Local Service Organization Service Manual

BE INSPIRED

S T 5 5

Version	Date	Department	Notes to change
V 1.00	01.08.2003	ICM MP CCQ SLI RHQ	First release

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.
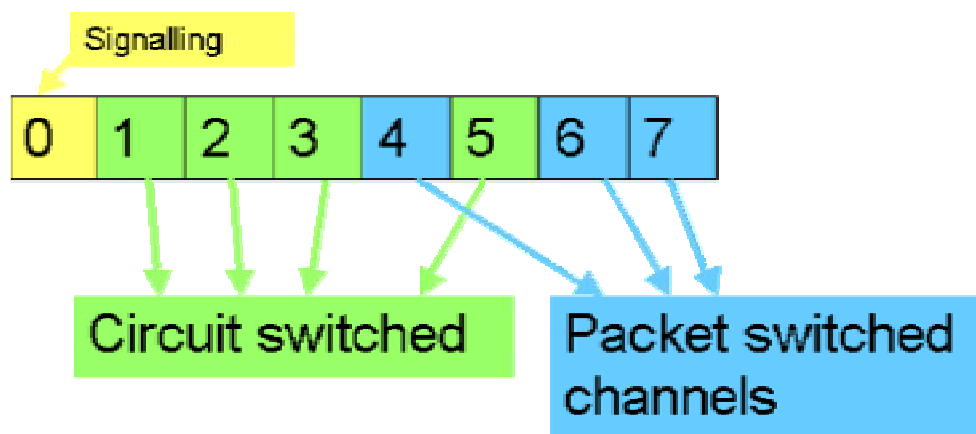

Figure1. Example of GPRS data transmission

Example: Cell with 1 Frequency channel:

1 physical channel for signaling, 4 physical channels for Circuit switched and 3 physical channels for Packet switched.

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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 (ie. program code and data) during application runtime: Minimum: 100 Kbyte (Has to be taken as working assumption for application development.) Goal: 145 Kbyte as SL45i (not committed)	yes
MIDP 1.0, CLDC 1.0	As SL45i, including performance optimizations from SL45i-Infusio.	yes
'OEM extensions'	Proprietary API extensions as SL45i. Including 'Siemens Game API'	yes
HTTP API over GPRS	SL45i: only over CSD	yes

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3   Key Features

Frequency Bands	• EGSM 900/GSM 1800/GSM 1900
Power	• EGSM 900 : Power Class 4 • GSM 1800 : Power Class 1 • GSM 1900 : Power Class 1
Battery	• Li-ion Battery Pack • Nominal Voltage : 3.7V • Nominal Capacity : 780mAh
Stand-by Time	• Min 140 hrs (actual time depends on the network)
Talk Time	• Best case : min 3.8 hours (DTX off, GSM 900, PL19) • Best case : min 4.5 hours (DTX on 40% GSM 900,Pl19) (Actual time depends on the network)
Charging	▪ Max charge time for empty battery (0-5% capacity) is 2.5 hrs for standard charger and via battery charging station.
SIM Card	• Plug In card 3V • SIM application Tool Kit Class II and III Send USSD command
Message	SMS, EMS, MMS Support

Display	• Backlight LED – LCD : White
	
	                    Keypad: Blue
	
	• LCD: 1.89" TFD module
	
	     120 x 160 pixel
	
	     16 bit (65536) colours

Camera Sensor	• Focus Range: 50 cm ~ ∞ • Preview Mode: SUBQCIF 128 x 98

	• Still pictures, tree qualities: High, Normal, Low • Resolution – VGA (640 x 480), QVGA (320 x 240), QQVGA (160 x 120)
Physical Details	• Dimension: 98.5 mm (L) x 48.86 mm (W) x 21.6 mm (H) • Volume: ~ 75 cc • Weight: ~ 87 g
Keypad	• 5-Way joystick • 2 function keys (Send, Power / End) • 2 multifunctional softkeys • 12 numeric keys (10 numeric,*, #)
Temperature Range	• -10 ^{o}C to +55 ^{o}C for normal operating • -40 ^{o}C to +85 ^{o}C for storage
Audio	• Ringer: On / Off / Beep • Melody: 20 embedded + 10 download + 3 compose • Melody Type: YAMAHA SMAF MA3 • Key Tones: Click / Tone / Silent • Info Tones: On/ Off / Extended • Speaker Volume: Adjustable in 4 levels during call via volume key
Setting	• User Profiles: Normal / Quiet / Noisy / Headset / Aeroplane mode / 2 Empty • Group : Friends / Colleague / Family / Biz Partner / VIP • Wallpaper: 3 default + 2 customized + OFF • Answer Mode: Any key / Key Tones / Flap • Security: Codes / Only > FDN > (Operator support) / This SIM only
Speech Codec	• AMR, FR, EFR, HR
Interface	• Bluetooth, USB, R232, IrDa, SyncML

