![Motorola logo]

Level 1 and 2 Service Manual

Product Family 38C
Personal Communicator

Model V100
GSM Technology

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Introduction

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

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

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 38C Personal Communicators are listed on the front cover. Product names are subject to change without notice. Some product names, as well as some frequency bands, are available only in certain markets.

Product Changes

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

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

Regulatory Agency Compliance

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

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

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

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

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About This Service Manual

Using this service manual and the many suggestions contained in it assures proper installation, operation, and maintenance of Product Family 38C Personal Communicators. Refer any questions about this manual to the nearest Customer Service Manager.

Audience

This document provides assistance to service personnel in testing and repairing Product Family 38C communicators. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

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

Scope

The scope of this document is to provide the reader with basic information relating to Product Family 38C Personal Communicators, 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.

Finding Information

A product family is identified by the first three digits of the serial number, unless covered by an extended warranty. Extended warranty products have two alphabetic characters in place of the first two digits of the family code. The first digit following the alphabetic code indicates the number of years the warranty period is in effect.

This Service Manual consists of the following sections:

- Overview - Describes the features, specifications, and options.
- Operation - Provides a theory of operation, describes message handling, and how to program the communicator, and a functional overview.
- Disassembly - Procedures for removing and replacing assemblies and a troubleshooting chart.
- Part Numbers - Provides diagrams and associated parts lists.

Conventions

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

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

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

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

Enter 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 board layouts.

Warranty Service Policy

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

Out of Box Failure Policy

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

Product Support

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

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.

Specifications

General Function	Specification
Frequency Range GSM	880-915 MHz Tx (with EGSM) 925-960 MHZ Rx
Frequency Range PCS	1850.2-1909.8 MHz Tx 1930.2-1989.8 MHz Rx
Frequency Range DCS	1710-1785 MHz Tx 1805-1880 MHz Rx
Channel Spacing	200 kHz
Channels	174 GSM; 299 PCS; 374 DCS
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz GSM, 80 MHz PCS, 95 MHz DCS
Frequency Stability	± 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	Full Rate PSU = 4.4V ± 5% (During Charging = VBatt ±5% 6.63V Mid Rate Charger = 5.9V ±0.3V CLA Supply = 4.4V Battery Operating Voltage = 2.85V (Radio Shut Down voltage) To 4.2 V Max
Transmit Current	Typically 250 ma avg, 1.7A peak
Stand-by Current	Typically 7.0 ma (DRX2)
Dimensions	93.75 mm x 71.5 mm x 28 mm (3.7 inches X 2.8 inches X 1.1 inches)
Size (Volume)	189 cm^3 (11.4 cubic inches)
Weight	120 grams (4.25 ounces)
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life	Talk Time 120 to 210 minutes Standby 75 to 125 hours

Transmitter Function	Specification
Maximum RF Power Output	33 dBm ±2 db GSM, 30 dBm ±2 db PCS and DCS
Output Impedance	50 ohms (nominal)
Spurious Emissions (Allocated Channel)	-36 dBm from 0.1 to 1 GHz -30 dBm from 1 to 12.75 GHz

Receiver Function	Specification
Reference Sensitivity (static)	-102 dBm
RX bit error rate (100 k bits) Type II	< 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

Speech Encoding Function	Specification
Speech Encoding Type	Regular Pulse Excitation/Linear Predictive Coding with Long Term Prediction (RPE LPC with LTP)
Bit Rate (Full Rate)	13.0 kbps
Multiframe Duration	120 ms
Block Length	260 bits
Classes	Class 1a bits = 50; Class 1b bits = 132; Class II bits = 78
Gross Data Rate (Full Rate Channel)	22.8 kbps

Product Overview

The Motorola PF38C Personal Communicator uses Dual-Band technology that allows roaming using the GSM 900/1800 bands.

Dual-Band technology is implemented using bandaware technology for GSM 900/1800. And, should GSM 1900 be required, Knifeswitch technology is used. There are two access choices for the user (1) through the menu structure - Network Selection, or (2) through the Quick Access key.

Features

The Product Family 38C Personal Communicator uses the most advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for GSM communication. Aside from the space and weight advantage, microcircuits enhance basic reliability, simplify maintenance, and provide a wide variety of operational functions.

The following features are available in PF38C Personal Communicators.

- Lower voltage technology that provides increased standby and talk times
- Extended GSM Channels
- Tri-Codec that allows Full Rate, Half Rate, and Enhanced Full Rate modes of transmission
- SIM Toolkit
- 3-Pin RS232 connection
- 126 x 64 row full graphics LCD
- External Headset
- Speaker Dependent Voice Recognition
- VibraCall™
- Voicenotes™
- HATIS - Hearing aid Telephone Interconnection device
- Language supports for prompts, Short Message Service (SMS), and the Phonebook
- WAP 1.1 compliant
- Simplified Alpha Text Entry
- Calling Name Presentation
- Display Animation
- Call Divert Interrogation
- Concatenated SMS

Speaker Dependant Voice Recognition

This feature allows voice tags to be allocated to up to 25 names within the communicator's memory and up to 15 voice tags be allocated to the quick access functions. The communicator must be "trained" for this function (i.e. the voice tags must first be read into the communicator's memory twice before being recognized).

Voice tags can be added to the communicator's memory using the usual name addition methods (i.e. via the phonebook menu structure, or using the quick access keys).

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

▶ *Since GSM does not allow the option to store voice tags onto the SIM card, voice tags are added to the communicator's memory.*

To place a call to a number allocated with a voice tag, the user must first press the smart button, whereupon the communicator will ask for a name. If the communicator recognizes the name, the name will be repeated and displayed on the screen. The user can then place a call.

To gain access to one of the quick access functions, the user must first press the quick access key. The communicator asks for a name. If the name is recognized (for example, Battery Meter), the name will be repeated, and the corresponding feature will display on the screen.

Closed User Group (CUG)

This is a network application that allows a select group of users to use a particular group of mobile units (For example, a manager of a field service team wants the team to be able to call only other users within his team (or CUG)).

Phase 2 Unstructured Supplementary Services Data (USSD)

This is an application whereby pressing a certain key or key combination while the communicator is in idle mode (i.e., not in a call) allows the user to access certain network functions, such as help lines.

Wireless Access Protocol (WAP) 1.1 Compliancy

In the WAP environment, access is achieved as described below.

1. The request for information is made in Wireless Markup Language (WML), which is derived from Hypertext Markup Language (HTML).
2. The request is then passed to a WAP Gateway, which retrieves the information from the server in standard HTML (which is then filtered to WML) or directly in WML if it is available.
3. The information is then passed to the mobile subscriber via the mobile network.
4. Listed below are the 5 parameters that can be edited by the user:
   - Baud
   - Idle time out
   - Line type

- Phone number
- Connection type

▶ *If the data being downloaded is an image, the bitmap image will download as text and, if the image is larger than the screen, only part of the image will display.*

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

Simplified Alpha Text Entry

This feature provides the user with a full QWERTY keyboard to enter Latin characters on a 126 x 64 display. At present, only Latin-based characters can be entered using the keyboard.

Caller ID

Currently, the name in the phonebook is displayed by comparing the last 8 digits of the calling party's phone number. This feature has been enhanced to display the calling party's name as sent by the network. The calling party's name can be up to eighty (80) characters in length (shortened to 12 characters if the name is stored in the phonebook).

If the user has this feature turned on, upon receipt of a call, the calling party's phone number is compared to the phonebook. If the number matches a phonebook entry that does not have a name allocated to it, then the calling party's name will be stored. However, if there is a name allocated to the phonebook entry, it will not be overwritten.

▶ *User must subscribe to caller ID service through their service provider.*

Display Animation

These animations display to inform the user that commands such as power up/down, incoming call, placing a call, incoming SMS, and sending a SMS are being executed.

Call Divert Interrogation

This function provides a more accurate method of ensuring that the calling party is diverted to the correct number. It is mainly achieved through the cooperation of network providers.

Concatenated SMS

This feature increases the amount of characters that can be sent and received by the communicator. It supports 5 x 153 character messages, and the SIM will be able to hold between 30 and 75 slots depending on the type of SIM card and memory already allocated. Each of these slots holds up to 160 characters.

Controls and Indicators

The communicator controls are located on the side of the device and on the keyboard. The keyboard is a fully functional QWERTY keyboard (see Figure 1). Indicators, in the form of icons, are displayed on the LCD (see Table 2). The following paragraphs describe the controls and indicators.
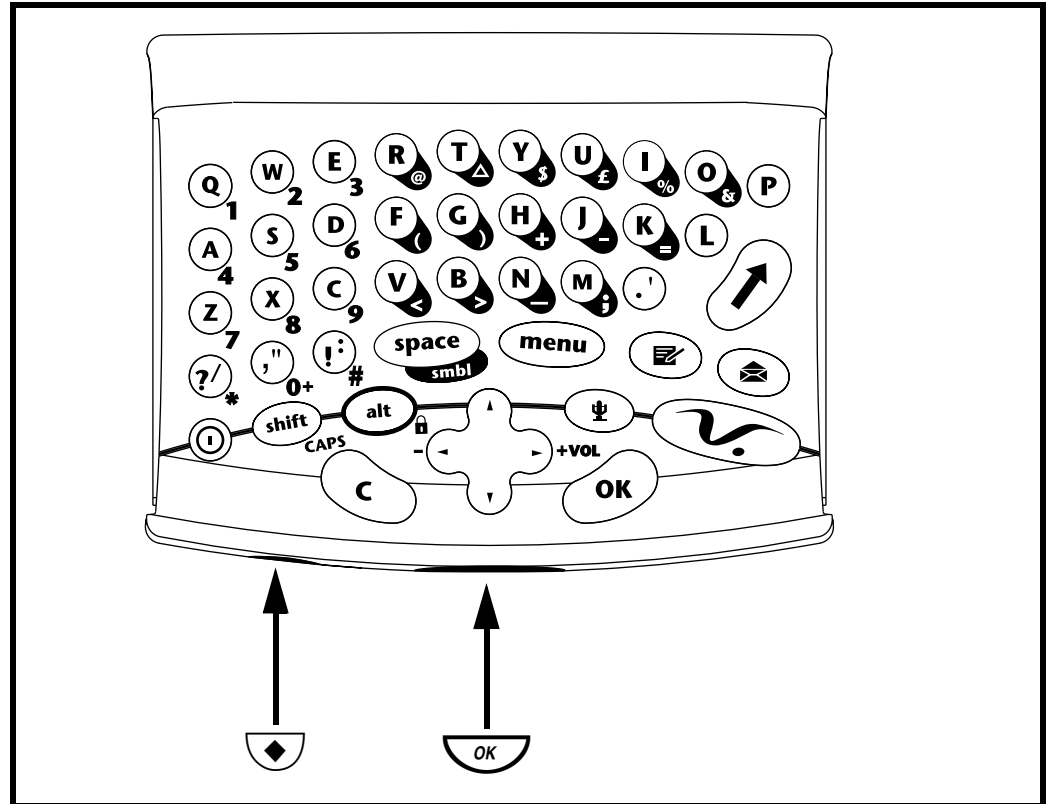
000643-O

Figure 1. Communicator Controls

Table 1. Control Buttons

Button	Description
⊚	Press and hold to turn on or off.
⬭ OK	Press to accept and end a call, setting, or option.
C	Used to reject or cancel a call, setting, option, and to return to the previous screen. When in text mode, press to delete the previous character.
⬭	Press to enter the quick access menu.
menu	Press to access the main menu.

Table 1. Control Buttons (Continued)

Button	Description
✚	Use to scroll through menus and text, and increase and decrease volume.
✉	Press to read a message.
✍	Press to write a message.
alt (0 - 9)	Press for ALT and 0 - 9 numbers.
alt space	Press for symbols and additional characters.
◆	Smart button. When the communicator is closed, use to answer, make, and end calls, access your phone book, and recall a number using voice tags.
shift	Press once to capitalize a letter. Press twice for continuous capitalization, press twice to stop capitalization.
OK	When the communicator is closed, or in the holster, press to answer and end a call.
⚇	Press to start and stop recording voice notes.

Liquid Crystal Display (LCD)

The LCD provides a high contrast full graphics display for easy readability. The LCD also features a high visibility backlight for reading the display in low-light conditions. The LCD is capable of displaying up to 64 lines of 126 characters per line. Indicators displayed on the LCD are shown in Table 2.

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

Table 2. Indicators

Icon	Description
⨊ııll	Signal strength. The more segments, the stronger the signal strength.
☎	A call is in progress or hanging up.
▲	Displayed when on a system other than the home system.
⌂	Home zone. Availability depends on the service provider.
✉	Displayed when a short message service (SMS) message is received. Flashes when you have an unread SMS message, or the message storage area is full.
✉·)	Displayed when you have voicemail. Availability depends on the service provider.

Table 2. Indicators (Continued)

Icon	Description
🔔	Call ringer is On.
🔋	Battery charge Indicator. The more segments, the stronger the charge.
📖... 📩	Displayed when the quick access menu is open.
✓	Menu item is currently selected.
12:00	Real time clock. Displays the time in either AM/PM or 24 hours.

User Interface Flowcharts

Figures 2 through 9 provide menu navigation assistance.

COLOR KEY

1st-Level Menu
2nd-Level Menu
3rd-Level Menu
4th-Level menu
5th-Level Menu
6th-Level Menu
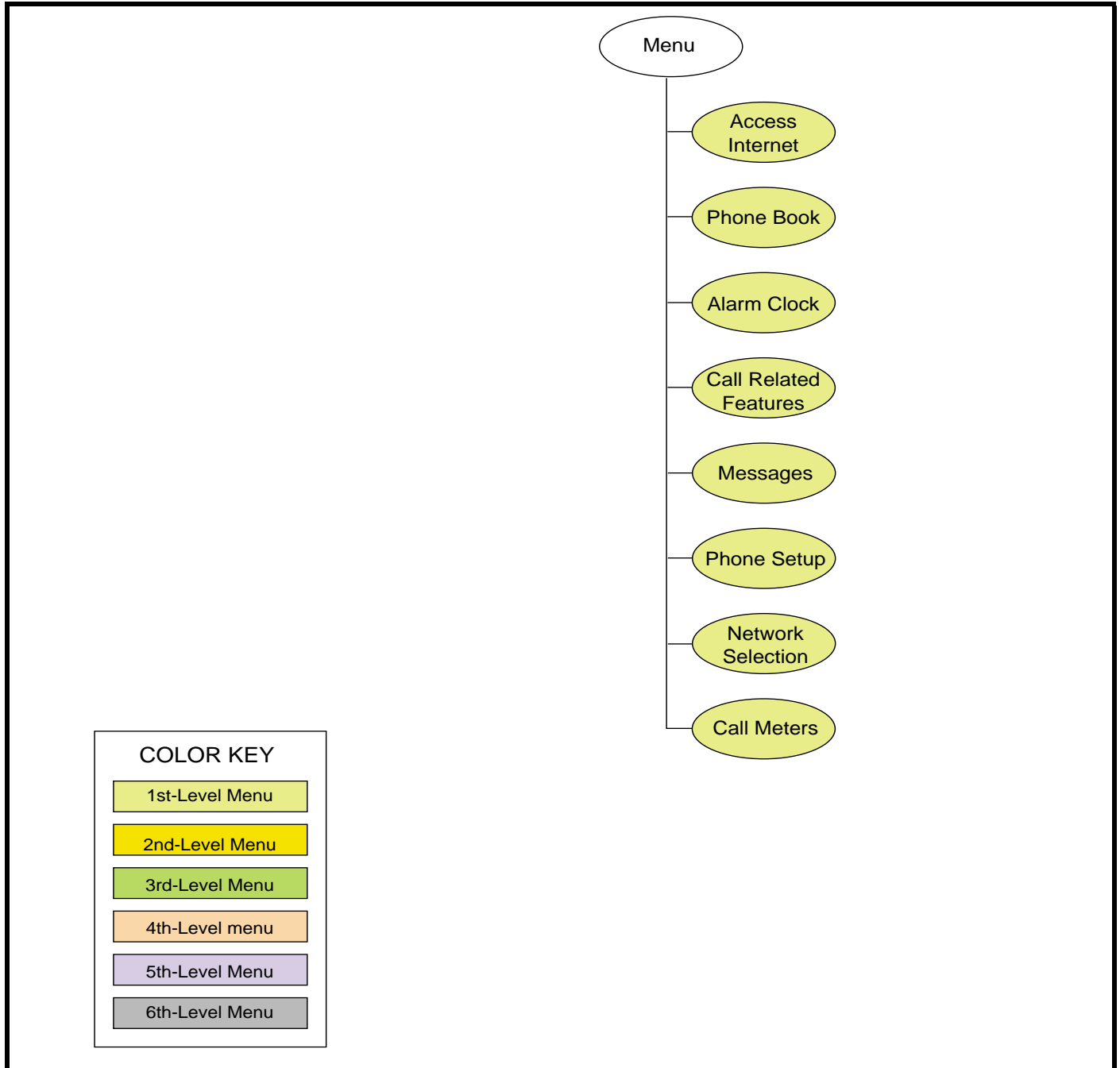
000677-O

