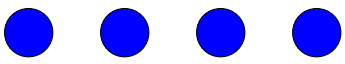
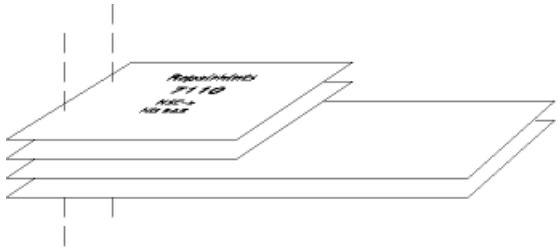
Repairhints

8210/8850/ 8890

NSM-2/3 & NSB-6



GENERAL



-How to use this document

Put the QUICK REPAIR layouts behind this manual.
Now you are able to follow these specifications with graphical layouts and it is easier for you to find the components and measuring points.

-Component characteristics:

Some components contain important data.
Several described steps only are practicable if you are able to reflash/ realign the phone and/or rewrite IMEI/SIMlock in certain cases. Please pay attention to separate notes.

-Underfills, broken balls, µBGA

It is not possible to change underfilled components. The trial surely will damage PCB. All replaceable µBGA-components must be renewed after removing.
Check soldering points, remove oxidated solderings (broken balls) carefully by enclosing few new solder before placing new components.
µBGA must be soldered with NMP approved µBGA-rework machines only (e.g. Zevac/OK International).
Only use recommended Fluxtype and an appropriate amount of it.

-PCB handling

Only use appropriate cleaning materials, don`t use scratching or rubbing tools. Clean PCB carefully after every rework and take great pains over the keyboard area. Do not make any loose wiring connections anywhere.
If it is necessary to change any item located under the metal shields, first remove the shield, do not cut partially or bend it.

-Realign after repair

Characteristics of replacement parts are different.
To prevent additional faults after repair (eg. low standby time, loosing network etc...) it is necessary to retune phone values after repair.

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 8210/8850/8890 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 built 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 does not contain any circuit descriptions or schematics.

All measurements are made using following equipment:

Nokia repair SW	: WinTesla Version 6.43
DLL version	: NSM2 03.18.00- 30.03.2001
Nokia Module Jig	: MJS 9
Digital multimeter	: Fluke 73
Oscilloscope	: Fluke PM 3380B
Spectrum Analyzer	: Advantest R3131 / R3162 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

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Contents

HW-CHANGES

Twin-rip added to NSM-2/3
To hold the bottom-connector in its supposed place, twin-rip has been added to both NSM-2 (SB05) and NSM-3 (SB40). The part only fits in one way into the SIMreader, so that wrong assembly is not possible.

Vibramotor modifications in NSM-2/3:
To ensure correct position of vibramotor, rubber frame has been modified in NSM-2 (SB26). Further more the weight of vibramotor has been reduced.
In NSM-3 supporttape has been added under vibramotor (SB11), before new vibraunit with modified rubber frame was available (SB21).

New CCONT implemented:
In NSM-2 (SB31), NSM-3 (SB32) and NSB-6 (SB07) new version of CCONT 2M has been implemented.
The new CCONT (4370719) can replace the old one (4370467) and vice versa, if component is not underfilled.
Remember to run energy management calibration after changing CCONT!

New HAGAR implemented:
Version of HAGAR changed in NSM-2 from HAGAR1 to HAGAR3 (SB18) and from HAGAR3 to HAGAR4 (SB33). Both HAGAR3 (4370667) and HAGAR4 (4370731) can replace HAGAR1 (4370599), but HAGAR1 only can be used for HW-versions ≤ 0395 or PCB-versions ≤ 14.
As in NSM-2, in NSM-3 the version of HAGAR changed from HAGAR1 to HAGAR3 (SB18) and from HAGAR3 to HAGAR4 (SB33). Both new versions are backward compatible.
In NSB-6 HAGAR changed from HAGAR3 to HAGAR4, which also is backward compatible.

New LCD-module:
For better reliability against drops and humidity, new version of LCD (9490366) with improved ACF-tape has been implemented in NSM-2 (SB41), NSM-3 (SB43) and NSB-6 (SB16).

Other changes in NSM-2:
In connection with changing the HW-version from 0392 to 0393 for improved sleepclock-functionality value of R134 changed from 4.7MΩ to 2.2MΩ.
Changes between HW-version 0393 and 0394 confine to an added capacitor (C861, 0.5pF) and a changed value of L505 (3.9nH instead of 4.7nH) for better GSM1800 TX-quality (SB13).
Foam added on diplexer Z670 to prevent broken solderings in case of drops (SB22). For picture refer to chapter "No Service".
To brighten keyboard-illumination value of R311 changed from 39kΩ to 10kΩ (SB23).

Other changes in NSM-3:
Differences between HW-version 1210 and 1220 are an added capacitor C861 and a changed value of L505 (from 4.7nH to 3.9nH) to improve TX-quality of GSM1800 band (SB13).
To improve TX quality (both GSM900 and GSM1800 band), several changes have been made from HW-version 1220 to 1230. For details refer to SB19.
For better RF-performance R974/R975 were removed and C164/C168 added (SB25).
Value of C205 changed from 1µF to 2.2µF for better stabilization of Flash programming voltage (SB26).

Elastomer connector available as a spare part:
In case of faulty elastomer it is not longer necessary to change the whole display-unit.
Note: Elastomer for NSM-2/NSB-6 and NSM-3 have different size. Do not mix them!

FEATURES OF NSB-6

Because of the similarity between NSM-2/3 and NSB-6 also the most common faults are the same and it is possible to use the Repairhints of NSM-2/3 for NSB-6 without problems.

If refurbishment is necessary, do not use colored parts of NSM-2 for NSB-6 or vice versa because of slight deviating colors between both phones. It also is not possible to interchange the main frame because of another antenna used in GSM1900.

Modifications in the baseband confine to some deviating item codes.
Differences between NSM-2/3 and NSB-6 Rf-part explain in the use of GSM 1900 network.
The GSM1900 TX-frequencies vary between 1850MHz and 1910MHz, RX-frequencies between 1930MHz and 1990MHz, SHF-oscillator runs between 3520MHz and 3980MHz.
The number of GSM 1900 channels is 299 (Ch.512 – 810). Duplex spacing is 80MHz and maximum sensitivity is –102dBm as it is in EGSM 900.

GSM900/1900 channels, frequencies and SHF control voltages

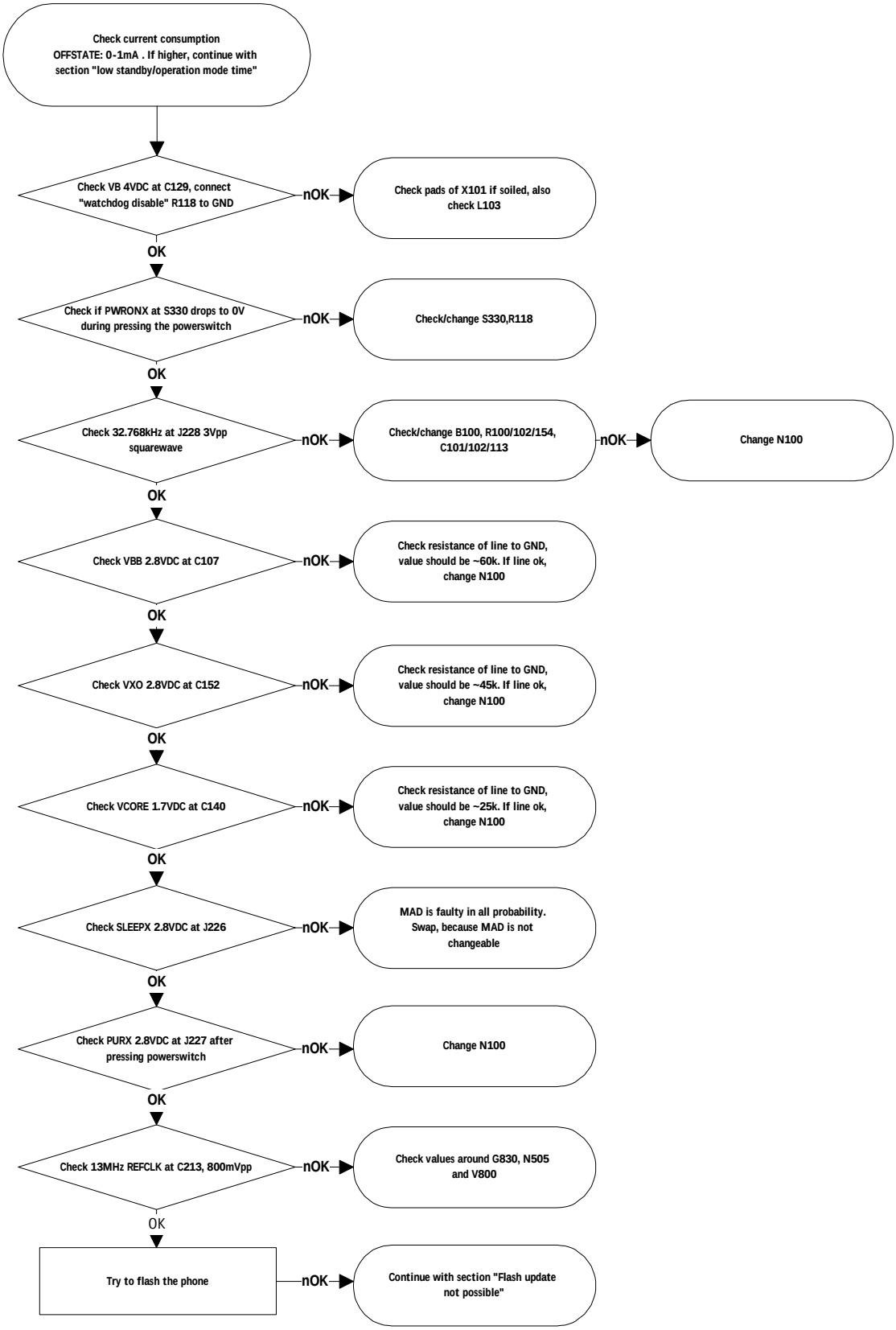
Channel	Tx-mode frequency [MHz]	Rx-mode frequency [MHz]	VCO-frequency Tx-mode [MHz]	VCO control-voltage at C803 [V]	VCO-frequency Rx-mode [MHz]	VCO control-voltage at C803 [V]
EGSM 900						
975	880.2	925.2	3520.8	1.137	3700.8	2.116
1023	889.8	934.8	3559.2	1.342	3739.2	2.246
1	890.2	935.2	3560.8	1.351	3740.8	2.251
60	902	947	3608	1.595	3788	2.409
124	914.8	959.8	3659.2	1.854	3839.2	2.579
GSM 1900						
512	1850.2	1930.2	3700.4	2.056	3860.4	2.816
600	1867.8	1947.8	3735.6	2.226	3895.6	2.929
661	1880	1960	3760	2.342	3920	3.007
700	1887.8	1967.8	3775.6	2.417	3935.6	3.056
810	1909.8	1989.8	3819.6	2.625	3979.6	3.198

The essential differences refer to frequency dependent on parts like filters, transformers, antenna-switch and power amplifier. Unlike to NSM-2/3 the poweramplifier in NSB-6 consists of two separate amplifiers located in one case, which explains the existence of separate control lines. Further more the splitting into two amplifiers makes unnecessary diplexer at the amplifiers input and no TX-buffer is used anymore.

Power amplifier N702 is not available as a sparepart!

The equipment for testing and alignment is almost the same as used for NSM-2/3, but it is necessary to take care not to short circuit the TX-out line at L770 to antenna´s ground pogo-pin when module is in the service-jig!

PHONE DOES NOT SWITCH ON



Phone does not switch on

Battery connector X101

- Check if contact springs are bent, soiled or corroded.
- Clean pads of connector on PCB with an appropriate amount of IPA if necessary.

Power on/off switch S330 faulty

- Check voltage at S330, 4V DC when powerswitch is not pressed.
  If voltage is not ok, check resistance/solderings of R118 or change CCONT N100.
  If voltage at S330 is ok, it must decrease to 0V during pressing the powerswitch, otherwise change S330.

B100 sleepclock oscillator faulty

- Check sleepclock 32.768kHz squarewave at J228, 3Vpp.
  If signal is not measurable, check if voltage at pads of B100 is 1.6V DC. If voltage is not ok, check R100/102/154 or change CCONT N100.
- If sleepclock-oscillator works but on an incorrect frequency, check C101and C102 for defect or broken solderings. But in most cases the crystal B100 itself is responsible for this fault.

G830 reference oscillator faulty

- Check VCC 2.7V DC at C831 and VCON (varies between 0.3V DC and 2.3V DC, normally 1.2V DC) at C832.
  If these two voltages are ok, you must be able to measure 26MHz Clk-frequency at C830, 0.9Vpp. Even without control-voltage the oscillator must work on a frequency around 26MHz – if not, you have to change G830.
- Check 13MHz Clk-signal at C829, 0.3Vpp. If not ok, check values around N505 – for details refer to section "No Service".
- If 13MHz Clk-frequency at C829 is ok, check same signal at C213, 0.8Vpp. If not ok, check whether V800 works. Therefore check 13MHz at base (0.2Vpp) and collector (0.8Vpp) of V800. Voltage at base of V800 normally is 0.7V DC, collector 1.2V DC, change V800 if necessary.

