Local Service Organization Service Manual

BE INSPIRED

MC 60

Our innovation shapes the future

Table of Contents

1 GPRS (General Packet Radio Service)

GPRS is a new non-voice value added services that allows information to be sent and received across a GSM mobile telephone network. It supplements today's Circuit Switched Data (CSD) and Short Message Services (SMS). GPRS involves overlaying a packet based air interface on the existing circuit switched GSM network. This gives the option to use a packet-based data service. The information is split into separated but related "packets" before being transmitted and reassembled at the receiving end. Theoretically, maximum speeds of up to 171.2 kilobits per second (kbps) are achievable with GPRS using all eight timeslots at the same time. This is about 3 times as fast as the data transmission speed possible over today's fixed telecommunications networks and 10 times as fast as current Circuit Switched Data services on GSM networks.

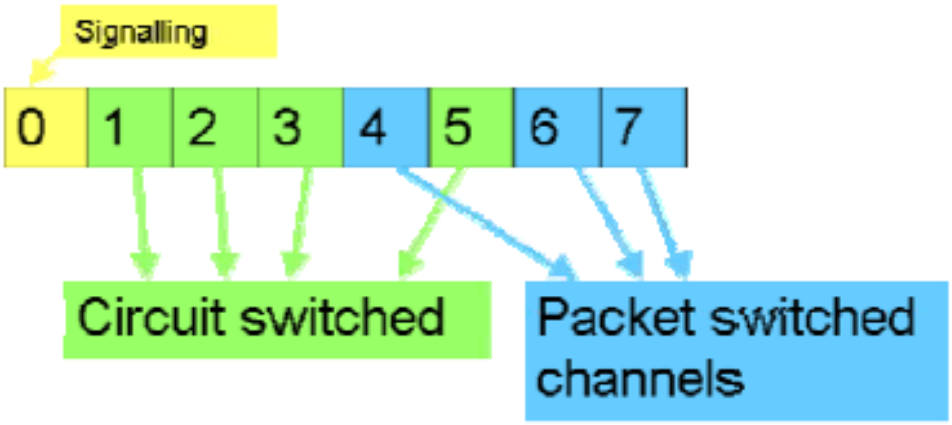


Figure1. Example of GPRS data transmission

Example: Cell with 1 Frequency channel:
1 physical channel for signaling, 4 physical channels for Circuit switched and 3 physical channels for Packet switched.

2 K-Java Application

Java-based game system		
Java Application Manager (JAM)	Application launcher and download manager. Supports HTTP-based OTA download of applications over GPRS and CSD.	yes
RAM for Java applications	Available RAM for Java applications (i.e. Program code and data) during application runtime: Minimum 100 Kbytes (Has to be taken as working assumption for application development). Goal: 145 Kbytes as SL45i (not committed)	yes
MIDP 1.0, CLDC 1.0	As SL45i, including performance optimizations from SL45i-Infusio.	yes
'OEM extensions'	Proprietary API extension as SL45i. Including 'Siemens Game API'	yes
HTTP API over GPRS	Sl45i: only CSD	yes

3 Key Features

Bands	• Tri Band E-GSM 900 / GSM 1800 / GSM 1900 • GPRS Multi Class 8
Battery	• Li-Ion Battery Pack

	• Nominal Voltage : 3.6V • Nominal Capacity : 750 mAh • GSM Capacity : 700 mAh • Power Input : 1.8A (0.6 ms) / (4 ms) • Cut-off Threshold : 3.2V
Stand-by Time	• Approx. 250 h / Li-Ion (measured at BSPAMFRMS = 9; Number of neighboring cells = 0)
Talk Time	• Best case approx. 5 hours (lowest output level with DTX • Worst case approx. : 2.0 hours (highest output level with DTX) Condition for DTX : 40% user talk time
SIM Card	• Small (”Plug In”) 3V SIM card (Phase II) • To insert the SIM card, the battery pack must be removed.
GSM Antenna	• A triple band PIFA antenna will be an integral part of the mobile phone.
Receiver Sensitivity	• EGSM: -102 dBm (-104dBm-15.2) (Specification; static & with fading) • PCN : -102 dBm (Specification; static & with fading) The reception sensitivity must comply with the corresponding GSM recommendations in all operating conditions (temperature, battery level ...). • EGSM: measurements according typical sensitivity are not yet available. • PCN: measurements according typical sensitivity are not yet available Measurement values are referred to the external antenna connector.

Transmitter Power	• EGSM: nominal 2W (Specification: Class 4 Mobile phone) • PCN: nominal 1W (Specification: Class 1 Mobile phone) Transmitter output characteristics is according to GSM 11.10 specification implying all specified operating conditions (temperature, battery level ...).

	Transmitter set points will be specified for GSM and PCN when typical values and statistical values become available.
Speech Codec	• Triple Rate (HR/FR/EFR) and AMR
Temperature Range	• -10^{0}C to +55^{0}C (Normal operation) • -30^{0}C to +85^{0}C (Storage capability)
Display	• Type: Full Graphic • Resolution: 101 x 80 Pixel • Color depth: 4096 • Technology: Color STN • Active area / mm: 29.379 x 25.265 • Visible area / mm: max. 32.4 x 28.9 • Illumination: 2 White LED • Contrast: Adjustable
Keypad	• Partially bridgeless • 12-digit block (0-9, #, *) and two function keys (SEND, END) in one block with small letters. • ON/OFF key combined with the END key; the symbol _ (I inside O) is used as a symbol for ON/OFF. • 2 soft keys • 2-way navigation key • Illumination color : Red • Dedicated picture key “5”
Acoustics	• Comfortable earpiece • Omni-directional microphone

4 Comparison with Previous Product

Feature	**M55**	**MC 60**
Supported Systems	Triple Band – EGSM 900 / 1800 / 1900	Triple Band – EGSM 900 / 1800 / 1900
Stand-by Time	Up to 250 H	Up to 250 H

Talk Time	Up to 5 H	Up to 5 H
Battery Type / Capacity	Li-Ion Battery Pack Nominal Cap. : 750 mAh	Li-Ion Battery Pack Nominal Cap.: 700 mAh
Weight	Approx. 95 g	Approx. 86 g
Volume	Approx. 69 cm^3	Approx. 88 cm^3
Length	100.8 mm	109 mm
Width	45.6 mm	46 mm
Thickness	20.9 mm	21 mm
SIM	Plug-in 1.8 V / 3 V	Plug-in 3 V
Antenna	Integrated	Integrated
SAR related to 1 g	1.0 W/kg @ 900 MHz 0.8 W/kg @ 1800 MHz 0.8 W/kg @ 1900 MHz	2.0 W/kg @ 900 MHz 0.8 W/kg @ 1800 MHz 0.8 W/kg @ 1900 MHz
Full Rate	Yes	Yes
Half Rate	Yes	Yes
Enhanced Full Rate	Yes	Yes
AMR	Yes	Yes
Fax / Data	Yes	Yes
GPRS	Yes, Class 8	Yes, Class 8
Keypad Illumination	Yes	Yes
Display	4K color STN full dot matrix, 6 lines graphic + icons	4K color STN full dot matrix, 6 lines graphic + icons
Display Illumination	White	White
Ringer Volume Level	Min. 95 dB(A) @ 5 cm Typ. > 100 dB(A) @ 5 cm	Min. 95 dB(A) @ 5 cm Typ. > 100 dB(A) @ 5 cm

5 Accessories

For MC 60, the following accessories will be available.