Figure 2. Main Menu

PHONE BOOK

Voice Dialing

Personal Numbers

Find Entry by Name — **Enter Name** — 1. Switch View
2. Call Number
3. Modify Name or Details
4. Erase Name or Number
5. Add/Edit Voice Tag
6. Delete Voice Tag

Find Entry by Location — **Enter Location**

Add Entry — **Add to Phone Memory** — **Add Voice Tag**

Add to SIM Card Memory

Check Capacity — **Check Phone Capacity**

Check SIM Capacity

Show Services

Prevent Access —
1. To Sim Card Memory
2. To Phone Memory
3. To Phone and SIM Memory
4. No Memory Restrictions

Last 10 Calls

Missed Calls —
1. Call Number
2. Time and Date
3. Add to Phone Memory
4. Add to SIM Memory

Answered Calls

My phone number(s)

Made Calls

Erase All Numbers

Fixed Dialing

View Fixed Dial List

Setup Fixed Dialing — **Enter Pin 2** —
1. On
2. Off
3. Edit Entry
4. Add Entry
5. Erase Entry

One-Touch Dial Setting

1. To Phone Memory
2. To SIM Memory
3. To Fixed Dial List

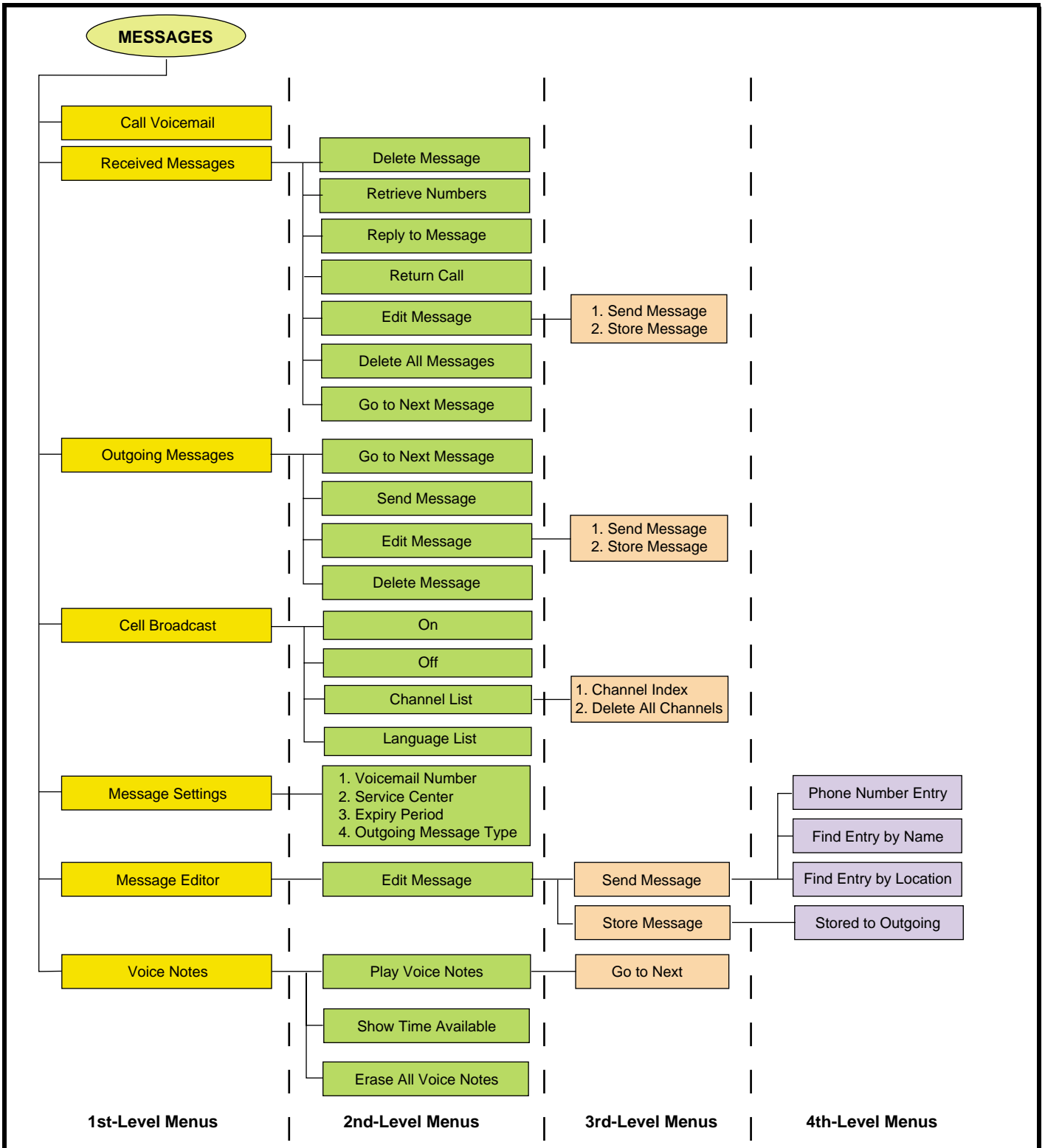| 1st-Level Menus	2nd-Level Menus	3rd-Level Menus	4th-Level Menus

000678-O

Figure 3. Phone Book Menu
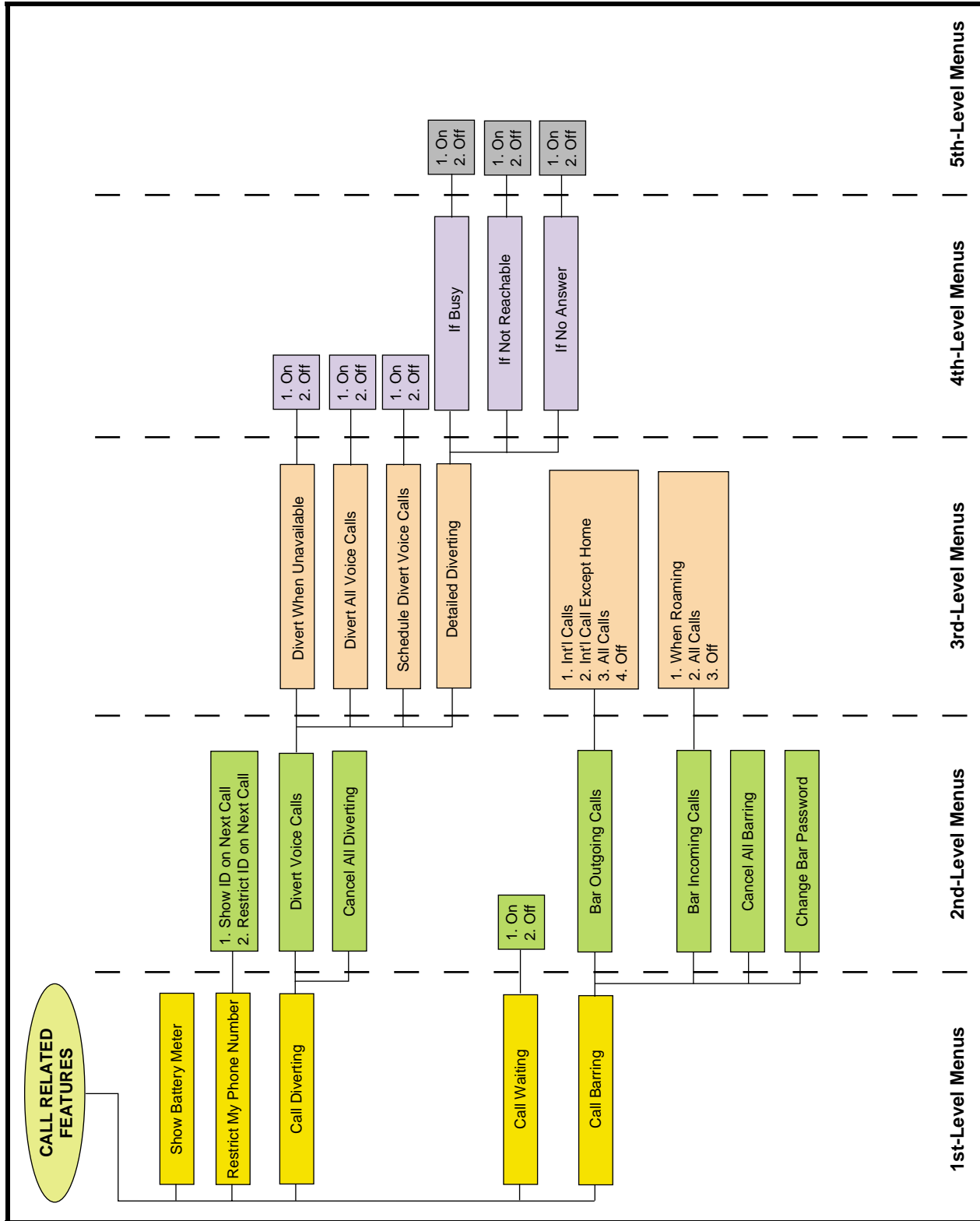
Figure 4. Call Related Features Menu

