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Service & Competence Center Europe
Customer Care Training Group
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RF Schematic Diagram	Version 1.0 Approved
NHM-5/ UB 4 V09	
27.03.2001	

No TX GSM 900

1. Check 26MHz reference oscillator at G502 pin 3, 1Vpp, frequency deviation < 100Hz
2. Check TXI/Q signals at R541/548. If OK, go to 5.
3. Check Vbb 2.8V DC at C119 and VCOBBA 2.8V DC at C116/117.
4. Check COBBAClk at J317, probably COBBA N100 faulty or broken solderings under it.
5. Check 897,6MHz, ch 38 at L514. If OK, goto 10.
6. Check supply voltages for HAGAR at C500/501/504/518 2.8V DC, C536 1.35V DC and C505 4.8V DC.
7. Check a) Sdata at R300, b) Sclk/Sena at R301 and c) HAGARReset at C540.
8. Check TXC at C542 and TXP at J503.
9. Check frequency of a) SHF oscillator G500 (3590.4MHz/Ch.38,TX-mode).
   If you have no possibility to check frequency, you can check if oscillator works by measuring b) Vcos 2.7V DC at C522 and
   c) control voltage at C558, which varies between 1.2V DC and 3.2V DC.
   If voltage at C558 is 4.8VDC, the oscillator does not work in all probability, or control loop is open.
   If values are ok but no TX signal at L514 measurable, probably HAGAR faulty or broken solderings under it.
10. Check 897,6 MHz at C605. If not ok, check parts like T504, Z503 or V601.
11. Check 897,6 MHz at N502 pin 6. If not ok, check Vbatt at pin 4 and 5 of N502.
.   Check also Vapc 1.4Vpp – 2.6Vpp squarewave depending on TX powerlevel at R532, change poweramplifier if necessary.
12. Check 897,6 MHz at J502 (Antenna pad). If not ok, check L515 in & out, also check signal at Z502 in & out and TXVGSM 2.7Vpp squarewave at L509.
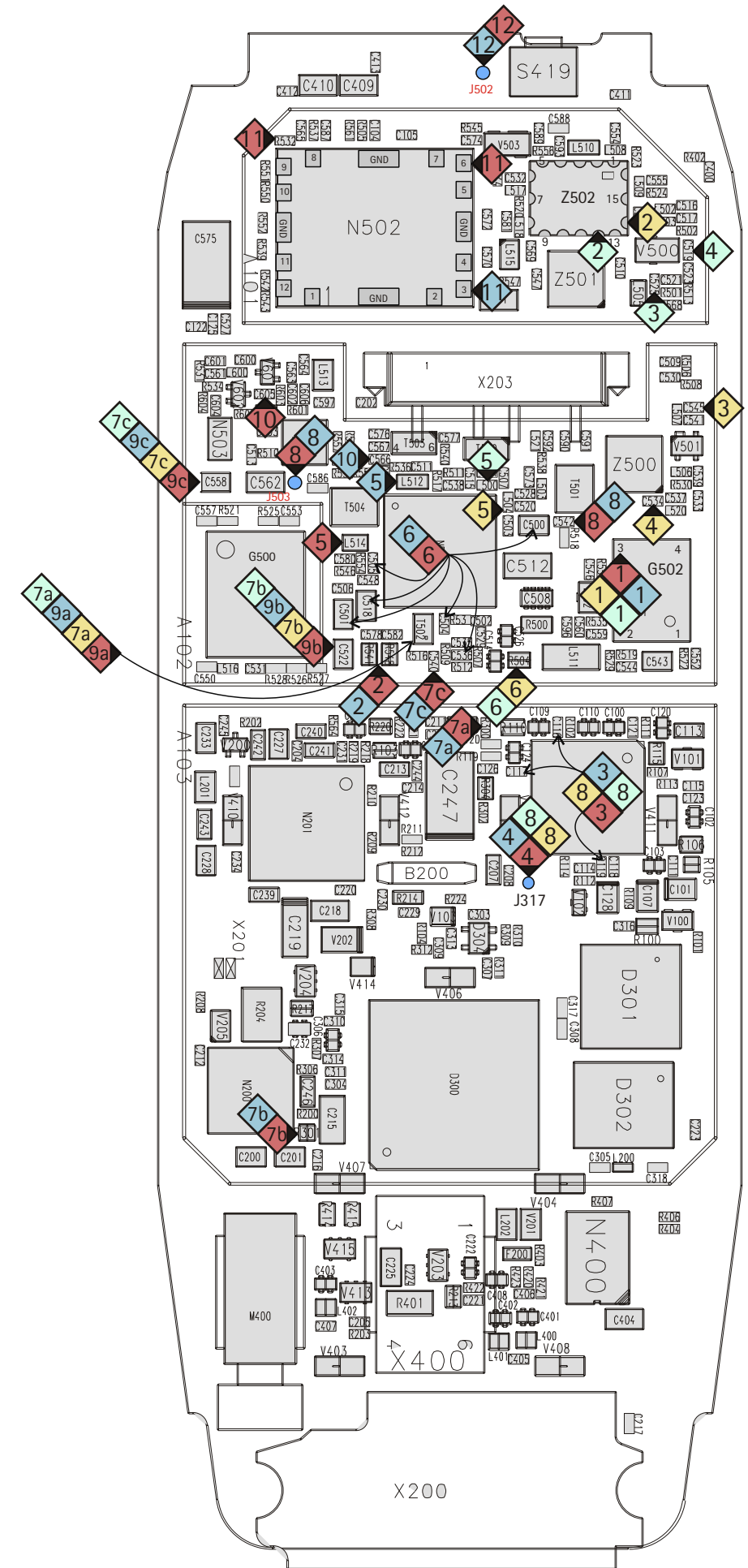
No RX GSM 900

