Service Manual
EF51
Level 1-2

Release	Date	Department	Notes to change
R 1.0	05.07.2006	ISC S CES	New document

Table of Content

1. Unit Description of EF51

Datasheet:

System	• GSM 900/1800/1900, GSM 850/1800/1900
Battery	• Li-Ion, 870 mAh
Stand – by Time	• Up to 200h
Talking Time	• Up to 4h
Dimensions	• 89 x 49 x 18 mm
Connectivities	• USB 1.1, Bluetooth 1.2
Messaging	• SMS, EMS, MMS

Highlights

- Fully featured music solution including FM radio and music player
- Recognizable music design, dedicated music keys and user interface
- Music specials: Speech-to-Music™, audio & FM radio recording,
  3D surround sound and 6 band equalizer, "show-lyrics" function
- Enjoy music with a wireless Headset Bluetooth® Stereo as accessory

Technology

- Music player (supports MP3/AAC/AAC+/WMA)
- FM radio and recording
- OMA & Microsoft® DRM
- Bluetooth® (A2DP compatible)
- 20 MB, MiniSD™ card slot
- 262,144 colors, TFT, 128 x 128 pixels,1.6 inches
- 1.3 megapixel camera, 4x digital zoom

Design

- Flip phone: music player-like design with special music keypad on the front;
  numeric keypad inside the flip mechanism
- Valuable, glossy finish

Accessories

- Bundled Headset Stereo and Data Cable USB
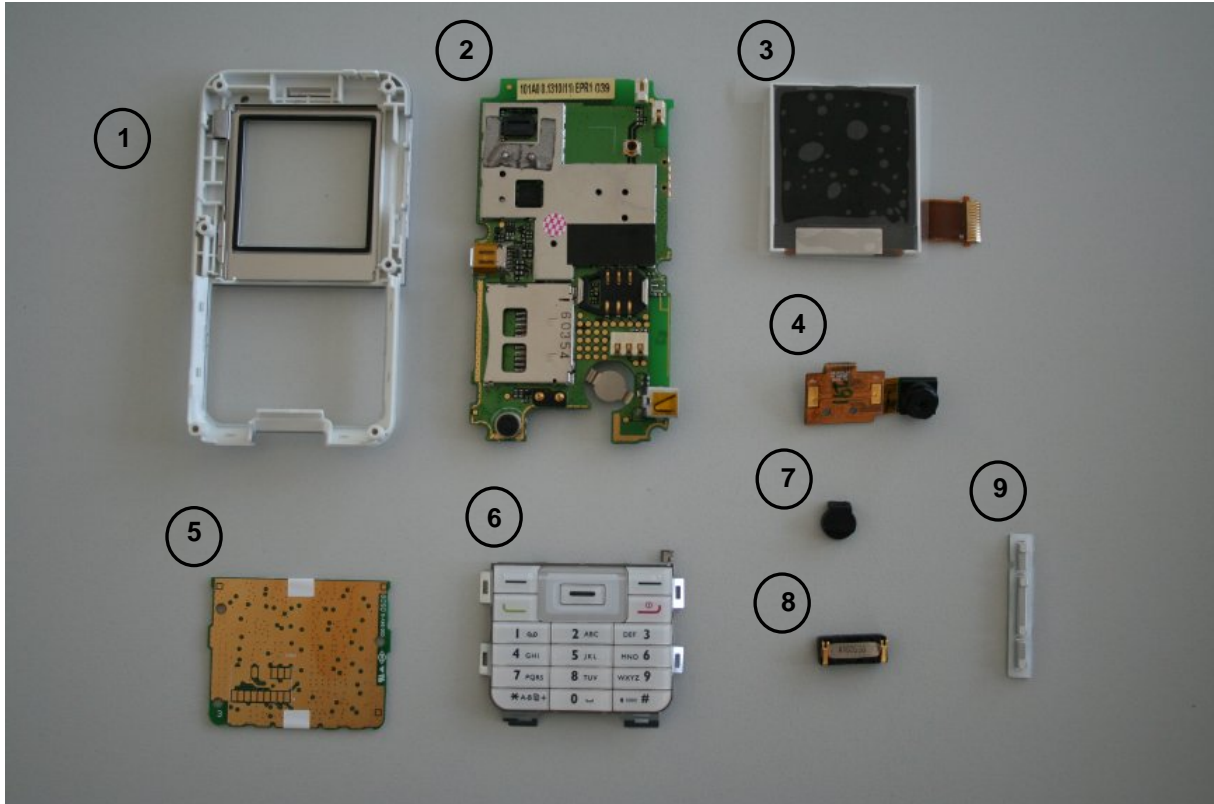- Headset Bluetooth® Stereo
- Headset Adapters

Applications
- Speech-to-Music™
- Multiple/Folder music playlist
- Lyrics & equalizer display during music playing
- Qsyncher & Qmusic PC management

2. Spare Part Overview of EF51

2.1. Overview Upper Parts

No.	Description CM	Order Number
1.	Upper Case Shell	L50658-A217-A16
2.	RF Control Board	L50658-A217-A21
3.	Display Module	L50651-Z1508-A204
4.	Camera Module	L50651-Z1508-A203
5.	Keypad PCB	L50658-A217-A7-1
6.	Keypad	L50658-A217-A10
7.	Microphone Cap	L50658-A217-A13
8.	Earpiece	L50612-Z3-C82
9.	Side key Left	L50615-Z77-C294

