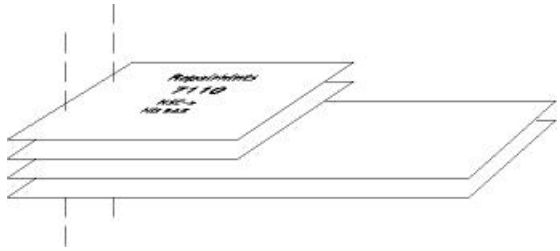
# Repairhints

# 6210/6250

## NPE-3/NHM-3

## HDa13/S 893

**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 are only 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 will damage PCB surely. All replaceable µBGA-components must be renewed after removing. Reflow is not allowed.
Check soldering points, remove oxidated solderings (broken balls) carefully by enclosing few new solder before placing new components.
µBGA must be soldered only with NMP approved µBGA-rework machines (e.g. Zevac/OK International).
Use only 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. Don´t make any loose wiring connections anywhere.
If it is necessary to change any item located under the metal shields, remove the shield first, don´t cut partially or bend it. **Take care: Corners of the lids are sharp, insuries are possible !**
Shields and screws must be renewed after removal.

## -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 authorized NOKIA service centers only.

The purpose of this document is to provide some further service information for NOKIA 6210/6250 phones.
It contains a lot of collected tips and hints to find failures and repair solutions easily.
It also will 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 using following equipment:**

| | |
|---|---|
| Nokia repair SW | : WinTesla Version 6.43 |
| DLL version | : 311.03.00 |
| Nokia Module Jig | : JBT-13 / MJS-23 |
| Digital multimeter | : Fluke 73 |
| Oscilloscope | : Hitachi V-1565; Fluke PM 3380A/B |
| Spectrum Analyzer | : Advantest R3162 with an analogue probe |
| RF-Generator / | : Rohde & Schwarz CMU 200 |
| 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: training.sace@nokia.com

## Contents

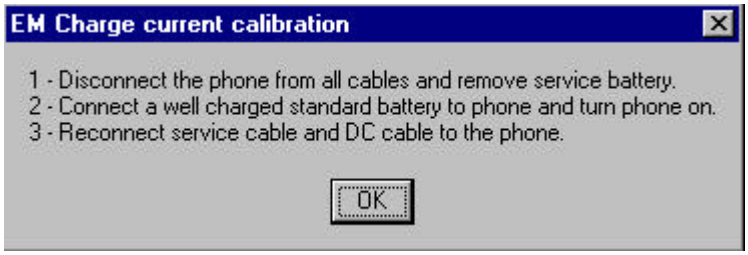
## GENERAL TUNING INFORMATION - DIFFERENCES TO EARLIER PHONES

**Energy management calibration information**

If it is necessary to realign, it is imperative to follow the instructions displayed in the pop-up windows!
As soon as you take an other order as given from WinTesla, the alignment will be failed or will stop and you must begin once more.

Follow these instructions as shown in pictures and your energy management calibration will work.

**First step: (Charge current)**




**Second step: (Charge current)**


If all of the measurements are OK, the values are now adjusted.

If one or more values failed, see charging problems on page #14.

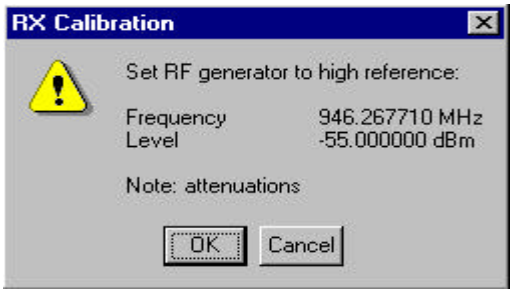
**TX tuning**

Has to be tuned in both bands, but only on middle channels :
**CH38 – 897,6 MHz** for EGSM and CH700 – 1747,8 MHz for PCN.
TX I/Q tuning has to be done for both bands.
Reference are always target- values given from WINTESLA.

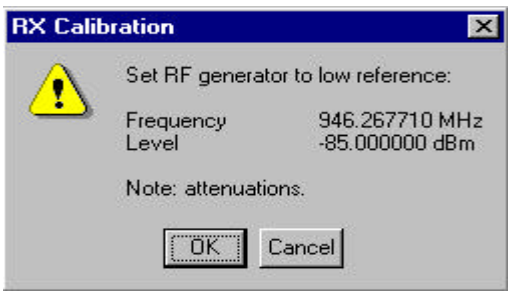
**RX calibration**

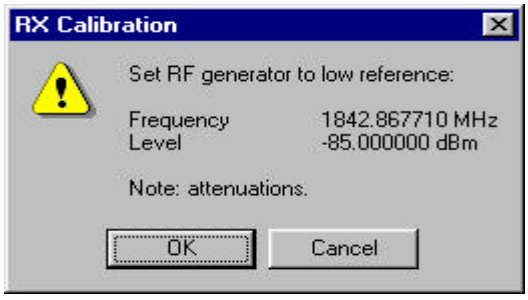
**RSSI (Radio / Received Signal Strength Indicator)**
The "RX calibration" is used to determine gain at different gain-settings for front-end and Hagar and needs to be done in both bands, but the calibration only has to be started once, it will automatically proceed to the PCN band after EGSM.

**Note: If the frequency in your Wintesla is different from 946.2671 MHz ,**you will have to close Wintesla and add or edit these lines in your tesla.ini file:
[NPE-3_TUNING]
RXChannelGSM =56
TXChannelGSM =38
Restart Wintesla and redo RX Calibration.




**Note if the low level in your Wintesla is different from –85dBm,** you will have to close Wintesla and add these lines in your tesla.ini file:
[NPE-3LEVELS]
RSSILow =-85
RSSIHigh =-55
Restart Wintesla and redo RX Calibration



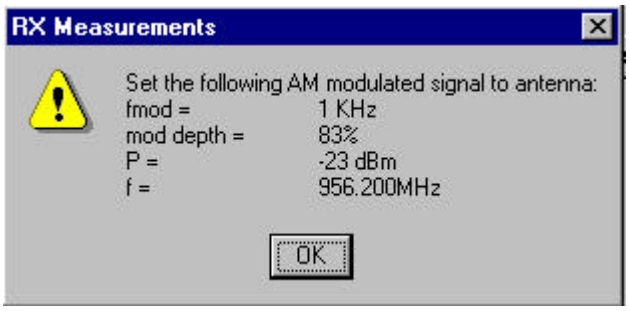

Note : Check if AGC-values are in ascending order (10dBm/step, exception: In PCN mode gainstep 2 to 3 is only ~5dBm)

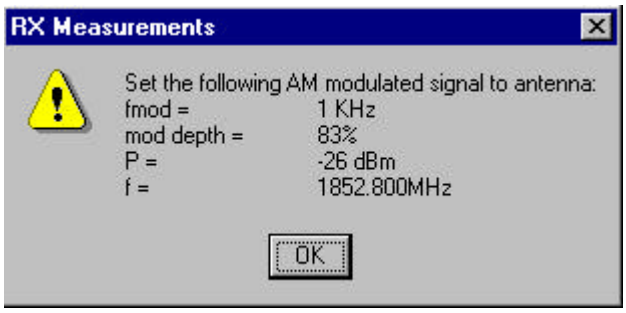
**AM suppression tuning**

Tune's four Hagar internal resistors of RX demodulator.
Purpose is to minimize the effect of any kind of AM interference to RX performance.
Tuning is automatic but it needs AM-modulated signal to phones` antenna input and has to be done for both bands.

**NOTE:**

**Set the generator to the level or frequency shown in your wintesla window!**

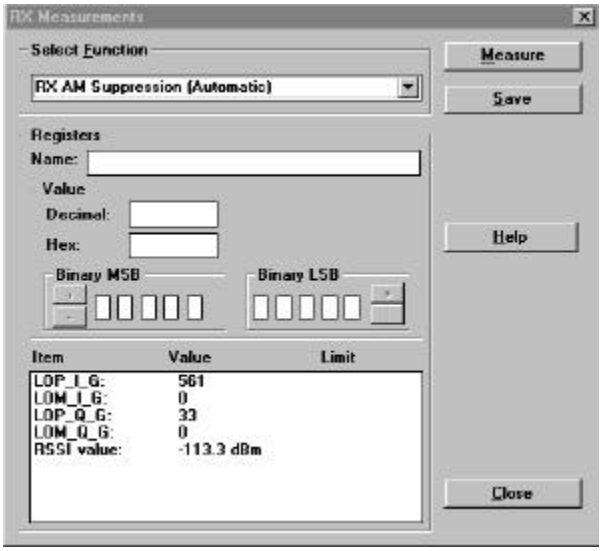


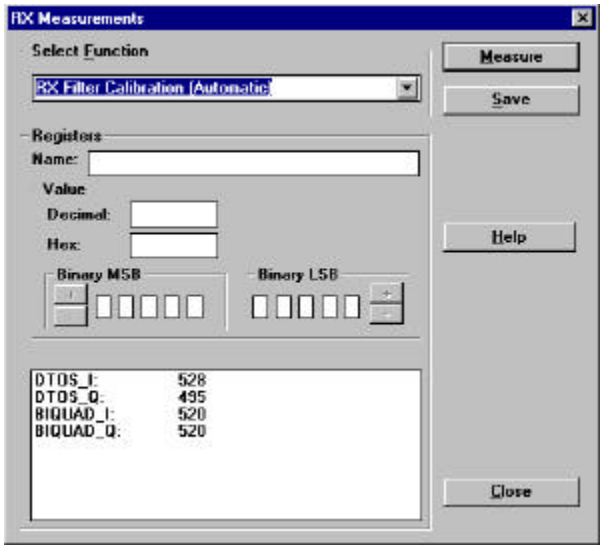




**NOTE : WINTESLA WILL USE CH.56/700+10MHz INSTEAD OF ALL MANUAL SETTINGS IN TESLA.INI !**

## Use these settings:

| **EGSM** | **PCN** |
|---|---|
| **Fmod=1kHz** | **Fmod=1kHz** |
| Mod depth=83% | Mod depth=83% |
| **P=-23dBm** | **P=-26dBm** |
| **F=956.2MHz** | **F=1852.800MHz** |




AM supression results should be in a range for: EGSM –86dBm to –130dBm, PCN -95dBm to –130dBm

RX filter calibration results for AD values should be in a range between 0 and 1023.