1. Check 26MHz reference oscillator at G502 pin 3, (1Vpp, frequency deviation < 100Hz).
2. Check 942,6MHz at Z502 pin 14. If not ok, check C593 or change Z502.
3. Check 942,6MHz at C545. If not ok, check C556 or change Z501. (PCB version UB4 V10)
4. Check 942,6MHz at C534. If not ok, check that voltage at V501 pin 3 is 0.4V DC and voltage at V501 pin 4 is 0.9V DC, change V500 or N500 if necessary.
5. Check 942,6MHz at both sides of L504. If not ok, check C520/528, T501 or change Z500.
6. Check RX_I/Q signal at R504. If not ok, check signals at HAGAR N500 like supply voltages at C500/501/504/518: 2.8V DC, C536 1.35V DC and C505: 4.8V DC,
   also check Sdata at R300, Sclk/Sena at R301 and HAGARReset at C540.
7. Check frequency of a) SHF oscillator G500 (3770.4MHz/Ch.38,RX-mode).
   If you have no possibility to check frequency, you can check if oscillator works by measuring b) Vcos 2.7V DC at C522 and control voltage at c) C558,
   which varies between 1.2V DC and 3.2V DC.
   If voltage at C558 is 4.8V DC, the oscillator does not work in all probability, or control loop is open.
   If values are ok but no RX signal at R504 measurable, probably HAGAR faulty or broken solderings under it.
8. If signal at R504 is ok but still no RX-calibration possible, check Vbb 2.8V DC at C119, also check VCOBBA 2.8V DC at C116/117 and COBBAClock at J317.
   If values ok, probably COBBA faulty or broken solderings under it.

No TX GSM 1800

1. Check 26MHz reference oscillator at G502 pin 3, (1Vpp, frequency deviation < 100Hz).
2. Check TXIQ signals at R541/548. If OK, go to 5.
3. Check Vbb 2.8V DC at C119 and VCOBBA 2.8V DC at C116/117.
4. Check COBBAClk at J317, probably COBBA N100 faulty or broken solderings under it.
5. Check 1747.8MHz at L512. If OK, go to 10.
6. Check supply voltages for HAGAR at C500/501/504/518: 2.8V DC, C536: 1.35V DC and C505: 4.8V DC.
7. Check Sdata at a) R300, Sclk and Sena at b) R301 and HAGARReset at c) C540.
8. Check TXC at C542 and TXP at J503.
9. Check frequency of a) SHF oscillator G500 (3495.6MHz/Ch.700,TX-mode).
   If you have no possibility to check frequency, you can check if oscillator works by measuring b) Vcos 2.7V DC at C522 and
   c) control voltage at C558, which varies between 1.2V DC and 3.2V DC.
   If voltage at C558 is 4.8V DC, the oscillator does not work in all probability, or control loop is open.
   If values are ok but no TX signal at T503 measurable, probably HAGAR faulty or broken solderings under it.
10. Check 1747.8MHz at C566. If not ok, check/change T503.
11. Check 1747.8MHz at N502 pin 3. If not ok, check Vbatt at pin 4 and 5 of N502, also check Vapc 1.2Vpp – 2Vpp squarewave,
    depending on TX powerlevel at R534, change poweramplifier if necessary.
12. Check 1747.8MHz at J502 (Antenna pad). If not ok, check L515 in & out, also check signal at Z502 in & out and TXVDCS 2.7Vpp squarewave at L508.

