MOTOROLA

W230/W388/W216/W231
Dual Band Wireless Telephone

W230/W388/W216/W231

GSM 900/1800

GSM 850/1900

Table of 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 that 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

The model number on a label (usually on the housing) identifies Motorola products. 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 numerique de la classe B respecte toutes les exigences du Reglement sur le materiel 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 Introduction 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 W230/W388/W216/W231 telephones. 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 W230/W388/W216/W231 telephones 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 W230/W388/W216/W231 telephones, and also provides 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 that may result in equipment damage.

Waring: Emphasizes information about actions that 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

The 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 Transceiver 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.

Specifications

General Functions	Specification
Dimensions	110.97mm x 45mm x 14.9mm
Weight	83g
LCD Display	65K Color CSTN, Active Area: 28.79mm x 28.79mm, Hardware pixels: 128 x 128
Band	GSM900/1800 or GSM850/PCS1900
Battery	940 mAh Li Ion Battery
Product type	BAR type
Antenna	Internal Antenna
Frequency Range (EGSM)	880-915 MHz Tx, 925-960 MHz Rx
Frequency Range (DCS)	1710 – 1785 MHz Tx, 1805-1880 MHz Rx
Frequency Range (GSM850)	824-849 MHz Tx, 869-894 MHz Rx
Frequency Range (PCS)	1850-1910MHz Tx, 1930-1990 MHz Rx
Channel Spacing	200KHz
Channels	174 EGSM, 374 DCS, 124 GSM850, 299 PCS
Modulation	GMSK at BT=0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex spacing	45MHz EGSM, 95MHz DCS, 45MHz GSM850, 80MHz PCS
Frequency Stability	±0.1PPM of the downlink frequency (Rx)
Operating voltage	3.53V ~4.2V
Average Transmit Current	Power Level 5@DTX 50%: 175mA Power Level 19@DTX 50%: 90mA
Average Standby Current	DRX2: 4mA DRX9: 1.9mA
Temperature Range	-20°C to 55°C
Battery Life	Talk Time: 250~500 Mins; Stand by Time: 150~300 Hours
Battery Charge Time	4 Hours to 90% of 940mAH capacity
Alert Volume	Max 95dB@ 5cm, 0.5 watts input

Transmitter Functions	Specification
RF Power Output	33 dBm typical GSM850/GSM900 30 dBm typical DCS1800/PCS1900
Output Impedance	50 ohms nominal
Spurious Emissions	-36 dBm from 0.1 to 1GHz, -30 dBm from 1 to 4 GHz

Receiver Functions	Specification
Receiver Sensitivity	-107 dBm typical GSM 850/GSM900 -107 dBm typical DCS1800/PCS1900
RX Bit Error Rate (100K bits) type II	<2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 6~10 Second

Speech Coding Functions	Specification
Speech Coding Type	Regular pulse excitation/linear predictive coding with long term prediction (PRE 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

The Motorola W230/W388/W216/W231 features a global system for mobile communications wireless interface technology. It also features a simplified icon and graphical user interface (UI) for easier operation in addition to short message service text messaging (SMS), speed dialing, quick dialing, an alarm, a calculator, games, and an address book.

The telephones are made of polycarbonate plastic. The display and speaker, as well as the 21-key keypad, transceiver printed circuit board (PCB), microphone, charger and headphone connectors, and power button are contained within Bar form-factor housing. The User-replaceable 940 mAh Lithium-Ion (Li-Ion) battery provide up to 250~500 Mins of talk time with up to 150~300 Hours of standby time. The phone accepts 1.8V/3V mini subscriber identity module (SIM) cards that fit into the SIM holder next to the battery. These telephones feature a 128 x 128 pixel color graphics display and an internal antenna.

Features

W230/W388/W216/W231 telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for GSM 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:

- A 128 x 128 pixel color graphics display
- Internal antenna
- Lower voltage technology that provides increased standby and talk times
- Extended GSM (EGSM) channels
- Display animation
- VibraCall® vibrating alert
- 5-Way navigation key
- SIM Toolkit™ Class 2 (STK) (Network, subscription and SIM card or service provider dependent feature. Not available in all areas.)
- Backlight
- Speed-, Quick- and One-Touch dialing
- Call Forwarding and Holding
- Customized Menus
- Personal management tools calculator with currency converter, and clock with date
- Other features

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.

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.

Harvey_ Comparison Chart

Harvey	Band	VGA	LCM	FM Radio	FLASH
W230	GSM 900/1800, GSM 850/1900	NO	1.6 CSTN	YES	128/64
W388	GSM 900/1800, GSM 850/1900	YES	1.8 TFT	YES	256/128
W216	GSM 900/1800, GSM 850/1900	NO	1.6 CSTN	NO	128/64
W231	GSM 900/1800, GSM 850/1900	NO	1.6 CSTN	YES	128/64

General Functions

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

The W230/W388/W216/W231 phone's controls are located on the front side of the device and on the keyboard as shown in below. Indicators icons are displayed on the LCD.
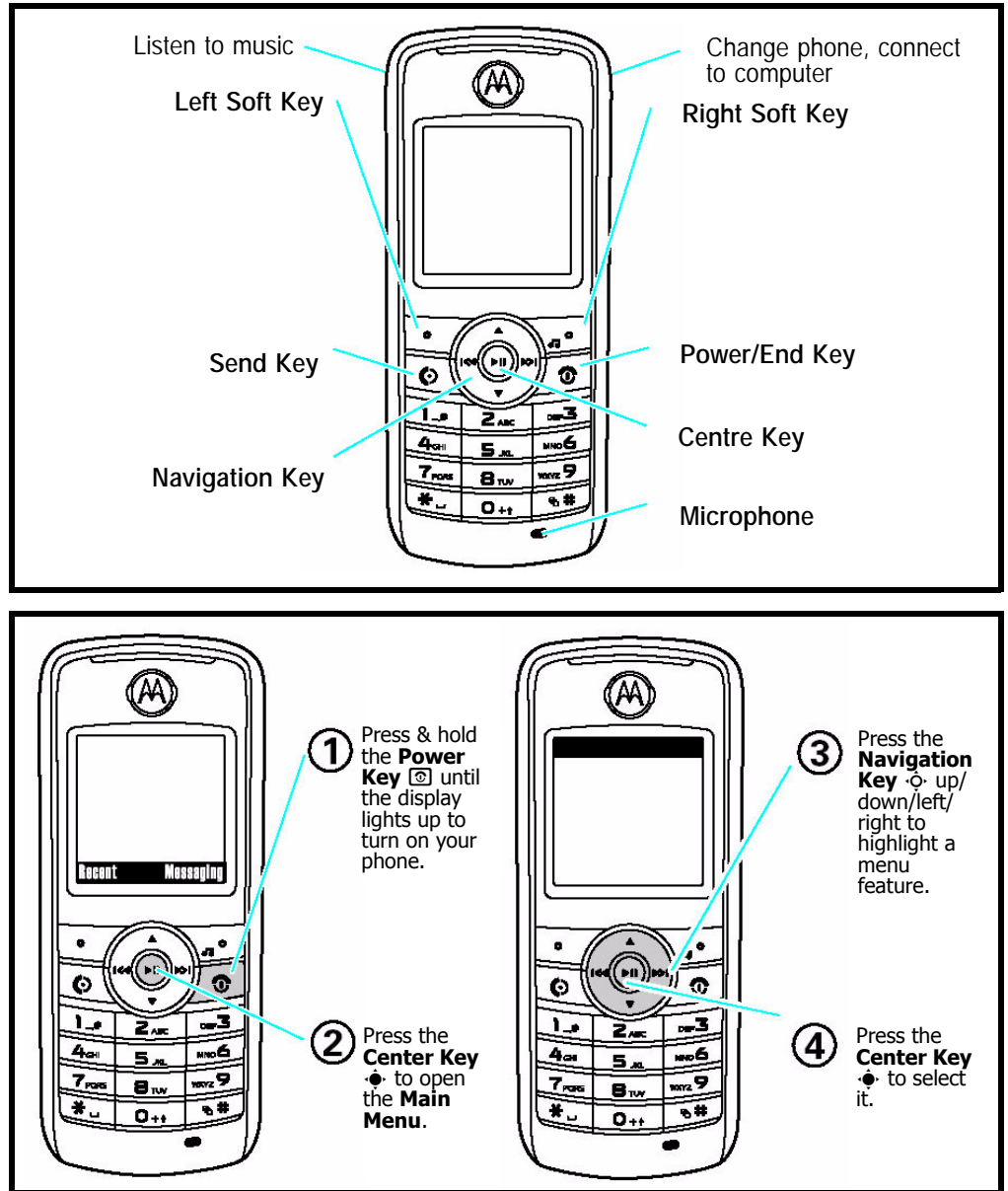

Figure 1. W230/W388/W216/W231 Telephone Control Locations

Menu Navigation

W230/W388/W216/W231 telephones are equipped with a simplified icon and graphical-based user interface. See the table below for details of the W230/W388/W216/W231 menu structure. A five-way navigation key allows you to move easily through menus and confirm your selection.

Liquid Crystal Display (LCD)

The LCD provides a 700 square millimeter multicolor backlit color display with user-adjustable contrast settings for optimum readability in all light conditions. The bit-map 128 x 128 pixel display includes up to 3 lines of text, 1 line of icons, and 1 line of prompts.

