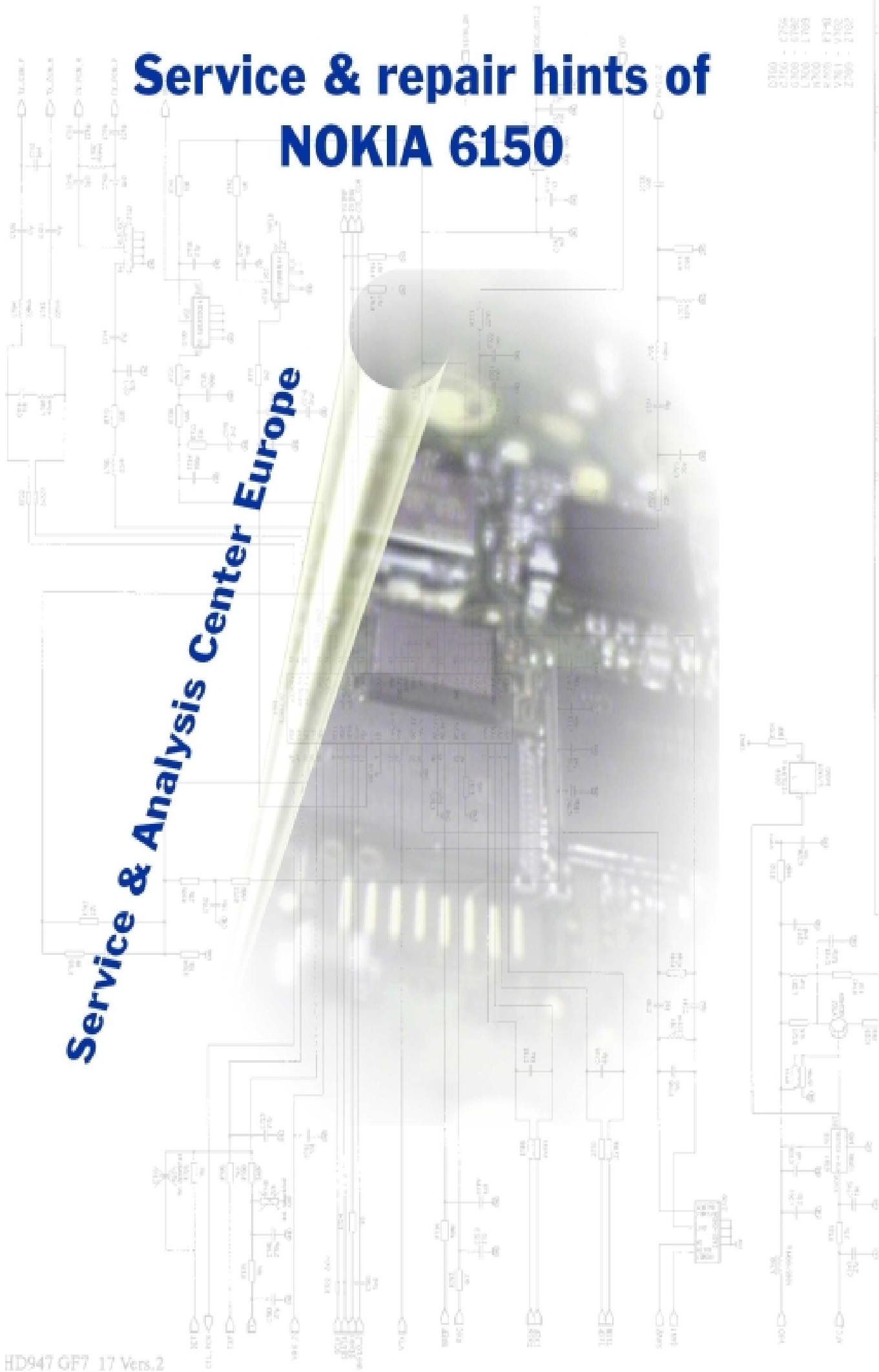


Service & Analysis Center Europe

Service & repair hints of NOKIA 6150



0380	-	0756
C155	-	0756
G100	-	0756
L100	-	1755
R100	-	0756
R101	-	0756
V101	-	0756
Z101	-	0756

Introduction

IMPORTANT:

This document is intended for use by authorised NOKIA service centers only.

The purpose of this document is to provide some further service information for NOKIA 6150 phones. It contains a lot of collected tips and hints, to find failures and repair solutions easily. It will also give support to the inexperienced technicians. Saving process time and improving the repair quality is the aim of using this document. We have build it up based on fault symptoms (listed in "Contents") followed by detailed description for further analysis. It is to be used additionally to the service manual and other service information like Service Bulletins, for that reason it doesn't contain any circuit descriptions or schematics.

All measurements are made with using of following equipment:

Nokia repair SW : Wintelsa Version 6.10
DLL version : NSEKM-13 version 2.41.03
Nokia Module Jig : JBS-19
Digital multimeter : Fluke 73
Oscilloscope : Hitachi V-1565; Fluke PM 3380A
Spectrum Analyzer : Advantest R3361C with an analogue probe
RF-Generator / : Rohde & Schwarz CMD 53
GSM Tester

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA should be notified in writing, using following procedure:

Please state:

Title of the Document + Issue Number/Date of publication
Page(s) and/or Figure(s) in error

Please send to:

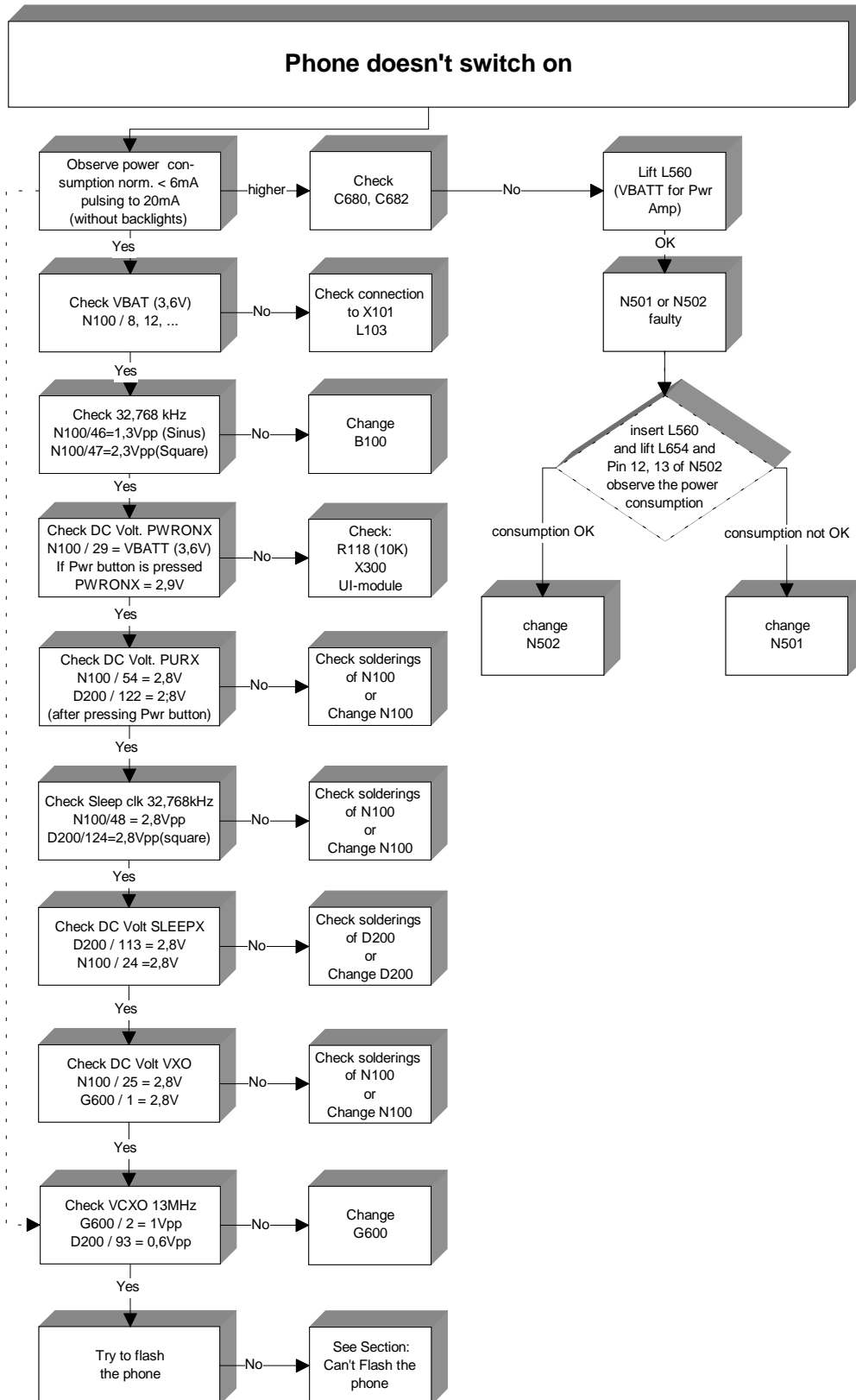
Nokia GmbH
Service & Analysis Center Europe
Meesmannstr.103
D-44807 Bochum / Germany
Email: ams.sace-training@nokia.com

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Doesn't switch on

Figure 1: doesn't switch on troubleshooting



N100 faulty/ poor soldering

- Check if voltage on Pin 29 decreases to 700 mV during pressing the Power on button
- Check if there is a 32.768 kHz square wave on Pin 48
- Check if PURX Pin 54 goes up to 2.8 V DC
- Check if VXO Pin 28 goes up to 2.8 V DC

B100 faulty 32,768 kHz

- Check 32.768 kHz ; 1 Vpp clock signal on B100

G650 faulty 13 MHz

- Check VXO 2,8V DC on pin 1 from G650
- Check 13 MHz; 1 Vpp on output pin 2

S001 User Interface

- Check if voltage on Pin 29 decreases to 700 mV during pressing the Power on button

X300 UI Connector bent out

- Check if voltage on Pin 29 decreases to 700 mV during pressing the Power on button

R118 missing/ poor soldering

- Check if voltage on Pin 29 decreases to 700 mV during pressing the Power on button

D200 MAD faulty/ poor soldering

- Check 32.768 kHz square wave on Pin 124 (comes from CCONT Pin 48)
- Check 13 MHz on Pin 93 (comes from G650)
- Check VBB 2.8 V DC
- Check PURX 2.8 V DC on Pin 122 (comes from CCONT Pin 54)
- Check SLEEPX 2.8 V DC On Pin 113
- Resolder MAD completely

D210 FLASH faulty / poor soldering/ empty

- Check VBB 2.8 V DC on Pin 37
- If power consumption is around 20mA try to flash the phone
- Resolder FLASH completely

L103 faulty/ poor soldering

- Check VB on J232 or pin 8 from CCONT

X101 / X102 contacts bend out/ dirty

- Check if VBATT and Gnd are connected

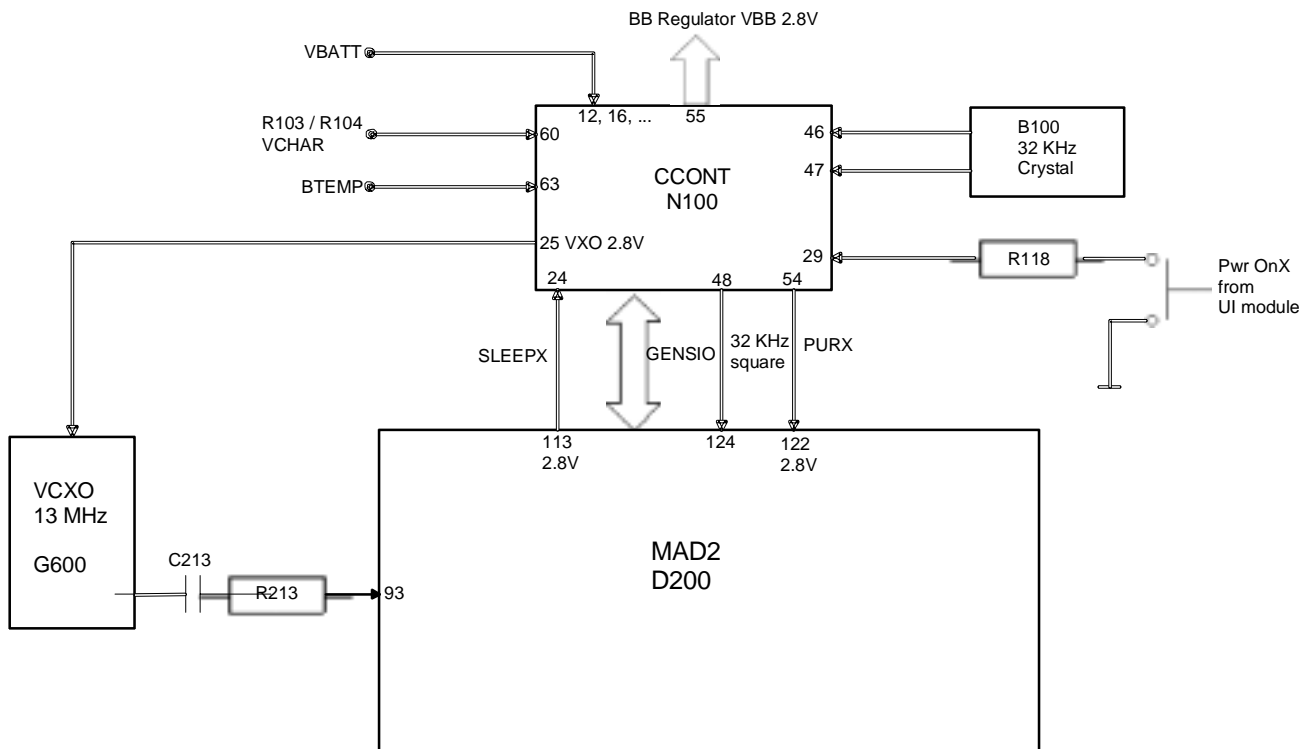
N501 / N502 short circuit

- If there is a short circuit on VBATT, lift L560 and check again
- If the current is OK one of the two PA is faulty
- Assemble L560 back and lift L654 and pin 12 and 13 from N502
- If the current is OK N502 is faulty, if not N501 is faulty
- If the PCB is burnt, swap the phone

