

# **Dual Band Wireless Telephone**



Level 2 Service Manual Table of Contents

# **Table of Contents**

Introduction	1
Product Identification	1
Product Names	1
Product Changes	
Regulatory Agency Compliance	
Computer Program Copyrights	
About this Service Manual	
Warranty Service Policy	
Parts Replacement	
Specifications	
Product Overview	
Features	
General Operation	
Controls, Indicators, and Input/Output (I/O) Connectors	
User Interface Menu Structure	
Alert Settings	
Battery Function	
Operation	
Tools and Test Equipment	
Disassembly	
Removing and Replacing the Rear Housing Cover	
Battery Removal and Replacement	
Removing and Replacing the Antenna	
Removing and Replacing the Endo Assembly	19
Removing and Replacing the Endo Housing	
Removing and Replacing the Side Grips	
Removing and Replacing the Display Lens	
Removing and Replacing the Rear Speaker	
Removing and Replacing the LCD Module Assembly	
Removing and Replacing the LCD Module	
Removing and Replacing the Microphone	
Removing and Replacing the Front Speaker	
Removing and Replacing the Transceiver PC Board and Keypad PC Board	90
Removing and Replacing the Keypad	30
Telephone Identification	
Identification Label	
Troubleshooting	
Manual Test Mode	
Troubleshooting Chart	
Programming: Software Upgrade and Flexing	
Programming, NAM Drogramming	34
Programming: NAM Programming	
Part Number Charts	20
Exploded View Diagram	
Exploded View Parts List	
Accessories	
Index	iriaex-i

Level 2 Service Manual Introduction

### Introduction

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

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

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

#### **Product Identification**

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

#### **Product Names**

Product names included in C331 telephones 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.

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:

- 1. This device may not cause any harmful interference, and
- 2. 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 PF C34 telephones. Refer questions about this manual to the nearest Customer Service Manager.

A product family is the group of products having the same Account Product Code (APC). To locate the APC on a device, refer to "Mechanical Serial Number (MSN)" later in this manual.

#### **Audience**

This manual aids service personnel in testing and repairing PF C34 telephones. Service personnel should be familiar with electronic assembly, testing, and trouble-shooting methods, and with the operation and use of associated test equipment.

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

#### Scope

The scope of this document is to provide basic information relating to PF C34 telephones, and also to provide procedures and processes for repairing the units at Level 1 and 2 service centers including:

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

Level 2 Service Manual Introduction

#### 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.



Warning: Emphasizes information about actions that may result in personal injury.



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

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

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

#### Revisions

Any changes that occur after manuals are printed are described in publication revision bulletins (PMRs). These bulletins provide change information that can include new parts listing data, schematic diagrams, and printed circuit board layouts.

# **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 units that fail very early on after the date of sale, are to be returned to Manufacturing for root cause analysis, to guard against epidemic criteria. Manufacturing will bear the costs of early life failure.

#### **Product Support**

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

#### **Customer Support**

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

## **Parts Replacement**

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

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

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

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

#### **Accessories and Aftermarket Division (AAD)**

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

Level 2 Service Manual Specifications

# **Specifications**

General Function	Specification
	<b>1850.040 - 1909.960 MHz</b> PCS TX band Channels 2 -1998 f <sub>TX</sub> = 0.03 * N + 1849.98 MHz Channels 1 and 1999 are not used.
	<b>1930.080 - 1989.860 MHz</b> PCS RX band Channels 2 - 1998 f <sub>RX</sub> = 0.03 * N + 1930.02 MHz Channels 1 and 1999 are not used.
Frequency Range	<b>824.04 - 848.97 MHz</b> Cell TX band Channels 1-799, f <sub>TX</sub> = 0.03 * N +825 MHz Channels 991-1023, f <sub>TX</sub> = 0.03 * (N-1023) + 825 MHz Channel 990 is not used.
	<b>869.04 - 893.97 MHz</b> Cell RX band Channels 1-799, f <sub>RX</sub> = 0.03 * (N-1023) + 870 MHz Channels 991-1023, f <sub>RX</sub> = 0.03 * (N-1023) + 870 MHz Channel 990 is not used.
Channel Spacing	30 kHz for analog and digital
Channels	832 (800 MHz), 1999 (1.9 GHz)
Modulation	FSK/FM for analog P 1/4 DQPSK for digital CELL and PCS
Duplex Spacing	45 MHz (CELL), 80.04 MHz (PCS)
Input/Output Impedance	50 Ohms
Operating Voltage	+3.4V dc to +4.2V dc
Power Supply	3.8V Li Ion 550 mAh battery
Average Transmit Current	310 mA (1.9 GHz TDMA in power step 2) 308 mA (800 MHz TDMA in power step 2) 850 mA (800 MHz AMPS in power step 2)
Average Stand-by Current	34 mA in analog mode 3.40 mA in digital mode
Dimensions (with 550 mAh Li ion battery)	106 mm x 50 mm x 23 mm (4.17 inches x 1.96 inches x 0.91 inches) (without antenna)
Size (Volume)	90 cc (5.49 in.3) without antenna
Weight	100 gm (3.52 oz) with battery 82.5 gm (2.91 oz) without battery
Temperature Range	-30° C to +60° C (-22° F to +140° F)
Humidity	80% Relative Humidity at 50° C (122° F)
Battery Life, 550 mAh Li Ion Battery	Up to 75 minutes digital talk time Up to 35 minutes analog talk time Up to 165 hours digital standby time Up to 13 hours analog standby time
	All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Talk times and standby times are lower when in analog mode.

