

**Nokia Customer Care**

# ***Service Manual***

**RX-44 (Nokia N810)**  
**Internet Tablet**  
*Part No: (Issue 1)*

***COMPANY CONFIDENTIAL***



**Amendment Record Sheet**

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## IMPORTANT

This document is intended for use by qualified service personnel only.

## Warnings and cautions

### Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

### Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

## ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages **MUST NOT** be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

## Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

## Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

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 MOBILE PHONES Business Group should be notified in writing/e-mail.

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## Battery information

**Note:** A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMH batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

## **Nokia N810 Service Manual Structure**

- 1 General Information
- 2 Service Tools and Service Concepts
- 3 Service Software Instructions
- 4 BB Troubleshooting and Manual Tuning Guide
- 5 RF Troubleshooting and Tuning
- 6 Camera troubleshooting
- 7 System Module
- Glossary

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# Nokia Customer Care

## 1 — General Information



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## ■ RX-44 product selection

The Internet Tablet offers an easy broadband access to the Internet over WLAN on a portable-size tablet.

The Internet Tablet provides users new possibilities for Internet communications. In addition to web browsing and emailing, you can do Internet calling and Instant messaging

The product has an outstanding widescreen display that is optimal for viewing online content.

Content creation can be done by Integrated HW qwerty keyboard or by touch screen.

There are two ways of creating the Internet connection; via WLAN or via Bluetooth using a mobile phone as a modem.



Figure 1 View of RX-44

## ■ RX-44 transceiver features

### Display and keypad features

- Color display, 16 bit (800x480, 65 536 colours), transflective with backlight
- Display brightness is adjusted automatically by ALS sensor
- Graphical user interface with selectable themes
- Keys: Qwerty keyboard, 5 way scroll key (with select), Home, Esc, Full Screen, Zoom In and Out, Power, Keypad lock

### Connectivity

- WLAN 802.11b/e/g
- Bluetooth 2.0
- HS-USB 2.0 OTG

### Hardware characteristics

- Slide, BB5.0

- Microphone and stereo speakers
- Function keys optimized for Internet use
- Integrated webcam
- Standing mode for on-table-use
- 2GB internal memory card
- Media expansion slot compatible with microSD and miniSD
- RGB Led to indicate operation mode

## **User Interface**

- 4.13" wide touch screen with 800x480 resolution
- Integrated HW QWERTY keyboard

## **SW features**

### **Memory**

- COMBO DDR 128MB
- TI OMAP 2420
- Flash 256MB
- 2GB internal memory card

### **Key Applications**

- Mozilla based browser with Flash 9
- Internet calling with webcam
- Instant Messaging
- Email
- Media player
- RSS feed reader

## **Sales package, inbox**

- RX-44 Internet Tablet
- Battery (BP-4L)
- Travel Charger (AC-4)
- Extra stylus input pen
- Data cable (CA-101)
- User guide
- Stereo headset HS-48
- Car holder
- Pouch, cleaning cloth
- Get started guide
- Safety, warranty and other product information booklet

## **Sales package, outbox**

- Mobile charger (DC-4)
- Charger adapter CA-44

- BT headsets (mono)
- Navigation sw
- Memory cards
  - miniSD card
  - microSD card (with adapter)
- Stereo-headphones
- Extra stylus pack
- Stereo headphones
- FM transmitter

## ■ Product and module list

Module name	Type code	Notes
Battery cover assembly		
Electronic assembly	2EH	Main PWB with components
Qwerty cover assembly		
SWPP module		
A-cover assembly		
B-cover assembly		
Decoration cover assembly		
Front Frame assembly		
Qwerty cover assembly		
Slider assembly		
Top key flex assembly	2FD	
Main flex assembly	2FC	
Display module		
Camera module		

## ■ Mobile enhancements

Table 1 Batteries

Battery	Type
Battery 1500mAh Li-Po	BP-4L

Table 2 Chargers

Chargers	Type
Fast travel charger (Euro plug), 100- 240 Vac	AC-4E
Fast travel charger (US plug), 100- 240 Vac	AC-4U
Travel charger (multi-voltage), Brazil/Portugal	AC-12EB

Chargers	Type
Fast travel charger (UK plug), multi-voltage	AC-4X

Table 3 Car accessories

Car accessories	Type
Mobile charger (EA, APAC, Americas)	DC-4

## ■ Technical specifications

### RX-44 device general specifications

Unit	Dimensions (L x W x T)	Weight (g)	Volume (cm3)
Browser	72 x 128 x 14.1	225	128

### Battery endurance

Battery	Capacity (mAh)	Browsing time	Stand-by (Always On Enabled)
BP-4L	1500	4 hours	5 hours

### Environmental conditions

Table 4 Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-10°C...+55°C	Specifications fulfilled
Reduced performance	-20°C...-10°C +55°C...+70°C	Operational for shorts periods only
No operation or storage	<-40°C...>+85°C	No storage or operation: an attempt may damage the phone.
Charging allowed	-25°C...+50°C	
Long term storage conditions	0°C...+85°C	

Table 5 Absolute maximum ratings

Signal	Min	Nom	Max	Unit	Notes
Battery voltage (idle)	-0.3		+5.4	V	Battery voltage maximum value is specified during charging is active



Signal	Min	Nom	Max	Unit	Notes
Battery voltage (active)			+5.4	V	Battery voltage maximum value is specified during charging is active
Charger input voltage	-0.3		+16V	V	

Table 6 DC characteristics

Signal	Min	Nom	Max	Unit	Notes
VBAT	3.2	3.6	4.2	V	3.2V is cut off voltage

## Temperature conditions

The Baseband module complies with the SPR4 Operating Conditions.

- 1) Operational temperature range (all specifications met within this range) -10°C...+55°C
- (2) Functional temperature range (Reduced performance) -25°C... -10°C and +55°C...+70°C
- (3) Storage temperature range: -40°C...+85°C

## Humidity

Relative humidity range is 5...95%. The BB module is not protected against water. Condensed or splashed water might cause malfunction. Any submerge of the phone will cause permanent damage. Long-term high humidity, with condensation, will cause permanent damage because of corrosion.

## ESD immunity

ESD limits are +-8kV for galvanic contact and +-15kV for air discharge.

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## **2 — Service Tools and Service Concepts**

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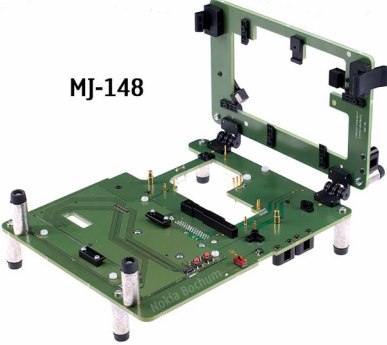

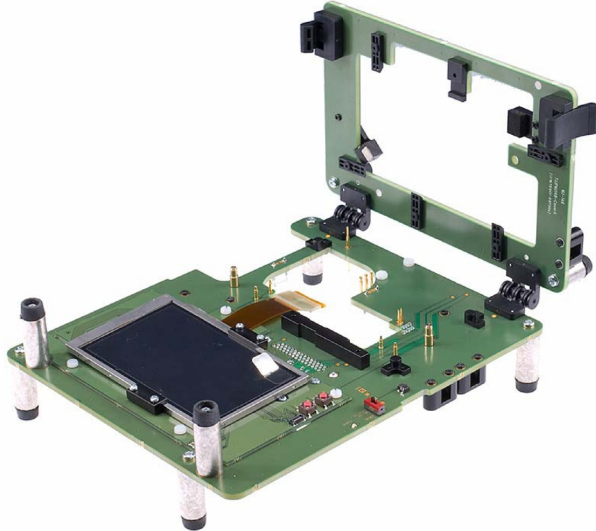
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## ■ Service tools


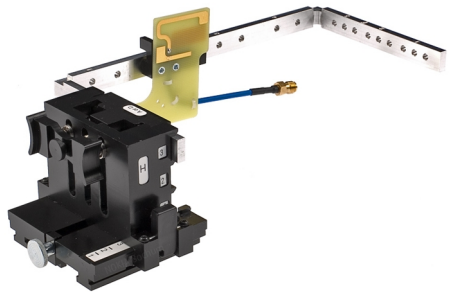

### Product specific tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RX-44, refer to various concepts.

<p>FS-66</p> 	FS-66	Flash adapter	
	<p>FS-66 has the following features:</p> <ul style="list-style-type: none"><li>• Provides galvanic connection to terminal test pads</li><li>• Provides standardized interface towards Control Unit</li><li>• Provides RF connection using galvanic connector or coupler</li></ul>		


MJ-148	MJ-148	Module jig	
 <p>MJ-148</p>	<p>The jig includes an RF interface for WLAN and Bluetooth. In addition, it has the following features:</p> <ul style="list-style-type: none"> <li>• Provides mechanical interface with engine module</li> <li>• Provides galvanic connection to all needed test pads in module</li> <li>• Multiplexing between USB and FBUS media, controlled by Vusb: <ul style="list-style-type: none"> <li>• UI test interface</li> <li>• MMC interface</li> <li>• Audio components: IHF, MIC</li> <li>• Connector for control unit</li> <li>• Access for USB connector</li> </ul> </li> <li>• MJ-148 usage when whole upper block of RX-44 is connected. Engine module and top keymat assembly (to engine module) can be connected separately:</li> </ul>		<ul style="list-style-type: none"> <li>• MJ-148 usage when display of RX-44 is connected. Engine module, camera module (to module jig) and top keymat assembly (to engine module) can be connected separately:</li> </ul> 







 <p><b>RJ-186</b></p>	RJ-186	Rework jig	
	RJ-186 is a soldering jig used for soldering and as a rework jig for the engine module.		
	SA-131	RF coupler	
	SA-131 is a coupler for GPS testing. It is used together with CU-4, SS-62 and FS-66.		
 <p><b>SS-137</b></p>	SS-137	Domesheet alignment jig	
	SS-137 is used for domesheet alignment.		

## General tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RX-44, refer to various concepts.





	AC-33	Power supply	
	Universal power supply for FPS-10; included in the FPS-10 sales package.		



	CU-4	Control unit	
	<p>CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.</p> <p>The unit has the following features:</p> <ul style="list-style-type: none"> <li>• software controlled via USB</li> <li>• EM calibration function</li> <li>• Forwards FBUS/Flashbus traffic to/from terminal</li> <li>• Forwards USB traffic to/from terminal</li> <li>• software controlled BSI values</li> <li>• regulated VBATT voltage</li> <li>• 2 x USB2.0 connector (Hub)</li> <li>• FBUS and USB connections supported</li> </ul> <p>When using CU-4, note the special order of connecting cables and other service equipment:</p> <p><b>Instructions</b></p> <ol style="list-style-type: none"> <li>1 Connect a service tool (jig, flash adapter) to CU-4.</li> <li>2 Connect CU-4 to your PC with a USB cable.</li> <li>3 Connect supply voltage (12 V)</li> <li>4 Connect an FBUS cable (if necessary).</li> <li>5 Start Phoenix service software.</li> </ol> <div data-bbox="667 1153 1337 1915"> </div> <p><b>Note:</b> Phoenix enables CU-4 regulators via USB when it is started.</p> <p>Reconnecting the power supply requires a Phoenix restart.</p>		

	FPS-10	Flash prommer	
	PK-1	Software protection key	
	SB-6	Bluetooth test and interface box (sales package)	


	<p>FPS-10 interfaces with:</p> <ul style="list-style-type: none"> <li>• PC</li> <li>• Control unit</li> <li>• Flash adapter</li> <li>• Smart card</li> </ul> <p>FPS-10 flash prommer features:</p> <ul style="list-style-type: none"> <li>• Flash functionality for BB5 and DCT-4 terminals</li> <li>• Smart Card reader for SX-2 or SX-4</li> <li>• USB traffic forwarding</li> <li>• USB to FBUS/Flashbus conversion</li> <li>• LAN to FBUS/Flashbus and USB conversion</li> <li>• Vusb output switchable by PC command</li> </ul> <p>FPS-10 sales package includes:</p> <ul style="list-style-type: none"> <li>• FPS-10 prommer</li> <li>• Power Supply with 5 country specific cords</li> <li>• USB cable</li> </ul> <p><b>Note:</b> FPS-21 is substitute FPS-10 if FPS-10 has not been set up.</p>		
	<p>PK-1 is a hardware protection key with a USB interface. It has the same functionality as the PKD-1 series dongle.</p> <p>PK-1 is meant for use with a PC that does not have a series interface.</p> <p>To use this USB dongle for security service functions please register the dongle in the same way as the PKD-1 series dongle.</p>		
	<p>The SB-6 test box is a generic service device used to perform Bluetooth bit error rate (BER) testing, and establishing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and an AXS-4 cable in case of cordless interface usage testing .</p> <p>Sales package includes:</p> <ul style="list-style-type: none"> <li>• SB-6 test box</li> <li>• Installation and warranty information</li> </ul>		




	SB-7	WLAN test box	
	WLAN test requires defined position for the device.		
	SRT-6	Opening tool	
	SRT-6 is used to open phone covers.		
	SRT-93	Opening tool	
	SRT-93 is an opening tool for mobile terminal covers.		
	SS-46	Interface adapter	
	SS-46 acts as an interface adapter between the flash adapter and FPS-10.		

	SS-62	Generic flash adapter base for BB5	
	<ul style="list-style-type: none"> <li>• generic base for flash adapters and couplers</li> <li>• SS-62 equipped with a clip interlock system</li> <li>• provides standardised interface towards Control Unit</li> <li>• provides RF connection using galvanic connector or coupler</li> <li>• multiplexing between USB and FBUS media, controlled by VUSB</li> </ul>		
	SX-4	Smart card	
	<p>SX-4 is a BB5 security device used to protect critical features in tuning and testing.</p> <p>SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.</p>		

## Cables

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RX-44, refer to various concepts.

 <p><b>CA-101</b> 100cm</p>	CA-101	Micro USB cable	
	<p>The CA-101 is a micro A/B USB cable.</p>		

	CA-31D	USB cable	
	CA-35S	Power cable	
	CA-58RS	RF tuning cable	

The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.

CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.

RF tuning cable for use with a module jig.




CA-58RS RF cable extends adapter features to allow RF function tests and RF tuning.

Features include:

- easy to use together with module jig or even stand alone
- most accurate RF connection to phone module under test
- low attenuation and small “ripple” over the width of WLAN band

**Note:** The RF cable must be used for RF tuning.



	DAU-9S	MBUS cable	
	PCS-1	Power cable	
	XCS-4	Modular cable	


The MBUS cable DAU-9S has a modular connector and is used, for example, between the PC's serial port and module jigs, flash adapters or docking station adapters.

**Note:** Only ROHS compliant version GM 30083821 allowed.

**Note:** Docking station adapters valid for DCT4 products.

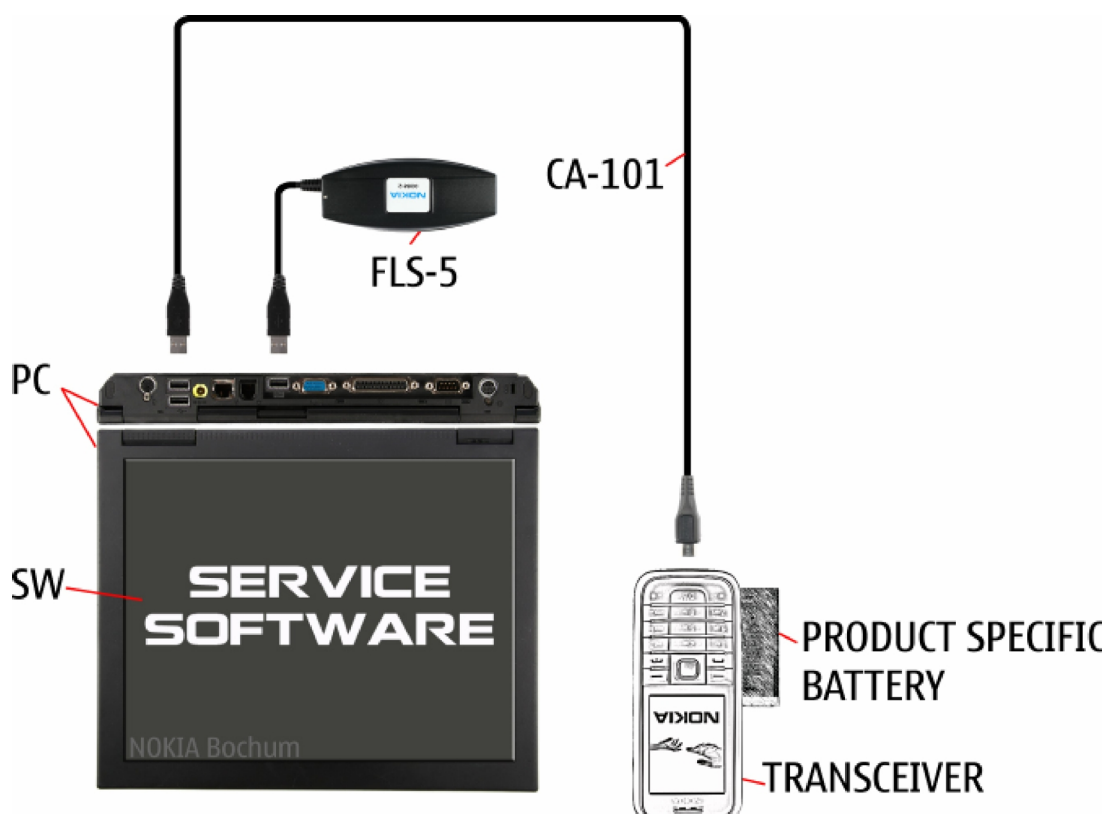
The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled voltage.

XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.

	XRS-6	RF cable	
			<p>The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment.</p> <p>SMA to N-Connector approximately 610 mm.</p> <p>Attenuation for:</p> <ul style="list-style-type: none"> <li>• GSM850/900: 0.3+-0.1 dB</li> <li>• GSM1800/1900: 0.5+-0.1 dB</li> <li>• WLAN: 0.6+-0.1dB</li> </ul>

## ■ Service concepts

### POS (Point of Sale) flash concept

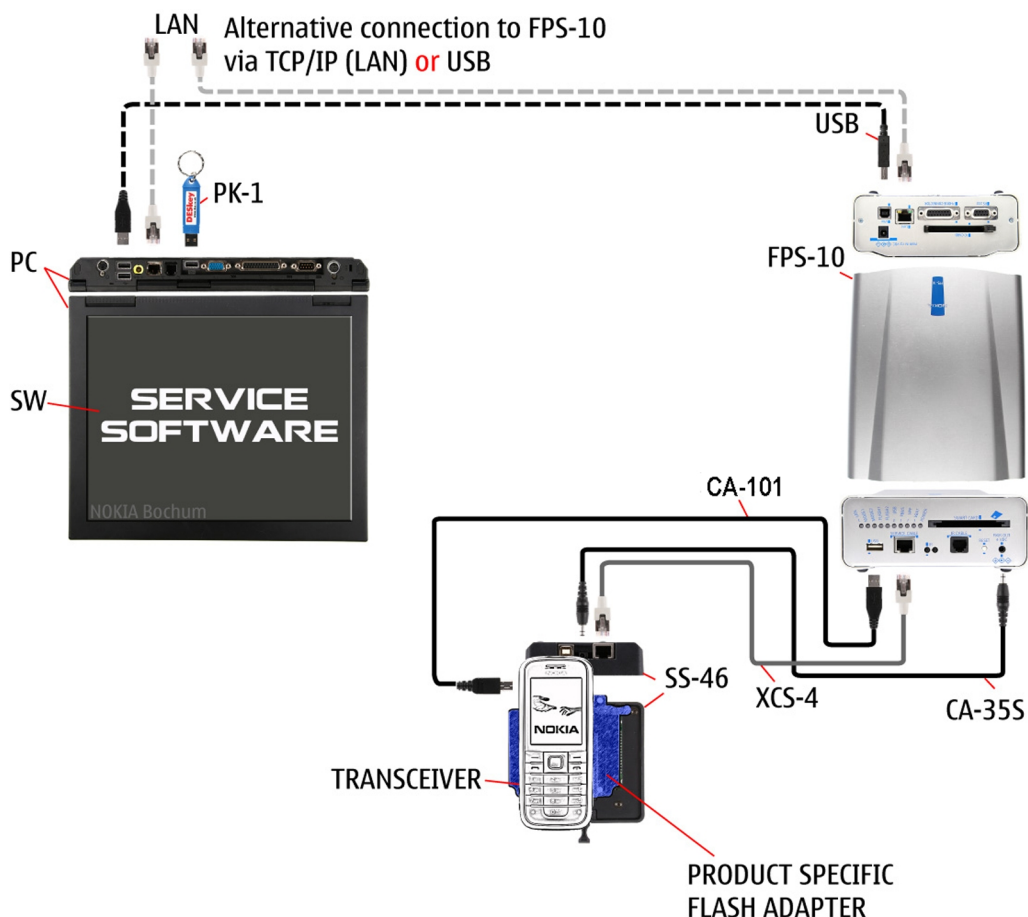


Type	Description
<b>Product specific tools</b>	
BP-4L	Battery
<b>Other tools</b>	
FLS-5	POS flash dongle
	PC with Phoenix service software



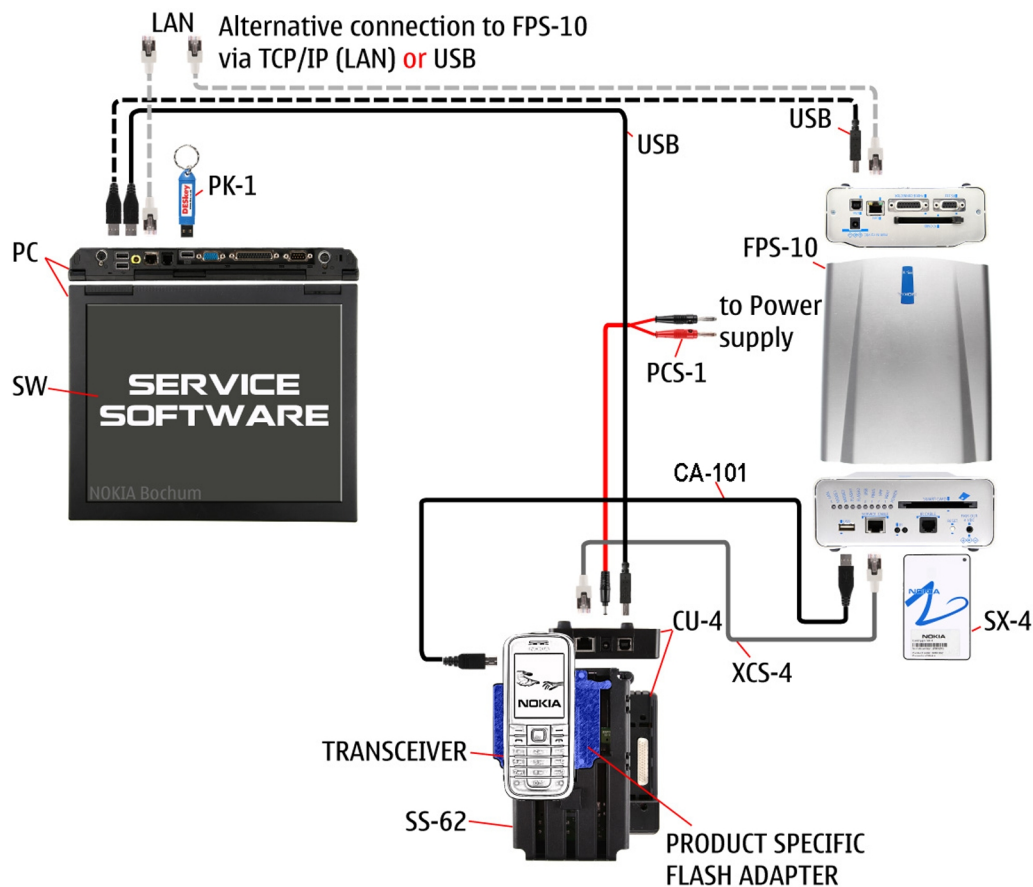
Type	Description
<b>Cables</b>	
CA-101	Micro USB cable

### Flash concept with FPS-10 with PK-1



Type	Description
<b>Product specific devices</b>	
FS-66	Flash adapter
<b>Other devices</b>	
FPS-10	Flash prommer box
PK-1	SW security device
SS-46	Interface adapter
	PC with Phoenix service software
<b>Cables</b>	
XCS-4	Modular cable
CA-35S	Power cable
CA-101	Micro A/B USB cable

## CU-4 flash concept with FPS-10 and PK-1



Type	Description
<b>Product specific devices</b>	
FS-66	Flash adapter
<b>Other devices</b>	
CU-4	Control unit
FPS-10	Flash prommer box
PK-1	SW security device
SS-62	Flash adapter base
SX-4	Smart card
	PC with Phoenix service software
<b>Cables</b>	
PCS-1	Power cable
XCS-4	Modular cable
	Standard USB cable
CA-101	Micro A/B USB cable

## Module jig service concept

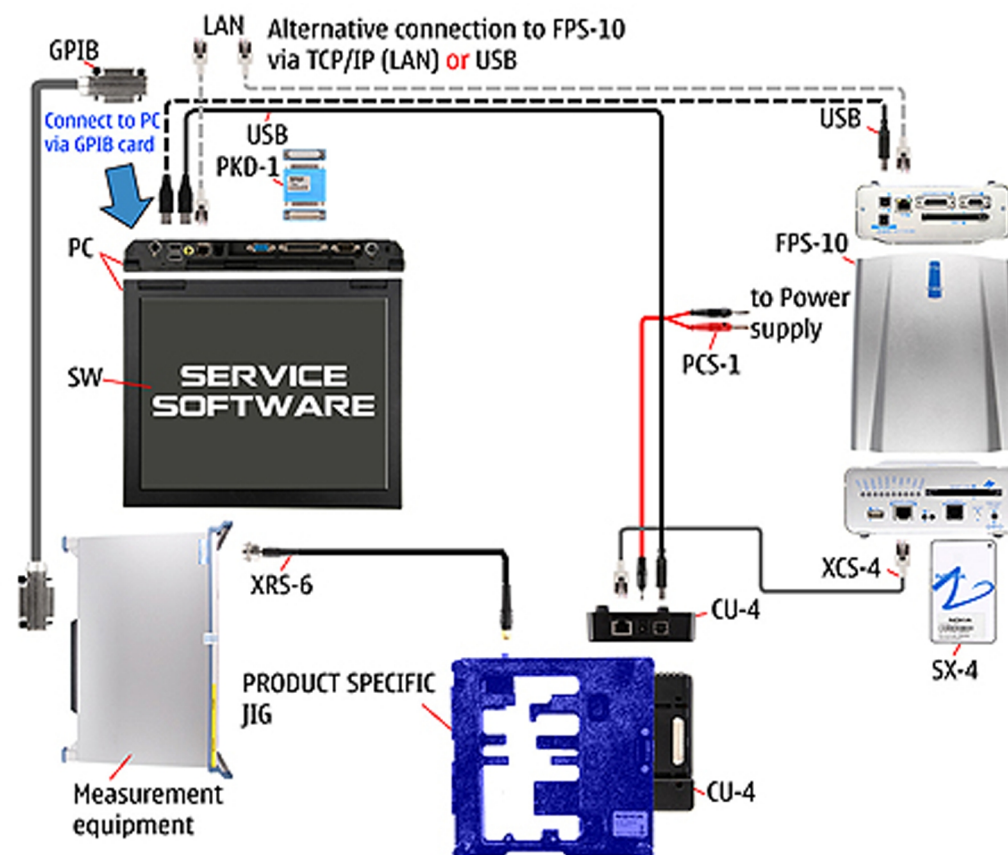


Figure 2 Module jig service concept

Type	Description
<b>Phone specific devices</b>	
MJ-148	Module jig
<b>Other devices</b>	
CU-4	Control unit
FPS-10	Flash prommer box
PK-1	SW security device
SX-4	Smart card
	PC with VPOS and Phoenix service software
	Measurement equipment
<b>Cables</b>	
PCS-1	DC power cable
XCS-4	Modular cable
XRF-1	RF cable
	USB cable

Type	Description
	GPIB control cable

### Service concept for RF testing and RF/BB tuning

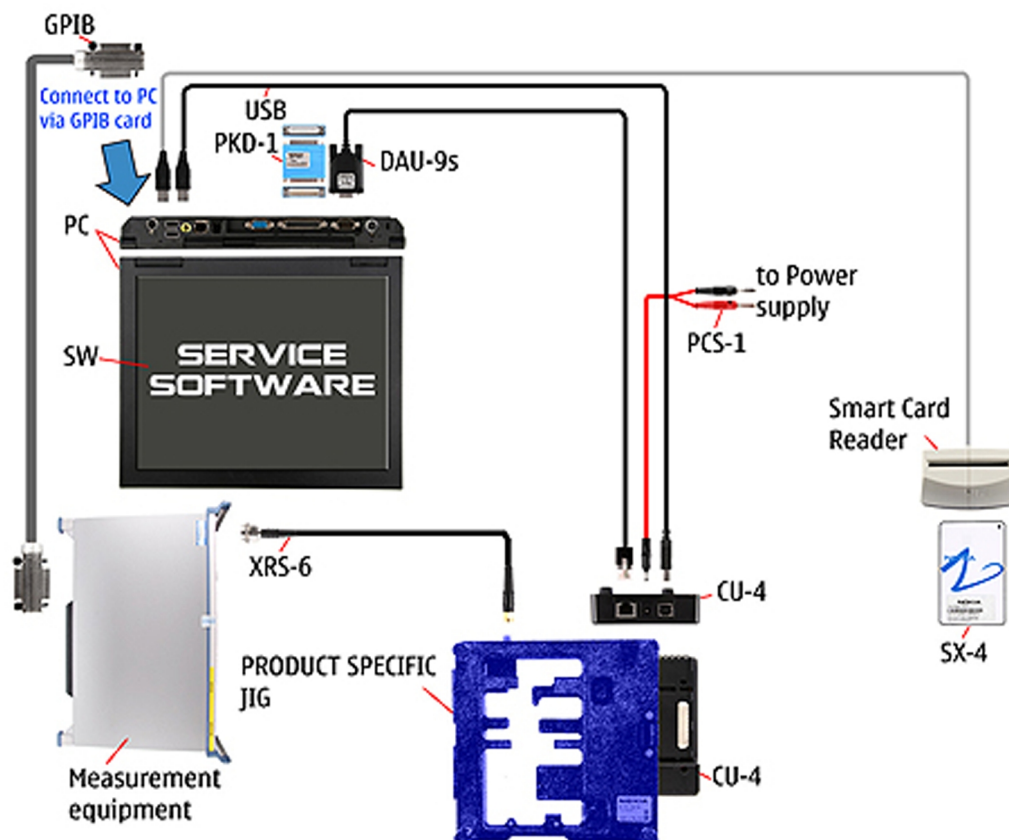


Figure 3 Service concept for RF testing and RF/BB tuning

Type	Description
<b>Product specific devices</b>	
MJ-148	Module jig
<b>Other devices</b>	
CU-4	Control unit
PK-1	SW security device
SX-4	Smart card
	Measurement equipment
	Smart card reader
	PC with Phoenix service software
<b>Cables</b>	
DAU-9S	MBUS cable
PCS-1	DC power cable

Type	Description
XRS-6	RF cable
	GPIB control cable
	USB cable

### Bluetooth test concept with SB-6

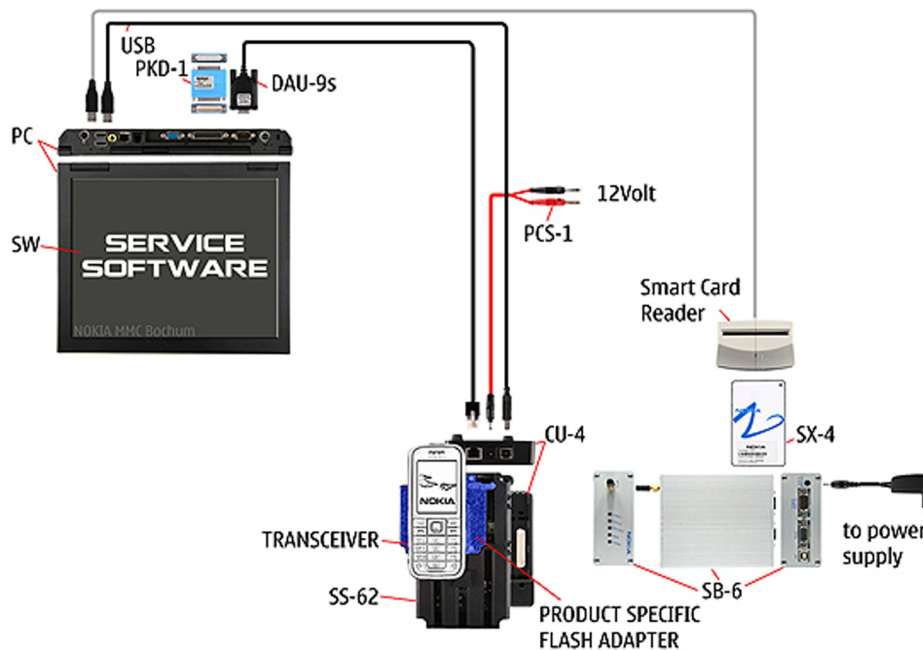


Figure 4 Bluetooth test concept with SB-6

Type	Description
<b>Product specific tools</b>	
FS-66	Flash adapter
<b>Other tools</b>	
CU-4	Control unit
PK-1	SW Security device
SS-62	Generic base adapter
SB-6	BT test box
ACP-8	Charger for SB-6
<b>Cables</b>	
PCS-1	Power cable
DAU-9S	Cable
PCS-1	DC power cable
	Standard USB cable

## WLAN functionality testing concept with SB-7

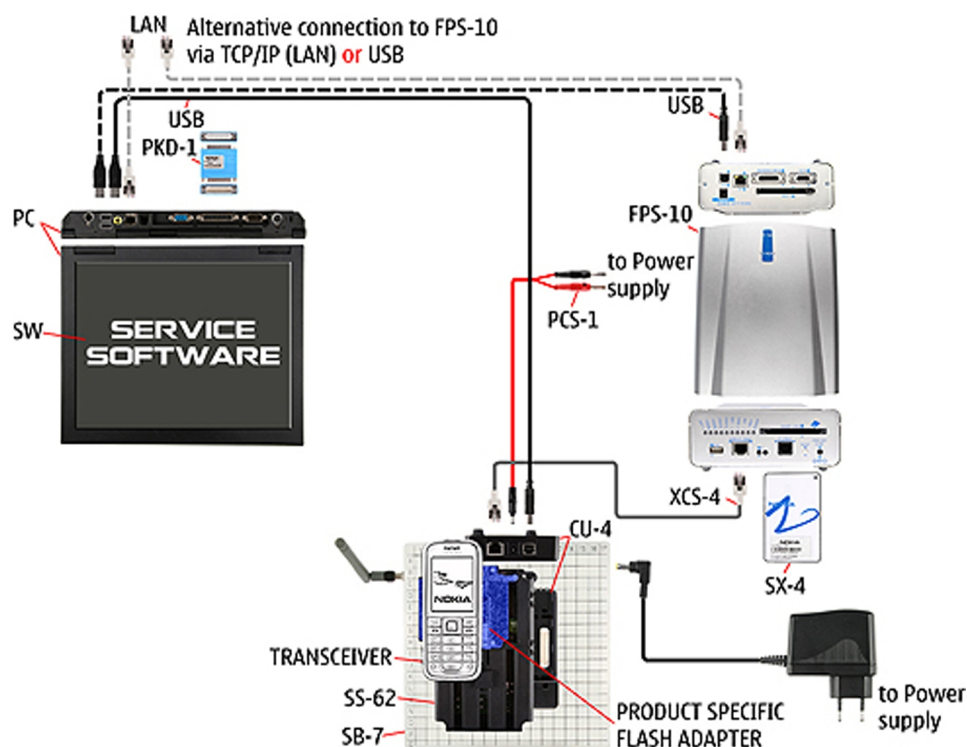


Figure 5 WLAN functionality testing concept with SB-7

Type	Description
<b>Product specific tools</b>	
FS-66	Flash adapter
<b>Other tools</b>	
CU-4	Control unit
PCS-1	DC power cable
PK-1	SW Security device
SS-62	Generic base adapter
<b>Cables</b>	
PCS-1	Power cable
DAU-9S	Cable
	Standard USB cable

## **3 — Service Software Instructions**

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## ■ Phoenix installation steps in brief

Phoenix is the service software for reprogramming, testing and tuning the phone.

Recommended PC HW requirements:

- Computer Processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-200 MB

Supported operating systems:

- Windows 2000 Service Pack 3 or higher
- Windows XP Service Pack 1 or higher

To install Phoenix, you need to:

- Connect a PK-1 dongle,
- Install the Phoenix Service SW,
- Install the Data Package for Phoenix,
- Configure users,
- Manage connection settings (depends on the tools you are using).

**Note:** If you use FPS-10:

- Update FPS-10 SW,
- Activate SX-4 Smart Card if you need tuning and testing functions in service software.

**Note:** When FPS-10 is used only for product SW updates, SX-4 Smart card is not needed.

Phoenix is now ready to be used with FPS-10 flash prommer and other tools as well.

The Phoenix Service Software installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - PK-1 dongle
  - CA-101 USB cable

**Note:** Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless updates appear between Phoenix Service SW releases. If separate update packages are used, they should be used after Phoenix and data packages have been installed.

The product model specific data package includes all changing product -specific data:

- Product software binary files
- Files for type label printing
- Validation file for the Faultlog repair data reporting system
- All product specific configuration files for Phoenix software components

**Note:** Phoenix Service SW and product data packages should only be used as complete installation packages. Uninstallation should be made from the Windows Control Panel.

## ■ Installing Phoenix

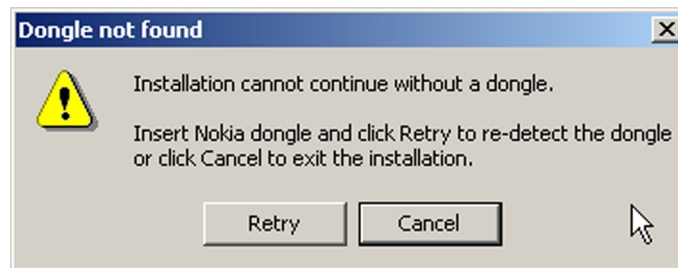
### Prerequisites

- Check that a dongle is attached to the parallel port of your computer.

- Download the installation package (for example, *phoenix\_service\_sw\_2007\_34.exe*) to your computer (in *C:\TEMP*, for instance).
- Close all other programs.
- Run the application file (for example, *phoenix\_service\_sw\_2007\_34.exe*) and follow the instructions on the screen.
- Administrator rights may be required to be able to install Phoenix depending on the operating system.
- If uninstalling or rebooting is needed at any point, you will be prompted by the Install Shield program.

## Context

If at any point during installation you get the following message, the dongle is not found and installation cannot continue:



**Figure 6 Dongle not found**

One possible reason may be a defective or too old PK-1 Dongle (five digit serial number Dongle when used with FPS-10 prommers).

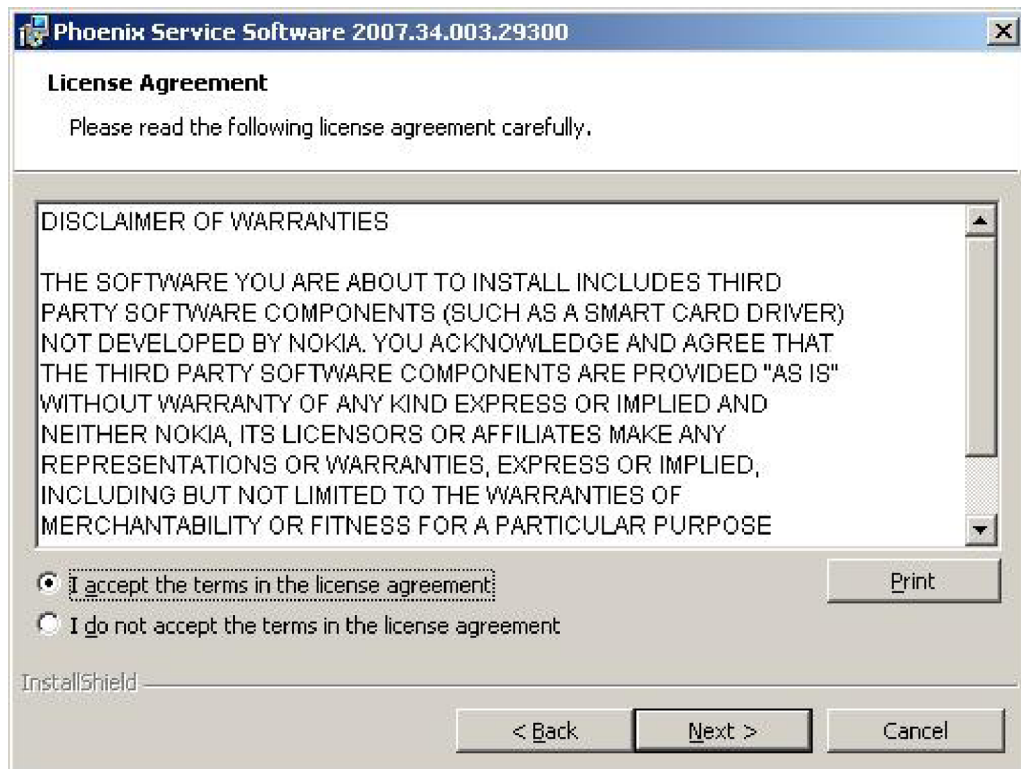
Check the parallel port used for PK-1. After correcting the problem, restart installation application.

For more detailed information, please refer to Phoenix Help files. Each feature in Phoenix has its own Help function, which can be activated while running the program. Press the **F1** key or the feature's **Help** button to activate a Help file.

## Steps

1. To start installation, run *phoenix\_service\_sw\_2007\_34.exe*.
2. In the Welcome dialogue, click **Next**.

3. Read the disclaimer carefully.



4. Choose destination folder.

The default folder *C:\ProgramFiles\Nokia\Phoenix* is recommended.

5. To continue, click **Next**.

You may choose another location by selecting **Browse** (not recommended).

6. Wait for the components to be copied.

Progress of the setup is shown in the *Setup Status* window.

7. Wait for the drivers to be installed and updated.

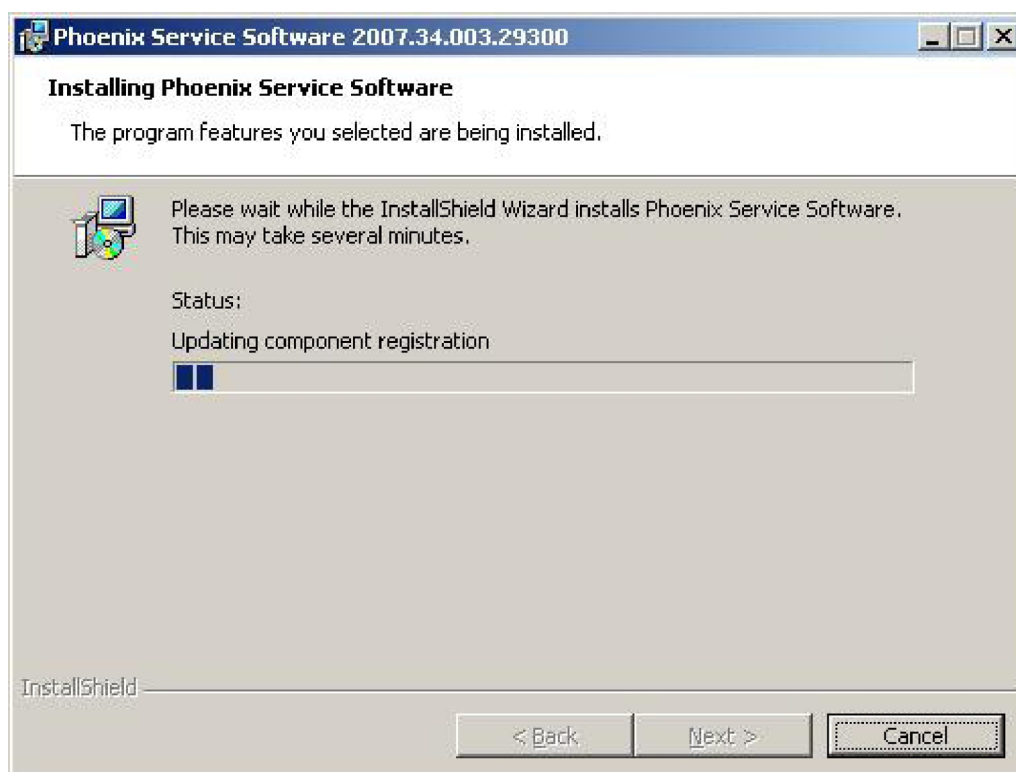
The process may take several minutes to complete.

If the operating system does not require rebooting, the PC components are registered right away.

If the operating system used requires restarting your computer, the Install Shield Wizard will tell you about it. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

After the reboot, components are registered and Phoenix is ready for use.

**Note:** Phoenix does not work, if components have not been registered.



8. To end installation, click **Finish** .



Phoenix is now ready for use.

## Next actions

After the installation, Phoenix service software can be used after:

- installing phone model specific data package for Phoenix
- configuring users and connections

FPS-10 flash prommers can be used after updating their Flash Update Package files.

## ■ Updating Phoenix installation

If you already have the Phoenix Service SW installed on your computer, sooner or later there will be need to update it when new versions are released.

Always use the latest available versions of both the Phoenix Service SW and the product specific data package. Instructions can be found in product model specific Technical Bulletins and data package readme.txt files (shown during installation).

To update the Phoenix you need to take exactly the same steps as when installing it for the first time:

- Download the installation package to your computer hard disk.
- Close all other programs.
- Run the application file (for example, phoenix\_service\_sw\_2007\_34.exe).
- New version of Phoenix will be installed.
- Driver versions will be checked and updated. When you update the Phoenix from old to new version (for example, a14\_2004\_16\_4\_47 to a15\_2004\_24\_7\_55), the update will take place automatically without uninstallation.

If you try to update the Phoenix with the same version that you already have (for example, a15\_2004\_24\_7\_55 to a15\_2004\_24\_7\_55) you are asked if you want to uninstall the version of Phoenix you have on your PC. In this case you can choose between total uninstallation and repair just like when you choose to uninstall Phoenix service software from the Windows Control panel.

If you try to install an older version (for example, downgrade from a15\_2004\_24\_7\_55 to a14\_2004\_16\_4\_47), installation will be interrupted.

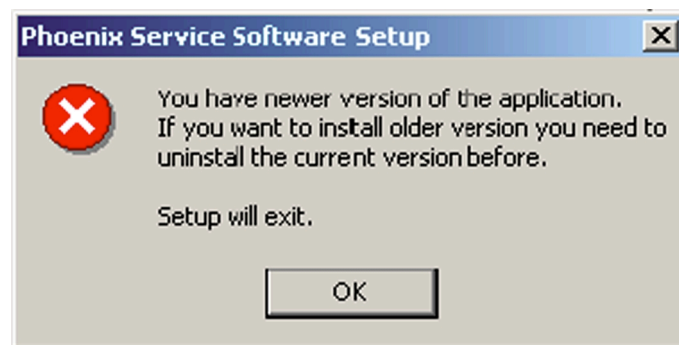


Figure 7 Installation interrupted

Always follow the instructions on the screen.

## ■ Uninstalling Phoenix

### Context

You can uninstall *Phoenix* service software manually from the *Windows Control Panel - Add/Remove Programs*.

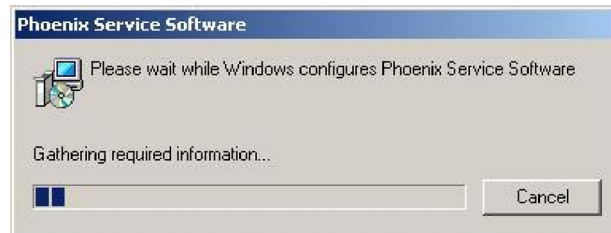
### Steps

1. Start Control Panel -> **Add/Remove** Programs.
2. Select **Phoenix Service Software** from the list and press **Remove** button to uninstall Phoenix.

3. Select **Yes** to start the uninstallation and **No** to cancel the uninstallation of Phoenix.



4. Wait until the uninstallation has completed.



If the operating system used requires rebooting, Install Shield Wizard will tell you about it. Select **Yes** to reboot the PC immediately and **No** to reboot the PC manually afterwards.