N100 CCONT faulty

- Check VB 3.6V DC at C129.
- Check 32.768kHz squarewave 3Vpp at J228.
- Check that PWRONX decreases to 0V at S330 when powerswitch is pressed. Also check R118.
  If these conditions are fulfilled, output voltage lines must rise to their supposed values and PURX is released after some milliseconds by CCONT: check VBB 2.8V DC at C107, VCORE 1.7V DC and VXO 2.8V DC at C152.
- If CCONT does not work, check output voltage lines for shorts to ground (check current consumption!).
  If resistance of lines is ok, probably CCONT is faulty or there are broken solderings under it - replace it with µBGA rework machine.
  Note that it is necessary to run energy management calibration after changing CCONT!

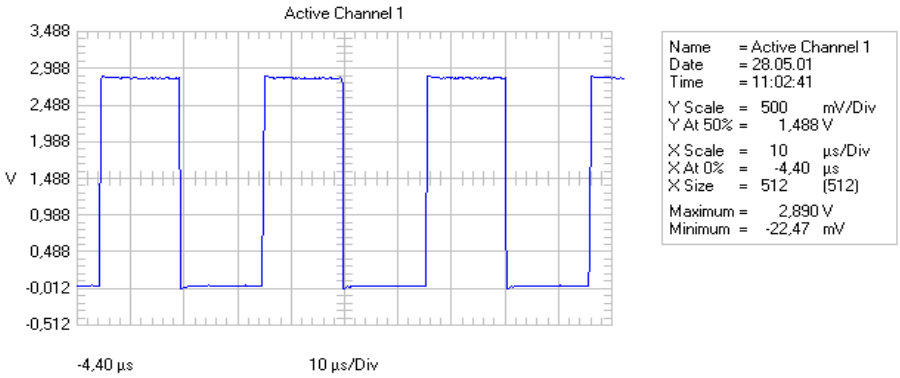
D200 MAD faulty

- Check 32.768kHz squarewave at J228.
- Check 13MHz Clk-frequency at C213.
- Check VBB 2.8V at C201 and VCORE 1.7V DC at C140.
- Check SLEEPX 2.8V at J226.
- Check PURX 2.8V at J227.
- Try to flash the phone.
- If all above mentioned works but phone does not switch on, MAD is faulty in all probability.
  Swap the phone, because MAD is not changeable.

PHONE INTERMITTENT SWITCHES OFF/ DOESN'T SWITCH ON

- Check mechanical appearance of battery-connector, especially check contact-springs if bent, soiled or corroded, change connector if necessary.
  Check contact-pads of battery-connector on PCB for dirt. If necessary clean them with a lint-free cloth and an appropriate amount of IPA. DO NOT USE ANY SCRATCHING OR RUBBING TOOLS!
  If you have to clean battery-connector´s contact-pads on PCB, always check appearance of contact-springs of connector and vice versa.

- Check amplitude of sleepclock-oscillator 32.768kHz at J228, 3Vpp squarewave:

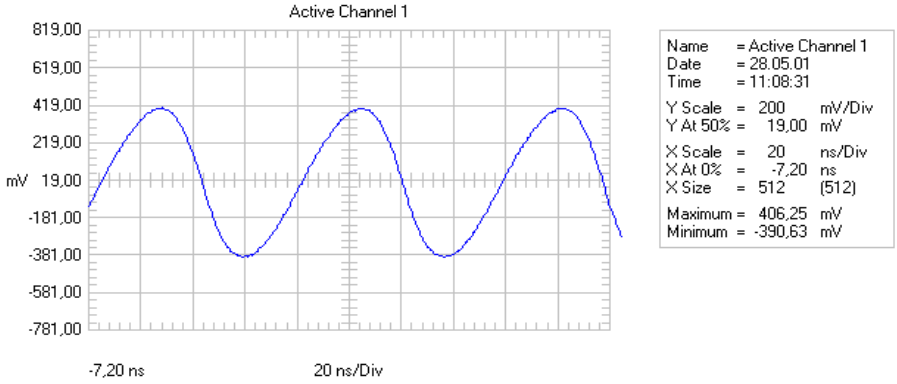


  If amplitude and/or frequency of signal is not ok, check periphery of B100 (R100/102/154, C101/102). If ok change crystal B100 or CCONT N100.

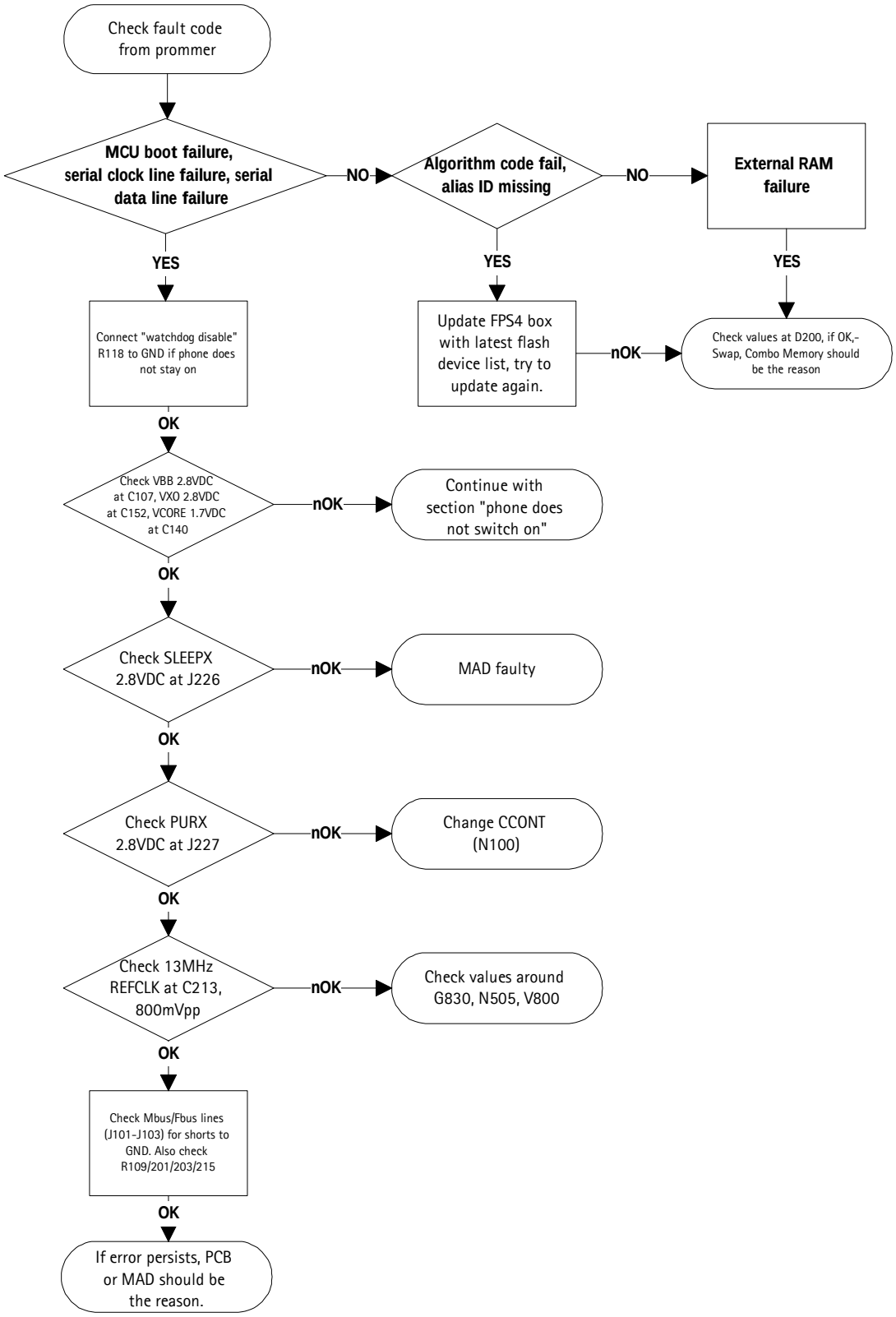
- Probably broken solderings under CCONT N100. Remove CCONT (if not underfilled!) with µBGA soldering machine, clean oxidized pads with a bit flux/solder and replace CCONT with µBGA soldering machine.
  Remember to run energy management calibration after changing N100!

- The above mentioned problem may also be caused by N505, because the reference oscillator G830 (26MHz) is divided to 13MHz system clock by HAGAR N505. If there are broken solderings under HAGAR, rework as described for CCONT.

- Other possibilities for this fault might be broken solderings of C213, or the capacitor itself is broken. Check 13MHz system-clock (0.8Vpp) at both sides of C213, change capacitor if amplitude of signal varies between both sides.



FLASH UPDATE NOT POSSIBLE



Flash update not possible

Failure message "MCU boot failure, serial clock-/dataline failure"

If fault-code from prommer is one of the above mentioned and phone does not stay on, disable watchdog by connecting R118 to ground and try to update again. If fault remains, check the following:

- Check VBB 2.8V DC at C107
- Check VCORE 1.7V DC at C140
- Check VXO 2.8V DC at C152
- Check SLEEPX 2.8 V DC at J226 and PURX 2.8V DC at J227
- Check 13MHz system-clock at C213, 0.8Vpp sinewave

If only one of the above mentioned signals is not measurable, continue with section "Phone does not switch on".
If all signals are ok but fault persists, check MBUS/FBUS-lines for shorts to ground:

- Check MBUS-line (J103) to GND: ≥ 60kΩ
- Check FBUS_RX-line (J102) to GND: ≥ 200kΩ
- Check FBUS_TX-line (J101) to GND: ≥ 100kΩ

To ensure function also check resistors R109, R201, R203 and R215. If these values are correct but Flash update still is not possible, MAD or PCB faulty in all probability.

Failure message "Algorithm code fail / alias ID missing"

If this failure message appears while flashing, update your FPS4-box with the latest flash device list and try to flash phone again.
If fault persists even though if FPS4-box has been updated, in all probability Combomemory is faulty. This is not changeable.

Failure message "External RAM failure"

In case of this failure message in all probability Combomemory D210 is faulty. This is not changeable.

Contact service

If "Contact Service" appears on LCD after flashing or SW update interrupts, change C205 from 1µF to 2.2µF (Code 2610203) to stabilize flash programming voltage. (SB26, NSM-3)

CONTACT SERVICE

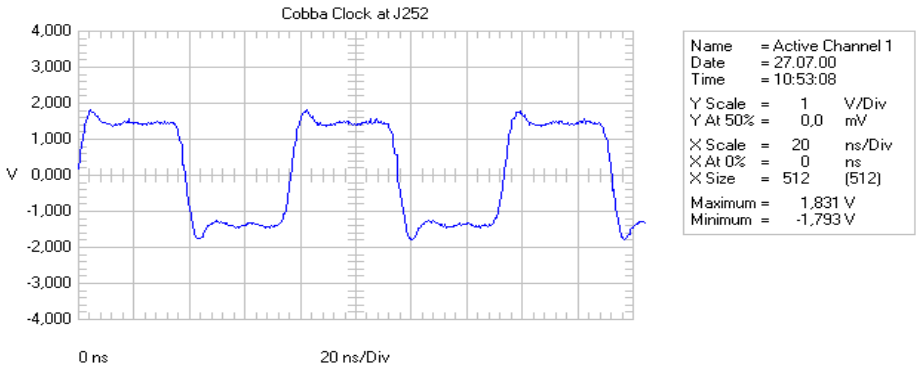
This fault means that the phone software is able to run and thus the watchdog of CCONT N100 can be served.
Selftest functions run when power is switched on and software is executed from ComboMemory.
If any selftest fails, a "Contact Service" text is shown on LCD.

Possible failures:

MCU ROM Checksum failed
Try to flash the phone. If not ok after flashing, probably ComboMemory is faulty, which is not changeable.

CCONT Interface failed
Probably broken solderings under CCONT N100. Remove CCONT (if not underfilled!) with µBGA soldering machine, clean oxidized pads with a bit flux/solder and replace CCONT with µBGA soldering machine.
Remember to run energy management calibration after changing N100!
If not ok after reworking the CCONT, MAD or PCB faulty in all probability.