2.2. Overview Lower Parts
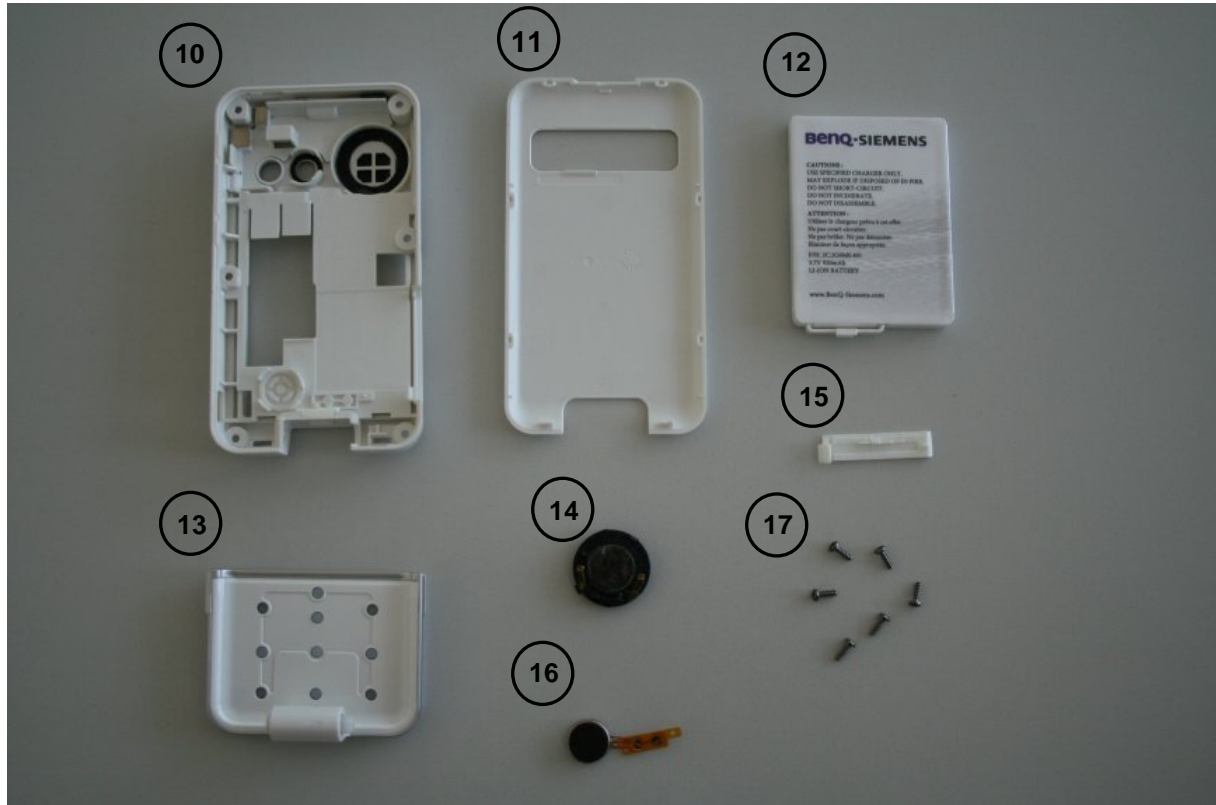
No.	Description CM	Order Number
10.	Lower Case Shell	L50658-A217-A17
11.	Battery Cover	L50658-A217-A8-1
12.	Battery	L50645-K1310-X416
13.	Keypad Flip	L50658-A217-A18
14.	Ringer	L50604-F3090-X939
15.	Mini SD Cap	L50680-Q3550-A2
16.	Vibra-Alert	L50653-Z5-C490
17.	Screws	L50658-A210-A25

4. Disassembly of EF51

All repairs as well as disassembling and assembling have to be carried out in an ESD protected environment and with ESD protected equipment/tools. For all activities the international ESD regulations have to be considered.

For more details please check information in c – market

https://market.benqmobile.com/SO/welcome.lookup.asp

There you can find the document "ESD Guideline".

Step 1 	Remove Battery Cover.
Step 2 	Remove Battery.

Step 3	Remove screws with the Torque – Screwdriver.
	T5+
Step 4	Remove Upper Case Shell from Lower Case Shell by using the Alternative Opening Tool.
Step 5	

Step 6	Remove RF Control Board by using the Alternative Opening Tool carefully.
Step 7	Remove Ringer.
Step 8	Remove Vibra-Alert.
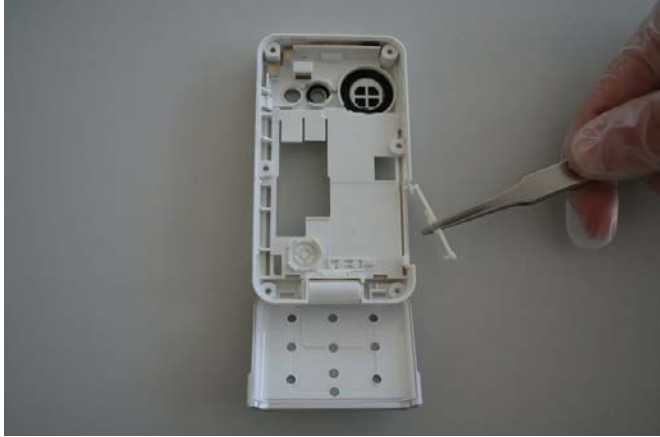
Step 9	
	Remove Mini SD Cap by using Tweezers carefully.
Step 10	
	Remove Keypad Flip by pushing the Hinge downwards to release the Cap.
Step 11	
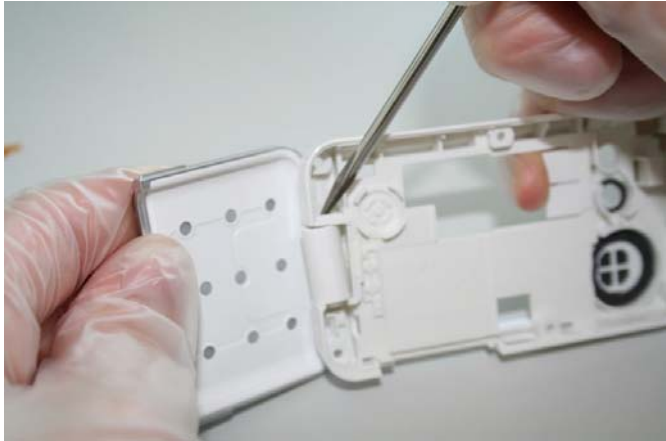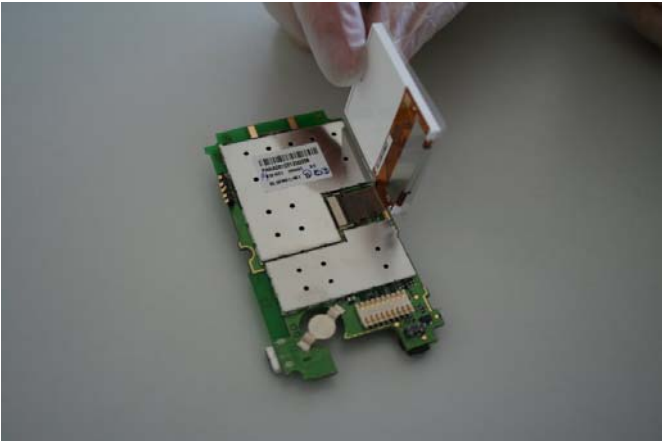
Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 10 of 38

Step 12	Remove RF Control Board from Upper Case Shell.
Step 13	To avoid scratches it is mandatory to place a Protection Foil onto the Display.
Step 14	Turn the Display Module around.

Step 15	

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 11 of 38

	Loosen the Clip from the Flex Cable.
Step 16 	Remove the Display Module. Take care of the Flex Cable.
Step 17 	Remove Microphone Cap.

Step 18 	Remove Camera Module by disconnecting the Flex Cable from the socket.
Step 19 	Remove Keypad PCB.
Step 20 	Remove Keypad.