**Description of Signals & Voltages**
**The cause of this list are some new named signals/voltages in opposite to former names which are used in this document (where to measure) & for a better understanding in addition to the service manual.**

**Startup sequence/CCONT section**

| | |
|---|---|
| PWRON/WDDISX (J102/R401) | Always high level, only pulled down as long as powerkey is pressed. |
| PURX (J101) | **P**ower-**U**p-**R**eset signal from CCONT. When the voltages are stable, this line is on high level allowing the MAD to run (Masterreset). |
| CCONTCSX (J100) | Chip select for the CCONT. Used when the MAD wants to access the CCONT on the serial bus (the serial bus is shared with the display) GENSIO-bus. |
| CCONTINT | Interrupt from the CCONT to the MAD; for example: from the **R**eal **T**ime **C**lock, when a charger is connected or when an intelligent battery powers the phone up |
| CHARG_CTRL (J114/C171) | Output to the charger, when using 3-wire charging. The duty cycle of this 32Hz signal switches the output current of the ACP-9 charger. |
| RFC (J601) | **R**eference **F**requency **C**lock. High stability clock signal for the digital circuits inBaseband (13MHz) |
| SLEEPCLK (J112/C113) | 32kHz clock generated in CCONT RTC. Used by MAD during sleepmode |
| SYNTHPWR (J317) | Control line from MAD to CCONT. Turns on/off 3 voltage regulators for RF |
| VCXOPWR/SLEEPX (J331/J333/R305) | Control line from MAD to CCONT. Controls the sleep-mode by turning on/off regulators needed during normal/sleep |
| VB (J103/C105) | Battery voltage |
| VCORE (C155) | Digital baseband supply for the MAD core, 1.7 –1.9V |
| VBB (J108/C147) | Digital baseband supply, 2.7V |
| VCOBBA (J109/C254) | Analog baseband supply, 2.7V (used for audio) |
| VBATTIR (L121) | Battery voltage for supplying IRDA, VIBRA and BUZZER |
| VBATTRF (L122) | Battery voltage for the Power amplifiers (RF) |
| VBATTUI (L120) | Battery voltage for supplying LED's |
| VREF (J117/C143) | 1.5V reference voltage (+-1,5%) generated by CCONT |
| VREF_RX (R510) | Reference voltage for HAGAR, generated by COBBA |
| VSYN_1 (J106/C130) | Supply voltage for SHF VCO |
| VSYN_2 (C133) | Supply voltage for digital and analog circuits in HAGAR (VLO,VPRE,VBB, VF_RX) |
| VRX (J104/C136) | Supply voltage for HAGAR part of the RX chain |
| VTX (J107/C142) | Supply voltage for the TX chain in HAGAR |
| VXO (J105/C141) | Supply voltage for the VCTCXO and VDIG in HAGAR |
| VCP (J110/C157) | 4,9V supply voltage for PLL charge pump HAGAR |
| V_IN (F101) | Charger input |
| VPP (C349) | 12V input for fast flashing. In normal use, this line of the Flash is used for write protecting the flash, and is then controlled by MAD with a possible overrule from a voltage detection circuit. So if the battery is removed, the voltage detector disabled writing to the flash |
| VIRDA (C139) | Regulator (2.7V), that turns the Infrared device and buffers on/off |
| RAM_BCK (C135) | Backup-supply to SRAM. When the phone is turned off, the SRAM gets power from the RTC-battery, so that data is not lost |
| BATTIO (V120) | Signal used for turning ON an intelligent battery from the phone |

**RF part**

| | |
|---|---|
| AFC (R604) | **A**utomatic **F**requency **C**ontrol - analog control signal for 26 MHz VCTCXO fine tuning |
| COBBACLK (J200) | 13MHz clock from MAD to COBBA - used for syncronized serial communication between COBBA and MAD |
| HAGARRESET (J500/N501) | Reset signal from MAD to HAGAR |
| DET (V800) | Detector signal between powerdetector and HAGAR |
| SCLK (J502/J506) | Clock for HAGAR serial programming (26 MHz) |
| SDATA (J503/J507) | Data for HAGAR serial programming |
| SLE (J501/J505) | **S**erial **L**atch **E**nable for HAGAR serial programming (formerly titled as SENA) |
| RXI, RXQ (R509) | The RX baseband signals (after downconversion) |
| GSM_RX (Z700) | EGSM RX signal between RX/TX switch and 1st EGSM SAW |
| GSM_TX (L800) | EGSM TX signal between dual-coupler and RX/TX switch |
| TXP (R512) | Transmitter power enable - used for timing of the power loop, Enables the operation amplifier in HAGAR |
| TXC (R518) | Transmitter power control signal, that controls the level of the output power and the shape of the burst |
| VPCTRL_G (V803) | Control line for PA output power |
| TXVDET (C531) | Supply voltage for the RF power detector circuit |
| TXBUF_G (C807) | Supply voltage for EGSM TX buffer |
| TXBUF_P (C829) | Supply voltage for PCN TX buffer |
| LNA_G (C706) | EGSM LNA supply voltage, front-end gain on/off |
| LNA_P (C700) | PCN LNA supply voltage, front-end gain on/off |
| LNAB_G (R708) | BIAS for both LNA's, front-end gain on/off |
| TXI_0, TXI_180 (R513) | Differential In-phase TX signals to the IQ-modulator |
| TXQ_0, TXQ_180 (R516) | Differential quadrature-phase TX signals to the IQ-modulator |
| TXVGSM (R910/N800) | Selects GSM Tx mode in PA and RX/TX Switch |
| TXVPCN (R911/N800) | Selects PCN Tx mode in PA and RX/TX Switch |
| OUTM_G_TX (L802) | Balanced EGSM TX signal between HAGAR and EGSM TX balun |
| OUTP_G_TX (L802) | Balanced EGSM TX signal between HAGAR and EGSM TX balun |
| OUTM_P_TX (L804) | Balanced PCN TX signal between HAGAR and PCN TX balun |
| OUTP_P_TX (L804) | Balanced PCN TX signal between HAGAR and PCN TX balun |
| INM_GSM_RX (L704) | Balanced EGSM RX signal between EGSM RX balun and RF input of HAGAR |
| INP_GSM_RX (L704) | Balanced EGSM RX signal between EGSM RX balun and RF input of HAGAR |
| INM_LO (T600) | Balanced VCO signal between VCO balun and VCO input of HAGAR |
| INP_LO (T600) | Balanced VCO signal between VCO balun and VCO input of HAGAR |
| INP_PCN_RX (L703) | Balanced PCN RX signal between PCN RX balun and RF input of HAGAR |
| INM_PCN_RX (L703) | Balanced PCN RX signal between PCN RX balun and RF input of HAGAR |
| OSC_DIV/TOUT (C614) | Reference divider output (13 MHz) -- RFClock |
| OSC_IN (G602) | Reference frequency input from ref oscillator |
| OUT_CP (C605) | Output of the PLL charge pump |
| PCS_RX (Z701) | PCN RX signal between RX/TX switch and 1st PCN SAW |
| PCS_TX (L800) | PCN TX signal between dual-coupler and RX/TX switch |

**Digital/programming part**

| | |
|---|---|
| MBUS (J113/R172) | Bidirectional serial bus between MAD and accessory - during flashing, clock signal is received on this line |
| MBUS1 (V170) | Same as above, but on the “dirty” side of the filter |
| FBUS(1:0) (V171) | FastBus. Consisting of FBUS_RX and FBUS_TX signals. Used for IRDA and accessory communication. During flashing, the data is transferred on these lines |
| FBUS_RX(J332/R306) | Receive line from the MAD’s point of view |
| FBUS_TX(J331/R305) | Transmit line from the MAD’s point of view |

**User Interface part**

| | |
|---|---|
| XEAR (L201) | Audio output when using carkit or headset |
| XMIC (L201) | Audio input when using carkit or headset |
| MICN (L200) | Negative side of the microphone |
| MICP (L200) | Positive side of the microphone |
| PD2 (R201) | Signal for muting microphone in headset, controlled by MAD |
| BUZZER (R410) | PWM-signal from MAD, controls the buzzer |
| LCDCD (J328) | Signal for controlling if the display is to receive data or control information on the serial bus |
| LCDEN (J451) | Chip enable signal to the display, informing that data on the serial bus is to the display driver |
| LCDRSTX(R430) | Reset signal from MAD to display driver |
| LIGHT (R427) | Signal from MAD, that turns on the LED’s for keyboard and backlight |
| ROW(4:0) (V450) | Keyboard matrix scan lines |
| COL(4:0) (V450) | Keyboard matrix scan lines |
| CARDDET (C127) | Used for detecting removal of the battery. When the battery is removed, this signal goes high before the power is lost, giving the MAD time to power down the SIM-card |
| SIMIF(4:0) (J300) | Serial bus for transferring SIM-data between MAD and CCONT |
| HEADDET (C211) | Used for detection of which accessory has been connected to the system connector by measuring the voltage on XMIC. Connected to A/D-converter in CCONT, and I/O-pin on MAD. Data can also be transferred, for example - between MAD and DLR3-cable |
| HOOKDET (C212) | For detecting when the push-button on the headset is pressed |
| DLR3 (V221) | When the DLR3-cable is detected, this signal controls a switch, which gives power to the cable |
| SGND (L201) | Return line for microphone and earpice when a headset is connected to the phone. When the DLR3-cable is connected, it changes to a power supply line to the cable, supplying 2.7V |

## USER INTERFACE FAILURES

**Display failure**
Check mechanical appearance of **H400 and C451.**
Check contact pads on PCB – clean also if necessary
Check VBB 2,7V at **C452**
Check if Vout 3,6V / 70mVpp at **C451** (noise < 100mV), if much higher, C451 may be broken.
Change LCD unit if failure persists - probably MAD **D301** faulty.
If the LCD shows too much contrast and / or LCD flickers, check if **C451** is broken.
If there are vertical or horizontal lines missing, LCD unit electrical defect.

