# Programmes After Market Services
# NHE–8/9 Series Transceivers

# Disassembly & Troubleshooting

issue 2 11/97

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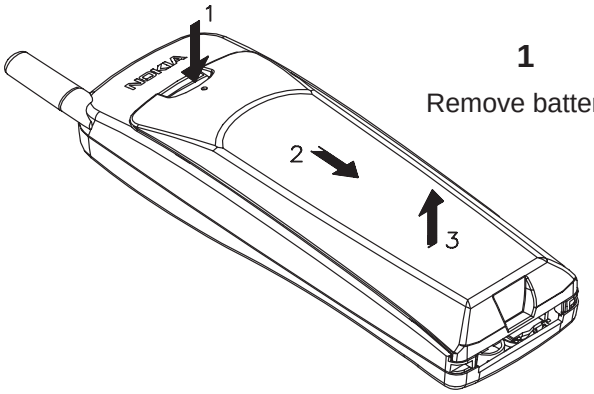
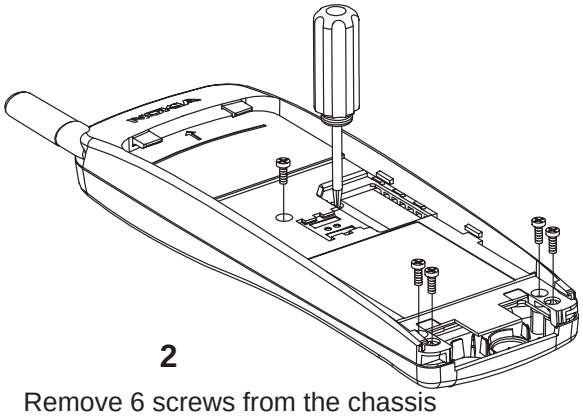
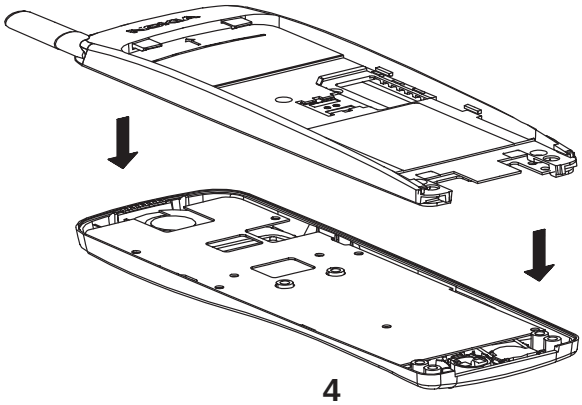
# Disassembly



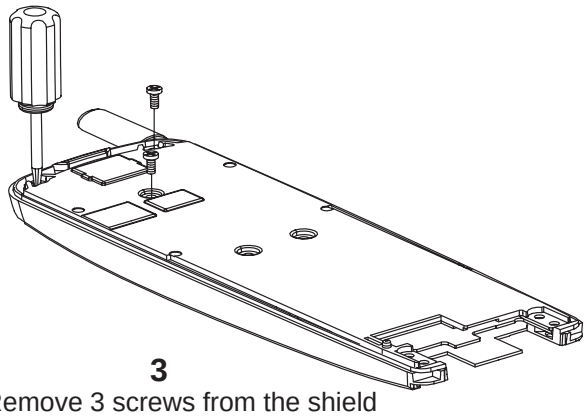

**1**
Remove battery



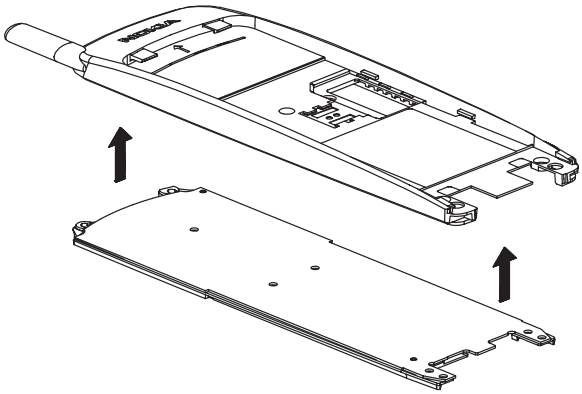
**2**
Remove 6 screws from the chassis



**4**
Remove the A cover



**3**
Remove 3 screws from the shield



**5**
Remove the shield

**6** Re–assemble in reverse order

# Troubleshooting

## General

The purpose is to define the faulty module block, and then to locate the faulty component. The trouble shooting diagram has been planned so that the fault, whatever it is, can be found by as simple measurements as possible.

The flow charts give you the overview of the blocks. The purpose is that you proceed through the flow diagram so that, if your answer is YES for the asked question, go straight to the next level, but if your answer is NO, you have to go the sub–branch.

Required servicing equipment:

- PC for Service Software
- Power supply (2.0 A)
- Digital multimeter
- Oscilloscope
- Spectrum analyzer
- Signal generator
- RF cables
- Modular cable
- RS232/MBUS adapter
- HP8922H or equivalent
- RF measuring chassis

## System Module Troubleshooting

The following hints should facilitate finding the cause of the problem when the circuitry seems to be faulty. This trouble shooting guide is divided into the following sections.

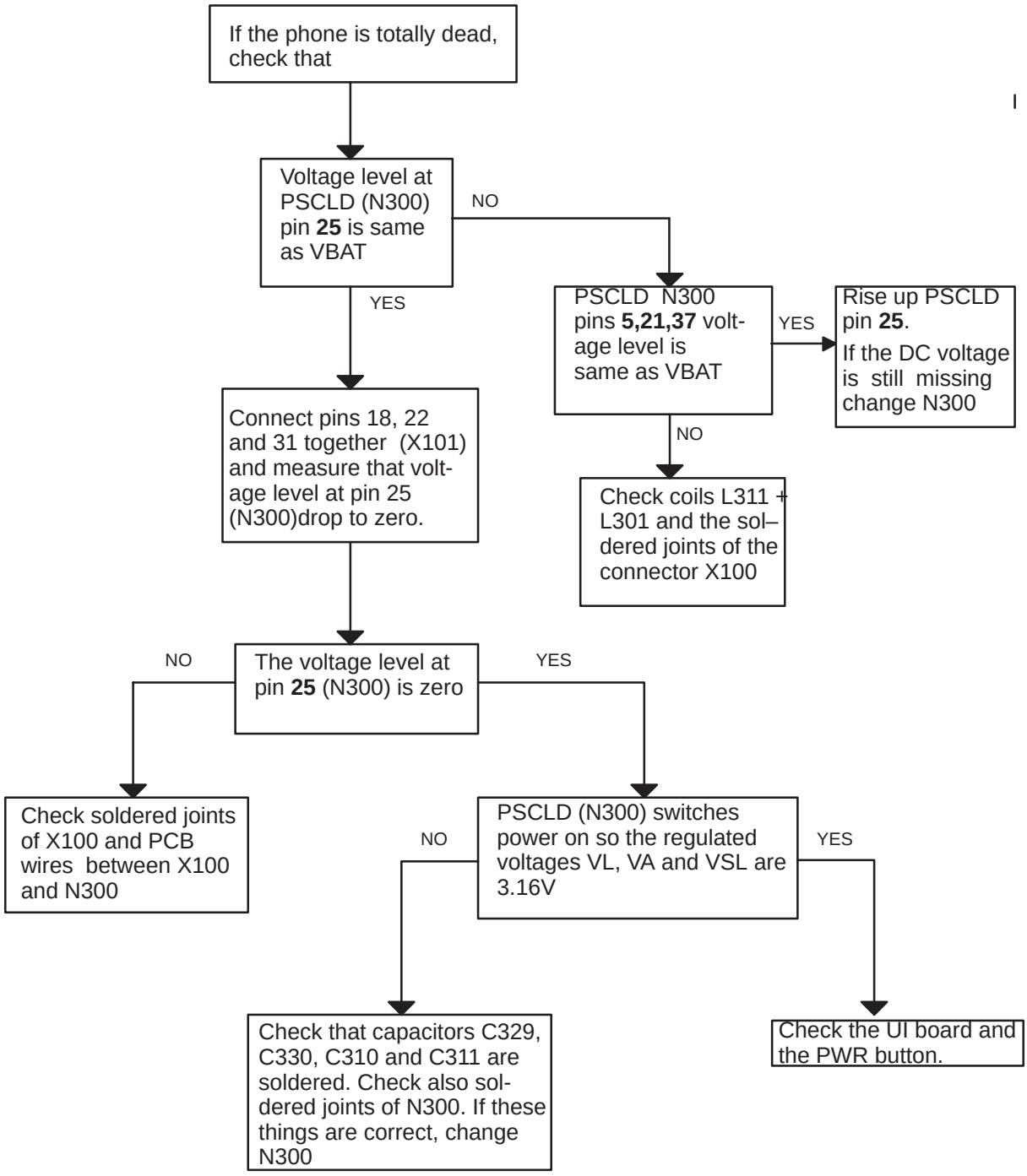
1. Phone is totally dead
2. Flash programming doesn‘t work
3. Power doesn‘t stay on or the phone is jammed
4. Display information: Contact Service
5. Phone doesn‘t register to the network or phone doesn‘t make a call.
6. Plug in SIM card is out of order (insert SIM card or card rejected).
7. Audio fault.

