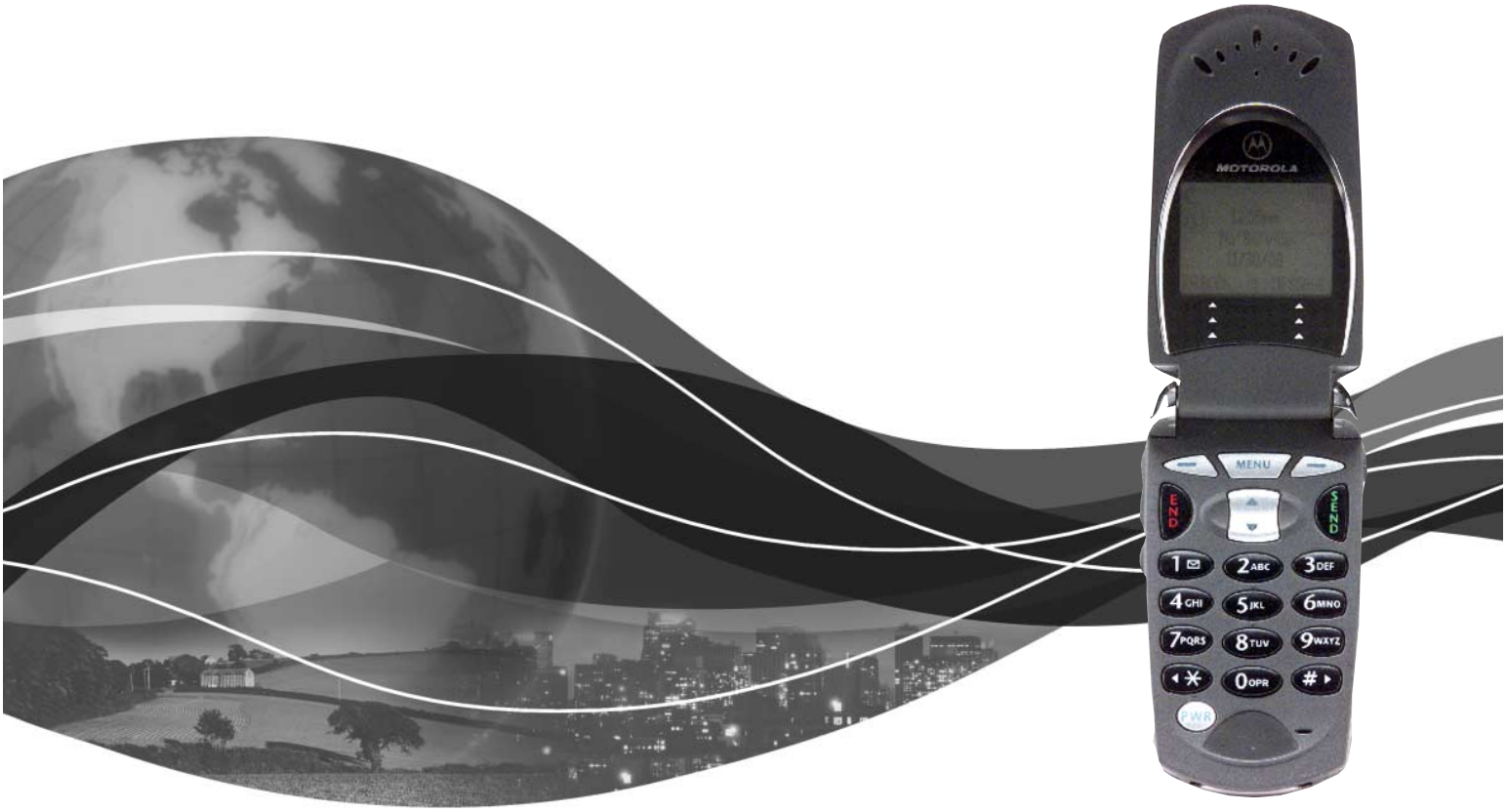
MOTOROLA

Level III Service Manual

Tri-Band Digital Wireless Telephone



V.series™ 60g

GSM 900/1800/1900 MHz & GPRS Technologies

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Introduction

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

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

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

Product Identification

Motorola products are identified by the model number on 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 V. Series 60g 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, 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.

Computer Program Copyrights

About This Service Manual

Using this service manual and the suggestions contained in it assures proper installation, operation, and maintenance of V. Series 60g 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 document aids service personnel in testing and repairing V. Series 60g telephones. Service personnel should be familiar with electronic assembly, testing, and trouble-shooting methods, and with the operation and use of associated test equipment.

Use of this 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 V. Series 60g 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 publication to emphasize certain types of information.

Note: Emphasizes additional information pertinent to the subject matter.

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

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

Keys to be pressed are represented graphically. For example, instead of “Press the 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.

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

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 +4.2V dc (battery) +4.4V dc to +6.3V dc (external connector)
Transmit Current Drain	250 mA nominal at room temperature
Stand-by Current drain	6.5 mA (DRX2), 3.75 mA (DXR9) nominal at room temperature
Dimensions, with 500 mAh Li Ion battery	86.8 mm x 45 mm x 24.2 mm (3.42 inches x 1.77 inches x 0.95 inches)
Size (Volume)	73 cc (4.45 in^3), with 500 mAh battery
Weight	110 gm (3.9 oz), with 500 mAh battery
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life, 500 mAh LI Ion Battery	Talk Time 108 to 159 minutes Standby 77 to 133 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	-106 dBm GSM, -104 dBm DCS / 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 V. Series 60g telephones are the smallest and lightest global system for mobile communications (GSM) general packet radio service (GPRS) wireless application protocol (WAP)-enabled mobile phones currently available. The V. Series 60g incorporates a new user interface (UI) for easier operation, allows short message service (SMS) text messaging, and includes personal information manager (PIM) functionality. 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.

V. Series 60g 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 the efficient use of radio spectrum. Data transmission rates for GSM networks can potentially increase from the current rate of 9.6 kbps up to a theoretical maximum of 171.2 kbps. An increased data rate is by no means the only benefit provided by GPRS. A key advantage is the provision of a permanent virtual connection to the network. This “always on” connection is possible because GPRS uses packet data transfer so that, for example, email can be downloaded in “background mode.” There is no need for the user to reconnect before requesting a service, eliminating connection set-up delays and adding convenience and immediacy to data services access. The “virtual” nature of this connection means that network resources are not consumed during periods when a user is not actually sending or receiving data.

V. Series 60g telephones have a clam form factor. They feature an anodized aluminum housing with titanium knuckles and have an externally viewable 96 x 16 pixel display for caller identification and date/time, an internal 96 x 64 pixel display, and the speaker located in the flip. At the top of the phone, on the right knuckle, the service indicator (status light) changes color to show the phone's state (incoming call or message received, for example) at a glance. The bottom part of the clam (front housing) contains the keypad, transceiver printed circuit board (PCB), microphone, flex connection, external accessory connector, smart button, volume buttons, and voice button. The standard 500 mAh Lithium Ion (Li Ion) battery fits behind a removable anodized aluminum back cover.

The phone accepts both 3V and 5V mini subscriber identity module (SIM) cards which fit into the SIM holder underneath the battery. The antenna is a fixed stub type antenna. Inexpensive direct connection to a computer or handheld device via RS232 or USB for data and fax calls, and for synchronizing phonebook entries with TrueSync® software, can be accomplished by using the optional data cable and soft modem.

Features

V. Series 60 g 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.
- Supports 3V and 5V SIM cards.
- Extended GSM (EGSM) channels.
- Tri-coder/decoder (CODEC) that allows full rate, half rate, and enhanced full rate modes of transmission.

- Supports mobile originated / mobile terminated SMS, concatenated SMS, and cell broadcast messages.[1]
- Supports GPRS, circuit switched, and SMS networks.[1]
- WAP 1.1 enabled microbrowser.[1]
- Supports SIM Toolkit (STK), Class 2.[1]
- Caller ID with link to phone book alerts.[1]
- Dual tinted mirror film (TMF) displays with electroluminescent (EL) back-lighting: internal 96x64 pixel; external 96x16 pixel.
- Internal display provides 3 lines of text, 1 line of icons, and 1 line of prompts.
- Display zoom 3 line to 2 line toggle.
- Display animation provides smooth-scrolling menus.
- PIM functionality includes: date book, message center, and 400 number phone book with Starfish® and TrueSync® support.[2]
- Voice activation for phonebook entries and menu shortcuts.
- Voice note voice recorder.[3]
- iTAP™ software for predictive text entry.
- Turbo Dial® abbreviated dialing.
- Multi-language support: English, Spanish, French, and Portuguese.
- 32 alerts.
- VibraCall® silent alert.
- Data capable without PC card using RS232 or USB.
- Integrated headset jack.
- Smart button operation.
- Hearing aid telephone interconnection system (HATIS) support.[4]
- Anodized aluminum housing.

Speaker Dependant Voice Activation and Voice Note Recording

This feature allows voice tags to be used for voice dialing up to 20 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 (i.e., via the phone book menu structure or with 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.

1. Network, subscription and SIM card or service provider dependent feature. Not available in all areas.
2. Designed to synchronize with basic features of the initial release of many popular Personal Information Management (PIM) software and hardware products.
3. Use of this function may be subject to varying State and Federal laws regarding privacy of phone conversations.
4. Not compatible with all hearing aids. Hearing aids must contain a T-coil. T-coil must be activated when using the phone.

V. Series 60g telephones also include a voice note recorder that allows up to 2 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) 1.1 Compliancy

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

The V. Series 60g 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.

SIM Application Toolkit™ - Class 2

SIM Application Toolkit is a value-added service delivery mechanism that allows GSM operators to customize the services they offer their customers, from the occasional user who requests sports news and traffic alerts, to a high call time business user who receives stock alerts and checks flight times. Operators can now create their own value-added services menu quickly and easily in the phone. The customized menu will appear as the first menu and may be updated over-the-air with new services when customers request them.

Simplified Text Entry

There are three different ways to enter text using the phone keypad:

- iTAP™ predictive text entry. Press a key to generate a character and a dynamic dictionary uses this to build and display a set of word or name options. The iTAP™ feature may not be available on the phone in all languages.
- Tap. Press a key to generate a character.
- Numeric. The keypad produces numeric characters only. For some text areas this is the only method available; for example, phone numbers.

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.

Other Features

Detailed descriptions of these and the other V.60g features can be found in the appropriate V.60g 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 V.60g telephone's controls are located on the sides of the device and on the keypad. Indicators, in the form of icons, are displayed on the LCD (see Figure 3). Service status is indicated by a tri-color light emitting diode (LED) located at the top of the phone on the right knuckle (Table 1). V.60g phones have an audible alert transducer on the top and I/O connectors, consisting of a headset jack and an accessory port, located on the top and bottom of the phone. See Figure 1.

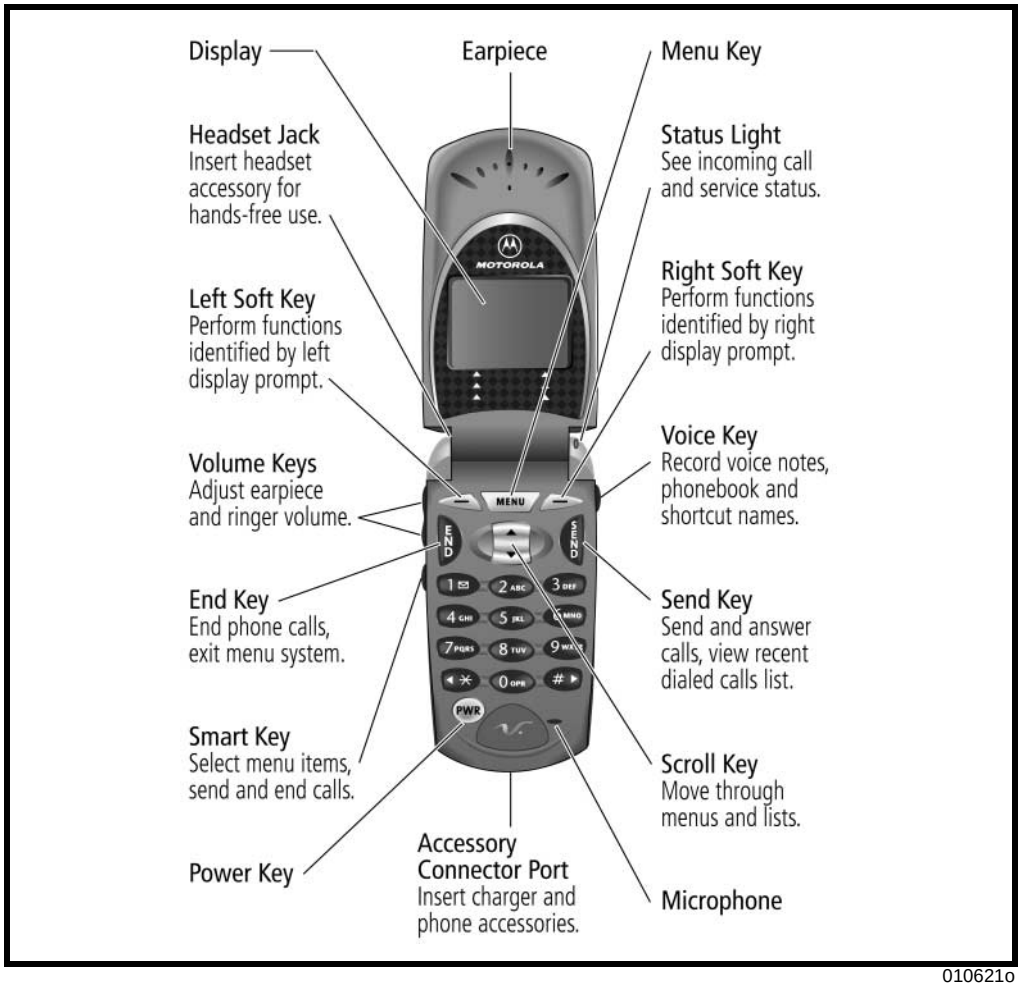

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Figure 1. V.60g Telephone Controls, indicators, and I/O

Service Indicator

The service indicator (status light) changes color to show the user the state of the phone as shown in Table 1, below.

