MOTOROLA

Level 1 and 2 Service Manual

DRAFT

Product Family 0C81

Tri-Band Wireless Telephone

A388c

GSM 900/1800/1900 MHz & GPRS Technologies

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

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 Product Family 0C81 (A388c) 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

About this Service Manual

Using this service manual and the suggestions contained in it assures proper installation, operation, and maintenance of A388c 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 A388c telephones. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

Use of this 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 the basic information relating to A388c telephones, and also to provide procedures and processes for repairing the units at Level 1 and 2 service centers including:

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

Conventions

Special characters and typefaces, listed and described below, are used in this manual 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 ".

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 comes 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 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.

Ordering Replacement Parts

Only centers authorized to carry out repairs can purchase spare parts. Orders for spare parts from hubs and Hi-Tech Centers should be placed with the regional Motorola Parts Distribution 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

To order spare parts in EMEA region call +44 131 479 1274.

To order spare parts in Asia region call +65 648 62995.

Specifications

General Function	Specification
Frequency Range GSM	880-915 MHz Tx (with EGSM) 925-960 MHZ Rx
Frequency Range DCS	1710-1785 MHz Tx 1805-1880 MHz Rx
Frequency Range PCS	1850.2-1909.8 MHz Tx 1930.2-1989.8 MHz Rx
Channel Spacing	200 kHz
Channels	174 EGSM, 374 DCS, 274 PCS carriers with 8 ch. per carrier
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz GSM, 95 MHz DCS, 80 MHz PCS
Frequency Stability	± 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	+3.0V dc to +5.1V dc (battery) +4.4V dc to +6.5V dc (external connector)
Transmit Current	170mA at RF power 15 280mA at RF power 5
Stand-by Current	Typically 4.4 mA (DRX2), 8.3 mA (DXR9)
Dimensions	98 mm x 58 mm x 24 mm (3.8 inches X 2.3 inches X 0.9 inches)
Size (Volume)	115 cc (6.8 in^3)
Weight	130 gm (4.5 oz)
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life, 800 mAh Lithium Ion Battery	Talk Time 180 to 300 minutes Standby 95 to 160 hours All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Standby times are quoted as a range from DRX=2 to DRX=9. Talk times are quoted as a range from DTX off to DTX on.

Transmitter Function	Specification
RF Power Output	33 dBm nominal GSM, 30 dBm nominal DCS / PCS
Output Impedance	50 ohms nominal
Spurious Emissions	-36 dBm from 0.1 to 1 GHz, -30 dBm from 1 to 4 GHz

Receiver Function	Specification
Receive Sensitivity	-105 dBm GSM, -103 dBm DCS, -104 dBm PCS
RX bit error rate (100k bits) Type II	< 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

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

Product Overview

Motorola A388c telephones are global system for mobile communications (GSM) general packet radio service (GPRS) wireless application protocol (WAP)-enabled mobile phones with full-featured personal information manager (PIM) functionality. The A388c incorporates a large task-based touch screen display user interface (UI) featuring handwriting recognition for email and short message service (SMS) text messaging. It is a tri-band phone that allows roaming within the GSM 900 MHz, digital cellular system (DCS) 1800 MHz, and personal communications services (PCS) 1900 MHz bands.

A388c telephones support GPRS and SMS in addition to traditional circuit switched transport technologies. GPRS, where available, provides substantial increases in mobile data communications performance and efficient use of radio spectrum. Data transmission rates for GSM networks can potentially increase from the current rate of 9.6 kbps up to a theoretical maximum of 171.2 kbps. In addition to increased data rate, GPRS provides a permanent virtual connection to the network. This “always on” connection is possible because GPRS uses packet data transfer so that, for example, email can be downloaded in “background mode” without need for the user to reconnect before requesting a service. This eliminates connection setup delays and adds convenience and immediacy to data services. The “virtual” nature of this connection means network resources are not consumed during periods when a user is not actually sending or receiving data.

A388c telephones have a clam form factor. They are made of a polycarbonate plastic with the earpiece speaker located in the flip. The flip features a viewing window that allows a portion of the display to be seen with the flip is closed. The bottom part of the clam (front housing) contains the touch screen display, main printed circuit board (PCB), microphone, external accessory connector, infrared (IR) communications port, and headset jack. Also located in the front housing are the voice, volume, power, page up, page down, and menu buttons, as well as the battery, antenna, subscriber identity module (SIM) holder, and status light. A stylus, also located in the front housing, is provided to aid manipulating the touch screen UI.

The battery and battery door are integrated into a single unit to minimize overall phone thickness. The phone accepts both 3V and 5V mini SIM cards which fit into the SIM holder beneath the battery. The antenna is a fixed stub type antenna. The service indicator (status light) displays flashing green while in-service, flashing amber when roaming, flashing red while out of service, and alternating red / green when ringing.

Features

A388c telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for GSM GPRS communication. Aside from the space and weight advantage, microcircuits enhance basic reliability, simplify maintenance, and provide a wide variety of operational functions.

Features available in this family of telephones include:

- Lower voltage technology that provides increased standby and talk times
- Extended GSM (EGSM) channels
- Tri-coder/decoder (CODEC) that allows full rate, half rate, and enhanced full rate modes of transmission
- Supports SMS, concatenated SMS, and cell broadcast messages
- Supports GPRS, circuit switched, and SMS networks
- Supports POP3, IMAP4, MIME and SMPT email protocols

- WAP 1.2.1 compliant
- 65K TFT Color touch screen liquid crystal display (LCD)
- Downloadable wallpaper, themes, screensavers and ring tones
- 7MB memory for user data
- J2ME
- VibraCall® vibrating alert
- Voice recorder personal memo feature
- Icon driven user interface with handwriting recognition and on-screen keyboards
- Supports caller ID
- Supports call forwarding for incoming voice, fax, and data calls
- Supports 3V and 5V SIM cards
- SIM Toolkit (STK), Class II
- Supports TrueSync® synchronization with most PC's PIM's or PDA's

Speaker Dependant Voice Recognition and Voice Note Recording

This feature allows voice tags to be used for voice dialing up to 25 phone numbers in the phone book and for creating up to 5 voice shortcuts for menu items. The phone must be "trained" by the voice tag being read into the phone's memory twice before it is recognized.

Voice tags can be added to the phone's memory using the usual name addition methods (phone book menu structure or the shortcut editor).

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

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

A388c telephones also include a voice note recorder that allows up to 3 minutes of personal messages to be recorded. This feature has a complete set of record, playback, and management tools that make it easy to store and maintain a list of personal memos.

Wireless Access Protocol (WAP) 1.2.1 Compliancy

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

The A388c's microbrowser can be configured for baud, idle timeout, line type, phone number, and connection type.

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

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

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, the Incoming Call message is displayed.

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

Call Forwarding

Call forwarding is a network feature that diverts incoming calls to another phone number if the user or phone is unavailable, or the user does not wish to receive calls. This option can be used to:

- Divert all incoming voice calls unconditionally
- Divert incoming voice calls whenever the phone is unavailable, busy, not reachable, or not answered
- Divert incoming fax calls
- Divert incoming data calls
- Allow all calls through to the phone.

Detailed operating instructions for these and the other A388c features can be found in the appropriate A388c telephone user's guide listed in the "Related Publications" section toward the end of this manual.

General Operation

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

The A388c telephone's controls are located on the front of the device (see Figure 1). Controls on the front of the phone include a Power ON/OFF button, Home Key, and a Up /Down key Soft Menu key on the left and right side. Indicators, in the form of icons, are displayed on the LCD. Service status is indicated by a tri-color light emitting diode (LED) (not shown) located on top of the phone. Additionally, I/O connectors consisting of a headset jack and an accessory port are located on the top and bottom of the phone, respectively. See Figure 1.

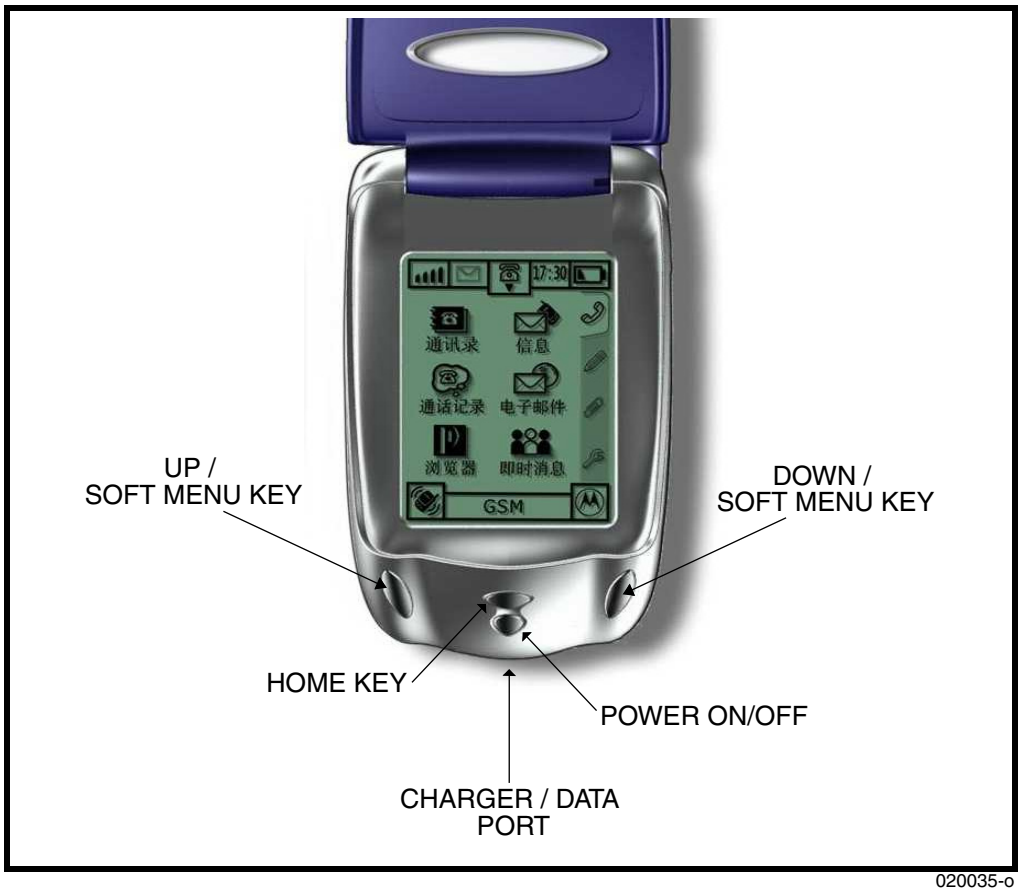

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Figure 1. A388c Telephone Controls, Indicators, and I/O

Menu Navigation

A388c telephones are equipped with a new user-friendly interface that employs 4 main menus. See Figure 2. Select each menu by tapping its tab on the right hand side of the screen. Each menu contains up to six function icons that make up a function group.