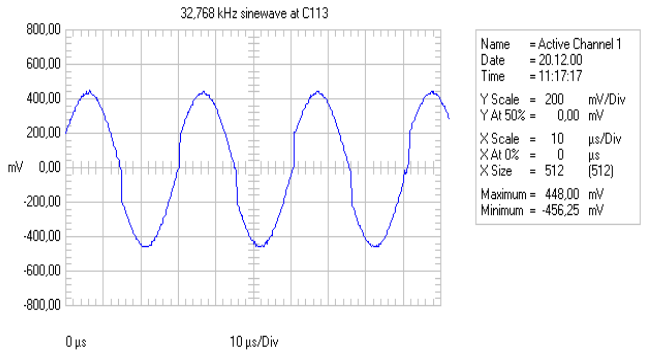
**Keypad malfunktion**
Check if domesheet contacts are dirty, clean PCB (keypads) if necessary
Check mechanical appearance of domesheet (LCD unit) itself.
Check resistance of ROW and COL lines between the keys (0 Ohm)
Change LCD unit.
If keypad is still malfunctioned - probably MAD **D301** faulty.
If keypad crackles when pressing keys, change keypad.

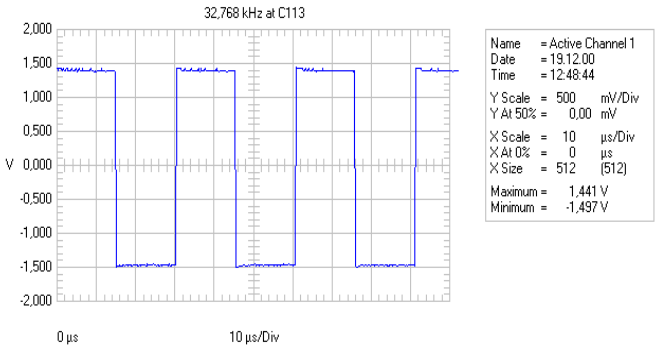
**Backlight failure**
**First check mechanical condition and position of baseband shield, check for shorts, etc.**
Check VBATTUI 3,6V at **L120**
Check VBATTUI 3,6V at **R424**
Check voltage at **V430** (LCD lights) 3,6V and at LED´s **V420** – **V423**
Check voltage at **V431** (Key lights) 3,6V and at LED´s **V424** – **V429**
Check voltage at **R427** (LIGHT line) – if this fails, MAD **D301** or PCB faulty
Note: Different LEDs for LCD (brighter) and keypad backlight.

**Clock time problems.**
Clock time has to be corrected in short periods.
Check amplitude and frequency of sleepclock oscillator at **J112 / C113** should be 3,2Vpp squarewave at 32,768kHz.
If not ok change **B110** and check parts around oscillator :(**R110**, **R111**, **R112**, **R113**, **C110**, **C111**, **C112**, **C113**).

**Clock time is lost after removing battery.**
First try to charge RTC battery, by connecting battery to the phone for app. 10 minutes.
If fault remains, check contact springs of battery or change RTC battery (LCD unit). Check VBACK 3.2V at RTC battery **G100**
If fault persists, probably CCONT **N102** or CHAPS **N100** faulty.

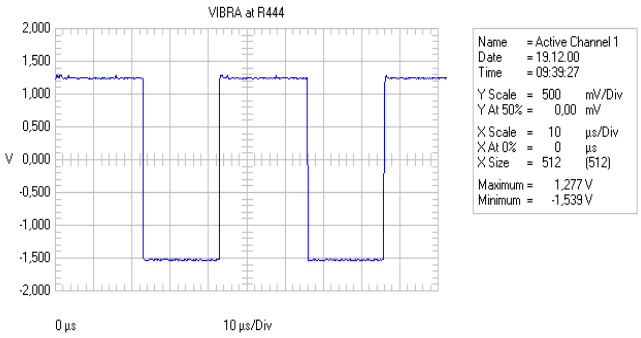
32 kHz before and after **C113**.



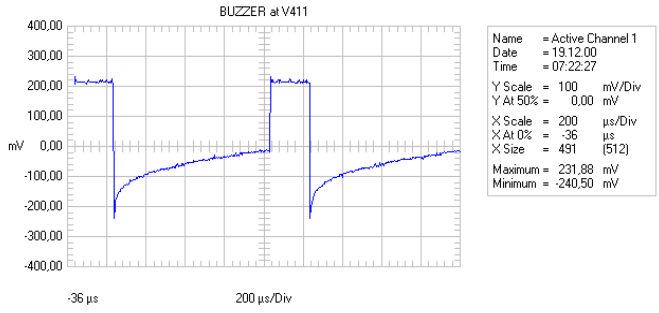
## Vibra failure

Check mechanical appearance of **M400**
Check VBATTIR 3,6V at **L121**
Check VBATTIR 3,6V at **V440**
Check vibra signal at **L401**. If not ok check VIBRA signal at **R444**
If signal is ok at **R444** change **V441**, if signal fails,
MAD **D301** is probably faulty, or a disconnection between MAD and R444 in VIBRA line is the reason




### Buzzer failure

Check mechanical condition of buzzer **B400**
Check VBATTIR 3,6V at **L121**
Check buzzer signal at **R410**
Check buzzer signal in and out at **V410**
Change buzzer **B400** if all of the above works



## SIMcard failures

### SIMcard not accepted

Use Wintesla to open normal mode/quick/RF info window - compare shown SIMlock data with the listed entries of the respective productcode (see SIMlock list).
If shown SIMlock data is the same as in the list – Status is ok und must be set so!
Probably MSIN data field is closed to special IMSI number range, it only can be opened by operator
(**refer to general Service Bulletin 065).**

If SIMlock data is not the same as in SIMlock list or somehow corrupted, SIMlock-data must be rewritten with the Nokia-security password.

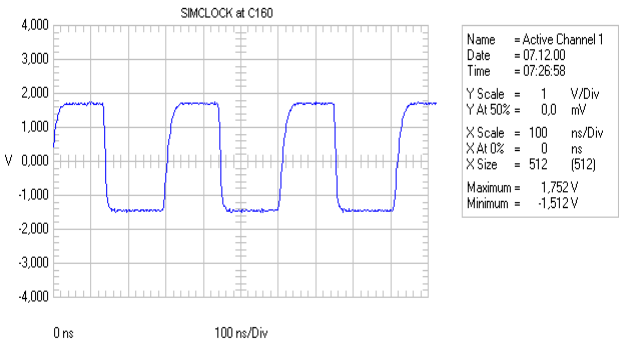
If SIMlock is corrected or inactive but fault remains - **N240** is faulty, or there are probably broken solderings under COBBA - change **N240** - realign RX / TX values and rewrite SIMlock data and flash the phone after this again.

### "Insert SIMcard" appears in Display

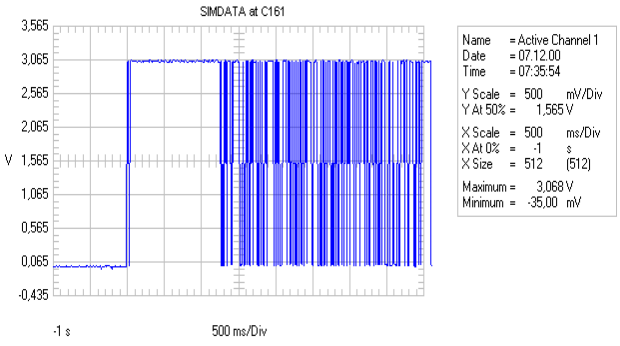
Check **X160**, if bent or soiled - change if necessary
Check BSI A/D values (ok range 340-350)
Check **V160**: pin1 – DATA_0, pin3 - VSIM, pin4 - SIMCLK, pin5 – SIMRST_0
Check also **R160**, **C160**, **C161**, **C162**
Check resistance of SIMlines to GND - change **V160**, **C163**, **C164** if necessary, probably broken solderings under CCONT **N102**
Change CCONT **N102** and run energy management calibration, if fault persists - probably MAD **D301** or PCB faulty.

SIMcard Signals

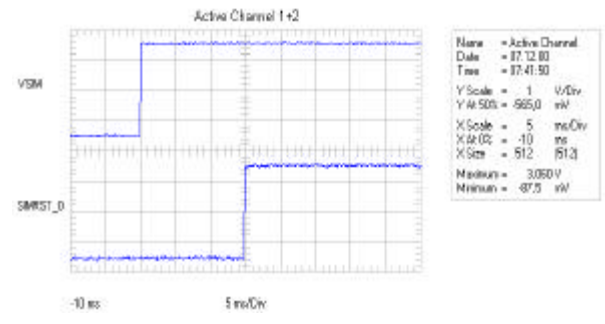
**SIMCLK**



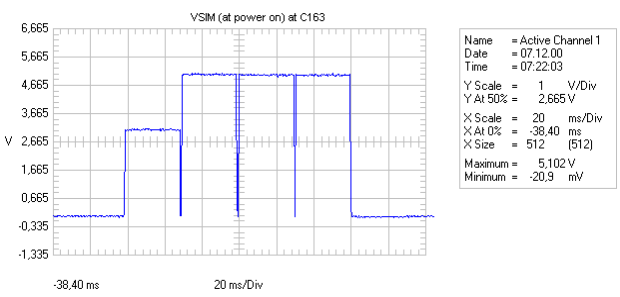

**DATA_0**




SIMRST_0




VSIM



## CHARGING PROBLEMS

At first try an energy management calibration; either to define the defective area, or the phone works well after calibration. (See page #5)

**"NOT CHARGING" appears on display**

If calibration failed – check possible failure message:
**Battery temperature failed**: Check **X120, X121**, **R122** / **R123**, **R124**, **V120**, change **N102** if necessary.
**Battery size failed**: Check **X121, X120**, **R120** / **R121**, change **N102** if necessary.
**Battery voltage failed:** Check **L123** / **R105** / **C104** / **C105,** change **N102** if necessary
**Charge current failed**: Check **R106**, change **N100** and / or **N102.**
**Charge voltage failed**: Check VCHARGE at voltage devider **R102** / **R103**, if ok – change **N102,**
if not ok - check **X001**, **R101**, **F101**, **L101**, change **N100** if necessary.

**X120 / X121 battery connector, X001 system connector.**
Check mechanical condition of connectors – change if necessary.

**V_IN line short-circuited to GND**
Check resistance of V_IN line at **F101** to GND (50 kOhm), if resistance is not ok - remove **L101** and check again.
If resistance is ok now - **C101** / **C102** or **N100** should be the reason, if resistance is still not ok – **R101** faulty.

