

# ACER D65

## Service Manual <Lever 1,2 Repair> 1<sup>st</sup> Draft 10/15/99

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## Preface

### Specifications

Table 1: Radio Frequency

Radio Frequency (900 MHz)	
Frequency Range	TX 890-915 MHz; RX 935-960 MHz
Channel Spacing	200 KHz
Number of Channels	124 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 4 (2 W peak)
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz)
Receiver Level	< 107 dBm (Wireless)
Radio Frequency (1800 MHz)	
Frequency Range	TX 1710-1785 MHz; RX 1805-1880 MHz

Channel Spacing	200 KHz
Number of Channels	374 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	95 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature
Receiver Level	< -106 dBm (Wireless)
Temperature Range	-20 to +55 °C

Table 2: Voltage Operation

Voltage Operation	
Li-ion Battery	DC 2.7-4.2 V
Ni-MH Battery	DC 3.3-4.2 V

Table 3: Power Consumption

Power Consumption	
Working Current Average	< 200 mAH
Standby Current	< 6 mAH
Talking Time*	> 3 hours (With Li-ion 600 mAH)
Standby Time*	> 100 hours (With Li-ion 600 mAH)
DTX / DTR	Yes

Table 4: Appearance

Handset Appearance	
Dimensions	112 x 46 x 18 mm
Volume	88 c.c.
Handset Weight	80 g

Table 5: Basic Services

Tele Service	
	Telephony (Speech)
	Emergency Call
Short Message Service	
	Delivery Report
	Short Message Service MT/MO
	Cell Broadcast

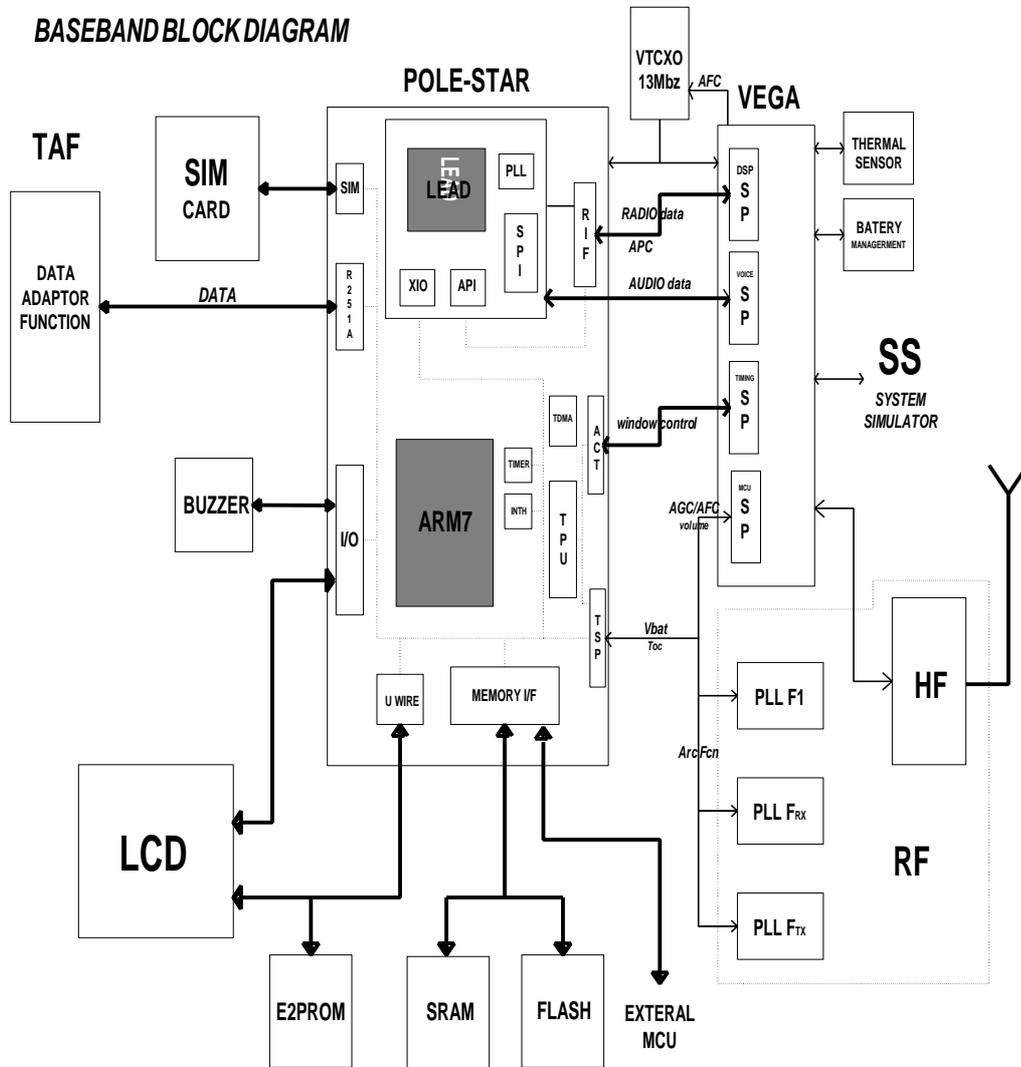
Bearer Service	
	Data circuit duplex asynchronous up to 14400 bit/sec

## Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. It is intended primarily to support electrical and mechanical repairs. Repairs not covered in the scope of this manual should be forwarded to Motorola's regional Cellular Subscriber Support Centers.

# Theory of Operation

## PART I. BASEBAND



## GSM System Description

### General Cellular Concept

The cellular systems are used to provide radiotelephone service in the frequency range 890-960 MHz. A cellular system provides higher call handling capacity and system availability

than would be possible with conventional radiotelephone systems (those which require total system area coverage on every operating channel) by dividing the system coverage area into several adjoining sub-areas or cells.