Step 21 	Remove Earpiece by using Tweezers.
Step 22 	Remove Side key Left.
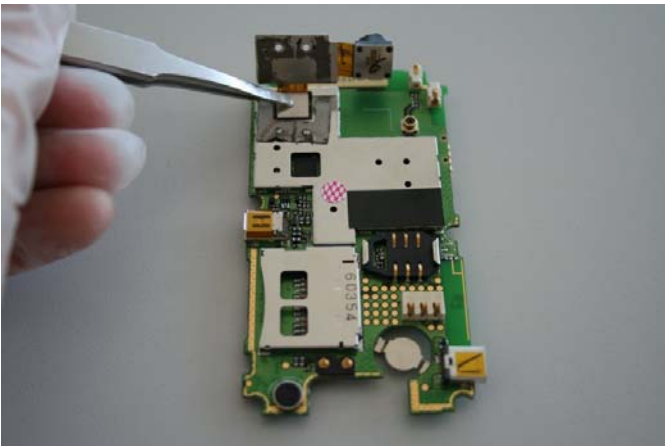
5. Assembly of EF51
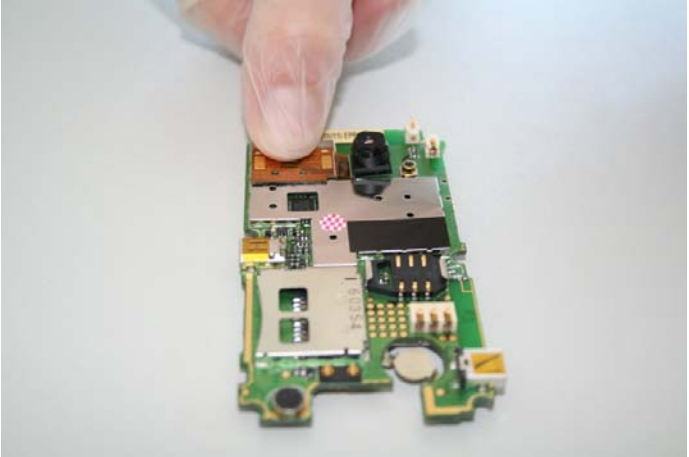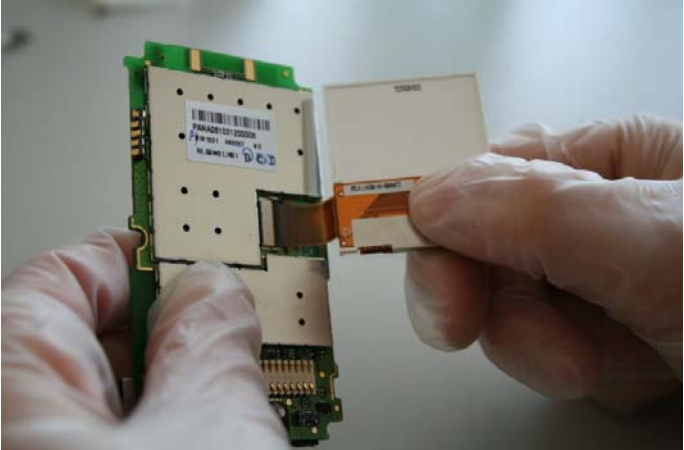
Step 1	
	Assemble Keypad.
Step 2	
	Assemble Keypad PCB.

Step 3	
	Assemble Earpiece.
Step 4	
	Assemble Side Key Left.
Step 5	
	Assemble Camera Module by using Tweezers.

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 16 of 38

Step 6	Connect the Flex Cable with the socket.
Step 7	Assemble Microphone Cap.
Step 8	Assemble Display Module.

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 17 of 38

Step 9	Insert the Flex Cable into the Socket and push the Button down.
Step 10	Remove the protection foil.
Step 11	Assemble Upper Case Shell.
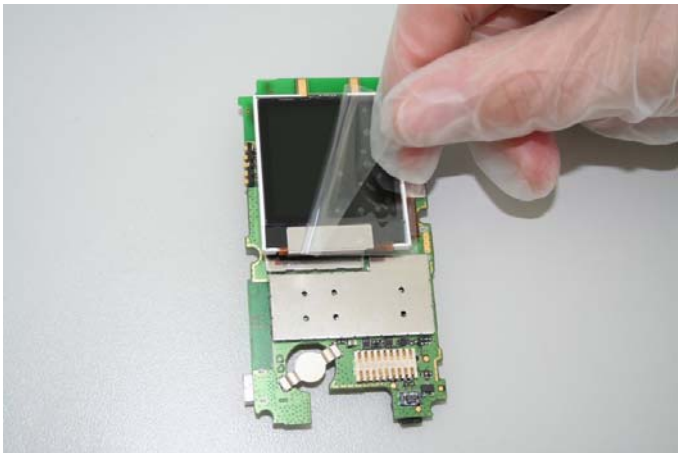
Step 12	Push the Hinge inside to assemble the Keypad Flip.
Step 13	Assemble Ringer.
Step 14	Assemble Vibra-Alert.
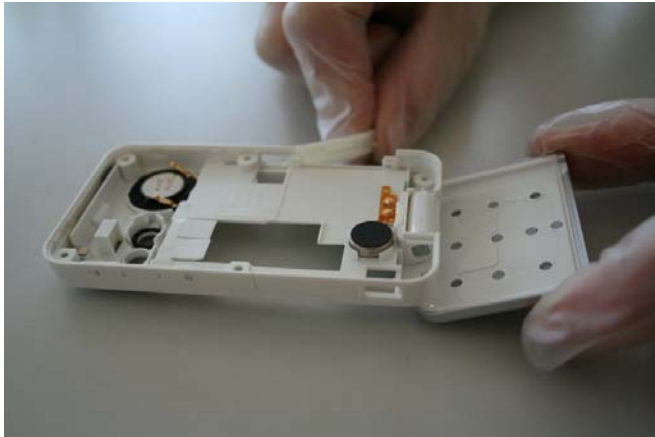
Step 15	Assemble Mini SD Cap.
Step 16	Assemble Upper Case Shell and Lower Case Shell.
Step 17	
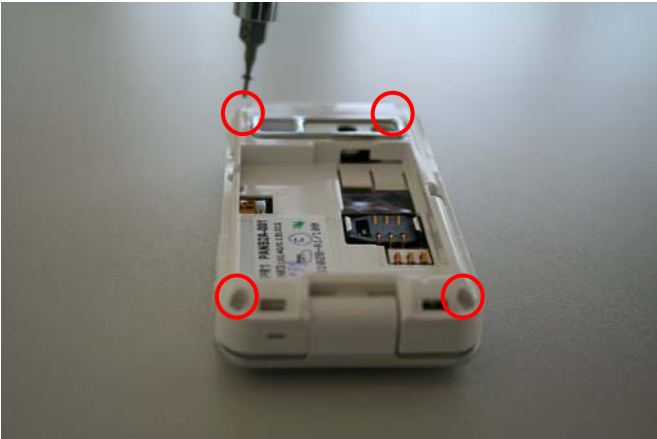
Step 18 	Place screws by using the Torque – Screwdriver T5+.
Step 19 	Assemble Battery
Step 20 	Assemble Battery Cover.

6. BenQ Service Equipment User Manual

Introduction

Every LSO repairing BenQ handset must ensure that the quality standards are observed. BenQ has developed an automatic testing system that will perform all necessary measurements. This testing system is known as:

BenQ Mobile Service Equipment

- **For disassembling / assembling**

	Torque – Screwdriver **Part Number: F 30032 – P 228 – A1**
	Opening tool **(Case opening without destroying)** **Part Number: F 30032 – P 38 – A1**
	Alternative Opening tool **Part Number: F30032 – P583 – A1**
	Tweezers

- **For testing**

All mobile phones have to be tested with the GRT – Software. The service partner is responsible to ensure that all required hardware is available.

For additional Software and Hardware options as well as the supported GRT equipment, please check the GRT User manual.