## ■ Repairing Phoenix installation

### Context

If you experience any problems with service software or suspect that files have been corrupted, uninstall Phoenix first and then reinstall it again.

### Steps

1. Reinstall Phoenix like described in the section Installing Phoenix.

## ■ Product data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain product model.

The product data package contains the following:

- Product software binary files
- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

If you change the default directory, check from the Phoenix menu Tools->Options->Product Location that the directory is configured correctly.

## ■ Installing Phoenix data package

### Prerequisites

- Product data package contains all product-specific data to make the Phoenix Service Software and tools usable with a certain phone model.
- Check that the dongle is attached to the parallel port of your computer.
- Install Phoenix Service SW.



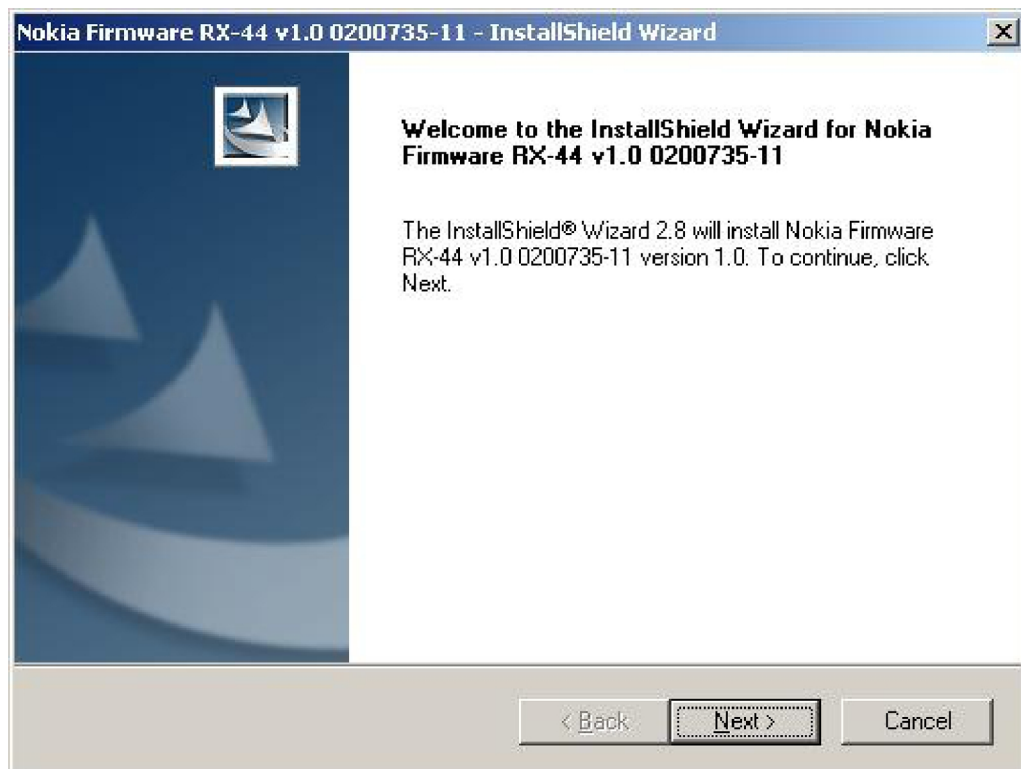
- Download the installation package (for example, *Nokia\_firmware\_RX-44\_v1\_0\_0200735-11.exe*) to your computer (for example, in *C:\TEMP*).
- Close all other programs.
- Run the application file (for example, *Nokia\_firmware\_RX-44\_v1\_0\_0200735-11.exe*) and follow the instructions on the screen.

If you already have the Phoenix Service SW installed on your computer, you will need to update it when a new version is released.

**Note:** Very often the Phoenix Service SW and the phone-specific data package for Phoenix come in pairs, meaning that a certain version of Phoenix can only be used with a certain version of the data package. Always use the latest available versions of both. Instructions can be found in phone model specific Technical Bulletins and *readme.txt* files of the data packages.

## Steps

1. To start installation, run the application file (for example, *Nokia\_firmware\_RX-44\_v1\_0\_0200735-11.exe*).
2. Click **Next**, and wait for the installation files to be extracted.
3. To continue, click **Next**.



In this view you can see the contents of the data package. Read the text carefully. There should be information about the Phoenix version required with this data package.

4. To continue, click **Next**.

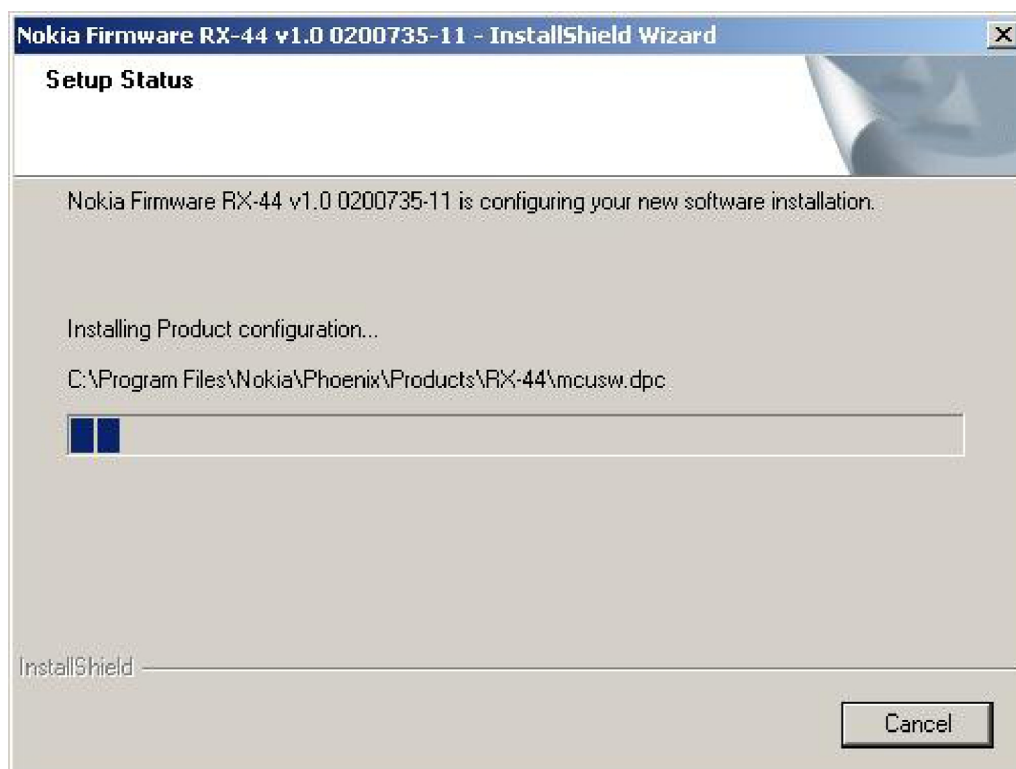


5. Confirm location and click **Next** to continue.



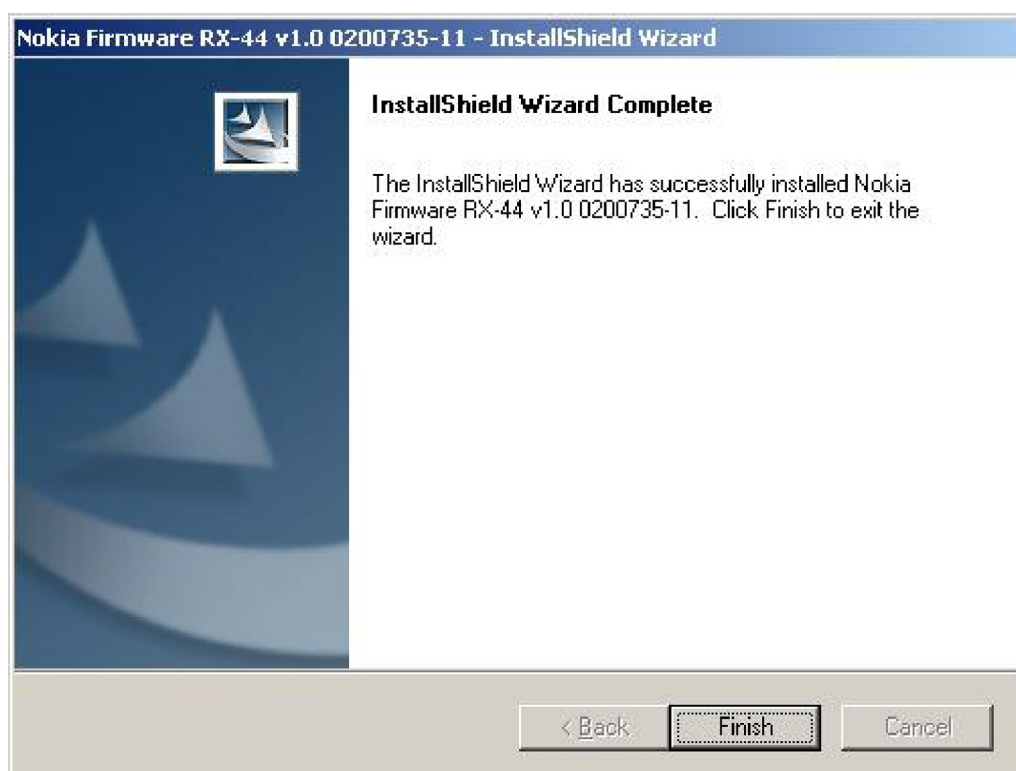
The install shield checks where the Phoenix application is installed and the directory is shown.

6. To start copying the files, click **Next** .



Product-specific files will be installed. Please wait.

7. To complete the installation, click **Finish** .



You now have all phone model specific files installed in your Phoenix Service SW.

## Next actions

After installing product-specific datapackage, you can use Phoenix for flashing products and printing type labels.

If you have an old Phoenix version on your PC, you need to update FPS-10 by running separate flash update package. If you have installed the latest Phoenix version, it updates the files needed for flashing automatically.

## ■ Uninstalling Phoenix data package

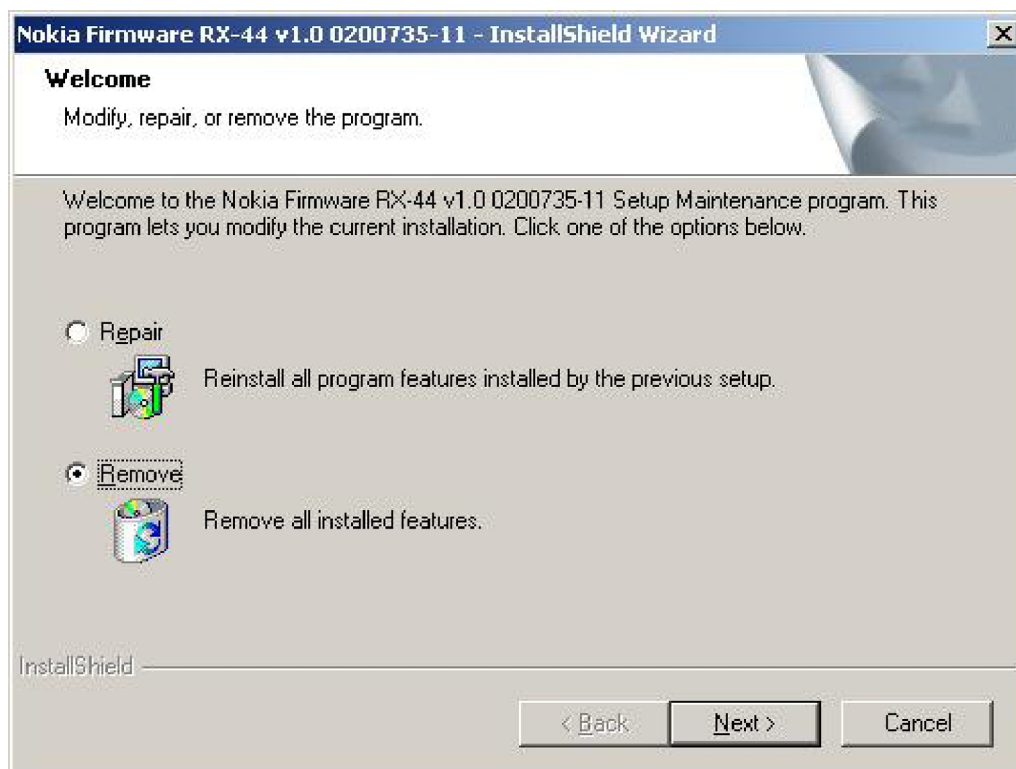
### Context

If you try to install the same version of Phoenix data package that you already have, you are asked if you want to uninstall the version you have on your PC. Older versions of data packages don't need to be uninstalled unless instructions to do so are given in the *readme.txt* file of the data package and bulletins concerning the release.

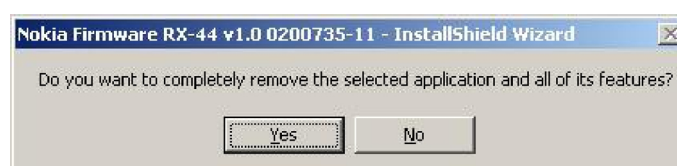
Please read all related documents carefully.

### Steps

1. To start uninstallation, run the same application file (for example, *Nokia\_firmware\_RX-44\_v1\_0\_0200735-11.exe*)

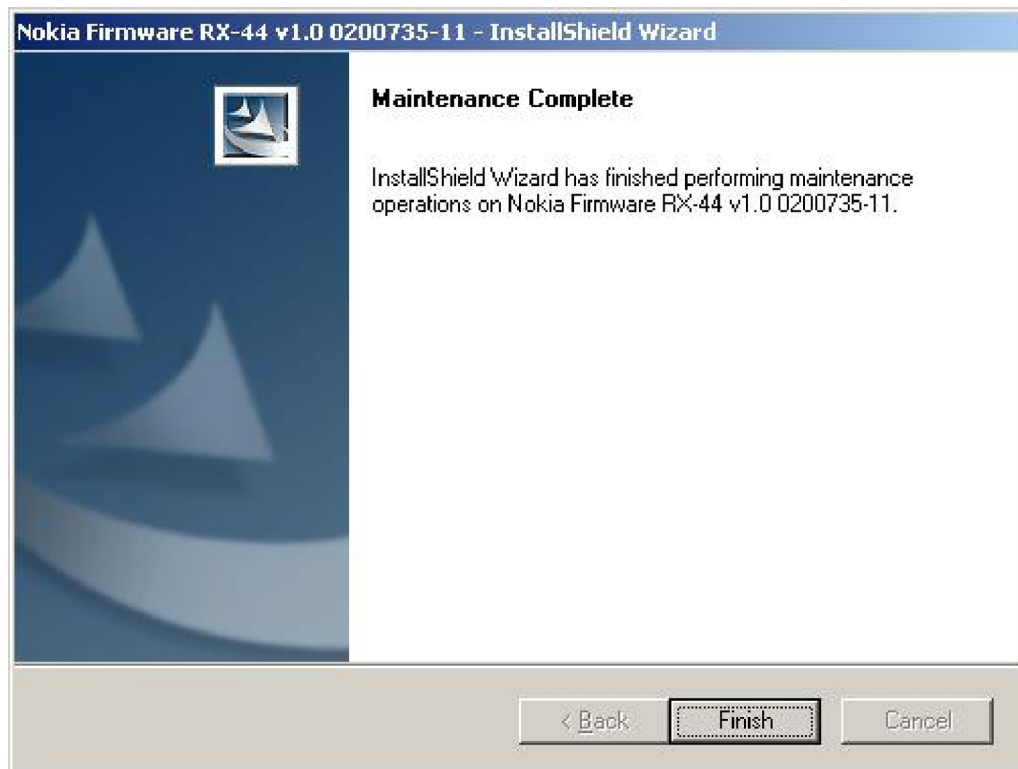


2. Select Remove button to uninstall all datapackage features, click **Next**.



3. Click **Yes** to uninstall, No if you don't want to uninstall.

4. Once the previously installed data package is uninstalled, click **Finish**.



### Alternative steps

- You can also uninstall the data package manually from **Windows Control Panel→Add/Remove Programs→Nokia\_firmware\_xx-xx\*\_v1\_0\_0200735-11** (\*= type designator of the product).

### Next actions

Reinstall the datapackage by running the product-specific application file.

### ■ Configuring users in *Phoenix*

#### Steps

1. Start *Phoenix* service software, and log in.

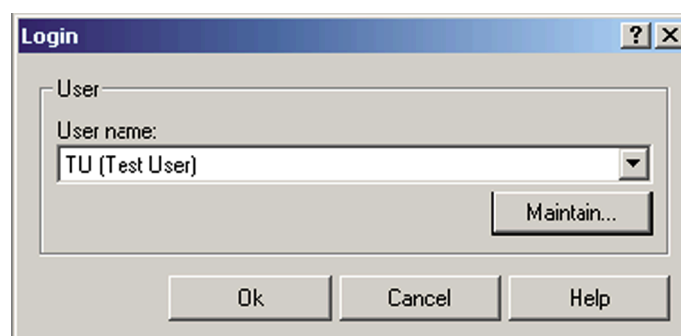


Figure 8 Phoenix login

If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.

2. To add a new user, or to edit existing ones, click **Maintain**.

3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.  
A new user is now created.
5. Click **OK**. You are now able to login with this user name.
6. Click **OK**.

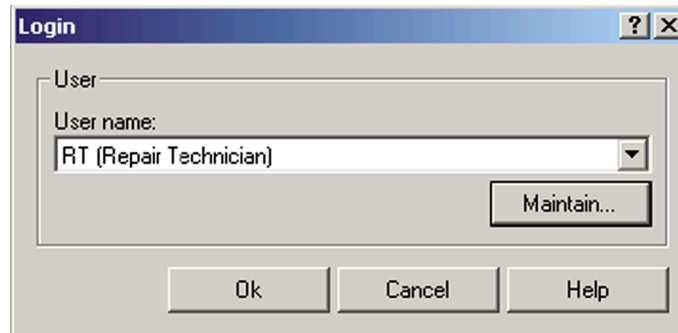


Figure 9 New user configured

## ■ Managing connections in Phoenix

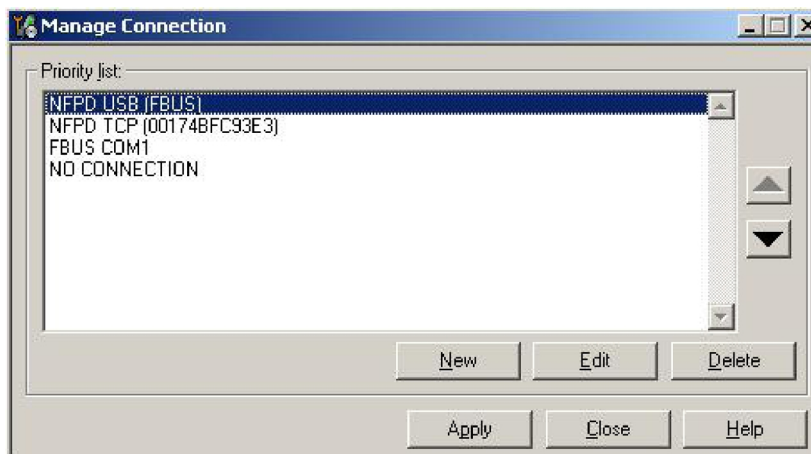
### Steps

1. Connect the service tools to your PC and attach the product to the service jig.
2. Start **Phoenix Service SW** and log in.
3. Choose File -> **Manage Connections**.



Figure 10 Phoenix icon

Existing connections can be selected, edited, deleted, and new ones created by using this dialog.



4. Click **New** to add a new connection. Pressing **New** starts the **Connection Wizard**. You can also create a connection manually with the **Connection Wizard** (see step 3).

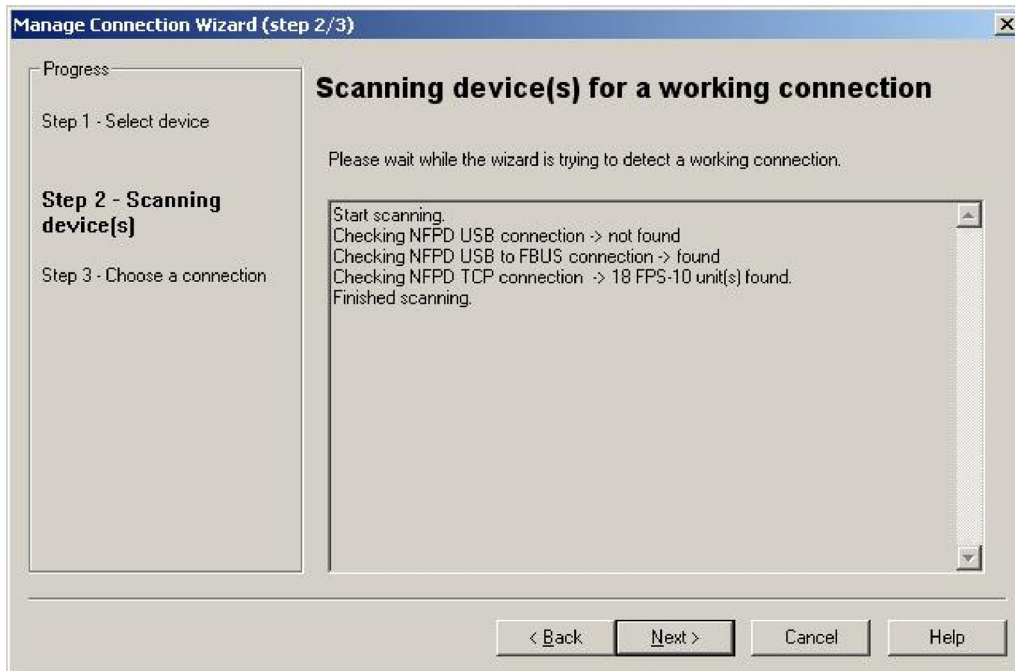
The wizard will automatically try to configure the connection. Please note that this may take a considerable amount of time because Phoenix will go through all connections on the PC.

5. Select Nokia flash programming device, if you want to create a connection for prommer. Select JBL-9 / Generic FBUS, if you need a connection for DAU-9S cable.





6. Press **Next** button. Phoenix starts to scan devices.



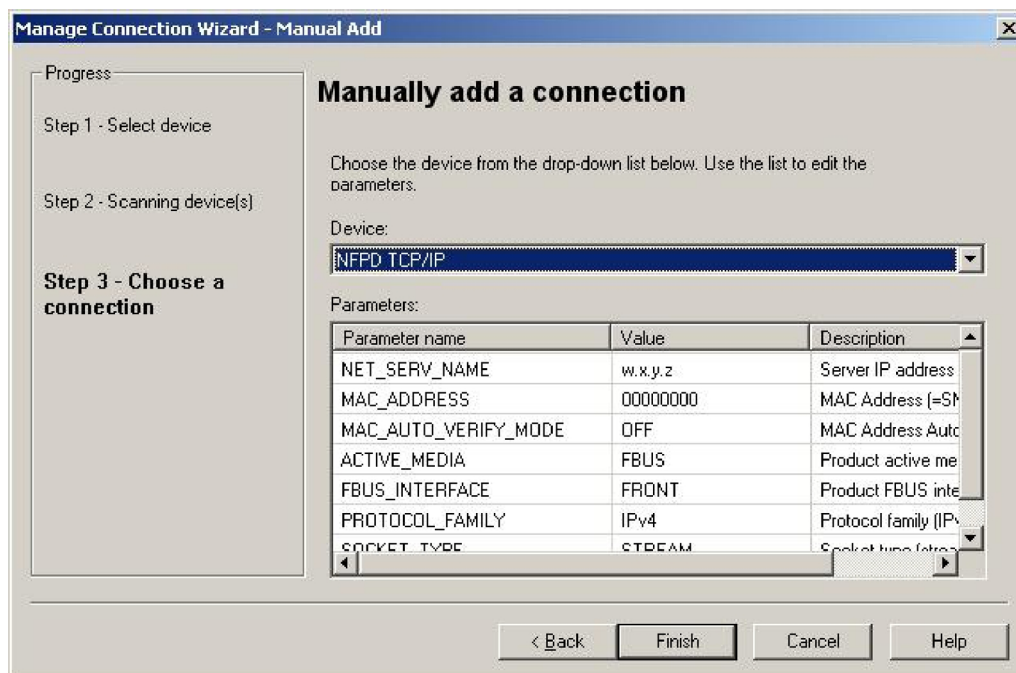
7. Phoenix shows what connections can be made after scanning. Press **Next** button.



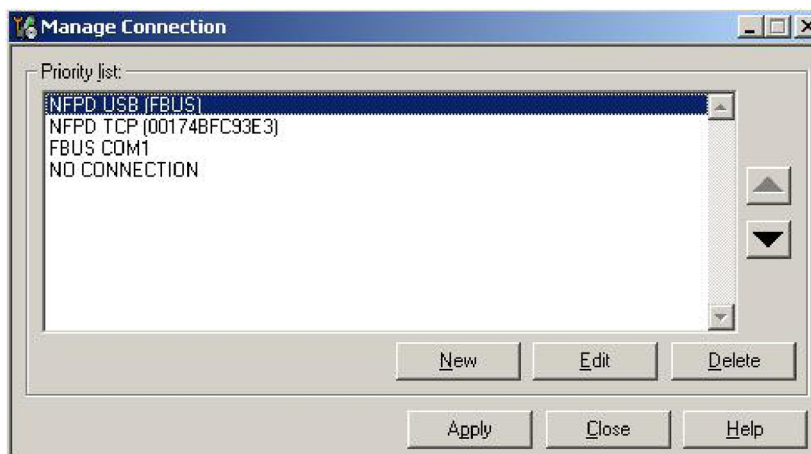
8. Choose Nokia Flash Programming Device you are using from the list. Select NFPD USB (FBUS), if the prommer is connected to your PC via USB cable. Select NFPD TCP (serial number), if the prommer is connected to your PC via TCP / IP. Check the serial number from the prommer's label.
9. Click **Finish** to complete the configuration of the connection.
10. Press **Manual Setup** button, if you want to create a connection manually.
11. Enter IP address and serial number of the prommer to the parameters, if you want to use NFPD TCP connection.



12. Enter the serial number of the prommer and select **FBUS** as the active media to the parameters, if you want to use NFPD USB (FBUS) connection.
13. Enter the serial port number to the parameters, if you want to use FBUS serial connection.



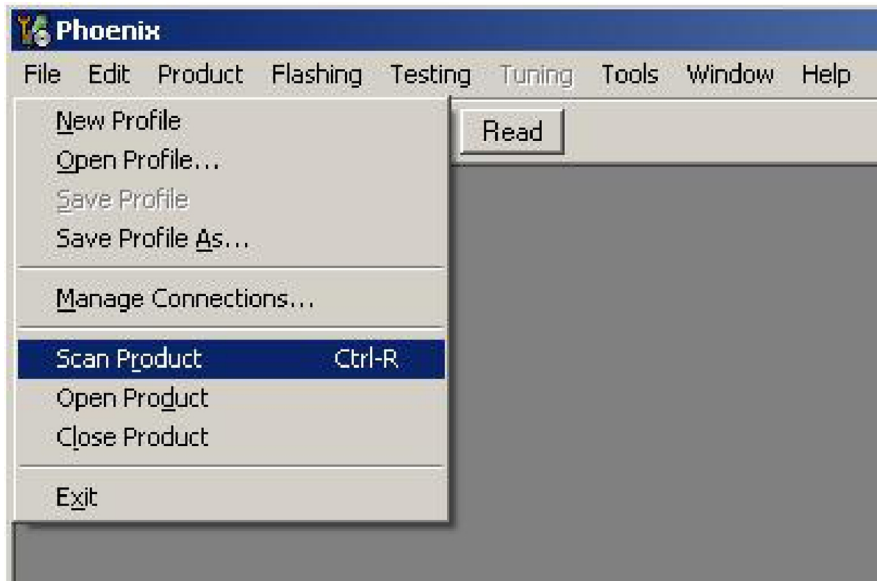
14. Activate the connection you want to use by clicking it, use up/down arrows to move it on top of the list, and click **Apply**.



The connection is now selected and can be used after closing the Manage Connections window. Selected connection will be shown on the right hand bottom corner of the screen.



15. To use the selected connection, connect the phone to Phoenix with correct service tools, make sure that it is switched on and select **Scan Product**.



When a product is found, Phoenix will load product support. Name of the loaded product support module and its version information will be shown on the bottom of the screen.

RX-44\_OSS01.1\_0.2007.35-11\_PR\_MR0 , V 1.1.102 , RX-44 , (c) NOKIA. / RX-44\_C

## ■ Installing flash support files for FPS-10

### Prerequisites

**Note:** You need to install flash support files for FPS-10 only, if you don't have the latest Phoenix available or the flash support files have changed after the latest Phoenix release.

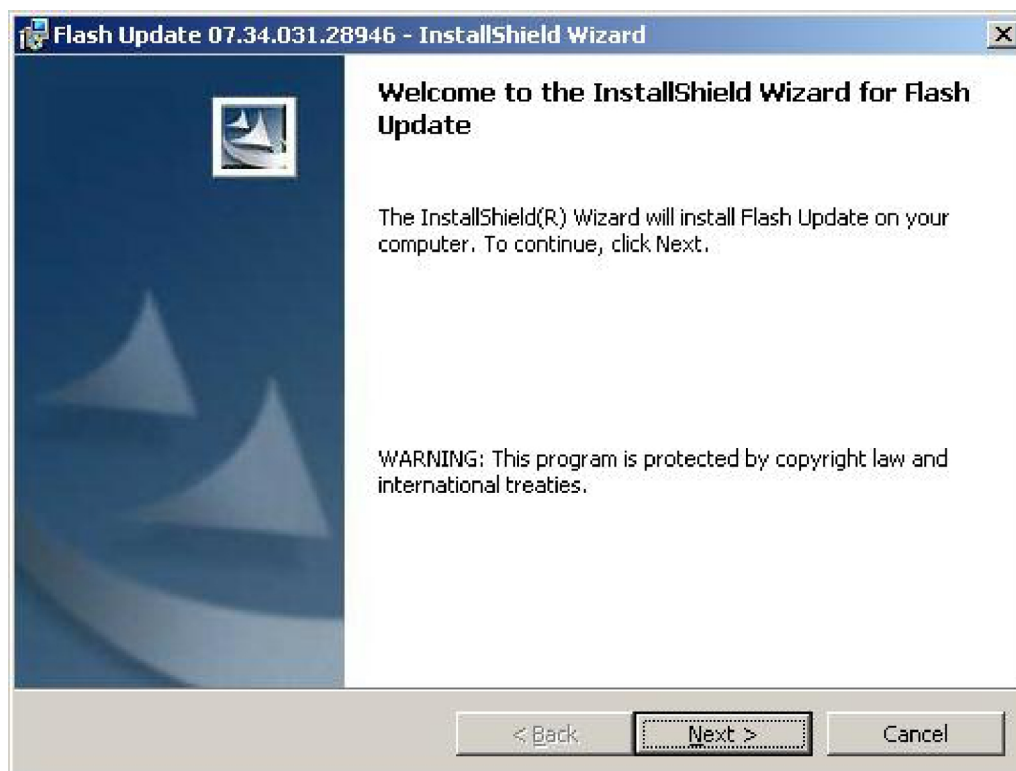
- Flash support files are installed automatically, when you install Phoenix. Use Phoenix packages later than September 2007.
- Normally it is enough to install Phoenix and the phone-specific data package because the Phoenix installation always includes the latest flash update package files for FPS-10.
- A separate installation package for flash support files is available, and the files can be updated according to this instruction, if updates appear between new Phoenix / data package releases

### Context

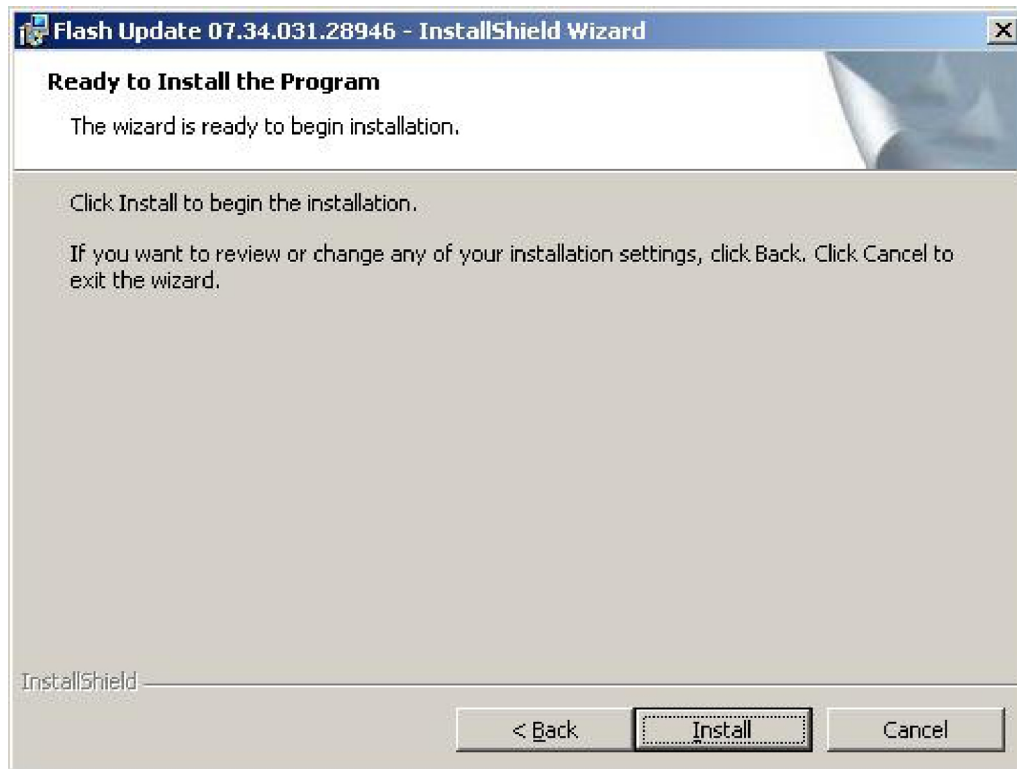
If you are NOT using a separate flash update package, you can skip this section and continue with updating FPS-10 flash prommer software after installing a new phone data package.

## Steps

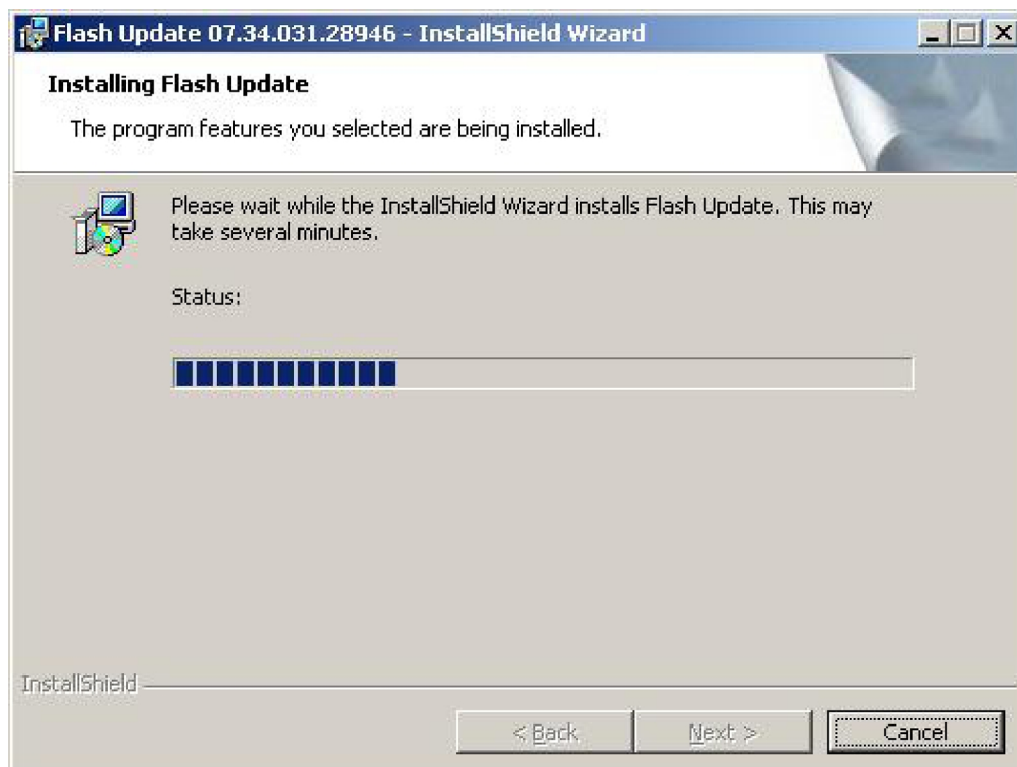
1. To begin installation, double-click flash update execution file e.g. *FlashUpdate\_xx\_yy\_zzz.msi*.



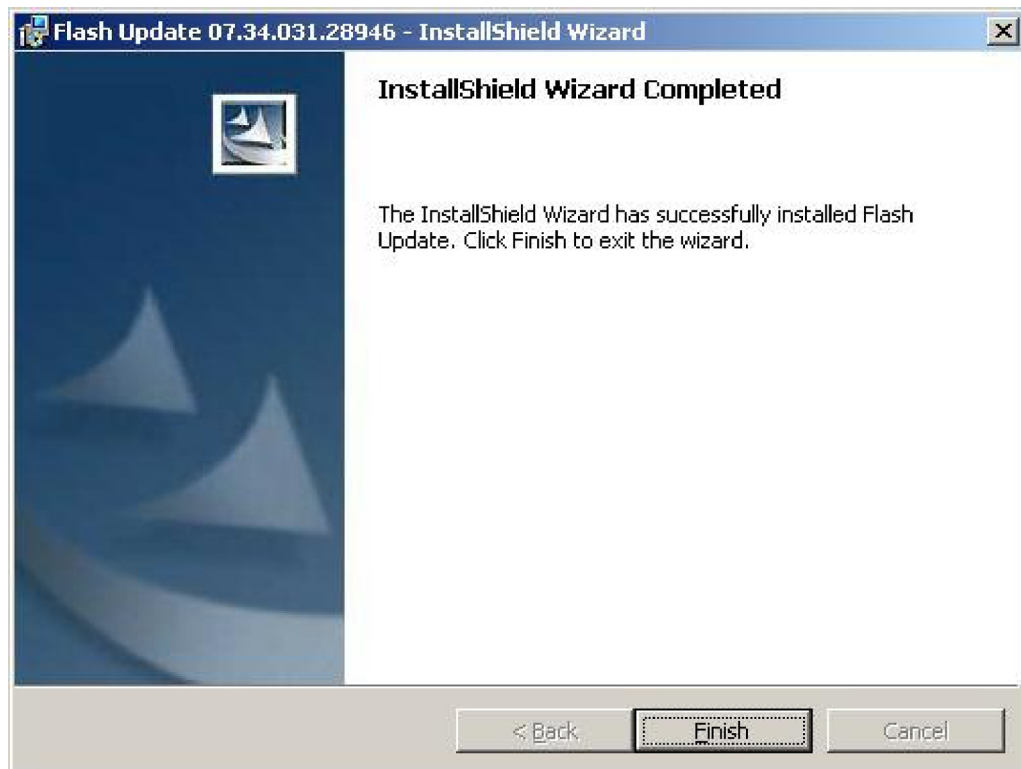
2. To continue, click **Next**. The installation application installs the new flash files to the default destination folder C:\Program Files\Common Files\Nokia\Tss\Flash. Don't move or copy these files to another directory, because that makes updating the prommer sw difficult.



3. To continue installation, click **Install**. To exit the installation wizard, click **Cancel**.
4. You can see the progress of the installation. Wait, until the installation completes.



5. Click **Finish** to end the installation.



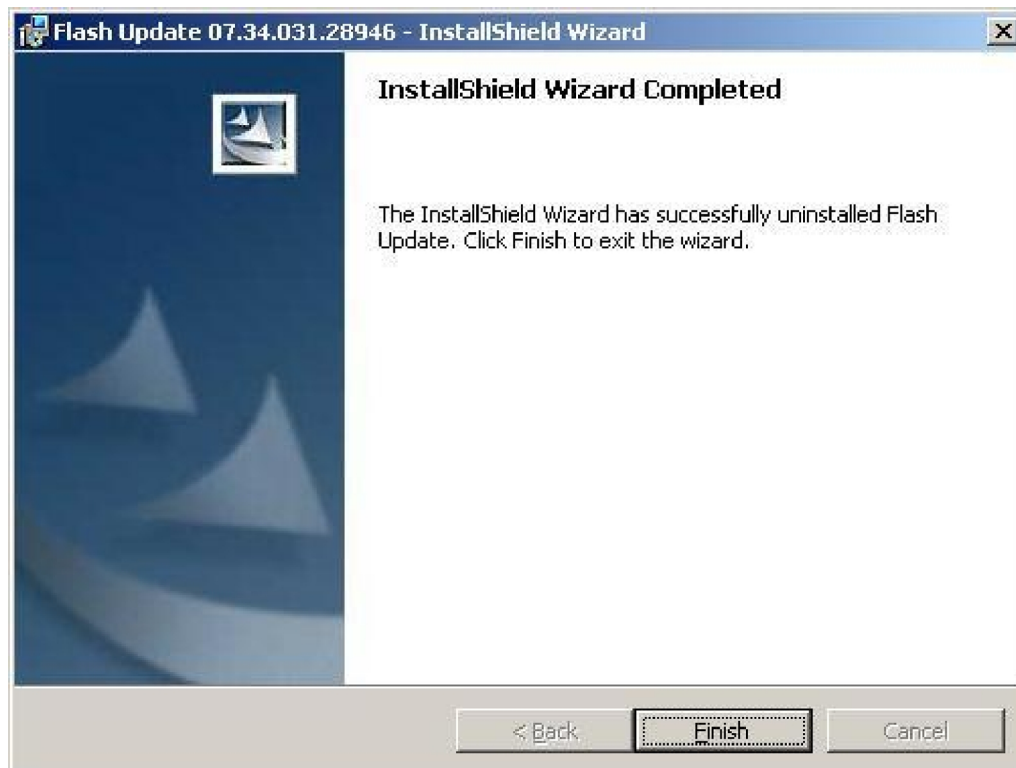
6. If the same version of Flash Update package already exists on PC, and you try to reinstall it, the installation application asks, whether you want to modify, repair or remove it. Select **Remove** and click **Next**.



7. To confirm that you really want to remove the older flash update, click **Remove**.



8. To end the uninstallation of flash update, click Finish.



9. If you want to downgrade the existing flash update version to older one, uninstall newer flash update files manually from **Control Panel -> Add/Remove Programs -> Nokia Flash Update** and then rerun the installation application again.



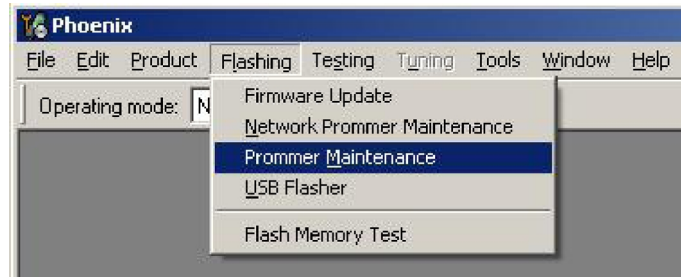
## Next actions

Update FPS-10 flash prommers using Phoenix.

### ■ Updating FPS-10 flash prommer software

#### Steps

1. Start **Phoenix Service Software** and log in, select a connection to the prommer.
2. Choose **Flashing -> Prommer Maintenance**.



3. When the new flash update package is installed to the computer you will be asked to update the files to your Prommer. Click **Yes**. Click **OK**, if the computer informs you about unsafe removal of the device.
4. Alternatively you can update FPS-10 flash prommer software by clicking **Update** button.
5. Wait until you are notified that update has been successful. The procedure will take a couple of minutes. Click **OK** to close the **Update Done** window.

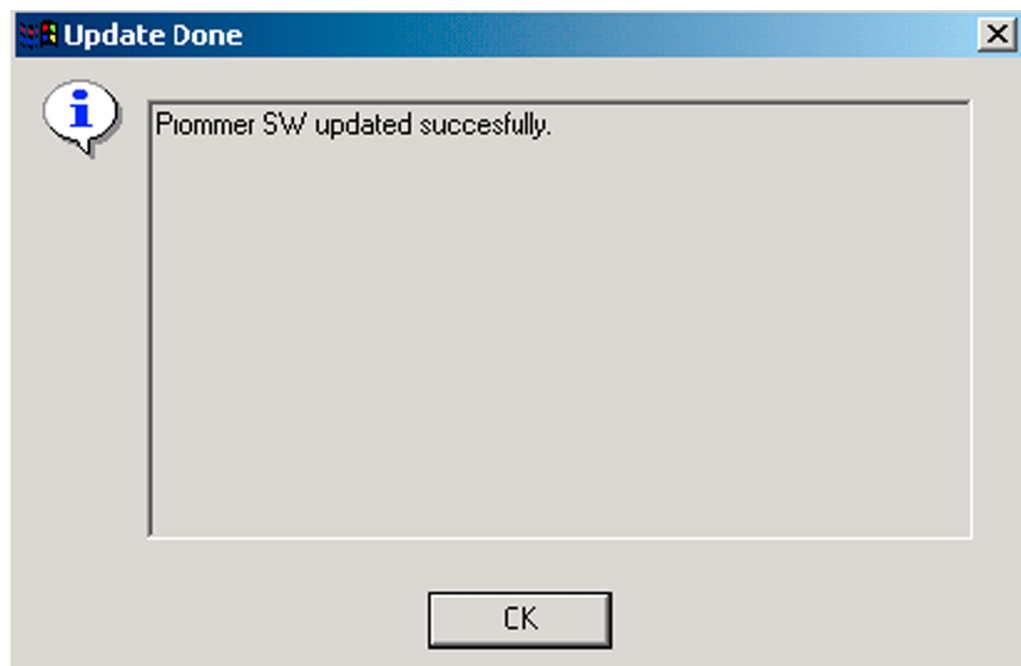
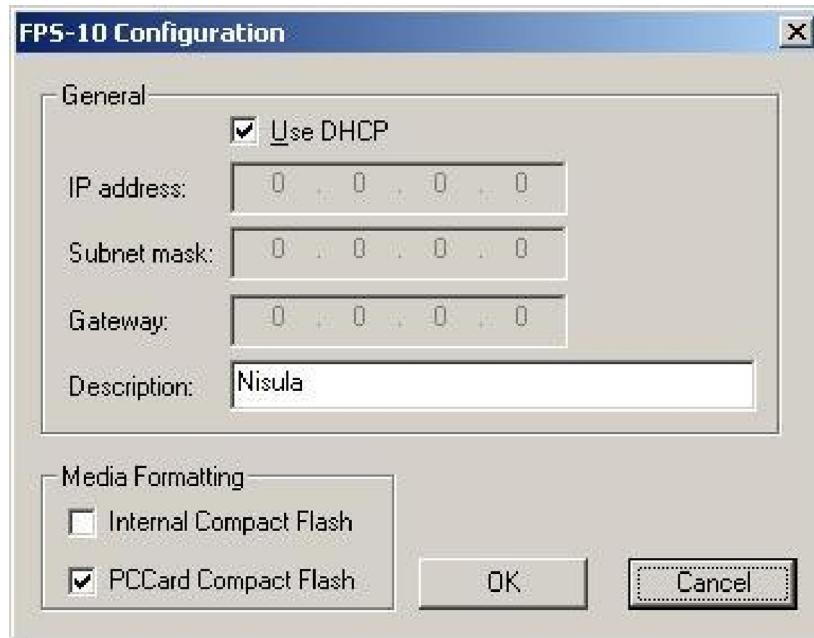


Figure 11 Prommer SW update finished

6. If you are using FPS-10 flash prommer, check that it is detected from the progress info. Check also the status leds in the FPS-10. The MODE2 led (green), VBAT and POWER leds (red) should be lit. If you are using LAN connection, the LAN led (yellow) should be blinking.
7. Check that your FPS-10 flash prommer has enough memory. Flashing RX-44 with the FPS-10 needs more than 128 MB memory in the prommer. You need to install a separate memory card (standard compact flash at least 256 MB and standard PCMCIA Compact Flash adapter) to the FPS-10 external PC Card slot.