Description	**Part number**
Li-Ion Battery EBA-510	L36880-N5601-A100

Car Charger ECC-500	L36880-N5601-A106
Travel Charger (Euro) ETC-500	L36880-N5601-A104
Travel Charger (UK) ETC-510	L36880-N5601-A105
Desk Top Charger EDC-510	L36880-N5601-A101
Headset with PTT HHS-510	L36880-N5601-A108
Basic Car Pack (Headset, Car Charger, Y-Adapter) HKB-500	L36880-N5601-A118
Car Kit Portable HKP-500	L36880-N5601-A109
Car Kit Comfort HKC-540	L36880-N5701-A100
Car Data Adapter (for CK Prof. Voice II) HKO-530	L36880-N5701-A108
Car Kit Professional Voice II (E) HKV-570	L36880-N5601-A100
Push To Talk Key (for CK Prof. Voice II) HKO-520	L36880-N4501-A135
Sync Station DSC-500	L36880-N5601-A103
Data Link Cable USB DCA-510	L36880-N5601-A111
Tour Case FCT-550	L36880-N5601-A140
Hands-free Loudspeaker	L36104-F3090-X903
Base Module without key with Slim-Lumberg-Connector	L36158-A91-A10
Hands-free Microphone Active	L36254-Z6-C95
E-Box Car Kit Voice	L36880-S4501-A301
Serial Data Cable	L36880-S5601-A800

5.1 Interface MC 60 to accessories

The I/O Connector of MC 60 is the slim Lumberg (identical to SL55, S55/57, C55/2128, A55/52, and M55).

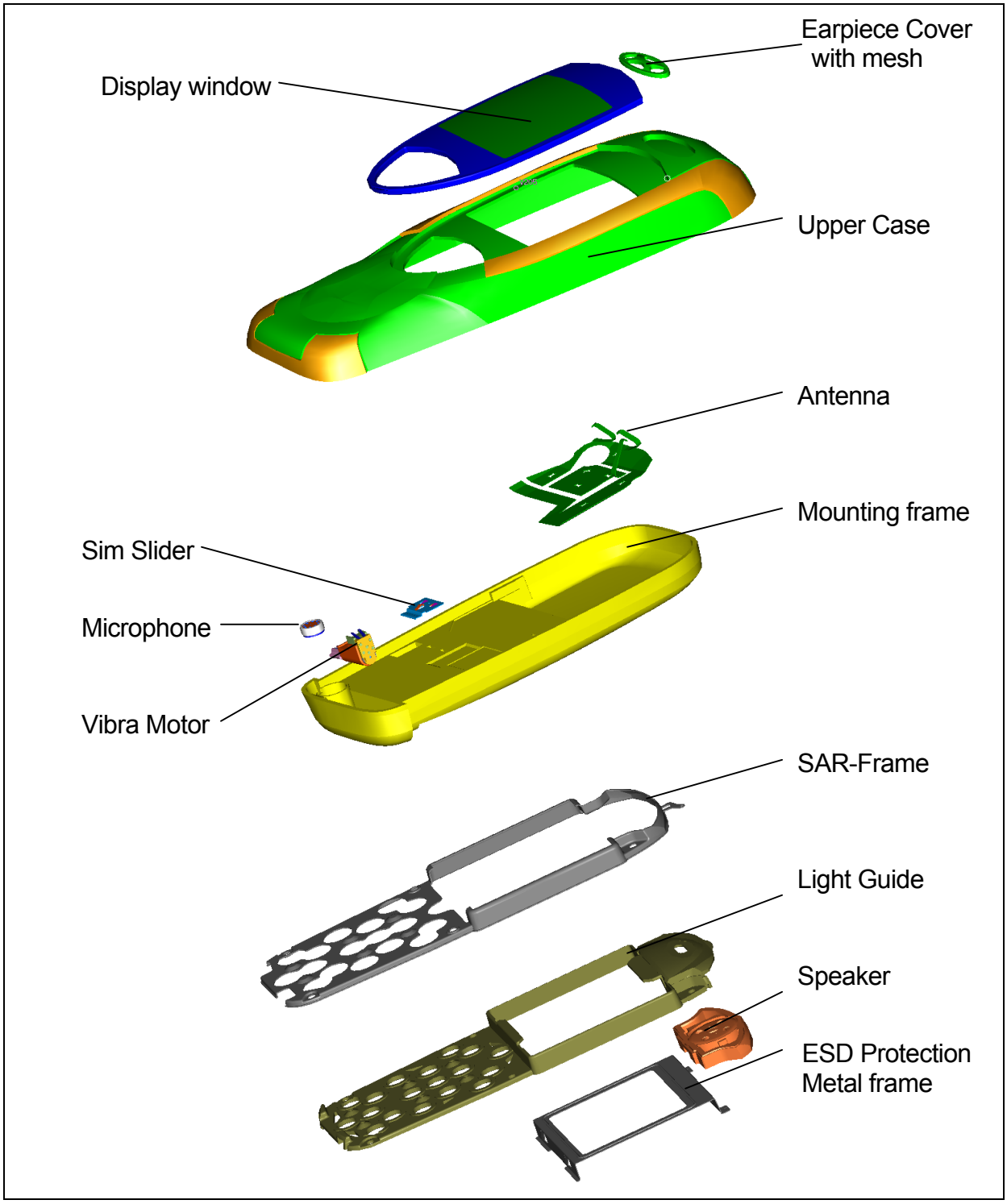
It is the only electrical interface to the Accessories. Also, it has only one mechanical interface which is integrated in the design parts.

Slim Lumberg I/O Connector

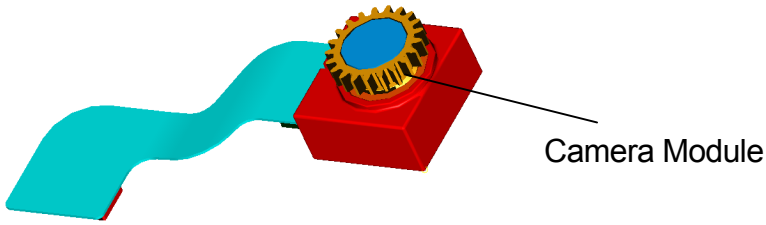
6 Unit Description MC 60

The MC 60 is the first Siemens mobile phone with integrated CIF-Camera. It is designed as a single-PCB phone with a partly bridgeless keypad, color display, exchangeable covers and exchangeable keypads. The upper and lower covers are designed as two-colored parts, which is realized in 2-shot-moulding technology.

