

Service Manual

for

C10 / C11 / C12



V 1.0

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2 Technical Data

Length:	137 mm
Width:	55 mm
Thickness:	22 mm
Volume:	149 cm ³
Weight:	165 g
Standards:	GSM Phase 2
Performance:	C10: GSM 900, Class 4 (2 Watt) C11: GSM 1800, Class 1 (1 Watt) C12: GSM 1900, Class 1 (1 Watt)
Power supply:	NiMH 700 mAh
Standby time:	Up to 80 hours
Talk time:	Up to 5 hours.
Charging time:	up to 7 hours (with Standard Charger) up to 1.5 hours (with Rapid Charger, optional)
Display:	3 lines of 12 characters each + 1 dedicated icon-line
SIM Card Type:	Plug-In, 3V or 5V
Antenna:	Non-retractable, Lambda/2 helix type
Accessories:	
a) Standard:	Standard Charger, Battery (3.6V, 700mAh)
b) Optional:	Spare Battery, Rapid Charger, Desk Top Charger, Belt Clip, Portable Handsfree, Car Accessories, Travel Charger



3 General Information

With the C1x (C10, C11 and C12) the first series of the new C class of Siemens Mobiles are offered to the customer. The intention of this class is to offer entry-level mobile phones for the mass consumer market.

One of the main differences is the new type of display used: It is an alphanumeric display which offers 3 lines of text (12 characters each) plus a dedicated icon-line to access the different menus.



4 Mechanical Concept

Note: All part numbers refer to mechanical drawing in section 4.1!

The mechanical concept of the C1x mobiles is similar to the one of S6 and E10. The C1x consists of two boards, the RF & Control module (1000) and the user interface (MMI board, 1010).

The connection between these two boards is not established by a normal connector with plug-in contacts, but by a special interconnector (1210) embedded into a shielding frame (1080). This interconnector is upholding the connection through the pressure implied on it by the housing.

Caution: Be careful when assembling the interconnector. Avoid any kind of dust or dirt because it will affect the contacts of the interconnector.

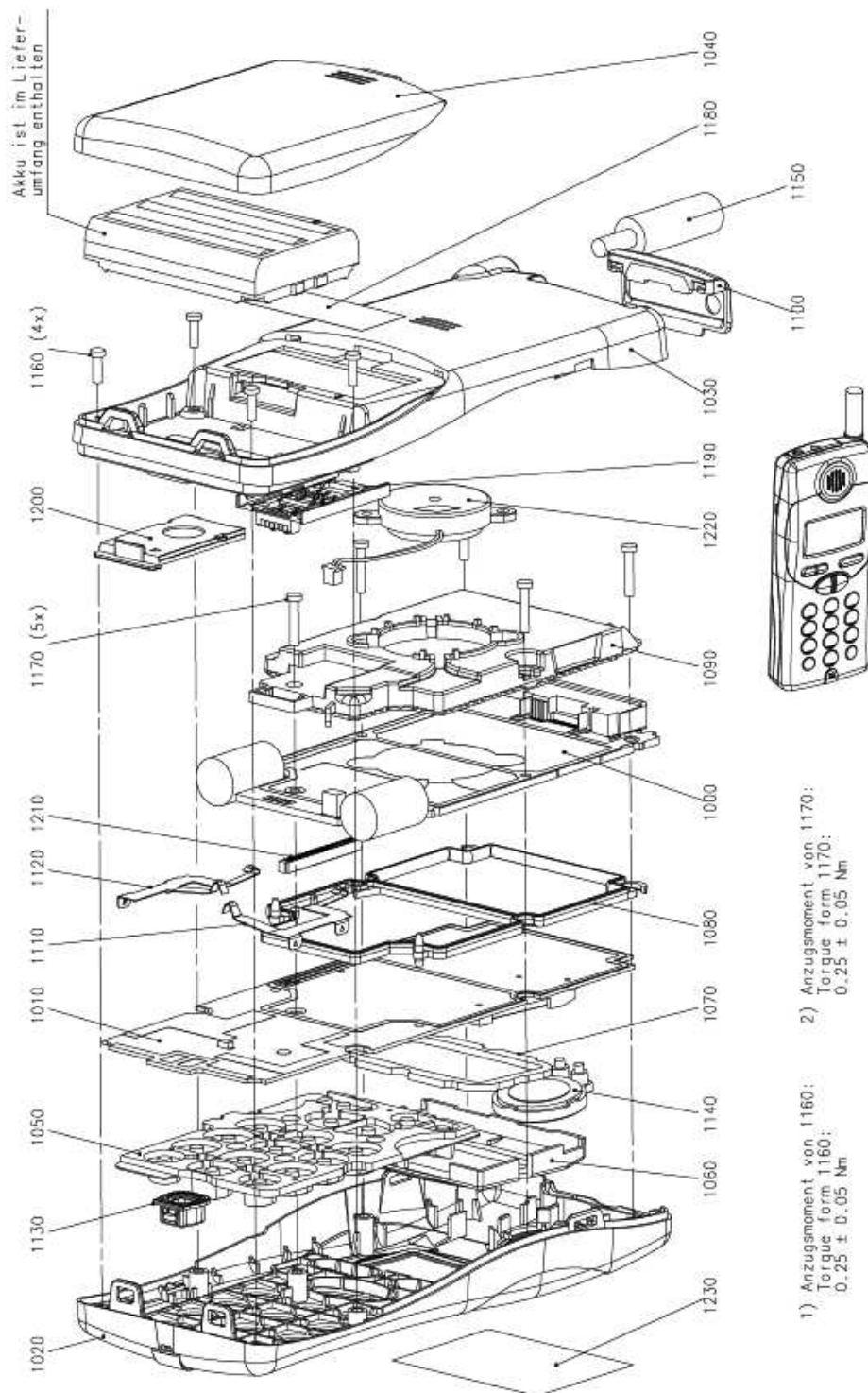
On the MMI board there are no exchangeable components. In opposite to the MMI board of S6 and E10 there is no ringer on the MMI. The ringer (1220) is placed in the shielding cover (1090) and connected to the RF&Control module (1000) by a plug and a cable.