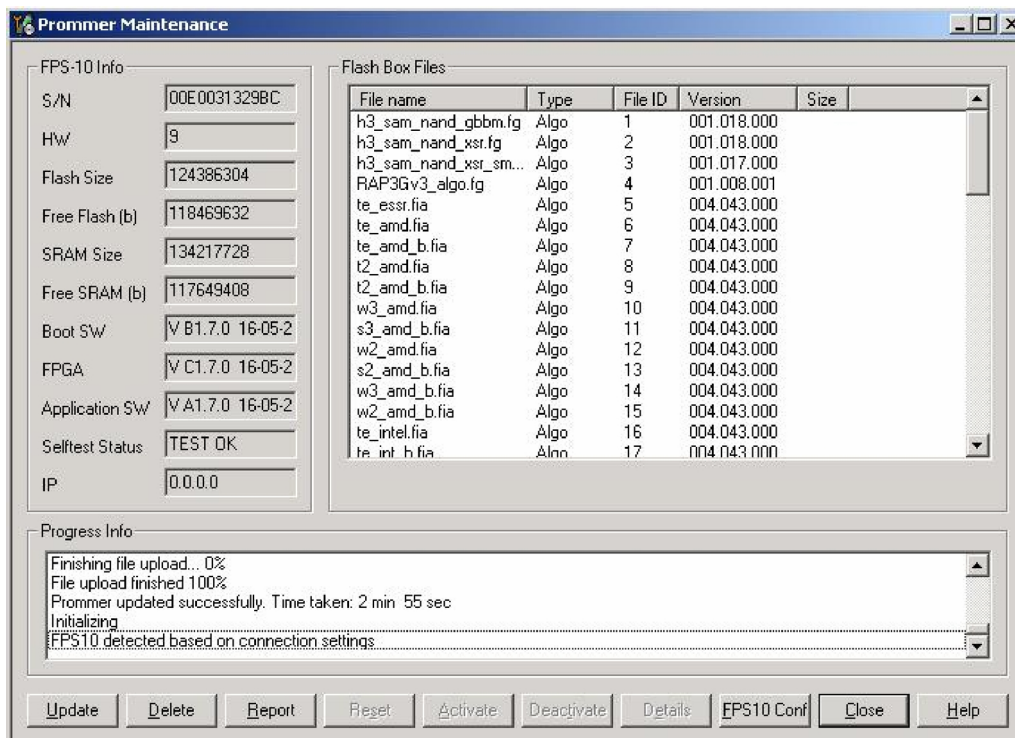
You can also install a memory card to internal compact flash slot inside FPS-10. See instructions in the FPS-10 User Guide. If you use internal compact flash, then you don't need PCMCIA Compact Flash adapter. Compact Flash is also available as service device spare part code 0780232, type MEMORY CARD CF 2G FOR FPS-10.

8. A memory card has to be formatted before use. Press FPS10 Conf button in Prommer Maintenance dialog.



The FPS-10 Configuration dialog box has two tabs: General and Media Formatting. In the General tab, the 'Use DHCP' checkbox is checked. Below it are input fields for IP address, Subnet mask, and Gateway, all showing '0'. The Description field contains 'Nisula'. In the Media Formatting tab, the 'Internal Compact Flash' checkbox is unchecked, and the 'PCCard Compact Flash' checkbox is checked. At the bottom are 'OK' and 'Cancel' buttons.

9. Check PCCard Compact Flash checkbox in Media Formatting and press **OK**.
10. After successful formatting, Phoenix will inform "Media preparation finished 100%". If the formatting is not successful, check that the PC Card is properly installed, reboot the FPS-10 and reformat it.



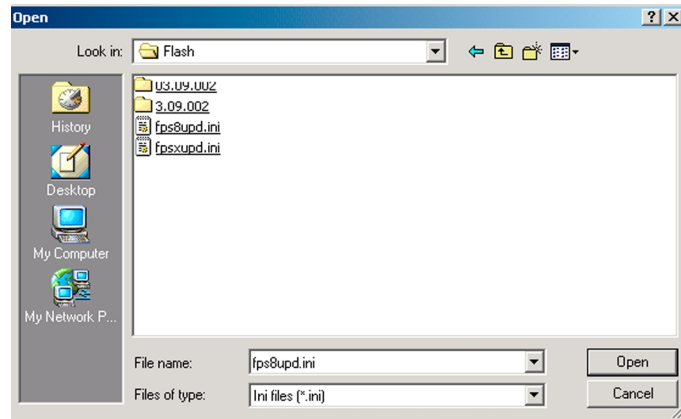
The Prommer Maintenance dialog box displays FPS-10 information and a list of flash box files. The FPS-10 Info section shows details like S/N, HW, Flash Size, Free Flash, SRAM Size, Free SRAM, Boot SW, FPGA, Application SW, Selftest Status, and IP. The Flash Box Files section is a table listing files with their names, types, file IDs, versions, and sizes. The Progress Info section shows the status of file uploads and initialization. At the bottom are buttons for Update, Delete, Report, Reset, Activate, Deactivate, Details, FPS10 Conf, Close, and Help.

File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.018.000	
h3_sam_nand_xsr.fg	Algo	2	001.018.000	
h3_sam_nand_xsr_sm...	Algo	3	001.017.000	
RAP3Gv3_algo.fg	Algo	4	001.008.001	
te_esr.fia	Algo	5	004.043.000	
te_amd.fia	Algo	6	004.043.000	
te_amd_b.fia	Algo	7	004.043.000	
t2_amd.fia	Algo	8	004.043.000	
t2_amd_b.fia	Algo	9	004.043.000	
w3_amd.fia	Algo	10	004.043.000	
s3_amd_b.fia	Algo	11	004.043.000	
w2_amd.fia	Algo	12	004.043.000	
s2_amd_b.fia	Algo	13	004.043.000	
w3_amd_b.fia	Algo	14	004.043.000	
w2_amd_b.fia	Algo	15	004.043.000	
te_intel.fia	Algo	16	004.043.000	
te_int_b.fia	Algo	17	004.043.000	



## Alternative steps

- You can update FPS-10 SW by clicking the **Update** button and selecting the appropriate fpsxupd.ini file in *C:\Program Files\Nokia\Phoenix\Flash*.



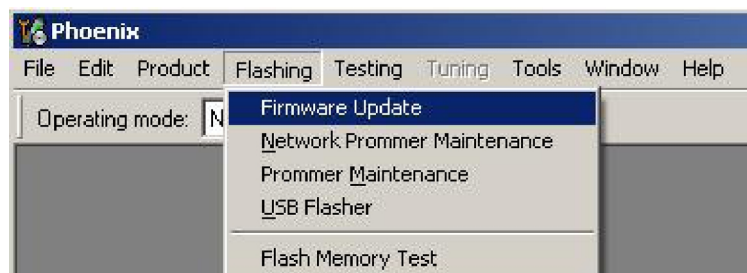
**Figure 12 Flash directory window**

- All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash box files* window and select the file type to be loaded.  
More information can be found in Phoenix **Help**.

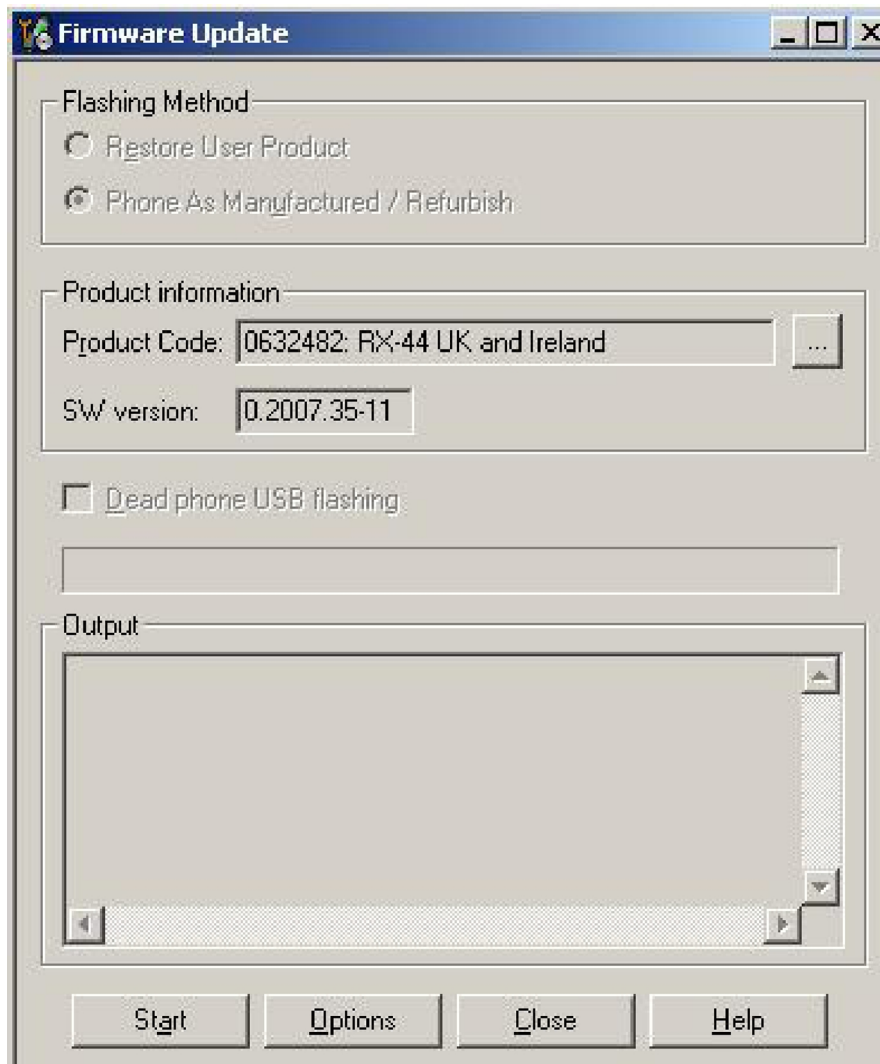
## ■ Flashing with FPS-10 Flash Prommer

### Steps

- First make flashing setup like described in the FS-66 / SS-46 flash concept or in the FS-66 / SS-62 / CU-4 flash concept. Remember to connect the CA-101 cable from the FPS-10 front panel to the product
- Start Phoenix Service Software. Log in and manage connection for the FPS-10. Create and select USB Connection or TCP / IP connection depending on the flashing setup.
- Check that FPS-10 is detected. Check also the status leds in the FPS-10. The MODE2 led (green), VBAT and POWER leds (red) should be lit. If you are using TCP/IP connection, the LAN led (yellow) should be blinking.
- Choose **Flashing ->Firmware update**.



5. The **Firmware Update** dialog reads product code and sets flash filename to a default name, if you have installed datapackage. Press **Options** button and browse another file to be flashed, if you want.



**NOTE!**

The SW update erases all data in the device memory.

Data on a internal or external memory card will not be erased.

Phoenix service SW cannot be used to backup/restore user data or format user data on internal or external memory.

To make backup/restore or format fuctions, applications need to be started from device.

**Backup and restore function**

If data should be saved, data should be backedup with the backup/restore utility in the device.

To backup/restore user data, select **Settings > Backup/restore -> New backup**.

In **New backup**, change the name of the backup and define the desired location of the backup. In **Select data for backup**, select data types you want to back up.

Note that the following information, for example, is not backed up:

- contents of the non-removable internal memory card on Nokia N810 Internet Tablet
- theme settings, when you restore backups from previous product versions

- Bluetooth connectivity settings
- browser settings
- installed applications

To restore data, do the following:

- a Select the desired backup and restore
- b In Select data for backup, select data types to restore

#### **Format internal or external memory card**

Data from internal and external memory card can be cleared with the Format utility of the device.

To view and manage the contents of a memory card, select **Utilities > File manager** and the desired memory card from the folder list.

To format a memory card in file manager, push the menu button (or menu icon in the upper left corner of the display).

Select **Tools > Format memory card**.

All data is permanently deleted.

#### **Clear device – make refurbishment**

To clear the device select **Applications > Settings > Control panel**. Push menu button (or menu icon in the upper left corner of the display). Select **Tools > Clear device > >** enter the lock code of the device, and tap OK to clear the data. Default lock code is 12345.

All content of device and internal 2 GB memory will be deleted. All applications will be closed and the device will restart. Push ok to start.

6. Press **Start** to flash the product. Wait until you are notified that flashing has been successful. The procedure will take a couple of minutes. If the connection is NFPD USB (FBUS), then the USB led (green) should be blinking during flashing. If the connection is NFPD TCP, then the LAN led (yellow) should be blinking. The MODE2 is blinking, when the file is loaded to the FPS-10 flash prommer. See the flash progress also from the Firmware Update dialog.
7. After flashing successfully, click the **Close** button to close the **Firmware Update** dialog.

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## **4 — BB Troubleshooting and Manual Tuning Guide**

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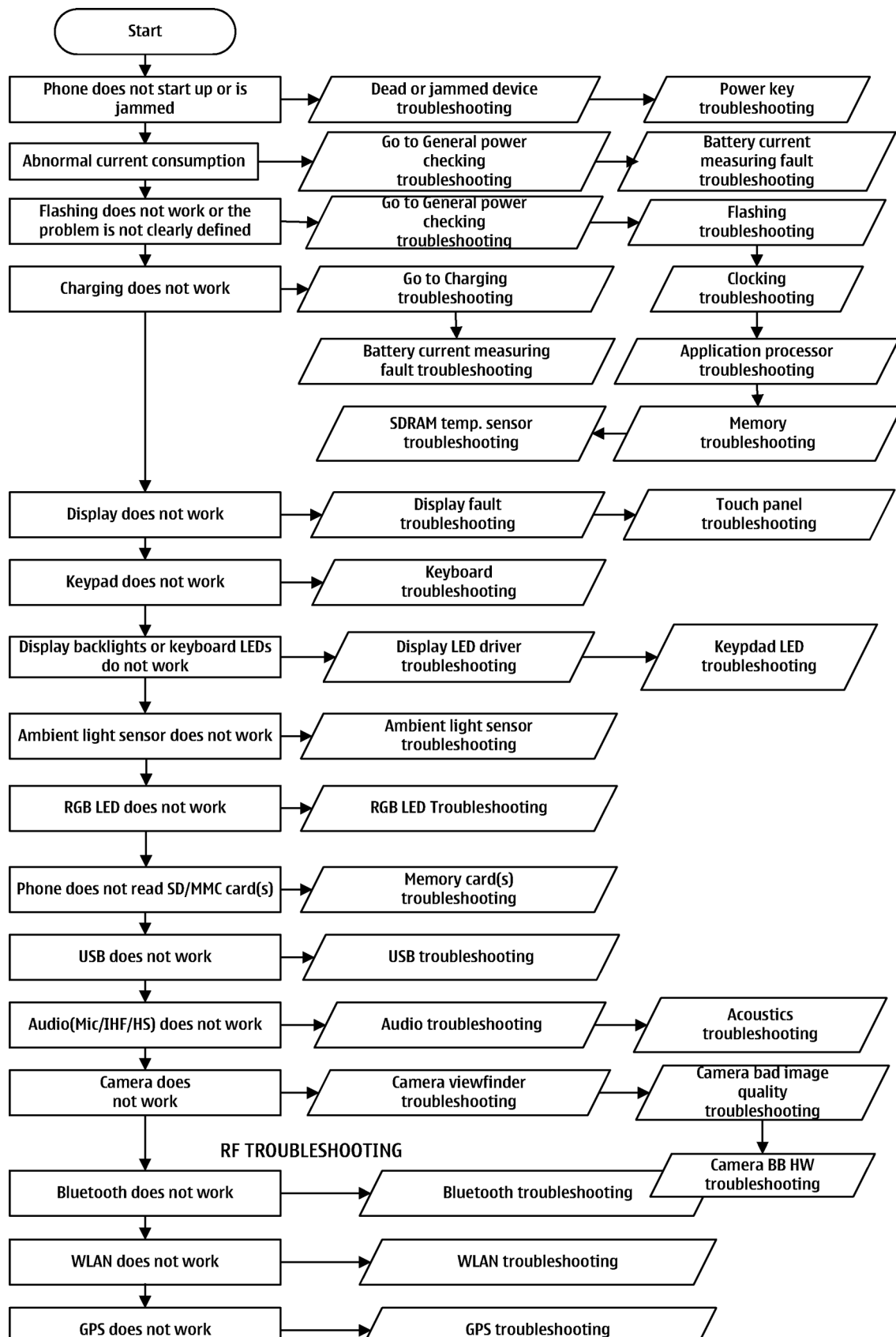
## ■ Main troubleshooting

### Context

This section is intended to be a guide for localising and repairing electrical faults. The fault repairing is divided into troubleshooting paths.

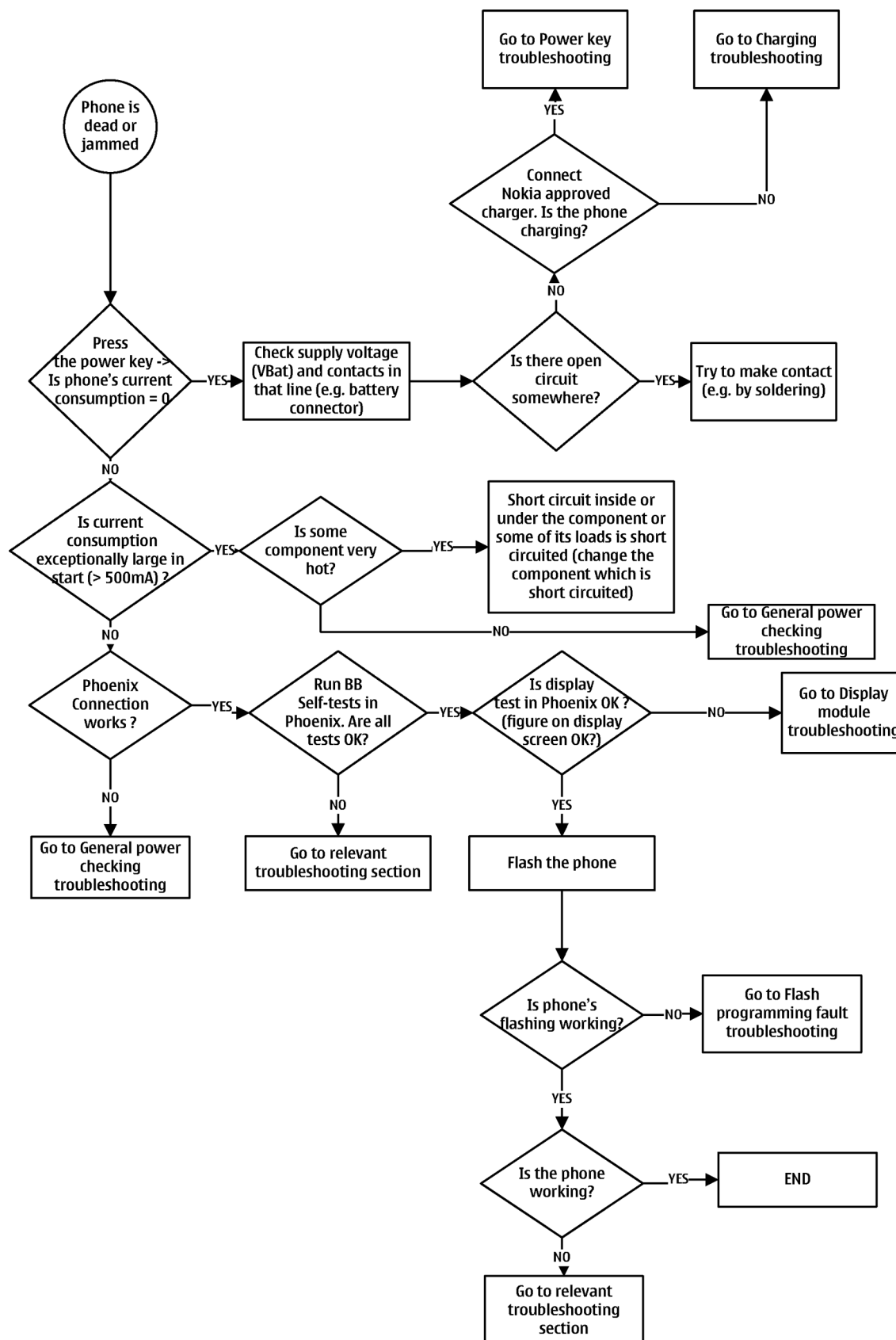
The following main troubleshooting tree describes the different baseband troubleshooting paths to be followed in fault situations.

## Troubleshooting flow



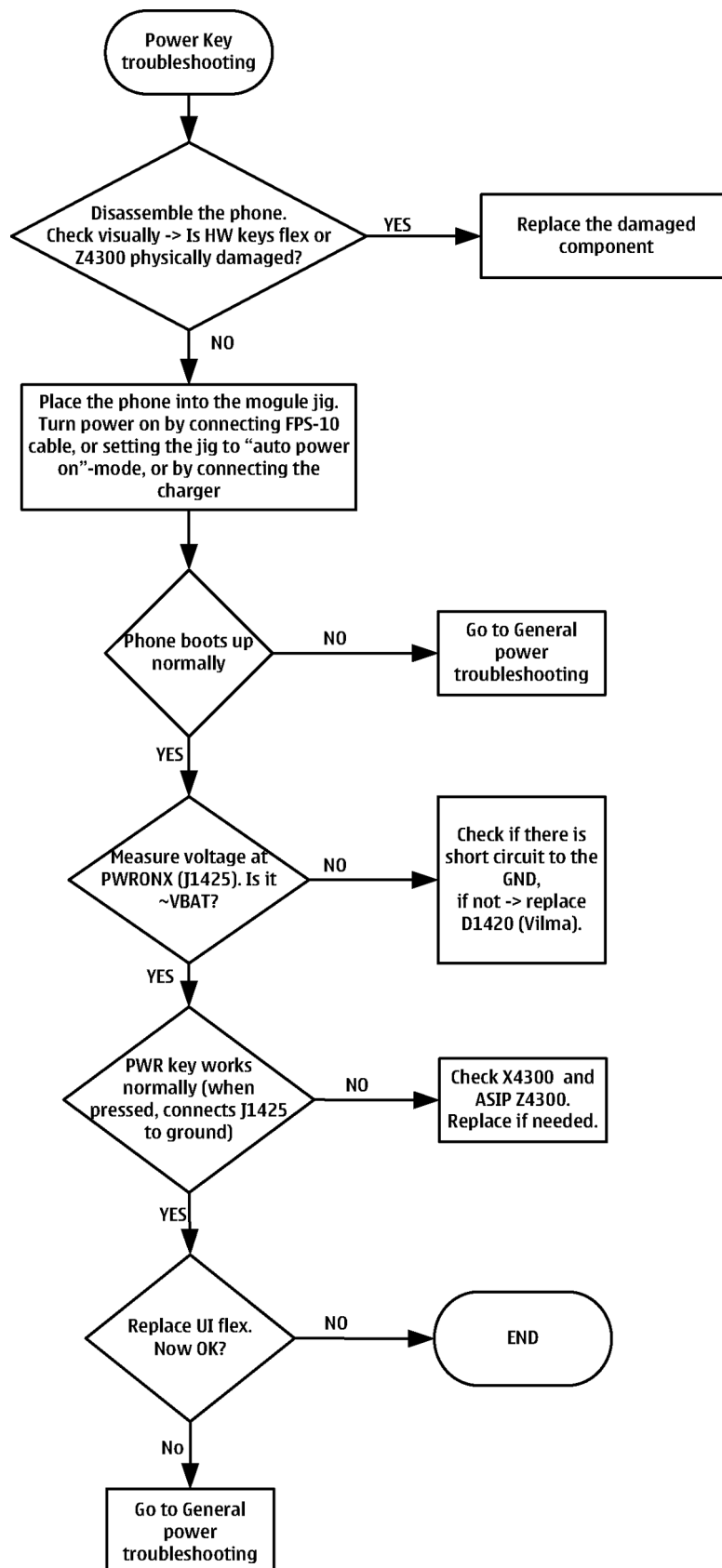
## ■ Dead or jammed device troubleshooting

### Troubleshooting flow



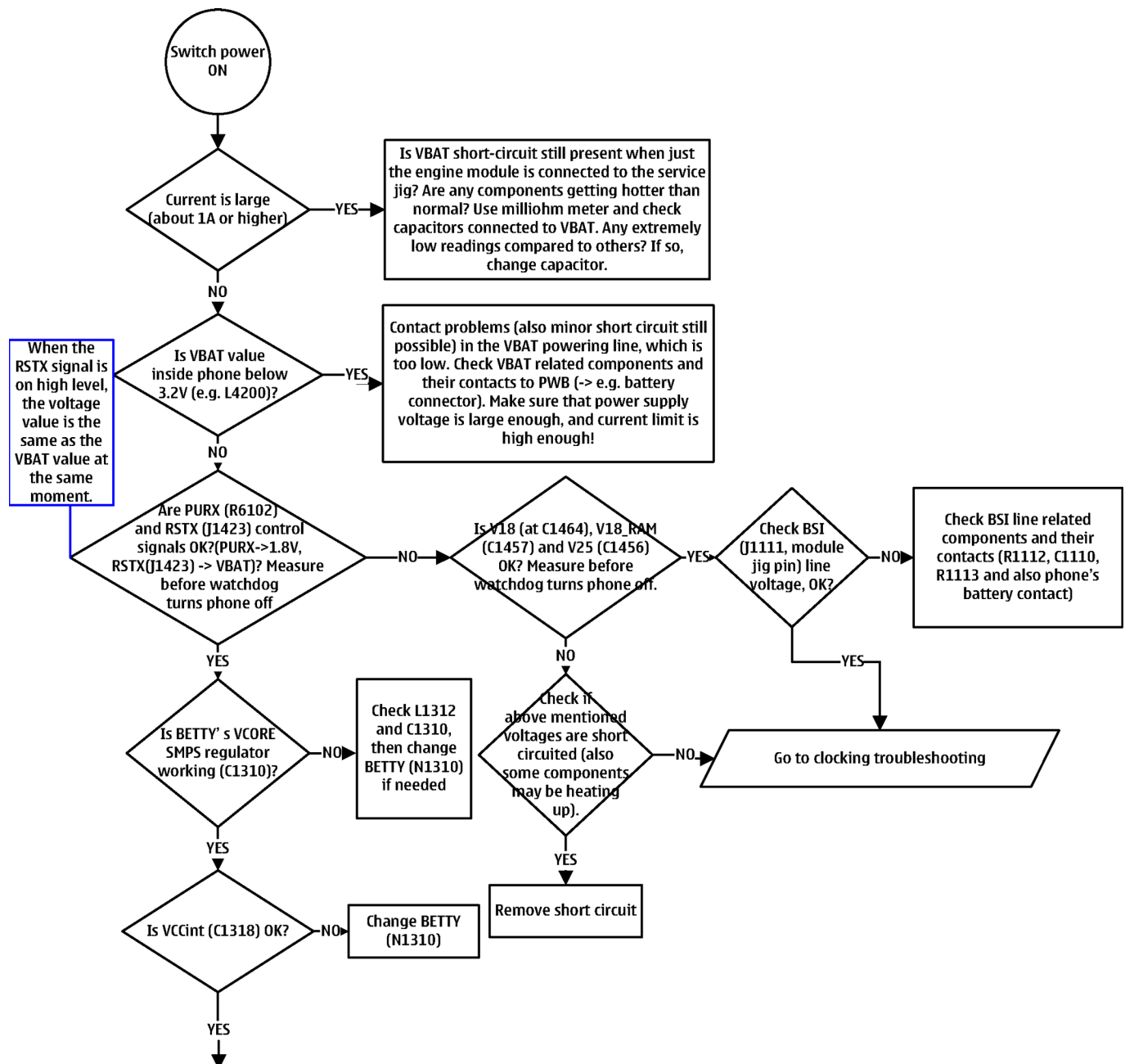
## ■ Power key troubleshooting

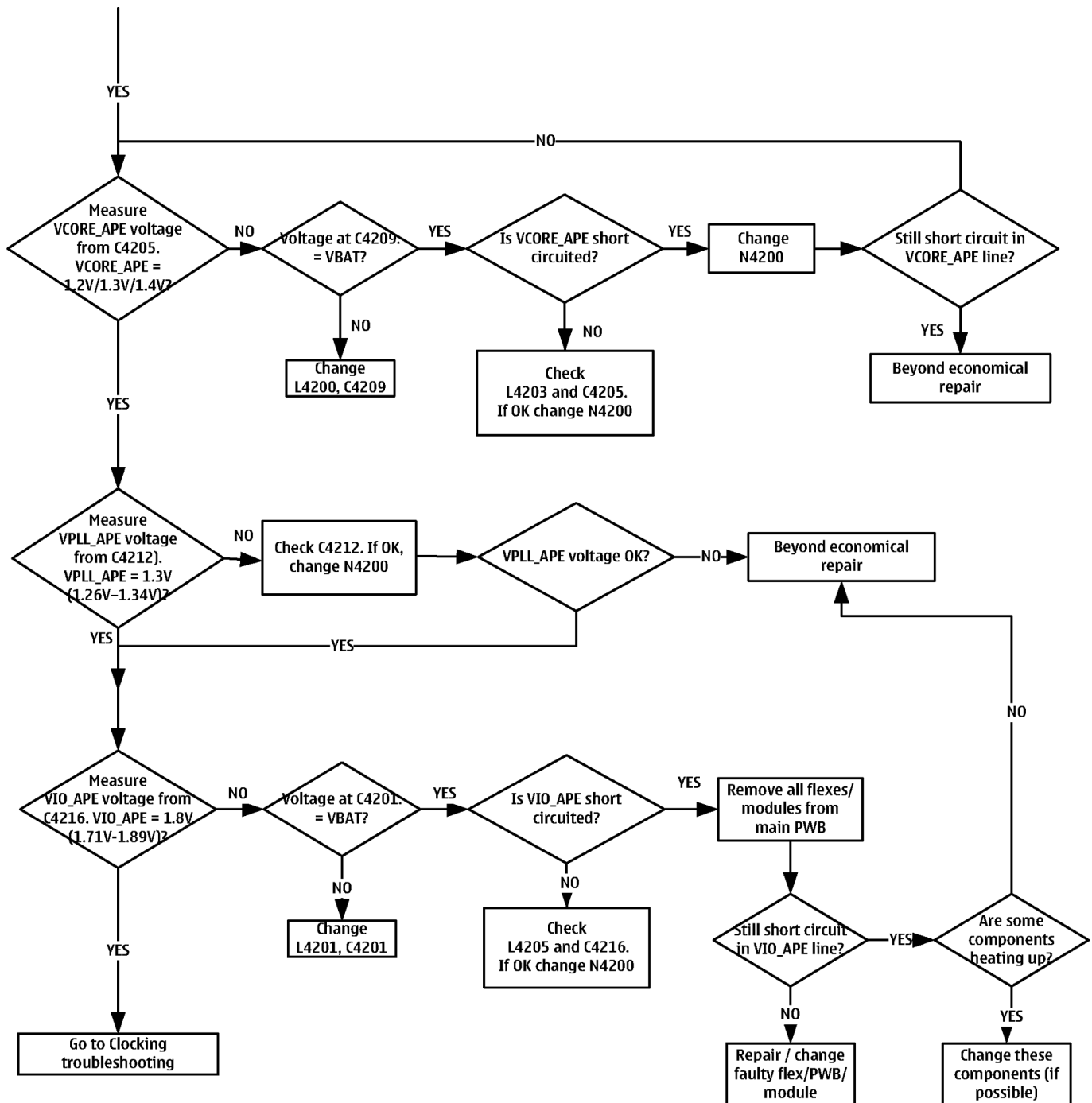
### Troubleshooting flow



## ■ General power checking troubleshooting

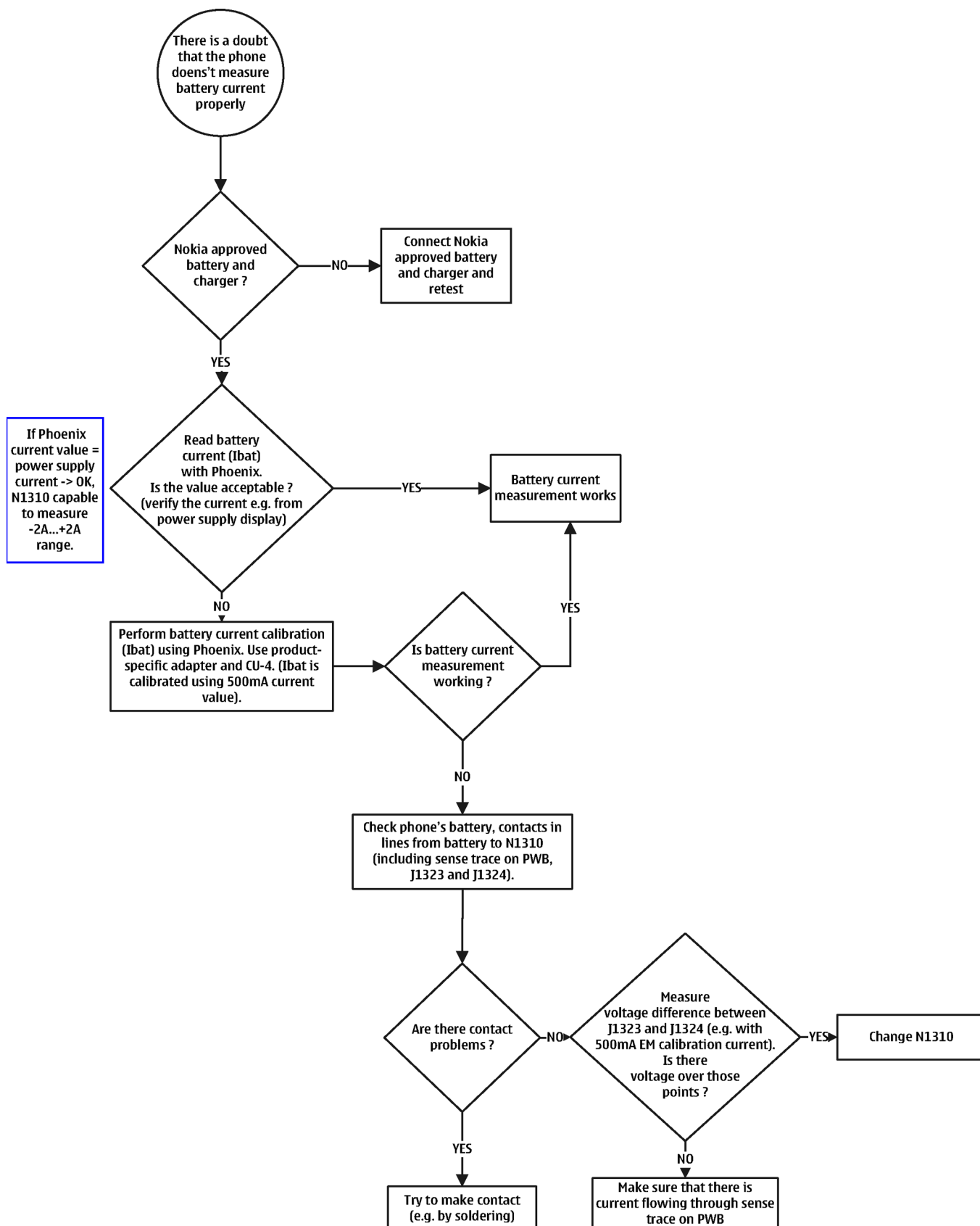
### Troubleshooting flow





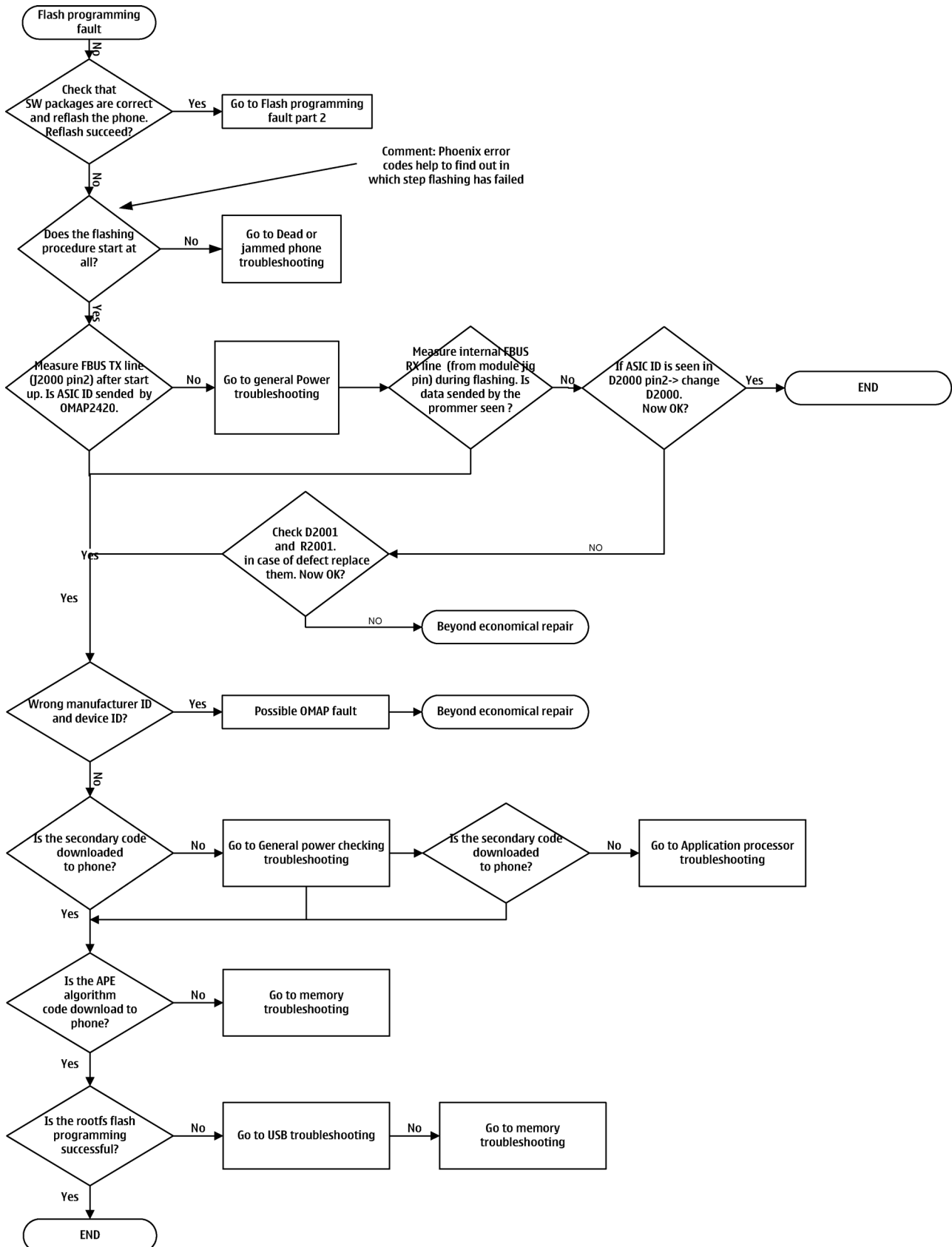
## ■ Battery current measuring troubleshooting