The first thing to do is carry out a thorough visual check of the module. Ensure in particular that:

a) there is not any mechanical damage
b) soldered joints are OK

## Phone is totally dead

Trouble shooting diagram for this fault is represented in figure below
Check at first that the battery back is OK and it is not empty.
This kind of fault has been limited around the system connector (X100) and the PSCLD (N300).



## Flash programming doesn‘t work

In error cases, the flash prommer can give some information about a fault.
The fault information messages could be:

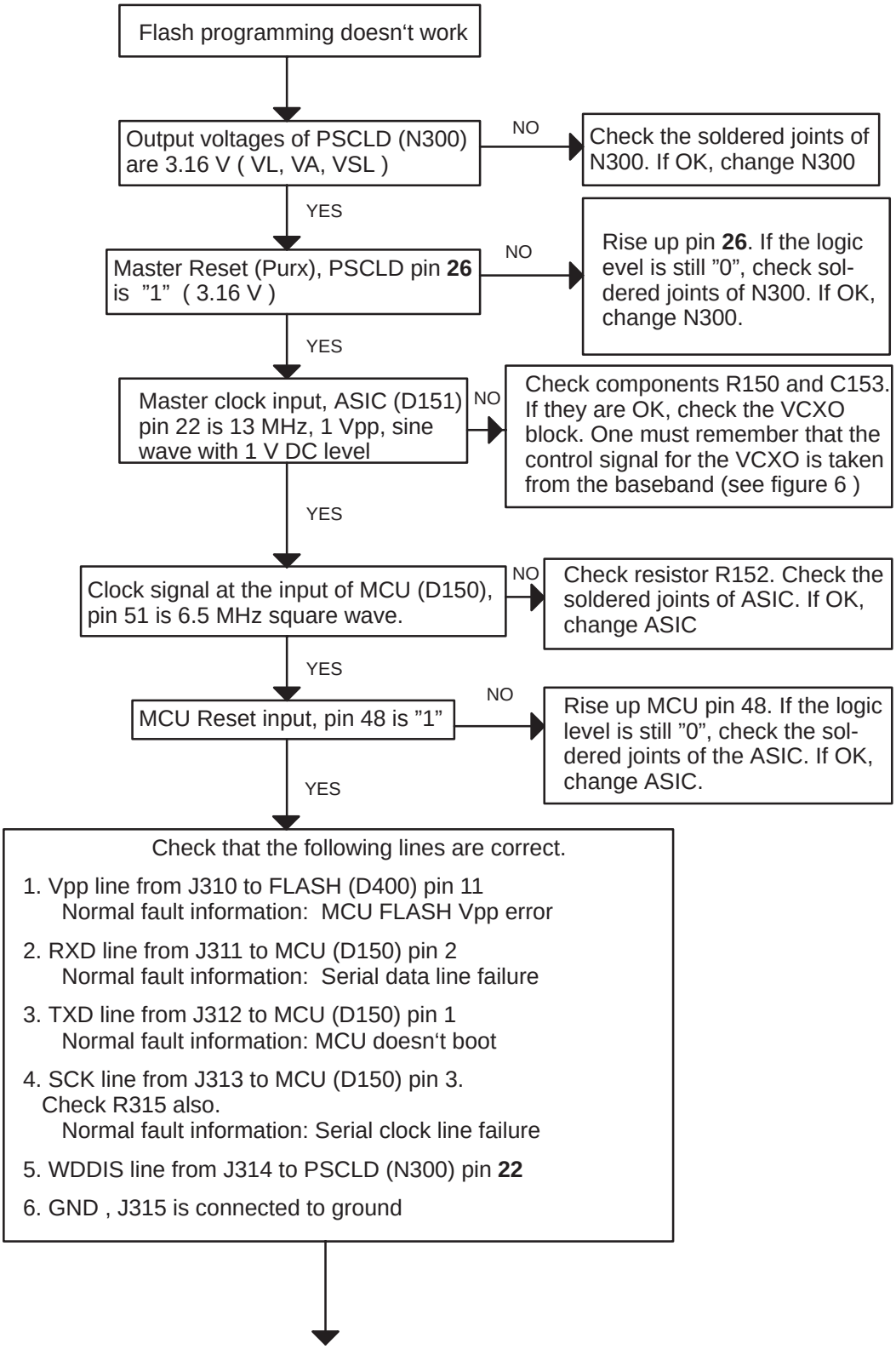
– MCU doesn‘t boot
– MCU flash Vpp error
– Serial data line failure
– Serial clock line failure
– External RAM fault
– Algorithm file or alias ID don‘t find

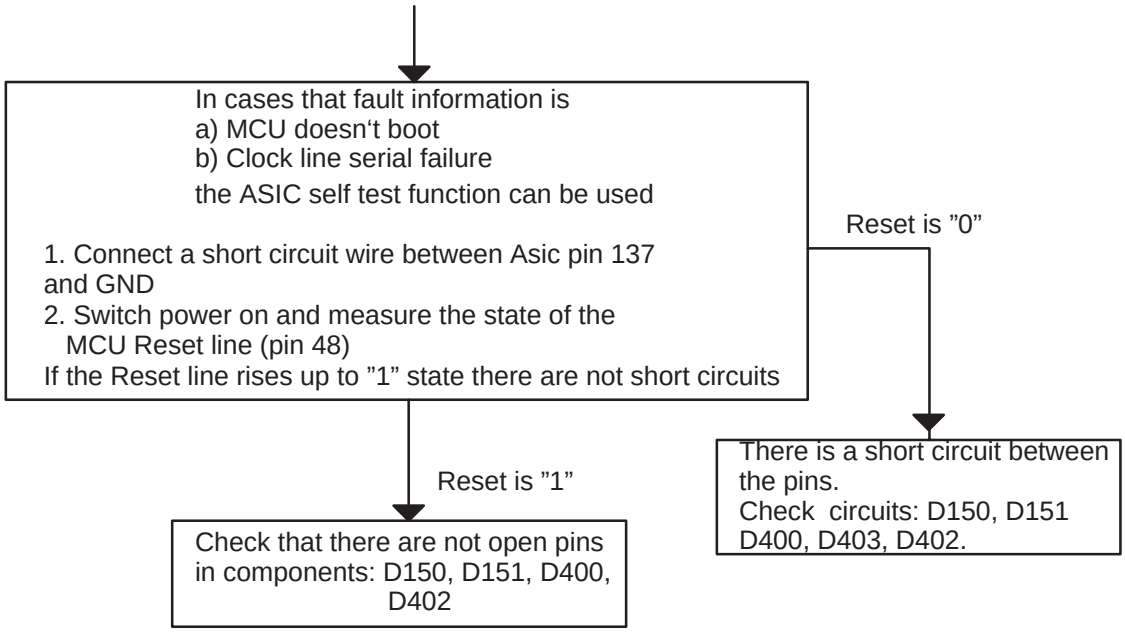
In cases that the the flash programming doesn‘t succeed, there is a possibility to test the interface between the ASIC and the MCU.
This test is useful to do, when the fault information is: MCU doesn‘t boot or Serial clock line failure.

