

CMD-CD5

SERVICE MANUAL

AEP-Model
UK-Model



SPECIFICATIONS

Signalling format
Frequency range

Dual-Band
E-GSM 900 MHz, Transmit: 880 ~ 915 MHz
Receive: 925 ~ 960 MHz
DCS 1800 MHz , Transmit: 1710 ~ 1785 MHz
Receive: 1805 ~ 1880 MHz

GSM power class
DCS power class
SIM chip
Display

Class 4 (2W)
Class 1 (1W)
Pluggable mini SIM card
High resolution full graphics display
Resolution: 97 x 33 pixels
1 header line for icons
3 lines x 16 large characters

Channel spacing
Number of channels

200 kHz
E-GSM: 174
DCS: 374

Frequency stability

Transmit frequency drift (synchronized)
< $\pm 0,1$ p.p.m

RF output power

GSM: 2W
DCS : 1W

Battery life

Standby : 50h -180h standard battery
70h -250h extended battery
Talk time : 2h30 - 6h standard battery
3h30 - 8h20 extended battery

**PORTABLE DIGITAL CELLULAR TELEPHONE
WITH ACCESSORIES**

SONY

Power requirements	3.8 V (nominal)	
Operating temperature	-10°C to +55°C	
Accessories operating temperature	± 0°C to +45°C	
Battery pack charging temperature	± 0°C to +40°C	
Dimensions	139 mm x 45.5 mm x 26.5 mm ³	
Weight	139 g	
Volume	120 cm ³	
Supplied accessories	Power adapter :	QN-2AC1 (AEP) QN-2AC2 (UK) QN-2AC3 (Australia)
Optional accessories	Battery (std.)	QN-CD5BPS
	Battery (extd.)	QN-CD5BPE
	Cigar Lighter Charger	QN-2CC
	Travel Charger	QN-2TC
	Handsfree kit	QN-CD5HFK
	EasyCom(SoftModem)	QN-2EC
	PC-Card	QN-2PCM
	Headset	QN-2HS
	Desktop Charger	QN-CD5DTC

Design and specifications are subject to change without prior notice.
This appliance conforms with EEC Directive 87/308/EEC regarding interference suppression.

NOTE

This device contains electrostatic sensitive components. Damage can occur to these components if the appropriate handling is not adhered to.

Handling precautions:

A working area where Digital Cellular Telephones may be safely handled without undue risk of damage from electrostatic discharge, must be available.

The area must be equipped as follows:

- All working surfaces must have a dissipative bench mat, safe for use with live equipment, connected via 1.2M Ω resistor to a common ground point.
- A quick release skin contact device with a flexible cord, which has a built in safety resistor of between 5.2M Ω and 1.2M Ω shall be used. The flexible cord must be attached to a dissipative earth point.
- All containers and storage must be of the conductive type.

Batteries:

This device contains an internal battery in addition to the external battery packs. These batteries are recyclable and should be disposed of in accordance with national legislation. They must not be incinerated, or disposed of as ordinary rubbish.

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SECTION 2

GENERAL DESCRIPTIONS

2.1 Multi-band :

CMD-CD5 support E-GSM 900 and DCS 1800 multi-band functionality.

Because the usage of multi-band depends on network capabilities, the phone is able to operate as a single band mobile in GSM 900 as well as in DCS 1800; In addition, it supports the extra functionality required for multi-band mobile stations: Inter-band/"seamless" hand-over, channel assignment, cell selection and re-selection, all between both bands within a **Public Land Mobile Network**.

The manual and automatic PLMN selection in both bands is given.

The user does not need any special action to use the multi-band functionality of the phone.
Users are able to manually roam between PLMN's operating in GSM 900 and DCS 1800 bands.

The CMD-CD5 is a phase II, GSM 900 class 4, DCS 1800 class 1 mobile phone.
The nominal maximum output power for GSM 900 is 2W, for DCS 1800 1W.

2.2 Real Time Clock (RTC):

The real time clock is integrated into the phone.

When the mobile is switched on the RTC is powered via the CPU.

When the phone is powered down, the RTC is powered from the main battery via it's own low quiescent current regulator.

When the main battery is low or removed, a back-up battery keeps the clock alive.

After the main battery has reached a voltage level of 3.5V the RTC keeps the time for 10 days.
After the main battery is removed the RTC keeps the time for 10 min.

2.3 Vibra Functionality

The vibrator is a 1.3V device with a vibrating frequency fixed at 120Hz ($\pm 20\%$).

A general port pin of the CPU controls the switch mode of the vibration motor. It is powered direct from the battery by an interface control unit. If the mobile is in the phase of switching on or off the vibrator is off at all times.

2.4 Battery Safety

The battery pack contains a safety circuitry. The charging circuitry and the safety circuitry together guarantee a double fail-safe battery pack. This means that each component can be either short or open and still all the safety requirements will not be violated.

The safety concept protects against:

Over voltage: The charging is stopped when Battery Voltage (Vbat) reaches (4.24V- 4.3V). The charging resumes when Vbat falls below (4.11V - 4.23V).