The tab represents the Communications Group.

The tab represents the Tools Group.

The tab represents the Setup Group.

The Setup Group allows you to configure and personalize the phone, as well as providing the capability to connect the phone to other devices.

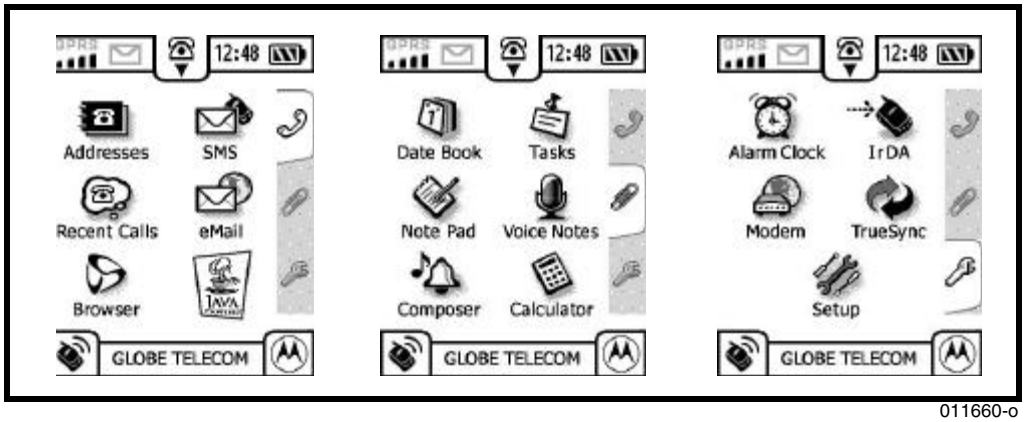

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Figure 2. A388c Menu Navigation

Liquid Crystal Display (LCD)

The color LCD provides a 65K TFT color touchscreen display. The display measures 240 x320 pixels.

The LCD screen displays the main menu icons and all of the function group icons. You can navigate around the touch screen using the stylus to select the desired functions.

Display animation makes the phone's menus 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 3 shows some common icons displayed on the LCD.

Figure 3. A388c Icon Indicators

Table 1. Icon Indicators and Description

Icon	Description
	**Signal Strength Indicator**. Shows the strength of the phone's connection with the network.
	**Antenna Off Indicator**. Calls cannot be sent or received when the "antenna off" indicator is displayed. The device is in PDA mode.
	**In Use Indicator**. Appears when a call is in progress.
	**Roam Indicator**. Appears 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.
	**GPRS Indicator**. Appears when the phone is in GPRS mode.
	**Message Waiting Indicator**. Appears when the phone receives a text message or voice message. This is a network-dependent feature.
	**Battery Level Indicator**. Shows the amount of charge left in the battery. The more segments visible, the greater the charge. Recharge the battery as soon as possible when the Low Battery warning message appears.
	**Invalid Battery Indicator.**
12:26	**Clock**. Shows the current time. This is a network-dependent feature.
	**Alert Setting Indicator**. Shows the current selected alert. The default alert setting is a ringer.

Alert Settings

A388c telephones include up to 32 preset alert tones and vibrations that can be applied to all alert events at the same time.

Pressing either volume key will mute the alert.

Battery Function

Battery Gauge

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

Battery Removal

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

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

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

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

The following table lists tools and test equipment recommended for disassembly and reassembly of A388c telephones. Use either the listed items or equivalent.

Table 2. General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
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
See Table 6	Charger	Used to charge battery and to power device
0180386A82	Antistatic Mat Kit (includes 66-80387A95 antistatic mat, 66-80334B36 ground cord, and 42-80385A59 wrist band)	Provides protection from damage to device caused by electrostatic discharge (ESD)
6680388B67	Disassembly tool, plastic with flat and pointed ends	Used during assembly/disassembly of device
6680388B01	Tweezers, plastic	Used during assembly/disassembly
—[2]	Tweezers, stainless steel, Type 2 pointed blade, Plato part number TZF-401-2 or equivalent	Used for flip removal.
—[3]	Digital Multimeter, HP34401A	Used to measure battery voltage
8102430Z04	GSM / DCS Test SIM Card	Used to enable manual test mode

1. To order in North America, contact Motorola Aftermarket and Accessories Division (AAD) at (847) 538-8000; Internationally, AAD can be reached by calling +1 847 5388023 or faxing +1 847 5763023.
2. Not available from Motorola. To order, contact Plato Products, Inc. at (626) 965-8044.
3. Not available from Motorola. To order, contact Hewlett Packard at (800) 452-4844.

Disassembly

The procedures in this section provide instructions for the disassembly of a A388c telephone. Tools and equipment used for the phone are listed in Table 2, preceding.

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

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

Removing and Replacing the Stylus

1. Grasp the stylus and pull straight out of the bottom of the telephone as shown in Figure 4.

Figure 4. Removing the stylus

2. To replace, insert the stylus, pointed end first, into the styles holder on the bottom of the telephone. Push until fully seated in the holder.

Removing and Replacing the Battery

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

1. Ensure the phone is turned off.
2. Slide the battery latch in the direction of the arrow as shown in Figure 5-1.

3. While holding the battery latch open, lift the end of the battery and remove it completely. See Figures 5-2 and 5-3.

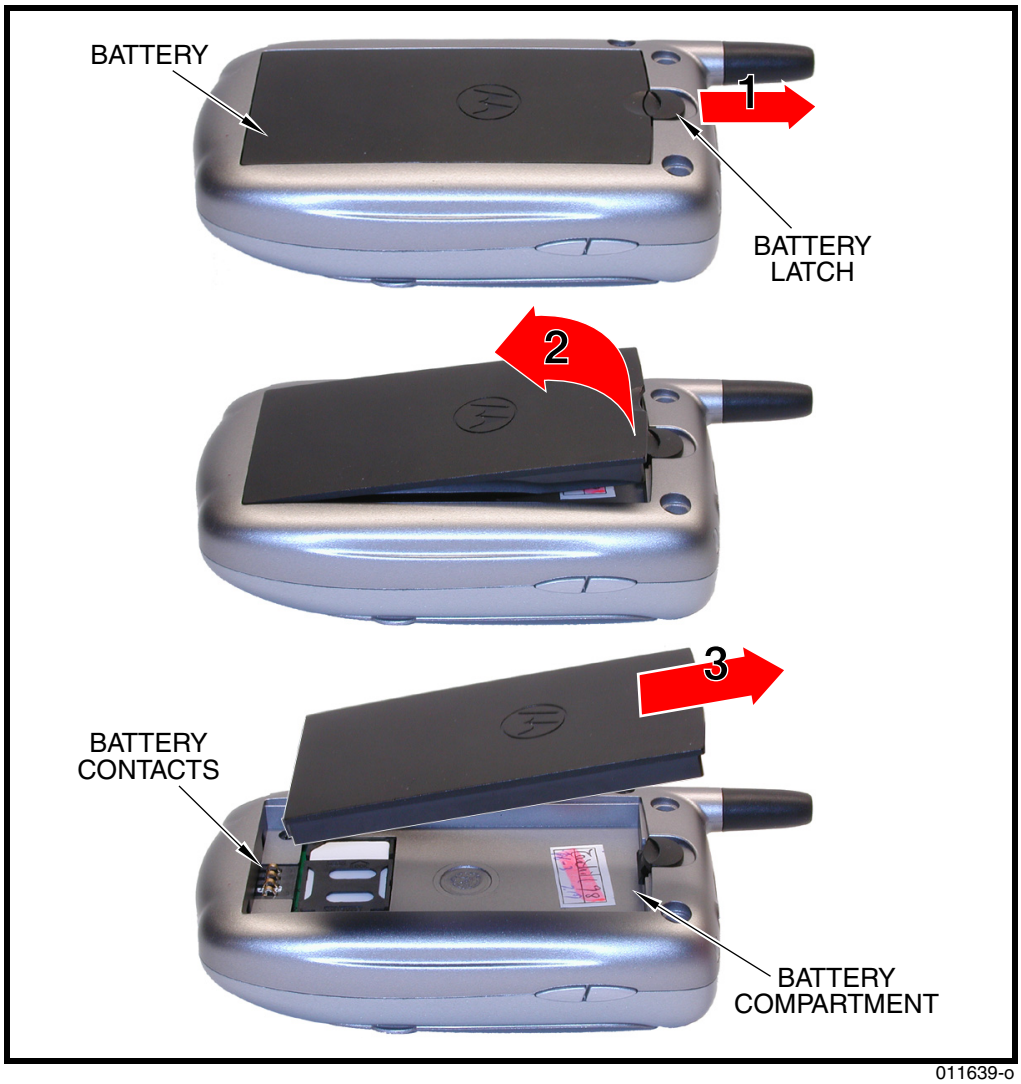

Figure 5. Removing the battery

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

4. To replace, align the battery with the battery compartment so the contacts on the battery match the battery contacts in the phone.
5. Insert the tabs at the base of the battery into the slots at the bottom of the battery compartment.
6. Push the top of the battery down until it snaps into place.

Removing and Replacing the Subscriber Identity Module (SIM)

1. Remove the battery as described in the procedures.
2. Slide the SIM holder in the direction of the arrow (Figure 6-1) to unlock and rotate (Figure 6-2) to open.
3. Carefully slide the SIM from its holder as shown in Figure 6-3.
4. To replace, insert the SIM into the holder, ensuring the keyed corner of the SIM aligns with the notch molded into the holder.