When you turn on your phone, it displays the home screen. To dial a number from the home screen, press number keys and 📞.

Note: Your home screen might look a little different from this example.

WED 10/10/07

10:51am

Messaging

Left Soft Key Label — Right Soft Key Label

Soft key labels show the current soft key functions.
For soft key locations, see page 2.
Press the *navigation key* ·Ô· up, down, left, or right to select items in the home screen.
Status indicators can appear across the top of the home screen:

indicator		
📶	**Signal Strength**	Vertical bars show the strength of the network connection.
▲	**Roaming**	Indicates phone is in a digital coverage area and is roaming off network.
	Missed Call	Indicates that you received an unanswered call.
📞	**Voice Call/ Incoming Call**	Shows during an active voice call.
🔋	**Battery Level**	Shows battery charge level. The more bars, the greater the charge.
(◦🔔	**Loud Ring**	Indicates **Style** (in **Ring Styles**) is set to **Loud**.
◦🔔	**Soft Ring**	Indicates **Style** (in **Ring Styles**) is set to **Soft**.
⊘🔔	**All Sounds Off**	Indicates **Style** (in **Ring Styles**) is set to **Silent**.
⅀▸	**Vibrate then Ring**	Indicates **Style** (in **Ring Styles**) is set to **Vibe then Ring**.
⅀▯⅀	**Vibrate**	Indicates **Style** (in **Ring Styles**) is set to **Vibrate**.
Spkrphone On		Indicates speakerphone is on.
✉	**New Text Message**	Appears when you receive a new text message.
✉»	**New Voicemail Message**	Appears when you receive a new voicemail message.

Figure 2. W230/W388/W216/W231 Display Icon Indicators

User Interface Menu Structure

The table below shows a portion of the W230/W388/W216/W231 telephone menu structure.

* Optional Network, SIM card, or subscription-dependent features.

Menu Map

main menu

- **Contacts**
- **Recent calls**
  - Received calls
  - Dialed calls
  - Notepad
  - Call times
  - Call cost *
  - Data times
  - Data volumes
- **Messages**
  - Create
  - Inbox
  - Drafts
  - Outbox
  - Quick notes
  - Voicemail
  - Browser msgs
  - Info services
  - MMS templates

Extras
- Calculator
- MyMenu
- Alarm clock
- Stop watch
- Chat*
- Dialling services*
- STK*
- Calendar
- Phone Inspector

Games
- Java
- Games

WebAccess
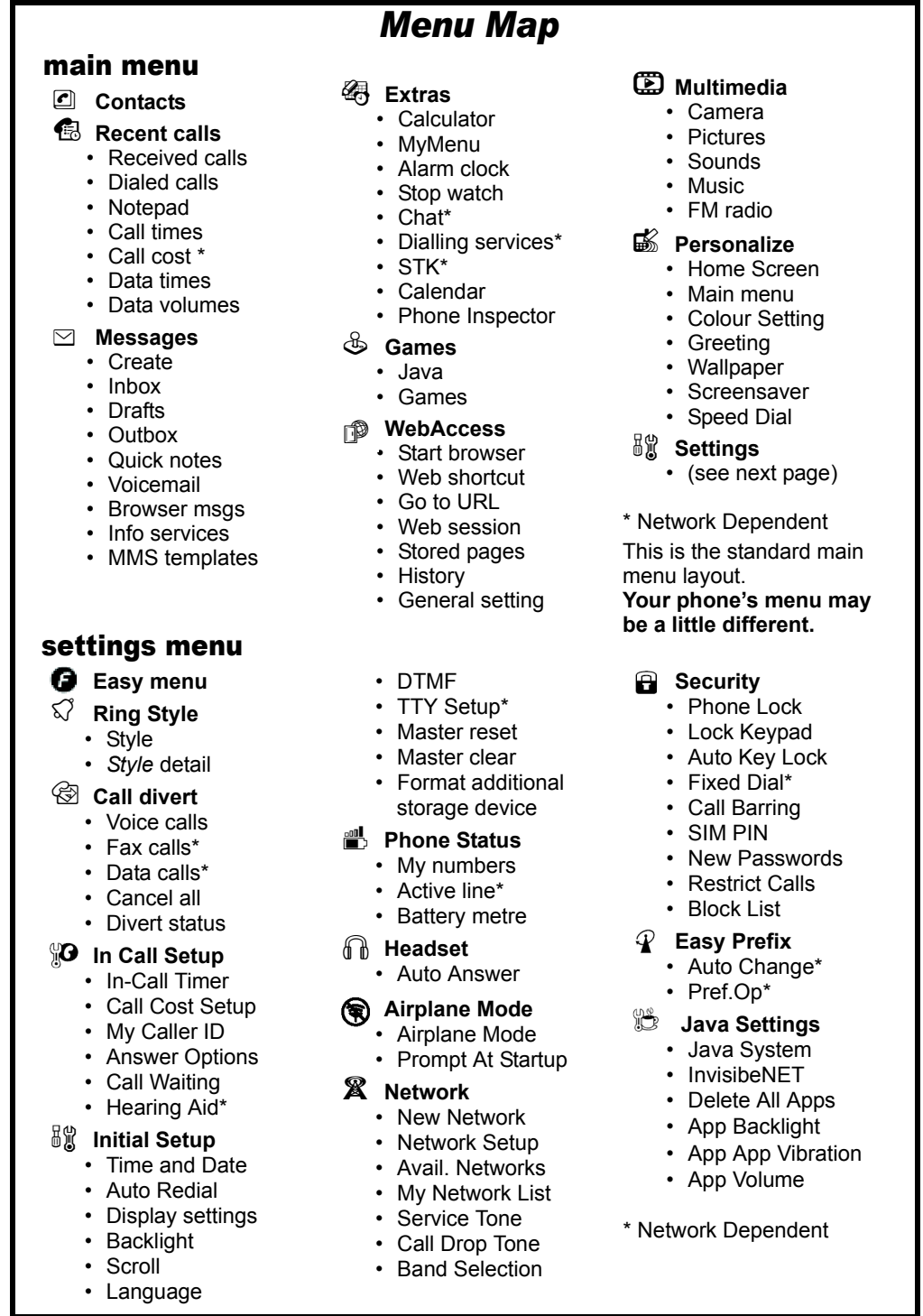- Start browser
- Web shortcut
- Go to URL
- Web session
- Stored pages
- History
- General setting

Multimedia
- Camera
- Pictures
- Sounds
- Music
- FM radio

Personalize
- Home Screen
- Main menu
- Colour Setting
- Greeting
- Wallpaper
- Screensaver
- Speed Dial

Settings
- (see next page)

* Network Dependent

This is the standard main menu layout.
Your phone's menu may be a little different.

settings menu

- **Easy menu**
- **Ring Style**
  - Style
  - *Style* detail
- **Call divert**
  - Voice calls
  - Fax calls*
  - Data calls*
  - Cancel all
  - Divert status
- **In Call Setup**
  - In-Call Timer
  - Call Cost Setup
  - My Caller ID
  - Answer Options
  - Call Waiting
  - Hearing Aid*
- **Initial Setup**
  - Time and Date
  - Auto Redial
  - Display settings
  - Backlight
  - Scroll
  - Language

- DTMF
- TTY Setup*
- Master reset
- Master clear
- Format additional storage device

Phone Status
- My numbers
- Active line*
- Battery metre

Headset
- Auto Answer

Airplane Mode
- Airplane Mode
- Prompt At Startup

Network
- New Network
- Network Setup
- Avail. Networks
- My Network List
- Service Tone
- Call Drop Tone
- Band Selection

Security
- Phone Lock
- Lock Keypad
- Auto Key Lock
- Fixed Dial*
- Call Barring
- SIM PIN
- New Passwords
- Restrict Calls
- Block List

Easy Prefix
- Auto Change*
- Pref.Op*

Java Settings
- Java System
- InvisibeNET
- Delete All Apps
- App Backlight
- App App Vibration
- App Volume

* Network Dependent

Figure 3. W230/W388/W216/W231 Menu Structure

Battery Function

The telephone displays a battery charge indicator icon in the idle screen to indicate the battery charge level. The gauge shows four levels: 50%, 20%, 5%, and Low Battery.

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).

Note: All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touches 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.

Tools and Test Equipment

The table below lists the tools and test equipment used on W230/W388/W216/W231 telephones. Use either the listed items or the equivalent.

Table 1: General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
See Table 3	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)
-	Antistatic Gloves	Provides protection from damage to phone caused by electrostatic discharge (ESD)
0-00-00-3005 (AMS)	Disassembly tool, plastic with flat and pointed ends (manual opening tool)	Used during assembly/disassembly
0-00-00-40861 (AMS)	Camera disassembly Jig tool	
6680388B01	Tweezers, plastic	Used during assembly/disassembly
-	T5 Screw driver	Used with Screw 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.

Figure 4. A screwdriver (T5), a pair of tweezers, wedge tool

Disassembly

This section describes how to disassemble a W230/W388/W216/W231 telephone. Tools and equipment used are listed on the preceding page.

⚠️ *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

All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touches 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.   Ensure the phone is turned off.
2.   Push the latch and pop out the battery cover.