Each cell contains a base station (cell site) which provides transmitting and receiving facilities, for an allocated set of duplex frequency pairs (channels). Since each cell is a relatively small area, both the cell site and the radiotelephone that it supports can operate at lower power levels than would be used in conventional systems.

Using this technique, radiation on a given channel is virtually contained in the cell operating on that channel and, to some extent, those cells directly adjacent to that cell.

Since the coverage area of a cell on a given channel is limited to a small area (relative to the total system coverage area), a channel may be reused in another cell outside the coverage area of the first. By this means, several subscribers may operate within the same geographic area, without interference with each other, on a single channel.

## **GSM Description**

Unlike previous cellular systems, GSM uses digital radio techniques. The GSM system has the following advantages over previous analogue systems:

◆ **International Roaming** - Due to international harmonization and standardization, it will be possible to make and receive calls in any country which supports a GSM system.

◆ **Digital Air Interface** - The GSM phone will provide an entirely digital link between the telephone and the base station, which is, in turn, digitally linked into the switching subsystems and on into the PSTN.

◆ **ISDN Compatibility** - ISDN is a digital communications standard that many countries are committed to implementing. It is designed to carry digital voice and data over existing copper telephone cables. The GSM phone will be able to offer similar features to the ISDN telephone.

◆ **Security and Confidentiality** – Telephone calls on analogue systems can very easily be overheard by the use of a suitable radio receiver. GSM offers vastly improved confidentiality because of the way in which data is digitally encrypted and transmitted.

◆ **Better Call Quality** - Co-channel interference, handover breaks, and fading will be dealt with more effectively in the digital system. The call quality is also enhanced by error correction, which reconstructs lost information.

◆ **Efficiency** - The GSM system will be able to use spectral resources in a much more efficient way than previous analogue

systems.

In the figure below, the area bounded by bold lines represents the total coverage area of a hypothetical system. This area is divided into several cells, each containing a cell site (base station) operating on a given set of channels which interfaces radiotele- phone subscribers to

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the telephone switching system.

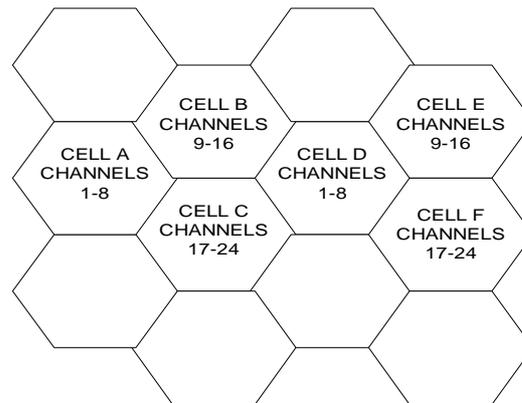


Figure 2: Hypothetical

The radiotelephones themselves are capable of operation on any channel in the system, allowing them to operate in any cell. Due to the low power requirements for communications between radiotelephones in a particular cell and the cell site, operating channels may be repeated in cells which are outside the coverage area of each other.

For example, presume that cell A operates on channels arbitrarily numbered 1 through 8, cell B operates on channels 9 through 16, cell C operates on channels 17 through 24 and cell D operates on channels 1 through 8 (repeating the usage of those channels used by cell A). In this system, subscribers in cell A and subscribers in cell D could simultaneously operate on channels 1 through 8.

The implementation of frequency re-use increases the call handling capability of the system, without increasing the number of available channels. When re-using identical frequencies in a small area, co-channel interference can be a problem. The GSM system can tolerate higher levels of co-channel interference than analogue systems, by incorporating digital modulation, forward error correction and equalization. This means that cells using identical frequencies can be physically closer, than similar cells in analogue systems. Therefore the advantage of frequency re-use can be further enhanced in a GSM system, allowing greater traffic handling in high use areas.

By incorporating Time Division Multiple Access (TDMA) several calls can share the same carrier. The carrier is divided into a continuous stream of TDMA frames, each frame is split into eight time slots. When a connection is required the system allocates the subscriber a dedicated time slot within each TDMA frame. User data (speech/data) for transmission is digitized and sectioned into blocks. The user data blocks are sent as information bursts in the allocated time slot of each TDMA frame.

The data blocks are modulated onto the carrier using Gaussian Minimum Shift Keying (GMSK), a very efficient method of phase modulation.

Each time an information burst is transmitted, it may be transmitted on a different frequency. This process is known as frequency hopping. Frequency hopping reduces the effects of fading, and enhances the security and confidentiality of the link. A GSM radiotelephone is

only required to transmit for one burst in each frame, and not continually, thus enabling the unit to be more power efficient.

Each radiotelephone must be able to move from one cell to another, with minimal inconvenience to the user. The mobile itself carries out signal strength measurements on adjacent cells, and the quality of the traffic channel is measured by both the mobile and the base station. The handover criteria can thus be much more accurately determined, and the handover made before the channel quality deteriorates to the point that the subscriber notices.

When a radiotelephone is well within a cell, the signal strength measured will be high. As the radiotelephone moves towards the edge of the cell, the signal strength and quality measurement decreases.

Signal information provides an indication of the subscriber's distance from the base station. As the radiotelephone moves from cell to cell, its control is handed from one base station to another in the new cell.

This change is handled by the radiotelephone and base stations, and is completely transparent to the user.

## **Service Area**

The area within which calls can be placed and received is defined by the system operators. (Because this is a radio system, there is no exact boundary that can be drawn on a map.) If the telephone is outside a coverage area, the (no service) indicator will illuminate and calls will be unable to be placed or received. If this happens during a conversation, the call will be lost. There may also be small areas within a particular service area where communications may be lost.

