MOTOROLA

ROKR E2
Digital Wireless Telephone

GSM 900/1800/1900 or GSM 850/1800/1900 MHz
GPRS

Contents

Introduction

Motorola® Inc. maintains a worldwide organization that is dedicated to provide responsive, full-service customer support. Motorola products are serviced by an international network of company-operated product care centers as well as authorized independent service firms.

Available on a contract basis, Motorola Inc. offers comprehensive maintenance and installation programs which enable customers to meet requirements for reliable, continuous communications.

To learn more about the wide range of Motorola service programs, contact your local Motorola products representative or the nearest Customer Service Manager.

Product Identification

Motorola products are identified by the model number on the housing. Use the entire model number when inquiring about the product. Numbers are also assigned to chassis and kits. Use these numbers when requesting information or ordering replacement parts.

Product Names

Product names are listed on the front cover. Product names are subject to change without notice. Some product names, as well as some frequency bands, are available only in certain markets.

Product Changes

When electrical, mechanical or production changes are incorporated into Motorola products, a revision letter is assigned to the chassis or kit affected, for example; -A, -B, or -C, and so on.

The chassis or kit number, complete with revision number is imprinted during production. The revision letter is an integral part of the chassis or kit number and is also listed on schematic diagrams and printed circuit board layouts.

Regulatory Agency Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

• This device may not cause any harmful interference, and
• this device must accept interference received, including interference that may cause undesired operation.

This class B device also complies with all requirements of the Canadian Interference-Causing Equipment Regulations (ICES-003).

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Computer Program Copyrights

The Motorola products described in this manual may include Motorola computer programs stored in semiconductor memories or other media that are copyrighted with all rights reserved worldwide to Motorola. Laws in the United States and other countries preserve for Motorola, Inc. certain exclusive rights to the copyrighted computer programs, including the exclusive right to copy, reproduce, modify, decompile, disassemble, and reverse-engineer the Motorola computer programs in any manner or form without Motorola's prior written consent. Furthermore, the purchase of Motorola products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license or rights under the copyrights, patents, or patent applications of Motorola, except for a nonexclusive license to use the Motorola product and the Motorola computer programs with the Motorola product.

About This Service Manual

Using this service manual and the suggestions contained in it assures proper installation, operation, and maintenance of E2 telephones. Refer questions about this manual to the nearest Customer Service Manager.

Audience

This document aids service personnel in testing and repairing E2 telephones. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

Use of this document assures proper installation, operation, and maintenance of Motorola products and equipment. It contains all service information required for the equipment described and is current as of the printing date.

Scope

The scope of this document is to provide the reader with basic information relating to E2 telephones, and also to provide procedures and processes for repairing the units at Level 1 and 2 service centers including:

- Unit swap out
- Repairing of mechanical faults
- Basic modular troubleshooting
- Testing and verification of unit functionality
- Initiate warranty claims and send faulty modules to Level 3 or 4 repair centers.

Conventions

Special characters and typefaces, listed and described below, are used in this publication to emphasize certain types of information.

▶ *Note: Emphasizes additional information pertinent to the subject matter.*

⚠ *Caution: Emphasizes information about actions which may result in equipment damage.*

⚡ *Warning: Emphasizes information about actions which may result in personal injury.*

☰ Keys to be pressed are represented graphically. For example, instead of "Press the Menu Key", you will see "Press ☰".

Information from a screen is shown in text as similar as possible to what appears in the display. For example, ALERTS or ALERTS or ALERTS.

Information that you need to type is printed in **boldface type**

Warranty Service Policy

The product will be sold with the standard 12 months warranty terms and conditions. Accidental damage, misuse, and extended warranties offered by retailers are not supported under warranty. Non warranty repairs are available at agreed fixed repair prices.

Out of Box Failure Policy

The standard out of box failure criteria applies. Customer units that fail very early on after the date of sale, are to be returned to Manufacturing for root cause analysis, to guard against epidemic criteria. Manufacturing to bear the costs of early life failure.

Product Support

Customer's original units will be repaired but not refurbished as standard. Appointed Motorola Service Hubs will perform warranty and non-warranty field service for level 2 (assemblies) and level 3 (limited PCB component). The Motorola High Technology Centers will perform level 4 (full component) repairs.

Customer Support

Customer support is available through dedicated Call Centers and in-country help desks. Product Service training should be arranged through the local Motorola Support Center.

Parts Replacement

When ordering replacement parts or equipment, include the Motorola part number and description used in the service manual or supplement.

When ordering crystals or channel elements, specify the Motorola part number, description, crystal frequency, and operating frequency desired.

When the Motorola part number of a component is not known, use the product model number or other related major assembly along with a description of the related major assembly and of the component in question.

In the U.S.A., to contact Motorola, Inc. on your TTY, call: 800-793-7834

Accessories and Aftermarket Division (AAD)

Order replacement parts, test equipment, and manuals from AAD.

U.S.A. **Outside U.S.A.**

Phone: 800-422-4210 Phone: 847-538-8023

FAX: 800-622-6210 FAX: 847-576-3023

Website: http://businessonline.motorola.com

EMEA

Phone: +49 461 803 1404

Website: http://emeaonline.motorola.com

Asia

Phone: +65 648 62995

Website: http://asiaonline.motorola.com

Specifications

General Function	Specification
Frequency Range GSM 850	824-849 MHz Tx 869-894 MHz Rx
Frequency Range GSM 900	880-915 MHz Tx (with EGSM) 925-960 MHZ Rx
Frequency Range DCS 1800	1710-1785 MHz Tx 1805-1880 MHz Rx
Frequency Range PCS 1900	1850-1910 MHz Tx 1930-1990 MHz Rx
Channel Spacing	200 kHz
Channels	174 EGSM, 374 DCS, 374 PCS, 124 GSM 850 carriers with 8 channels per carrier
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz GSM, 95 MHz DCS, 80 MHz PCS
Frequency Stability	± 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	+3.0V dc to +4.2V dc (cell) +4.4V dc to +6.6V dc (external charger jack with 2.4 K ohm resistor)
Average Transmit Current	300 mA max
Average Stand-by Current	4.0 mA max (DRX2), 2.0 mA max (DRX9)
Dimensions	49.8 mm x 106 mm x 17 mm (1.96 inches x 4.17 inches x 0.66 inches)
Size (Volume)	80 cc (4.8 in^3)
Weight	100 g (3.52 oz) with cell
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life, 880 mAh Li Ion Battery	Talk time 205 - 240 minutes Standby time 144 - 216 hours
	All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Standby times are quoted as a range from DRX=2 to DRX=9. Talk times are quoted as a range from DTX off to DTX on.

Transmitter Specification	
RF Power Output	33 dBm nominal GSM 850 33 dBm nominal GSM 900 30 dBm nominal GSM 1800 30 dBm nominal PCS 1900
Output Impedance	50 ohms nominal
Spurious Emissions	-36 dBm from 0.1 to 1 GHz, -30 dBm from 1 to 4 GHz

Receiver Specification	
Receive Sensitivity	-106 dBm GSM 850, -106 dBm GSM 900, -104 dBm GSM 1800, -104 dBm PCS 1900
RX bit error rate (100k bits) Type II	< 2%
Channel Hop Time	500 microseconds

Receiver Specification	
Time to Camp	Approximately 5-10 seconds

Speech Coding Function	Specification
Speech Coding Type	Regular pulse excitation / linear predictive coding with long term prediction (RPE LPC with LTP)
Bit Rate	13.0 kbps
Frame Duration	20 ms
Block Length	260 bits
Classes	Class 1 bits = 182 bits; Class 2 bits = 78 bits
Bit Rate with FEC Encoding	22.8 kbps

Product Overview

Motorola ROKR E2 mobile telephones feature global system for mobile communications (GSM) air interface, general packet radio service (GPRS) transport technology, and wireless application protocol (WAP) Internet browser. The mobile telephone uses a simplified icon and graphical-based user interface (UI) for easier operation, allows short message service (SMS) text messaging, and include clock, alarm, datebook, calculator, and caller profiling personal management tools. The E2 is a tri band phones that allows roaming within the GSM 900MHz, DCS 1800 MHz and PCS 1900 MHz bands, or the GSM 850MHz, DCS 1800MHz and PCS 1900MHz bands, depending on factory programming.

E2 telephones support GPRS, EDGE, SMS, EMS, and MMS in addition to traditional circuit switched transport technologies. GPRS or EDGE, where available, provides substantial increases in mobile data communications performance and the efficient use of radio spectrum. A key advantage is the provision of a permanent virtual connection to the network. This "always on" connection is possible because GPRS and EDGE use packet data transfer so that, for example, email can be downloaded in "background mode." There is no need for the user to re-connect before requesting a service, eliminating connection set-up delays and adding convenience and immediacy to data services access. The "virtual" nature of this connection means that network resources are not consumed during periods when a user is not actually sending or receiving data.

The telephones are made of polycarbonate plastic. The display and speaker, as well as the transceiver printed circuit board (PCB), microphone, charger and headphone connectors, and buttons are contained within the candy bar form-factor housing. The 880 mAh Lithium Ion (Li Ion) battery provides up to 240 minutes of talk time with up to 216 hours of standby time[1]. The phone accepts 3V and 1.8V mini subscriber identity module (SIM) cards which fit into the SIM holder under the rear housing cover. These telephones feature a 240 x 320, 262k QVGA TFT color display and an internal antenna.

Features

E2 telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for GSM GPRS communication. Aside from the space and weight advantage, microcircuits enhance basic reliability, simplify maintenance, and provide a wide variety of operational functions.

Features available in the E2 include:

- 1.3 Mega Pixel Camera w/ flash
- Standard 3.5 mm headset jack
- Dedicated music keys
- FM Radio
- FOTA (Firmware Over The Air)
- iTunes or Native Media player
- SD memory card (plug and play)
- Stereo audio (via Stereo BT or wired headsets)
- Video capture, playback (15fps)
- Lower voltage technology that provides increased standby and talk times
- Extended GSM (EGSM) channels

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1. All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Standby times are quoted as a range from DRX=2 to DRX=9. Talk times are quoted as a range from DTX off to DTX on.

