



Service Manual

Nokia 7650

NHL-2

Service Level 1&2

Copyright © Nokia Corporation. This material, including documentation and any related computer programs, is protected by copyright controlled by Nokia Mobile Phones. All rights are reserved. Copying, including reproducing, storing, adapting or translating, any or all of this material requires the prior written consent of Nokia Mobile Phones. This material also contains confidential information, which may not be disclosed to others without the prior written consent of Nokia Mobile Phones.

Introduction

The purpose of this document is to give Nokia service level 1&2 workshop technicians aids to carry out service for 7650. The use of this Service Manual is only for Nokia authorized service partners additionally to other service documentation like Service Bulletins.

While every endeavor has been made to ensure the accuracy of this document, some errors may exist. If you find any errors or if you have further suggestions, Nokia should be notified. Please keep in mind also that this documentation is continuously being updated and modified, so watch always out for the newest version.

Warnings and Cautions

Please refer to the phone's user guide for instructions relating to operation, care and maintenance including important safety information. Note also the following:

Warnings:

1. 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.
2. THE HANDPORTABLE TELEPHONE MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES EG PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
3. 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.

Cautions:

1. Servicing and alignment must be undertaken by qualified personnel only.
2. Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
3. Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
4. Use only approved components as specified in the parts list.
5. Ensure all components, modules screws and insulators are correctly re-fitted after servicing and alignment. Ensure all cables and wires are repositioned correctly.
6. All PC's used with NMP Service Software for this produce must be bios and operating system "Year 2000 Compliant".

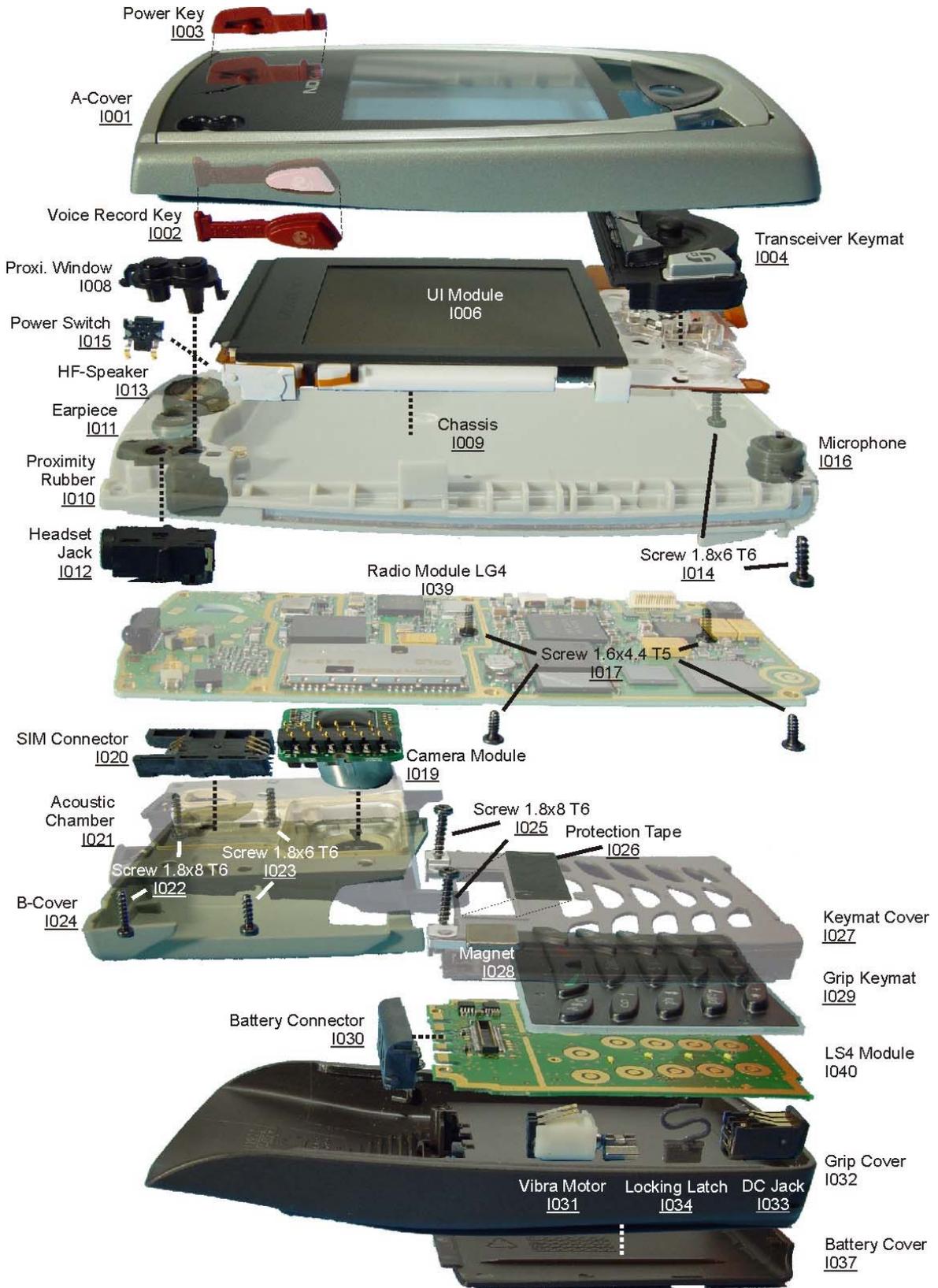
Table of content

1. EXPLODED VIEW.....	5
2. SPARE PART LIST	6
3. CAMERA INFORMATION AND GONOGO TEST	9
4. INFRARED GONOGO TEST	11
5. BLUETOOTH GONOGO TEST	12
6. SW-UPDATE	13
7. GENERAL REPAIR INFORMATION	14
8. DISASSEMBLY INSTRUCTIONS	15
9. QUICK TROUBLE SHOOTER PART1	18
10. QUICK TROUBLE SHOOTER PART2	19
11. QUICK TROUBLE SHOOTER PART3	20
12. ESD PROTECTION REQUIREMENTS.....	21
13. SERVICE NOTES.....	22
14. GONOGO TESTER.....	23
15. BATTERYTESTER.....	23