Figure 5. Removing the battery cover

3.   Press the tab to pop out 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 battery with 2 tabs on its bottom end into the battery slot.

Figure 6. Replace the battery cover

5.   Click the battery into place, then slip the battery cover over it.

Removing and Replacing the T-flash Card

1. Remove the battery.
2. Remove the T-flash from its holder by sliding it in the direction shown below.

Figure 7. Removing the T-flash card

3. To replace, carefully slide the T-flash into position in its socket.

Removing and Replacing the SIM Card

1. Remove the SIM from its holder by sliding it in the direction shown below.

Figure 8. Removing the SIM card

2. To replace, carefully slide the SIM into position in its socket.

Removing the audio jack cover

1. Remove the audio jack cover.

Figure 9.

Removing the EMU jack cover

1. Remove the EMU jack cover.

Figure 10.

Removing and Replacing the Front Housing

1. Pull open the top of the front housing.

Figure 11.

2. Remove the front housing.

Figure 12. Removing the front housing

3. (Optional) Remove and replace the rubber keypad. It slips out of the front housing.

Figure 13. Removing the rubber keypad

4. To replace, simply snap the front and back halves together again.

5. Remove six T5 screws around the rear housing.
6. Use torque force of 13.73 N-cm.

Figure 14. Removing the six T5 screws

Removing and Replacing the Transceiver Board, Back Housing, and Vibrator Module

1. Remove the front housing.
2. Disengage the both side hooks which help to secure the transceiver board to the rear housing, and then pop it out.

Figure 15. Disengaging the side hooks

3. In the rear housing component, gently pry out the vibrator module.

Figure 16. Removing the vibrator module

Removing the key frame

1. Remove the key frame.
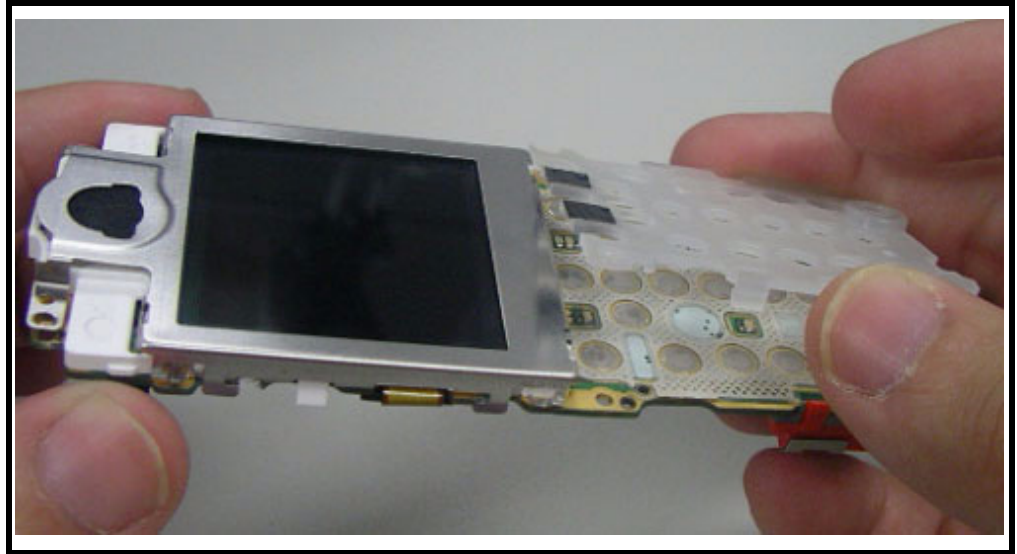
Figure 17.

Removing and Replacing the Antenna Module, Microphone

1. Remove the transceiver board, the vibrator module, and the rear housing.
2. Gently snap the antenna away from the transceiver board.
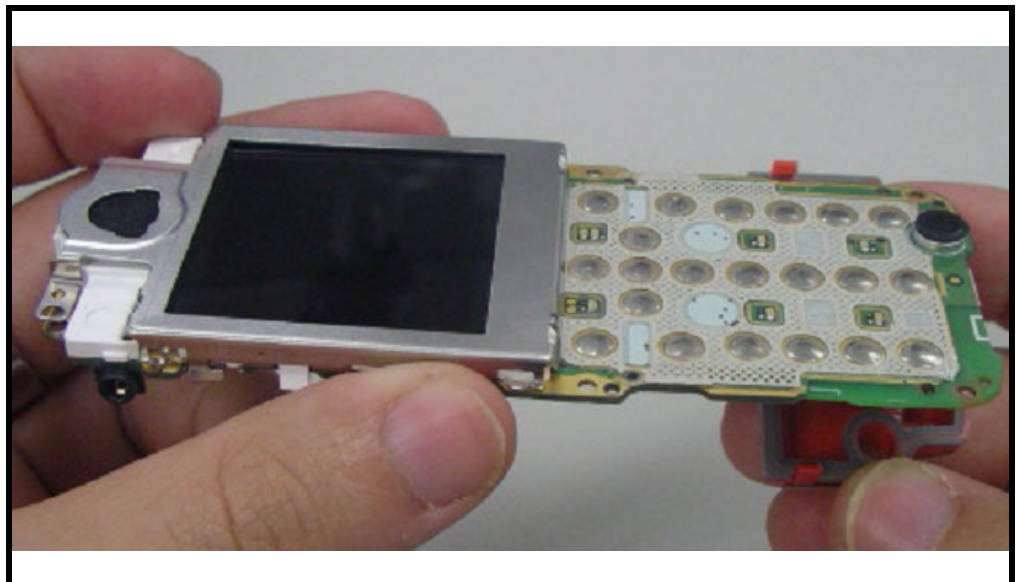
Figure 18. Removing the antenna module
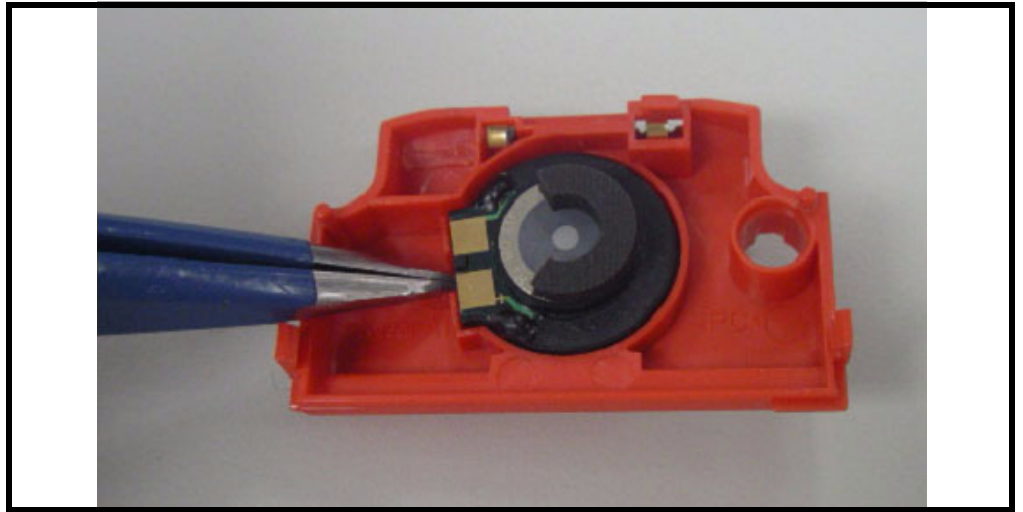
3.   (Optional) Remove and replace the speak.

Figure 19. Removing the microphone
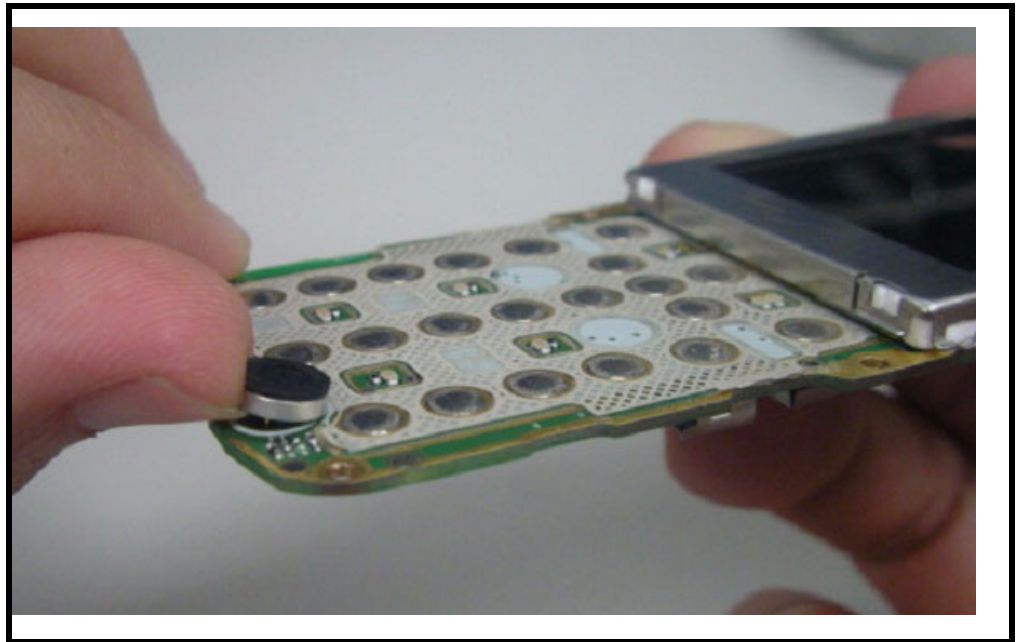
4.   Carefully pry off the microphone component.