Transmitter Function	Specification
RF Power Output	-5.5 to +26 dBm (PL 10 to PL2 for CELL and PCS TDMA 2.38 to +25 dBm (PL10 to PL2 for AMPS
Analog 800 MHz RF Power Output nominal	0.407 Watts (26.1 dBm)
Digital 800 MHz RF Power Output nominal	0.467 Watts (26.7 dBm)
Digital 1.9 GHz RF Power Output nominal	0.363 Watts (25.6 dBm)
Automatic Power Control Cellular, PCS, TDMA	-5.5 to +26 dBm (PL10 to PL 2)
Automatic Power Control for AMPS	2.38 to +25 dBm (PL 8 to PL 2)
Maxim Transmit Channel Capability	1 to AMPS, 3 to CELL and PCS TDMA
Audio Distortion	Less than 5% at 1004 Hz, +/- 8 kHz peak frequency deviation (AMPS)
Voice Modulation	Maximum + 12 kHz deviation (AMPS)
Error Vector Magnitude	12% for CELL and PCS TDMA

Receiver Function	Specification
Receive Sensitivity	-110 dBm for 3% static BER (PCS and CELL TDMA) -116 dBm for 12 dBm SINAD for AMPS
FM hum and noise (C-MSG weighted)	-32 below at 1004 Hz, +/- 8kHz peak deviation (AMPS)
Audio Distortion	Less than 5% at 1004 Hz, +/- 8 kHz peak frequency deviation (AMPS)
Transmit Audio Sensitivity (AMPS)	TOLR of -46 dB nominal
Transmit Audio Sensitivity (CELL and PCS TDMA)	9 kHz deviation (nominal) at 97 dB SPL input at 1 kHz
Adjacent and Alternate Channel Desensitization	3% BER max at 107 dBm signal; -94 dBm/ 30 kHz, -65 dBm/60 kHz
IM (AMPS)	Greater than 65 dB
IM (CELL and PCS TDMA)	3% BER max @107 dBm signal; @ - 45 dBm to 2 interferer's

TDMA System Specification		
Modulation Type	P 1/4DQPSK	
Frequency Stability	+/- 200 Hz (TDMA), +/- 2.5 PPM (AMPS)	
Duty Cycle	1/3 (CELL and PCS TDMA) Continuous (AMPS)	
Error Vector Magnitude	Error Vector Magnitude [EMV1] 0.01% to 8% Error Vector Magnitude [EMV10] 0.01% to 25%	
Receive Sensitivity	-110 dBm for 3% static BER	
Adjacent and Alternate Channel Desensitization	-110 dBm for 3% static BER	
Vocoder	ACELP	

Level 2 Service Manual Product Overview

### **Product Overview**

Motorola C331 mobile telephones feature Time Division Multiple Access (TDMA) technology, and Wireless Application Protocol (WAP) Internet browser. The mobile telephone uses a simplified icon and Graphical user interface (GUI) for easier operation, allow Short Message Service (SMS) text messaging, and include clock, alarm, datebook, calculator, and caller profiling personal management tools. The C331 telephone features voice recognition dialing and Voice note voice recorder. This phone also provides 32 Embedded ring tones including VibraCall vibrating alert and 32 Downloadable/Customizable iMelody ring tones. The C331 is a dual band phone that allows roaming within the TDMA 800 MHz and digital cellular system (PCS) 1900 MHz bands.

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, and power button are contained within the candy bar form-factor housing. The 600 mAh Lithium Ion (Li Ion) battery provides up to 75 minutes of talk time with up to 165 hours of standby time  $^1$ . These telephones feature a large 96 x 64 pixel display and a stubby antenna.

#### **Features**

C331 telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for TDMA 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:

- Low voltage technology that provides increased standby and talk times
- Supports MO/MT SMS, Email MO SMS Messaging, Canned Messaging
- WAP 1.1/PDC 4.1 compliant<sup>2</sup>
- 96 x 64 pixel grayscale graphical LCD display with 3 lines of text, 1 line of icons, and 1 line of prompts
- Display zoom
- · Display animation
- VibraCall<sup>®</sup> vibrating alert
- 4-way navigation key
- 32 embedded ring tones
- 32 downloadable/customizeable iMelody ring tones<sup>2</sup>
- Voice activated dialing for phone book entries
- Simplified text entry using iTAP™ predictive text entry
- Calling line identification<sup>2</sup>
- Supports call forwarding for incoming voice calls<sup>2</sup>
- Personal management tools calculator, real-time clock with date, reminders, and caller profiling
- Changeable Covers and side grips
- Hearing Aid Telephone Interconnection System (HATIS) support
- TrueSync™ Multi-Point Synchronization Capability

<sup>1.</sup> 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.

<sup>2.</sup> Network, subscription or service provider dependent feature. Not available in all areas.

### **Speaker Dependant Voice Activation**

The voice dialing feature allows the user to recall preprogrammed voice numbers by pressing the Voice/OK key and speaking the desired voice tag. Up to 10 voice tags can be stored.



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

#### Wireless Access Protocol (WAP) 1.1 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 through the mobile network.

The C331 microbrowser can be configured for baud, idle timeout, line type, phone number, and connection type.



Bitmap image data downloads as text. If the image is larger than the screen, only part of the image displays.



If the user receives a call while in browser mode, the browser pauses and allows the user to resume after completing the call.

#### **Simplified Text Entry**

iTAP<sup>TM</sup> 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<sup>TM</sup> feature may not be available 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 displays. If there is no phone book entry, the incoming phone number displays. If no caller identification information is available, an incoming call message displays.