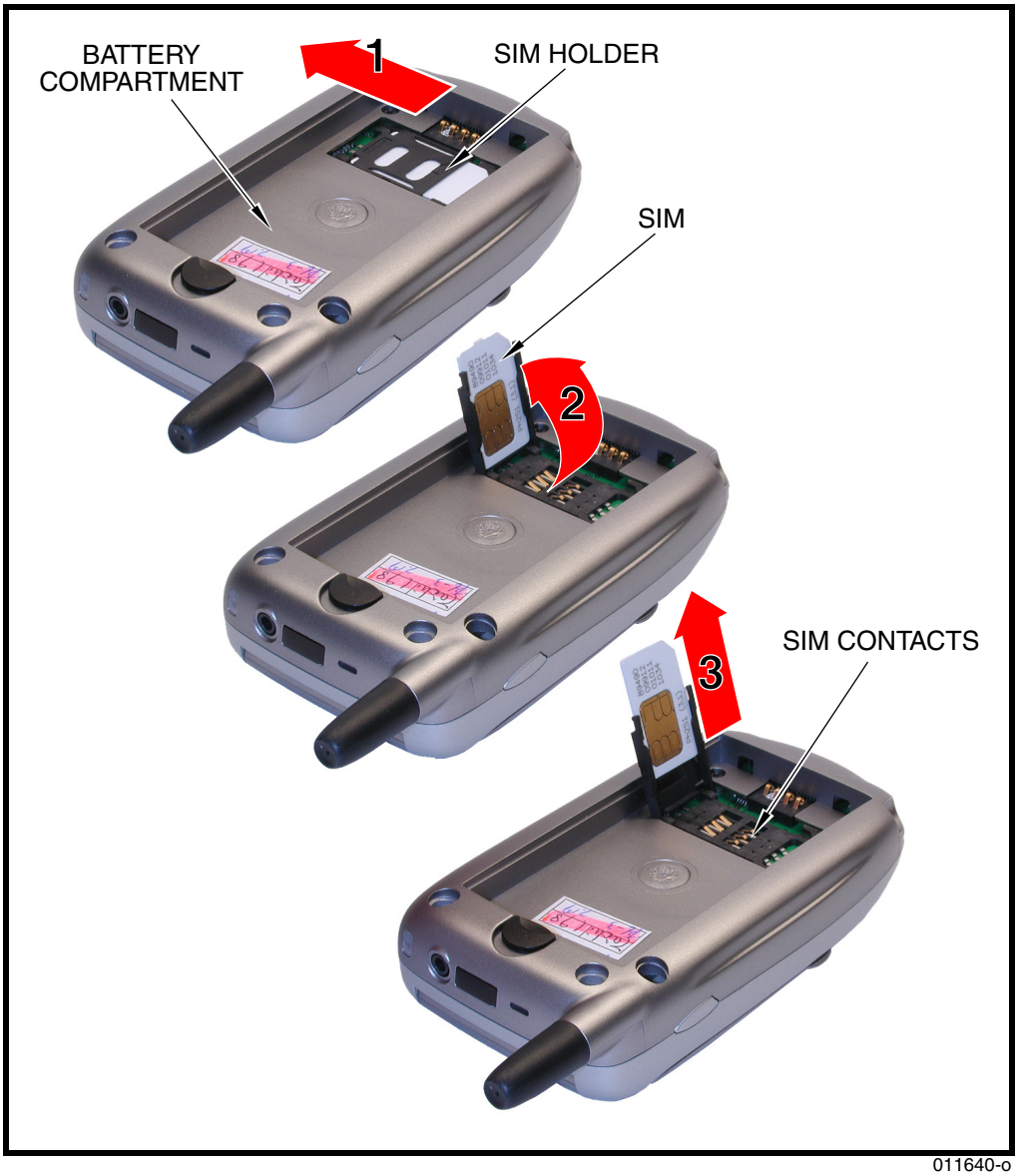

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Figure 6. Removing the SIM

5. Close the SIM holder and slide to lock.
6. Replace the battery as described in the procedures.

Removing and Replacing the Antenna

1. Remove the battery as described in the procedures.
2. By hand, rotate the antenna counterclockwise until loose as shown in Figure 7-1.

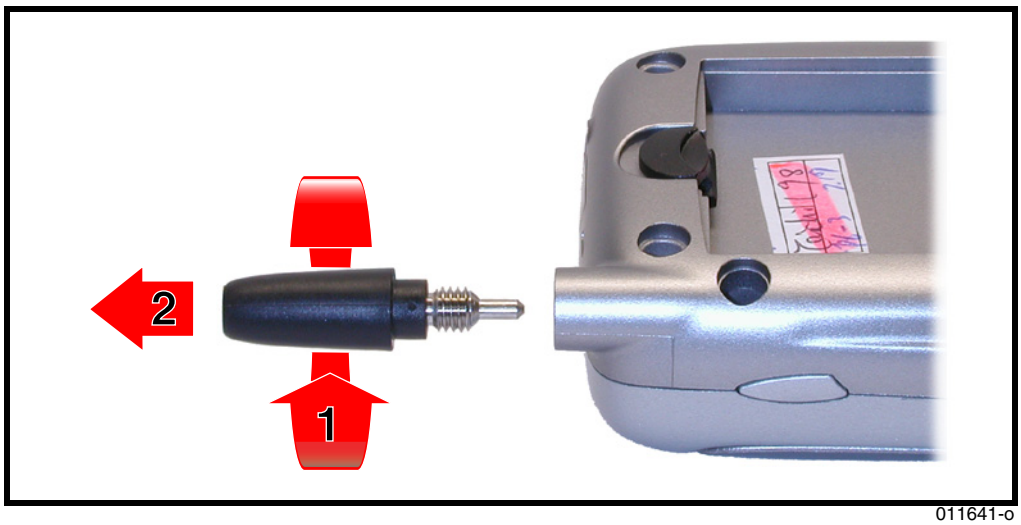

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Figure 7. Removing the antenna

3. When the antenna threads are completely disengaged, pull the antenna straight out of the phone housing to remove. Figure 7-2.

Ensure antenna threads are properly engaged before tightening to prevent damage to the antenna or housing.

4. To replace, insert the threaded end of the antenna carefully into the housing and, after ensuring the threads are properly engaged, rotate clockwise. Tighten firmly by hand.
5. Replace the battery as described in the procedures.

Removing and Replacing the Rear Housing

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

1. Remove the battery, SIM, and antenna as described in the procedures.

In addition to 4 screws, the rear housing is fastened with 4 plastic catches. The catches are fragile and should be handled with care.

2. Using the flat end of the disassembly tool, remove the 2 housing screw plugs (Figure 22, “Exploded view diagram,” on page 41, Item 21).
3. Using a Torx driver with a T-6 bit, remove the 4 screws from the rear housing. See Figure 8A.
4. With the flat end of the disassembly tool, carefully press the 4 housing catches inward to release the rear housing. See Figure 8B.

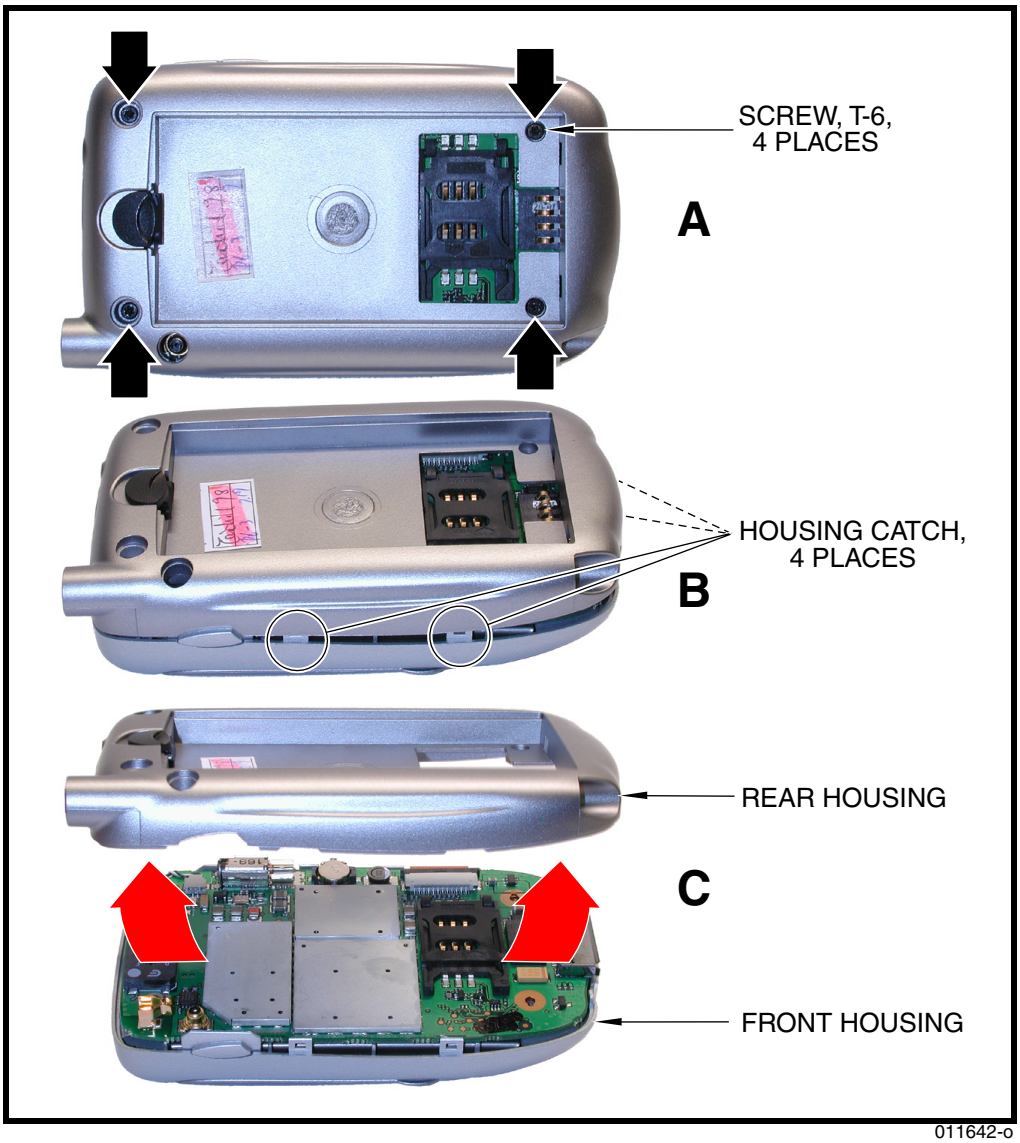

Figure 8. Removing the rear housing

5. Lift the rear housing away from the front housing as shown in Figure 8C.
6. To replace, align the housing catches then press the rear housing down until the 4 housing catches engage. Press the housings together until the catches snap into place.
7. Replace the 4 screws and tighten securely. Do not over tighten.