The radiotelephone's identity information is held by its local GSM system in its Home Location Register (HLR) and Visitor Location Register (VLR). The VLR contains identity information on all local active radiotelephones. Should you roam to another area, system or country the radiotelephone's identity information is sent to the VLR in the new system. The new system will then check the radiotelephone's details with your home system for authenticity. If everything is in order it will be possible to initiate and receive calls whilst in the new area.

## **Part II. GSM Processor & Voiceband Baseband Codec**

### **GSM Processor : GEMINI, GEM12LA68**

GEMINI is a software development chip dedicated for digital base-band GSM application. This chip combines a DSP core (LEAD) with its program and data memories, a Micro-controller core with emulation facility (ARM7TDMI), a slicer cell, a 5.6kbit dual-ports implemented in standard cells.

The purpose of this circuit is to execute the GSM base-band processing through the layer 1, 2, and 3 protocols. The chip will support the GSM full-level approval. This circuit is implemented with a Standard Cells library and is optimized in silicon area, speed and power consumption.

GEM12LA68 contains the follow blocks:

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- ARM7TDMI core (32/16 bits RISC processor).
- LEAD MEGAMODULE (DSP with 12Kwords of RAM + 68Kwords of ROM +API + SPI + PLL + TIMER).
- SLICER analog cell.
- STd-cells based Micro controller peripherals.
- ARM ice crusher for test.
- ARM Memory Interface for RAM, Flash or ROM.
- ARM interrupt Handler.
- ARM General purpose I/O for buzzer and keyboard.
- Micro Wire interface for Real time clock, LCD and EEPROM.
- Timers (generics, watchdog, buzzer modulation)
- UART interface for data transfer.
- SIM Interface.
- Arm Peripheral Interface.(APIF)
- GSM Timer. (TPU)
- Timer Serial Port. (TSP)
- ASIC DSP periperal.
- Radio interface.
- OTHER ASIC peripherals.
- Clock generator & control
- Test Macros
- Busgrant macro
- Clicer Power-down

## Voiceband Baseband Codec & A/D D/A Interface

The TCM4400 global system for mobile communication (GSM) baseband RF interface circuit is designed for GSM 900 and DCS 1800 European digital cellular systems (DCS), and PCS 1900 North America personal communications systems (PCS). It includes a complete set of functions to perform the interface and processing of voice signals, generate baseband in-phase (I) and quadrature (Q) signals, and control the signals between a digital signal processor (DSP) and associated RF circuits.

The TCM4400 includes a second serial interface for use with a microcontroller. Through this interface, a microcontroller can access all the internal registers that can be accessed through the DSP digital serial interface. This option is for applications in which part of the L1 software is implemented in the microcontroller.

A 4-pin parallel port is dedicated to the full control of the digital audio interface (DAI) to the GSM system simulator; the DAI consists of system simulator reset (SSRST) control, clock generation, and rate adaptation with the DSP.

The voice processing portion of the device includes microphone and earphone amplifiers, analog-to-digital converter (ADC) and digital-to-analog converter (DAC), speech digital filtering, and a serial port. The baseband processing portion of the device includes a two-channel uplink path, a two-channel downlink path, a serial port, and a parallel port. The uplink path performs Gaussian minimum shift keying (GMSK) modulation, D/A conversion, and has smoothing filters to provide the external RF circuit with I and Q baseband signals. The downlink path performs antialiasing, analog/digital (A/D) conversion, and channel

separation filtering of the baseband I and Q signals. The serial port allows baseband data exchange with the DSP, and the parallel port controls precise timing signals.

Auxiliary RF functions such as automatic frequency control (AFC), automatic gain control (AGC), power control, and analog monitoring are also implemented in the TCM4400. Internal functional blocks of the device can be separately and automatically powered down with GSM RF windows.

#### Features

- Applications Include GSM 900, DCS 1800, and PCS 1900 Cellular Telephones
- 80-Pin TQFP Package
- Single 3-V Supply Voltage
- Internal Voltage Reference
- Extended RF Control Voltages
- Advanced Power Management
- GSM-Digital Audio Interface (DAI)
- MCU and DSP Serial Interface
- Five-Port Auxiliary A/D
- Meets JTAG Testability Standard (IEEE Std 1131.1-1990)
- Baseband Codec-GMSK Modulator with On-Chip Burst Buffer
- Voice Codec Features: Microphone Amplifier and Bias Source, Programmable Gain Amplifiers,
- Volume Control, and Sidetone Control

## Download & Testing

### Introduction:

This document describes all options and setting in the window application program :**Dmtool**. Dmtool is a 'Tool' program that has multi-functions. It can upgrade the software in handsets, change the eeprom contents, perform RF test, ,set target handset's internal parameters to factory-default values, and flex-option modification .For detail description, please refer to III Function descriptions.

### System requirements and setup:

#### A. Lowest requirement:

Operation system:	Win95/ Win98. (NT not supported).
CPU:	Pentium 100 Mhz or higher.
Hard Disk:	Free 10MB space.
Memory:	16MB RAM.
Input Device:	Keyboard and mouse

#### B. Setup in Windows 95:

In Windows 95 , you should make a directory , copy all these files into the new directory, then you can run Dmtool.exe. All the files are listed below:

1. dmtool.exe (main application )
2. E2pBase.bin (eeprom database file)
3. Boot\_AMDT.mot (flash programmer file)
4. Flash.mot (flash-loaded file)

## Function descriptions:

There are several option-buttons in the Dmtool application. Each option performs a special function.