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

#### **Personal Information Management**

The C331 telephone contains a built in date book with alarm reminders message center and a phonebook.

Level 2 Service Manual Product Overview

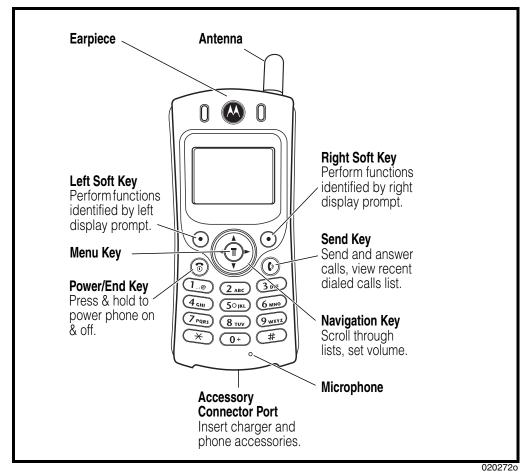
#### **Other Features**

The C331 wireless telephone also features an MP3 player. Detailed descriptions of these and other features are in the appropriate PF 0C34 telephone 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 C331 telephones' controls are on the front and side of the device, and on the keyboard as shown in Figure 1. Indicator icons are displayed on the LCD (see Figure 2).



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Figure 1. C331 Telephone Controls and Indicators Locations

#### **Menu Navigation**

C331 telephones have a simplified icon and GUI. The phone also features a user-definable Quick Access menu accessed by holding down the Menu key. See Figure 3 for the C331 menu structure. A 4-way navigation key allows you to move easily through menus.

### **Liquid Crystal Display (LCD)**

The C331(TDMA) phone features a large 96 x 64 grayscale display offering 3 lines of text, 1 line of icons, and 1 line of prompts. The display provides constant graphical

Level 2 Service Manual General Operation

representations of battery capacity and signal strength, as well as the real-time clock.

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.

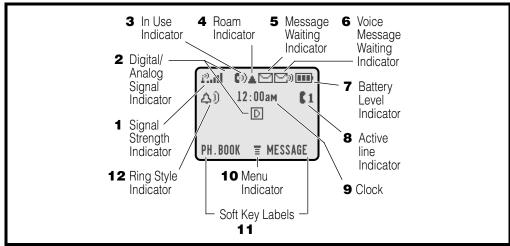


Figure 2. C331 Display Icon Indicators

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- 1. **Signal Strength Indicator** shows the strength of the phone's connection with the network. Calls cannot be sent or received when the "no signal" indicator displays.
- Digital/Analog Signal Indicator shows weather you are receiving a digital
   or analog ( ) signal.
- 3. **In Use Indicator** icon indicates a call in progress.
- 4. **Roam Indicator** indicates when the phone uses another network system outside the user's home network. When leaving the home network area, the phone roams, or seeks, another network.
- 5. **Message Waiting Indicator**<sup>3</sup> appears when the phone receives a text message.
- 6. **Voice Message Waiting Indicator**<sup>3</sup> icon indicates when the phone receives a voicemail message.
- 7. **Battery Level Indicator** shows the amount of charge left in the battery.
- 8. **Active Line Indicator** indicates the current active line
- 9. **Real Time Clock** shows the current time.
- 10. **Menu Indicator** provides access to the phone's main menu.
- 11. Soft Key Labels provide selectable options in screen display.
- 12. **Ring Style Indicator** indicates the phones current ringer alert setting.

<sup>3.</sup> Network, subscription or service provider dependent feature. Not available in all areas.

#### **User Interface Menu Structure**

Figure 3 shows the C331 telephone menu structure.

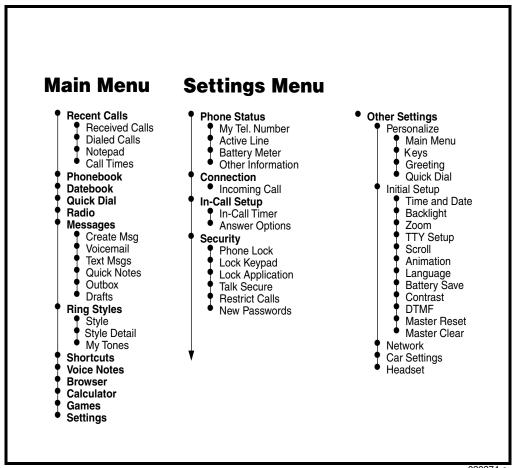


Figure 3. C331 Menu Structure

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## **Alert Settings**

In addition to 32 preset ring tones, C331 telephones allow the user to download 32 additional ring tones through SMS. (Availability is carrier and Network dependant).

Motorola C331 phones incorporate the VibraCall $^{\otimes}$  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.

Level 2 Service Manual General Operation

### **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 device 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 list the tools and test equipment used on C331 telephones. Use either the listed items or equivalents.

**Table 1. General Test Equipment and Tools** 

Motorola Part Number <sup>1</sup>	Description	Application
See Table 5	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)
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-6 Plus, Apex 440-6IP Torx Plus or equivalent	Used with torque driver
HP34401A <sup>2</sup>	Digital Multimeter	Used to measure battery voltage

<sup>1.</sup> 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 a C331 telephone. Tools and equipment used are listed in Table 1, preceding.



Many of the integrated devices used in this phone are vulnerable to damage from 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 Rear Housing Cover

- 1. Ensure the phone is turned off.
- 2. Press down on the rear housing cover latch on the top of the phone, gently lift the rear housing cover away from the latch, and lift the cover away from the phone (see Figure 4).