Table 1. Service Indicator States

Indication	State
Alternating red / green (fast)	Incoming call
Flashing green	In service, home system
Flashing yellow	Roaming, non-home system
Flashing red (slow)	No service
Flashing red (fast)	Text or voicemail message received but no service
Alternating green (short) / red (long)	Text or voicemail message received, home system
Alternating yellow (short / red (long)	Text or voicemail message received, roaming service

Menu Navigation

V.60g telephones are equipped with a new user-friendly interface that employs soft keys and a 2-way scroll key to access phone functions and features. See Figure 2.

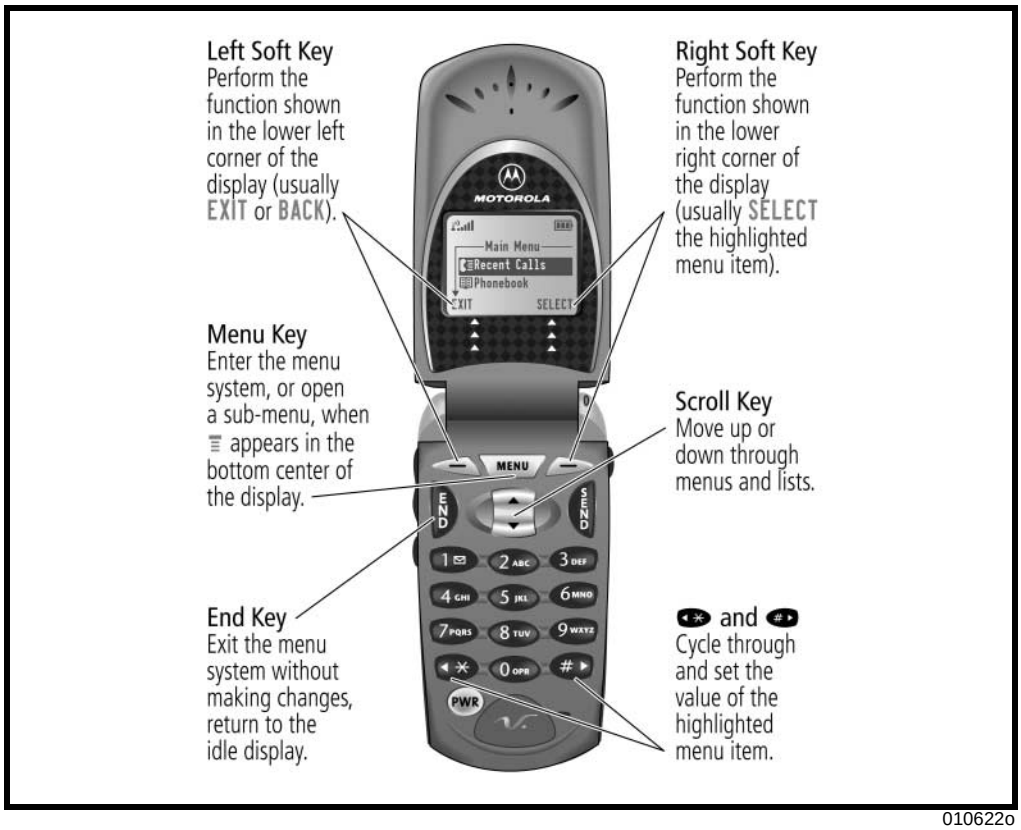

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Figure 2. V.60g Menu Navigation

"Soft keys" refer to non-labeled keys that correspond to text options displayed on the screen. The left and right soft keys perform the function shown in the corners of the display. The right key will usually select an option whereas the left key will usually exit a function or return to a previous screen.

The menu key opens the initial menu structure, or allows access to a submenu whenever appears on the screen. See Figure 4 for details of theV.60g menu structure.

Liquid Crystal Display (LCD)

The LCD provides a high contrast backlit display for easy readability in all light conditions. The large bit-mapped 96 x 64 display includes 3 lines of text, 1 line of icons, and 1 line of prompts.

Display zoom allows setting the phone's display to show either three lines or two lines of text plus soft key labels. Three lines of text display more information, while two lines increase text size for improved visibility.

Display animation makes the phone's menus move smoothly as the user scrolls up and down. Turn animation off to conserve the battery.

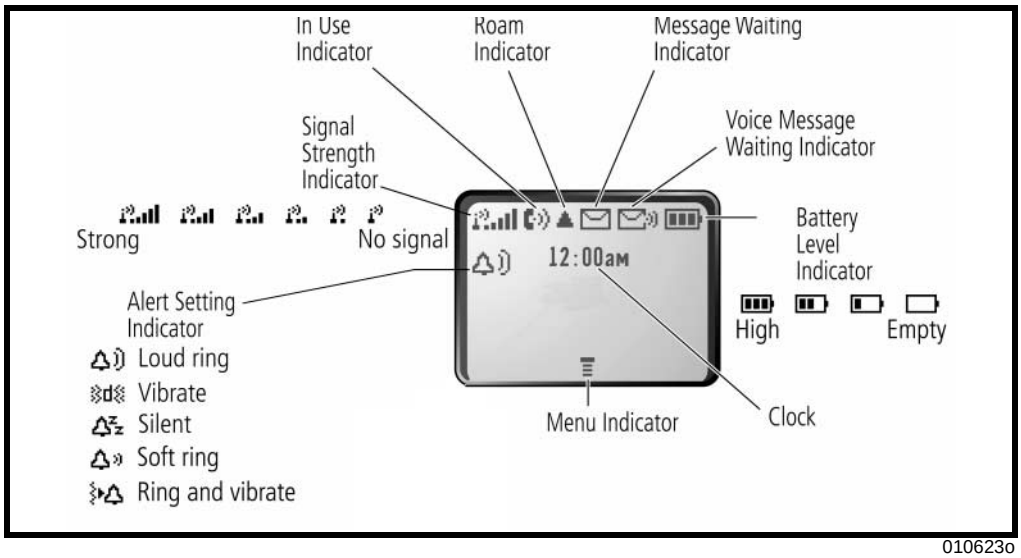

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Figure 3. V.60g Icon Indicators

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.

- **Signal Strength Indicator**. Shows the strength of the phone's connection with the network. Calls cannot be sent or received when the "no signal" indicator is displayed.
- **In Use Indicator**. Appears when a call is in progress.
- **Roam Indicator**.[5] 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.

- **Message Waiting Indicator**.[5] Appears when the phone receives a text message. This is a network-dependent feature.
- **Voice Message Waiting Indicator**.[5] Appears when a voicemail message is received. 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.
- **Clock**. Shows the current time.
- **Menu Indicator**. Indicates the user can press the menu soft key to open a menu.
- **Alert Setting Indicator**. Shows the current selected alert. The default alert setting is a ringer.

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

User Interface Menu Structure

Figure 4 shows the V.60g telephone menu struct ure.

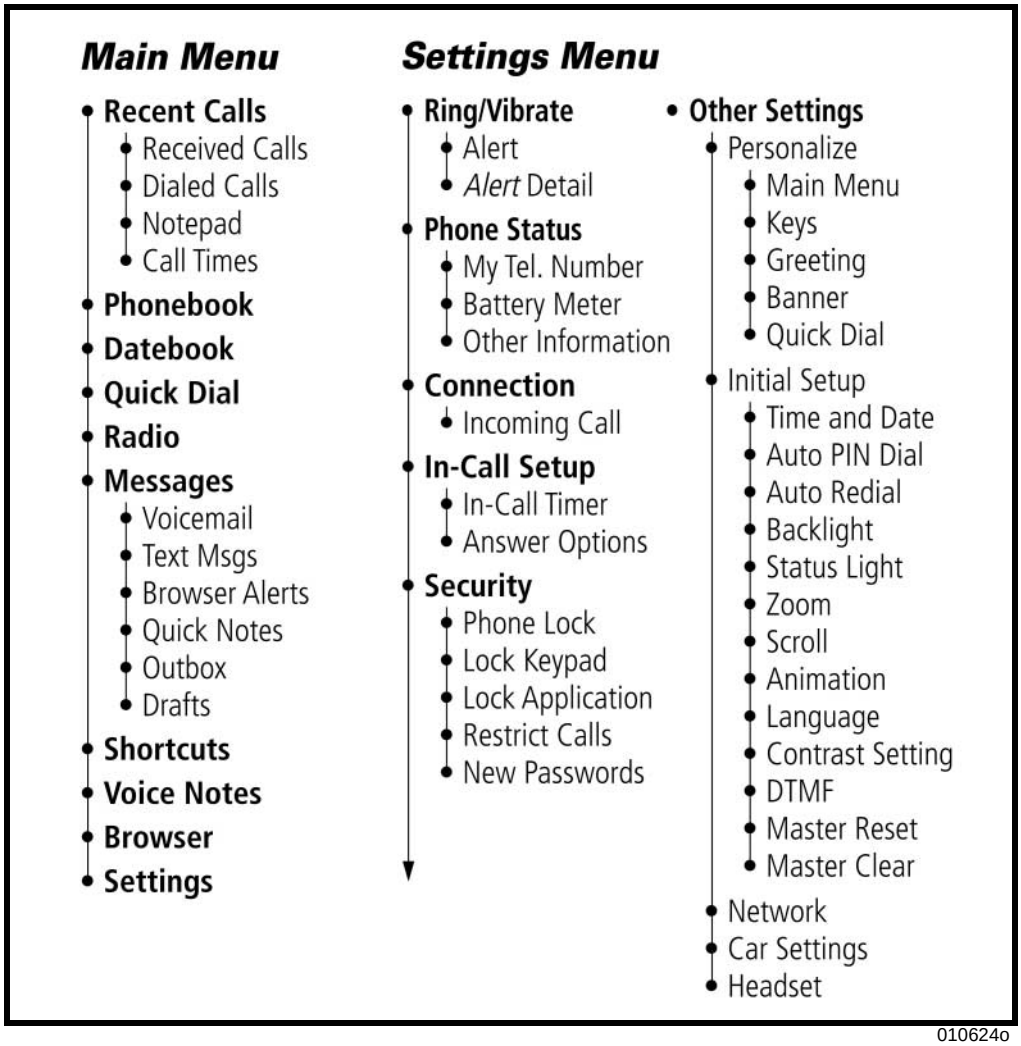

Figure 4. V.60g Menu Structure

Alert Settings

V.60g 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's 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 V.60g telephones. Use either the listed items or equivalents.

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 7	Rapid 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 (manual opening tool)	Used during assembly/disassembly of device
6680388B01	Tweezers, plastic	Used during assembly/disassembly
—	Digital Multimeter, HP34401A[2]	Used to measure battery voltage
8102430Z04	GSM / DCS Test SIM	Used to enable manual test mode

1. To order in North America, contact Motorola Aftermarket and Accessories Division (AAD) at (800) 422-4210 or FAX (800) 622-6210; Internationally, AAD can be reached by calling (847) 538-8023 or faxing (847) 576-3023.
2. 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 V.60g 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 Battery Housing and 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. Press in and hold the battery housing latch as shown in Figure 5.