4   Accessories

For the ST55, the following accessories will be available.

Battery, Li-Ion (3.7V, 750mAh)   Standard Charger

Download Cable

5   Unit Description ST55

The mechanical concept of the ST55 as a bar phone type is much similar with other Siemens series mobile phones.

ST55 can be divided into three main physical blocks, the top cover, middle frame and base cover. The top cover is composed of internal and external LCD protected by LCD base and lens with shielding effect. The LCD Lens will joint receiver and top cover.
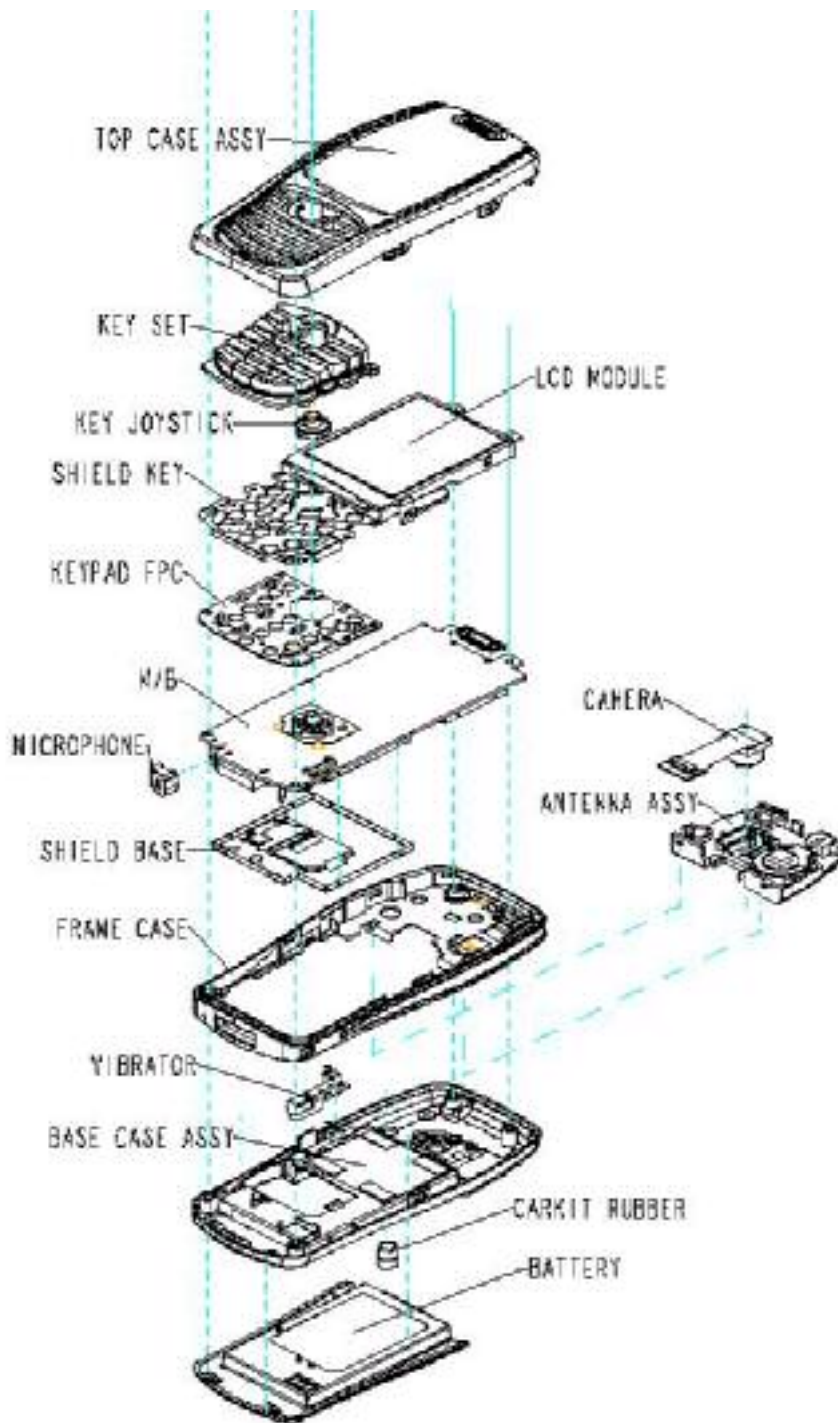
For the main function assy., there are 2 screws located on the base and 2 on the M/B. Screwdriver (T5) and tweezers will be used as main tools to perform mechanical repair.