Figure 5. Messages Menu
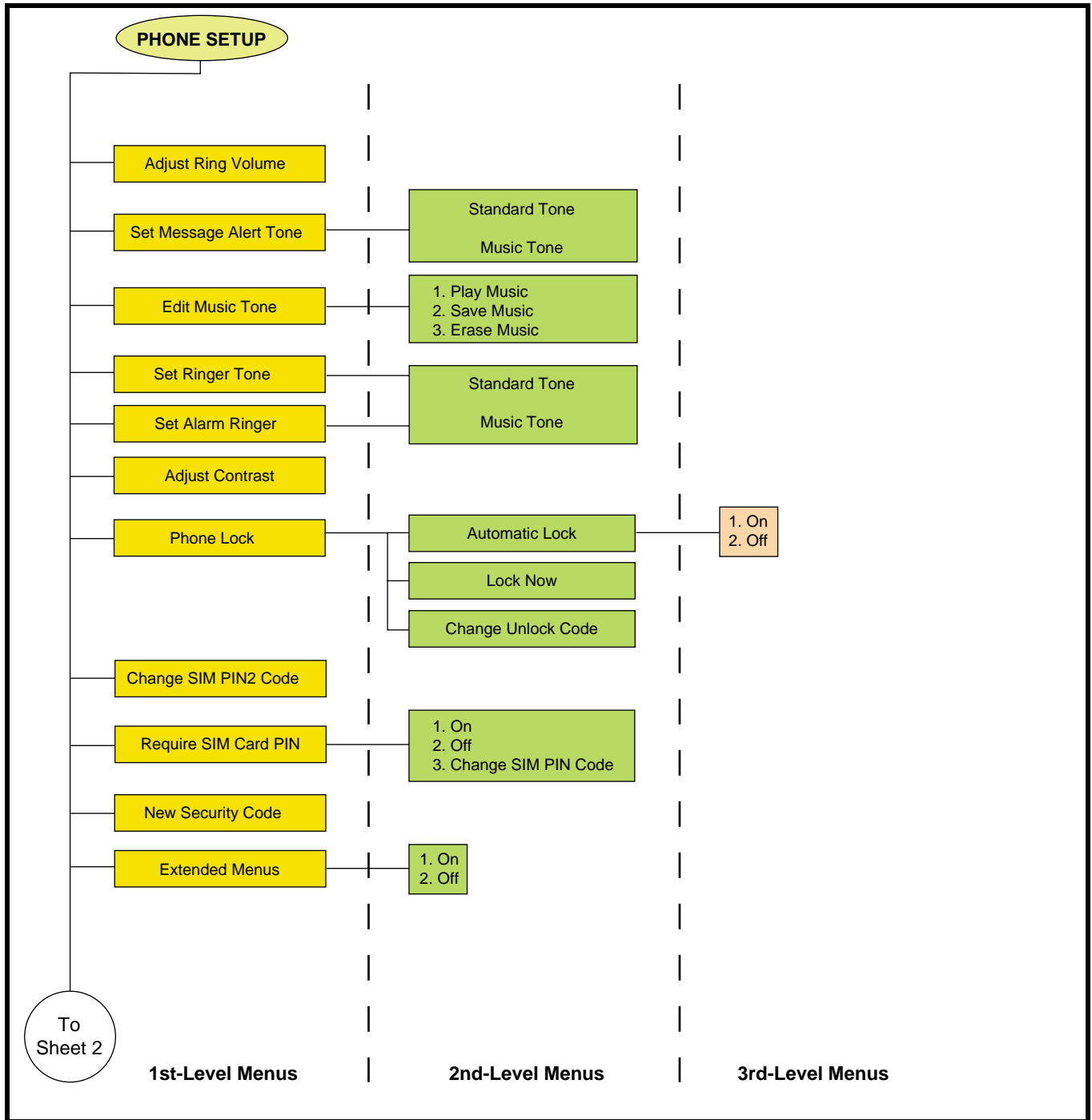
Figure 6. Phone Setup Menu (Sheet 1 of 2)
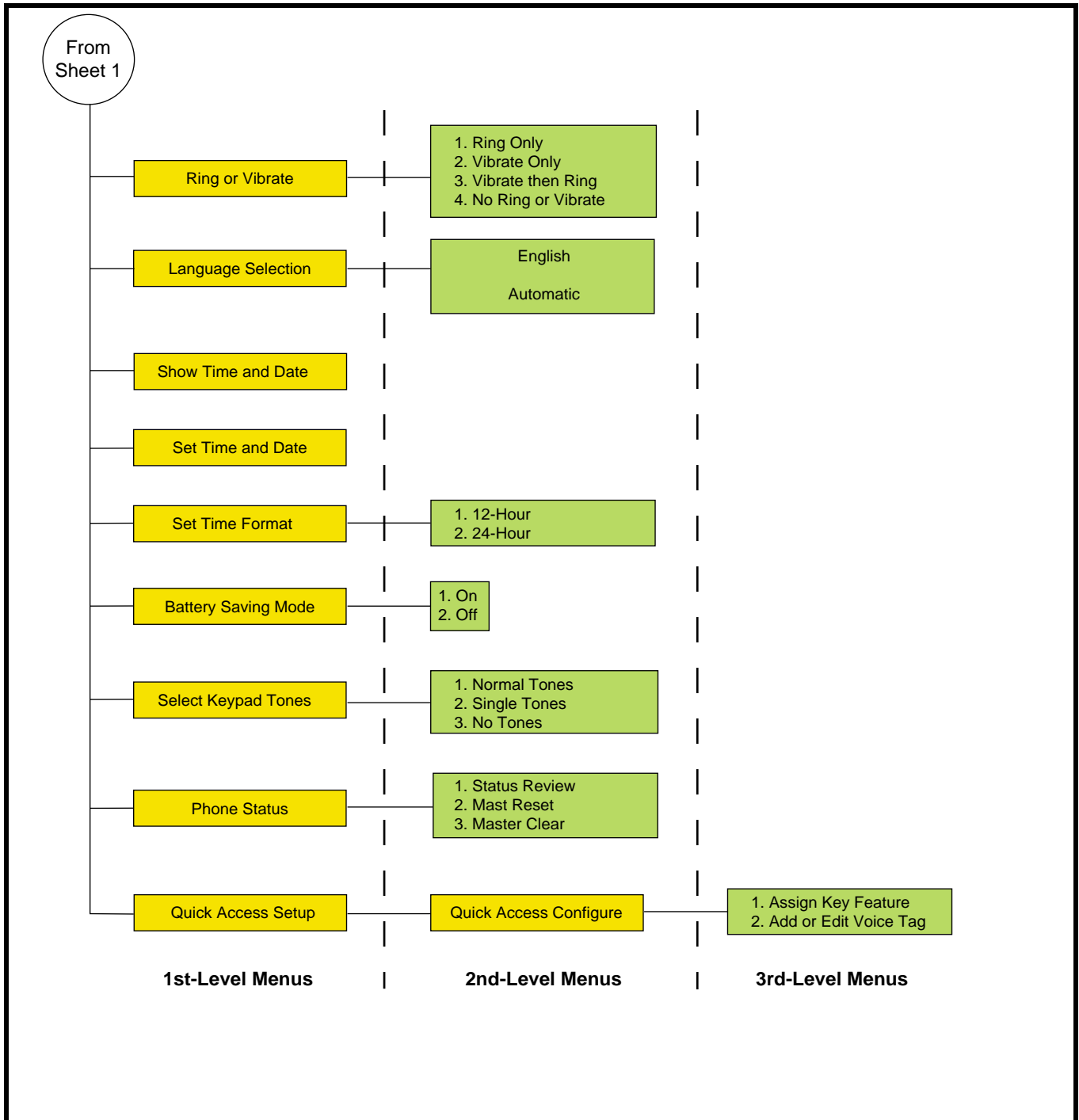
Figure 7. Phone Setup Menu (Sheet 2 of 2)
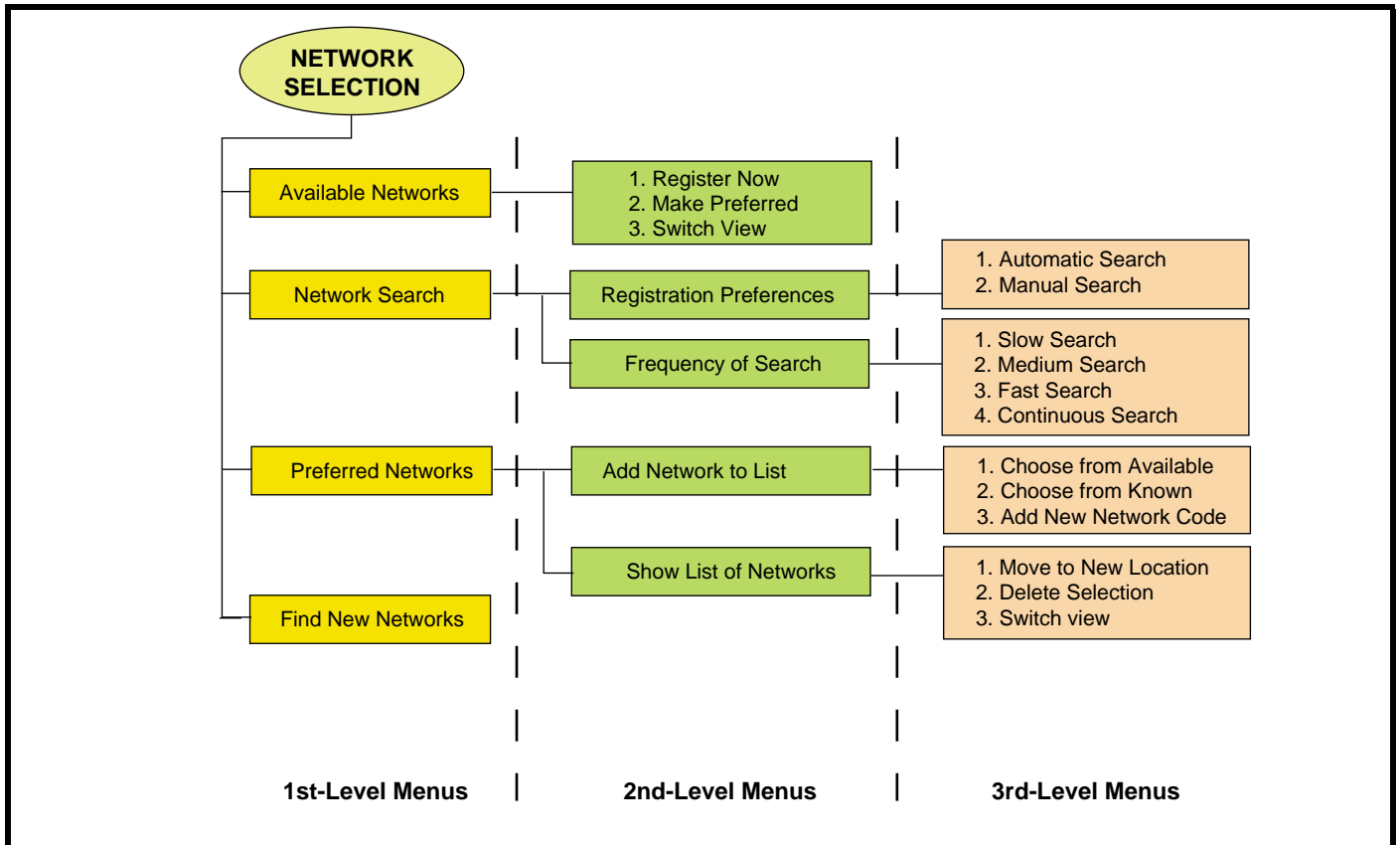
Figure 8. Network Selection Menu
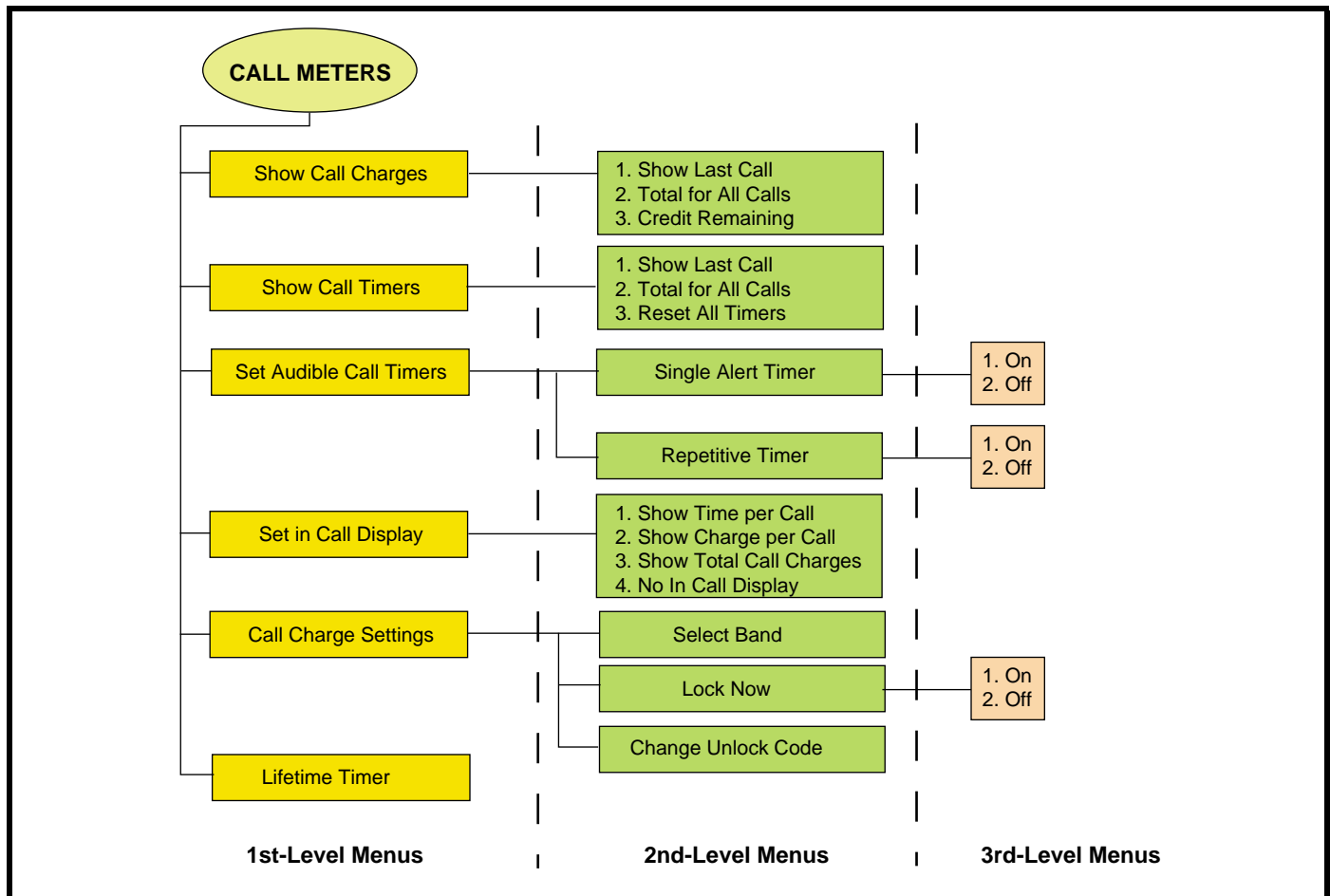
Figure 9. Call Meters Menu

Alert Modes

The PF38C Personal Communicator provides the following alert feature options:

- Volume adjust
- Alert selection
- Vibrator alert
- Silent alert

▶ *Pressing a key will automatically end the alert.*

Volume Adjust

Audible alerts can be set to loud or soft to announce received messages or incoming calls.

Alert Selection

A variety of standard, pleasing, and chirp alerts can be selected.

Vibrator Alert

When the vibrate option is set, audible alerts are disabled, and the communicator vibrates to announce incoming calls and messages.

Silent Alert

When the silent option is set, audible and vibrator alerts are disabled, and the LED flashes when the communicator receives a message or phone call.

Battery Function

Issues concerning battery function include:
- Battery gauge
- Battery removal

Battery Gauge

The PF38C Personal Communicator displays a battery gauge icon in the home screen to indicate the battery charge level. The gauge shows four levels: 100%, 66%, 33%, and Low Battery. If the battery charge level is low, the battery gauge is displayed on the status bar of all screens. When the low battery state is entered, the communicator sounds an alert and displays a pop-up message telling the user to replace or recharge the battery.

▶ *When the PF38C Personal Communicator is connected to the charging device, a plug icon is displayed instead of the battery gauge icon.*

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 communicator 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 V100 Personal Communicator User's Guide listed in the "Related Publications" section toward the end of this manual.

Tools and Test Equipment

The following tables list the tools and test equipment used on the Product Family 38C Personal Communicator. Use either the listed items or equivalents.

Table 3. Specific Test Equipment

Motorola Model Number	Equipment Type	Application
SPN4604A	Rapid Charger[1]	Used to charge battery and to power device

1. To order, contact Motorola Aftermarket and Accessories Division at (847)538-8000.

Table 4. General Test Equipment

Motorola Model Number	Equipment Type	Application
6662894B35	Radial UMP Connector Extraction Tool [1]	Used to disconnect the coaxial cable from the transceiver circuit board
RSX4043-A	Torque Driver[1]	Used to remove and replace screws
	Torque Driver Bit T-6 Plus, Apex 440-6IP Torx Plus or equivalent[1]	Used with torque driver
6680388B67	Disassembly tool, plastic with flat and pointed ends[1]	Used during assembly/disassembly of device
6680388B01	Delrin Tweezers[1]	Used during assembly/disassembly
HP34401A	Digital Multimeter[2]	Used to measure battery voltage

1. To order, contact Motorola Aftermarket and Accessories Division at (847)538-8000.
2. Not available from Motorola. To order, contact Hewlett Packard at 1-800-452-4844.

Disassembly

The procedures in this section provide instructions for the disassembly of a Product Family 38C Personal Communicator. Special tools used for the communicator are listed under Tools and Test Equipment in the preceding section.

Removing the Battery Door and Battery

1. Ensure the communicator is turned off.
2. With the communicator flip side down, slide the battery door locking latch in the direction of the arrow (see Figure 10).

LOCKING LATCH

BATTERY DOOR

UNLOCK
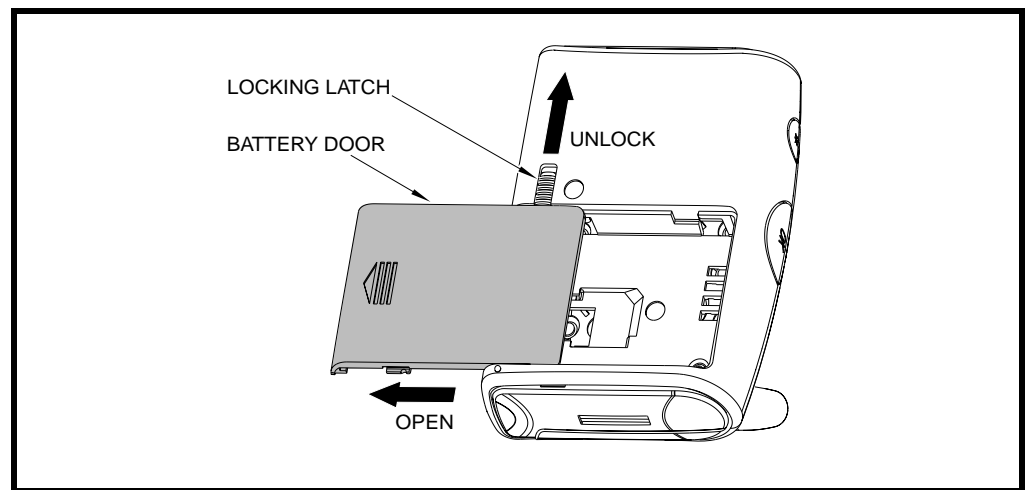
OPEN

000624-O

Figure 10. Opening the Battery Door

3. While pressing on the battery door, slide the door in the direction of the arrow.
4. Lift the end of the door and remove it completely.
5. Remove the battery by gently pushing the battery in the direction of the arrows on the battery and lifting it from the battery compartment.

Replacing the Battery and Battery Door

1. Align the new battery so that the + and - markings on the battery match the polarity indicators in the battery compartment.

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.

2. Insert the new battery with the contacts facing down.
3. Align the battery door with the notches in the battery compartment and slide the door towards the front of the communicator.
4. Slide the battery door locking latch towards the battery door.