8. Replace both housing screw plugs.
9. Replace the antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Real Time Clock (RTC) Battery

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

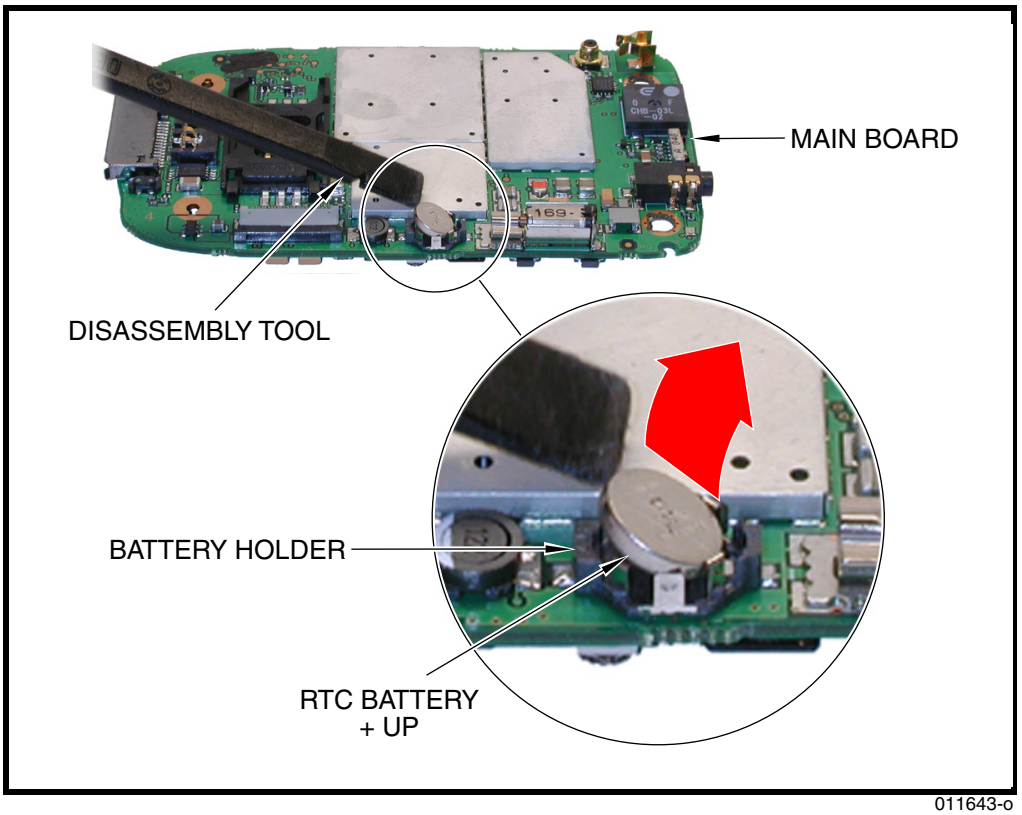

Figure 9. Removing the RTC battery

2. Using the flat end of the disassembly tool, gently pry the RTC battery from its socket on the display board. See Figure 9.

Use only non-conductive tools, such as the plastic disassembly tool and the plastic tweezer, when removing and replacing the RTC battery.

3. To replace, insert the new RTC battery into its socket on the main board. The plastic tweezer may be used to replace the RTC battery. Be sure the positive battery terminal is up (facing away from the board) and the battery is completely seated in its socket.
4. Replace the rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Alert Gasket

1. Remove the battery, SIM, antenna, and rear housing as described in the procedures.
2. Using the plastic tweezers, grasp the alert gasket and pull completely out of the housing as shown in Figure 10.

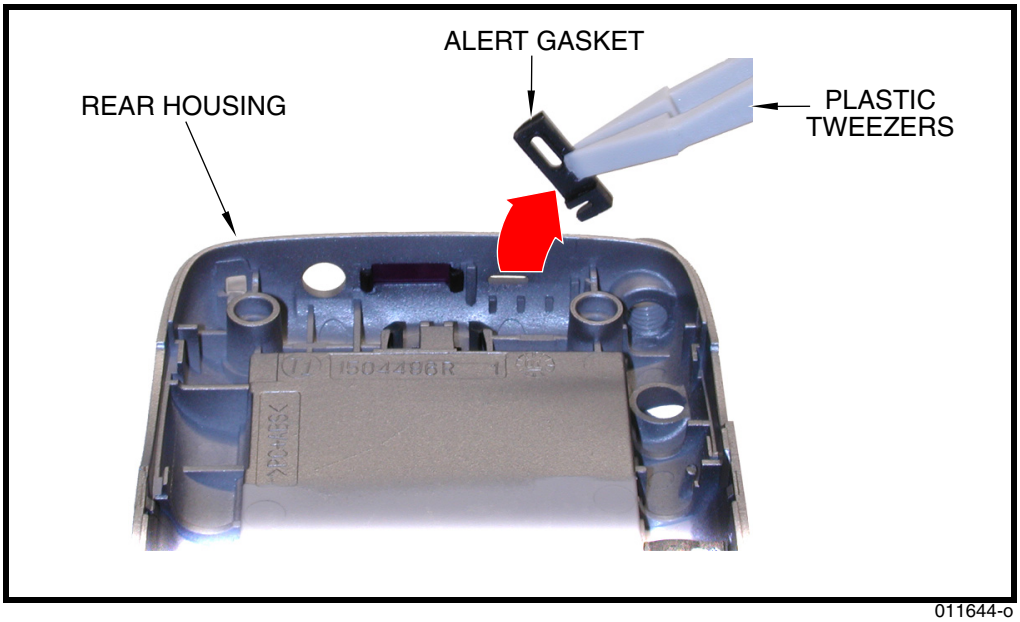

Figure 10. Removing the alert gasket

3. To replace, insert the alert gasket into the rear housing and press until fully seated. Be sure the openings in the gasket and the housing align with each other.
4. Replace the rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Light Guide

1. Remove the battery, SIM, antenna, and rear housing as described in the procedures.
2. Using the pointed end of the disassembly tool from inside the rear housing, firmly push the light guide straight out of the housing as shown in Figure 11-1, then remove completely (Figure 11-2).

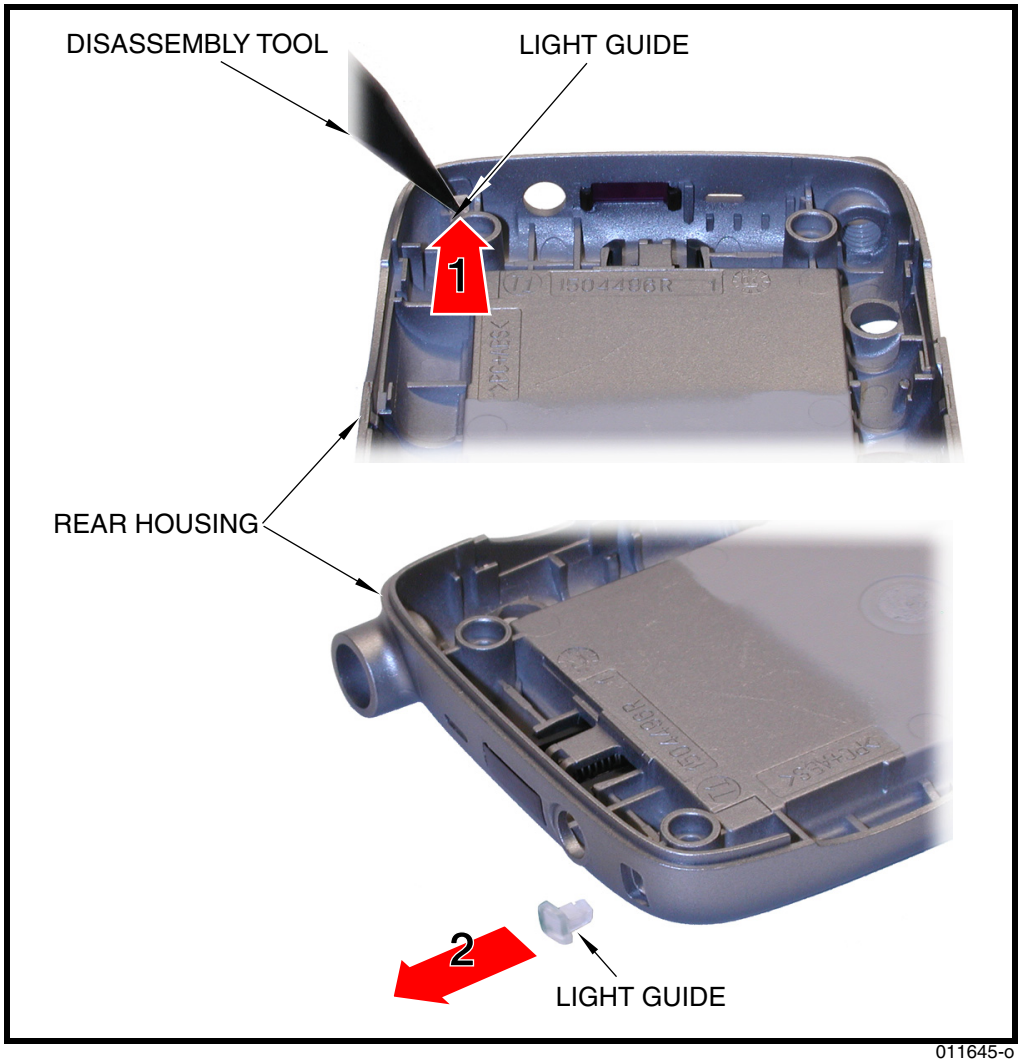

Figure 11. Removing the light guide

3. To replace, insert the light guide straight into the opening in the top of the rear housing and push until fully seated.
4. Replace the rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Battery Latch

1. Remove the battery, SIM, antenna, and rear housing as described in the procedures.
2. Using the disassembly tool inside the rear housing, disengage both of the battery latch catches as shown in Figure 12-1.