Inside, the middle frame consist a M/B, which carries control and RF section of the mobile, and a key PCB and microphone directly insert into plug-in connectors to show function. The display module and vibrator are connected to the board by the board to board connector which is inserted into a plug-in connector. In case they are defective electrically or mechanically it can be exchanged very quickly. Camera module and antenna is attached on antenna frame which is inserted on middle frame. The I/O connector for software upgrading and charging is located on the bottom of middle frame.

The connector for external RF cable is located at the base cover of the mobile. Battery is attached on the base cover and fix position with battery knob.

Notice: The ST55 is a dual-band mobile operating on GSM900 and GSM1800.

5.1 Exploded View of ST55

TOP CASE ASSY

KEY SET

KEY JOYSTICK

LCD MODULE

SHIELD KEY

KEYPAD FPC

M/B

MICROPHONE

CAMERA

ANTENNA ASSY

SHIELD BASE

FRAME CASE

VIBRATOR

BASE CASE ASSY

CARKIT RUBBER

BATTERY

6   Disassembly of ST55

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.

Attention: Do not touch the screen of the display module when the upper case is removed! The module is damaged after finger contact! Use a protection foil during disassembly and do not forget to remove this foil during reassembly.

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 IC pins.

It is a requirement for the service personnel to observe ESD protection rules while performing servicing the ST55.

For assembly a torque T5 screw driver adjusted to 7Ncm is required.

Step 1	Step 2
Remove BATTERY, CARKIT RUBBER and 2 SCREWS (M1.6*6.5) located on BASE CASE ASSY.	Detach the TOP CASE ASSY. by sliding the upper gap from bottom to both sides.
Step 3	**Step 4**
Remove the KEYSET from TOP CASE ASSY.	Add a protect membrane on LCD. Remove 2 SCREWS (M1.6*6.5) on top.

Step 5	Step 6
Detach the BASE CASE ASSY. by sliding the lower gap from bottom to both sides.	Pull out CAREMA FPC carefully and detach the FRAME CASE.
Step 7	**Step 8**
Pull out LCD FPC carefully.	Gently push apart the two clips of the metal snap to release LCD MODULE from M/B.
Step 9	**Step 10**
Remove JOYSTICK COVER and KEY SHIELD	Lift the LCD CONNECTOR holder vertically and remove the KEYPAD FPC from upper left corner carefully.
Step 11	**Step 12**
Remove the MICROPHONE.	Remove the SHIELD_BASE
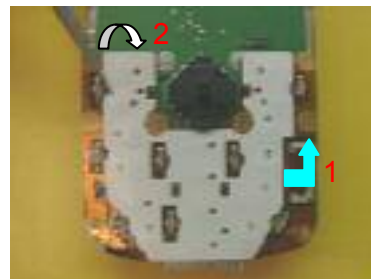
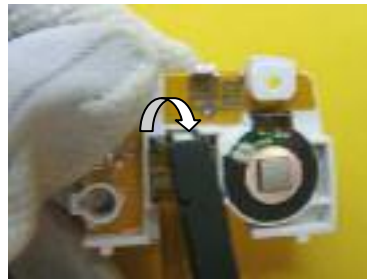| Step 13	Step 14
Remove the ANTENNA Assy. from FRAME CASE by pressing the clip.	Remove the CAMERA from ANTENNA FRAME by slightly lifting the clip and pushing it forward.
Step 15	**Step 16**
Unlock the screw (M1.6*1.5) on BASE CASE ASSY. and remove the Vibrator.	Fully disassembled ST55