Removing the Back Housing

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

1. Remove the battery door and battery as described in the procedures.
2. Using a torque driver with a T-6 bit, remove the 2 screws in the battery compartment (see Figure 11).
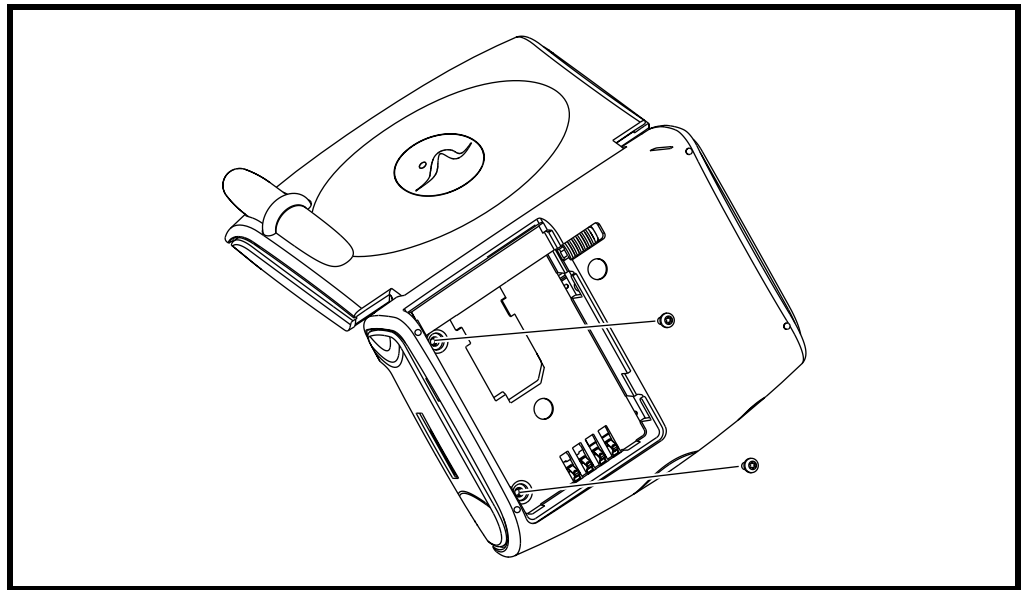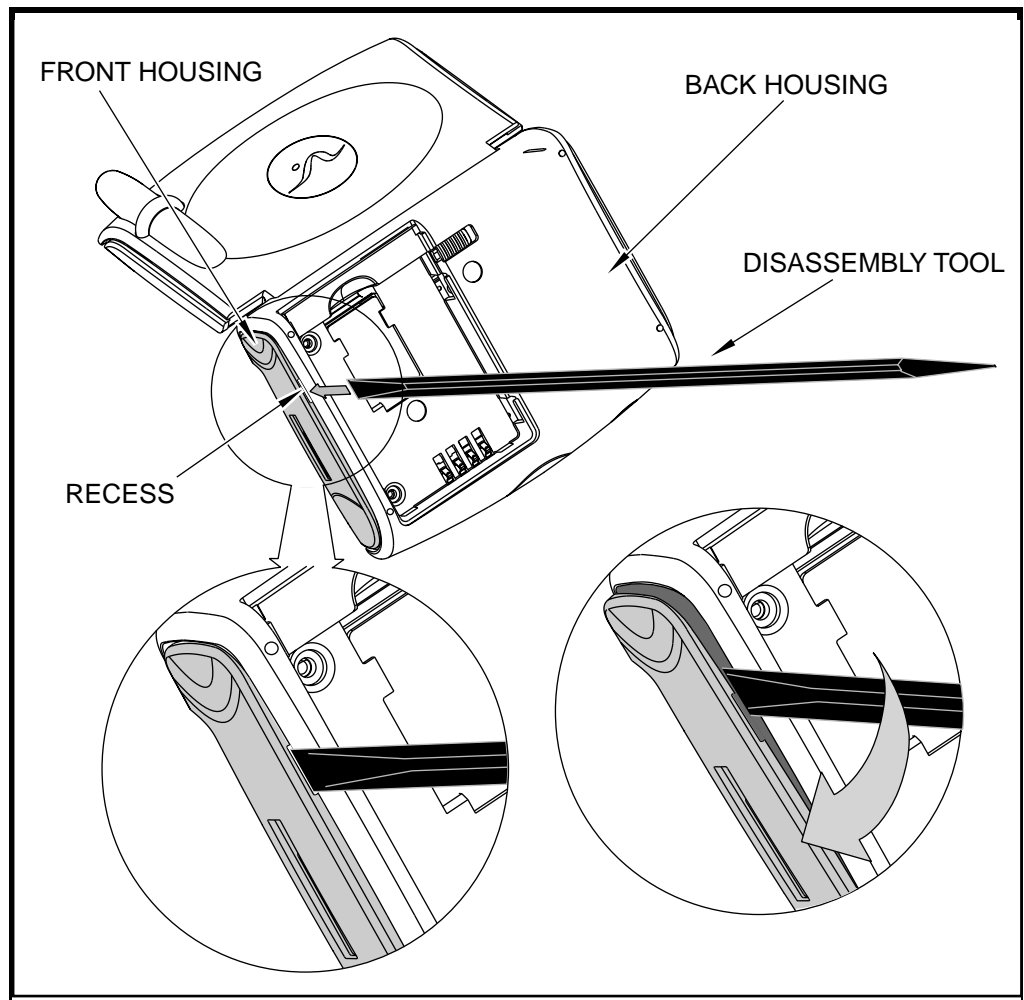

000686-O

Figure 11. Removing the Back Housing Screws

3. Carefully insert the flat end of the disassembly tool into the recess on the side of the front housing near the battery opening as shown in Figure 12.

000676-A

Figure 12. Separating the Back Housing from the Front Housing

4. Using the disassembly tool, carefully pry the side of the front housing away from the back housing to disengage internal catches.

▶ *It may be necessary to repeat the procedure on the other side of the front housing to disengage catches.*

5. After the sides of the front housing have been freed, pull the back housing away from the front housing to remove it (see Figure 13).
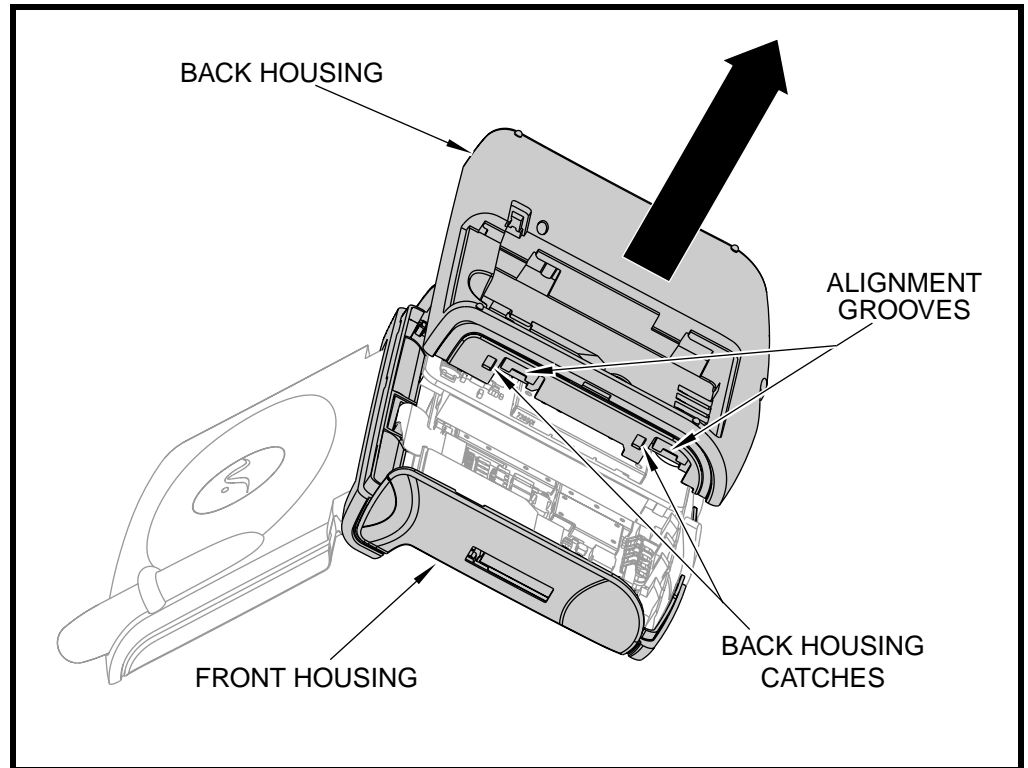

000675-A

Figure 13. Removing the Back Housing

Replacing the Back Housing

1. Align the back housing with the front housing, then press the front and back housings together to connect.
2. Using a torque driver with a T-6 bit, replace the 2 screws in the battery compartment (see Figure 11). Tighten to 1.9 inch-pounds.
3. Replace the battery and battery door as described in the procedures.

Removing and Replacing the External Keys

1. Remove the battery door, battery, and back housing as described in the procedures.

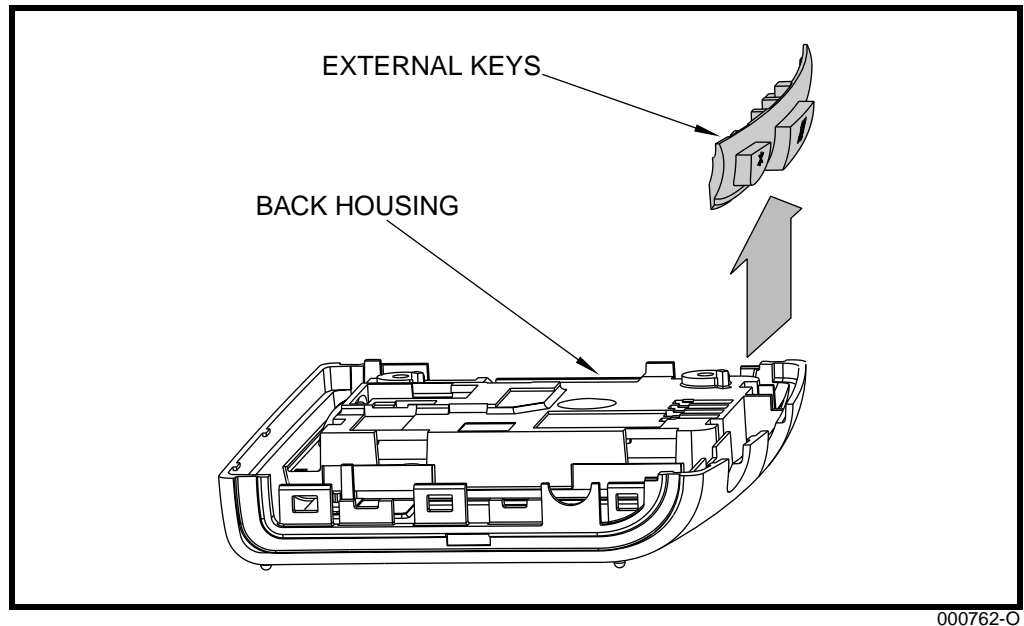2. Referring to Figure 14, lift the external keys from the back housing.

EXTERNAL KEYS

BACK HOUSING

000762-O

Figure 14. Removing and Replacing the External Keys

3. To replace, insert the new keys into the front housing.
4. Replace the back housing, battery, and battery door as described in the procedures.

Removing the Transceiver Board

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

When removing the transceiver board, take care not to damage the coaxial cable connected to the flip assembly.

1. Remove the battery door, battery, back housing, and external keys as described in the procedures.

2. Disconnect the transceiver board from the controller board by carefully separating the board interconnect connector (see Figure 15). Lift away the board-to-board snubber.
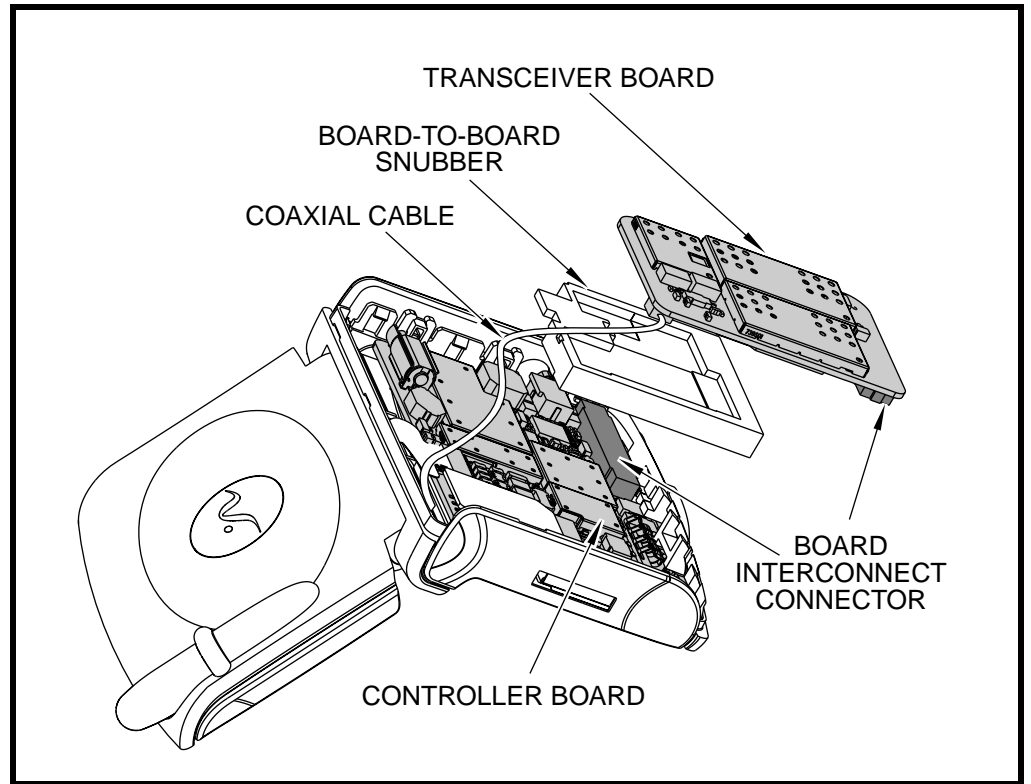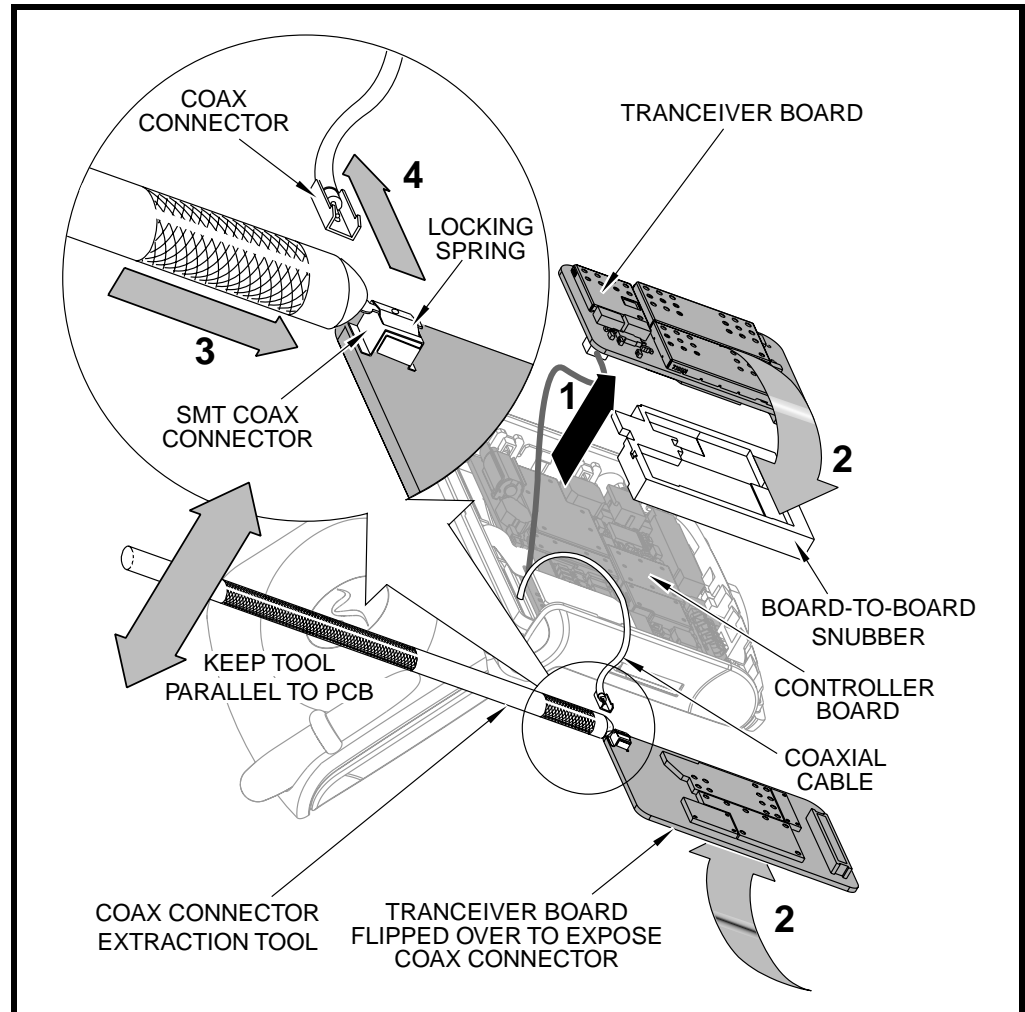

000685-O

Figure 15. Removing the Transceiver Board

3. Referring to Figure 16, disconnect the coaxial cable from the transceiver board using a radial UMP Connector Extraction Tool. While gently pulling the cable

straight away from the SMT coaxial connector, use the blade of the extraction tool to release the connector's locking spring.