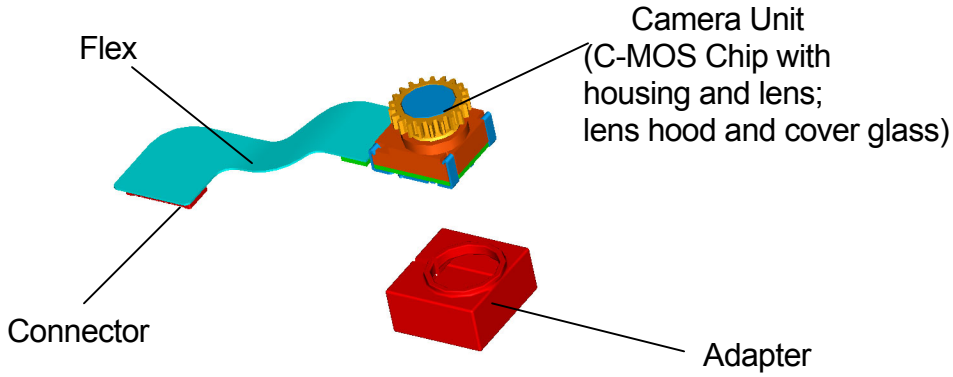
6.1 Exploded View of MC 60



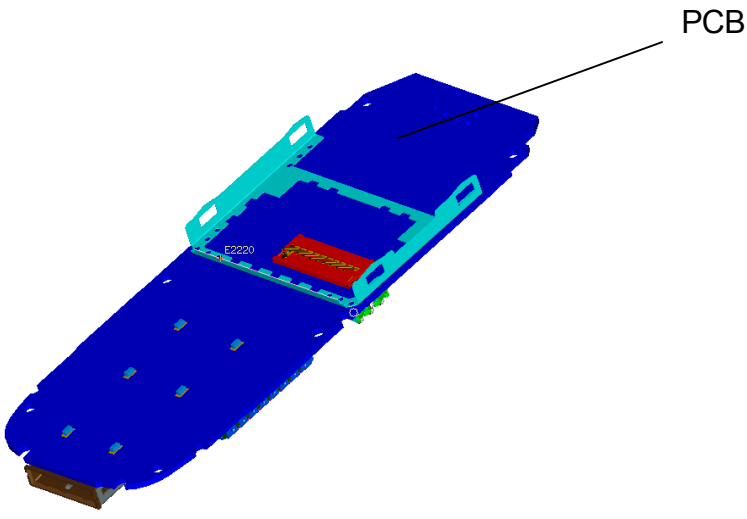
Camera Module



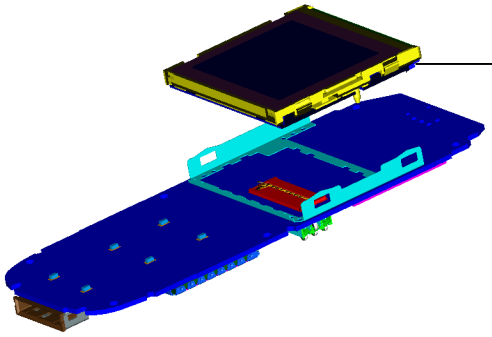
Explode View of Camera Module:



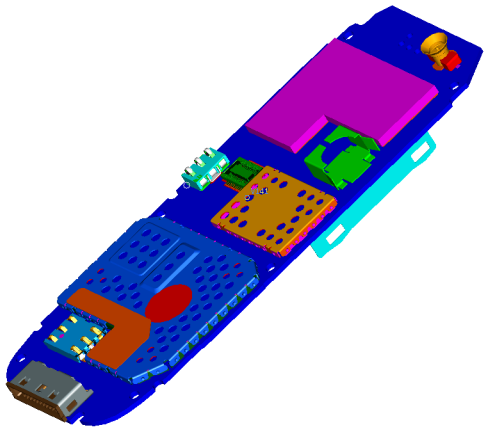
PCB Assembly



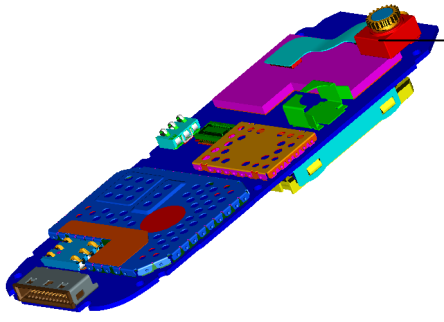
Assembly of Display Module



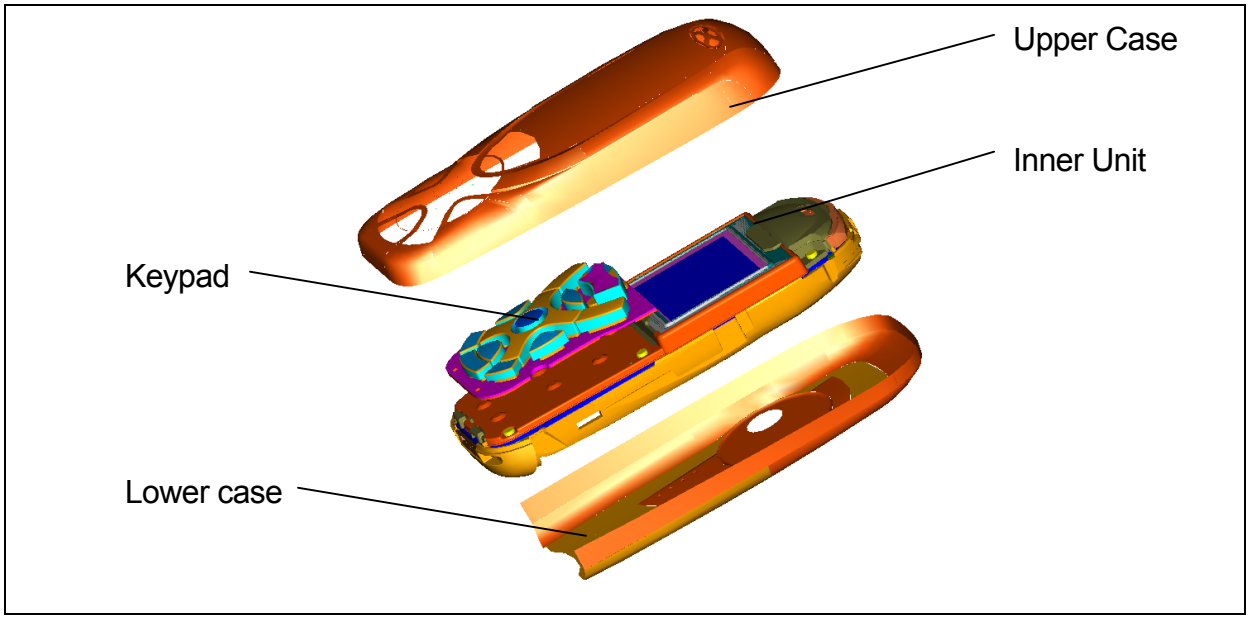
PCB Back View



Assembly of Camera Module



MC 60 Final Assemblies:



7 Disassembly of MC 60

Note: ESD concept; the internal circuits will be more susceptible to ESD because of the use of exchangeable housing. The construction of the internal block must be/is designed, in the best possible way, to protect the circuit against sparks.

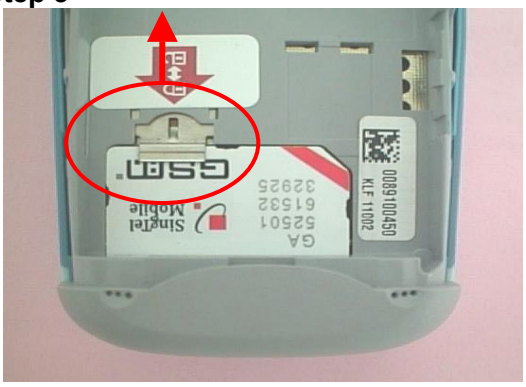
The keypad must be completely closed to prevent any occurrence of an ESD disruptive discharge.