**CCONT / N102 faulty**
Change CCONT **N102** if any A/D (calibration) value, is out of limit and DC voltage is ok.
If DC voltages are not ok, check corresponding voltage dividers and battery connectors **X120** / **X121**, always realign RX/TX and AD values after changing CCONT **N102.**

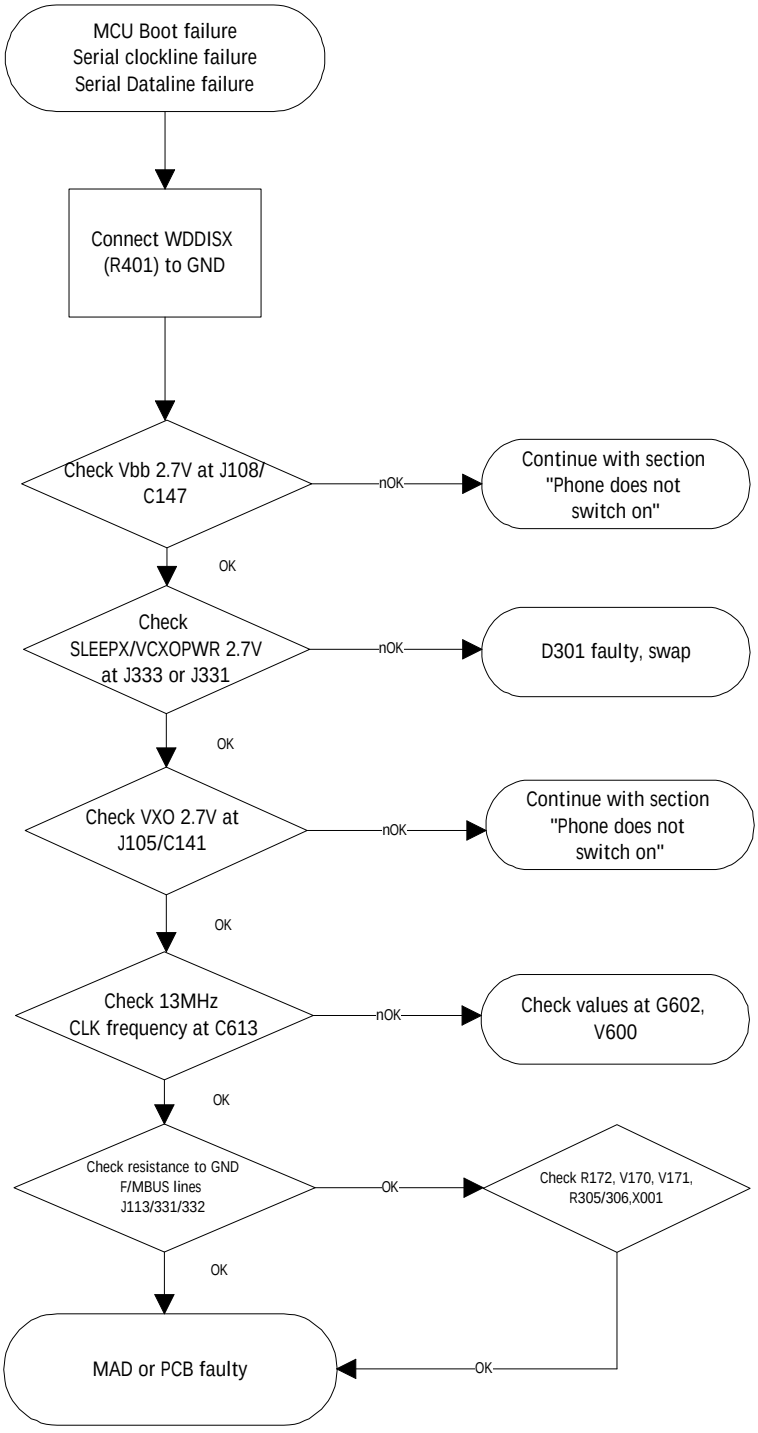
**Nothing happens if charger is connected**
F101 faulty
Check resistance of **F101** ( 0 Ohm ).
Check voltage at **R103** > 0,4V if charger is connected. If not ok (<0,4V) – check / change **X120**,**X121**, **F101**, **R101**, **R102**/**R103,** if ok - change **N100** and / or **N102.**

**Energy management calibration.**
Calibration has to be done always if any part in charging circuit has been replaced.

Try calibration, if charging process stops too early or doesn´t start and if message **"NOT CHARGING"** appears on Display.

**( Also see "General tuning informations" )**

## CONTACT SERVICE



## CONTACT SERVICE PROBLEMS

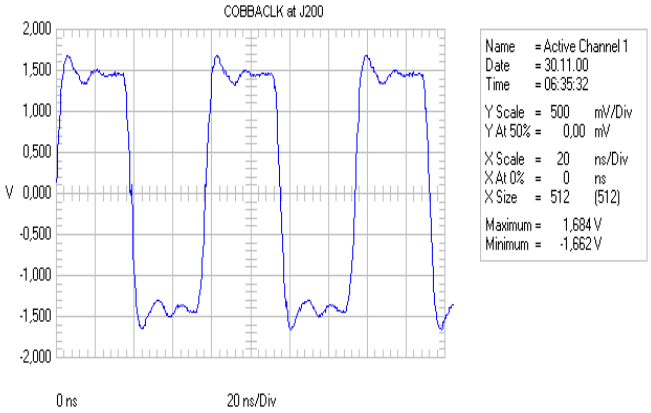
**This fault means that the phone software is able to run and thus the watchdog of CCONT N102 can be served. Selftest functions run when power is switched on and program is executed from FLASH**
**If any selftest fails, - "CONTACT SERVICE" appears in Display.**
**Note: Always try SW-update to solve the problem or locate the error - in most of the cases phones are ok after update.**

Possible failures:

**MCU ROM Checksum failed :**
Try to flash the phone. If not ok after flashing – change FLASH **D311** **if you are authorized to rewrite IMEI and SIMlock data, if failure persists after changing D311, MAD D301 defect which is not changeable.**

**CCONT Interface failed :**
Probably broken solderings under CCONT **N102**
If not ok after rework of CCONT, probably MAD **D301** or PCB faulty. Run energy management calibration after changing CCONT!
NOTE: For Energy management calibration see also **general tuning information** page!

**COBBA parallel/serial failed**
Check VBB 2,7V at **C147**, VCOBBA 2,7V at **C254** & COBBACLK at **J200**
If all ok – change COBBA **N240**
If the failure persists after changing COBBA – probably MAD **D301** or PCB faulty.




**DSP Alive failed**
In most of all DSP alive selftest failures MAD **D301** is faulty, which is not changeable.

**EEPROM tune checksum / security checksum failed**
Use Wintesla to check if phonedata like IMEI, product data 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, FLASH **D311** is faulty.

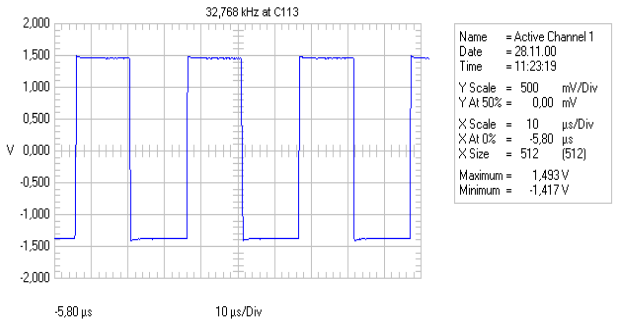
**RTC Battery failed**
First try to charge RTC battery by switching on the phone for app. 10 minutes
If fault remains, check contact springs of battery.
In some cases it is necessary to change CCONT **N102**.

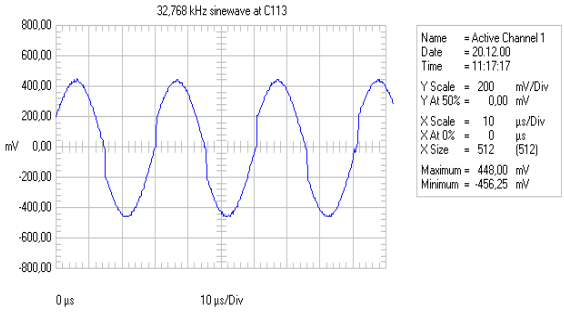
## PHONE DOES NOT SWITCH ON

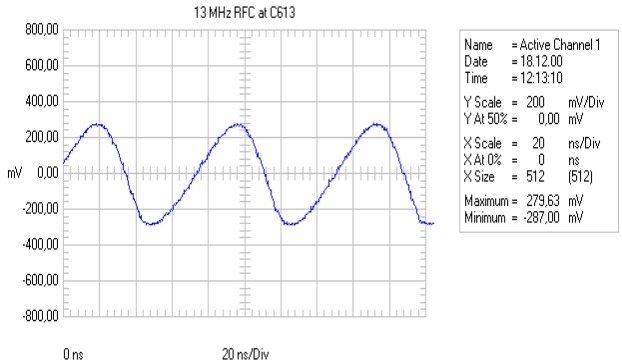
**First check always current consumption: off state 0-2,3mA, sleep mode 2,3-4mA.**
**If too high – see section „low standby / operation mode time".**
Disable watchdog if phone switches off after 2 or 3 seconds.

Check connectors **X001/X120/X121** - change if bent or soiled.
Check VB 3,6V at **J103/C105** - if not ok, check/change **L123.**
Check if PWRON at **R401/J102** drops to 0V while pressing powerswitch, if not ok - check/change **S402**, **R401.**
Check 32,768kHz at **J112/C113**, 3Vpp squarewave – (if it is difficult to measure squarewave, because of Basebandshield, check 32,768 kHz at the other side of C113, 900mVpp sinewave).
If not ok, check/change components around **B110, (R110-R113 & C110-C113)** and/or change CCONT **N102** if necessary.
Check VCORE at **C155** – 1,7V – if not ok, change CCONT **N102.**
Check VBB 2,7V at **J108/C147**, VXO 2,7V at **J105/C141**, VREF 1,5V (+-1,5%) at **J117/C144** –if not ok, check resistance of lines to GND and/or change CCONT **N102** if necessary.
Check SLEEPX/VCXOPWR 2,7V at **J333/J331** - if not ok, MAD is faulty in all probability - swap the phone, because MAD **D301** is not changeable.
Check PURX 2,7V at **J101** after pressing powerswitch - if not ok, change CCONT **N102.**
Check 13MHz Clk frequency (RFC) at **C613**, if not ok, check values around 26MHz oscillator **G602** / **V600**
Change HAGAR **N500** if necessary.
Try to flash the phone - if not ok, see section "FLASH update not possible".