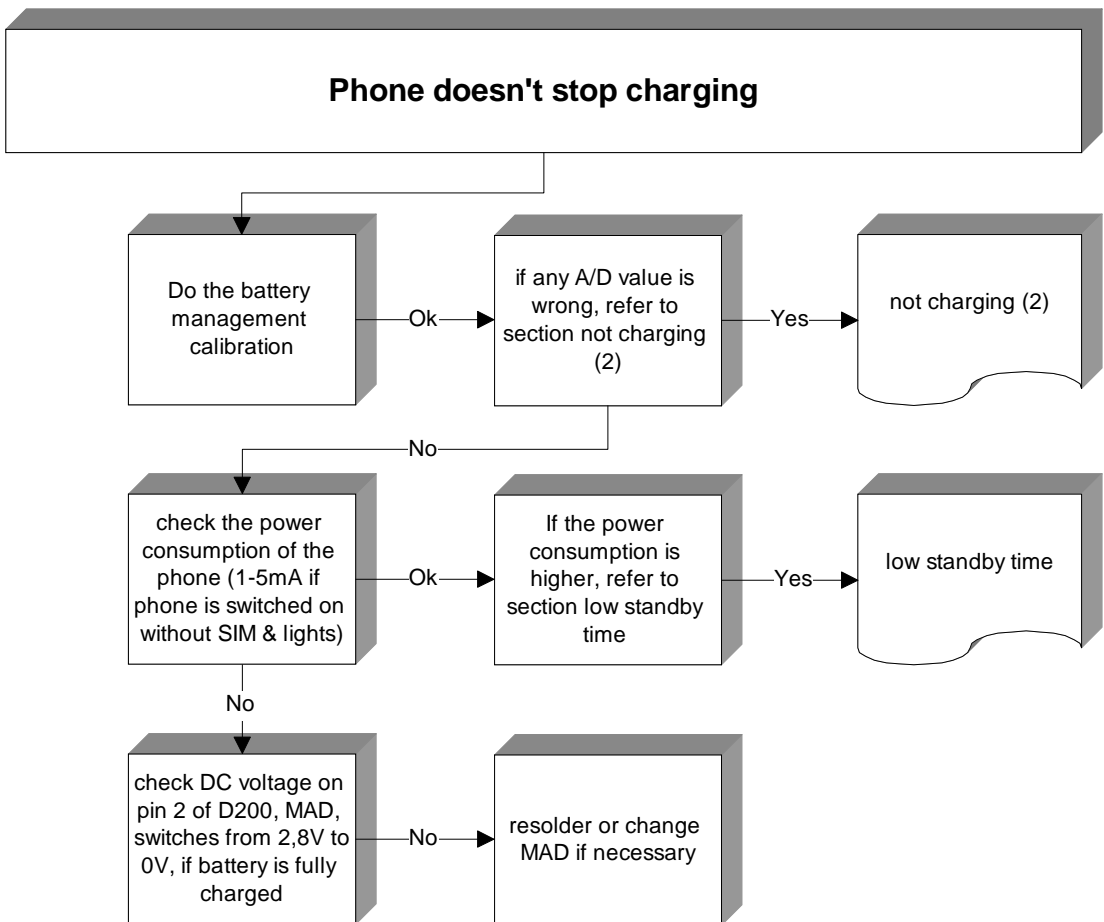
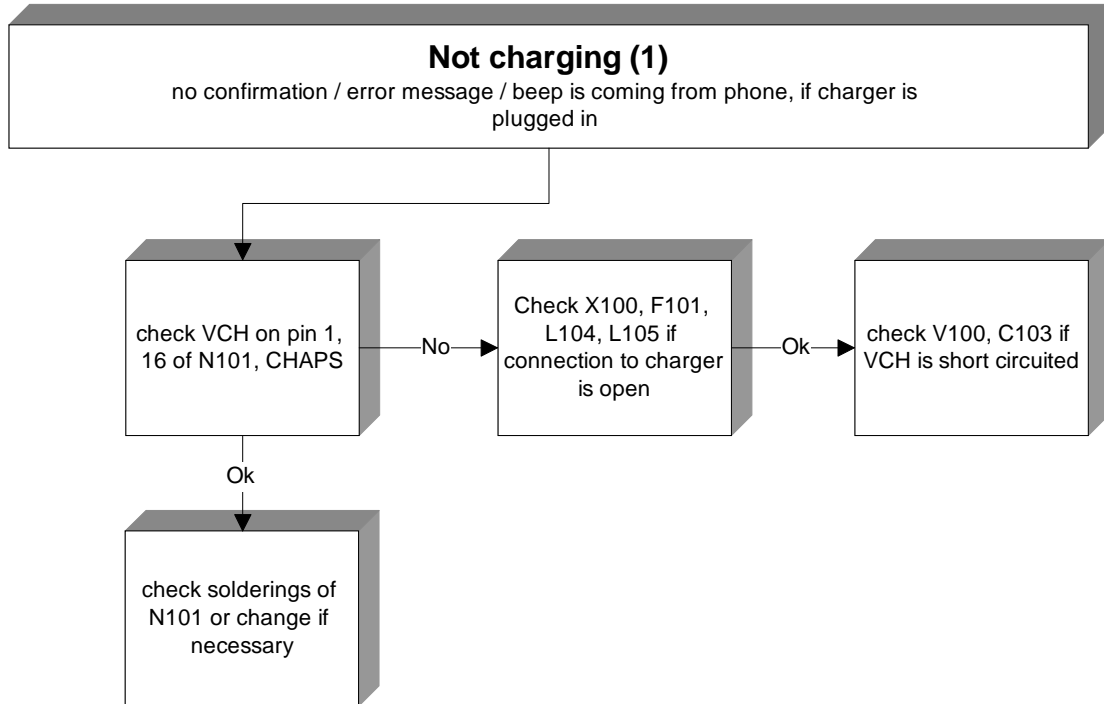
C680; C682 / short circuit

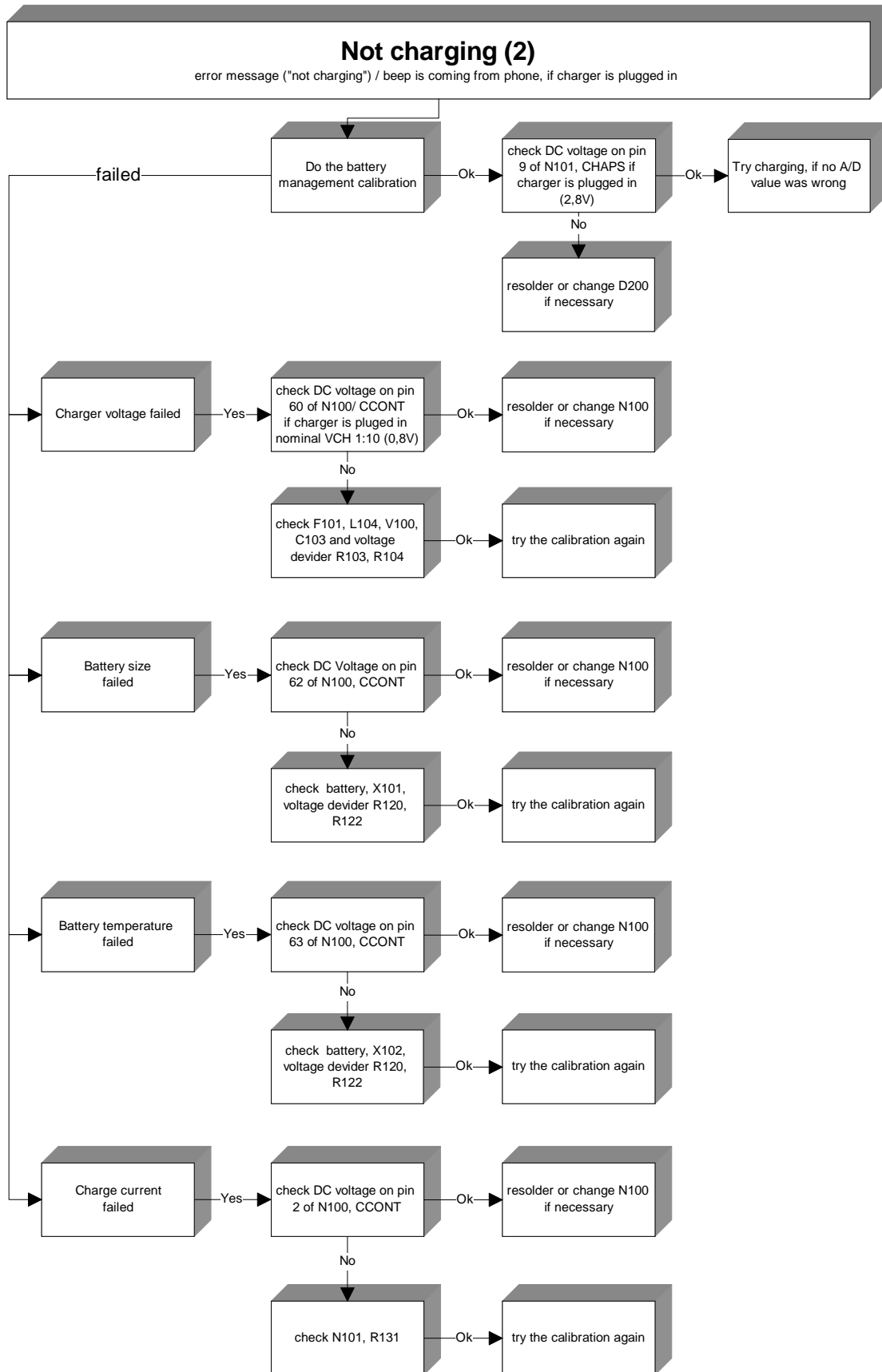
- Lift the capacitor and check again

Figure 2: Block diagram of switching on routine



Not charging





F100 faulty

- Check resistance of F100 (0Ω)

V100 faulty

- Check resistance of V100 (50KΩ in circuit)

C103 faulty short circuit on Vcharge

- Check resistance of C103 (50KΩ in circuit)
- NOTE! V100 is connected in parallel to C103

L104 faulty Vcharge

- Check resistance of L104 (0Ω)

L105 faulty Charge ground

- Check resistance of L105 (0Ω)

N101 faulty/ poor soldering

- Check PWMOUT on Pin 7 (1 Hz standard charger / 32Hz fast charger)
- Check if CHARLIM on Pin 9 is 2.8V DC

N100 faulty/ poor soldering

- Change if any A/D value is out of limit but the DC voltages are ok.
- If DC voltages are wrong, check corresponding voltage dividers
- Check PWMOUT on Pin 56 (1 Hz standard / 32 Hz fast)

X100 faulty/ poor soldering

- Check connection of Vcharge; charge ground; charge control

X101 BSI; X102 BTEMP

- Check connection if battery size or battery temp A/D are out of limit

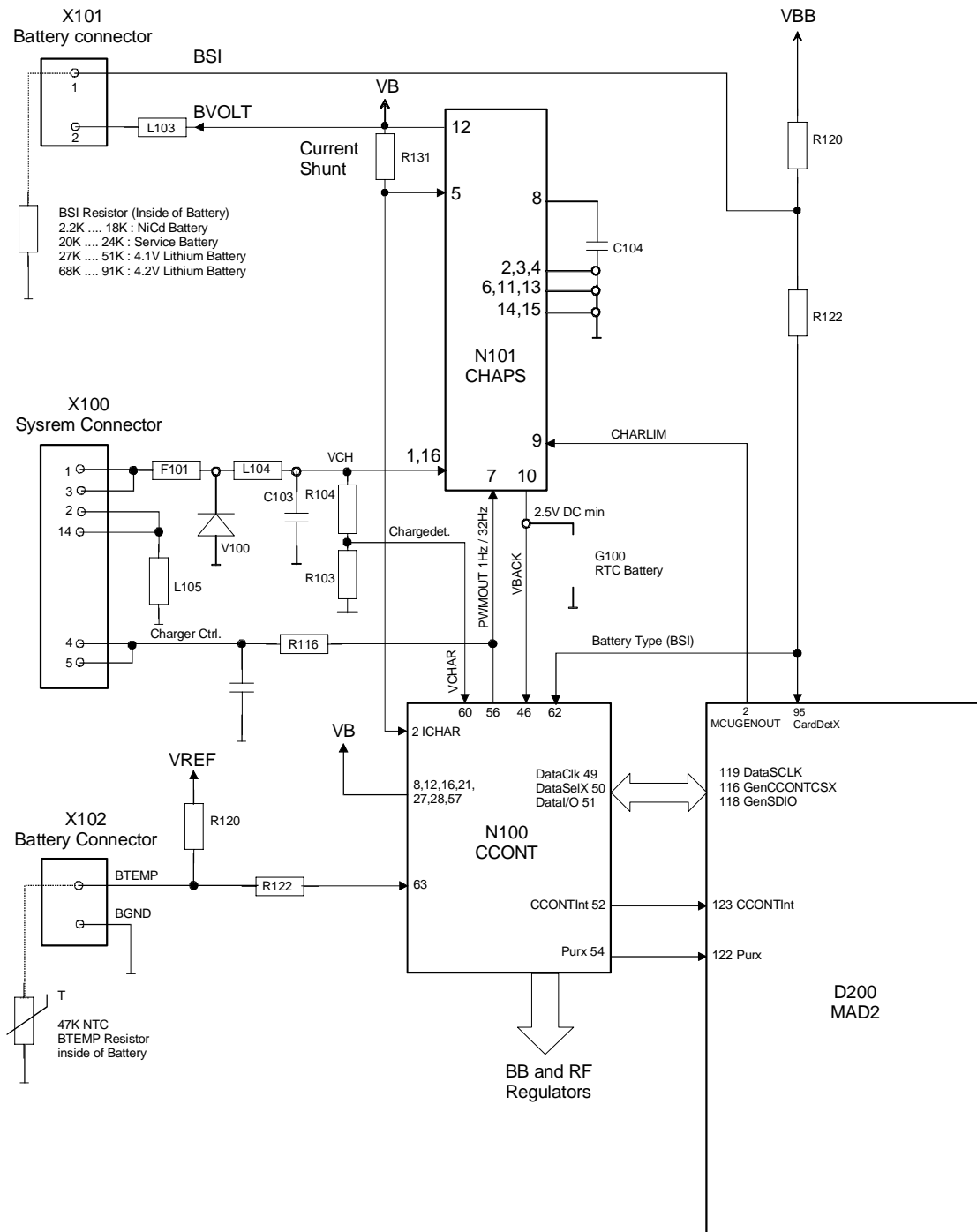
V102 faulty

- Check if there is a short circuit in charge control line

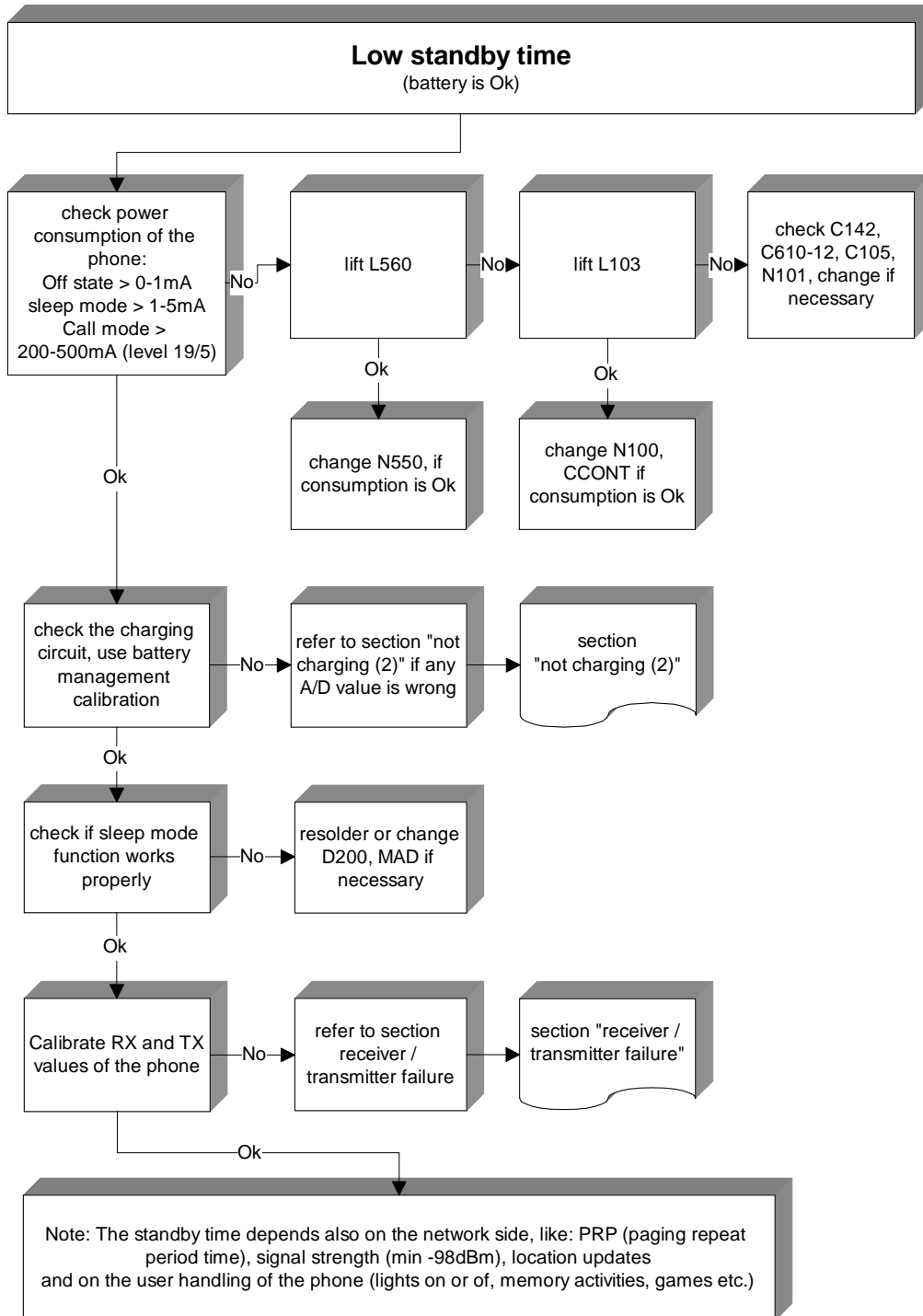
Energy management Calibration

- If charging stops too early
- If message "not charging" appears on LCD
- If any part in charging circuit has been changed
- If any A/D value is out of limit, check the corresponding DC Voltages on CCONT