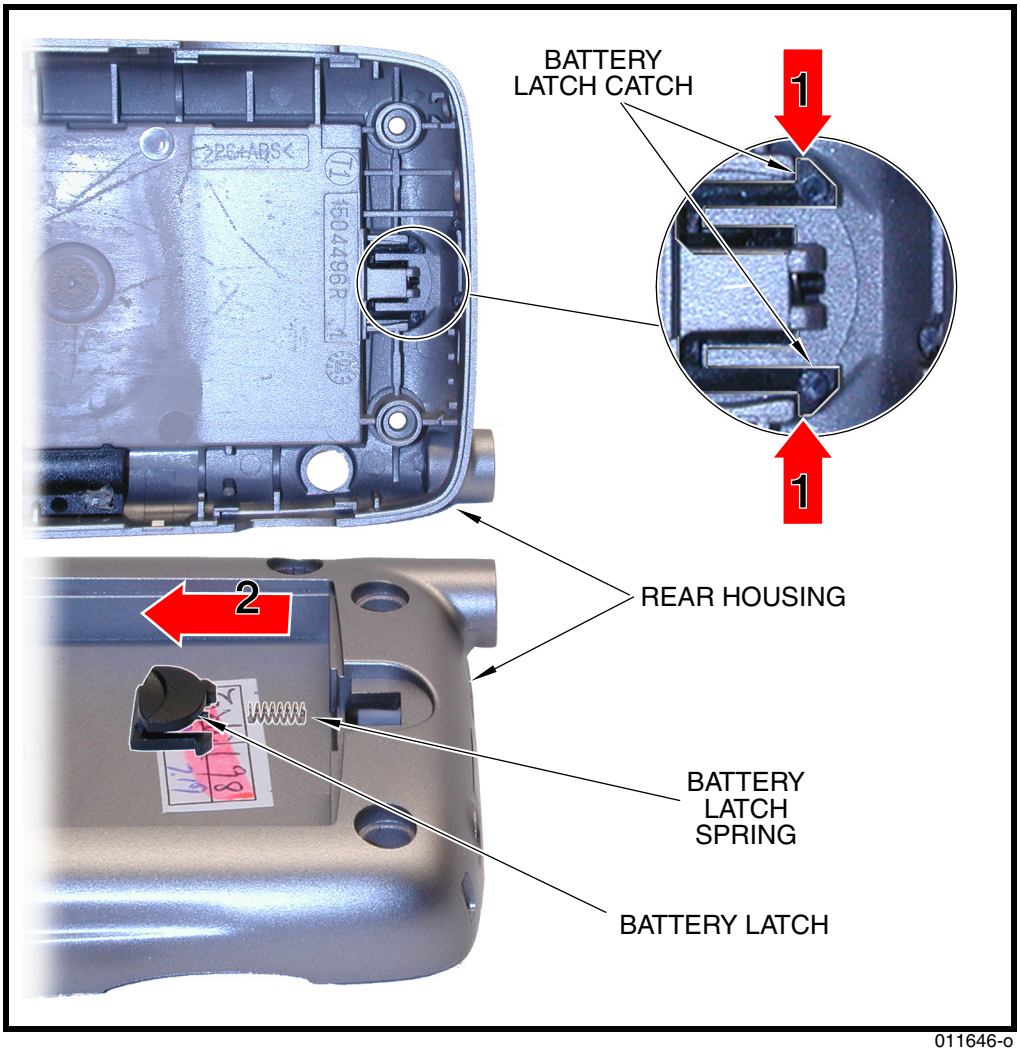

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Figure 12. Removing the battery latch

3. Slide the battery latch in the direction of the arrow shown in Figure 12-2 and remove completely from the housing. Be careful not to lose the battery latch spring during removal.
4. To replace, slip the battery latch spring over its post on the battery latch then slide the latch and spring straight into the opening on the rear housing. Press the latch until both catches lock into place inside the rear housing.
5. Replace the rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Main Board

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

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

The flexible printed cable (FPC or flex) is easily damaged. Exercise extreme care when handling.

2. Using the flat end of the disassembly tool, slide both ends of the flex connector latch away from the connector body to unlock the flex. See Figure 13-1.
3. Using the plastic tweezers, carefully disconnect the flex from the main board as shown in Figure 14.
4. Disconnect the speaker leads from the speaker connector on the main board. See Figure 13-2.

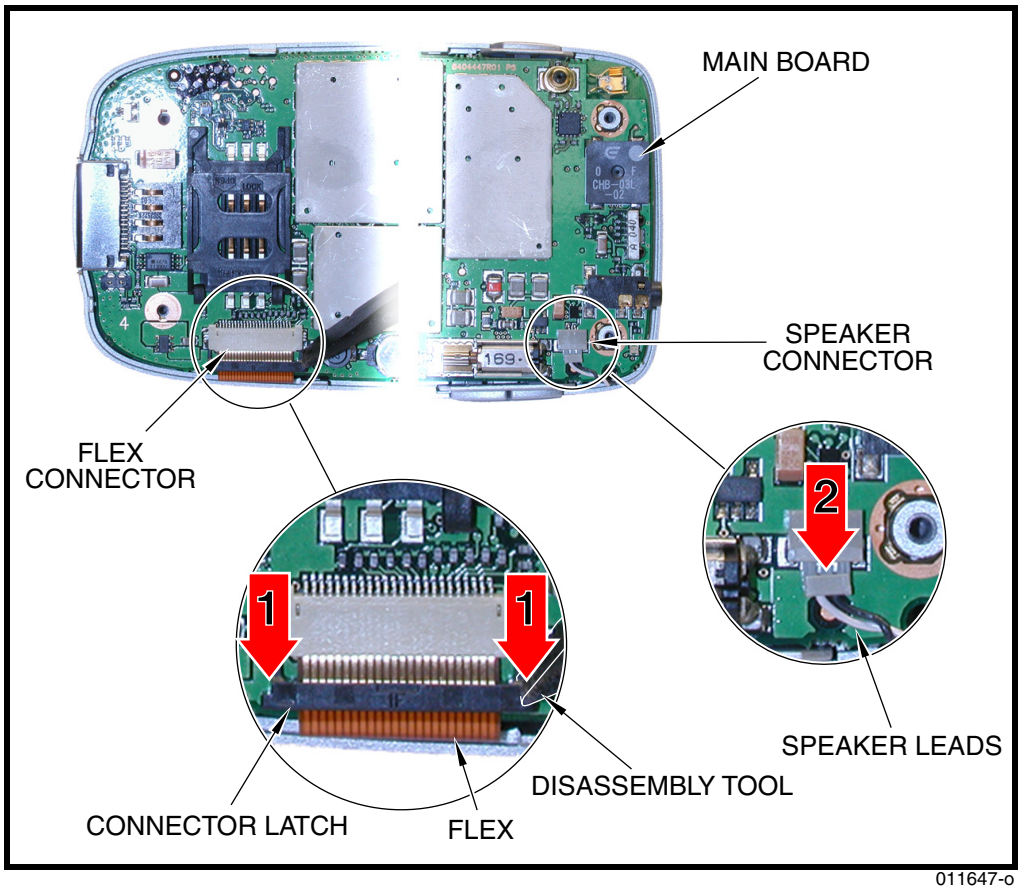
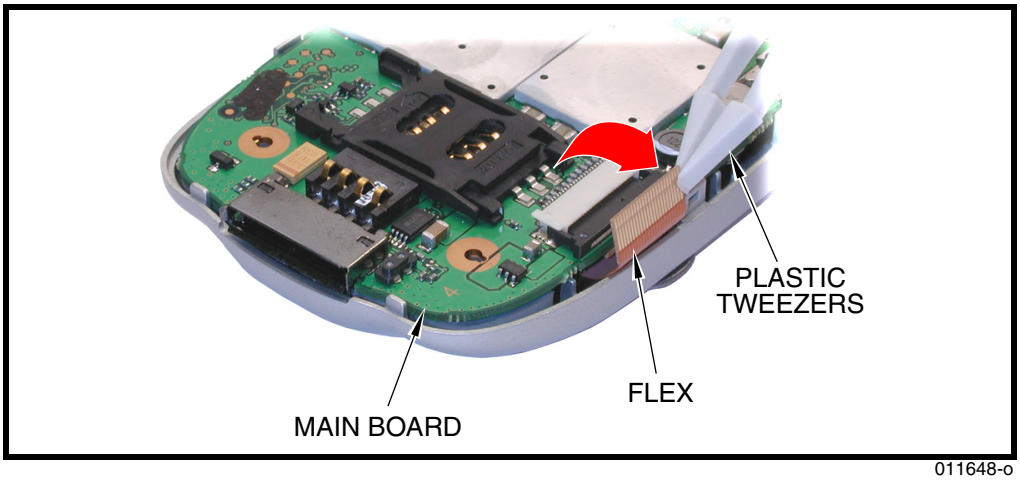


Figure 13. Disconnecting the flex and speaker from the main board



011648-o

Figure 14. Disconnecting the flex from the main board

5. Lift the transceiver board assembly completely from the front housing as shown in Figure 15.

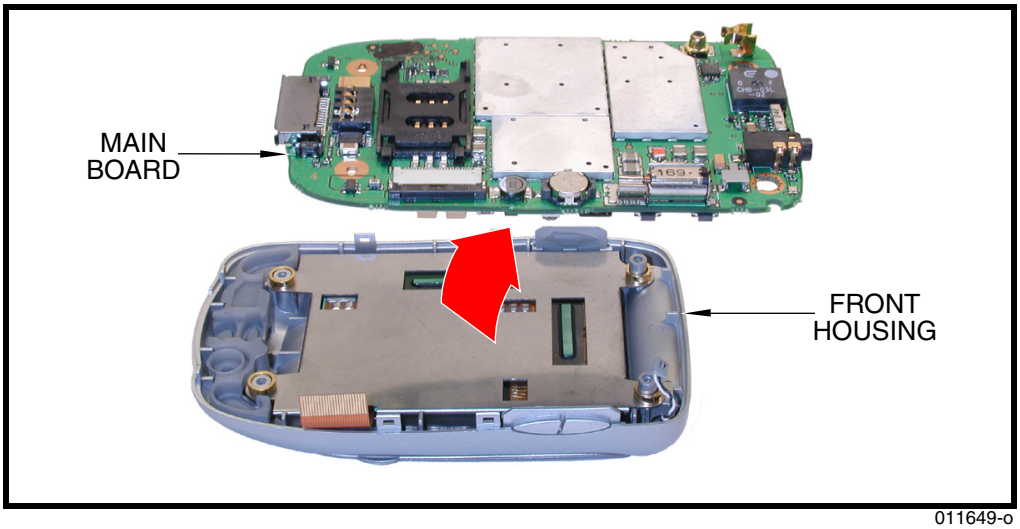


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Figure 15. Removing the main board

6. To replace, insert the transceiver board assembly into the front housing with the flex connector on top. Be sure the main board assembly is properly seated on the 4 front housing posts.