- Tri-coder/decoder (CODEC) that allows full rate, half rate, and enhanced full rate modes of transmission
- Supports MP3, AAC, WMA, RA, WAV, MIDI, AMR-NB/-WB audio
- Expandable to over 1GB with removable memory (SD/MMC card)
- High quality video capture and playback (RV, H.263, MPEG4)
- 2 hour video capture capable
- Built-In FM Radio
- Multi-Media Messaging (MMS)
- PIM functionality with Picture Caller ID
- Downloadable themes (ringers, images, sounds)
- Voice recognition (Commands, Dialing & Navigation)
- Class 10 EDGE/GPRS (2U/4D)
- Email: POP3, SMTP
- IM Wireless Village
- PIM and real desktop sync
- Apple i-tunes client for portable music enjoyment and familiarity.
- Dedicated music player buttons on the side for easy access to the player.
- Enhanced Bluetooth profiles, including stereo headset support.
- High Speed synchronization with Desktop with USB 2.0 for faster music and personal information downloads.
- Large (2 inch), high resolution (240x320), (TFT, 262K color display)
- 1.3 Megapixel camera with flash for capturing images or video.
- Approximately 10 Mbytes of built-in end user storage.

Speaker Dependant Voice Activation

The voice dialing feature allows the user to recall pre-programmed voice numbers simply by pressing the Voice/Ok key and speaking the desired voice tag. Up to 10 voice tags can be stored.

▶ *The user cannot place or receive calls while adding voice tags to the phone's memory.*

▶ *Because the GSM standard does not provide the option to store voice tags onto the SIM card, voice tags are added to the phone's memory.*

Wireless Access Protocol (WAP) 2.0 Compliancy

In the WAP environment, access to the Internet is initiated in wireless markup language (WML), which is derived from hypertext markup language (HTML). The request is passed to a WAP gateway which retrieves the information from the server in standard HTML (subsequently filtered to WML) or directly in WML if available. The information is then passed to the mobile subscriber via the mobile network.

The E680 and E680i's microbrowser can be configured for baud, idle timeout, line type, phone number, and connection type.

▶ *Bitmap image data will download as text. If the image is larger than the screen, only part of the image will display.*

▶ *If the user receives a call while in browser mode, the browser will pause and allow the user to resume after completing the call.*

Simplified Text Entry

iTAP™ predictive text entry. Press a key to generate a character and a dynamic dictionary uses this to build and display a set of word or name options. The iTAP™ feature may not be available on the phone in all languages.

Caller Line Identification

Upon receipt of a call, the calling party's phone number is compared to the phone book. If the number matches a phone book entry, that name will be displayed. If there is no phone book entry, the incoming phone number will be displayed. In the event that no caller identification information is available, an incoming call message is displayed.

▶ *User must subscribe to a caller line identification service through their service provider.*

SIM Toolkit™ - Class 2

SIM Application Toolkit is a value-added service delivery mechanism that allows GSM operators to customize the services they offer their customers, from the occasional user who requests sports news and traffic alerts, to a high call time business user who receives stock alerts and checks flight times. Operators can now create their own value-added services menu quickly and easily in the phone. The customized menu will appear as the first menu and may be updated over-the-air with new services when customers request them.

Network Based Chat Messaging

The chat messaging feature provides a constant WAP connection through GPRS to carrier, service center, or factory flexed WAP site. The specific site can also be entered by the user. Chat messaging is a carrier option.

Personal Information Management

The E2 telephone contains a built in calendar with date book reminders and phonebook that can be synchronized easily to a computer.

General Operation

Controls, Indicators, and Input/Output (I/O) Connectors

The E2 telephones' controls are located on the front and sides of the device, and on the keyboard as shown in Figures 1 and 2.

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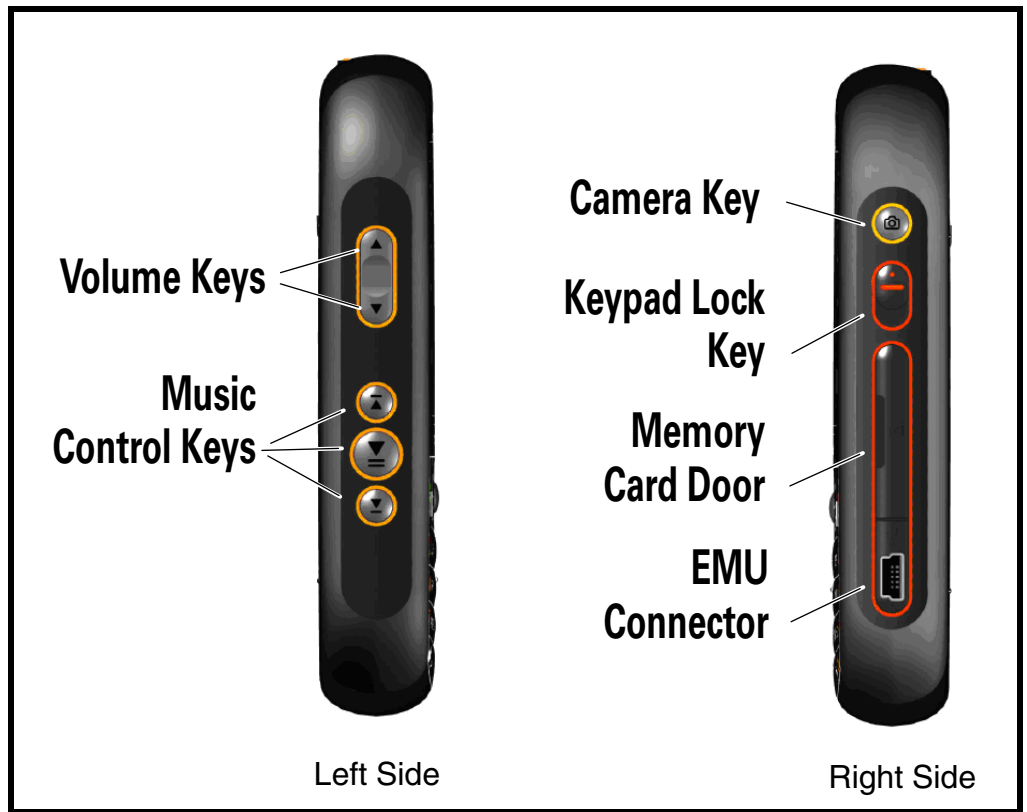**Figure 1. Telephone Controls and Indicators Locations (Front)**

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Figure 2. Telephone Controls and Indicators Locations (Sides)

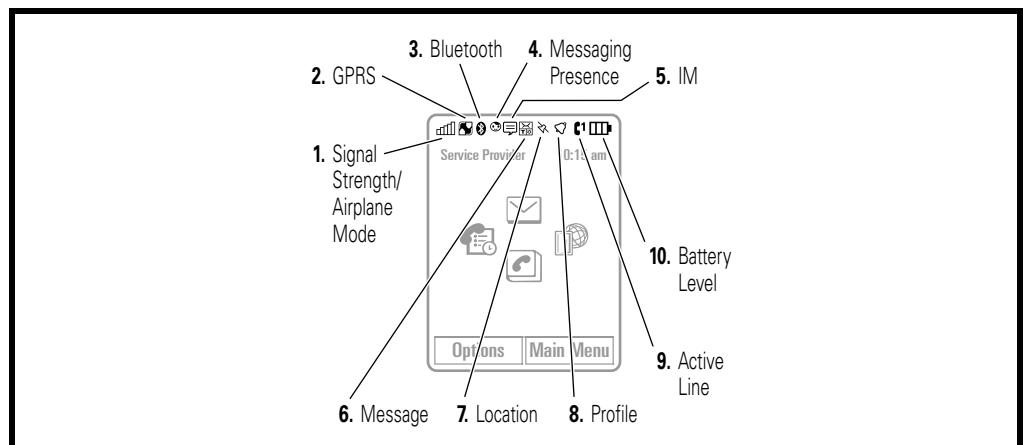Indicators, in the form of icons, are displayed on the LCD (see Figure 3).

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Figure 3. Main Screen Icon Display

1.   **Signal Strength/Airplane Mode Indicator –** Vertical bars show the
      strength of the network connection. You can't make or receive calls when the
      no signal indicator ▽ or airplane mode indicator ➔ shows. The roam indicator

(✝ or ᴀ̂ꟸ) shows when your phone is seeking or using a network outside your home network.

2. **GPRS Indicator –** Shows when your phone is using a high-speed *General Packet Radio Service* (GPRS) network connection. Indicators can include:

◧ = GPRS connection	⬆ = GPRS secure data transfer
⇌ = GPRS data transfer	⬆ = GPRS unsecure data transfer

3. **Bluetooth Indicator –** Shows when your phone is connected to another device in a Bluetooth connection.

4. **Messaging Presence Indicator –** Shows your instant messaging (IM) status. Indicators can include:

☺ = online	℘ = offline
℘ = busy	℘ = discrete
℘ = invisible to IM	

5. **IM Indicator –** Shows when you receive a new IM message.

6. **Message Indicator –** Shows when you receive a new text or voicemail message.

7. **Profile Indicator –** Shows the profile setting.

▽ = normal	✈ = airplane
▯▮ = vibrate	⁑▽ = sleeping
⊘▽ = silent	▽⁑ = active
⁑▽ = meeting	▽ = car

8. **Active Line Indicator –** Shows X to indicate an active call, or Y to indicate when call forwarding is on. Indicators for dual-line-enabled SIM cards can include:

☎¹ = line 1 active	☎² = line 2 active
☎ꟷ = line 1 call forward on	☎ꟷ = line 2 call forward on

9. **Battery Level Indicator –** Vertical bars show the battery charge level. Recharge the battery when your phone shows Low Battery.

Menu Navigation

ROKR E2 telephones are equipped with an icon and graphical-based user interface. All of the phone's features can be accessed with a 5-way navigation key that allows you to move easily through menus and select menu items.

Liquid Crystal Display (LCD)

The LCD provides an large color display with user-adjustable brightness settings for optimum readability in all light conditions. The large 240 x 320 pixel display

provides room for entering text, viewing graphics, tapping icons, and system prompts.