Figure 3: Block diagram of charging concept



Low Stand-by time



N501 / N502 / N100 / N101 / D200 / Battery calibration - faulty

- Check the current consumption in different operation modes

Figure 4: current consumption values

Function mode	Minimum current in mA	Maximum current in mA
Off state	0	1,35
Sleep mode	1	5
Call mode GSM 900	250	440
Call mode GSM 1800	200	420

- Disconnect the PA's N501 / N501 lift L560 and check the current again
- Check if the current consumption comes from the first or second side of CCONT lift L103
- Check C105, C142 or N101
- Check solderings of the MAD
- Change MAD
- calibrate battery value if charging stops too early or battery is too hot after charging (see also chapter "Not charging")

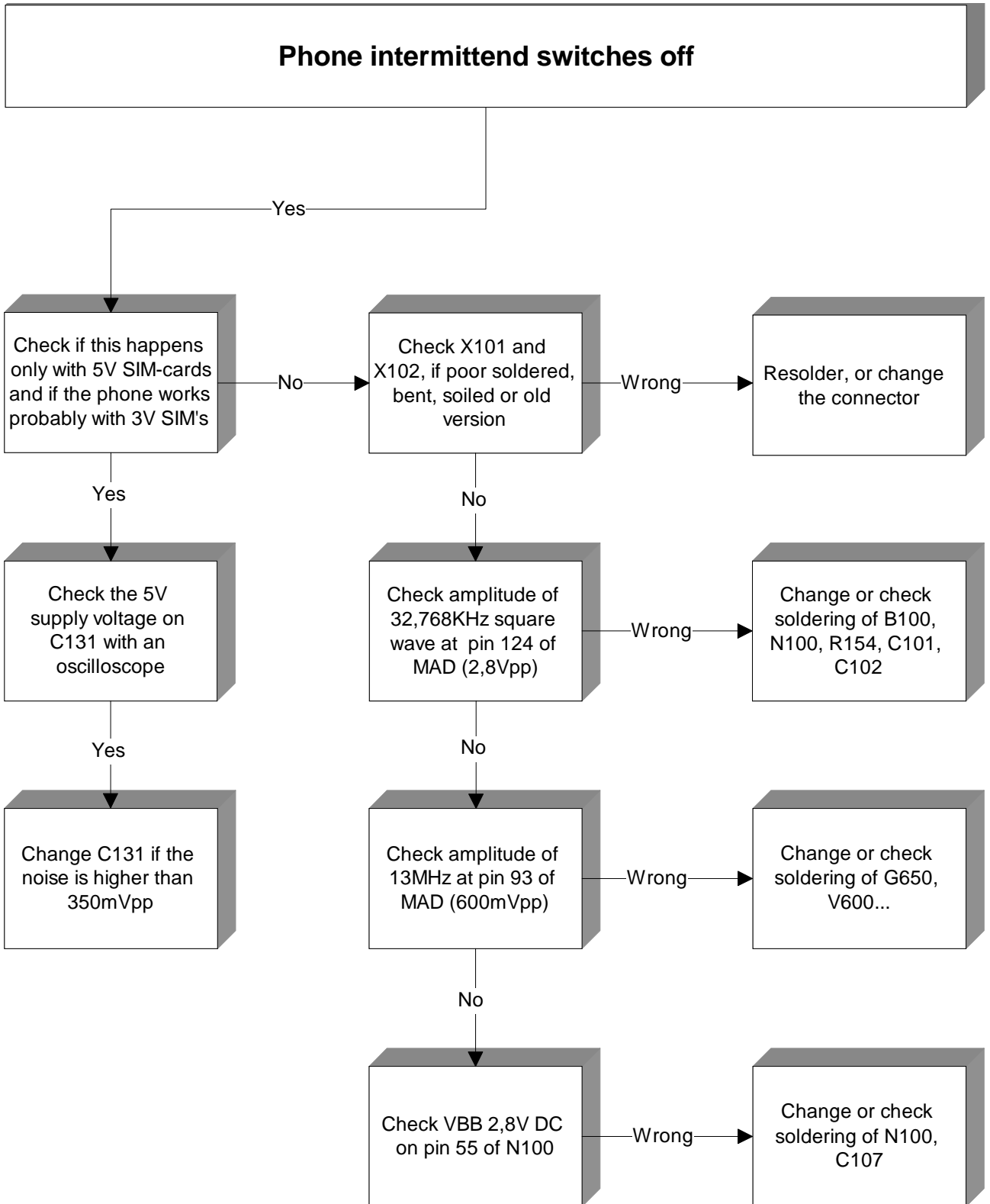
Note! The Standby-time depends on the network side and on the user handling

Intermittent doesn't switch on

D210 FLASH faulty

- Check if the handset switches on after removing the battery for few seconds or after connecting it with the charger or headset
- D210 Flash internal fail

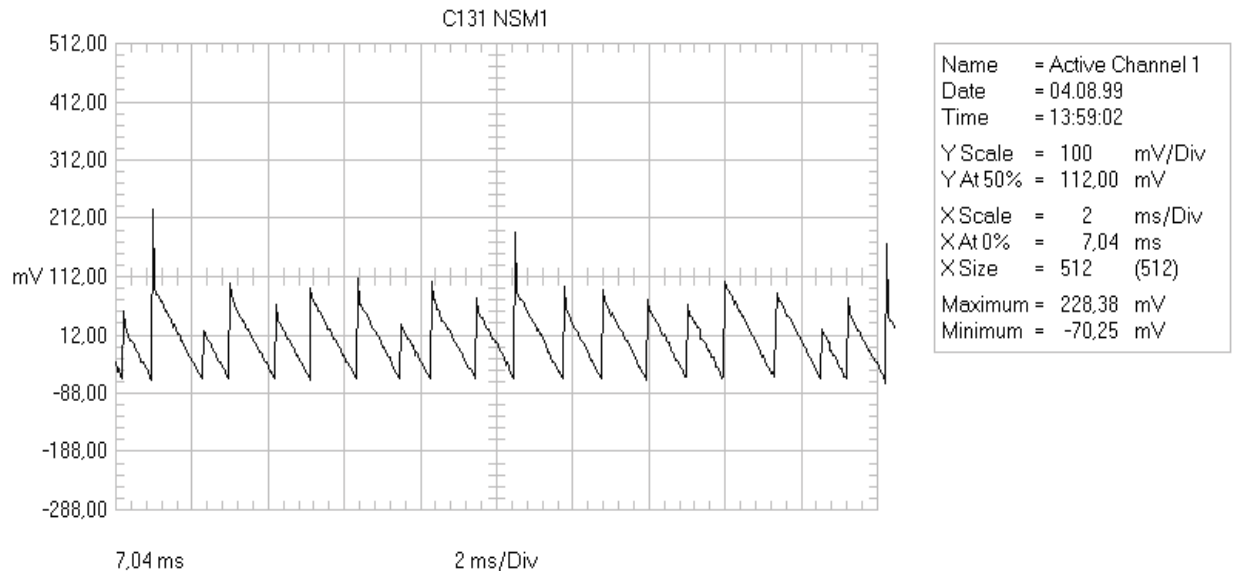
Phone switches off itself



C131 10 μ F/10V

- Check if the handset works with 3V SIM-cards
- Check if the 5V voltage over the capacitor C131 is around 4,8V-5,2V with maximal 350mVpp noise overlap (look at the diagram below)

Figure 5: maximal noise on C131



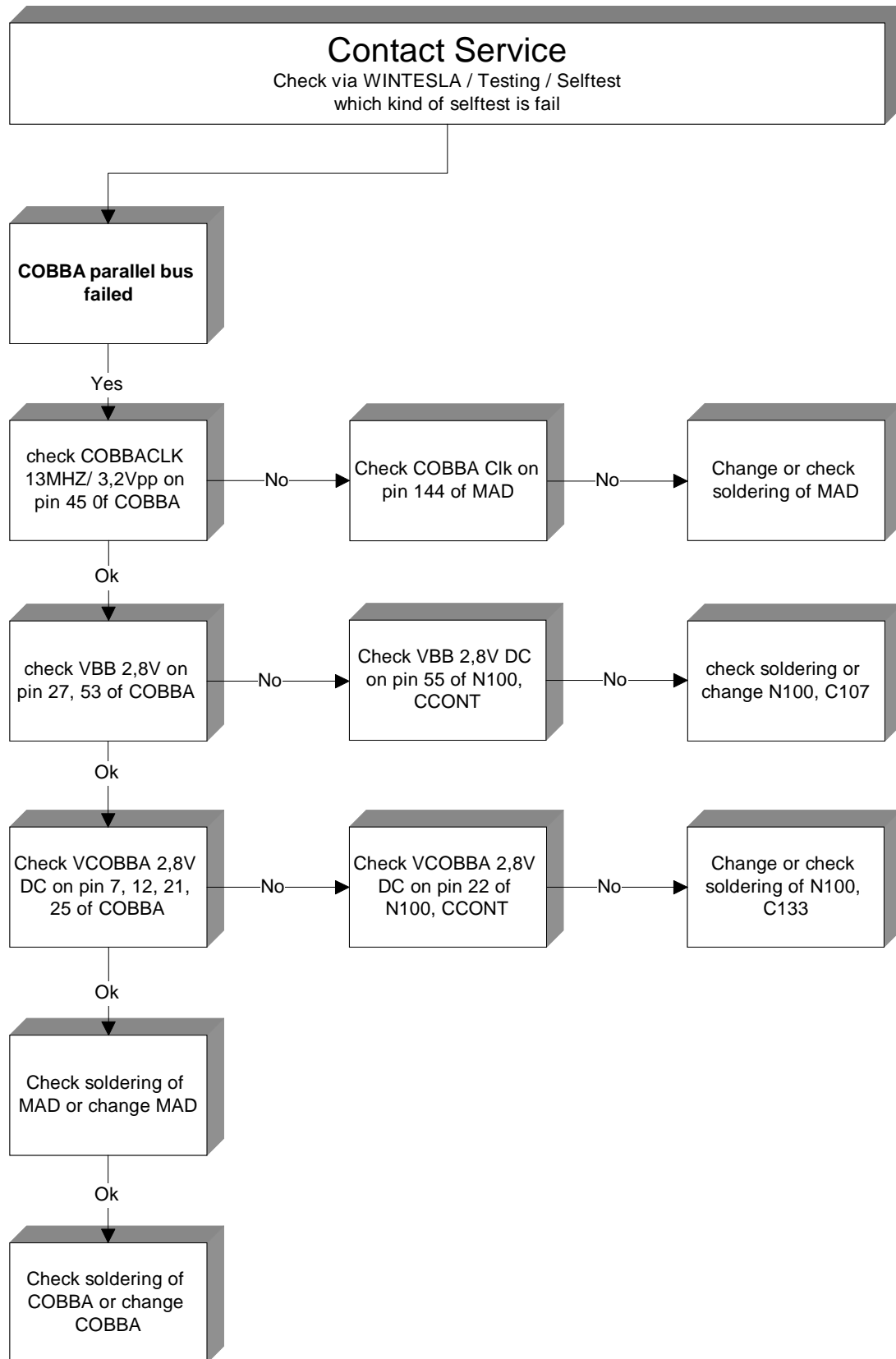
Maximum noise on C131 with 5V SIM-card

Switch off itself - contact service on the display

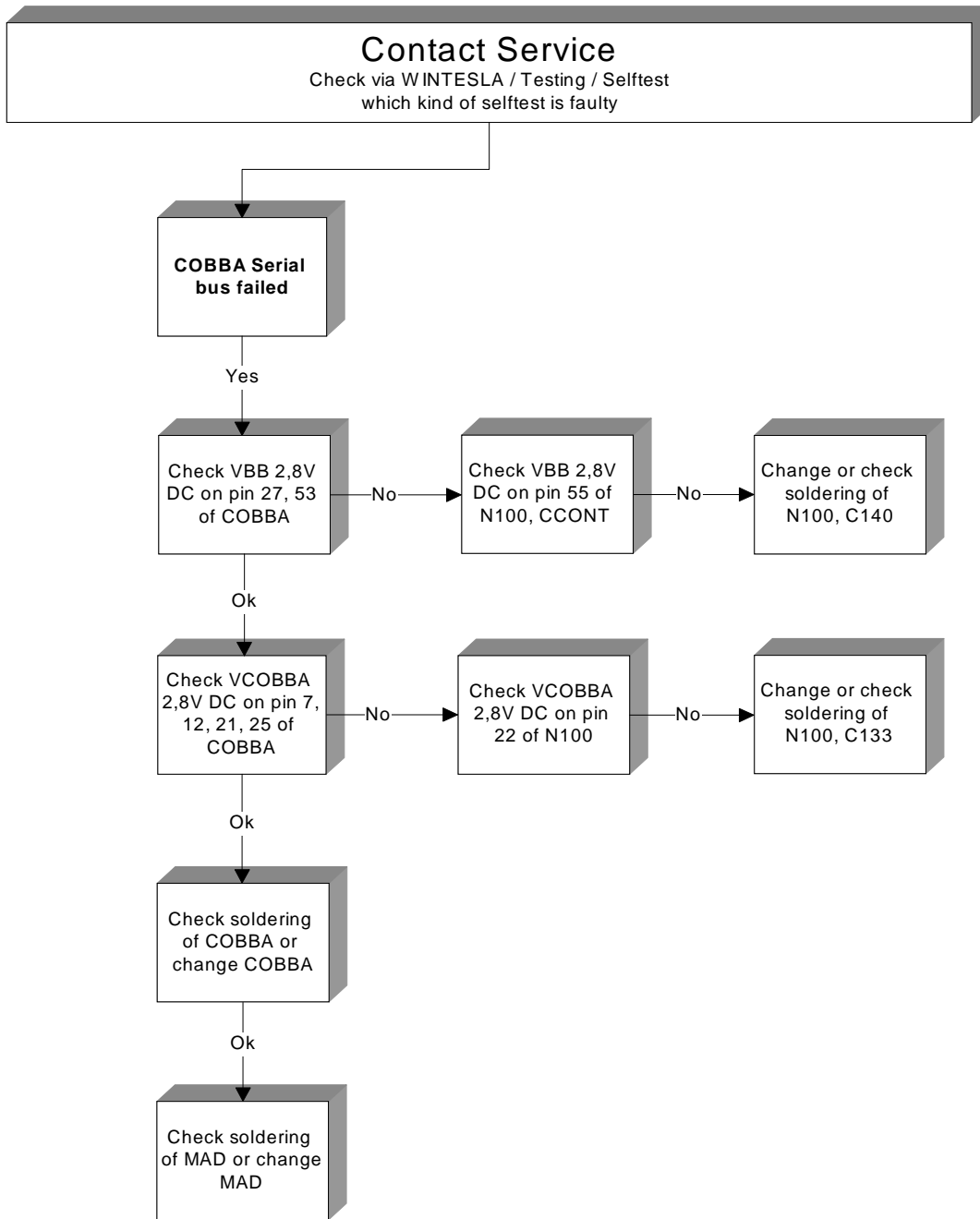
D200 MAD faulty / poor soldering

- Check the amplitude of the 32,768 kHz square wave on pin 124 (comes from CCONT pin 48)
- Check the amplitude of the 13 MHz clock frequency pin 93 (from G650)
- Check VBB 2,8V DC
- Resolder MAD
- Internal error of MAD