Figure 20. Removing the microphone

Removing the board to board connector

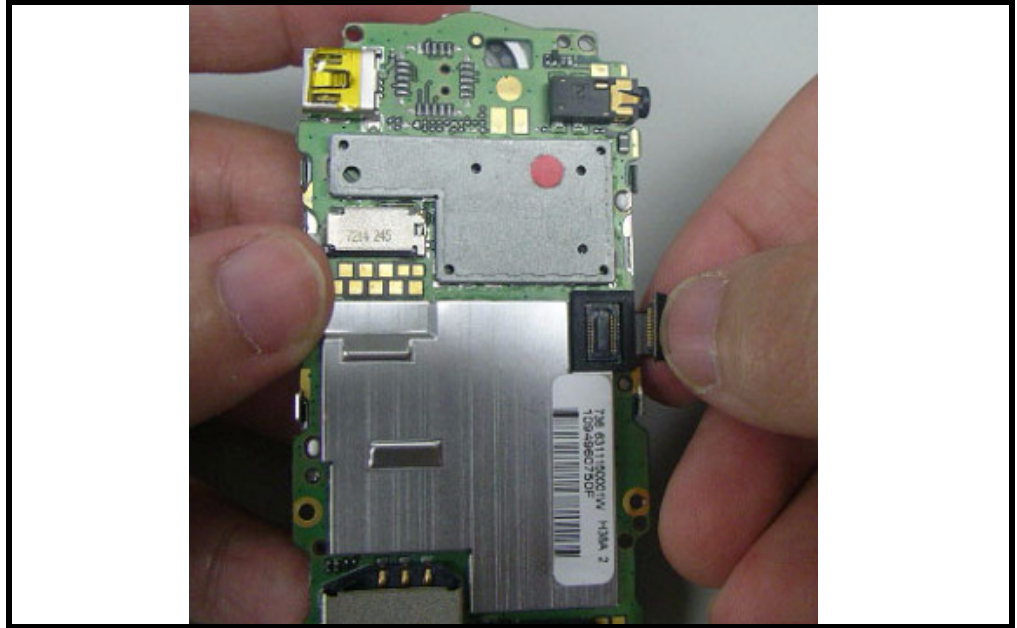1.   Removing the board to board connector.

Figure 21.

Removing and Replacing the LCD Screen

1.   Remove the antenna module as described earlier.
2.   Gently pry the LCD screen away from the Transceiver board. Six hooks hold it in place (three on each side).
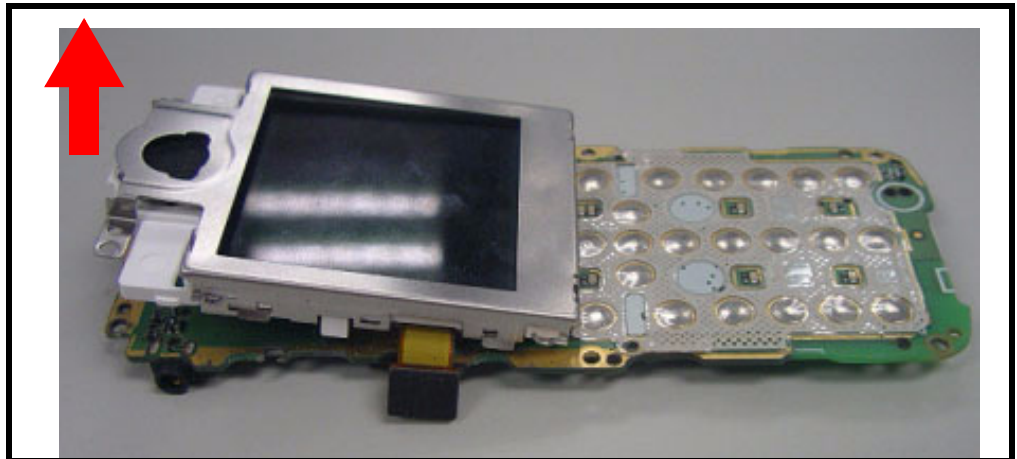

Figure 22. Pry the LCD screen away from the Transceiver board

3.   Detach the cable connecting the LCD screen to the Transceiver board.
4.   To replace it, gently solder the cable to the Transceiver board then mount the LCD.
5.   Restore the antenna module and other parts.

Removing and Replacing the LCD Shielding Case

1. Remove the LCD screen as described earlier.
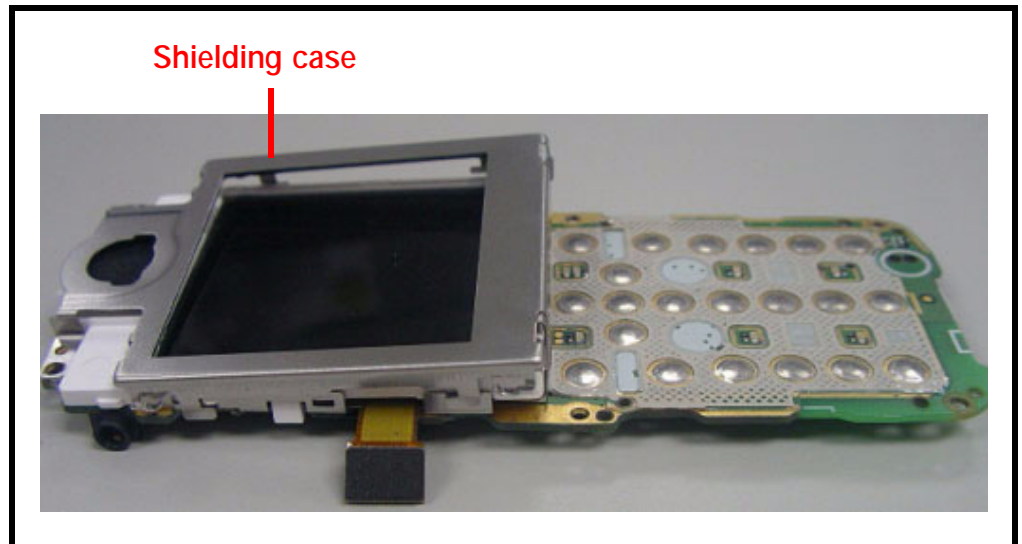2. Gently pry the LCD shielding case away from the LCD screen.

Figure 23. Pry the LCD shielding case away

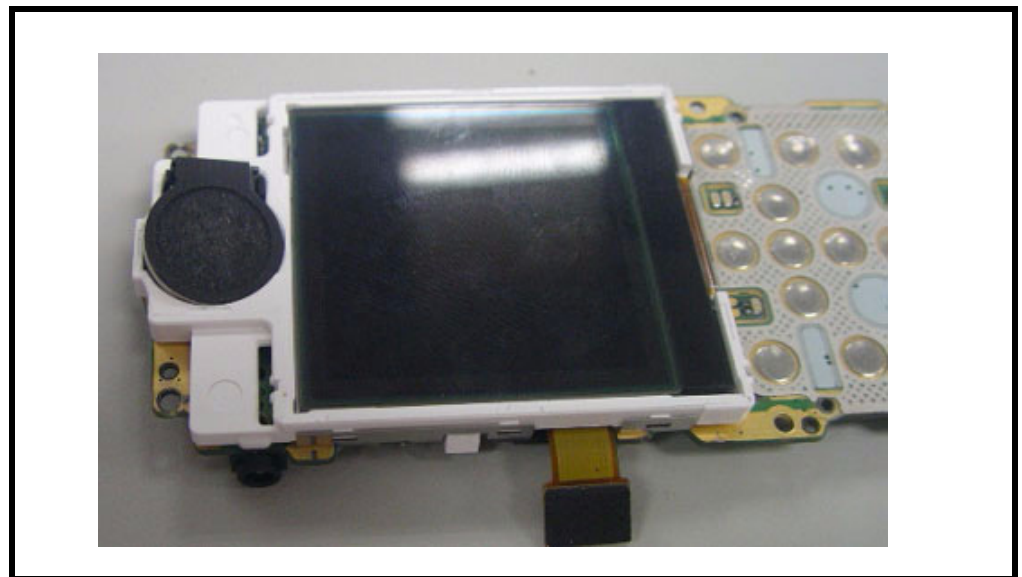3. (Optional) Remove and Replace the receiver.