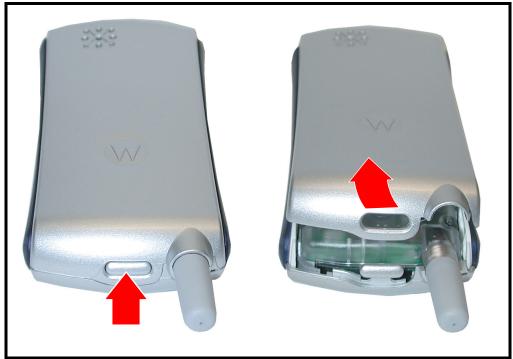


Figure 4. Removing the Rear Housing Cover

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- 3. To replace, align the rear housing cover to the front housing
- 4. Gently press the rear housing cover into position onto the front housing until the rear housing cover snaps into place.

Level 2 Service Manual Disassembly

## **Battery Removal and Replacement**

- 1. Remove the rear housing cover as described in the procedures.
- 2. Slide the battery in the direction of the arrow in Figure 5A.
- 3. Lift the top of the battery near the antenna up and out of the battery compartment as shown in Figure 5B.



Figure 5. Removing and Replacing the Battery

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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 bottom of the battery into the battery compartment with contacts facing downward as shown in Figure 5B.
- 5. Press the top of the battery into the battery compartment.
- 6. Replace the rear housing cover as described in the procedures.

## **Removing and Replacing the Antenna**

- 1. Remove the rear housing cover and battery as described in the procedures.
- 2. Unscrew the antenna from the endo housing as shown in Figure 6.
- 3. Lift the antenna and antenna bushing away from the endo housing.



Figure 6. Removing the Antenna

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- 4. To replace, align the antenna and antenna bushing with the endo housing.
- 5. Carefully screw the antenna and antenna bushing into position on the endo housing until the antenna and bushing are flush with the endo housing.
- 6. Replace the battery, and rear housing cover as described in the procedures.

**Level 2 Service Manual** Disassembly

## Removing and Replacing the Endo Assembly

- 1. Remove the rear housing cover, battery, and antenna as described in the procedures.
- Bend the side grips slightly outward as indicated by the arrows in Figure 7A 2. to release the endo housing latches.
- Lift the bottom end of the endo housing out of the front housing followed by the top end of the front housing as shown in Figure 7B.

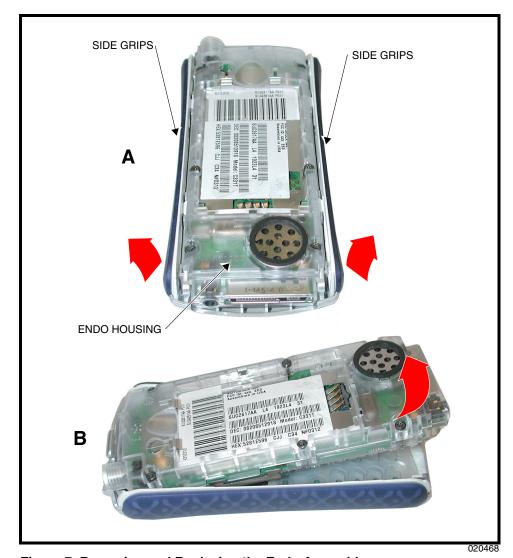


Figure 7. Removing and Replacing the Endo Assembly

- To replace, insert the top end of the endo assembly into the front housing.
- Press the bottom end of the endo assembly into the front housing until it snaps into place.
- Replace the antenna, battery, and rear housing cover as described in the 6. procedures.

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# Removing and Replacing the Endo Housing

- 1. Remove the rear housing cover, battery, and antenna as described in the procedures.
- 2. Using a Torx<sup>®</sup> driver with a T-6 bit, remove the six screws from the rear endo housing as shown in Figure 8A.
- 3. Set the screws aside for reuse.
- 4. Carefully separate the front endo from the rear endo.



Figure 8. Removing and Replacing the Endo Housing

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- 5. To replace, align the front endo screw hole posts to the rear endo screw holes.
- 6. Insert and torque the six screws to 2.6 in. pounds.
- 7. Replace the antenna, battery, and rear housing cover as described in the procedures.

Level 2 Service Manual Disassembly

## **Removing and Replacing the Side Grips**

1. Remove the rear housing cover, battery, and endo housing as described in the procedures.

- 2. Hold the front housing assembly by the top and bottom ends.
- 3. Lift the side grip on each side out of the front housing as shown in Figure 9.

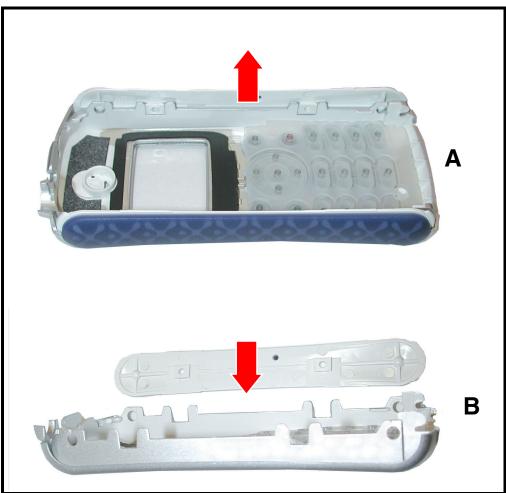


Figure 9. Removing and Replacing the Side Grips

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- 4. To replace, align the side grip to the front housing as shown in Figure 9.
- 5. Slide the side grip into position.
- 6. Repeat steps 5 and 6 for the other side grip.
- 7. Replace the endo housing, battery, and housing cover as described in the procedures.