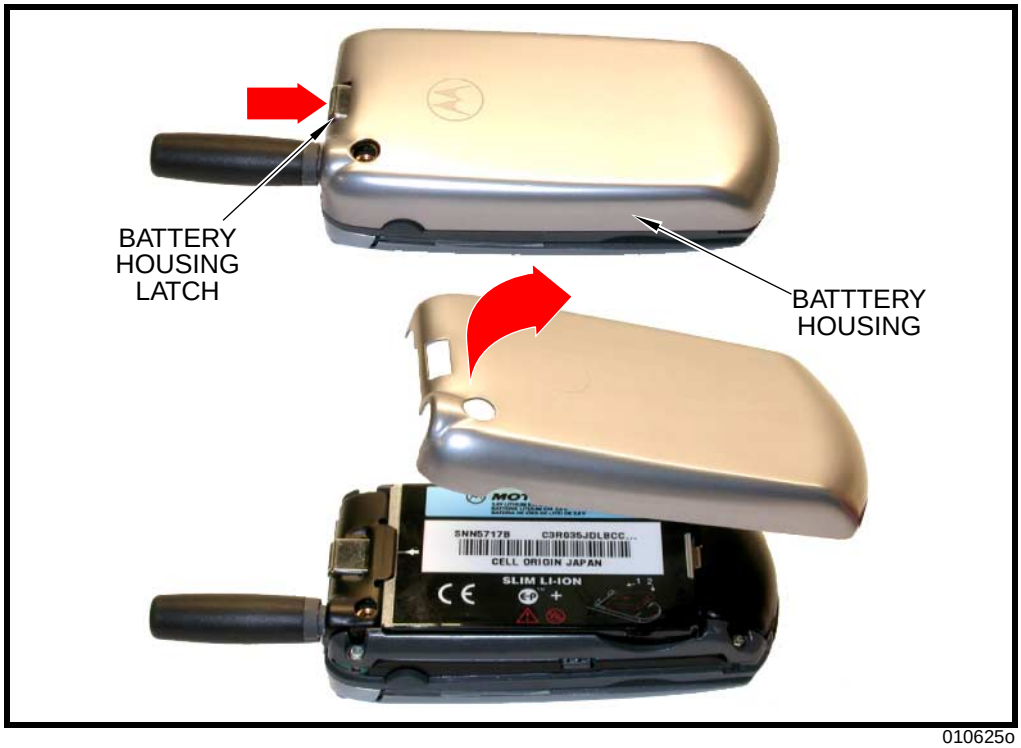

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Figure 5. Removing the battery housing

3. Lift the battery housing completely off the phone.
4. Lift the end of the battery and remove it completely. See Figure 6.

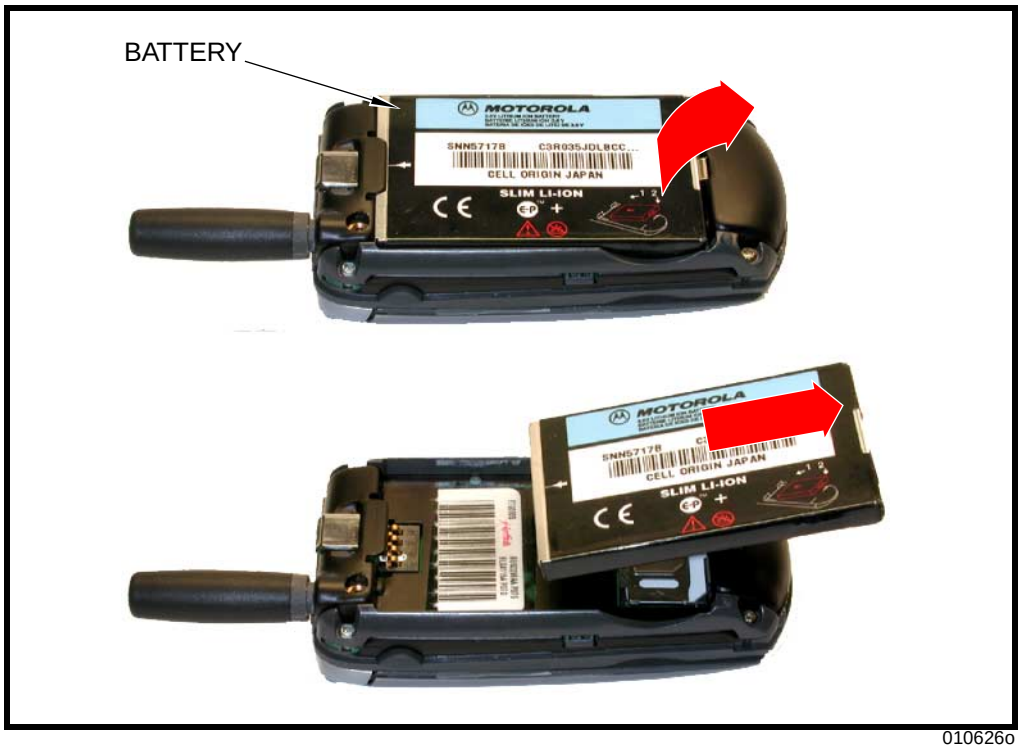

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Figure 6. Removing the battery

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

5. To replace, Align the battery with the battery compartment so the contacts on the battery match the battery contacts in the phone.
6. Insert the battery, printed arrow first, into the battery compartment and push down.
7. Insert the ridge at the bottom of the battery housing into the base of the phone, then push the cover down and snap it into place.

Removing and Replacing the Subscriber Identity Module (SIM)

1. Remove the battery housing and battery as described in the procedures.

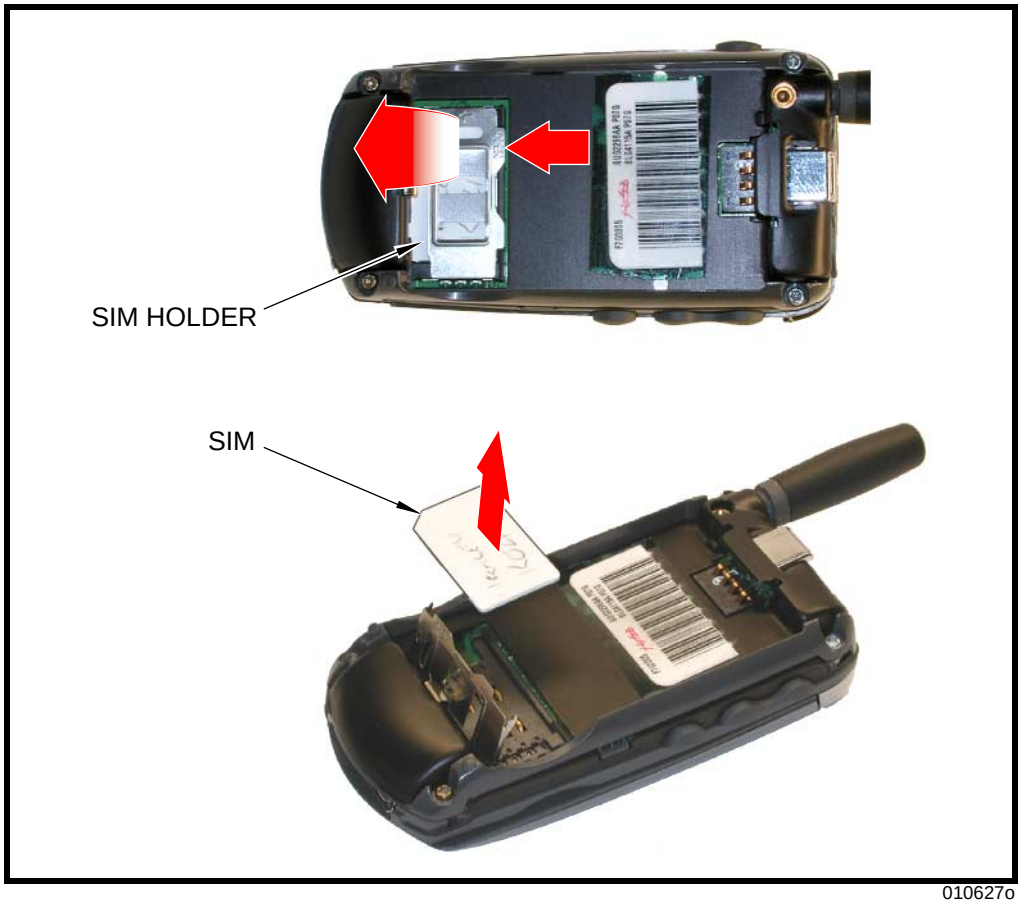

Figure 7. Removing the SIM

2. Slide the SIM holder down (away from the antenna) to unlock and rotate to open as shown in Figure 7.
3. Carefully lift the SIM from its holder.
4. To replace, insert the SIM into the holder, ensuring the keyed corner of the SIM aligns with the notch molded into the holder.
5. Close the SIM holder and slide it up (toward the antenna) to lock.
6. Replace the battery and battery housing as described in the procedures.

Removing and Replacing the Antenna

1. Remove the battery housing and battery as described in the procedures.
2. By hand, rotate the antenna counterclockwise until loose. See Figure 8.

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Figure 8. Removing the antenna

3. When the antenna threads are completely disengaged, pull the antenna straight out of the phone to remove.

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 and battery housing as described in the procedures.

Removing and Replacing the Rear Chassis Assembly

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

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

In addition to 4 screws, the rear chassis assembly is fastened with plastic catches. These are fragile and should be released with care.

2. Using a Torx driver with a T-6 bit, remove the 2 knuckle screws and 2 transceiver screws from the rear chassis assembly. See Figure 9.

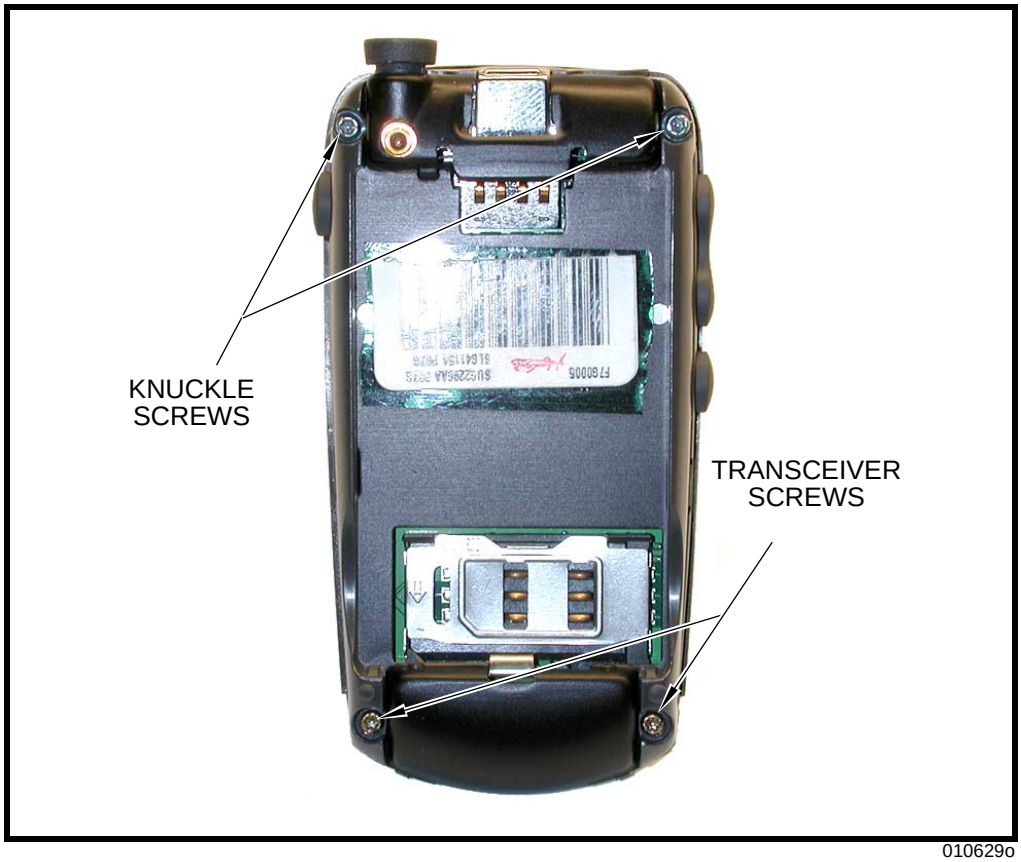

Figure 9. Removing the rear chassis assembly screws

3. Locate the 2 housing catches on the sides of the phone as shown in Figure 10.
4. Using the disassembly tool, depress the housing catches to release the rear chassis assembly from the front housing.