Note:
It is nessesary to realign all RX/TX values after changing HAGAR **N500 and** run energy management calibration after changing CCONT **N102.**
For Energy managemant calibration see also **general tuning information page**!
32,687 kHz before and after C613.



## LOW STANDBY / OPERATION MODE TIME

**Off state current > 0-2,3mA.**
lift **L122** (VBATTRF) - check current consumption, if ok - **N800** faulty in all probability,
if current is still too high after changing **N800.** check / change **C814**, **C815**, **C817.**
Lift **L123** (VB) - check current consumption – if too high,
**VB line faulty**
In most cases is CCONT **N102** the reason. If fault persists after changing CCONT, it is also possible, that capacitor(s) in VB line is/are faulty (**C105**, **C122**, **C123,** ... ). Check all these components lifting one after the other, with repeated current testing.
If fault persists, probably one of the µBGA / CSP´s and / or PCB should be the reason.

**Sleep mode current > 2,3-4mA**
Check resistance of all voltage output lines of CCONT **N102** to GND
Check component(s) in corresponding line(s) if resistance is not ok
If resistance of voltage lines (from CCONT **N102**) are ok, but sleep mode current is still too high – change CCONT **N102.**
Check charging circuit, run energy management calibration.
If calibration fails - continue with section "Not charging"
Align RX / TX values. If calibration fails - continue with section "RX / TX faults".

**Note:**
**Standby time also depends on network side and users handling, like lights on/off, VIBRA- / WAP activities, games etc.**

## FLASH UPDATE NOT POSSIBLE

Check if fault code from prommer is one of the following:

**MCU boot failure, serial clock/data line failure:**
Connect „watchdog disable" WDDISX **R401** to GND.
Check VBB 2,7V at **J108**/**C147** and VXO 2,7V at **J105** / **C141**, if not ok - continue with section "PHONE DOES NOT SWITCH ON"
Check SLEEPX 2,7V at **J333** - if not ok - MAD **D301** faulty in all probability
Check PURX 2,7V at **J101** - if not ok change CCONT **N102**
Check 13MHz Clk frequency at **C613**, approximately 800mVpp, if not ok, check values around 26MHz oscillator **G602** / **V600,** change HAGAR **N500** if necessary
Check resistance of MBUS / FBUS lines (**J113** / **J331** / **J332**) to GND, also check **R172**, **V170**, **V171**,**R305**, **R306** and check **X001.**
If update still not possible – swap the phone, MAD **D301** or PCB should be the reason.

**Algorithm code fail, alias ID missing:**
Update FPS4 box with the latest flash device list and try to update again, if fault remains, check values at MAD **D301**.
If ok, change FLASH **D311**
**External RAM failure:**
Check values at MAD **D301**, if ok - SRAM **D310** faulty and/or change FLASH **D311** if necessary.
See chapter "PHONE DOES NOT SWITCH ON"

Note:
It is necessary to run energy management calibration after changing CCONT **N102**!
For Energy managemant calibration see also **general tuning information page** (#5).

## NO SERVICE PROBLEMS

### No RX EGSM

Use Wintesla to set phone in following mode: Initialise / Local mode / Testing / RF Controls / **Gain step value >2** / active unit RX-burstmode / **Channel 56 (946,2MHz). Set Generator to same frequency, -40dBm.**

Check 26MHz reference oscillator frequency at **G602**, 800mVpp/frequency deviation < 100Hz
Check 946,2MHz at **C912**, if not ok, check/ change **Z900, X900.**
Check 946,2MHz at **L700**, if not ok, check/change **Z700.**
Check 946,2MHz at **V700** in & out, if not ok, check LNA values: VLNAB_G 2,7V at **V700**, pin 8 and LNA_G 0,7V at pin4, change HAGAR **N500** if necessary.
Check 946,2 MHz at **L704** - if not ok, check/change **Z703**, **R702**, **T700.**
Check RXIQ signals at **R509**, if not ok, check supply values at HAGAR **N500:** 2,7V at **C513** (VXO), **C501** (VRX), **C503**(VSYN_2) and **N501** input 4,9V (VCP). If one or more of these fails, change **N102.**
Check SDATA at **J503/J507**, SCLK at **J502/J506** and SLE at **J501/J505**, if not ok MAD **D301** faulty
Check VREF (1,5V) at **R514** / VREF_RX (1,2V) at **R510,** if not ok, change **N102.**
Check frequency of SHF oscillator **G600** if possible – refer to EGSM frequencies list.
If all values are ok but no RXIQ signals measurable at **R509**, HAGAR faulty, or there are probably broken solderings under **N500**.
If signals at **R509** ok, but still no RX calibration possible, check values at COBBA **N240:**
VBB at **C256** (2,7V) and VCOBBA at **R245** (2,7V), also check COBBACLK at **J200.**
If values ok – **N240** faulty, or there are probably broken solderings under COBBA.

### No RX PCN

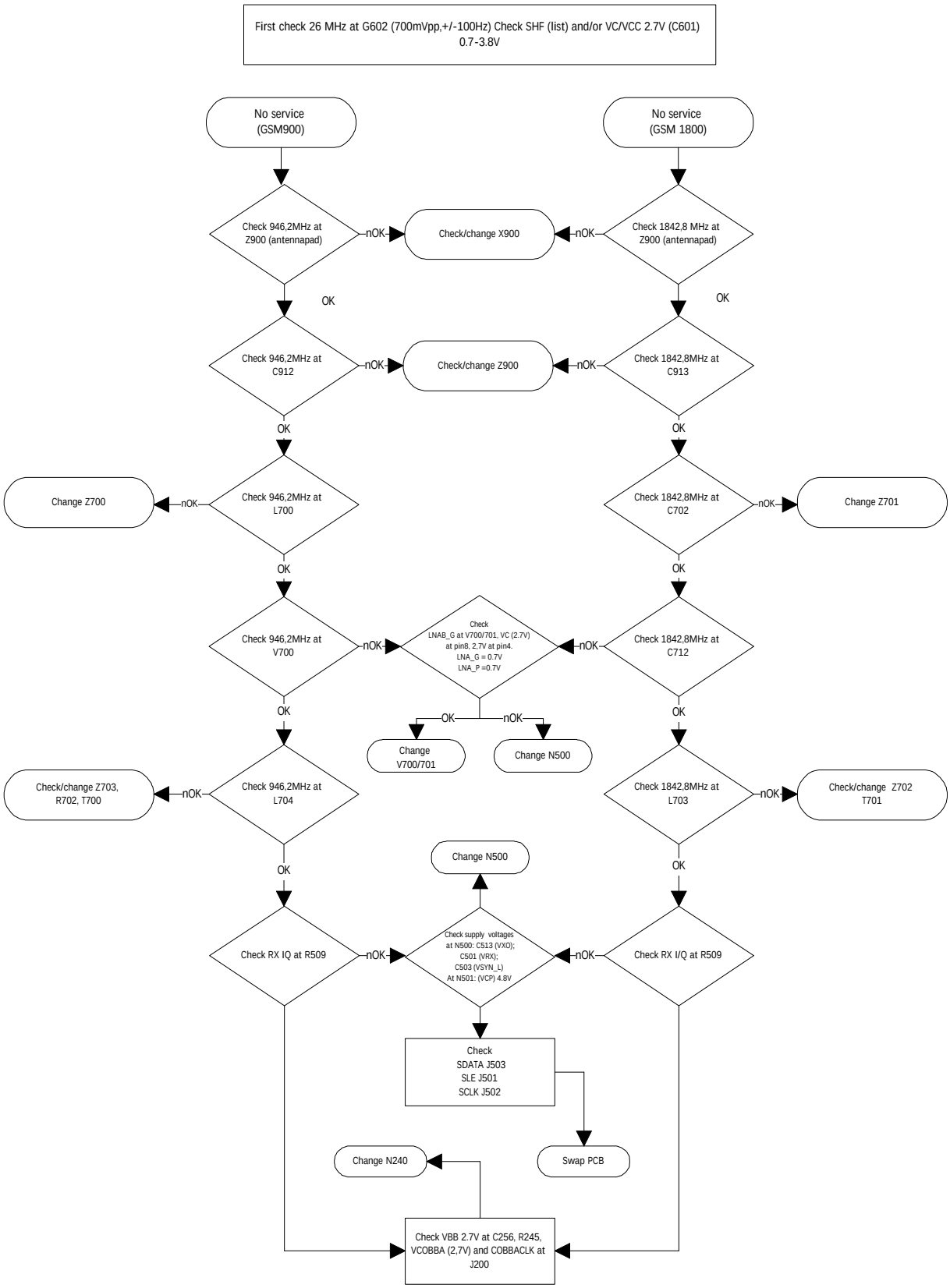
Use Wintesla to set phone in following mode: Initialise / Local mode / Testing / RF Controls / **Gain step value >2 /** active unit RX burst / **Channel 700 (1842,8MHz). Set Generator to same frequency, -40dBm.**

Check 26MHz reference oscillator frequency at **G602**, 800mVpp/frequency deviation < 100Hz
Check 1842,8MHz at **X900** and ANT pad of **Z900** - change **X900** if necessary.
Check 1842,8MHz at **C913**, if not ok, check solderings of **Z900**, change if necessary .
Check 1842,8MHz (PCS_RX) at **C702** - if not ok, check/change **Z701.**
Check 1842,8MHz at **C712** - if not ok check values of LNA: VLNAB_G = 2,7V at **V701**, pin 8 (VC) and LNA_P = 0,7V at pin 4 (VCC) Change **V701** if necessary.
Check 1842,8MHz at **L703**, If not ok, check/change **Z702**, **T701**
Check RXIQ signal at **R509** - if not ok, check values at HAGAR **N500**: 2,7V at **C513** (VXO), **C501** (VRX), **C503** (VSYN_2) and **N501** input 4.9V (VCP).
If one or more of these fails - change **N102**
Check SDATA at **J503/J507**, SCLK at **J502/J506** and SLE at **J501/J505,** if not ok MAD **D301** faulty.
Check VREF (1,5V) at **R514** / VREF_RX (1,2V) at **R510, if not ok, change N102.**
Check frequency of SHF oscillator **G600** if possible – refer to EGSM frequencies list.
If there is no possibility to check frequency - check if oscillator works by measuring VCC at **C601** (2,7V) and VC at **C603**, which varies between 0,7V and 3,8V (see EGSM list).
If VC is 4,8V, the oscillator doesn't work in all probability, also check **T600** and **R608**.
If all values are ok but no RXIQ signal is measurable at **R509, N500** is faulty, or there are probably broken solderings under HAGAR.
If signal at **R509** ok but still no RX calibration possible, check values at COBBA **N240**: VBB 2,7V at **C256** and VCOBBA 2,7V at **R245**, also check COBBACLK at **J200.**
If values are ok, **N240** faulty, or there are probably broken solderings under COBBA.

