MOTOROLA

PRELIMINARY

MPx220
Quad-band Wireless Smartphone

MPx220
GSM 850/900/1800/1900MHz

Contents

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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 a label usually located under the battery. 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 MPx220 smartphones. Refer questions about this manual to the nearest Customer Service Manager. This manual contains mechanical service information required for the equipment described and is current as of the printing date.

Audience

This document aids service personnel in testing and repairing MPx220 smartphones. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

Scope

This manual provides basic information relating to MPx220 smartphones, 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.

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

Warranty Service Policy

The product is sold with the standard 12 month 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 phones 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 phones 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). Motorola High Tech 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.

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)

Replacement parts, test equipment, and manuals can be ordered 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

For EMEA spare parts call +49 461 803 1638.
For Asia spare parts call +65 648 62995.

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Specifications

General Function	Specification
Dimensions	99.9 x 48 x 24 mm
Weight	110g
OS	Microsoft Smart Phone 2003
Desktop Applications	ActiveSync 3.7.1, Outlook 2002
Processor	TI OMAP 330, 192 MHz
Internal Storage Memory	64MB NAND flash
External Storage Memory	Mini-SD slot
Internal LCD	Type: TFT Resolution: 176 X 220 Color: 65K
External LCD	Type: STN Resolution: 96 X 64 Color: 56K
Band	Quad-band (GSM 850 + EGSM 900 + DCS 1800 + PCS 1900)
Java	MIDP 2.0
Polyphonic Ring Tone	40 polyphonic ring tones

Camera	Flash: Super bright LED
	Resolution: 160 X 120 (QQVGA)
	              176 X 144 (QCIF)
	              320 X 240 (QVGA)
	              640 X 480 (VGA)
	              1280 X 960 (SXGA)

Battery	Capacity: 1000 mA Talk Time: Up to 5 hrs Standby Time: Up to 200 hrs
Data Support	GPRS class: B
Browser	WAP 1.2.1, HTML 4.0
Product Type	Folder type
Messaging	SMS/MMS/Email (ActiveSync w/ Outlook, POP3, IMAP)/MSN Messenger/Cell broadcast service
Synchronization	Synchronizing Information: Inbox, Contacts, Calendar, Tasks Bearer: IrDA, USB, Bluetooth, and Over the Air (OTA via CSD or GPRS)
Antenna	Internal type
I/O Bus Connector	Bluetooth 1.1/Infrared/USB 1.1/USB-CE cable

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General Function	Specification
Frequency Range (EGSM)	880-915 MHz Tx/925-960 MHz Rx
Frequency Range (DCS)	1710-1785 MHz Tx/1805-1880 MHz Rx
Frequency Range (PCS)	1850-1910 MHz Tx/1930-1990 MHz Rx
Channel Spacing	200 KHz
Channels	EGSM 174/DCS 374/PCS 299 (carriers with 8 channels per carrier)
Modulation	GMSK at BT= 0.3
Transmitter Phase Accuracy	$\leq$ 5 degrees RMS, 20 degrees peak
Duplex Spacing	EGSM 45 MHz/DCS 95 MHz/PCS 80 MHz
Frequency Stability	$\pm$ 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	+ 3.3V dc to + 4.2V dc
Average Transmit Current	300 mA max
Average Standby Current	5 mA max
Temperature Range	-10℃ to 55℃ (15℉ to 130℉)

Transmitter Function	Specification
RF Power Output	32.8 dBm nominal GSM 850/ 33 dBm nominal EGSM 900/ 29.5 dBm nominal DCS 1800/ 29.8 dBm nominal PCS 1900
Output Impedance	50 ohms nominal
Spurious Emissions	$\leq$ -36 dBm from 0.1 to 1 GHz/ $\leq$ -30 dBm from 1 to 4 GHz

Receiver Function	Specification
Receive Sensitivity	-104 dBm GSM 850/ -104 dBm EGSM 900/ -104 dBm DCS 1800/ -104 dBm PCS 1900
Rx Bit Error Rate (100k bits) Type II	$\leq$ 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

Product Overview

Motorola MPx220 mobile smartphones 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 smartphone 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 MPx220 is a quad-band phone that allows roaming within the GSM 850 MHz, EGSM 900 MHz, digital cellular system (DCS) 1800 MHz, and personal cellular system (PCS) 1900 MHz bands.

MPx220 smartphones support GPRS and SMS in addition to traditional circuit switched transport technologies. GPRS, where available, provides substantial increases in mobile data communications performance and the efficient use of radio spectrum. Data transmission rates for GSM networks can potentially increase from the current rate of 9.6 kbps up to a theoretical maximum of 171.2 kbps. An increased data rate is by no means the only benefit provided by GPRS. A key advantage is the provision of a permanent virtual connection to the network. This "always on" connection is possible because GPRS uses packet data transfer so that, for example, email can be downloaded in "background mode." There is no need for the user to reconnect 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 with a metal enclosure. The display and speaker, as well as the 18-key keypad, transceiver printed circuit board (PCB), microphone, charger and headphone connectors, power button, camera key, serial IrDA (SIR), Bluetooth and USB connectivity, and mini-SD slot are contained within the clam shell form-factor housing. The user-replaceable 1000 mAh Lithium Ion (LiIon) battery provides up to 300 minutes of talk time with up to 200 hours of standby time[1]. The phone accepts 3V mini subscriber identity module (SIM) cards which fit into the SIM holder next to the battery. These telephones feature a 176 x 220 pixel high-resolution color graphics display and an internal antenna.

Features

MPx220 smartphones 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 this family of telephones include:

- Lower voltage technology that provides increased standby and talk times
- Extended GSM (EGSM) channels
- Tri-coder/decoder (CODEC) that allows full rate, half rate, and enhanced full rate modes of transmission
- Supports SMS, concatenated SMS, MMS, Email, MSN Messenger and cell broadcast mes-sages[2]
- Supports GPRS, circuit switched, and SMS networks[2]
- WAP 1.2.1 compliant[2]
- 176 X 220 pixel 65K color graphical display with 8 lines of text, 2 lines of icons, and 1 line of prompts
- Embedded VGA Camera

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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.

2. Network, subscription and SIM card or service provider dependent feature. Not available in all areas.

- Display animation
- VibraCall® vibrating alert
- 5-way navigation key
- Downloadable wallpaper, icons, animations, video clips and MIDI ring tones[3]
- Polyphonic speaker supporting 128 different instruments
- Application Shortcuts, Voice Activation for phone numbers and phone book entries
- Simplified text entry using iTAP™ predictive text entry
- Caller line identification (CLI)[3]
- Supports call diverting for incoming voice calls[3]
- Supports 3V SIM cards
- SIM Toolkit™ Class 3 (STK)[3]
- Personal management tools calculator with currency converter, real time clock with date, reminders, and caller profiling
- Phase II Unstructured Supplementary Service Data (USSD)[3]
- Hearing Aid Telephone Interconnection System (HATIS) support
- Chat messaging via WAP over GPRS[3]
- Multiple destination SMS
- ActiveSync™ Synchronization Capability

Speaker Dependent Voice Activation

The voice dialing feature allows the user to recall pre-programmed voice numbers simply by pressing and holding the up Volume key and speaking the desired voice tag. You can also dial 7-digit or 10-digit phone numbers by voice.

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) 1.2.1 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 MPx220'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.

3. Network, subscription and SIM card or service provider dependent feature. Not available in all areas.

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 3

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 MPx220 smartphone contains a built-in calendar with date book reminders, phonebook, inbox and things-to-do list that can be synchronized easily to a computer or PDA.

Camera

The MPx220 smartphone contains a built-in camera. You can take photos to view and send as Multimedia Messaging Service (MMS) or email messages.

Other Features

Detailed descriptions of the other features can be found in the appropriate MPx220 smartphone user guides listed in the Related Publications section toward the end of this manual.

General Operation

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

The MPx220 smartphones' controls are located on the front and side of the device, and on the keyboard as shown in Figure 1. Indicators, in the form of icons, are displayed on the LCD (see Figure 1).
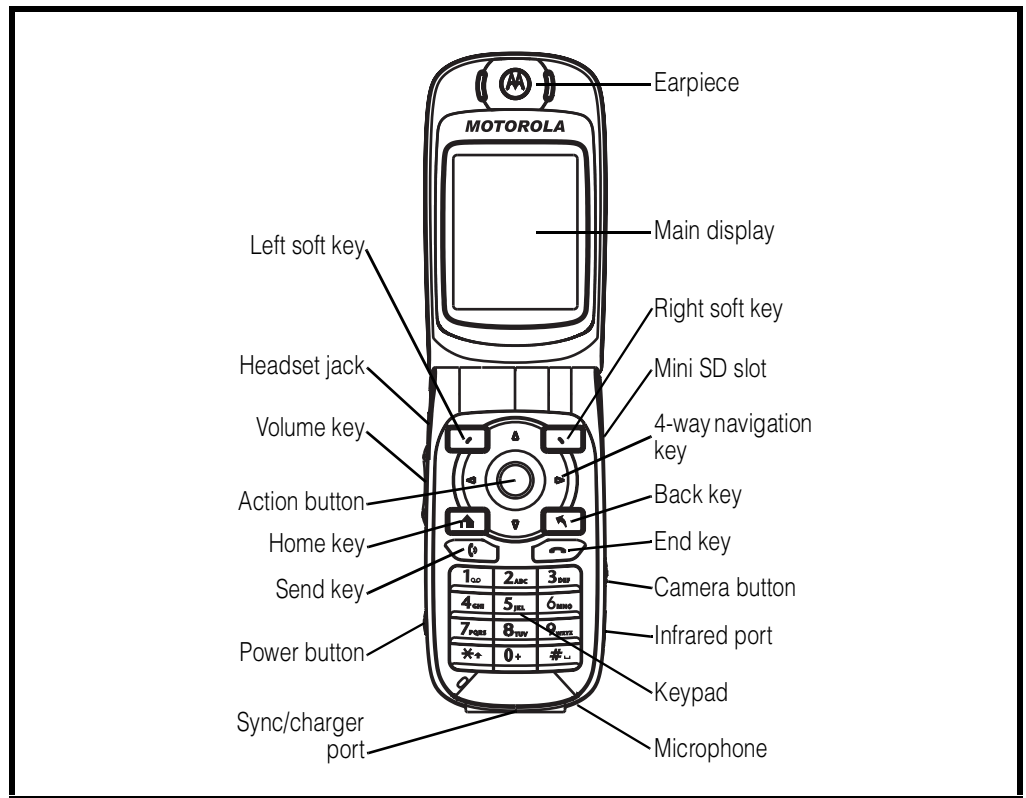

Figure 1. MPx220 Smartphone Controls Locations

Menu Navigation

MPx220 smartphones are equipped with a simplified icon and graphical-based user interface. The phone also features dynamic shortcuts to menu options or applications that are accessed by scrolling and selecting desired icons near the top of the main display. See Figure 3 for details of the MPx220 menu structure. A 5-way navigation key allows you to move easily through menus and confirm your selection. The left side key (volume key) functions as a speaker volume up/down key only during a call. When the up volume key is held down from a idle display, provides a shortcut to voice commands. When you use the built-in camera, press the right side key (camera key) to capture images with the phone flip closed and the external display as the viewer.