The test procedure is following:

1. Connect a short circuit wire between Asic pins 137 and gnd.
2. Switch power on.
3. If the reset line of the MCU rises up, the interface is OK. Otherwise the reset line stays low.

***Note:*** *this test can only find short circuits, not open pins.*


Flash programming doesn‘t work
Output voltages of PSCLD (N300) are 3.16 V ( VL, VA, VSL )
NO
Check the soldered joints of N300. If OK, change N300
YES
Master Reset (Purx), PSCLD pin 26 is ”1” ( 3.16 V )
NO
Rise up pin 26. If the logic evel is still ”0”, check soldered joints of N300. If OK, change N300.
YES
Master clock input, ASIC (D151) pin 22 is 13 MHz, 1 Vpp, sine wave with 1 V DC level
NO
Check components R150 and C153. If they are OK, check the VCXO block. One must remember that the control signal for the VCXO is taken from the baseband (see figure 6 )
YES
Clock signal at the input of MCU (D150), pin 51 is 6.5 MHz square wave.
NO
Check resistor R152. Check the soldered joints of ASIC. If OK, change ASIC
YES
MCU Reset input, pin 48 is ”1”
NO
Rise up MCU pin 48. If the logic level is still ”0”, check the soldered joints of the ASIC. If OK, change ASIC.
YES
Check that the following lines are correct.
1. Vpp line from J310 to FLASH (D400) pin 11
Normal fault information: MCU FLASH Vpp error
2. RXD line from J311 to MCU (D150) pin 2
Normal fault information: Serial data line failure
3. TXD line from J312 to MCU (D150) pin 1
Normal fault information: MCU doesn‘t boot
4. SCK line from J313 to MCU (D150) pin 3.
Check R315 also.
Normal fault information: Serial clock line failure
5. WDDIS line from J314 to PSCLD (N300) pin 22
6. GND , J315 is connected to ground




In case that fault information is:
External RAM fault
Check the pins of SRAM (D403)

Check also the control lines of SRAM:
WrX, RdX from MCU;
RAMCS from ASIC

In case that fault information is:
Algorithm file or alias ID don‘t find, ID is unkwon etc.
Check pins of the FLASH (D400)

Check also the control lines of FLASH:
WrX, RdX from MCU
CSelX, PwrDown from ASIC

## Power doesn‘t stay on or the phone is jammed

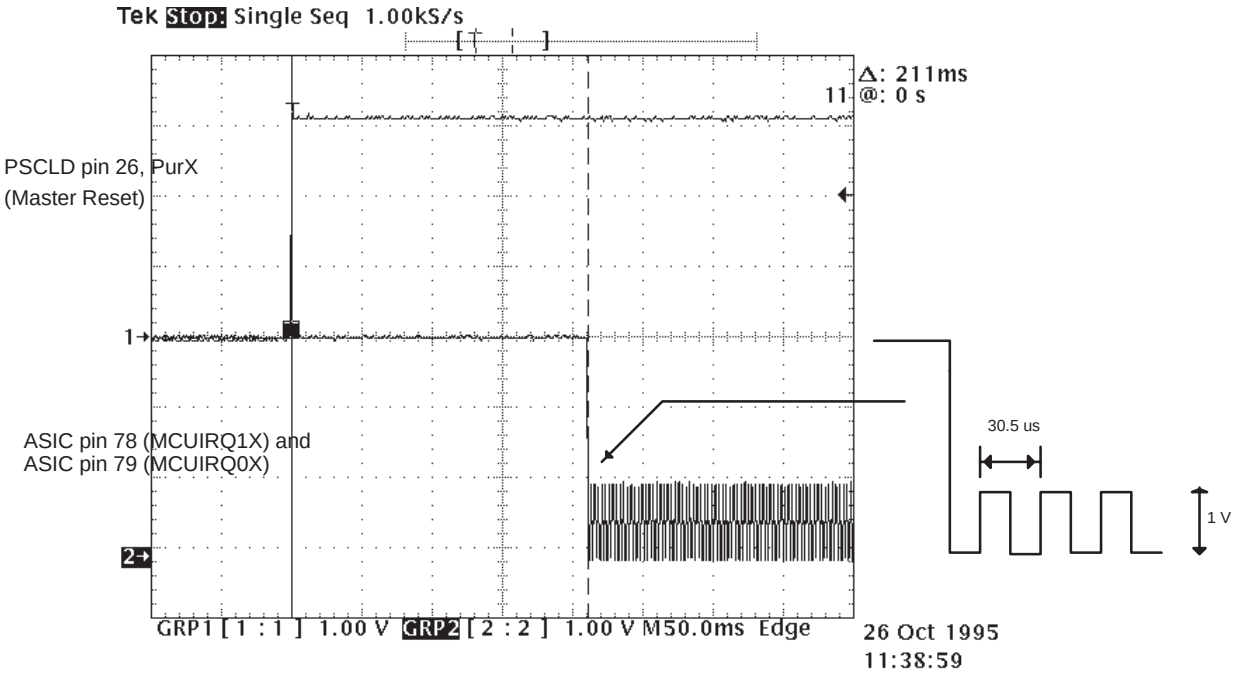
If a fault has come after the flash programming, there are most probably open pins in IC‘s.
The soldered joints of IC‘s : D150 (MCU), D151 (ASIC), N300(PSCLD), D400 (FLASH), D403 (SRAM) is useful to check at first.