Figure 24. Pop out the receiver

4. To replace it, mount the LCD shielding case over the LCD screen.
5. Restore the LCD screen and other parts.

Removing and Replacing the Camera Module

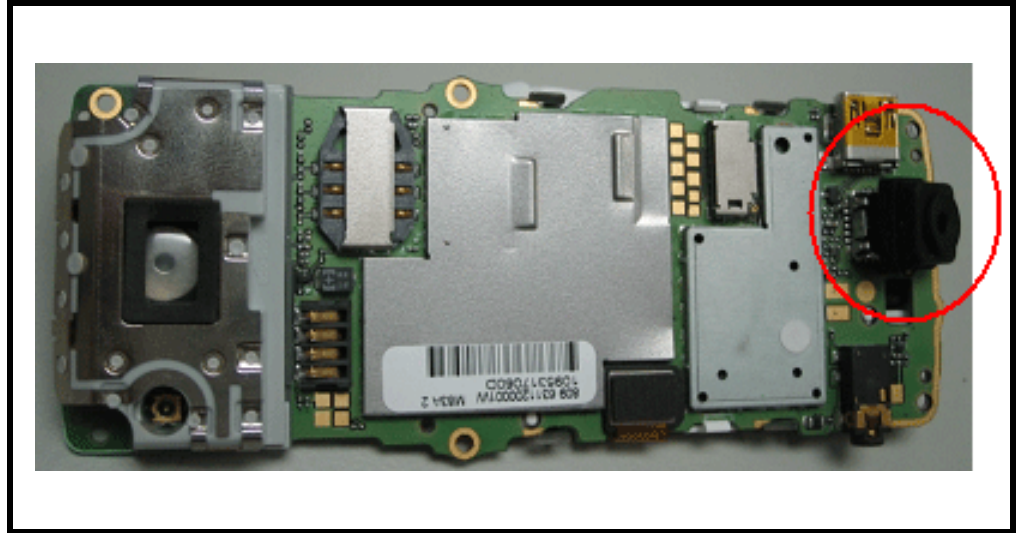1. Remove the gasket of Camera.

Figure 25. Remove the gasket of Camera

2. Use Jig to clip out the camera module gently.
    Notice: Please use Jig (AMS PN: 0-00-00-40861 /CCI PN: XXXX005700W) to remove Camera module.
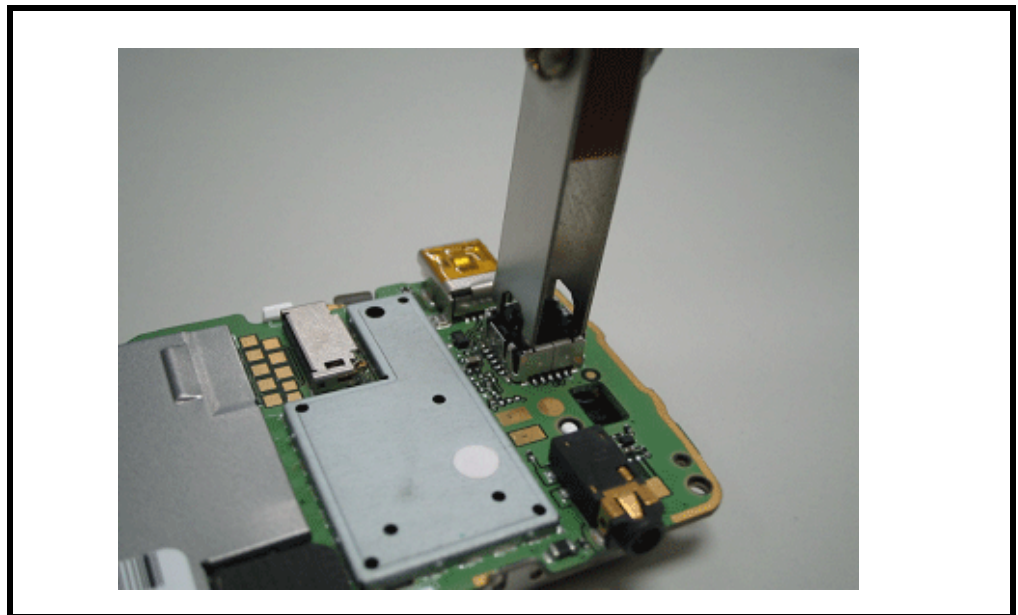

Figure 26. Use Jig to clip out the camera module gently
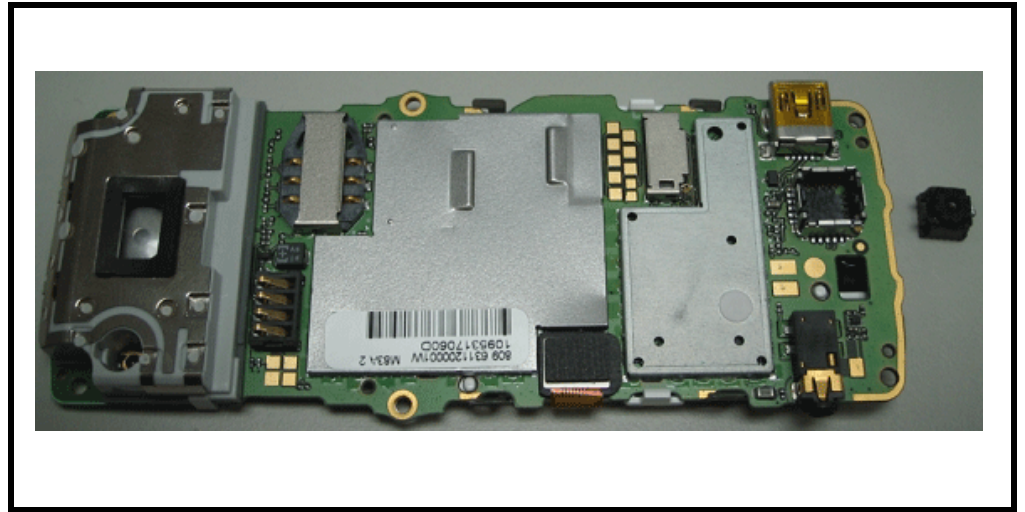
3.   (Optional) remove and replace the camera module.

Figure 27. Remove the camera module

4.   Restore the camera module and other parts.

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.
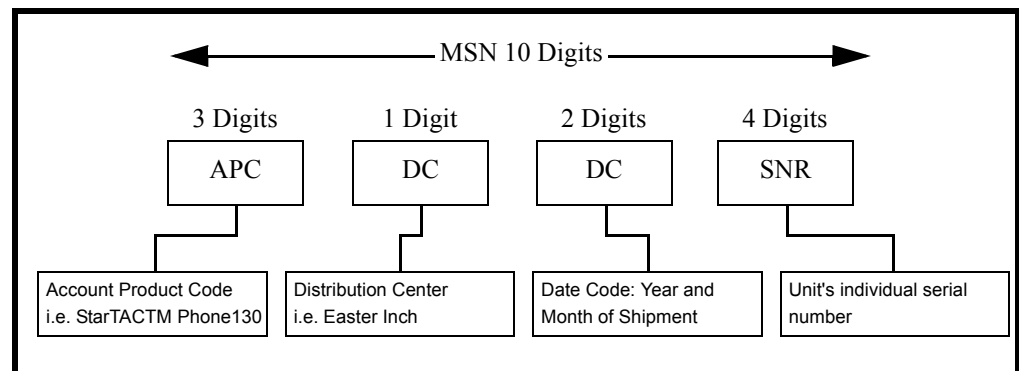- The MSN is divided into 4 sections as shown in Figure 28.

Figure 28. MSN Label Breakdown

International Mobile Station Equipment Identity (IMEI)

The International Mobile Station Equipment Identity (IMEI) number is an individual number unique to the Transceiver 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 the table below.

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 (BABT or CTIA)
XXXXXX	Type Identifier (defined by BABT or CTIA)
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 W230/W388/W216/W231 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/PCS test SIM must be used.

1. Press and hold 🔴 to 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. Press and hold 🔴 to turn the phone ON.

Manual Test Mode Commands

Table 3: Manual Test Commands

Key Sequence	Test Function/Name	Remarks
#02#	Handset information	
#03#	RF information	
#04#	ADC information	
#09#	Simple Test mode	
**0102#	FFS format	
**0105#	Disable EFEM mode	
*#06#	IMEI number	

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 mis-aligned.	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. Temporarily connect a +3.6 Vdc supply to the battery terminals. Press and hold 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.	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 as described in the procedures. 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 as described in the procedures. 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.