Because the Molex connector is not located at the bottom of the telephone but on it's top, there is no need anymore for RF cable mounted to the MMI board and for a RF plug neither.

The antenna (1150) is not screwed into the lower case shell, but it is a plug-in type. The keypad (1050), the loudspeaker (1140), the microphone (1130), the dust protection frame (1070) and the display window (1060) are mounted into the upper case shell (1020). Make sure that the microphone contact springs are not damaged when mounting.

When turning in the screws (1160 and 1170) make sure that the right torque is used (0.25 \pm 0.05)Nm, because this will have an effect on the contacts of the interconnector.

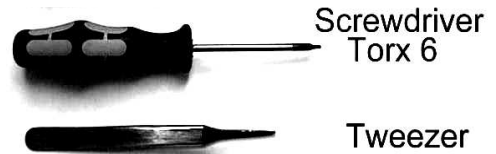
4.1 C1X mechanical drawing



Note: The numbers shown above are NO ordering numbers. Use the numbers supplied by your service manager for ordering!

4.2 Necessary tools

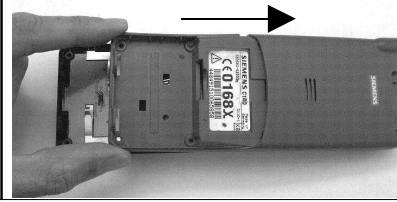
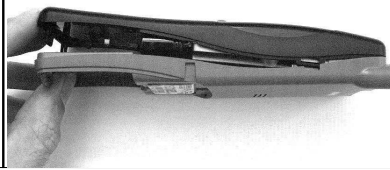
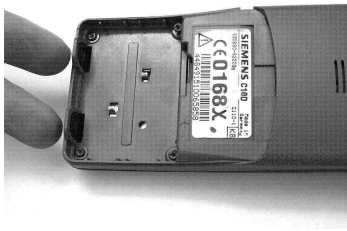
For disassembling the SL10 the following tools are mandatory:



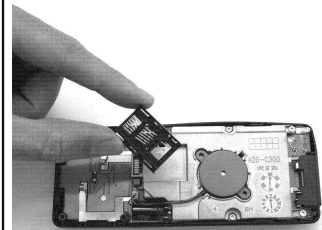
4.3 Disassembling the C1X

Attention: ESD regulations have to be followed!

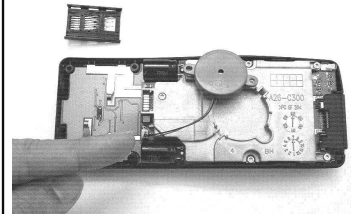
1. First remove the battery lid and the battery below it.	
2. Remove the SIM card rack with the SIM card.	
3. Then you pull the antenna out and remove the connector cover.	
4. Remove the four cylinder-head screws in the battery compartment.	
5. Release the catches in the battery compartment, lift the lower housing section and push it forwards and out (see figures below).	