COBBA parallel/serial failed
Check VBB 2.8V at C107 and VCOBBA 2.8V at C248.
Check COBBACLK at J252, 3.6Vpp squarewave at 13MHz:



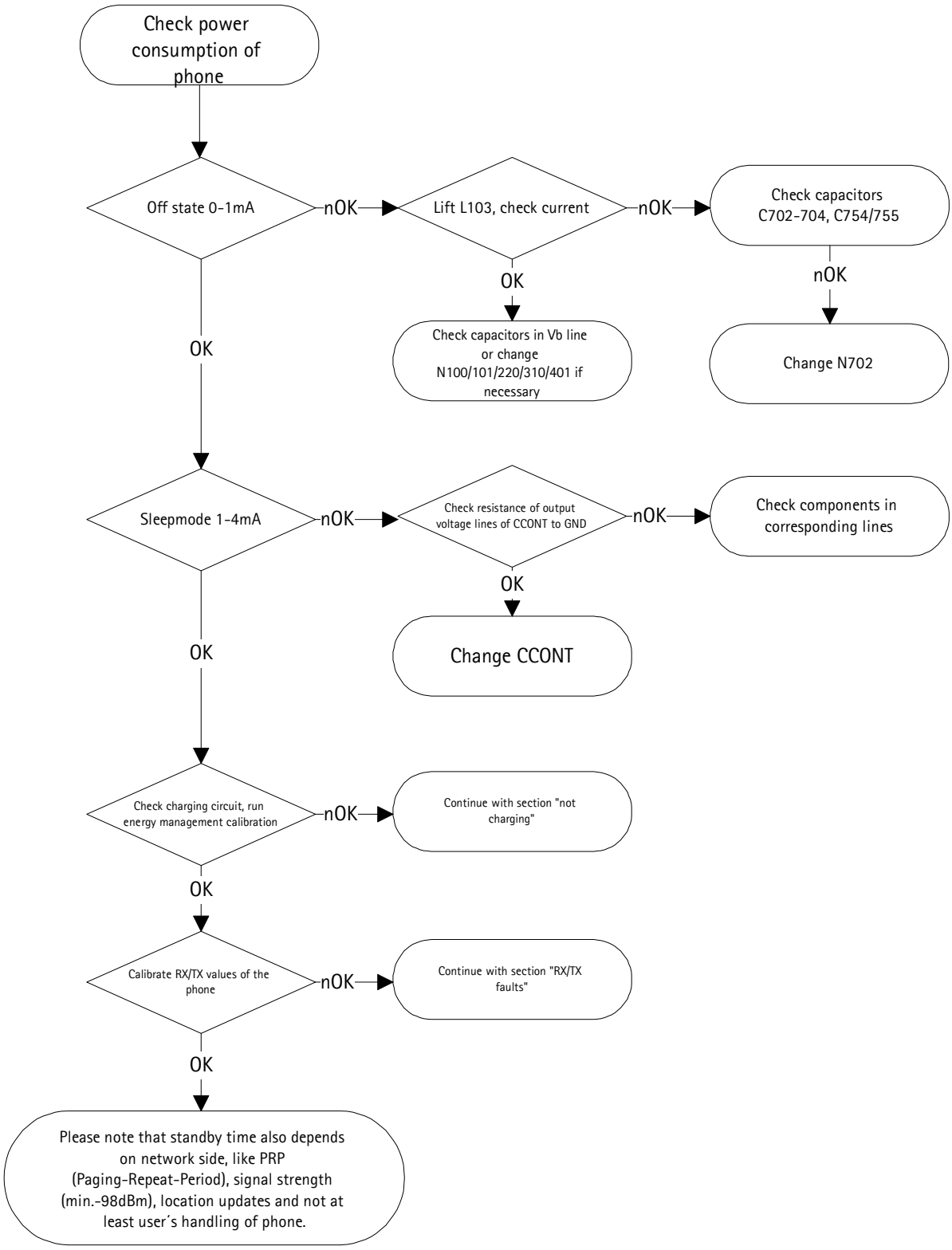
Probably broken solderings under COBBA N250 – remove part with soldering machine, clean oxidized pads and replace new COBBA with soldering machine. If fault remains after changing COBBA, MAD or PCB faulty in all probability.
Note that SIMlock must be rewritten after changing COBBA. You also have to make SW-update and retune RF-values!

DSP alive test failed.
In most of all DSP alive selftest failures MAD is faulty, which is underfilled and because of that not changeable.

EEPROM tune checksum failed
Use WinTesla to check if phonedata like IMEI, product-code or PSN are corrupted.
If phone data is ok, try to reset the phone. If phone data is not ok or fault remains after reset, ComboMemory is faulty in all probability.

RTC Battery failed
See chapter "Clock time problems" at page #21

LOW STANDBY / OPERATION MODE TIME



Low standby / operation mode time

Check current consumption in different operation modes:

Function mode	Minimum current in mA	Maximum current in mA
off state	0	1
sleep mode	1	4
call mode GSM 900	140	400
call mode GSM 1800/1900	120	370

Offstate current faulty

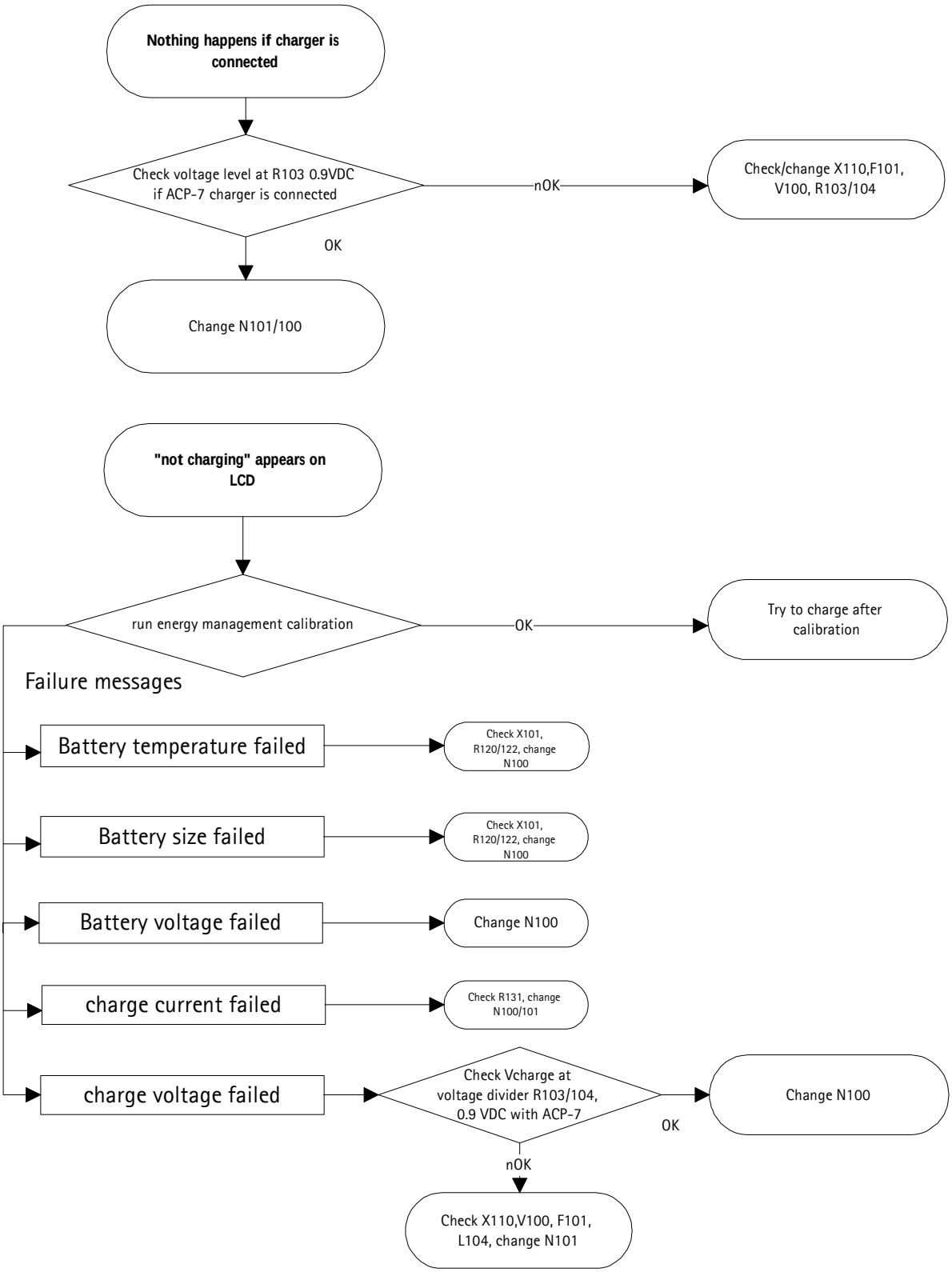
First to do in case of this fault is to lift L103 and check current consumption.
If current still is too high, usually the power amplifier N702 is defect but it also is possible that one of the capacitors C702/703/704/754/755 is faulty – lift them one by one to find the fault.
If current consumption is ok after removing L103, VB-line is faulty. It now is a bit difficult to find the reason for the fault, because both capacitors in VB-line (eg. C100/105/129/142/165...) or N100/101/220/310/401 can be responsible. Anyway you should begin with CCONT N100, which is the reason in most cases.

Sleepmode current faulty

Check resistance of every output voltage line of CCONT N100 to ground. The values should be higher than 10kΩ, except VSYN1 (3kΩ) and VSYN2 (0.9kΩ).
If resistance of any line is not ok, check/change parts of this line.
If resistance of all lines is ok, change CCONT N100.

If both offstate current and sleepmode current are ok but the standby-/operationmode time is not acceptable, check the charging circuit and run energy management calibration to ensure that the fault does not result of an insufficient charged battery.
If also the charging circuit is ok but fault persists, it can be necessary to calibrate RX/TX values of the phone.
If calibration is not possible continue with section "No Service".

NOT CHARGING



Not charging

In case of any fault in the charging circuit: First run energy management calibration to define the fault!

Always check whether the fault only appears intermittend or if it is permanently impossible to charge the battery. In case that the fault appears only from time to time, check if contact springs of DC/HS-connector and battery-connector are bent, soiled or corroded. Also check contact-pads for connectors on PCB. If necessary clean them with an appropriate amount of IPA, DO NOT USE ANY SCRATCHING OR RUBBING TOOLS!

Nothing happens if charger is connected:

Check voltage at voltage divider R103/104, should be 0.9V DC if charger (ACP-7) is connected. If there is no voltage, check Vcharge-line for disconnection:

- Check mechanical appearance of DC/HS-connector, especially check contact springs if bent, soiled or corroded.
- Check solderings and resistance of fuse F101 and coil L104.
- Check resistance of R103 (4.7kΩ) and R104 (47kΩ), also check that Vcharge-line has no short circuit to ground: resistance normally is 50kΩ. Check V100 and C103/114 if not ok.

If nothing happens when charger is connected to the phone, but voltage at R103/104 is ok, it is necessary to change the CCONT.

Display message "Not Charging"

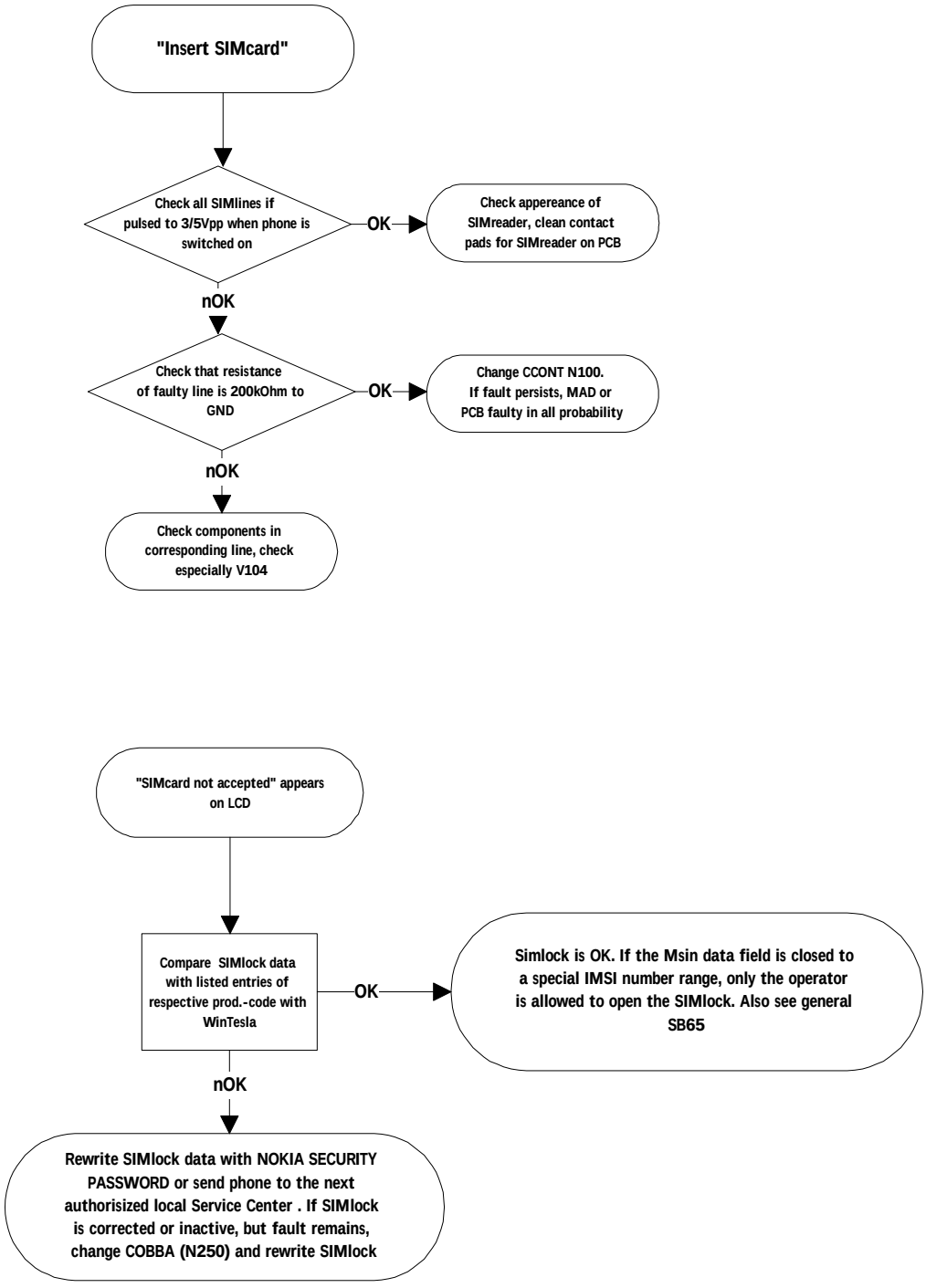
In case of this fault first you should run energy management calibration to get more information about the fault. If calibration works without failure message, check if charging does work now.
If calibration does not work, following failure messages are possible:

- Battery temperature failed:
  Check voltage at C161 or C163, normally 0.5V DC in service-jig. If voltage is not ok, check R120/122 for defect or broken solderings, also check that C121/161/163 have no shorts to ground. If the mentioned parts are ok but fault persists, it is necessary to change the CCONT N100.
- Battery size failed:
  Check voltage at C160 or C162, normally 0.5V DC in service-jig. If voltage is not ok, check R120/122 for defect or broken solderings, also check that C120/160/162 have no shorts to ground. If the mentioned parts are ok but fault persists, change CCONT N100.
- Battery voltage failed:
  This A/D-value is generated inside of CCONT N100, so that you have to change CCONT if A/D-value is out of limit.
- Charge current failed:
  Probably Vcharge-line interrupted. Check resistance of R131 (0.22Ω) or change PSCC N101. If this does not solve the problem, change CCONT N100 and try calibration once more.
- Charge voltage failed
  In case of this failuremessage, first of all check voltage at voltage divider R103/104. Voltage here normally is 0.9V DC with connected charger ACP-7. If this voltage is ok, it is necessary to change the CCONT N100. If voltage at voltage divider is not ok, check contact springs of DC/HS-connector, also check F101 and L104.

Energy management calibration

Run calibration if battery gets hot, charging stops too early or any part in the charging circuit has been replaced.

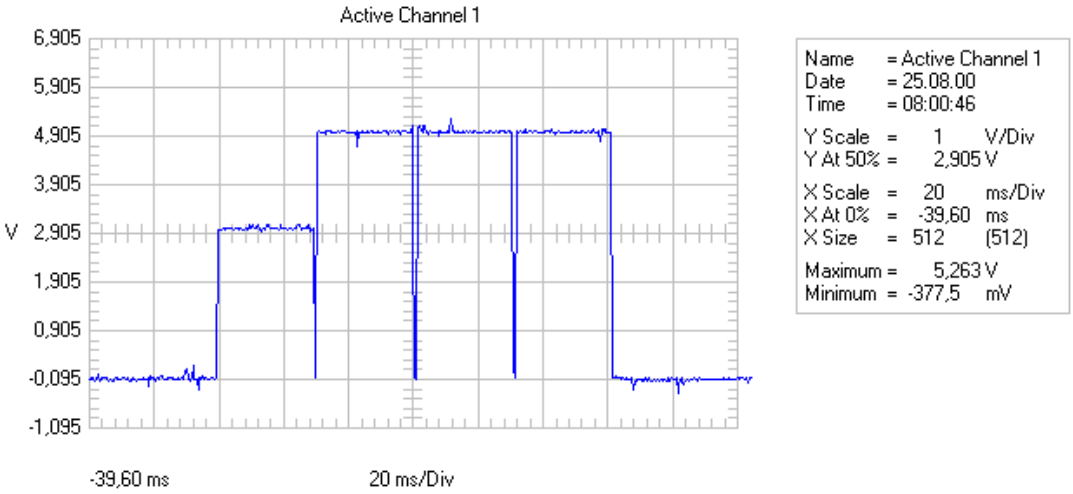
SIMCARD FAULTS



SIMCARD FAULTS

Display message "Insert SIMcard"

The best way to find out the reason for this fault is to check if every single SIMline is pulsed to the signal shown below after switching on the phone:



You can easily check the signal at the SIMreaders pogo-pins of the service-jig. The signal must be measurable at all pins, except the one at the left upper corner because this is the ground pin, located to the edge between Combomemory and MAD.

If the above mentioned signal is ok at all five pogo-pins, check mechanical appearance of SIMreader, also check that contact-pads for SIMreader on PCB are clean.

If the signal is not measureable at a single line only, check corresponding line for shorts to ground. Resistance of lines should not be lower than 200kΩ. Especially check V104 if resistance is not ok.
If resistance of line to ground is ok but no signal is measurable, change CCONT N100 with µBGA rework machine.
In case that oxidized pads exist under CCONT, rework them with a few flux/solder and replace CCONT.
Remember that it is necessary to run energy management calibration after changing CCONT!
If fault persists after changing CCONT, MAD or PCB faulty in all probability.

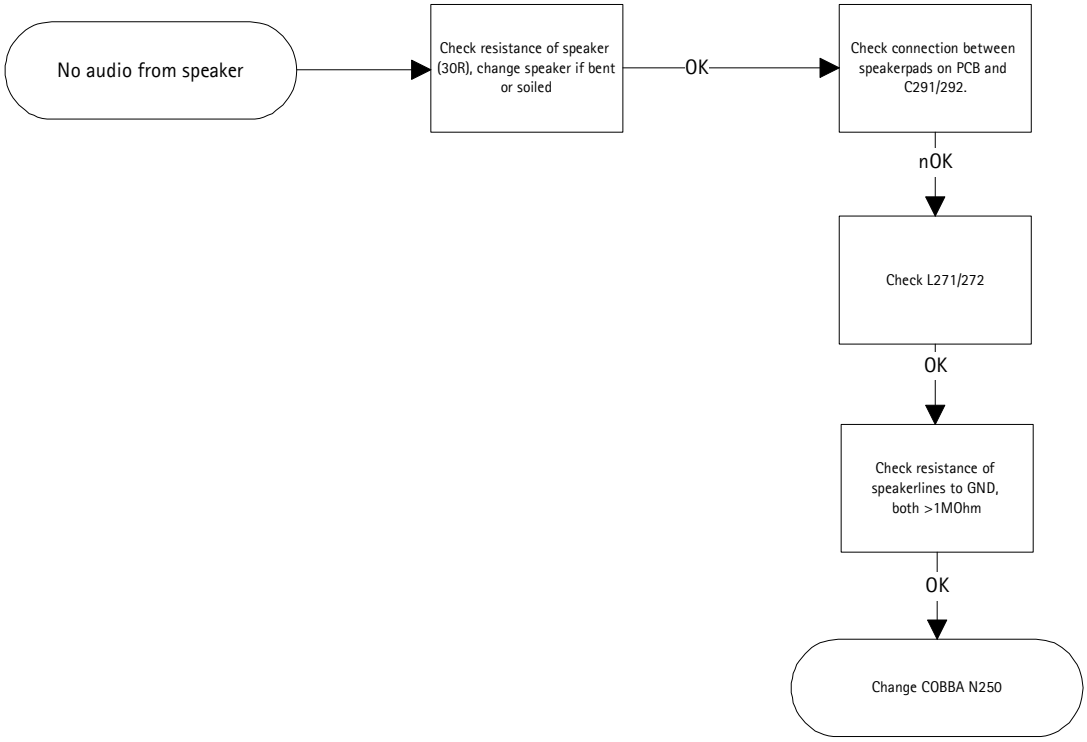
If the signal shown on the top of this page is not measurable at a single SIMreaders pogo-pin, rework CCONT N100 as described above. If this does not solve the problem, the SIMinterface between CCONT and MAD is interrupted or the MAD itself is faulty. This is not changeable.

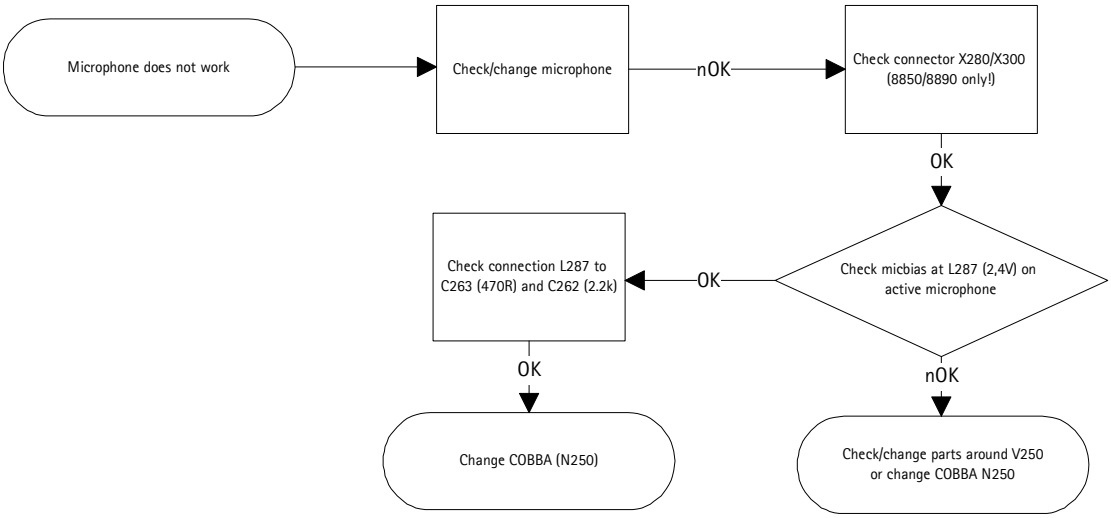
Display message "SIMcard not accepted"

In case of this fault use WinTesla to open Quick /RF-Info window and compare the shown SIMlock-data with the entries of the SIMlocklist for the respective product-code.
If SIMlock-settings are ok or no SIMlock is set, it is necessary to change the COBBA N250. In case that oxidized pads exist under COBBA, rework them with a few flux/solder and replace part with µBGA rework machine.

Note that you have to rewrite SIMlock-settings, make SW-update and retune RX/TX-values after changing COBBA!

INTERNAL AUDIO FAULTS





INTERNAL AUDIO FAULTS

In case of any internal audio-fault in your phone, first you should use WinTesla to define the fault to a single audio-line. If for example communication is possible without problems when using a headset but the internal audiolines do not work, activate audioloop between external input and internal output, so that you can hear the incoming signal from generator in the internal speaker. If this is not the case you concrete know that the internal speakerline is faulty. With this procedure you have the possibility to exactly define the defect line, what simplifies finding out the trouble.

Speaker does not work

- Check that resistance of speaker is 30Ω
- Check mechanical appearance of speaker if audiosignal is too low or distorted
- Check that resistance between speakerpads on PCB and C291/292 is 0Ω, change L271/272 if necessary
- Check resistance of speakerlines to ground, should be > 1MΩ.
- If all above mentioned is ok but speaker does not work, it is necessary to change the COBBA N250.
  Note that you have to rewrite SIMlock-data, make SW-update and retune RX/TX-values after changing this part!

Microphone does not work

- Check/change microphone
- Check connector X280 (8890: X300) if bent or soiled (8850/90 only). If it is necessary to change the slide-connector, keep in mind soldering instructions as described in SB005 (8890: SB 006).
- check bias voltage for microphone at L287 (2.4V) on active micro. If voltage is not measurable, check V250 or change COBBA N250.
- If the bias voltage for microphone is ok, check audiolines for disconnection, therefore check solderings of L287, R268 and C262/263.
- If fault persists, change COBBA N250.
  Note that you have to rewrite SIMlock-data, make SW-update and retune RX/TX-values after changing this part!

TDMA – noise

If audio is distorted by TDMA – noise, make sure that PCB is clean, especially the ground areas.
Further more it is necessary to assemble the phone with a torque screwdriver. For NSM-3 torque must be set to 17Ncm.
For NSM-2/NSB-6 torque must be set to 15Ncm for the four metric screws and 20Ncm for the remaining two screws in the keymat. If this does not solve the problem, you still have these possibilities:
NSM-3: Try to change the mainframe assy, RF can or antenna.
NSM-2: Try to change the B-Cover and/or the speaker/ metal gasket and/or slide.

USER INTERFACE FAILURE

Display failure

- Check mechanical appearance of display, change item if necessary.
- If display failure is caused by faulty elastomer, this part now is available as a spare part, so that you do not have to change the whole display-unit. Do not touch the elastomer with bare hands!
  Note: Elastomers for NSM-2/NSB-6 and NSM-3 have different size. Do not mix them!
- Check VBB 2.8V DC at C330.
- Check VOUT 8V DC at C331, which is generated by LCD.
- If the above mentioned actions do not solve the problem, it also is possible that MAD or PCB are faulty

Keypad no function

- Check if contacts of domesheet / keymat are dirty.
- Clean PCB if necessary, check surface of LCD-module if bent or soiled
- Check resistance of ROW and COL lines between the keys.
- Probably MAD or PCB faulty.