### Troubleshooting flow



## Flash programming fault troubleshooting

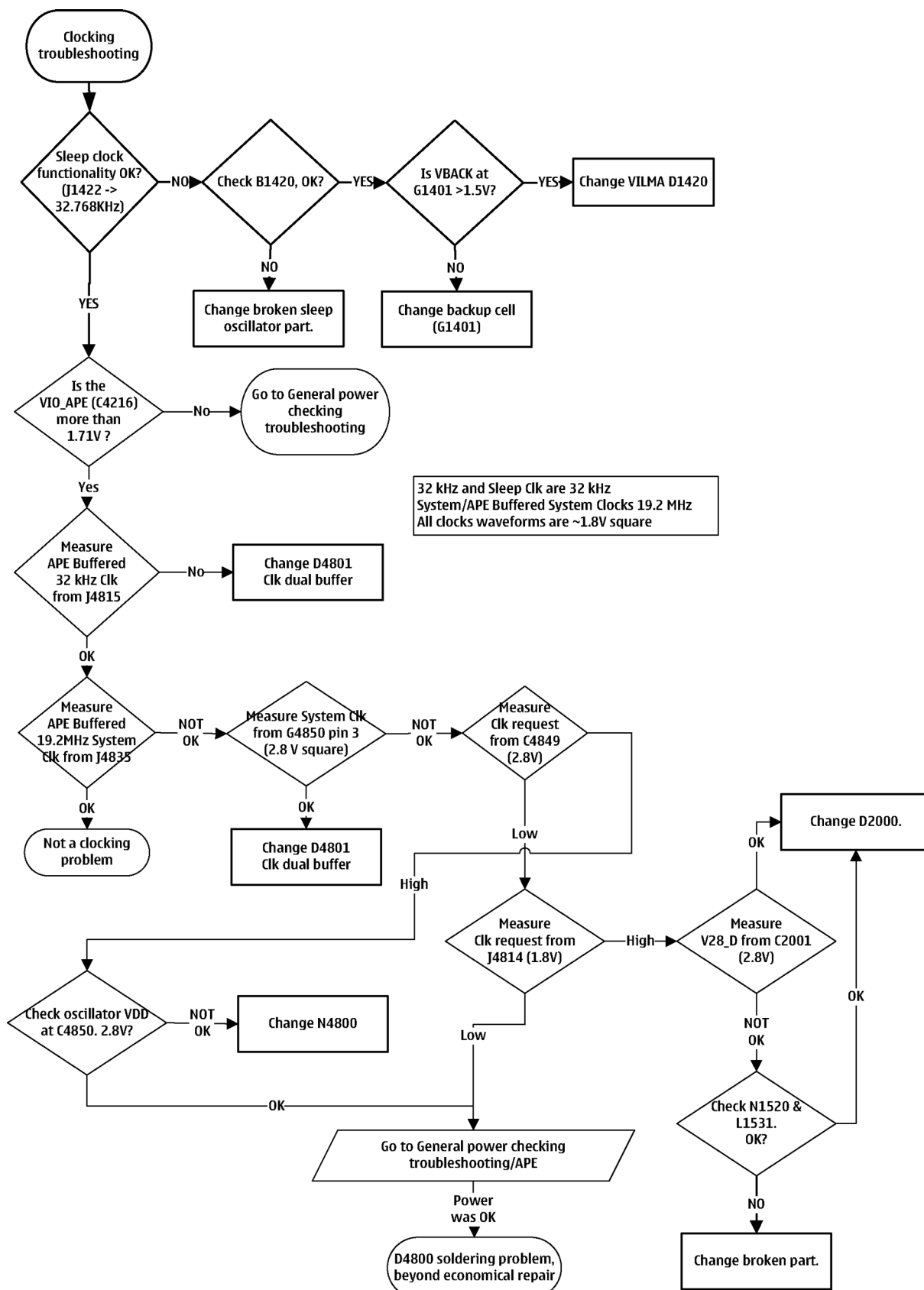
### Troubleshooting flow





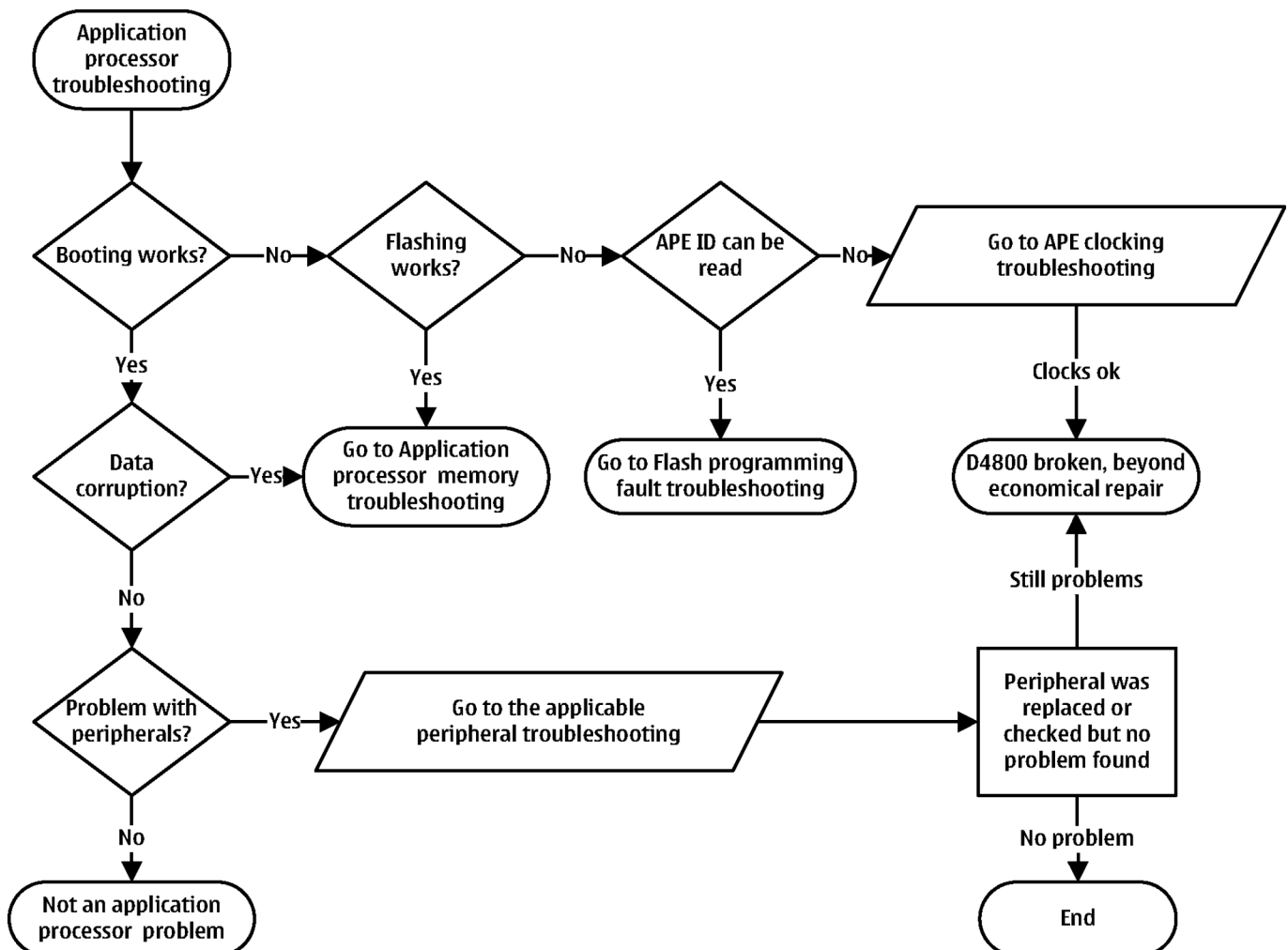
## ■ Clocking troubleshooting

### Troubleshooting flow



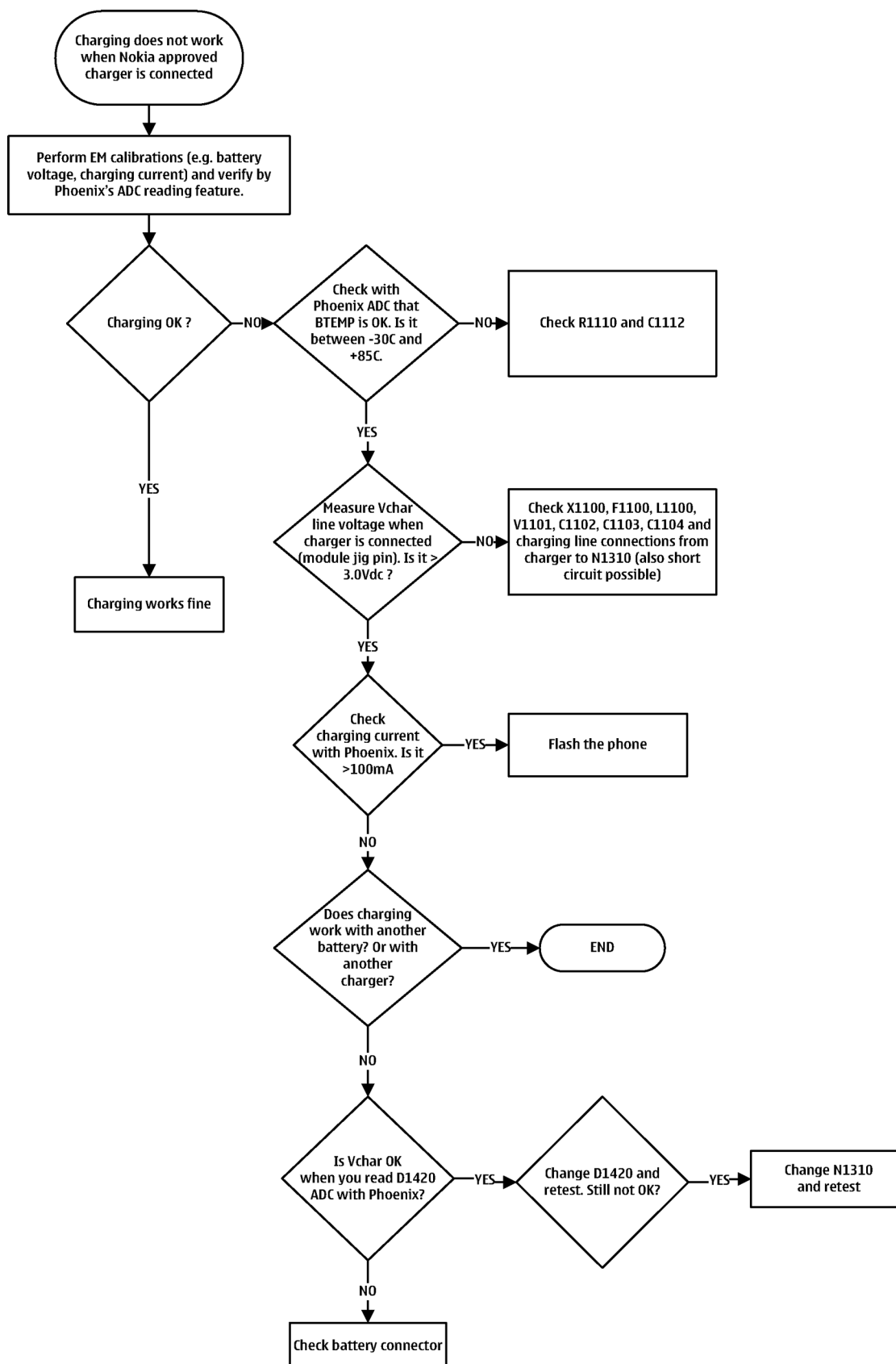
## ■ APE CPU troubleshooting

### Troubleshooting flow



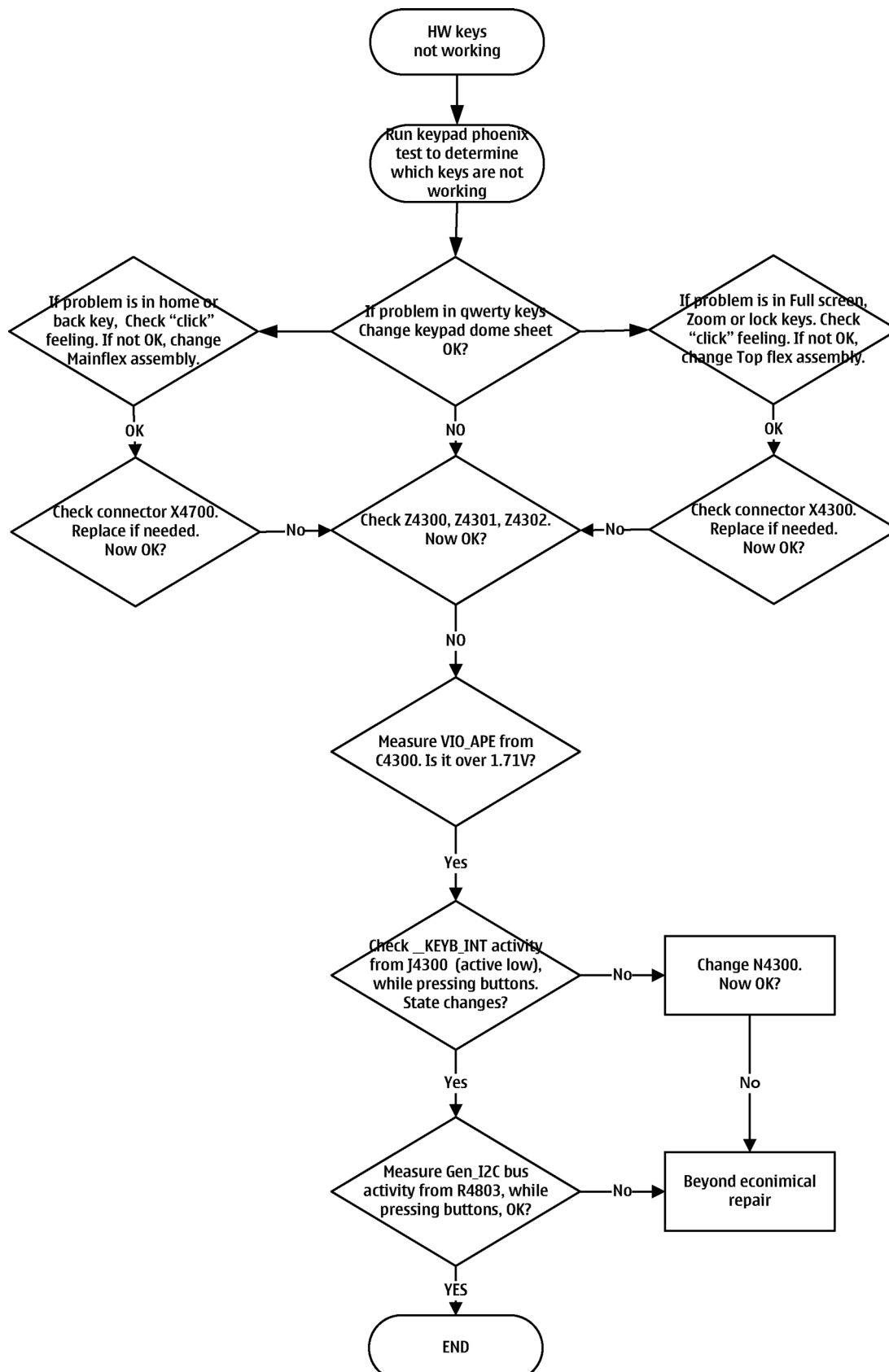
## ■ Charging troubleshooting

### Troubleshooting flow



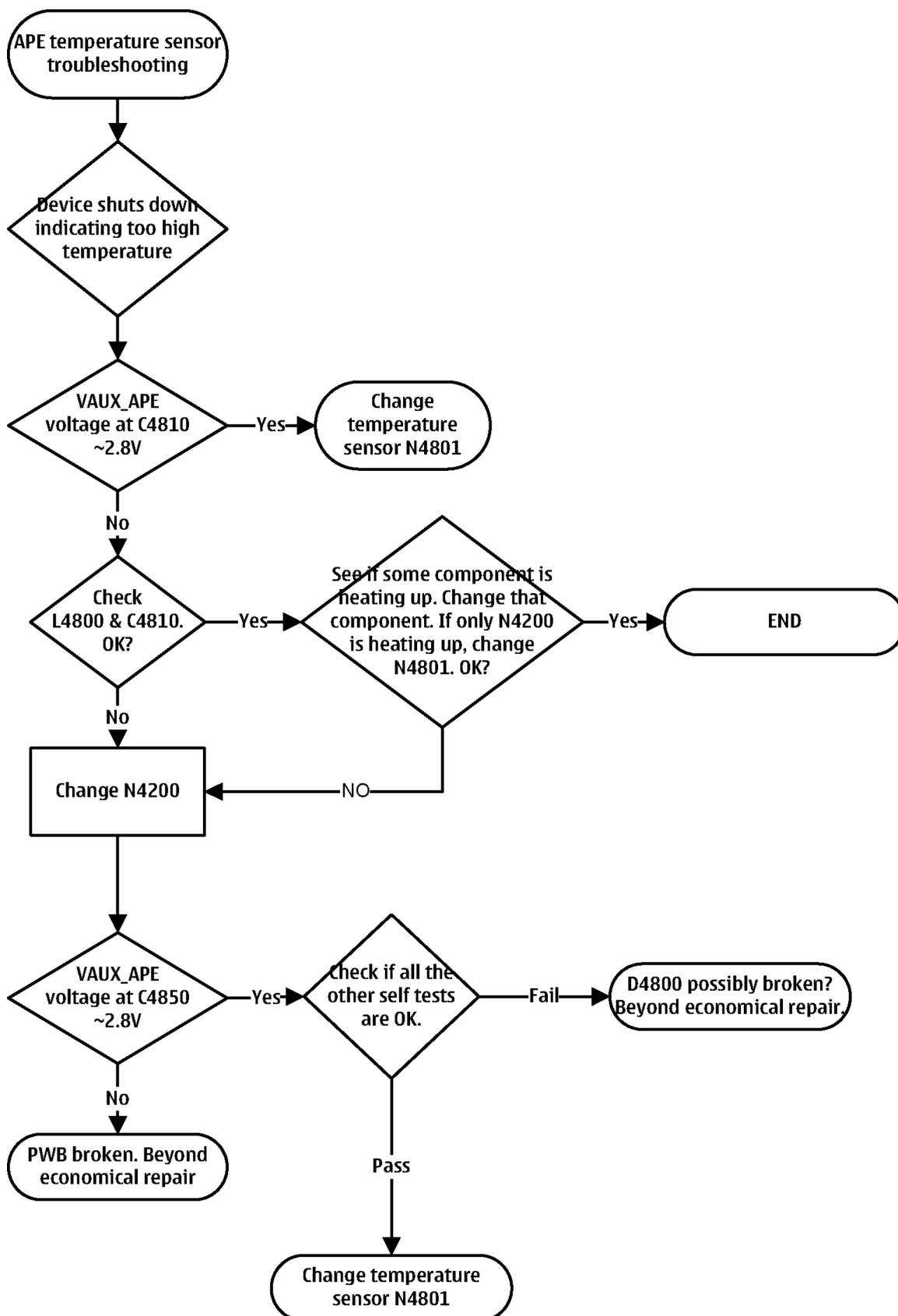
■ HW keys troubleshooting

Troubleshooting flow



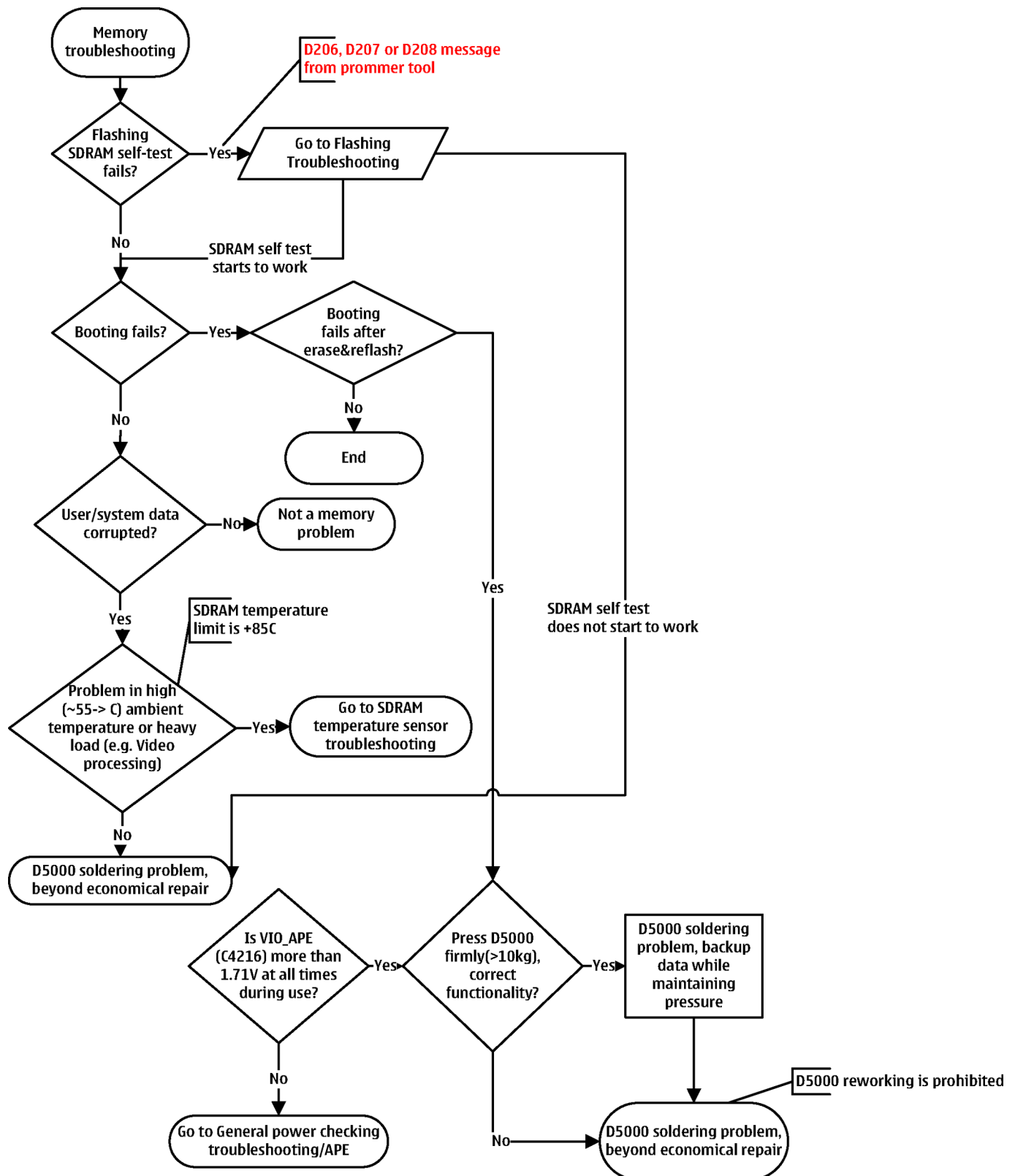
## ■ SDRAM temperature sensor troubleshooting

### Troubleshooting flow



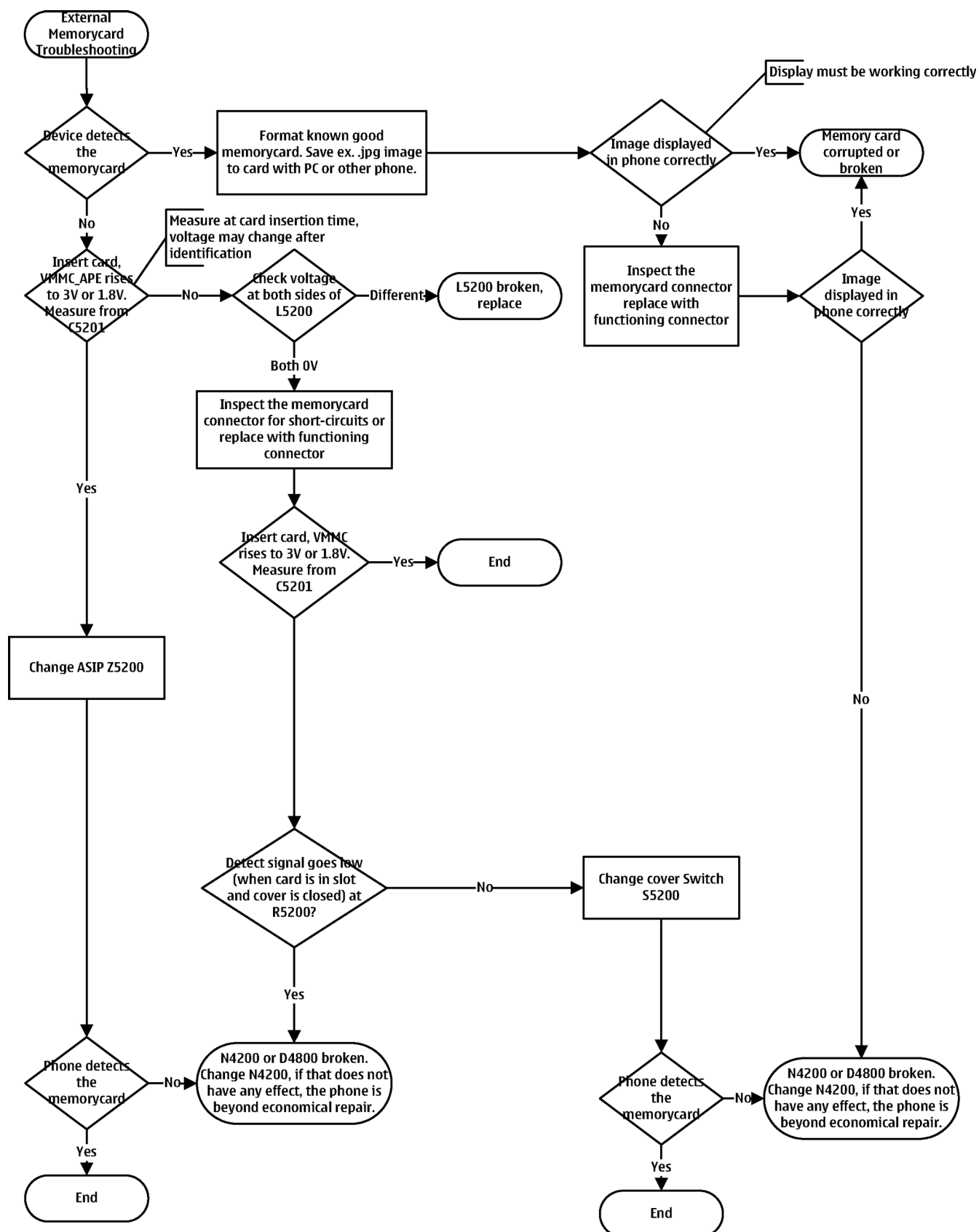
## ■ Memory troubleshooting

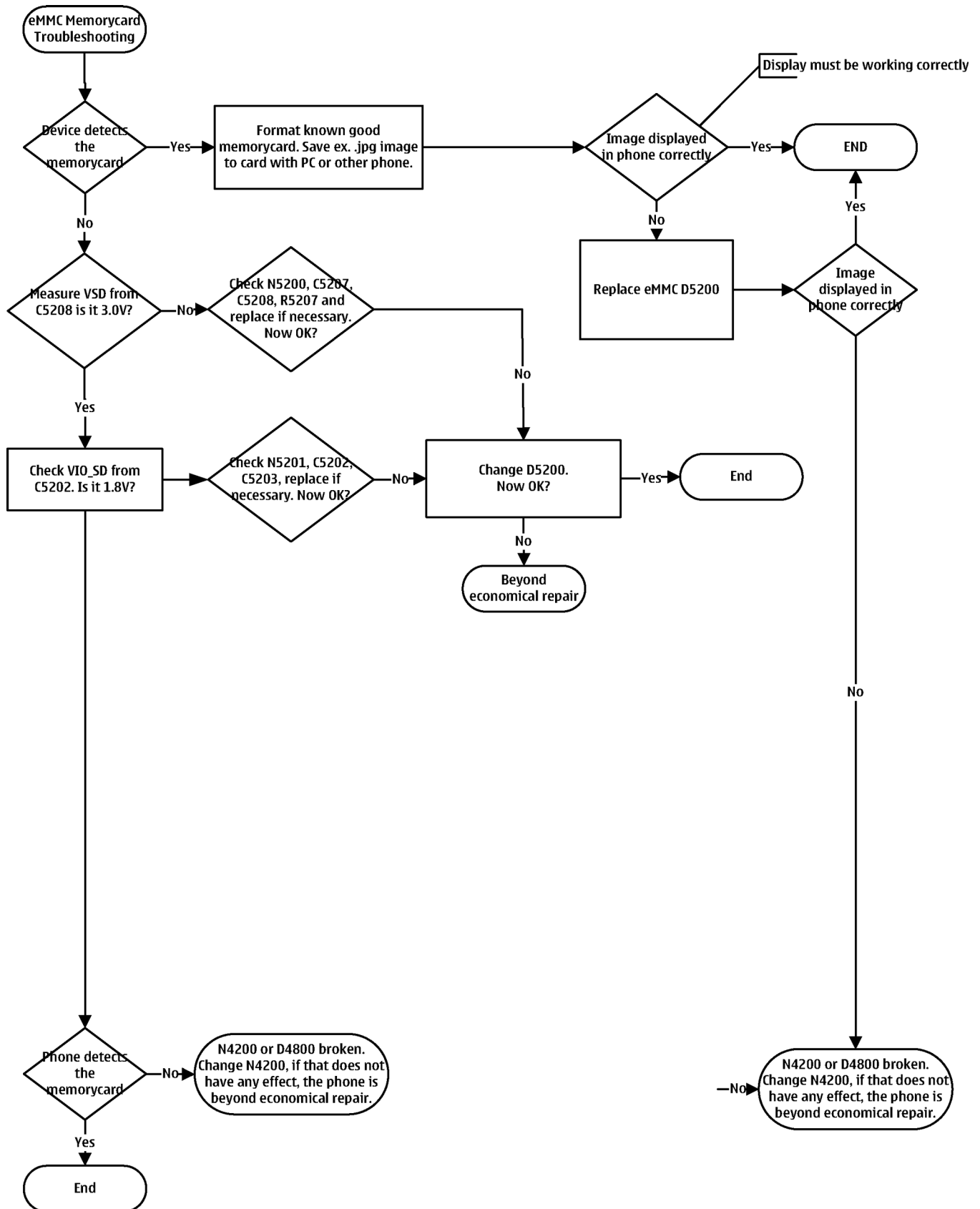
### Troubleshooting flow



## ■ Memorycards troubleshooting

### Troubleshooting flow

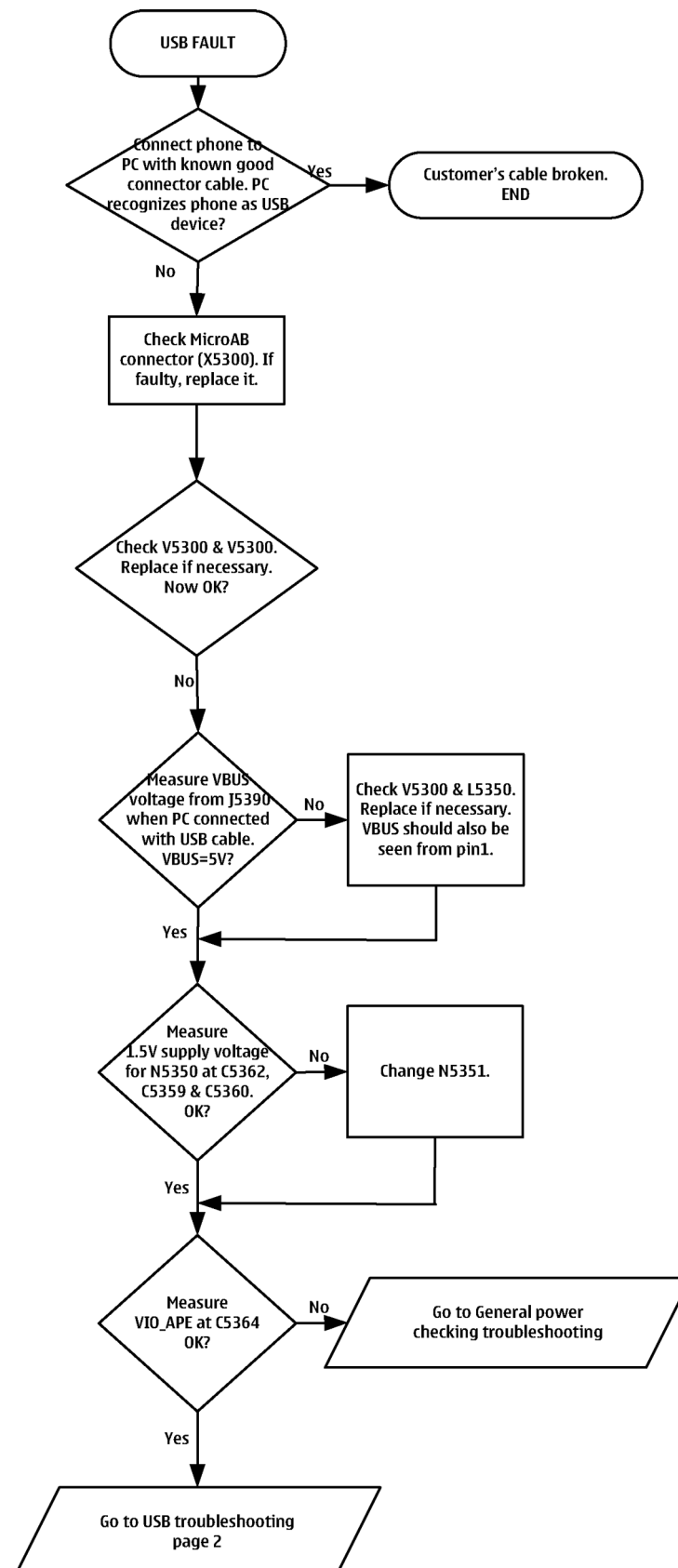


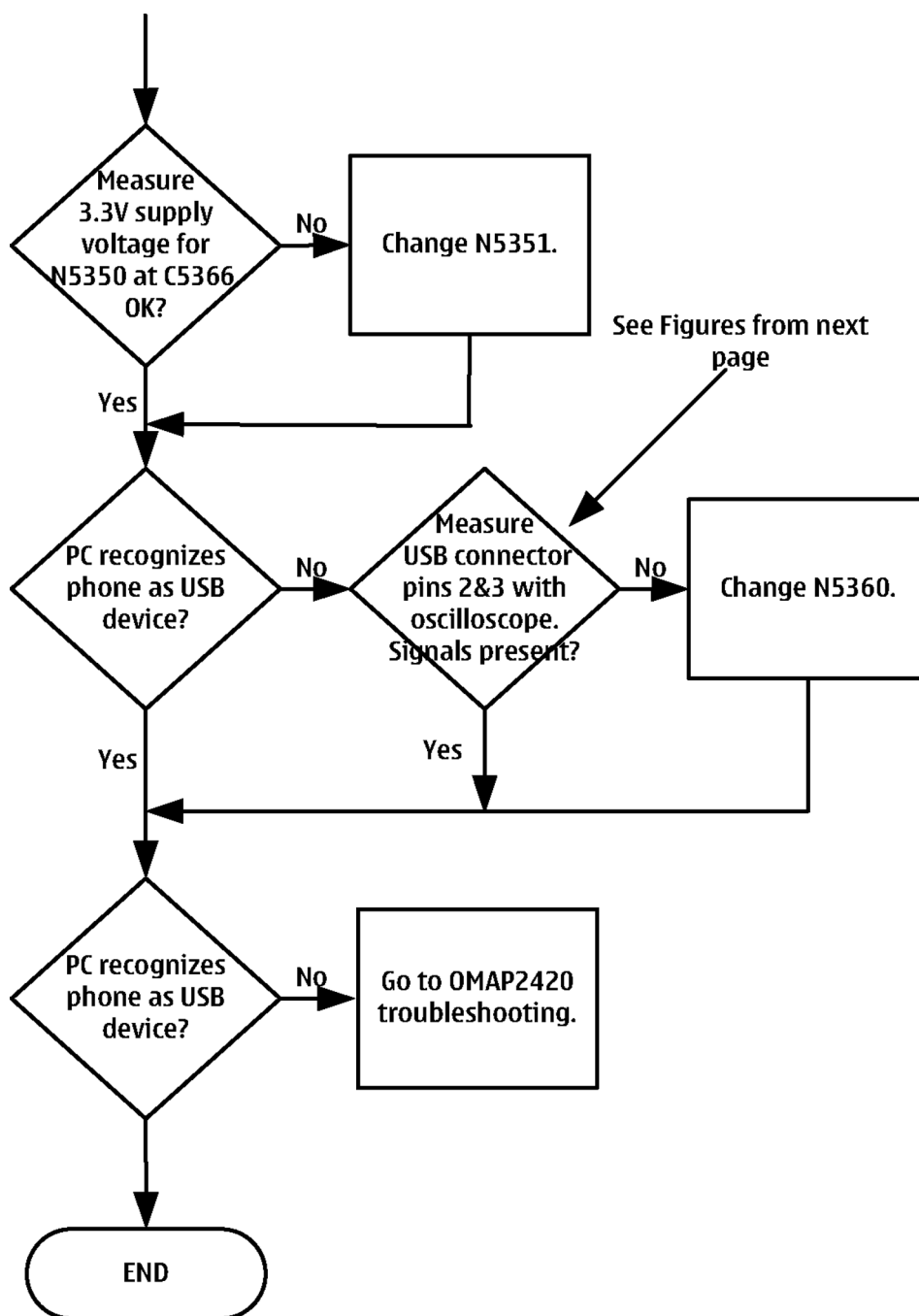




## ■ USB interface troubleshooting

### Troubleshooting flow





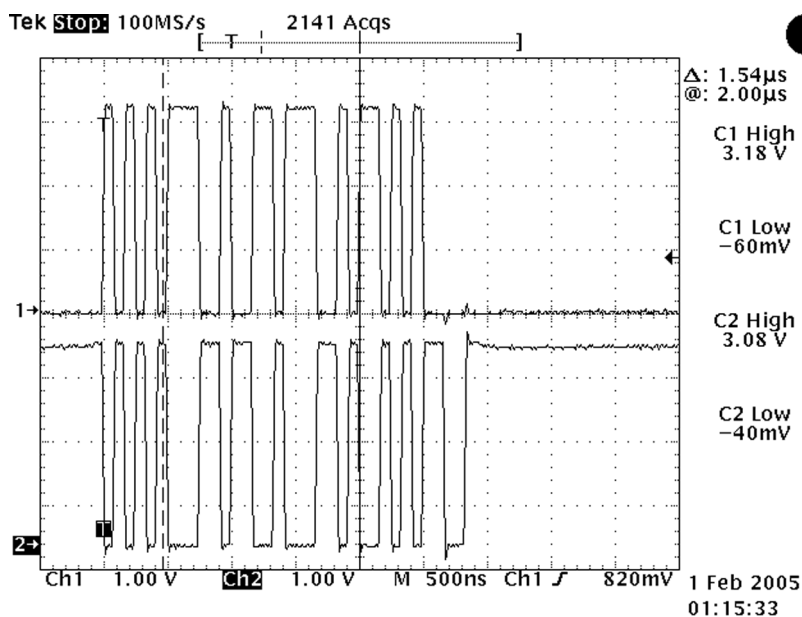


Figure 13 Full speed USB

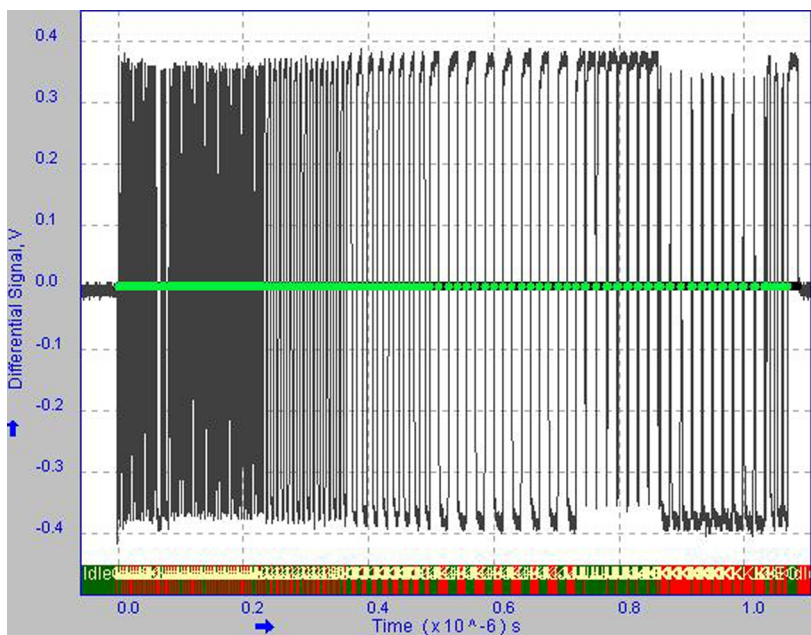


Figure 14 High speed USB differential pulse

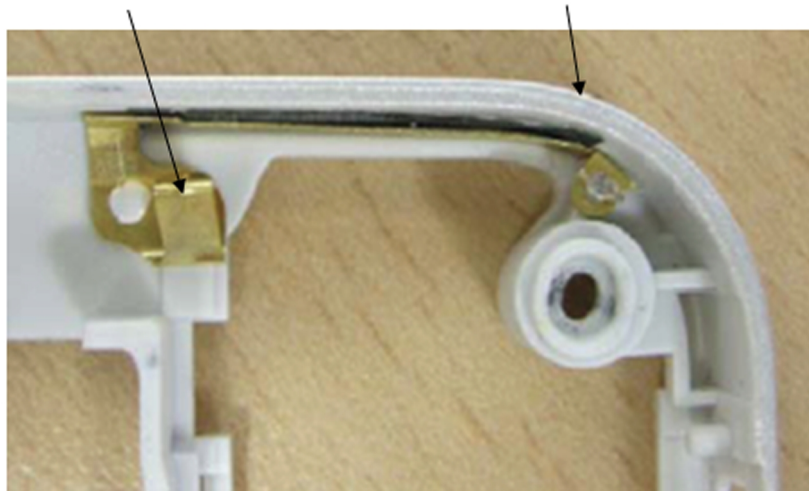
## ■ GPS troubleshooting

### GPS antenna

The GPS antenna is located at the top of the left corner of B-cover.

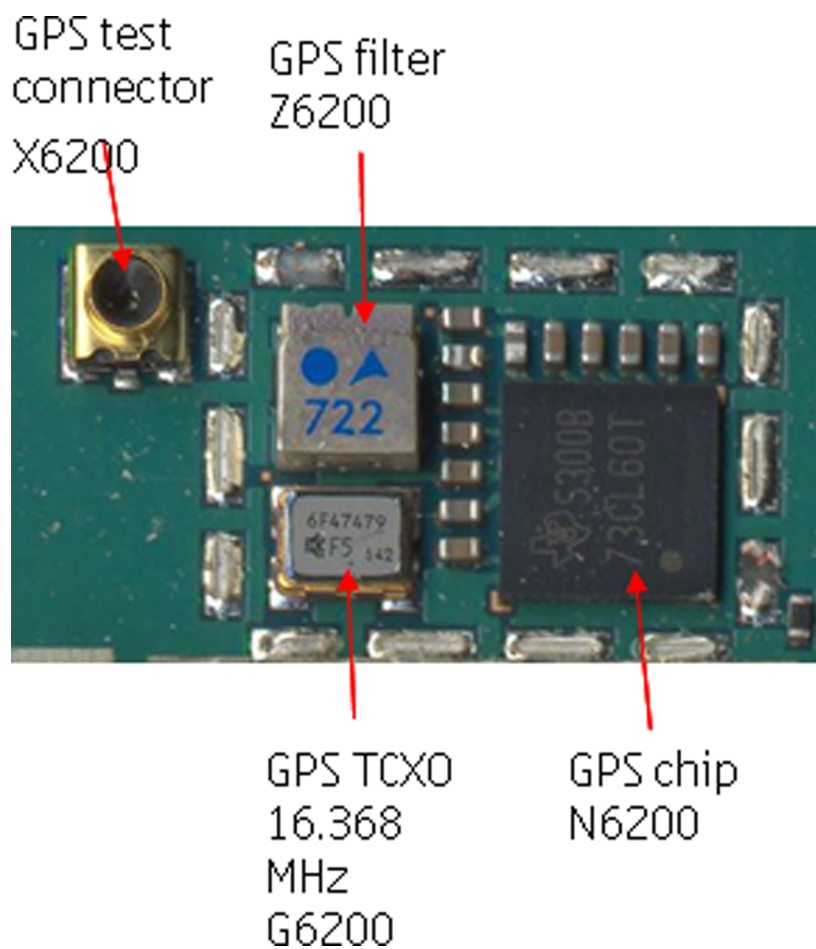
Antenna contact

B-cover



**Figure 15 GPS antenna**

The GPS antenna is mounted into B-cover and antenna contact point towards antenna test pad on PWB is pointed out in a GPS antenna picture.



**Figure 16 GPS key components**

Components are located on the bottom side of the PWB at the upper left corner.

## GPS layout and basic test points

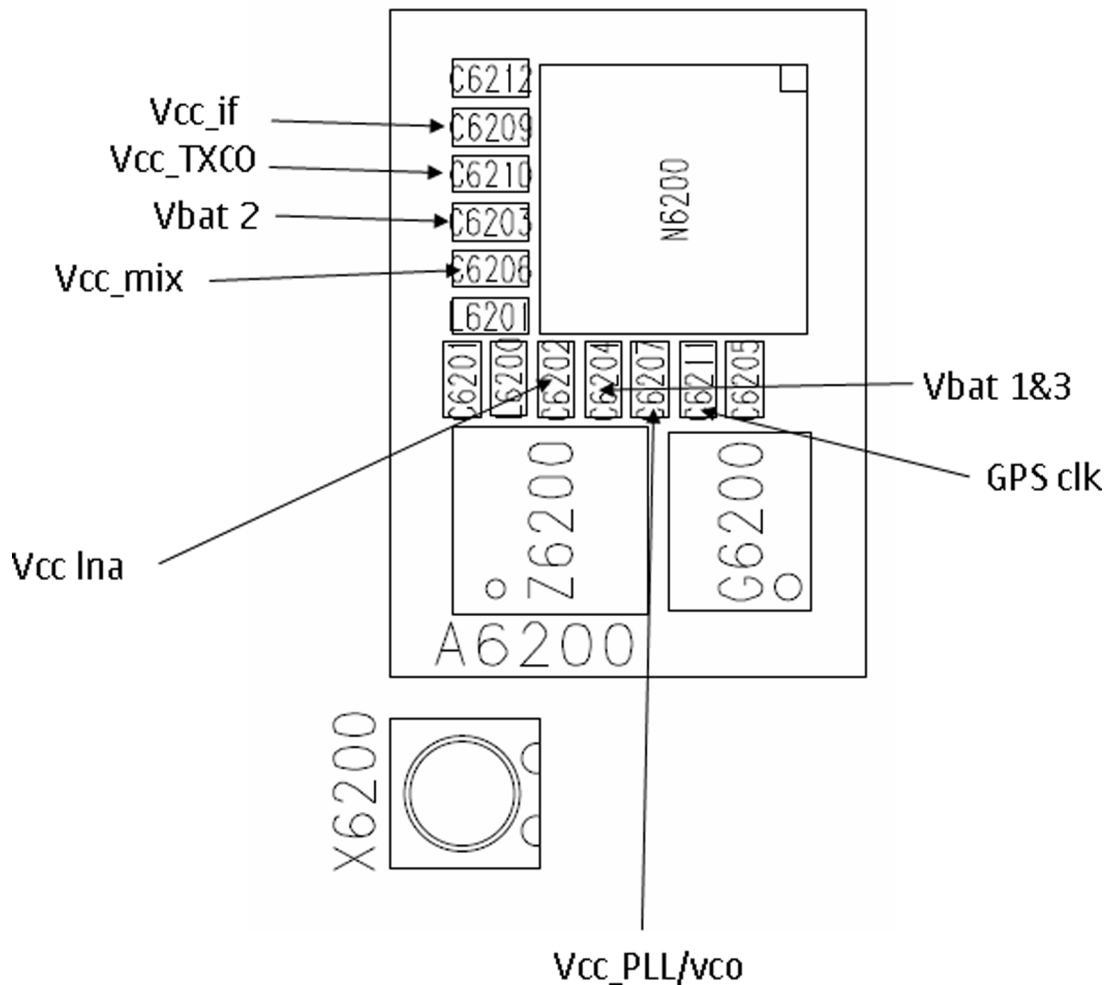


Figure 17 GPS layout and basic test points

VBat, ASIC internal LDO voltages, and clocks are available as shown in figure above.

## GPS settings for Phoenix

### GPS control

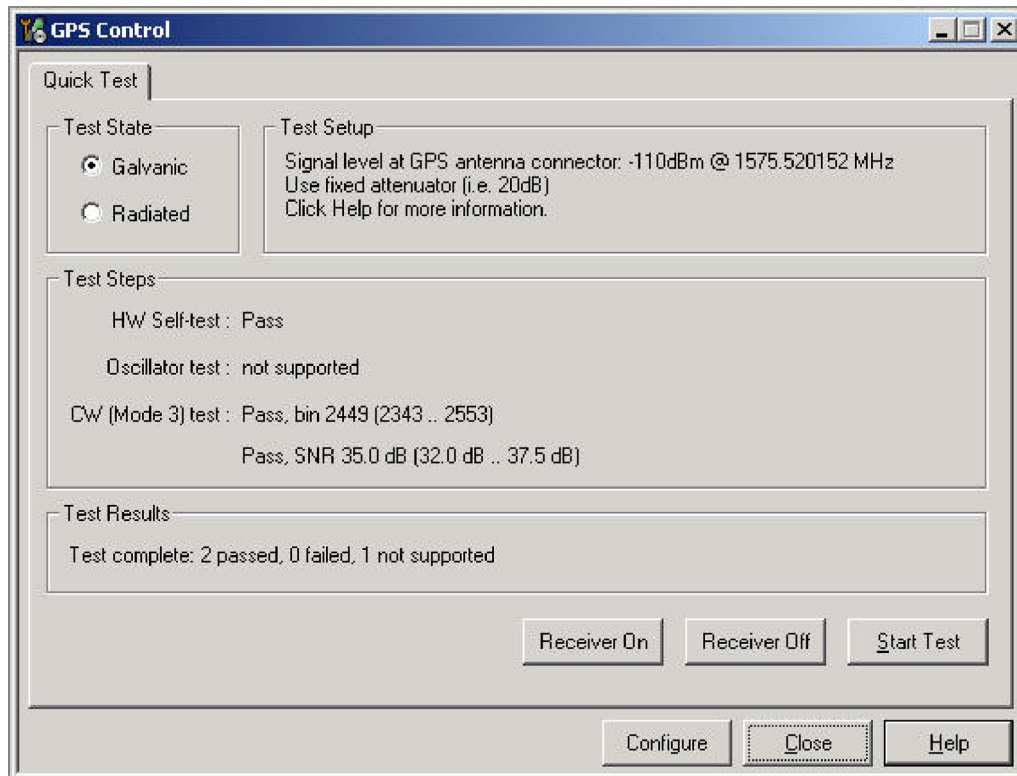
#### Context

Use the following to test GPS using Phoenix.

#### Steps

1. Start Phoenix service software.
2. From the **File** menu, select **Scan Product** and check that the correct product version is displayed.

- From the **Testing** menu, select **GPS Control**. This opens up *GPS Control* dialogue box, as shown in the figure below, and enables the GPS.



**Figure 18 GPS Control dialog box**

At this point all clocks should be present, GPS\_En\_Reset & SleepX should be high, and Vdd\_Dig, Vcc\_TCXO & Vcc\_PLL/VCO will be present.

Receiver On turns on all RF sections of the ASIC and so all LDOs will be on. These checks are part of [GPS basic checks troubleshooting \(page 4–30\)](#).

### **Quick Test window**

The *Quick Test* window has all the necessary functionality for GPS troubleshooting. Ensure the test setup is correct and click **Start Test**. (Select **Help** for further information).

This test will perform 3 tests in one; Self Test, Oscillator Test (not supported) and CW Test, and will provide a Pass/Fail response. It also contains a Receiver On button. These checks are part of [GPS failure troubleshooting \(page 4–29\)](#).

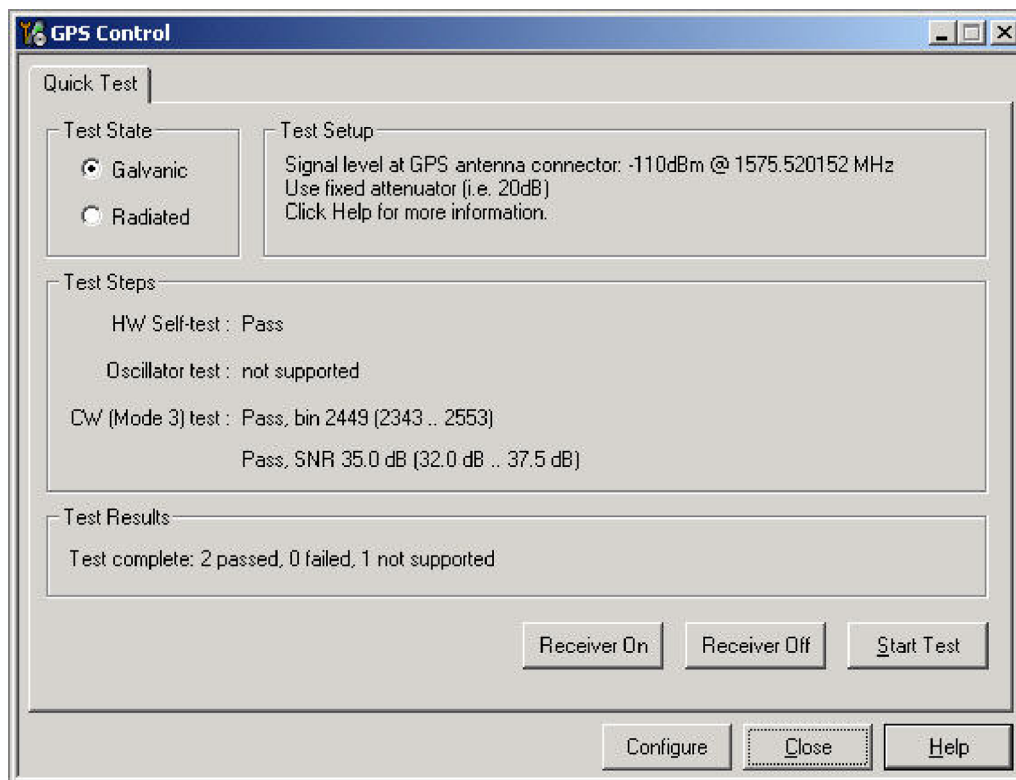


Figure 19 GPS Quick Test window for GPS troubleshooting

### GPS RF test points

The GPS antenna test pad is located on the left side under the decoration cover as shown in figure "GPS antenna test pad". Checking for a connection of test point will confirm that the antenna is working correctly, as well as performing a radiated CW test.

J 6201 = GPS Antenna test pad

In order to probe GPS RF test points, inject 1575.52 MHz tone @ -50dBm at the GPS antenna test connector and select **Receiver On**, then probe the GPS RF test points as shown in figure "GPS RF probe points". Compare RF levels with a known reference phone.