Under voltage: When the cell voltage drops below (1.3V - 1.7V) the cell is disconnected for discharging. Charging is still possible.

2.5 Battery Capacity:

Standard Battery	1000mAh typical	Li-ion QN-CD5BPS
Extended Battery	1450mAh typical	Li-ion QN-CD5BPE

The phone can be charged even during making phone calls.
However, the shortest charging time will be reached when the phone is switched off.

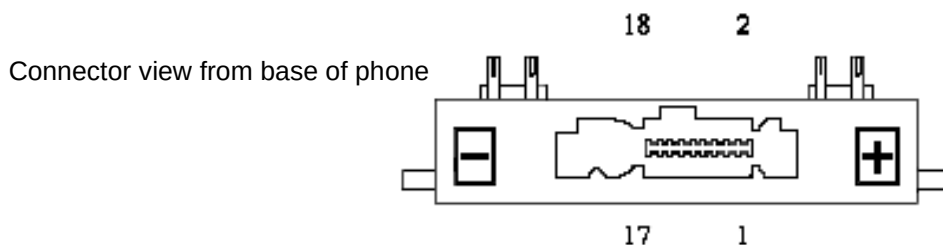
As the charging circuit is integrated in the battery pack, the phone cannot be powered up by the charger without the battery pack being attached.

2.6 Accessory interface

The table explains what kind of pins the phone supplies to the different accessories.

Pins	GND 18	Charge 1/2	ACC_ power 3	Audio IN 14	Audio Out 13	ACC ID 11	ACC Detect 6	TX (OUT) 9	RX (IN) 10	AGND 12
Charger	√	√								
CLC	√	√								
Desktop charger	√	√								
Head set	√		√	√	√	√	√			√
HFK	√		√	√	√	√	√			√
PCMCIA	√		√			√	√	√	√	
EasyCom	√		√			√	√	√	√	

Connector layout



The connector comprises the following pins:

Detection:

The detection of accessory is done by the charge pin and the detect pin.

Any accessory with an active charge will wake up the phone.

The insertion and removal of the charger (Cigar Lighter Charger, Desktop-Charger, AC-Charger) is detected via polling. To reduce the power consumption the polling can take up to 5 sec.

The insertion and removal of other accessory is detected via an Interrupt. This detection is only possible when the phone is powered up.

ID:

The ID pin indicates what kind of accessory is connected.

ACC power:

ACC-power has different functionality with different accessories. ACC-power supplies power to the headset (min.2.7V and min. 10 mA) or will be used as a signaling pin for the Hands Free Kit.

In the car-kit environment the ext. Vbat indicates that a phone call is accepted/in progress. This information is used by the car-kit to power up the audio section of the car-kit, mute the car stereo and keep the car-kit powered up even when the ignition is switched off.

Due to the fact that the ID of the accessory is detected first, the ACC power is not current limited (protected).

RX and TX:

This is the communication interface to the PCMCIA card "QN-2PCM" or the PC-link cable "QN-2EC".

Audio In and Audio Out

These pins build the audio interface to the Head-Set and the Hands Free Kit.

Audio IN:

To limit the noise which is coupled on the Mic-line, the Mic amplifier in the Hands Free Kit "QN-CD5HFK" and Head-set "QN-2HS" have an output 280mVrms into 10k Ω .

Audio OUT:

The single ended output delivers 265mV into a 32 Ω load.

2.7 RF Antenna connector / antenna switch

To connect an external antenna for accessory use, the CMD-CD5 contains a stable RF connector with an integrated mechanical switch. This connector is placed on the PWB. The integrated mechanical switch switches between the helix antenna and the external RF antenna connection. The switching criterium is mechanical pressure from the RF accessory connector.

2.8 Languages

The CMD-CD5 supports the following languages:

• Bulgarian	• French	• Portugese
• Croatian	• German	• Romanian
• Czech	• Greek	• Russian
• Danish	• Hungarian	• Slovakian
• Dutch	• Italian	• Spanish
• English	• Norwegian	• Swedish
• Finnish	• Polish	• Turkish

SECTION 3

ACCESSORIES

3.1 Hands Free Kit

The Hands Free Car Kit QN-CD5HFK is designed to offer superior speech quality and Full Duplex speech transmission. In Full Duplex operation both parties can speak simultaneously. The Car Kit has a RF connector for the use of an external antenna to offer a high quality radio link to the base station. It is a one box design for quick and easy installation.

Specifications:

Input voltage	DC 12V-24V, negative ground
Rated output voltage	5.0V
Rated output current	500mA

3.2 Cigar Lighter Charger

The QN-2CC Cigar Lighter Charger is only for use in vehicles equipped with a 12-24 volt negative ground electrical system. This Charger is intended for charging purposes only and not for making/receiving phone calls in the car.

Charging Time:

Full charging can take up to ~3 hours, but will be longer if the CMD-CD5 is switched on or if the temperature is outside the 0°C - 45°C operating range.