000993-O

Figure 16. Removing the Coaxial Cable from the Transceiver Board

To prevent damage to the SMT coax connector, keep the extraction tool parallel to the transceiver board.

Replacing the Transceiver Board

1. Plug the coaxial cable into the SMT coaxial connector on the transceiver board (see Figure 16).
2. Replace the board-to-board snubber, then install the transceiver board by mating the board interconnect connectors (see Figure 15). Be sure the connector is fully seated.
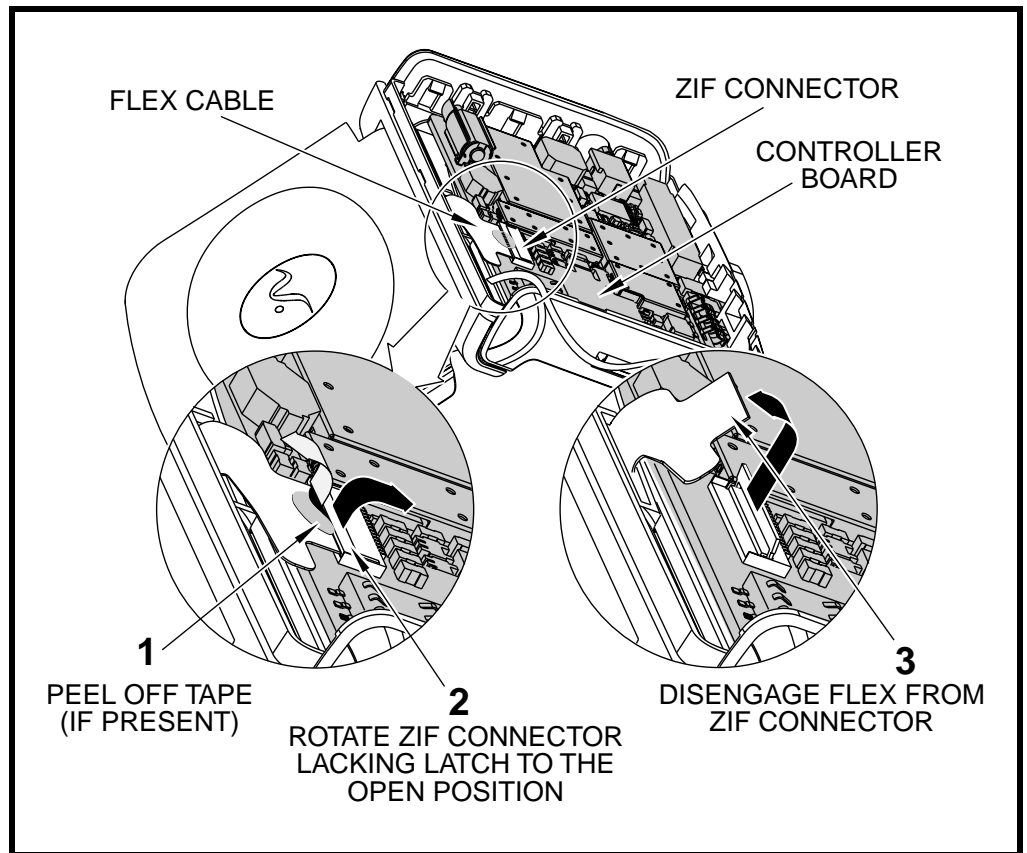
3. Replace the external keys, back cover, battery, and battery door as described in the procedures.

Removing the Controller Board

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

1. Remove the battery door, battery, back housing, and external keys as described in the procedures.
2. Remove the transceiver board as described in the procedures.
3. Referring to Figure 17, carefully remove the adhesive tape (if present) from the flex cable/ZIF connector, then lift the ZIF connector latch to unlock the flex. Disconnect the flex from the controller board.

000996-O

Figure 17. Disconnecting the Flex Cable from the Controller Board

4.   Carefully, lift the controller board from the front housing assembly (see Figure 18).
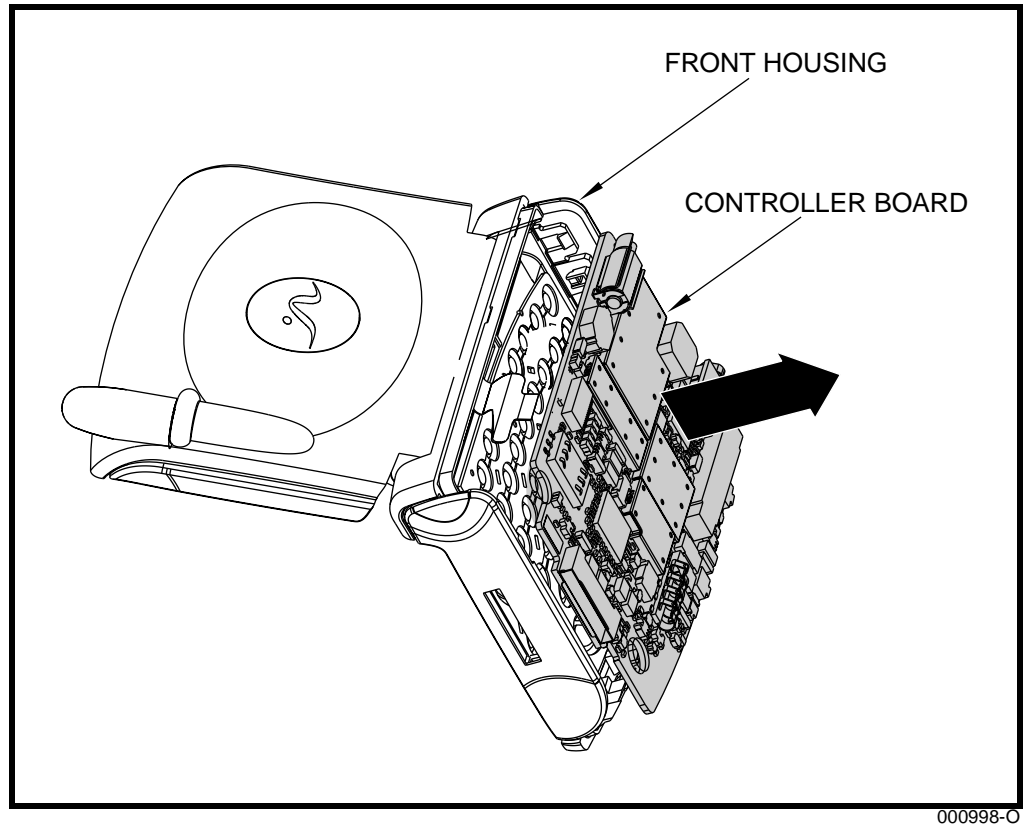
000998-O

Figure 18. Removing the Controller Board

Replacing the Controller Board

1.   Insert the controller board into the front housing with the flex connector on top.
2.   Insert the flex into the flex connector on the controller board and close the flex connector latch.
3.   Replace the board-to-board snubber, transceiver board, external keys, back housing, battery, and battery door as described in the procedures.

Removing and Replacing the Keypad and Keypad Reflector

1.   Remove the battery door, battery, back housing, external keys, transceiver board, and controller board as described in the procedures.
2.   Referring to Figure 19, lift the keypad from the front housing.
3.   Also referring to Figure 19, lift the keypad reflector from the front housing
4.   To replace, insert the new keypad reflector into the front housing.
5.   Insert the new keypad into the front housing.

6. Replace the controller board, board-to-board snubber, transceiver board, external keys, back housing, battery, and battery door as described in the procedures.
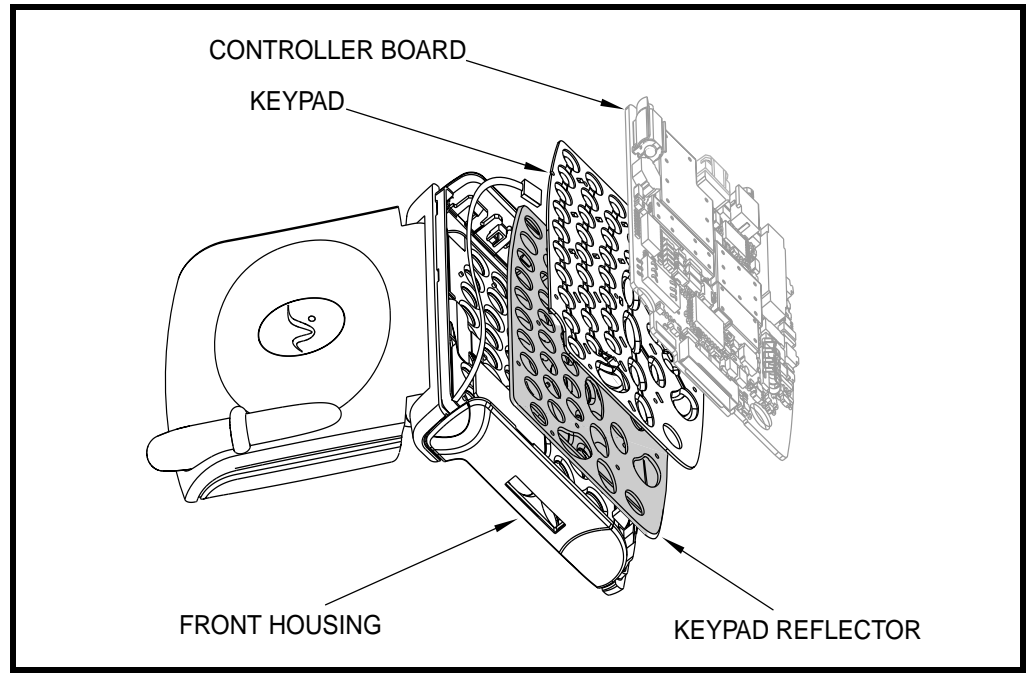
000674-O

Figure 19. Removing and Replacing the Keypad and Keypad Reflector

Removing and Replacing the Antenna

1. By hand, unscrew the antenna by rotating counterclockwise.
2. After threads are completely disengaged, pull antenna straight out of flip assembly as shown in Figure 20.
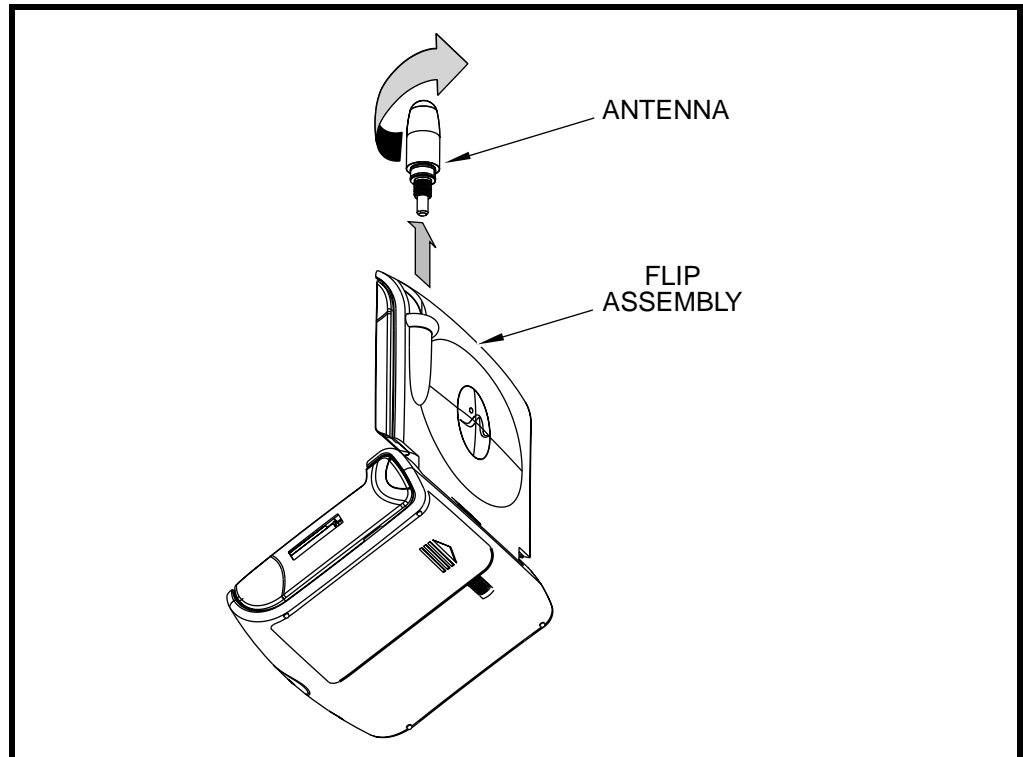
000763-O

Figure 20. Removing the Antenna

3. To replace antenna, insert threaded end into flip assembly and carefully rotate clockwise by hand until tight.

Ensure antenna threads are properly engaged before tightening to prevent damage to antenna or flip assembly.

Removing the Flip Assembly

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

1. Remove the battery door, battery, back housing, external keys, transceiver board, board-to-board snubber, controller board, keypad, and keypad reflector as described in the procedures.

> ⚠️ *Take care not to damage the coaxial cable when removing the flip assembly.*

2. Holding the flip assembly stationary, carefully twist the front housing to separate the flip assembly from the front housing (see Figure 21).
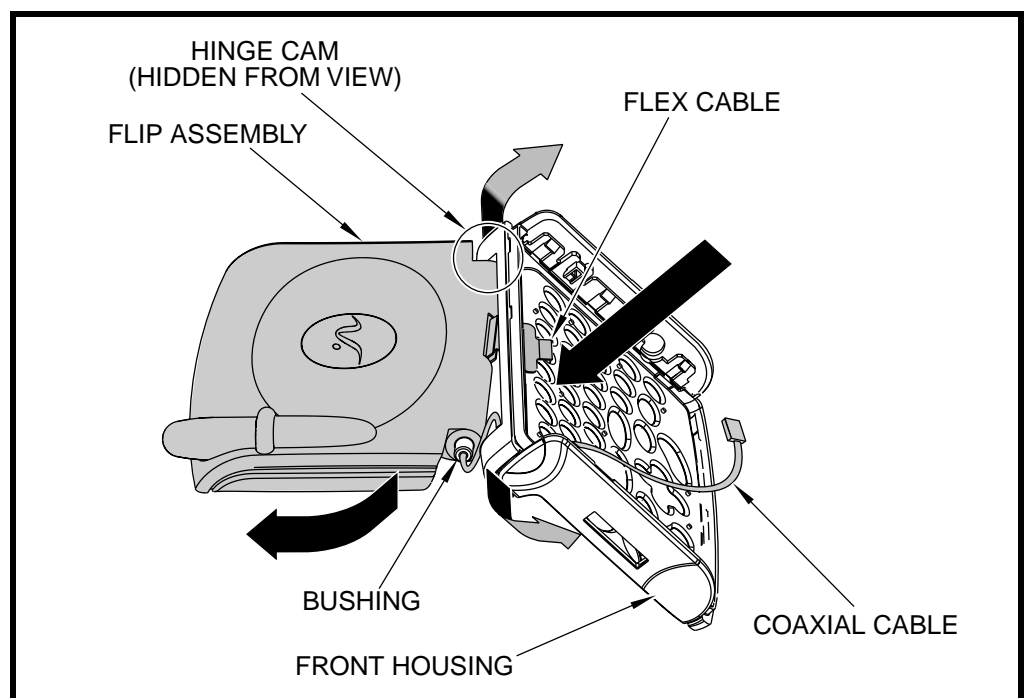
000673-A

Figure 21. Removing the Flip Assembly

3. Carefully guide the flex cable through the front housing opening.

> ⚠️ *The flex cable is easily damaged. Exercise care when handling.*

4. Carefully pull the coaxial cable through the hole in the front housing.

Replacing the Flip Assembly

1. Thread the coaxial cable and flex through the openings in the front housing.

Exercise care to prevent damage to the coaxial cable when replacing the flip assembly.