Contact service – COBBA parallel bus failed



Contact service – COBBA serial

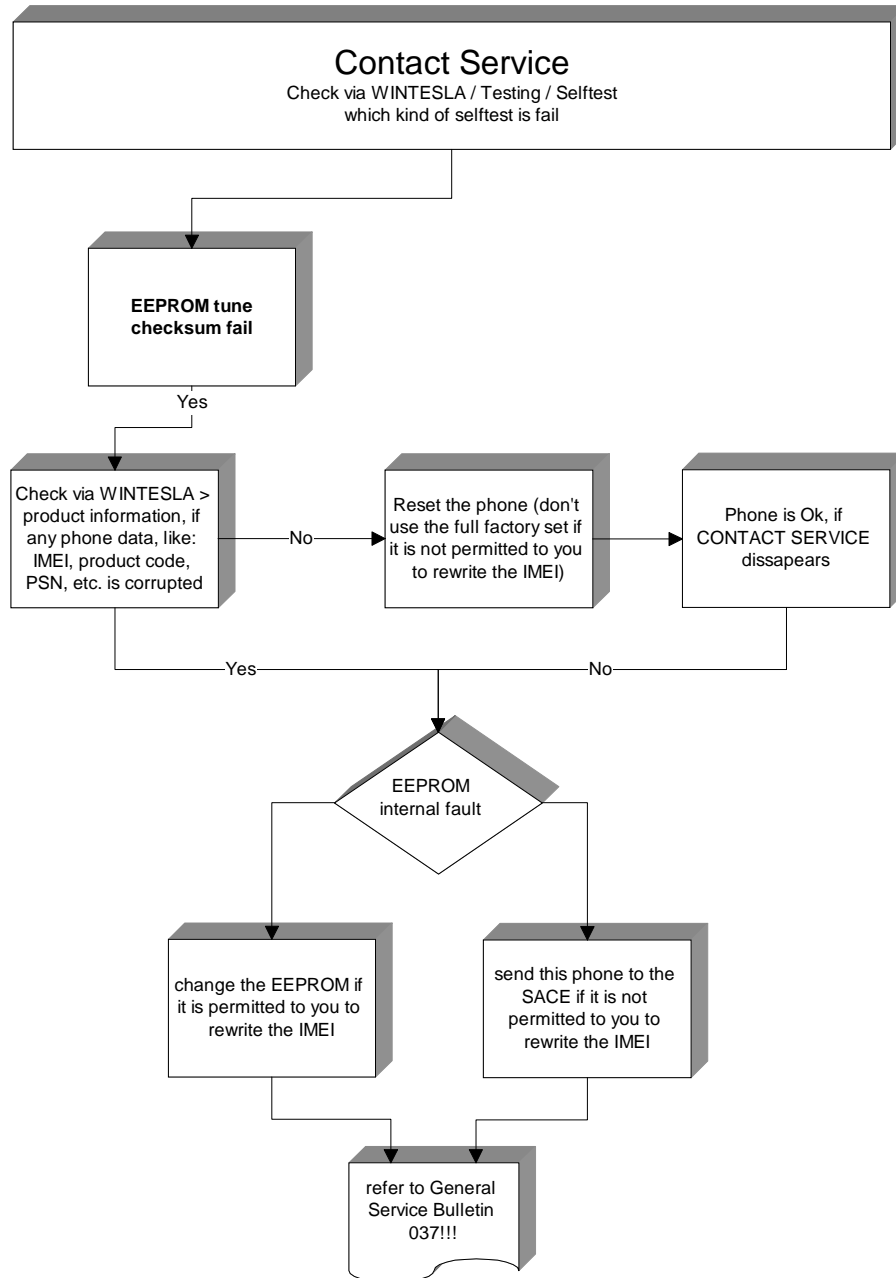


N250 COBBA faulty / poor soldering

- Check VBB 2,8V DC on pin 27, 53 from COBBA
- Check VCOBBA 2,8V DC on pin 7,12,21,25, from COBBA
- Check COBBACLK 13MHz 3,2Vpp pin 45 from COBBA
- Resolder COBBA
- Internal error of COBBA

Note! Rewrite SIMLOCK and IMEI entries with use of the Nokia security SW (SSSW) and make a SW-update or send these phones to the SACE, if this procedure is not permitted to you

Contact service – Eeprom tune checksum fail

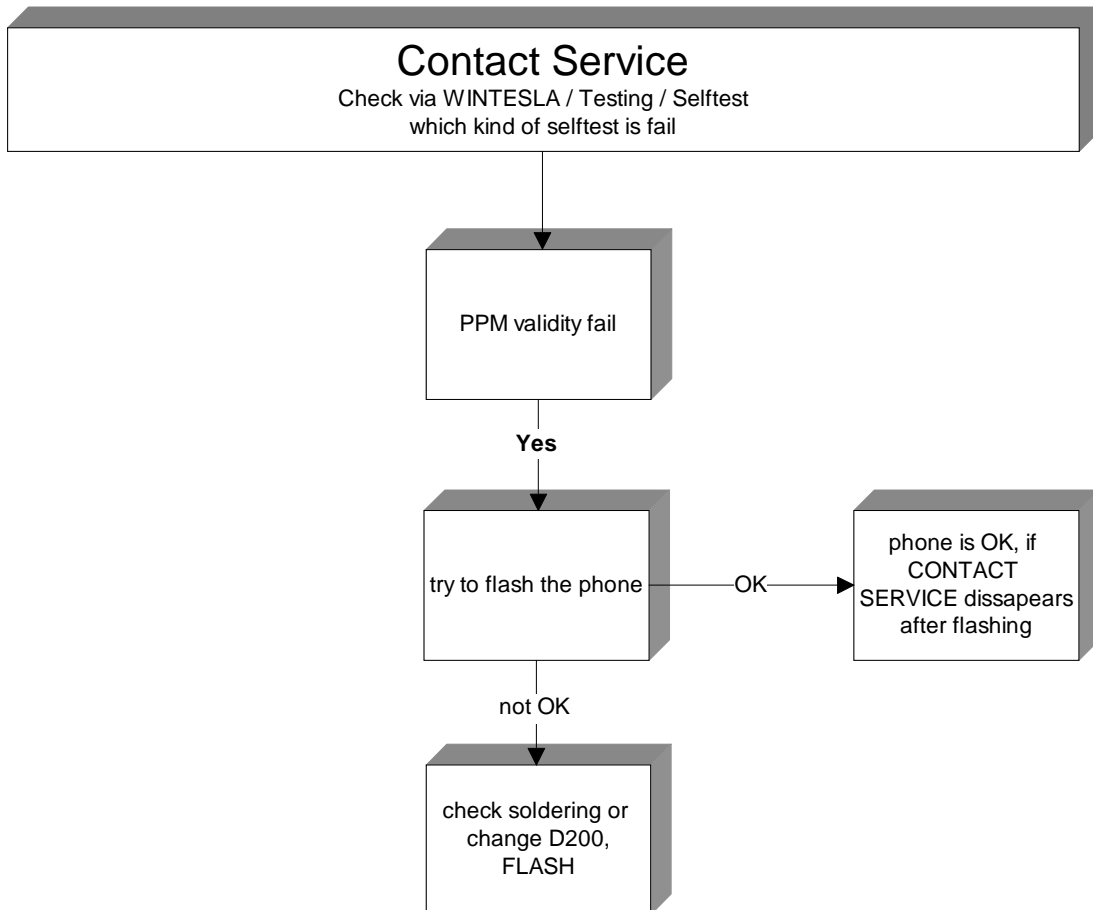


D230 Eeprom faulty

- Check with Wintesla if IMEI or product data are corrupted
- Don't use the "Full factory set" with Wintesla, otherwise the IMEI will be changed to question marks
- Change the Eeprom if it's permitted to you and write all ID data (IMEI, product code...) back
- If you aren't allowed to change the Eeprom and the IMEI is missing, write a note with a little comment, and send it together with the phone to the SACE

Note! Rewrite SIMLOCK and IMEI entries with use of the Nokia security SW (SSSW) and make a SW-update or send these phones to the SACE, if this procedure is not permitted to you

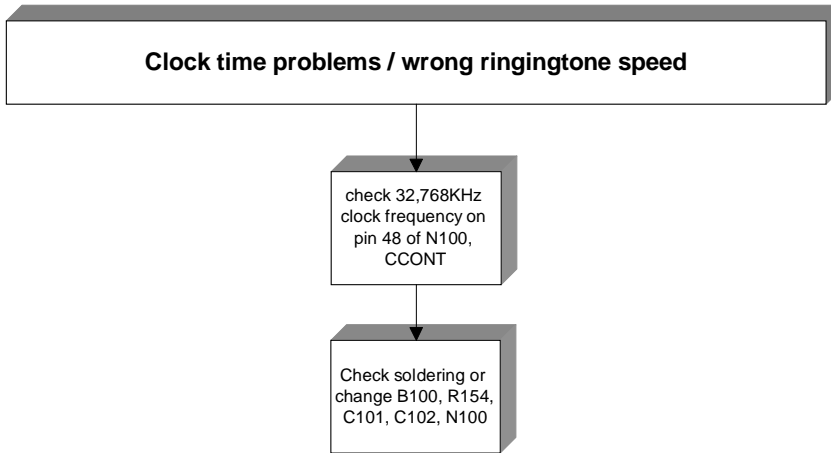
Contact service – ppm validity



SW / D210 Flash faulty / poor soldering

- Check if the fault disappears after a SW-update
- Resolder D210 Flash
- Internal error of Flash

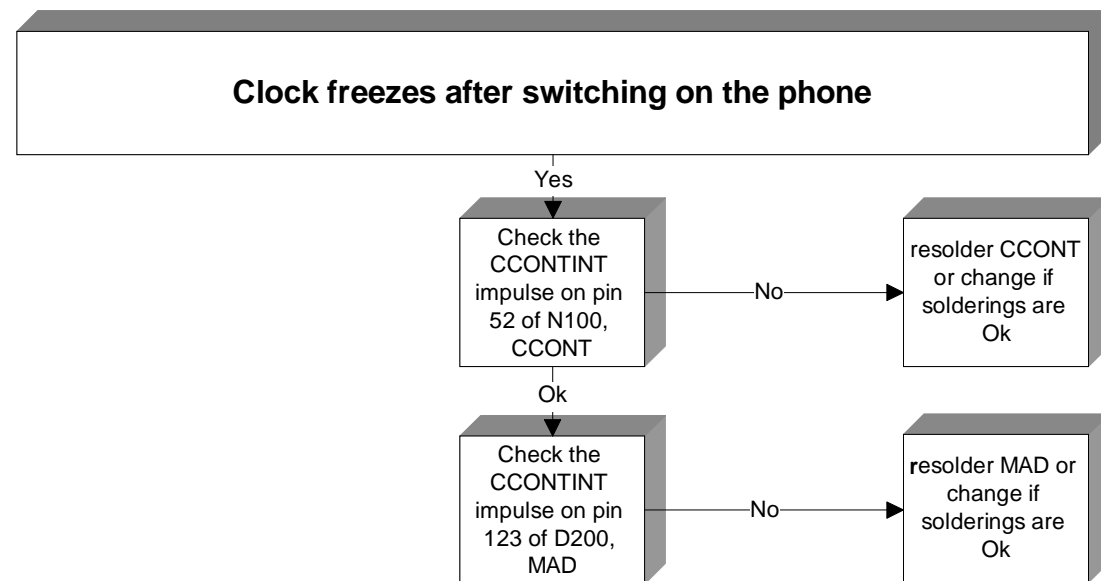
Clock time or user settings problems



Clock time / Ringing tone is too fast or too slow

32,786 kHz Sleep oscillator

- Check that the sleepclk 32.768 kHz square wave frequency on pin 48 CCONT is not higher or lower
- Check the crystal B100, R154, C101, C102, N100