Specifications:

Input voltage	DC 12-24V, negative ground
Rated output voltage	5.0V
Rated output current	500mA

3.3 Travel Charger

The Travel Charger QN-2TC is a small and lightweight device. It has a full Input Voltage Range from 100-260Volts. Using a standard cable makes the connection to the mains socket.

Specifications:

Input voltage	100 to 260 V
Rated output voltage	5.0V
Rated output current	500mA

3.4 EasyCom (Soft Modem)

The EasyCom QN-2EC Data Cable connects the phone to a PC via a RS 232 cable. It supports SMS and Phonebook function as well as Full Data/Fax Capability 9.6 Kbps. This configuration is available for Windows 95/98.

3.5 PCMCIA Card

The functionality of the PC Card QN-2PCM is the same as the Data Cable QN-2EC.

3.6 Headset

The Headset QN-2 HS supports full Handsfree Operation, Auto Answering to incoming calls, as well as with microphone muting function.

3.7 Desk Top Charger

The desktop charger QN-CD5 DTC can charge either the Standard or Extended battery with the phone attached. The Desk Top Charger gets its power supply via the Power adapter or the Travel Charger QN-2TC.

Specifications:

Input voltage	DC 5V
Rated output voltage	5.0V
Rated output current	500mA

3.8 Extended Battery

Specifications:

Lithium Ion Battery	QN-CD5 BPE
Maximum output voltage	DC 4.2V
Nominal output voltage	DC 3.8V
Capacity	1450mAh

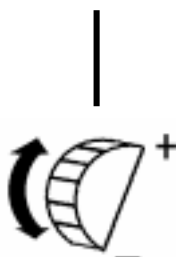
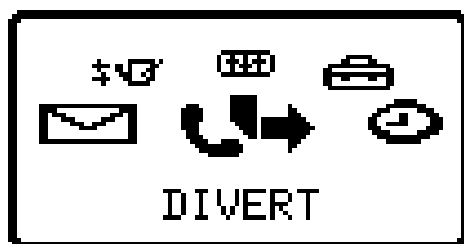
Icon Glossary

Your phone lets you see at a glance if you have missed calls, have messages waiting, and the status of options you have selected (like if you have diverted your phone or turned the ringer off). Sony has developed the following icons to provide you with a quick overview of your mobile activity:

ICON	Explanation
	Keypad locked
	SMS Message (flashing = message storage full)
	Voice mail Notification
	Battery strength (flashing = battery level low)
	Network strength
	Network not available (no calls possible)
	Active call
	Incoming call
	Option activated
	Option deactivated
	Missed calls
	Divert option activated
	Vibra Alert activated
	Vibra Alert + Ringer activated
	Vibra Alert + Single Beep activated
	Ringer switched to volume 0
	Ringer and all tones switched to Silent Mode (off)
	Ringer switched to Single Beep
	Ringer Volumes choices
	Speaker Volume
	Microphone Mute

Menu Overview

Rotate the Jog Dial or press the Menu key from standby mode to access the main menu:



DIVERT

If not
Reachable

If No Reply

If Busy

All Calls

Clear All

MESSAGING

Read

Create

Service Centre

Settings

Local Area Info

REDIAL LIST

Last Calls

Received Calls

Missed Calls

Clear All

CONTROL

Security

Network
Services

Time, Cost

PRE- FERENCES

Caller ID

Select Line*

Language

Ringer
Volume

Ringer Tone

1Minute Beep

Key Click Sound

DTMF Tones

Illumination

Auto Redial

Auto Answer

Any Key Answer

Welcome Message

Factory Reset

TOOLS

Clock

Calculator

Calendar

Data Services

* Network-dependant

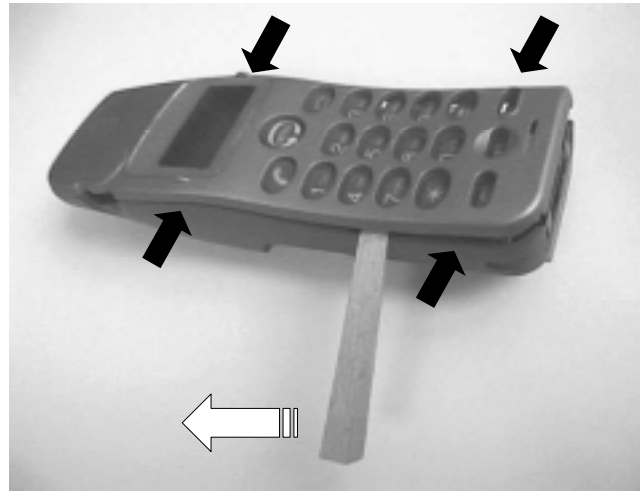
SECTION 5 DISASSEMBLY

IMPORTANT NOTE :

The IMEI Sticker mounted on the main board (visible from the battery compartment) should not be removed at all. The IMEI number is the electronic identification of the hardware, and it is stored electronically. There should be no discrepancy between the number on the sticker and the number within the set logic allowed.