Liquid Crystal Display (LCD)

The LCD provides an 832 square millimeter multicolor backlit color display with user-adjustable contrast settings for optimum readability in all light conditions. The large bit-mapped 176 x 220 pixel display includes up to 8 lines of text, 2 lines of icons, and 1 line of prompts.

Display animation makes the phone's icon menu move smoothly as the user scrolls up and down.

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

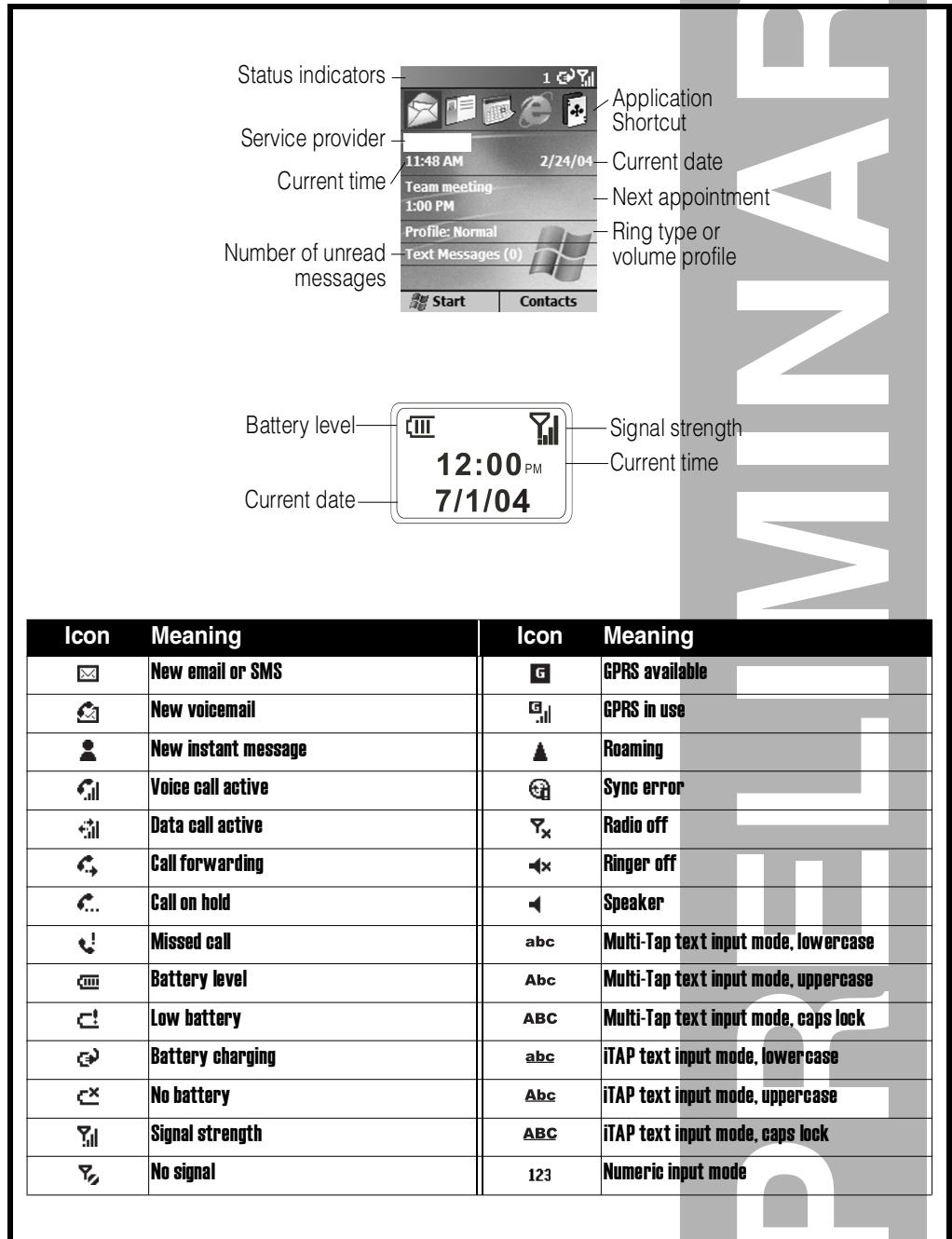Figure 2 shows some common icons displayed on the LCD.

Icon	Meaning	Icon	Meaning
✉	New email or SMS	G	GPRS available
✉	New voicemail	G⌗	GPRS in use
👤	New instant message	▲	Roaming
📶	Voice call active	🔄	Sync error
📶	Data call active	▽ₓ	Radio off
↪	Call forwarding	◀×	Ringer off
☎...	Call on hold	◀	Speaker
☎!	Missed call	abc	Multi-Tap text input mode, lowercase
▭	Battery level	Abc	Multi-Tap text input mode, uppercase
▭!	Low battery	ABC	Multi-Tap text input mode, caps lock
🔌	Battery charging	a̲b̲c̲	iTAP text input mode, lowercase
▭×	No battery	A̲b̲c̲	iTAP text input mode, uppercase
▽	Signal strength	A̲B̲C̲	iTAP text input mode, caps lock
▽	No signal	123	Numeric input mode

Figure 2. MPx220 Display Icon Indicators

User Interface Menu Structure

Figure 3 shows a portion of the MPx220 smartphone menu structure.

Menu Map

Main Menu Display

Messaging
- Text Messages
- Outlook E-Mail *
- Multimedia Messages *

Contacts

Calendar

Internet Explorer *

ActiveSync

Call History

MSN Messenger *

Settings
- Phone *
- Sounds
- Profiles
- Home Screen
- About
- Accessibility
- Beam
- Bluetooth
- Certificates
- Data Connections
- Date and Time
- Owner Information
- Power Management
- Regional Settings
- Remove Programs
- Security
- Phone Settings

Camera

Favorites Manager

File Manager

PhotoAlbum

Pocket MSN *

Resource Manager
- Task Manager
- Space Manager

Speed Dial

Tasks

Voice Recorder

Camcorder

File Viewer

Game Room

Media Manager

MMS Settings *

Speech Recognition #

Video Player

Windows Media

Accessories
- Calculator
- Modem Link

Games
- Jawbreaker
- Solitaire

* Optional network, SIM card, or subscription-dependent feature.

\# The voice recognition application works only via the phone directly or a wired headset attached to the phone, but not with a Bluetooth® headset.

Figure 3. MPx220 Menu Structure

Alert Settings

In addition to 40 preset ring tones, MPx220 smartphones allow the user to download a variety of ring tones via GPRS until the phone's memory is not able to store any more ring tones. (Availability is carrier and Network dependant). Motorola MPx220 smartphones incorporate the VibraCall® discreet vibrating alert that helps to avoid disturbing others when a ringing phone is unacceptable. Alerts can be set to ring only, vibrate only, vibrate then ring, or no ring or vibrate Additionally, the profiling feature allows users to identify incoming calls by a specific ringer tone.

Battery Function

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 phone to shut down immediately and loose any pending work (partially entered phone book entries or outgoing messages, for example).

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 is lost.

To ensure proper memory retention, turn the phone OFF before removing the battery. Immediately replace the old battery with a fresh battery.

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 lists the tools and test equipment used on MPx220 smartphones. Use either the listed items or equivalents.

Table 1. General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
See Table 6	Charger	Used to charge battery and 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 / EGSM / 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
6680388B01	Tweezers, plastic	Used during assembly/disassembly
RSX4043-A	Torque Driver	Used to remove and replace screws
—	Torque Driver Bit T-5 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 by fax (847) 576-3023.
2. Not available from Motorola. To order, contact Hewlett Packard at (800) 452-4844.

Disassembly

This section describes how to disassemble an MPx220 smartphone. Tools and equipment used are listed in Table 1, preceding.