## GPS antenna test pad

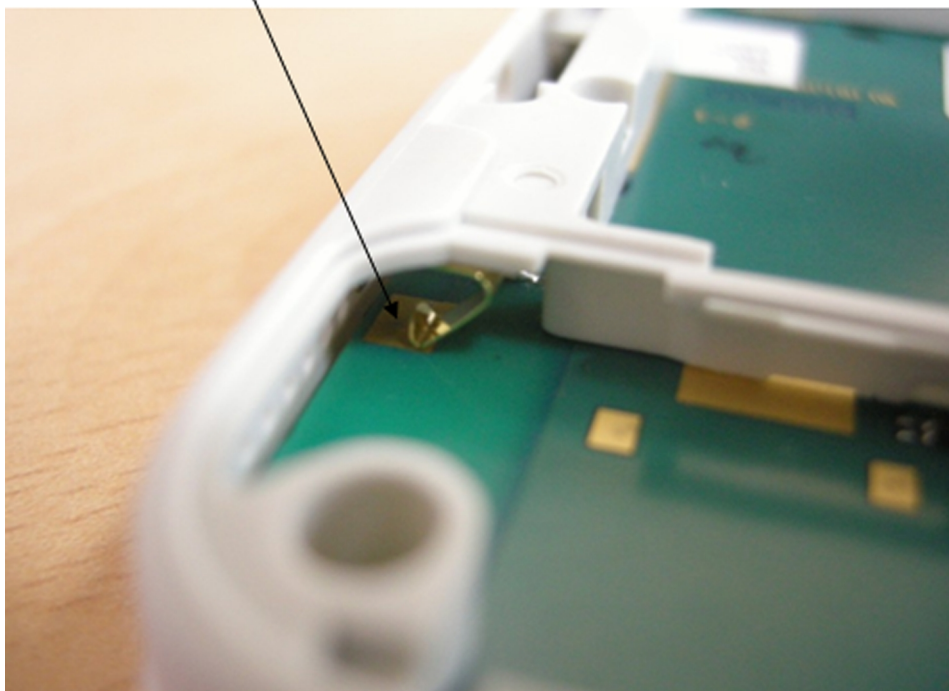


Figure 20 GPS antenna test pads

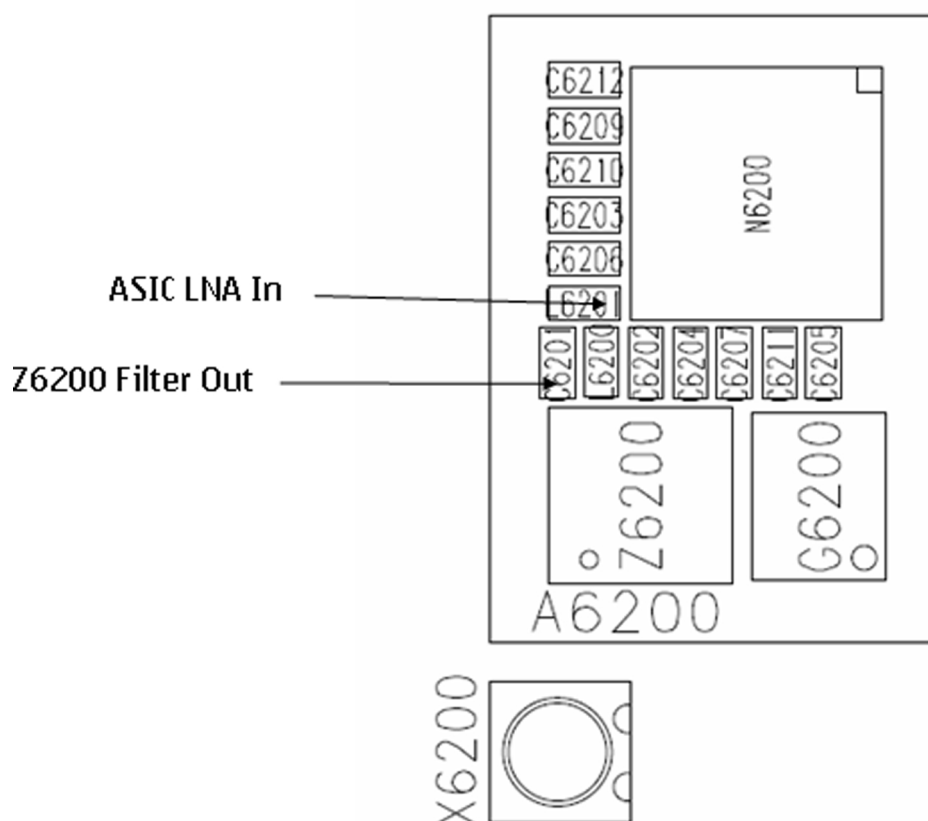


Figure 21 GPS RF probe points

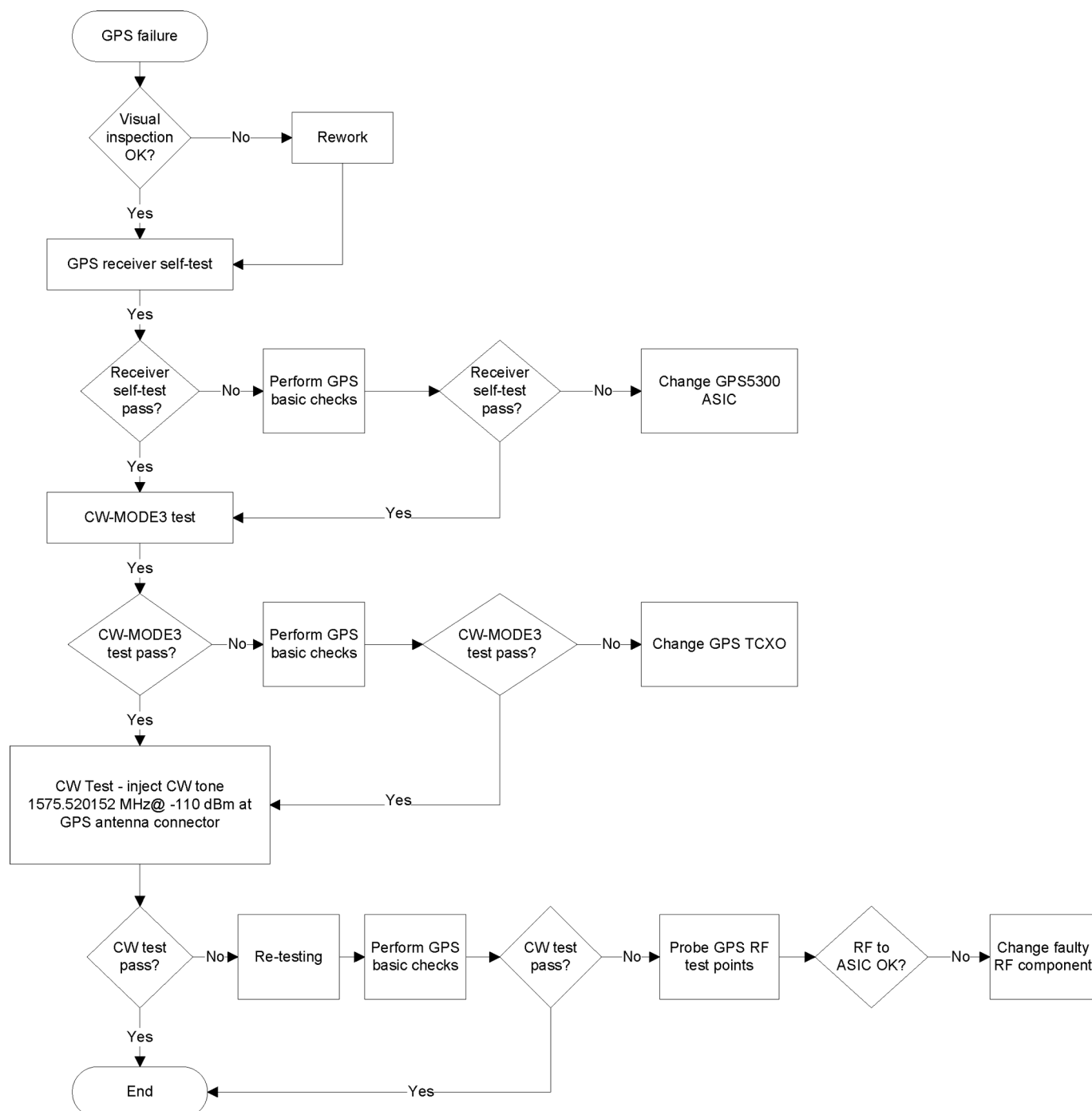


## GPS failure troubleshooting

### Context

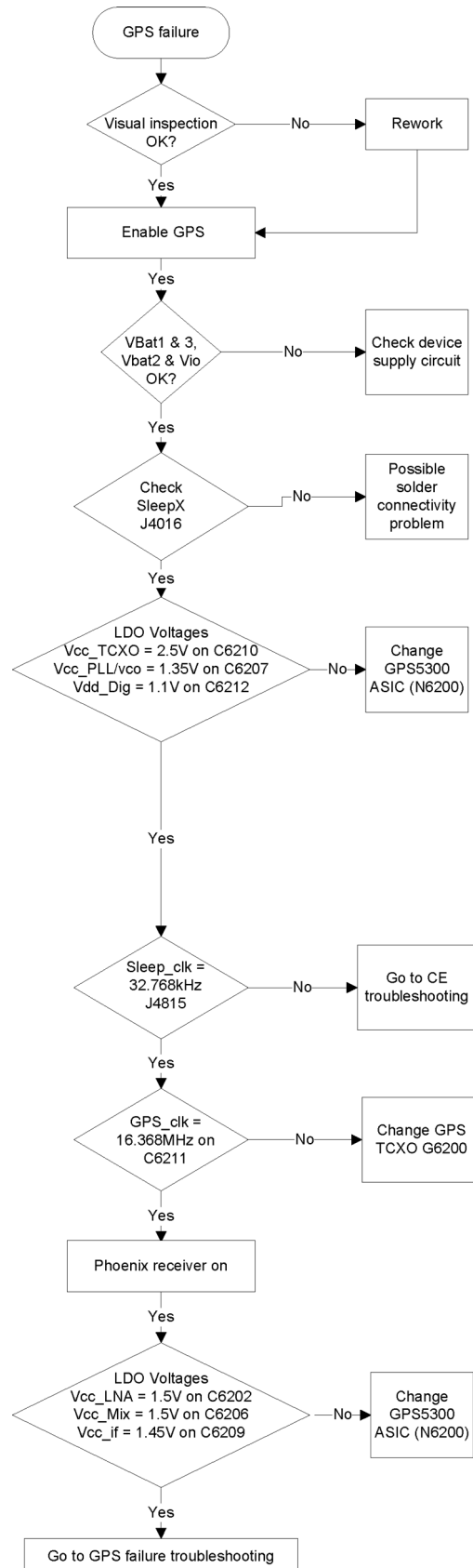
GPS troubleshooting is broken down into two parts: general GPS failure & GPS basic checks. The GPS failure troubleshooting flow can be followed and, where applicable, will feed into the Basic checks troubleshooting flow.

### Troubleshooting flow



## GPS basic checks troubleshooting flow

### Troubleshooting flow



### GPS radiated CW test

The meaning of the test is to confirm that GPS antenna is working properly and antenna connection to the test pad is good enough.

The coupler position A4 in SA-131:



Figure 22 Test set-up

Coupler attenuation is about 20 dB at GPS frequency.

### GPS settings for Phoenix; GPS control

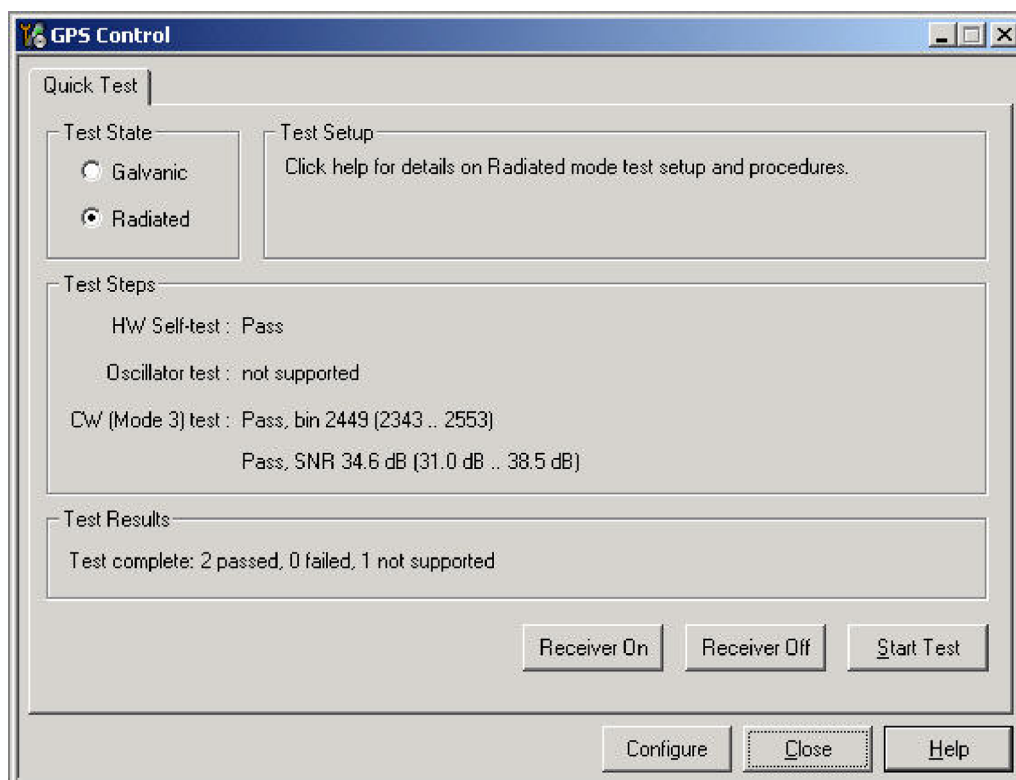
#### Context

Use the following to test GPS using Phoenix.

#### Steps

1. Start Phoenix service software.
2. From the File menu, select Scan Product and check that the correct product version is displayed.
3. From the Testing menu, select GPS Control. This opens up GPS Control dialogue box, as shown in the figure below, and enables the GPS.

4. Choose Test state to Radiated.



5. Attach the SA-131 adapter to CU4/SS-62 +FS-66 as shown in figure above (Test Set-Up).

6. Adjust signal level and frequency from RF generator according to instructions which could be found by clicking "Help" button.

7. Click Start Test.

This test will perform 3 tests in one; Self Test, Oscillator Test (not supported) and CW Test, and will provide a Pass/Fail response.

## ■ Display module troubleshooting

### General instructions for display troubleshooting

The first step is to verify with a working display that the fault is not on the display module itself. The display module cannot be repaired.

The second step is to check that the engine is working normally. This can be done by connecting the phone to a docking station and starting Phoenix service software. With the help of Phoenix read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).

After these checks proceed to the display troubleshooting flowcharts. Use the Display Test tool in Phoenix to find the detailed fault mode.

## Pixel defects

**Table 7 Display module troubleshooting cases**

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
---------------	--

Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. Backlight is also controlled automatically by the ambient light sensor.  This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen.  The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

**Table 8 Pixel defects**

Bright sub-pixels	(sometimes called on-pixels or stuck-on) are characterized by the appearance of bright/colored pixels in, for example, black full screen picture.
Dark sub-pixels	(sometimes called off-pixels, stuck-off, or black pixels) are characterized by the appearance of dark pixels in white, red, green, or blue full-screen picture.
Combined sub-pixel	defects are characterized by at least two sub-pixels defects (bright or dim) being closer than 5 mm to each other.
Temporal sub-pixels	(sometimes called blinking defects) exhibit temporal variations not related to any steady-state video input. Temporal sub-pixel defects may be intermittent, exhibit a sudden change of state, or be flickering.

**Table 9 Defects table**

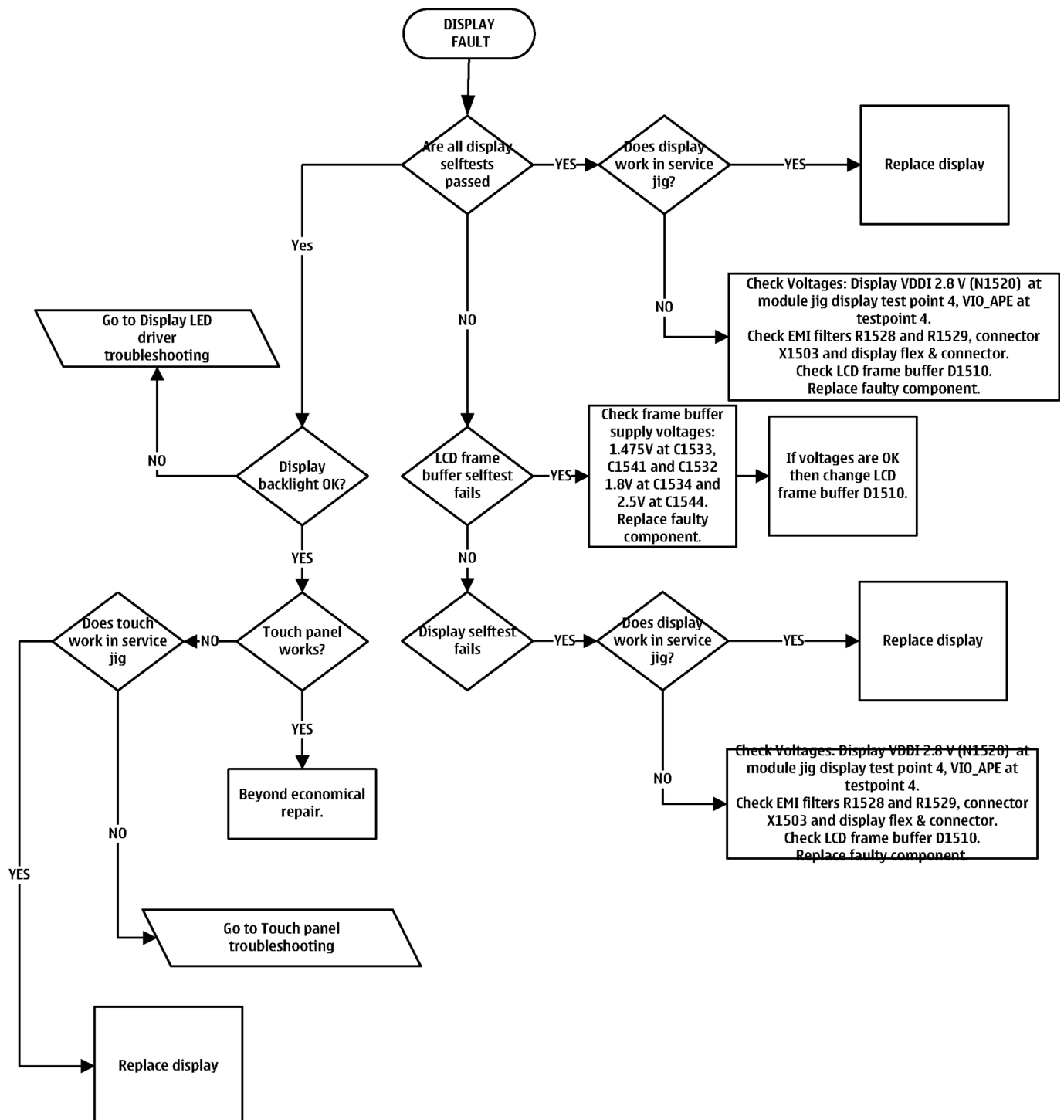
Item		Bright dot (sub-pixel) defect	Dark dot (sub-pixel) defect	Total
1	Defect counts	2	0	2
2	Combined sub-pixel defect	Not allowed		

Item		Bright dot (sub-pixel) defect	Dark dot (sub-pixel) defect	Total
3	Temporal sub-pixel defect	Not allowed		

**Note:** Blinking pixels are not allowed in normal operating temperatures and light conditions.

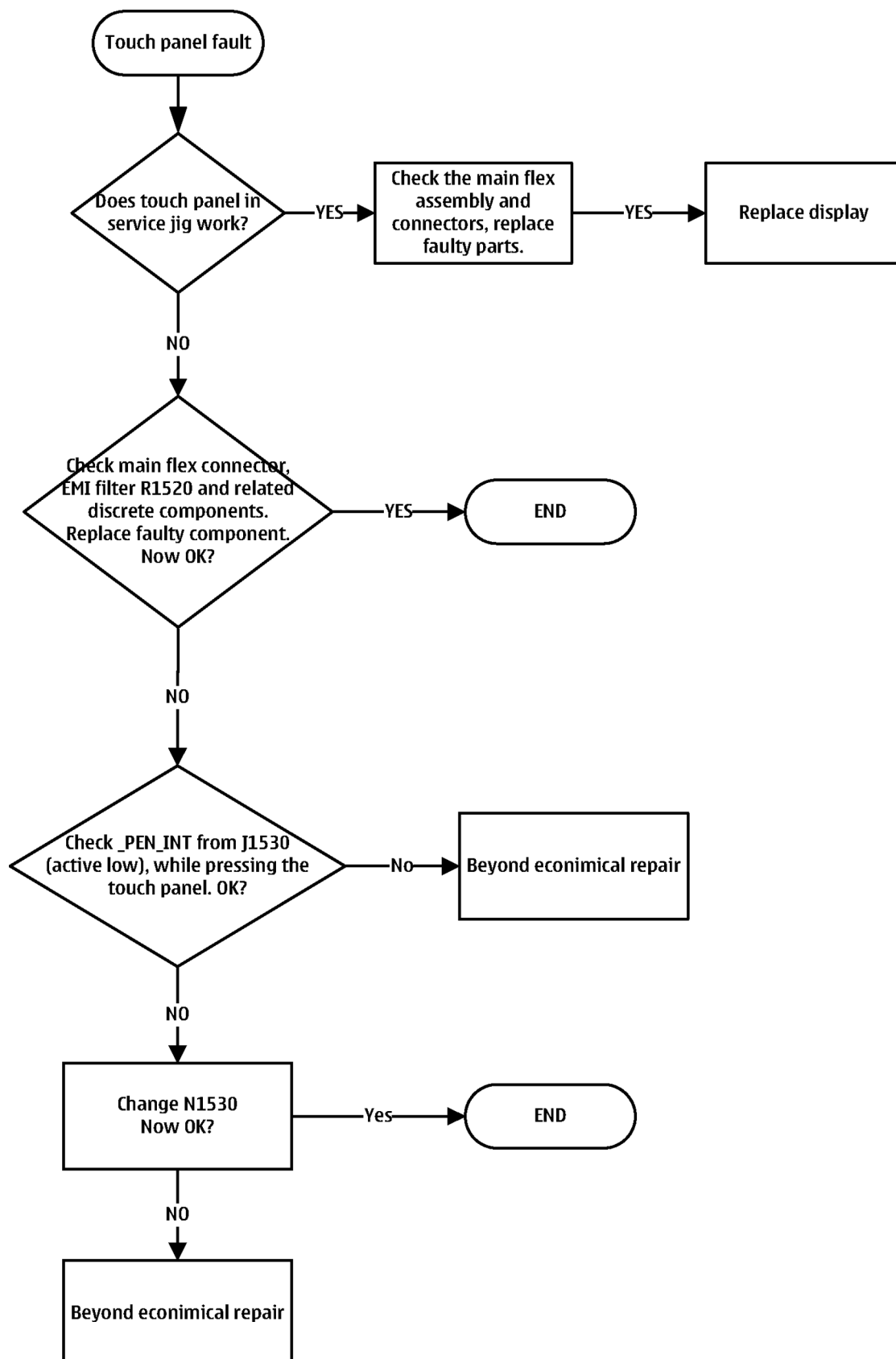
## Display troubleshooting

### Troubleshooting flow



## Touch panel troubleshooting

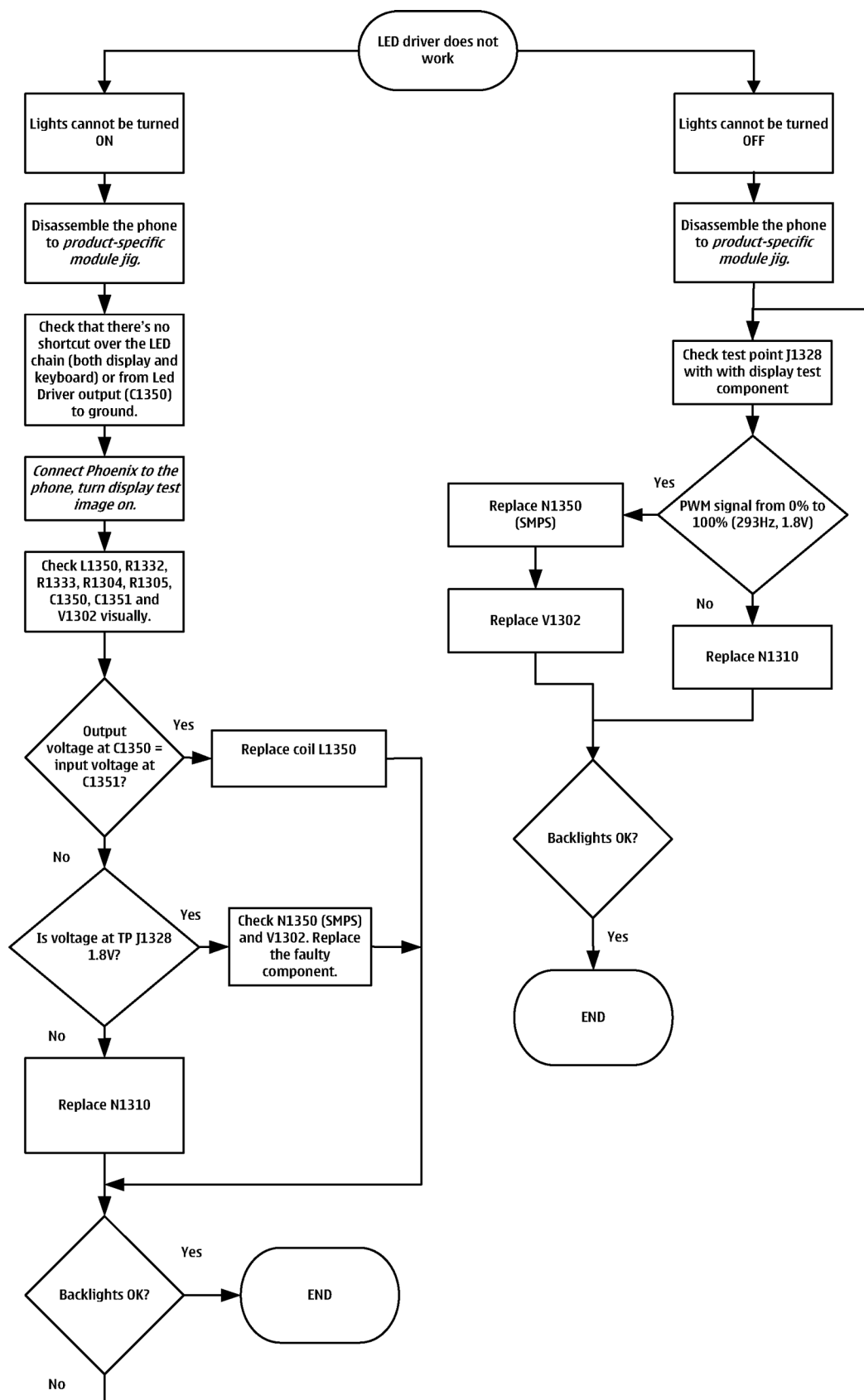
### Troubleshooting flow





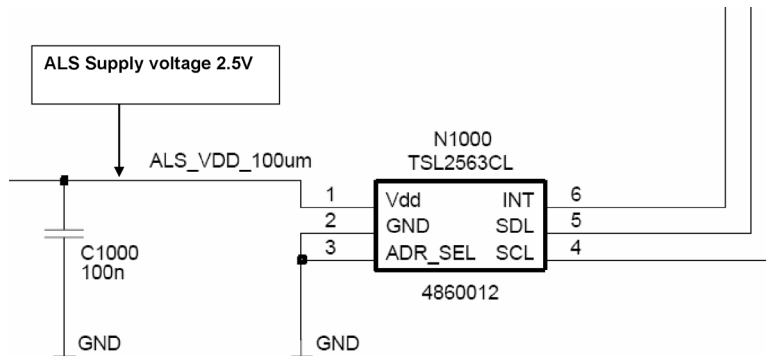
## Display LED troubleshooting

### Troubleshooting flow



## Ambient Light Sensor

### Ambient Light Sensor



Ambient Light Sensor consists of the following components:

- Light guide (in A-Cover assembly)
- Ambient Light Sensor (ALS) is located in 2FC Main Flex assembly.  
ALS is a digital I2C interface component, having two channels with different spectral sensitivities. When combined, the component responds to illuminance similar as human eye.
- Vdd Filtering capacitor C1000.

Ambient Light Sensor information is used to control keypad and display brightness of the device.

Keyboard backlight is turned OFF, when it's not needed. Display brightness is dimmed, when environment lighting is dark.

Ambient Light Sensor is calibrated in production and can be re-tuned in service points though not recommended unless calibration coefficient are lost for some reason

## ALS troubleshooting

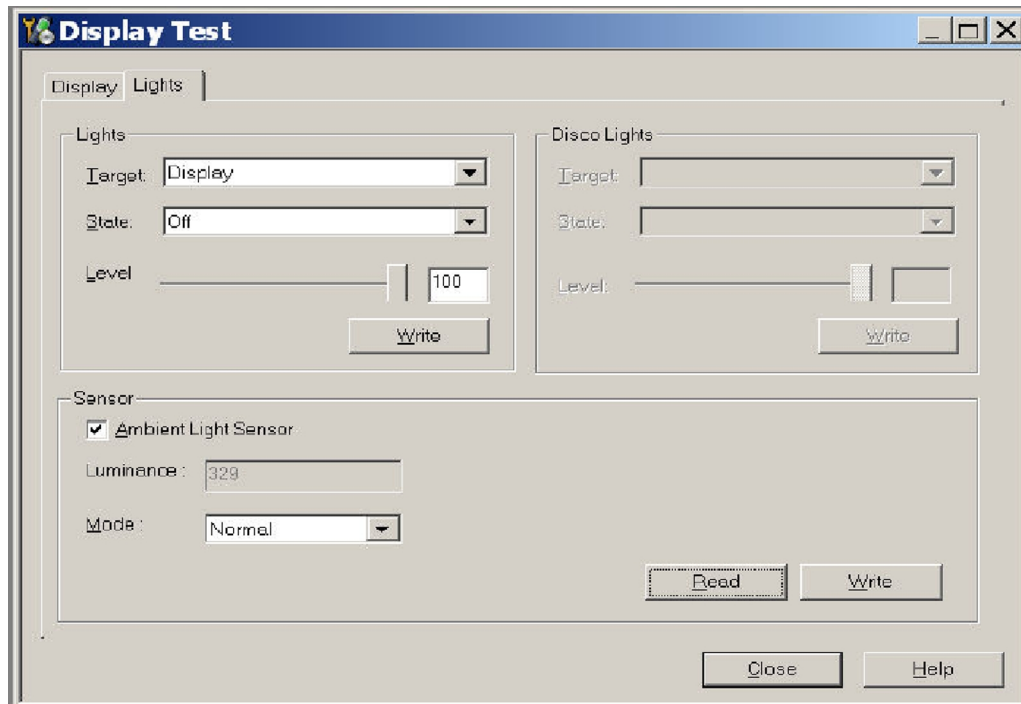
### Context

Functionality check:

### Steps

1. Connect phone to Phoenix and set the phone (e.g. on the table) so that the amount of ambient light seen by ALS is as stable as possible.
2. Start Phoenix
3. Choose **File -> Scan product**
4. Choose **Testing -> Display Test**
5. Open the **Lights** tab, check Ambient Light Sensor check box, click **Read**, cover the sensor and click **Read** again. When covered, Luminance reading should be less than after clicking **Read** without covering the sensor.

6. If component doesn't give any reading or reading doesn't change when sensor is/is not covered, replace the part.



**Note:** After replacing the ALS. If calibration values of the new sensor are lost or for some other reason, ALS re-tuning is required (see instructions later in this document).

When doing the ALS calibration procedure, it is required to have a reference phone, which includes calibrated ALS. ALS re-tuning instructions show why the reference phone is needed.

## Retuning ALS

### Steps

1. Connect reference phone to *Phoenix* and set the phone (e.g. on the table) so that the amount of ambient light seen by ALS is as stabile as possible.
2. Start *Phoenix*.
3. Choose **File**→**Scan Product**.

4. Choose **Tuning -> Ambient Light Sensor Calibration**. You should see the following window

**Ambient Light Sensor Calibration**

☐ Use default values only

**Channel 0**

Reference Level: 15

AD-Count: 6311

Co-efficient: 0.9619

**Channel 1**

Reference Level: 158

AD-Count: 666

Co-efficient: 0.0000

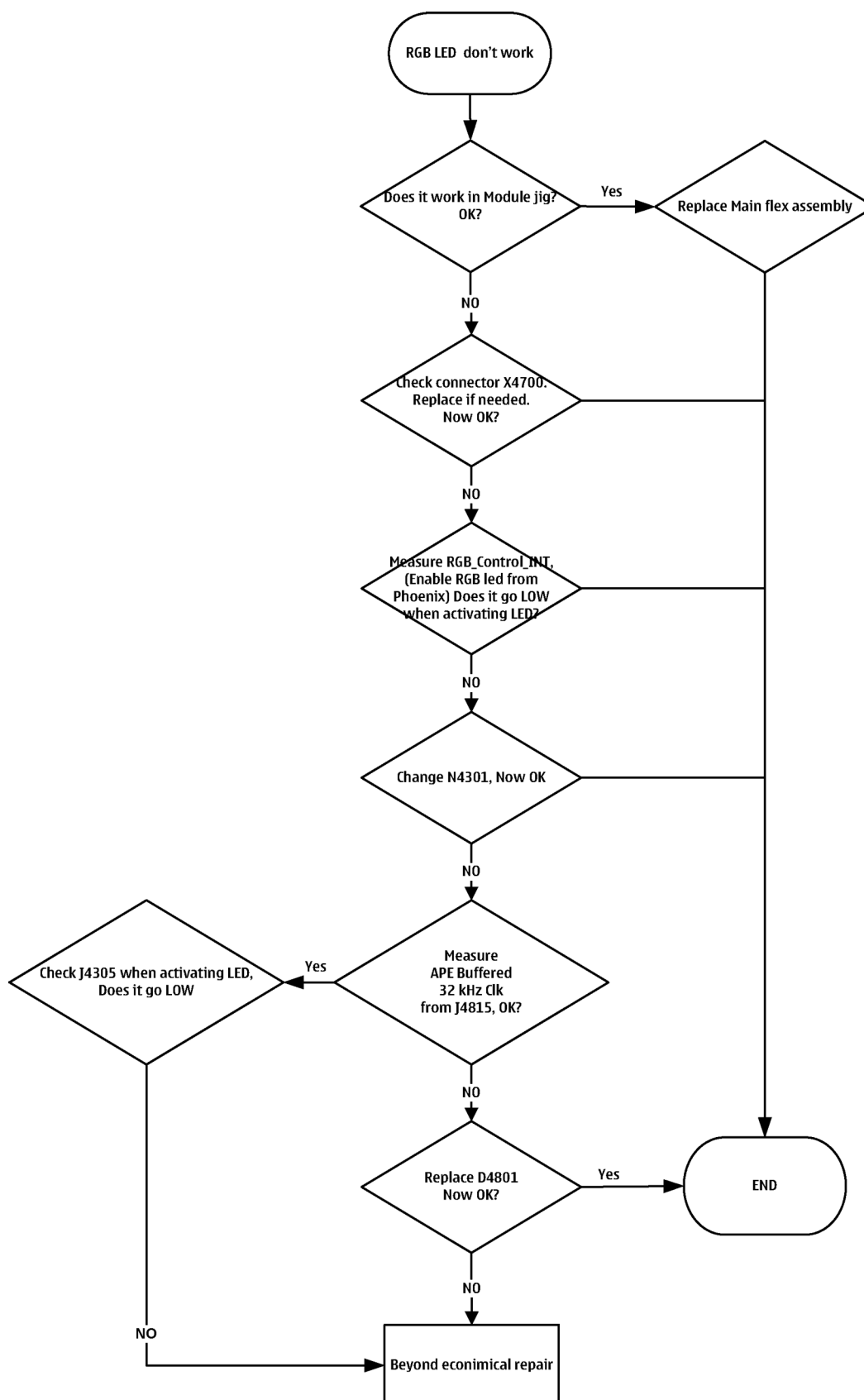
Read Calibrate Write

Close Help

5. Read AD-count values for Channel 0 and Channel 1 by click Read button and write them down.
6. Repeat 1-5 for the phone to be calibrated and make sure the phone to be calibrated is located in the same place as reference phone was when luminance reading was taken.
7. Calculate co-efficient from reference phone and phone to be calibrated AD-count values by division:  $\text{Co-efficient} = \text{AD-count}(\text{reference phone}) / \text{AD-count}(\text{phone to be calibrated})$ , write down the calculated co-efficient values.
8. -> Iterate by changing Channel 0 and Channel 1 (reference level) values (remove cross from 'Use default values only'). After writing some value to Channel 0 and Channel 1 (reference value), calibrate button must be pressed. Stop iterating when Co-efficient is equal to Co-efficient calculated in bullet 7. Note that decimal numbers should be used in the iteration in order to achieve enough precision (e.g. 200.2455)
9. After having same Co-efficient value in "Co-efficient" textbox as the calculated value, make sure that ambient light values (read using **Testing -> Display Test -> "Luminance"** textbox) are almost the same in reference phone and calibrated phone. Remember that illuminance readings for reference and calibrated phones must be done in the same ambient light conditions. If illuminance values differs a lot (difference max. +/- 10%), repeat whole ALS re-tuning procedure.
10. To end the calibration, click **Close**.

## RGB LED driver troubleshooting

### Troubleshooting flow



## ■ Bluetooth troubleshooting

### Introduction to Bluetooth troubleshooting

Bluetooth problems that can occur:

Problem	Description
A malfunction in the BT ASIC, BB ASICs or Phone's BT SMD components.	This is unpredictable and could have many causes i.e. SW or HW related.

The main issue is to find out if the problem is related to the BT antenna or related to the BT system or the phone's BB and then replace/fix the faulty component.

### Bluetooth/WLAN antenna element

Bluetooth and WLAN have common antenna element which is mounted into decoration cover. Antenna connection to PWB antenna pad is made through pogo pin.

### Bluetooth/WLAN antenna pogo pin

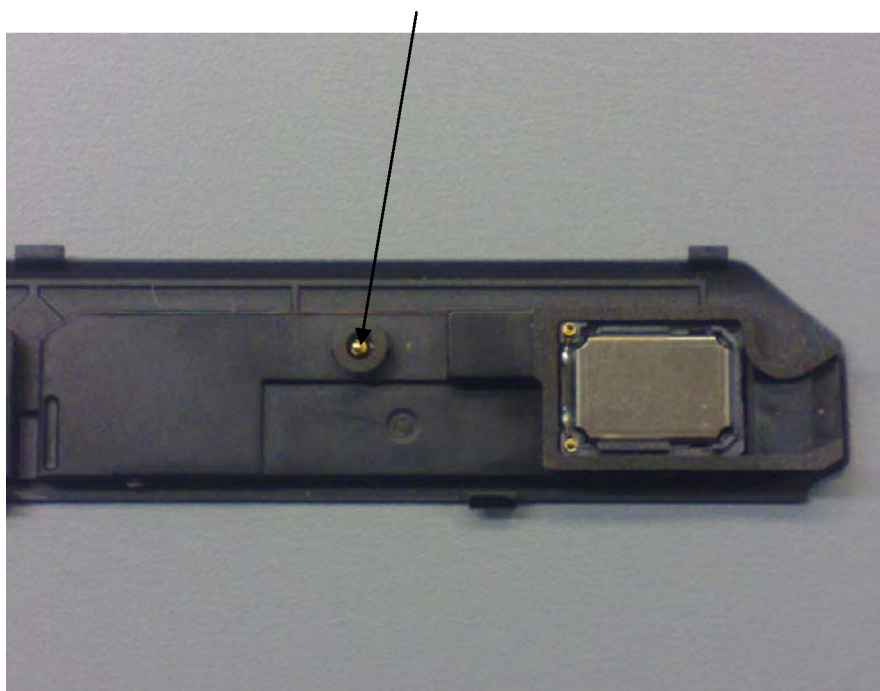


Figure 23 BT/WLAN antenna

## Bluetooth/WLAN antenna pad

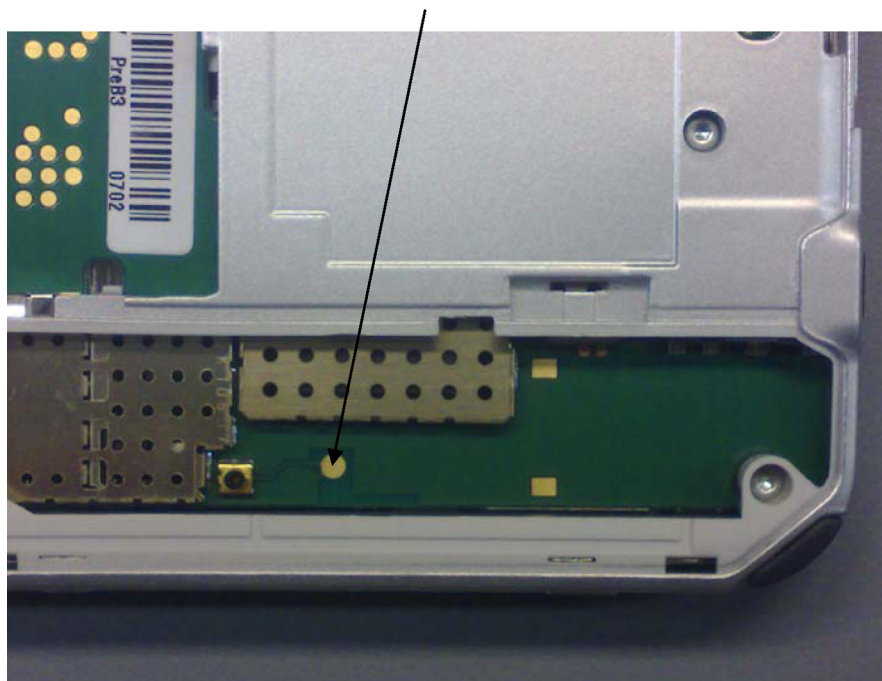
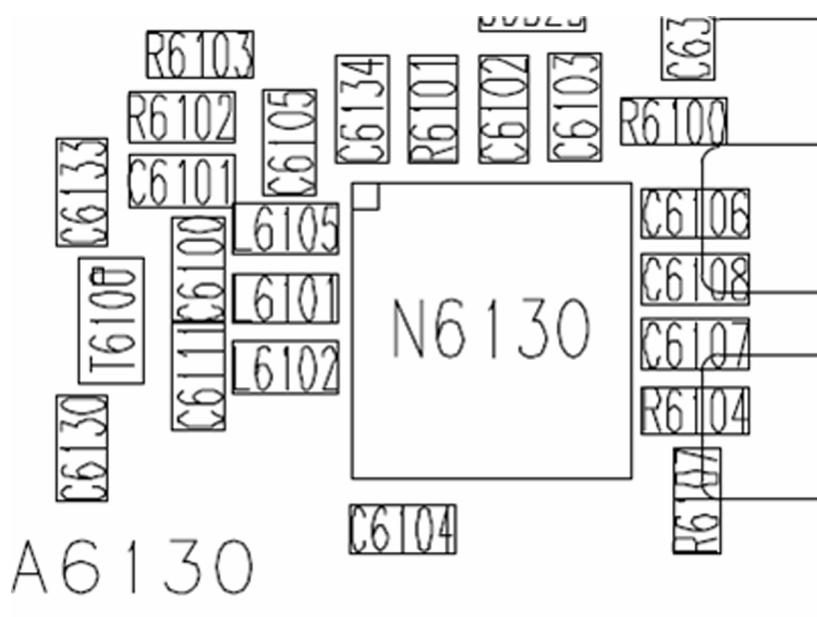


Figure 24 BT/WLAN antenna pad

## Bluetooth component layout



## Bluetooth settings for Phoenix

### Steps

1. Start *Phoenix* service software.
2. From the **File** menu, choose **Open Product**, and then choose the correct type designator from the **Product** list.
3. Place the phone to a flash adapter in the local mode.



4. Choose **Testing**→**Bluetooth LOCALS**.
5. Locate SB-6's serial number (12 digits) found in the type label on the back of SB-6.  
In addition to SB-6, JBT-3, JBT-6 and JBT-9 Bluetooth test boxes can be used.
6. In the *Bluetooth LOCALS* window, write the 12-digit serial number on the **Counterpart BT Device Address** line.  
This needs to be done only once provided that SB-6 is not changed.
7. Place the SB-6 box near (within 10 cm) the BT antenna and click **Run BER Test**.

## Results

Bit Error Rate test result is displayed in the *Bit Error Rate (BER) Tests* pane in the *Bluetooth LOCALS* window.

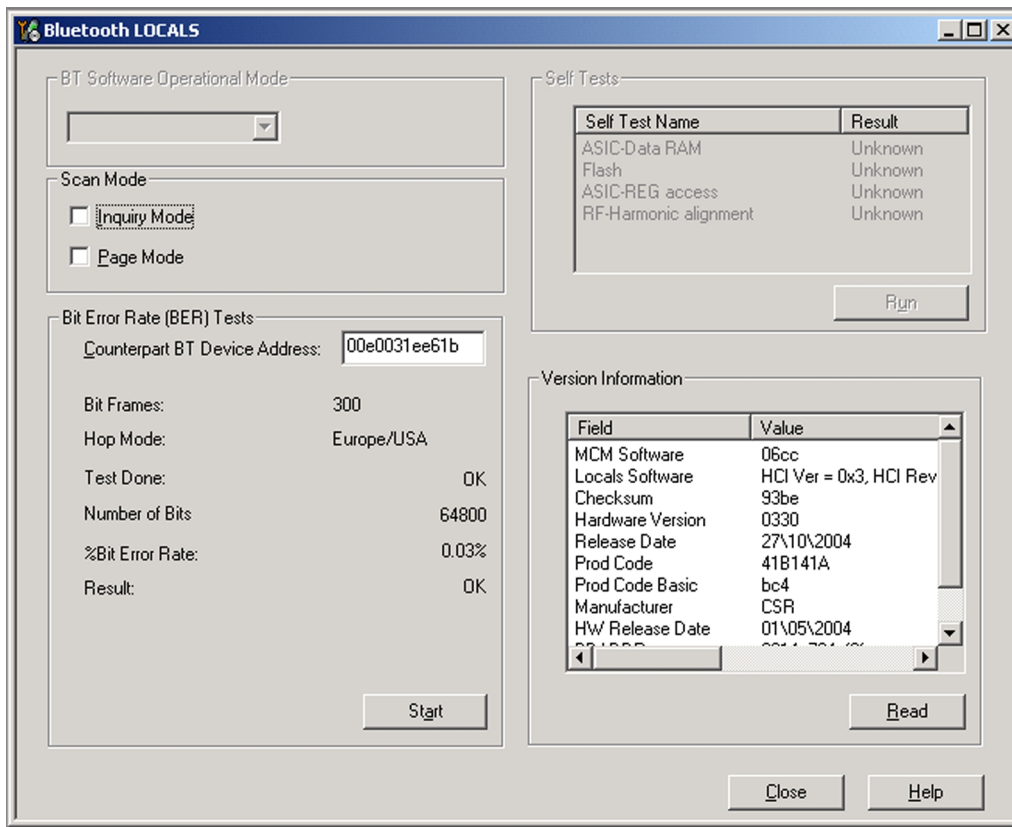


Figure 25 BER test result

## Bluetooth self tests in Phoenix

### Steps

1. Start *Phoenix* service software.
2. From the **File** menu, choose **Open Product**, and then choose the correct type designator from the **Product** list.
3. Connect the phone to a docking station in the local mode.
4. Choose **Testing**→**Self Tests**.
5. Choose the following Bluetooth related tests:
  - Bluetooth
6. To run the tests, click **Start**.