2. Insert the flip hinge cam into its corresponding socket in the front housing. Carefully twist the front housing while engaging the flip hinge bushing with its mating front housing hole.
3. Replace the keypad reflector, keypad, controller board, board-to-board snubber, transceiver board, external keys, back housing, battery, and battery door as described in the procedures.

Removing and Replacing the Lens

1. Rotate communicator's flip to its fully open position to expose the lens.

The lens is a flexible overlay attached to the inside of the flip housing with pressure-sensitive adhesive (PSA) applied to the back of the lens.

2. Carefully insert the flat end of the disassembly tool between the lower left corner of the lens and the mating surface inside the flip housing as shown in Figure 22A.

When using the disassembly tool to pry the lens from the flip housing, be sure the tool contacts the housing only in the safe area shown in Figure 22C. Prying against the LCD may result in damage.
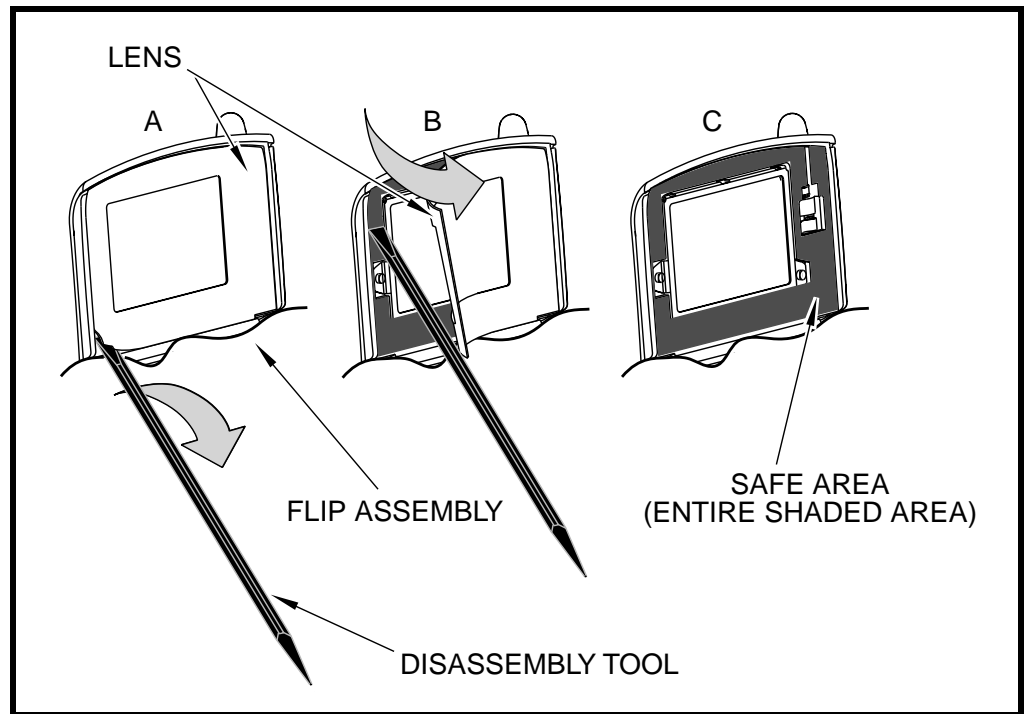
000764-O

Figure 22. Removing the Lens

3. Work the tool between the lens and the flip housing to release the adhesive and loosen the lens.

4. When a sufficient portion of the lens has been released from the housing, as shown in Figure 16B, grasp the lens between thumb and forefinger and carefully peel the lens away from the housing.

5. To reassemble, peel the protective paper backing from a new replacement lens to expose the pressure-sensitive adhesive. Refer to table 9 on page 56 to determine the correct part number for a matching-color lens.

⚠️ *Do not remove the transparent protective film from the front of the new lens. This film prevents damage to the lens during service and handling. It is to be removed only by the user.*

6. Carefully center the new lens over the flip housing, being sure to align the outside edge of the lens with the recess molded into the housing.

7. Press the new lens onto the inside of the flip housing and apply finger pressure evenly over the entire adhesive coated area.

Removing the LCD Assembly

1. Remove the battery door, battery, back housing, external keys, transceiver board, board-to-board snubber, controller board, keypad, keypad reflector, flip assembly, antenna, and lens as described in the procedures.

2. Using a torque driver with a T-6 bit, remove the two screws holding the LCD assembly and inside flip housing in place (see Figure 23).
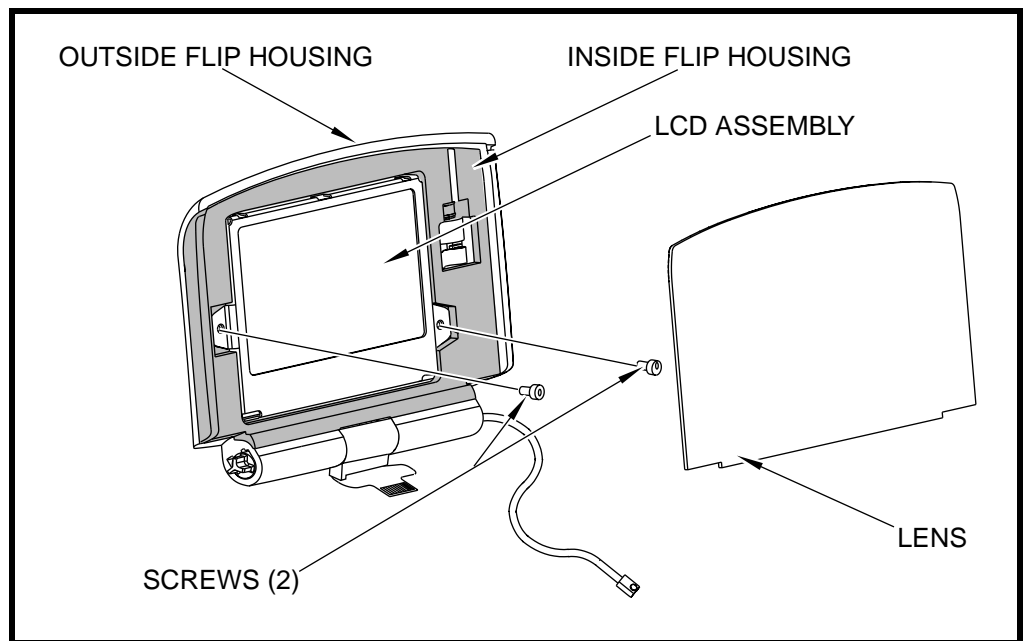
000768-O

Figure 23. Removing the Screws

3. Using the disassembly tool, carefully loosen the inside flip housing from the outside flip housing (see Figure 24).

FLIP ASSEMBLY

DISASSEMBLY TOOL

OUTSIDE FLIP HOUSING
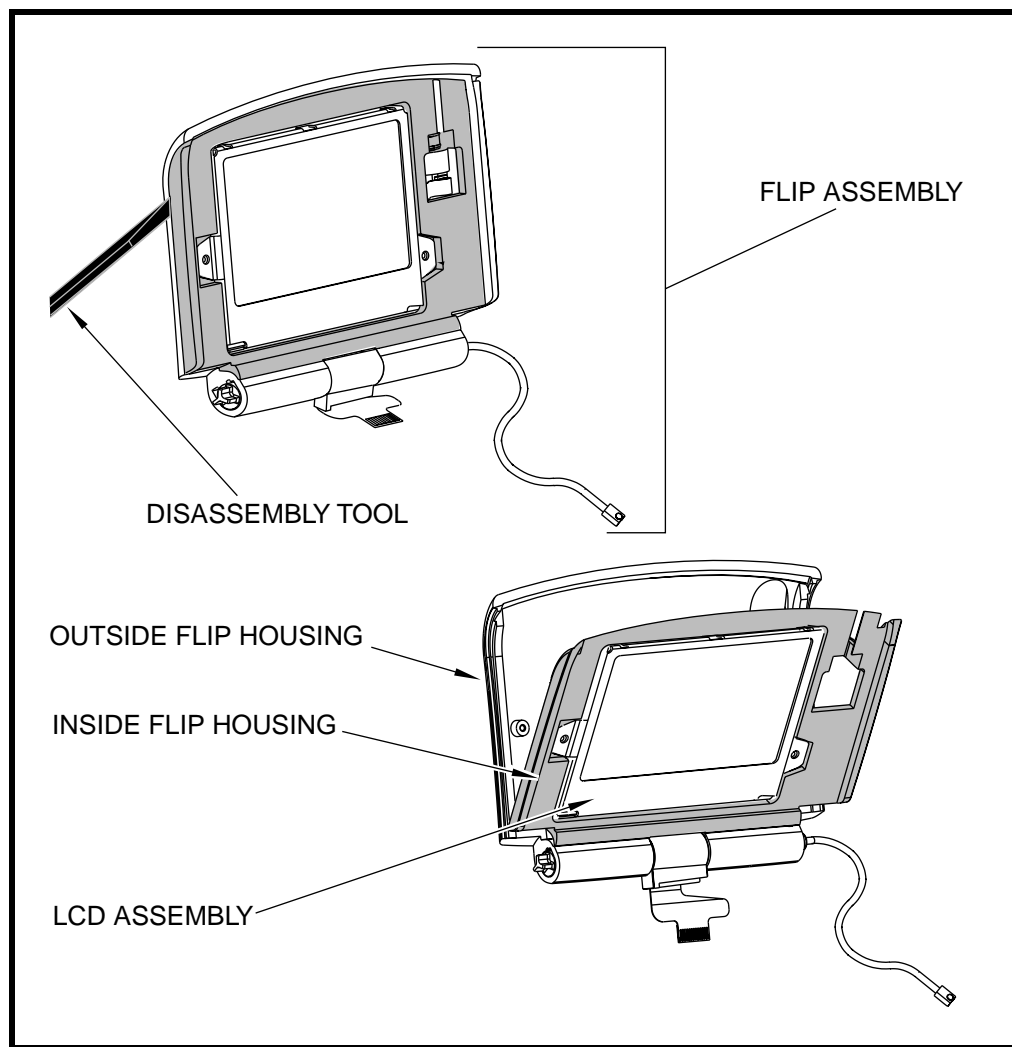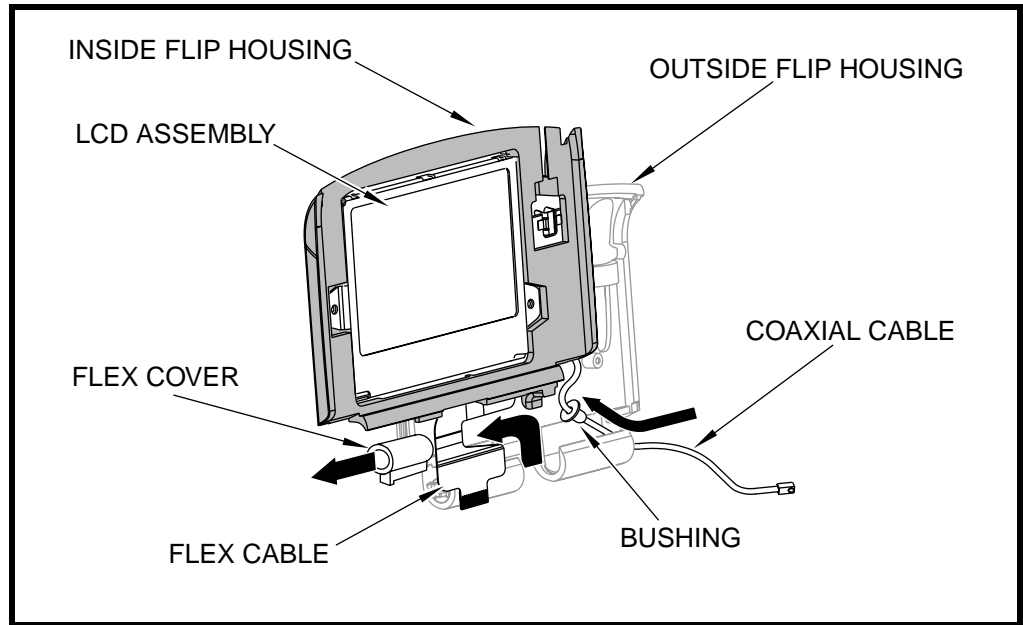
INSIDE FLIP HOUSING

LCD ASSEMBLY

001017-O

Figure 24. Separating Inside and Outside Flip Housings

! *CAUTION: When removing the LCD assembly, use care not to damage the coaxial cable, flex cable, or heat seal connector.*

4. Referring to Figure 25, remove the flex cover by gently pushing it toward the LCD assembly, then sliding off of the flex cable.

5.   Again referring to Figure 25, using the disassembly tool if necessary, press the bushing inward to remove from the hole in the outside flex housing and slide along coaxial cable until free from the outside flip housing.


001018-O

Figure 25. Routing Flex and Coaxial Cable

6.   Still referring to Figure 25, while guiding the flex and coaxial cable to prevent damage, separate the inside flip housing (with LCD assembly attached) from the outside housing

7.   Release the antenna/display board from the LCD by disengaging the two plastic locking tabs located on the light guide (see Figure 26).

8. Remove the LCD assembly from the inside flip housing by rotating the LCD 1/8 turn, then guiding the LCD through the opening in the housing.
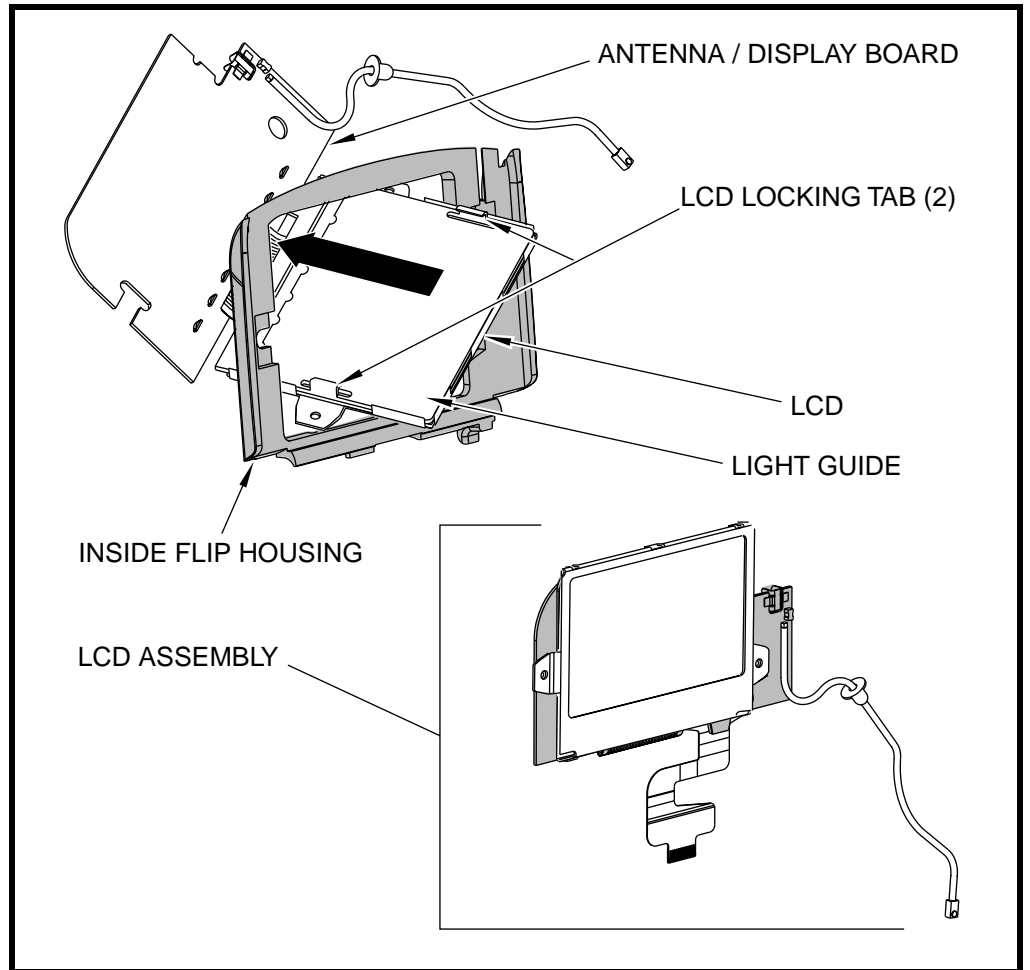
001019-O

Figure 26. Removing the LCD Assembly

Replacing the LCD Assembly

1. If necessary, release the antenna/display board from the LCD by disengaging the two plastic locking tabs located on the light guide (see Figure 26).
2. Fit the LCD assembly to the inside flex housing by reversing the procedure described in Step 8, above.
3. Carefully thread the coaxial cable through the opening in the bottom right of the outside flip housing (see Figure 25). Seat the bushing completely into the hole in the outside flex housing, using the disassembly tool if necessary.
4. Referring to Figure 25, slide the flex cover (barrel) onto the flex cable.
5. Align the flex cable and flex cover with the slot in the outside flex housing, then carefully insert into the opening.