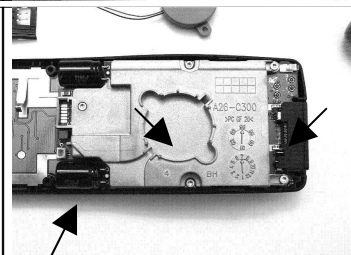
6. Remove the card reader from the recess in the screen lid.



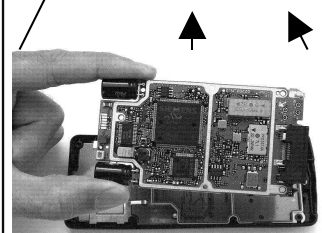
7. Then loosen the ringer plug-in connector on the radio and control module and remove the ringer afterwards.



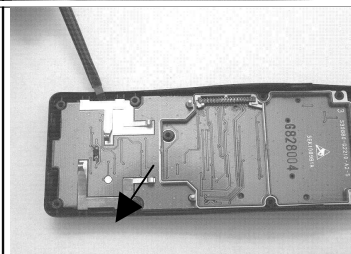
8. Unscrew the five cylinder-head screws in the screen lid and remove the screen lid.



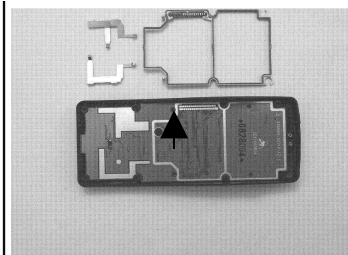
9. Remove the RF- and control modul.



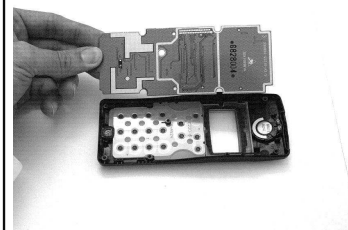
10. Remove the battery contacts.



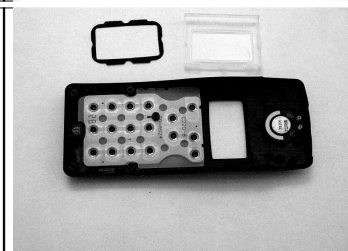
11. Then you remove the screen frame and the interconnector joined to it.



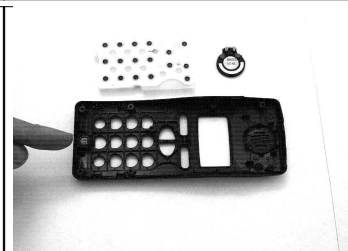
12. Lift off the MMI-board from the upper housing section.



13. Then lift the dust protection frame and display glass out of the upper housing section.

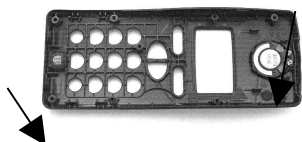
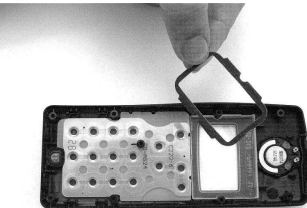
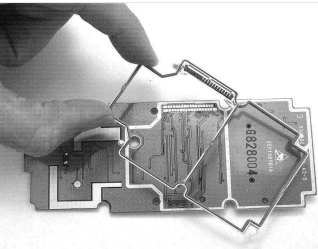
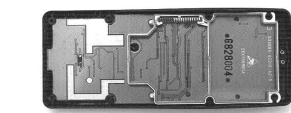
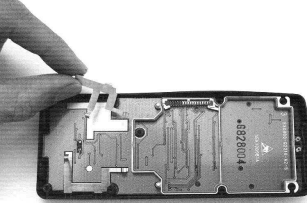
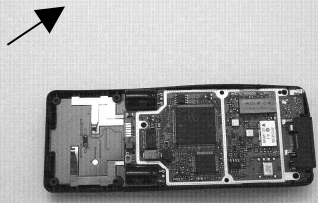


14. Finally remove keypad mat, loudspeaker and microphone from the upper housing section.

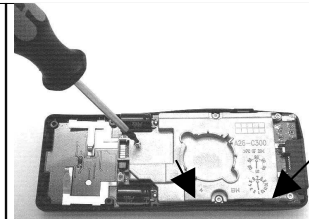


4.4 Assembling the C1X

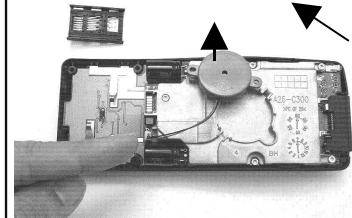
Attention: ESD regulations have to be followed!