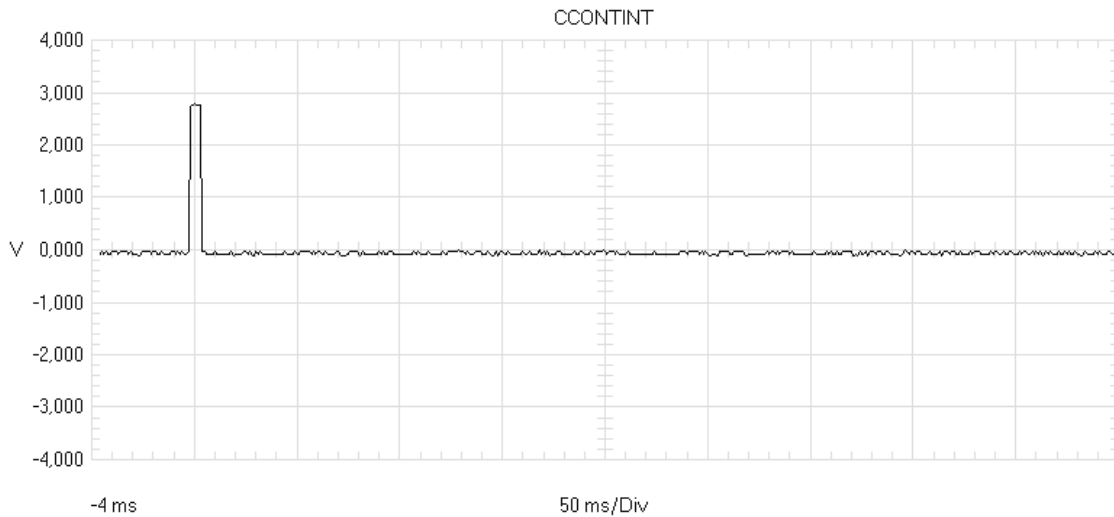


Clock freezes after power on

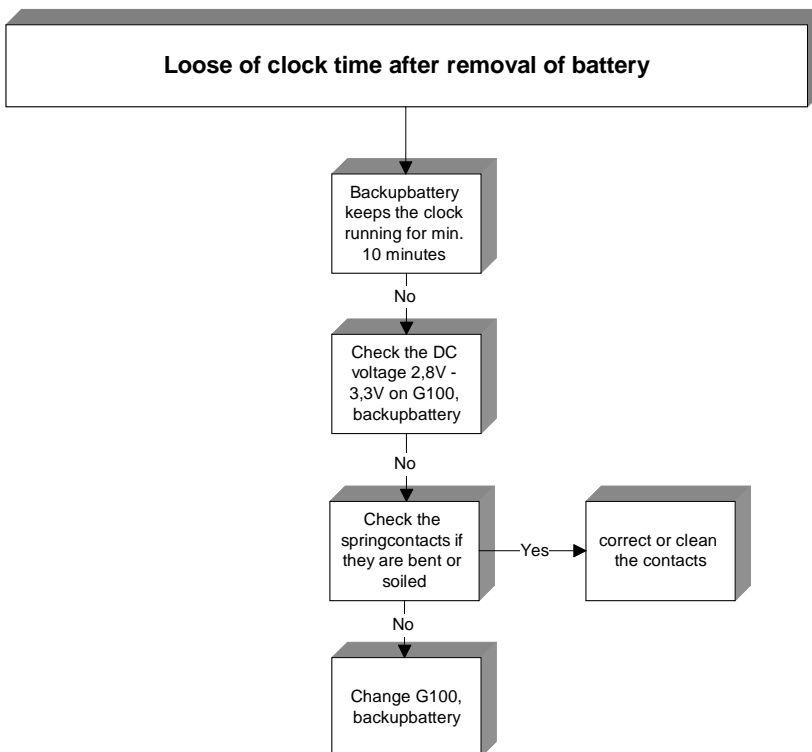
CCONTINT short circuit / break

- Check the CCONTINT impulse on pin 52 CCONT or pin 123 MAD (see the diagram below)
- Check pin 52 CCONT pin 123 MAD short circuit or break

Figure 6: CCONTINT impulse



CCONTINT measurable, after connect or disconnect a charger (ACP-7/9)
Measurement point J223 or pin 52 CCONT, pin123 MAD

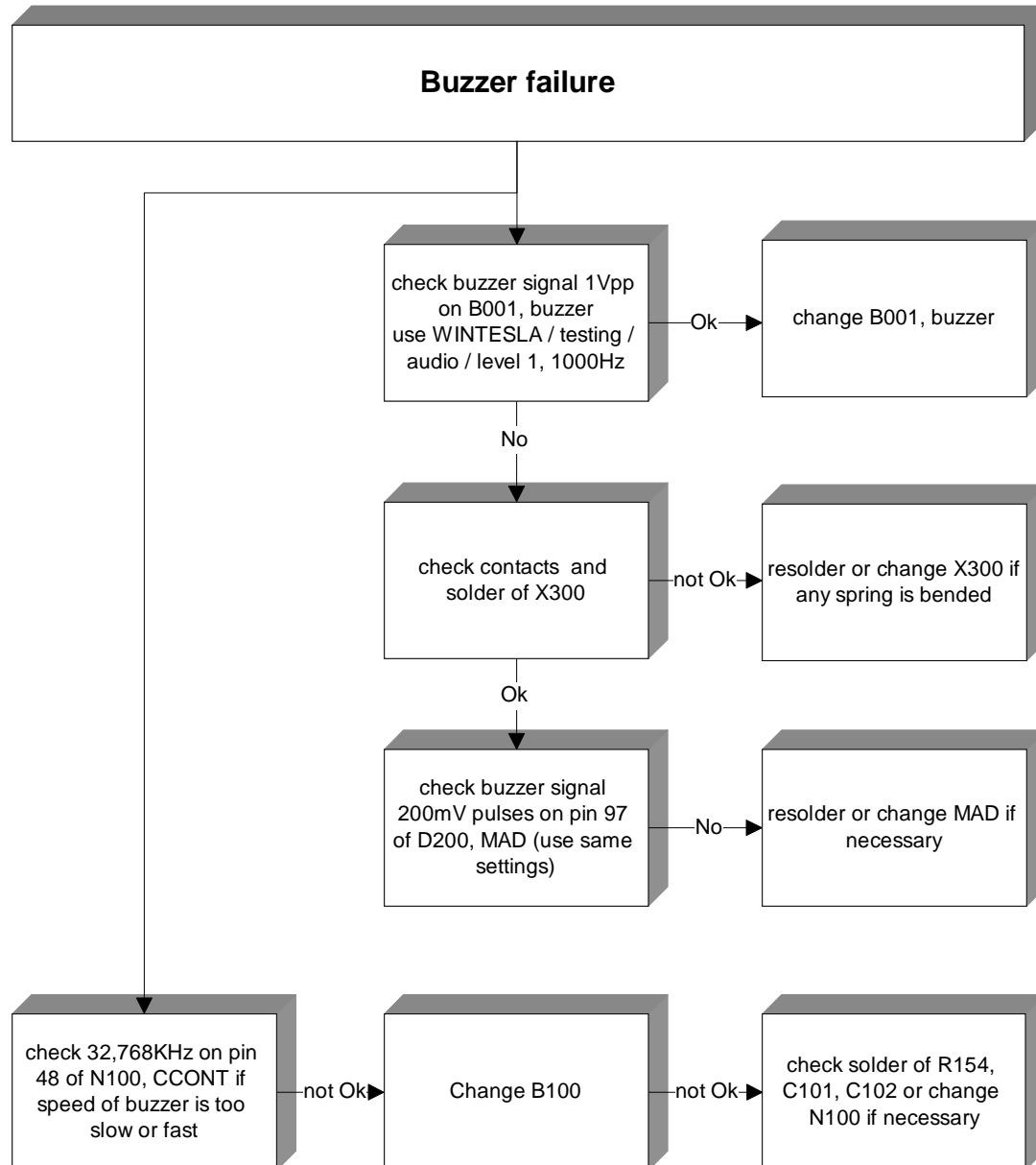


Looses clock time if the battery is empty or removed for a few minutes

G100 Back up battery faulty / disconnected

- Check the voltage 2,8V-3,3V over the back up battery connected to the PCB in the service modus
- Check the spring contacts
- Clean the contacts for the back up battery on the board

Buzzer failures



B001 / UI-module

- Check buzzer signal about 1Vpp pulses (use WINTESLA / testing / audio Level 1, 1000Hz)
- Change component if signal is ok

X300, board to board connector

- Check soldering
- Check contact springs, change component if bent

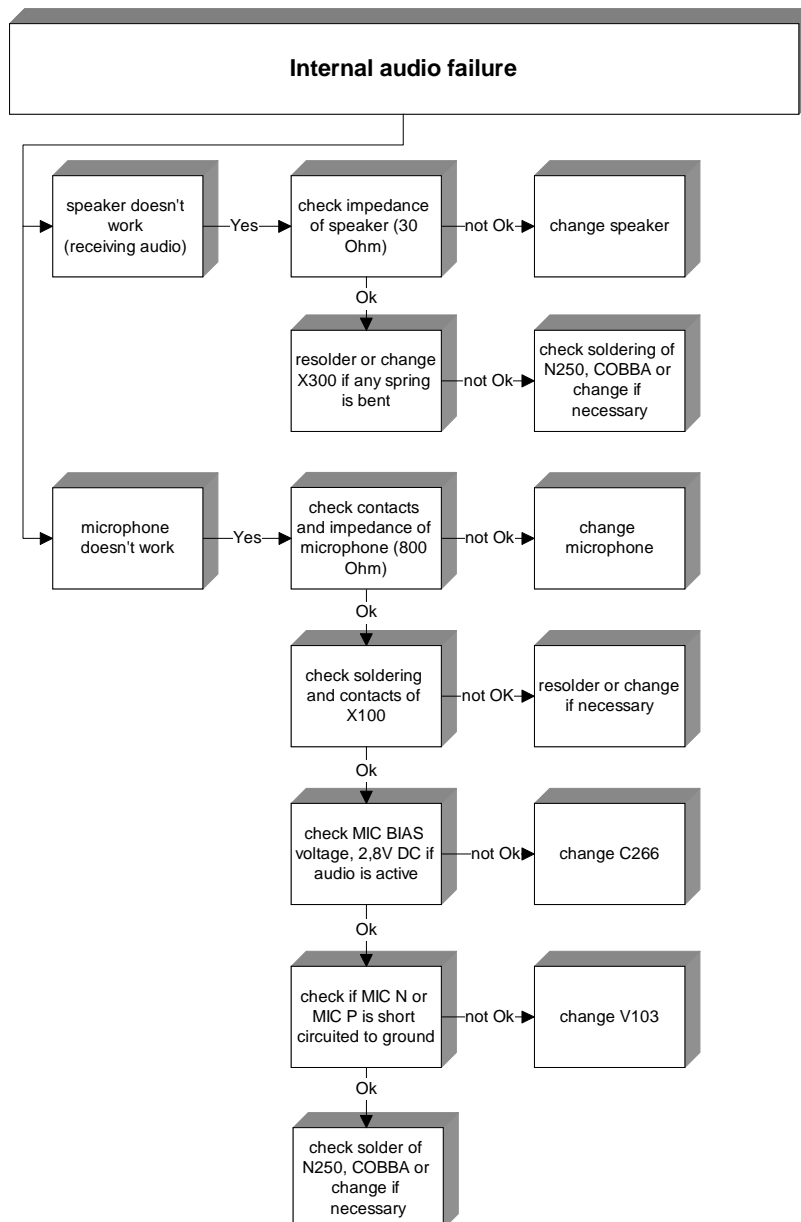
D200, MAD

- Check buzzer signal on Pin 97 (200mV pulses) use WinTesla / testing / audio Level 1, 1000Hz

B100, 32.768 kHz crystal

- Change component if ringing tone speed is too low or high if a call comes in. If you pick a ringing tone from the menu, the speed is normal.
- In this case, also the clock is running wrong if the phone is switched off.

Internal Audio Failures



Speaker

No / quiet / distorted receiving audio signal

- Check the mechanic of speaker, contacts, membrane, soiling
- Check resistance of speaker (about 30Ω)

Microphone

No / quiet / distorted transmitting audio signal

- Check contacts of microphone
- Check resistance of microphone (about 800Ω)

X300

- Check soldering
- Check contacts (change connector if bent)

X100

- Check microphone spring contacts
- Check soldering

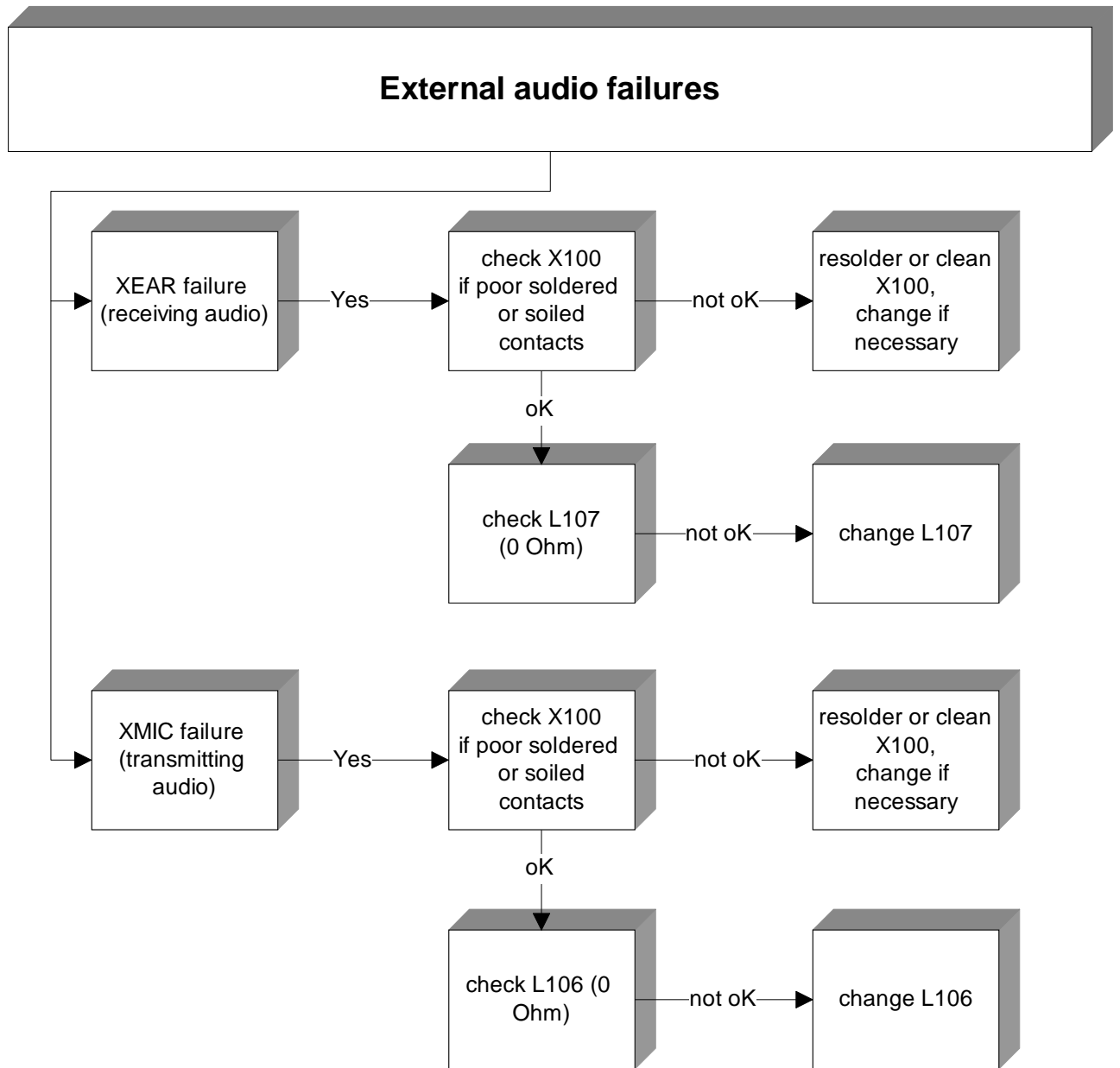
V103

- Check resistance from MIC N or MIC P to ground (about 1KΩ and 2KΩ)
change component if resistance is 0Ω

C266

- Check MIC BIAS voltage 2.8V DC collector V 250 if audio is active (use WinTesla / testing / audio)