6.   Align the inside flip housing with the outside flip housing and hold in place while attaching with the two screws as shown in Figure 23.

7.   Replace the lens, antenna, flip assembly, keypad reflector, keypad, controller board, board-to-board snubber, transceiver board, external keys, back housing, battery, and battery door as described in the procedures.

Subscriber Identity Module (SIM) Cards and Security

Removing the SIM Card

1. Remove the battery door and battery as described in the procedures.
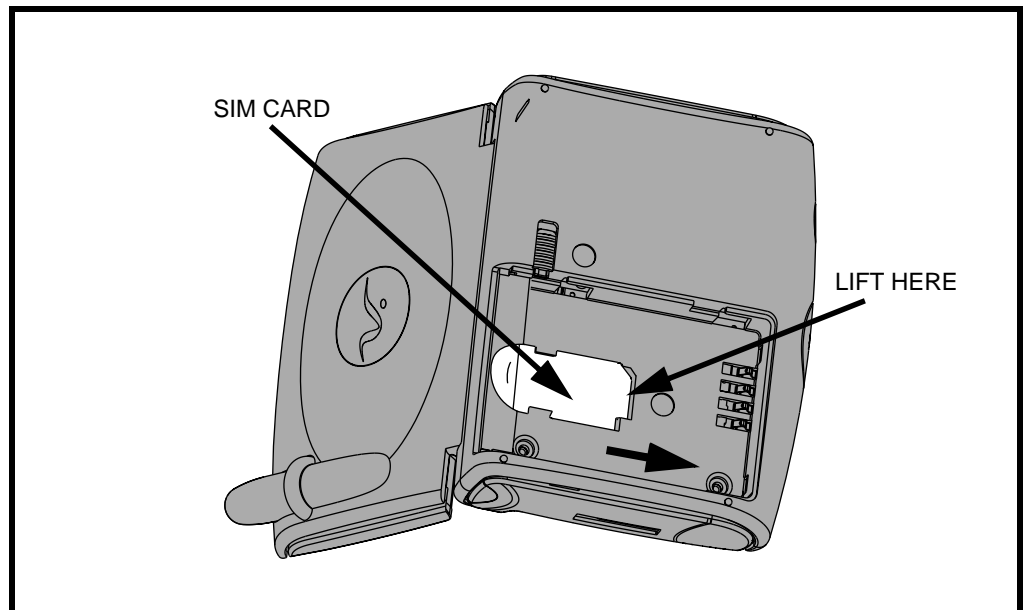2. Lift the SIM and slide it in the direction of the arrow (see Figure 27).

SIM CARD

LIFT HERE

000687-A

Figure 27. Removing the SIM card

Replacing the SIM Card

1. Carefully insert the SIM card into the SIM card slot.
2. Replace the battery and battery door as described in the procedures.

Manual Test Mode

The GSM Motorola V100 Personal Communicator is equipped with a manual test mode capability. This capability allows service personnel to take control of the unit and make the unit perform desired functions by entering certain keypad commands.

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

1. Press ◎ to turn the communicator OFF.
2. Remove the battery door and battery as described in the procedures.
3. Remove the customer's SIM card from the communicator as described in the procedures.
4. Insert the test SIM into the SIM slot.
5. Replace the battery and battery door as described in the procedures.
6. Press ◎ to turn the communicator ON.

7. Press and hold the # button for approximately 3 seconds until TEST displays on the screen. The communicator may now be issued test commands listed in Table 5.

Live SIM Card

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

The SIM card contains:
* All the data necessary to access GSM services
* The ability to store user information such as phone numbers.
* All information required by the network provider to provide access to the network.

Personality Transfer

A personality transfers is required when a communicator is Express Exchanged or when the main board is replaced. The reason for personality transfers is to reproduce the customer's original personalized details such as menu and stored memory such as phone books, or even just to program a unit with basic user information such as language selection. There are two possible methods of transferring this information from unit to unit; normal transfer and master transfer.

* **Normal Transfer** - Used when the customer's original unit still powers up and, the customer's personalized menu selections and options are required to be transferred to the replacement unit.
* **Master Transfer** - Used when the faulty unit will not power up and the transfer is used to configure the replacement board to a set standard.

Listed below are the procedures to set up a master transfer card and to perform each method of transfer.

Normal Transfer

1. Remove the battery door and battery from the customer's communicator as described in the procedures.
2. Remove the customer's SIM card as described in the procedures.
3. Insert the transfer card into the 'donor' unit.
4. Replace the battery and battery door as described in the procedures on page 24.
5. Press and hold ◎ until Clone displays on the screen.
6. Using the keypad buttons, type **021#** to upload the first block of data. Please wait displays on the screen.
7. When Clone displays on the screen, the transfer of the first data block is complete. Remove the battery door, battery, and transfer SIM card.
8. Insert the transfer SIM card into the replacement unit, or the unit containing new main RF / Logic PCB.
9. Install the battery and battery door as described in the procedures.
10. Press and hold ◎ until Clone displays on the screen.
11. Using the keypad buttons, type **03#**. Please wait displays while data is transferred.

12. When Clone displays on the screen, the transfer of the first data block is complete.
13. Repeat steps 1 - 10 but type **022#** at step 6 to transfer second block of data to the clone card.
14. Repeat steps 1 - 10 but type **025#** at step 6 to transfer final block of data to the clone card.

Creating a Master SIM Card

1. Remove the battery door and battery from the customer's communicator as described in the procedures on page 24.
2. Remove the customer's SIM card.
3. Insert the transfer SIM card into the customer's communicator.
4. Replace the battery and battery door as described in the procedures.
5. Press and hold ◎ until Clone displays on the screen.
6. Using the keypad buttons, type **024#** to copy the 'personality' from the unit to the transfer SIM card. Please wait displays on the screen.
7. When Clone displays on the screen, the transfer is complete and the Master Transfer card is created.

Master Transfer

1. Remove the battery door and battery from the replacement unit as described in the procedures.
2. If required, remove the SIM card from the replacement unit.
3. Insert the Master Transfer Card into the replacement unit.
4. Replace the battery and battery door as described in the procedures.
5. Press and hold ◎ until Clone displays on the screen.
6. Using the keypad buttons, type **03#** to download the data from the Master Transfer Card to the replacement unit. Please wait displays on the screen.
7. When Clone displays on the screen, the download is complete.

Troubleshooting

GSM Test Commands

Table 5. GSM Test Commands

Test Command	Test Function/Name
Press and hold # for 3 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
16#	Mute tone generator
19#	Display software version number of Call Processor
20#	Display software version number of Modem
36#	Initiate acoustic loopback
37#	Stop test
38#	Activate Mini SIM
39#	Deactivate Mini SIM
43x#	Change audio path
47x#	Set audio volume
51#	Enable sidetone
52#	Disable sidetone
57#	Initialize non-volatile memory
58#	Display security code
58xxxxxx#	Modify security code
59#	Display lock code
59xxx#	Modify lock code
60#	Display IMEI
99#	Display all display pixels
98#	Change GSM mode (primary access code)
20#	GSM 1800*
21#	GSM 900*
22#	GSM 1900 (PCS)*
23#	Dual Band 900/1800*
15xx#	Change Alert Mode (primary access code)
90#	Change to Vibrator Mode*
91#	Change to Ringer Mode*
36xx#	Change Data Rate (primary access code)

*Note: To access these options, you must first type the primary access code.

Table 5. GSM Test Commands (Continued)

Test Command	Test Function/Name
0 or Omitted	Full Rate*
1	Enhanced Full Rate*
2	Half Rate*

*Note: To access these options, you must first type the primary access code.

Troubleshooting Chart

Table 6. PF38C Personal Communicator: Level 1 and 2 Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
1. Personal Communicator will not turn on or stay on.	a.) Battery pack either discharged or defective.	Measure battery. If the battery voltage is < 4.00 V dc, recharge the battery using the appropriate charger. If the battery will not recharge, replace the battery. If the battery is not at fault, proceed to 1.b.
	b.) Battery connectors open or misaligned.	Refer service to a Level 3 or Level 4 qualified service organization.
	c.) Transceiver Board Assembly Defective.	Refer service to a Level 3 or Level 4 qualified service organization.
	d.) Display circuit failure.	Refer service to a Level 3 or Level 4 qualified service organization.
2. Personal Communicator exhibits poor reception and/or erratic operation (such as calls frequently dropping, weak and/or distorted audio, etc.).	a.) Antenna is defective.	Replace antenna as described in "Removing/Replacing the Antenna" on page 34.
	b.) Transceiver Board Assembly is Defective.	Refer service to a Level 3 or Level 4 qualified service organization.
3. Erratic, partial, or no display.	a.) Mating connections to/from LCD module faulty.	Refer service to a Level 3 or Level 4 qualified service organization.
	b.) LCD module is defective.	Refer service to a Level 3 or Level 4 qualified service organization.
	c.) Transceiver board assembly defective.	Refer service to a Level 3 or Level 4 qualified service organization.
4. Incoming call alert transducer audio distorted or volume is too low.	a.) Faulty alert transducer.	Refer service to a Level 3 or Level 4 qualified service organization.
	b.) Main transceiver PCB defective.	Refer service to a Level 3 or Level 4 qualified service organization.
5. Personal communicator transmit audio is weak (usually indicated by called parties complaining of difficulty in hearing voice from personal communicator).	a.) Headset defective	Replace headset and place a call to verify transmit audio quality. If good, replace headset.
	b.) Headset connections to the main transceiver board are defective.	Refer service to a Level 3 or Level 4 qualified service organization.

Part Number Charts

The following charts are provided as a reference for the parts associated with Product Family 38C Personal Communicators.

Model Chart

Table 7. PF 38C Personal Communicator Model Chart

MODEL NUMBER	DESCRIPTION
SE2036AA5B1	V100, British, Ocean Jaxx
SE2036AA5D1	V100, Dutch, Ocean Jaxx
SE2036AA5E1	V100, French, Ocean Jaxx
SE2036AA5F1	V100, Spanish, Ocean Jaxx
SE2036AA5H1	V100, Italian, Ocean Jaxx
SE2036AA5J1	V100, Norwegian, Ocean Jaxx
SE2036AA5L1	V100, Spanish, Ocean Jaxx
SE2036AA5M1	V100, Swedish, Ocean Jaxx
SE2036AA5R1	V100, Hungarian, Ocean Jaxx
SE2036AX4B1	V100, British, Klub Blue
SE2036AX4D1	V100, Dutch, Klub Blue
SE2036AX4E1	V100, French, Klub Blue
SE2036AX4F1	V100, German, Klub Blue
SE2036AX4H1	V100, Italian, Klub Blue
SE2036AX4J1	V100, Norwegian, Klub Blue
SE2036AX4L1	V100, Spanish, Klub Blue
SE2036AX4M1	V100, Swedish, Klub Blue
SE2036AX4R1	V100, Hungarian, Klub Blue
SE2036AY4B1	V100, British, Explosive Sonic
SE2036AY4D1	V100, Dutch, Explosive Sonic
SE2036AY4E1	V100, French, Explosive Sonic
SE2036AY4F1	V100, German, Explosive Sonic
SE2036AY4H1	V100, Italian, Explosive Sonic
SE2036AY4J1	V100, Norwegian, Explosive Sonic
SE2036AY4L1	V100, Spanish, Explosive Sonic
SE2036AY4M1	V100, Swedish, Explosive Sonic
SE2036AY4R1	V100, Hungarian, Explosive Sonic
SE2134AX4E3	V100, French, Klub Blue
SE2172AA5L2	V100, Spanish, Klub Blue
SE2172AX4L2	V100, Spanish, Klub Blue
SE2173AA5L2	V100, Spanish, Klub Blue

Table 7. PF 38C Personal Communicator Model Chart (Continued)

MODEL NUMBER	DESCRIPTION
SE2173AX4L2	V100, Spanish, Klub Blue
SE2174AA5L4	V100, Spanish, Ocean Jaxx
SE2174AX4L4	V100, Spanish, Klub Blue
SE2175AA5L3	V100, Spanish, Ocean Jaxx
SE2175AX4L3	V100, Spanish, Klub Blue
SE2176AA5L3	V100, Spanish, Ocean Jaxx
SE2176AX4L3	V100, Spanish, Klub Blue
SE2177AA5Q2	V100, Turkish, Ocean Jaxx
SE2177AX4Q2	V100, Turkish, Klub Blue
SE2178AX4E4	V100, French, Klub Blue
SE2182AX4B3	V100, British, Klub Blue
SE2188AA5F8	V100, German, Ocean Jaxx
SE2188AX4F8	V100, German, Klub Blue
SE2189AA5H2	V100, Italian, Ocean Jaxx
SE2189AX4H2	V100, Italian, Klub Blue
SE2190AX4B3	V100, British, Klub Blue
SE2344AA5Y3	V100, Czechoslovakian, Ocean Jaxx
SE2359AX4B1	V100, British, Klub Blue
SE2360AX4H4	V100, Italian, Klub Blue
SE2361AX4B8	V100, British, Klub Blue
SE2362AA5A7	V100, Dutch, Ocean Jaxx
SE2362AX4A7	V100, Dutch, Klub Blue
SE2363AX4V4	V100, British, Klub Blue
SE2364AX4B7	V100, British, Klub Blue
SE2365AX4B4	V100, British, Klub Blue
SE2393AX4E1	V100, French, Klub Blue
SE2393AX4E1	V100, French, Ocean Jaxx
SE2440AX4B5	V100, British, Klub Blue
SE2497AA5Y3	V100, Czechoslovakian, Ocean Jaxx
SE2497AX4Y3	V100, Czechoslovakian, Klub Blue
SE2498AX4B1	V100, British, Klub Blue
SE2534AA5K2	V100, Portuguese, Ocean Jaxx
SE2534AX4K2	V100, Portuguese, Klub Blue
(USA ONLY)	V100, USA, Klub Blue
(USA ONLY)	V100, USA, Explosive Sonic
(USA ONLY)	V100, USA, Ocean Jaxx

Identity and Security

Each Motorola GSM device is labeled with various number configurations. The following information describes these configurations.