7. Setup of the Software

Download of the required software:
Download the driver, the XCSD software mobile software (core-software and language files) from the Technical Support Page:

https://market.benqmobile.com/so/welcome.lookup.asp

Installation of USB – Serial converter boot cable:
Start the "DataCableDrvInstaller.exe" file and follow the instructions of the installer.

Data Cable Driver Installer

1. Please remove your USB data cable first.

2. Click "OK" to install, "Cancel" to abort.

OK   Cancel

DataCableDrvInstaller

Driver installation OK !
Please plug-in the Data Cable to complete the installation.

OK
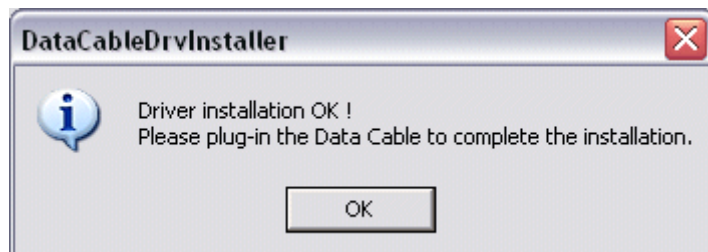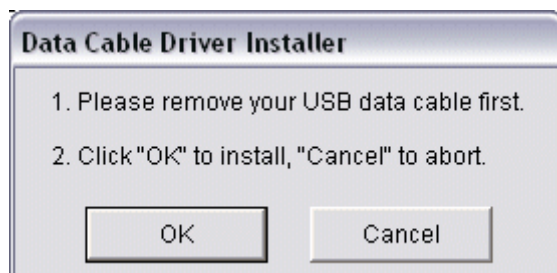
Plug in the Data cable and follow the installation instructions to complete the process.

Check the Comport number of the data cable in the device manager.
(XCSD tool supports only Comport 1 to 10)

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 23 of 38

Installation of XCSD tool:
Start "setup.exe" file and follow the instructions.
The installer creates a shortcut in the start menu bar. Start – Programs –
XCSDTool_L1 - BenQS
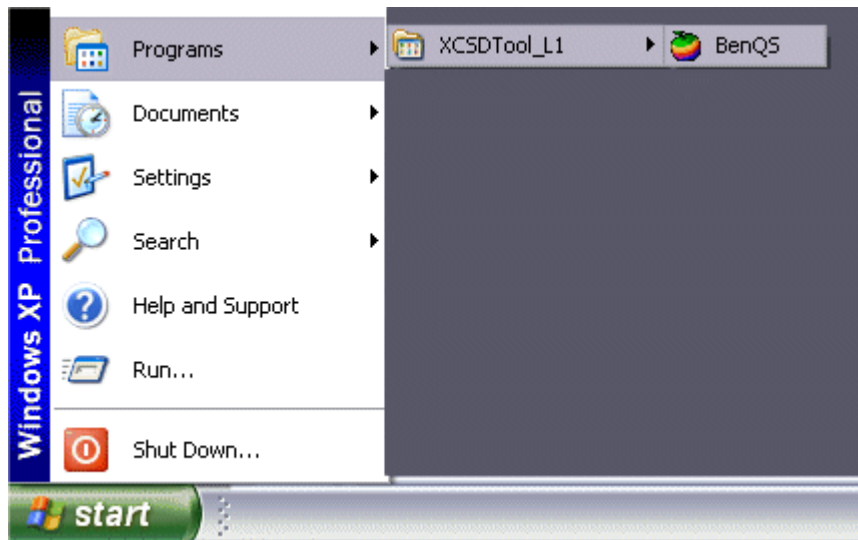
8. Software basic settings

- Start the software (BenQS.exe). The XCSD tool will be shown on the screen

- Select Model:
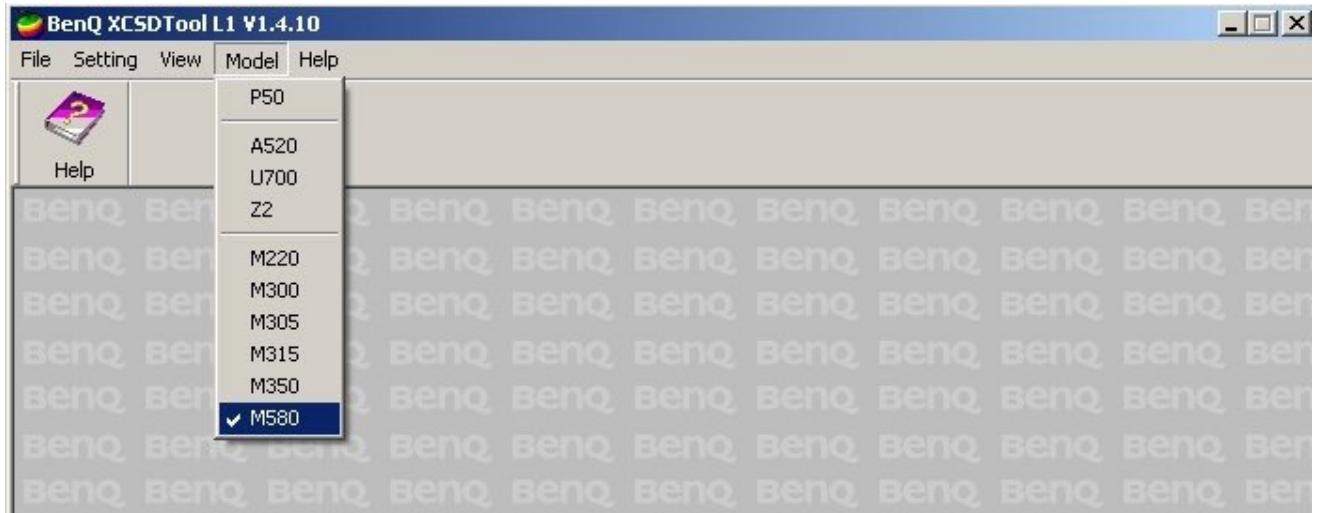
- Select Com port (Setting – Com port):
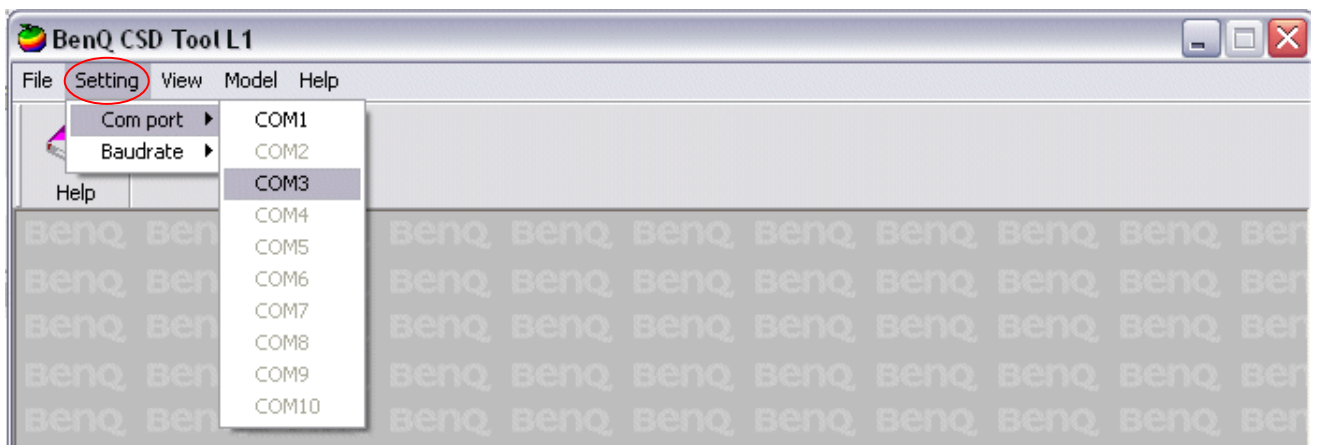
9. Software Download procedure