The SIM contacts may be open, thus reachable for ESD contact discharge. This could lead to damage or destruction of the E-Gold pins.

It is a requirement for the service personnel to observe ESD protection rules while performing servicing the M55.

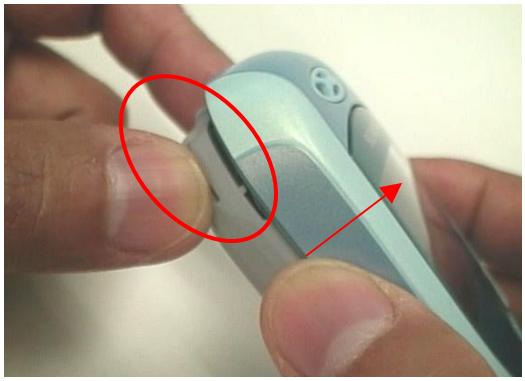
Step 1  Front view of the MC 60	**Step 2**  Back View of the MC 60
Step 3  Remove the back cover by pushing it upwards as indicated by the arrow.	**Step 4**  To remove the battery, release the catch, located at the side, by pressing with the finger tip.

Step 5



To remove the SIM card, push the SIM slider upwards as indicated by the arrow.

Step 6



To remove the CLIPit cover, gently pull the cover upwards from the side of the phone while holding firmly the lower mounting frame as shown.

Step 7

The keypad can be separated from the CLIPit cover.

Step 8

To remove the SAR frame and Light Guide assembly from the lower mounting frame, unscrew the 6 screws (as indicated) with a T5 Plus screw driver (set Torque = 16 cNm).

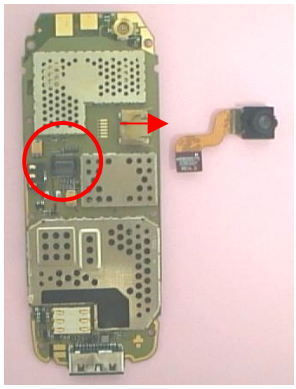
Step 9

The RF board (PCB) can be seen after removing the SAR Frame and Light Guide assembly.

Step 10

Separate the PCB from the Lower Mounting Frame. The antenna is built-in on the Lower Mounting Frame.

Step 11



To detach the camera module with a pair of tweezers to disconnect the flex cable from the connector. Then, gently push the camera outwards as shown by the arrow.

Step 12

Remove the Vibrator motor and MIC from the Lower Mounting Frame.

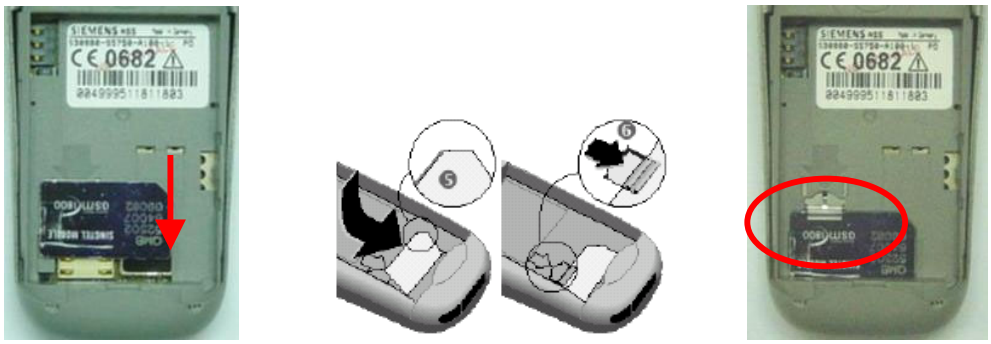
Step 13

Fully disassembled MC 60

8 Reassembly of MC 60

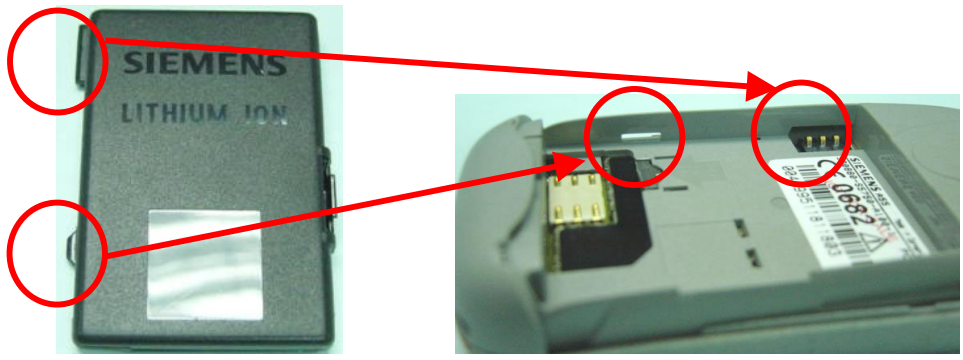
For the reassembly of the MC 60, reverse the disassembly procedures from Step 12 to Step 1. However there are some areas to be taken note of during reassembling of the phone.

During the installation of the SIM card, make sure that the SIM card is inserted properly and that the golden contact area is facing backwards. Push the SIM slider downwards to lock the SIM card into position.



Installation of the SIM card

During the installation of the battery, make sure that the hinges are properly in place (See picture below). Otherwise the battery will not be able to fit into the phone properly.



9 Mobile Software Programming

The common mobile software available is divided into language groups. However, this software does not contain the specific settings, such as ringing tones, greeting text, and short dial list etc., required by the operator or service provider. Therefore, it is common to have some menu item(s) differ in different variants or are not visible at all. These settings are stored in different memory area of the mobile and will be activated depending on the customer specific model or variant of the phone by a separate test step during the production process.

Due to this separation of common mobile software and customer specific initialization, it is possible to fulfil the demands of the market requiring customization and flexibility. As a consequence the software programming process in the LSO is divided into two different steps as followed:

- Software update to actual version and appropriate language group

- Programming of CUSTOMER SPECIFIC INITIALIZATION

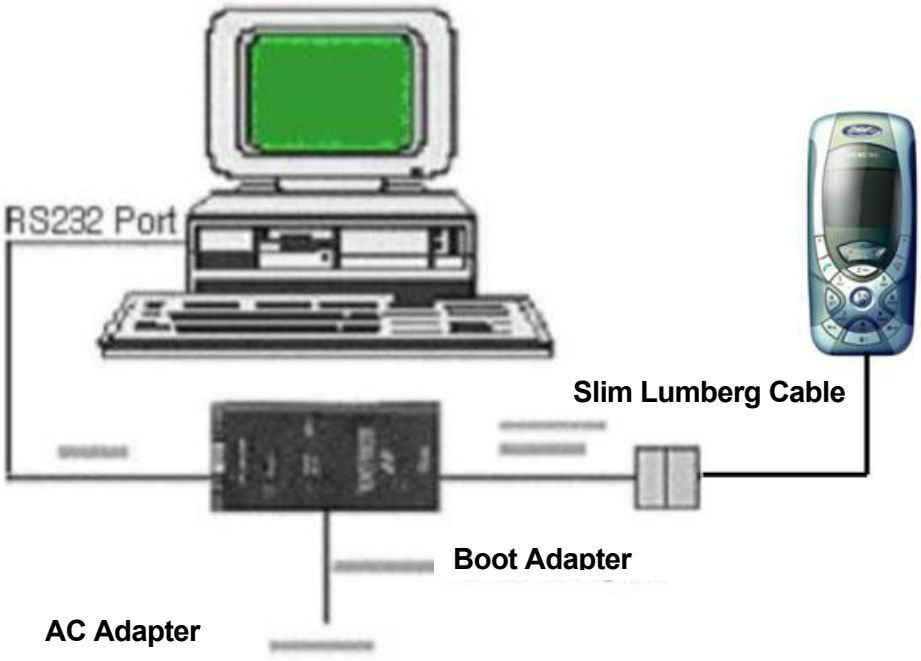


Figure 1. MC 60 Software Programming Setup

9.1 Mobile Software Updating

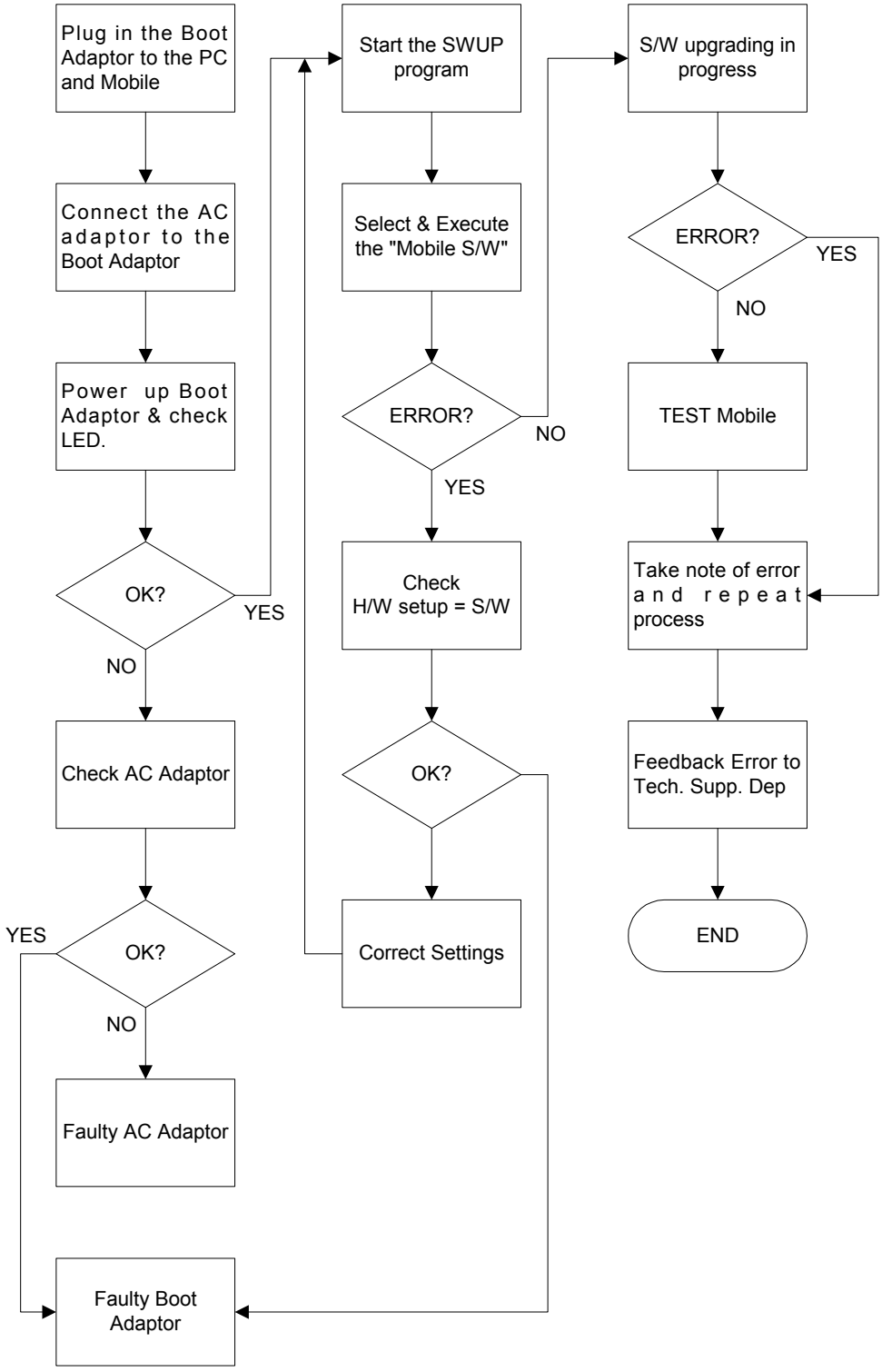
The software of the mobile, L55 series is loaded from a PC directly. Hardware interconnection between the mobile and the PC is shown in Figure 1. Because of the new type of external connector used in X55 series (Slim-Lumberg type) an additional adaptor cable between mobile and boot adaptor is required. Table 1 listed all the hardware requirements

If you use the battery dummy, make sure that the power supply voltage is correctly adjusted.

Description	Part No.
Bootadapter 2000 incl. AC-Adapter, serial cable and mobile connection cable	L36880-N9241-A200
IBM Compatible PC – Pentium	-
Adapter cable – Slim Lumberg to Old	F30032-P226-A1

TABLE 1. EQUIPMENT LIST FOR SOFTWARE PROGRAMMING

9.2 Flow Chart for Software Upgrading



FLOW CHART FOR S/W PROGRAMMING PROCESS

10 Siemens Service Equipment User Manual

Introduction

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

Siemens Mobile Service Equipment

Using this system vastly simplifies the repair of the phones and will make sure that:

1. All possible faults are detected
2. Sets, which pass the test, will be good enough to return to customer.

Starting from the P35 Series, Siemens will introduce a simpler and faster testing platform for testing a repaired Siemens mobile phone. The testing platforms are either base on R&S CMD 53/55 or CTS55 GSM test set.

There is also test software under development for testing with the Wavetek 4201S and the 4107 GSM test set.