Change History

Originator	Status	Version No.	Date	Comments
MWy	Draft	0.1	01.06.2002	Initial draft
MWy	Approved	1.0	05.07.2002	approval

1. EXPLODED VIEW



Description: See corresponding ITEM/CIRCUIT REF of the BOR (Bill Of Repair)

2. SPARE PART LIST

SPARE PARTS

ITEM/ CIRCUIT REF.	QTY	PART NO	PART NAME
I002	1	9790529	VOICE RECORD KEY
I003	1	9790530	POWER KEY
I004	1	9790535	TRANSCEIVER KEYMAT ASSY
I009	1	9467066	CHASSIS ASSEMBLY
I010	1	9460416	PROXIMITY RUBBER
I011	1	5140247	SPEAKER 105+-3DB
I012	1	5409119	SM JACK 2.5MM 5POL+SW
I013	1	5140255	SPEAKER 78+-2DB
I014	2	6290119	SCREW 1.8*6 RF T6+ BLK
I015	1	5200049	SM SW DOME
I016	1	5140261	COND.MIC 40+-2DB
I017	4	6290117	SCREW 1.6*4.4 RFF T5+ BLK
I019	1	4858001	VGA CAMERA MODULE
I020	1	5409215	SM SIM CONN 2*3POL
I021	1	9467064	ACOUSTIC CHAMBER ASSY
I022	2	6290093	SCREW 1.8*8 FEZN T6+
I023	2	6290119	SCREW 1.8*6 RF T6+ BLK
I025	2	6290093	SCREW 1.8*8 FEZN T6+
I026	1	9480728	PROTECTION TAPE
I027	1	9458182	KEYMAT COVER ASSY
I028	1	6490201	MAGNET
I030	1	5400255	BATTERY CONNECTOR
I031	1	5400251	DC JACK
I033	1	6800027	VIB MOTOR ASSY 1.3V
I034	1	9452255	LOCKING LATCH
I037	1	9452059	BATTERY COVER

SOLDERING COMPONENTS (Level 2 only!)

ITEM/ CIRCUIT REF.	QTY	PART NO	PART NAME
G190	1	4700129	BATTERY LITHIUM 0.1MAH 3V
F001	1	5119019	SM FUSE F 1.5A 32V 0603
V001-V006	6	4860331	LED LWL88S WHITE >3,4V
V013-V014	2	4860331	LED LWL88S WHITE >3,4V

VARIANT PARTS

ITEM/ CIRCUIT REF.	QTY	PART NO	PART NAME
I001	1	9458224	A-COVER ASSEMBLY
I029	1	9794057	GRIP KEYMAT ASSY
I024	1	9458205	B-COVER PAINTED

SWAP UNITS

	QTY	PART NO	PART NAME
		0073982	NHL-2NA N7650 Swap Engine E&A
		0073983	NHL-2NA N7650 Swap Engine FR
		0073984	NHL-2NA N7650 Swap Engine PL
		0073985	NHL-2NA N7650 Swap Engine CS-SK
		0073986	NHL-2NA N7650 Swap Engine TR
		0073987	NHL-2NA N7650 Swap Engine RU

SERVICE TOOLS

TYPE	QTY	PART NO	PART NAME
		0080541	FLS-4S SALES PACK E&A
		0670246	BLB-2 BATTERY PACK
		0775283	FLA-21 POS FLASH ADAPTER
		0730218	XCS-1 SERVICE CABLE
		0273039	DCC-1 DESKTOP STAND
		0272169	AC TRAVEL CHARGER ACP-8E (EUR)
		0272172	AC TRAVEL CHARGER ACP-8X (UK)
		0271467	HDC-5 HEADSET
		0770286	SRT-4 OPENING TOOL (UPPER PART)
		0770444	SRT-5 OPENING TOOL (LOWER PART)
		0770431	SRT-6 OPENING TOOL 5510

3. CAMERA INFORMATION AND GONOGO TEST

Digital cameras behave in principle like their analog predecessors. Meaning that e.g. exposure times will increase in low light situation and the risk of blurring pictures will also rise. Too high display contrast can lead to let the pictures appear bad on the display.

Taking a picture of a white sheet of paper can do finding dust in camera system (see pic no.7). After this you should use full resolution view when locating the dust. Clean back window from both sides in Acoustic Chamber (compare pic 5 & 6). A clean workbench is needed, especially when assembling the camera.

GoNoGo Test:

From Home Menu, open the Grip Cover

- ☞ Select **Camera**, the Camera application opens and you can see the view to take a picture.
- ☞ To take a picture, press the "Joystick". **If you have a frozen image (still picture), the Camera is ok.**
- ☞ Select **Delete**
- ☞ Select **Yes**
- ☞ Select **Exit**
- ☞ Close the Grip Cover
- ☞ Select **No**, now the device is in the Home Menu again.



1. The VGA Camera works from 30cm to infinity to the object. This object is much too close to the Camera, which caused an unsharp picture.



2. The sharpest area is generally around the middle of the picture. It is quite normal, that the edges appear a bit unsharp in scenes with small details.