Remove the battery and the 4 screws in the battery compartment. Note: The SIM card holder is located in this area.

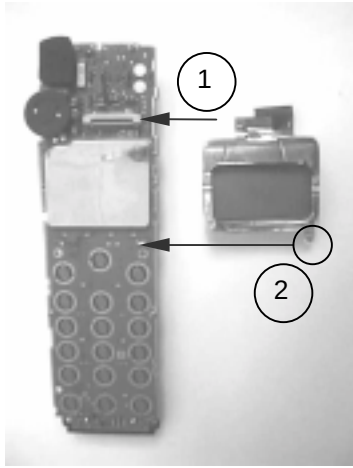


Insert the hook release jig (p/n 3-043-180-01) in the gap between upper and lower case. Then gently slide the jig in the direction of the white arrow. This is to release the claws between the upper and lower case (as indicated by the black arrows).

Important: Do not insert the hook release jig too deep into the gap, that might result in damaging the main board while sliding the jig.



The upper and lower case can be separated, the main board is now removed.



The LCD unit can be lifted out in the way as follows:

1. disconnect the flex cable
2. unsolder the cushion
3. release the LCD assembly clips from the main board.



The Vibra Alert unit consisting of the Vibra motor, Capacitor and the flex cable, is attached to the shield case. It is removed by disconnecting from the 9pin connector.

IMPORTANT: Do not detach the shield case from the main board



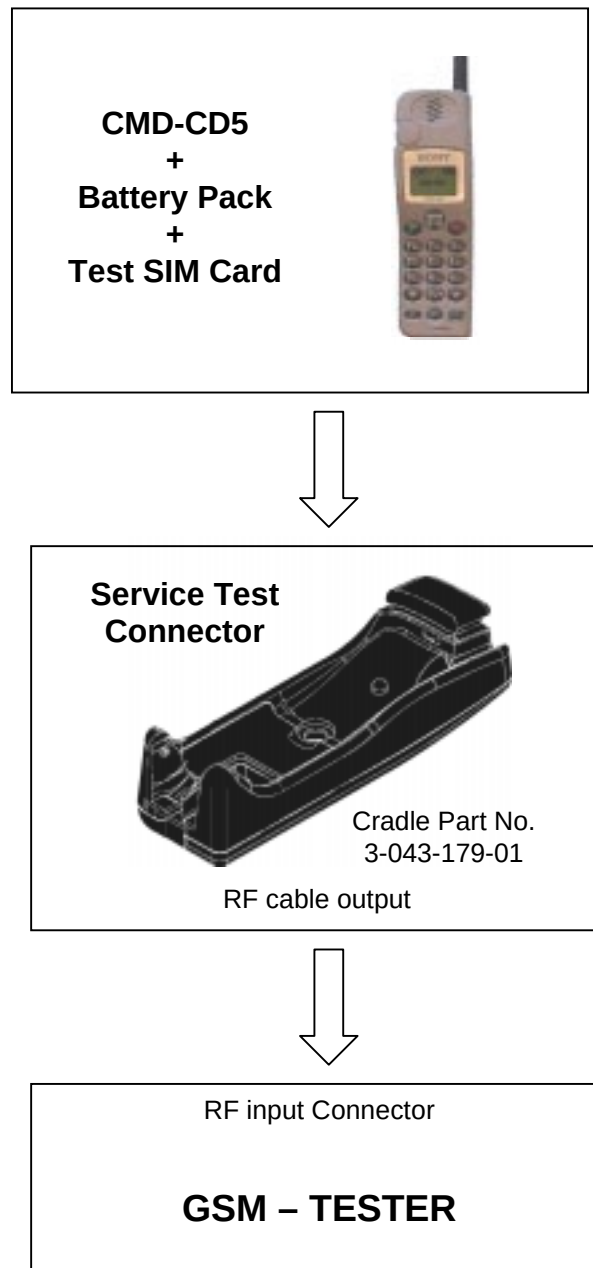
Parts on the main board specified in the parts list can now be reached.

Re-assembly procedure :

To re-assemble the unit, apply the reverse order of the above mention disassembly procedure.

5.2 Interface to GSM-Tester

CMD-CD5 Level 1 Testing with GSM Tester



Level Test Procedure with GSM TESTER recommendation:

- Simulate GSM call processing – to check the functionality of transmit and receive audio of loudspeaker and microphone.
- Basic GSM transmission & reception parameter testing – to ensure handset's performance compile with standard GSM specification.