Note: After changing COBBA, HAGAR and/or CCONT it is necessary to realign all RX,TX -and AD values, and rewrite IMEI and SIMlock data (COBBACHANGE)

## NO SERVICE PROBLEMS

### EGSM/PCN no RX



## NO SERVICE PROBLEMS / TX POWER

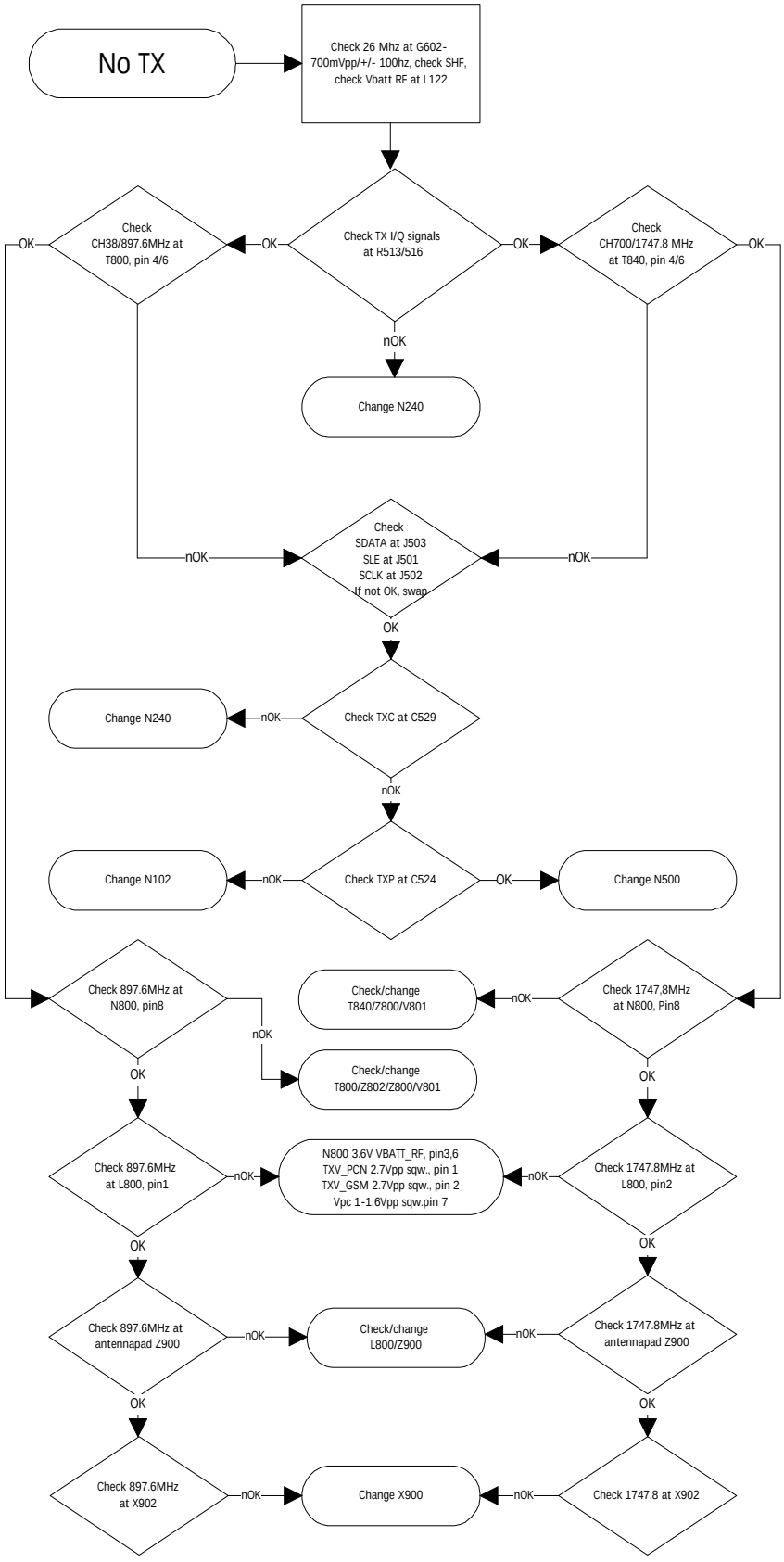
First of all: Try to calibrate RX / TX values to define the fault area, or phone works well after calibration

**No or low TX power EGSM**

Use Wintesla to set phone in following mode: Initialise / Local mode / Testing /RF Controls / active unit TX / **Channel 38 (897,6MHz).**
Check 26MHz reference oscillator frequency at **G602** (800mVpp, frequency deviation < 100Hz)
CheckTXBUF_G at **C807** – 2,7Vpp squarewave - see signal page #**27**
Check TXIQ signals at **C525 / C526**, refer to signals shown on page #27.
If not ok, check values at COBBA **N240** (see COBBA **N240** chapter page #24).
Check 897,6 MHz at **T800** pin 4 and 6. If not ok, check signals at HAGAR **N500** (see HAGAR **N500** chapter)
Check 897,6 MHz at **N800** pin 8. If not ok,check / change parts like **T800**,**V801, Z802**, **Z800**.
Check 897,6 MHz at **L800** pin 1. If not ok, check values at **N800.**
Check 897,6 MHz at **X902** (Antenna pad). If not ok, check / change **X900.**
Check **L800** in & out, check also signal at **Z900** in & out and TXVGSM: 2,7Vpp squarewave at **C910** (sets **Z900** into TX-mode).

**No or low Tx power PCN**
Use Wintesla to set phone in following mode: Initialise / Local mode / Testing /RF Controls / active unit TX / **Channel 700 (1747,8MHz).**
Check 26MHz reference oscillator frequency at **G602** (800mVpp, frequency deviation < 100Hz).
Check TXBUF_P at **C829** – 2,7V squarewave – see signal page #**27**
Check TXIQ signals at **C525 / C526**, refer to signals shown on page #27.
If not ok check values at COBBA **N240** (see COBBA **N240** chapter, page #24)
Check 1747,8MHz at **T840** pin 4 and 6. If not ok check signals at HAGAR **N500** (see HAGAR **N500** chapter).
Check 1747,8MHz at **N800** pin 8. If not ok check / change parts like **T840**,**V802**, **Z800**.
Check 1747,8MHz at **L800** pin 2. If not ok, check values at **N800.**
Check 1747,8MHz at **X902** (Antenna pad). If not ok, check / change **X900.**
Check **L800** in & out, check also signal at **Z900** in & out and TXVPCN: 2,7Vpp squarewave at **C911** (sets **Z900** into TX-mode).

**NO TX**

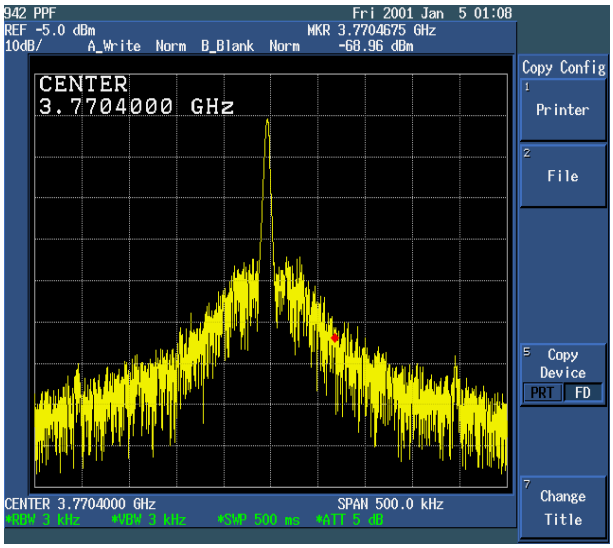


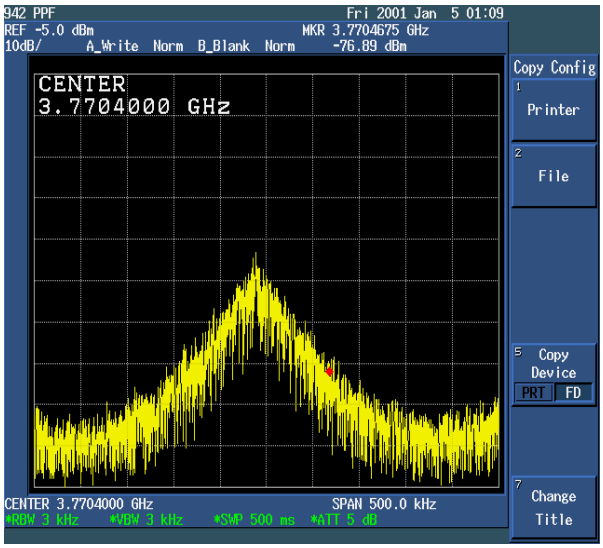
**SHF OSCILLATOR PROBLEMS**

This causes problems in EGSM and PCN mode (RX/TX).
If the phone has no service because of too low TX power (eg. approximately 5dBm in the highest powerlevels) and / or there are strange A/D values in the RSSI measurements – check (if possible) the SHF frequency with a spectrum analyzer
and /or the RX calibration A/D values (also see pictures below) if there might be something unusual like a cutted SHF oscillator frequency amplitude and / or the gain readings in RX calibration are lower as normal, - approximately about values of 10 to 20.