<p>1. First you place the microphone and the loudspeaker in the upper housing section.</p>	
<p>2. Place the keypad mat and the display glass in the upper housing section and put the dust protection frame on the display window.</p> <p>Attention: The foam side of the frame has to face the MMI-board.</p>	
<p>3. Put the interconnector in the screen frame and place the screen frame on top of the MMI.</p>	
<p>4. Place the MMI board in the upper housing section.</p>	
<p>5. Place the battery contacts in above the MMI board by inserting them into the appropriate holes in the upper housing section.</p>	
<p>6. Now put the RF- and control module on the screen frame.</p>	

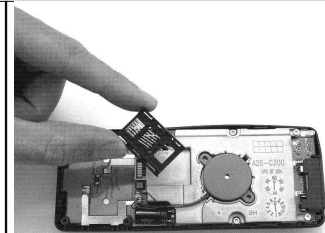
7. Put the screen lid on the RF- and control module and fasten it with the five cylinderhead screws.



8. Place the ringer in the recess in the screen lid and plug in the connector on the RF- and control module.



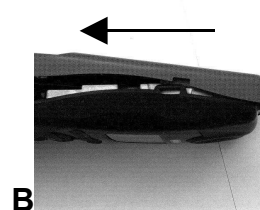
9. Insert the card reader in the recess in the screen lid.



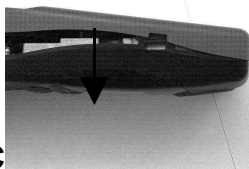
10. Close the telephone by placing the lower housing section on at an angle and pushing it backwards and down (see figures A – D below). Make shure that the two catches in the battery compartment are fixed properly (see figure E).



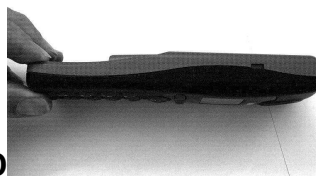
A



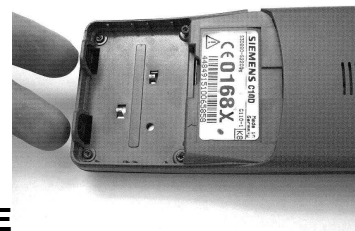
B



C

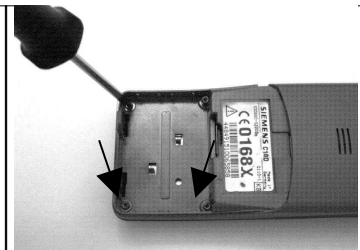


D



E

11. Screw the four cylinderhead screws into the battery department.



12. Now you push the antenna in (figure A).
Fasten the connector cover by hooking it into the lower housing section, and snapping it down until it locks in the upper housing section (figure B).



13. Insert the SIM card rack together with the SIM card.



14. Finally you insert the battery and close the battery compartment with the battery lid.

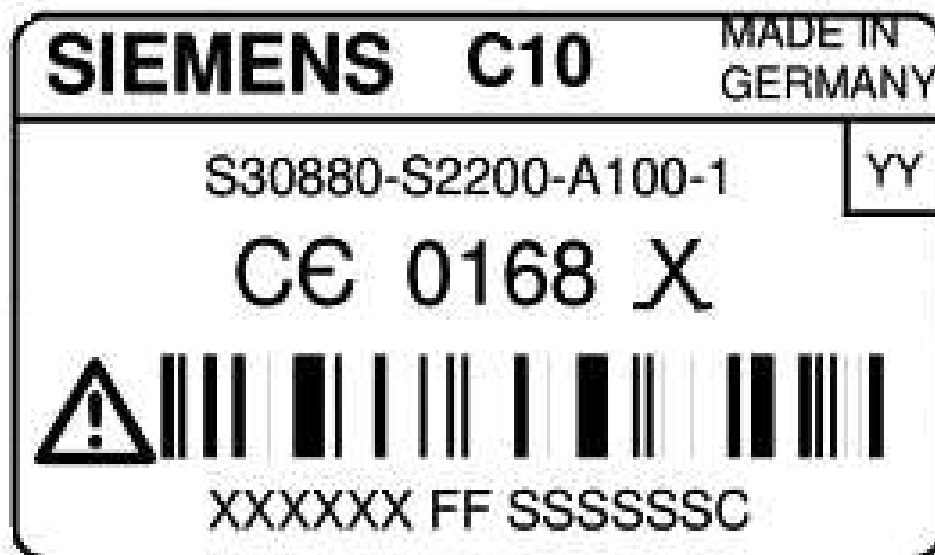


15. Now you have assembled the phone completely.



4.5 Handset Datecodes

Siemens is using the industrial standard DIN EN 60062 to indicate the production / service dates. The code is printed on the IMEI sticker located in the battery compartment.