Ensure the keys and buttons are correctly positioned in the front housing. Verify operation of the keys and buttons after reassembling the phone.

7. Insert the flex squarely into the flex connector on the transceiver board and, after ensuring it is fully seated, close the connector latch to lock in place.
8. Reconnect the speaker leads.

9. Replace the rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Microphone

1. Remove the battery, SIM, antenna, rear housing, and main board as described in the procedures.

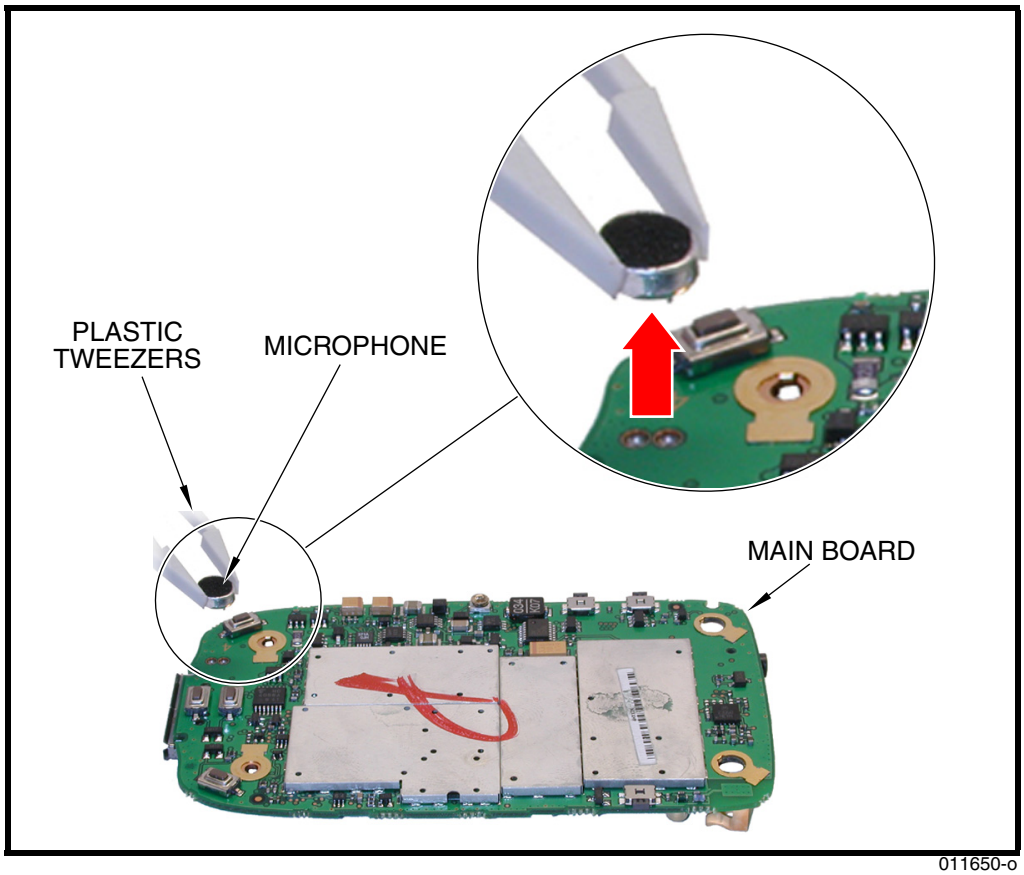

Figure 16. Removing the microphone

2. Observe the orientation of the microphone before removing.
3. Using the plastic tweezers, carefully pull the microphone straight out of the main board as shown in Figure 16.

The microphone connector pins are easily bent or broken. Exercise care when replacing the microphone.

4. To replace, insert the microphone connector pins into the main board socket and press until the microphone is seated flat against the board. Be sure to observe proper orientation when replacing the microphone.
5. Replace the main board, rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Keypad and Buttons

1. Remove the battery, SIM, antenna, rear housing, and main board as described in the procedures.
2. Using the plastic tweezers, lift the volume button, voice button, and keypad from the front housing as shown in Figure 17.

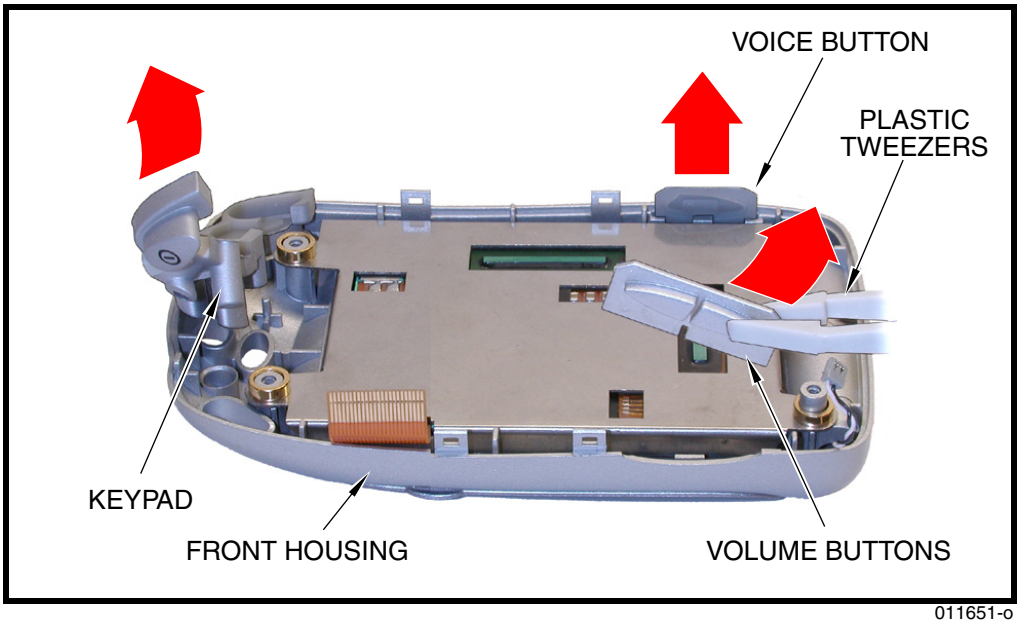

Figure 17. Removing the external buttons

3. To replace, insert the keypad and buttons into the front housing. Make sure they align properly with the openings in the front housing.
4. Replace the main board, rear housing, antenna, SIM, and battery as described in the procedures.
5. After reassembly, operate all the keypad and buttons to verify correct function.

Removing and Replacing the Touch Screen Display Assembly

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

1. Remove the battery, SIM, antenna, rear housing, main board, external keys, and buttons as described in the procedures.

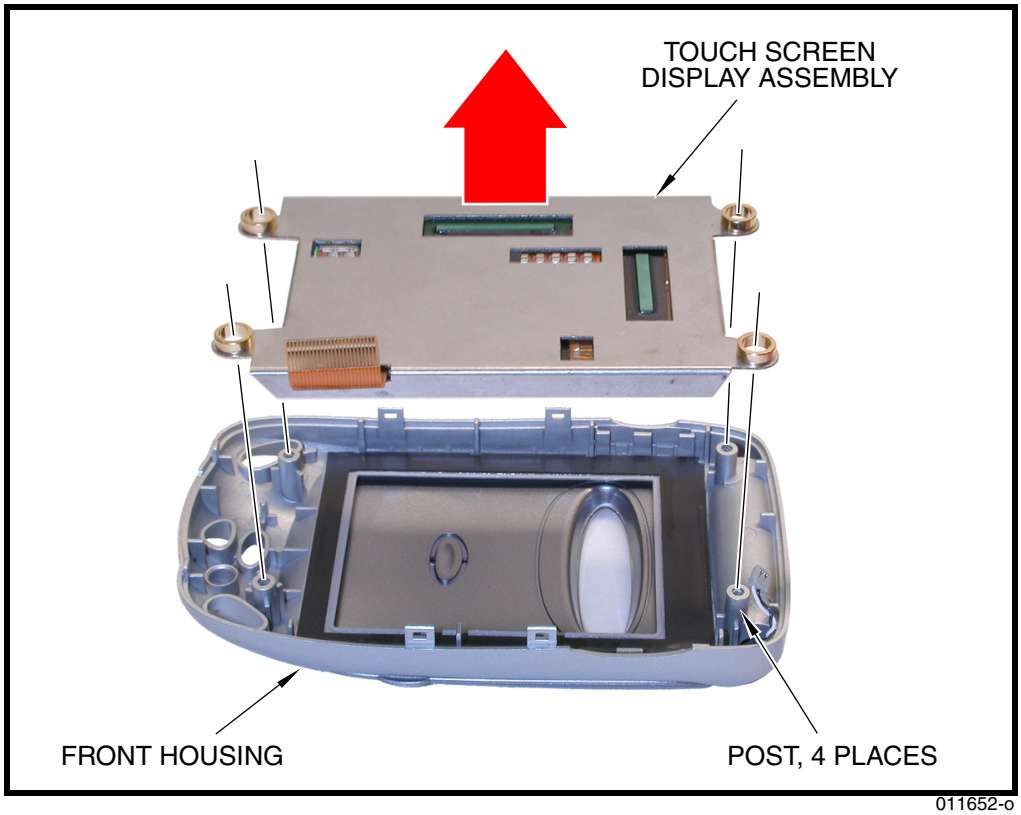

Figure 18. Removing the touch screen display assembly

2. Carefully lift the touch screen display assembly straight up and away from the front housing as shown in Figure 18.

The touch screen display is fragile. Do not twist, pry, or drop the assembly during removal and reassembly.

3. To replace, align the touch screen display assembly with the 4 posts inside the front housing and set in place.
4. Replace the external keys, buttons, main board, rear housing, antenna, SIM, and battery as described in the procedures.

Removing and Replacing the Flip Assembly

1. Remove the battery, SIM, antenna, rear housing, main board, external keys, buttons, and touch screen display assembly as described in the procedures.

After releasing the hinge assembly in the following step, DO NOT attempt to completely separate the flip assembly from the front housing until you have safely routed the speaker leads through the opening in the front housing.