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

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

Removing and Replacing the Battery Door

1. Ensure the phone is turned off.
2. Remove the battery door by pressing the latch and sliding the battery door right and away from the phone as shown in Figure 6.
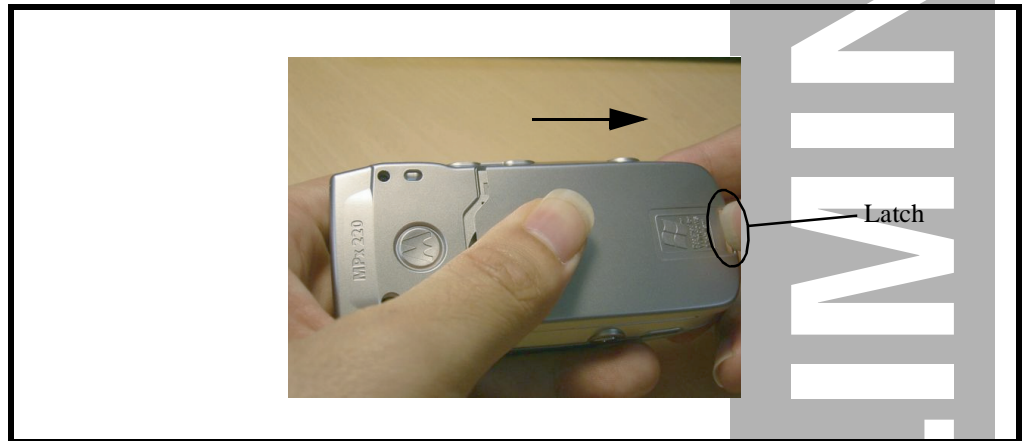
Figure 4. Removing the Battery Door

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3. To replace, align the tabs on the battery door with the grooves on the phone. Slide the battery door left until it locks into place as shown in Figure 7.
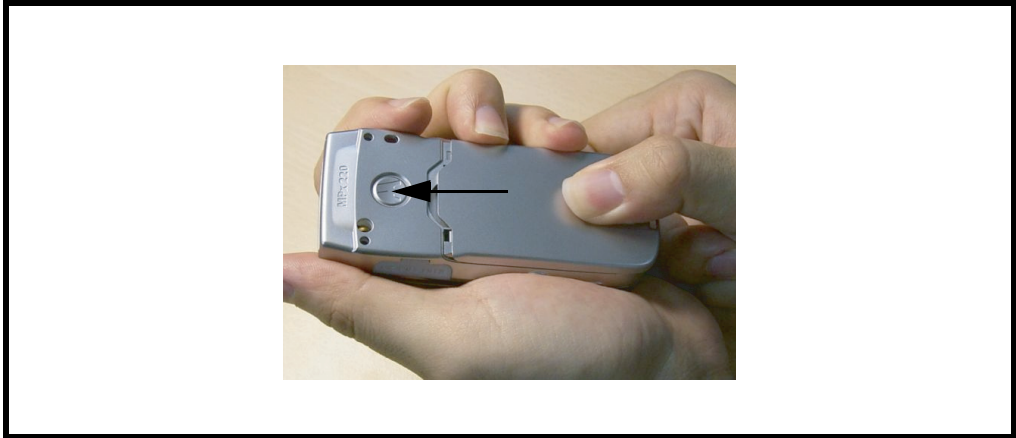
Figure 5. Replacing the Battery Door

Removing and Replacing the Battery

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.

1. Remove the battery door as described in the procedures.
2. Remove the battery by lifting its bottom end and taking the battery up and away from the battery compartment as shown in Figure 6.
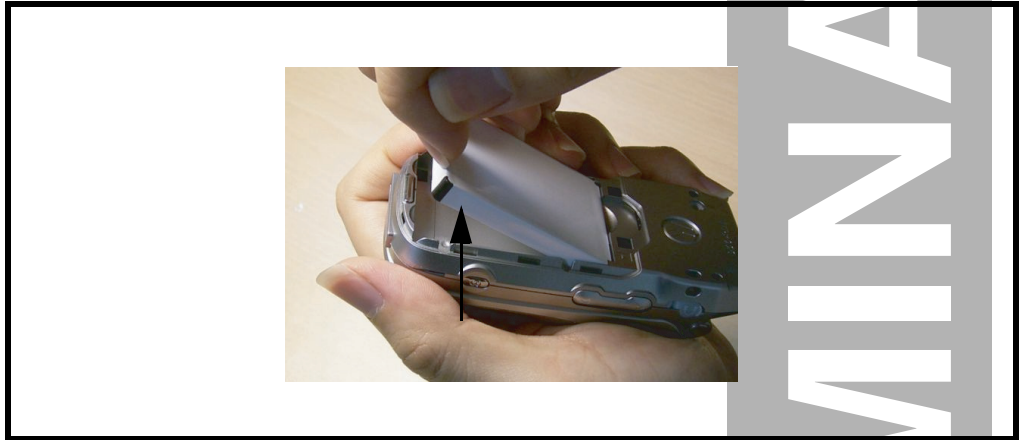
Figure 6. Removing the Battery

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.

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3. To replace, insert the battery with the metal contacts on the top end in alignment with the ones on the battery compartment as shown in Figure 7. Then push the bottom end down into the battery compartment so that the battery locks into place.
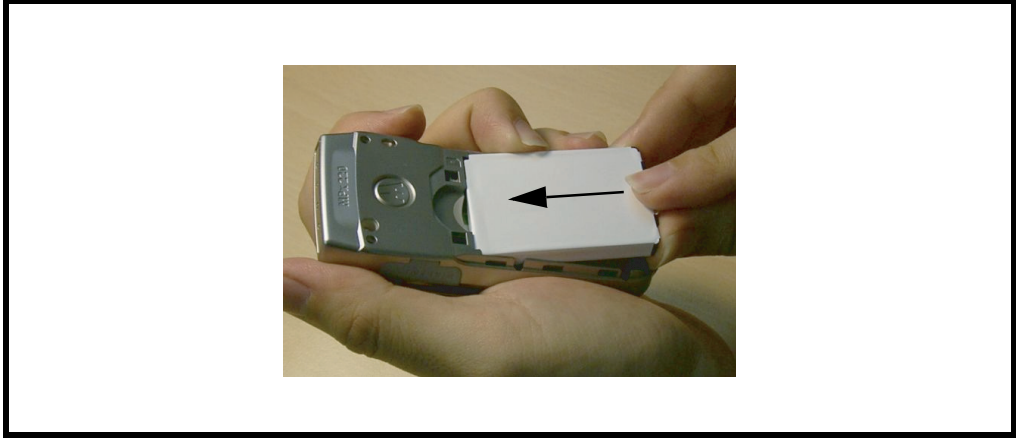
Figure 7. Replacing the Battery

4. Replace the battery door as described in the procedures.

Removing and Replacing the Front Housing Cover

1. Remove the battery door and battery as described in the procedures.
2. Use a tweezers to remove the 4 cap screws from the front housing as shown in Figure 8.

Figure 8. Removing the 4 Cap Screws

3. Use a screwdriver to remove the 4 screws from the front housing as shown in Figure 9.

Figure 9. Removing the 4 Screws

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4. Lift the bottom and then the top ends of the front housing cover away from the front case as shown in Figure 10.
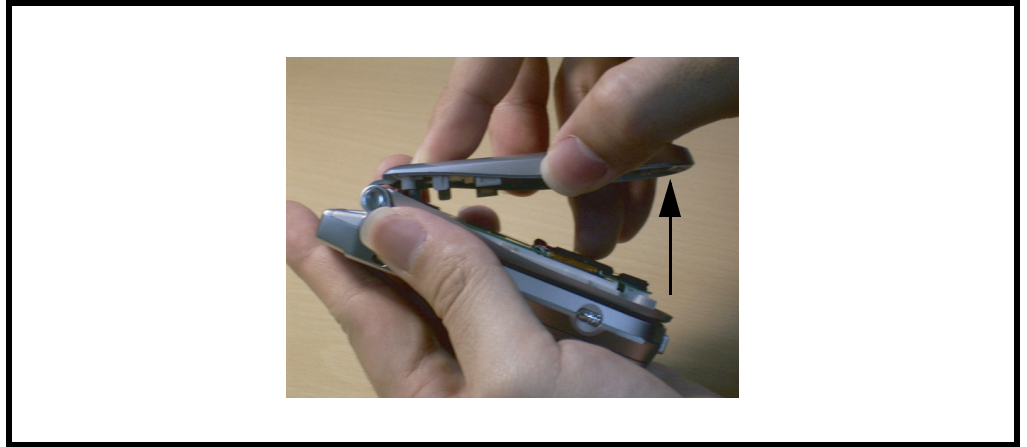
Figure 10. Removing the Front Housing Cover

5. To replace, align the front housing cover to the front case. Press the front housing cover into place, allowing the hook on its top end to snap into position as shown in Figure 11.

Hook
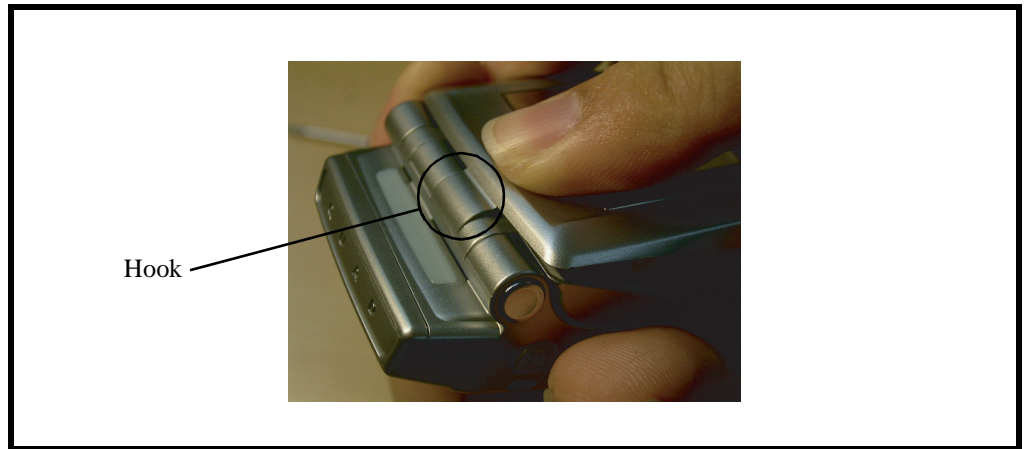
Figure 11. Replacing the Front Housing Cover

6. Use the 4 screws to fasten the front housing cover to the front case.
7. Locate the 4 cap screws on top of the 4 screws.
8. Replace the battery and battery door as described in the procedures.

Removing and Replacing the Upper PCB

1. Remove the battery door, battery, and front housing cover as described in the procedures.
2. Disconnect the board-to-board FPC connector from the upper PCB as shown in Figure 12.