5. Lift the rear chassis assembly away from the front housing to remove.

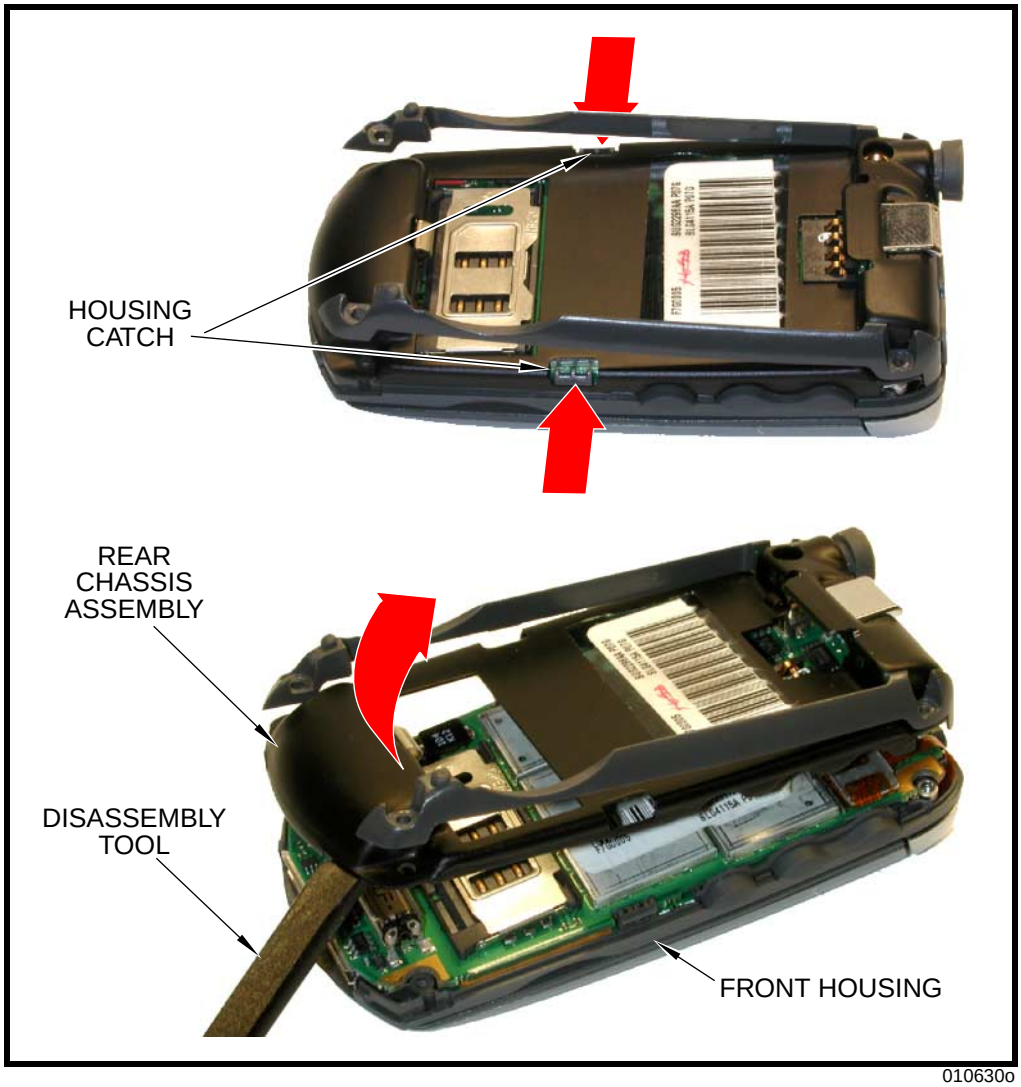

Figure 10. Removing the rear chassis assembly

6. To replace, carefully align rear chassis assembly with the front housing, then press the rear chassis assembly down until the 2 housing catches engage with the corresponding openings on the rear chassis assembly. Press the housings together until the catches snap into place.
7. Replace the 2 knuckle screws and 2 transceiver screws and tighten securely. Do not over tighten.
8. Replace the antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Transceiver Board Assembly

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

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

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

2. Carefully work the flat end of the disassembly tool under the flex connector and remove the connector from the transceiver board. See Figure 11.

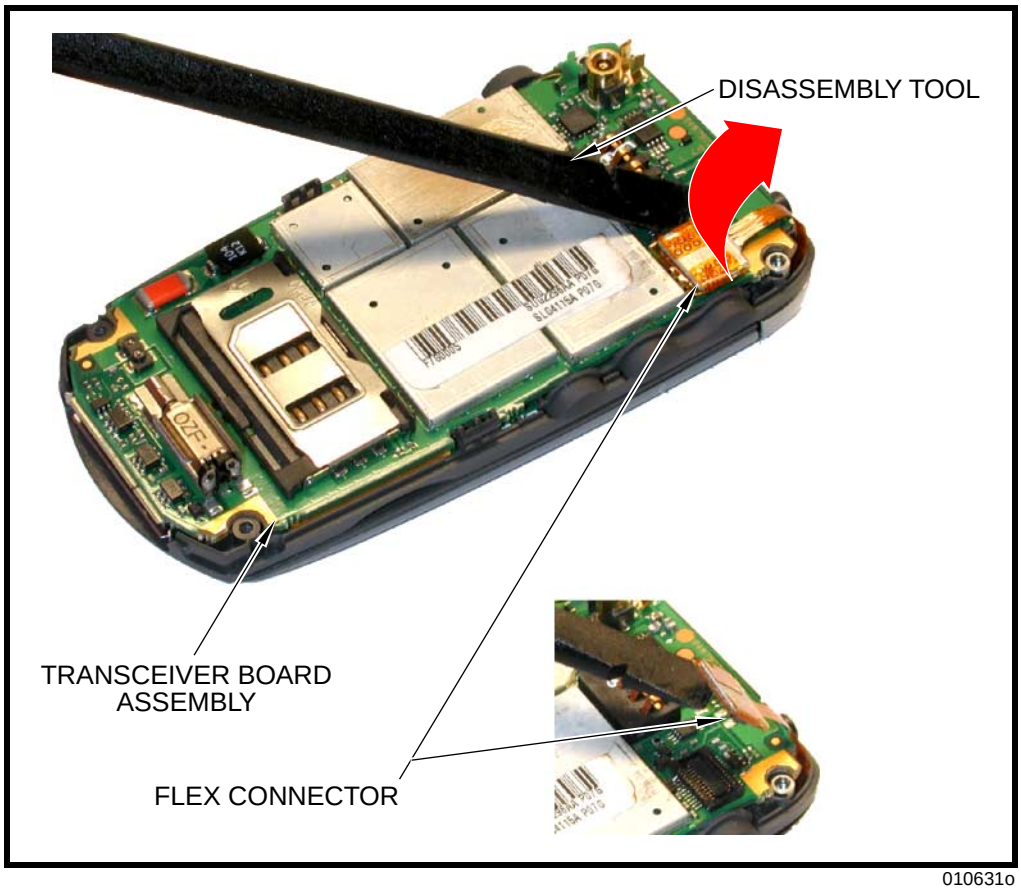

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Figure 11. Disconnecting the flex from the transceiver board

3. Lift the transceiver board assembly from the front housing. See Figure 12.

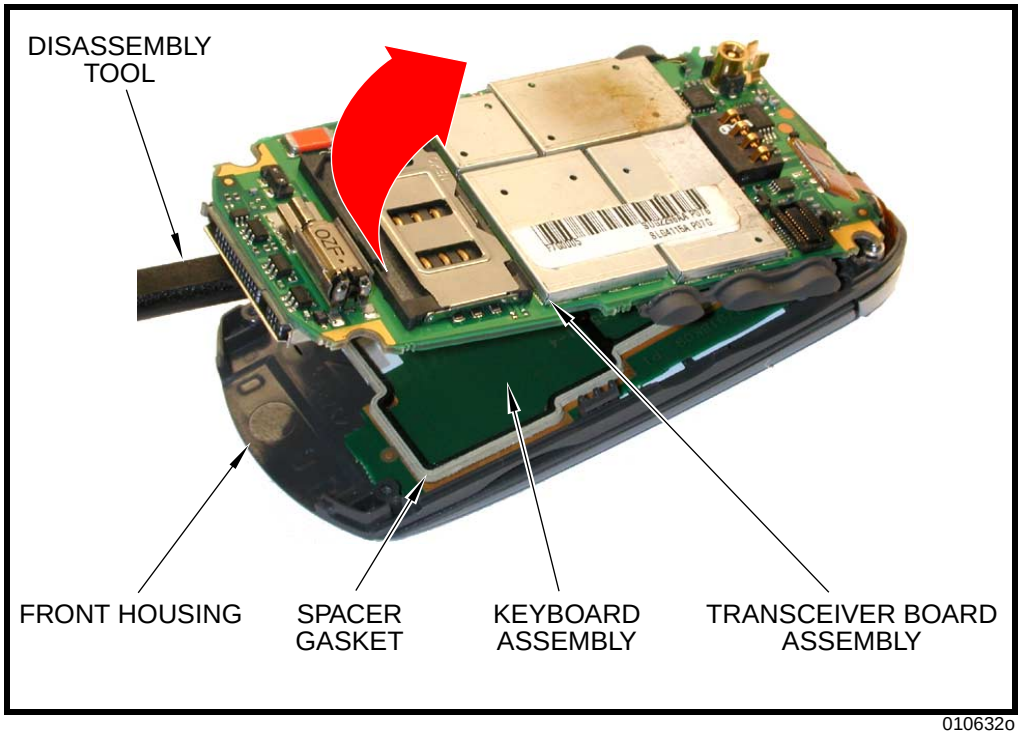

Figure 12. Removing the transceiver board assembly

4. To replace, insert the transceiver board assembly into the front housing with the flex connector on top. Ensure the spacer gasket is correctly positioned between the keyboard assembly and the transceiver board assembly.

Be sure the volume/smart buttons and voice button are correctly positioned in relation to the corresponding switches on the transceiver board. Verify operation of the buttons after replacing the transceiver board and rear chassis assembly.

5. Insert the flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place.
6. Replace the rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Volume / Smart and Voice Buttons

1. Remove battery housing, battery, antenna, rear chassis assembly, and transceiver board assembly as described in the procedures.
2. Using the plastic tweezers, lift the volume / smart buttons and the voice button from the transceiver board assembly. See Figure 13.

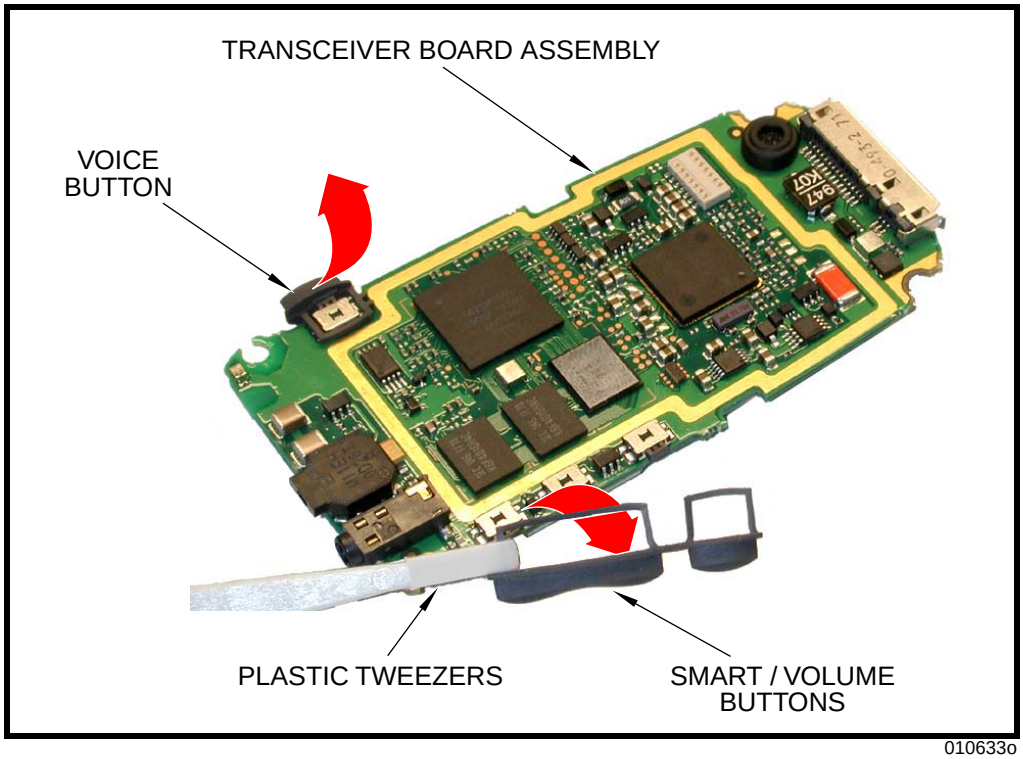

Figure 13. Removing the volume / smart and voice buttons

3. To replace, set the volume / smart buttons and the voice button onto the corresponding transceiver board switches.
4. Replace the transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Microphone

1. Remove the battery housing, battery, antenna, rear chassis assembly, and transceiver board assembly as described in the procedures.