Backlight failure

- Check KBlights 2.8V at pin 7/15 of N310. If not ok, there could be an interruption between D200 and N310, or MAD is faulty.
- Check VB 3.6V pin 1 and VBB 2.8V pin 2 of N310.
- Check resistance of R310 and R311.
- Check VB at LED´s V320-325 and V331-340.
- If keypad backlight is not bright enough, change resistor R311 from 39kΩ to 10kΩ (Also see NSM-2 service bulletin 23).

Buzzer failure

- Check mechanical condition of buzzer.
- Check VB 3.6V at B301.
- Check VB 3.6V pin 1 and VBB 2.8V pin 2 of N310
- Check buzzer signal with scope at pin 6 of N310.
- Check buzzer_cnt signal at pin 3 of N310. If not ok, there could be a disconnection between D200 and N310, or MAD is faulty.

Vibra failure

- Check version of vibramotor, add support tape if necessary (only for 8210, also see NSM-3 service bulletin 11).
- Check VB 3.6V at V350.
- Check VB 3.6V pin 1 and VBB 2.8V pin 2 of N310.
- Check vibra signal with scope at pin 16 of N310. If not ok, check vibra_cnt at pin 19 of N310.
- If signal is ok at pin 19, change N310, otherwise there is a disconnection between D200 and N310, or MAD is faulty.

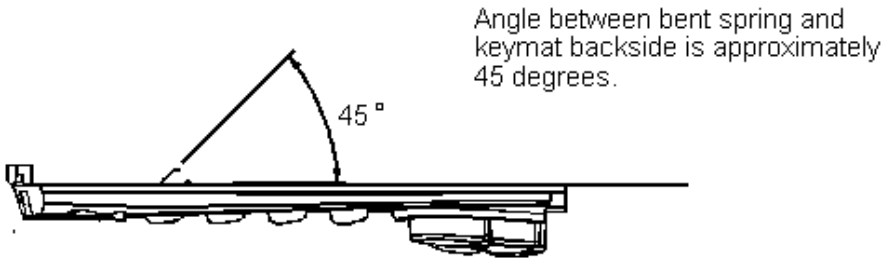
CLOCK TIME PROBLEMS

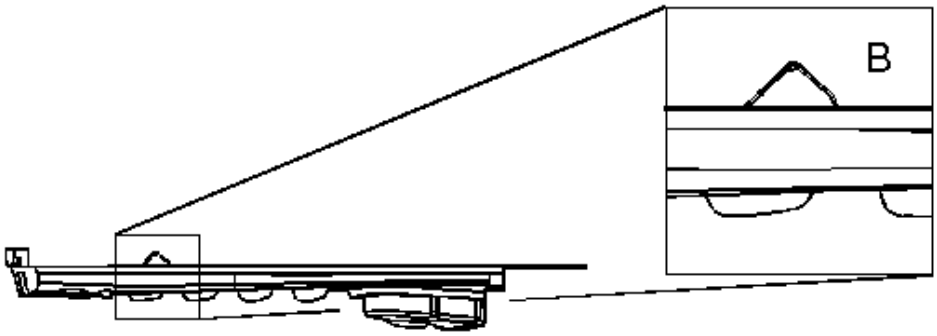
Clock time has to be corrected in short periods.

Check amplitude and frequency of sleepclock oscillator at J228 (3Vpp squarewave at 32.768kHz).
If amplitude or frequency is not ok, change crystal B100. If fault persists, check parts around B100 like R100/102/154 and C101/102/113.

Clock time is lost after removing battery

Check mechanical appearance of RTC-battery, especially check the angles of the battery springs.
If necessary bend them for the plus (short) spring as shown in the first picture and for the minus (longer) spring in the second with help of plastic tweezers. Also see NSM 2 service bulletin 20.



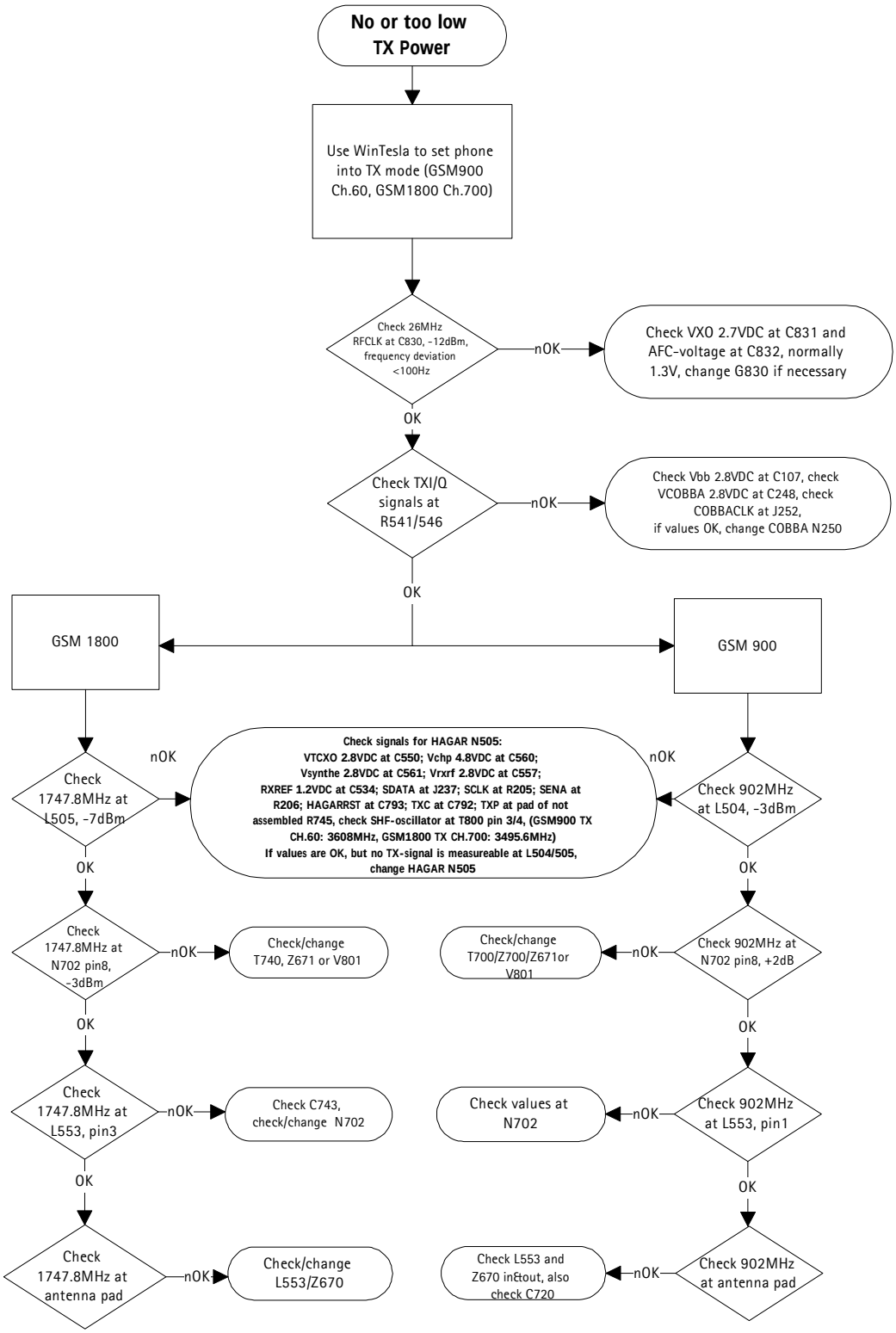


The bending of the battery-spring should always be done, also with new batteries!
After changing the RTC-battery it is necessary to charge it. This can easily be done by assembling the BLB-2 battery to the phone for 10 to 15 minutes (It is not necessary to switch on the phone).
After that, RTC-battery should be able to save the clocktime.
If the fault still remains, change Chaps N101 and try charging RTC-battery once more.

NO SERVICE

In case you suppose any fault in the RF-area of your phone: First try to calibrate RX/TX-values of the phone to define the fault!

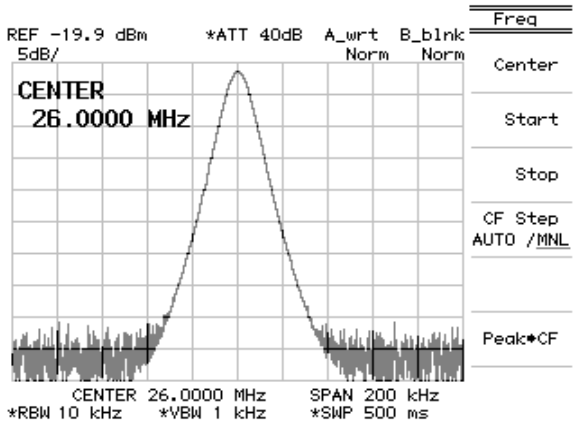
No or too low TX power



No or too low TX power GSM 900 (NSM-2/3)

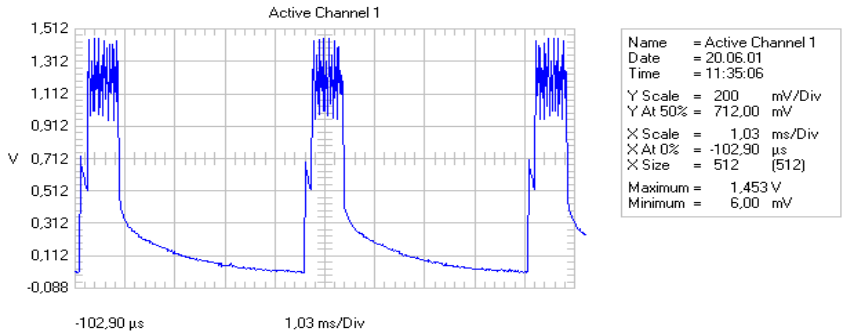
Use WinTesla to set phone into following mode: Initialise/ Local mode/Testing/ RF Controls/ active unit TX, Ch.60

First of all check 26MHz reference oscillator at C830:

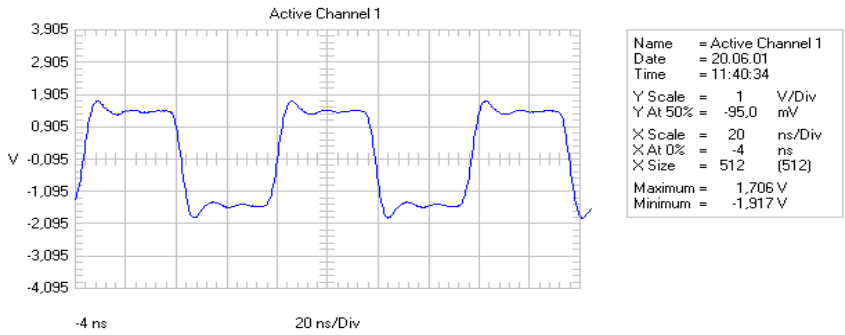


Amplitude of spectrum approximately is –12dBm.
If signal is not ok, check VXO 2.7V DC at C831 and AFC-voltage at C832, which normally is 1.3VDC but may vary between 0.3V and 2.3V DC. If AFC-voltage is 0V, especially check R832 if torn off or defect.
If DC-voltages are ok but frequency deviation is >100Hz it is necessary to change G830.

If reference oscillator is working properly, check TXIQ-signals at R541/546:

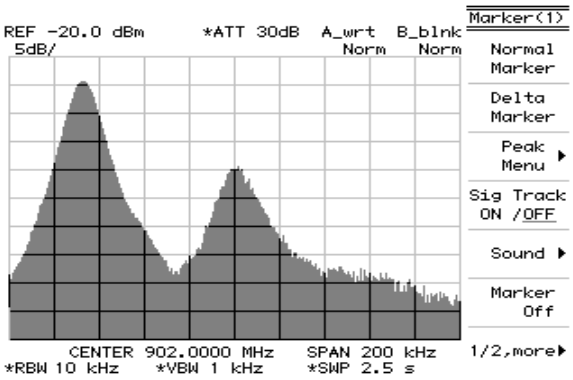


If TXIQ-signals at R541/546 are not measurable or somehow corrupted, check the following signals for COBBA N250: check VBB 2.8V DC at C107, VCOBBA 2.8V DC at C248 and 13MHz COBBACLK at J252:



If the above mentioned signals for COBBA N250 are ok but TXIQ-signals are not measurable, probably COBBA is faulty or has broken solderings under it. Remove COBBA, clean pads if necessary with flux and solder and replace sparepart with µBGA rework machine.
Note that it is necessary to rewrite SIMlock-data, make SW-update and retune RX/TX-values of the phone after changing COBBA N250!