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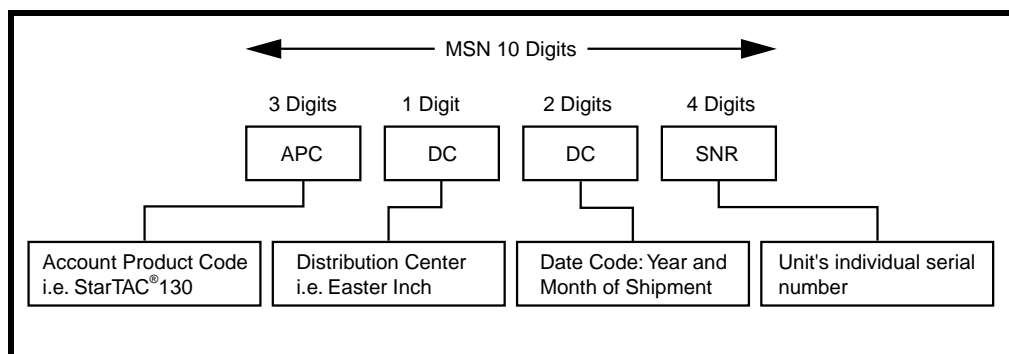
The MSN is divided into 4 sections as shown in Figure 28.

000829-O

Figure 28. MSN Label Breakdown

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.

000830-O
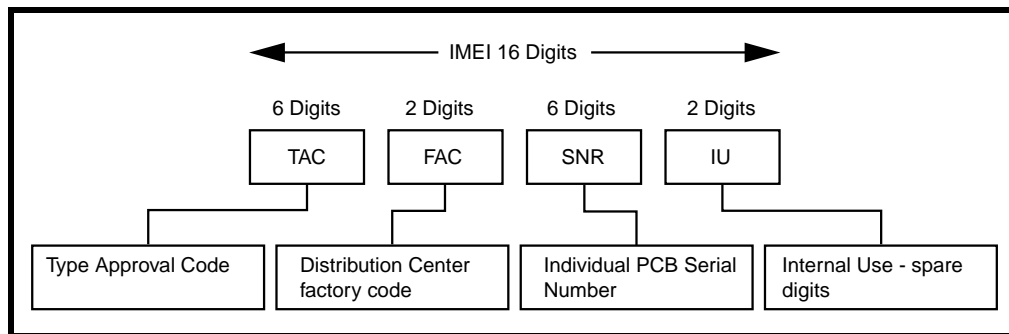
Figure 29. IMEI Label Breakdown

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

Picasso Tracking Label

The number recorded on the Picasso label, when used with the MSN, allows precise identification of the device's origin. By tracking field failures back to the site, shift, and line of manufacture, failure trends can be quickly diagnosed and corrected at the source.
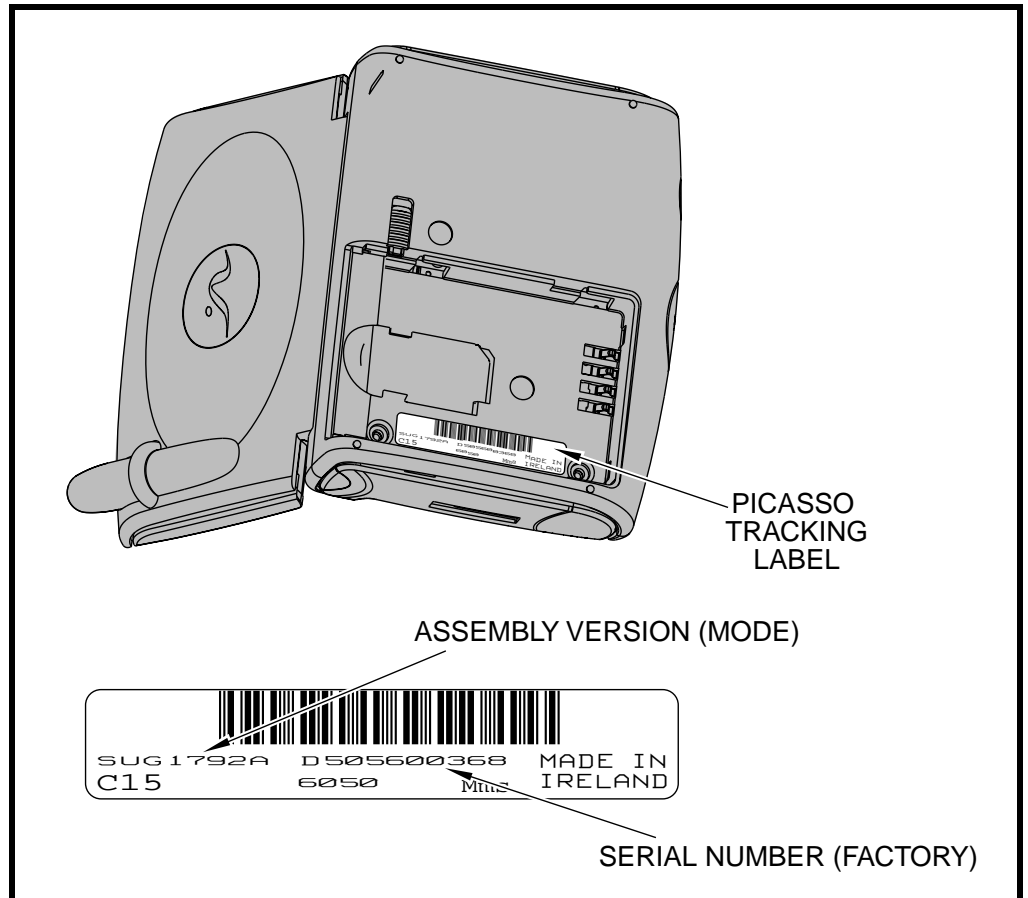
Figure 30. Picasso Tracking Label

Related Publications

PF38C Service Manual Level 3	6881036B20
PF38C Controller Supplement	6881104B83
PF38C Transceiver Supplement	6881111B05
UK English V100 Personal Communicator User's Guide	6881036B80
UK English V100 Personal Communicator Games Supplement	6881102B20
LA Spanish V100 Personal Communicator User's Guide	6881036B11
LA Portuguese V100 Personal Communicator User's Guide	6881036B12
French Canadian V100 Personal Communicator User's Guide	6881036B13
European Spanish V100 Personal Communicator User's Guide	6881036B81
European Spanish V100 Personal Communicator Games Supplement	6881102B21
Italian V100 Personal Communicator User's Guide	6881036B82
Italian V100 Personal Communicator Games Supplement	6881102B24
French V100 Personal Communicator User's Guide	6881036B83
European French V100 Personal Communicator Games Supplement	6881102B23
German V100 Personal Communicator User's Guide	6881036B84
German V100 Personal Communicator Games Supplement	6881102B06
Swedish V100 Personal Communicator User's Guide	6881036B85
Swedish V100 Personal Communicator Games Supplement	6881102B07
Norwegian V100 Personal Communicator User's Guide	6881036B86
Norwegian V100 Personal Communicator Games Supplement	6881102B08
Hungarian V100 Personal Communicator User's Guide	6881036B87
Hungarian V100 Personal Communicator Games Supplement	6881102B09
Dutch V100 Personal Communicator User's Guide	6881036B88
Dutch V100 Personal Communicator Games Supplement	6881102B13
Danish V100 Personal Communicator User's Guide	6881036B89
Danish V100 Personal Communicator Games Supplement	6881102B14
Finnish V100 Personal Communicator User's Guide	6881037B10
Finnish V100 Personal Communicator Games Supplement	6881102B19
European Portuguese V100 Personal Communicator User's Guide	6881037B11
European Portuguese V100 Personal Communicator Games Supplement	6881102B22
Turkish V100 Personal Communicator User's Guide	6881037B12

Turkish V100 Personal Communicator Games Supplement	6881102B82
Czechoslovakian V100 Personal Communicator User's Guide	6881037B13
Czech V100 Personal Communicator Games Supplement	6881102B83
Polish V100 Personal Communicator User's Guide	6881037B14
Polish V100 Personal Communicator Games Supplement	6881102B84

Exploded View Diagram
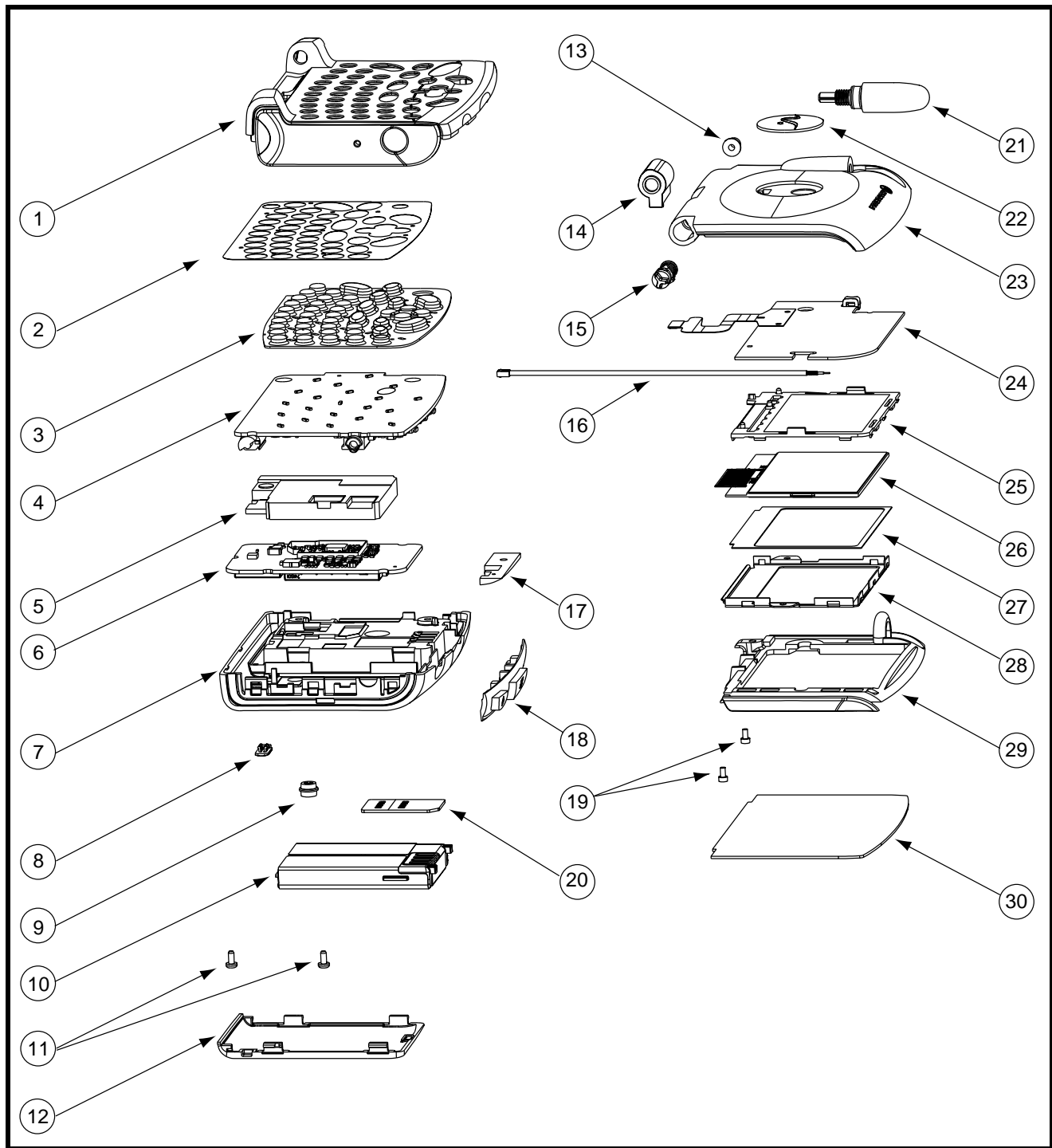
000672-C

Figure 31. Exploded View Diagram

Exploded View Parts List

Table 8. Exploded View Parts List

Item Number	Motorola Part Number	Description
1	See Table 9	Base Front Housing Assembly
2	3386460K01	Reflector, Keypad
3	See Table 9	Keypad, QWERTY
4	See Note 3	Controller PCB
5	7586410K01	Snubber, board-to-board
6	See Note 3	Transceiver PCB
7	See Note 1	Base Back Housing
8	See Note 1	Lock, Battery Door
9	2886472K01	RF Plug
10	See Table 10	Battery, Lithium Ion
11	0362035B17	Screws (2), Back Housing
12	See Note 1	Door, Battery
13	4308800E01	Bushing
14	See Table 9	Flex Cover (barrel)
15	5504765Z06	Hinge (Cam)
16	3086439K01	Coaxial Cable
17	4586461K01	Snubber, Board Support

Item Number	Motorola Part Number	Description
18	See Note 1	External Keys
19	0310944A85	Screws (2), LCD
20	See Note 3	SIM Card
21	8586338K01	Antenna
22	6186427K01	Medallion
23	See Table 9	Flip Housing, Outside
24	See Note 2	Antenna/Display PCB
25	6186409K01	Light Guide
26	See Note 2	LCD w/ COG Driver
27	32864899K01	Gasket, LCD
28	0786408K01	Bezel (LCD Frame)
29	See Table 9	Flip Housing, Inside (LCD Cover)
30	See Table 9	Lens
31	See Table 9	Flip Assembly (includes items 1, 13-16, 19, and 22-31)
32	See Table 9	Base Back Housing Assembly (includes items 7- 9, and 12)
33	0186446K01	LCD Assembly (includes items 25, 27, and 28)

Notes:
1. Order next higher assembly, item number 32.
2. Order next higher assembly, item number 33.
3. Not available as spares in EMEA Service markets.

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.

Housing-dependent Part Numbers

Table 9. Housing-dependent Part Numbers

Flip Assembly			
Part Description	**Ocean Jaxx 0162475Z02**	**Klub Blue 0162475Z03**	**Explosive Sonic 0162475Z04**
Flip Housing, Outside	1586387K02	1586387K03	1586387K04
Flip Housing, Inside (LCD Cover)	1586389K02	1586389K03	1586389K04
Flex Cover (Barrel)	1586390K02	1586390K03	1586390K04
Lens	6186426K02	6186426K03	6186426K04
Base Front Housing Assembly	0162474L02	0162474L03	0162474L04
Medallion	6186427K02	6186427K03	6186427K04

Base Back Housing Assembly			
Part Description	**Ocean Jaxx 0162474A02**	**Klub Blue 0162474A03**	**Explosive Sonic 0162474A04**
Base Back Housing	7586391K02	7586391K03	7586391K04
External Keys	7586407K02	7586407K02	7586407K04
Battery Door	1586392K02	1586392K03	1586392K04

Other Parts			
Part Description	**Ocean Jaxx**	**Klub Blue**	**Explosive Sonic**
Keypad, QWERTY	7586394K02	7586394K02	7586394K03

Accessories

Table 10. Accessories

Part Description	Part Number
Battery 600 mAh Slim LSQ6 Li Ion	SNN5517A

Battery Door
    Klub Blue
    Ocean Jaxx
    Explosive Sonic
	SHN7660A
	SHN7659A
	SHN7661A

Travel Charger
    Rapid Universal P/S with U.S. Flip (Klaus Adapters)
    Charger, 12V, 800 mA
	SPN4604A
	SPN4204A

Plugs
    U.K. Plug
    Euro Plug (Klaus Adapters)
	SYN7455A
	SYN7456A

Vehicle Power Adapter (CLA) For EMEA Vehicle Power Adapter (CLA)	SYN4241A SYN4241C

Table 10. Accessories (Continued)

Part Description	Part Number
Wearables	
Holster (Plastic)	SHN7927A
Headsets	
Headset with Boom Microphone	SYN8146A
Retractable Headset	SYN8284A
Headset (Plastic Bag)	SYN8390A
Colored Headset (Blue)	AAYN4207A
Colored Headset (Gray)	AAYN4208A

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