▪ Select Download Option (View – Download):
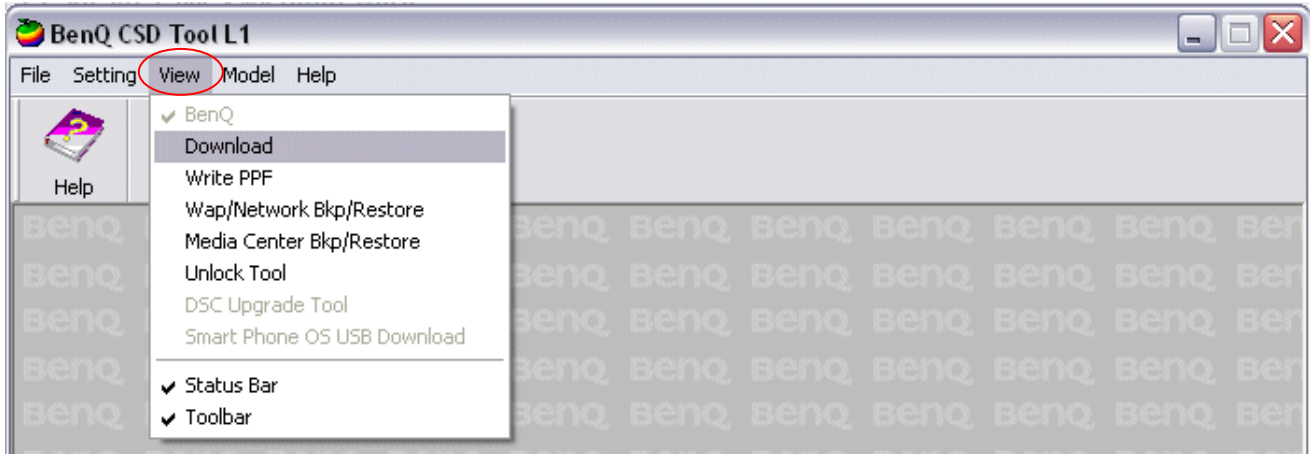
▪ Select   Program Code (example: E22 **1** 11710.mot) and
                             Language Pack (example E22 **L** 11711.mot)
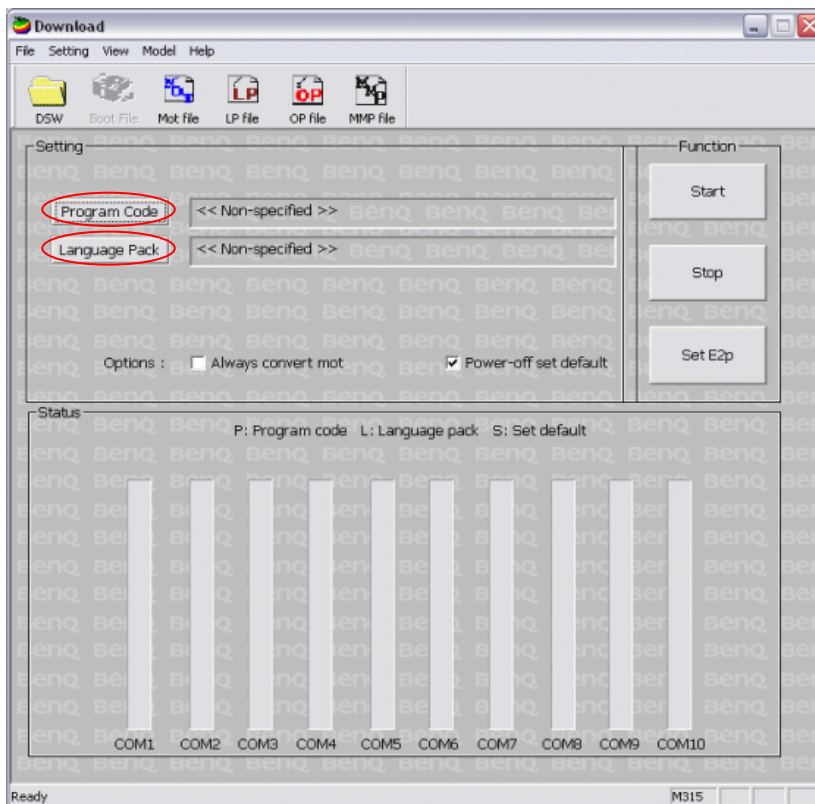
Status bar colour scheme:

yellow	waiting for update
blue	update in progress
red	error occurred
black	Comport not available
green	Update successful

- Connect mobile phone with data cable. Phone must be switched off. Click on "Start" button and press the power on button on the handset to start the download. During download process status bar shows the state of the process of P = Program code,   L = Language file and S = Set default (if activated). After successful SW download, the status bar of the used Com port is changed to green.
-

Erase of customer data:

Select the "Power-off set default" option to erase all customer data of the phone during the download process.

- Click the "Set E2p" to erase the customer data without software update.

SW files naming rules:

Program Code   E22111710
Language Pack   E22L11711

E22   Project name
   117   Program Code
L   Language Pack
   117   Version 1.17
10/11   Program Code ID

10.   Download PPF (Handset configuration)

- Select write PPF option (View – Write PPF):