## Removing and Replacing the Display Lens

- 1. Remove the rear housing, battery, endo housing, and antenna as described in the procedures.
- 2. Using your thumb, apply firm even pressure to the top inside area of the display lens to separate it from the front housing. Be careful not to damage the housing or the display lens mounting tabs at the bottom of the display lens.
- 3. When the top of the lens separates from the housing, carefully lift the lens away from the opening.
- 4. Remove any remaining adhesive from the lens opening on the front housing.



Figure 10. Removing and Replacing the Display Lens

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- 5. To replace, remove any adhesive protective covering on the back of the display lens.
- 6. Align the display lens face up to the lens opening on the front housing.
- 7. Insert the display lens mounting tabs into their slots at the bottom of the lens opening on the front housing.
- 8. Gently and firmly press the display lens into position on the front housing.
- 9. Carefully peel away the plastic protection film from the front of the display lens.
- 10. Replace the endo housing, antenna, battery, and rear housing cover as described in the procedures.

Level 2 Service Manual Disassembly

## Removing and Replacing the Rear Speaker

1. Remove the rear housing cover, battery, antenna, endo housing, and rear endo housing as described in the procedures.

- 2. Use metal tweezers to unlatch the three metal clips that secure the rear speaker to the rear endo housing as shown in Figure 11.
- 3. Carefully remove the rear speaker out of its socket in the rear endo housing. Avoid damage to the rear speaker clips and speaker elastomer.

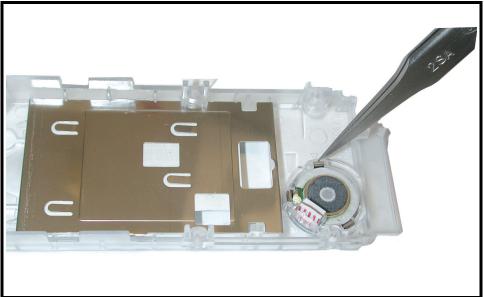


Figure 11. Removing the Rear Speaker

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- 4. To replace, peel off any adhesive protective covering and carefully press the speaker into position.
- 5. Ensure that the speaker elastomer is correctly aligned or the speaker will not function.
- 6. Replace the front endo housing, endo housing, antenna, battery, and rear housing cover as described in the procedures.

## Removing and Replacing the LCD Module Assembly

- 1. Remove the rear housing cover, battery, antenna, endo housing, and front endo housing as described in the procedures.
- 2. Use the disassembly tool to carefully release the four metal display latches on each side of the display assembly as shown in Figure 12.
- 3. Carefully lift the LCD module assembly away from the transceiver board.



Figure 12. Removing the LCD Module Assembly

020449o

- 4. To replace, align the LCD module assembly with the printed circuit board.
- 5. Gently press the LCD module assembly latches into position over the printed circuit board while holding the display assembly in position.
- 6. Replace the front endo housing, endo housing, battery, and rear housing cover as described in the procedures.

Level 2 Service Manual Disassembly

## Removing and Replacing the LCD Module

1. Remove the rear housing cover, battery, antenna, endo housing, and front endo housing as described in the procedures.

- 2. Use the disassembly tool to unlatch the metal locking tabs on the LCD bracket.
- 3. Lift the bottom end of the LCD bracket away from the LCD until the tabs at the top of the LCD bracket are clear of the plastic.
- 4. Lift the LCD bracket away from the LCD module and set aside for reuse.
- 5. Use the plastic tweezers to remove the LCD module from the front endo housing.

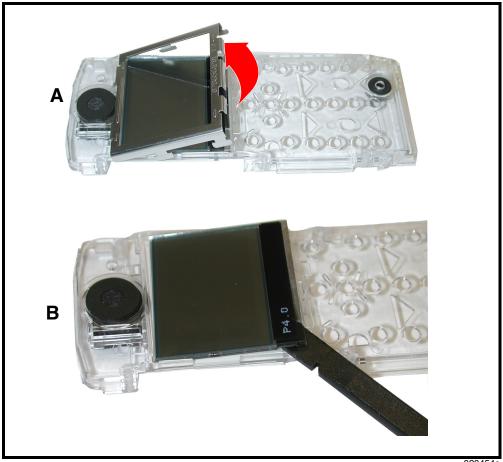


Figure 13. Removing the LCD Module

0204540

- 6. To replace, align the LCD module to the front endo housing. Ensure that the LCD revision number is visible at the bottom left side of the LCD module.
- 7. Insert the top tabs of the LCD bracket into the front endo housing.
- 8. Lower the bottom end of the LCD bracket onto the front endo housing and gently press the LCD bracket against the front endo housing until the metal locking tabs snap into position.
- 9. Replace the endo housing, endo assembly, antenna, battery, and rear housing cover as described in the procedures.

## **Removing and Replacing the Microphone**

- 1. Remove the rear housing cover, battery, antenna, endo housing, and front endo housing, as described in the procedures.
- 2. Use the pointed end of the plastic tweezers to release the microphone from the frond endo housing as shown in Figure 14. The microphone should come away easily.