▶ *Whether a phone displays all indicators depends on the programming and services to which the user subscribes.*

Figures 4 shows the Idle Screen display.
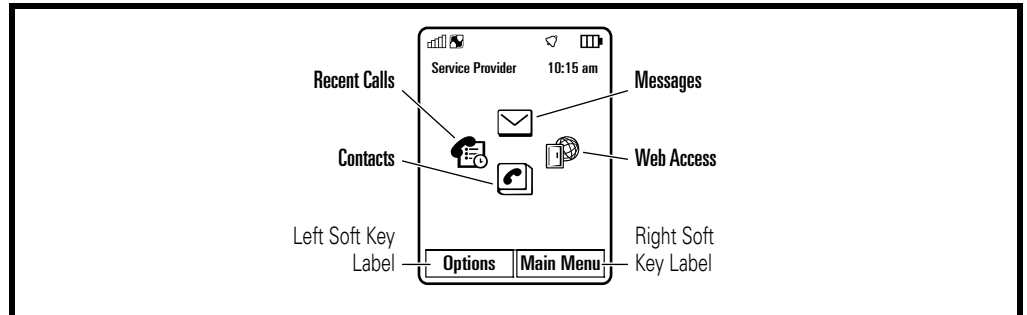
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Figure 4. Main Screen Display

Battery Information

Battery Charge Indicator

The telephone displays a battery charge indicator icon in the idle screen to indicate the battery charge level. The gauge shows four levels: 100%, 66%, 33%, and Low Battery.

Battery Removal

Removing the battery causes the device to immediately shut down and any pending work (partially entered phone book entries or outgoing messages, for example) is lost.

⚠ *All batteries can cause property damage and / or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.*

⚠ *If the battery is removed while receiving a message, the message will be lost.*

▶ *To ensure proper memory retention, turn the phone OFF before removing the battery.*

Battery Date Code

The battery date code is a 15 position alphanumeric code that provides, back end manufacture site information, year and week of manufacture date, cell type and vendor information.

The battery date code is used for cell phone batteries that were manufactured beginning in March 2000. The following paragraphs provide more detail about the battery date code.

1. Backend Pack Manufacturing Site (first position of battery code)

A = Motorola Penang	J= ESG, Chihuahua	S = T.D.I Scotland
B = T.D.I. Mexico	K= T.D.I. Romeoville	T = T.D.I Downers Grove
C = Motorola China	L = Motorola Lawrenceville	U = T.D.I. Hungary
D = T.D.I. Shanghai, China	M = TDI, Malaysia	V =
E = ESG, Evadin, Brazil	N = TDI, Manau, Brazil	W = ESG, Sung Woo
F = ESG, Propower, Korea	O =	X = ESG, Foxlink, China
G =	P = Intesys Arizona	Y = P&K (G.E.T.) Systems, Korea
H = Motorola Harvard	Q =	Z =
I = Motorola Ireland	R =	

2. Cell code and vendor (second and third position of battery code): 2 alpha characters.

Cell Reference Designator	Vendor	Size	Part Number
IA	A&TB	6.6x30x48	LGQ633048C
1B	A&TB	6.6x30x48	LGQ633048D
1C	A&TB	6.6x30x47.2	LGQ633048P
1D	A&TB	8.8x34x48	LGQ863448C
1E	A&TB	8.8x34x47.3	LGQ8634481-1
1F	A&TB	18x65	LGR18650E
IG	A&TB	7.5x14.5x48	TH750F5
1H	A&TB	10.5x43.6	TH550AAA
3F	Toshiba	7.5x14.5x48	TH900F5
3G	Gold Peak	1/3A	GPZSAFK
3H	Toshiba	4.4x34x56	LA8423456A

Cell Reference Designator	Vendor	Size	Part Number
3J	Saft	AA	VHAA1200
3K	Maxell	5.5x30x48	ICP053048G
3L	NEC-Moli	6.7x30x47.3	MK11-2293
3M	Mitsubishi	4.4x34x56	Lipmo001
3N	Toshiba	6.6x34x50	LGQ633450R
3P	Panasonic	6x34x50	CGP34506
3R	Toshiba	3.9x34x56	LAB363456A
3S	NEC-Moli	6.5x22x65	MK11-2300
3T	BYD	6.6*9.8x47.9	LP063048A
3U*	Panasonic	LL-AAAA	HHR70QAB4
3V	Sanyo (Toshiba)	6mm NiMH	THF6M
3W	LG Chemical	6x30x48	ICP633048
3X	BYD	5.4x30.1x48.2	LP053048A
3Y	BYD	6x34x50	LPO53048A
3Z*	Panasonic	6.2x35.2x16.	HF6OSS
4A	Peacebay-Manual	6mm NiMH	F6MG
4B	BYD	4x30x48	F6MG
4C	Peacebay-Auto	6.4x16.34	F6MP
4D	Sanyo	6mm NiMH	HFC1U
4E	BYD	8x3 x47.5	LP083448SH
4F	Sony	34x67	UP423467A4H
4G	LG Chemical	8.6x34x48	ICP863448
4H	LG Chemical	6.3x 34x50	ICP633450
4J*	BYD	4x30x41	LP043O41A
4K	GS Melcotec	4.6x29.5x41	LP423041A
4L	LG Chemical	4.2x30x48	ICP423048
4M	Toshiba	5.5x30x48	LGQ553048U
4N	Sanyo	3.8x34x50	UF383450P
4P	Toshiba	4.4x34x50	LGQ443450U
4R	Toshiba	4.4x30x48	LGQ443048U

Cell Reference Designator	Vendor	Size	Part Number
4S	Lishen	06x30x48	LP0601AE
4T	Panasonic	AAAALL	HHR70QAB4

3. Cell date code (fourth fifth and sixth position of battery code) consisting of characters as stated on cell pack by cell manufacturer. If a 3 digit code is not used, place a period in the sixth position.
4. Line and shift manufactured (optional) (seventh and eighth positions of battery code)
5. Year of battery manufacture (ninth position of battery code)

1990 = A	1997 = H	2004 = O	2011 = V
1991 = B	1998 = I	2005 = P	2012 = W
1992 = C	1999 = J	2006 = Q	2013 = X
1993 = D	2000 = K	2007 = R	2014 = Y
1994 = E	2001 = L	2008 = S	2015 = Z
1995 = F	2002 = M	2009 = T	
1996 = G	2003 = N	2010 = U	

6. Week of manufacture (tenth and eleventh positions of battery code).

A=0	C=2	E=4	G=6	I=8
B=1	D=3	F=5	H=7	J=9

7. Front end corepack manufacturing site (twelfth position of battery code (see step 1)).

Example of a battery date code: **A1V90311JCCC...**

position 1 = A = Motorola Penang.t (Backend Pack)
position 2 & 3 = 1V = Panasonic, AAA, HHR55B2
position 4, 5 & 6 = 903 = cell date code (from manufacturer)
position 7 & 8 = 11 = (TBD by supplier. Example: Line one of the first shift.)
position 9 = J = 1999 = Year of battery pack manufacture
position 10 & 11 = CC = week twenty two. (backend pack)
position 12 = C = Motorola, China. (Frontend Core Pack)
position 13, 14 & 15 = placeholders (...) to indicate pack has not been relabeled.

8.   Batteries sold in China have a 16 character date code:

Example: **YYYYMMDDABCXXXX**

Where YYYYMMDD is the actual battery manufacturing date
A is the line number
B is the shift number (A,C is day shift; B, D is night shift)
C is a serial number from A to Z
XXXX is a sequence number

9.   Embedded battery packs use a 6 character date code:
      Position 1 is the manufacturing site:

Manufacturing Site	Code
BYD	a
ESG	b
GSMT China	c
GSMT Japan	d
LG China	e
LG Japan	f
Maxell China	g
Maxell Japan	h
TDI	i
Toshiba China	j
Toshiba Japan	k

Position 2 and 3 is cell code and vendor. See step 2.

Position 4, 5, and 6 is cell date code (year and week). See steps 5 and 6.

Operation

For detailed operating instructions, refer to the appropriate User Guide listed in the Related Publications section toward the end of this manual.

Tools and Test Equipment

Table 1 list the tools and test equipment used on E2 telephones. Use either the listed items or equivalents.

Table 1. General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
See Table 5	Charger	Used to charge battery and to power phone
0180386A82	Antistatic Mat Kit (includes 66-80387A95 antistatic mat, 66-80334B36 ground cord, and 42-80385A59 wrist band)	Provides protection from damage to phone caused by electrostatic discharge (ESD)
8102430Z04	GSM / DCS / PCS Test SIM	Used to enable manual test mode
6680388B67	Disassembly tool, plastic with flat and pointed ends (manual opening tool)	Used during assembly/disassembly of phone
6680388B01	Tweezers, plastic	Used during assembly/disassembly
RSX4043-A	Torque Driver	Used to remove and replace screws
—	Torque Driver Bit T-6 Plus, Apex 440-6IP Torx Plus or equivalent	Used with torque driver
HP34401A[2]	Digital Multimeter	Used to measure battery voltage

1. To order in North America, contact Motorola Aftermarket and Accessories Division (AAD) by phone at (800) 422-4210 or FAX (800) 622-6210; Internationally, AAD can be reached by calling (847) 538-8023 or faxing (847) 576-3023.
2. Not available from Motorola. To order, contact Hewlett Packard at (800) 452-4844.

Disassembly

This section describes how to disassemble a E2 telephone. Tools and equipment used are listed in Table 1, preceding.

⚠ *Many of the integrated devices used in this equipment are vulnerable to damage from electrostatic discharge (ESD). Ensure adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.*

⚠ *Avoid stressing the plastic in any way to avoid damage to either the plastic or internal components.*

Removing and Replacing the SD (Secure Digital) Card

1. Ensure the phone is turned off.
2. Open the memory card door to see if a memory card is installed.
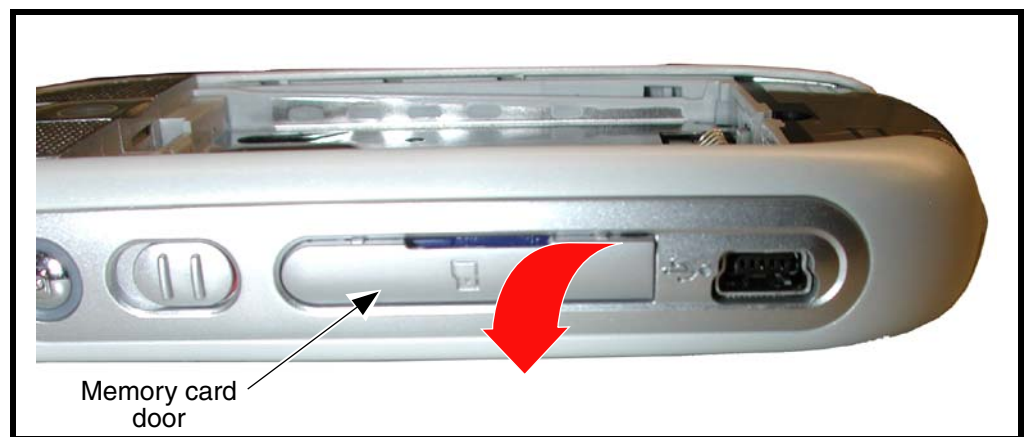
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Figure 5. Opening the Memory Card Door