No RX GSM 1800

1. Check 26MHz reference oscillator at G502 pin 3, 1Vpp, frequency deviation < 100Hz.
2. Check 1842.8MHz at Z502 pin 12. If not ok, check C593 or change Z502.
3. Check 1842.8MHz at C525. If not ok, check C510/547 or change Z501.
4. Check 1842.8MHz at C519. If not ok ,check voltages at V500: pin 3 0.4V DC, pin 4 0.9V DC.
   pin 5/6 0.7V DC, pin 8 0.13V DC, change V500 or N500 if necessary.
5. Check 1842.8MHz at both sides of L500. If not ok, check C507/515, T500 or change Z500.
6. Check RX_I/Q signal at R504. If not ok, check signals at HAGAR like supply voltages at C500/501/504/518 2.8V DC, C536 1.35V DC and C505 4.8V DC,
   also check Sdata at R300, Sclk/Sena at R301 and HAGARReset at C540.
7. Check frequency of a) SHF oscillator G500 3685.6MHz/Ch.700,RX-mode).
   If you have no possibility to check frequency, you can check if oscillator works by measuring b) Vcos 2.7V DC at C522
   and c) control voltage at C558, which varies between 1.2V DC and 3.2V DC.
   If voltage at C558 is 4.8V DC, the oscillator does not work in all probability, or control loop is open.
   If values are ok but no RX signal at R504 measurable, probably HAGAR faulty or broken solderings under it.
8. If signal at R504 is ok but still no RX-calibration possible, check Vbb 2.8V DC at C119, also check VCOBBA 2.8V DC at C116/117 and COBBAClock at J317.
   If values ok, probably COBBA faulty or broken solderings under it.

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Phone doesn´t switch on

Check current consumption : off state 0.1- 0.6mA, sleep mode 0.6 – 4mA, If too high, continue with section "low standby / operation mode time".

1. Check Vb 3.6V DC at C227/228. If not ok, check X203 if bent or soiled, also check L513 and L201.
2. Check sleepclock 32.768kHz at C220, 3Vpp squarewave. If not ok, check parts around B200 like R211/212/214, C229/230, change B200 or N201 if necessary.
3. Check if PWRONX at R402 drops to 0V during pressing the powerswitch. If not ok, check S419, R402/224, change N201 if necessary.
4. Check Vbb 2.8V DC at C209/211. If not ok, check resistance of line to ground or change N201.
5. Check Vxo 2.8V DC at C243. If not ok, check resistance of line to ground or change N201.
6. Check Vcore 1.7V DC at L200. If not ok, check resistance of L200 and line to ground, change N201.
7. Check SLEEPX 2.8V DC at J308. If not ok, swap the phone, because MAD should be the reason.
8. Check PURX 2.8V DC at R308. If not ok, change CCONT N201.
9. Check 13MHz Clk-frequency at C303, 500mVpp sinewave. If not ok, check values at G502, N500 and V502.
   Try to flash the phone, if not ok, continue with section "Flash update not possible"

Flash update not possible

Check if fault code from prommer is one of the following:
MCU boot failure, serial clock/data line failure: Go to 3.
Algorithm code fail, alias ID missing: Go to 2
External RAM failure:

1. Change SRAM D302. If fault persists, change D301 and try to update again, probably PCB faulty
2. Update FPS4 box with latest flash device list, try to update again.
   If fault remains, change Flash D301, try to update again. probably PCB faulty.
3. Connect "Watchdog disable" R224 to Ground if phone does not stay on.
4. Check Vbb 2.8V DC at C209/211, Vxo 2.8V DC at C243 and Vcore 1.7V DC at L200.
   If not ok, continue with section "Phone doesn't switch on".
5. Check SLEEPX 2.8V at J308. If not ok, MAD faulty in all probability
   Swap the phone because MAD is not changeable.
6. Check PURX 2.8V at R308. If not ok, change CCONT N201
7. Check 13MHz Clk-frequency at C303, 500mVpp sinewave. If not ok, check values around G502, N500 and V502.
8. Check resistance of Mbus/Fbus lines (X201 pad 1, 2 and 4) to GND, also check R217, R302/304, R307, C232 and V204.
   If update still not possible: Swap, MAD or PCB should be the reason.