Select   Database File   (example: E22111710.bin) and
                PPF File   (example benq_m315_twn.ppf)
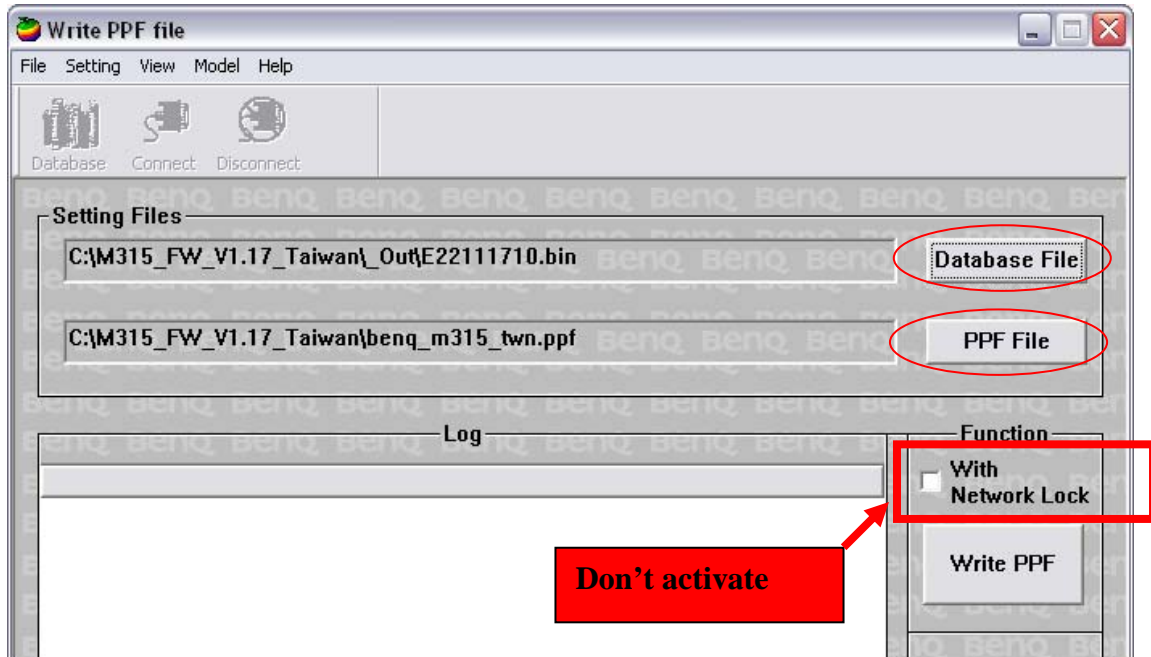
- Connect mobile phone with data cable. Phone must be switched on. Click to "Write PPF" button to start the process.

- Confirmation about successful write of PPF appears after process is completed.
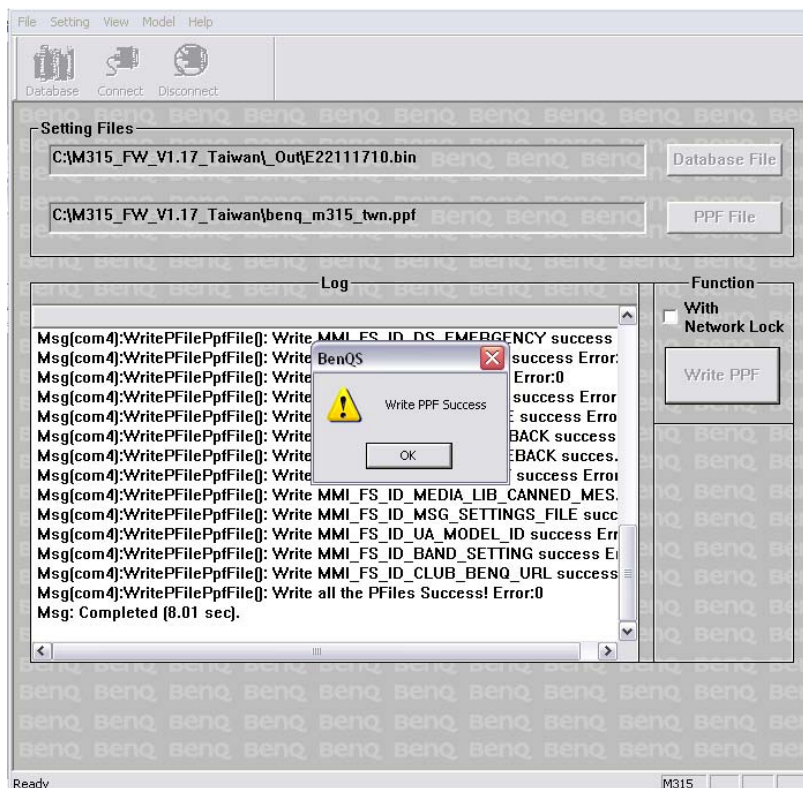
Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 28 of 38

11. Backup and Restore of Wap and Network settings

- Select Back and Restore of Wap and Network settins option
  (View – Wap/Network Bkp/Restore):
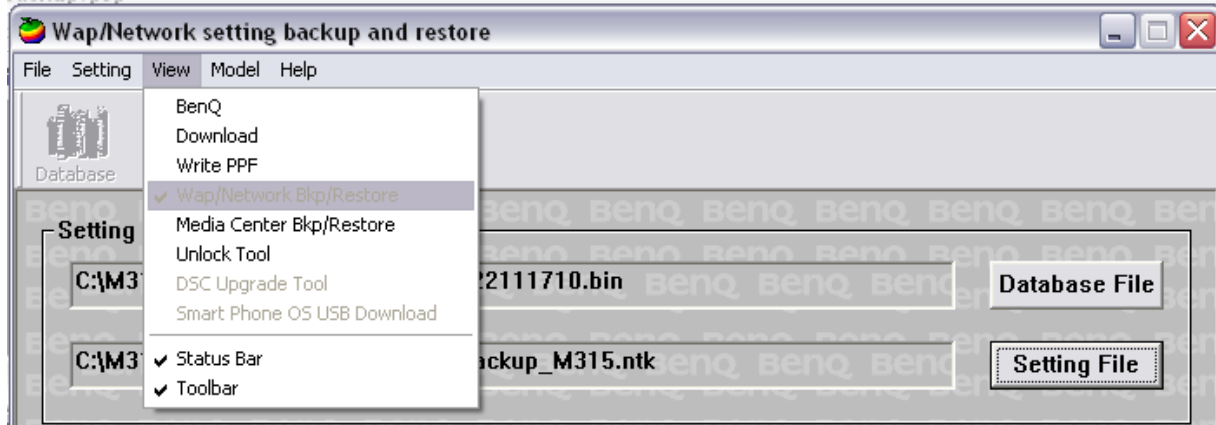
- Select   Database File   (example: E22111710.bin) and
  Setting File   (create new txt file and rename it to ntk file for
  settings backup)
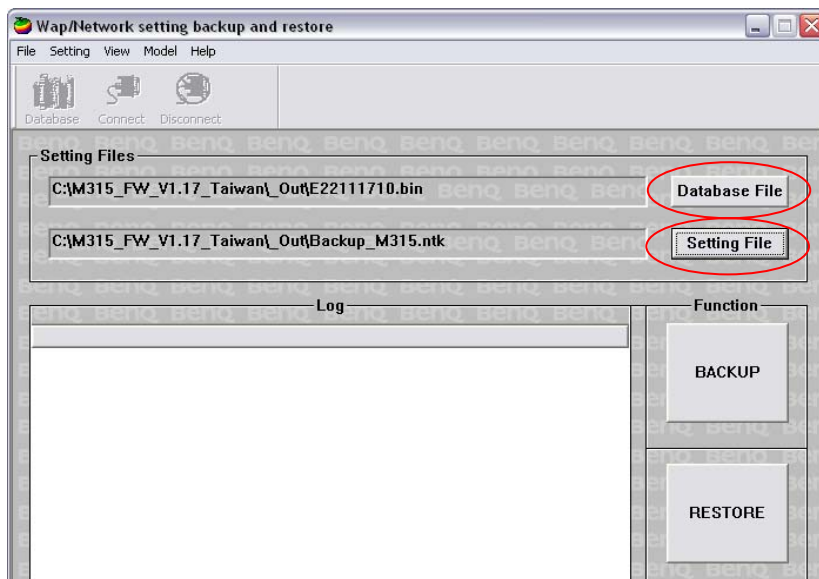
- Connect mobile phone with data cable. Phone must be switched off.
- Click to "Backup" button to start the transfer the settings into the selected file.
- Click to "Restore" button to start the transfer from selected file into handset.