The wire leads on the microphone are easily bent or broken. Exercise care when handling.

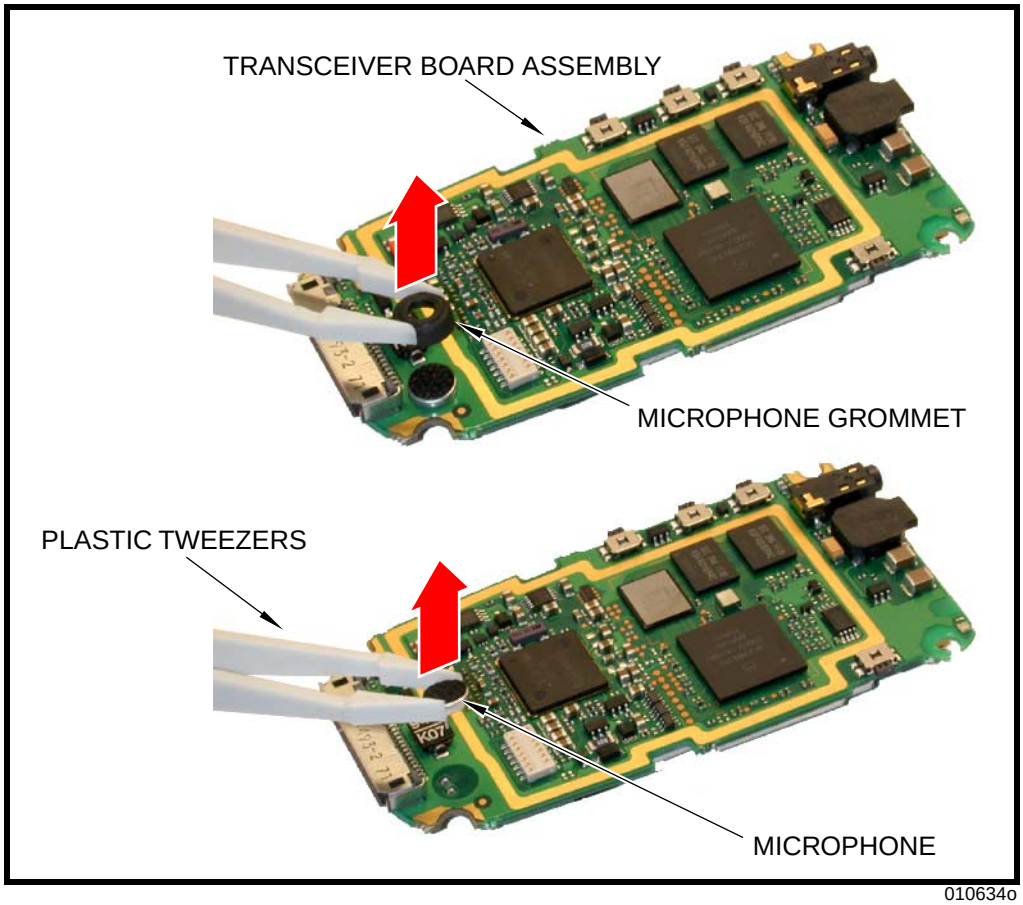

Figure 14. Removing the microphone

2. Using the plastic tweezers, carefully lift the microphone grommet from the microphone as shown in Figure 14.
3. Again using the plastic tweezers, pull the microphone straight out of its socket on the transceiver board.

When replacing, do not force the microphone into its socket. The microphone is keyed to fit only one way and will fit easily when properly aligned.

4. To replace, align the microphone with the microphone socket on the transceiver board and press firmly into place. Be sure the microphone is seated flat against the transceiver board.
5. Press the microphone grommet into place over the microphone.
6. Replace the transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Spacer Gasket

1. Remove battery housing, battery, antenna, rear chassis assembly, and transceiver board assembly as described in the procedures.
2. Using the disassembly tool, lift the spacer gasket completely from the keyboard assembly. See Figure 15.

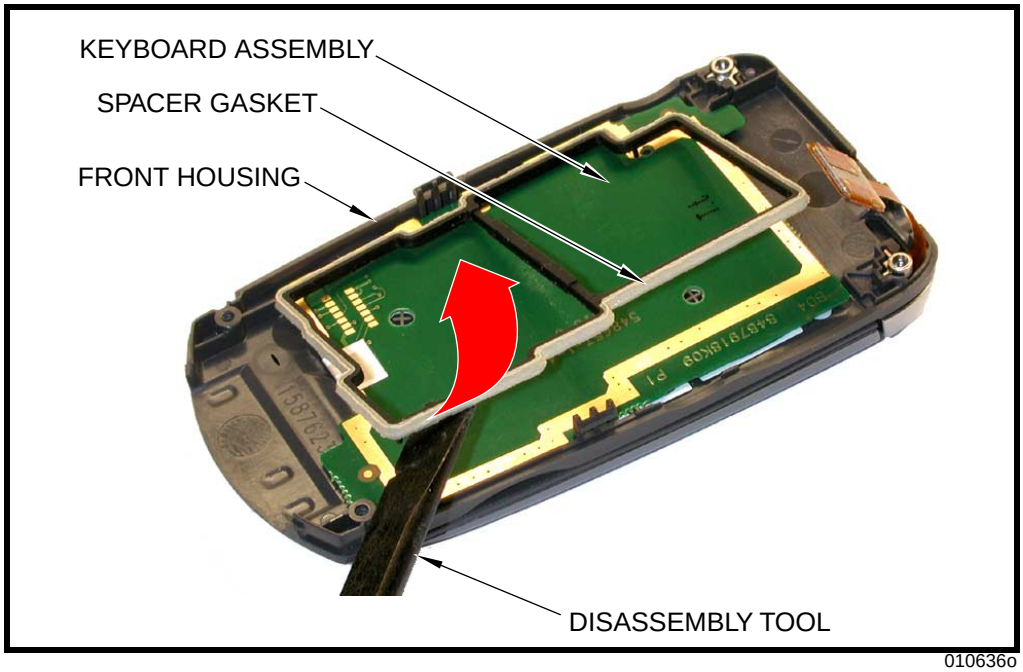

Figure 15. Removing the spacer gasket

3. To replace, position the spacer gasket so the alignment pins on the spacer gasket line up with the alignment holes on the keyboard assembly. Press the spacer gasket into place, ensuring it is flat against the keyboard assembly.
4. Replace the transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Keyboard Assembly

1. Remove battery housing, battery, antenna, rear chassis assembly, transceiver board assembly, and spacer gasket as described in the procedures.
2. Using the disassembly tool, carefully lift the keyboard assembly from the front housing. See Figure 16.

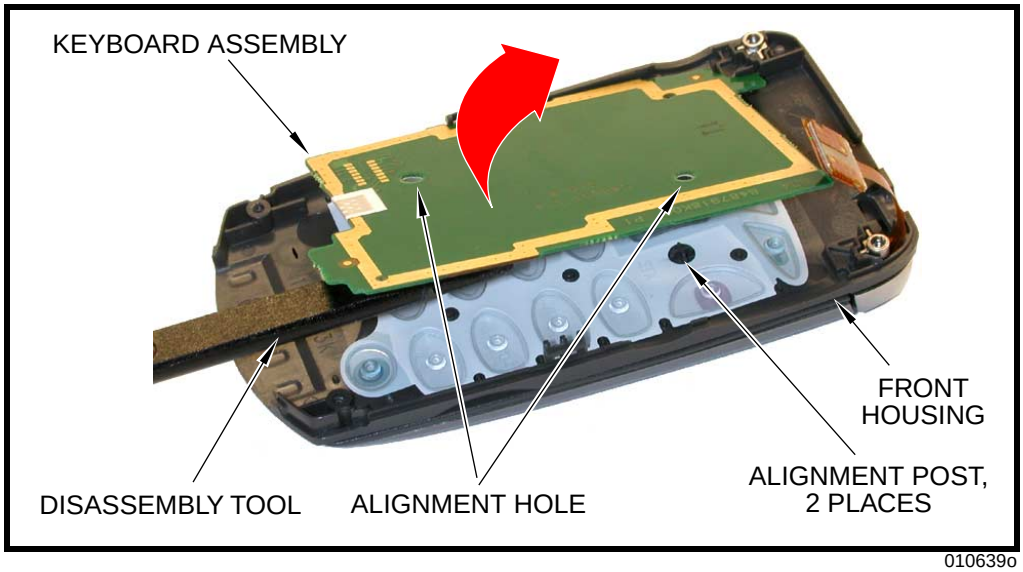

Figure 16. Removing the keyboard assembly

3. To replace, position the keyboard assembly so its alignment holes line up with the posts on the front housing. Firmly press the keyboard assembly into place in the front housing.
4. Replace the spacer gasket, transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Keypad

1. Remove the battery housing, battery, antenna, rear chassis assembly, transceiver board assembly, spacer gasket, and keyboard assembly as described in the procedures.
2. Lift the keypad from the front housing as shown in Figure 17.

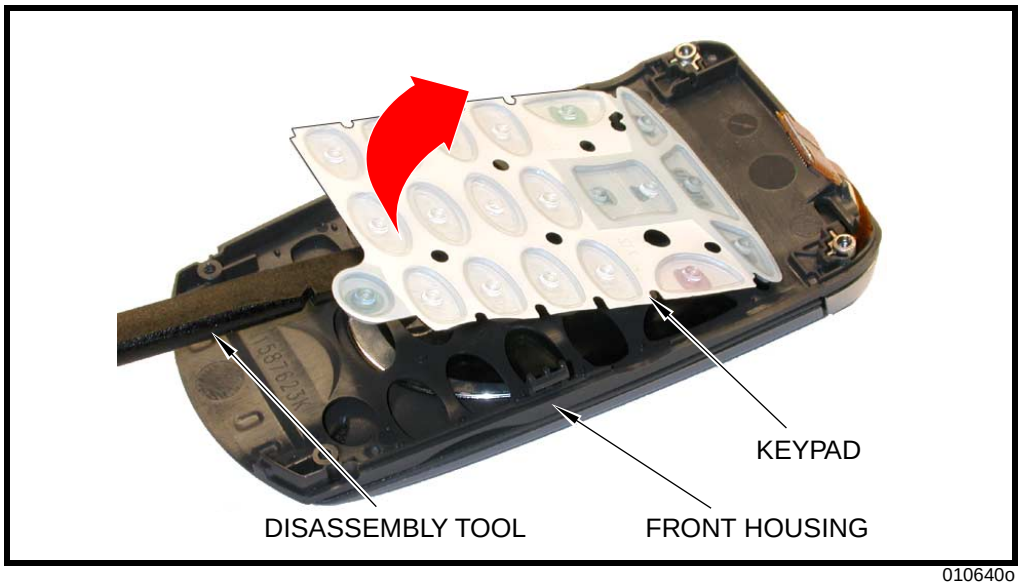

Figure 17. Removing the keypad

3. To replace, insert the keypad into the front housing, ensuring the keys align properly with the openings in the front housing.
4. Replace the keyboard assembly, spacer gasket, transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

Removing and Replacing the Flip Assembly

1. Remove the battery housing, battery, antenna, rear chassis assembly, transceiver board, spacer gasket, keyboard assembly, and keypad as described in the procedures.

The flex is fragile and easily damaged. Be very careful when passing the flex through the front housing opening.