3. If an SD card is present, first, push the SD Card inward to unlock it (see Figure 6),
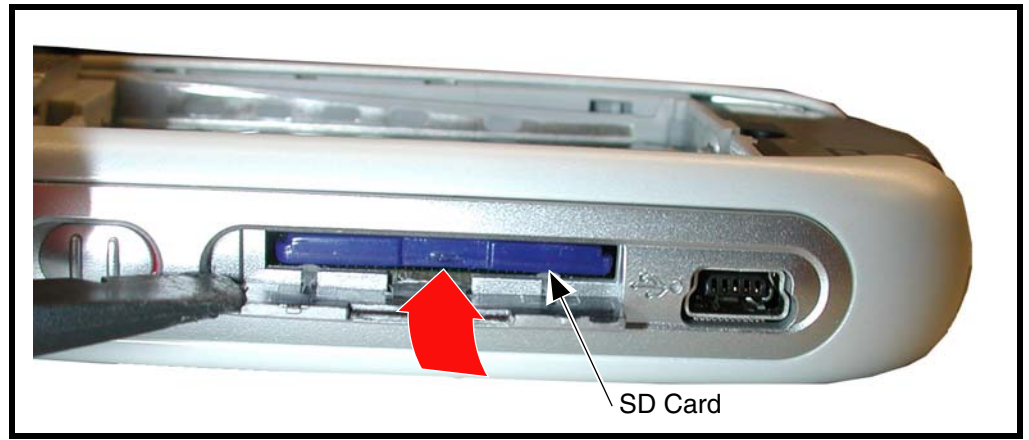
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Figure 6. Unlocking the SD Card

4. Pull the SD card out of the phone (see Figure 6).
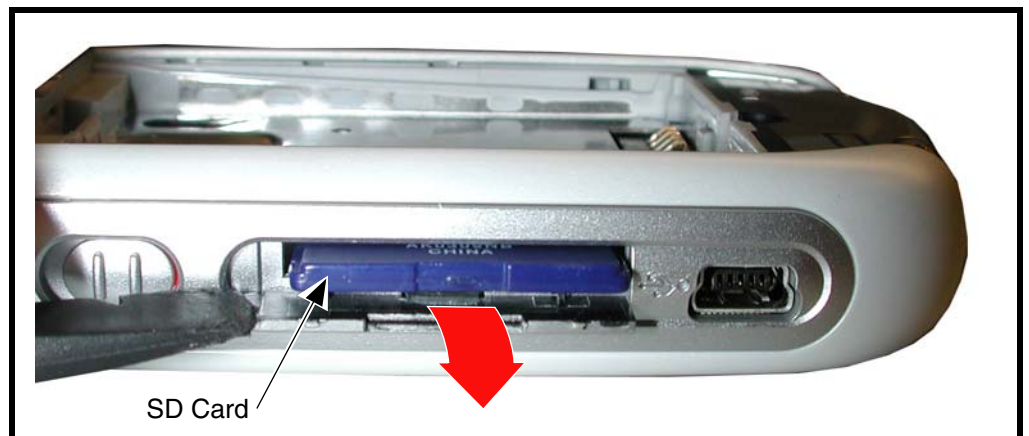
051884o

Figure 7. Removing the SD Card

5. To replace, slide the SD card all the way into the opening near the navigation key. Ensure the notched end of the SD card faces the phone and the metal contacts face downward.

Removing and Replacing the Battery Cover

1. Ensure the phone is turned off.
2. Remove the SD card if present.
3. Press down on the battery cover latch on the back of the phone and slide it the direction of the arrow and then lift the battery cover away from the phone (see Figure 8).
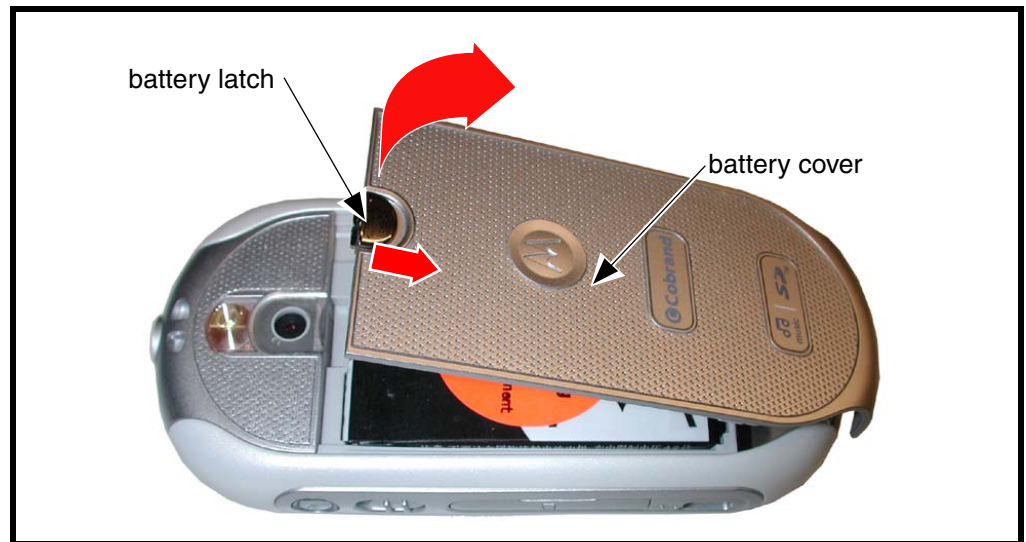
051869o

Figure 8. Removing the Battery Cover

4. To replace, align the battery cover to the back of the phone.
5. Gently press the battery cover into position onto the phone until the battery cover snaps into place.
6. Reinstall the SD card if present.

Removing and Replacing the Battery

Battery date codes are explained in the Battery Date Code section on page 17

Before handling the battery, please observe the battery cautions listed below.

⚠ *Do not handle batteries with wet or sweaty hands.*
Do not short the positive or negative terminals
Non conductive tweezers or grasping tools are to be used for battery connector manipulation, assembly, and disassembly.

1. Remove the SD Card, and battery cover, as described in the procedures.
2. Lift the end of the battery near the battery latch (use the disassembly tool if needed) as shown in Figure 5.
3. Lift the bottom end of the battery near the SD card slot out of the battery compartment as shown in Figure 5.
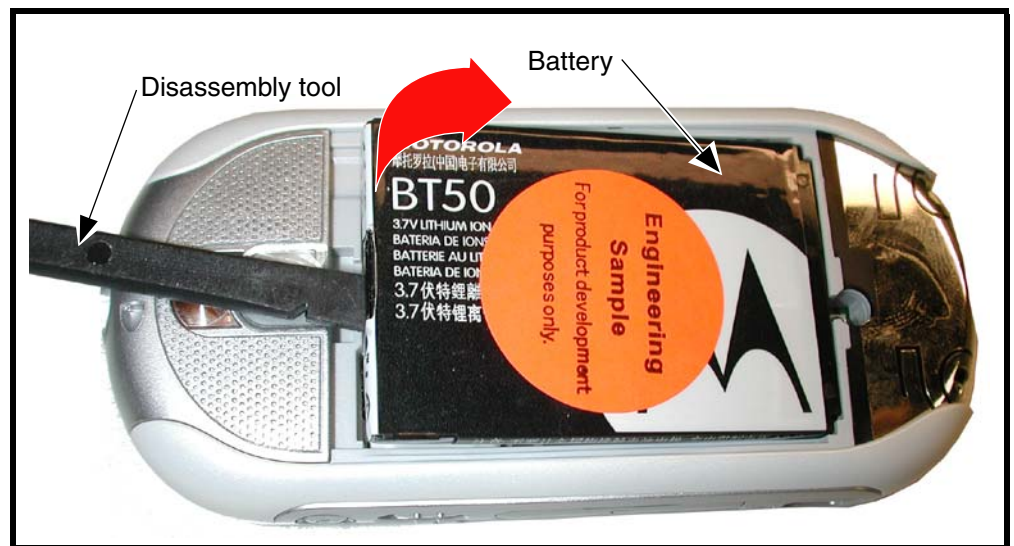
051870o

Figure 9. Removing and Replacing the Battery

⚠ *There is a danger of explosion if the Lithium ion battery is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

4. To replace, insert the top end of the battery into the battery compartment with contacts facing downward as shown in Figure 5B.
5. Press the top of the battery into the battery compartment.
6. Replace the battery cover as described in the procedures.

Removing and Replacing the Subscriber Identity Module (SIM)

1. Remove the SD card, battery cover, and battery as described in the procedures.
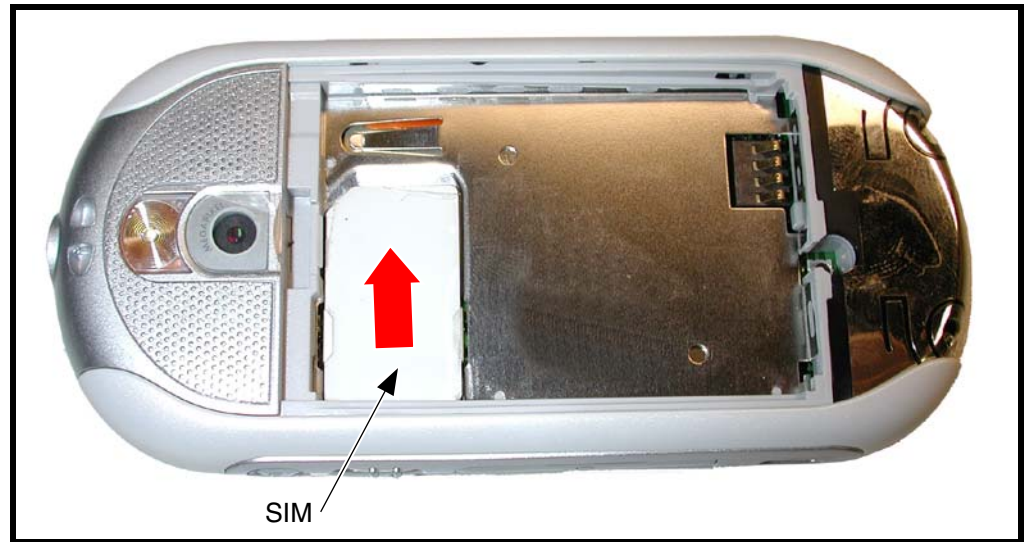2. Remove the SIM from the phone by sliding it in the direction indicated as shown in Figure 10.