3. Geometrical distortion especially in the edges can be seen in objects with straight lines. This is a normal behavior.



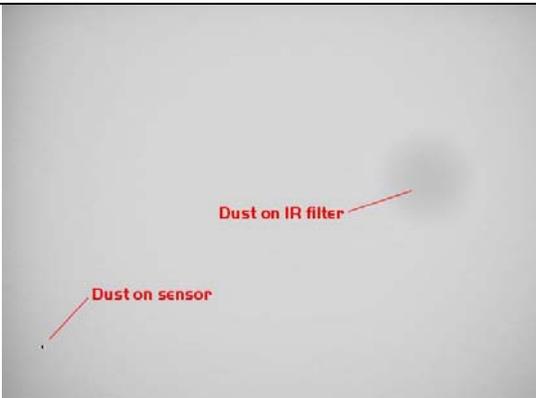
4. Moving objects or moving the camera can cause blurring to the images.



5. Example of a good picture with clean back window (located in Acoustic Chamber).



6. Dust, scratches or fingerprint can cause very unsharp pictures. Clean window or change Acoustic Chamber.



7. This distortion comes from camera dirt or dust, which can't be cleaned. Change Camera Module, if back window is clean.



8. Good sample of an outdoor picture in good light conditions.



9. Taking pictures from a moving car will lead to skewed pictures.



10. When taking the 7650 out of your hot car in summer, you could have distortion like this. This is also normal.

4. INFRARED GONOGO TEST

You need another infrared device (e.g. 6310i) to do a GoNoGo test. The infrared windows of the devices must be directed to each other and should have a distance of approximate 15 cm.

		
Test device		Golden Phone
<p>Activate Infrared in the 7650 first:</p> <ul style="list-style-type: none"> ☞ Push the Menu Key ☞ Select Connect. ☞ Select Infrared, now a blinking infrared symbol appears on top right corner <ul style="list-style-type: none"> ⚡ <i>Infrared is only activated for approx. 1 minute</i> ☞ Send Business Card via infrared from golden phone (refer to user guide) ☞ Wait for confirmation on golden phone. If sending fails, direct IR windows to each other and check if infrared is still active in 7650. ☞ Select Back on 7650, when "new messages" symbol appears on top right corner. Test is successful! ☞ Select Exit ☞ Select Show to display the received business card ☞ Select Options ☞ Select Delete to erase the card immediately ☞ Select Yes for confirmation ☞ Select Back ☞ Select Exit to go to Stand-by Mode 		

5. BLUETOOTH GONOGO TEST

You need a second 7650 or another Bluetooth device (e.g. 6310/i) to do a GoNoGo test.
Make sure that Bluetooth is activated in the reference device (Golden Phone).
Activate Bluetooth in the 7650 (receiver), for another device please see in the user guide.



Test device



Golden Phone, Bluetooth activated

Bluetooth testing

Home Menu

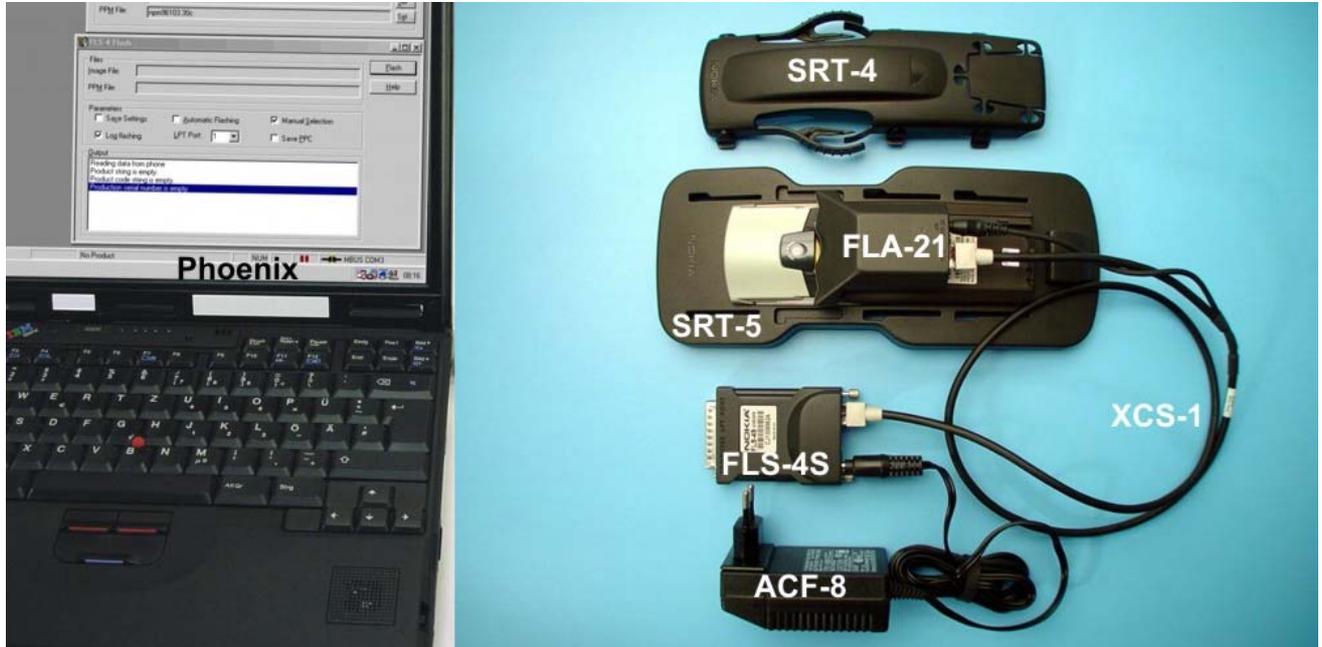
- ☞ Push the Menu key
- ☞ Select **Games**
- ☞ Select **Snake EX**
- ☞ Select **Option**
- ☞ Select **Play 2-player**
- ☞ Select **Via Bluetooth**
- ☞ Select **Client**
- ☞ Select **Yes**, if Bluetooth isn't already activated, otherwise go to next step
- ☞ Search window appears, **if all Bluetooth devices in range will be displayed, the test is successful!**
- ☞ Select **Cancel, Exit, Back** and **Exit** to go back to Stand-by Mode

6. SW-UPDATE

To use FLS-4S Flash Dongle you have to follow the user guide inside the sales package. Please check always the latest version of flash software, which is available on Nokia Partner Web Site.
Flash Concept – (Point of Sales)

Note that ACF-8 charger is inside FLS-4S sales pack and cannot be ordered separately.