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 29 of 38

12. Backup and Restore of Media Center content

- Select Back and Restore of Media center (View – Media center Bkp/Restore):
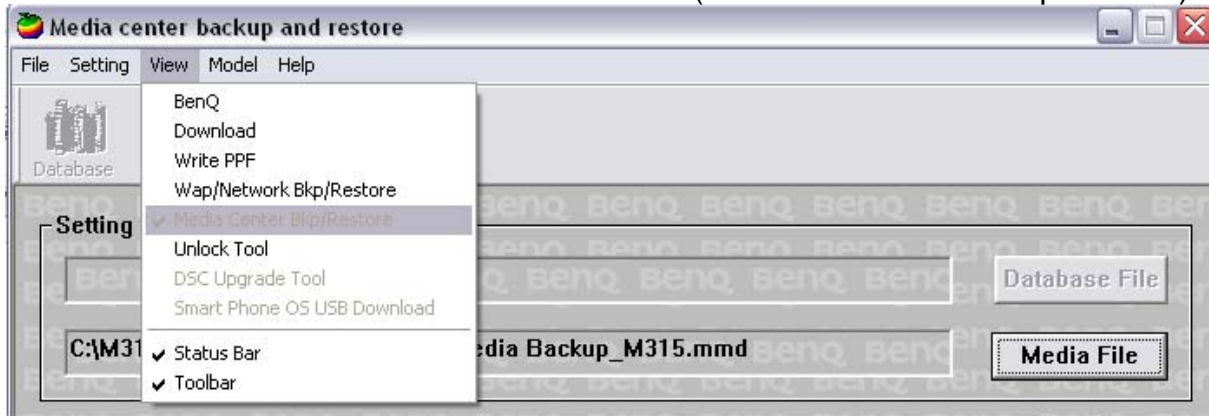
- Select Media File (create new txt file and rename it to mmd file)
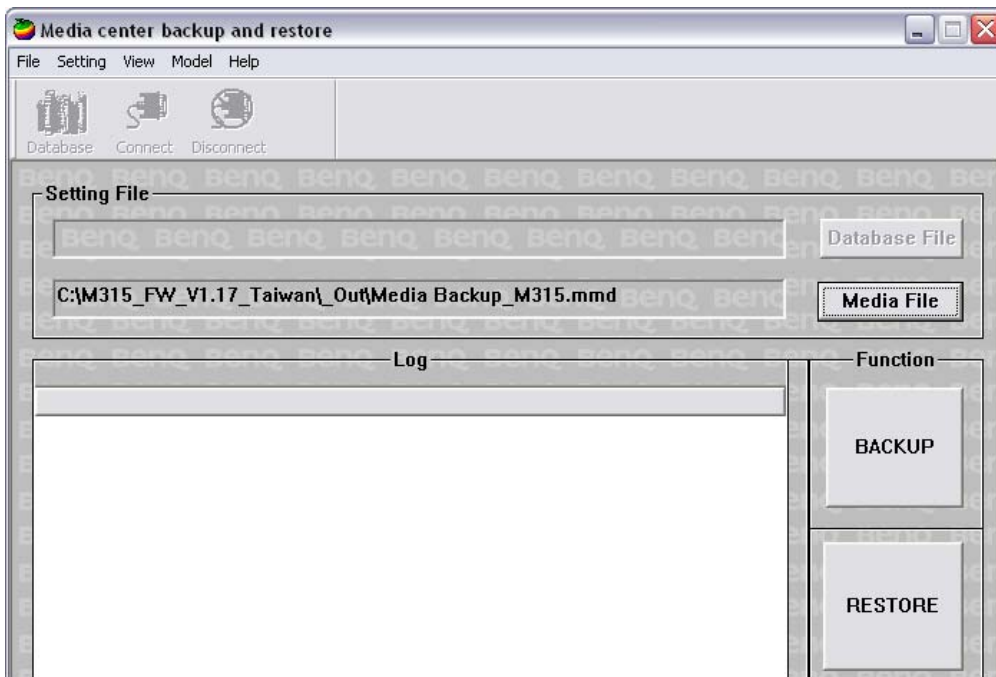
- Connect mobile phone with data cable. Phone must be switched on.
- Click to "Backup" button to start the transfer the settings into the selected file.
- Click to "Restore" button to start the transfer from selected file into handset.

13. Unlock Tool

- Select Unlock tool function (View – Unlock Tool):
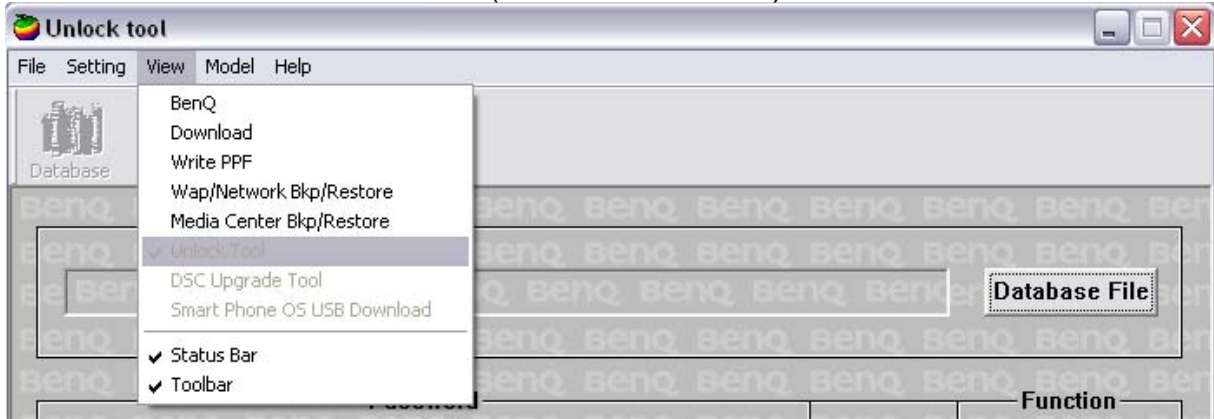
- Select Database File (example: E22111710.bin)

- Click to "Show PW" button to get the codes.
- Unlock the codes in the mobile phone menu.
- Click to "Hide PW" button to hide the codes.
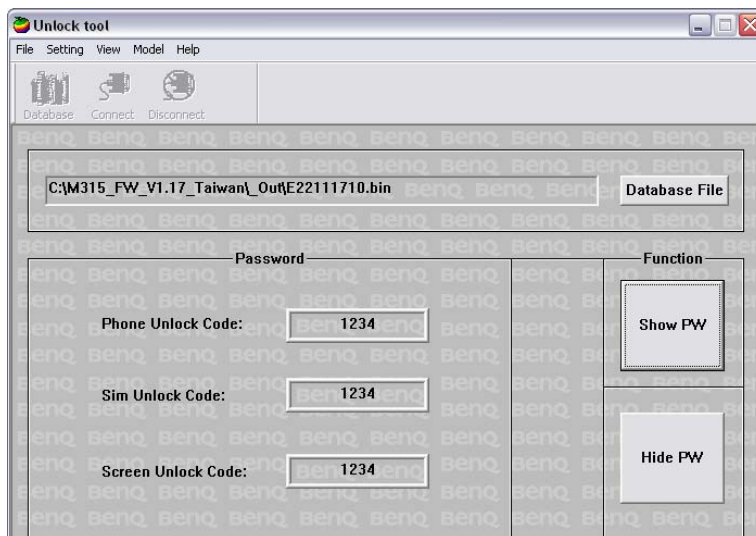
Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 31 of 38

14. International Mobile Equipment Identity, IMEI

The mobile equipment is uniquely identified by the International Mobile Equipment Identity, IMEI, which consists of 15 digits. Type approval granted to a type of mobile is allocated 6 digits. The final assembly code is used to identify the final assembly plant and is assigned with 2 digits. 6 digits have been allocated for the equipment serial number for manufacturer and the last digit is spare.