### A. Open a *flash* program:

This is an assistant option for download programs into handsets. Before downloading any program into MS, users need to choose 2 files. Both of them have the same file extension name: \*.mot, such as D65fp.mot , D65flash.mot. The first one is a flash-programmer file, which is selected in configuration menu. The second file is a flash-loaded file. This file is the major program running in handsets. Click this “Open” button will bring out a “file selection dialog”. Just choose the target flash file and click OK.

### B. RS232 Download:

This option will be activated only if a flash-loaded program has been assigned. But you may still encounter errors if a incorrect flash-programmer file is used.

To start a RS232 download process, first power off the handset. After selecting a flash-loaded file and a flash programmer file, press the download button.

When the string Wait for target ready appears, power on the handset. Then the download process starts. It will take about 2~ 3 minutes for completing the download.

After undergoing a completed download process , remember to execute Set E2P option.

Remark: It must be emphasized that never stop or remove the power supply (battery) when your handset is downloading the block 0 and block 1 program codes . It is writing critical boot codes at this time. If you terminate the download process at this moment, this handset not only can't power on but also can't re-download again. In this case , the only solution is using a special “Jtag interface and cable” to do a low-level download.

### C. Calibration:

For manual-calibration, users must assigned necessary parameter in the input dialog manually. First turn off the handset and click the Manu-Cal button. When the “Wait for target ready” message appears in the status window, turn on the handset and the input dialog will pop-up.

The input dialog shows itself in a tree-structure format. This tree has six branches and each of them can be activated by double-click the target branch. Detail descriptions are listed below:

1. type : This branch decides what kind of command it will execute. A “New value” dialog appears when double-clicking this branch. The valid value range from 1 to 5, and each value corresponds a unique calibration command. Value 1 is AGC calibration ( Rx test), value 2 is AFC calibration (Frequency test), value 3 is APC calibration ( Tx test), and value 5 is battery ADC calibration. Value 4 is a write-EEPROM command instead of a calibration command.
2. agc : If the selected command type is AGC, you must assign values to all parameters in this branch. The “arfcn” is the desired channel, valid range is 1 ~1024. Note that the ARFCN in capital letter is the actual channel value and the arfcn in small letter format is an shifted channel value. You should give the ARFCN value, and the program will calculate the arfcn value. The “gain” is the gain value of DSP’s MCU. In a normal agc calibration, the larger the gain value you give, the larger pm(power measurement value) you get.
3. afc: If the selected command type is AFC, you must assign values to all parameters in this branch. The afcValue is the initial point for afc calibration. If the frequency burst has been detected, you get the frequency error at current initial point. The meaning of “arfcn” and “gain” are the same as those in agc calibration.
4. ramp: If the selected command type is AGC, you must assign values to all parameters in this branch. The meaning of “arfcn” is the same as agc calibration. The “tsc” is training sequence code. The “txLoopCount” is the number of frequency burst. The larger the txLoopCount, the longer the duration of transmission. “scaling factor” is the gain value to magnify the output signal from DSP. “freqComp” is the offset value for current scaling factor. The handset will add this value to the scaling factor. The “txLevel” enable users to select the ramping table. For gsm, valid range is 5 ~19. For dcs, valid range is 0 ~15.
5. adc: If the selected command type is ADC, you must assign values to all parameters in this branch. There are five types of adc value you can get in this calibration : Set channel number to 0 is the battery voltage, channel number 1 is battery temperature, number 2 is battery ID, channel number 3 is accessory ID, and channel number 4 is handset’s temperature

When the command type and relative parameters are given, just click the “OK” to get the measured result.

#### D. EEPROM Editor:

EEPROM editor enables users to modify the contents in EEPROM (or EEPROM of flash, EOF). Before executing this function, you must choose a correct database file in configuration menu. This database file, in common case, is database.bin. Without this file, the application can’t not initialize memory and parse structures. This database is varied as the different flash program downloaded into the handset. Thus make sure a relative database file is used. After all settings are completed, execute this function and pull down the list menu in EEPROM editor to choose a signal. This contents of the selected signal will be retrieved from EEPROM. Then you can modify values and write back to EEPROM. It must be emphasized that the baud rate of this function is the one that a user chooses in configuration menu. If the baud rates between MS and PC are different, it is impossible to get the correct data.

#### E. Set E2P:

There are several sub-options for this function. To execute those options, first power off the handset and click this “Set E2p” button. After the “Wait for target ready” message appears, power on the handset. Details for each sub-options are listed below.

1. Set EEPROM default will set a part of contents in EEPROM to factory default value. Phone books and calibration data won't be reset in this operation.
2. Log: On will set the baud rate of target MS to 115200 and enable the MS to send out debug information latter.
3. Log: Off will set the baud rate of target MS to 19200 and stop the MS sending any debug information.
4. Set EEPROM Default and Phone books initialize is similar to Set EEPROM default, but this option will erase all phone book data in EEPROM.

#### *F. Config Menu:*

There are lots of settings in this menu dialog. Improper setting may cause execution error or get incorrect result. There are 2 selection sheets in configuration menu: one is about communication and files setting and the other is for miscellaneous settings. In Communication and files setting sheet, Port Selection decides which COM port will be reserved for RS232. Baud Rate is the data transfer rate of PC, and must be identical between MS and PC.

For a successful download, a user needs to select a correct flash programmer file(or boot code file) in the Boot Code file name option. The R character implies RS232 download. When execute EEPROM Editor function, users need to assign a database file in EEPROM File names group. Its label is DataBase, just click the Change button to select a desired database file.