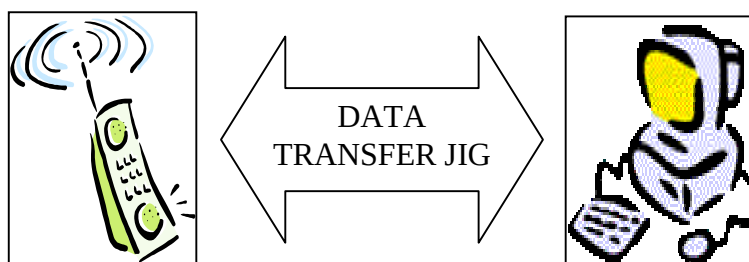
Section 6

PROGRAMMING INSTRUCTIONS

6.1 Requirement

- PC (486 type or higher) with Microsoft "Windows" Operating System
- One COM-port free for usage
- The Data Transfer Jig (p/n 1-792-172-11)

PREPARATION FOR SOFTWARE UPDATE



6.2 Hardware set-up

- Copy all the files to the PC (define own directory).
- Connect the Data Transfer Jig to the PC COM-port (COM 1 or COM 2) and the CMD-CD5 external connector.
- Attach battery pack to CMD-CD5; the CMD-CD5 is powered up from the battery pack.
- The initial settings of the flash.exe program may not correspond with the normally correct settings. It is highly advisable to check the settings first (see 3. Software set-up).

6.3 Software set-up

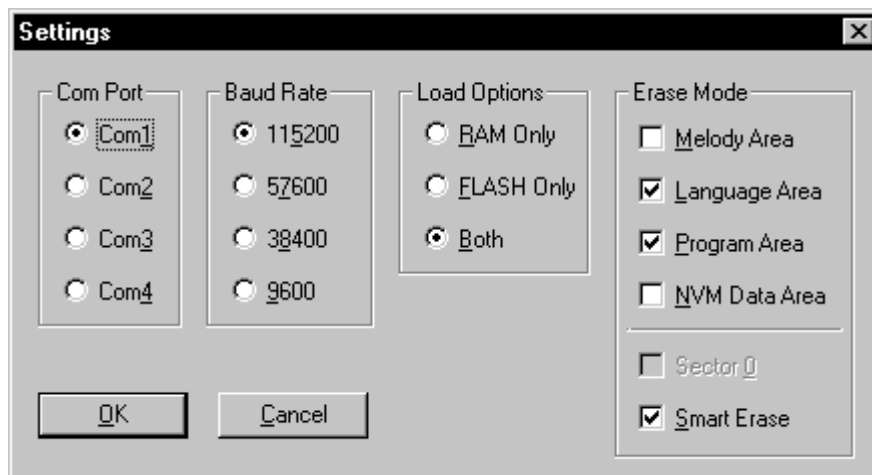
* *Loading new software into the flash*

- Start the program flash.exe by double-clicking on its icon in the Windows Explorer.
- Select "File"/"Settings..." and check if the settings for the "Com Port", the "Baud Rate" and the "Erase Mode" are correct. Normally the "Load Options" do not have to be changed. The default values are :



Flash.exe

Com Port :	COM 1
Baud Rate :	115200
Load Options :	Both
Erase Mode :	Program Area, Smart Erase (! Disable melody area for normal software update) (! Disable NVM data area for normal software update)



After changing the settings, select “OK” to store the new values in the file “flash.ini” in the windows directory.

- Click on “File”/”Open...” and select an SRE file for downloading.
 - The CMD-CD5 software is located in the CD5.SRE file.
 - Any other SRE file is either only needed for the program itself, or can be a melody file (see below)

There are 3 kinds of SRE files:- “CD5.sre” for actual software download

- “melody.sre” for melody software download

- “fuflash.sre” is an application software (do not use / modify)

- Click on the “LOAD” button of the program.
- Switch on the CMD-CD5.
- Now the program runs automatically.

NOTE

- CMD-CD5 Flash Loader can allow for erasing the entire personal phone book entries and all adjustment settings, by selecting “NVM DATA AREA” only.
A warning message is displayed if this item is selected.

Once the entire phone book entries are erased, there is no possibility to recover the data.

- CMD-CD5 Flash Loader can allow for loading different ringer melodies by selecting “MELODY AREA” only, then load the new file CD5melody.sre.

It is important to change the erase mode settings back to “PROGRAM AREA” and “LANGUAGE AREA”, in preparation for software update.

6.4 Display contrast adjustment

1. The hardware set-up for this adjustment is the same as for the software update.
2. Once the hardware connection is made, the CMD-CD5 must be powered on with the battery pack.
3. The display contrast adjustment software is DOS-based, the program name is LCDCONT.EXE.
4. When activating this program (either from within Windows or from the DOS prompt), by default COM port 1 is selected as the interface between PC and the external connector of the CMD-CD5.

For other COM port selection, go to DOS prompt and enter the following parameter: LCDCONT.EXE -p<port>. (where <port> is the number of the COM port you want to activate)

For example: to select COM port 2, the correct command to activate the program is: LCDCONT.EXE -p2.