If TXIQ-signals at R541/546 are ok, check 902MHz TX-spectrum at both sides of L504:

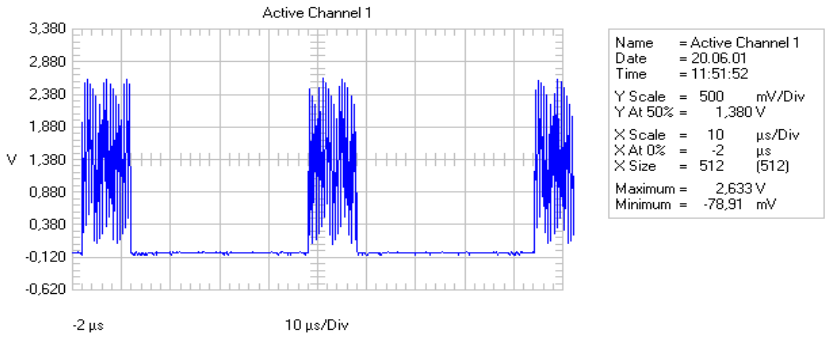


Amplitude of 902MHz TX-spectrum is –3dBm. If this spectrum is not measurable, you have to check a lot of signals, which HAGAR N505 needs to work. These are:

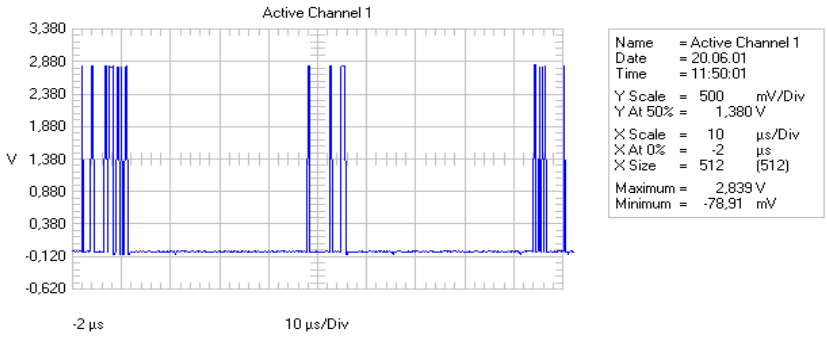
- VTCXO 2.8V DC at C550
- VCHP 4.7V DC at C560
- VSYNTE 2.8V DC at C561
- VRXRF 2.8V DC at C557
- VREF_2 1.35V DC at C535
- RXREF 1.2V DC at C534

also check signals for PLL, which is located inside of HAGAR:

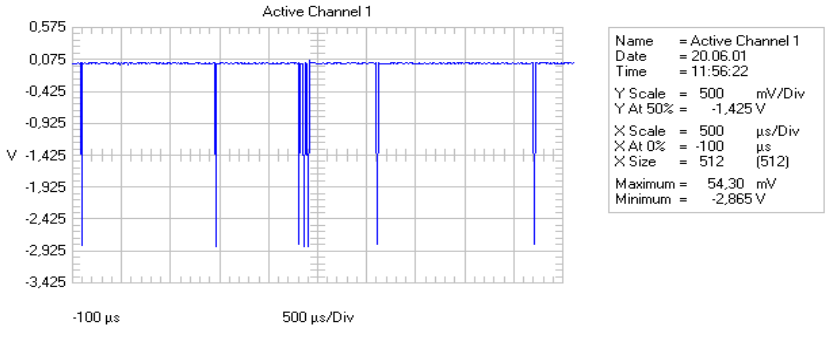
SCLK at R205:



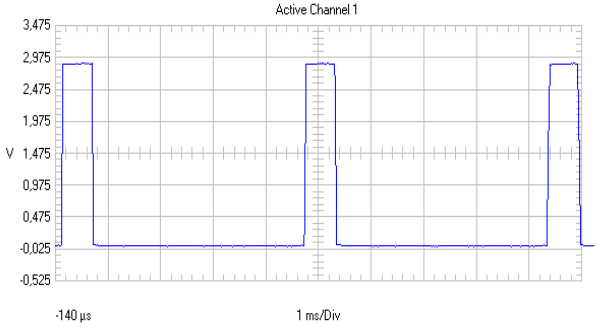
SDATA at J237:



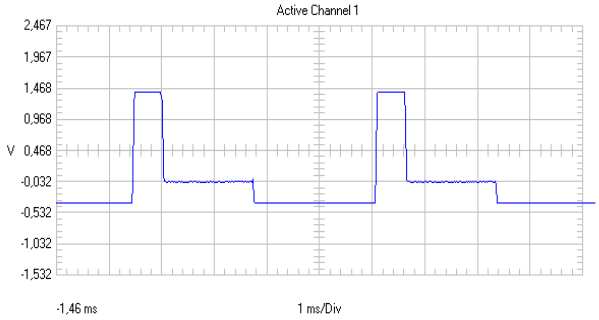
SENA at R206:



Further more these signals are necessary for a proper working HAGAR N505:

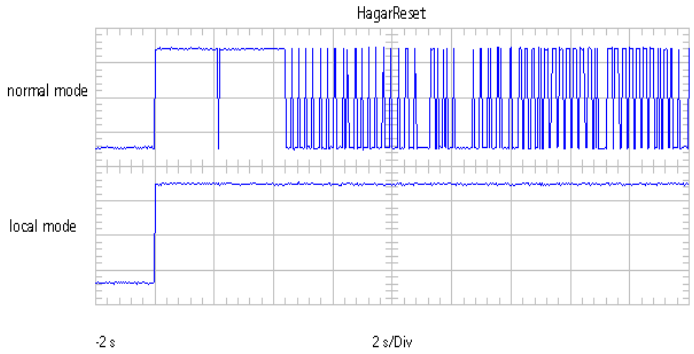


TXP 2.8Vpp measured at pad of not assembled R745, which is located between R791 and R541. You can check the signal at the pad located near by R744.



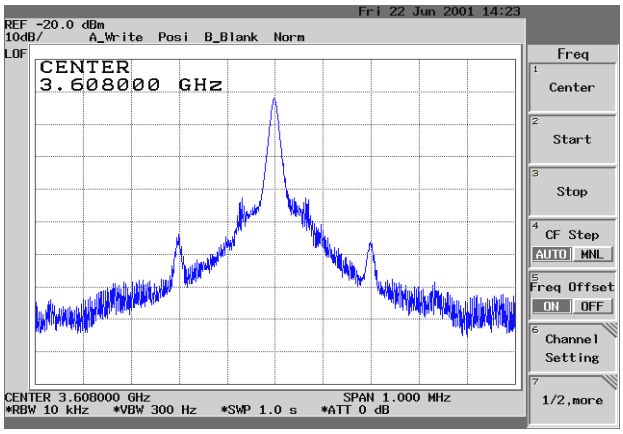
TXC measured at C792
Note that the ampitude of TXC varies between 0.4Vpp - 1.8Vpp depending on TX-powerlevel.

Also check HAGARReset at C793:

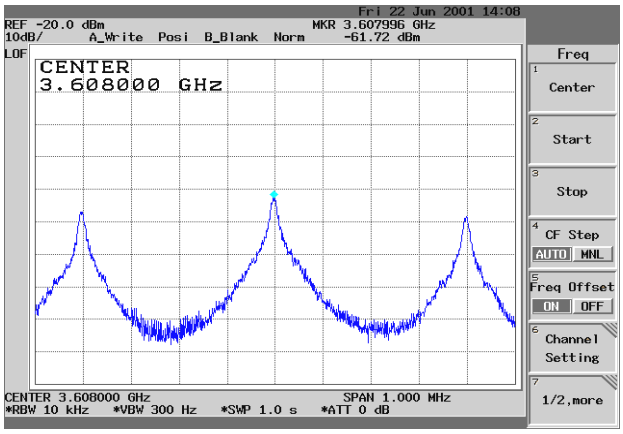


Remember that HAGARReset varies depending on the phone mode: while it is 2.8V DC in local mode, it changes between 0V and 2.8V in normal mode!

Check last but not least signal of SHF-oscillator at R805 (left spectrum):



Spectrum OK



Spectrum not OK

If SHF-oscillator does not work, check whether voltage at C804 is 2.7V DC. Also check control voltage at C803, which varies between 0.7V and 3.8V DC. If control voltage is 4.8V DC, the oscillator is faulty or the control loop is open. Especially check C802 if spectrum of SHF-oscillator looks like the one shown on the right. A faulty C802 often is the reason for poor service with high phase/frequency errors in combination with the shown spectrum. If all signals mentioned on the last two pages are ok but no TX-signal is measurable at L504, change HAGAR N505.

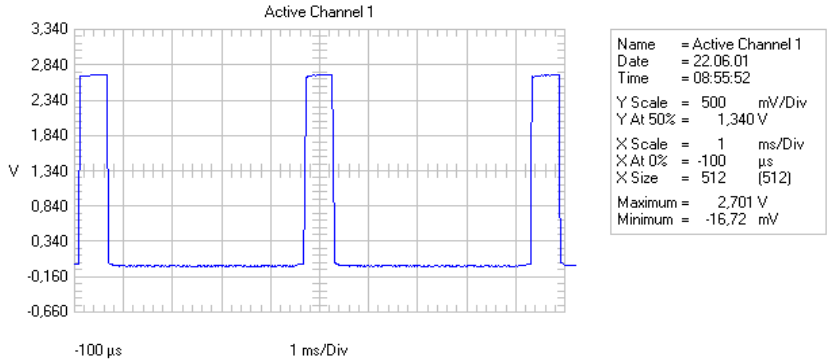
If 902MHz TX-spectrum at L504 is ok, check same signal at input of poweramplifier N702 pin 8, +2dBm.

If no spectrum is measurable or amplitude is too low, check balun T700 and diplexer Z671. Prove that attenuation of filter Z700 is ≤ 3.5dBm and loss over R723 is ≤ 2dBm. Also check that V801 works. Therefore check that voltage at base of V801 is 0.8Vpp / 217Hz and voltage at collector is 1.9Vpp / 217Hz. Amplitude of 902MHz TX-spectrum at base of V801 is –10dBm, amplitude at collector is +3dBm.

If TX-spectrum at input of poweramplifier is ok, check same signal at L553 pin 1. Amplitude here depends on the choosen TX-powerlevel (+5dBm up to +33dBm).

If amplitude of spectrum at L553 pin 1 is not measurable or too low, check signals for poweramplifier N702:

- check VBATT 4V DC at N702 pin 3 and 6
- check TXVGSM at N702 pin 2, 2.8Vpp / 217Hz:



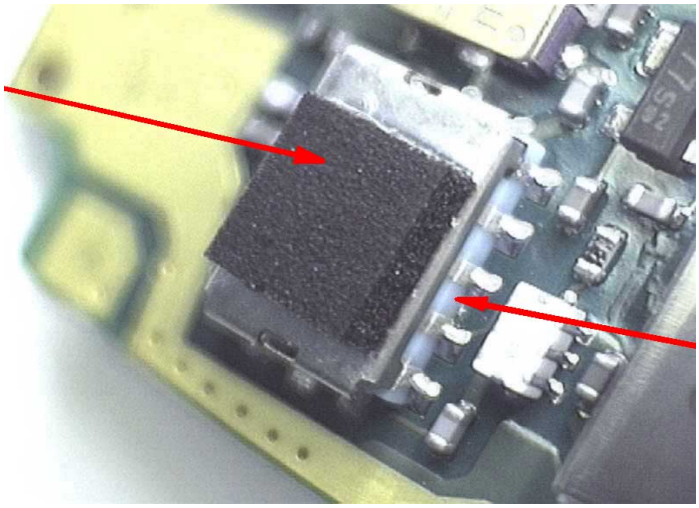
- Also check VAPC at N702 pin 7. Waveform is the same as it is for TXVGSM, but the amplitude of VAPC varies depending on the chosen TX-powerlevel: 1.2Vpp on power level 19 and 2Vpp on power level 5.

If the above mentioned conditions are fulfilled but amplitude of TX-spectrum at L553 pin 1 is too low, change the poweramplifier N702.

If also the power amplifier works well, check TX-spectrum at J600 (antenna pad) – amplitude, as before, depending on choosen TX-power level.

If amplitude is too low, check mechanical appearance and solderings of coupler L553. But in most cases the diplexer Z670 is responsible for this kind of fault. Therefore check TXVGSM 1.7Vpp at C746 (near HAGAR), which sets the diplexer into TX-mode. Especially check if the ceramic bottom plate of the diplexer is broken, what easily happens if phone has been dropped.
If it is necessary to change Z670, do not forget to replace foam on spare part (NSM-2 only, see alsoSB 022).

added foam on diplexer



Check this ceramic plate with microscope whether it is broken or not

Because of the resemblance between GSM900/1800 TX-path in NSM-2/3 and GSM900/1900 TX-path in NSB-6, in the following we describe GSM1800 TX-mode (NSM-2/3) and GSM900/1900 TX-mode (NSB-6) in short form only. For further information refer to previous pages with detailed description of GSM900 TX-mode in NSM-2/3.

No or too low TX power GSM1800 (NSM-2/3):

Use WinTesla to set phone in following mode: Product/Band/PCN//Testing/RF Controls/active unit TX Ch.700

Check 26MHz reference oscillator at C830, -12dBm, frequency deviation < 100Hz.
Check TXIQ-signals at R541/546. If not ok, check signals at COBBA N250 as described on page 34.
Check 1747.8MHz at both sides of L505, -7dBm. If not ok, check signals at HAGAR N505 as described on page 33 and 34.
Check 1747.8MHz at N702 pin 8, -3dBm. If not ok, check parts like T740, Z671 or V801.
Check 1747.8MHz at L553 pin 3, amplitude depending on chosen powerlevel. If not ok, check following signals at N702:
VBATT 4V DC at N702 pin 3 and 6,
TXVDCS 2.8Vpp / 217Hz at N702 pin 1,
VAPC at N702 pin 7, 1.1Vpp on power level 15 up to 1.7Vpp on power level 0.