Low standby / operation mode time

A. Check power consumption of phone: off state 0.1mA - 0.6mA. If OK, goto B
1. lift L513, check current consumption, if OK, goto 3.
2. N502 faulty in all probability. Also possible that C563/564 or C570/571/572 are faulty if current is too high after changing N502
3. Resolder L513, lift L201, check current consumption. If fault remains, check capacitors. C233, C527, C575 and C597. If current is ok after lifting L201,
4. Check capacitors in Vb-line (eg. C200/201, C226-228...), change N200/201 or N400 if necessary.
B. Check current in sleep mode: 0.6 - 4mA. If OK, goto C.
5. Check resistance of output voltage lines of N201 CCONT to Ground.
   Change components in corresponding lines if resistance is not ok.
   If resistance of lines is ok but sleep mode current is still too high change CCONT N201.
C. Check charging circuit, run energy management calibration.
   If calibration is not ok, continue with section "Not charging"
   Calibrate RX / TX values of the phone. If calibration is not ok continue with section "RX / TX faults"
   Note that the standby time depends also on the network side and on the users handling of the phone, eg lights on/off, memory activities, games...

Contact Service

MCU ROM Checksum failed:
Try to flash the phone. If not ok after flashing, probably D301 faulty. Change D301 with µBGA soldering machine and update phone once more.
Note that you have to write back phone data and retune phone values after changing D301.

CCONT Interface failed:
Probably faulty CCONT N201 or broken solderings under it, replace CCONT with µBGA soldering machine, run energy management calibration.
If not ok after reworking the CCONT, MAD or PCB faulty in all probability.

COBBA parallel/serial failed:
1. Check Vbb 2.8V DC at C119 and VCOBBA 2.8V DC at C116/117, also check COBBAClock at J317
   Probably COBBA N100 faulty or broken solderings under it, change COBBA. If fault remains, probably MAD or Pcb faulty.

DSP Alive Test failed
In most of all DSP alive selftest failures MAD is faulty, which is 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,
change D301, write back phone data and retune phone values after changing D301!