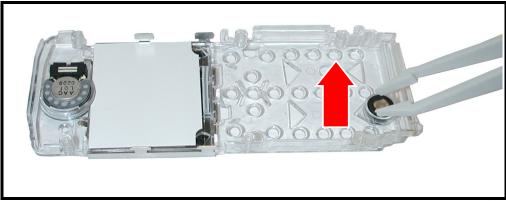


Figure 14. Removing and Replacing the Microphone

020450o

- 3. To replace, place the microphone into its location on the front endo housing. Ensure the microphone contacts are facing upward as shown in Figure 14.
- 4. Replace the endo front housing, antenna, endo housing, and rear housing cover as described in the procedures.

Level 2 Service Manual Disassembly

## **Removing and Replacing the Front Speaker**

1. Remove the rear housing cover, battery, antenna, endo housing, and front endo housing as described in the procedures.

- 2. Using the flat end of the disassembly tool gently pry the speaker out of its socket as shown in Figure 15.
- 3. Lift the speaker from the front housing.



Figure 15. Removing the Front Speaker

020451o

- 4. To replace, align the speaker to its socket.
- 5. Place the speaker elastomer over the speaker contacts as shown in Figure 15.
- 6. Gently press the speaker and elastomer into place.
- 7. Replace the front endo housing, endo housing, battery, and rear housing cover as described in the procedures.

## Removing and Replacing the Transceiver PC Board and Keypad PC Board

1. Remove the rear housing cover, battery, antenna, endo housing, and front endo housing as described in the procedures.



This product contains static-sensitive devices. Use anti-static handling procedures to prevent ESD and component damage.

- 2. Insert the flat end of the disassembly tool between the keypad PC board and the transceiver PC board as shown in Figure 16.
- 3. Gently twist the disassembly tool to unseat the keypad PC board from its connector socket on the transceiver PC board.

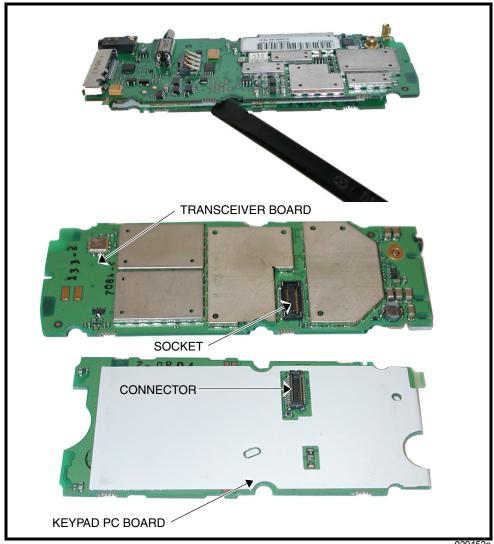


Figure 16. Removing and Replacing the Keypad PC Board

0204520

Level 2 Service Manual Disassembly

4. To replace, align the connector on the keypad PC board to the connector socket on the transceiver PC board.

- 5. Gently press the keypad PC board connector into the socket on the transceiver PC board.
- 6. Replace the front endo housing, endo housing, antenna, battery, and rear housing cover as described in the procedures.

# Removing and Replacing the Keypad

- 1. Remove the rear housing cover, battery, antenna and endo housing as described in the procedures.
- 2. Use the disassembly tool to lift the keypad up and away from the front housing as shown in Figure 17.



020453o

Figure 17. Removing the Keypad

- 3. To replace, insert the keypad into the front housing. Ensure the keys align with the openings and the keypad is fully seated in the front housing.
- 4. Replace the endo housing, antenna, battery, and rear housing cover, as described in the procedures.

# **Telephone Identification**

## **Identification Label**

Each Motorola TDMA phone is labeled with a variety of identifying numbers. Figure 19 describes the current identifying labels.

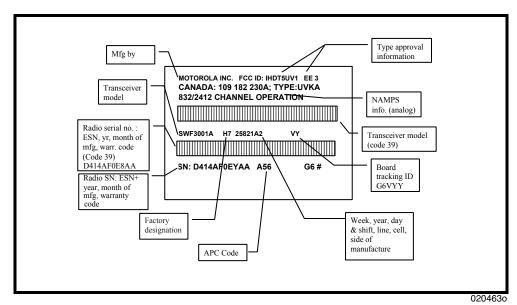


Figure 18. Telephone Identification Label

# **Troubleshooting**

### **Manual Test Mode**

Motorola C331 telephones are equipped with a manual test mode capability. This allows service personnel to verify functionality and perform fault isolation by entering keypad commands.

Press (5) to turn the phone ON.

**Table 2. Manual Test Mode Commands** 

Key Sequence	Test Function/Name	Remarks
<menu>048263*</menu>	Enter manual test mode	
"End" Key	Exit manual test mode	
54*	Suspend	Required for all test mode operations
0*0*0	Select tone 0	
0*0*1	Select tone 1	
0*0*2	Select tone 2	
0*0*3	Select tone 3	
0*0*4	Select tone 4	
0*0*5	Select tone 5	
0*0*6	Select tone 6	
0*0*7	Select tone 7	
0*0*8	Select tone 8	
0*0*9	Select tone 9	
0*1*X	Disable tone X	
3*0*1	Enable vibrator	
3*0*0	Disable vibrator	
5*0*0	Set audio level 0	
5*0*1	Set audio level 1	
5*0*2	Set audio level 2	
5*0*3	Set audio level 3	
5*0*4	Set audio level 4	
5*0*5	Set audio level 5	
5*0*6	Set audio level 6	
5*0*7	Set audio level 7	
5*0*8	Set audio level 8	
5*0*9	Set audio level 9	
5*0*10	Set audio level 10	
5*0*11	Set audio level 11	
5*0*12	Set audio level 12	
5*0*13	Set audio level 13	