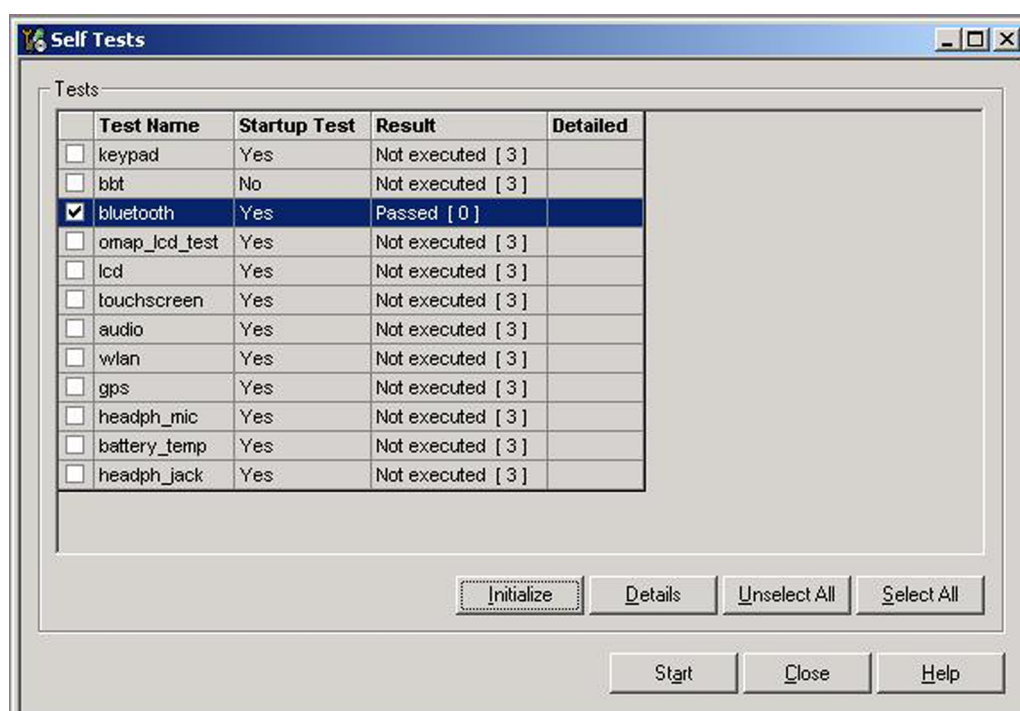
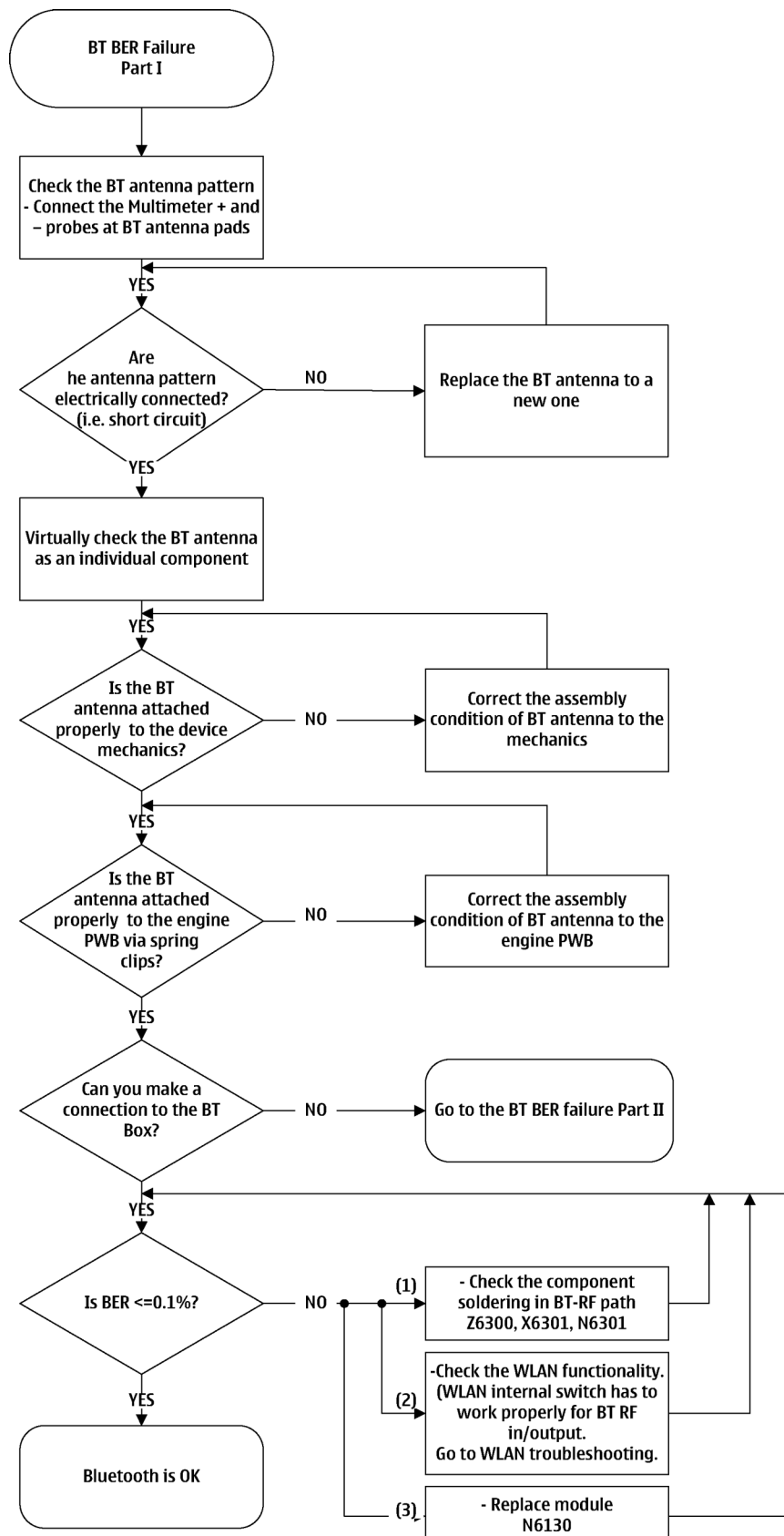
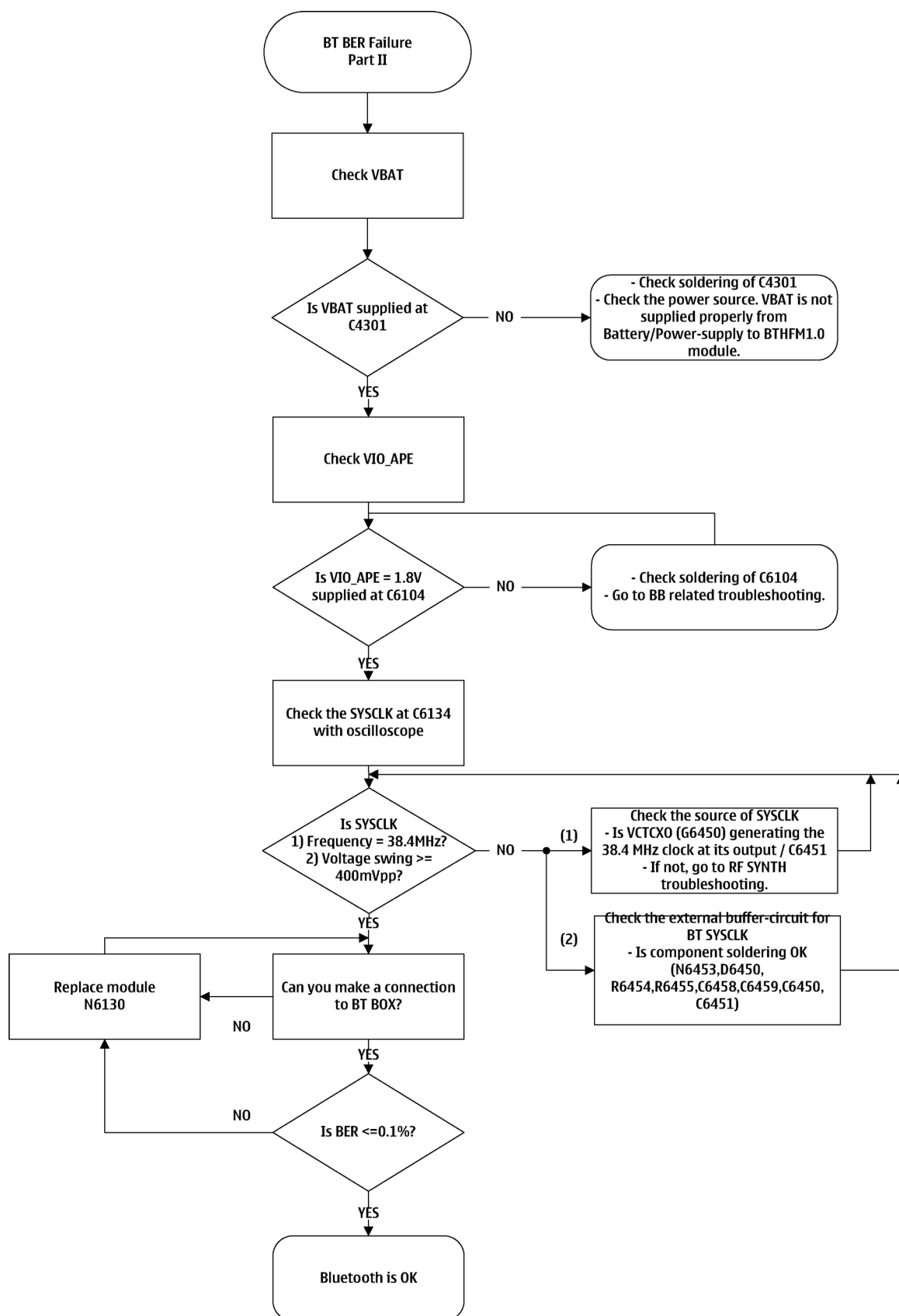


Figure 26 Bluetooth self tests in *Phoenix*

## Bluetooth BER failure troubleshooting 1 and 2

### Troubleshooting flow





## ■ Audio troubleshooting

### Audio troubleshooting test instructions

Headphone outputs are single-ended type thus those must be measured against ground.

Internal loudspeakers outputs are measured using a current probe, if a special low-pass filter designed for measuring digital amplifiers is not available.

### Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Current probe (Internal handsfree DPMA output measurement)
- Low-pass filter designed for DPMA measurements
- Phoenix service software
- Battery voltage 3.7V
- Nokia HS-48 headset
- Sine signal generator
- Multimeter

### Test procedure

Audios can be tested using the Phoenix audio routing options. Two different audio loop paths can be activated:

- From internal microphone to headphone output (HP microphone in Ext earpiece out)
- From external microphone to headphone output (Ext microphone in Ext earpiece out)

These loops are basically meant for device's internal microphone and headset's microphone testing.

For internal loudspeakers and headphone output testing there is possibility to use test signals generated inside of the device.

**Note:** Sine test signals frequency and amplitude are fixed.

It's possible to route the signal to the following outputs:

- Headphone left channel (Generated earpiece left out)
- Headphone right channel (Generated earpiece right out)
- Internal loudspeaker (Generated int handsfree out)

Each audio output configuration sets the internal test signal generator or microphone routing to the specified output. Test signal path gains are fixed and they cannot be changed using Phoenix. Microphone is tested by talking to the microphone and listening the output signal using headphones/headsets.

Correct measurement/test points for each test case are presented in a table below.

### Phoenix audio loop tests and test results

The results presented in a table apply when no accessory is connected and the battery voltage is set to 3.7V.

Internal loudspeakers are in place during the measurements. Applying a headset or a headphone during measurement causes a significant drop in measured quantities.

Output device	Output terminals	Output voltage (mVrms)
Headphone left	X4100 pin 5 and gnd	~43mVrms

Output device	Output terminals	Output voltage (mVrms)
Headphone right	X4100 pin 4 and gnd	~43mVrms
Speaker left	L4103 and L4104 pads	~300mVrms
Speaker right	L4101 and L4102 pads	~300mVrms

Internal microphone can be tested by subjective testing. When using internal mic to headphone out loop connect known working headset (Nokia HS-48) to the device and test if you can hear the sound through the headsets.

External microphone is tested by feeding test signal to the X4100's pin 3 and gnd.

In this case use input signal presented a table below and check also supposed output.

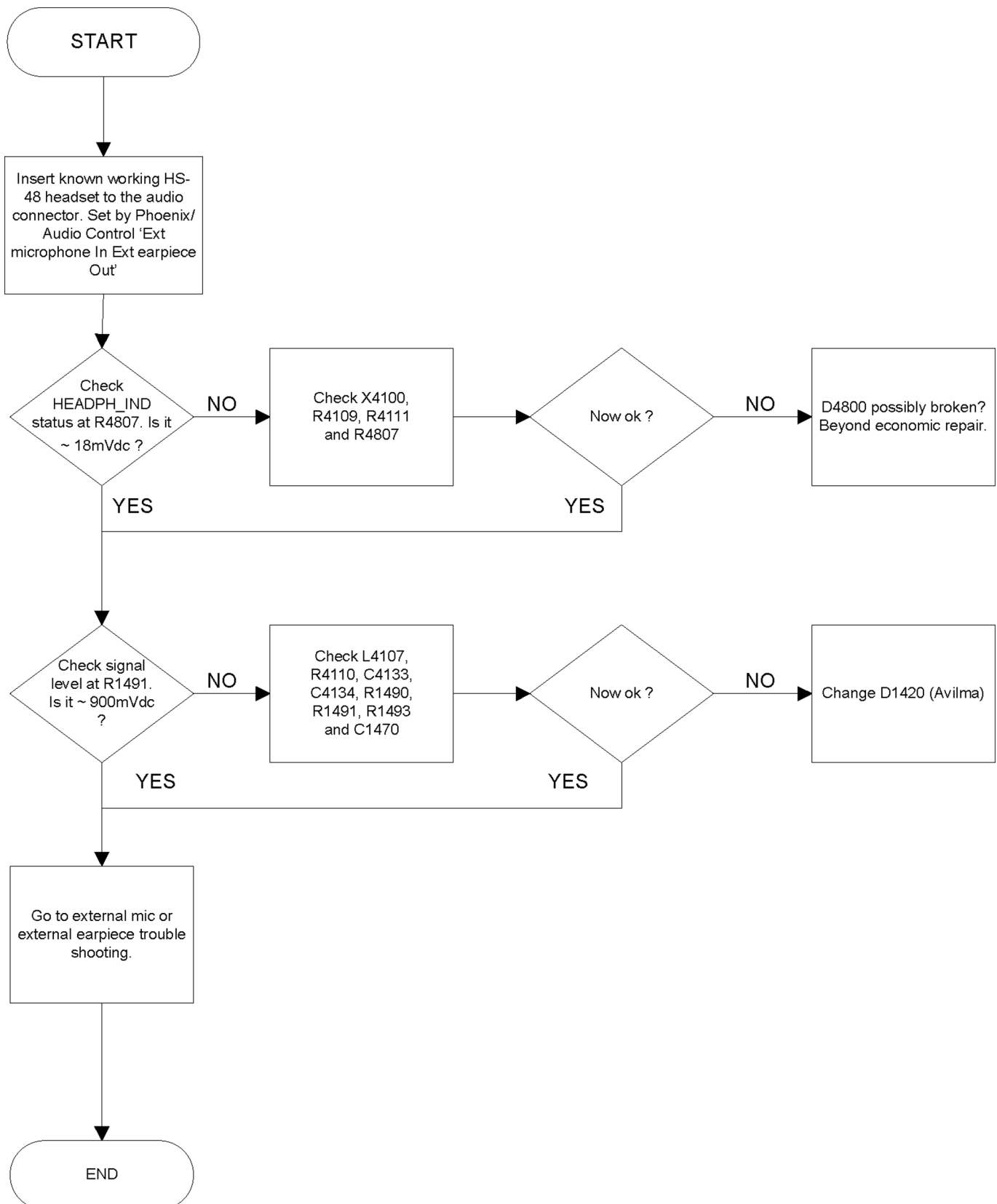
Fastest and easiest way to test external microphone functionality is to insert known working (HS-48) headset to the audio connector, enable Ext microphone in Ext earpiece out test audio loop by the Phoenix and just speak and listen.

**Note:** Before testing any microphone path test the headphone output functionality as described on previous page.

Input terminals	Output terminals	Input signal	Output signa
X4100 pin 3 and gnd	X4100 pin 5 and gnd or X4100 pin 4 and gnd	Sine 1kHz/10mVrms	Sine 1kHz/ ~65mVrms (without load)

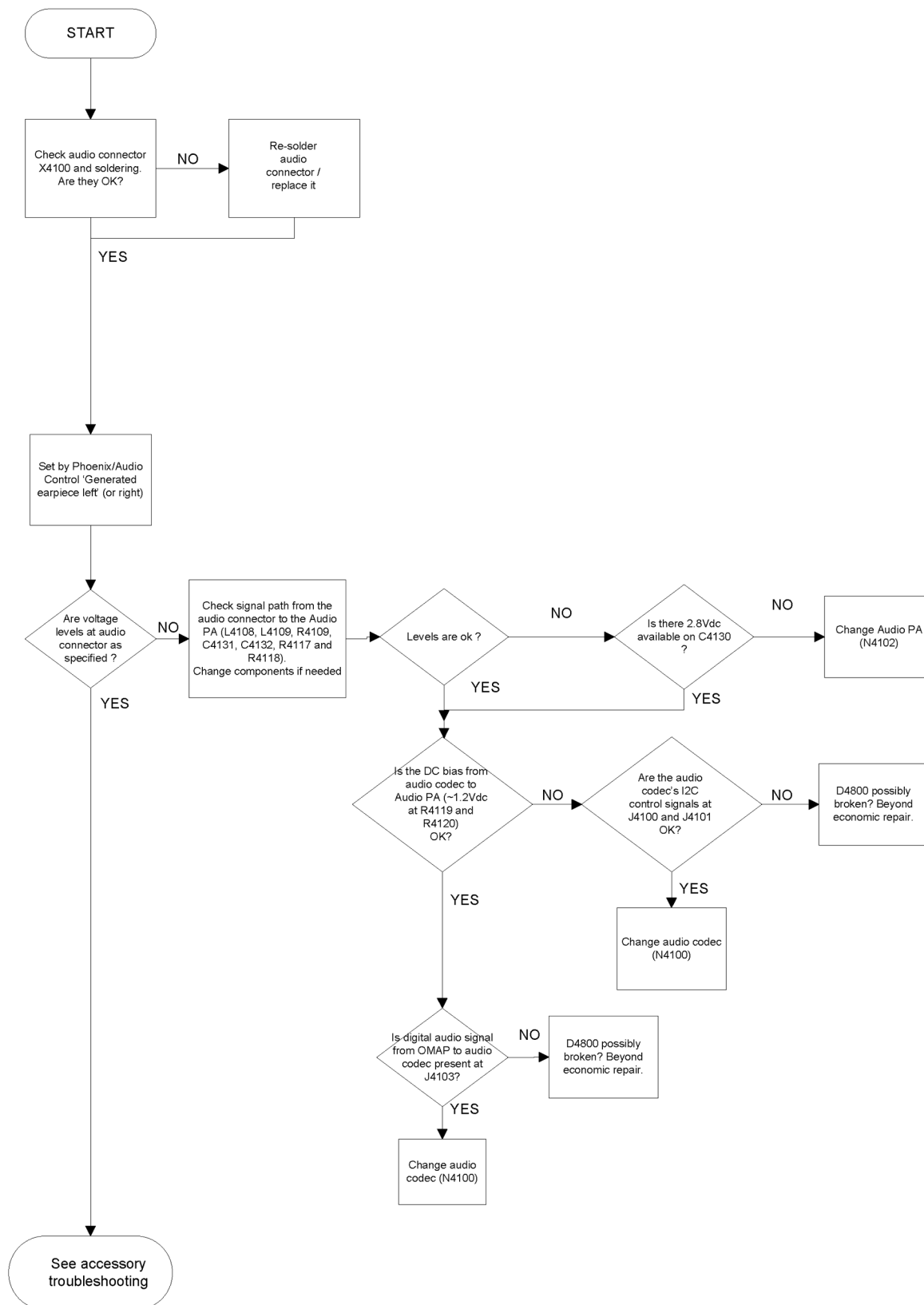
## Accessory troubleshooting

### Troubleshooting flow



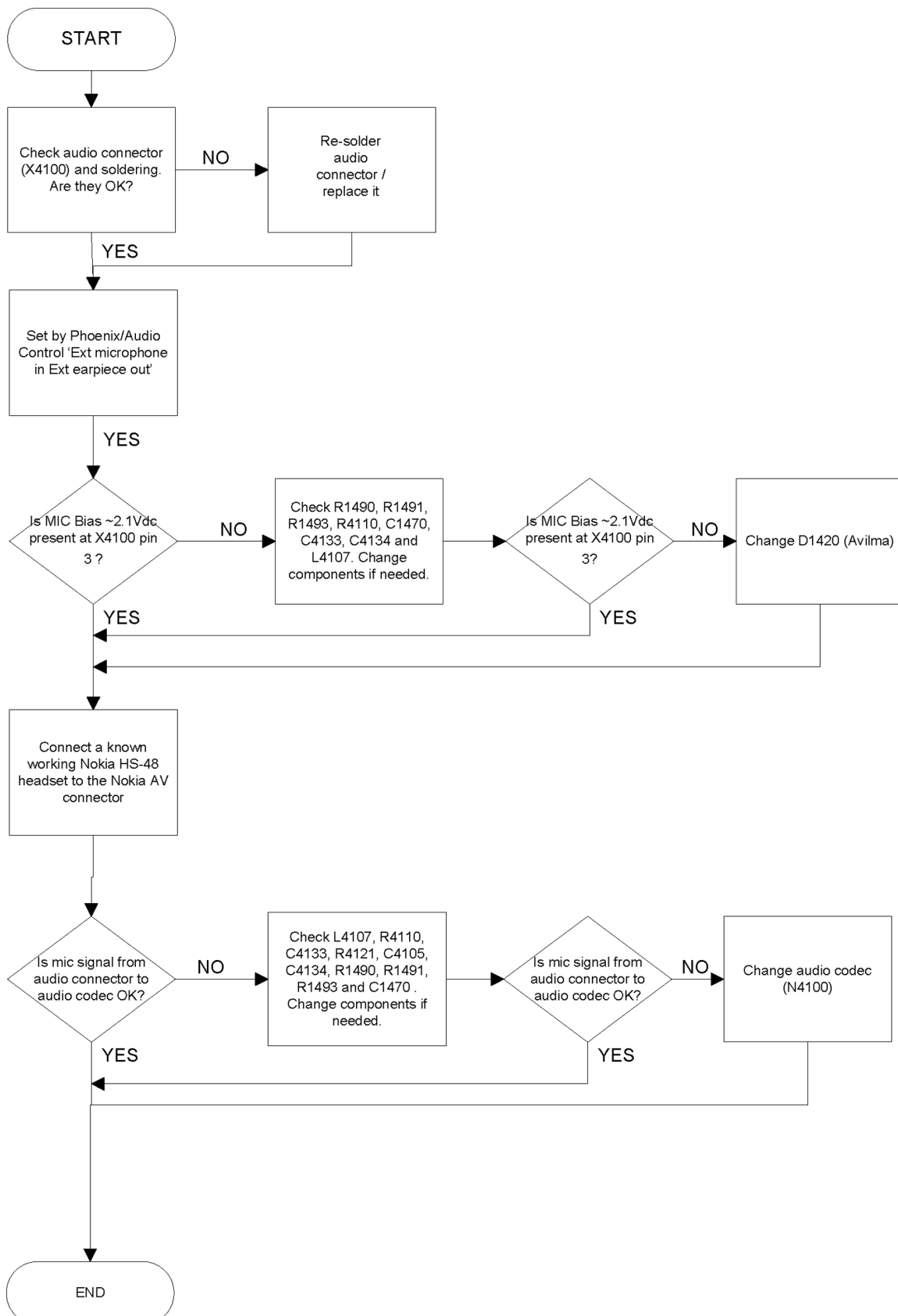
## Headset/headphone earpiece troubleshooting

### Troubleshooting flow



## Headset microphone troubleshooting

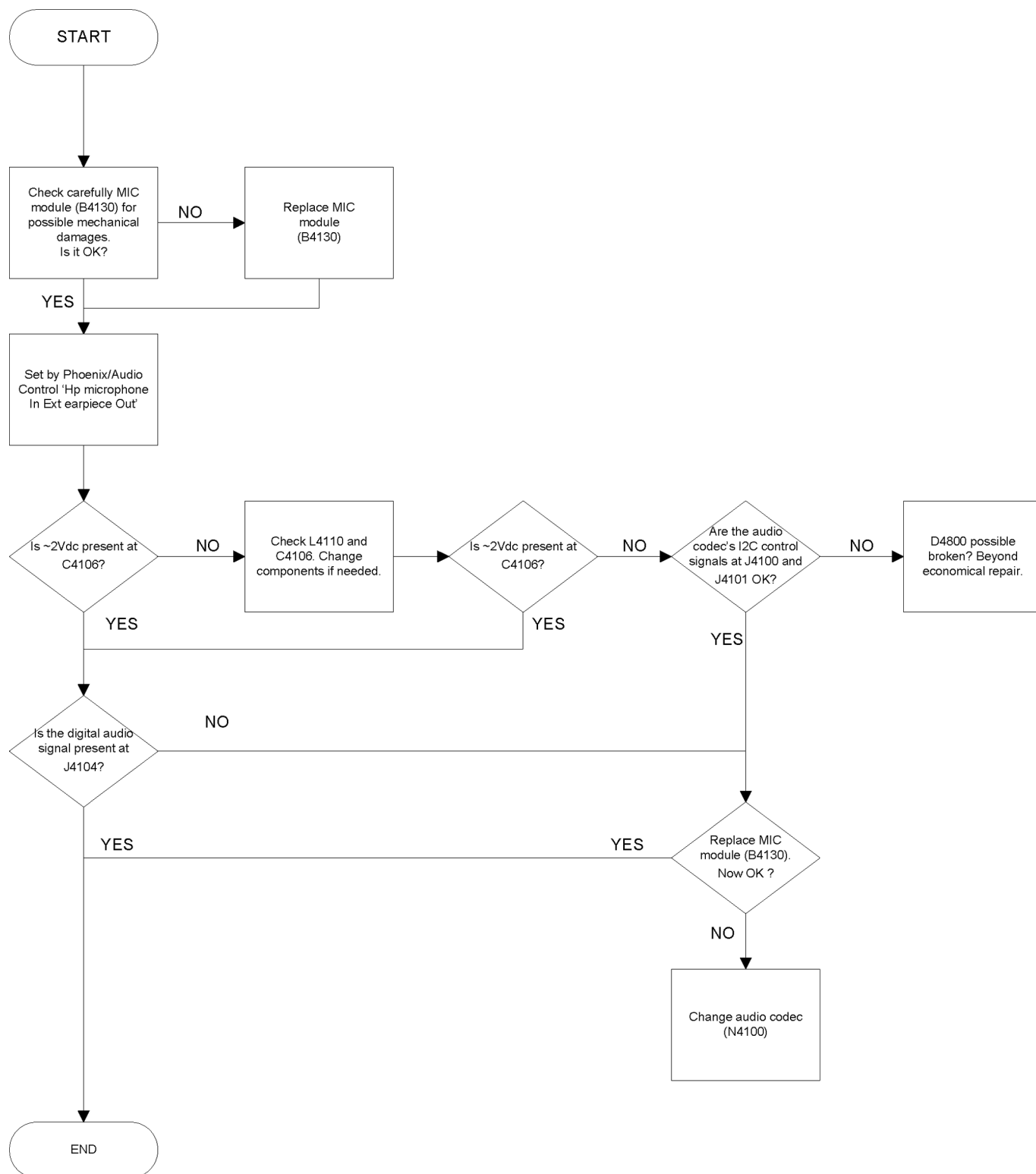
### Troubleshooting flow





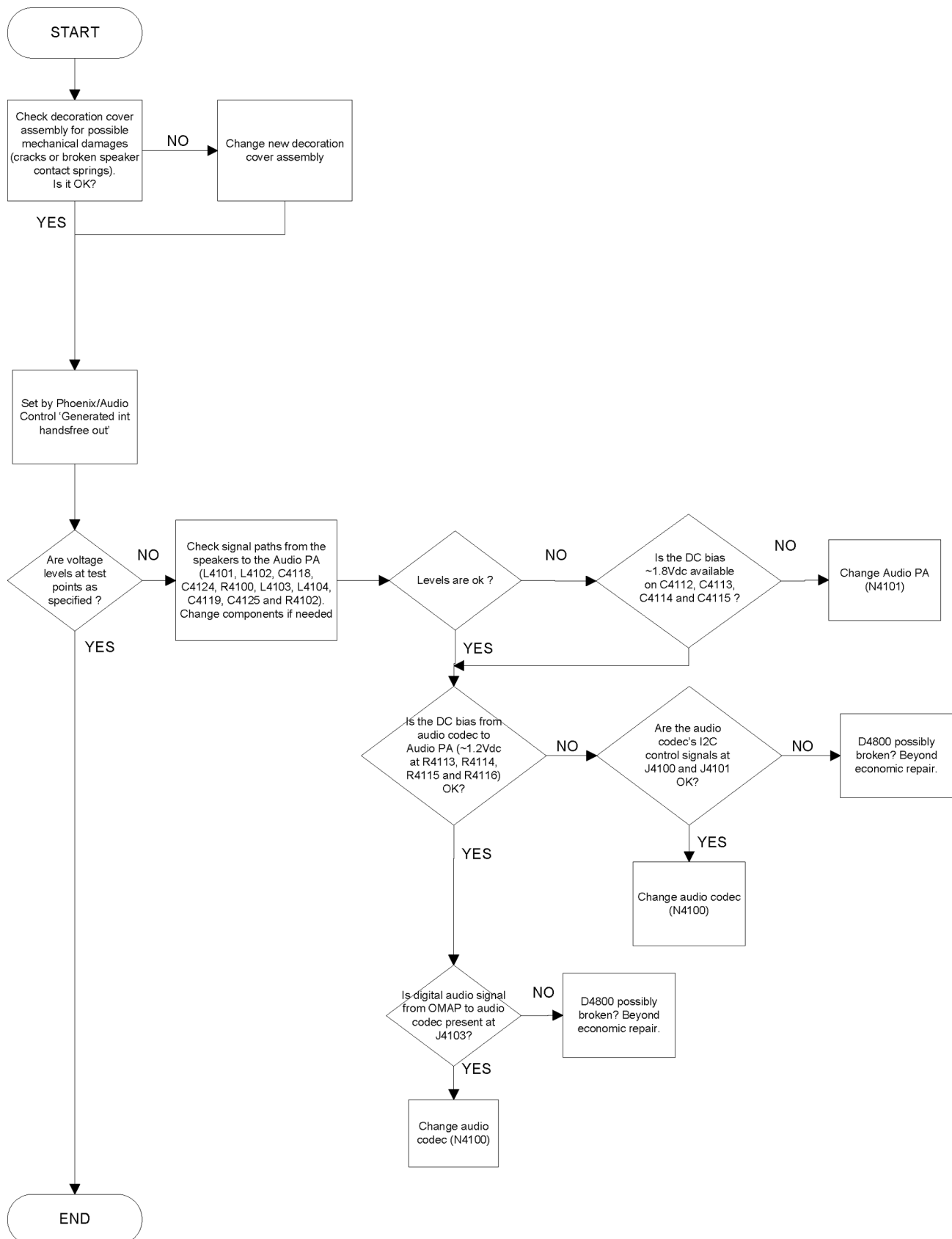
## Internal microphone troubleshooting

### Troubleshooting flow



## Internal speakers troubleshooting

### Troubleshooting flow



## ■ Baseband manual tuning guide

### Energy management calibration

#### Prerequisites

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

#### Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File**→**Scan Product**.
4. Choose **Tuning**→**Energy Management Calibration**.
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

**Note:** ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.

8. Click **Calibrate**.

The calibration of the selected item(s) is carried out automatically.

The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 10 Calibration value limits

Parameter	Min.	Max.
ADC Gain	13000	13350
ADC Offset	-14	14
BSI Gain	1100	1300
VBAT Gain	21000	21900
VBAT Offset	2450	2570
IBAT Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

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## **5 — RF Troubleshooting and Tuning**

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## ■ RF troubleshooting and tuning

### WLAN RF troubleshooting

#### Introduction to WLAN RF troubleshooting

Measurements should be done using Spectrum analyzer with high-frequency high impedance passive probe (LO-/reference frequencies and RF power levels) and Oscilloscope with a 10:1 probe (DC-voltages and low frequency signals).

The RF-section is build around one RF-ASIC (STLC4560 N6300). For easier troubleshooting, this RF troubleshooting document is divided in to sections.

Before changing STLC4560, please check following things: Supply voltages are OK and serial communication coming from baseband to STLC4560.

**Note:** Most RF semiconductors are static discharge sensitive!

So ESD protection must be taken care of during repair (ground straps and ESD soldering irons).

STLC4560 and FEM are moisture sensitive so parts must be pre-baked prior to soldering.

Apart from key components described in this document here are a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done by checking if soldering of the component is done properly (for factory repairs checking if it is missing from PWB).

Capacitor can be checked for shortening and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

**Note:** Please be aware that all measured voltages or RF levels in this document are rough figures. Especially RF levels varies due to different measuring equipment or different grounding of the used probe. When using RF probe usually a good way is to use metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

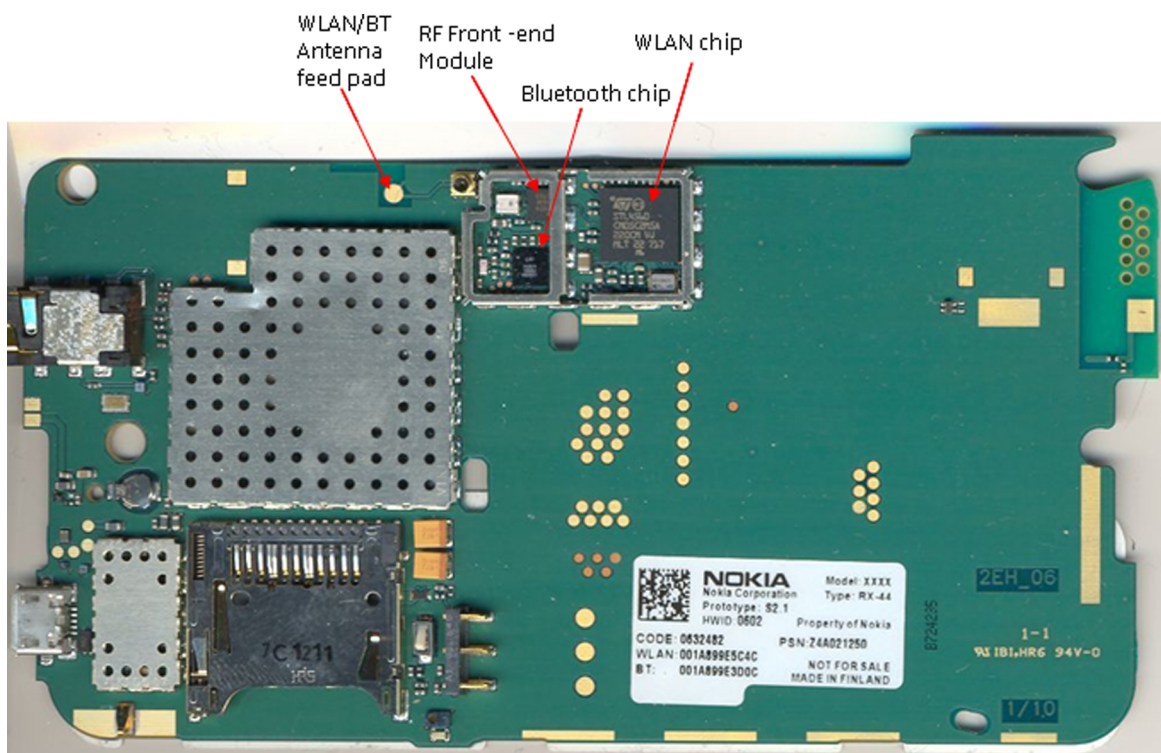
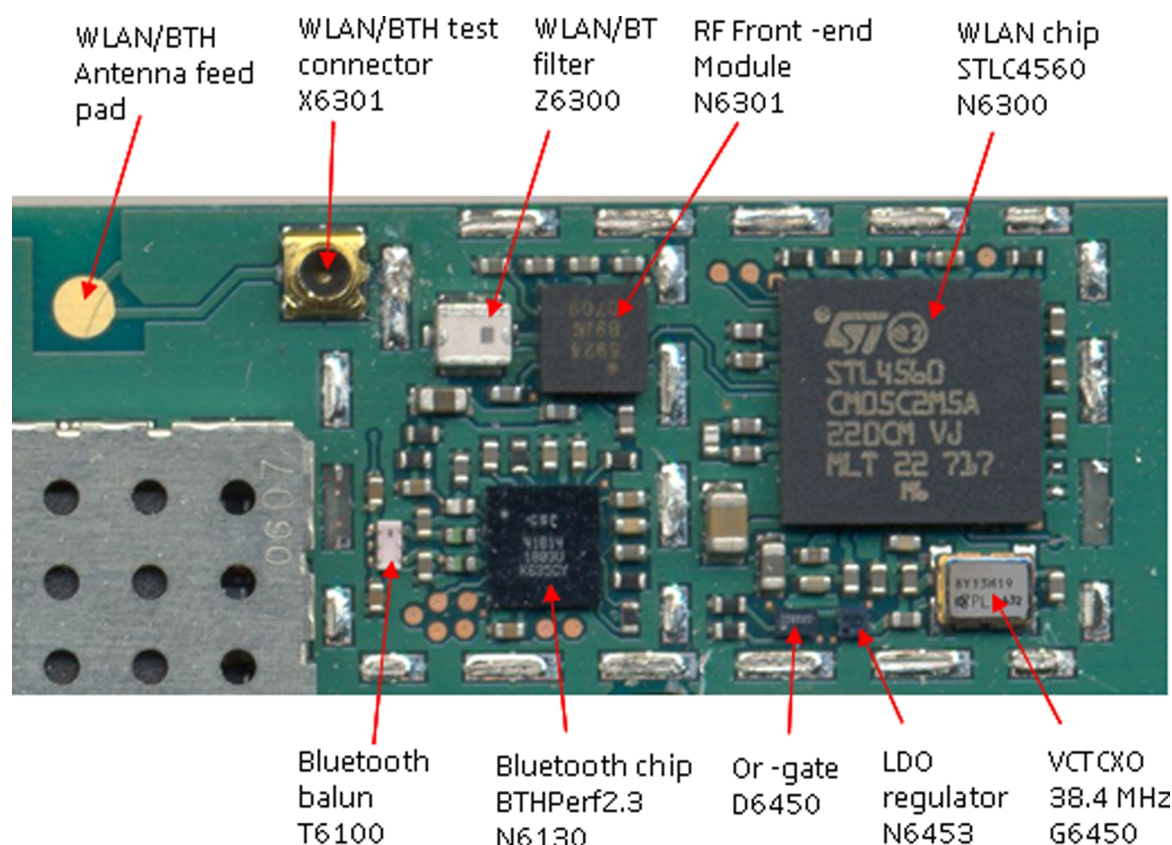
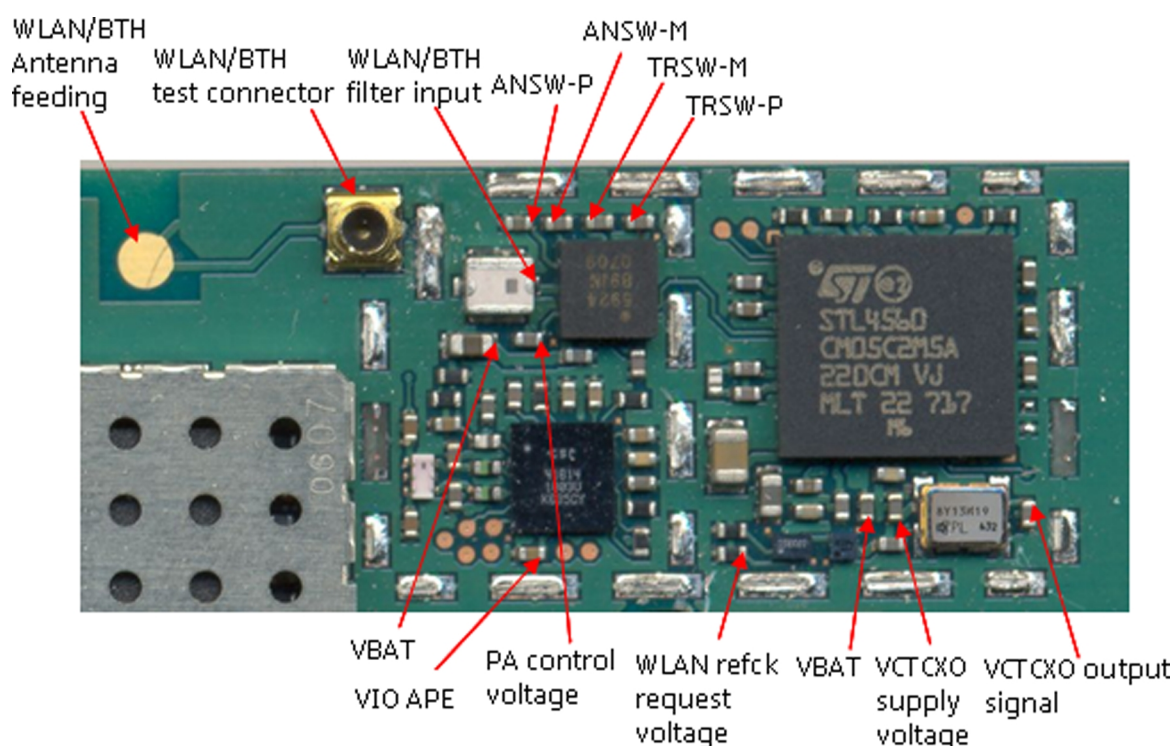


Figure 27 WLAN, Bluetooth and GPS placement



**Figure 28 RF key component placement**



**Figure 29 WLAN RF measurement points**

## General instructions for TX troubleshooting

### Context

To start TX troubleshooting

### Steps

1. Connect the module jig MJ-148 to a computer with a DAU-9S cable or to an FPS-10 flash prommer with an XCS-4 modular cable and USB cable. Make sure that you have a PK-1 dongle connected to the computer's parallel port.

2. Connect a DC power supply to the module test jig with an FLC-2 cable.

**Note:** If CU-4 is used then correct DC supply voltage is 12V . If DC power is connected directly to module test jig then absolutely max. DC power is 4.2 V. Use nominal value 3.7 V.

3. Connect an RF cable to the RF connector of the PWB board and measurement equipment; or at least a 10dB attenuator, otherwise the PA may be damaged. Use a spectrum analyzer as measurement equipment.

**Note:** The maximum input power of a spectrum analyzer is +30dBm. It is recommended to use 10dB attenuator on the spectrum analyzer input to prevent any damage.

4. Set the phone module to test jig and start Phoenix service software.

5. Initialize connection to the phone. (Use FBUS driver when using DAU-9S.

6. To choose a product in Phoenix: From the File menu, choose "Choose Product" and select RX-44 from the list or from the File menu, choose "Scan Product".

7. From the toolbar, set operating mode to "Local".

8. From the Testing menu, choose "WLAN TX tests".

9. In the "WLAN TX tests" window:

- Test mode "Continuous TX"
- Data rate "11 MBit/s (Clk)"
- Channel 7 (2.442 GHz)
- Power loop "Calibrated"
- All other items use "defaults"
- Press "Start" button"
- Power level(dBm) "17"
- Press "Set" button

Table 11 Maximum wlan TX power limits for US version

Data rate	Max. Wlan TX power for US version [dBm]		
	Channel		
	1	2-10	11
1, 2, 5.5 and 11 Mbit/s	17	17	17
6 and 9 Mbit/s	14	15	15
12 and 18 Mbit/s	14	15	15
24 and 36 Mbit/s	13	13	13
48 and 54 Mbit/s	13	13	13

**Table 12 Maximum wlan TX power limits for EU version**

Data rate	Max. Wlan TX power for EU version [dBm]		
	Channel		
	1	2-12	13
1, 2, 5.5 and 11 Mbit/s	17	17	17
6 and 9 Mbit/s	14	15	15
12 and 18 Mbit/s	14	15	15
24 and 36 Mbit/s	13	13	13
48 and 54 Mbit/s	13	13	13

## WLAN TX and STLC4560 troubleshooting

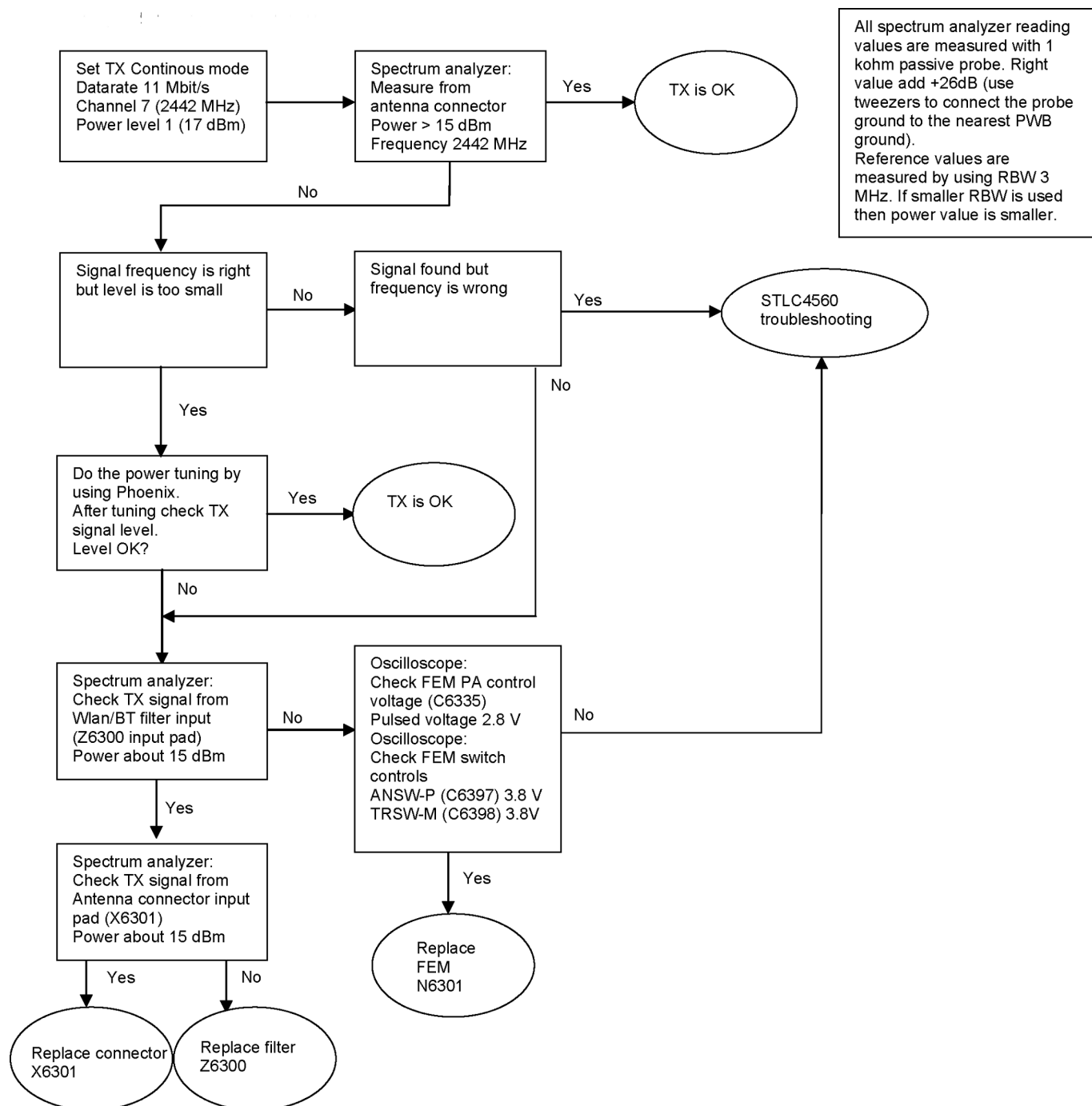
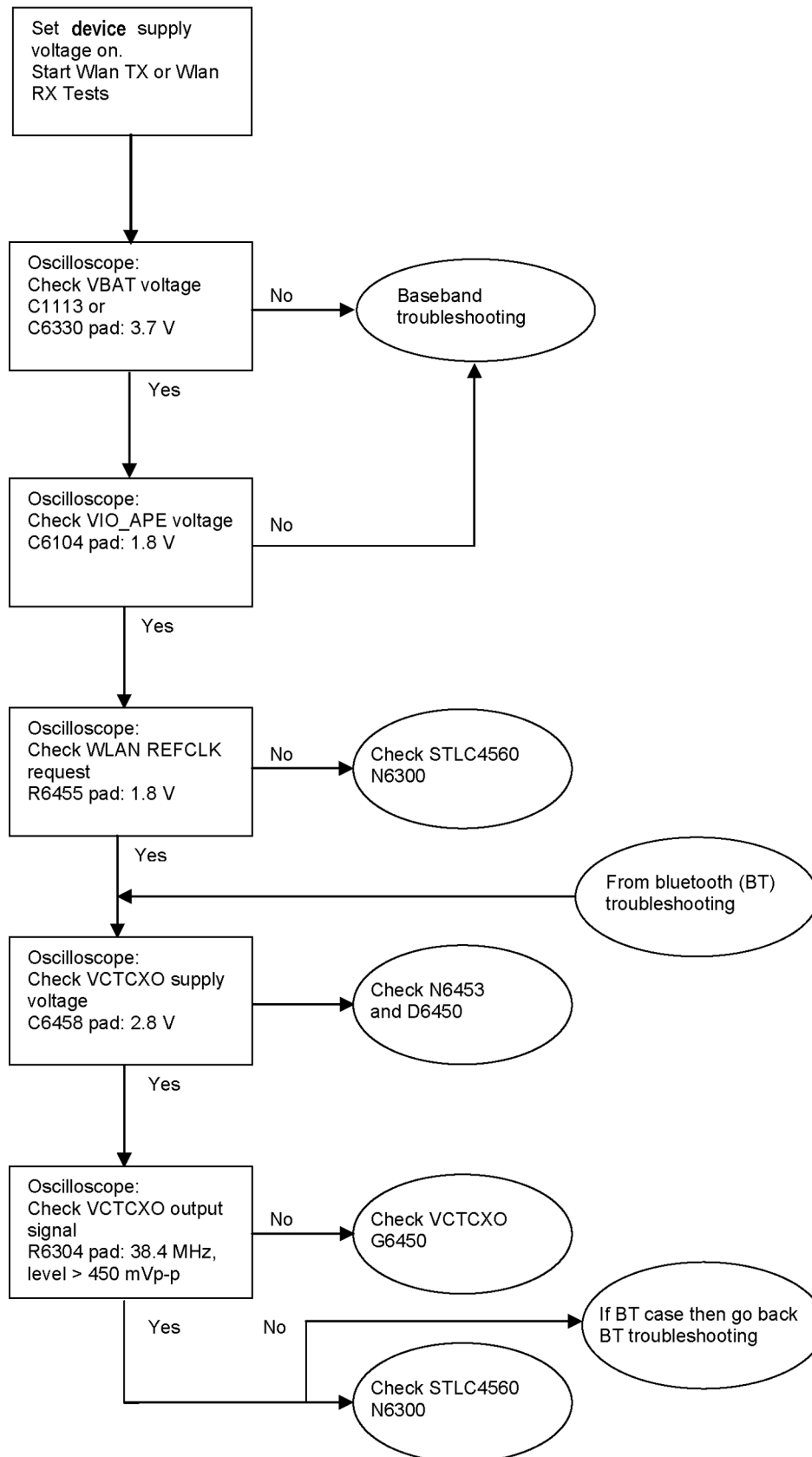


Figure 30 WLAN TX troubleshooting





**Figure 31 WLAN STLC4560 troubleshooting**

## General instructions for WLAN RX troubleshooting

### Context

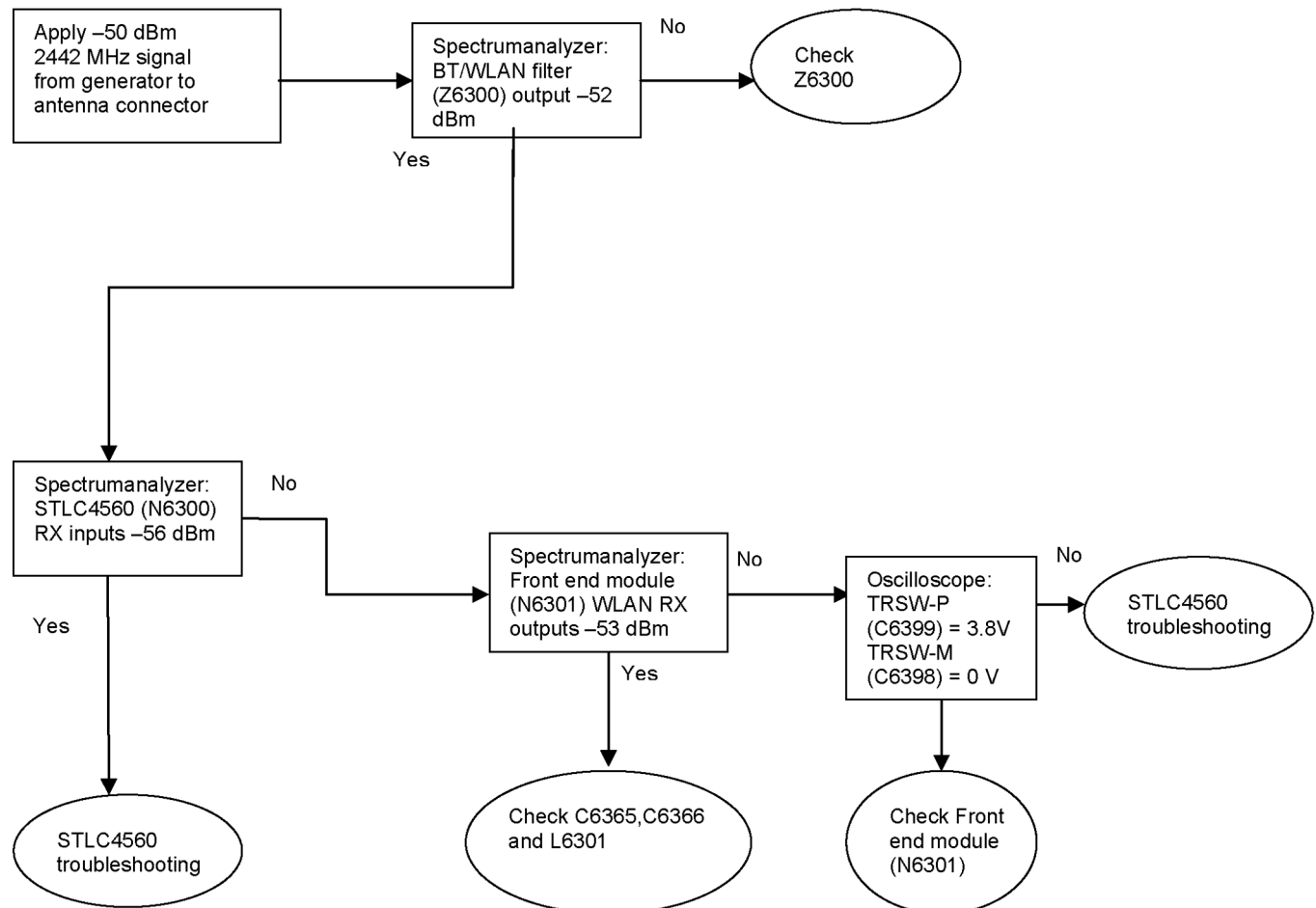
To start RX troubleshooting

### Steps

1. Connect the module jig MJ-148 to a computer with a DAU-9S cable or to an FPS-10 flash prommer with an XCS-4 modular cable and USB cable. Make sure that you have a PK-1 dongle connected to the computer's parallel port.
2. Connect a DC power supply to the module test jig (MJ-148) with an FLC-2 cable.  
**Note:** If CU-4 is used then correct DC supply voltage is 12V . If DC power is connected directly to module test jig then absolutely max. DC power is 4.2 V. Use nominal value 3.7 V
3. Connect an RF cable to the RF connector of the module test jig (MJ-148) and RF signal generator;
4. Set the phone module to test jig and start Phoenix service software.
5. Initialize connection to the phone. (Use FBUS driver when using DAU-9S).
6. To choose a product in Phoenix: From the File menu, choose "Choose Product" and select RX-34 from the list or from the File menu, choose "Scan Product".
7. From the toolbar, set operating mode to "Local".
8. From the Testing menu, choose "WLAN RX tests".
9. In the "WLAN RX tests" window:
  - Test mode "Generator mode"
  - Channel "7" (2.442 GHz)
  - Press "Start" button

## WLAN RX troubleshooting

Note! Generator level can be set higher if needed. Just note that levels will be different in whole chain respectively.