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

Symptom	Probable Cause	Verification and Remedy
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 or refer to a Level 3 Service Center for the keypad metal dome replacement.
9. Vibrator feature not functioning.	a) Vibrator faulty.	Check general condition of vibrator. If it is good, proceed to b.
	b) Vibrator defective.	Replace the defective vibrator.
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 (W230)

The following section provides a reference for the parts associated with W230 telephones.
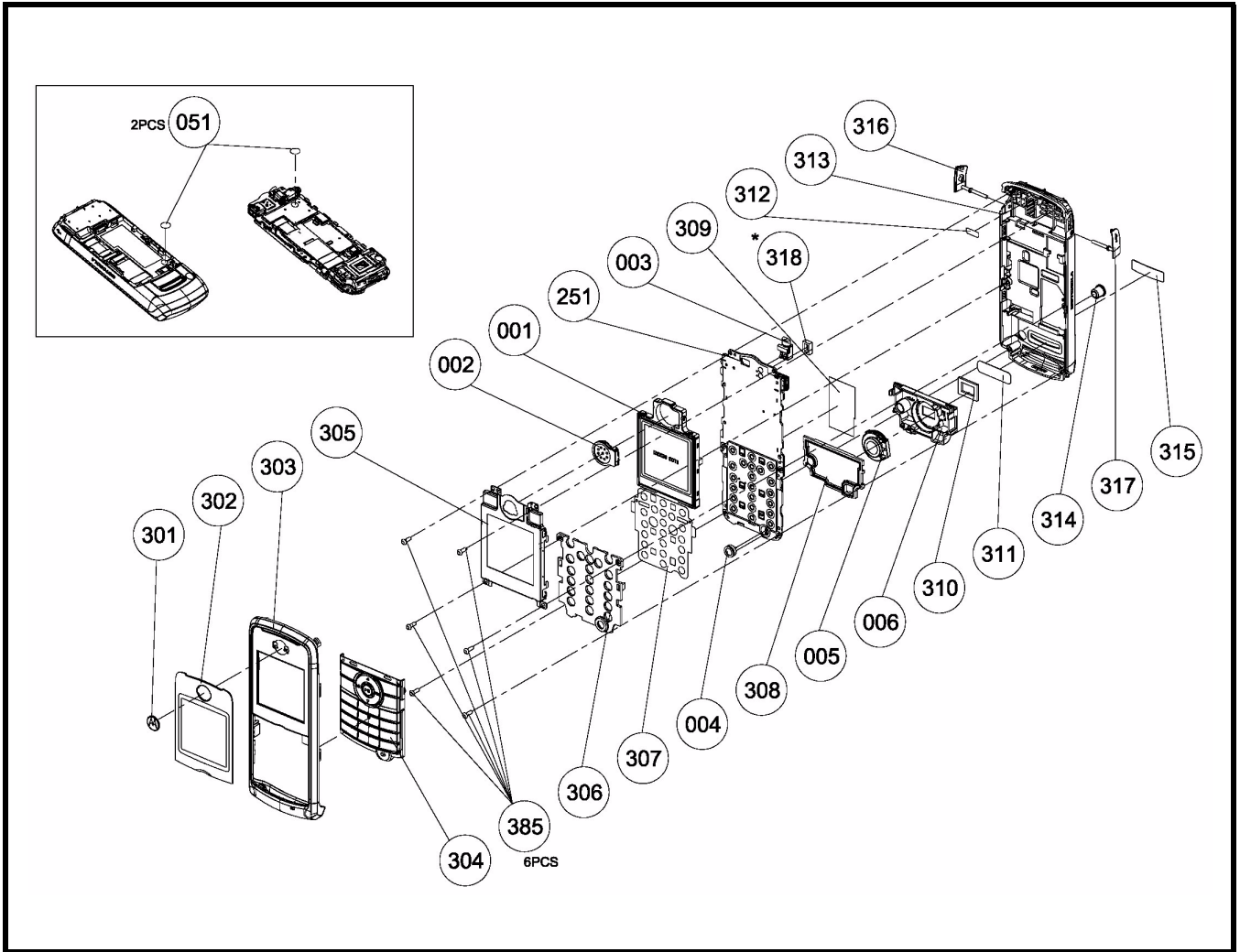
Exploded View Diagram

Figure 29. W230 Exploded View Diagram

Exploded View Parts List

Table 5: W230 Exploded View Parts List

Part Number	Item Number	Description	Specification
001	7630121256W	LCM	WD-Y1212VC-6CLW 128*128 WINTEK
002	2240133209W	RECEIVER	SDR1332F-S2-FB5-G AAC
003	3930507104W	SPR-VIB	ϕ5*L7.15 1.3V NEBG-MC3 SHICOH
004	2220601502W	MIC	ACMG6015-03P22-213 -41dB AAC
005	2250160808W	SPEAKER	DMS1608F-05-PC-F1B-G 8ohm AAC
006	2300H38001W	I-ANTENNA	H38 ANT+HOLDER EU
051	82E5800003W	LABEL	E58 WATERPROOF 3M5559ϕ4mm
251	6911120001W	F/WMB 33	H38 GA-144
300	5501780001W	ME/PT 33	H38 MANDARIN
301	2545H38001W	MARK	H38-ABS-CHROME-M-LOGO
302	2541H38003W	LCD-LENS	H38-MR58-0.8MM-BLACK
303	2511H38001W	UPP-ASSY	H38-SILVER
304	3104H38011W	DIAL-KEY	H38-P+R-BLACK-E-21KEY
305	3012H38001W	SHIELDASY	H38-LCM-BRACK+SPONGE ASSY
306	254BH38001W	PLATE	H38-PC-KEYPAD
307	3109H38001W	MET-DOME	H38-ϕ4*160g-21KEY
308	302FH38001W	SPK-GASKE	H38-RUBBER-39.2*24.4*2.8-SPK
309	3064H38002W	MYLAR	H38-MYLAR-ON-RF
310	303EH38001W	SPK-SPON	H38-PORON-12.4*9.4*1.05T
311	3061H38004W	DUST-PRO	H38-MESH-6.5*22-SPK
312	3064H38001W	MYLAR	H38-PC-8.14*3.09*0.08T
313	2512H38001W	LOW-ASSY	H38-LICORICE
314	3028H38001W	RF-COV	H38-RUBBER-LICORICE
315	3062H38001W	NAMEPLATE	H38-PC-BLACK
316	302BH38001W	RUBBERPAD	H38-TPU-15.21*7-AUDIO-LICORICE
317	302BH38002W	RUBBERPAD	H38-TPU-15.21*7-EMU-LICORICE
318	303MH38001W	SPONGE	H38-PORON-9.7*7.7*1-MB BTB
385	3501750102W	SCREW_G	TORX M1.7*5.0-BLACK-NI KL

Part Number Charts (W388)

The following section provides a reference for the parts associated with W388 telephones.
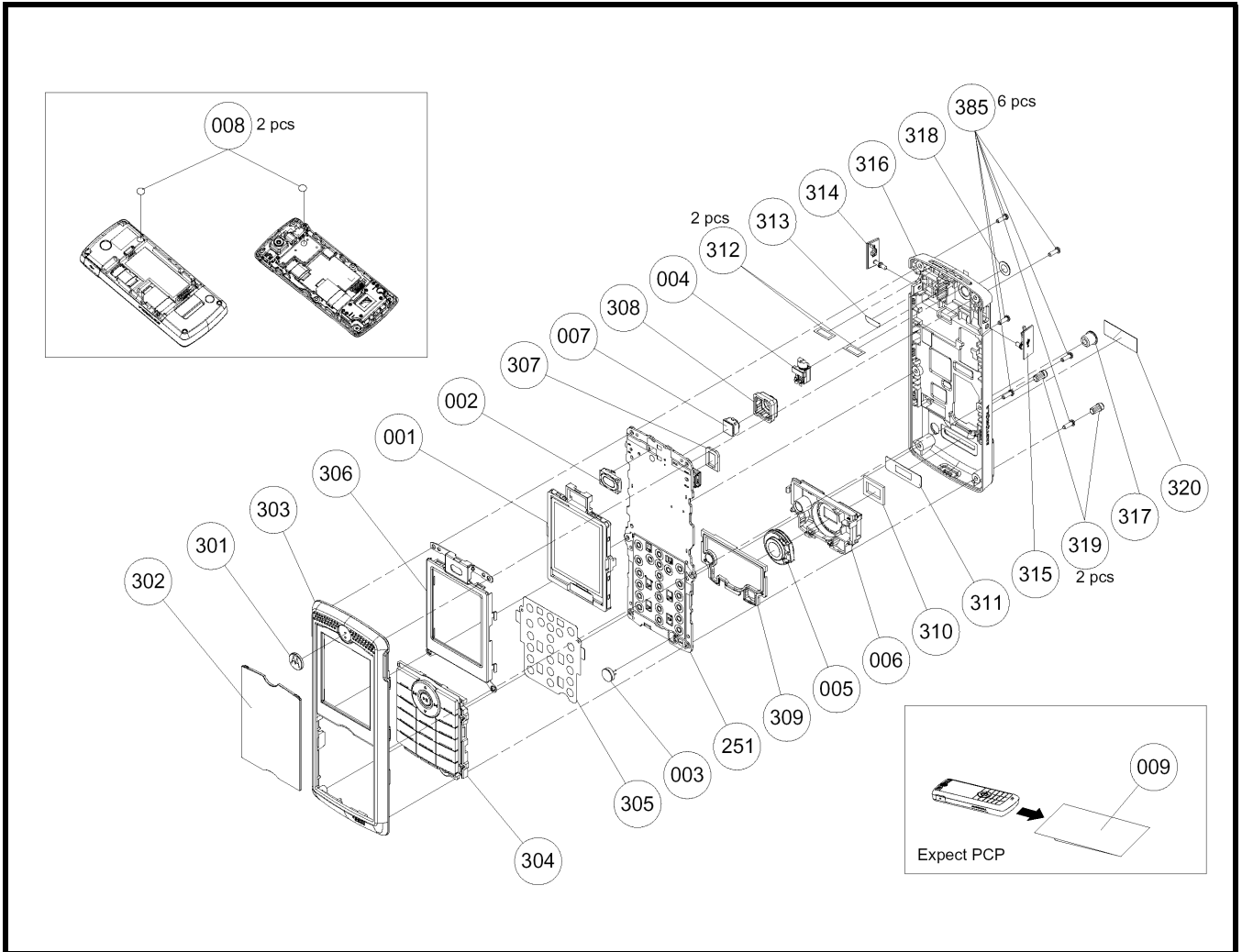
Exploded View Diagram