Board-to-Board
FPC Connector
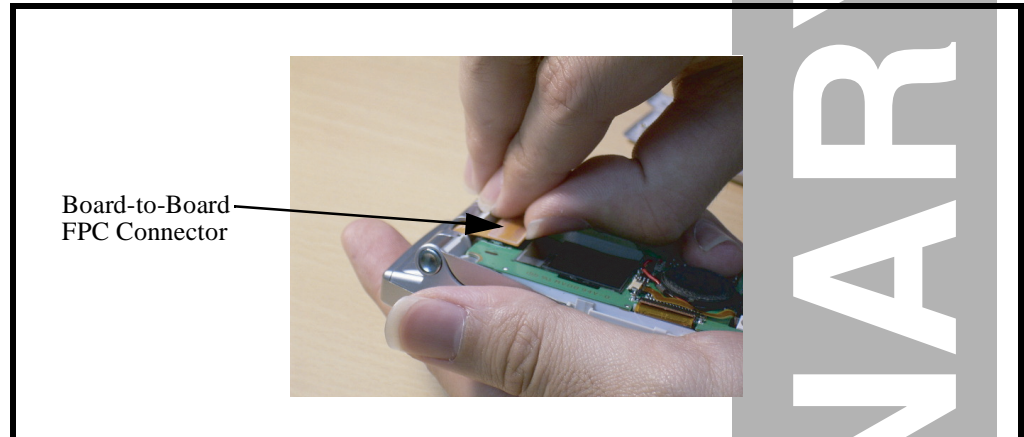
Figure 12. Disconnect the Board-to-Board FPC Connector

3. Lift the upper PCB up and away from the front case as shown in Figure 13.
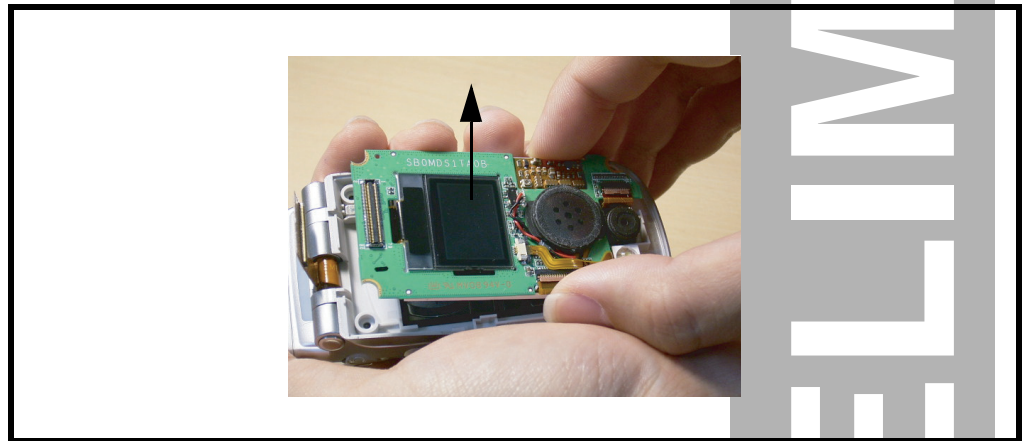
Figure 13. Removing the Upper PCB

4. To replace, align the upper PCB to the front case and press it into place.
5. Connect the board-to-board FPC connector to the upper PCB.
6. Replace the front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Receiver

1. Remove the battery door, battery, front housing cover, and upper PCB as described in the procedures.
2. Use a tweezers to remove the receiver from the front case as shown in Figure 14.
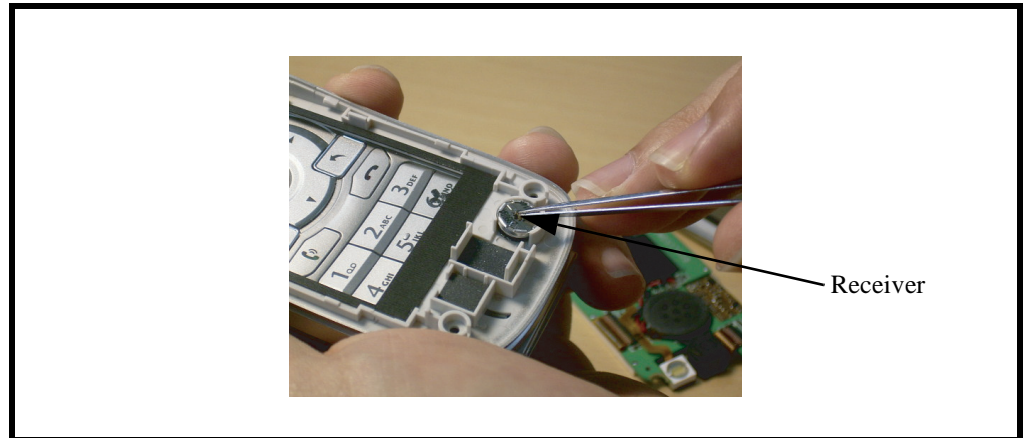
Receiver

Figure 14. Removing the Receiver

3. To replace, press the receiver into place.
4. Replace the upper PCB, front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Camera-module FPC and Flush-light FPC Connectors

1. Remove the battery door, battery, front housing cover, upper PCB, and receiver as described in the procedures.
2. Lift the camera-module-FPC connector cap up and disconnect the camera-module FPC connector away from the upper PCB as shown in Figure 15.
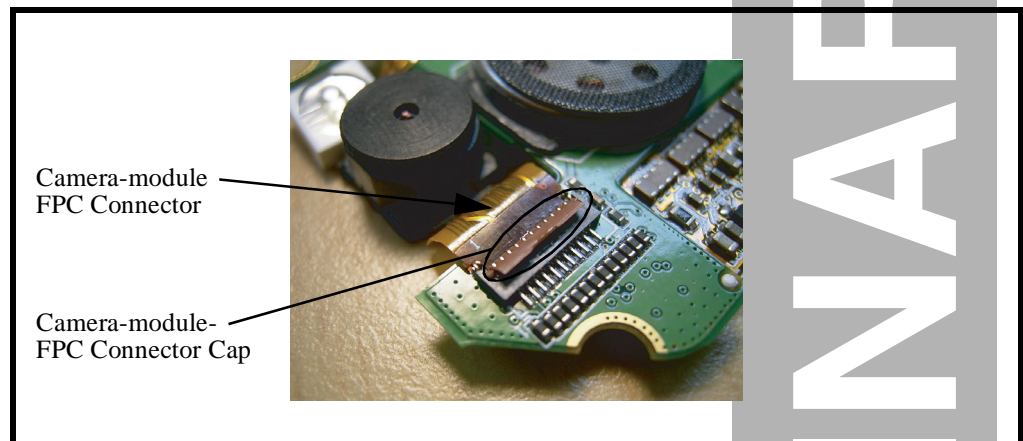
Figure 15. Removing the Camera-module FPC Connector

3. Push the flush-light-FPC connector cap a little bit toward the speaker and disconnect the flush-light FPC connector away from the upper PCB as shown in Figure 16.
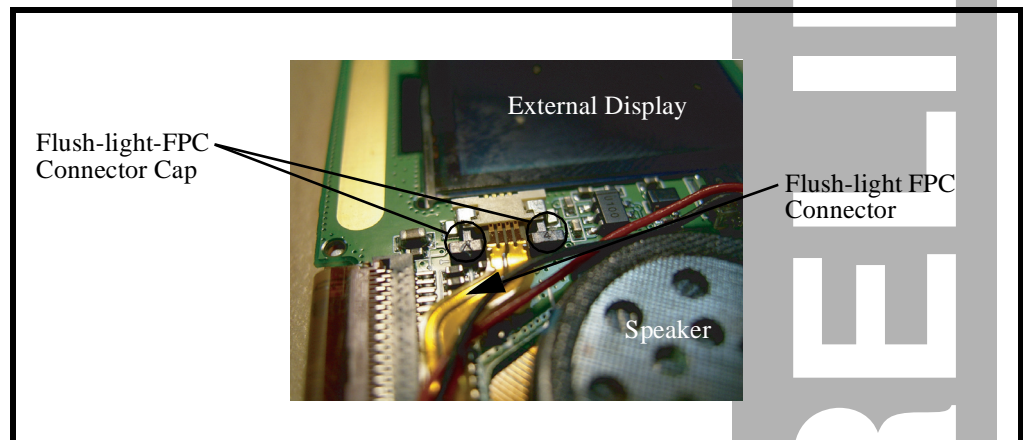
Figure 16. Removing the Flush-light FPC Connector

4. To replace, press the flush-light FPC connector into place and push the flush-light-FPC connector cap a little bit toward the external display to lock the FPC connector.
5. Press the camera-module FPC connector into place and push the camera-module-FPC connector cap down to lock the FPC connector.
6. Replace the receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Rear Housing Cover

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, and flush-light FPC connector as described in the procedures.
2. Use a screwdriver to remove the 6 screws from the rear housing cover as shown in Figure 17.