External Audio Failures



L106

- Check resistance of coil (0Ω), if there is no XMIC

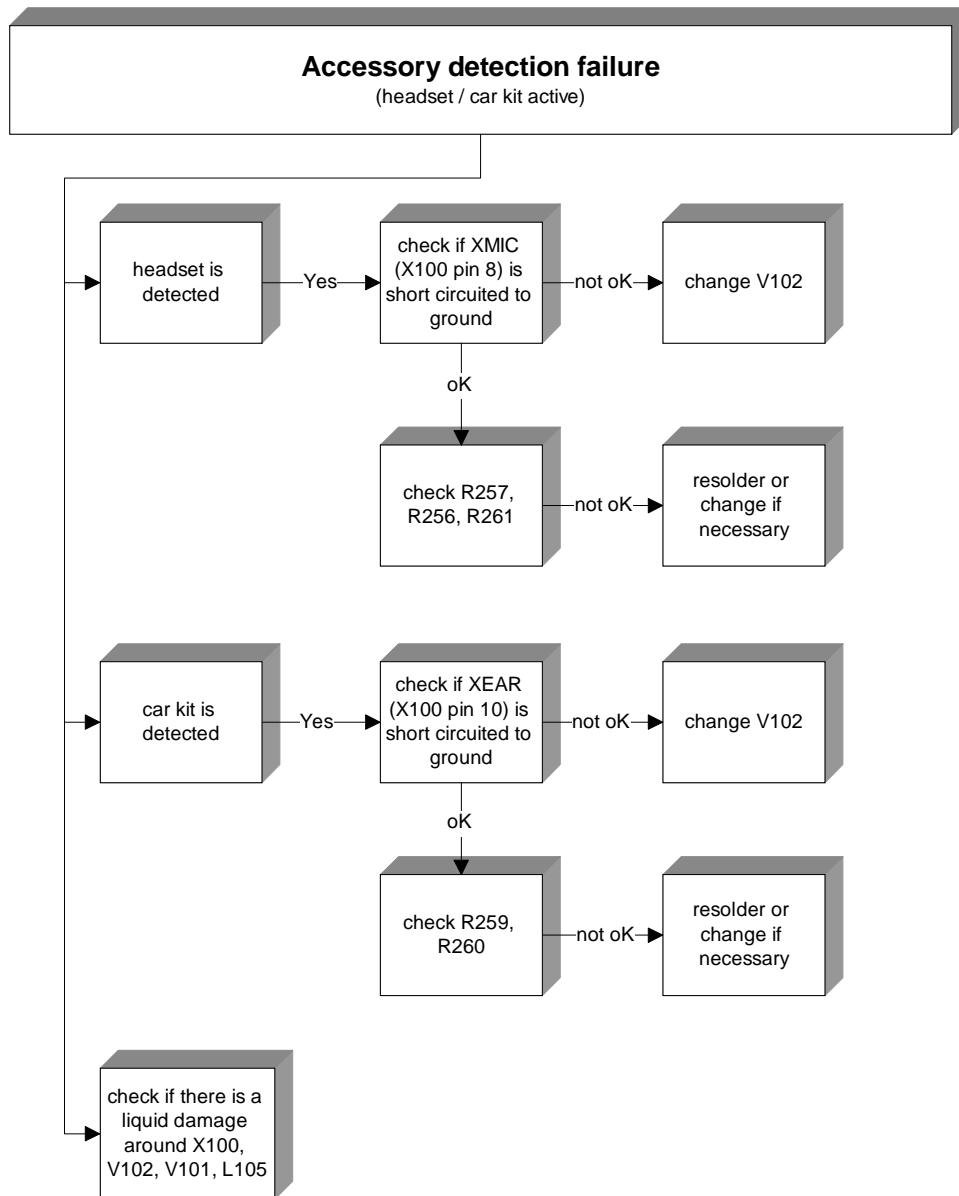
L107

- Check resistance of coil (0Ω), if there is no XEAR

X100

- Check soldering
- Check contacts (soiling)

Accessory detection failure (headset / car kit active)



V102

- Check the resistance of XMIC to ground if headset is detected
- Check the resistance of XEAR to ground if car kit is detected
- Change component if resistance is low

R259 / R260

- Check soldering and resistance of components if car kit is detected (45KΩ / 22KΩ inside PCB)

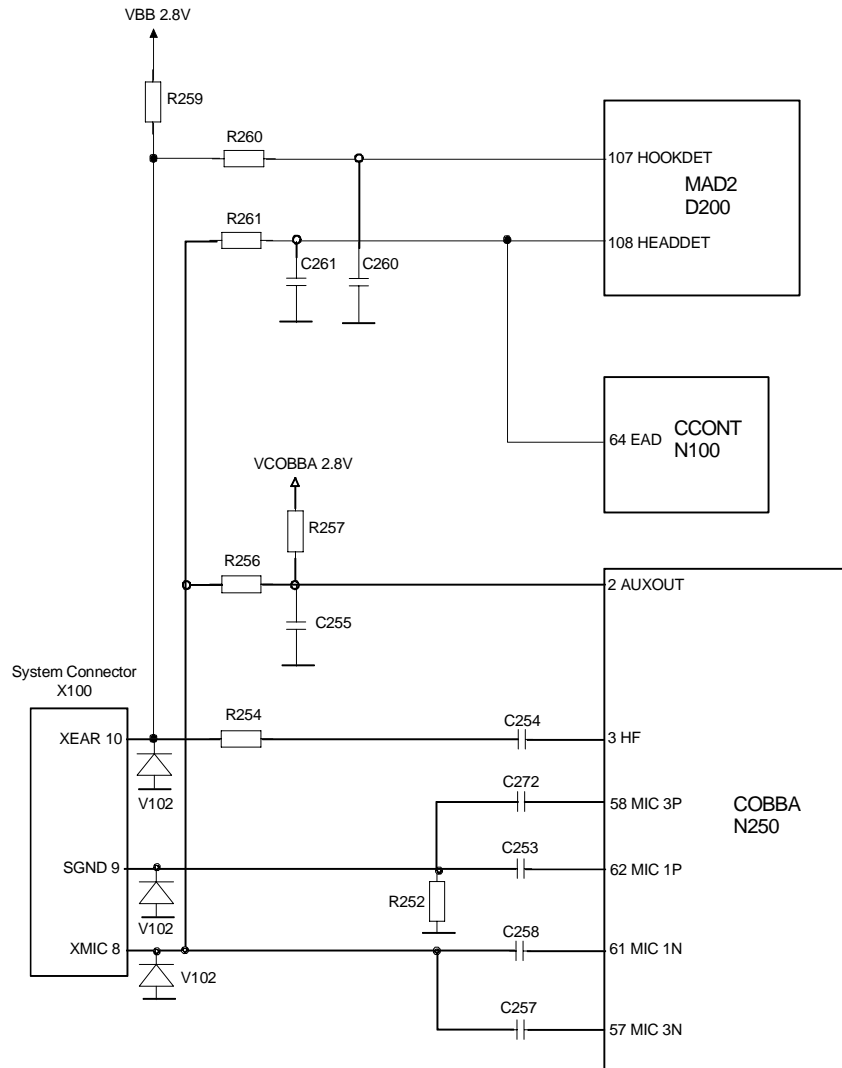
R256 / R257 / R261

- Check soldering and resistance of components if headset is detected (2,2KΩ, 45KΩ, 22KΩ inside PCB)

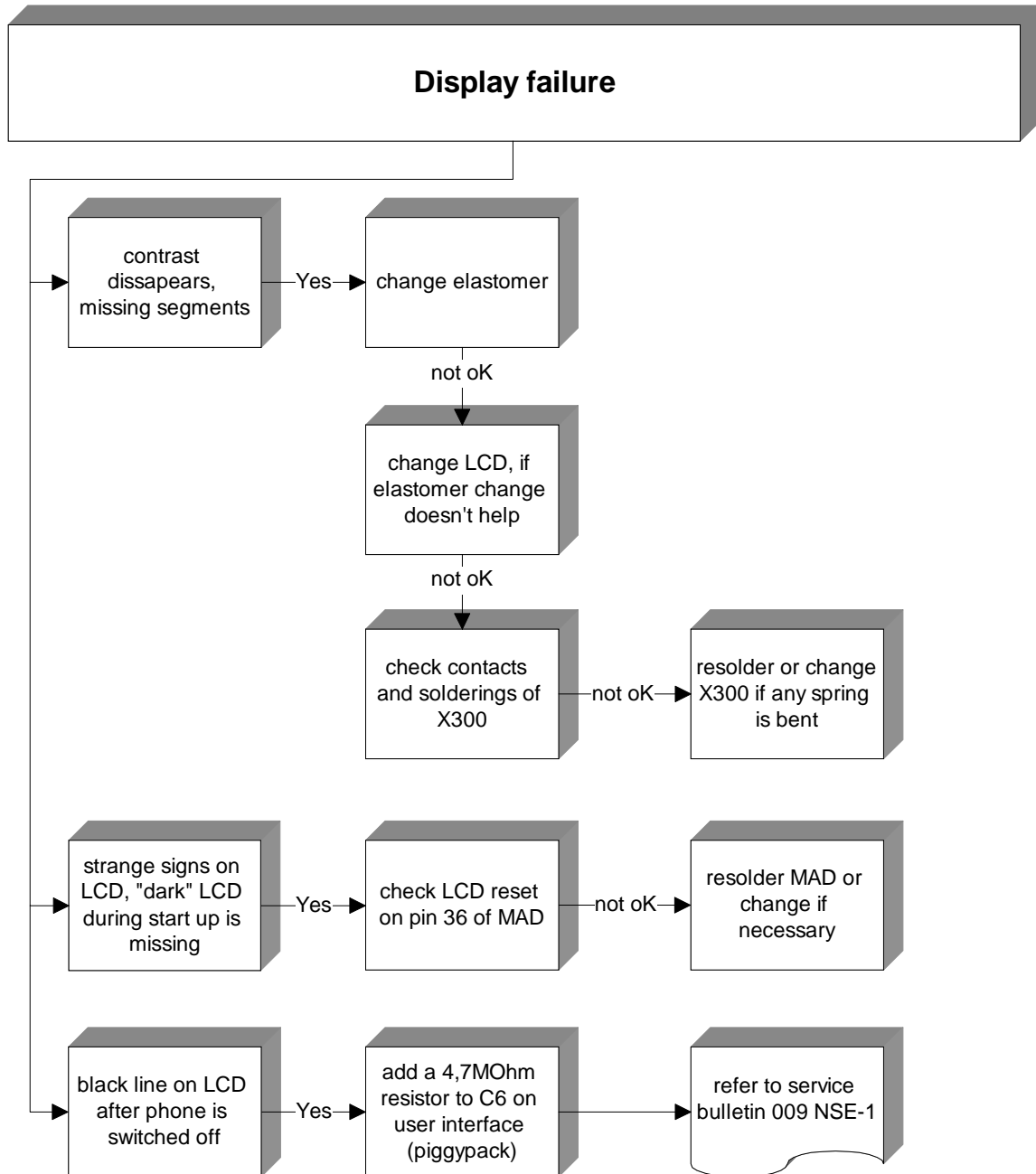
Liquid damage

- Check if there is a liquid damage around X100, V101, V102 and L105)

Figure 7: Block diagram of audio switching concept



Display Failure



Elastomer

- Change Elastomer to recommended blue ShinEtsu elastomer MSG in Tape & Reel. Do not touch elastomer with bare hands (see SB035 NSM-1).

Figure 8: different types of elastomers



DO NOT USE
ANY LONGER

#5409131

#9780252
Recommended Elastomer

LCD / UI Module

- Change LCD if elastomer change doesn't help
- The PCB version UE4_13 makes better contact between PCB and the Elastomer, pad size of the LED's is modified

Figure 9: different types of LCD's

Philips LCD

Seiko LCD



NO capacitors

capacitors inside

X300

- Check solderings
- Check contacts (change connector if bent)

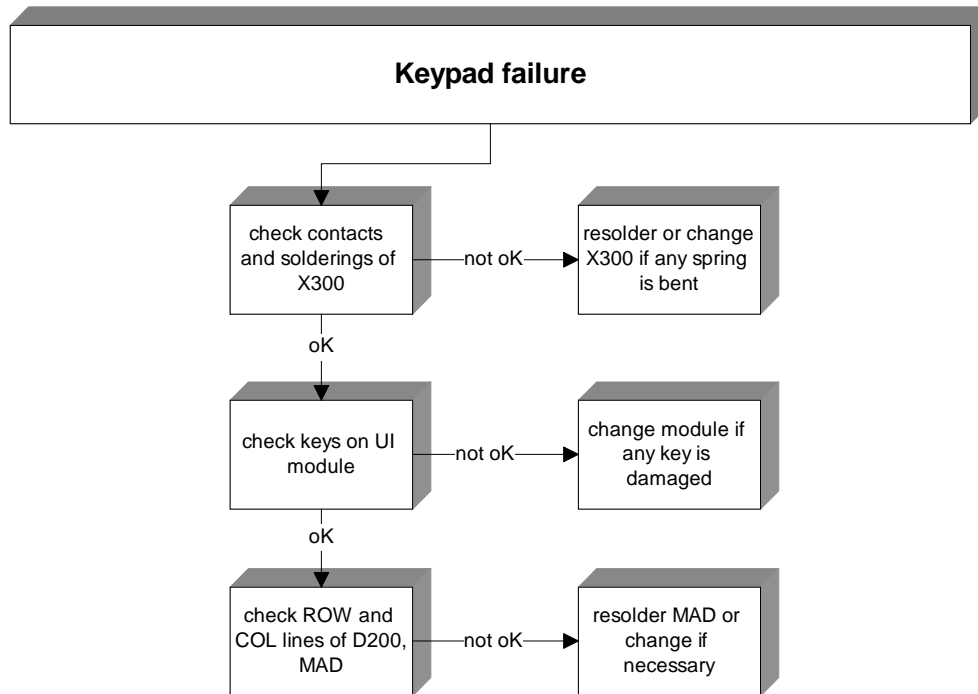
D200

- If there are wrong signs on LCD and the filled LCD during start up is missing, check LCD reset on JBS-19 Test Pin 25 or D200/ 36 during start up

UI-module

- Check LCD contact pads, clean if soiled
- Change if elastomer and LCD change do not help

Keypad failure



X300

- Check soldering
- Check contacts (change connector if bent)