Before attaching the Flash Adapter FLA-21, the FBus and MBus pads have to be uncovered with opening tool SRT-4/5 (see disassy instructions).



Description: See corresponding ITEM/CIRCUIT REF of the SPL (Spare Part List)

7. GENERAL REPAIR INFORMATION

In this section the technician will get some general hints how to carry out repairs:

- Before starting the repair you must take care of ESD precautions like being in your ESD-area and connecting your wristband.
- Use gloves to avoid corrosion and fingerprints.
- Protect windows and displays with a foil to avoid dust and scratches.
- When cleaning the pads you have to use a soft cloth and isopropanol. It is not allowed to use a glass fiber pencil because it scratches the surface and will lead later on to corrosion.
- Mechanical parts, which didn't repair the failure, can be reused, if they are not soldered.
- Use always original Nokia parts or accessories.
- Meet the torque requirements when assembling the unit (see also the document "torques for transceiver assembly" on Partner Websites).
- Always use your own equipment for testing where you are sure that it works. E.g. if the customer complains about charger function, please test the phone with your own charger to be sure if phone or charger causes the malfunction.

Following General Service Bulletins have to be followed:

- SB-055 Common notice for good ventilation
- SB-089: Don't try to repair prototypes (indicated on Typelabel).
- SB-107: Be sure that you have minimum hardware requirements in place.
- SB-115: Handling of liquid damages.
- SB-121: If one of your service tools cause malfunction, return the defective part.
- SB-122: Soldering with manual hot air gun is totally forbidden because of the very sensitive μ BGA components and μ Via technology.**
- SB-124 Service Policy for packaging serviced products
- SB-131: Check these guidelines when refurbishing products.
- SB-132: You need a **Golden Phone** for inspecting your measuring equipment.

Please check Nokia Partner Web Site (PWS) for latest news and files on a regular basis.

Legend for Quick Trouble Shooter:

This legend is valid for all parts of the **Quick Trouble Shooter**

Follow the steps until the problem is solved. If this doesn't help, you are not authorized to go forward. Only underlined components (e.g. <u>I007</u>) can be changed.	
	Follow the arrows step by step
	Pads or contacts: Check optical and mechanical condition as well as corrosion. Clean if necessary.
	Measure component for electrical functionality and change, if needed.
	No more action possible, send product to the appropriate service partner with higher service level.
^{4, 5}	Superscript numbers are for additional comments or instructions

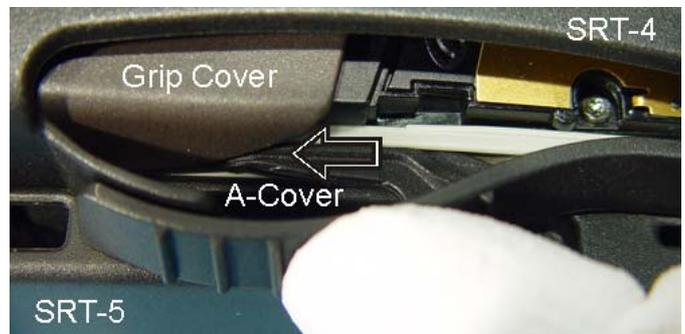
8. DISASSEMBLY INSTRUCTIONS

You will find more detailed information about 7650 disassembly and assembly in video clips, which are located on [Nokia Care Point](#) sites. You have access to Nokia Care Point through Nokia Partner Web Site (PWS).

Following instructions will show only the most important steps in Disassembly procedure.



After removing Battery Cover and B-Cover use SRT 4 and SRT-5 opening tools for A-Cover and Grip Cover.



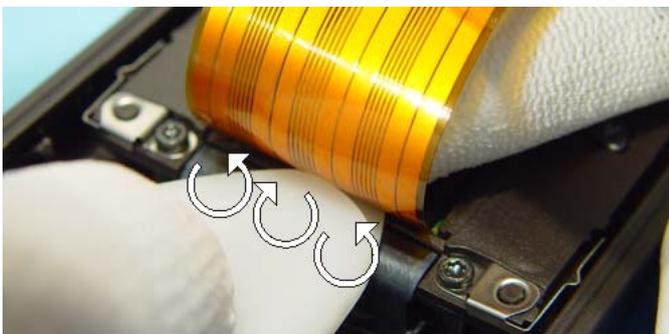
Press the levers so, that the nails of SRT-4 are between the covers and push it to the left forcefully.



After the SRT-4 is taken away, the Grip Cover has to be unlocked from the A-Cover.



Remove the Protection Foil from the flex foil connector.



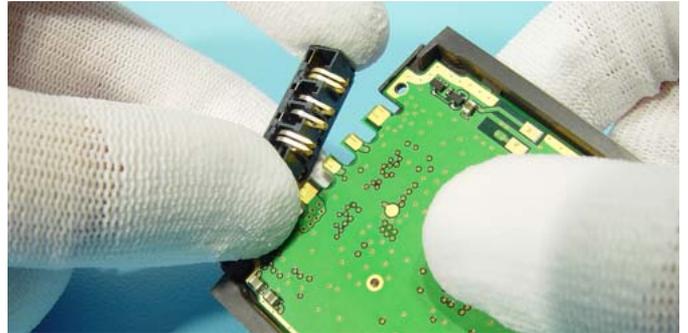
Use SRT-6 to open the connector **carefully**. Turn the opening tool several times to pull up the connector.