Figure 17. Removing the 6 Screws from the Rear Housing Cover

3. Disconnect the rear housing cover from the rear housing as shown in Figure 18.
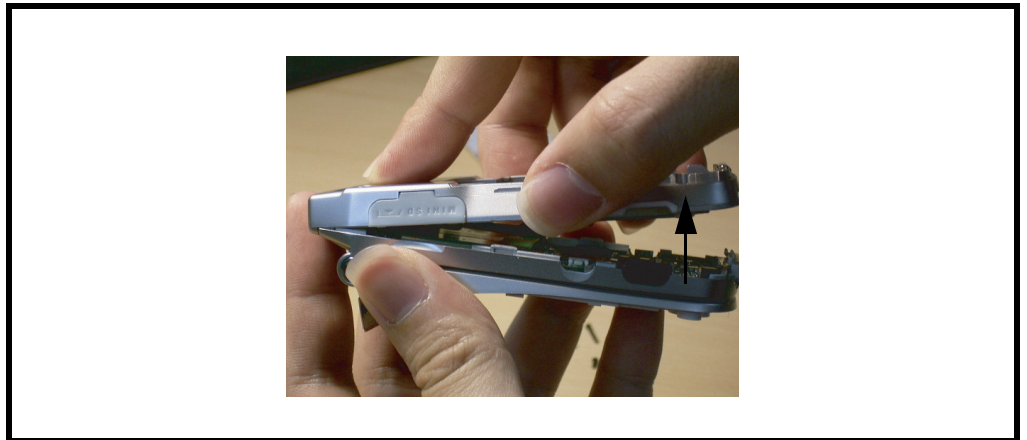
Figure 18. Removing the Rear Housing Cover

4. To replace, align and connect the rear housing cover to the rear housing.
5. Use the 6 screws to fasten the rear housing cover to the rear housing.
6. Replace the flush-light FPC connector, camera-module FPC connector, receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

PRELIMINARY

Removing and Replacing the Carrier Antenna, Vibrator Connector, and Daughter Board

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, flush-light FPC connector, and rear housing cover as described in the procedures.
2. Disconnect the carrier antenna from the rear housing cover as shown in Figure 19.
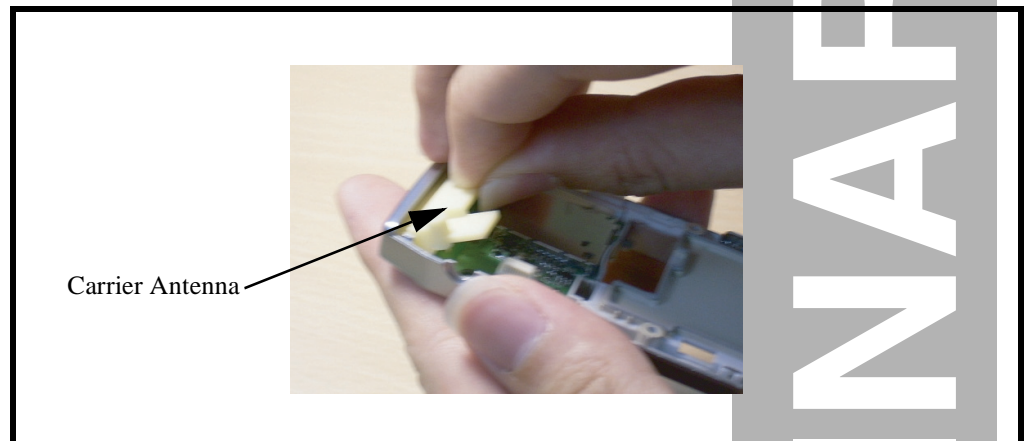
Figure 19. Removing the Carrier Antenna

3. Use a tweezers to disconnect the vibrator connector from the rear housing cover as shown in Figure 20.
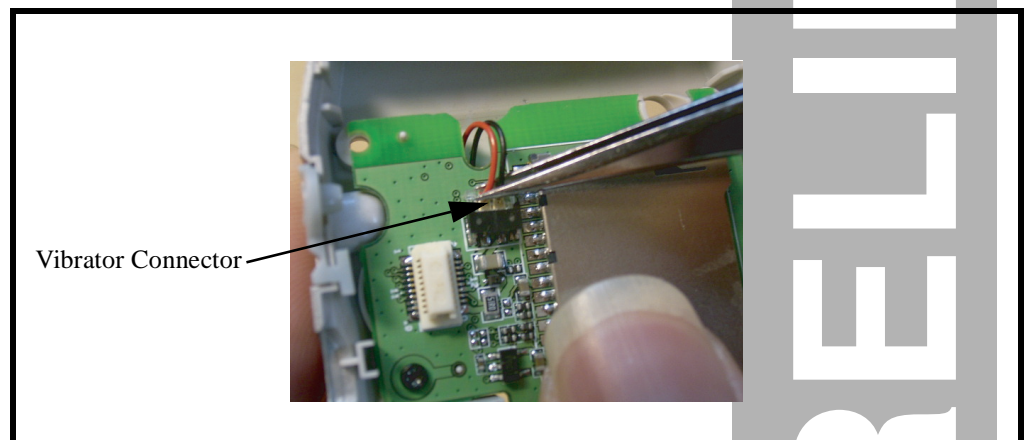
Figure 20. Removing the Vibrator Connector

4.   Disconnect the daughter board from the rear housing cover by removing the screw as shown in Figure 21.
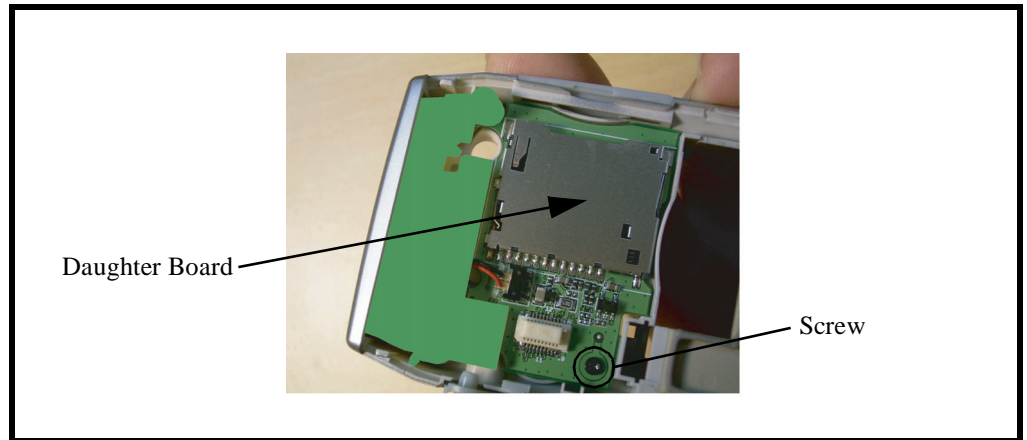
Figure 21. Removing the Daughter Board

5.   Remove the vibrator from the rear housing cover as shown in Figure 22.
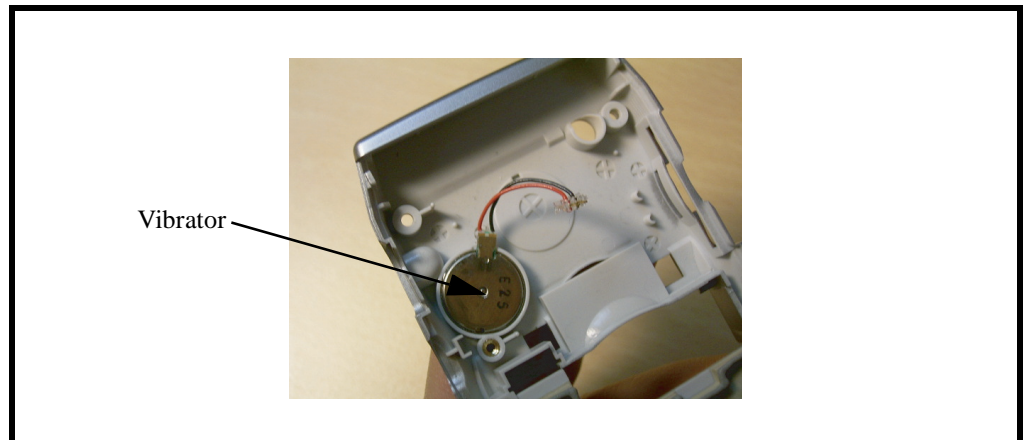
Figure 22. Removing the Vibrator

6.   To replace, press the vibrator, daughter board, vibrator connector, and carrier antenna into place.
7.   Replace the rear housing cover, flush-light FPC connector, camera-module FPC connector, receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Lower PCB and Keypad

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, flush-light FPC connector, rear housing cover, carrier antenna, vibrator connector, daughter board, and vibrator as described in the procedures.

2. Lift the lower PCB up from the rear housing by releasing the housing latches on each side of the rear housing and pushing the keypad below the lower PCB upward as shown in Figure 23.

Housing Latches
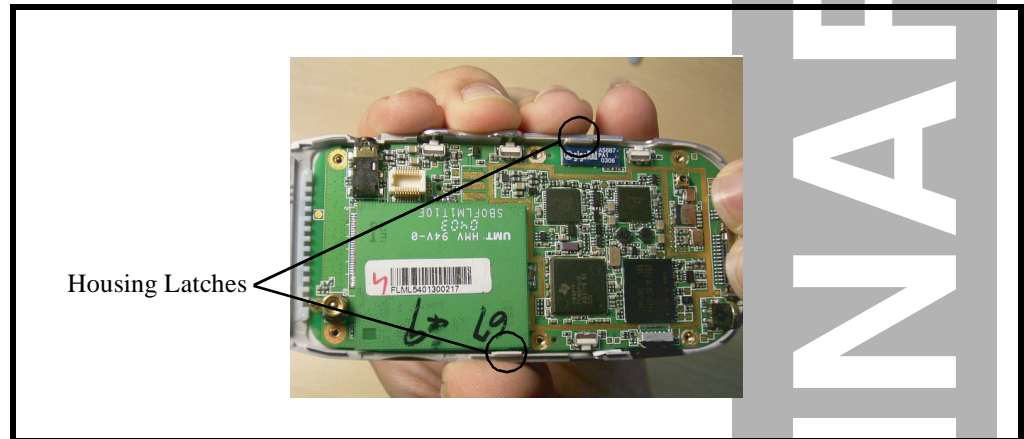
Figure 23. Partially Removing the Lower PCB

3. Remove the keypad below the lower PCB from the phone as shown in Figure 24.
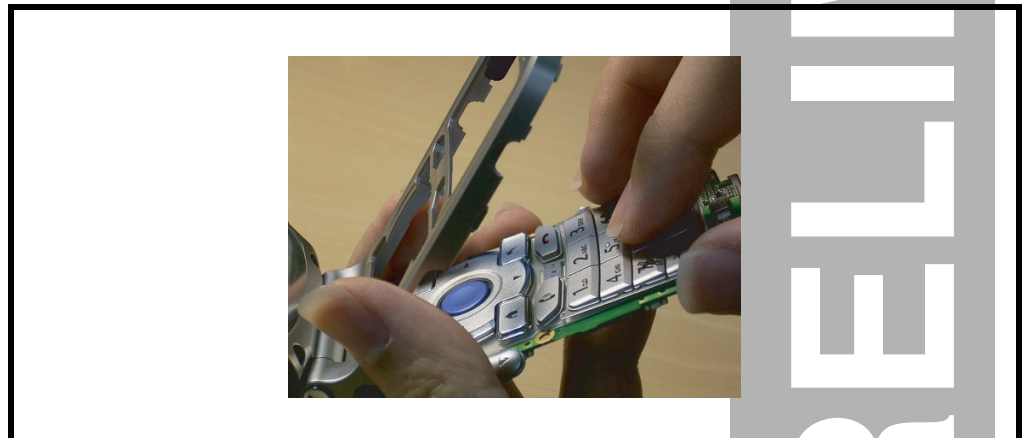
Figure 24. Removing the Keypad

PRELIMINARY

4. Remove the lower PCB from the rear housing by lifting the board-to-board FPC connector up and away from the back side of the lower PCB as shown in Figure 25.