YY = Datecode

The first character of the datecode indicates the year of production:

F	= 1995
H	= 1996
J	= 1997
K	= 1998

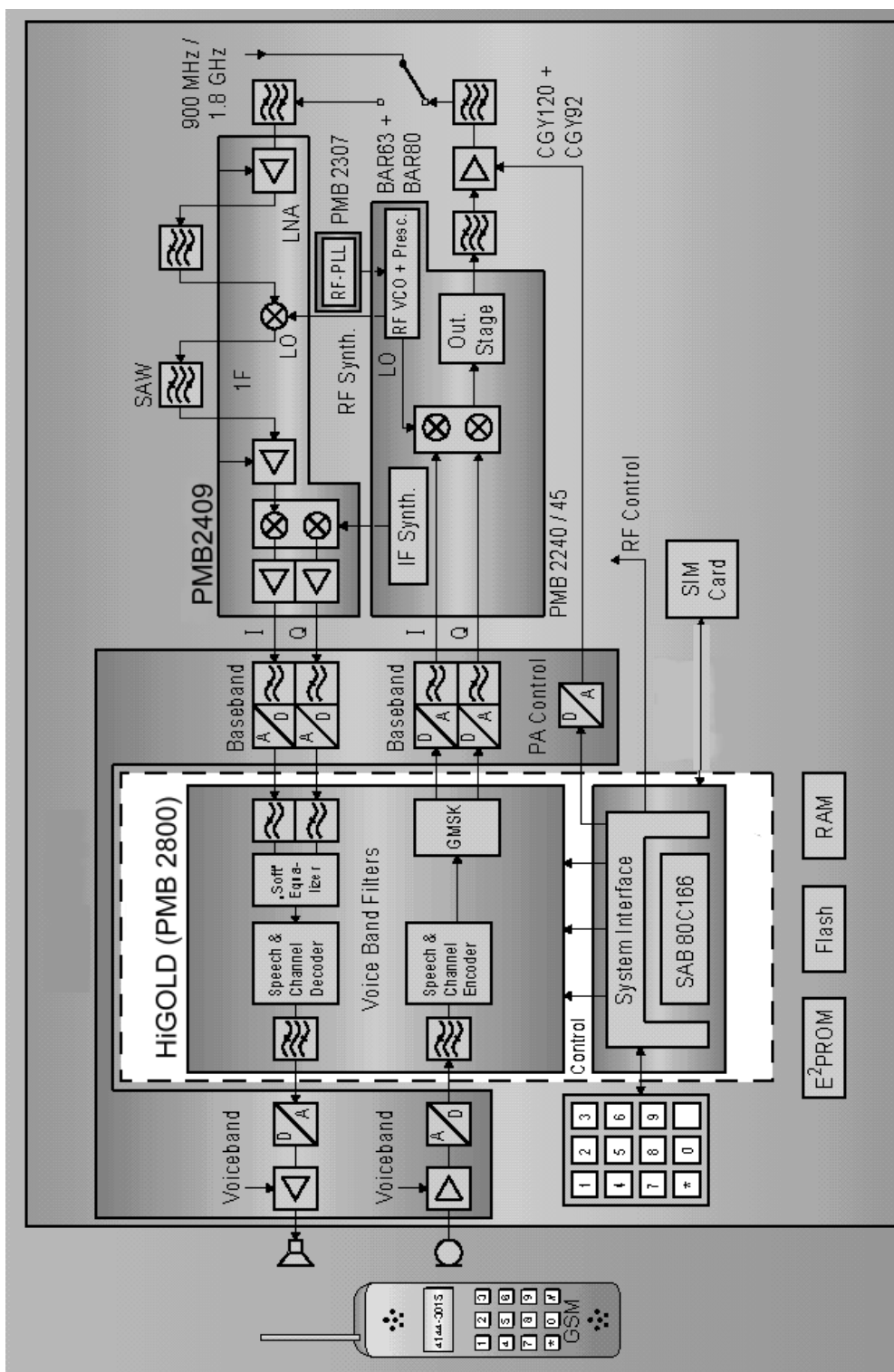
The second character indicates the month of production:

1-9	= january to september
O	= october
N	= november
D	= december

Example: “JO” means that the set was produced in october of 1997.

5 Hardware Concept

5.1 Block Diagram



5.2 Hardware Description

The handset consists of five major integrated circuits:

1) HiGOLD (PMB 2800)

This IC is a combination of microprocessor and signalprocessor.