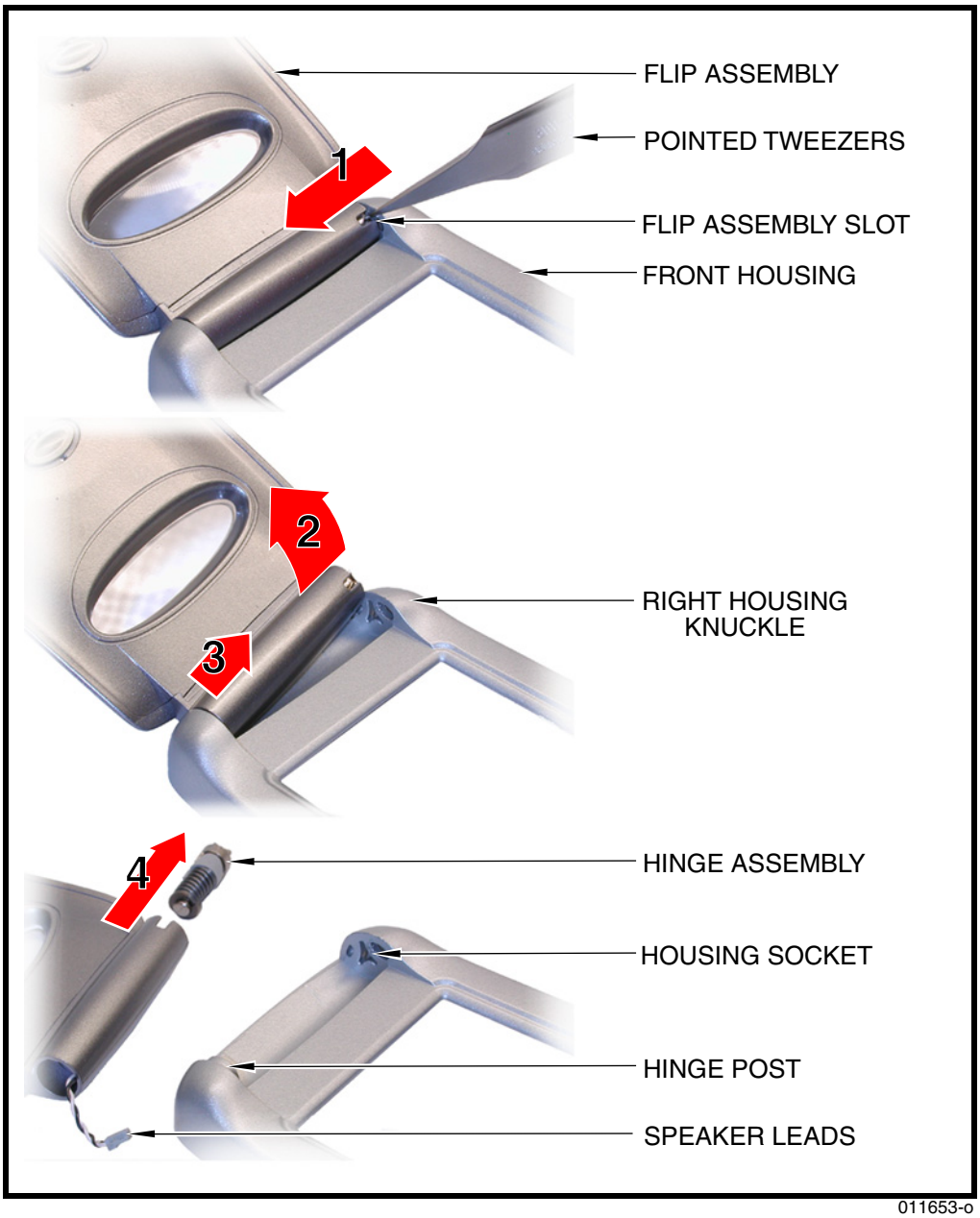

Figure 19. Removing the flip assembly

2. Using the pointed tweezers through the flip housing slot, depress the hinge assembly to release the flip assembly from the front housing knuckle. See Figure 19-1.
3. Tilt and slightly separate the flip assembly (Figures 19-2 and 19-3) from the front housing. Carefully pull the speaker leads through the front housing opening, then completely separate the housings as shown in Figure 19-4.
4. The hinge assembly can be removed by pulling it straight out of the flip assembly. See Figure 19-4.
5. To replace, insert the hinge assembly into the flip assembly.
6. While carefully routing the speaker leads through the opening in the front housing, insert the front housing hinge post into the flip housing.
7. Using the flat end of the disassembly tool, depress the hinge assembly and slide the end of the hinge into the socket molded into the right housing knuckle. The hinge assembly will snap into place when it is properly aligned with the socket.
8. Replace the touch screen display assembly, external keys, buttons, main board, rear housing, antenna, SIM, and battery as described in the procedures.

SIM Cards and Identification

SIM Card

A SIM card is required to access the existing local GSM network and remote networks when traveling.

The SIM card contains:

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

Personality Transfer

A personality transfer is required when a phone is Express Exchanged or when the main board is replaced. Personality transfers reproduce the customer's original personalized details such as menu and stored memory such as phone books, or even just program a unit with basic user information such as language selection.

Personality transfers performed at levels 1 and 2 service centers include only the information stored on the SIM.

Identification

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

Mechanical Serial Number (MSN)

The Mechanical Serial Number (MSN) is an individual unit identity number and remains with the unit throughout the life of the unit.

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

The MSN is divided into 4 sections as shown in Figure 20.

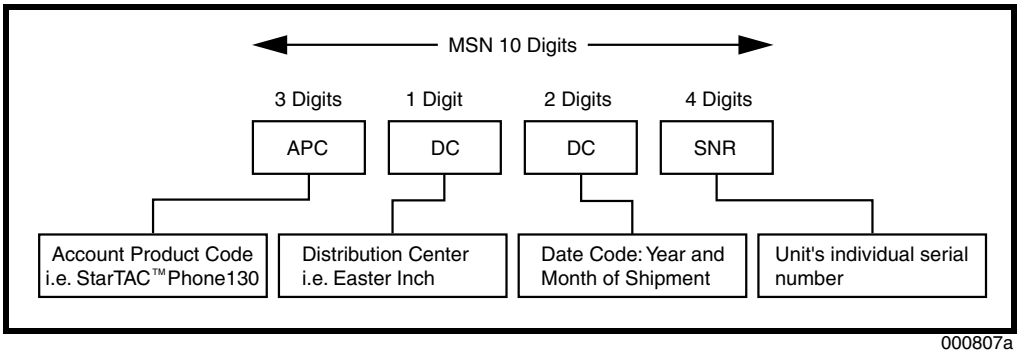

Figure 20. MSN Label

International Mobile Station Equipment Identity (IMEI)

The International Mobile station Equipment Identity (IMEI) number is an individual number unique to the PCB and is stored within the unit's memory. The following diagram illustrates the various parts of this number.

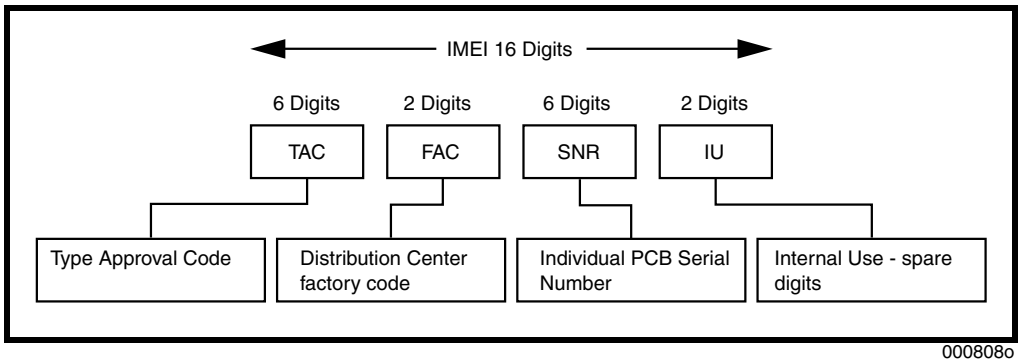

Figure 21. IMEI Label

Other label number configurations present are:

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

Troubleshooting

Manual Test Mode

Motorola A388c telephones are equipped with a manual test mode capability. This allows service personnel to verify functionality and perform fault isolation by entering keypad commands.

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

1. Press ⏻ 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 ⏻ to turn the phone ON.

Press and hold the # button for approximately 3 seconds until TEST displays on the screen. The phone may now be issued test commands listed in Table 3.

Manual Test Mode Commands

Table 3. Test Commands

Test Command	Test Function/Name
Press and hold # for 2 seconds	Enter manual test mode
01#	Exit manual test mode
07x#	Mute RX audio path
08#	Unmute RX audio path
09#	Mute TX audio path
10#	Unmute TX audio path
15x#	Generate tone
1590#	Vibrate Mode
1591#	Ringer Mode
16#	Mute tone generator
19#	Display software version number of Call Processor
20#	Display software version number of Modem
36#	Initiate acoustic loopback
360#	Full Rate
361#	Enhanced Full Rate
362#	Half Rate
37#	Stop test
38#	Activate Mini SIM
39#	Deactivate Mini SIM
43x#	Change audio path
47x#	Set audio volume
51#	Enable sidetone

Table 3. Test Commands (Continued)

Test Command	Test Function/Name
52#	Disable sidetone
54#	Show service indicator LED (0 - Off, 1 - Red, 2 - Green, 3 - Amber) (flip must be closed)
57#	Initialize non-volatile memory
58#	Display security code
58xxxxxx#	Modify security code
59#	Display lock code
59xxx#	Modify lock code
60#	Display IMEI
980#	DCS Mode (PF B95 only)
981#	GSM Mode (PF B95 only)
962#	PCS Mode (PF C21 only)
99#	Display all pixels

Troubleshooting Chart

Table 4. Product Family 0C45 Telephone: 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 connectors open or misaligned.	Visually inspect the battery connectors 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 connectors are not at fault, proceed to c.
	c) Main board assembly defective.	Remove the main board assembly. Substitute a known good assembly and temporarily reassemble the unit. Depress the PWR button; if unit turns on and stays on, disconnect the dc power source and reassemble the telephone with the new main board assembly. Verify that the fault has been cleared.
2. Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	a) Antenna assembly defective.	Check to make sure that the antenna pin is properly connected to the main board assembly. If connected properly, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Main board assembly defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
3. Display is erratic, or provides partial or no display.	a) Main board connections faulty.	Remove rear housing from unit, check general condition of flexible printed cable (flex). If the flex is good, check that the flex connector is properly locked. If faulty connector, replace the main board assembly. If connector is not at fault, proceed to b.

