is installed for the selected pre-set.
5. Indicates if the set is not receiving an 'IDENT' signal on the selected source. It will display 'Not Tuned'.
6. Indicates if the sleep timer is enabled.
7. Not applicable for Europe.
8. Value indicates parameter levels at CSM entry. CO= CONTRAST, CL= COLOR, BR= BRIGHTNESS, HU= HUE, SH= SHARPNESS

9. Value indicates parameter levels at CSM entry. VL= VOLUME LEVEL, BL= BALANCE LEVEL, AVL= AUTO VOLUME LEVEL LIMITER, DV= DELTA VOLUME
10. Value indicates parameter levels at CSM entry (only for stereo sets). TR= TREBLE, BS= BASS

How to exit
Use one of the following methods:
• After you press 'any' key of the remote control transmitter with exception of the CHANNEL and VOLUME keys.
• After you switch-off the TV set with the Mains voltage switch.

5.3   Problems and Solving Tips (Related To CSM)

5.3.1   Picture Problems

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described.

No colours/noise in picture
Check CSM line 4. Wrong colour system installed. To change the setting:
1. Press the MENU button on the remote control.
2. Select the INSTALL sub menu.
3. Select the MANUAL STORE sub menu.
4. Select and change the SYSTEM setting until picture and sound are correct.
5. Select the STORE menu item.

Colours not correct/unstable picture
Check CSM line 4. Wrong colour system installed. To change the setting:
1. Press the MENU button on the remote control.
2. Select the INSTALL sub menu.
3. Select the MANUAL STORE sub menu.
4. Select and change the SYSTEM setting until picture and sound are correct.
5. Select the STORE menu item.

TV switches 'off' (or 'on') or changes the channel without any user action
(Sleep)timer switched the set 'off' or changed channel. To change the setting:
1. Press the MENU button on the remote control.
2. Select the FEATURES sub menu.
3. Select the TIMER sub menu.
4. Select and change the SLEEP or TIME setting.

Picture too dark or too bright
Increase/decrease the BRIGHTNESS and/or the CONTRAST value when:
• The picture improves after you have pressed the 'Smart Picture' button on the remote control.
• The picture improves after you have switched on the Customer Service Mode
The new 'Personal' preference value is automatically stored.

White line around picture elements and text
Decrease the SHARPNESS value when:
• The picture improves after you have pressed the 'Smart Picture' button on the remote control.
• The picture improves after you have switched on the Customer Service Mode
The new 'Personal' preference value is automatically stored.

Snowy picture
Check CSM line 5. If this line indicates 'Not Tuned', check the following:
• No or bad antenna signal. Connect a proper antenna signal.

- Antenna not connected. Connect the antenna.
- No channel/pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace/repair if necessary.

Snowy picture and/or unstable picture
- A scrambled or decoded signal is received.

Black and white picture
Increase the COLOR value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new 'Personal' preference value is automatically stored.

Menu text not sharp enough
Decrease the CONTRAST value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new 'Personal' preference value is automatically stored.

5.3.2 Sound Problems

No sound or sound too loud (after channel change/switching on)
Increase/decrease the VOLUME level when the volume is OK after you switched on the CSM. The new 'Personal' preference value is automatically stored.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the L01 chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector (located on the Main panel, see also figure 8-1 suffix D).

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I^2C level. ComPair can access the I^2C bus of the television. ComPair can send and receive I^2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I^2C busses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. Does the screen gives a picture? Click on the correct answer: YES/NO) and showing you examples (e.g. Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

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

Beside fault finding, ComPair provides some **additional features** like:
- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the (European) Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. Example: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.*Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568. Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 How To Connect

1. First install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the Mains voltage adapter to the supply connector (marked with 'POWER 9V DC') on the ComPair interface.
4. Switch the ComPair interface OFF.
5. Switch the television set OFF (remove the Mains voltage).
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I^{2}C') and the ComPair connector on the mono carrier (see figure 8-1 suffix D).
7. Plug the Mains voltage adapter in the Mains voltage outlet and switch on the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'introduction' chapter.
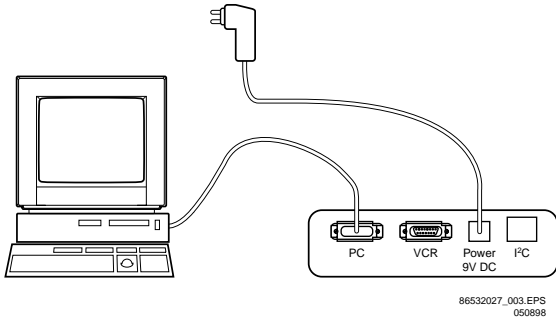
86532027_003.EPS
050898

Figure 5-6

5.4.4 How To Order

ComPair order codes:
- Starter kit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- Starter kit ComPair software (registration version): 4822 727 21634
- Starter kit SearchMan software: 4822 727 21635
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable: 3122 785 90004

5.5 Error Buffer

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is written at the left side and all other errors shift one position to the right.