Board-to-Board
FPC Connector
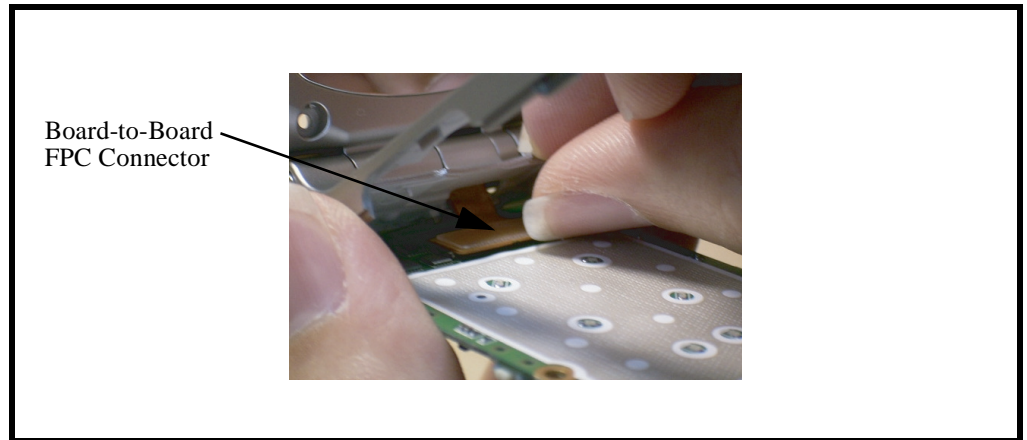
Figure 25. Removing the Lower PCB

5. To replace, connect the board-to-board FPC connector to the back side of the lower PCB.
6. Place the keypad below the lower PCB.
7. Align the lower PCB to the rear housing, allowing the hooks on each side of the lower PCB to snap into position.
8. Replace the vibrator, daughter board, vibrator connector, carrier antenna, rear housing cover, flush-light FPC connector, camera-module FPC connector, receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Rubber Stopper and Cover Hinge FPC

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, flush-light FPC connector, rear housing cover, carrier antenna, vibrator connector, daughter board, vibrator, lower PCB, and keypad as described in the procedures.

2. Use a tweezers to remove the rubber stopper from the rear housing as shown in Figure 26.
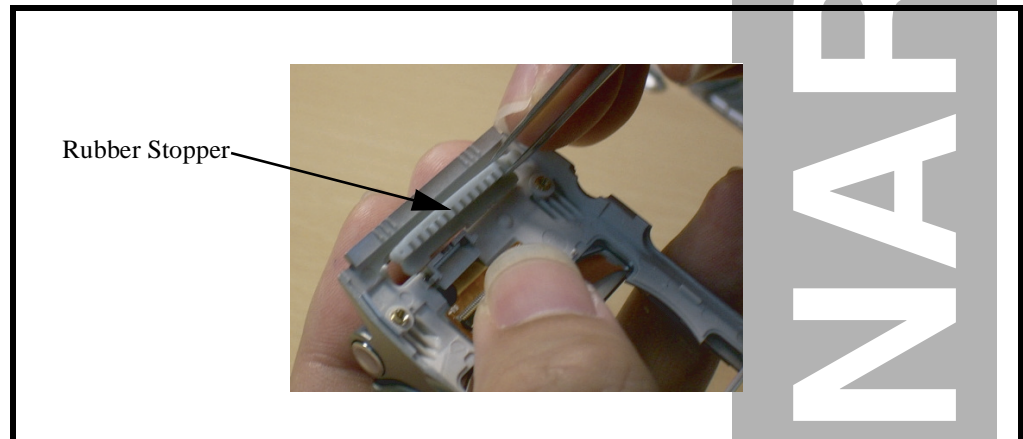
Figure 26. Removing the Rubber Stopper

3. Use a tweezers to remove the cover hinge FPC from the rear housing as shown in Figure 27.
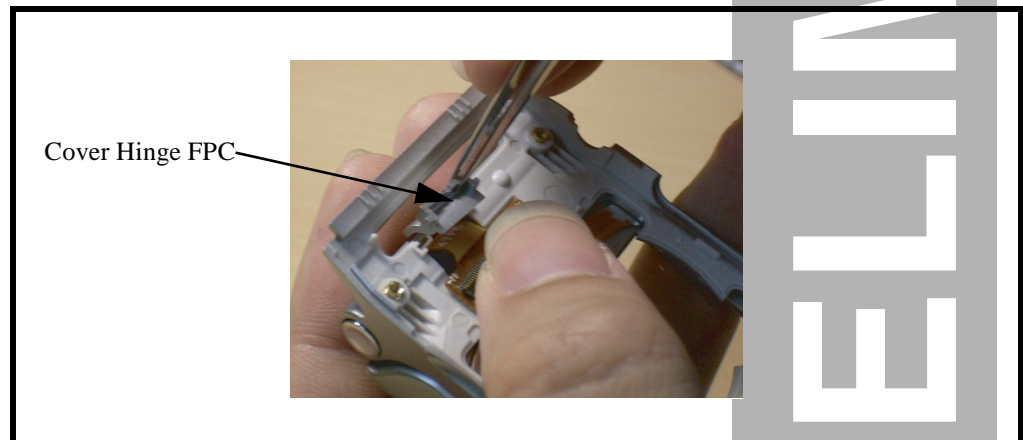
Figure 27. Removing the Cover Hinge FPC

4. To replace, press the cover hinge FPC and rubber stopper into place.

5. Replace the keypad, lower PCB, vibrator, daughter board, vibrator connector, carrier antenna, rear housing cover, flush-light FPC connector, camera-module FPC connector, receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

Removing and Replacing the Board-to-Board FPC Connector

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, flush-light FPC connector, rear housing cover, carrier antenna, vibrator connector, daughter board, vibrator, lower PCB, keypad, rubber stopper, and cover hinge FPC as described in the procedures.

2. Have a right angle between the front housing and the rear housing and then remove the board-to-board FPC connector from the phone as shown in Figure 28.

Board-to-Board
FPC Connector
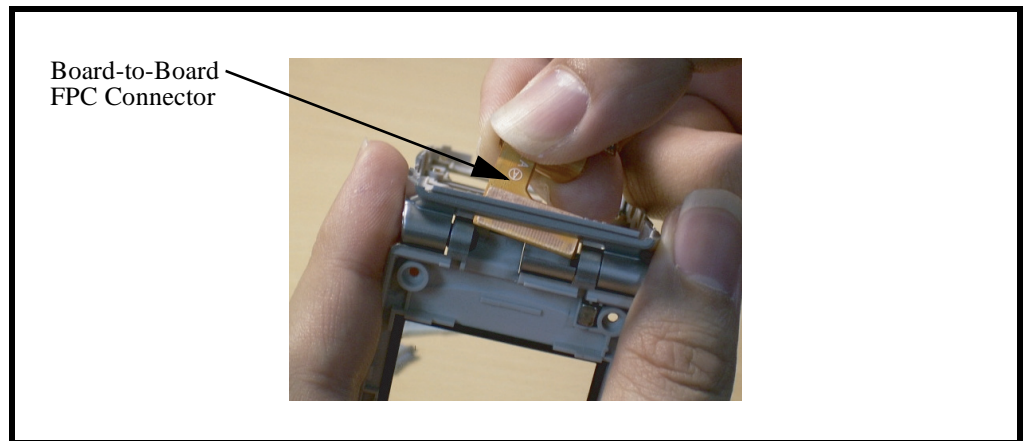
Figure 28. Removing the Board-to-Board FPC Connector

3. To replace, press the board-to-board FPC connector into place.

4. Replace the cover hinge FPC, rubber stopper, keypad, lower PCB, vibrator, daughter board, vibrator connector, carrier antenna, rear housing cover, flush-light FPC connector, camera-module FPC connector, receiver, upper PCB, front housing cover, battery, and battery door as described in the procedures.