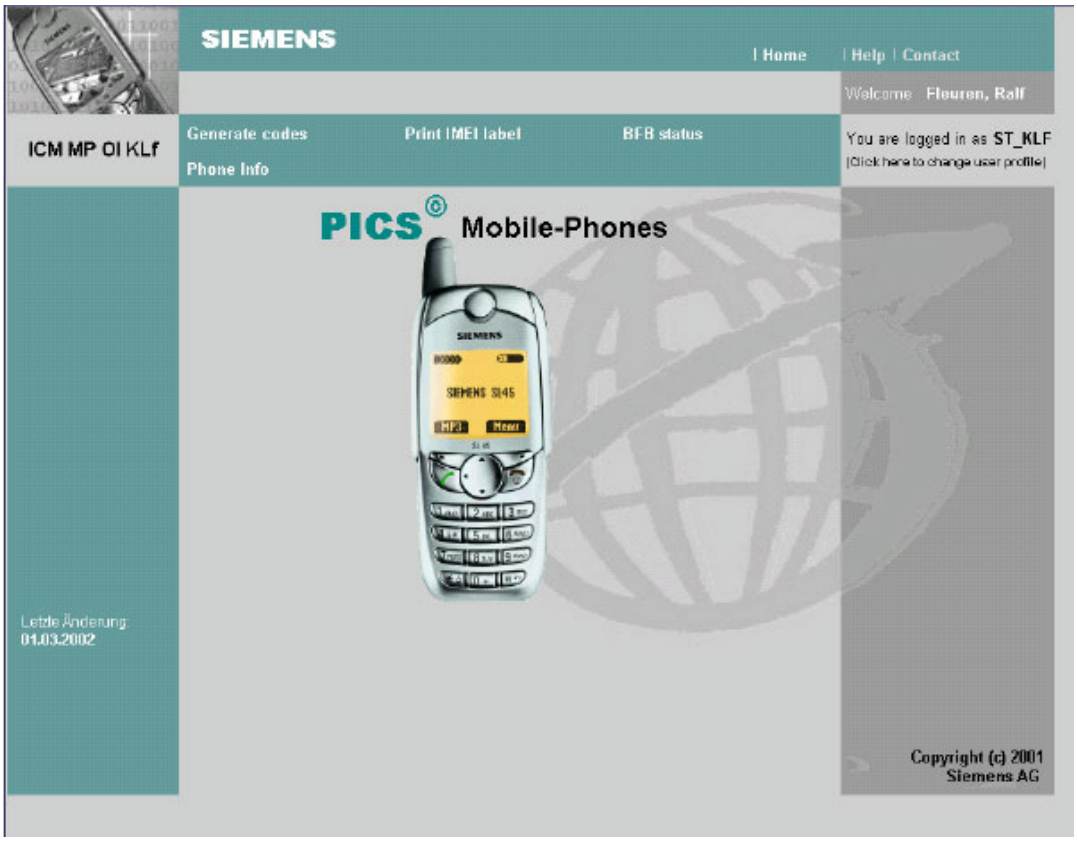
Level 2.5 service software is also under development for more elaborate testing for the repair for the L55 series mobile phone.

THE LSO WILL HAVE TO PURCHASE THE SYSTEM, CHOOSING BETWEEN THE COMPLETE PACKAGE AND SUB-SET OF IT.

A FULLY AUTOMATIC TEST PROCEDURE IS ONLY POSSIBLE IF THE COMPLETE SYSTEM IS INSTALLED.

Make sure that your CTS firmware is Version 3.01 or higher. For CMD 55 it must be Version 4.03 and higher. Please check with the Service Info SB_0500 for the CTS/CMD Hardware Options.

11 PICS Internet



Overview

The following functions are available for the LSO

- Generate **PINCODE**
- Generate **SIMLOCK-UNLOCK-Code**
- **Print IMEI labels**

The access to the server which is located in Kamp-Lintfort is protected and will only be granted to authorize users being supplied with a special coded chip card.

Chip cards and the administration services of the PICS database are provided by *PICS-TRUST- Center* at department **ICP MP OI Kamp-Lintfort**.

In case of any questions or requests concerning chip cards or administration of the databases please ask your responsible Siemens Customer Care Manager.

Installation for Windows 95 / 98 / NT / 2000

Requirements

In order to use the PICS-Internet websites you need a fully configured internet access with a 32bit NETSCAPE-Browser.

Remark:

Microsoft Internet Explorer and Netscape versions above 4.7x cannot be used!

There is a 90-day-trial-version of Netscape Navigator 4.6 in English or German available on the PICS installation CD provided by Siemens.

Every user is responsible for a proper installation matching the license agreements.

For installation and further access you need the following:

1. The Installation-CD which contains:
   - the SETUP program for the InterSEC plug-in
   - the **trial version** of Netscape Navigator 4.6 (German / English)
   - the German / English documentation
2. A chip card which is authorized by ICP MP OI KLF in order to decode the protected PICS Websites (and a password which gives you access to your chip card). Chip cards can be ordered via your responsible Customer Care Manager within Siemens.
3. A supported chip card reader (Smarty or Siemens B1) in order to access your chip card.

Remark:

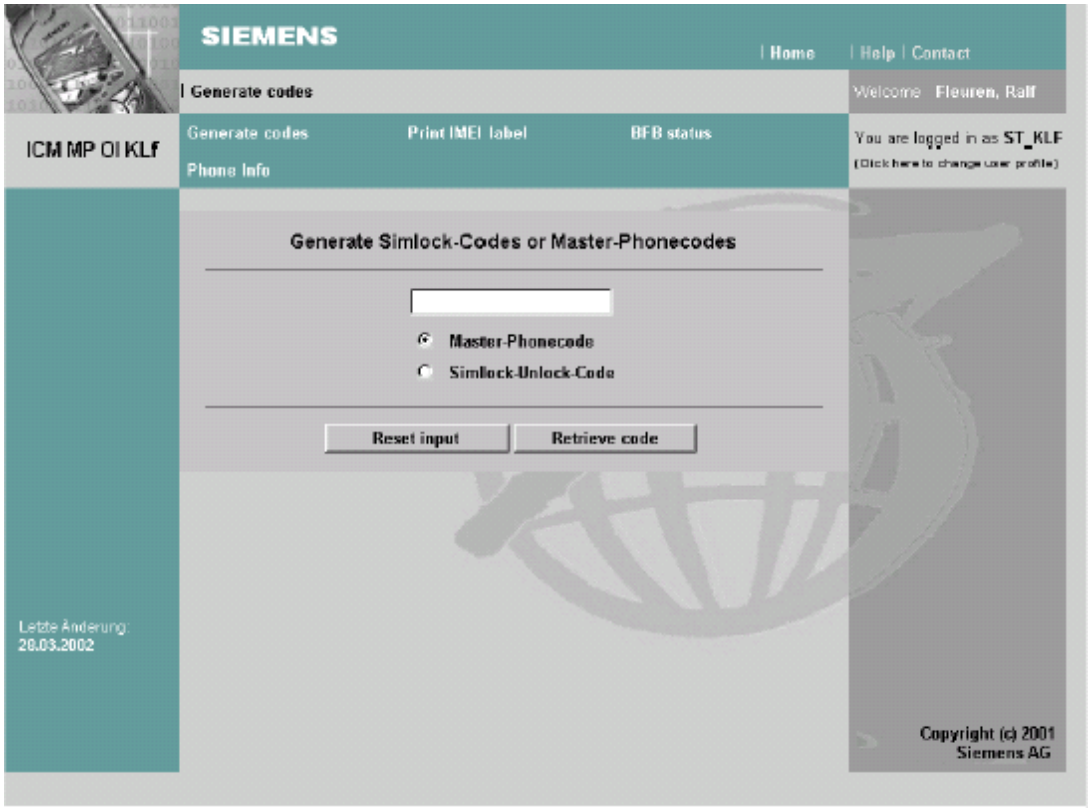
We recommend using Siemens B1 reader. Similar device to B1 is Cardman 9010.