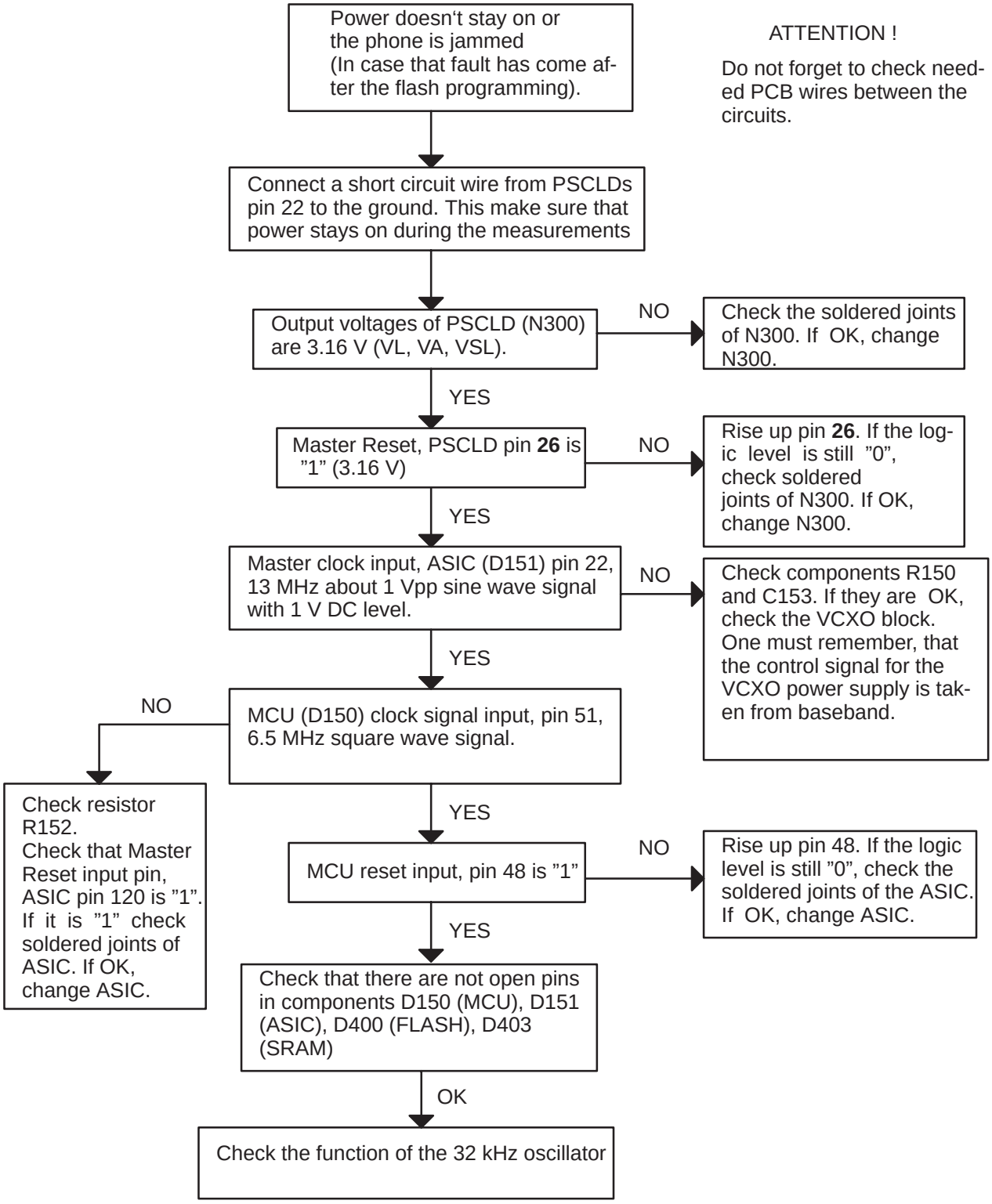
Normally, the power switch off after 30 seconds, if the watchdog of the PSCLD can not be served by software. The power off function can be prevented by connecting a short circuit wire from the PSCLD pin **22** (WDDIS) to the ground.

If the power switches off after 1..2 seconds, the pins of PSCLD and the PSCLD‘s auxiliary components must be checked.

If the phone is jammed, and no other reason has been found, the function of 32 kHz clock oscillator must be checked. This can be done by setting the phone to the ASIC self test mode.

1. Connect a short circuit wire between Asic pin 137 and GND.
2. Make a short circuit between the ASIC pins 78 and 79.
3. Switch power on.
4. Measure the signal by oscilloscope at pins 78, 79 (ASIC).

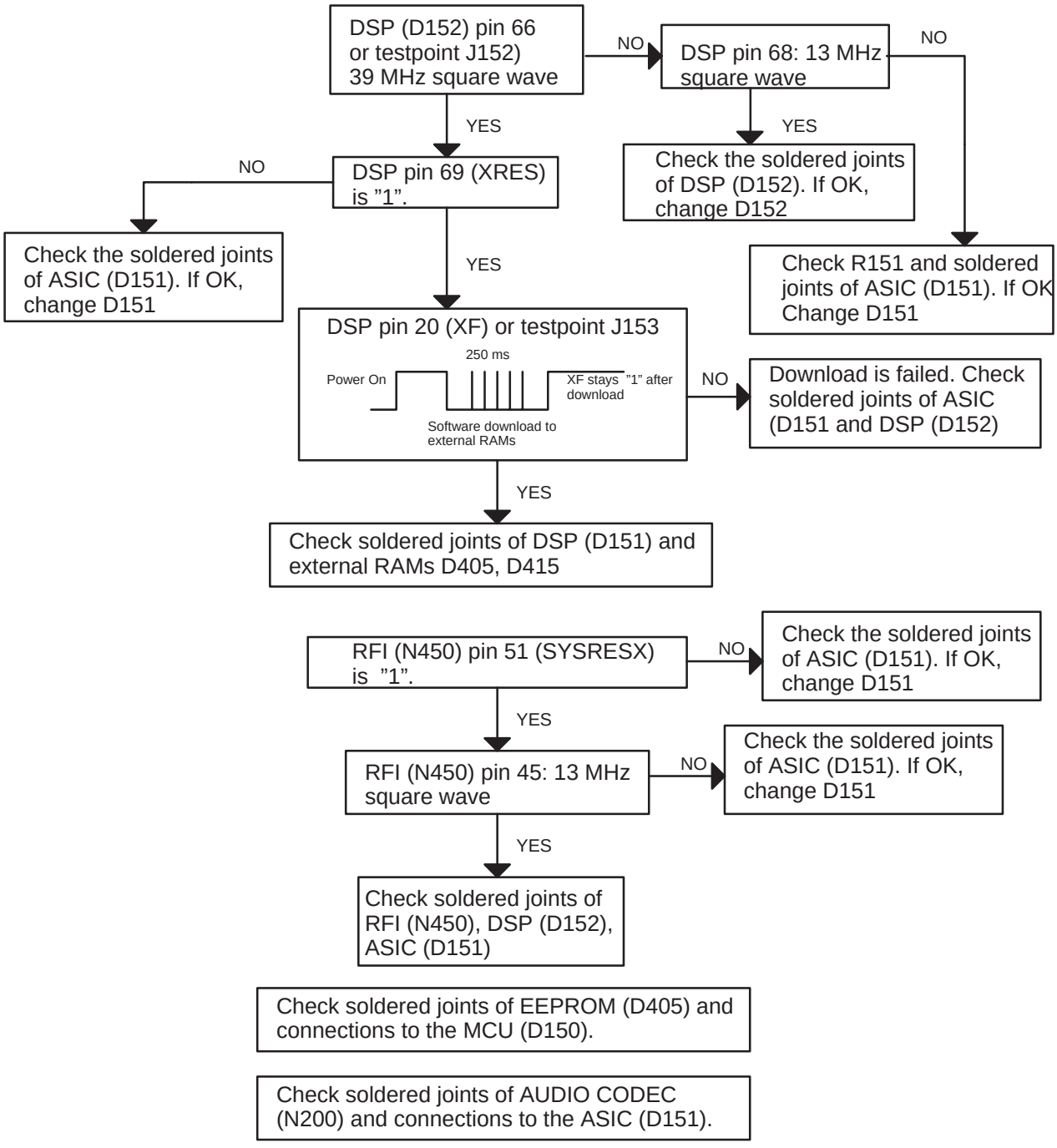



Power doesn‘t stay on or the phone is jammed (In case that fault has come after the flash programming).
ATTENTION !
Do not forget to check needed PCB wires between the circuits.
Connect a short circuit wire from PSCLDs pin 22 to the ground. This make sure that power stays on during the measurements
Output voltages of PSCLD (N300) are 3.16 V (VL, VA, VSL).
NO
Check the soldered joints of N300. If OK, change N300.
YES
Master Reset, PSCLD pin **26** is ”1” (3.16 V)
NO
Rise up pin **26**. If the logic level is still ”0”, check soldered joints of N300. If OK, change N300.
YES
Master clock input, ASIC (D151) pin 22, 13 MHz about 1 Vpp sine wave signal with 1 V DC level.
NO
Check components R150 and C153. If they are OK, check the VCXO block. One must remember, that the control signal for the VCXO power supply is taken from baseband.
YES
NO
MCU (D150) clock signal input, pin 51, 6.5 MHz square wave signal.
Check resistor R152. Check that Master Reset input pin, ASIC pin 120 is ”1”. If it is ”1” check soldered joints of ASIC. If OK, change ASIC.
YES
MCU reset input, pin 48 is ”1”
NO
Rise up pin 48. If the logic level is still ”0”, check the soldered joints of the ASIC. If OK, change ASIC.
YES
Check that there are not open pins in components D150 (MCU), D151 (ASIC), D400 (FLASH), D403 (SRAM)
OK
Check the function of the 32 kHz oscillator

## Display information: Contact service

This fault means that MCU is able to run and the watchdog of the PSCLD (N300) can be served.
Thus PCLOCAL functions can be used and some information about the fault is possible to get.