Check 1747.8MHz at J600 (Antenna pad), amplitude depending on power level. If not ok, check TX-signal at L553 in & out.
Check same signal at Z670 in & out and TXVDCS at R670, 2.8Vpp / 217Hz, which sets Z670 into TX-mode.

No or too low TX power GSM900 (NSB-6):

Use WinTesla to set phone into following mode: Testing/ RF Controls/ active unit TX, Ch.60

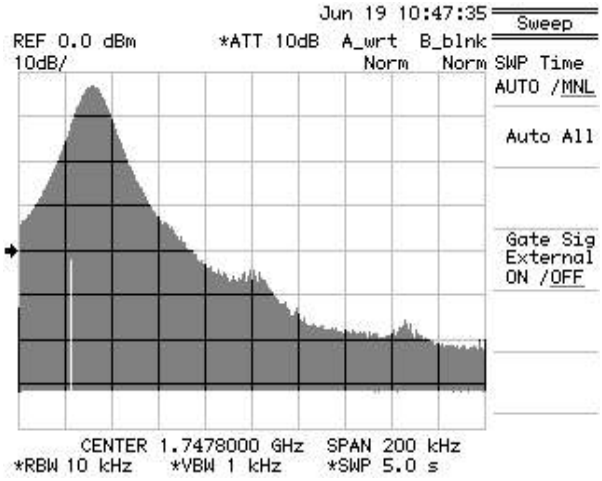
Check 26Mhz reference oscillator at C830, -12dBm, frequency deviation < 100Hz.
Check TXIQ-signals at R541/546. If not ok, check signals at COBBA N250 as described on page 34.
Check 902MHz at both sides of L504, - 10dBm. If not ok, check signals at HAGAR N505 as described on page 33 and 34.
Check 902MHz at L710, -12dBm. If not ok, check/change T700, Z700 and C701.
Check 902MHz at diplexer Z670 pin TX1_GSM, amplitude depending on chosen power level (+5dBm up to +33dBm).
If 902MHz TX-spectrum at input of diplexer is not ok, in most cases power amplifier N702 is faulty. This is not available as a spare part!
Check 902MHz at J600, amplitude depending on power level. If signal is not ok, check solderings of diplexer Z670, also check TXVGSM 2.7Vpp at L673.

No or too low TX power GSM1900 (NSB-6):

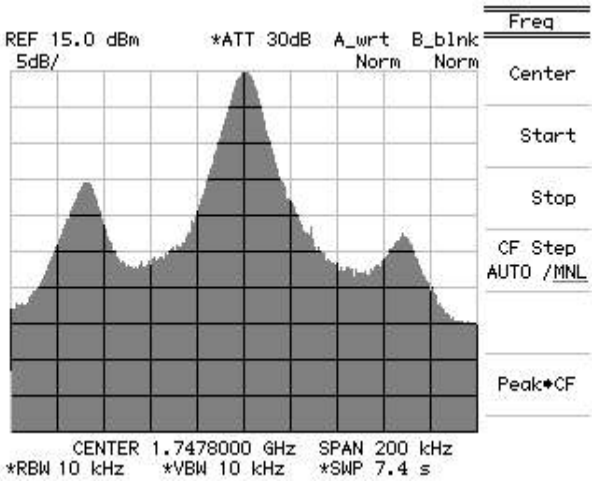
Use WinTesla to set phone into following mode: Product/Band/GSM1900// Testing/ RF Controls/ active unit TX, Ch.661

Check 26MHz reference oscillator at C830, -12dBm, frequency deviation < 100Hz.
Check TXIQ-signals at R541/546. If not ok, check signals at COBBA N250 as described on page 34.
Check 1880MHz at R740/741, -12dBm. If not ok, check signals at HAGAR N505 as described on page 33 and 34.
Check 1880MHz at C734, -15dBm. If not ok, check/change T740, R737/738, C737 and L739.
Check 1880MHz at diplexer Z670 pin TX2_DCS, amplitude depending on chosen power level (0dBm up to +30dBm).
If 1880MHz TX-spectrum at input of diplexer is not ok, in most cases power amplifier N702 is faulty. This is not available as a spare part!
Check 1880MHz at J600, amplitude depending on power level. If signal is not ok, check solderings of diplexer Z670, check also TXVDCS 2.7Vpp at L672.

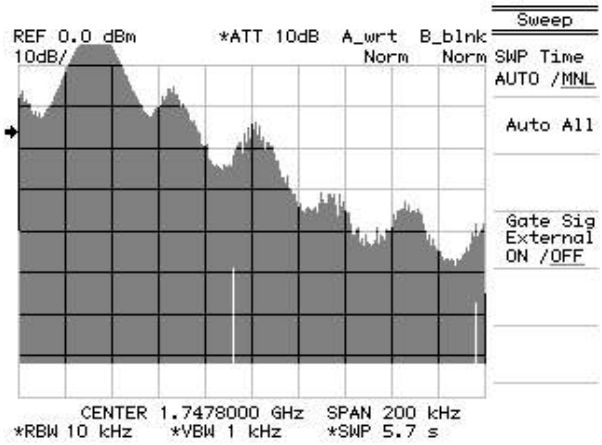
Faulty TX-spectrum



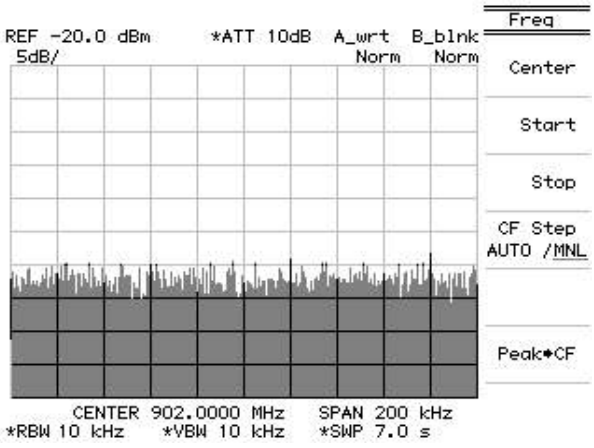
1) Normal spectrum



2) Spectrum with faulty COBBA

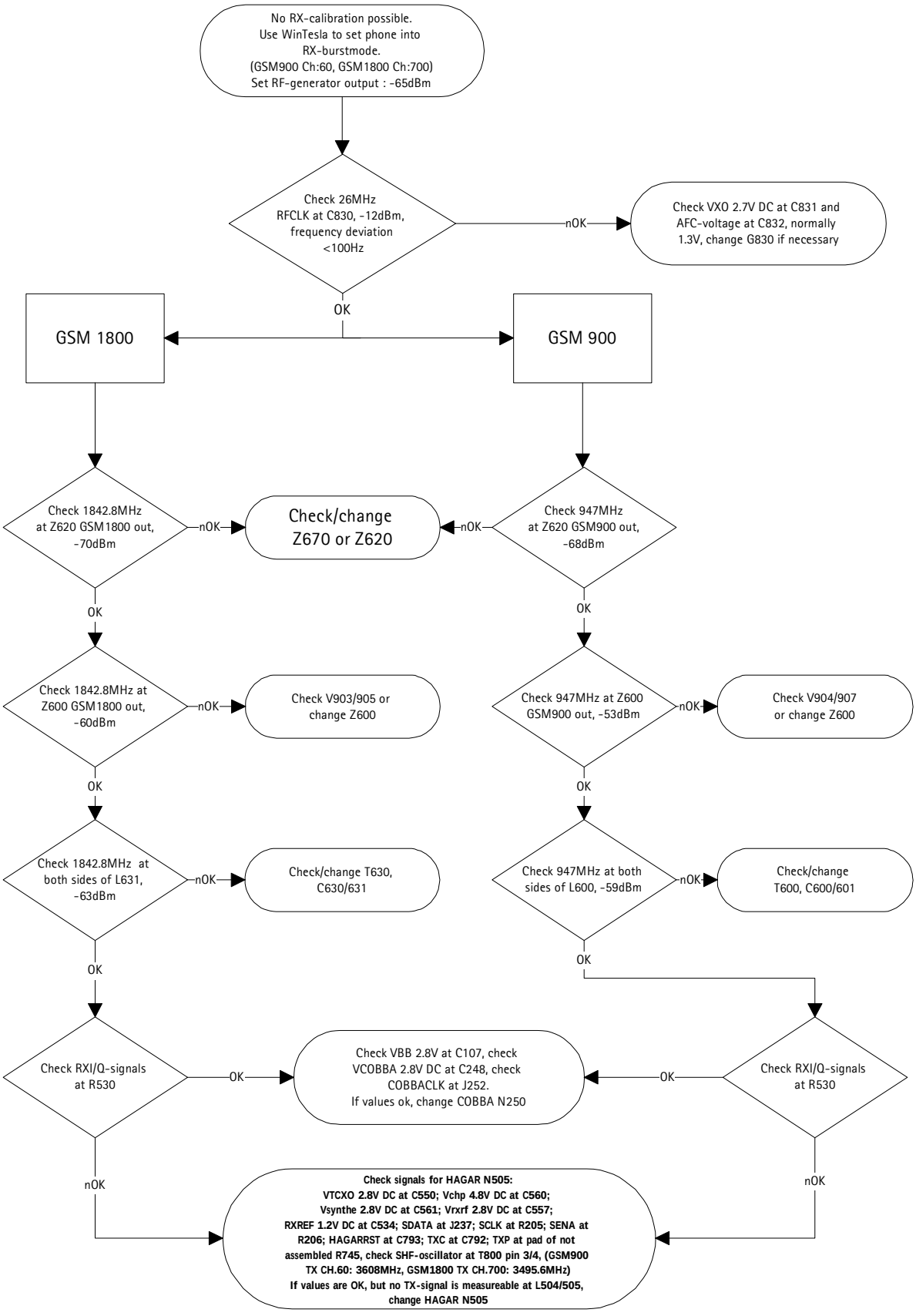


3) Spectrum with broken solderings under CCONT
Spectrum turns to picture 1 if CCONT is carefully pushed with some nonmetallic item.



4) Spectrum with faulty oscillator G800

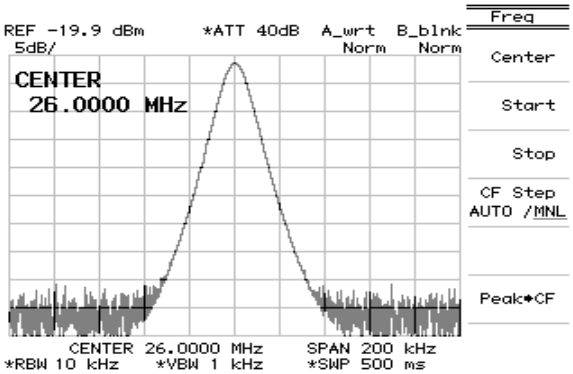
RX-calibration not possible



No RX-calibration GSM 900 possible (NSM-2/3 & NSB-6)

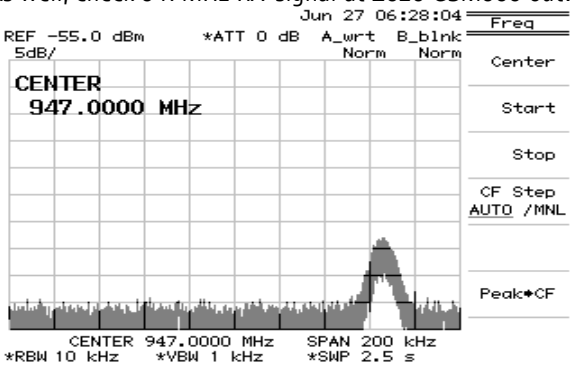
Use WinTesla to set phone in following mode: Initialise/Local mode/Testing/RF Controls/active unit RX Ch.60, burst mode. Set RF- generator to RF- level output of –65dBm.

The first to do, as in case of TX-faults, check signal of 26MHz reference oscillator at C830:



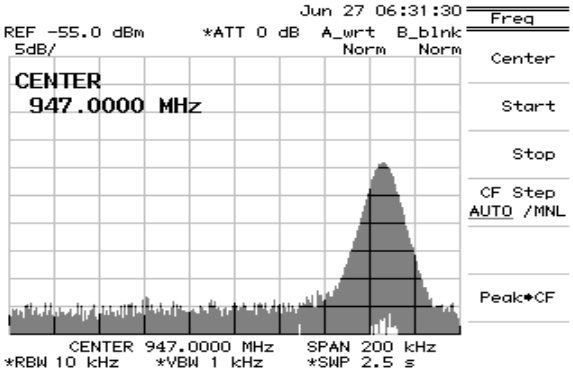
Amplitude of spectrum is approximately –12dBm.
If signal is not ok, check VXO 2.7V DC at C831 and AFC-voltage at C832, which normally is 1.3V DC but may it vary between 0.3V and 2.3V DC. If AFC-voltage is 0V, especially check R832 if torn off or defect.
If DC-voltages are ok but frequency deviation is >100Hz it is necessary to change G830.