EF51 series IMEI label is accessible by removing the battery.

Re – use of IMEI label is possible by using a hair – dryer to remove the IMEI label.

Date code is shown on IMEI label: Detailed description on how to read date code is given in Annex 2.

To display the IMEI number, exit code and SW/HW version, key: * # 300 #
Code *#301# activates self diagnosis.

15. General Testing Information

General Information

The technical instruction for testing GSM mobile phones is to ensure the best repair quality.

Validity

This procedure is to apply for all from BenQ mobile authorized level 2 up to 3 workshops.

Procedure

All following checks and measurements have to be carried out in an ESD protected environment and with ESD protected equipment/tools. For all activities the international ESD regulations have to be considered.

Get delivery:

- Ensure that every required information like fault description, customer data a.s.o. is available.
- Ensure that the packing of the defective items is according to packing requirements.
- Ensure that there is a description available, how to unpack the defective items and what to do with them.

Enter data into your database:

(Depends on your application system)

- Ensure that every data, which is required for the IRIS-Reporting is available in your database.
- Ensure that there is a description available for the employees how to enter the data.

Incoming check and check after assembling:

!! Verify the customers fault description!!

- After a successful verification pass the defective item to the responsible troubleshooting group.
- If the fault description can not be verified, perform additional tests to save time and to improve repair quality.

  - Switch on the device and enter PIN code if necessary unblock phone.
  - Check the <u>function</u> of all **keys** including **side keys.**
  - Check the **display** for error in <u>line and row</u>, and for <u>illumination.</u>
  - Check the **ringer/loudspeaker** acoustics by individual validation.
  - Perform a **GSM Test** as described on page 36.

Check the storage capability:

- Check internal resistance and capacity of the battery.
- Check battery charging capability of the mobile phone.
- Check charging capability of the power supply.
- Check current consumption of the mobile phone in different mode.

> ➤

Visual inspection:

➤ Check the entire board for liquid damages.

➤ Check the entire board for electrical damages.

➤ Check the housing of the mobile phone for damages.

SW update:

➤ Carry out a software update and data reset according to the master tables and operator/customer requirements.

Repairs:
The disassembling as well as the assembling of a mobile phone has to be carried out by considering the rules mentioned in the dedicated manuals. If special equipment is required the service partner has to use it and to ensure the correct function of the tools.
If components and especially soldered components have to be replaced all rules mentioned in dedicated manuals or additional information e.g. service information have to be considered

Technical Documentation	Release 1.0
TD_Repair_L1-L2_EF51_R1.0.pdf	Page 34 of 38

GSM Test:

With the availability of the GRT Test /Alignment software, this tool has to be used to perform the outgoing test!

>Connect the mobile/board via internal antenna (antenna coupler) and external antenna

  (car cradle/universal antenna clip) to a GSM tester

>Use a Test SIM

For Triple Band phones use a separate test case, if the test software allows only one handover.

Skip the GSM Band test cases if not performed by the mobile phone

Example: 1. Test file   Band 1 = GSM900 / Band 2 = GSM1800
                  2. Test file   Band 1 = GSM1900

Internal Antenna

Test case		Parameter	Measurements	Limits
1	Location Update	• GSM Band 1 • BS Power = -55 dBm • middle BCCH	• Display check	• individual check
2	Call from BS	• low TCH • highest PCL • BS Power = -75 dBm • middle BCCH	• Ringer/Loudspeaker check	• individual check
3	TX GSM Band 1	• low TCH • highest PCL • BS Power = -75 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
4	Handover to GSM Band 2 Including Handover Check			
5	TX GSM Band 2	• low TCH • highest PCL0 • BS Power = -75 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
6	Call release from BS			

External Antenna				
7	Call from MS	• GSM900 • high TCH • second highest PCL • BS Power = -75 dBm • middle BCCH	• Keyboard check	• individual check
8	TX GSM Band 1	• high TCH • second highest PCL • BS Power = -75 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
9	RX GSM Band 1	• high TCH • BS Power = -102 dBm • 50 Frames • middle BCCH	• RX Level • RX Qual • BER Class Ib • BER Class II • BER Erased Frames	• GSM Spec.
10	Handover to GSM Band 2 Including Handover Check			
11	TX GSM Band 2	• high TCH • second highest PCL • BS Power = -75 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
12	RX GSM Band2	• high TCH • BS Power = -102 dBm • 50 Frames • middle BCCH	• RX Level • RX Qual • BER Class Ib • BER Class II • BER Erased Frames	• GSM Spec.
13	Call release from MS			

Final Inspection:

The final inspection contains:

1) A 100% network test (location update, and set up call).

2) Refer to point 3.3.

3) A random sample checks of:
      - Data reset (if required)
      - Optical appearance
      - complete function

4) Check if PIN-Code is activated (delete the PIN-Code if necessary).
Basis is the international standard of **DIN ISO 2859**.
Use Normal Sample Plan Level II and the Quality Border 0,4 for LSO.
Remark: All sample checks must be documented.

Annex 1

Test SIM Card

There are two different "Test SIM Cards" in use:

1) Test SIM Card from the company **"ORGA"**

    Pin 1 number: 0000
    PUK 1   :   12345678

    Pin 2 number: 0000
    PUK 2   :   23456789

2) Test SIM Card from the company **"T-D1"**

    Pin 1 number: 1234
    PUK   :   76543210

    Pin 2 number: 5678
    PUK 2   :   98765432

Annex 2

Device Date Code overview

GSN rule:
(ex: GS11500001TG0)

GS   1   9   5   00001   TG0
Big class Date Month Year   S/N   Factory

Code	Meaning	Content
D	Date	1~9, A=10, B=11, C=12, D=13, E=14, F=15, G=16, H=17, J=18, K=19, L=20, M=21, N=22, P=23, R=24, S=25, T=26, V=27, W=28, X=29, Y=30, Z=31 (Don't use: 0, I, O, Q, U)
M	Month	1=Jan, 2=Feb, 3=Mar, 4=Apr, 5=May, 6=Jun, 7=Jul, 8=Aug, 9=Sep, A=Oct., B=Nov, C=Dec
Y	Year	Last digit of Year (Christian era) ex. Year 2004 → "4"

Based on the definition above, GSC55... below means 2005/05/12.