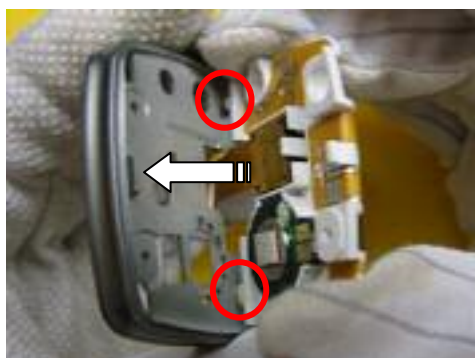# 7   Reassembly of ST55

| Step 1	Step 2
Put back Vibrator into BASE CASE and tighten the SCREW (M1.6*1.5).	Align the position and push CAMERA into the ANTENNA ASSY
Step 3	**Step 4**
Align the position and push ANTENNA ASSY back to FRAME CASE	Assemble KEYPAD FPC, LCD Module
Step 5	**Step 6**
Assemble SHIELD_KEY and MICROPHONE. The SHIELD_KEY should hook on to the PCB properly at the bottom.	Place KEY JOYSTICK, the 2 bulges should be positioned horizontally.
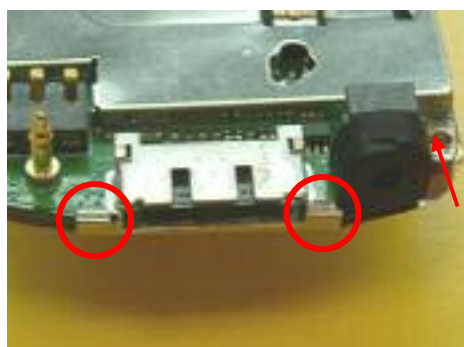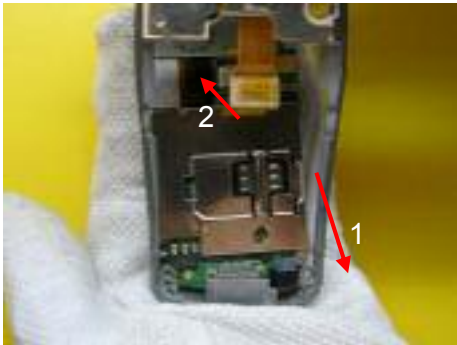
Step 7	**Step 8**
Slide PCB into FRAME CASE from bottom and connect CAMERA FPC	Slide middle assy. into BASE CASE ASSY. from bottom
Step 9	**Step 10**
Reassemble the 2 screws (M1.6*6.5) located on the PCB	Reassemble KEYSET into TOP CASE ASSY
Step 11	**Step 12**
Cover TOP CASE ASSY from top and press slightly to close along both sides.	Reassemble the 2 screws (M1.6*6.5) located on BASE CASE ASSY. and place the CARKIT RUBBER.