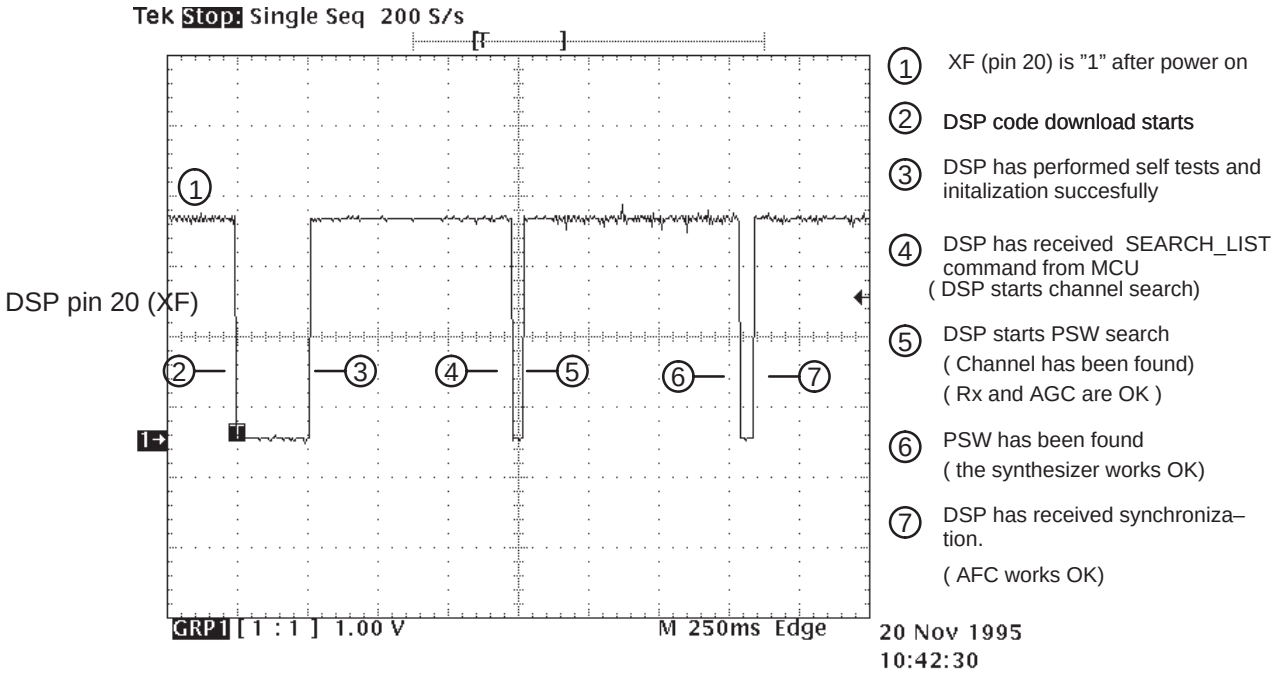
In principle, the fault for contact service information can be found around ASIC (D151), DSP (D152), RFI (N450), EEPROM (D402) or AUDIO CODEC (N200).



## The phone doesn‘t register to the network (no serv) or phone doesn‘t make a call

If the phone doesn‘t register to the network or the phone doesn‘t make a call, the reason for this could be either the baseband or the RF part.
The phone can be set to wanted mode by PCLocals software and try to find reason for fault.
The control lines for RF are supplied both the ASIC (D151) and the RFI (N450).
The ASIC handles digital control lines (between ”0” = 0 V and ”1” = 3.16 V) and the RFI handles analog control lines and proper input and output signals.

The DSP uses its external flag outpin (XF pin 20) as an indicator of its operation state. During power up, DSP signals all completed functions by changing the state of the XF pin.



Phone doesn‘t register to the network or phone doesn‘t make a call

RFI (N450) pins 9,10,11 DC level 4.5 V

NO → Check regulator N451. One must remember, that control signal for RFI regulator N451 pin 1 is taken from ASIC (D151) pin 130 and routed to the RFI regulator via PSCLD (N300) pins 24, 20 ( **pins 17,13** ).

YES

RFI (N450) pin 3 (REFOUT) DC level 2.5 V

NO → Check components C452. If OK, Change RFI (N450)

YES

ASIC pin 33 (RxPwr) is ”1” during the receive slot
ASIC pin 34 (SynthPwr) is ”1” during the receive slot
ASIC pin 35 (SEna1X) is ”0” during the receive slot
ASIC pin 39 (SCLK) is ”1” during the receive slot
ASIC pin 38 (SDATA) is ”1” during the receive slot

→ Check the soldered joints of ASIC (D151) and the connections to the RF part

YES

RFI pin 16 (TXCOUT) is ”1” during the receive slot
RFI pin 24 (PDATA0) is ”1” during the receive slot
RFI pin 24 (PDATA0) is ”1” during the receive slot
RFI pin 54 (RXINN): DC level 1.6 V during the receive slot
RFI pin 55 (RXINP): DC level 1.6 V during the receive slot
RFI pin 64 (AFC) : 1 V < DC level < 3 V

NO → Check the soldered joints of RFI (N450) and the connections to the RF part

YES

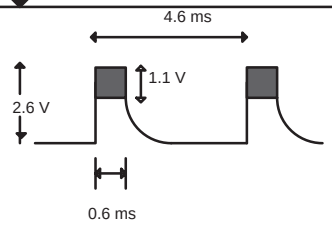
Use PCLocals functions to turn transmitter on

ASIC pin 31 (TXP) is ”1” during the transmit slot
ASIC pin 32 (TXPWR) is ”1” during the transmit slot

NO → Check the soldered joints of ASIC(D151) and the connections to the RF part

YES

RFI pin 1 (TXQN)
RFI pin 2 (TXQP)
RFI pin 12 (TXIN)
RFI pin 13 (TXIP)