2. Lift the front housing from the flip assembly being careful to not damage the flex attached to the flip assembly.

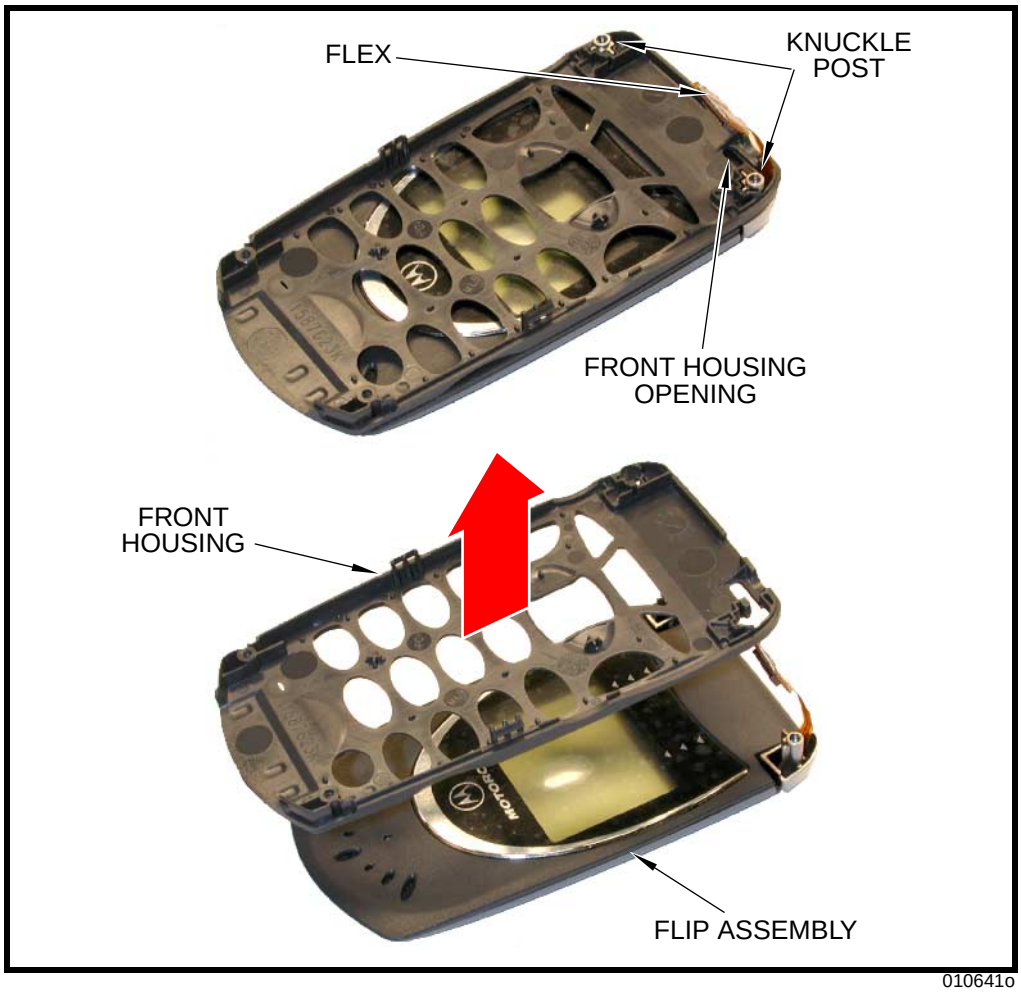

Figure 18. Removing the flip assembly from the front housing

When installing a new flip assembly, do not remove the transparent protective film from the lenses. This film prevents damage to the lenses during service and handling. It is to be removed only by the end user.

3. To replace, route the flex through the front housing opening and press the front housing firmly onto the knuckle posts. Be sure the front housing is flat against the flip assembly.
4. Replace the keypad, keyboard assembly, spacer gasket, transceiver board assembly, rear chassis assembly, antenna, battery, and battery housing as described in the procedures.

There are no Level 1 and 2 serviceable parts inside the flip assembly. The flip assembly must be replaced as a complete assembly.

Subscriber Identity Module (SIM) and Identification

SIM Card

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

The SIM contains:

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

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. V.60g telephones use TrueSync® synchronization software to effect a personality transfer.

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 19.

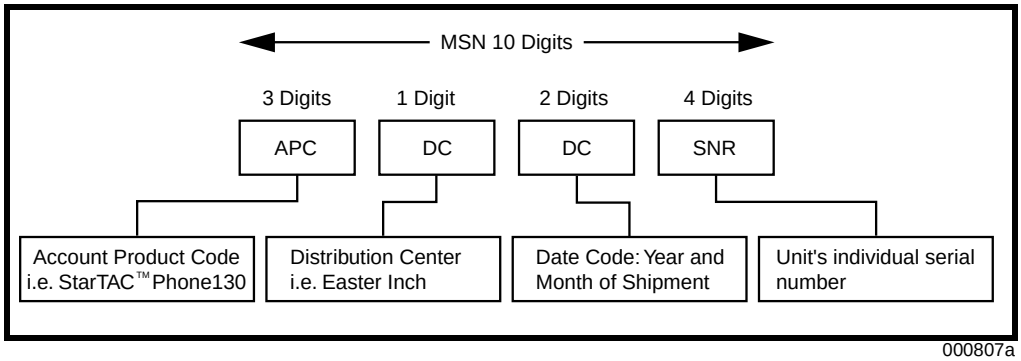

Figure 19. MSN Label breakdown

International Mobile Station Equipment Identity (IMEI)

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

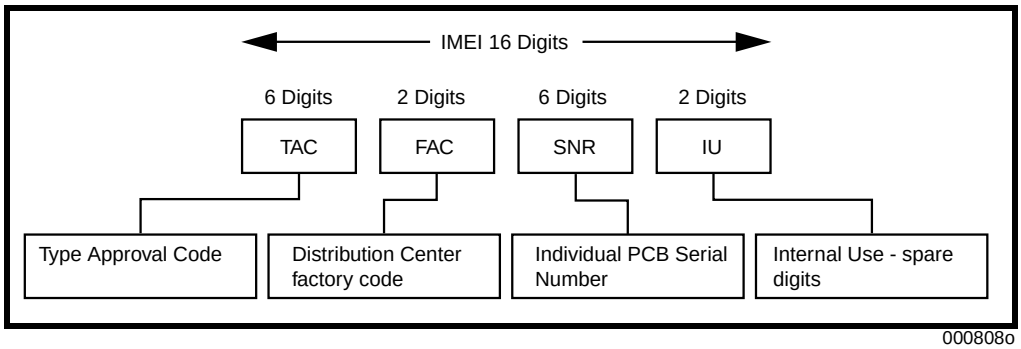

Figure 20. IMEI Label breakdown

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.

Troubleshooting

Manual Test Mode

Motorola V.60g 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.

Manual Test Mode Commands

Table 3. Manual Test Commands

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

Table 3. Manual Test Commands (Continued)

Key Sequence	Test Function/Name	Remarks
5*0*8	Set audio level 8	
5*0*9	Set audio level 9	
5*0*10	Set audio level 10	
5*0*11	Set audio level 11	
5*0*12	Set audio level 12	
5*0*13	Set audio level 13	
5*0*14	Set audio level 14	
5*0*15	Set audio level 15	
6*2*2*0*0	Set Audio Path. Int Mic, IntSpk, RX unmute, TX unmute	
6*4*6*0*0	Set Audio Path. Boom Mic, Boom Spk, RX unmute, TX unmute	
10*0*3	Set band GSM 900	
10*0*4	Set band DCS 1800	
10*0*5	Set band PCS 1900	
10*0*6	Set dual band GSM 900 / 1800	
10*1*0	Read band	3= GSM 4= DCS 5= PCS 6 =GSM/DCS
18*0	Initialize non-volatile memory (Master Reset)	
18*1	Initialize non-volatile memory (Master Clear)	
55*2*001	Test Display. All pixels ON	
55*2*000	Test Display. All pixels OFF	
55*2*002	Test Display. Checkerboard pattern A	
55*2*003	Test Display. Checkerboard pattern B	
55*2*004	Test Display. Border pixels ON	
*#06#	IMEI Check	No Test Mode Required
Phone Set up --> Phone Status --> Other Information	Flex Version / Technology / S-W Version / Readiness Status	No Test Mode Required

Troubleshooting Chart

Table 4. V.60g 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) Transceiver board assembly defective.	Remove the transceiver 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 transceiver board assembly. Verify that the fault has been cleared. If the fault has not been cleared then proceed to d.
	d) keyboard assembly failure.	Replace the keyboard assembly. Temporarily connect a +3.6 Vdc supply to the battery connectors. Depress the PWR button. If unit turns on and stays on, disconnect the dc power source and reassemble with the new keyboard assembly.
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 transceiver board assembly. If connected properly, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
3. Display is erratic, or provides partial or no display.	a) Transceiver board connections faulty.	Remove rear chassis assembly from unit, check general condition of flexible printed cable (flex). If the flex is good, check that the flex connector is fully pressed down. If not, check connector to transceiver board connections. If faulty connector, replace the transceiver board assembly. If connector is not at fault, proceed to b.
	b) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Table 4. V.60g Telephone: Level 1 and 2 Troubleshooting Chart (Contd.)

SYMPTOM	PRO ABLE CAUSE	VERIFICATION AND REMEDY
4. Incoming call alert transducer audio distorted or volume is too low.	Faulty transceiver board assembly.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone connections to the transceiver 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) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
6. Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from transceiver board assembly defective.	Gain access to the transceiver board assembly as described in the procedures. Check flex and the flex connector from the flip assembly to the transceiver board assembly. If flex is at fault, replace flip assembly. If flex connector is at fault, proceed to d. If connection is not at fault, proceed to b.
	b) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, 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) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble with the new transceiver board assembly.
7. Telephone will not recognize or accept SIM.	a) SIM defective.	Check the SIM contacts for dirt. Clean if necessary and check if fault has been cleared. If the contacts are clean, insert a known good SIM into the telephone. Power up the unit and confirm that the SIM has been accepted. If the fault no longer exists, replace the defective SIM. If the SIM is not at fault, proceed to b.
	b) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Table 4. V.60g Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
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) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
9. Vibrator feature not functioning.	Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
10. Internal Charger not working.	Faulty charger circuit on transceiver 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 transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
11. Real Time Clock resetting when standard battery is removed.	Lithium button cell in the display board may be depleted.	Refer service to a Level 3 service center for replacement.
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. If fault not cleared, proceed to b.
	b) Faulty jack socket on transceiver board assembly.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

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 V.60g telephones.

Related Publications

Motorola V.series™ 60g Wireless Phone Reference Guide, English	6809435A89

Exploded View Diagram

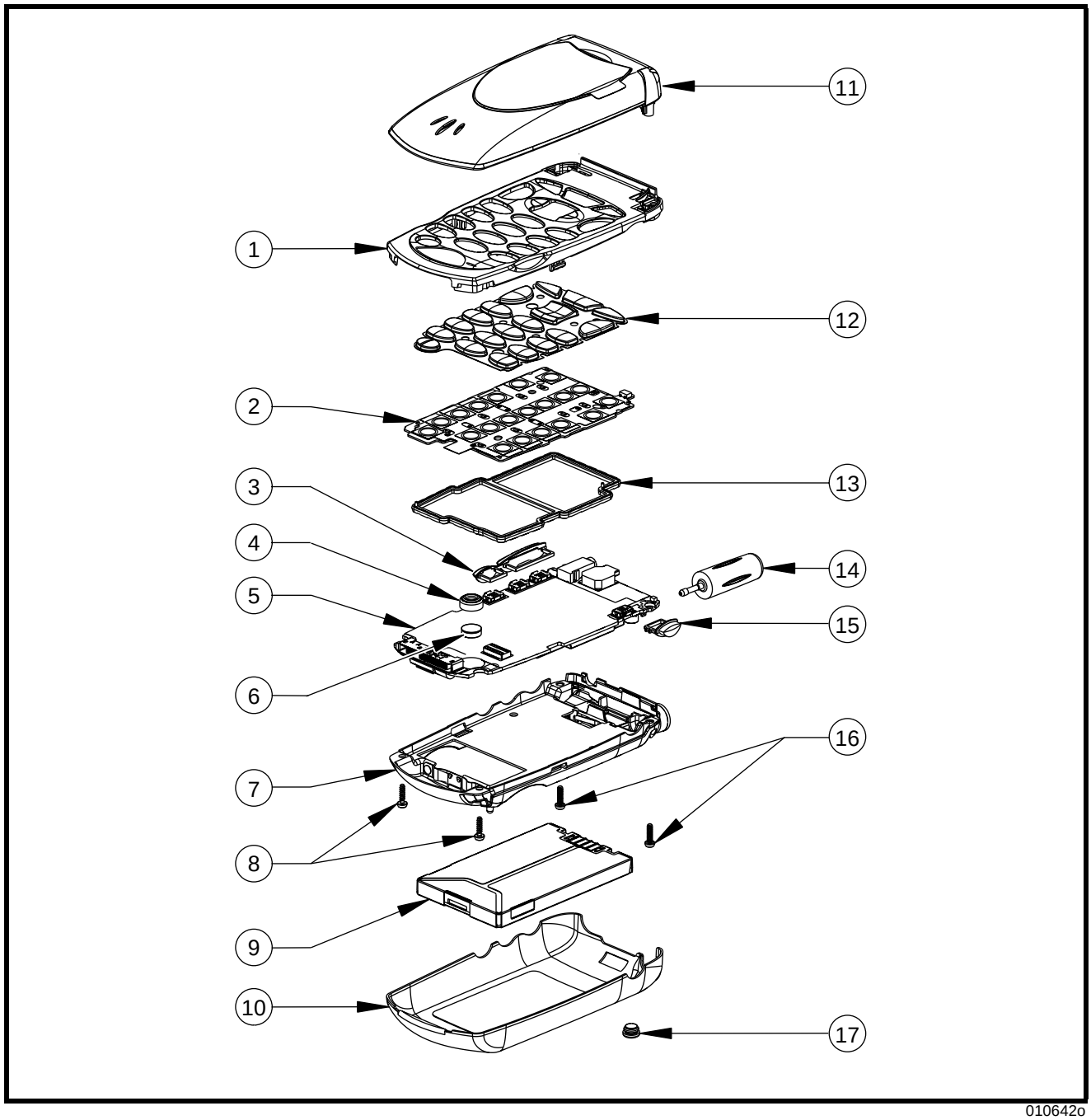

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Figure 21. Exploded view diagram