In Misc. Settings sheet, the Job Selection group allows users to enable/disable the main option buttons in dmtool. For example, if you uncheck Download and Calibrate and check all the others. then the download and calibration options will become disable. You can't execute these functions any more except you change their settings again. The Enable Modification option allows user to disable any configuration setting-change in this configuration menu.

#### *G. Service:*

This option provides certain flexibility for manipulating the private data and settings of a handset. Until recently, 2 sub-options have been implemented. The first one is E2p Cloner, and the second is the flex-option setting.

1. "E2p Cloner" is used for duplicating the data in the handset's EEPROM. It backup the network-lock, handset-feature settings, and phone book records to PC and enable users to restore them to handsets latter. There are 2 backup modes when executing this option: "Keep MS data" will only backup phone book records and ignore the others. "Replace MS data" will backup all data mentioned above. To make an successful backup-restore procedure, follow the instructions step by step: Make sure the correct database file has been selected in the configuration setting.
  - a. Choose backup mode and connect the first handset with PC.
  - b. Press the Backup button. After a successful message appears, replace the first handset with a new one.
  - c. Press the Restore button. When restoring process completes successfully, all data has copied to the target handset.
2. "Flex option" is used for modifying the handset's flex option settings. Changing those options are straightforward, just click the individual enable/disable button of every sub-options. When all settings are done, click the "Write Flex option" button to write modifications into eeprom.

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**FAQ:****A. How do I select a correct baud rate?**

The baud rate sets to 115200 for Download, Calibration, and Set E2P internally in dmtool. Thus no matter which baud rate the user chooses in the configuration menu, their baud rate is always 115200. Users can ignore the baud rate setting when execute these three functions. But for EEPROM editor, and Service , their baud rates are changeable. If a user selects baud rate as 19200, then the baud rate for these two options is 19200. There are several situations may confuse users. After execution Set EEPROM Default or Log Off, the target handset will change its baud rate to 19200. In order to communicate with the MS, the dmtool's baud rate should set to 19200. And if you run LOG ON command in dmtool or Mobilog, the baud rate of the MS will change to 115200. So remember to change baud rate to 115200 in configuration menu.

**B. How do I select a correct flash-programmer file?**

The flash programmer file (boot code file) plays an important role during a download procedure. It takes care of programming flash ROM and is responsible for data receiving/transmission. Flash programmer files for download vary as different MS models. For Dual band, it uses AMD flash, thus the flash programmer files is r\_AMDT.mot. In some situation, this file is renamed as "BootCode.mot" and users just need to click the "change" button in configuration menu to select this file.

**C. Why can't I read data from EEPROM?**

The reasons for this problem can divide into two parts:

**1. Software setting problems:**

- a. The most common case is : database.bin file hasn't been assigned or the baud rate setting is incorrect in configuration menu. Choosing a wrong COM port also results in this problem.
- b. Has the MS completed the download process and set EEPROM default?
- c. Solutions:
  1. Assigned a correct database.bin file in configuration menu. If the target handset is in Log On mode, then the baud rate should be 115200, else is 19200. Note that if you get used to read EEPROM after an auto-calibration test without re-power on the MS, the baud rate in the MS is 115200 at this time. Thus you should set to 115200 before auto-calibration starts.
  2. Choose a correct COM port.
  3. Download a new flash program into the MS and run Set E2P function to set EEPROM default.

**2. Hardware problems:**

After making relative corrections for the software problems mentioned above, and you still can't read data from EEPROM, then do some further checks : In EEPROM editor dialog, there is an Interface Debug status window. Is there any string in this window? For example, you may observe sentences like ACK/NAK sent or Unexpected MI. If there is nothing in this window, it is very possible the hardware problems. Some common hardware problems are:

- a. The RS232 connection between the MS and PC is unsuitable or the cable is bad.
- b. Does your downloader require an external power supply?
- c. Something shorts with the Accessory-in pins

**D. Why can't I download/upgrade programs into the handset?**

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For RS232 download, verify the following procedures step by step:

1. Do you disable the write protect in your downloader? I.e. set the switch to BOOTCODE location.
2. Do you select the RS232 item of Downloader in configuration menu ?
3. Do you assign a correct flash programmer (boot code) file?
4. Do you select a correct COM port?
5. Does the connection between the MS and PC setup properly?
6. Do you power off the MS before the download starts?
7. Do you power on the MS after the sentence Wait for Target ready appears?
8. Have you ever terminated a download process when it was downloading the block 0 and block 1 codes? If yes, then the boot-code area of this handset has been corrupted and can't use RS232 download

# Disassembly

## Introduction

Responsible care should be taken during the disassembly and reassembly of the units in order to avoid damaging or stressing the housing and internal components. Ensure that a properly grounded high impedance conductive wrist strap is used while performing these procedures on electronic units.

**NOTE** Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. Ensure that adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.

## Recommended Tools

The following tools (or similar tools with the same functions) are recommended for use during the disassembly and reassembly of the phone.

- ? Anti-Static Mat (Ground Cord included)
- ? Anti-Static Wrist Strap
- ? Torque Screw Driver (T5 type, torque is set to 1.2kg-cm)
- ? Tweezers

## Disassembly Procedure

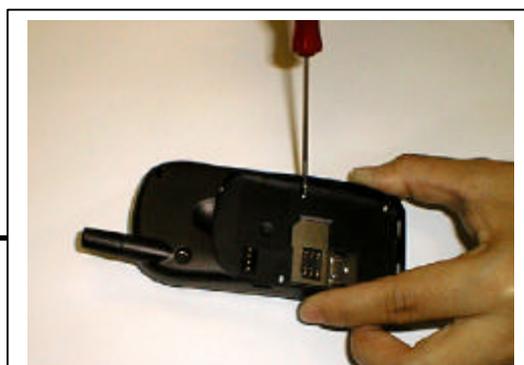
The following information describes the procedure for removing and accessing various parts of the phone.