5. When the program is correctly set and activated, the following sequence will appear on the PC:

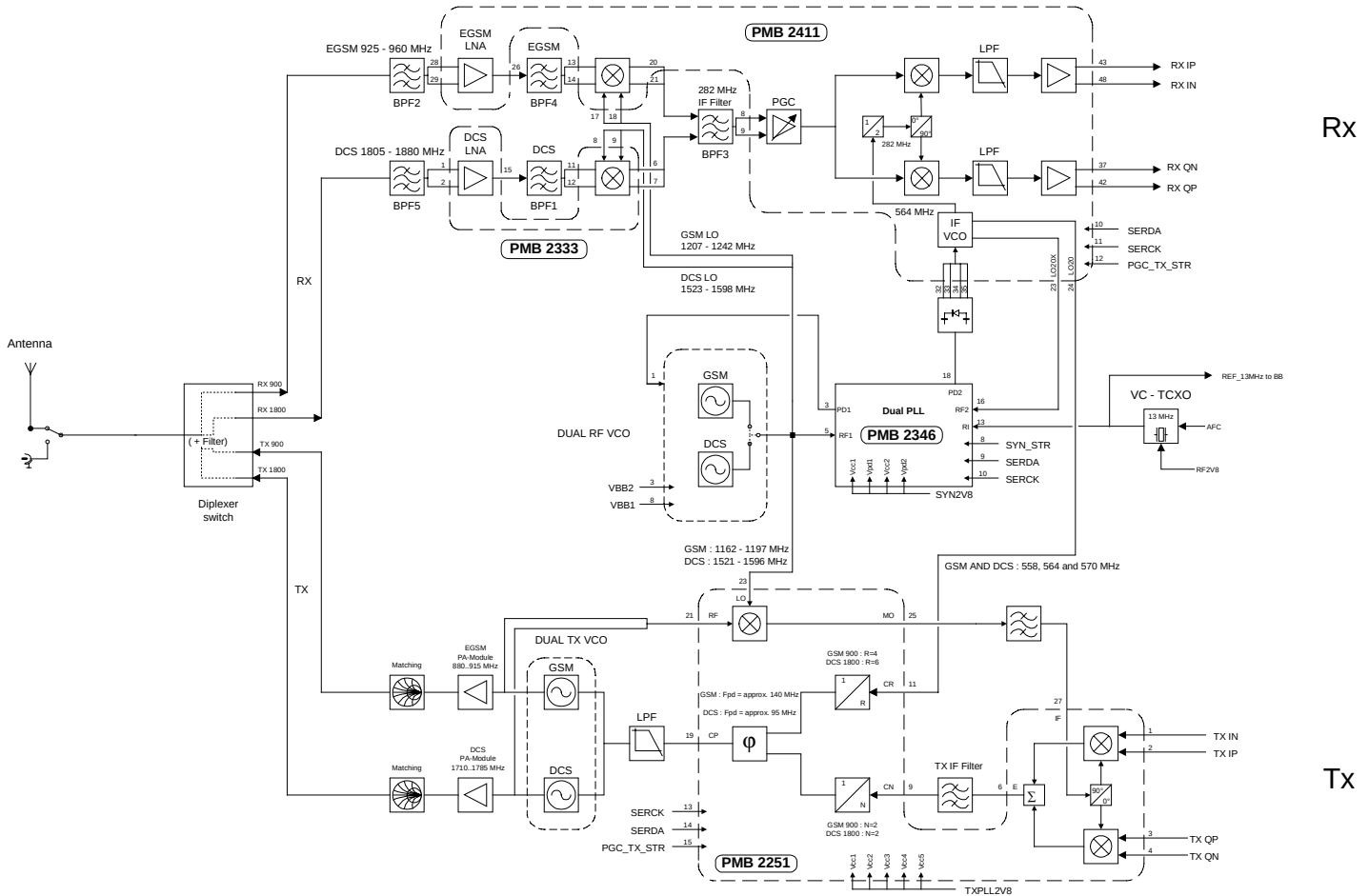
Waiting for mobile (this message will appear for a few seconds only)

LCD contrast: X (X is a numeric value between 0 and 15)

6. The LCD contrast is adjustable by keying the (↑) and (↓) arrows while observing the CMD-CD5 display.
7. Once the best contrast setting is adjusted, just exit from the program and leave the DOS prompt. The adjusted value will be automatically written into the CMD-CD5 memory.