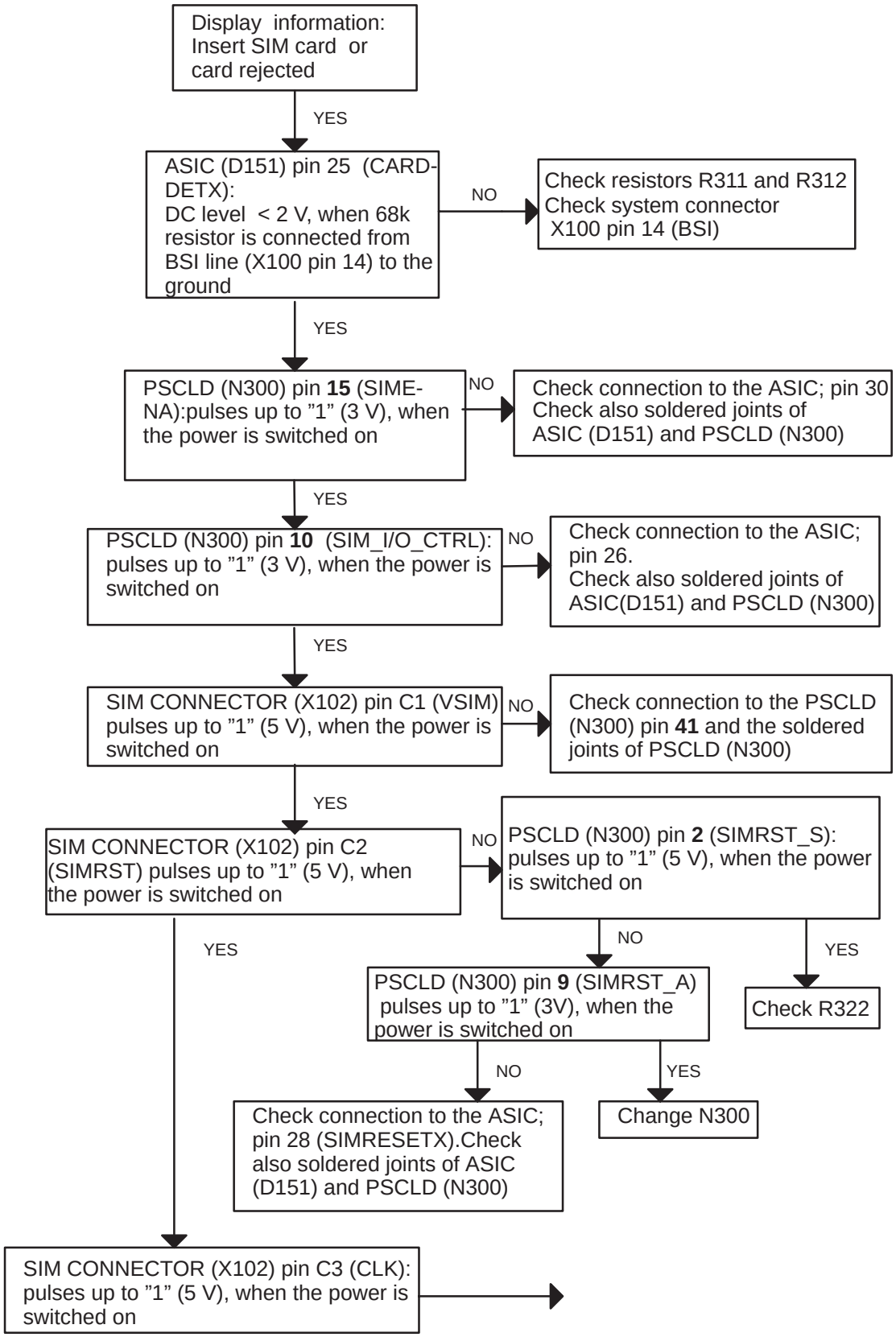


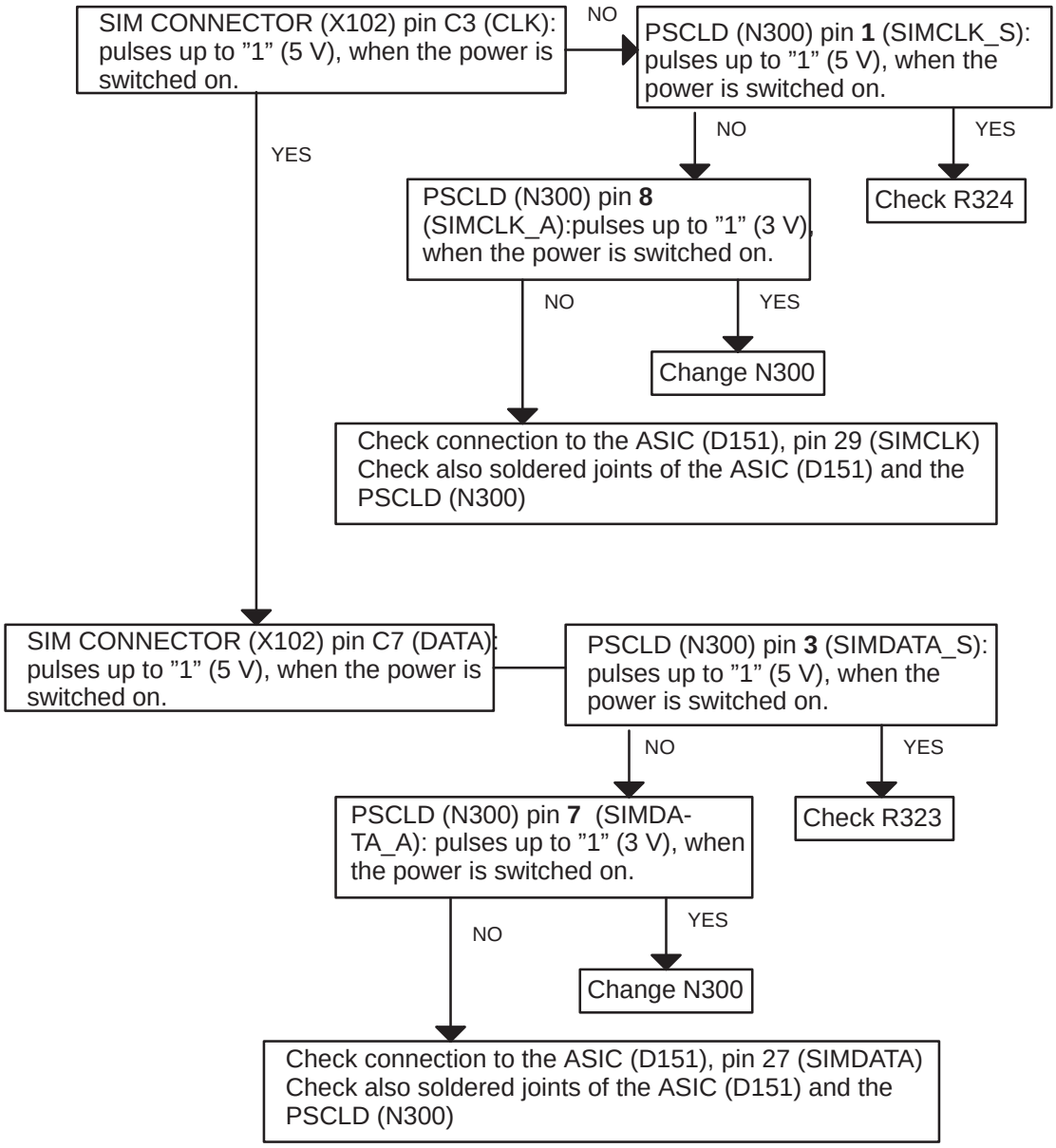

YES → CHECK RF PART

NO → Check the soldered joints of RFI (N450) and the connections to the RF part

## SIM Card is out of order (insert SIM card or card rejected)

The hardware of the SIM interface from the ASIC (D151) to the SIM connector (X102) can be tested without SIM card. When the power is switched on and if the BSI line is grounded by resistor, all the used lines (VSIM, RST, CLK, DATA) rises up to ”1” (5 V) four times. Thus the fault can be found without SIM card most of the cases.


Display information: Insert SIM card or card rejected
YES
ASIC (D151) pin 25 (CARD-DETX): DC level < 2 V, when 68k resistor is connected from BSI line (X100 pin 14) to the ground
NO
Check resistors R311 and R312 Check system connector X100 pin 14 (BSI)
YES
PSCLD (N300) pin **15** (SIME-NA):pulses up to ”1” (3 V), when the power is switched on
NO
Check connection to the ASIC; pin 30 Check also soldered joints of ASIC (D151) and PSCLD (N300)
YES
PSCLD (N300) pin **10** (SIM_I/O_CTRL): pulses up to ”1” (3 V), when the power is switched on
NO
Check connection to the ASIC; pin 26. Check also soldered joints of ASIC(D151) and PSCLD (N300)
YES
SIM CONNECTOR (X102) pin C1 (VSIM) pulses up to ”1” (5 V), when the power is switched on
NO
Check connection to the PSCLD (N300) pin **41** and the soldered joints of PSCLD (N300)
YES
SIM CONNECTOR (X102) pin C2 (SIMRST) pulses up to ”1” (5 V), when the power is switched on
NO
PSCLD (N300) pin **2** (SIMRST_S): pulses up to ”1” (5 V), when the power is switched on
YES
NO
YES
PSCLD (N300) pin **9** (SIMRST_A) pulses up to ”1” (3V), when the power is switched on
Check R322
NO
YES
Check connection to the ASIC; pin 28 (SIMRESETX).Check also soldered joints of ASIC (D151) and PSCLD (N300)
Change N300
SIM CONNECTOR (X102) pin C3 (CLK): pulses up to ”1” (5 V), when the power is switched on