The microprocessor is responsible for controlling the keyboard, SIM-Card, EEPROM, Flash and RAM. Furthermore it controls the power up/power down of the RF module and sets the amplification of the PA.

The signal processor is responsible for processing the Rx I/Q signals (filtering, equalizing, speech and channel decoding).
Furthermore it does the speech and channel encoding and the GSMK modulation of the Tx I/Q signals.

3) GAIM (PMB 2905)

The GAIM provides the interface between the analogue signals (I/Q, voiceband, PA-control) and its digital representation.

4) Receiver Circuit (PMB 2409)

This circuit provides the following main functionalities:

- a) Low Noise Amplifier (LNA) with a fixed amplification of +20dB to amplify the input RF signal.
- b) Mixer to mix down the RF signal to the Intermediate Frequency (IF)
- c) Programmable IF amplifier with a dynamic range of 60dB (-10dB ... +50dB in steps of 2dB)
- d) Mixer to mix down the IF signal to the baseband, generating and inphase (I) and a quadrature (Q) signal.
- e) Offset compensation for the I/Q signals.

5) Transmitter Circuit PMB 2240/45

This circuit provides the IF synthesizer, the I/Q modulator, prescalers to regulate the RF synthesizer and a buffer stage to feed the PA.

The antenna switch is mechanical, located in the Molex connector.

TH

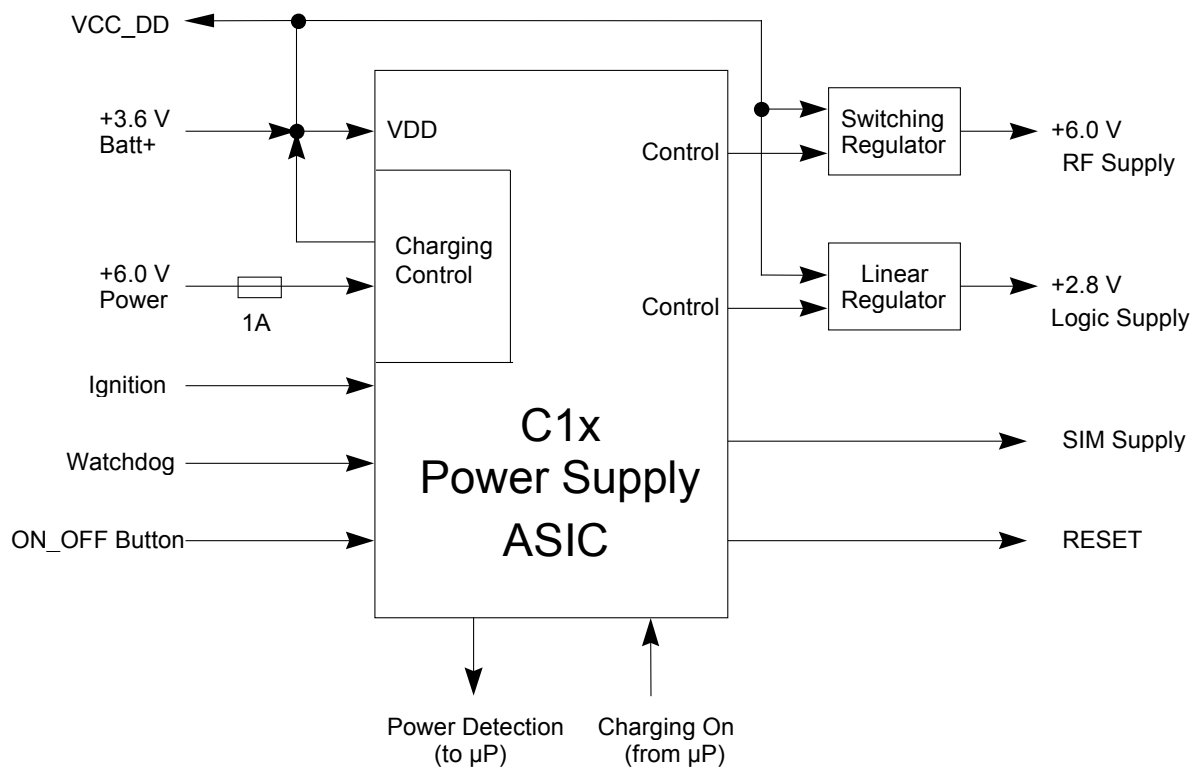
5.3 Power Supply Concept

The C1x has two main power inputs (see Blockdiagram):

- 1) Battery Voltage (3.6 Volts) connected at the battery contacts
- 2) Charging Voltage (6.5 Volts) delivered by
 - a) The plug-in charger at the charging plug
 - b) The car kit through the charging connection at the Molex connector
 - c) The desktop charger through the contacts at the outer ends of the Molex connector.