Generate Codes

In the module "**Generate Codes**"you can choose to generate:

- Master – Phonecodes

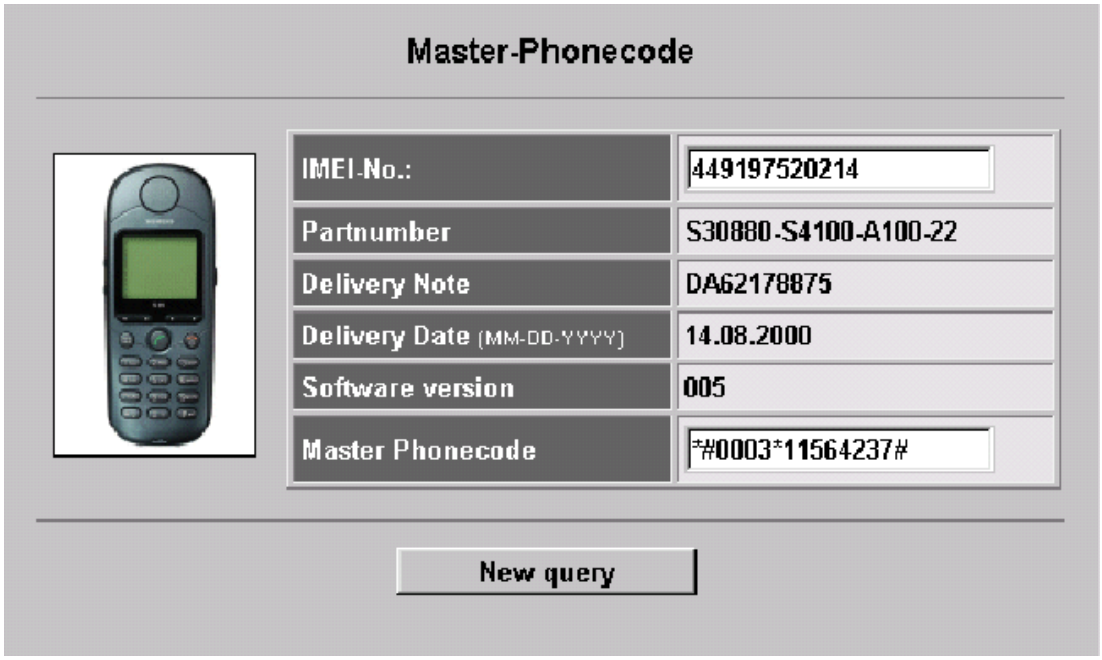
- Simlock Unlock – Codes



Master - Phonecodes

The **Master – Phonecode** is used to unlock blocked mobiles.

Master – Phonecodes can only be supplied for mobiles which have been delivered in a regular manner.



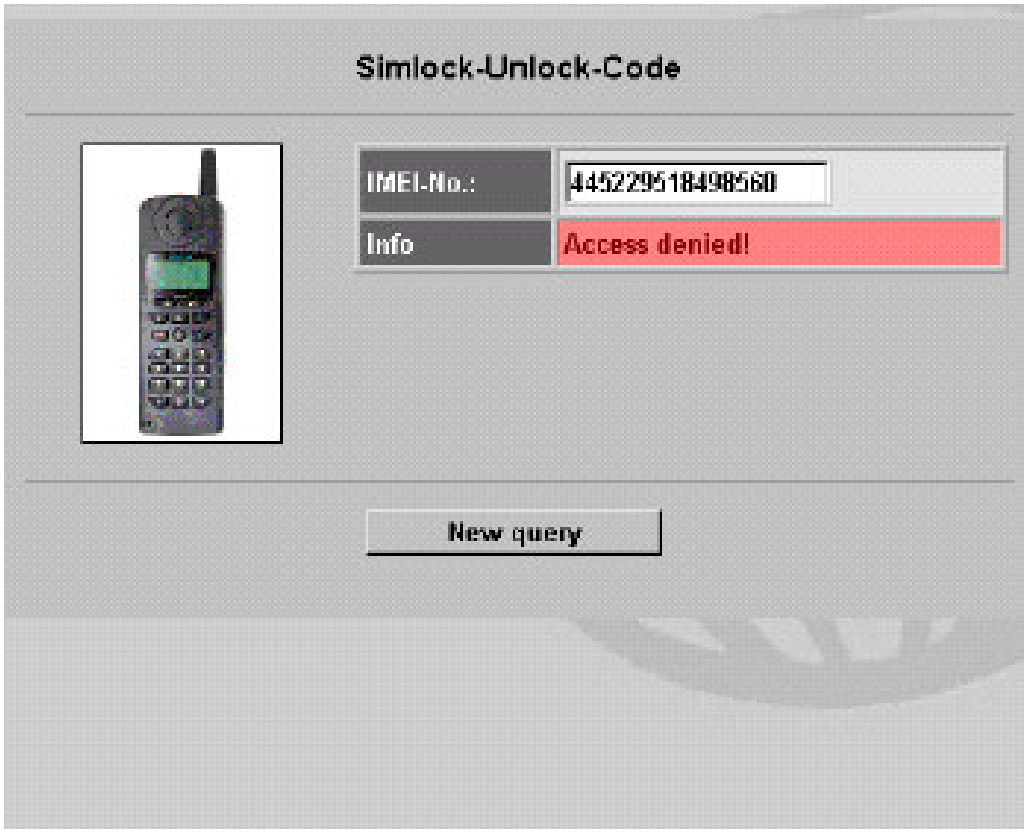
Simlock Unlock - Code

The **Simlock-Unlock-Codes** can only be generated if the following conditions are given:

- Mobile must have an active **Simlock** inside.
- The user must be given the authorization to obtain **Simlock Unlock- Codes** for the variant of the operator to which the mobile was delivered last time.

Hint:

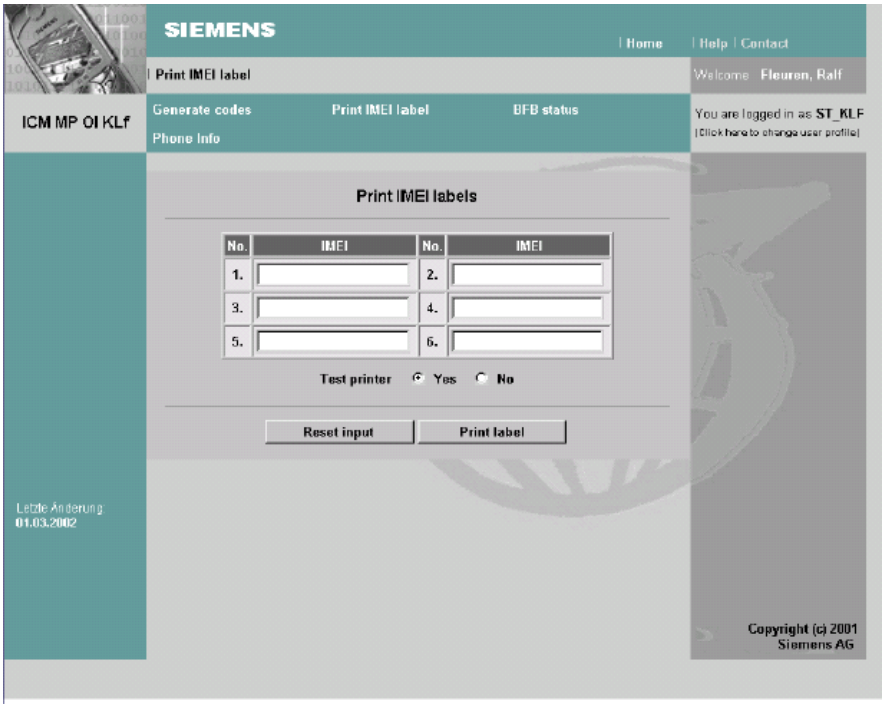
If there's no such authorization you'll get the following screen:



In this case please contact your responsible Siemens Customer Care Manager.