### Rear Case Removal

1. Turn off the telephone.
2. Slide down the battery latch, and remove the battery pack from the housing.



3. Release the four screws and remove them.



4. Unclip the 2 snap fits on the right & left sides of the phone, and remove the rear case from the front case.

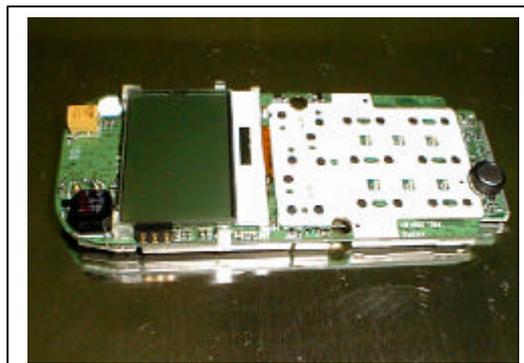


### Main Board Removal

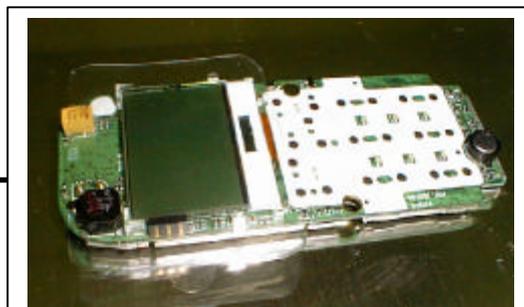
1. Carefully separate the main board from the front case by lifting it upwards.



2. Place the main board facing upwards on an anti-static mat.



3. Place a protection tape over the LCD module.



**NOTE** Do not touch the LCD module with your hands!

4. Remove the keypad from the front case by lifting it upwards.



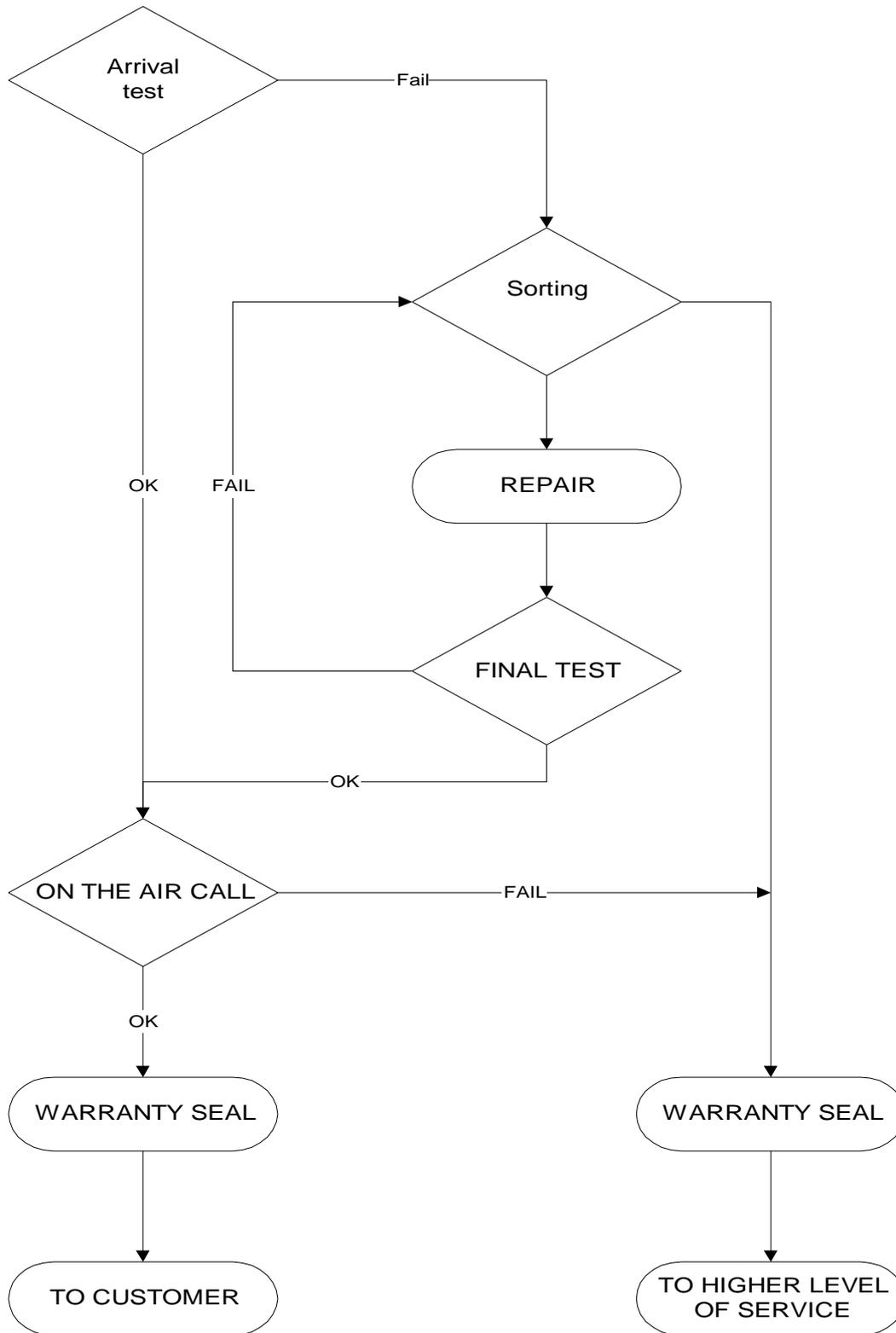
## Assembly Procedure

Once the unit is disassembled and the repair is carried out, it then becomes obvious that to assemble the unit, the procedure is the reverse of that previously completed for disassembly.