051871o

Figure 10. Removing the SIM

3. To replace, carefully slide the SIM into position into the SIM holder.
4. Observe the notched corner when inserting the SIM.
5. Replace the battery and the battery cover as described in the procedures.

Removing the Side Bands

1. Remove the SD card, battery cover, battery and SIM as described in the procedures.
2. With the disassembly tool, pry the side band outward and then slide the side band upward and slide as indicated to release the side bands from the phone (see Figure 11).

051888o
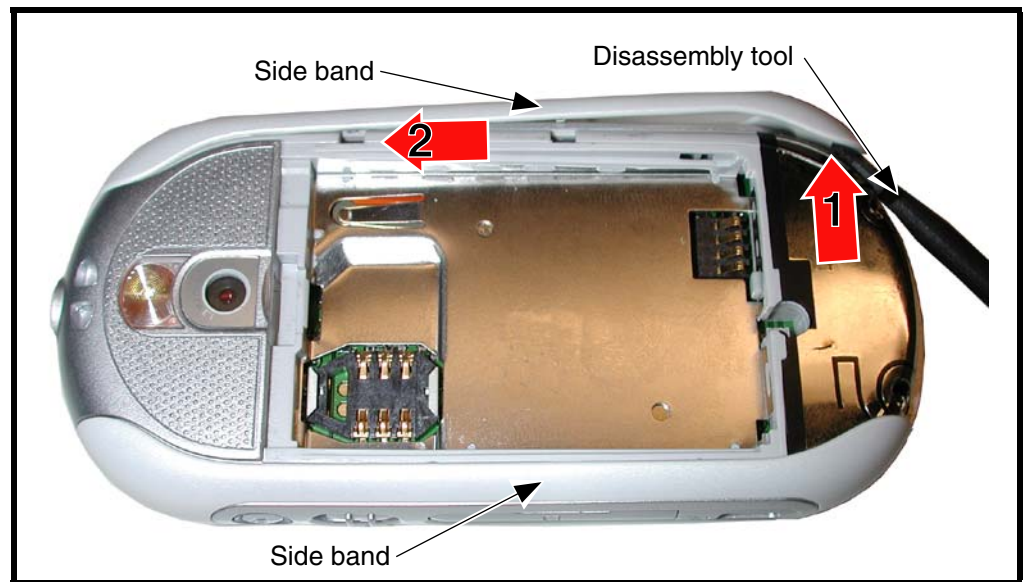
Figure 11. Side Band Removal

3. Repeat this procedure for opposite side band.
4. To replace, align side band with phone.
5. Carefully press side band into position on phone.
6. Repeat steps 4 and 5 for the opposite side band.
7. Replace the SIM, battery, battery cover and SD card as described in the procedures.

Removing and Replacing the Rear Housing

1. Remove the SD card, battery cover, battery, SIM, and side bands as described in the procedures.
2. Use a T6 driver to remove 6 housing screws (see Figure 12). Set the screws aside for reuse.

051889o
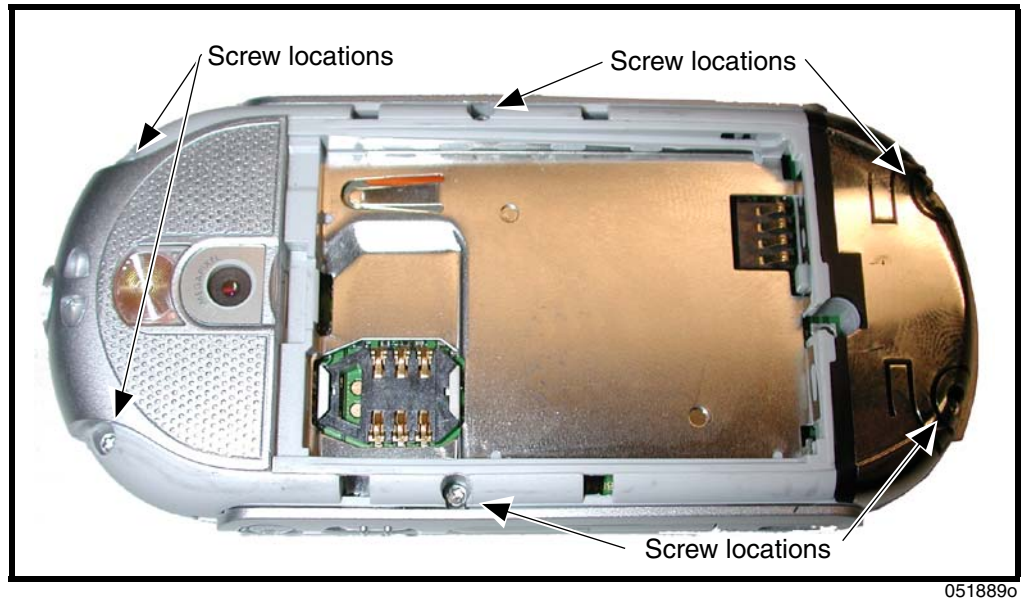
Figure 12. Housing Screw Locations

3. Use the disassembly tool to unseat the flex connector on the transceiver PC board under the rear housing (see Figure 13).
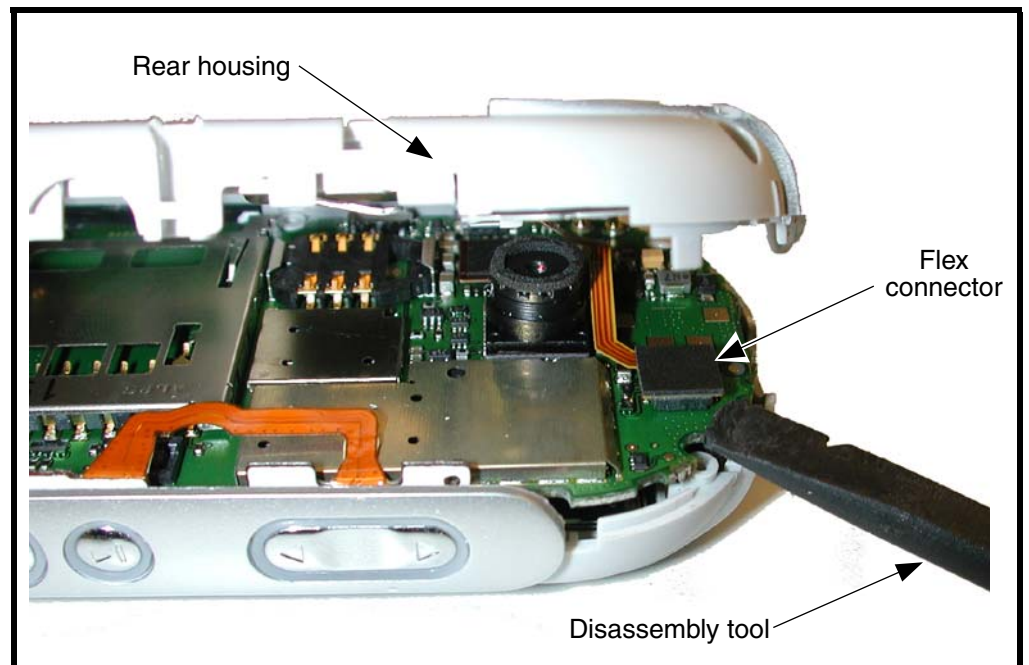

0511980o

Figure 13. Removing the rear housing

4. To replace, align the front and rear housings. Carefully seat the flex connector onto its socket on the transceiver PC board.
5. Lower the rear housing onto the phone.
6. Insert and tighten the 4 housing screws using the T6 driver. Tighten to 24.5 Ncm. Do not overtighten.
7. Replace the side bands, SIM, battery, battery cover, and SD card as described in the procedures.

Removing and Replacing the Camera Module

1. Remove the SD card, battery cover, battery, SIM, side bands, rear housing, as described in the procedures.

⚠ *This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.*

2. Use the disassembly tool to unseat the camera module connector from it's socket on the transceiver board.
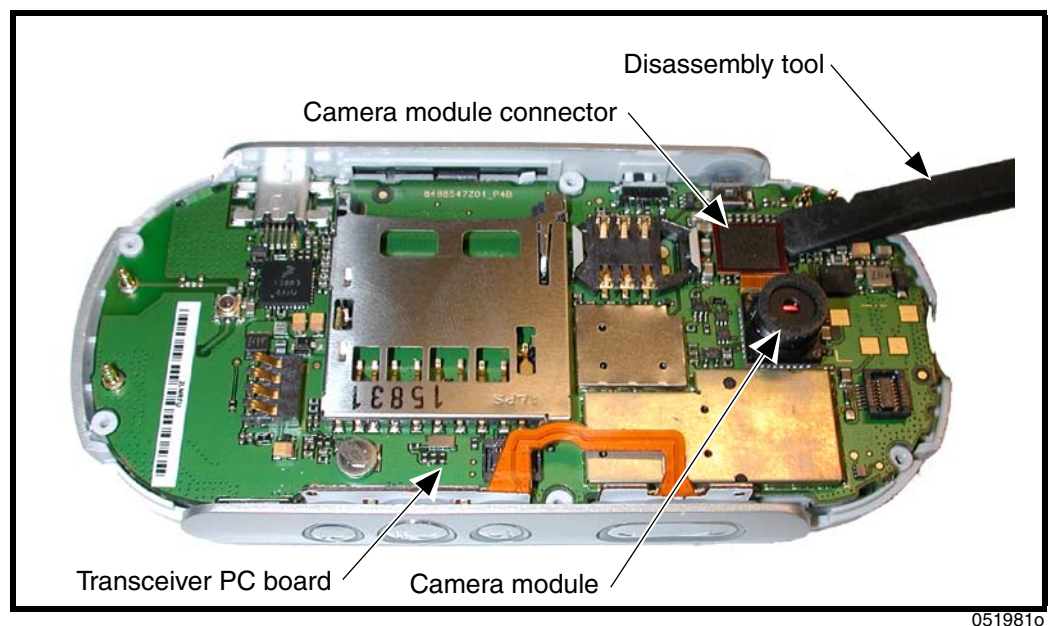3. Lift the camera module off of the transceiver board (see Figure 14).

051981o

Figure 14. Removing the Camera Module

4. To replace, align the camera module and connector to the socket on the transceiver PC board.
5. Press the camera connector gently until seated in it's socket. Be careful not to damage the camera flex.
6. Replace the rear housing, side bands, SIM, battery, battery cover, and SD card as described in the procedures.