PRELIMINARY

Removing and Replacing the Power Button, Camera Button, Mini-SD Cover, and Earphone Jack Cover

1. Remove the battery door, battery, front housing cover, upper PCB, receiver, camera-module FPC connector, flush-light FPC connector, rear housing cover, carrier antenna, vibrator connector, daughter board, vibrator, lower PCB, keypad, rubber stopper, cover hinge FPC, and board-to-board FPC connector as described in the procedures.
2. Remove the power button from the phone as shown in Figure 29.
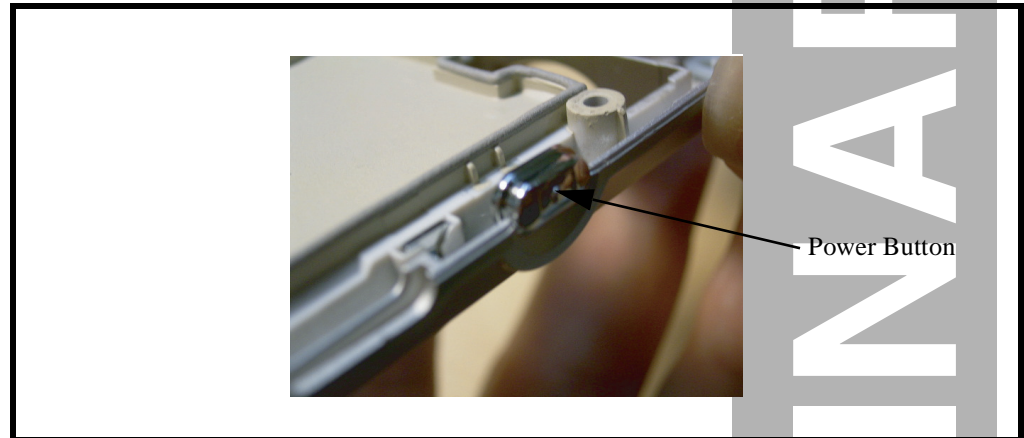
Figure 29. Removing the Power Button

3. Remove the camera button from the phone as shown in Figure 30.
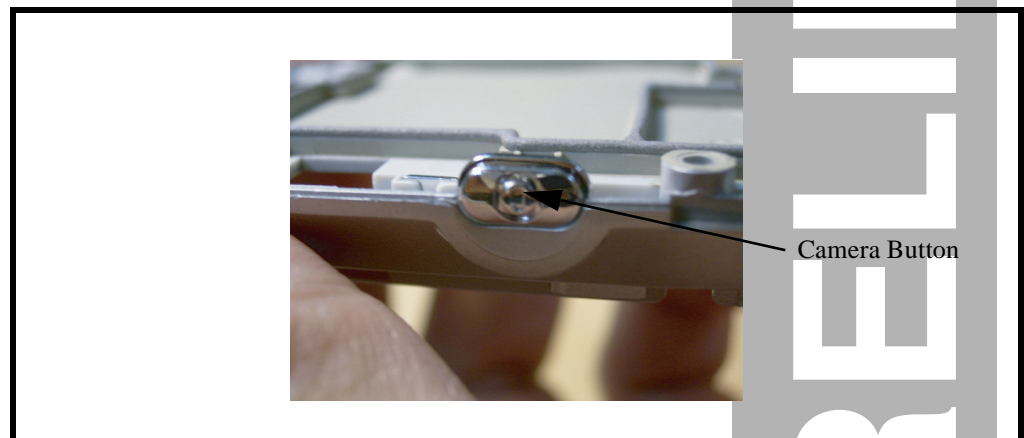
Figure 30. Removing the Camera Button

PRELIMINARY

4. Remove the mini-SD cover from the phone as shown in Figure 31.
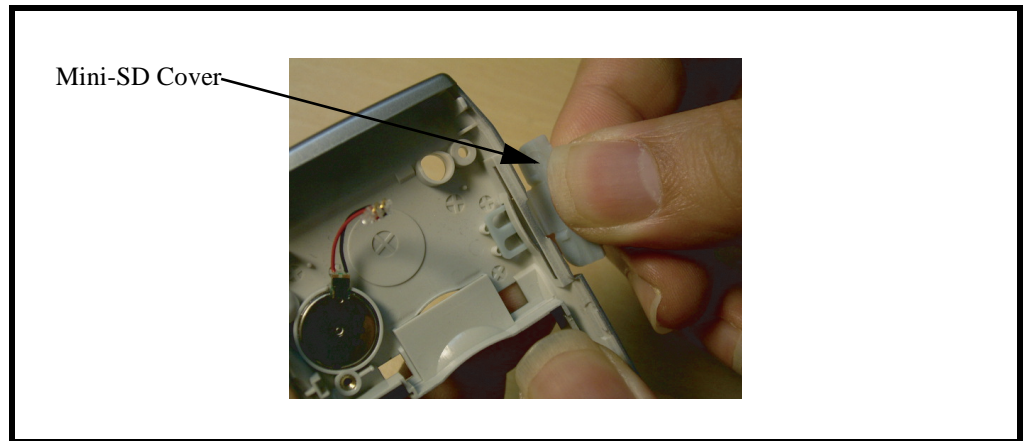
Mini-SD Cover

Figure 31. Removing the Mini-SD Cover

5. Remove the earphone jack cover from the phone as shown in Figure 32.

Earphone Jack
Cover
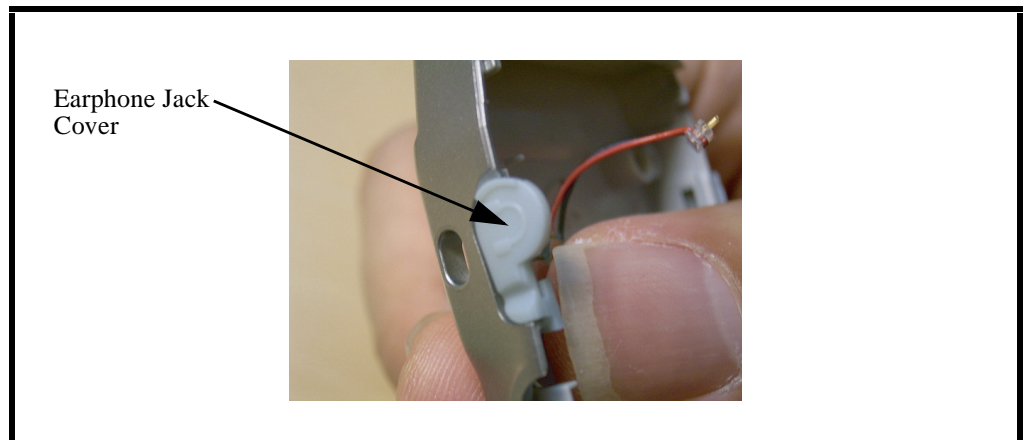
Figure 32. Removing the Earphone Jack Cover

6. To replace, press the earphone jack cover, mini-SD cover, camera button, and power button
    into place.
7. Replace the board-to-board FPC connector, cover hinge FPC, rubber stopper, keypad,
    lower PCB, vibrator, daughter board, vibrator connector, carrier antenna, rear housing
    cover, flush-light FPC connector, camera-module FPC connector, receiver, upper PCB,
    front housing cover, battery, and battery door 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 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 33.
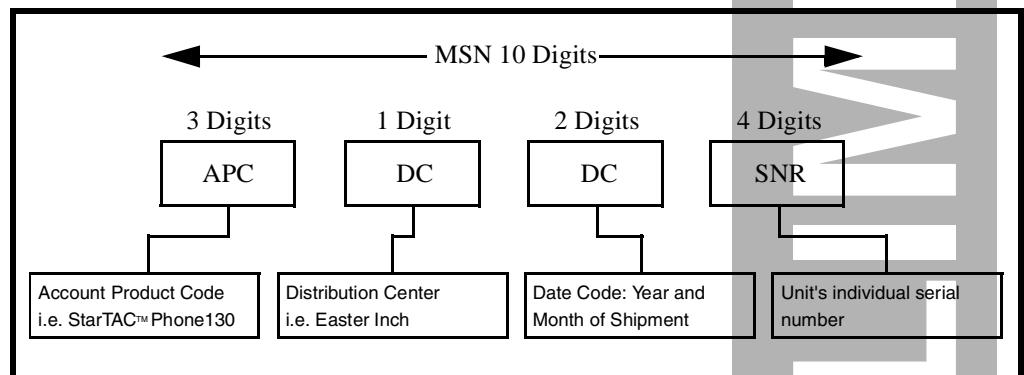
Figure 33. MSN Label Breakdown

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
NNXXXX YY	ZZZZZZ	A

Where

TAC   Type Allocation Code, formerly known as Type Approval Code

NN   Reporting body identifier

XXXX   Type Identifier

YY   YY is set to 00 from 01/01/2003 until 31/03/2005

ZZZZZZ   Individual unit serial number

A   Phase 1 = 0.
              Phase 2 & 2+ = check digit and is 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 MPx220 smartphones 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/EGSM/DCS/PCS test SIM must be used.

1. Press **Power** (⏻) to turn the phone OFF.
2. Remove the battery door as described in the procedures.
3. Remove the battery as described in the procedures.
4. Remove the customer's SIM card from the phone.
5. Insert the test SIM into the SIM slot.
6. Replace the battery as described in the procedures.
7. Replace the battery door as described in the procedures.
8. Press **Power** (⏻) to turn the phone ON.