# Troubleshooting

## **D70 BASEBAND TROUBLESHOOTING**

### 1. Repair flow chart



- **Arrival test**

Arrival test is the first step to identify faults within the phone for mechanical damages and faults indicated by the customer. If there is no mechanical damage, run through the level 3 testing equipment.

- **Sorting**

Sorting is carried out according to repair actions in this section depending on the

complexity of faults. The phone may have to be sent to a service center of higher level.

- **Repair**

Repair is carried out of components stated in the sorting part and/or mechanically damaged components

- **Final test**

Final test is carried out to verify that the phone is OK after repair

- **On the air call**

On-the air call is made to a stationary phone using a handfree kit to check system connector functionality.

- **Warranty**

Warranty seal is attached if the old seal has been broken.

## 2. Troubleshooting and repair chart

All repair actions including exchange of components are to be done according to the instructions given in the following instructions. If actions described below have been carried out and the phone still can't work, you need to send the phone to a higher level of service.

Item	Symptom	Probable cause	Verification and remedy
1	Volume key fail	Connection between LCD holder and PCB defective	Replace LCD holder
		Switch position shift	Move volume keypad to the right position
2	Numerical key fail	Metal dome broken	Replace metal dome
3	Illumination fail	Soldering fail or wrong polarization of LED	Replace LED
4	Display is erratic	LCD not properly heated seal to PCB	Heat seal LCD one more time
5	Display provides nothing	LCD not properly heated seal to PCB	Heat seal LCD one more time
		LCD broken	Replace LCD

6	Buzzer fail	Bad soldering	Re-solder
		Component broken	Replace buzzer
7	Setup call fail	Antenna connector damage or not properly connected	Check and if necessary, replace
8	Audio fail	Microphone or earphone broken	Replace microphone or earphone
		Microphone or earphone connector defective	Replace connector
9	Rush current	Bad soldering cause short circuit	Track the circuit of power supply
10	Turn on fail	Battery connector defective	Re-solder connector or replace a new one
		Keypad "ON" fail	Verify metal dome
		13MHz fail	Replace component
		Power management IC fail	Replace component
		Power on circuit short or open	Verify PCB
11	Not recognize or accept SIM card	FLASH memory defective	Replace FLASH and re-download
		SIM card defective	Exchange SIM card
		SIM connector defective	Replace with a good one
12	Vibrator fail	Upper/lower case assembly defective	Inspect the upper/lower case visually, if necessary, exchange a good one
		Vibrator motor defective	Replace with a good one
		Connector defective	Replace with a good one