8   Mobile Software Programming
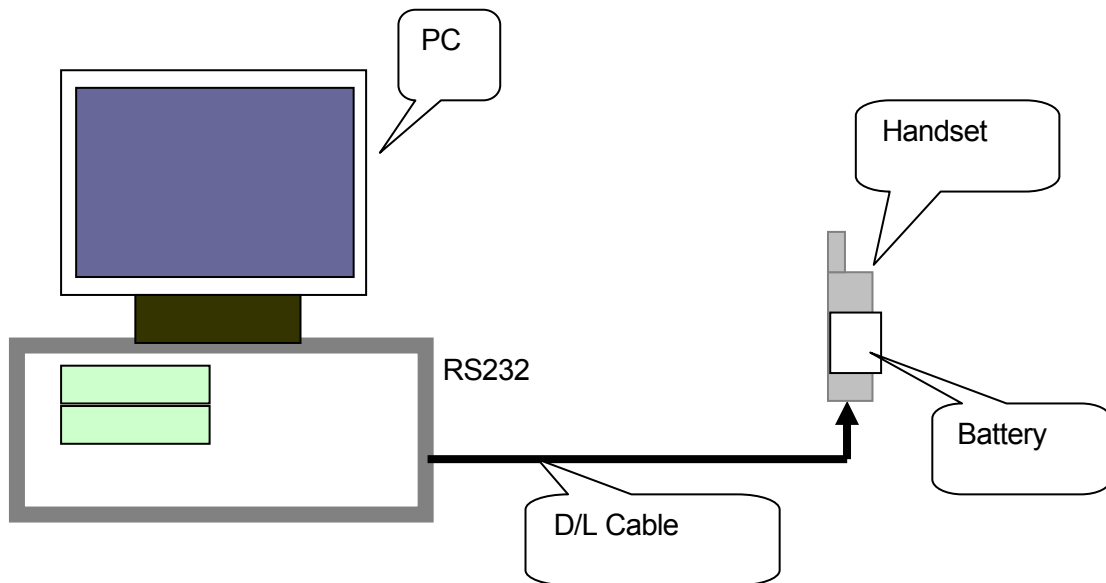
STL55 Software Programming Setup

The software of ST55 is loaded from a PC directly. All hardware interconnections are shown above. Please make sure the capacity of battery is sufficient and the D/L cable connects well. SW Download Process:

1. Install the download tool into PC just double click "Setup.exe" in the folder and follow instructions in process.
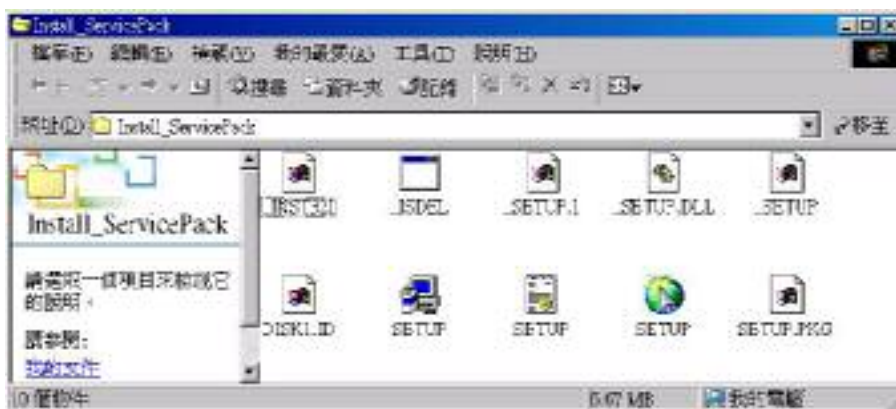
2. Execute the main program.
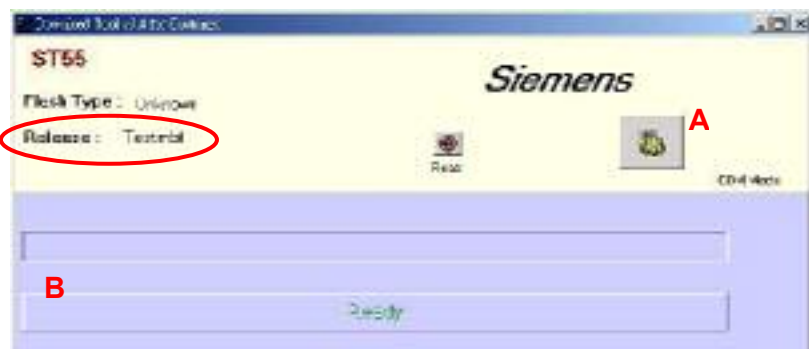
A) Click the wheel icon to load the related mbf file.
B) Press the power-on key until release message is shown. The downloading process will start.

3. After the downloading process is completed, remove the handset and connect to another.
Choose "Reset" to start download again.

8.1 Customer Mode (*#369#)

In ST55, the repair technicians can dial *#369# on handset under normal operating condition to check or adjust the below functions. Please notice the items 4~6 are for production and RD's analysis, don't change the default value or may cause mobile malfunction.

Contrast Up& Down to adjust; Select to exit.

BB Test: Up& Down to chose item; Select to enter.

- Illumination: test if the backlight shows; OK to exit.
- Speaker: test if the ring tone gives sound, OK to exit.
- Vibrator: test if the vibrator starts, OK to exit.
- Keypads: press each key to eliminate the indicators on screen;
- long press OK to exit.
- RTC status: show if the RTC OK; OK to exit.
- Acoustic: blow to MIC and listen from Speaker; OK to exit.
- LCD Test: Up& Down to check White, Black, R, B, G, R/G/B colour display; Exit to exit.