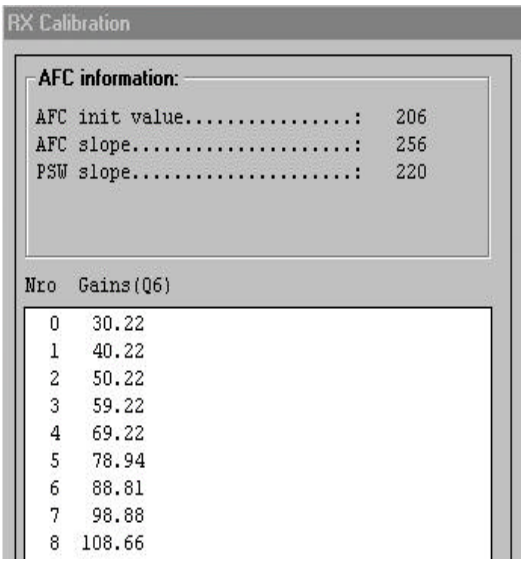
If this is the case, check the periphery – capacitors of SHF Oscillator **G602** in VC circuit (**C603**, **C604**, **C605**)
Check their resistance to GND (approximately 3MOhm at **R612** to GND in normal case / otherwise the value should be in lower kOhm range (around 10k):

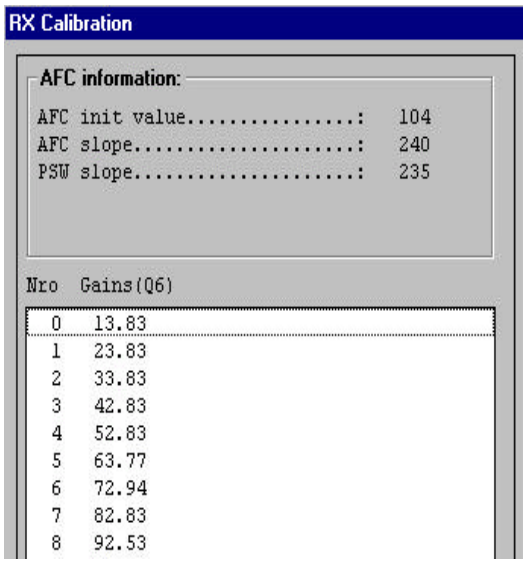
Left picture shows a normal SHF frequency amplitude – right side in defect case



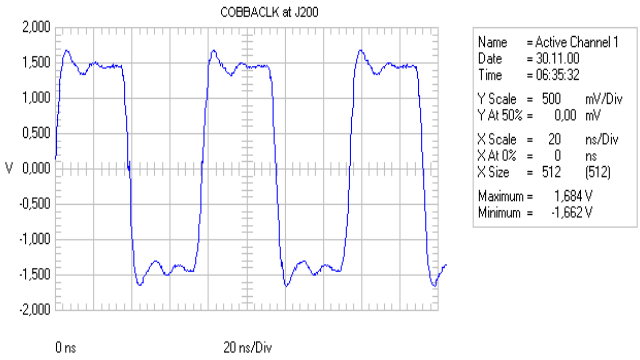

Left picture shows normal gain readings – right picture in defect case (RX Calibration):



## COBBA / N240 faulty

Check VBB 2,7V at **C256** and VCOBBA 2,7V at **R245**
Check 13MHz COBBACLK at **J200**, probably broken solderings under COBBA / **N240**.
Realign Rx / Tx values after rework of COBBA **N240**.




## HAGAR / N500 faulty

Check voltages at HAGAR:

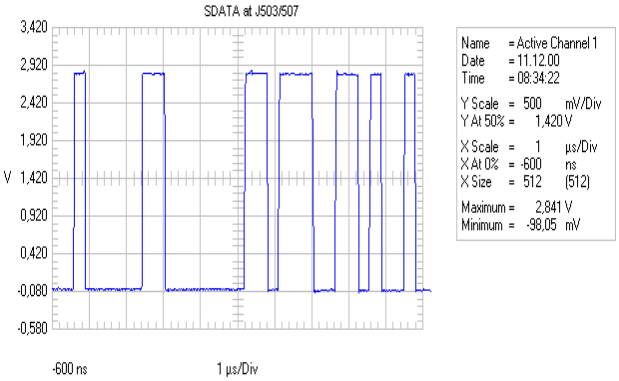
| | |
|---|---|
| **VXO** | 2,7V at **C533** |
| **VCP** | 4,7V at **N501** (output) |
| **VSYN_2** | 2,7V at **C503** |
| **VRX** | 2,7V at **C501** |
| **VREF** | 1,5V at **C143** |

Check 26MHz reference oscillator frequency at **G602**:
800mVpp – frequency deviation < 100Hz.
Check TXIQ signals at **R513/C525** (TXI 0/180) and **R516 / C526** (TXQ 0/180)
Check SDATA at **J503/J507**, SCLK at **J502/J506** and SLE (SENA) at **J501/J505** (refer to signals shown on **page #27**)
Check TXC at **C529** (diagram on page #25)
Check TXP at **R512**, 3Vpp squarewave/ 217Hz
Check frequency of SHF oscillator / **G600** – refer to EGSM frequency list
If all values are ok but no TX - signal is measurable at **T800**, there are probably broken solderings under HAGAR, or **N500** is faulty.

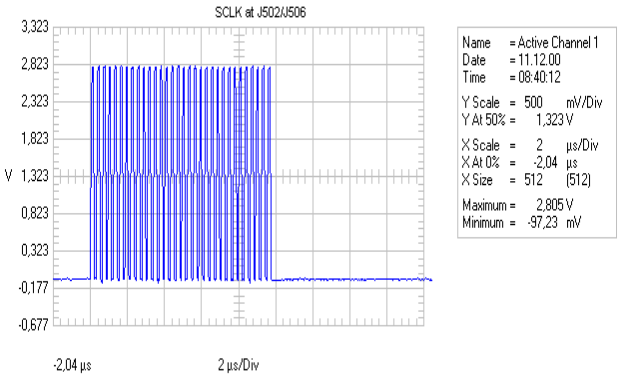
Note: After changing COBBA, HAGAR and/or CCONT it is necessary to realign all RX,TX -and AD values, and rewrite IMEI and SIMlock data (COBBACHANGE)

## SIGNAL CHARTS

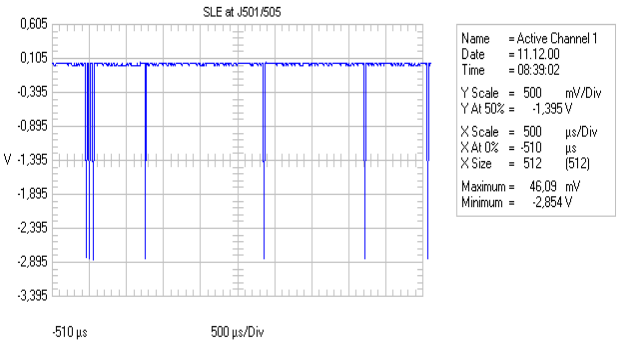
Serial data (RX Burst mode)



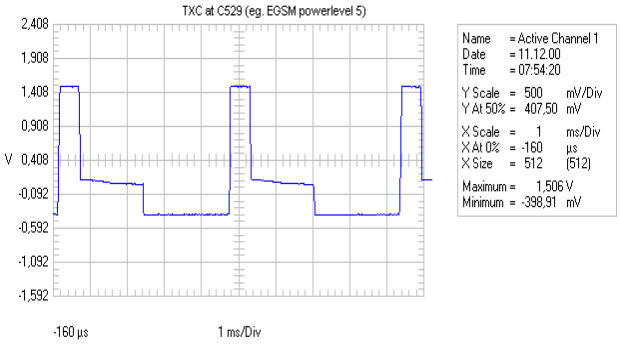

Serial clock (RX Burst mode)



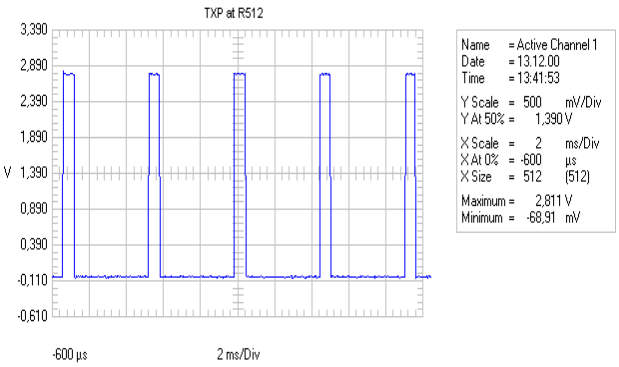

Serial Latch enable (RX Burst mode)



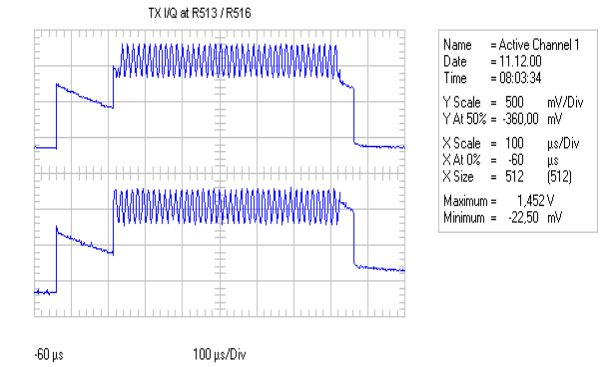

TX power control TXC




TX power enable TXP




TX_IN phase /Quadrature phase (0/180°)