Removing and Replacing the Transceiver PC Board Assembly

1. Remove the SD card, battery cover, battery, SIM, side bands, rear housing, as described in the procedures.
2. Carefully lift one side of the transceiver PC board out of the front housing.
3. Carefully use the disassembly tool to disconnect the display module flex connector from the transceiver PC board (see Figure 15).
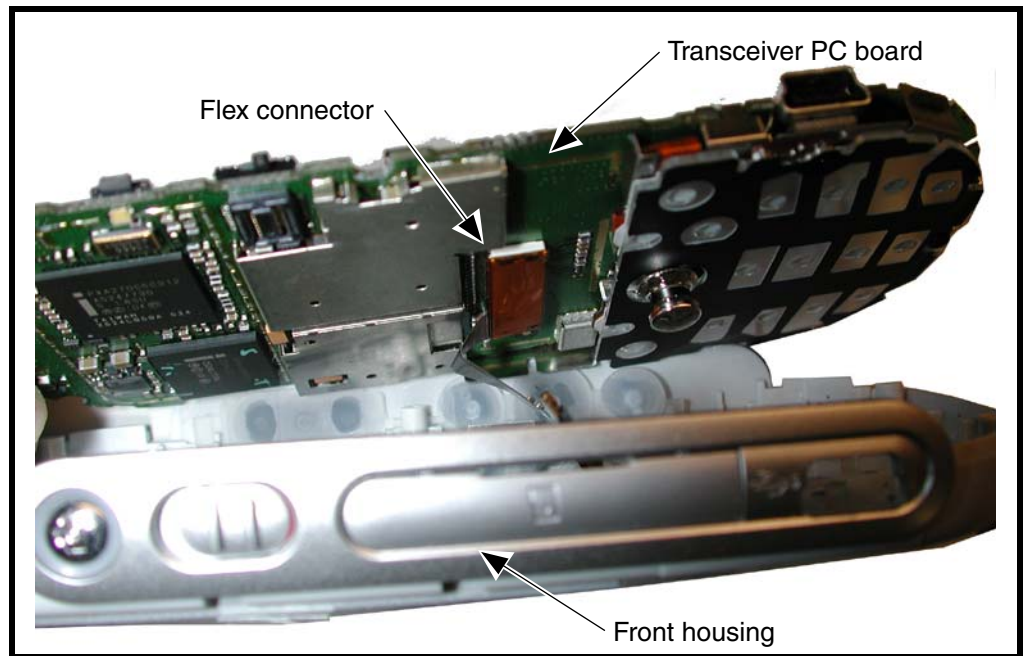
051982o

Figure 15. Removing the Transceiver PC Board Assembly

4. Carefully lift the transceiver PC board out of the front housing.
5. To replace, align the transceiver PC board assembly to the rear housing and then lower the transceiver PC board assembly onto the rear housing.
6. Replace the rear housing, side bands, SIM, battery, battery cover, and SD card as described in the procedures.

Removing and Replacing the Keypad Assembly

1. Remove the SD card, battery cover, battery, SIM, side bands, rear housing, and transceiver PC board assembly as described in the procedures.
2. Beginning underneath the front housing, use the plastic disassembly tool to push the keypad upward out of the front housing.
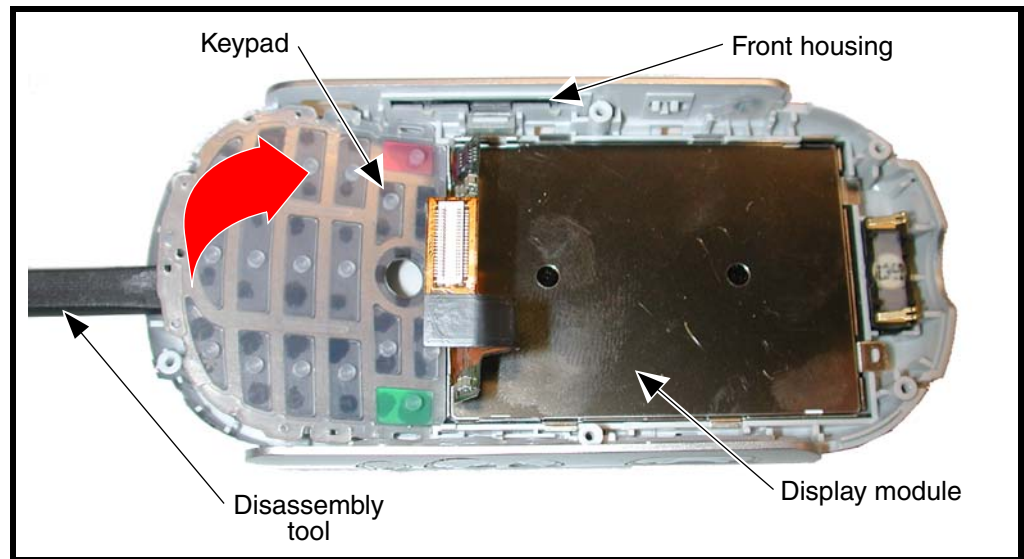3. Lift the keypad assembly away from the front housing as shown in Figure 16.

051987o

Figure 16. Removing the Keypad Assembly

4. To replace, turn the front housing over so that the display lens is facing up.

5. Insert the straight edge of the keypad between the display lens and the display module (see Figure 17).
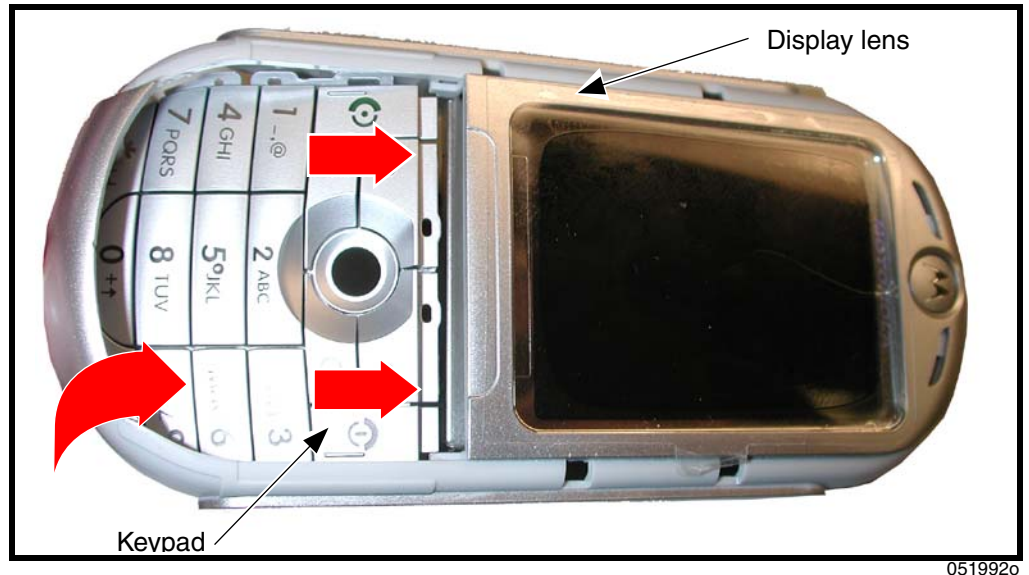
051992o

Figure 17. Installing the Keypad Assembly

6. Insert the rest of the keypad into the front housing. Use the keypad alignment holes to correctly align the keypad with the front housing.
7. Replace the transceiver PC board, rear housing, side bands, SIM, stylus, battery, battery cover, and SD card as described in the procedures.

Removing and Replacing the Display Module Assembly

1. Remove the SD card, battery cover, battery, SIM, side bands, rear housing, transceiver PC board assembly, and keypad assembly as described in the procedures.
2. Use the disassembly tool to lift the bottom edge of the display module assembly away from the front housing.
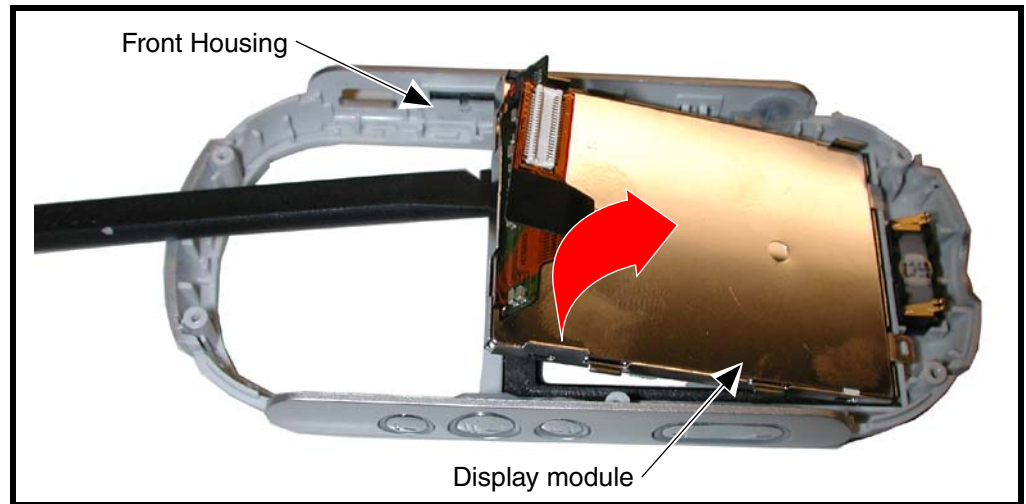3. Carefully lift the transceiver PC board assembly out of the front housing.