SECTION 7 DIAGRAMS

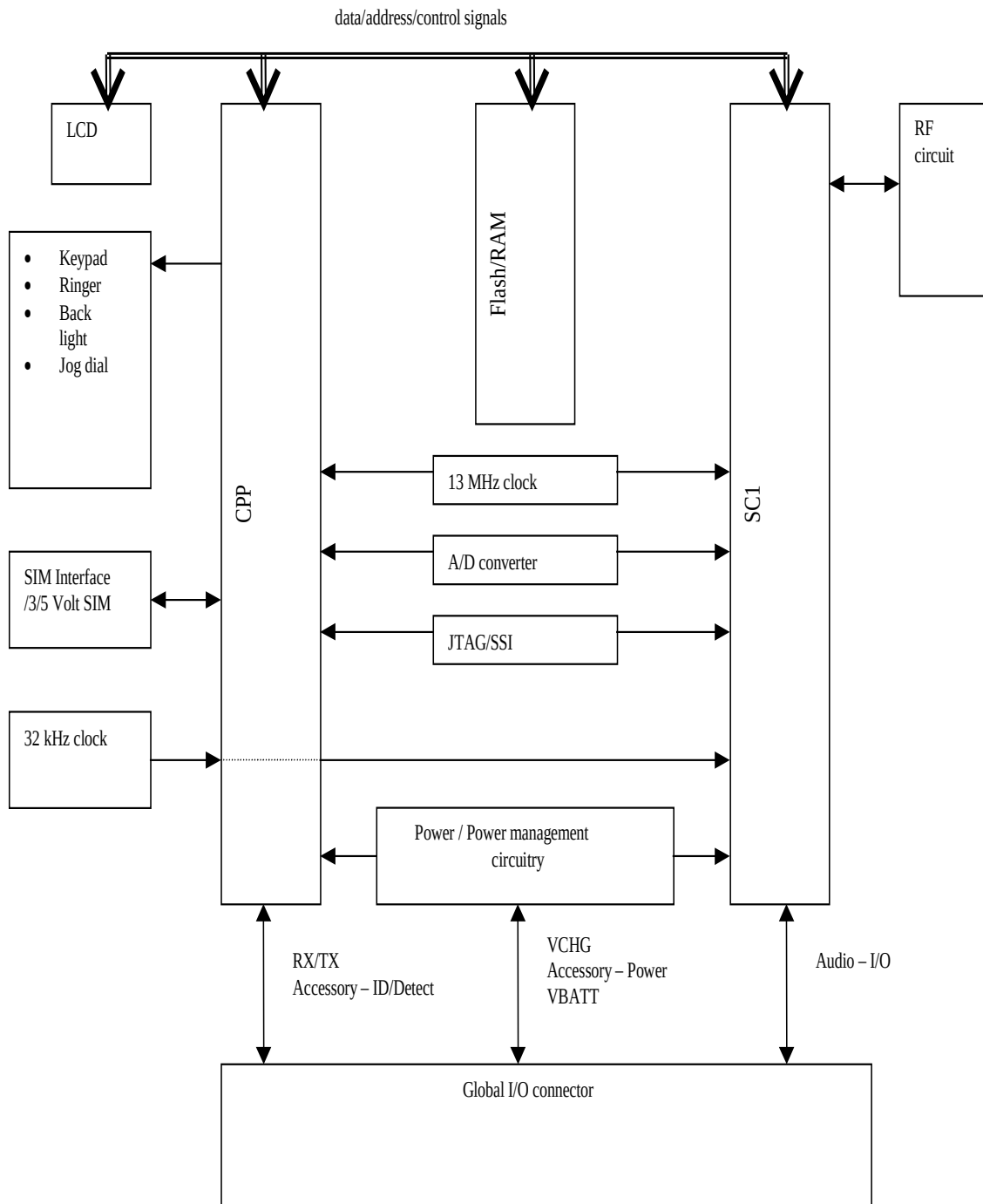
7.1 Radio Frequency (RF) Block Diagram



The GMSK modulated 900 MHz / 1800 MHz signal received by the antenna is downconverted into the baseband via an intermediate frequency of 282 MHz. In the transmit direction the digitally GMSK-modulated baseband signal is modulated to the transmit frequency in the 900 MHz / 1800 MHz bands by means of a modulation loop and the dual power VCO.

The radio part mainly consists of the RF Synthesizer, Receiver (RX), Transmitter (TX), power amplifiers, diplexer/switch, antenna connector with integrated switch and antenna.