Manual Test Mode Commands

Table 3. Manual Test Commands

Key Sequence	Test Function/Name	Remarks
*#06#	IMEI Check	No Test Mode Required
*#**837# **Send**	Flex Version/Technology/S-W Version/Readiness Status	No Test Mode Required
*#**364#	Display engineering menu	
*#**266*0#	Set as data COM port	
*#**266*1#	Set as log COM port	
*#**797#	Display time to failure timer & power down codes	
*#**367628# **Send**	Erase data from the file system, such as photos, melodies, java, etc.	
*#**778337# **Send**	Erase data from E2P, such as user's phonebook	
*#**372# **Send**	Test Display. Melody, speaker, keypad, etc.	
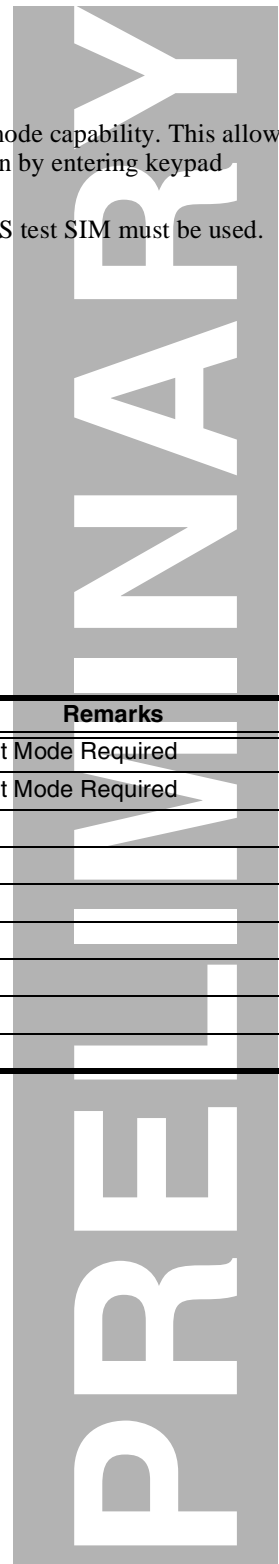
Troubleshooting Chart

Table 4. 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 battery voltage across a 50 ohm (>1 Watt) load. If the battery voltage is <3.25 Vdc, recharge the battery using the appropriate battery charger. If the battery will not recharge, replace the battery. If battery is not at fault, proceed to b.
	b) Battery terminals open or misaligned.	Visually inspect the battery terminals on both the battery and the telephone. Realign and, if necessary, either replace the battery or refer to a Level 3 Service Center for the battery connector replacement. If battery terminals are not at fault, proceed to c.
	c) Keypad defective.	Replace the keypad as described in the procedures. Temporarily connect a +3.6 Vdc supply to the battery terminals. Press the PWR button. If unit turns on and stays on, disconnect the dc power source and reassemble with the new keypad.
2. Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	Connections to or from lower PCB defective.	Check connection between the antenna and the lower PCB.
3. Display is erratic, or provides partial or no display.	a) FPC cable faulty.	Check general condition of FPC cable and upper PCB. If the FPC cable and upper PCB are good, proceed to b.
	b) LCM defective.	Replace the LCM. Verify that the fault has been cleared and reassemble the unit with the new LCM.
4. Incoming call alert transducer audio distorted or volume is too low.	Speaker defective.	Replace the speaker. Verify that the fault has been cleared and reassemble the unit with the new speaker.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	Microphone defective.	Replace the microphone. Verify that the fault has been cleared and reassemble the unit with the new microphone.
6. Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from lower PCB defective.	Check connection between the antenna and the lower PCB. If the connection is OK, proceed to b.
	b) Speaker defective.	Temporarily replace the speaker with a known good speaker. Ensure good connection. Place a call and verify improvement in earpiece audio. If fault is cleared, reassemble the telephone with the good speaker.
7. Telephone will not recognize or accept SIM card.	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 no longer exists, replace the defective SIM card.
8. Keypad not functioning.	Keypad defective.	Use alcohol to wipe the keypad metal dome. Check if fault has been cleared. If the fault is still present, either replace the keypad as described in the procedures or refer to a Level 3 Service Center for the keypad metal dome replacement.

Table 4. Level 1 and 2 Troubleshooting Chart(Continued)

Symptom	Probable Cause	Verification and Remedy
9. Camera feature not functioning.	a) FPC cable faulty.	Check general condition of FPC cable and upper PCB. If the FPC cable and upper PCB are good, proceed to b.
	b) Camera defective.	Replace the defective camera.
10. No or weak audio when using headset.	Headset plug not fully pushed.	Ensure the headset plug is fully seated in the jack.

Programming: Software Upgrade and Flexing

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

Part Number Charts

The following section provides a reference for the parts associated with
MPx220 smartphones.

Related Publications

Motorola MPx220 Wireless Smartphone User Guide   6887301Z56

Exploded View Diagram
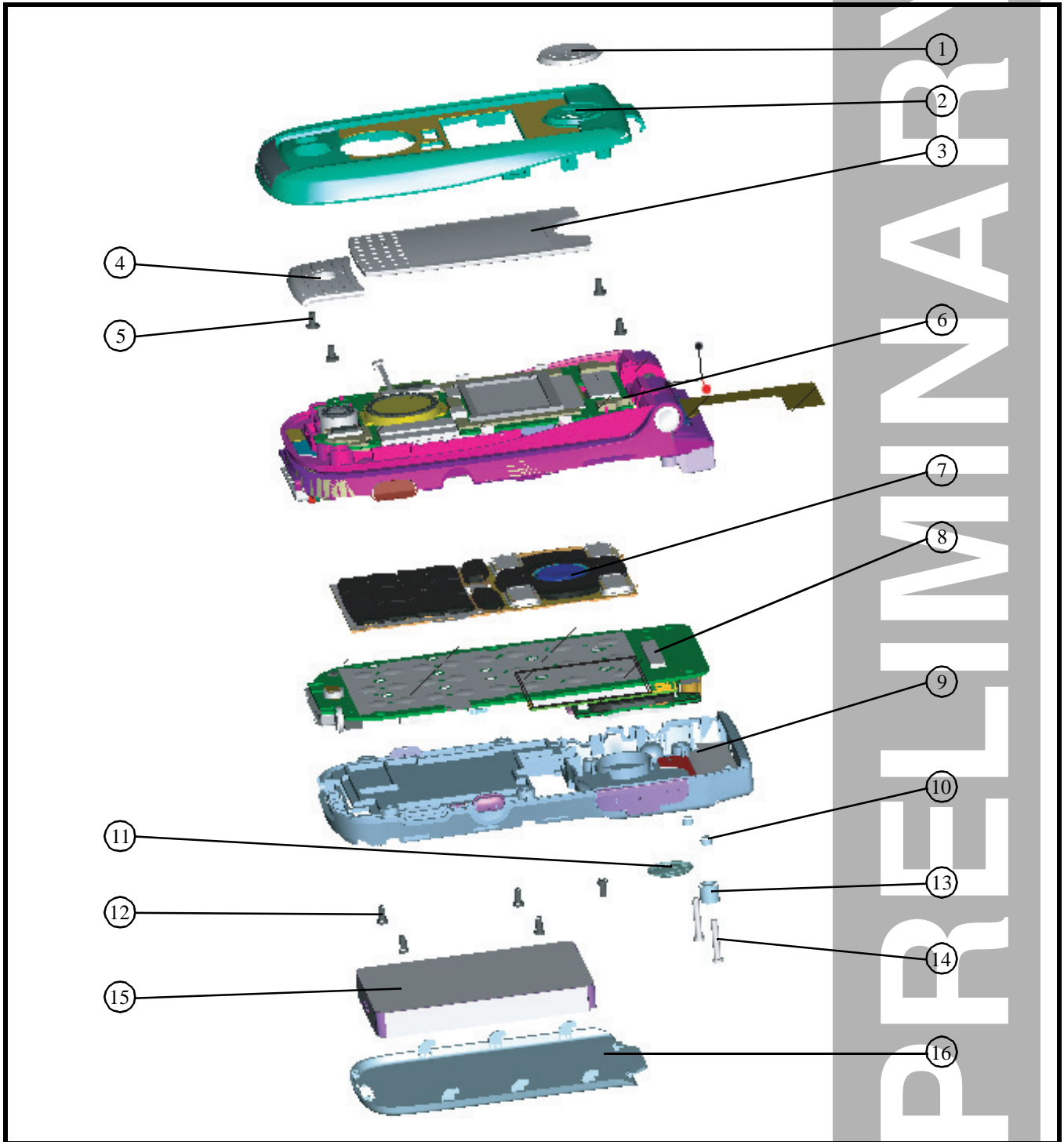
Figure 34. MPx220 Exploded View Diagram

Exploded View Parts List

Table 5. Exploded View Parts List

Item Number	Part Number	Description
1	MEMDS05001B	Name Plate Flip Rear
2	MEMDS61007B	Assembly Housing Flip Rear
3	MEMDS04002B	Lens CLI
4	MEMDS08004B	Camera Lens Silver
4	MEMDS08005B	Camera Lens Black
5	W6403163311	Screw_M Type_T5_W/O Washer_Pan_Head_1(*4)
6	MEMDS61009B	Assembly Housing Front Silver
6	MEMDS61012B	Assembly Housing Front Black
7	MEMDS07002B	Keypad Silver
7	MEMDS07003B	Keypad Black
8	-	Lower PCB

Item Number	Part Number	Description
9	MEMDS61008B	Assembly Housing Base Rear
10	MEMDS36007B	Cap Screw Base Silver (*2)
10	MEMDS36008B	Cap Screw Base Black (*2)
11	MEMDS05003B	Name Plate Base Rear
12	W6403163310	Screw_M Type_T5_W/O Washer_Pan_Head_1(*5)
13	MEMDS36006B	Cap RF Switch
14	W640319410	Screw_M Type_T5_W/O Washer_Pan_Head_1(*2)
15	BPMDSGS301A	Battery Pack_6089096S01 _Cell: GS/LP623448B/LiIon/ 1000 mAh
16	MEMDS01015BB	Cover Battery Silver
16	MEMDS01016BB	Cover Battery Black

Accessories

Table 6. List of Accessories

Description	Part Number
Power Solutions	
Battery 1000 mAh LiIon	SNN5747A
Silver battery door	SHN8646A
Black battery door	SHN8647A
Travel charger - US/TWN plug	SPN5037A
Travel charger - UK/HK plug	SPN5039A
Travel charger - PRC plug	SPN5040A
Travel charger - Aus plug	SPN5045A
Travel charger - India plug	SPN5046A
Audio & Connectivity	
Black stereo headset	CHYN4516
Bluetooth low tier HS RIPCURL headset - Aus	SYN9951A
Bluetooth man user HS820 headset - Aus	6802912J97
One touch headset - PRC	SYN8419B
Painted mono headset	AAYN4264B
CE bus to USB data cable	SKN6311B
GSM complex Chinese CD-ROM - HK	SVN5302A
GSM complex Chinese CD-ROM - TWN	SVN5300A
English CD-ROM - Aus	8288204W20
Complex Chinese CD-ROM - HK/TWN	8288204W28
Mini-SD 32M card - TWN/Aus	SYN1219A

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