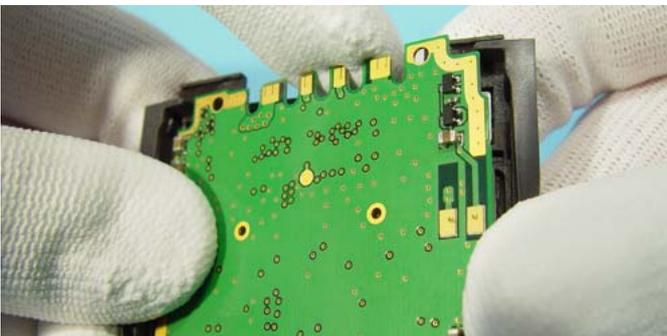
Unscrew the two screws of the Keymat Cover. When re-assembling, take care that the Battery Connector fits well.



Pull up the Keymat Cover and take it out to the left.



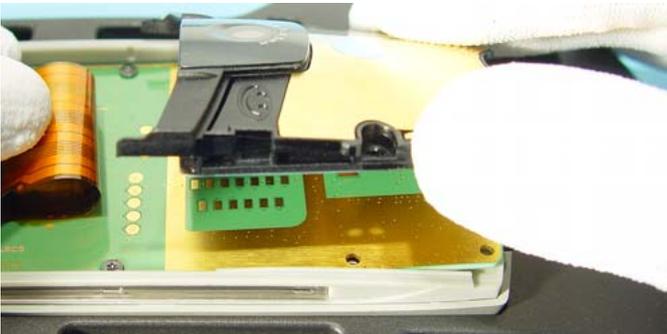
Take off the Battery Connector from LS4 Module.



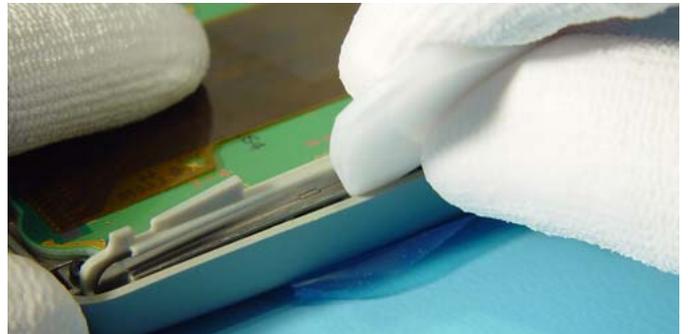
Gently press the edges of Keymat Cover and push off LS4 Module from the Keymat Cover.



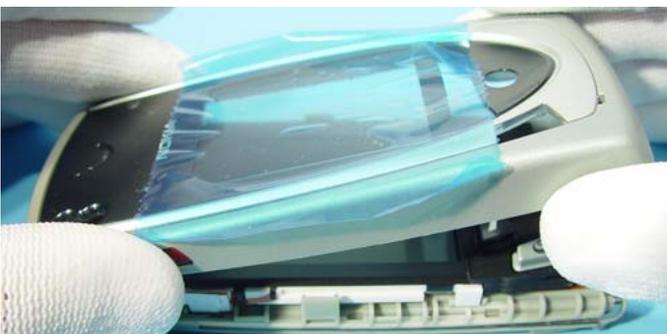
Unscrew six T6 screws in the following order. **Assembly order is 3,4,5,6,1,2, with torque of 22Ncm.**



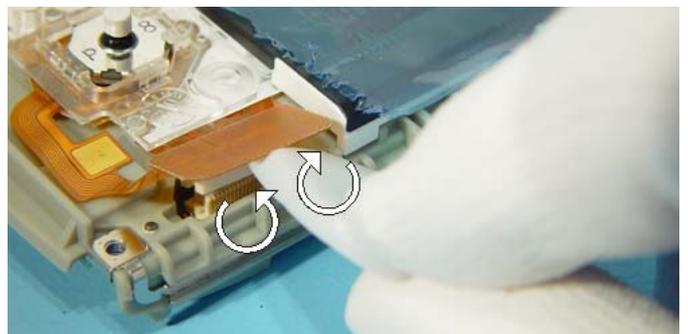
Acoustic Chamber, containing Camera Module and SIM Connector can be taken away now.



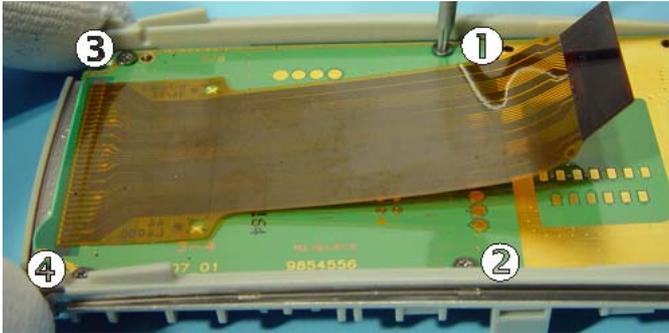
To separate Chassis from A-Cover, SRT-6 can be used to unlock the snaps on both sides along the edges.