All spectrum analyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PVB ground). Reading value is represented without +26 dB compensation.

\* Spectrum analyzer reading with 1 kohm passive probe (right value add +26dB)

Figure 32 WLAN RX troubleshooting



## Antenna troubleshooting

The device uses a common antenna for Bluetooth and WLAN. If fault is not found after TX and/or RX troubleshooting then check antenna by doing SB-7 test.

If it does not work check detailed instructions for antenna troubleshooting from Bluetooth troubleshooting in BB Troubleshooting and Manual Tuning Guide.

## Introduction to WLAN RF tuning

Phone WLAN RF is tuned in production. There is no reason to do the re-calibration unless one or more of the RF components is changed.

### Note:

RF calibration is always performed with the help of a product-specific module jig, never with an RF coupler. Using an RF coupler in the calibration phase will cause a complete mistuning of the RF side.

Cable and adapter losses RF cables and adapters have some losses. They have to be taken in account when the phone is tuned.

As all the RF losses are frequency dependent, the user have to be very careful and understand the measurement setup. In the following table there are RF attenuations of the Rf cable CA-58 RS connected to RF connector on PWB.:

Freq. (MHz)	Attn. (dB)	Tolerance (dB)
2400	0.4	0.5
2440	0.4	0.5
2480	0.4	0.5

**Note:** XRS-6 RF cable should be connected to SMA connector of CA-58RS cable.

## Tx IQ tuning

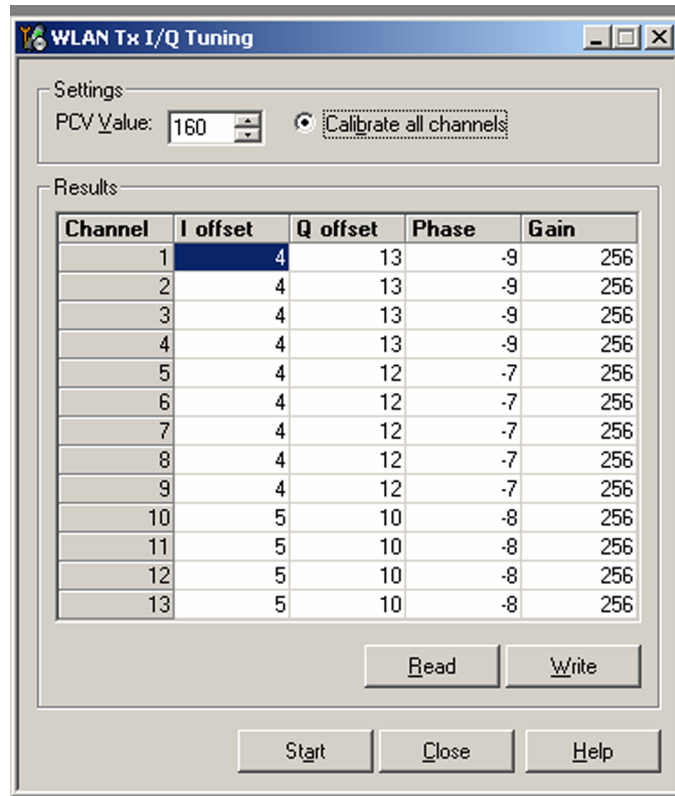
### Context

The Tx path branches to I and Q signals at the RF I/Q modulator. Modulator and analog hardware located after the modulator cause unequal amplitude and phase disturbance to I and Q signal paths. Tx IQ tuning balances the I and Q branches.

### Steps

1. Connect the phone to a measurement equipment.
2. From the dropdown menus, set "Operating mode" to "Local"
3. From the Tuning menu, choose "WLAN Tx I/Q Tuning"
4. Set PCV value to 160 and Calibrate all channels on.
5. Click Start.

- Wait until automatic tuning has finished and press "Write".



- When the values have been written to the phone memory, click the Close button to close the tuning window.

## Tx power level tuning

### Context

Because of variations in the IC process and discrete component values, the actual transmitter RF gain of each phone is different. Tx power level tuning is used to find out mapping factors called 'power control values' (PCV). These factors adjust the WLAN transmitter output power to fulfill the required specifications.

### Steps

- Connect the phone to the WLAN measurement equipment.
- From the dropdown menus, set "Operating mode" to Local.
- From the Tuning menu, choose "WLAN Tx Tuning".
- Adjust the measurement equipment for power level tuning. **Remember to take jig and RF cable attenuations into account!**
- Choose Data rate 6 Mbit/s. **It should be 6 Mbit/s, otherwise power levels for other datarates will be miscalculated!.**
- Click Start.

7. Adjust all 6 power levels on every 3 (1,7 and 13) channels by adjusting PCV value to get corresponding power (dBm). Adjusting could be made by pressing + or – keys or writing the value directly to cell.

**WLAN Tx Tuning**

**Tx Tuning parameters**

RF Power limit OFDM BPSK: **15.00**

RF Power limit OFDM QPSK: **15.00**

RF Power limit OFDM 16-QAM: **13.00**

RF Power limit OFDM 64-QAM: **13.00**

RF Power limit Barker / CCK: **17.00**

Detector gain: **12**

**Tx Test Settings**

Data rate: 6 MBit/s PCV back off manual: 12

**Power curves parameters**

Number of channels N: 13

Points per channel M: 6

**Power curves**

	Channel 1 (2412 MHz)			Channel 7 (2442 MHz)			Channel 13 (2472 MHz)		
Point	Power	PCV	Det.	Power	PCV	Det.	Power	PCV	Det.
1	<b>17.0000</b>	45937	29917	<b>17.0000</b>	43681	28670	<b>17.0000</b>	42978	28303
2	<b>15.0000</b>	43834	23144	<b>15.0000</b>	41538	21801	<b>15.0000</b>	40835	21788
3	<b>13.0000</b>	41731	18115	<b>13.0000</b>	39395	16844	<b>13.0000</b>	38692	17004
4	<b>10.0000</b>	38577	12892	<b>10.0000</b>	36181	11871	<b>10.0000</b>	35477	12102
5	<b>5.0000</b>	33320	8023	<b>5.0000</b>	30823	7477	<b>5.0000</b>	30119	7625
6	<b>0.0000</b>	28063	5711	<b>0.0000</b>	25466	5533	<b>0.0000</b>	24762	5556

Default values are BOLD !

Start Finish Read Write Defaults Close Help

8. After all values are adjusted to their corresponding power targets press “Finish” button.
9. Write the values to the phone memory by pressing “Write” button.
10. Finally close the window by pressing “Close”.

**Note:** WLAN Tx power Level tuning is only allowed with adequate measurement equipment.

## WLAN functionality testing using SB-7 WLAN test BOX with RX-44

### Context

The build-up and usage of the WLAN Test Box SB-7 is described. A simple functionality test is advised. With this test both WLAN RX/TX will be tested in weakened field scenario. The test uses active scan.

**WARNING:** in USA DO NOT use channels 12 and 13 for scanning.

**Note:** SB-7 supports WLAN Standard IEEE 802.11b/g.

Do not open SB-7. The following just describes, what the delivery package of SB-7 consists of.

The SB-7 contains following modules:

Name of module	Notes
SB-7 WLAN TEST BOX	Milled aluminium
AC POWER ADAPTER	5V / 2.5A
ANTENNA	D-Link, female reverse SMA

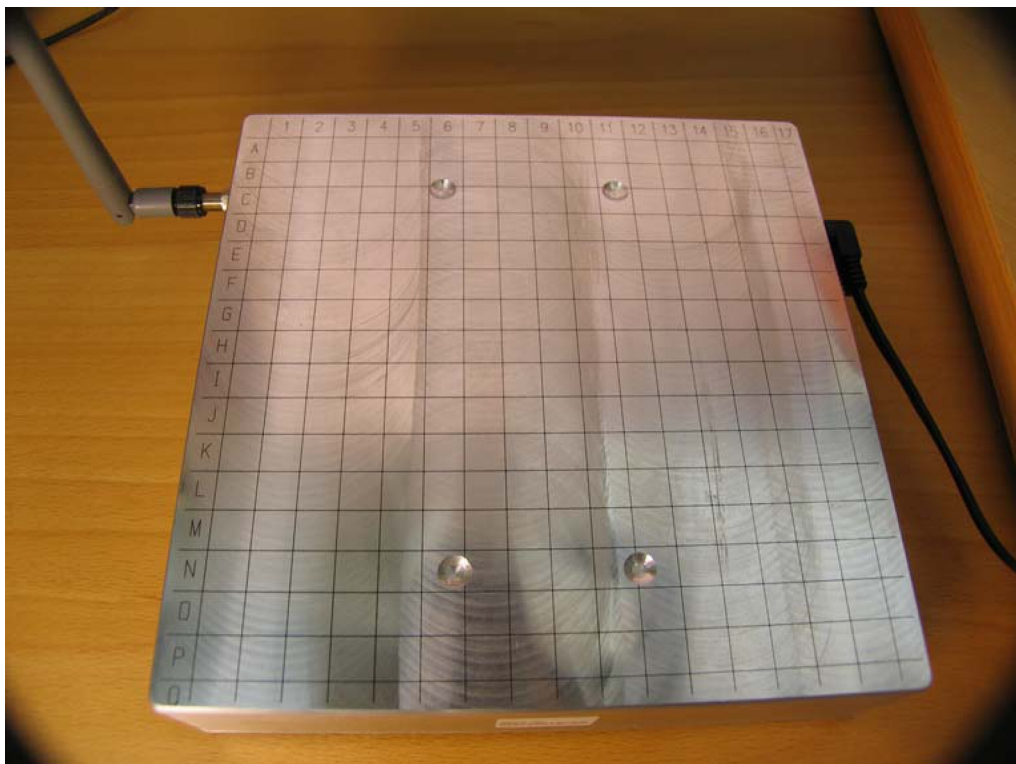


Figure 33 SB-7 - Outside view

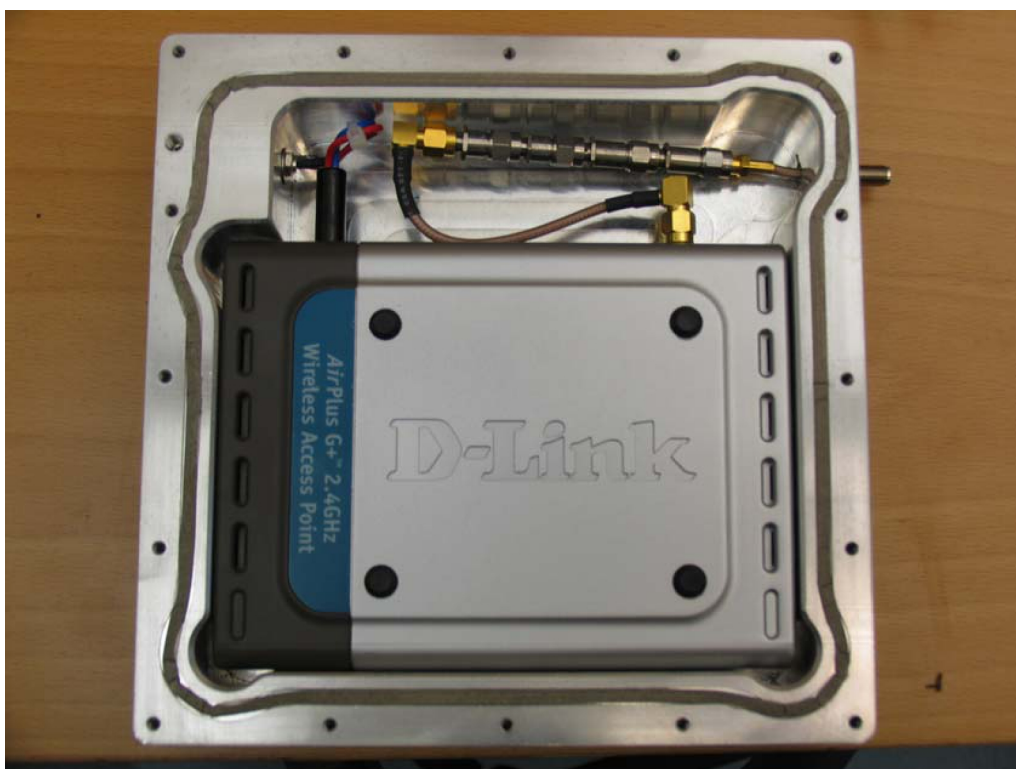


Figure 34 SB-7 - Inside view

## Steps

1. The cover of SB-7 contains a grid starting from A1 and ending to Q17 (see figure 7). Place CU4/SS-62 + FS-66 on SB-7 so, that the corners of SB-7 are on top of the following square of the grid: A5, A13, Q4 and Q14.

2. Antenna is pointing straight up (see figure 9). Place SB-7 on working surface so that there is at least 20cm free space around it.

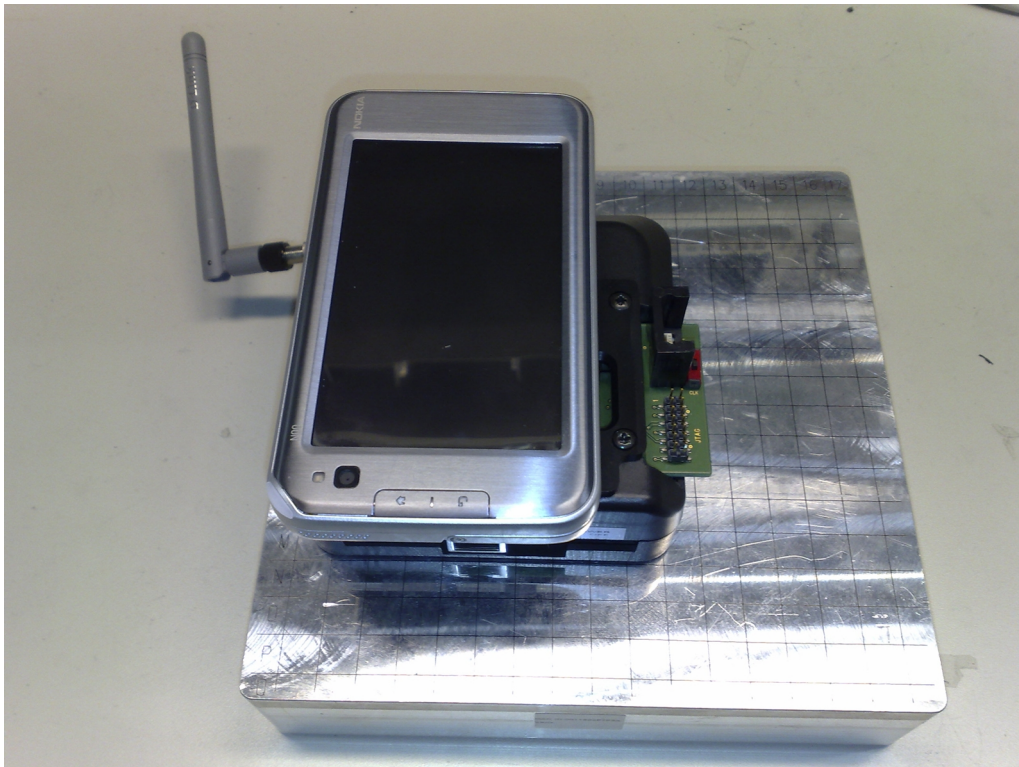


Figure 35 Placement of RX-44 on SB-7

## WLAN functionality test

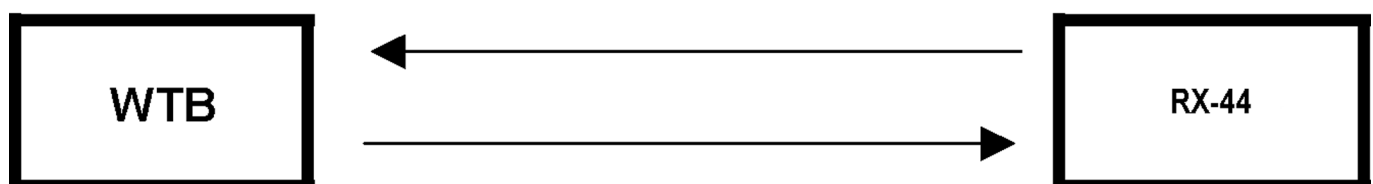
### Context

Connect power cable and antenna to SB-7. Wait for 3 minutes to be sure that SB-7 is fully up and running.

### Steps

1. Attach RX-44 with CU4/SS-62 + FS-66 and place on top of the WLAN Test Box at the correct place as explained in **WLAN functionality testing using SB-7 WLAN test BOX with RX-44**.
2. Make connection to RX-44 with Phoenix (test mode).
3. Choose Testing -> WLAN Configuration.
4. Write "default" into 'Network SSID to scan' field.
5. Press **Scan**.

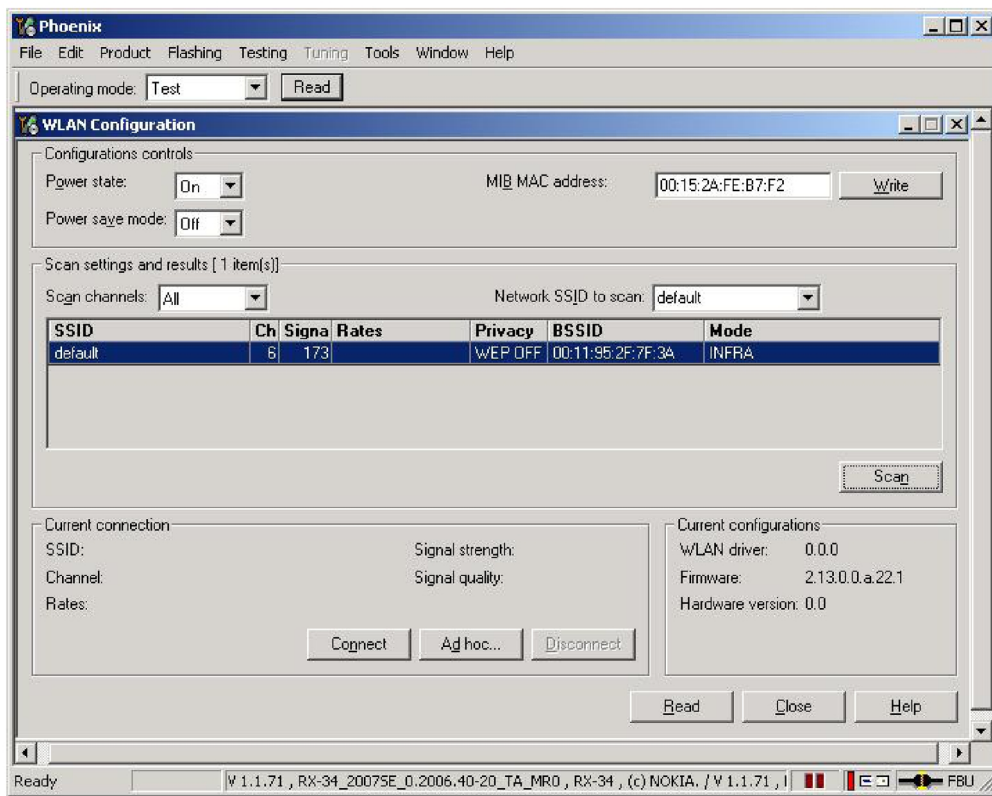
### Probe request (on all channels)



### Probe response



6. If the name of the WLAN test Box (Default) appears on the list under Scan results, the RX-44 is OK (see following figure).



After scanning signal level should be 173 +/- 6

Otherwise repeat testing 3-4 times as follows:

7. If the name was not on the list:
- i Choose Power state: Off, and wait 5 seconds
  - ii Choose Power state: On, and wait 5 seconds
- Jump to task 5.
8. If you still can't find the name of the WLAN test Box (Default) on the list under Scan results, the RX-44 is not OK

**Note:** Note: Local WLAN environment may affect test results, especially if there are many WLAN access points nearby.

Known issue: If you manage to scan SB-7 with RX-44 and remove power from SB-7 and press scan again, SB-7 is still found. You have to wait for 1 minute after SB-7 power down before scanning in order that scan results history is deleted from RX-44.

## 6 — Camera troubleshooting

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## ■ Camera Module Specification

The front camera of RX-44 is for video imaging purposes only. The main use cases are video call and web camera use. Sales release SW does not enable still imaging.

**Table 13 Sub camera specification**

Sensor type	1/7" CMOS sensor
Sensor valid pixels	658(H)x494(V)
F number	F3.5
Focus range	30cm to infinity
Video resolution (max)	640 x 480
Video frame rate	30fps

## ■ Camera Module Mechanics

The camera module as a component is not a repairable part, meaning that the components inside the module may not be changed. Cleaning dust from the front face is allowed only. Use clean compressed air.

The main parts of the module are:

- 1/7" CIF CMOS sensor
- 24-pin board to board connector'

## ■ Camera troubleshooting introduction

### Possible Faults in Image Quality

When checking for possible errors in camera functionality, knowing what error is suspected will significantly help the testing by narrowing down the amount of test cases.

The following types of video image quality problems may be expected to appear:

- Dust (black spots)
- Lack of sharpness
- Bit errors

In addition, there are many other kinds of possibilities for getting bad image quality, but those are ruled out from the scope of this document since probability of their appearance is going to be minimized by production testing.

### Testing for Dust

For detecting this kind of problems, take video of uniform white surface and analyze it in full resolution. Good quality PC CRT monitor is preferred for analysis (avoid using LCD). Search carefully since finding these defects is not always easy.

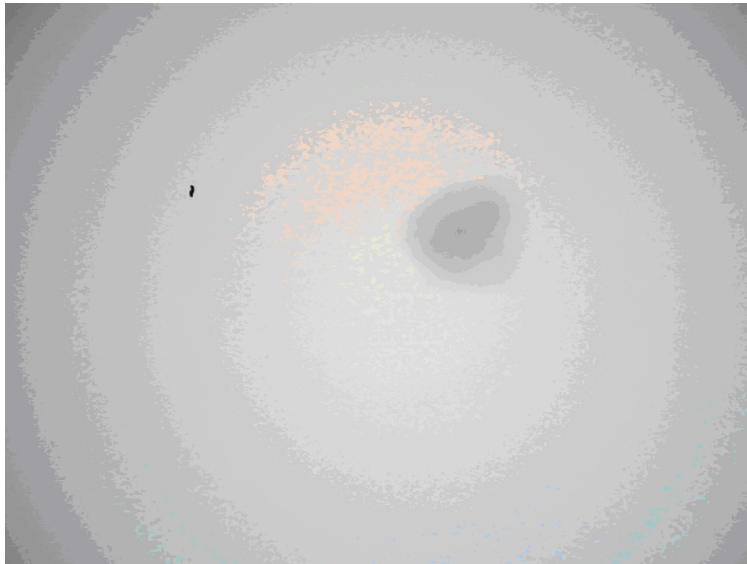
Figure below gives an example of still image containing easily detectable dust problems. For taking a white video uniformly lightened white paper or white wall can be used. One possibility is to use uniform light but make sure that camera image is not flickering when taking test video.

In case flickering happens try to reduce illumination level. Black spots in image are caused by dirt particles trapped inside the optical system. Clearly visible and sharp edged black dots in image are typically dust particles on image sensor. These spots are searched for in manufacturing phase, but it is possible that the

camera body cavity contains a particle, which may move onto the image sensor active surface, e.g. when the phone is dropped. Thus it is also possible that the problem will disappear before the phone is brought to service.

The camera should be replaced if the problem is present when the service technician analyses the phone. If dust particle is lying on infrared filter surface on either side, they are much harder to locate because they will be out of focus, and appear in image as large, grayish and fading-edge 'blobs'.

Sometimes they will be very hard to find, and thus the user probably will not notice them at all since they do no harm. But it is possible that a larger particle disturbs the user, causing need for service.



If large dust particles get trapped on top of the lens surface in the cavity between camera window and lens, they will cause image blurring and poor contrast (see also item 'sharpness').

The dust gasket between the window and lens should prevent any particles from getting into the cavity after manufacturing phase. If dust particles are found on sensor, this is classified as a manufacturing error of the module and thus the camera should be replaced, since camera module cannot be disassembled without damaging it.

Any particles inside the cavity between protection window and lens have most probably been trapped there in assembly phase at camera module supplier. Unauthorized disassembling of product can also be root cause for the problem.

## Testing for Sharpness

### Effects of Dirty or Defective Protection Window

If video image taken with some device are claimed to be blurry, there are following possible sources for the claim:

- 1 Protection window is fingerprinted, soiled, dirty, visibly scratched or broken.
- 2 Camera module has failed to focus correctly. Producing a blurred image.
- 3 User has tried to take video in too dark conditions and video is blurred due to handshake or movement. This is no cause to replace camera module.
- 4 There is dirt between protection window and camera lens.
- 5 The protection window is defective. This can be either manufacturing failure or caused by user. Camera module should be changed.

It should be noted that the effects of any dirt in video images can vary very much; it may be difficult to judge if the window has been dirty when some image has been taken or if something else has been wrong.

That is why the cleanness of the protection window should always be checked and the window should be wiped clean with a suitable cloth.

## Bit Errors

Bit errors are defects in image caused by data transmission error between camera and phone baseband or inside camera module. Bit errors can be typically seen in images taken of any object, and they should be most visible in full resolution video images.

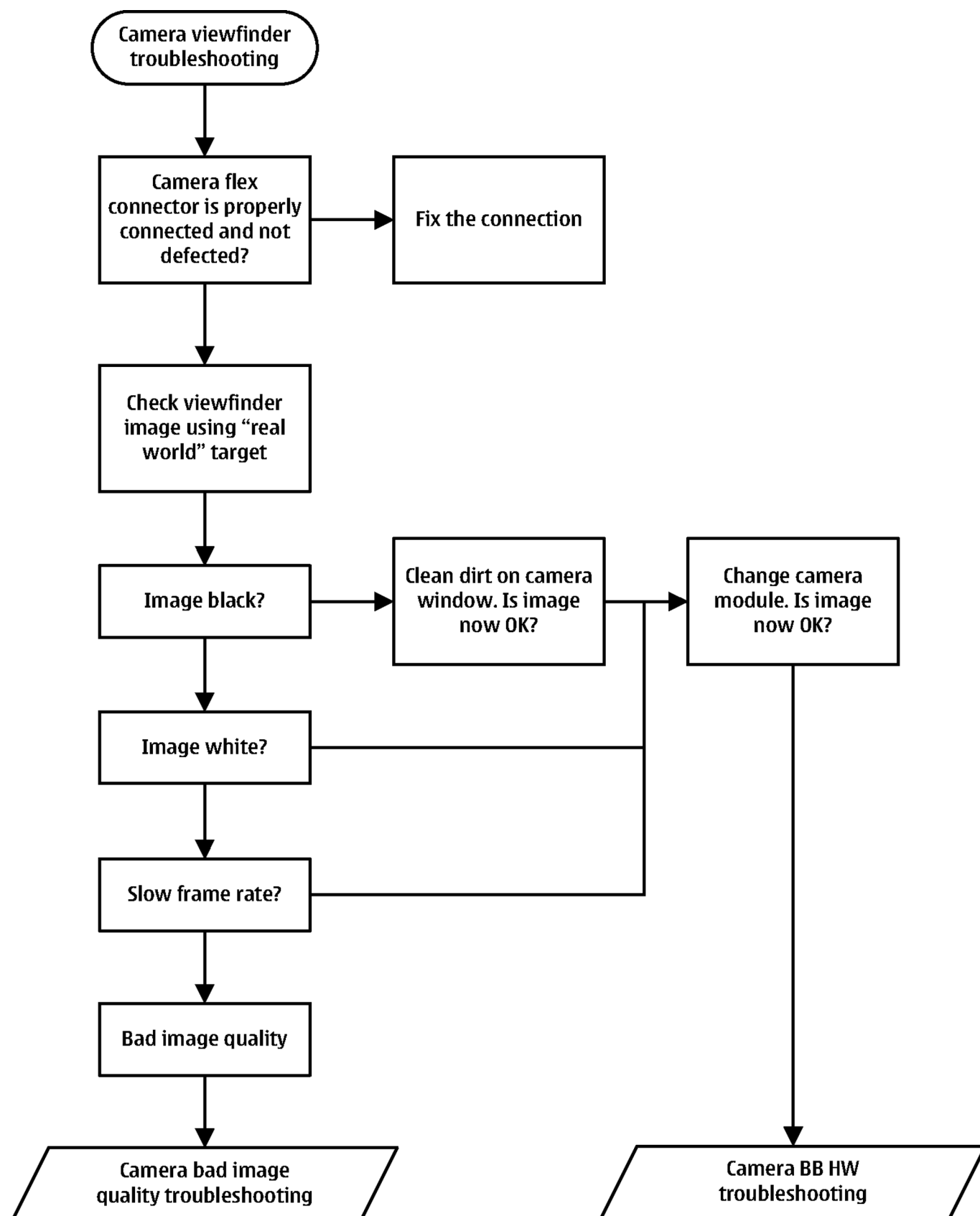
A good practice is to use uniform white test target when analyzing this kind of errors. The errors will be clearly visible as colorful sharp dots or lines in camera images. See figure below.

One type of bit error is lack of bit depth. In that case image is almost totally black under normal conditions sensing something only under very high illumination. Typically this is a contact problem between the camera module and phone main PWB. Check camera assembly and connector contacts. If fault is in the camera module typically bit error is visible only when using some specific video resolution.



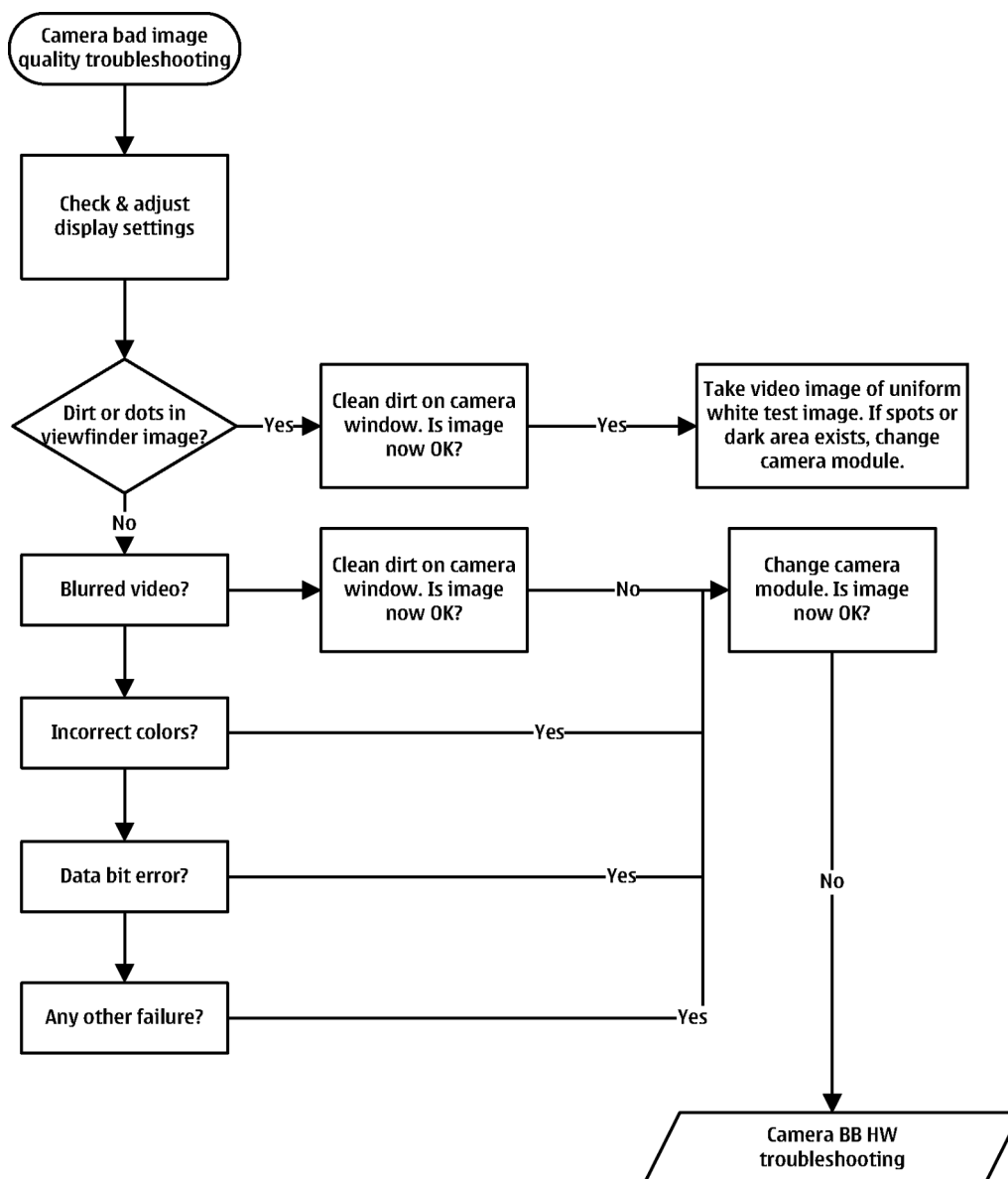
## ■ Camera viewfinder troubleshooting

### Troubleshooting flow



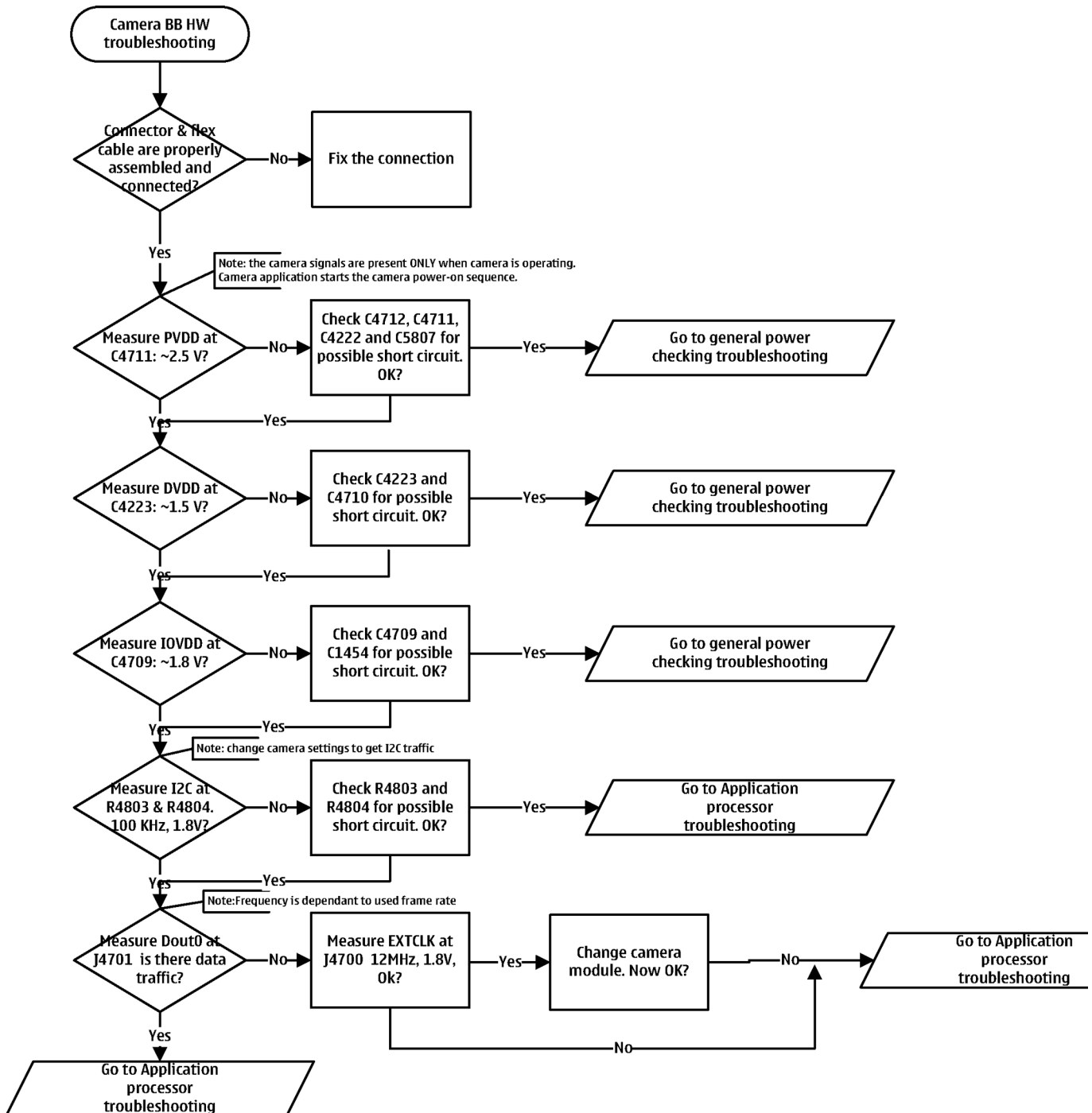
## ■ Camera bad image quality troubleshooting

### Troubleshooting flow



## ■ Camera BB HW troubleshooting

### Troubleshooting flow





## 7 — System Module

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## ■ Baseband description

### System module block diagram

The device consists of four different main modules: engine (2 EH), Main flex (2FC), Top Flex (2FD) , camera and LCD module. The engine module consists of BB and RF components. Connection between UI flexies,, camera and display is done with board-to-board connectors.

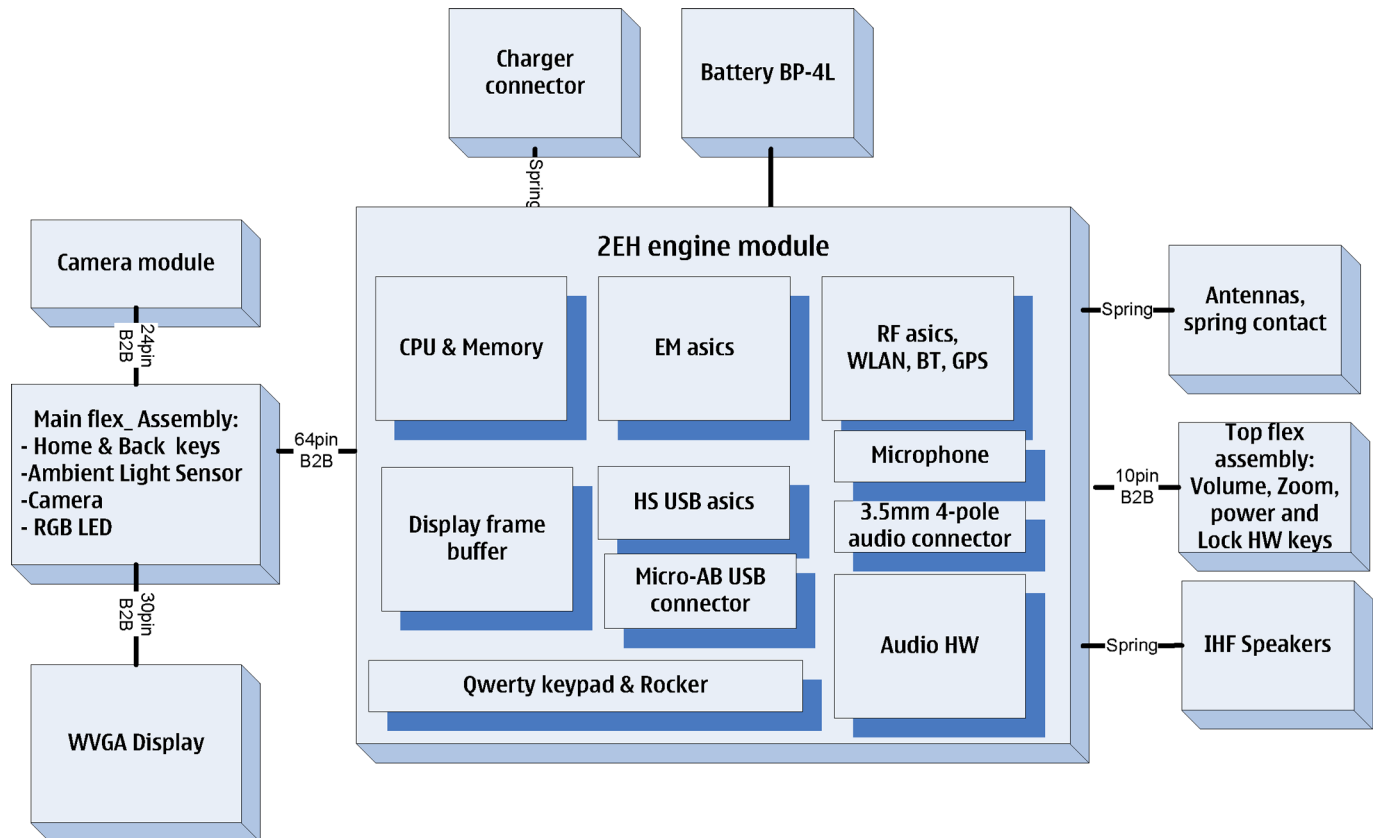


Figure 36 RX-44 system block diagram

### Baseband functional description

The device is based on OMAP2420 (D4800) application processor on top of which the SDRAM / MuxOneNAND combo memory is stacked. More detailed information about OMAP2420 (D4800) is presented in the following chapter. EM asics are EM ASIC Vilma D1420, EM ASIC Betty N1310 and EM ASIC Menelaus N4200. Keyboard and its lightning are controlled by N4300, AIC33 audio codec is N4100 and touch pad controller N1530. HS-USB interface goes via USB controller ASIC N5350 and USB EM ASIC N5350. WVGA display has external display frame buffer D1510.

### Application processor

The application processor OMAP2420 (D4800) is also called an application ASIC because it is processing application SW and handles the UI SW. It consists of the application processor and peripheral subsystems such as camera, display and keyboard driver blocks.

In addition to interfaces mentioned above, the peripherals block includes several different I/O interfaces, for example, for keyboard, audio, Bluetooth and WLAN.

## Absolute maximum ratings

Signal	Min	Nom	Max	Unit	Notes
Battery voltage (idle)	-0.3		+4.5	V	Battery voltage maximum value is specified during charging is active
Battery voltage (Call)	+3.2		+4.3	V	Battery voltage maximum value is specified during charging is active
Charger input voltage	-0.3		+20	V	
Back-Up supply voltage	0	2.5	2.6	V	Maximum capacity of the backup power supply assumed to be 16 $\mu$ Ah.