Front Housing

Display module

051993o

Figure 18. Removing the Display Module Assembly

4. To replace, align the transceiver PC board assembly to the rear housing and then lower the transceiver PC board assembly onto the rear housing.
5. Replace the keypad assembly, transceiver PC board assembly, rear housing, side bands, SIM, battery, battery cover, and SD card as described in the procedures.
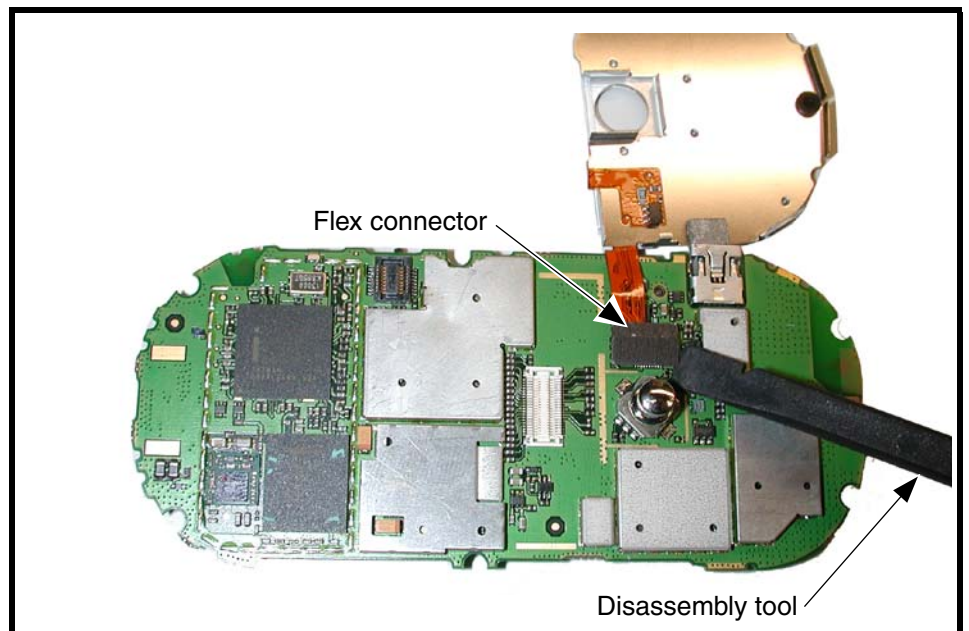
Removing the Keypad Switch PC Board

1. Remove the SD card, battery cover, battery, SIM, stylus, rear housing, side bands, transceiver PC board, and switch lock as described in the procedures.
2. Use the metal tweezers to release the keypad switch PC board latch on each side of the main transceiver PC board (see Figure 19).
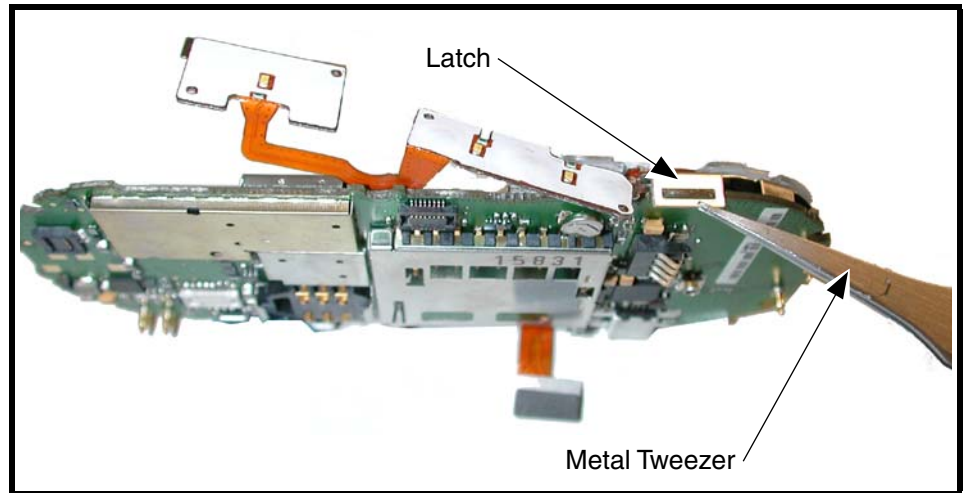
051995o

Figure 19. Removing the Keypad Switch PC Board Latch

3. Turn the keypad switch PC board over to reveal the PC board connector.
4. Use the disassembly tool to unseat the PC board flex connector.

051994o

Figure 20. Removing the Keypad Switch PC Board Connector

5. Lift the keypad switch PC board away from the transceiver PC board.
6. To replace, align the keypad switch flex connector to its socket on the transceiver PC board.
7. Gently press the keypad switch flex connector into position until the connector is properly seated in its socket.
8. Turn the keypad switch PC board over so that the keypad switch is aligned to the transceiver PC board.
9. Engage the metal latch on one side of the keypad switch PC board to the transceiver PC board.
10. Engage the metal latch on the other edge of the keypad switch PC board to secure the keypad switch PC board to the transceiver PC board.
11. Replace the display module assembly, keypad assembly, transceiver PC board assembly, rear housing, side bands, SIM, battery, battery cover, and SD card as described in the procedures.

Subscriber Identity Module (SIM) and Identification Label

SIM

A SIM is required to access the existing local GSM network, or remote networks when traveling (if a roaming agreement has been made with the provider).

The SIM card contains:

- All the data necessary to access GSM services
- The ability to store user information such as phone numbers
- All information required by the network provider to provide access to the network

Identification

Each Motorola GSM phone is labeled with a variety of identifying numbers. The following information describes the current identifying labels.

Mechanical Serial Number (MSN)

The MSN is an individual unit identity number and remains with the unit throughout its life.

The MSN can be used to log and track a phone on Motorola's Service Center Database.

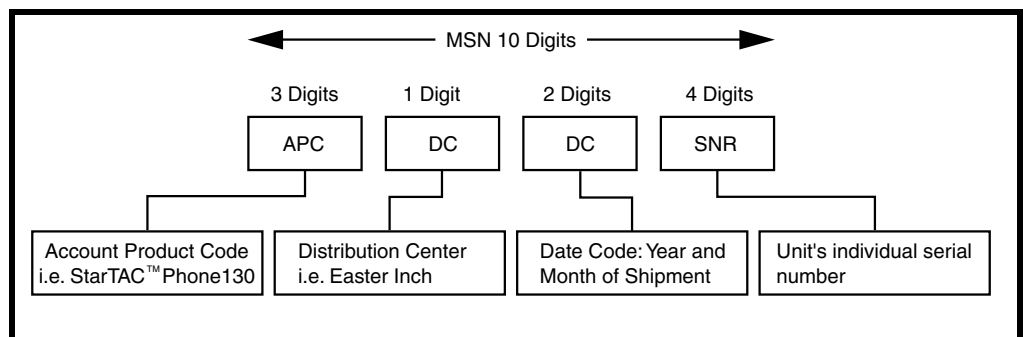The MSN is divided into 4 sections as shown in Figure 21.

000807a

Figure 21. MSN label breakdown

International Mobile Station Equipment Identity (IMEI)

The International Mobile station Equipment Identity (IMEI) number is an individual number unique to the PCB and is stored within the unit's memory.

The IMEI uniquely identifies an individual mobile station and thereby provides a means for controlling access to GSM networks based on mobile station types or individual units. The full IMEI structure is listed in Table 2.

Table 2. IMEI Number Breakdown

TAC	Serial Number	Check Digit
NNXXXXXX	ZZZZZZ	A

Where

TAC   Type Allocation Code, formerly known as Type Approval Code

NN   Reporting body identifier

XXXXXX Type Identifier

ZZZZZZ   Individual unit serial number

A   Phase 1 = 0.
Phase 2 = check digit defined as a function of all other IMEI digits

Other label number configurations present are:

- **TRANSCEIVER NUMBER**: Identifies the product type. Normally the SWF number. (i.e. V100).
- **PACKAGE NUMBER**: Identifies the equipment type, mode, and language in which the product is shipped.

Troubleshooting

Manual Test Mode

Motorola E2 telephones are equipped with a manual test mode capability. This allows service personnel to verify functionality and perform fault isolation by entering keypad commands.

To enter the manual test command mode, a GSM / DCS test SIM must be used.

1. Turn the phone OFF.
2. Remove the battery as described in the procedures.
3. Remove the customer's SIM card from the phone as described in the procedures.
4. Insert the test SIM into the SIM slot.
5. Replace the battery as described in the procedures.
6. Turn the phone ON.
7. In the idle screen, press and hold the ⌗ key to enter test mode. The test mode screen appears.
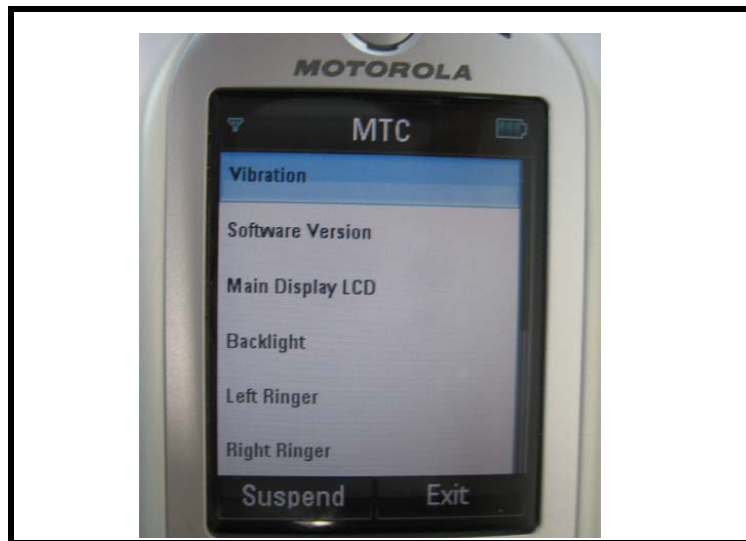
060107o

Figure 22. Test Mode Screen

8. Select Suspend and then enter individual test parameters.
9. Scroll up-and-down using the navigation key to select the specific function to be tested.

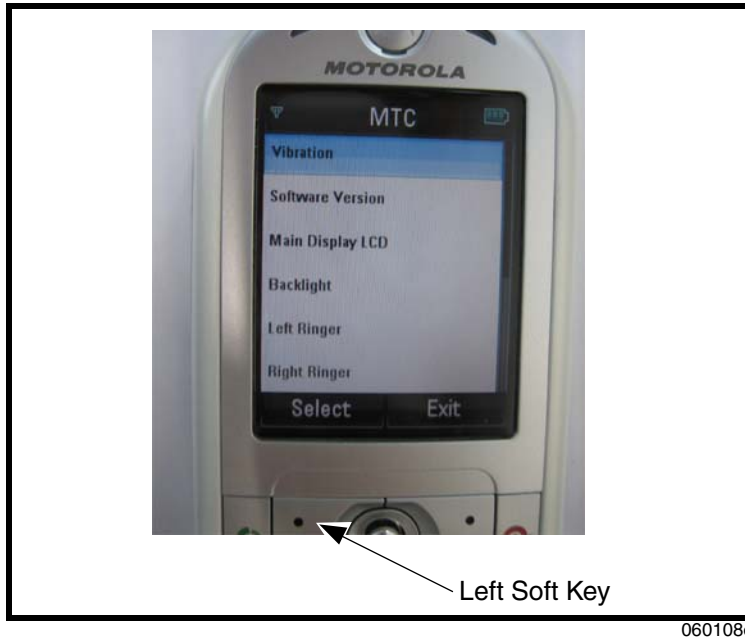10. Press the left soft key (⊟) to begin the test.