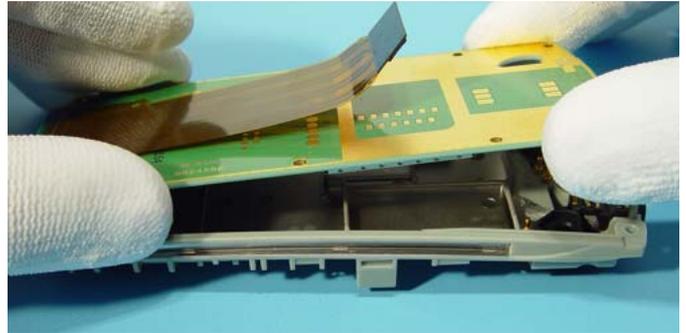
Turn around the unit and take off the A-Cover. Always protect windows and displays with protection foil to avoid dust and scratches.



Remove Transceiver Keymat and unlock the Flexfoil Connector carefully.



Radio Module LG4 is fixed with four T5 screws. Unscrew, using the shown order. Assembly order is the same (22 Ncm for all screws).



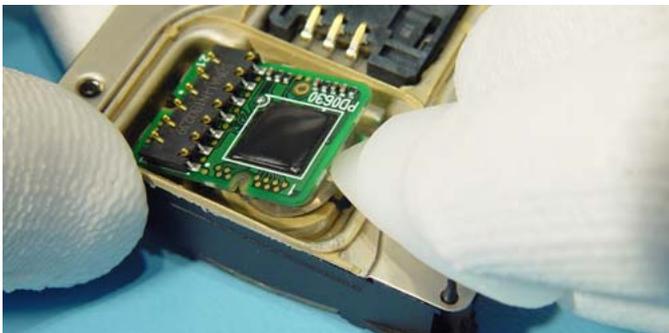
Take away the Radio Module from the Chassis.



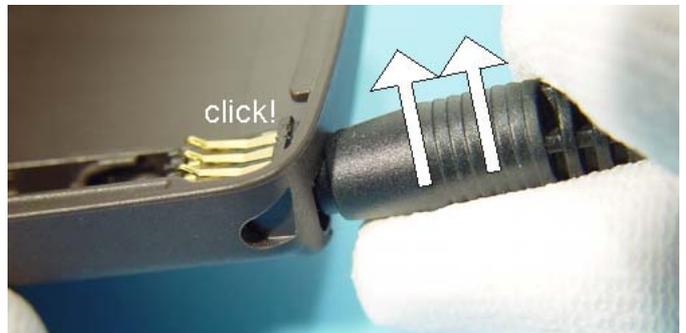
Headset Jack, Earpiece and HF-Speaker can be easily taken away. Note the guiding pins when assembling.



Do not take the Microphone from the spring contacts because it can fall apart.



If you need to change Camera Module you can also use SRT-6 for demounting.



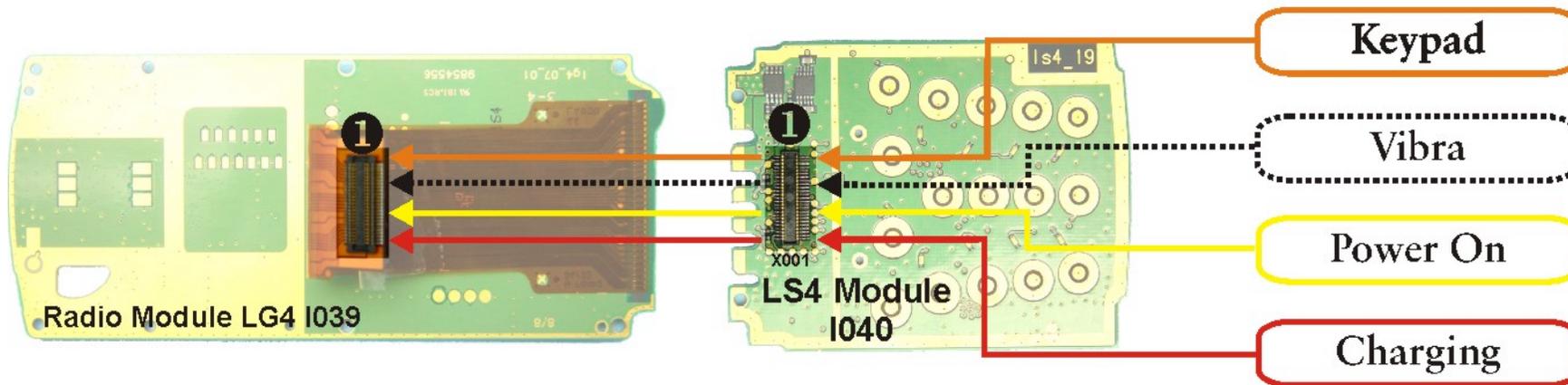
Use an old charger socket to unlock the DC Jack from the Grip Cover.

**When assembling the phone, all screws must be tightened with a torque of 22 Ncm!
The GoNoGo test verifies that the electrical specifications will be fulfilled.**