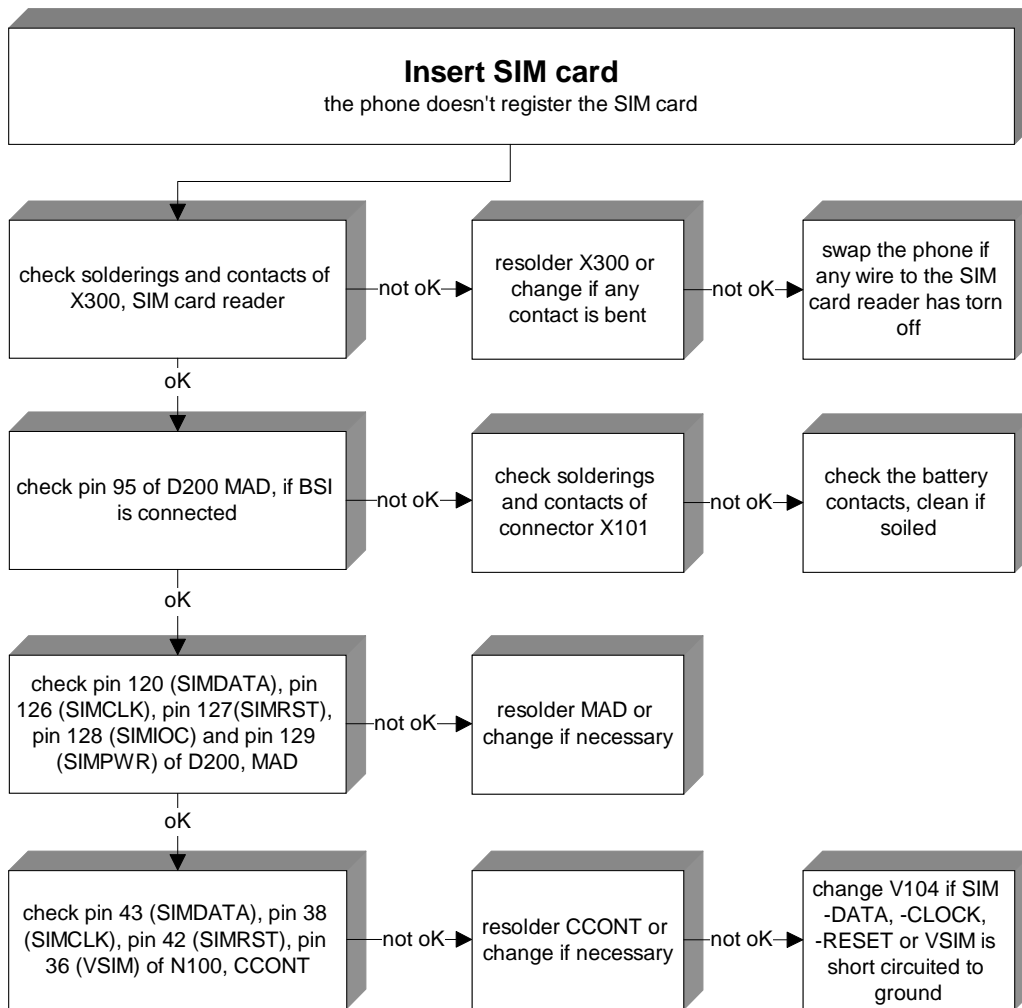
D200

- Check ROW (5:0) and COL (4:0) lines

UI-module

- Check keys on UI, change UI-module if any keydome is damaged

Insert SIM CARD



X302, SIM card reader

- Check soldering
- Check contacts (change connector if bent)

X101, battery connector

- Check BSI connection to D200 / 95 CardDetX

D200, MAD

- Check SIM card -DATA (Pin120), -Clock 3,25MHz (Pin 126), -Reset (Pin 127), -IOC (Pin 128) and -Power (Pin 129)

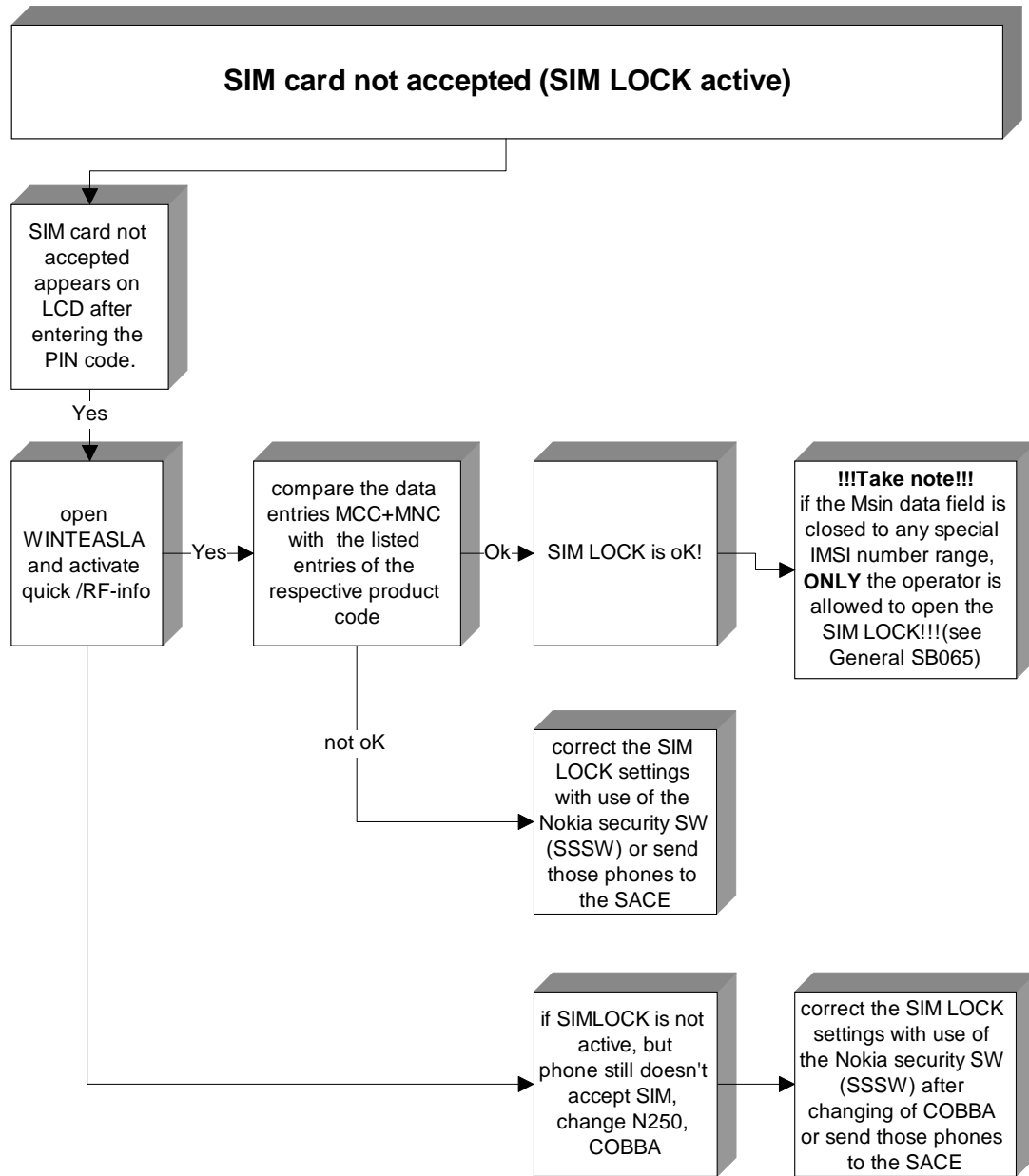
N100, CCONT

- SIM card -DATA (Pin 43), -Clock 3,25MHz (Pin 38), -Reset (Pin 42) and VSIM 3V/5V DC (Pin 36) depends on SIM card

V104

- Change component if SIM -DATA, -Clock, -Reset or VSIM is short circuited to ground

SIM card not accepted, SIM LOCK failure



- If message "SIM Card not accepted" appears on LCD after entering PIN code, a SIM LOCK is activated in this phone.
- Initialise phone into normal mode and activate *Quick/RF-info* (WinTesla) compare the SIM LOCK entries with the references from the operator

N100, CCONT

- Refer to insert SIM Card procedure

N250, COBBA

- Change COBBA if all SIM LOCK entries and SIM card signals from CCONT are ok

Note! Rewrite SIMLOCK and IMEI entries with use of the Nokia security SW (SSSW) and make a SW-update or send this phones to the SACE, if this procedure is not permitted to you

Figure 10: No SIMLOCK set to the phone

```

Phone Mode:
  NORMAL
Phone Version:
  V 5.31 19-02-99 NSE-3 (c) NMP.
Serial Number:
  490518/10/020919/4
SIM Lock Settings:
  SimLock  Status  Type      Counter  Data
  L1       Open   Factory   0        Mcc+Mnc 00101
  L2       Open   Factory   0        Gid1     0000
  L3       Open   Factory   0        Gid2     0000
  L4       Open   Factory   0        Msin     0000000001
    
```

Figure 11: SIMLOCK is set to operator OLA France

```

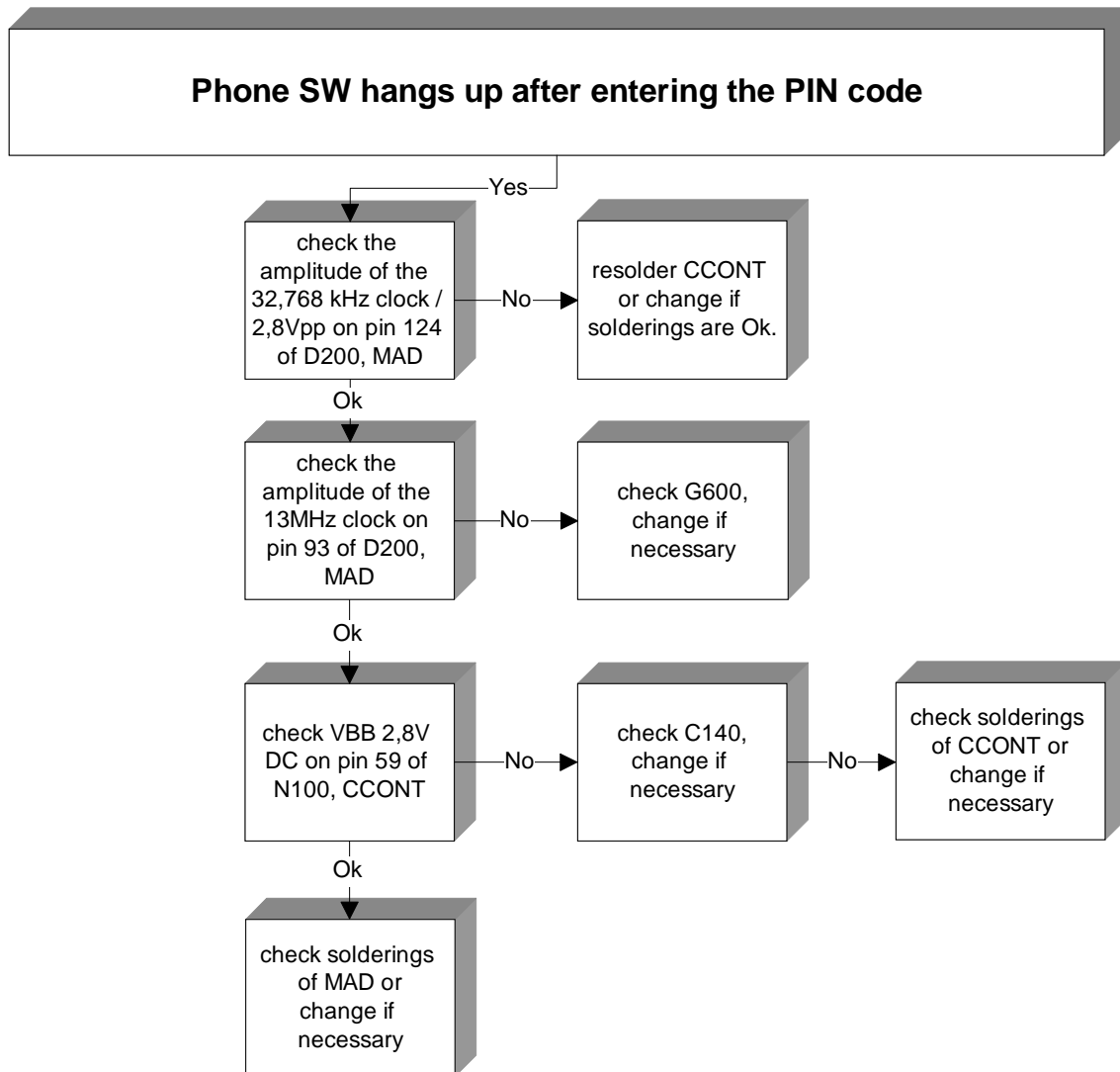
Phone Mode:
  NORMAL
Phone Version:
  V 5.11 19-02-99 NSE-1 (c) NMP.
Serial Number:
  490520/20/083049/9
SIM Lock Settings:
  SimLock  Status  Type      Counter  Data
  L1       Closed  User      0        Mcc+Mnc 20801
  L2       Closed  User      0        Gid1     0000
  L3       Open   Factory   0        Gid2     0000
  L4       Open   Factory   0        Msin     0000000000
    
```

SIM LOCK DATA NSM-1

Figure 12: List of current SIM LOCK phones NSM-1

<i>Product-Code NSM-1</i>	<i>SIM-LOCK-DATA</i>	<i>Operator</i>
0502586	Mcc+Mnc 21401 Msin 0000000000	AIRTEL
0502581	Mcc+Mnc 23433 Msin 0000000000	ORANGE
0502570	Mcc+Mnc 26803 Msin ??????????	OPTIMUS
0502582	Mcc+Mnc 23430 Msin ??????????	ONE2ONE
0502571; 0503476	Mcc+Mnc 23205 Msin ??????????	CONNECT
0502587	Mcc+Mnc 2140; Msin ??????????	MOVISTAR
0502824	Mcc+Mnc 20420 Msin 0000000000	DUCHTONE
0503022	Mcc+Mnc 20416 Msin 0000000000	PROXIMUS
0503126	Mcc+Mnc 23201 Msin ??????????	MOBILKOM
0503138	Mcc+Mnc 26801 Msin ??????????	TELECEL
0503160	Mcc+Mnc 21403 Msin ??????????	AMENA
0503142	Mcc+Mnc 26806 Msin ??????????	TMN
0503710, 0503711	Mcc+Mnc 23202 Msin ??????????	Maxmobil
0503712; 0503932	Mcc+Mnc 28602 Msin ??????????	Telsim
0503765	Mcc+Mnc 20810 Msin ??????????	SFR (GID1=2456)
0503808; 0503931	Mcc+Mnc 28601 Msin ??????????	Turkcel
0503611	Mcc+Mnc 28010 Msin ??????????	SFR
0501437; 0501438; 0501677; 0501678; 0501883; 0501884; 0501885; 0501886; 0501887; 0501888; 0502205; 0502206; 0502207; 0502208; 0502209; 0502238; 0502239; 0502240; 0502241; 0502242; 0502243; 0502348; 0502420; 0502426; 0502427; 0502583; 0502584; 0502585; 0502589; 0502590; 0502690; 0502691; 0502774; 0502996; 0502997; 0503110; 0503488; 0503504; 0503709; 0503933; 0503975; 0504079; 0504166; 0504167;	NO SIM-LOCK	

The phone hangs up after entering the PIN code



D200 MAD faulty / poor soldering

- Check the amplitude of the 32,768 kHz square wave on pin 124 (comes from CCONT pin 48)
- Check the amplitude of the 13 MHz clock frequency pin 93 (from G650)
- Check VBB 2,8V DC
- Resolder MAD
- Internal error of MAD

Low receiver signal strength indicator

Antenna faulty / wrong - Tuning

- Check the code of the antenna label (see below)
- Check the receiver signal indicator with a new antenna
- Retune the handset

Figure 123: Antenna codes

NMP CODE	DESCRIPTION	TYPE CODE (Stamped in helix antenna)	NOTE
0660178	ANTENNA FXD 890-960/1710-1880 MHz	DGPxxxxx	NSM-1*
0660160	ANTENNA FIXED HELIX 890-960 MHz	SGSxxxxx	NSE-1/3*
0660145	HELIX 1710-1880 MHz PCN	SPNxxxxx	NSK-1/3*

No service

13 MHz VCTCXO G650 out of range

- Check the 13 MHz reference frequency pin 15 N600 (SUMMA) or pin 2 from G650, set first the module in service mode, a frequency error higher +-50Hz can create deviation of the IF frequencies