Figure 30. W388 Exploded View Diagram

Exploded View Parts List

Table 6: W388 Exploded View Parts List

Part Number	Item Number	Description	Specification
001	763000189GW	LCM	990000214 128*160 TPO
002	2240071103W	RECEIVER	SDRP0711KJ01-F2-G AAC
003	2220432301W	MIC	KUF4323-013220 ϕ 6*1.5 -41dB
004	3930507104W	SPR-VI	ϕ 5*L7.15 1.3V NEBG-MC3 SHICOH
005	2250160808W	SPEAKER	DMS1608F-05-PC-F1B-G 8ohm AAC
006	2300H38001W	I-ANTENNA	H38 ANT+HOLDER EU
007	7650600301W	CMOS SENS	CCS600320V03850L VGA 6*6*4.97C
008	82E5800003W	LABEL	E58 WATERPROOF 3M5559 f 4mm
251	6911190001W	F/WMB 33	M83 GA-165
300	5501870001W	ME/PT 33	M83 BLACK/SLATE
301	2545M83001W	MARK	M83-ABS-DARK CHROME-M-LOGO
302	2541M83001W	LCD-LENS	M83-MR58-CLEAR BLACK
303	2511M83001W	UPP-ASSY	M83-BLACK SLATE
304	3104M83011W	DIAL-KEY	M83-P+R-BLK-E-21KEY RED R
305	3109M83001W	MET-DOME	M83-f 4*160g-21KEY
306	3012M83001W	SHIELDASY	M83-LCM-BRACK+SPONGE ASSY
307	303MH38001W	SPONGE	H38-SRS40P-MB BT
308	3068M83001W	GASKET	M83-RUBBER-CMOS
309	302FH38001W	SPK-GASKE	H38-RUBBER-ANTENNA HOLDER
310	303EH38001W	SPK-SPON	H38-SRS40P-SPEAKER
311	3061M83006W	DUST-PRO	M83-MESH-SPK-RED
312	3061M83005W	DUST-PRO	M83-MESH-3RD-REC-RED
313	3064M83001W	MYLAR	M83-PC-LANYARD
314	302BM83001W	RUBBERPAD	M83-TPU-AUDIO-BLACK
315	302BM83002W	RUBBERPAD	M83-TPU-EMU-BLACK
316	2512M83001W	LOW-ASSY	M83-BLACK
317	3028M83002W	RF-COV	M83-SILICON-BLACK
318	254GM83003W	CMOS-LENS	M83-MR58-CLEAR RED
319	254CM83001W	SCREW-COV	M83-SILICON-BLACK
320	3062M83001W	NAMEPLATE	M83-PC-BLACK W388
385	3501755102W	SCREW_G	FPH T5-M1.7*5.5-BLACK-SAE 1018

Part Number Charts (W216)

The following section provides a reference for the parts associated with W216 telephones.
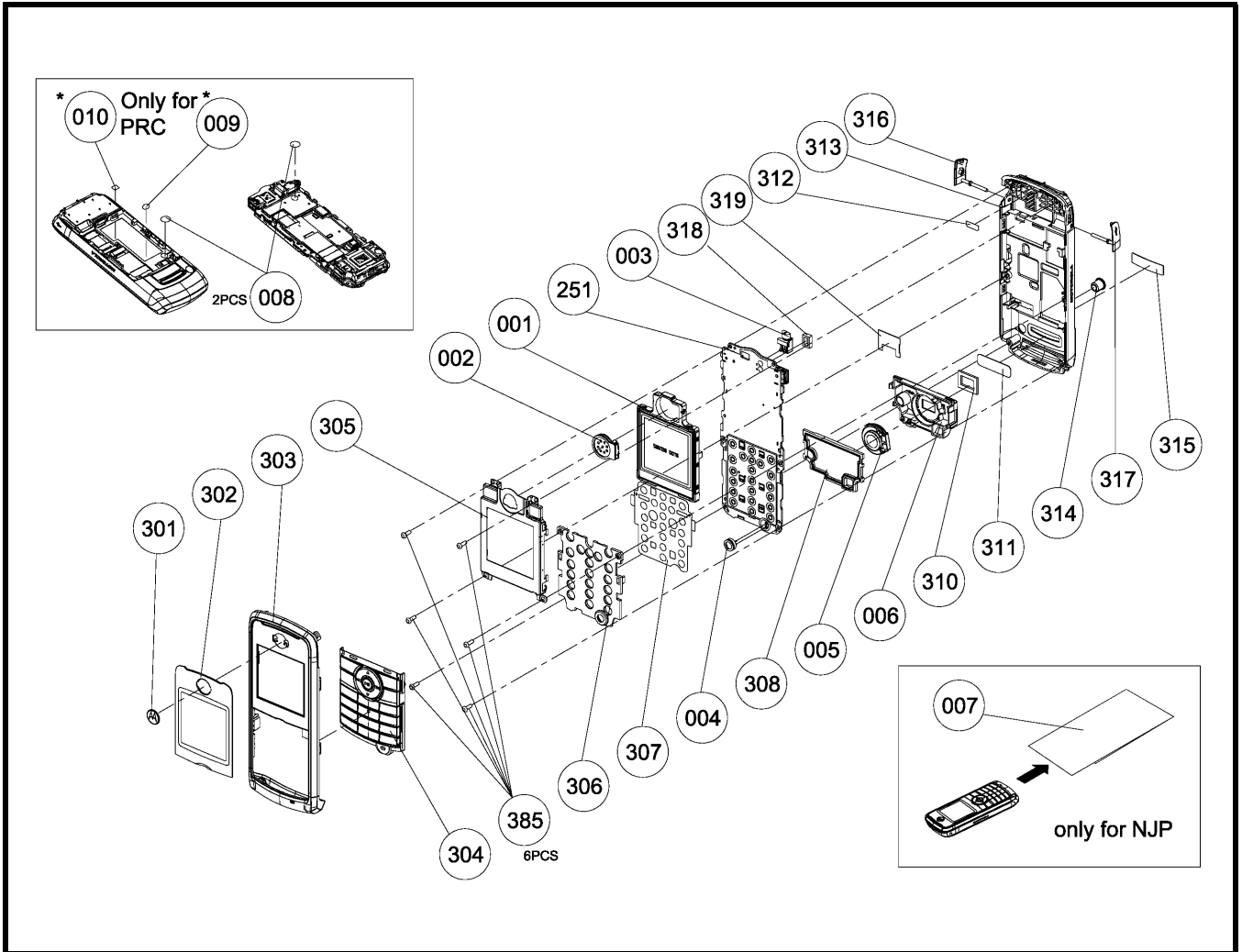
Exploded View Diagram

Figure 31. W216 Exploded View Diagram

Exploded View Parts List

Table 7: W216 Exploded View Parts List

Part Number	Item Number	Description	Specification
001	7630121256W	LCM	WD-Y1212VC-6CLW 128*128 WINTEK
002	2240133209W	RECEIVER	SDR1332F-S2-FB5-G AAC
003	3930507104W	SPR-VIB	ϕ5*L7.15 1.3V NEBG-MC3 SHICOH
004	2220601502W	MIC	ACMG6015-03P22-213 -41dB AAC
005	2250160808W	SPEAKER	DMS1608F-05-PC-F1B-G 8ohm AAC
006	2300H38001W	I-ANTENNA	H38 ANT+HOLDER EU
007	8701000034W	PE BAG	H38 W/O TALC 70*160mm
008	82E5800003W	LABEL	E58 WATERPROOF 3M5559 ϕ4mm
009	82E7200001W	LABEL	E72 3C LABEL FOR PRC
010	82H8000003W	LABEL	H80 CMM LOGO FOR PRC
251	6911120041N	F/WMB 33	M51 GA-144
300	550193H001N	ME/PT 33	M51 LICORICE DK-MC CMCC
301	2545M51001W	MARK	M51-ABS-BLACK-M-LOGO
302	2541M51001W	LCD-LENS	M51-MR58-0.8MM-BLACK-CMCC
303	2511H38002W	UPP-ASSY	H38-LICORICE
304	3104M51031W	DIAL-KEY	M51-P+R-BLACK_SLATE-MC-21KEY
305	3012H38001W	SHIELDASY	H38-I CHIUN-LCM SHD ASSY
306	254BH38001W	PLATE	H38-PC-KEYPAD
307	3109H38001W	MET-DOME	H38-ϕ4*160g-21KEY
308	302FH38001W	SPK-GASKE	H38-RUBBER-ANTENNA HOLDER
310	303EH38001W	SPK-SPON	H38-SRS40P-SPEAKER
311	3061H38004W	DUST-PRO	H38-MESH-SPK
312	3064H38001W	MYLAR	H38-PC-LANYARD
313	2512H38001W	LOW-ASSY	H38-LICORICE
314	3028H38001W	RF-COV	H38-RUBBER-LICORICE
315	3062H38003W	NAMEPLATE	H38-PC-BLACK-CMCC
316	302BH38001W	RUBBERPAD	H38-TPU-15.21*7-AUDIO-LICORICE
317	302BH38002W	RUBBERPAD	H38-TPU-15.21*7-EMU-LICORICE
318	303MH38001W	SPONGE	H38-SRS40P-MB BTB
319	3064M51001W	MYLAR	M51-PC-T_FLASH
385	3501750102W	SCREW_G	TORX M1.7*5.0-BLACK-NI KL