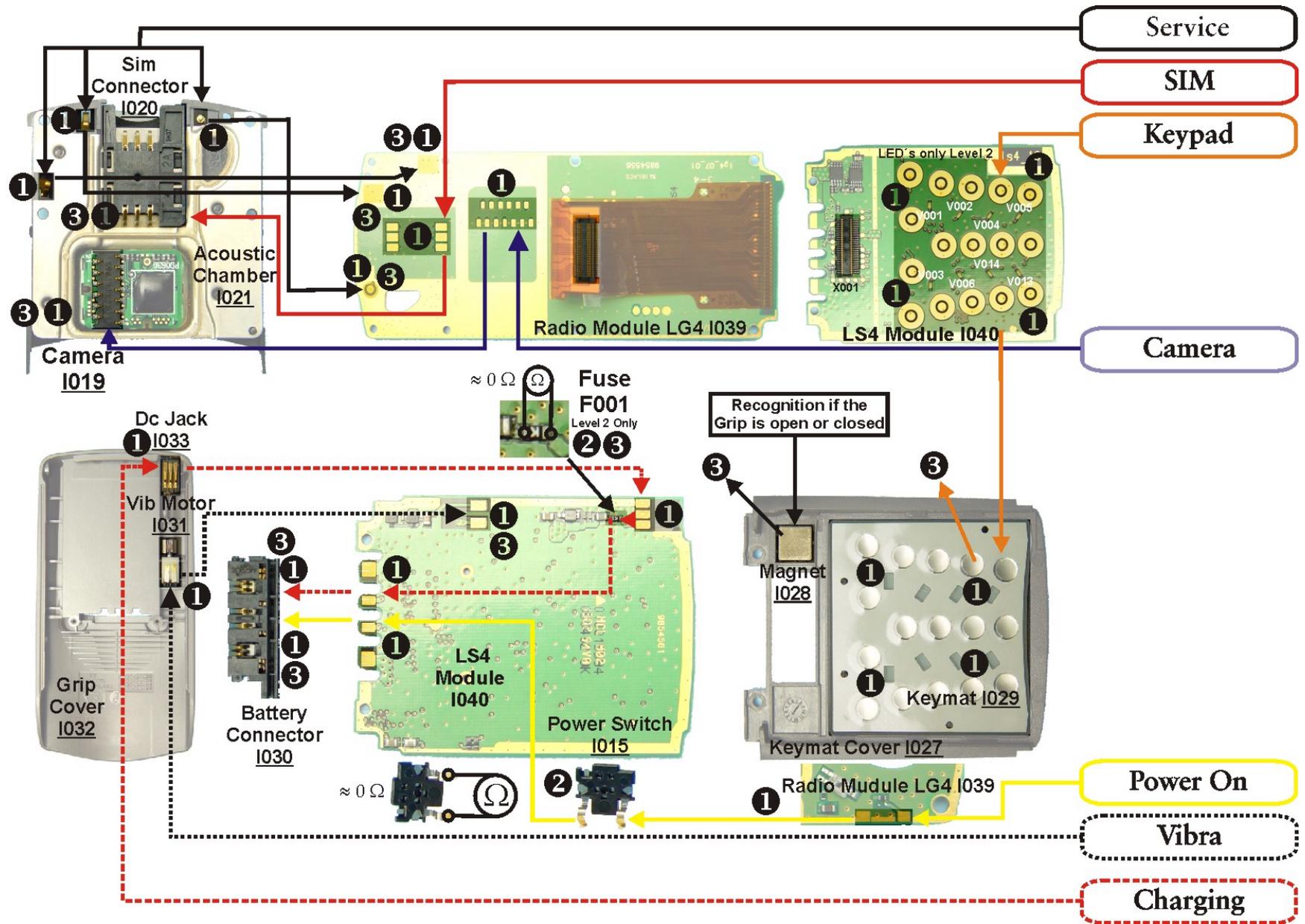


9. QUICK TROUBLE SHOOTER PART1

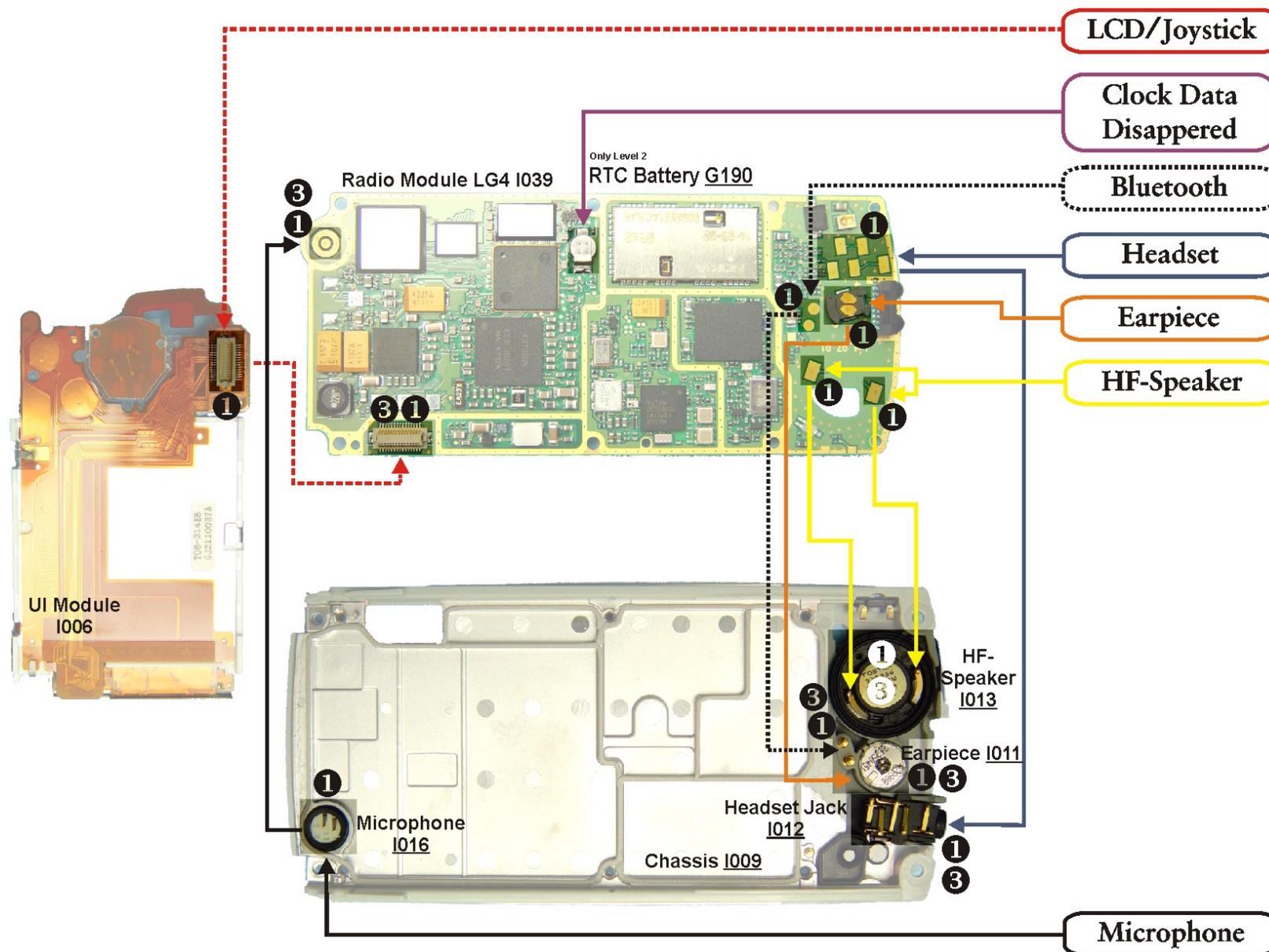
First of all, check connections



10. QUICK TROUBLE SHOOTER PART2



11. QUICK TROUBLE SHOOTER PART3



12. ESD PROTECTION REQUIREMENTS

	<p>Electrostatic discharge can easily damage the sensitive components of electronic products. Therefore every Service Partner has to take care of at least some precautions like ESD restricted area, floor, table, covering, chair(s), shoes or arm wrist.</p>
---	---

Please refer to the Partner Web Site document
[ESD protection requirements for NMP Service Level 1/2 Service Suppliers](#)

	
<p>example configuration of an epa-area source: www.armeka.com</p>	<p>example configuration of a workbench source: www.warmbier.com</p>
	
<p>example workbench and testers source: http://www.armekaengineering.com</p>	

13. SERVICE NOTES

We recommend using Service Notes when shipping phones to other Service Partners. It prevents the product from scratches, it is ESD-neutral and has the possibility to give valuable feedback of the fault symptom through a structured form. Please refer to the document [Service Notes for faulty NMP transceiver](#) on Partner Web Site to get further information.

Sender <i>Repair Center</i>		Our Ref. <i>4711</i>	
Handled by _____		Product Code <i>050381</i>	
Serial n.o.: <i>449333/20/975406/2</i>		Date <i>10.07.01</i>	
Yes <input checked="" type="checkbox"/> Warranty Case <input type="checkbox"/> No		Inst <input type="checkbox"/> Instant Service <input type="checkbox"/> DOA	

<input checked="" type="checkbox"/> R Repair	<input type="checkbox"/> RR Repair and Refurbishment
<input type="checkbox"/> RO Refurbishment only	<input type="checkbox"/> SW Software update
<input type="checkbox"/> A Analysis	<input type="checkbox"/> C Claim
<input type="checkbox"/> 24h 24 h Service	<input checked="" type="checkbox"/> SR Special Request <i>Save User data</i>

A) EXISTENCE OF FAULT

1. <input checked="" type="checkbox"/> Continuous fault	2. <input type="checkbox"/> Intermittent fault	3. <input type="checkbox"/> Temperature