Table 4. Product Family 0C45 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
	b) Touch screen display assembly defective.	Remove the touch screen display assembly as described in the procedures. Temporarily reassemble unit with a known good touch screen display assembly and verify proper operation. If fault is cleared, reassemble unit with the new assembly. If fault not cleared, proceed to c.
	c) Main board assembly defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
4. Incoming call alert transducer audio distorted or volume is too low.	Faulty alert transducer or main board assembly.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone connections to the main board assembly defective.	Gain access to the microphone as described in the procedures. Check connections. If connector is faulty proceed to c; if the connector is not at fault, proceed to b.
	b) Microphone defective.	Gain access to microphone. Disconnect and substitute a known good microphone. Place a call and verify improvement in transmit signal as heard by called party. If good, reassemble with new microphone. If microphone is not at fault, reinstall original microphone and proceed to c.
	c) Main board assembly defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
6. Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from main board assembly defective.	Gain access to the main board assembly as described in the procedures. Check the speaker leads and connector from the flip assembly to the main board assembly. If speaker leads are at fault, replace the flip assembly. If connector is at fault, proceed to d. If connection is not at fault, proceed to b.
	b) Earpiece speaker defective.	Replace the flip assembly as described in the procedures. Temporarily reassemble unit and verify proper operation. If fault has not been cleared, replace original flip assembly and proceed to proceed to c.
	c) Antenna assembly defective.	Check to make sure the antenna is installed correctly. If the antenna is installed correctly, substitute a known good antenna assembly. If this does not clear the fault, reinstall the original antenna assembly and proceed to d.
	d) Main board assembly defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble with the new main board assembly.
7. Telephone will not recognize or accept SIM card.	a) SIM card defective.	Check the SIM card contacts for dirt. Clean if necessary and check if fault has been cleared. If the contacts are clean, insert a known good SIM card into the telephone. Power up the unit and confirm that the card has been accepted. If the fault no longer exists, replace the defective SIM card. If the SIM card is not at fault, proceed to b.

Table 4. Product Family 0C45 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
	b) Connections between touch screen display assembly and main board assembly faulty.	Refer to remedy 3a and 3b. If fault has not been cleared, proceed to c.
	c) Touch screen display assembly defective.	Replace touch screen display assembly with a known good one. Temporarily reassemble unit and verify proper operation. If fault has not been cleared, replace original touch screen display assembly and proceed to d.
	d) Main board assembly defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
8. Phone does not sense when flip is opened or closed (usually indicated by inability to answer incoming calls by opening the flip, or inability to make outgoing calls).	a) Magnet in flip assembly missing or defective.	Replace flip assembly with known good one. Refer to the procedures. Place call to phone and verify ability to answer by opening flip. If fault is cleared, rebuild phone with new flip assembly. If fault is still present, replace original flip assembly and proceed to b.
	b) Sensor on main board defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
9. Vibrator feature not functioning.	Vibrator on main board defective.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
10. Internal Charger not working.	Faulty charger circuit on main board assembly.	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 main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.
11. Real Time Clock resetting when standard battery is removed.	Lithium Ion RTC battery on the main board may be depleted.	Replace the RTC battery as described in the procedures. Check RTC time does not reset.
12. No or weak audio when using headset.	a) Headset not fully pushed home.	Ensure the headset plug is fully seated in the jack socket.
	b) Faulty jack socket on main board assembly.	Replace the main board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new main board assembly.

Programming: Software Upgrade and Flexing

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

Part Number Charts

The following charts are provided as a reference for the parts associated with A388c telephones.

Related Publications

Motorola 388 Wireless Phone User Guide, Simple Chinese	9804586R01
Motorola 388 Wireless Phone User Guide, Traditional Chinese	9804586R02
Motorola 388 Wireless Phone User Guide, English	9804586R03

Exploded View Diagram

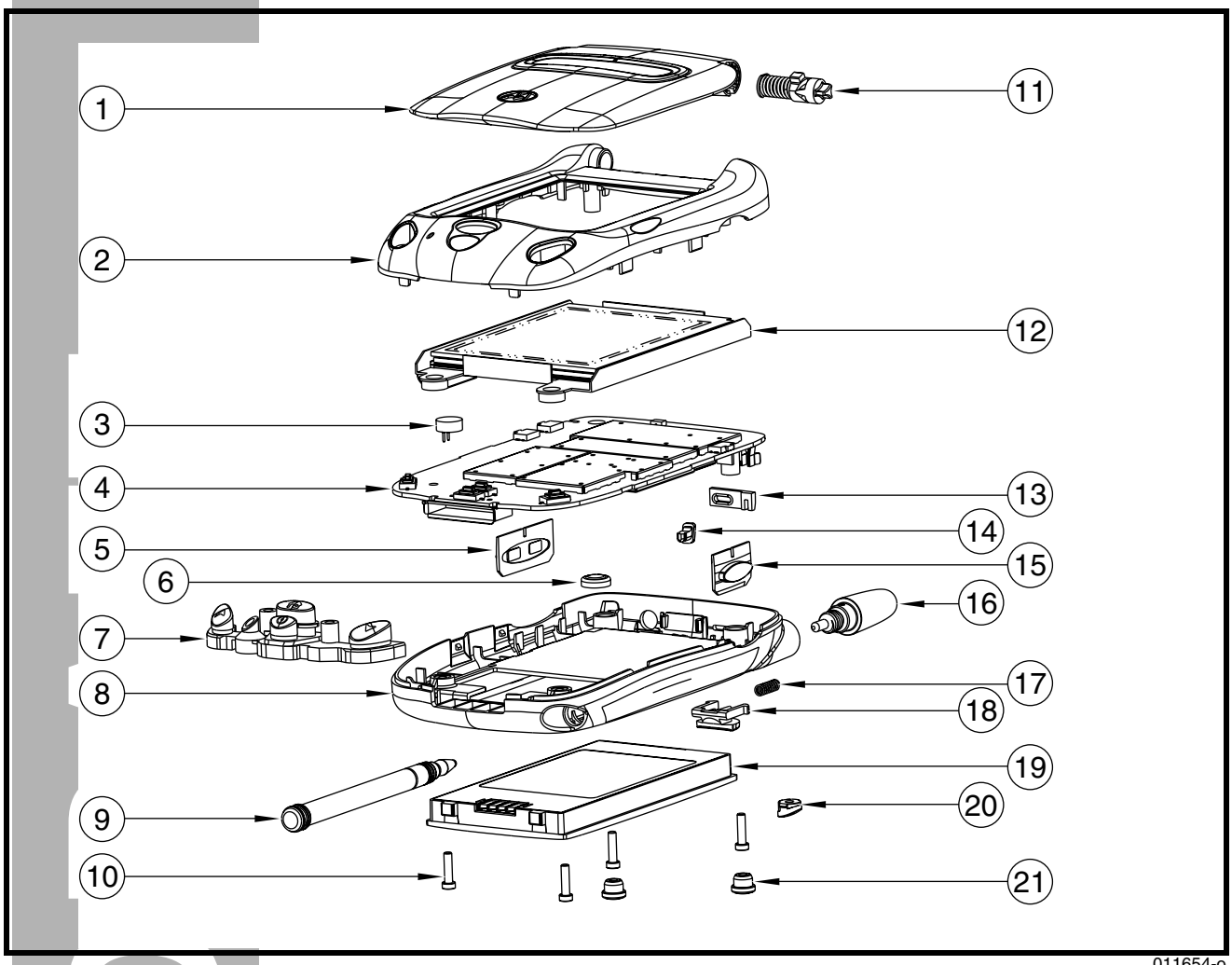

Figure 22. Exploded view diagram

Exploded View Parts List

Table 5. Exploded View Parts List

Item Number	Motorola Part Number (EMEA)	Motorola Part Number (North America & Latin America)	Description
1	See Table 5	See Table 5	Flip assembly
2	0164059E01	0164057E01	Front housing assembly
3	5009135L07	5009135L07	Microphone
4	See Table 5	CHLF4336AA	Main board[1]
5	3804504R01	3804504R01	Button, volume
6	6003710K08	6003710K09	Battery, RTC
7	3804506R01	3804506R02	Keypad
8	See Table 5	See Table 5	Rear housing assembly
9	0164055E01	0164055E01	Stylus assembly
10	0364579E01	0364579E01	Screw, housing (4)
11	5504555R01	5504555R01	Hinge assembly
12	0164056E01	0164056E01	Touch screen display assembly
13	0504488R01	0504488R01	Gasket, alert
14	6104512R01	6104512R01	Light guide
15	3804505R01	3804505R01	Button, record
16	0164054E01	0164054E02	Antenna assembly
17	4104584R01	4104584R01	Spring, battery latch
18	5504515R01	5504515R01	Latch, battery
19	See Table 5	See Table 5	Battery, Lithium Ion
20	0504489R01	0504489R01	Plug, RF
21	0504487R01	0504487R01	Plug, housing screw (2)

Note: 1. Not available as spares in EMEA Service markets.

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.

Model-dependent Part Numbers

Table 6. Model-dependent Part Numbers

Item Number	Part Description	Model					
		SA04090A Nickel	SA04091A Onyx Blue	SA0499A Nickel	SA0500A Onyx Blue	92570XYESA 388 Nickel	Onyx Blue
1	Flip assembly	0164060E01	0164060E02	0164060E02	0164060E02	0164060E02	0164060E02
4	Main board[1]	CHLF4290AA	CHLF4290AA	CHLF4290AB	CHLF4290AB	CHLF4290AC	CHLF4290AC
8	Rear housing assembly	0164058E01	0164058E02	0164058E02	0164058E02	0164058E02	0164058E02
19	Battery, Lithium Ion, 800 mAh	SNN5715	SNN5709	SNN5714	SNN5708	SNN5714	SNN5709

Note: 1. Not available as spares in EMEA Service markets.

Accessories

Table 7. Accessories

Part Description	Part Number
Travel Charger, PRC Travel Charger, UK Travel Charger, US	SPN4654 SPN4659 SPN4604
Pouch	CHYN4292
Headset, earbud, with send/end key	SYN8419
TrueSync Kit	CHYN4291

Personal Communications Sector,
Sawgrass International Concourse
789 International Parkway, Room S2C
Sunrise, Florida 33323

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