# Replacement Parts

## Exploded View

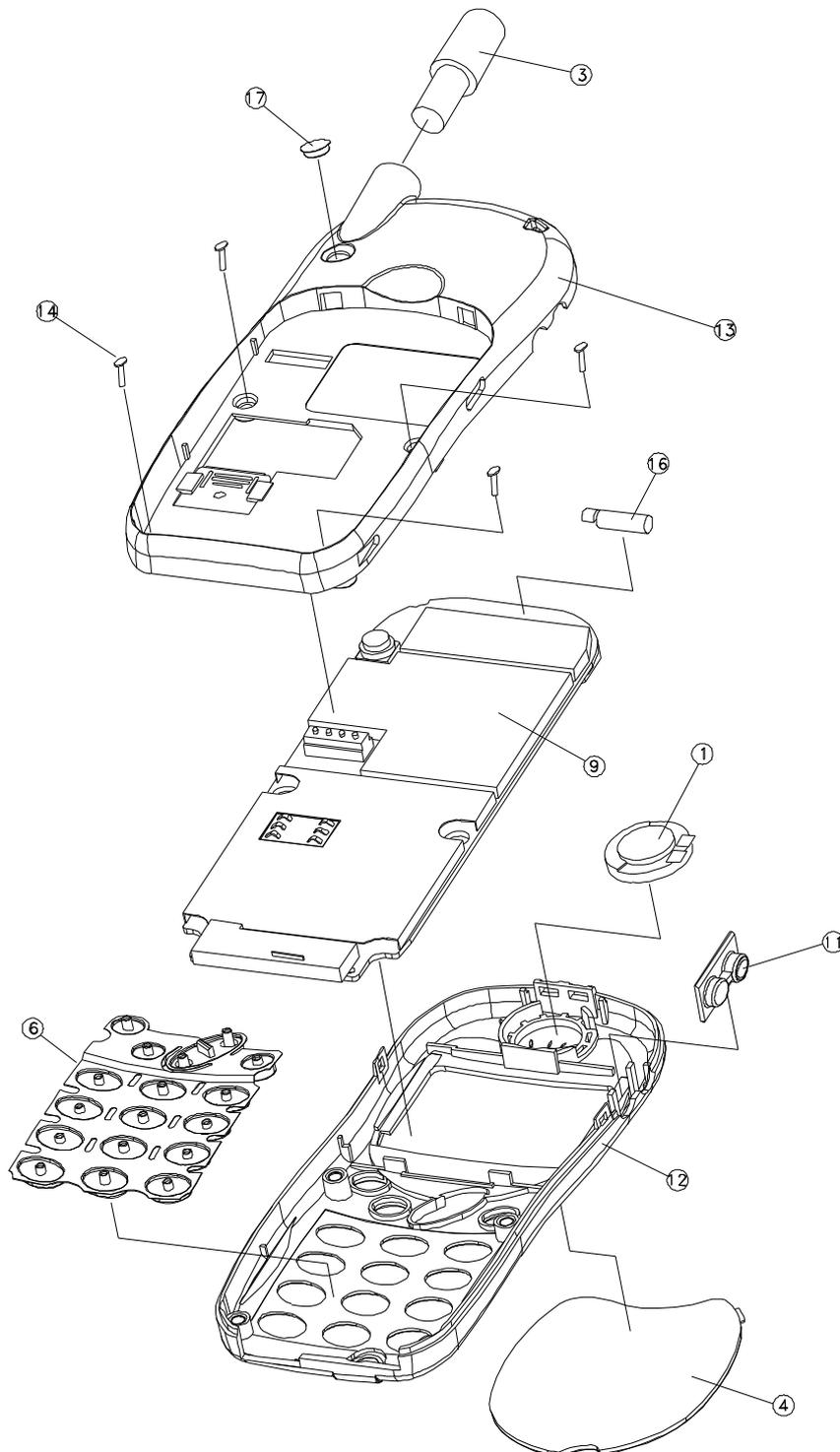


Fig 1. Mechanical Exploded View (I)

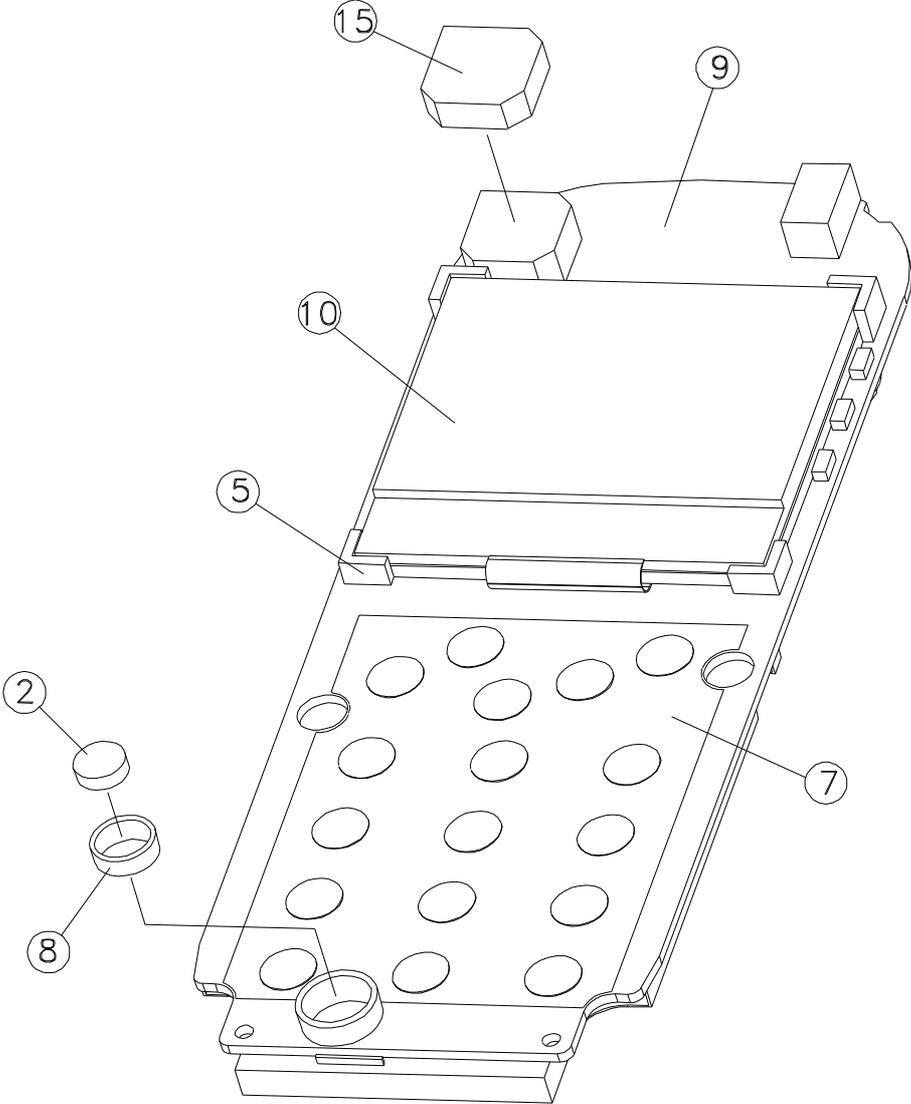


Fig 2. Mechanical Exploded View (II)

**Spare Parts List**

<b>No</b>	<b>Description</b>	<b>Q'ty</b>
1.	Speaker	1
2.	Microphone	1
3.	Antenna	1
4.	LCD Lens	1
5.	LCD Back-Light Holder	1
6.	Keypad	1
7.	Dome Switch Membrane	1
8.	Microphone Holder	1
9.	Main Board	1
10.	LCD Module	1
11.	Volume Key	1
12.	Front Case	1
13.	Rear Case	1
14.	Screw M1.6x3.5L	4
15.	Buzzer Cap	1
16.	Vibrator	1
17.	Antenna Cap	1

# Service Manual Feedback Form

**To report any problem or omissions to this service manual:**

1. Photocopy this page.
2. Fill out the boxes below and give your comments.
3. Fax this form to Motorola Asia Pacific Cellular Subscriber Division  
Fax Number (847)523-8795, Attn : Mr. Reginald Townsend

**Service Manual Number:** \_\_\_\_\_ **Revision:**

**Your Name:**

**Address:**

**Telephone Number:**

**Nature of Problem or Omission:**  
(Specify Section, Page Number, Diagram, etc.)