Part Number Charts (W231)

The following section provides a reference for the parts associated with W231 telephones.
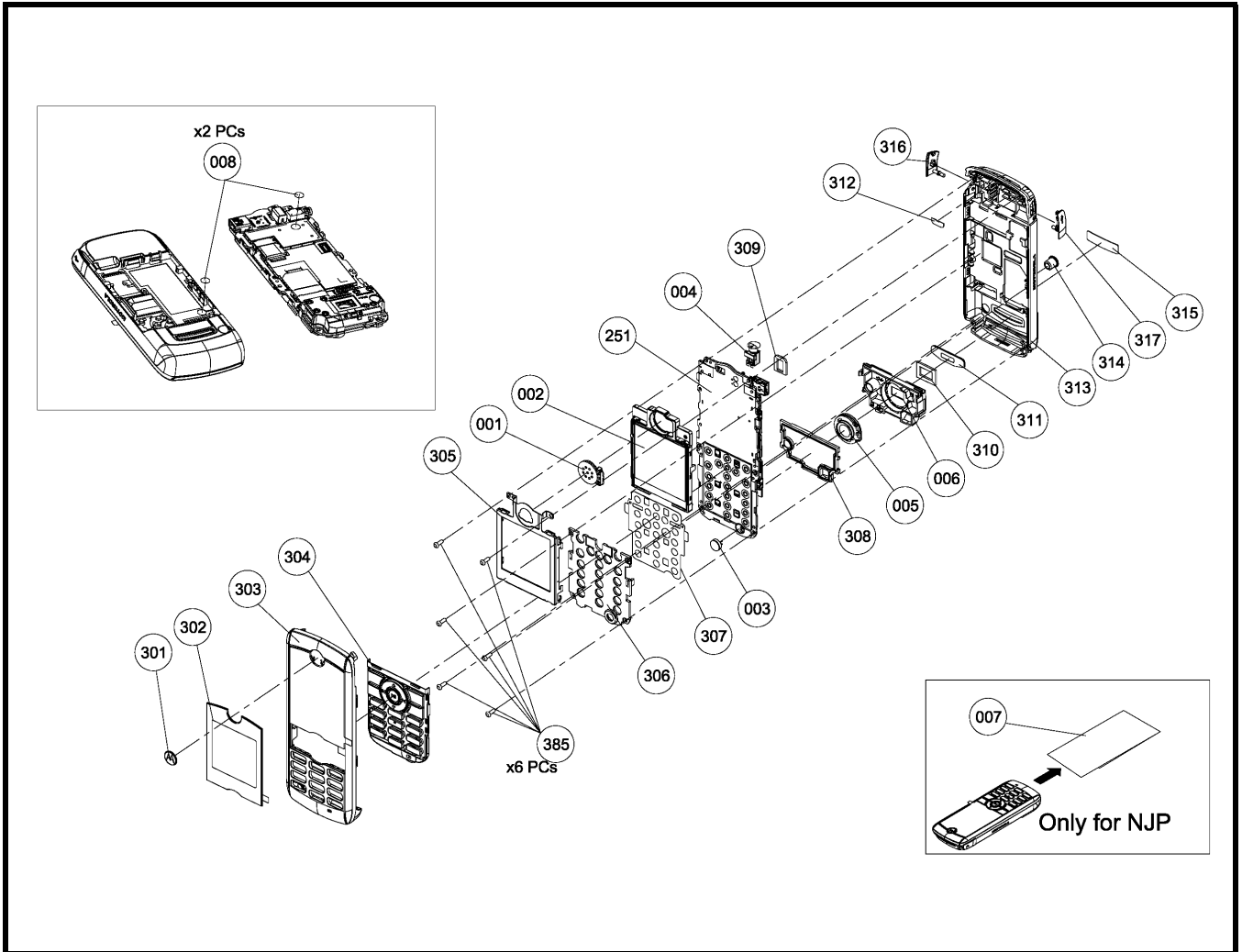
Exploded View Diagram

Figure 32. W231 Exploded View Diagram

Exploded View Parts List

Table 8: W231 Exploded View Parts List

Part Number	Item Number	Description	Specification
001	2240133209W	RECEIVER	SDR1332F-S2-FB5-G AAC
002	7630121256W	LCM	WD-Y1212VC-6CLW 128*128 WINTEK
003	2220601502W	MIC	ACMG6015-03P22-213 -41dB AAC
004	3930507104W	SPR-VIB	ϕ5*L7.15 1.3V NEBG-MC3 SHICOH
005	2250160808W	SPEAKER	DMS1608F-05-PC-F1B-G 8ohm AAC
006	2300H38001W	I-ANTENNA	H38 ANT+HOLDER EU
007	8701000029W	PE BAG	H80 W/O TALC 70*190MM
008	82E5800003W	LABEL	E58 WATERPROOF 3M5559 ϕ4mm
251	6911120001N	F/WMB 33	H38 GA-144
300	5501960101N	ME/PT 33	M55 LICORICE/MANDARIN
301	2545H38001W	MARK	H38-ABS-CHROME-M-LOGO
302	2541M55001W	LCD-LENS	M55-MR58-0.8MM-BLACK SLATE
303	2511M55002W	UPP-ASSY	M55-LICORICE WITH MANDARIN
304	3104M55012W	DIAL-KEY	M55-P+R-LICORICE-E-21KEY
305	3012H38001W	SHIELDASY	H38-I CHIUN-LCM SHD ASSY
306	254BH38001W	PLATE	H38-PC-KEYPAD
307	3109H38001W	MET-DOME	H38-ϕ4*160g-21KEY
308	302FH38001W	SPK-GASKE	H38-RUBBER-ANTENNA HOLDER
309	303MH38001W	SPONGE	H38-SRS40P-MB BTB
310	303EH38001W	SPK-SPON	H38-SRS40P-SPEAKER
311	3061H38004W	DUST-PRO	H38-MESH-SPK
312	3064H38001W	MYLAR	H38-PC-LANYARD
313	2512H38001W	LOW-ASSY	H38-LICORICE
314	3028H38001W	RF-COV	H38-RUBBER-LICORICE
315	3062M55001W	NAMEPLATE	M55-PC-BLACK
316	302BH38001W	RUBBERPAD	H38-TPU-15.21*7-AUDIO-LICORICE
317	302BH38002W	RUBBERPAD	H38-TPU-15.21*7-EMU-LICORICE
385	3501750102W	SCREW_G	TORX M1.7*5.0-BLACK-NI KL

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.
To order parts please use the following Link:
https://servicelink3.motorola.com
(Password is required)
For information on ordering parts please contact EMEA at +49 461 803 1638.

Accessories

Table 9: List of Accessories

Description	Part Number
Mini-USB plug Accessories	
EMU Switch Mode Midrate (PRC)	SPN5188
EMU Switch Mode Midrate (US)	SPN5185
EMU Switch Mode Midrate (Taiwan)	SPN5216
EMU Switch Mode Midrate (Euro)	SPN5189
EMU Switch Mode Midrate (HK/UK)	SPN5190
EMU Switch Mode Midrate (Australia)	SPN5193
EMU Switch Mode Midrate (India)	SPN5194
EMU Switch Mode Midrate (Mexico)	SPN5186
EMU Switch Mode Midrate (Brazil)	SPN5187
EMU Switch Mode Midrate (Arg)	SPN5192
EMU Switch Mode Midrate (Japan)	SPN5274
EMU Switch Mode Midrate (Korea)	SPN5351
EMU Switch Mode Dual Rate (Brazil)	SPN5196
EMU Switch Mode Dual Rate (Arg)	SPN5197
EMU Switch Mode Dual Rate (PRC)	SPN5198
EMU Switch Mode Dual Rate (HK)	SPN5199
EMU Switch Mode Dual Rate (Mex)	SPN5200
EMU Switch Mode Dual Rate (US)	SPN5202
EMU Switch Mode Dual Rate (Twn)	SPN5270
EMU Switch Mode Dual Rate (Japan)	SPN5275
P790 Portable Charger	SPN5353
Charger Adapter	SYN8127
Charger Adapter °V Aust / NZ Plug	SYN7456
Charger Adapter °V Euro Plug	SYN7455
Charger Adapter °V UK Plug	SPN5440A
Travel Charger BASE ONLY Standard- PRC COMMON USBA	SKN6371x
Data Cable Mini USB/USB/Serial	SKN6253
512MB microSD card & Mot SD adapter	SYN1405
1GB microSD card & Mot SD adapter	SYN1406
2GB microSD card & Mot SD adapter	SYN1407
In-Vehicle Accessories	
Hi Performance VPA	SPN5401
P310 EMU MidRate	SYN1630
VC700 EMU Power Adapter	SYN0847
Audio Accessories	
Mono Earbud Headset (Black)	SYN8390
S212 Wired Stereo HS (2.5mm barrel)	SYN1462
Headset One Touch w/ Send-End	SYN8419
Stereo One-Touch Earbud	CHYN4516
Batteries	
Battery BQ50 Li-Ion 940 mAh	SNN5804A

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