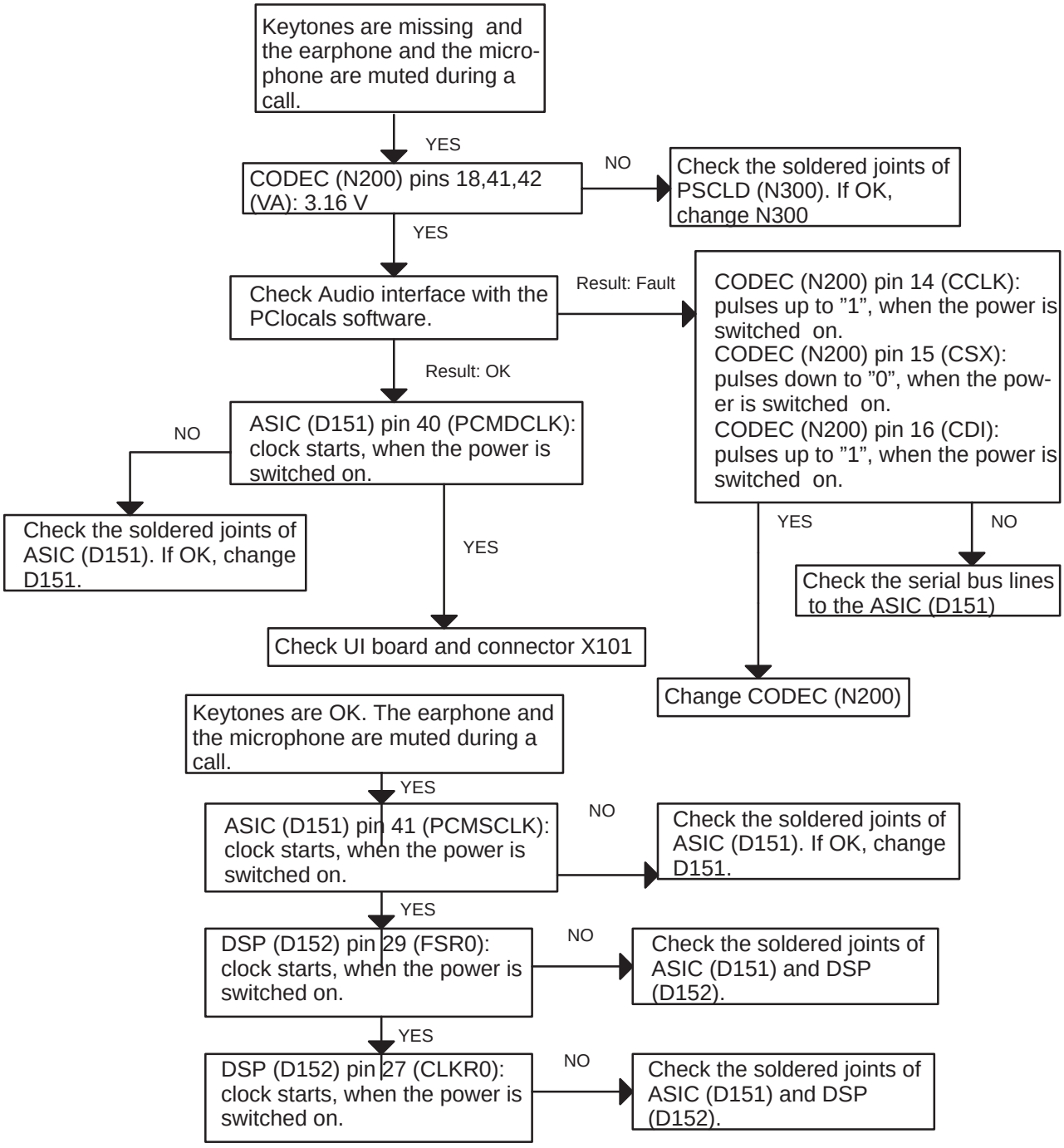

SIM CONNECTOR (X102) pin C3 (CLK): pulses up to ”1” (5 V), when the power is switched on.
NO
PSCLD (N300) pin **1** (SIMCLK_S): pulses up to ”1” (5 V), when the power is switched on.
NO
YES
YES
PSCLD (N300) pin **8** (SIMCLK_A):pulses up to ”1” (3 V), when the power is switched on.
Check R324
NO
YES
Change N300
Check connection to the ASIC (D151), pin 29 (SIMCLK) Check also soldered joints of the ASIC (D151) and the PSCLD (N300)
SIM CONNECTOR (X102) pin C7 (DATA): pulses up to ”1” (5 V), when the power is switched on.
PSCLD (N300) pin **3** (SIMDATA_S): pulses up to ”1” (5 V), when the power is switched on.
NO
YES
PSCLD (N300) pin **7** (SIMDA-TA_A): pulses up to ”1” (3 V), when the power is switched on.
Check R323
NO
YES
Change N300
Check connection to the ASIC (D151), pin 27 (SIMDATA) Check also soldered joints of the ASIC (D151) and the PSCLD (N300)

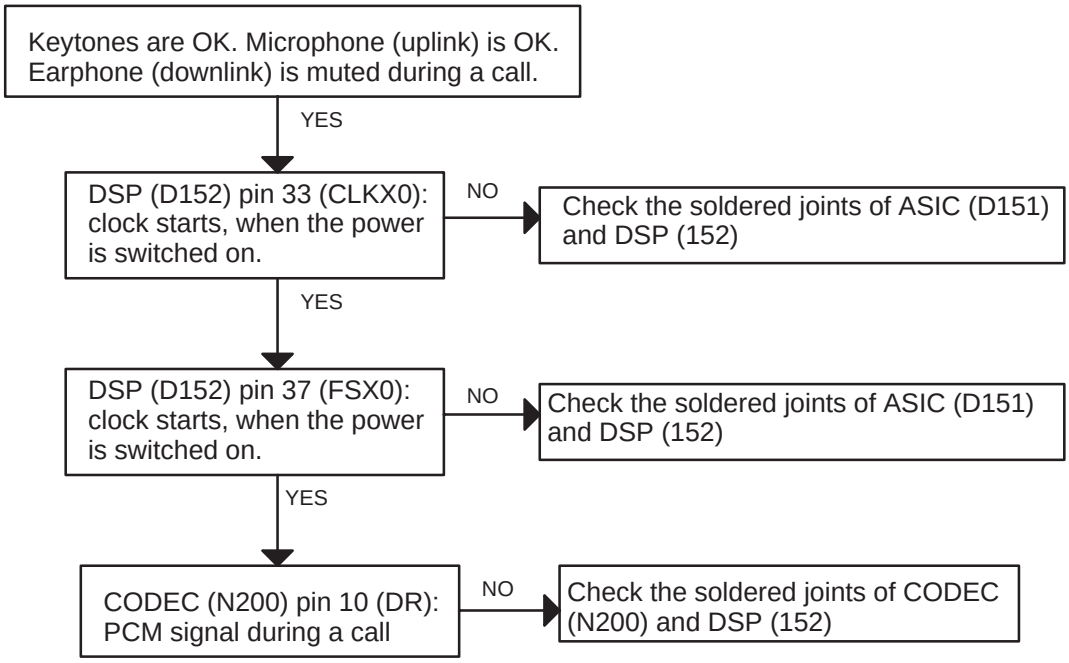
## Audio fault

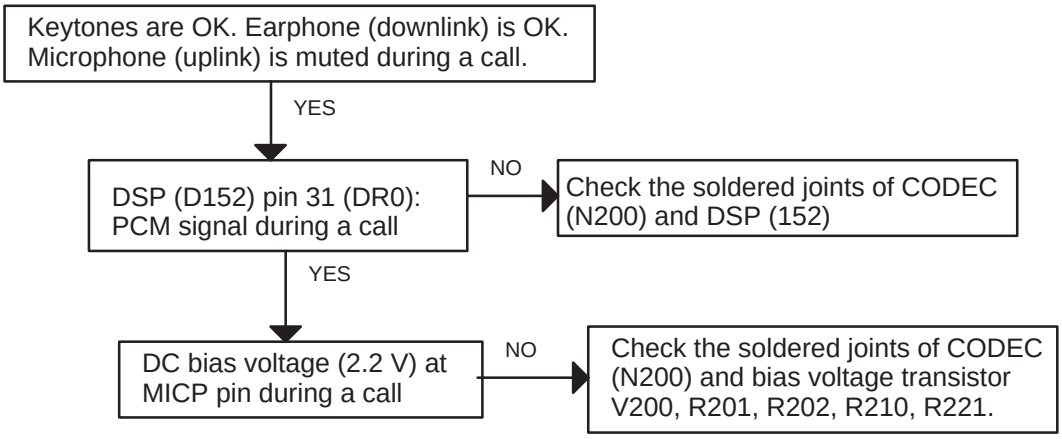
In cases that audio routings are totally muted, a fault could be in serial bus.
This serial bus is used for PSCLD (N300) and for Display driver also, so if the PSCLD and the display are OK, there are open pins in the AUDIO CODEC (N200) or the AUDIO CODEC is faulty.