Exploded View Parts List

Table 5. Exploded View Parts List

Item Number	Motorola Part Number	Description
1	1587623K08	Front housing
2	0187969K03	Keyboard assembly
3	3887988K03	Volume / smart button
4	0587988K01	Microphone grommet
5	See Note 1	Transceiver board assembly
6	5087974K01	Microphone
7	0187514L19	Rear chassis assembly
8	0387790L04	Screw, transceiver (2)
9	See Table 7	Battery
10	See Table 7	Battery housing
11	0187985K09	Flip assembly
12	See Table 6	Keypad
13	2687960K03	Spacer gasket
14	8589243L05	Antenna
15	3887987K03	Voice button
16	0387791L01	Screw, knuckle (2)
17	3888329L01	RF plug

Notes: 1. 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.

Model-dependent Part Numbers

Table 6. Model-dependent Part Numbers

Item Number	Part Description	Part Number
12	Keypad, English	3887961K02
12	Keypad, Simple Chinese	3887961K03
12	Keypad, Complex Chinese	3887961K04

Accessories

Table 7. Accessories

Part Description	Part Number
Battery, slim, Li Ion, 500 mAh	SNN5717
Battery, high performance, Li Ion, 800 mAh	SNN5705
Battery, extra capacity Li Ion, 1100 mAh	SNN5706
Battery housing, slim battery	SYN9072
Battery housing, high performance battery	SYN8359
Battery housing, extra capacity battery	SYN8360
Mid-Rate travel charger	SPN4950
Adapter, travel charger, Euro plug	SYN7456
Adapter, travel charger, UK plug	SYN7455
Adapter, travel charger, Aus/NZ plug	SYN8127
Adapter, travel charger, Indian (5 Amp) plug	SYN7461
Adapter, travel charger, Korean plug	SYN7460
Desktop charger, dual pocket	SPN4772
Vehicle power adapter	SYN7818
Car kit, easy install	SYN8597
Car kit, pro install	S8780
Headset, FM stereo radio	SYN8609
Headset, send / end button	SYN8419
Headset, retractable	SYN8284
Neckloop, hands-free (compatible with T-coil hearing aids)	SYN7875
Speaker, hands-free clip-on	SYN8610
Desktop station, hands-free	SYN8596
Data kit, USB	98326
Data kit, serial multi-connect	98320
Data kit, serial multi-connect for Palm™ III/V	98321
Carry case, leather	SYN8463
Holster	SYN8454

V.60g L3 Parts List

Part Ref	Part Number	Part Description	Part Ref	Part Number	Part Description
A10	3989013L02	ANT CONTACT	Q932	4809579E29	SI3443
A11	0987796L01	ANT SWITCH	Q938	4809579E29	SI3443
AL900	5087951K01	SPKR	Q942	4809579E49	SI6467DQ
CR1948	4809948D18	SMS05	Q944	4809939C39	EMD9T2R
CR200	4809877C09	BB555	Q946	4809579E33	SI6963DQ
CR201	4809877C10	BB659	SH2	2688686K04	SHIELD
CR806	4809118D02	LNJ115W8P0MT	SH3	2688402K04	SHIELD
CR850	4808612Y01	RB751V-40	SH4	2688404K04	SHIELD
CR901	4813833B10	MBR0530T1	SH5	2688403K04	SHIELD
CR902	4813833B10	MBR0530T1	SH825	2609827G10	DOG HOUSE
CR903	4809924D18	RB520S-30	SH826	2609827G10	DOG HOUSE
CR932	4809653F07	MBRM120ET3	SH827	2609827G10	DOG HOUSE
CR940	4809653F07	MBRM120ET3	SH900DNP	2687960K03	LOGIC SH
CR950	4808612Y01	RB751V-40	SMART	4087635K01	DWN
D510	4809948D13	BA892	U10	5109572E38	AC_717
D545	4809948D13	BA892	U100	5113814A15	RF FE IC
D701	4809606E02	DAN222T	U110	5109522E74	NC7ST08
DWN	4087635K01	DWN	U120	5109522E74	NC7ST08
FL100	9103769S05	FILTER	U201	5109879E91	Magic DM
FL101	9109069E04	FILTER	U202	5109522E73	NC7WZ08K
FL102	9109239M12	FILTER	U300	4809283D85	HDI RX VCO
FL103	9109450C06	FILTER	U350	4809283D92	HDI TX VCO
FL104	9109487U02	IF SAW	U400	5109923D50	PAC
FL200DNP	9188695K02	Intarsia	U500	5109730C47	GSM PA
J650	0987837L02	HEADSET JACK 5pins	U550	5109730C48	DCS PA
J651	0985622G01	MIC CON	U702	5109509A36	KM616FR4010
J800	0987816K04	BD-BD CON	U703	5109509A39	CY62137V18
J825	0987817K01	DISPLAY CON 22 pin	U850DNP	5162852A33	IrDA
J850	0987636K05	CE BUS CON	U855	5162852A59	MUX SW
J851	3987522K03	BATTERY CON	U856	5162852A59	MUX SW
J890	3987955K02	SIM CON	U857	5162852A59	MUX SW
M810	5987947K02	VIBRATOR	U858	5162852A59	MUX SW
Q151	4809527E30	27E30	U859DNP	5109522E53	NC7SZ125
Q200	4809527E24	27E24	U900	5109879E83	GCAP3 Rev 2.6S
Q201	4809579E48	FDC6306P	U901	5109731C32	OVIC IC
Q203	4809579E48	FDC6306P	UP	4087635K01	DWN
Q204	4809579E39	FDG6323L	VA	4087635K01	DWN
Q403	4809939C35	EMT5	VR1948	4809788E06	UDZTE-176.8B
Q404	4809939C34	EMB10	VR802	4809788E06	UDZTE-176.8B
Q405	4809939C34	EMB10	VR825	4809788E06	UDZTE-176.8B
Q406	4809939C34	EMB10	VR826	4809788E06	UDZTE-176.8B
Q410	4809939C32	EMH4	VR827	4809788E06	UDZTE-176.8B
Q450	4809579E49	SI6467DQ	VR828DNP	4809788E06	UDZTE-176.8B
Q451	4809940E02	DTC114YE	VR829DNP	4809788E06	UDZTE-176.8B
Q530	4809527E26	2SC5081	VR940	4809788E06	UDZTE-176.8B
Q901	5109817F45	FET	VS1845	4809948D18	SMS05
			VS1946	4809948D18	SMS05
			VS1947	5109962C20	USB Buffer
			VS1949	4809948D18	SMS05
			Y200	4809612J35	26 MHz
			Y900	4809995L05	CC4V

00DNP	..	DNP
00DNP00001	RES,	DNP
00DNP00002	RES,	DNP
00DNP00037	RES,	DNP
00DNP00038	IDCTR,	DNP
00DNP00043	CAP,	DNP
00DNP00399	IDCTR,	DNP
00DNP11111	CAP,	DNP
0609175L02	RES,	.250
0609591M37	RESNET	10K
0609591M45	RESNET	47K
0613744L11	RES,	.24
0660076S01	RES,	0 OHM 30x60
0662057M01	RES,	0 OHM
0662057M02	RES,	1 OHM
0662057M14	RES,	3.3
0662057M19	RES,	5.1
0662057M26	RES,	10
0662057M32	RES,	18
0662057M34	RES,	22
0662057M38	RES,	33
0662057M42	RES,	47
0662057M43	RES,	51
0662057M46	RES,	68
0662057M50	RES,	100
0662057M54	RES,	150
0662057M58	RES,	220
0662057M62	RES,	330
0662057M68	RES,	560
0662057M70	RES,	680
0662057M74	RES,	1K
0662057M76	RES,	1.2K
0662057M78	RES,	1.5K
0662057M82	RES,	2.2K
0662057M83	RES,	2.4K
0662057M84	RES,	2.7K
0662057M86	RES,	3.3K
0662057M88	RES,	3.9K
0662057M90	RES,	4.7K
0662057M91	RES,	5.1K
0662057M92	RES,	5.6K
0662057M93	RES,	6.2K
0662057M98	RES,	10K
0662057N03	RES,	15K
0662057N06	RES,	20K
0662057N07	RES,	22K
0662057N09	RES,	27K
0662057N11	RES,	33K
0662057N13	RES,	39K
0662057N15	RES,	47K
0662057N19	RES,	68K
0662057N23	RES,	100K
0662057N32	RES,	240K
0662057N33	RES,	270K
0662057N34	RES,	300K

0662057N35	RES,	330K
0662057N39	RES,	470K
0662057N47	RES,	1MEG
0687874L02	RES,	.1
0688783L01	RES,	.24
0809084T38	CAP,	.0033UF
0809084T40	CAP,	.0047UF
0985622G01	CONN_J	MIC CON
0987636K03	CONN_J	CE BUS CON
0987636K05	CONN_J	CE BUS CON
0987796L01	CONN_J	ANT SWITCH
0987816K02	CONN_J	BD-BD CON
0987816K04	CONN_J	BD-BD CON
0987817K01	CONN_J	DISPLAY CON 22 pin
0987817K02	CONN_J	DISPLAY CON 16 pin
0987850K04	CONN_J	HEADSET JACK
0987984K01	CONN_J	ANT SWITCH
0987984K02	CONN_J	ANT SWITCH
0987837L02	CONN_J	HEADSET JACK 5pins
0989958K01	CONN_J	DISPAY SAPPH
2104801Z01	CAP,	0.5PF
2104801Z08	CAP,	1.2PF
2104801Z09	CAP,	1.3PF
2104801Z11	CAP,	1.6PF
2104801Z17	CAP,	3.0PF
2109622N01	CAP,	560PF
2113740F12	CAP,	2.4PF
2113740F14	CAP,	3PF
2113740F15	CAP,	3.3PF
2113740F17	CAP,	3.9PF
2113740F31	CAP,	15PF
2113740F35	CAP,	22PF
2113740F58	CAP,	200PF
2113740F59	CAP,	220PF
2113740F61	CAP,	270PF
2113740F65	CAP,	390PF
2113740F67	CAP,	470PF
2113741F28	CAP,	1300PF
2113743E03	CAP,	.015UF
2113743E20	CAP,	0.1UF
2113743F16	CAP,	1UF
2113743L05	CAP,	330PF
2113743L17	CAP,	1000PF
2113743L19	CAP,	1200PF
2113743L21	CAP,	1500PF
2113743L33	CAP,	4700PF
2113743L41	CAP,	.01UF
2113743M24	CAP,	0.1UF
2113743N03	CAP,	1PF
2113743N05	CAP,	1.2PF
2113743N07	CAP,	1.5PF
2113743N08	CAP,	1.6PF
2113743N10	CAP,	2.2PF
2113743N12	CAP,	2.7PF
2113743N13	CAP,	3.0PF