Software version: check the current software version

Mapping version: check the current software version

Auto-answer: factory usage, working when insert test SIM card

Comport: factory usage, AT-DATA/GENIE for RD analysis only.

DTMF-on: On/Off, determine if DTMF function valid during calling.

Camera: capture the image from camera to test if camera is working.

8.2 SW Version Definitions

The format of SW name shown on handset as below

Software	Mapping
(Date Code) n- (TTP Version) (Project) (Customer) (RD Version) (Function)	(Date Code) - (Project) (Customer)-(Region)(Structure Version)(Value Version)
Date Code: YYMMNN means release date TTP version: The internal version used for RD Project: ML1 means Milano Customer: TMO means T-Mobile RD Version: The internal version used for RD Function: W means WAP, M means MMS	Date Code: YYMMNN means release date Project: ML1 means Milano Customer: TMO means T-Mobile Region: Applied region. Ex: CZ means Czech. Structure Version: File structure version Value Version: Setting change version

9 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 or CMD200 with a software called (CTS, CMD, or CMU-GO).

There is also test software available for testing with the Willtec 4201S the 4107 and the 4400 GSM test set called (CATS 4200 or CATS4400).
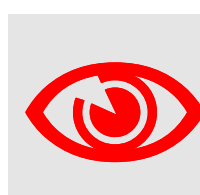
THE LSO WILL HAVE TO PURCHASE THE SYSTEM, CHOOSING BETWEEN THE COMPLETE PACKAGE OR SUB-SET OF IT.

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.

10 International Mobile Equipment Identity, IMEI

The International Mobile Equipment Identity, IMEI, which consists of 15 digits, uniquely identifies the mobile equipment.

IMEI=TAC+FAC+SNR+SP

IMEI: International Mobile Equipment Identity

TAC: 6 digits, indicating type approved

FAC: 2 digits, indicating final assembly plant

SNR: 6 digits, indicating equipment serial number for manufacturer

SP: 1digits, spare

The part number for the ST55 is SXXXXX-SXXXX-AXXX where the last 4 letters specify the housing and software variant.
The IMEI starts with 351736 as ST55 model.

ST55 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 if 2 characters: first character denotes the Year and the second character denotes the Month. For example, the IMEI above show date code M3 mean 2001/03.

Year	Date code	Month	Date caode
2003	Q	December	D
2004	R	January	1
2005	S	February	2

Table: DIN EN 60062 DATE CODE

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

11   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 <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 31.

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 release 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			

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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) A random sample check of:

  - data reset (if required)

  - optical appearance

  - complete function

3) 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 2 different "Test-SIM-Cards" in use

    a) Test SIM from the company "**ORGA**"

Pin 1 No:	0000
PUK 1:	12345678
Pin 2 No:	0000
PUK 2:	23456789

    b) Test SIM from the company "**T-D1**"

Pin 1 No:	1234
PUK 1:	76543210
Pin 2 No:	5678
PUK 2:	98765432

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Annex 2
Battery – Date – Code overview

Date Code overview

Varta

Date code example ➡ N 8 A VA

Year (N: 2001, O: 2002, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)
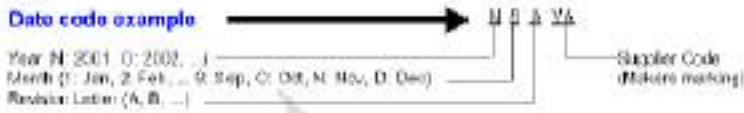
Hitachi / Maxell

Date code example ➡ N 8 A MX

Year (N: 2001, O: 2002, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)

Sanyo

Date code example ➡ N 8 A SY

Year (N: 2001, O: 2002, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)

NEC

Date code example ➡ N 8 A NC

Year (N: 2001, O: 2002, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)

Panasonic

Date code example ➡ O 8 B PAN

Year (N: 2001, O: 2002, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)

Sony

Date code example ➡ P 8 A SO

Year (O: 2002, P: 2003, …)
Month (1: Jan, 2: Feb, … 9: Sep, O: Oct, N: Nov, D: Dec)
Revision Letter (A, B, …)

Supplier Code
(Makers marking)