Serial bus faults can be found with PCLocals software (self test).

Other possibilities are that PCM clock and sync lines are open. CODEC (N200), ASIC (D151) and DSP (D152) must be checked.




Keytones are OK. Microphone (uplink) is OK. Earphone (downlink) is muted during a call.
YES
DSP (D152) pin 33 (CLKX0): clock starts, when the power is switched on.
NO
Check the soldered joints of ASIC (D151) and DSP (152)
YES
DSP (D152) pin 37 (FSX0): clock starts, when the power is switched on.
NO
Check the soldered joints of ASIC (D151) and DSP (152)
YES
CODEC (N200) pin 10 (DR): PCM signal during a call
NO
Check the soldered joints of CODEC (N200) and DSP (152)

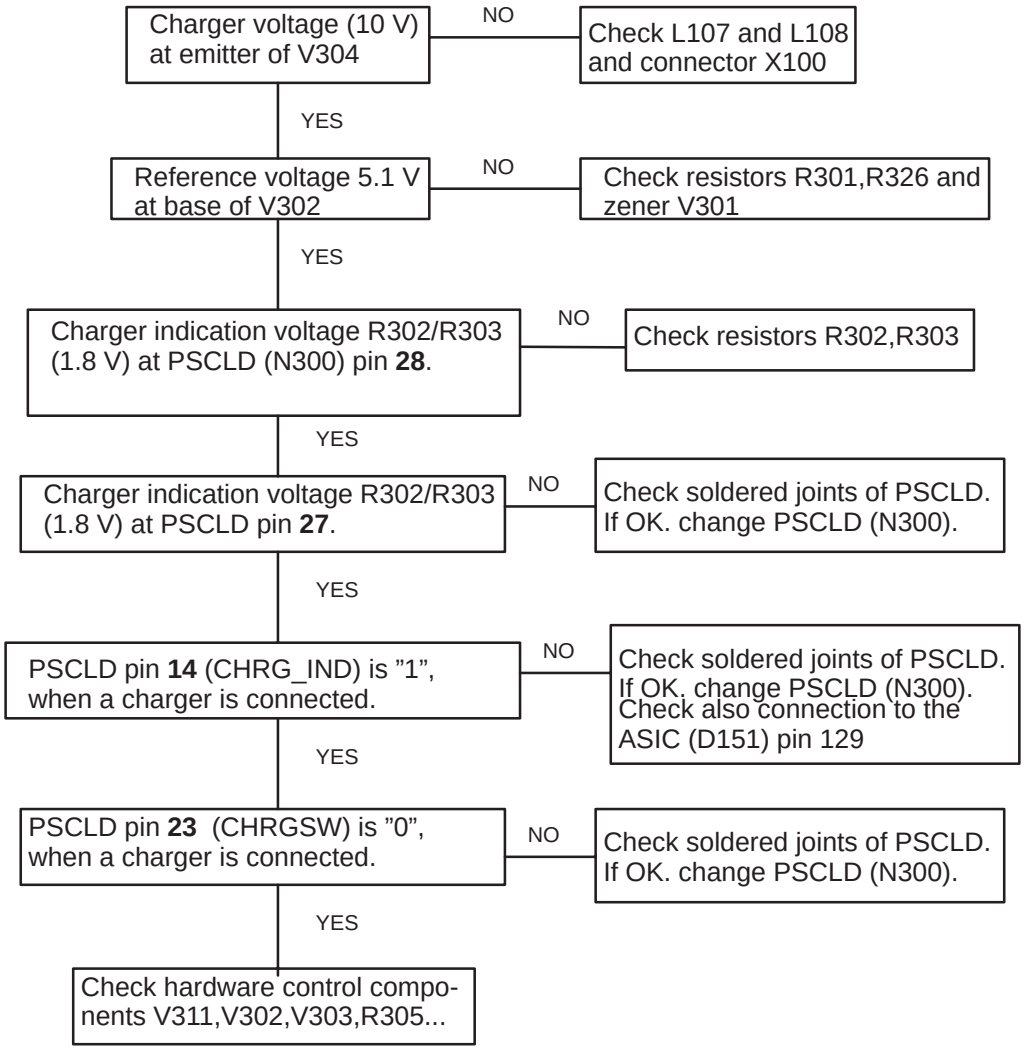

Keytones are OK. Earphone (downlink) is OK. Microphone (uplink) is muted during a call.
YES
DSP (D152) pin 31 (DR0): PCM signal during a call
NO
Check the soldered joints of CODEC (N200) and DSP (152)
YES
DC bias voltage (2.2 V) at MICP pin during a call
NO
Check the soldered joints of CODEC (N200) and bias voltage transistor V200, R201, R202, R210, R221.

## Charging fault

Two different kind of faults can be separated each other:
1. No information at all on the display, when a charger is connected.
2. Display information: Not charging.

1. In case that information on the display is not given, when a charger is connected, means that PSCLD (N300) , pin **14**, can not change the level of the CHRG_IND line ( 0 –> 1) or the input pin of the ASIC (D151) pin 126 is unconnected.

2. If the display information is: Not charging, the charger indication has been done, but the hardware control unit can not control the charging switch transistor V304.



# Troubleshooting and Module Repairing at Service

The tests listed,can be executed on a complete phone either at module level or by way of PC–locals on a complete handset.

## UIF– connector

– if module seems not to work, first check the condition of B–B– connector

## LCD

1. LCD does not work
– check the voltages VL and V5, voltage difference (VL–V5) should be 7 to 9 volts
– check the solderings of the TAB on to the PCB, i.e. H400
– check that correct values of resistors R416 and R419 are mounted
– check the solderings of the periferal components arround the display

2. Missing rows in LCD
– check if there are broken connections in the TAB. If yes, change the module.
– check if there are breaks on LCD glass. If yes, change the module.

## Microphone

1. Mic does not work
– check board–to–board connectors
– check microphone spring connection (eg. spring contact, dirt on springs).
– change microphone if needed

## Earpiece

1. Earpiece does not work
– Send tone to earpiece
– if no tone appears, check the spring contacts of earpiece (eg. spring contact to pads, dirt on springs)
– change Earpiece if needed

## Buzzer

1. Buzzer does not work
– check the voltage VBatt
– send tone to buzzer, connect PWM signal to BUZZER line
– if no sound appears, check the spring connection to the buzzer
– measure, that transistor V403 operates
– change buzzer or transistors if needed

## Keyboard and display LEDs

1. Keyboard LEDs do not work
   – check the voltage VBatt
   – connect ’KEYLIGHT’ line to logical HIGH and measure, that control transistors V404 and V405 operate
   – check the solder pads of LEDs
   – change LED or transistor if needed

2. Display LEDs do not work
   – check the voltage VBatt
   – connect ’LCDLIGHT’ line to logical HIGH and measure, that control transistor V402 operate
   – check the solder pads of LEDs
   – change LED or transistor if needed

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