Internal audio faults

A: No audio from speaker
Check resistance of speaker (30Ohm), change speaker if bent or soiled
1. Check connection between speakerpads on PCB and C124. If not ok, check R119/120.
   Check resistance of speakerlines to ground, resistance of both lines should be > 0.5M
   If fault persists, change COBBA N100. Note that it is necessary to realign RX / TX values and rewrite SIMlockdata after changing COBBA.
B: Microphone doesn't work
Check mechanical condition of bottom-connector, change if necessary and check function
2. Check MicBias at V413 pin 5: 2.4V DC on active microphone. If not ok, check values around V101, check Mic-lines for shorts to ground or change COBBA N100.
3. Check connection between C120 and Micro-pads on PCB. If not ok, check solderings and resistance of L402.
   If fault remains, change COBBA N100. Note that it is necessary to align RX / TX values and rewrite SIMlockdata after changing COBBA!
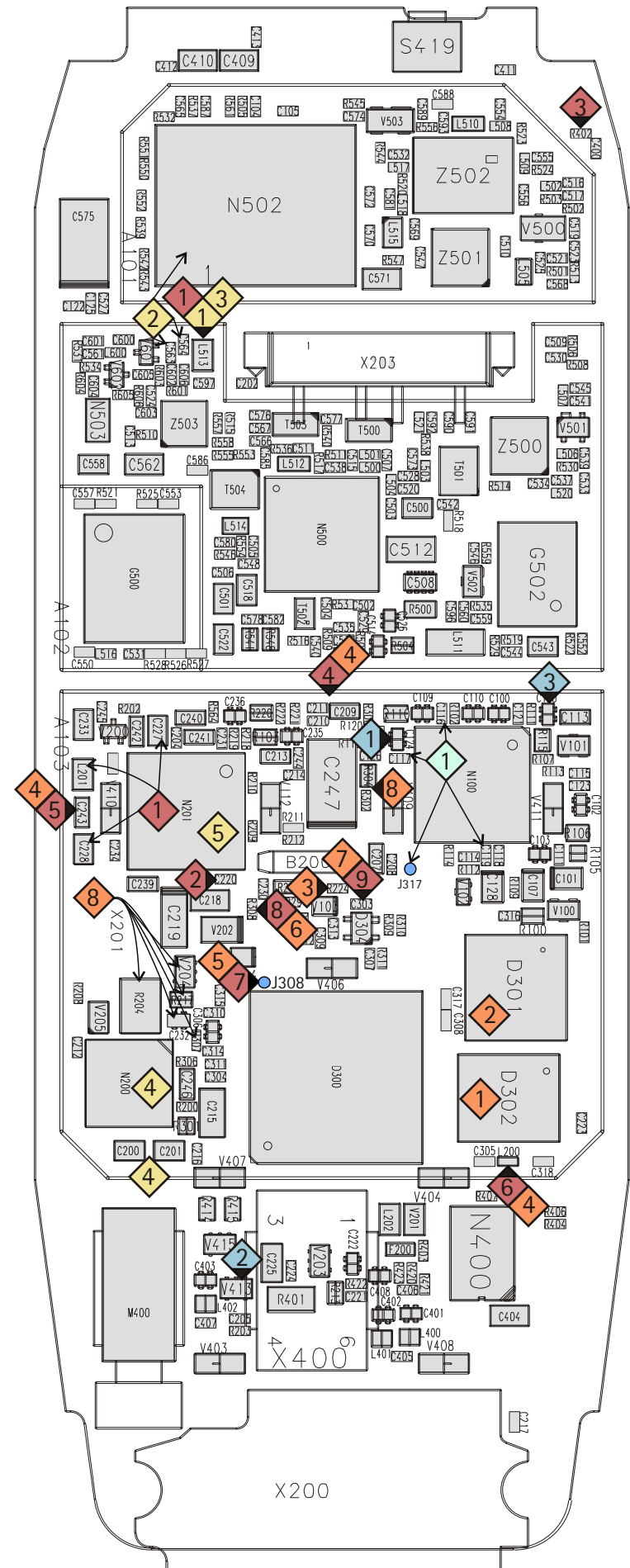
Clock time problems
Clock time has to be corrected in short periods.

1. Check amplitude and frequency of sleepclock oscillator at C220, should be 3Vpp squarewave at 32.768kHz.
   If amplitude or frequency is not ok, change crystal B200. If fault persists,check parts around B200 like R211/212/214 and C229/230 or change CCONT N201.

Phone intermittend switches off
In case of PhoneSW <4.06 make software update and check if fault persists

2. Check if HW-ID is one of the following: 0600,0601,0602,0603,0604,0607,0608,0612 or 0614. In this case change R559 to 1k and C303, C559, C560 to 47pF.
   since HW-ID 0615 the changes were implemented in production. If fault persists after SW- and/or HW-update, continue with the following steps:
3. Check mechanical appearance of connector X203, change if necessary.
4. Check that pads of X203 on PCB are clean.
5. Check that amplitude of sleepclock-oscillator at C220 is 3Vpp squarewave at 32.768kHz
   Probably broken solderings under CCONT N201. Remove CCONT and replace it with µBGA soldering machine, run energy management calibration.
   The same problem may cause N500, because the reference oscillator G502 is divided to 13 MHz system clock by HAGAR N500.

Not charging
Nothing happens if charger is connected.
Check mechanical appearance of bottom-connector.

1. Check resistance of F200 and L202.
2. Check resistance of Vcharge-line to ground, value should be around 50kOhm.
   If not ok check/change V201, C215-217, N200.

"Not charging" appears on LCD
Run energy management calibration. If it works without failuremessages, try to charge after calibration.

Battery temperature failed:
3. Check X203, R220/222, if not OK, change CCONT N201.

Battery size failed:
4. Check X203, R220/222 or change CCONT N201.

Battery voltage failed:
5. Change CCONT N201.

Charge current failed.
6. Check/change R204, N200, N201.

Charge voltage failed:
7. Check Vcharge at voltage-divider R209/210. If ok, change CCONT N201.
8. If not ok, check parts like X200, V201, F200, L202 or change N200.