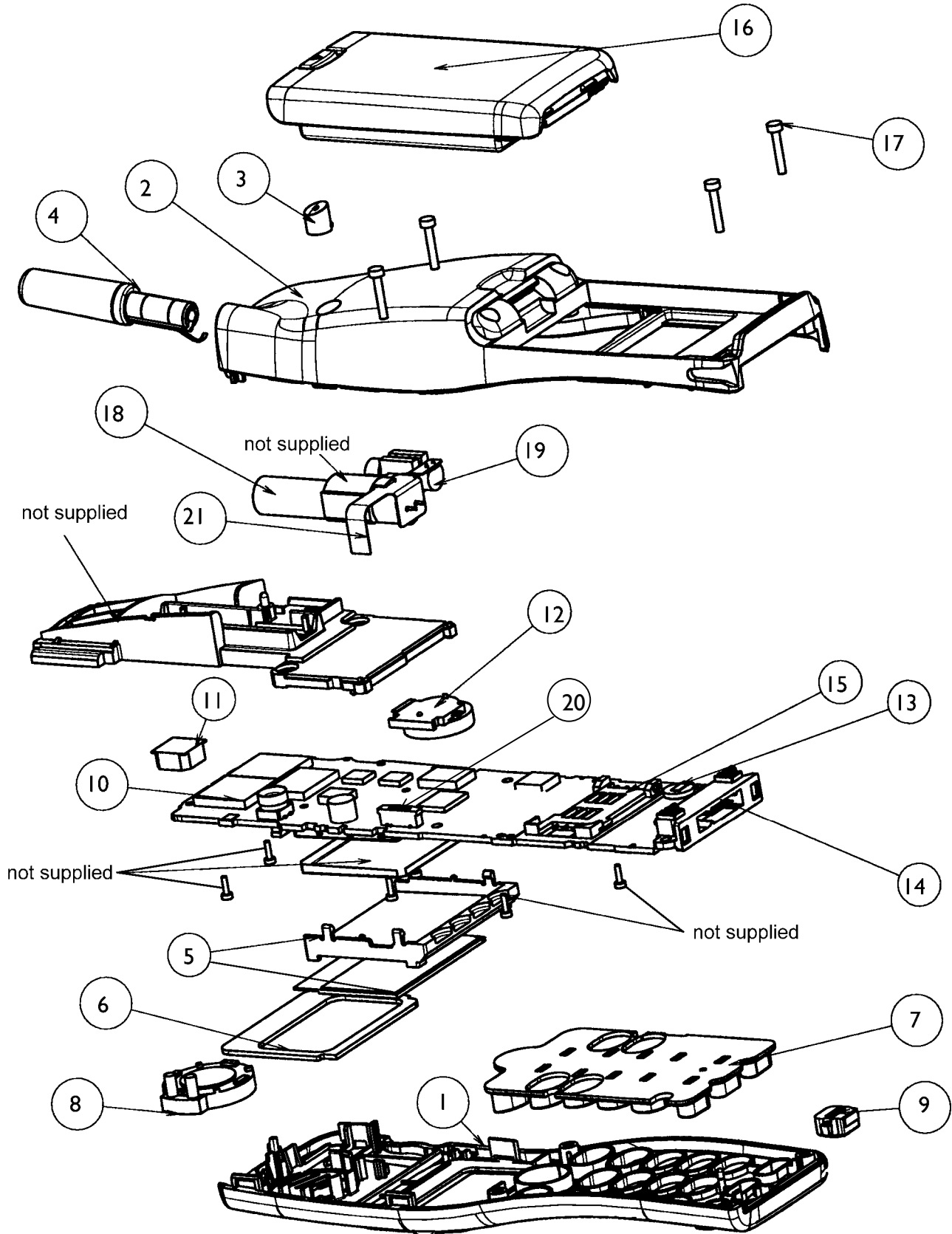
7.2 Baseband Block Diagram



SECTION 8 EXPLODED VIEW

Note:

- The parts with no reference in the exploded view are not supplied.
- The construction parts of an assembled part are indicated with a collation number in the remark column.



SECTION 9

SPARE PARTS AND ACCESSORIES LIST

Ref. No.	Part Number	Description	Remark
1	X 3377 737 1	Cabinet, Upper Assy	Metallic Black
	X 3377 738 1	Cabinet, Upper Assy	Metallic Blue
	X 3377 739 1	Cabinet, Upper Assy	Classic Silver
	X 3378 177 1	Cabinet, Upper Assy	Pearl White
2	3 038 175 01	Cabinet Lower	
3	3 038 176 01	Cap, RF	
4	1 754 089 11	Antenna	
5	A 3647 481 A	LCD, Assy	(6)
6	3 031 803 03	Cushion, LCD	
7	3 038 181 01	Rubber Key	Light version
	3 038 181 11	Rubber Key	Dark version
8	1 529 191 12	Loud Speaker	
9	1 542 407 11	Microphone	
10	1 759 436 21	Ringer	
11	3 031 801 01	Cushion, Ringer	
12	1 418 057 22	Jog Encoder	
13	1 756 040 11	Battery, Manganese Lithium	Back up battery
14	1 793 633 11	Connector (External)	
15	1 793 605 21	Sim Connector	
16	A 3647 660 A	Battery Pack Assy	
17	3 041 807 01	Screw 2.0x10	
18	1 127 709 41	Capacitor, Elect 4400MF	99.00% 6.3V
19	1 763 207 11	Motor, Oscillation	Vibra Alert
20	1 793 615 11	FFC/FPC Connector	9P
21	1 675 575 11	PWB, Flexible	
Instruction Manual			
	3 867 714 11	German / Italian	
	3 867 714 21	English	
	3 867 714 31	French / Dutch	
	3 867 714 41	Swedish / Norwegian	
	3 867 714 51	Danish / Finnish	
	3 867 714 61	Spanish / Turkish	
	3 867 714 71	Greek / Portuguese	
	3 867 714 81	French (Customised version)	
	3 868 364 21	Hungarian / Romanian	
	3 868 364 11	Czech / Polish	
AC Power Supply			
	1 418 678 11	QN-2AC1	Euro
	1 418 679 21	QN-2AC2	UK
	1 418 684 11	QN-2AC3	Australia
Jigs			
	3 043 179 01	Cradle	Service-Test Connector
	1 792 172 11	Data Transfer Jig	Software Update
	3 043 180 01	Hook Release Jig	Housing Opening
	9 870 400 11	Service Manual	AEP / UK Model