5.5.1 How to Read the Error Buffer

Use one of the following methods:
- On screen via the SAM (only if you have a picture). Examples:
  – ERROR: **0 0 0 0 0** : No errors detected
  – ERROR: **6 0 0 0 0** : Error code 6 is the last and only detected error
  – ERROR: **9 6 0 0 0** : Error code 6 was first detected and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:
- By activation of the CLEAR command in the SAM menu:
- When you exit SDM/SAM with the STANDBY command on the remote control (when leaving SDM/SAM, by disconnecting the set from Mains voltage, the error buffer is not reset).
- When you transmit the command DIAGNOSE-99-OK with ComPair.
- If the content of the error buffer has not changed for 50 hours, it resets automatically.

5.5.3 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. These to ensure that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

ERROR CODE TABLE				
Error	Device	Error description	Def. item	Diagram
0	Not applicable	No Error		
1	Not applicable	X-Ray/overvoltage protection (USA only)	2465, 7460	A2
2	Not applicable	Horizontal protection	7460, 7461, 7462, 7463, 6467	A2
	TDA8359/TDA9302	Vertical protection	7861, VlotAux+13V	A2, A3
3	Reserve			
4	MSP34X5 / TDA9853	MSP I²C identification error	7831 or 7861	A9 or A11
5	TDA95xx	POR 3V3 / +8V protection	7200, 7560, 7480	A5, A6, A7, A1, A2
6	I²C bus	General I²C bus error	7200, 3624, 3625	A7
7	AN7522/3	Power down (over current) protection	7901 / 7902, 7561	A8, A1
8	Not applicable	E/W protection (Large Screen)	7400, 3405, 3406, 3400	A2
9	M24C08	NVM I²C identification error	7602, 3611, 3603/04	A7
10	Tuner	Tuner I²C identification error	1000, 7482	A4, A2
11	TDA6107/8	Black current loop protection	7330, RGB amps, CRT	B1, B2
12	M65669	PIP I²C identification error	7803	P

CL 16532008_047.pdf
210501

Figure 5-7

5.6 The Blinking LED Procedure

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the LED will blink the contents of the error-buffer.
Error-codes $\geq$ 10 are shown as follows:
– a long blink of 750 ms (which is an indication of the decimal digit),
– a pause of 1.5 s,
– n short blinks (n = 1 - 9),
– when all the error-codes are displayed, the sequence finishes with a LED blink of 3 s.,
– the sequence starts again.

Example of error buffer: **12 9 6 0 0**
After entering SDM:
– 1 long blink of 750 ms followed by a pause of 1.5 s,
– 2 short blinks followed by a pause of 3 s,
– 9 short blinks followed by a pause of 3 s,
– 6 short blinks followed by a pause of 3 s,
– 1 long blink of 3 s to finish the sequence,
– the sequence starts again.

5.7 Protections

If a fault situation is detected an error code will be generated and if necessary, the set will be put in the protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SAM), the blinking LED procedure or via ComPair. The DST diagnose functionality will force the set into the Service-standby, which is similar to the usual standby mode, however the microprocessor has to remain in normal operation completely.

To get a quick diagnosis the chassis has three service modes implemented:
• The Customer Service Mode (CSM).
• The Service Default Mode (SDM). Start-up of the set in a predefined way.
• The Service Alignment Mode (SAM). Adjustment of the set via a menu and with the help of test patterns.

See for a detailed description Chapter 9 paragraphs Deflection and Power Supply.

5.8 Repair Tips

Below some failure symptoms are given, followed by a repair tip.
• **Set is dead and makes hiccuping sound** 'MainSupply' is available. Hiccuping stops when de-soldering L5561, meaning that problem is in the 'MainSupply' line. No output voltages at LOT, no horizontal deflection. Reason: line transistor 7460 is defective.
• **Set is dead, and makes no sound** Check power supply IC7520. Result: voltage at pins 1, 3, 4, 5 and 6 are about 180 V and pin 8 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 6) has an open load. That is why MOSFET TS7521 is not able to switch. Reason: feedback resistor 3523 is defective. **Caution:** be careful measuring on the gate of TS7521; circuitry is very high ohmic and can easily be damaged! (first connect ground to measuring equipment, than the gate).
• **Set is in hiccup mode and shuts down after 8 s.** Blinking LED (set in SDM mode) indicates error 5. As it is unlikely that µP 'POR' and '+8V protection' happen at the same time, measure the '+8V'. If this voltage is missing, check transistor TS7480.
• **Set is non-stop in hiccup mode** Set is in over current mode; check the secondary sensing (opto coupler 7515) and the 'MainSupply' voltage. Signal 'Stdby_con' must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
• **Set turns on, but without picture and sound** The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 5 and 7 are okay, 'VT_supply' at pin 9 is missing. Conclusion: resistor 3460 is defective.
• **Set turns on, but with a half screen at the bottom. Sound is okay** Blinking LED (set in SDM mode) indicates error 3. Check 'Vlotaux+11V' and '+50V'. If they are okay, problem is expected in the vertical amplifier IC7471. Measure with a scope the waveform on pin 17 of the UOC. Measure also at pin 1 of IC7471. If here the signal is missing, a defective resistor R3244 causes the problem.