SIM Card faults
"Insert SIM card"

1. Check SIMreader if bent or soiled, change if necessary.
2. Make sure that pads for SIMreader on PCB are clean.
3. Check signals at SIMreader, pad 1 SIMclock, pad 2 SIMReset, pad 3/5 VSIM, pad 6 SIMData, check also R213.
4. Check resistance of SIMlines to ground, change V203, C221-225 if necesasary.
5 If fault persists, change CCONT N201 with µBGA soldering machine, run energy management calibration.
   probably MAD or PCB faulty.

SIM card not accepted
Use Wintesla to open quick/RF info window, compare shown SIMlockdata with the listed entries of the respective productcode.
If shown SIMlockdata is the same as in the list SIMlock is ok!
Probably Msin datafield is closed to special Imsi number range and can be opened only by operator! (refer to general SB 65)
If shown SIMlockdata is not the same as in the list or somehow corrupted, rewrite SIMlockdata with Nokia security password.
If SIMlock is corrected or inactive but fault remains COBBA N100 faulty. Change COBBA, align RX / TX values and rewrite SIMlockdata once more.

Display failure
Check mechanical appearance of display assy, change if necessary.
If LCD does not work after changing display assy, check Vbb 2.8V DC at C409/413.

1. Voltage at C410/412 is normally 8V DC, check capacitors for shorts if voltage is not ok.
2. Check that voltage at J314 is 2.8V DC (LCDReset) if line is short circuited to ground LCD does not work. Check also that voltage at both sides of R306 is 2.8V DC.
   If above mentioned values are ok but LCD does not work probably, MAD or PCB faulty.

Keypad malfunktion
Check that contacts for keys on display assy are clean, make sure that PCB is not dirty.
Check resistance of ROW and COL lines between the keys, probably MAD faulty.

Backlight failure
Check Vb 3.6V DC at anode of keypad/display-LED´s .
Check Vbb 2.8V DC pin 2 and Vb 3.6V DC pin 1 of N400.

3. Check resistance of R403 and R404.
4. Check signal KBlights 2.8V DC at pin 7/15 of N400. If signal is ok but illumination does not work, change N400
5. If no voltage is measurable there may be a disconnection between D300 and N400 or MAD is faulty.

Buzzer failure
Check mechanical condition / contact springs of buzzer.
Check Vb 3.6V DC at E401.

1. Check PWM- signal at E400 and pin 6 of N400.
2. Check Vb 3.6V DC at pin 1 and Vbb 2.8V DC at pin 2 of N400.
3. Check buzzer_cnt signal at pin 3 of N400. If signal is ok but buzzer does not work change N400,
-. if signal is not ok, there may be a disconnection between D300 and N400, or MAD is fault.

Vibra failure
Check contact springs of vibramotor, make sure that pads for vibramotor on PCB are clean.

4. Check Vb 3.6V DC at vibrapad located to the edge of the PCB, at the other pad and pin 16 of N400 you can check vibrasignal
   with a scope (waveform depends of chosen ringing-tone!),
   also check R401.
5. Check Vb 3.6V DC at pin 1 and Vbb 2.8V DC at pin 2 of N400.
6. Check vibra_cnt at pin 19 of N400. If signal is ok but vibra does not work change N400, else there is a disconnection between D300 and N400 or MAD is faulty.

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RF Schematic Diagram
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Version 1.0 Approved

Legend:
- -199
- 200-299
- 300-399
- 400-499
- 500-699

UB 4 V09

UB 4 V10

Top labels: RX_GSM (HAGAR in) · VRXrf 2.8V · TX_C · VCO 26MHz · VCO control · RX_Ref 1.2V · Connected to Speakerpads · Connected to Mic-pads

Bottom labels: Vc (SHF) · Vcc (SHF) · Vref_2 1.3V · PWR_ON/OFF · PURX 2.8V

Right area: Buzzerpads · GND · Charger Voltage + · GND · Xmic P · Xmic N · XEar P · Headset DET · XEar N · MIC − · MIC + · Vibrapads · 1 SIMCLK · 2 SIMRST · 3 Vsim · SIMData 6 · Vsim 5 · GND 4

1) TXC	2) RX I/Q	3) TX I/Q	4) SIMData	5) SIMClock	6) Sdata	7) SCLK

8) SENA	9) COBBACLK	10) HAGARRESET	11) 32 kHz	12) 32 kHz	13) 67.708 kHz at R500	14) Vibra