## Device modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below EM ASIC D1420 master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32kHz oscillator is running (RTC is on).
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over EM ASIC D1420 master reset threshold.
RESET	RESET mode is a synonym for start-up sequence.
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low.
FLASHING	FLASHING mode is for SW downloading.

## Voltage limits

Parameter	Description	Value
VMSTR	Master reset threshold (D1420)	2.2V (typ.)
VMSTR+	Threshold for charging, rising (N1310)	2.1V (typ.)
VMSTR-	Threshold for charging, falling (N1310)	1.9V (typ.)
VCOFF+	Hardware cutoff (rising)	2.9V (typ.)
VCOFF-	Hardware cutoff (falling)	2.6V (typ.)
SWCOFF	SW cutoff limit	~3.2V

The master reset threshold controls the internal reset of EM ASICs. If battery voltage is above VMSTR, N1310 charging control logic is alive. Also, RTC is active and supplied from the main battery. Above VMSTR, N1310 allows the system to be powered on although this may not succeed due to voltage drops during start up. SW can also consider battery voltage too low for operation and power down the system.

## **Power key**

The system boots up when power key is pressed (adequate battery voltage, VBAT, present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW).

## **Power distribution**

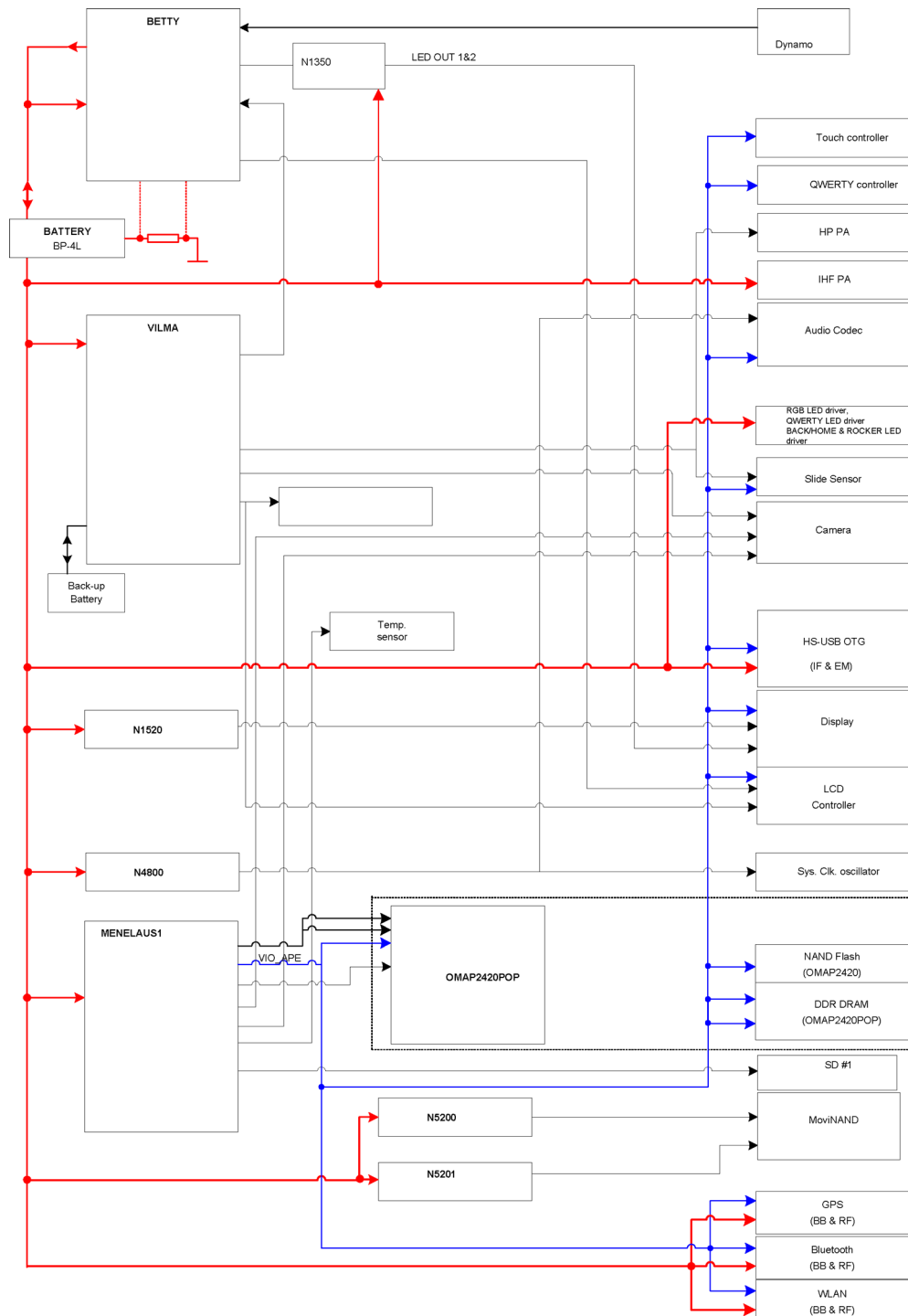
Generally, RX-44 EM architecture is implemented with three EM ASICs, EM ASIC Vilma D1420, EM ASIC Betty N1310 and EM ASIC Menelaus N4200 controlling the EM and supplying the output voltages.

In addition to the ASICs, N5351 PM ASIC handles the power supply for HS USB controller.

In addition to mentioned EM ASICs, RX-44 EM includes functionalities to be powered using discrete regulator or direct battery voltage supply.

The following functionality is supplied with discrete power supplies:

- LCD analog Supply (2.8V)
- System clock oscillator
- eMMC core (3.0V) and IO (1.8V)

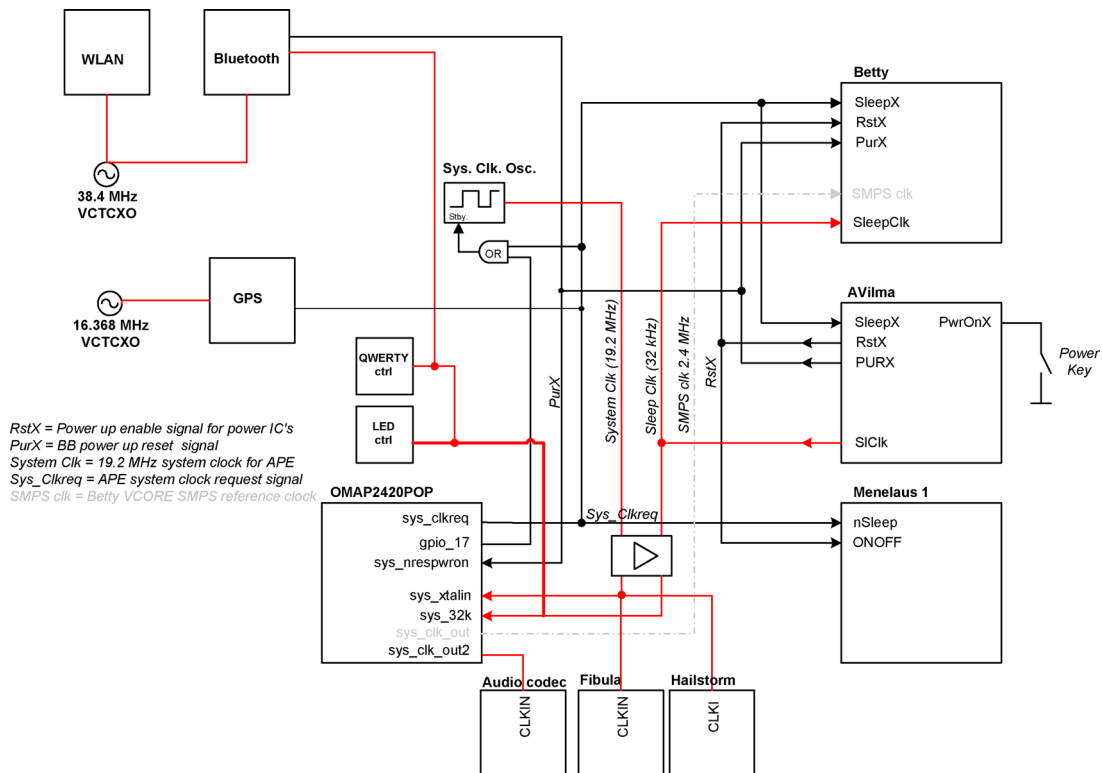


**Figure 37 RX-44 power distribution**

## Clocking scheme and controlling signals

There are two main clocks in the BB system: 19.2 MHz square wave clock provided by discrete oscillator and 32.678 kHz sleep clock produced by the EM ASIC D1420 with an external crystal.





## Interfaces

### Bluetooth

Bluetooth data interface is connected to UART1 of application processor D4800. UART is an asynchronous interface for transferring data and control information to BT device.

### WLAN

WLAN host interface is 4-line synchronous serial interface.

### HS-USB

Universal Serial Bus is a galvanic interconnection between product and an external device. RX-44 is High Speed USB 2.0 OTG device, through the Micro-AB connector.

OTG (On-To-Go) support means that RX-44 can work as host (like PC) in USB connection to another USB slave device. Supported (e.g. another RX-44) slave devices are shown as mass storage device connection in RX-44 file manager.

### Memorycards

The device has one memory card reader, which support dual voltage cards. In addition, there is an internal memory card assembled on PWB.

Internal 2GB eMMC flash memory is intended for user content storage. It can be used to store pictures, music, map files etc. This memory is shown in file manager as internal memory card and is not removable by the user.

The external memory card is supplied with dual 1.8/3 V supply voltage, depending on the card type.

The detection of external memory card removal/insertion is done by a switch in the lid. Internal memory card is assembled on PWB and is not removable by the user.

### **Battery interface**

The battery interface supports BP-4L battery. This interface consists of three connectors: VBAT, BSI and GND. BSI line is used to recognize battery capacity by a battery internal pull down resistor.

Battery temperature is estimated by measuring separate battery temperature NTC via BTEMP line, which is located on the transceiver PWB, in a place where phone temperature is most stable.

For service purposes the device SW can be forced into local mode by using pull down resistors connected to the BSI line.

### **User interface**

#### **Main display**

#### **Display module features:**

The device has one display.

Video interface is used for image data transfer (video and still) and serial interface is used for sending commands.

- 800x480 transmissive LTPS LCD display
- 65k colours used in RX-44
- a backlight incorporating 6 white LED's to illuminate the display.
- a touch screen
- Compact Display Port (CDP) for display data and serial interface (LOSSI) for commands.

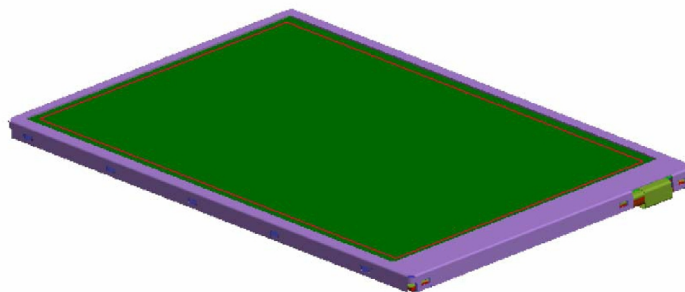
The display has four different operating modes:

- Normal mode
- Sleep mode
- Partial mode
- Off

The interconnection between the LCD module and the main flex assembly is implemented with a 30-pin board-to-board connector. Display is controlled via LCD controller using LOSSI interface (Low Speed Serial Interface).

Image data is transferred through 3-link CDP (Compact Display Port). CDP is using differential sub-LVDS voltage levels.

The display module does not require any tunings. Display backlights are powered with discrete SMPS.



**Figure 38 800x480 transmissive LCD display**

## *HW keys*

### **Upper block**

The upper block HW keys (Home, Back) are located in main flex, which is connected to the main PWB with a 64-pin board-to-board connector.

### **Lower block**

Top left corner of the device has 5 HW keys, full screen, volume up, volume down, power and device lock key. These keys are connected to engine PWB through topflex assembly 10-pin board-to-board connector.

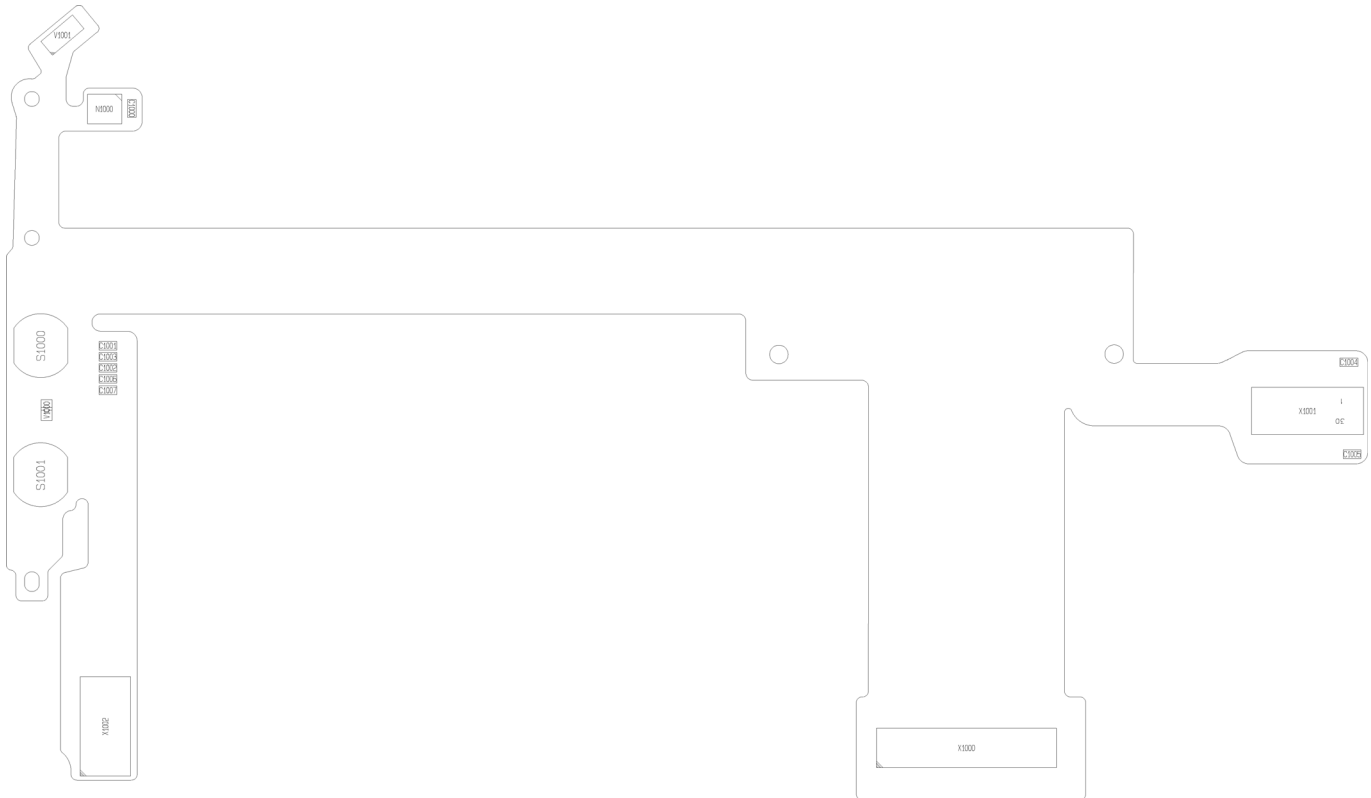
Engine pwb implements full Qwerty keyboard, 5-way rocker and Menu key.

All the keys (except power and lock key) are on matrix. The key matrix has eight rows and twelve columns, which is connected to the LM8323 integrated keyboard controller.

Power button is connected directly to AVilma and Lock key is connected directly OMAP2420POP GPIO102.

**Table 14 Main flex keys**

<b>Ref</b>	<b>Name</b>	<b>Pin No.</b>
S1000	Home	54
S1001	Back	55
V1001	RGB led	50, 51, 53
N1000	ALS	See schematics
X1002	Camera connector	See schematics
X1001	Display Connector	See schematics
X1003	Main Flex connector	See schematics



**Figure 39 Main flex layout**

### ***UI illumination***

Display backlight power supply is implemented with Betty's current regulated step-up converter. The most important edge conditions are sufficient high output power and efficiency of the converter. Dimming of backlights is implemented with traditional PWM control.

Qwerty keyboard and Rocker button backlights are supplied by two TPS75105 converters that are controlled by PWM signal fed from Keyboard controller. Keypad illumination conditions are controlled by OMAP2420POP according the device state and ambient light conditions.

Keypad controller communicates with OMAP2420POP through GEN\_I2C bus. RGB LED which is placed in top left corner of the device is used to indicate the status of the device mainly when the display has been turned off.

The on / off control for indication LED is implemented using integrated RGB LED driver LP5521. RGB controller communicates with OMAP2420POP through GEN\_I2C bus.



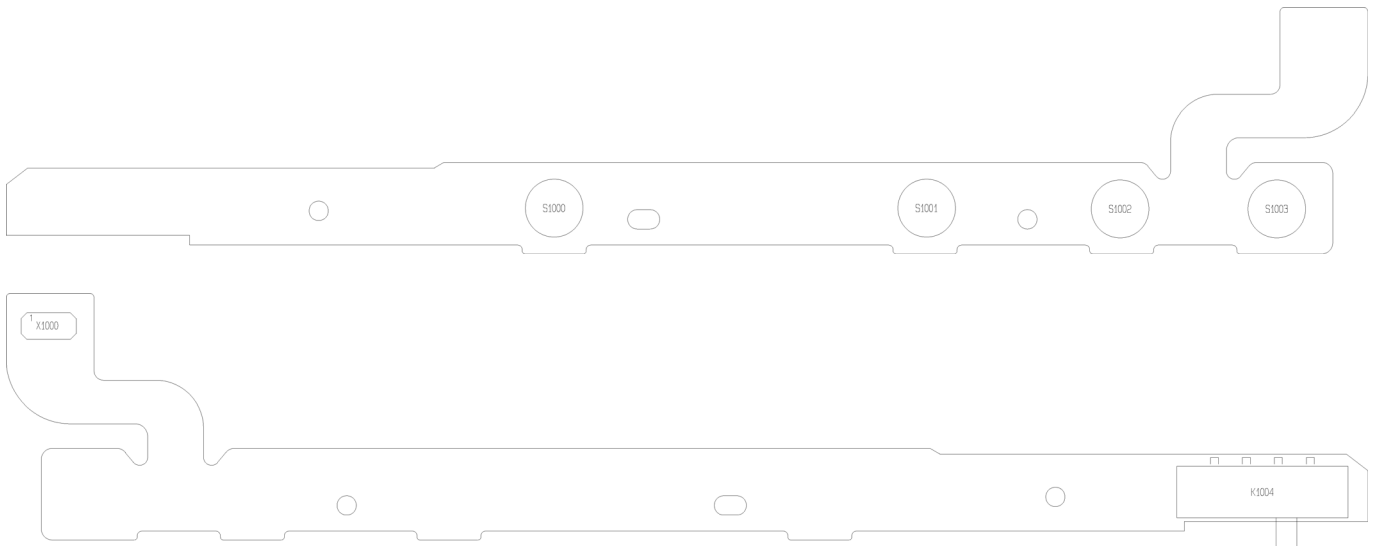
Red Green Blue (RGB) LED, which is placed on main flex is used to indicate the status of the device mainly when the display has been turned off.

- The TSL2563 is low-voltage (2.5V) light-to-digital converter that transform light intensity to a digital signal I2C interface. Device combines one broadband photodiode (visible plus infrared) and one infrared-responding photodiode. Two integrating ADCs convert the photodiode currents to a I2C bus that represents the irradiance measured on each channel.
- Display and keypad backlight intensity are controlled according to ALS output.

## Table 15

Key	Name	Pin No.
S1000	Power	10
S1001	Volume+	8
S1002	Volume-	7
S1003	Zoom	6
S1004	Lock	9

Lock Switch Position	Open	Closed (pressed)
Switch contact	Open	Closed
GPIO102	VCC	GND



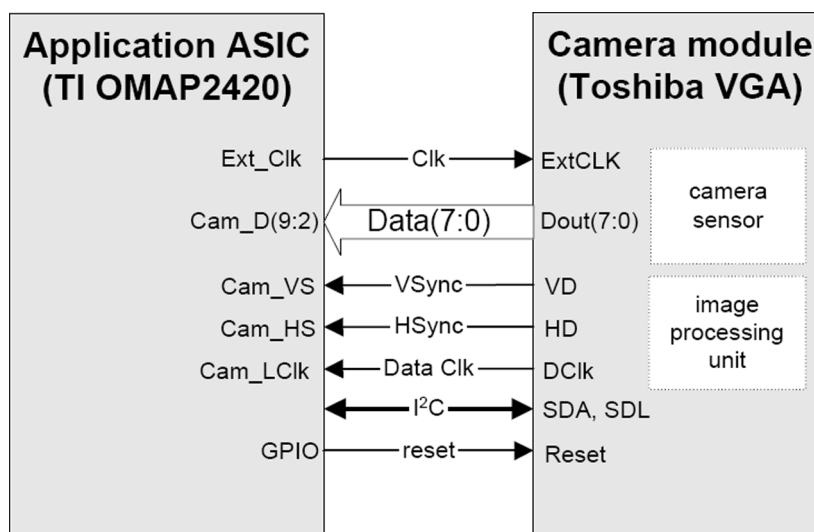
**Figure 41 Top flex assembly**

## Camera

The device has a camera module, which includes area color image sensor embedded with camera signal processor that meets with VGA format.

In the sensor area 494 vertical and 658 horizontal signal pixels, and the image size meets with 1/7-inch optical format.

Camera is intended for video imaging purposes.



**Figure 42 Camera architecture**

## ASICs

### Application processor OMAP2420 D4800

OMAP is the application processor running with OSS0 1.1 Linux based open source software operating system. It is the platform for executing all user related application.

Key functions:

- Camera interface
- Display interface (via Hailstorm D1510 display buffer)

- Bluetooth data interface
- WLAN data interface
- SD interface (via Menelaus)
- USB interface (Via TUSB6010 USB transceiver to OMAP2420 NOR flash interface)
- I2C interface for temperature sensor, Keypad IO expander, ALS, RGB led controller

Power supply:

- Core voltage V<sub>CORE\_APE</sub>=1.4V (in local mode) generated by Menelaus
- V<sub>CORE\_APE</sub> is lowered to 1.05V in sleep mode
- I/O voltage V<sub>IO\_APE</sub>=1.8V generated by Menelaus

Clock frequencies:

- SysClk=19.2 MHz as main clock provided by external oscillator G4850
- SleepClk=32.768 kHz as sleep clock provided by Vilma

### ***EM ASIC Menelaus N4200***

Menelaus is an auxillary energy management ASIC.

It acts in addition to AVilma and Betty.

Key functions:

- OMAP2420 Core supply generation
- OMAP2420 I/O supply generation
- OMAP2420 PLL block supply generation
- DDR/NAND Memory Core and I/O supply generation
- Camera modulue supply generation
- Level shifter and regulator for miniSD card
- Level shifter for internal eMMC

### ***EM ASIC Vilma D1420***

EM ASIC Vilma includes following functional blocks:

- Start up logic and reset control
- Charger detection
- Battery voltage monitoring
- 32.768kHz clock supply with external crystal
- Real time clock with external backup battery
- SIM card interface (Not used in RX-44)
- Stereo audio codecs and amplifiers (Not used in RX-44)
- A/D converter
- Regulators
- Vibra interface (Not used in RX-44)
- Digital interface (CBUS)

### ***EM ASIC Betty N1310***

EM ASIC Betty includes following functional blocks:

- Core Voltage supply generation for Hailstorm Display buffer D1510

- Charge control circuitry
- Level shifter and regulator for USB/FBUS (Not used in RX-44)
- Current gauge for battery current measuring
- Integrated LED driver (Not used in RX-44)
- External LED driver control interface for Display backlight
- Digital interface (CBUS)

### ***ASICS N5350 and N5351***

ASIC N5350 (TUSB6010) is a physical layer of USB OTG transceiver IC including crystal oscillator, PLL, USB controller (core), OMAP 2420 interface logic.

ASIC N5351 (TPS65030): a dedicated Power Management ASIC for USB OTG transceiver.

## **Device memories**

### ***Memory package***

Package-On-Package (POP) memories refer to memories that are in separate package, and attached on top of the processor.

### ***APE memory (POP3)***

RX-44's APE memory POP3 consists of DDR/MuxOneNAND combo memory.

DDR memory is using 32-bit interface and flash memory is using 16-bit muxed NOR interface.

- 1Gbit DDR + 2Gb MuxOneNAND

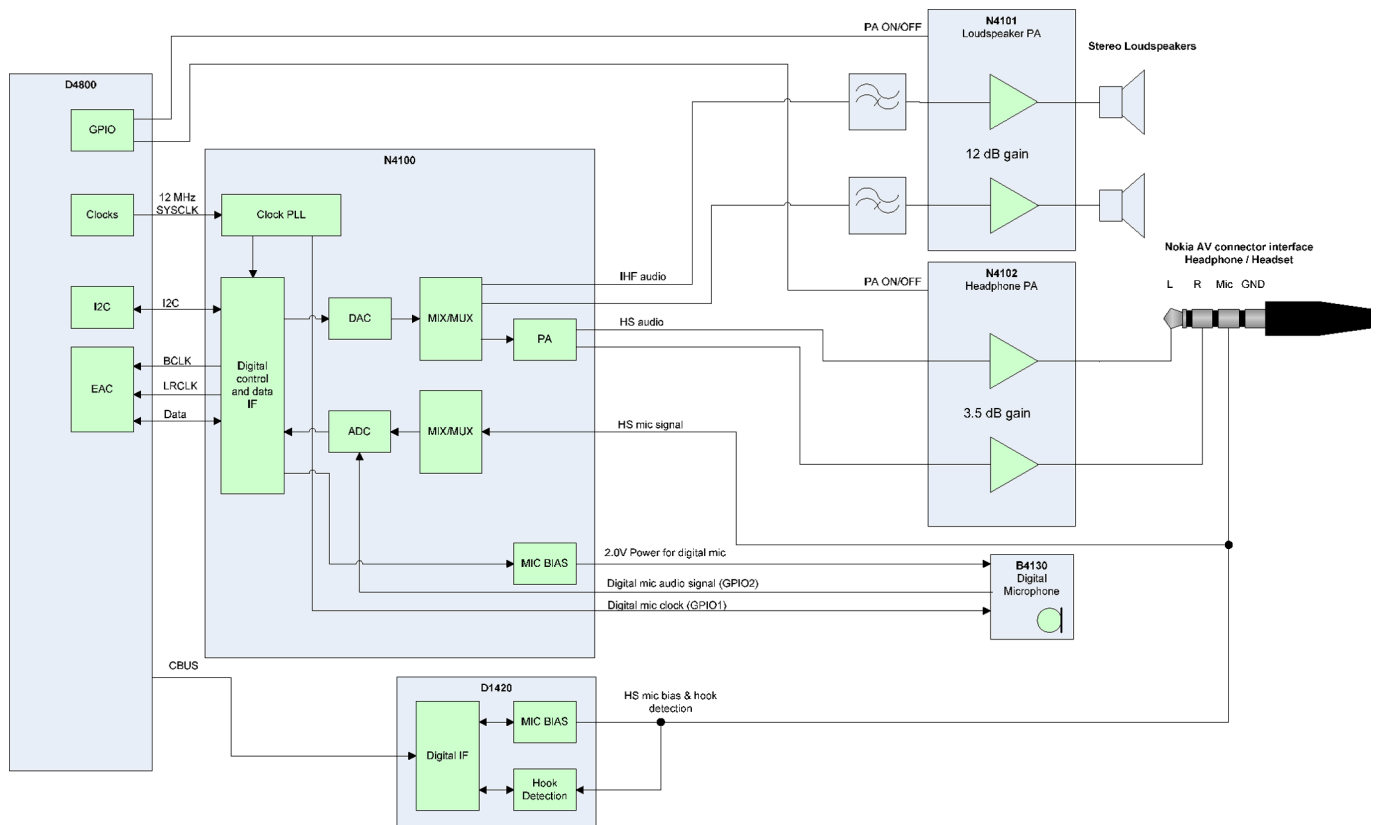
This capacity memories consist of three dies stacked on top of each other.

## **■ Audio concept**

### **Audio concept**

The device provides acoustical stereo audio output via integrated dynamic speakers and electrical calvanic stereo audio output via 3.5mm Nokia AV interface. Analog audio signal capture is handled by internal digital microphone and via Nokia AV interface using headset's microphone, such as Nokia HS-48.





**Figure 43 Audio concept**

The D4800 is the heart of the device's audio system handling digital signal processing and controlling of audio related peripherals chips.

The audio HW codec handling ADC and DAC tasks and analog signal amplifications is referred as N4100. The N4100 is also interface against the device's internal digital microphone module B4130.

### Internal speakers

The D4800 feeds digital audio data to the N4100 via the I2S interface. After the N4100 the signal is further amplified by stereo audio power amplifier (N4101) and fed to the dynamic speakers (B4140 and B4141).



The digital microphone module is connected directly to the interface provided by the N4100. The microphone is also powered by the microphone bias generator of the N4100 by 2.0Vdc. After filtering and decimation the signal is passed to the D4800 for further usage via the I2S bus.



### Nokia AV connector

A 3.5mm round 4-pole SMD connector is used for stereo audio out, mono audio in (external microphone) and enhancement identification purposes.

All signals are single-ended type and enhancement identification is implemented through the same pin that external mic also uses.

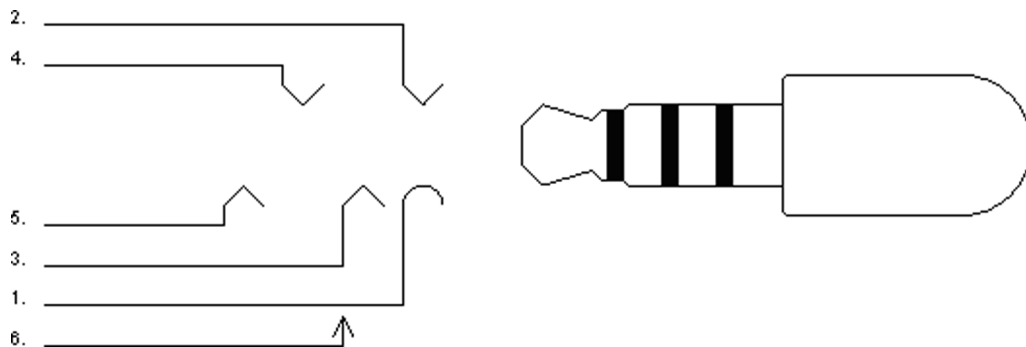


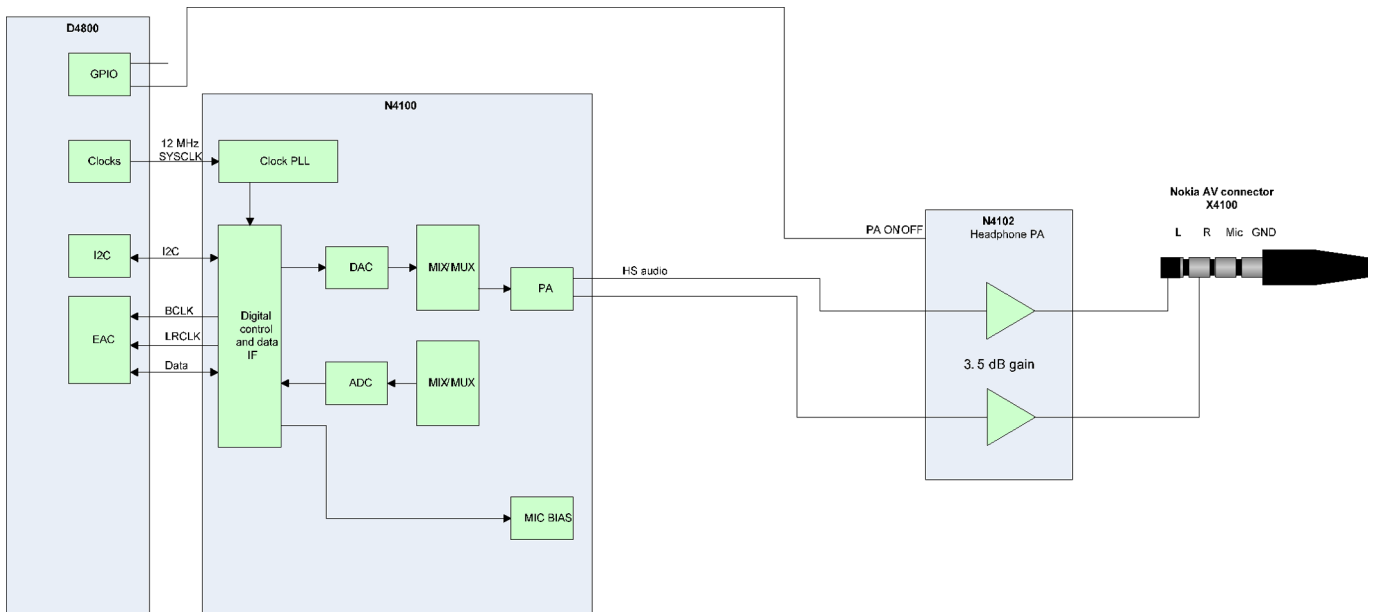
Figure 46 Nokia AV connector

Table 17 Pin/signal orders

3.5mm Pin #	Signal name	Direction	Description
6	PLUGDET	Input	Terminal internal connection, plug detection
5	HS EAR L	Output	Audio output
4	HS EAR R	Output	Audio output
3	HS MIC	Input	Microphone audio & send/end button info
1, 2	HS GND	-	Ground contacts

### Nokia AV interface, output

The D4800 feeds digital audio data to the N4100 via the I2S interface. After the N4100 the signal is further amplified by stereo audio power amplifier (N4102) and fed to the 3.5mm Nokia AV interface connector (X4100).

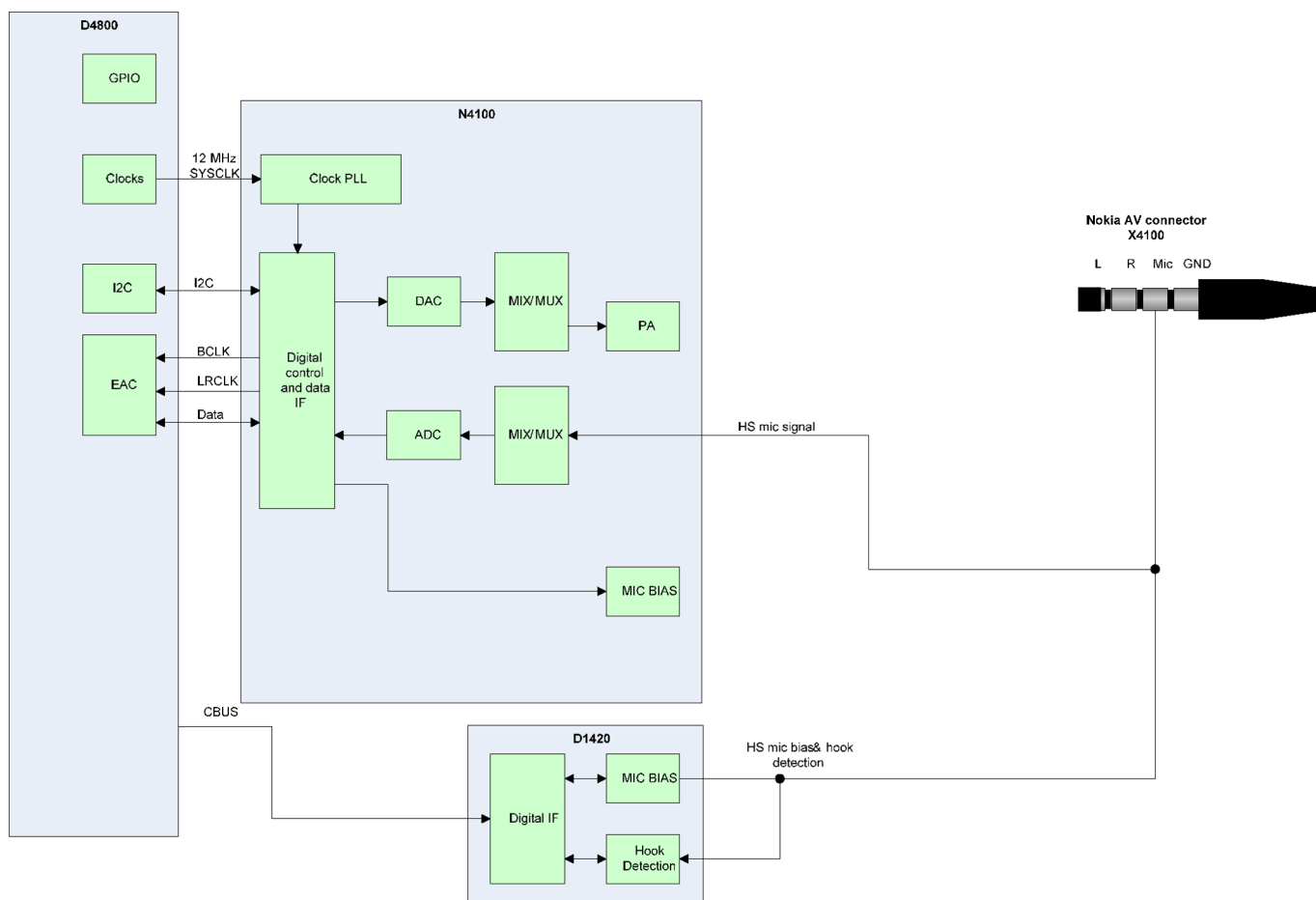


**Figure 47 Nokia AV interface, output**

### Nokia AV interface, input

Traditional analog electret type of microphone is supported by the Nokia AV interface.

The microphone is biased by the 2.1Vdc from the D1420 asic. The weak analog audio signal got from the microphone is fed to the N4100, amplified, AD converted and passed to the D400 for further usage via the I2S interface.



**Figure 48 Nokia AV interface, input**

## ■ Sensors and switches

### Slide position switch

Slide position switch, a hall sensor is used for detecting if slide is open or closed position.

Hall sensor is located in main PWB and magnet is located in the slider assembly. Sensor output is to OMAP2420POP GPIO110. Sensor signal is used by UI software to select suitable features according the device state.

Slide Position	Open	Closed
Switch contact	Open	Closed
GPIO110	VCC	GND

### SD door switch

A mechanical switch is used for SD door opening detection.

Switch is connected to card detect pin of N4200.

Door Position	Open	Closed
Switch contact	Closed	Open
Detect pin	GND	VCC

## ■ Baseband technical specifications

### External interfaces

#### External interfaces

Table 18 External interfaces

Name of connection	Connector reference
Battery	X1110
Charger	X1100
USB	X5300
External memory card reader	X5201
Main Flex	X4700
Audio jack	X4100
Display (on main flex)	X1001
Camera (on main flex)	X1002
Top Flex	X4300

#### Battery connector

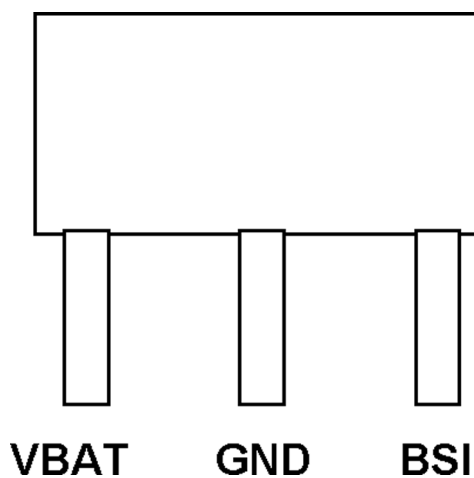


Figure 49 Battery connector pinout

Table 19 Battery connection

Pin	Signal	Notes
1	VBAT	Battery voltage
2	GND	Battery Status indication (fixed resistor inside the battery pack)
3	BSI	Ground

## Charger Interface

Table 20 Charging connector

Pin No	Pin Name	Description	Voltage levels, current	Comment
1	CHARGE	Charger input	0-9V, 0.85A	Center pin
2	GND	Ground	0.85A	

## Internal interfaces

### LCD interface

X1001 in main flex connected to display frame buffer.

No.	Name	I/O	Function
1	TP	Output	Touch panel analog signal
2	TP	Output	Touch panel analog signal
3	GND	Ground	Ground
4	D2+	Input	Data bus
5	D2-	Input	Data bus
6	GND	Ground	Ground
7	D1+	Input	Data bus
8	D1-	Input	Data bus
9	GND	Ground	Ground
10	Clk+	Input	CDP Clock Positive
11	Clk-	Input	CDP Clock Negative
12	GND	Ground	Ground
13	D0+	Input	Data bus
14	D0-	Input	Data bus
15	GND	Ground	Ground
16	VDD	Supply	Logic supply (1.8V)
17	VDDI	Supply	Analog supply (2.8V)
18	SCL	Input	Serial clock
19	DOUT	Output	Serial data out
20	DIN	Input	Serial data in
21	CSX	Input	Chip select
22	RESX	Input	Reset
23	GND	Ground	Ground
24	LED2+	LED	LED current source 2

No.	Name	I/O	Function
25	LED1-	LED	LED current sink 1
26	LED1+	LED	LED current source 1
27	LED2-	LED	LED current sink 2
28	GND	Ground	Ground
29	TP	Output	Touch panel analog signal
30	TP	Output	Touch panel analog signal

## Camera interface

Table 21 Pin functions

No.	NAME	I/O	FUNCTION
1	EXTCLK	I	Clock for external input
2	VDD25	-	Power supply (2.8V or 2.5V)
3	D5(DOUT5)	O	Data output
4	D1(DOUT1)	O	Data output
5	D2(DOUT2)	O	Data output
6	D0(DOUT0)	O	Data output (LSB)
7	D3(DOUT3)	O	Data output
8	D6(DOUT6)	O	Data output
9	D7(DOUT7)	O	Data output (MSB)
10	D4(DOUT4)	O	Data output
11	VDD15	-	Power supply (1.5V)
12	DCLK	O	Clock for output data
13	GND	-	GND (IOVSS)
14	GND	-	GND (IOVSS)
15	GND	-	GND (IOVSS)
16	IOVDD	-	Power supply for I/O (1.8V)
17	VD	O	Vertical synchronization pulse output
18	HD	O	Horizontal synchronization pulse output
19	SDA	I/O	Data for I2C-bus command
20	RESET	I	RESET terminal ("L" active)
21	SCL	I	Clock for I2C-bus command
22	GND	-	GND (IOVSS)
23	GND	-	GND (IOVSS)
24	GND	-	GND (IOVSS)



## Topflex connector X4300

No.	Name	I/O	Function
1	GND	Ground	Ground
2	GND	Ground	Ground
3	GND	Ground	Ground
4	GND	Ground	Ground
5	GND	Ground	Ground
6	Zoom	Output	Zoom Key
7	Volume down	Output	Volume up key
8	Volume up	Output	Volume down key
9	Lock	Output	Lock Switch (1V8)
10	PWRONX	Output	Power button (VBAT)

### ■ RF description

#### WLAN RF description

##### Transceiver

Wlan RF implements 802.11b/g WLAN radio for embedded, low-power and small form factor mobile applications. It conforms to the IEEE 802.11b/g protocols operating in 2.4 GHz band supporting OFDM data rates of 54, 48, 36, 24, 18, 12, 9, and 6 Mbps as well as CCK data rates of 11 and 5.5 Mbps and legacy data rates of 2 and 1 Mbps. IEEE802.11e/i protocol extensions are included to implement quality of service (QoS) and security functions.

Parameter	Value
Frequency range	2412-2472MHz
Channel spacing	5 MHz
Number of channels	11 in US 13 in EU 13 in France
Frequency accuracy	-+25 ppm

The RF block diagram is shown below:



The energy management chip integrates required power management functions to operate the system from VBAT (3.0 – 5.5 V). In default configuration the chip has SMPS to generate 1.2 V digital core voltage, two 1.8 V LDOs for RF and 2.8 V LDO for PA bias supply.

The EM chip also integrates power-on reset circuitry and level-shifters for RF front-end GaAs switches. Host interface is provided by a flexible serial interface (SPI) supporting clock frequency upto 60 MHz. The system uses 19.2 or 38.4 MHz reference clock from the cellular system as the reference. RF5924 Front-End Module (FEM) implements amplification of the transmit signal to required power levels. FEM is connected to VBAT and it has integrated b/g power amplifier, power detector, RX balun, and TX filtering. Also, it is capable of switching between WLAN RX, WLAN TX and BTH RX/TX operations. .

## Synthesizer

The PLL synthesizer with VCO is integrated into RFIC, only the loop filter is needed outside the RFIC.

## Antenna

WLAN/BTH has a common antenna and is located in decoration cover. Antenna is shown in picture 23.

## WLAN TX description

### Transmitter characteristics

The transmitter consists of:

- final frequency IQ-modulators
- power amplifier, for the lower and upper bands separately
- power control loop.

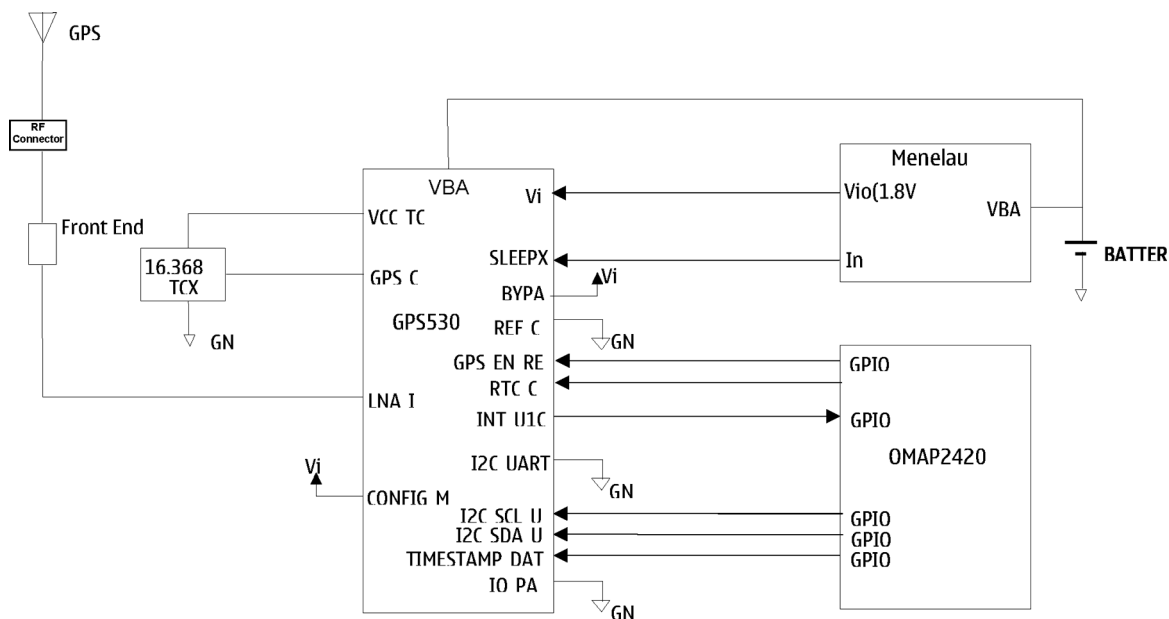
The IQ-modulator is integrated in STLC4560, as well as the operational amplifiers of the power control loop. The power amplifier is located in a single module with a power detector.

Item	Values
Type	Direct conversion
LO frequency range	4824...4944 MHz
Output power	<b>802.11b:</b> 17 dBm <b>802.11g:</b> 13/15/ dBm
Gain control range	60 dB

## GPS interface

The device includes an inbuilt GPS receiver and it works as a stand-alone positioning device. The antenna is located on the top left corner of the product.

The GPS system is connected to OMAP2420 ASIC.



**Figure 51 Block diagram of the GPS system**

# Nokia Customer Care

## Glossary

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A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analogue converter
DAC	Digital-to-analogue converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package

DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GMSK	Gaussian Minimum Shift Keying
GND	Ground, conductive mass
GPIO	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Association
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out



LED	Light-emitting diode
LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architecture
OMAP	Operations, maintenance, and administration part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x and BB5
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSS	Web content Syndication Format
RSSI	Receiving signal strength indicator
RST	Reset Switch

RTC	Real Time Clock (provides date and time)
RX	Radio Receiver
SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noise ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)