4. <input type="checkbox"/> By shock or vibration	5. <input type="checkbox"/> No clear fault	6. <input type="checkbox"/> Only as portable
7. <input type="checkbox"/> Only in a car	8. <input type="checkbox"/> Only in desktop	

B) SYMPTOM OF THE FAULT ON CMT-PART - Symptom Code _____

1. <input type="checkbox"/> Totally dead	2. <input type="checkbox"/> Selftest failure	3. <input type="checkbox"/> SIM Fail
4. <input checked="" type="checkbox"/> No service	5. <input type="checkbox"/> No calls in	6. <input type="checkbox"/> No calls out
7. <input type="checkbox"/> Keypad failure	8. <input type="checkbox"/> Display failure	9. <input type="checkbox"/> Audio failure
10. <input type="checkbox"/> Doesn't charge	11. <input type="checkbox"/> Overcharging	12. <input type="checkbox"/> Hand-free failure
13. <input type="checkbox"/> Burns fuses	14. <input type="checkbox"/> Accessory fail, which _____	
15. <input type="checkbox"/> Switches off	16. <input type="checkbox"/> Other _____	

C) OBSERVED OR MEASURED FAULT

1. <input checked="" type="checkbox"/> TX Power
2. <input type="checkbox"/> TX Phase error
3. <input type="checkbox"/> Bit Error Rate
4. <input type="checkbox"/> Burst Template
5. <input type="checkbox"/> Ramping spectra
6. <input type="checkbox"/> RX Quality
7. <input type="checkbox"/> RSSI
8. <input type="checkbox"/> Other _____

D) SYMPTOM OF THE FAULT ON PDA-PART - Symptom Code _____

1. <input type="checkbox"/> PDA doesn't start
2. <input type="checkbox"/> Internal error
3. <input type="checkbox"/> Keypad failure
4. <input type="checkbox"/> Display failure

NOKIA MOBILE PHONES LTD.
 Type: NPE-SNX Model: E210
 MADE IN GERMANY

CE 0168 X

449333/20/975406/2
 Code: 050381

Owner: R&D Bochum
 TTA

Phone: 04041 NMP-ENG

14. GONOGO TESTER

The Acterna/Wavetek GoNoGo Tester has to be used to carry out the final test after your service action to guarantee the functionality of the phone.

Please refer to the actual information in the Nokia Care Point Extranet within the Partner Web Site.



15. BATTERYTESTER

The Astratec battery tester lets you test the capacity of Nokia batteries.

Please refer to the actual information in the Nokia Care Point Extranet within the Partner Web Site.