Since the battery voltage is supplying the power supply asic, it is always needed to operate the phone. You cannot switch on the handset if the battery voltage is not present.

Blockdiagram C1x Power Supply



From the 3.6 V battery voltage, all other supply voltages of the C1x are derived, controlled by the power supply ASIC.

The VCC_DD voltage is used to supply external accessories through the Molex connector at the top of the telephone.

The RF module needs 6.0 V for its PA, this voltage is generated by a step-up converter.

The logic module uses 2.8 V, generated by a simple linear regulator.

Furthermore the ASIC generates the supply voltage for the SIM-Card and the RESET signal for the logic devices.

The ASIC also checks the presence of the watchdog signal from the μ P and provides the switching on functionality (ON_OFF button or Ignition signal).

During testing it is advisable to use a battery dummy, connected to a power supply delivering +4V, max 3A.

Make sure that you connect the battery dummy with the right polarity, the red plug to +4V and the blue plug to ground.

If you use a voltage higher than +7V, or with wrong polarity, the phone can be destroyed!

5.4 Overvoltage Conditions

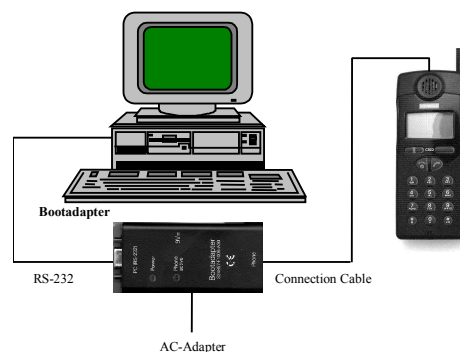
- a) Battery Voltage: If the supply voltage rises above 6.2 Volts, the phone will switch off and it cannot be switched on again before the voltage is lower than 6.2 Volts.
- If the supply voltage rises above 7 Volts the phone can be destroyed.
- b) Charging Current: The charging current must not rise above 1 A or the phone (fuse) will be inoperable, meaning that charging the battery will not be possible anymore.
- Be careful with foreign accessories or chargers!
 - Make sure that the charging current is limited to a value below 1A!

6 Software programming

The software of the C1x handset is programmed directly from a PC using a bootadapter as an interface between serial port of the PC and the mobile.

6.1 Description of software booting

1. Connect COM-port of PC to the bootadapter using the enclosed RS232 cable.
2. Afterwards plug in AC-Adapter: If connected correctly the "Power" lamp will be active.
3. Switch off the C1x handset and connect it to the boot adapter.
4. Copy bootsoftware to the PC and follow the instructions in the file "readme.txt".



Ordering number of **Bootadapter: L24857-F1006-A30**

The bootadapter comes complete with AC-Adapter, RS-232 and handset connection cable.

6.2 Language Groups

Since the C1x has a big memory, a lot of languages fit into one handset software.

That's why there is only one language group at the moment. More may be defined later.

Catalan	Cestina	Danish
Dutch	English	Finnish
French	German	Greek
Hungar	Inggris	Italian
Malayian	Norsk	Polish
Portu	Russian	Spanish
Swedish	Turkish	

Attention:

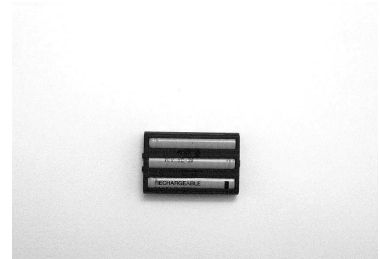
This information is subject to change! Contact your service coordinator for the latest update and ordering numbers.

7 Battery

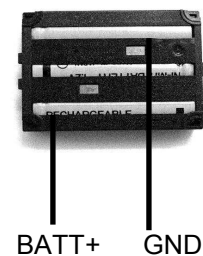
7.1 Specification

The C1x battery is a NiMH type with a voltage of 3.6 Volts and a capacity of 700 mAh.

Suppliers are Varta and Maxell. You can easily recognize the manufacturer by the colour of the battery cells: Varta's cells are of a green colour, Maxell's ones are bluish.

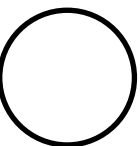


The connections BATT+ and GND are used to supply the mobile.



Insertion of battery:

If the battery would be inserted into the telephone the wrong way round, the phone would be destroyed because of inverted polarity. To prevent this, at both sides of the bottom of the battery there are different mechanical guides which match their respective counterparts in the battery compartment of the telephone.