Level 2 Service Manual Troubleshooting

**Table 2. Manual Test Mode Commands (Continued)** 

Key Sequence	Test Function/Name	Remarks
5*0*14	Set audio level 14	
5*0*15	Set audio level 15	
6*2*2*0*0	Set Audio Path. Int Mic, IntSpk, RX unmute, TX unmute	
6*4*6*0*0	Set Audio Path. Boom Mic, Boom Spk, RX unmute, TX unmute	
18*0	Initialize non-volatile memory (Master Reset)	
18*1	Initialize Non-volatile memory (Master Clear)	
55*2*001	Test Display. All pixels ON	
55*2*000	Test Display. All pixels OFF	
55*2*002	Test Display. Checkerboard pattern A	
55*2*003	Test Display. Checkerboard pattern B	
55*2*004	Test Display. Border pixels ON	
*#9999#	Display Phone Information	No test mode required
Phone Set up> Phone Status> Other Information	Flex Version / Technology / S-W Version / Readiness Status	No test mode required

## **Troubleshooting Chart**

Table 3. C331 Telephone: Level 1 and 2 Troubleshooting Chart

Symptom	Probable Cause	Verification and Remedy
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 battery voltage is <3.25 Vdc, recharge the battery using the appropriate battery charger. If battery will not recharge, replace the battery. If battery is not at fault, proceed to b.
	b) Battery terminals open or misaligned.	Visually inspect 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 battery connector replacement. If battery terminals are not at fault, proceed to c.
	c) Transceiver board defective.	Remove the transceiver board assembly. Substitute a known good transceiver board and temporarily reassemble the unit. Press the PWR button; if unit turns on and stays on, disconnect the dc power source and reassemble the phone with the new transceiver board. Verify that the fault has been cleared.
Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	a) Antenna defective.	Check connection between the antenna and the transceiver board. If the connection is OK, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.

Table 3. C331 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

Symptom	Probable Cause	Verification and Remedy
3. Display is erratic, or provides partial or no display.	a) Mating connections to or from transceiver board faulty.	Check general condition of flex and flex connector. If the flex and connector are good, check that the display assembly mounting tabs are fully engaged. If connector is not at fault, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
Incoming call alert transducer audio distorted or volume is too low.	Faulty transceiver board.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone defective.	Replace the microphone as described in the procedures. If fault is not cleared, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from transceiver board defective.	Check connection from the earpiece to the transceiver board. If connection is not at fault, proceed to b.
	b) Earpiece 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 phone with the good transceiver board. If fault is not cleared, proceed to c.
	c) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the phone with the new transceiver board.
7. Vibrator feature not functioning.	a) Vibrator defective.	Replace vibrator as described in the procedures. If the fault has not been cleared, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
8. Internal Charger not working.	Faulty charger circuit on transceiver board.	Test a selection of batteries in the rear pocket of the desktop charger. Check LED display for the charging indications. If these are charging properly, then the internal charger is at fault. Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
9. No or weak audio when using headset.	a) Headset plug not pushed in fully.	Ensure the headset plug is fully seated in the jack.
	b) Faulty jack on transceiver board.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.

Level 2 Service Manual Troubleshooting

## **Programming: Software Upgrade and Flexing**

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

#### **Programming: NAM Programming**

Follow this procedure to program the phone's telephone number.

- Enter Programming Mode:
   Press ⊕, enter the carrier System ID number, ⊕, ⊕, ...
- 2. Enter the security code:

  (0), (0), (0), (0), (0) (factory default security code).
- 3. Submit the security code: Press OK (•).
- 4. Scroll using 🔄 to MIN (Mobile Identification Number).
- 5. Open the MIN display: Press CHANGE (•).
- 6. Use the Keypad to enter the 10-digit MIN.
- 7. Store the new MIN: Press OK (•).
- 8. Exit Programming Mode: Press DONE (•).

6881040B85 July 19, 2002 35

# **Part Number Charts**

The following section provides a reference for the parts associated with C331 telephones.

Level 2 Service Manual Part Number Charts

## **Exploded View Diagram**

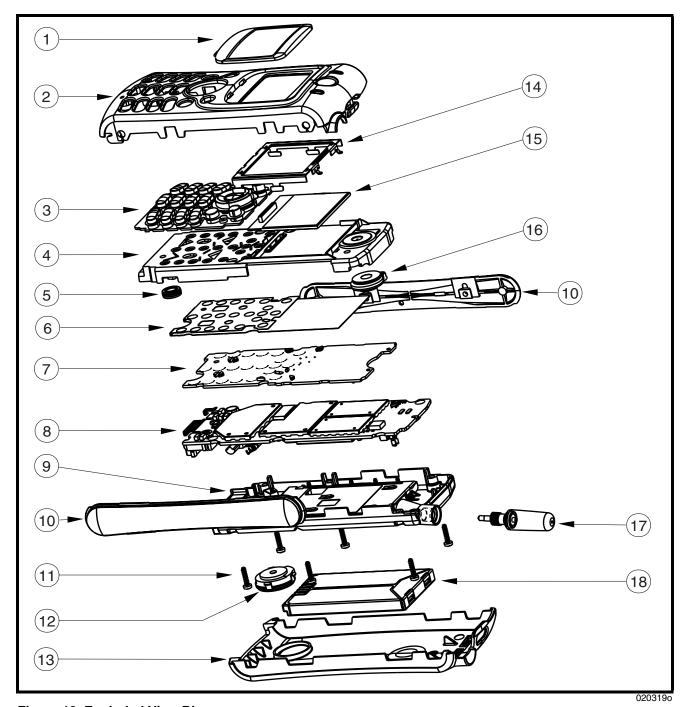


Figure 19. Exploded View Diagram

6881040B85 July 19, 2002 37

### **Exploded View Parts List**

**Table 4. Exploded View Parts List** 

Item Number	Motorola Part Number	Description
1	6187805M01	LCD lens assembly
2	0162473R01	Front housing assembly
3	7587551N01	Keypad
4	1588285M01	Front endo housing
5	5089725K01	Microphone
6	4087382N01	Metal domes keypad
7	SYN0480A	Keypad PCB assembly
8	SLG4309AA	Transceiver PCB assembly
9	1588286M01	Rear endo housing