If reference oscillator works well, check 947MHz RX-signal at Z620 GSM900 out:



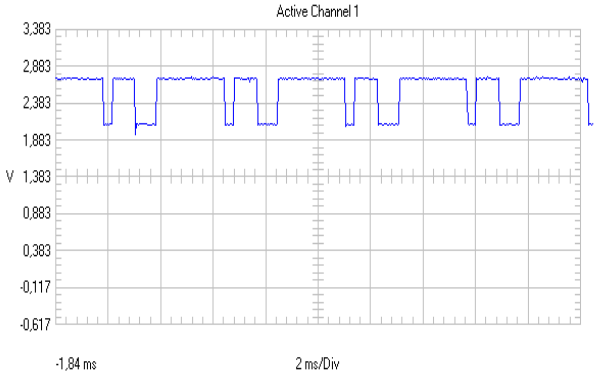
Amplitude of RX-signal at GSM900 output pin is –68dBm. If signal is not measurable or amplitude is too low, check solderings of Z620, Z670 and C645. Change parts if attenuation is too high. Especially check ceramic bottom plate of diplexer Z670 if broken.

If 947MHz RX-signal at Z620 is ok, check same signal at Z600 GSM900 out:

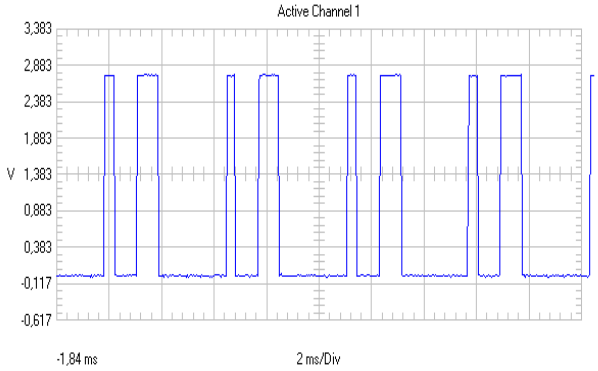


Amplitude here is approximately –53dBm. If not ok, check solderings of C615 and check that LNA works. Therefore check signals shown on next page:

VIna measured at collector of V907:

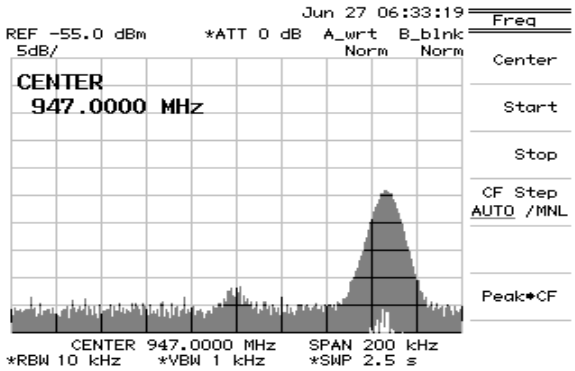


Signal at base of V907 coming from HAGAR:



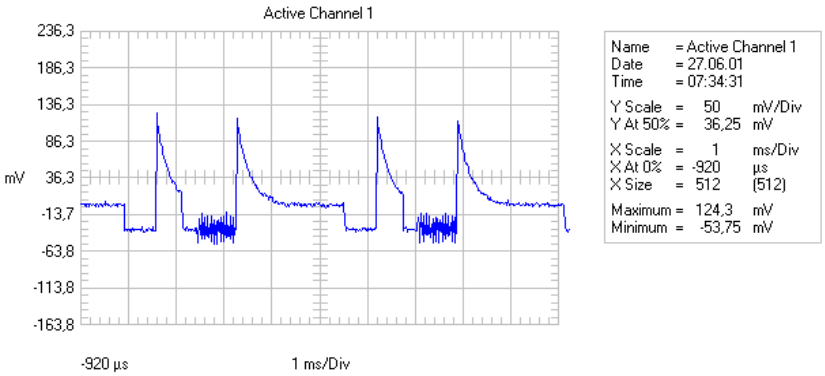
Further more check 947MHz RX-signal at base and collector of V904. Amplitude at base is approximately -67dBm while amplitude at collector is –55dBm.

If 947MHz RX-signal at Z600 is ok, check same signal at both sides of L600:



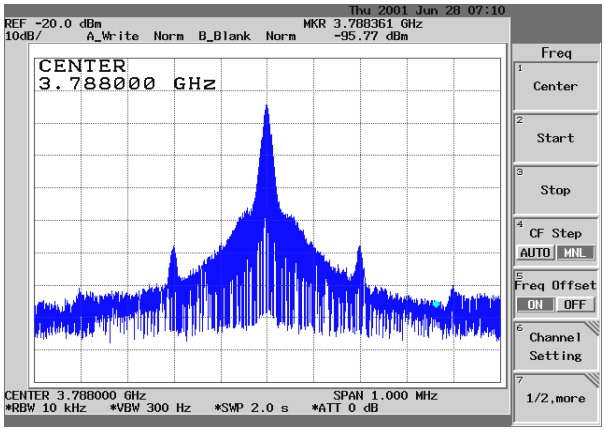
Amplitude at L600 approximately is –59dBm. If signal is not ok, check appearance and solderings of T600, L600 and C600/601.

If 947MHz RX-signal at L600 is ok, check 67.708kHz at C522/523:



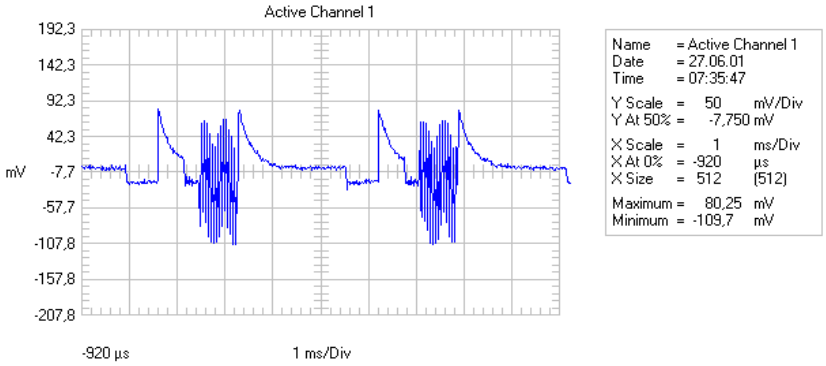
If this signal is not measurable, check voltages/signal which HAGAR needs to work as listed on next page:

- Check VTCXO 2.8V DC at C550
- Check VRXRF 2.8V DC at C557
- Check VSYNTE 2.8V DC at C561
- Check VCHP 4.8V DC at C560
- Check VLNA 2.8V DC at C562
- Check HAGARReset at C793, SDATA at J237, SCLK at R205 and SENA at R206, refer to diagrams shown in section "No or too low TX-power GSM900".
- Check signal of SHF-oscillator at R805, 3788MHz:



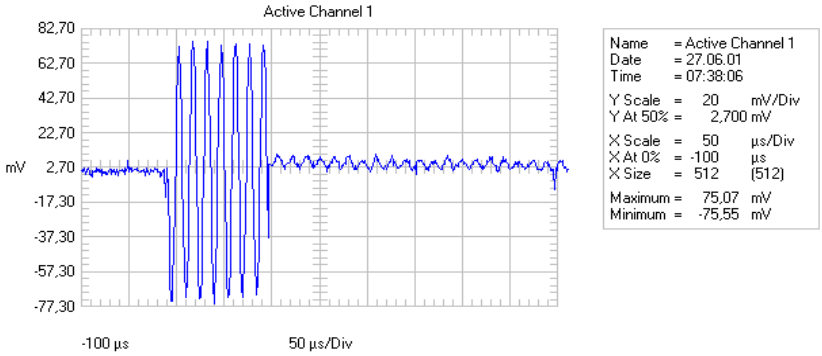
If the above mentioned signals are ok but no 67.708kHz signal is measurable at C522/523, change HAGAR N505.

Check 67.708kHz at C520/521:



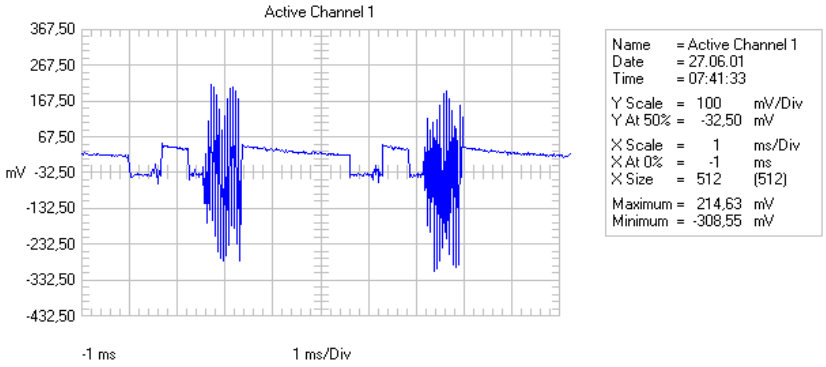
If no signal is measurable at C520/521, change HAGAR N505.

Check 67.708kHz at all four lines of R510:



If signal is not ok, check C510- C513 for shorts to ground, check resistance of R510 (4 * 100Ω) or change HAGAR N505.

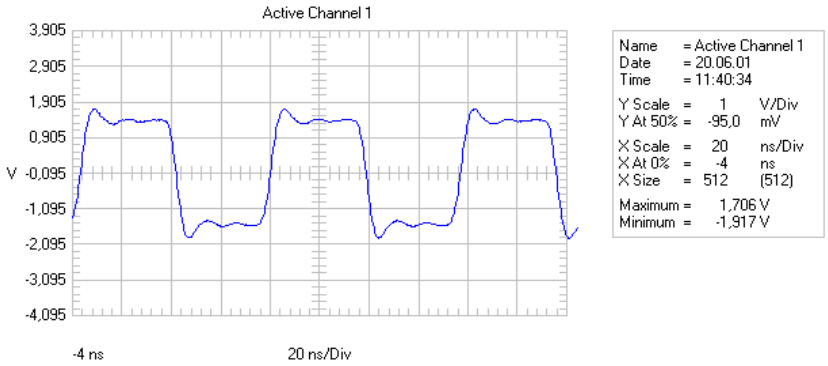
Check 67.708kHz at R530:



If signal at R530 is not measurable, check VREF 1.35V DC at C535 and RXREF 1.2V DC at C529.
Also check C530- C533 if broken or cold soldered or change HAGAR N505.

If 67.708kHz at R530 is ok but RX-calibration still is not possible, check the following signals for COBBA N250:

- check VBB 2.8V DC at C107
- check VCOBBA 2.8V DC at C248
- check 13MHz COBBACLK at J252:



If these signals are ok, change COBBA N250.
In case that oxidized pads exist under COBBA, rework them with a few flux and solder, then replace the sparepart with µBGA soldering machine.
Note that rewriting of SIMlock-data is necessary after changing COBBA, further more you have to make SW-update und retune RX/TX-values of the phone!

If fault persists after changing COBBA, MAD or PCB faulty in all probability.

Low receiver signal strength indicator

First of all try to calibrate RX-values of the phone.
Check if antennas pad on PCB is dirty or contact spring of antenna is bent.
Check receivers signal strength indicator with a new antenna.

Bit error too high

If bit error is too high, probably Z620 faulty. Change filter, retune phone values and check phone in call mode with a simulator.

No RX-calibration GSM1800 (GSM1900) possible

Use WinTesla to set phone in following mode: Initialise/Product/Band/PCN (GSM1900) // Testing/RF Controls/ active unit RX Ch.700 (661), burst mode.
Set RF- Generator to a high RF-level output of –65dBm.

To find a fault in GSM 1800/1900 RX mode, you can proceed almost the same way as described for GSM 900:

Check 26MHz reference oscillator at C830, -12dBm, frequency deviation < 100Hz.
Check 1842.8MHz (1960MHz) at Z620 GSM1800/1900 out, -70dBm. If not ok, check solderings of Z620, Z670 and C614, change parts if attenuation is too high. Especially check if ceramic bottom plate of diplexer Z670 is broken!
Check 1842.8MHz (1960MHz) at Z600 GSM1800/1900 out, -60dBm. If not ok, check solderings of C644, (L601/602, NSB-6 only) and check that LNA works as described in section "No RX-calibration possible GSM900".
Check 1842.8MHz (1960MHz) at both sides of L631, -63dBm. If not ok, check appearance and solderings of T630, L630/631 and C630/631.
Check 67.708kHz RXIQ-signals at R530. If not ok check values at HAGAR N505 as described on page 33.
If RXIQ-signals at R530 are ok but still no RX-calibration possible, check VBB 2.8V DC at C107, VCOBBA 2.8V DC at C248 and 13MHz COBBACLK at J252. If signals are ok, change COBBA N250. Remember to rewrite SIMlock-data, make SW-update and retune RX/TX-values of the phone.
If fault persists after changing COBBA N250, MAD or PCB faulty in all probability.

CHANGE HISTORY

Originator	Status	Version	Date	Comment
TS-Training-Group	Draft	0.1	05.10.2000	First draft version for the repair group
TS-Training-Group	Draft	0.3	09.10.2000	Comments of repairgroup added.
TS-Training-Group	Approved	1.0	11.10.2000	First CC version.
TS-Training-Group	Approved	2.0	16.10.2000	Frequency list added.
TS-Training-Group	Approved	3.0	23.07.2001	NSB-6 Part added, Flowcharts RF-part added.