7.2 Charging

The battery can only be charged if inserted into the telephone. The charging process is completely controlled by the mobile. Different kinds of Siemens chargers out of the accessory program for C1x models can be used for this task:

- a) Standard charger
- b) Quick charger
- c) Desk top charger (This device is not really a charger but a stand for the mobile, where Standard- , Quick- or Travel charger are connected to)
- d) Travel charger
- e) Car charger

Attention:

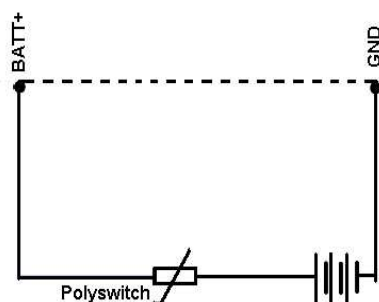
Charging the battery can be impossible, if the temperature is too high (e.g. in car use during summer) or too low. This is to prevent the battery from being damaged during fast charge process. To enable the charging process again, battery and phone only needs to cool down/warm up. A replacement of battery is not necessary.

7.3 Short Circuit Protection

CAUTION: **Avoid short circuit of battery !**

The battery is not short-circuit protected by an electronic fuse like e.g. in S10. Inside the battery a polyswitch is protecting the battery cells from a too high output current.

Schematic of the battery:



7.4 *Deep Discharge*

In case of a deeply discharged battery, the phone can not be turned on and the normal charging process can not be started.

In this case, charging the battery is divided into two different steps, which have to be run subsequently:

a) Trickle charge

Trickle charge mode is automatically started if the battery voltage is below a certain value when the charger is connected to the mobile. This mode is not terminated automatically but has to be terminated by disconnecting the charger.

Trickle charge mode has to last until the battery voltage has exceeded a certain level. During trickle charge the charging symbol will not be visible and the telephone can not be turned on.

Action:

Insert battery into handset and connect travel charger to the telephone. Wait for appr. 1 hour, then disconnect and reconnect charger. If the battery voltage is high enough again, the charging symbol will come up.

If the battery is discharged very deeply, the symbol may not come up and the trickle charge time possibly has to be extended up to 24 hours.

b) Normal charge

When the battery voltage is above the a.m. value (e.g. by trickle charge) the mobile will start the normal charging mode.

Action:

Connect charger to the telephone.

The charging symbol will come up as an indication that the normal charging process has been started by the mobile.

7.5 Battery Datecodes

There are two different suppliers of the C1x batteries and they use different kinds of codes to give information about production date:

a) Maxell batteries

The datecode printed on the battery looks like this:

K 7 08 20 M

Explanation:

K = Year of production (1998=K, 1999=L)
7 = Month of production (Jan=1, Feb=2,Oct=O, Nov=N, Dec=D)
08 = Day of production (1st=1, 2nd=2, 3rd=3,....., 31st=31)
20 = Week of cell-production
M = Factory code (M=UK, E= Germany)

Example:

K 7 08 20 M This battery was produced on July 8th of 1998!

b) Varta batteries

The datecode printed on the battery looks like this:

TOS 8 G9 VA 1

Explanation:

TOS = Battery cells supplied by Toshiba
8 = Revision level
G = Year of production (1997=J, 1998=K, 1999=L)
9 = Month of production (Jan=1, Feb=2,Oct=O, Nov=N, Dec=D)
VA = Varta (battery manufacturer)
1 = Place of manufacturing (1=Germany ,2= Novibor, Czech Republic)

Example: TOS 8 K4 VA 1 This battery was produced in april of 1998!

8 Unlocking

If the phone is disabled due to a wrong entry of the phonecode (not PIN1, PIN2, network code or service provider code!) it can only be resetted by entering the right unlocking code.

This unlocking code is derived from the IMEI number of the mobile and can only be calculated in two different ways:

8.1 Siemens Hotline

You can retrieve the code from our hotline personell in Germany.
If you need unlocking codes just send a fax with the IMEI numbers to:

**Siemens AG
PN MP SH
World Service Center
Bocholt, Germany

Fax: +49 2871 91 3007**

Please use the appropriate form provided by your Siemens service coordinator.

8.2 Internet solution

As an alternative to the a.m. procedure, since november 1997 an internet solution is offered to the LSO. It is a password protected internet homepage where you can enter the IMEI number of the affected handset. The page will then present Master Phone Codes, Master Network Codes and Master Service Provider Codes (if applicable to the relevant telephone).

If you do not have access to this tool up to now, please contact your Siemens service manager for details.