## FREQUENCY LIST

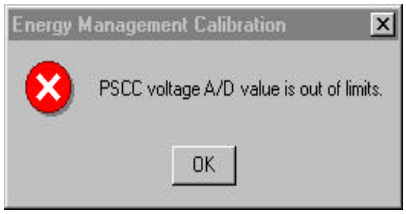
| Channel | TX<br>MHz | RX<br>MHz | VCO - TX<br>MHz | VCO<br>VC at C603<br>VOLT | VCO - RX<br>MHz | VCO<br>VC at C603<br>VOLT |
|---|---|---|---|---|---|---|
| 1 | 890,2 | 935,2 | 3560,8 | 1,7 | 3740,8 | 2,81 |
| 38 | 897,6 | 942,6 | | | | |
| 60 | 902 | 947 | 3608 | 2,01 | 3788 | 3 |
| 124 | 914,8 | 959,8 | 3659,2 | 2,34 | 3839,2 | 3,2 |
| 512 | 1710,2 | 1805,2 | 3420,4 | 0,84 | 3610,4 | 2,03 |
| 700 | 1747,8 | 1842,8 | 3495,6 | 1,3 | 3685,6 | 2,36 |
| 885 | 1784,8 | 1879,8 | 3569,6 | 1,77 | 3759,6 | 2,66 |
| | | | | | | |
| 975 | 880,2 | 925,2 | 3520,8 | 1,46 | 3700,8 | 2,66 |
| 976 | 880,4 | 925,4 | 3521,6 | | 3701,6 | |
| 977 | 880,6 | 925,6 | 3522,4 | | 3702,4 | |
| 978 | 880,8 | 925,8 | 3523,2 | | 3703,2 | |
| 979 | 881 | 926 | 3524 | | 3704 | |
| 980 | 881,2 | 926,2 | 3524,8 | | 3704,8 | |
| 981 | 881,4 | 926,4 | 3525,6 | | 3705,6 | |
| 982 | 881,6 | 926,6 | 3526,4 | | 3706,4 | |
| 983 | 881,8 | 926,8 | 3527,2 | | 3707,2 | |
| 984 | 882 | 927 | 3528 | | 3708 | |
| 985 | 882,2 | 927,2 | 3528,8 | 1,51 | 3708,8 | 2,69 |
| 986 | 882,4 | 927,4 | 3529,6 | | 3709,6 | |
| 987 | 882,6 | 927,6 | 3530,4 | | 3710,4 | |
| 988 | 882,8 | 927,8 | 3531,2 | | 3711,2 | |
| 989 | 883 | 928 | 3532 | | 3712 | |
| 990 | 883,2 | 928,2 | 3532,8 | | 3712,8 | |
| 991 | 883,4 | 928,4 | 3533,6 | | 3713,6 | |
| 992 | 883,6 | 928,6 | 3534,4 | | 3714,4 | |
| 993 | 883,8 | 928,8 | 3535,2 | | 3715,2 | |
| 994 | 884 | 929 | 3536 | | 3716 | |
| 995 | 884,2 | 929,2 | 3536,8 | 1,56 | 3716,8 | 2,72 |
| 996 | 884,4 | 929,4 | 3537,6 | | 3717,6 | |
| 997 | 884,6 | 929,6 | 3538,4 | | 3718,4 | |
| 998 | 884,8 | 929,8 | 3539,2 | | 3719,2 | |
| 999 | 885 | 930 | 3540 | | 3720 | |
| 1000 | 885,2 | 930,2 | 3540,8 | | 3720,8 | |
| 1001 | 885,4 | 930,4 | 3541,6 | | 3721,6 | |
| 1002 | 885,6 | 930,6 | 3542,4 | | 3722,4 | |
| 1003 | 885,8 | 930,8 | 3543,2 | | 3723,2 | |
| 1004 | 886 | 931 | 3544 | | 3724 | |
| 1005 | 886,2 | 931,2 | 3544,8 | 1,61 | 3724,8 | 2,75 |
| 1006 | 886,4 | 931,4 | 3545,6 | | 3725,6 | |
| 1007 | 886,6 | 931,6 | 3546,4 | | 3726,4 | |
| 1008 | 886,8 | 931,8 | 3547,2 | | 3727,2 | |
| 1009 | 887 | 932 | 3548 | | 3728 | |
| 1010 | 887,2 | 932,2 | 3548,8 | | 3728,8 | |
| 1011 | 887,4 | 932,4 | 3549,6 | | 3729,6 | |
| 1012 | 887,6 | 932,6 | 3550,4 | | 3730,4 | |
| 1013 | 887,8 | 932,8 | 3551,2 | | 3731,2 | |
| 1014 | 888 | 933 | 3552 | | 3732 | |
| 1015 | 888,2 | 933,2 | 3552,8 | 1,66 | 3732,8 | 2,78 |
| 1016 | 888,4 | 933,4 | 3553,6 | | 3733,6 | |
| 1017 | 888,6 | 933,6 | 3554,4 | | 3734,4 | |
| 1018 | 888,8 | 933,8 | 3555,2 | | 3735,2 | |
| 1019 | 889 | 934 | 3556 | | 3736 | |
| 1020 | 889,2 | 934,2 | 3556,8 | | 3736,8 | |
| 1021 | 889,4 | 934,4 | 3557,6 | | 3737,6 | |
| 1022 | 889,6 | 934,6 | 3558,4 | | 3738,4 | |
| 1023 | 889,8 | 934,8 | 3559,2 | 1,7 | 3739,2 | 2,81 |
| 0 | 890 | 935 | 3560 | | 3740 | |

## Special information for NHM-3

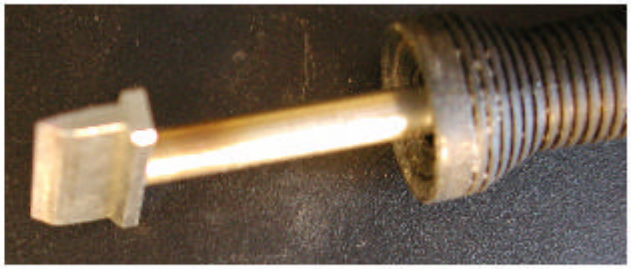
This phone is build so that it can withstand a fall of 3 metres height without harmful effects – what certainly does not mean that you should test this feature on purpose.
Further more the phone endures drops into water of 0.5metres depth up to 1minute at a water temperature of not more than 50°C. Therefore the speaker, buzzer and microphone are sealed. Take care not to destroy these seals if you have to change one of the above mentioned item, don´t even touch the seals!
To ensure water resistance, covers with gaskets must not be used more than three times after tightening the screws. Check always appearance of gasket around systemconnector and battery cover, change parts in case of doubt!
It is absolutly necessary to use always new screws to assemble the phone, because gaskets around screws are surely damaged after tightening them! Order / torque of tightening screws: middle screws at 12Ncm, top screws at 25Ncm and then bottom screws at a torque of 25Ncm.

Note that accessories do not fulfill the same tough specifications as the phone is made for.
Do not connect any electrical item ( eg. charger, carkit ) to the phone if it is still damp!

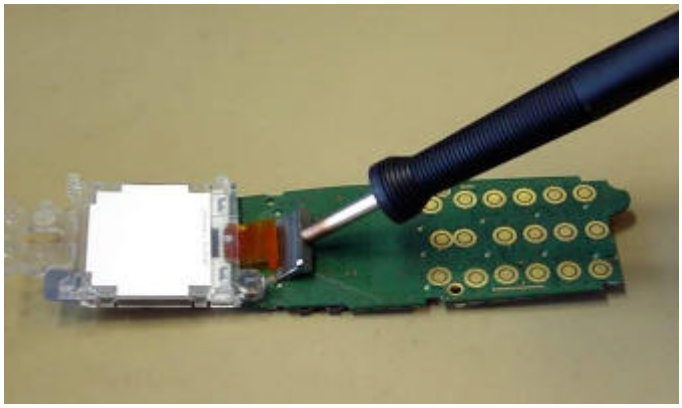
**The usage of NPE-3 Repair-Hints for NHM-3 phones is possible without any problems**.
Schematics of both phones differ only in few points ( eg. varistors in Xmic-line, some more components around LNA... ), and almost all itemcodes are the same.
Because of different systemmodul-forms you have to use MJS-23 Jig with XRC-3 Rf-cable for testing and adjustment.
If you have to make energy management calibration ( eg. after changing Ccont or any part of the charging circuit ), be sure that you are using dll 311.04.00 or later, else the tuning of battery size won´t work and you will get the following failure message:



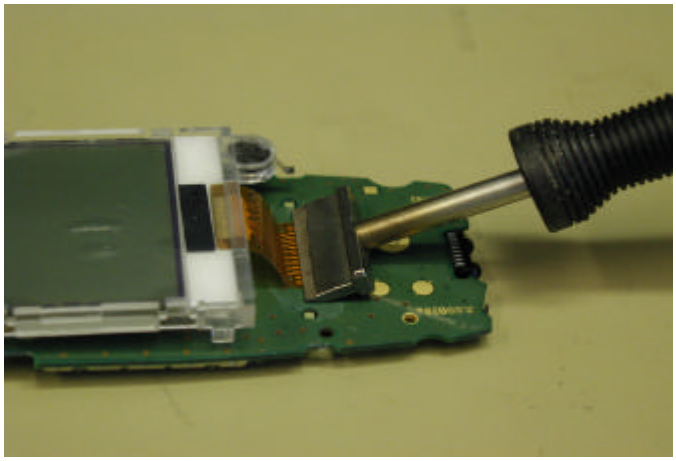

One of the most conspicuous differences between NPE-3 and NHM-3 is the systemconnector, which is connected via flexfoil to Pcb. Further more a batteryconnector similar to the one in NSM-2/3 is used. The Simcard-holder is combined with the shielding of the baseband as well as the antenna is one part with the shielding of the poweramplifier. The RF-connector is constructed flexible, so that a fall does not result in torn off traces.
If it is necessary to change any item with help of a soldering machine ( eg µBGA-components, shieldings, poweramplifier...), you have to remove the display assy first, which is connected to PCB with a flexfoil. This can be done easily with help of a Metcal Soldering Station MX500 equipped with a soldering tip SMTC 162.
Hot air should not be used to desolder anything ever since using Pcb with microvias, which will crack rapidly if exposed to too high temperature!



To remove the flexfoil release clips of display assy first and turn it around, so that you have access to the soldering points of the foil. Now you can desolder the flexfoil easily.



Before soldering a new display ( do not use the old one! ) clean careful the soldering points. Add few new solder to the pads and enclose only a little bit of flux.
Bend the flexfoil a little bit at the perforation, so that it is easier to hold the display in correct position. Do not touch the contacts of the flexfoil with bare fingers!



Heat up the soldering points for approximately 10 seconds. Check connection visually ( especially at the top of the flex for shorts to ground ) and clip display on Pcb. Never bend the flexfoil for more than 90°!

## CHANGE HISTORY

| Originator | Status | Version | Date | Comment |
|---|---|---|---|---|
| CC-Training-Group | Draft | 0.1 | 24.01.2001 | First draft version for the repair group |
| CC-Training-Group | Approved | 1.0 | 06.02.2001 | First approved version |