Item Number	Motorola Part Number	Description
10	1588298M01	Housing side grips (2)
11	0388708L01	Torx screw (6)
12	5088922L01	15 mm speaker assembly
13	1587504N01	Painted back housing
14	0786561P01	LCD bracket
15	0186698K01	LCD display assembly
16	5089081L01	Front 13 mm speaker
17	8587529N01	Stubby antenna
18	SNN5582A	Battery



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://accesssecure.mot.com

(Password is Required)

Level 2 Service Manual Part Number Charts

### **Accessories**

**Table 5. List of Accessories** 

Description	Part Number
Extended Capacity Lithium Ion 1100 mAh Battery	SNN5595
Standard Lithium Ion 580 mAh Battery	SNN5582
Travel Charger, US	SPN4940
Desktop Charger with Clock	SPN5019
Free Charge Emergency Power Source (blue)	98419
Free Charge Emergency Power Source (yellow)	98418
Emergency Battery Charger	SPN5026
Retractable Self-Install Car Kit	SYN9169
Self-Install Hands free Car Kit	SYN8597
Vehicle Power Adapter	SYN7818
Desktop Speaker	SPN5028
FM Radio Headset	SYN8609
Headset, Retractable Mono	SYN8284
Headset, 2nd Generation, Retractable	SYN9050
Headset, Over the Ear	SYN8908
Headset, One Touch (Send/End Button)	SYN8419
Side Grips	
MP3 Player	
USB Cable	98326
Soft Carry Case	
Neck loop	SYN7875

6881040B85 July 19, 2002 39

Level 2 Service Manual Index

Α	Introduction 1
alert settings 12	
antenna, removing and replacing 17, 18	K
	keypad PC board, removing and replacing 29
В	keypad, removing and replacing 31
battery	
charge indicator 13	L
function 13	LCD 10
removing and replacing 16	LCD module, removing and replacing 26
	liquid crystal display (LCD) 10
C	
caller ID 9 Canadian Interference-Causing Equipment regulations 1	M
changes	manual test mode 33
product 1	menu structure 12
commands, manual test mode 33	microphone, removing and replacing 27
copyrights	
computer software 2	N
	NAM Programming 37 names
D	product 1
disassembly 16	product
display assembly, removing and replacing 25	0
display lens, removing and replacing 23	operation 10
_	alert settings 12
E	battery 13
endo housing, removing and replacing 21	controls, indicators, and I/O connectors 10
exploded view diagram 39 exploded view parts list 40	icons 11
exploded view parts list 40	alarm 11
F	battery charge indicator 11 battery level indicator 11
FCC rules 1	digital/analog indicator 11
features	menu 11
caller ID 9	message 11
text entry 9	message waiting indicator 11
voice recognition 8	real time clock 11
Wireless Access Protocol (WAP) 8	ring style indicator 11 ringer 11
front endo housing, removing and replacing 24 front speaker, removing and replacing 28	roam 11
noni speaker, removing and replacing 20	signal strength 11
11	voice message waiting indicator 11
H	voicemail 11
housing cover rear, removing and replacing 21	LCD 10
	menu navigation 10 menu structure 12
	overview, product 7
identification	2.2on, p. 00000.
product 1	

labels 32

Level 2 Service Manual Index

P	side grips 22
parts	transceiver board 27
exploded view diagram 39	transceiver PC board 29
exploded view parts list 40	revisions
replacement parts 38	service manual 3
product	
changes 1	S
identification 1	service manual
names 1	about 2
product overview 7	audience 2
features 7	conventions 3
	revisions 3
R	scope 2
	service policy 3
rear housing cover, removing and replacing 16	customer support 4
rear speaker, removing and replacing 24	out of box failure 3
regulatory agency compliance 1 transceiver PC board 29	product support 3
	shut down
removing	upon battery removal 13
antenna 17, 18 battery 13, 16	side grips, removing and replacing 22
display assembly 25	specifications 5
display lens 23	support
endo housing 21	customer 4
front endo housing 24	product 3
front speaker 28	p
keypad 31	_
keypad PC board 29	T
LCD module 26	test equipment 15
microhpone 27	text entry 9
rear housing cover 16, 21	tools, disassembly 15
rear speaker 24	transceiver board, removing and replacing 27
side grips 22	transceiver PC board, removing and replacing 29
transceiver board 27	troubleshooting 33
transceiver PC board 29	manual test mode 33
replacement parts	manual test mode commands 33
ordering 4	troubleshooting chart 34
replacing	
antenna 17, 18	V
battery 16	voice recognition 8
display assembly 25	
display lens 23	W
endo housing 21	WAP (Wireless Access Protocol) 8
front endo housing 24	,
front speaker 28	warranty service 3
keypad 31	
keypad PC board 29	
LCD module 26	
microphone 27	
rear housing cover 16, 21	
rear speaker 24	

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