X560 Antenna connector mechanical faulty

- Check the handset with the external antenna
- Check the resistance "00hm" from the internal antenna pad to the "in" pin from X560

B100 32,768 kHz crystal

- Check the amplitude of the 32,768 kHz square wave on pin 48 from CCONT

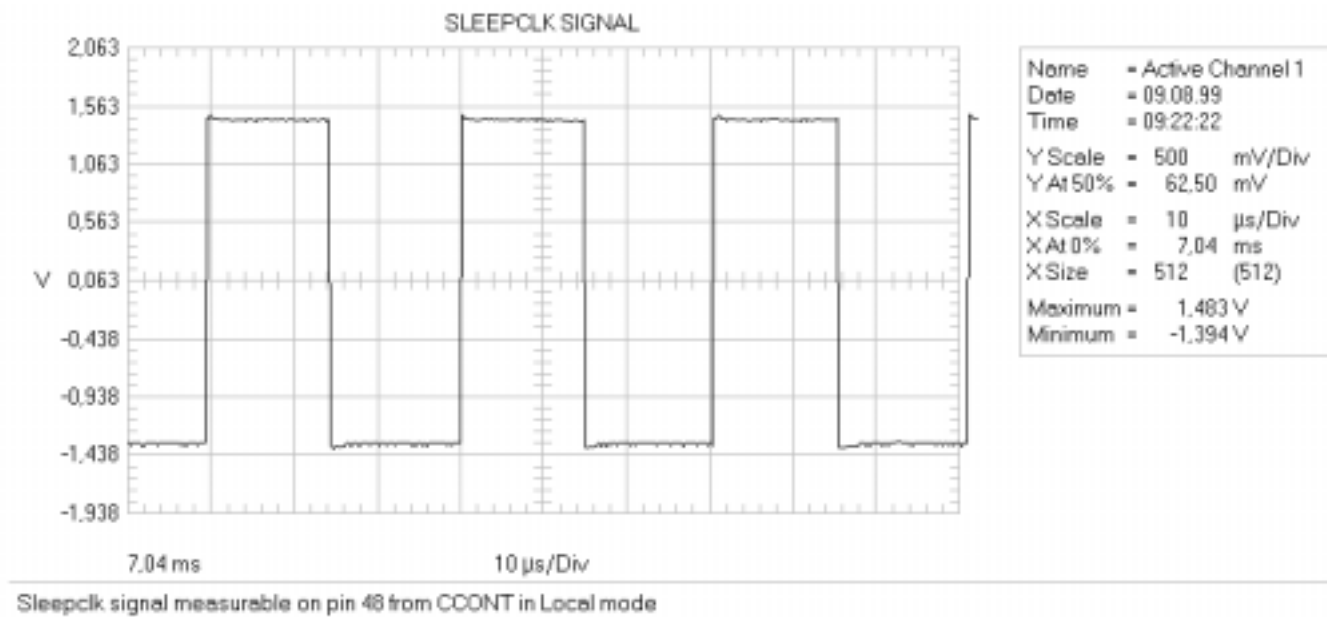


Figure 13: Sleepclock signal

No RX (no rx calibration...RSSI reading fixed value)

MAD / COBBA / R263 faulty

- Check if the 13 MHz IF frequency on pin 22 & 23 COBBA changes the amplitude if the generator frequency level is changed
- Check if the RXC impulse on pin 36 N600 (SUMMA) changes the amplitude if the generator frequency level is changed
- Check R263 if any or low signal is measurable
- Change MAD
- Change COBBA (Remember SIM-LOCK data and new update after change)

No RX (no rx calibration...RSSI readings -> high difference)

Z560 Duplexer faulty / poor soldering

- Check the rx signal on the ANT pin and on the out going pins RX-G or RX-D
- Check that the signal attenuation between duplexer "in" and "out" is around 2dbm-5dbm depending on the receiver band
- Resolder the duplexer or change it

No RX (no rx calibration...RSSI reading highest value)

Z600 / Z601 faulty / poor soldering

- Check the 73 MHz IF frequency on Z600
- Check the components C511, C512, L503, L504 if the signal amplitude is different between the two lines
- check the soldering of Z600 or change it
- check the 13 MHz IF frequency on Z601, around 3dbm attenuation between signal-in and signal-out
- check the soldering of Z601 or change it

No RX (no rx calibration...RSSI reading highest value)

N600 SUMMA faulty / poor soldering

- check the UHF- and VHF oscillator frequency
- check the control-lines for the PLL, pin 5, 6, 7 from N600 (see the diagrams below)
- check the UHF-VC on pin 21 N600 1,9V-3.2V depending on the channel
- check the VHF-VC on pin 12 N600 2,6V check the 5V VCP supply voltage drop over R606 (normal 0,2V)
- change the N600 SUMMA

Figure 14: PLL-SCKL Signal

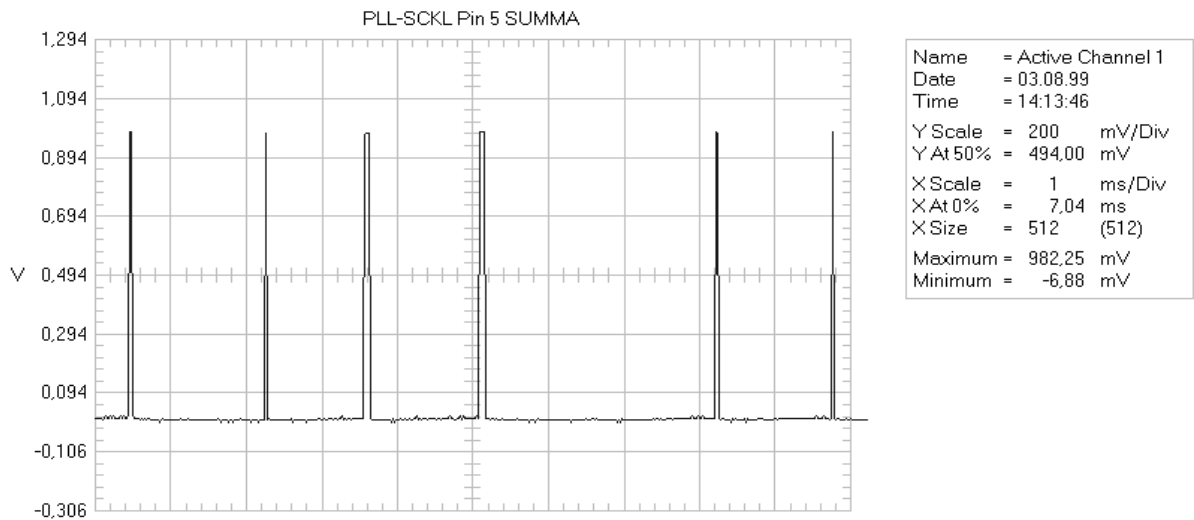


Figure 15: PLL-SDAT Signal

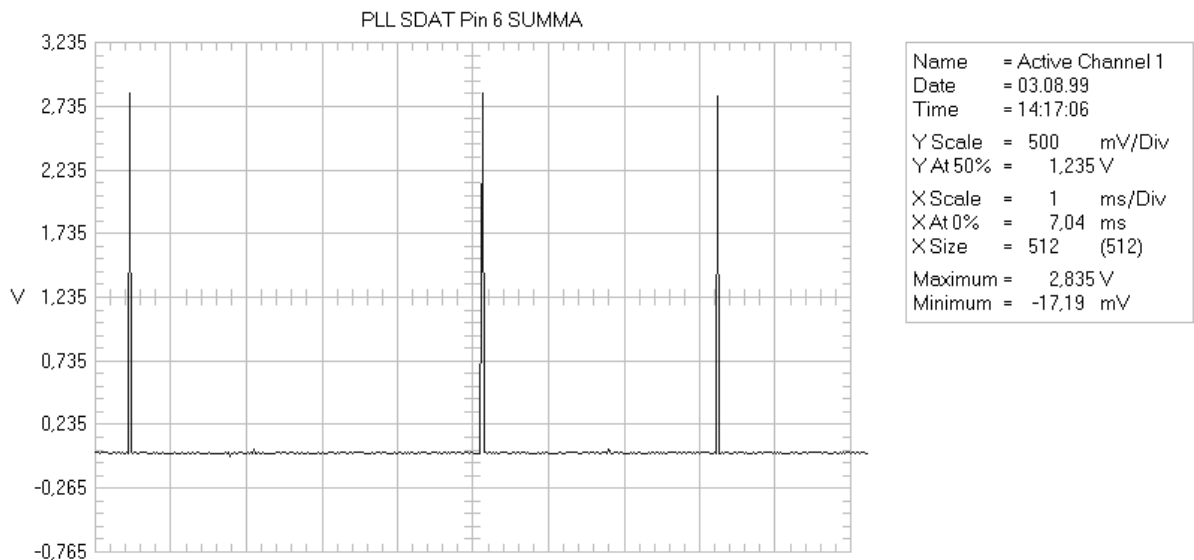
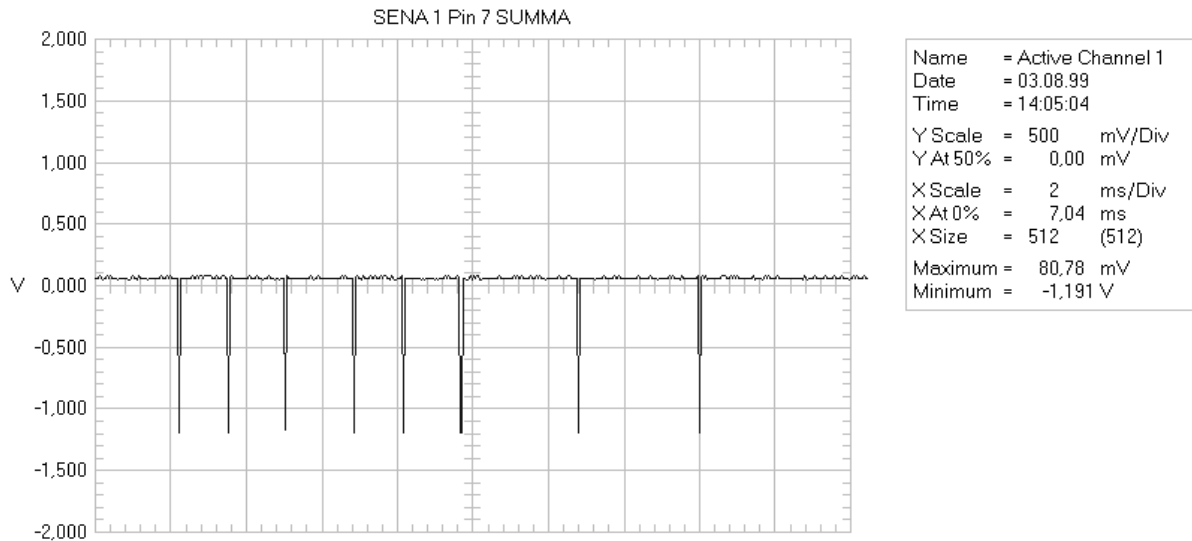


Figure 16: PLL-SENA Signal



Call breaks / No service

G550 UHF Oscillator out of range or high spurious emission

- check the UHF frequency on G550 for high spurious or deviation
- check the UHF-VC on pin 21 N600 1,9V-3.2V depending on the channel
- check the 5V VCP supply voltage on pin 13, 22 from N600 SUMMA or pin 32 from CCONT
- check R507 10Kohm, C542 1nF

No Call / service OK

N100 CCONT faulty

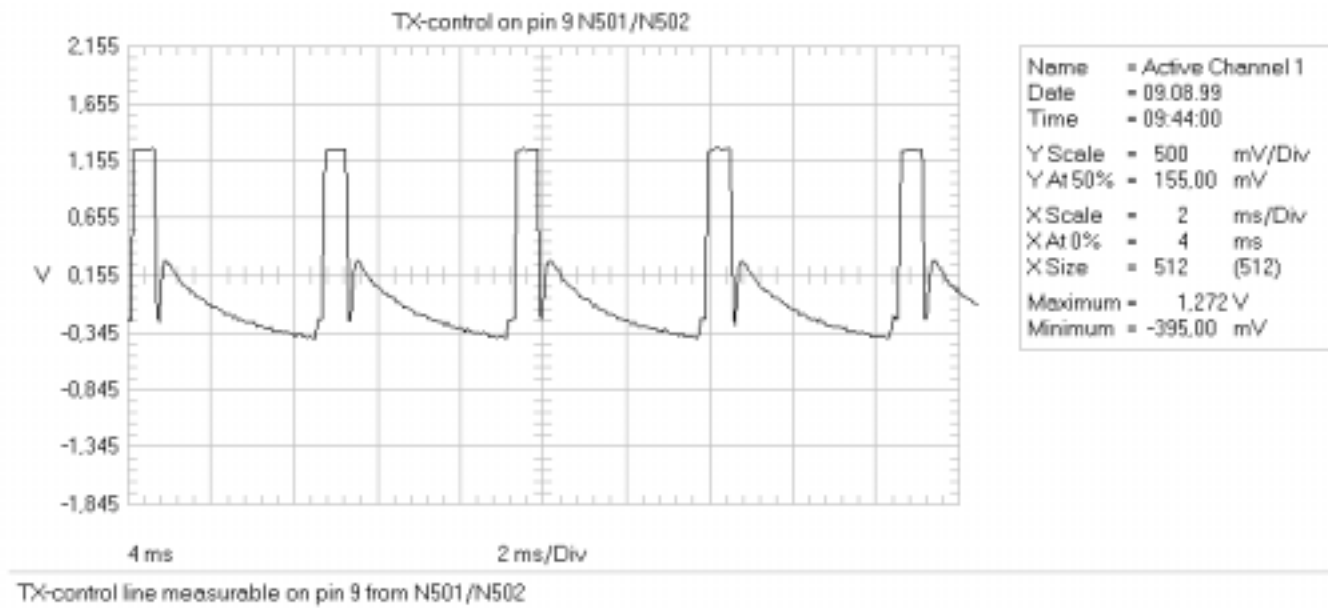
- check if the "Insert SIM-card" message appears sometimes on the display
- check if it's possible to read the saved phone numbers of the SIM-card
- Resolder CCONT
- Change CCONT

No or low TX-Power

N501 / N502 / X 560 faulty

- Check the power supply Vbat N502 pin 2,3,4,12,13 / N501 pin 4,6,11,12,13
- Check the input power on pin 8 N501/ pin 6 N502 depend on the band (nominal 0dbm)
- Check the outgoing power on pin 12 or 13 N501/ N502
- Check the TX-Power control on pin 9 N501/ N502 ,1Vpp-1,5Vpp / 0,4..V - 0,9..V DC depend on the power-level (see the diagram below)
- Change the PA if no or too low power comes out
- Check the TX-Power on the antenna IN/OUT pads from X 560
- Check the X560 connector if it has a high attenuation

Figure 17: TX-Control Signal



Change history

Originator	Status	Version	Date	Comment
Jose Marquez	Draft	0.2	20.09.1999	First public version
	Draft	0.3	01.10.1999	Example for AMS
	approved	1.0	19.10.1999	SIM-LOCK entries up-dated
Holger Klein	approved	1.1	01.02.2000	SIM-LOCK entries up-dated Flow-charts corrected