Figure 23. Test Parameters

Troubleshooting Chart

Table 3. Level 1 and 2 Troubleshooting Chart

Symptom	Probable Cause	Verification And Remedy
1. Telephone will not turn on or stay on.	a) Battery either discharged or defective.	Measure the voltage at TP_BATT+ with battery attached. If voltage is below 3.0V, attach a charger to the phone and ensure that the phone is charging. If the phone does not charge, change the battery and repeat the measurement charging procedure. If the phone still does not turn on, proceed to b).
	b) Transceiver board defective.	Replace the faulty board with a known good transceiver board. If the phone powers up after replacement, reassemble the phone with a new transceiver board. Verify that the fault is fixed.
2. Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	a) Speaker/antenna assembly defective	Check connection between the speaker/antenna assembly and the transceiver board. If the contact is intermittent visually, replace with a known good speaker/antenna assembly. If the fault is still present, proceed to b.
	b) Transceiver board defective.	Replace with a known good transceiver board (refer to 1b). Verify that the fault has been cleared with the new transceiver board and reassemble the unit.
3. No display.	a) Connections between transceiver and display faulty.	Check connections between transceiver board and display. If display still does not come up, proceed to b.
	b) Display module defective.	Replace with a known good display module. Verify that the fault has been cleared with the new display module and reassemble the unit.
4. Incoming call alert transducer audio distorted or volume is too low.	a) Faulty antenna/speaker assembly.	Replace the antenna/speaker assembly with a known good antenna/speaker assembly. If the problem goes away, replace with a new antenna/speaker assembly. Else proceed to b.
	b) Transceiver board defective	Replace with a known good transceiver board (refer to 1b). Verify that the fault has been cleared with a new transceiver board.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone defective.	Replace the microphone as described in the procedures. If fault is not cleared, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
6. Receive audio from earpiece speaker is weak or distorted.	a) Contacts between earpiece speaker and transceiver board faulty.	Replace the earpiece speaker with a known good one. Reassemble with a new front housing if the fault goes away. If the fault is still present, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.

Table 3. Level 1 and 2 Troubleshooting Chart (Continued)

Symptom	Probable Cause	Verification And Remedy
7. Telephone will not recognize or accept SIM card.	a) SIM card defective.	Check the SIM card contacts for dirt. Clean if necessary, and check if fault has been cleared. If the contacts are clean, insert a known good SIM card into the telephone. Power up the unit and confirm that the card has been accepted. If the fault goes away, replace the defective SIM card. If the SIM card is not at fault, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the phone with the new transceiver board.
8. Vibrator feature not functioning.	a) Vibrator/Camera flash/Speaker assembly.	Replace the Vibrator/ Camera Flash /Speaker assembly, placed in the back housing with a good known assembly. Verify that the fault has been cleared and reassemble the unit with the Vibrator/Camera flash/Speaker assembly. If the Vibrator/Camera flash/Speaker assembly is not at fault, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the phone with the new transceiver board.
9. No or weak audio when using headset.	a) Headset plug not pushed in fully.	Ensure the headset plug is fully seated in the jack.
	b) Faulty jack on transceiver board.	Replace the transceiver board with a known good transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
10. Camera feature not functioning.	a) Camera module defective.	1. Replace camera module with a good known camera module. Verify that the fault has been cleared and reassemble the phone with the new camera module. If the camera module is not at fault, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the phone with the new transceiver board.
11. No camera flash.	a) Vibrator/Camera flash/Speaker assembly defective	Replace the Vibrator/ Camera Flash /Speaker assembly, placed in the back housing with a good known assembly. Verify that the fault has been cleared and reassemble the unit with the Vibrator/Camera flash/Speaker assembly. If the Vibrator/Camera flash/Speaker assembly is not at fault, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1b). Verify that the fault has been cleared and reassemble the phone with the new transceiver board.

Programming: Software Upgrade and Flexing

Contact your local technical support engineer for information about equipment and procedures for flashing and flexing.

Part Numbers

The following section provides a reference for the parts associated with E2 telephones.

Exploded View Diagram

051890o

Figure 24. Exploded View Diagram

Exploded View Parts List

Table 4. Exploded View Parts List

Item Number	Motorola Part Number	Description
1		Rear housing assembly
2		Bluetooth antenna
3		Acoustic booth
4		1.3M camera module
5		Joystick
6		Transceiver PCBA
7		Side bands
8	0309315B35	Screws (6X)
9		Front housing assembly
10		Side keys
11		Keypad
12		Display module
13		Keypad holder
14		PF4 Series battery
15		Battery door assembly
16		Internal antenna

There is a danger of explosion if the Lithium ion battery pack is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.

For information on ordering parts please contact EMEA at +49 461 803 1404.

Accessories

Table 5. Accessories

Accessory Description	Part Number
Audio & Connectivity	
1 GB micro SD card & Mot SD adapter	syn1406
128MB micro SD card & Mot SD adapter	SYN1403
256MB micro SD card & Mot SD adapter	SYN1404
32MB micro SD card & Mot SD adapter	SYN1401
512MB micro SD card & Mot SD adapter	SYN1405
64MB micro SD card & Mot SD adapter	SYN1402
Data Cable Mini USB/USB/Serial	SKN6371
Headset Stereo 3.5mm	SYN1302
Mobile Phone Tools	Region-specific
SD Card - 128MB	SVN4595
SD Card - 32MB	SVN4593

Table 5. Accessories (Continued)

Accessory Description	Part Number
SD Card - 64MB	SVN4594
Bluetooth Products	
Bluetooth Module (Stereo Music and Telephony)	SYN1447
Bluetooth Headset - Oakley RAZRWIRE (Mercury: NA) - H7	98679H
Bluetooth Headset - Oakley RAZRWIRE (Pewter/Black: NA) - H7	98677H
Bluetooth Headset - Oakley RAZRWIRE (Platinum/Rootbeer: NA) - H7	98678H
Bluetooth Class 1 USB Adapter PC850	SYN1244
Bluetooth Headset (Medusa - Pink) - H300	SYN1417
Bluetooth Headset (Medusa - Pure White) - H300	SYN1416
Bluetooth Headset (MiniBlue) - H5	SYN1310
Bluetooth PC USB Adapter	SYN0717
H500 Bluetooth headset Black Softtouch	SYN1374
H500 Bluetooth Headset Hot Pink	SYN1525
H500 Bluetooth Headset iPOD Blue	SYN1523
H500 Bluetooth Headset iPOD Gold	SYN1524
H500 Bluetooth Headset Spa Blue	SYN1527
H500 Bluetooth Headset White	SYN1526
H500 Gloss Black	SYN1375
H500 Nickel Japan	SYN1441
H500 Pink	SYN1436
RAZR H3 Black	SYN1437
RAZR H3 Silver	SYN1438
Bluetooth Car Kit - Asia/Americas	S9642
Bluetooth Car Kit - Euro	S9643
Bluetooth Car Kit - HF850	SJ0014
Bluetooth Car Kit - IHF1000 - Americas/Asia	98676H
Bluetooth Car Kit - IHF1000 - EMEA	CFLN1232
Bluetooth Headset - Glossy Black - HS820	SYN9951
Bluetooth Headset - Green - HS820	SYN0945
Bluetooth Headset - Grey - HS820	SYN1106
Bluetooth Headset - HS850 (Paladin Refresh - Black)	SYN1107
Bluetooth Headset - HS850 (Paladin Refresh - Blue)	SYN1226
Bluetooth Headset (Aphrodite) - H700	SYN1311
Bluetooth Headset (Genie Refresh - Dk Blue) - HS815	SYN1201
Bluetooth Headset (Mage) - HS830	SYN0996
Bluetooth Headset (Medusa - Pearl Dark Gray) - H300	SYN1297
Bluetooth Headset (Nexus) - HS805	SYN0986
Bluetooth Headset (Paladin) - HS810	SYN9826
Bluetooth Headset (Persephone) - H605	SYN1303
Bluetooth Helmet Headset - HS830 (Mage)	SYN0997
Bluetooth Mono Headset, Nickel- H500	SYN1290

Table 5. Accessories (Continued)

Accessory Description	Part Number
Bluetooth Speaker (Quadrant Refresh) - HF820	SYN0736C
Bluetooth Stereo Headset HT820 (Neptune)	SYN0948
Bluetooth Stereo Transceiver DC800 (Triton)	SYN1001
In vehicle Solutions	
Self Install Car Kit Universal - Mandarin - Smart Drive+	SYN0888
Self Install Car Kit Universal - Smart Car Kit - Smart Drive	SYN0890
Smart Cable EMU - Motorola	SYN1003
Vehicle Power Adapter EMU - VC700	SYN0847
Power Solutions	
Battery BT50 (PF4 Ltd) Li-Ion 880 mAh	SNN5771
Battery-Only-Charger for PF batteries, US/Euro plug	SYN1488A
Battery-Only-Charger for PF batteries, PRC plug	SYN1489A
Battery-Only-Charger for PF batteries, Taiwan plug	SYN1490A
Battery-Only-Charger for PF batteries, Hong Kong plug	SYN1491A
Travel Charger EMU Mid-Rate Switcher - Argentina	SPN5192
Travel Charger EMU Mid-Rate Switcher - Australia	SPN5193
Travel Charger EMU Mid-Rate Switcher - BRAZIL	SPN5187
Travel Charger EMU Mid-Rate Switcher - EURO	SPN5189
Travel Charger EMU Mid-Rate Switcher - INDIA	SPN5194
Travel Charger EMU Mid-Rate Switcher - MEXICO	SPN5186
Travel Charger EMU Mid-Rate Switcher - PRC	SPN5188
Travel Charger EMU Mid-Rate Switcher - TWN	SPN5216
Travel Charger EMU Mid-Rate Switcher - UK/HK	SPN5190
Travel Charger EMU Mid-Rate Switcher - US ENG	SPN5185
Travel Charger EMU Rapid Switcher - Argentina	SPN5197
Travel Charger EMU Rapid Switcher - BRAZIL	SPN5196
Travel Charger EMU Rapid Switcher - HK	SPN5199
Travel Charger EMU Rapid Switcher - MEXICO	SPN5200
Travel Charger EMU Rapid Switcher - PRC	SPN5198
Travel Charger EMU Rapid Switcher - US	SPN5202
Travel Charger EMU Rapid TWN	SPN5270

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