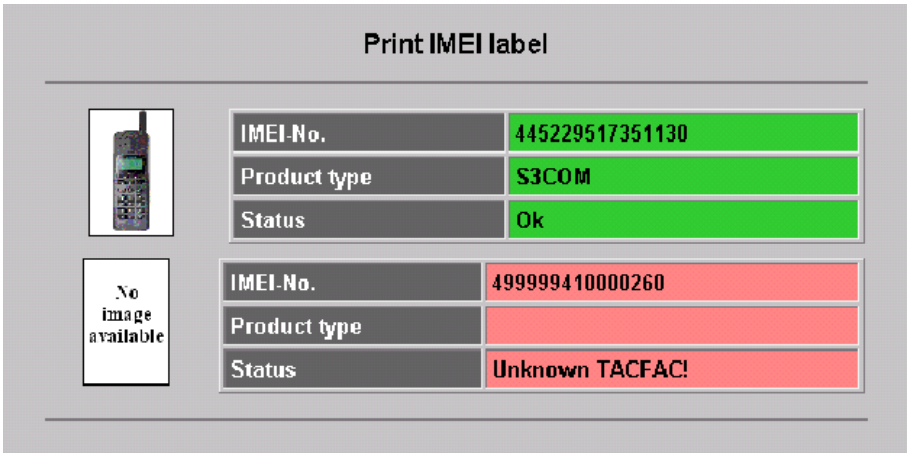
Printing IMEI label

The module "**Print IMEI label**" offers the possibility to print IMEI labels for mobiles again.



You are able to print up to six labels in just one step.

To prevent that misaligned labels are being printed, the setting "test printer = Yes" is activated as default. After having printed a well-aligned test label you can switch setting to "No" and print the correct label.



Hint:

For correct printing of IMEI labels you must have a **Zebra – label printer** with special material that fits for label printing. This printer has to be connected to local LPT1 printer port (also see Installation of IMPRINT) and MUST feature a printing resolution of 300dpi.

12 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.

The part number for the MC 60 is S30880-S5760-Axxx where the last 4 letters specify the housing and software variant.

MC 60 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.

On this IMEI label, Siemens has also includes the date code for production or service, which conforms to the industrial standard DIN EN 60062. The date code comprises of 2 characters: first character denotes the Year and the second character denotes the Month.

For example: **M3**

CODE	YEAR	MONTH	CODE
M	2000	MARCH	**3**
N	2001	APRIL	4
P	2002	MAY	5
R	2003	JUNE	6

TABLE 2 DIN EN 60062 DATE CODE

To display the IMEI number, exit code and SW/HW version, key: *#06#.

13 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 Siemens AG authorized level 2 up to 2.5e 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 function of all **keys** including **side keys.**
  - Check the **display** for error in line and row, and for illumination.
  - Check the **ringer/loudspeaker** acoustics by individual validation.
  - Perform a **GSM Test** as described on page 34.

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

GSM Test:

- Connect the mobile/board via internal antenna (antenna coupler) and external antenna (car cradle) to a GSM tester.
- Use a Test SIM.
- Skip GSM 900/GSM1800 or GSM1900 test cases if not performed by the mobile phone.

Internal Antenna			
Test case	**Parameter**	**Measurements**	**Limits**
1 Location Update	• GSM900 • BS Power = -55 dBm • middle BCCH	• Display check	• individual check
2 Call from BS	• low TCH • PCL 5 • BS Power = -55 dBm • middle BCCH	• Ringer/Loudspeaker check	• individual check
3 TX GSM900	• low TCH • PCL 5 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
4 Handover to GSM1800 Including Handover Check			
5 TX GSM1800	• low TCH • PCL 0 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
6 Handover to GSM1900 Including Handover Check			
7 TX GSM1900	• low TCH • PCL 0 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
8 Call relaese from BS			

External Antenna			
Test case	**Parameter**	**Measurements**	**Limits**
9 Call from MS	• GSM900 • high TCH • PCL 6 • BS Power = -55 dBm • middle BCCH	• Keyboard check	• individual check
10 TX GSM900	• high TCH • PCL 6 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
11 RX GSM900	• 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.
12 Handover to GSM1800 Including Handover Check			
13 TX GSM1800	• high TCH • PCL 1 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
14 RX GSM1800	• 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.
15 Call relaese from MS			

16	Handover to GSM1900 Including Handover Check			
17	TX GSM1900	• high TCH • PCL 1 • BS Power = -55 dBm • middle BCCH	• Frequency Error • Phase Error RMS • Phase Error Peak • Average Power • Power Time Template	• GSM Spec.
18	RX GSM1900	• 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.
19	Echo Test	• high TCH • PCL 1 • BS Power = -70 dBm • middle BCCH		• individual check

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”**

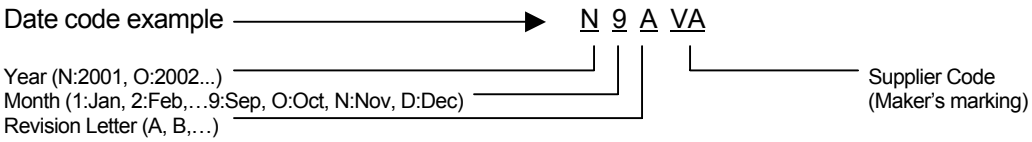
   Pin 1 number: 1234
   PUK : 76543210

   Pin 2 number: 5678
   PUK 2 : 98765432

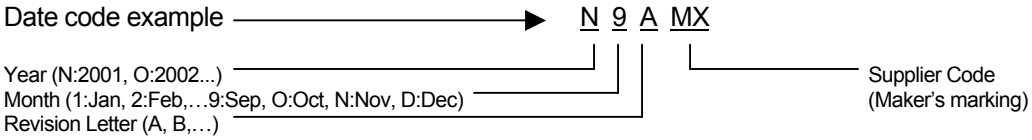
Annex 2

Battery Date Code overview

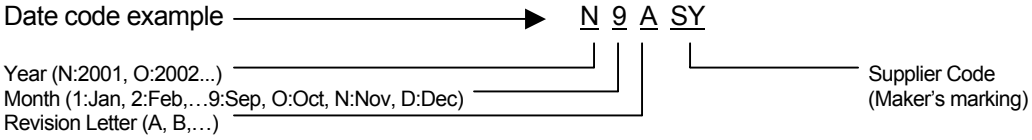
Varta



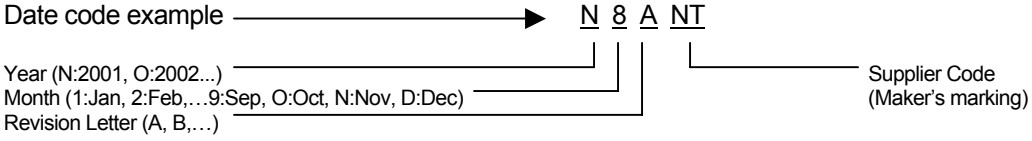
Hitachi / Maxwell



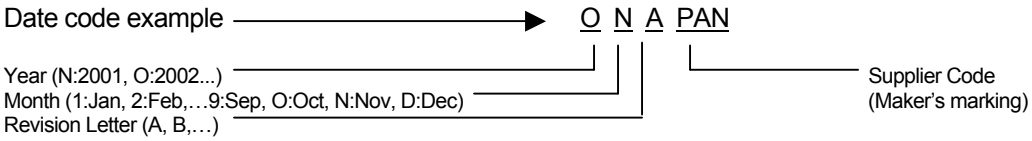
Sanyo



NEC



Panasonic



Sony