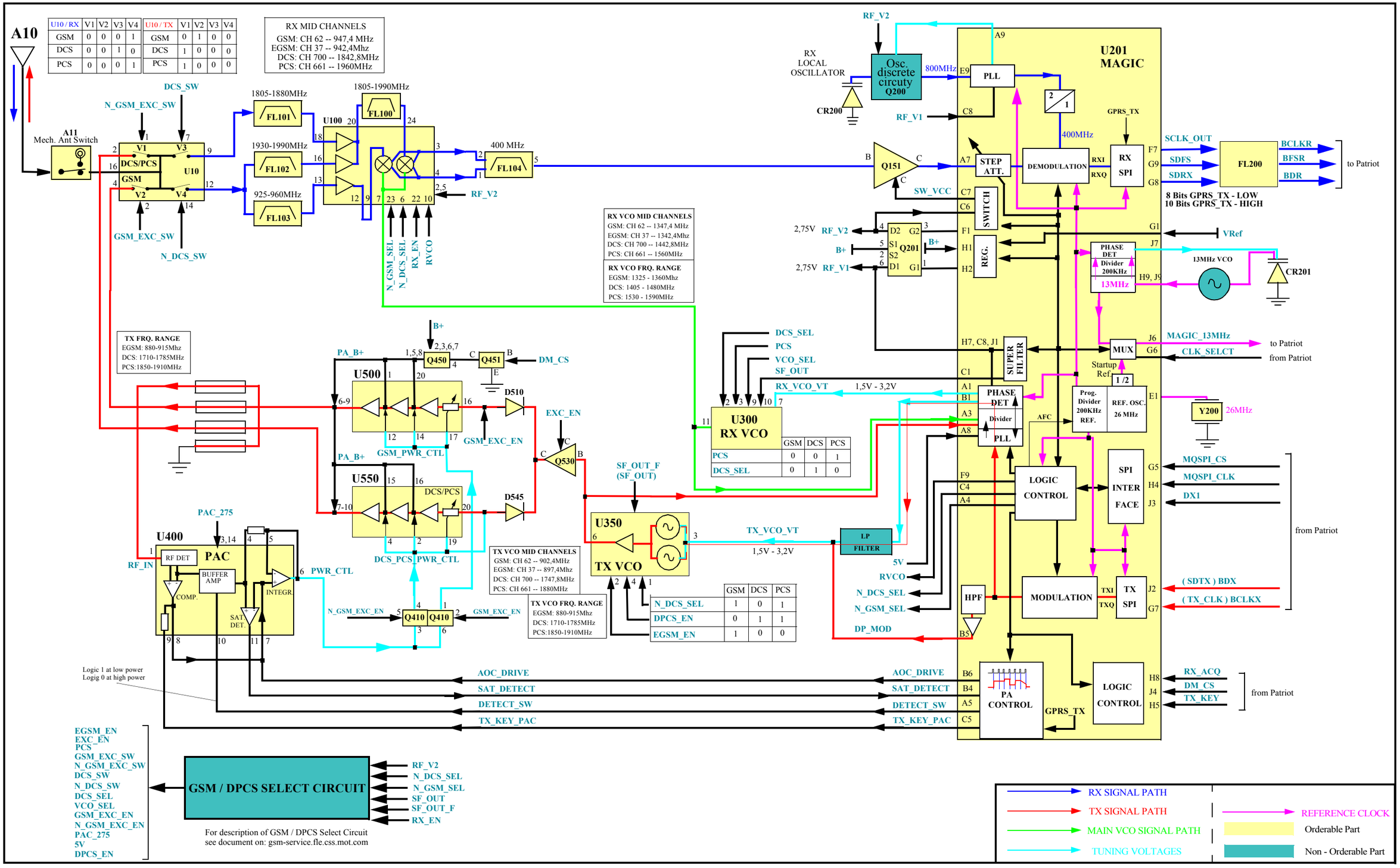
2113743N14	CAP,	3.3PF
2113743N16	CAP,	3.9PF
2113743N18	CAP,	4.7PF
2113743N19	CAP,	5.1PF
2113743N20	CAP,	5.6PF
2113743N24	CAP,	8.2PF
2113743N26	CAP,	10PF
2113743N27	CAP,	11PF
2113743N28	CAP,	12PF
2113743N30	CAP,	15PF
2113743N34	CAP,	22PF
2113743N36	CAP,	27PF
2113743N38	CAP,	33PF
2113743N40	CAP,	39PF
2113743N42	CAP,	47PF
2113743N44	CAP,	56PF
2113743N50	CAP,	100PF
2113743N52	CAP,	120PF
2113743N54	CAP,	150PF
2113928A01	CAP,	1.0UF
2113928C03	CAP,	1.0UF
2113928C04	CAP,	4.7UF
2113928J08	CAP,	10UF
2113928N01	CAP,	0.1UF
2113928P04	CAP,	1.0UF
2113928V08	CAP,	10UF
2309121D10	CAPP,	33UF
2311049A58	CAPP,	10UF
2311049A89	CAPP,	22UF
2387328L01	CAPP,	33UF
2387328L02	CAPP,	33UF
2404554Z27	IDCTR,	8.2UH
2409134J27	IDCTR,	100MH
2409154M01	IDCTR,	1.0NH
2409154M04	IDCTR,	1.8NH
2409154M05	IDCTR,	2.2NH
2409154M09	IDCTR,	4.7NH
2409154M10	IDCTR,	5.6NH
2409154M11	IDCTR,	6.8NH
2409154M12	IDCTR,	8.2NH
2409154M13	IDCTR,	10.0NH
2409154M15	IDCTR,	15.0NH
2409154M17	IDCTR,	22.0NH
2409154M19	IDCTR,	33.0NH
2409154M20	IDCTR,	39.0NH
2409154M60	IDCTR,	5.6NH
2409154M86	IDCTR,	6.8NH
2409646M03	IDCTR,	5.6NH
2409646M04	IDCTR,	6.8NH
2409646M05	IDCTR,	8.2NH
2409646M09	IDCTR,	18NH
2409646M13	IDCTR,	39NH
2409646M85	IDCTR,	22NH
2409646M87	IDCTR,	33NH
2409646M94	IDCTR,	47NH

2409646M95	IDCTR,	39NH
2409646M96	IDCTR,	68NH
2409646M97	IDCTR,	82NH
2503778K07	IDCTR,	15UH
2503778K12	IDCTR,	47NH
2609827G10	SHIELD	DOG HOUSE
2687960K03	SHIELD	LOGIC SH
2888196K01		SMART CON
2688402K03	SHIELD	SHIELD
2688402K04	SHIELD	SHIELD
2688403K02	SHIELD	SHIELD
2688403K04	SHIELD	SHIELD
2688404K03	SHIELD	SHIELD
2688404K04	SHIELD	SHIELD
2688686K03	SHIELD	SHIELD
2688686K04	SHIELD	SHIELD
2880001S07	CONN_P	HEADER
2880001S10	CONN_P	HEADER
3987522K02	CONTACT	BATTERY CON
3987522K03	CONTACT	BATTERY CON
3987955K01	CONTACT	SIM CON
3987955K02	CONTACT	SIM CON
3988742L01	ANTENNA	ANT CONTACT
3989006K01	ANTENNA	ANT CONTACT
3989006K03	ANTENNA	ANT CONTACT
3989013L01	ANTENNA	ANT CONTACT
3989013L02	ANTENNA	ANT CONTACT
4087635K01	SWITCH	DWN
4808612Y01	RB751V-40	RB751V-40
4809118D02	LNJ115W8P0MT	LNJ115W8P0MT
4809283D63	83D63	RX VCO
4809283D65	ATXN1007A	TX VCO
4809283D84	TX VCO	HDI TX VCO
4809283D85	RX VCO	HDI RX VCO
4809283D92	TX VCO	HDI TX VCO
4809527E24	27E24	27E24
4809527E26	2SC5081	2SC5081
4809527E30	27E30	27E30
4809579E29	SI3443	SI3443
4809579E33	SI6963DQ	SI6963DQ
4809579E35	FDG6301N	FDG6301N
4809579E39	FDG6323L	FDG6323L
4809579E48	FDC6306P	FDC6306P
4809579E49	SI6467DQ	SI6467DQ
4809579E52	FDZ204P	FDZ204P
4809606E02	DAN222T	DAN222T
4809612J35	XTAL	26 MHz
4809653F07	MBRM120ET3	MBRM120ET3
4809788E06	UDZTE-176.8B	UDZTE-176.8B
4809877C09	BB555	BB555
4809877C10	BB659	BB659
4809924D18	RB520S-30	RB520S-30
4809939C31	EMD3	EMD3
4809939C32	EMH4	EMH4
4809939C34	EMB10	EMB10

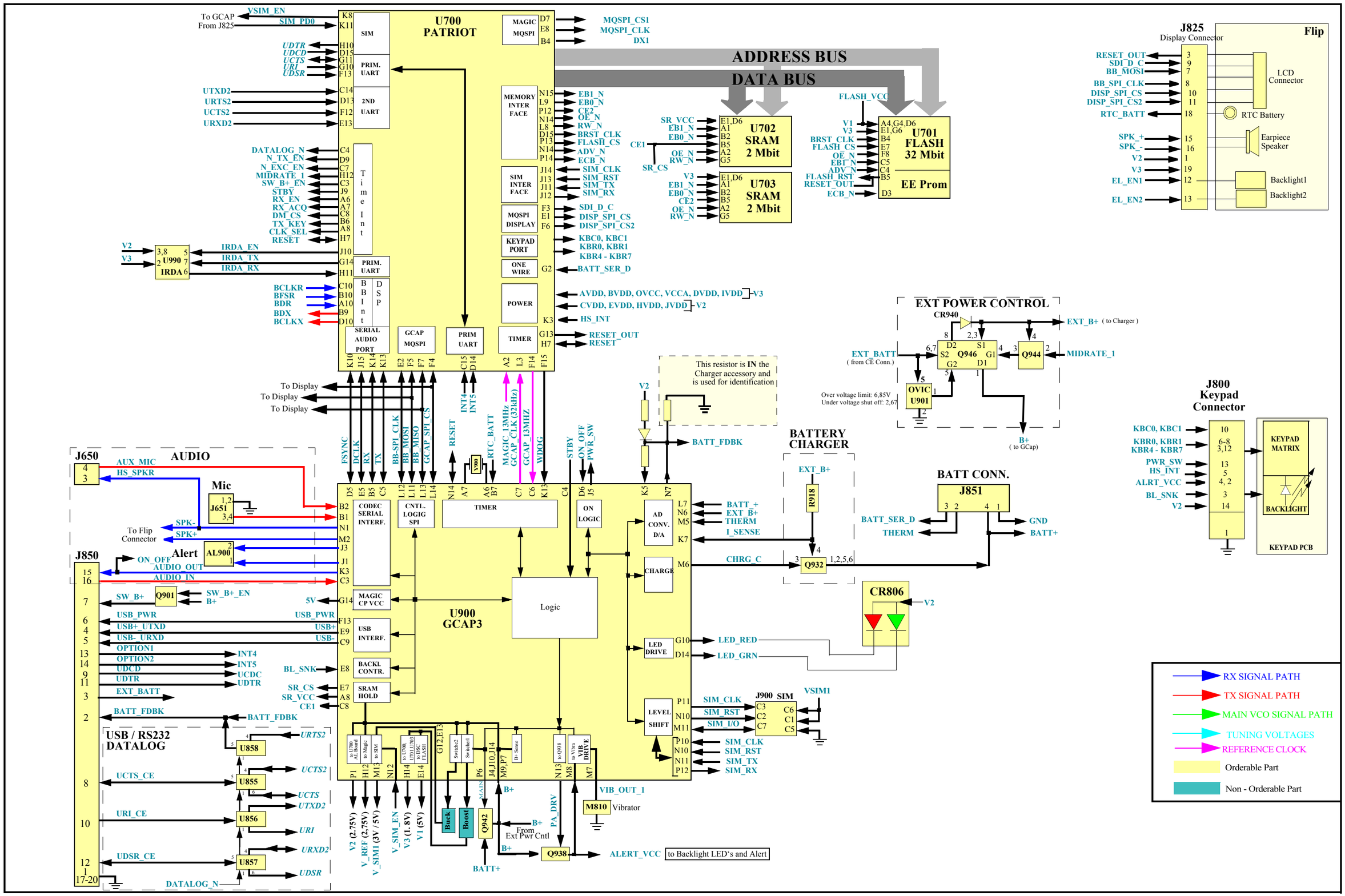
4809939C35	EMT5	EMT5	
4809939C39	EMD9T2R	EMD9T2R	
4809940E02	DTC114YE	DTC114YE	
4809948D12	BAR_63-02W	BAR_63-02W	
4809948D13	BA892	BA892	48D39
4809948D18	SMS05	SMS05	
4809995L05	CC4V	CC4V	
4809995L10	CC4V	CC4V	
4813833B10	MBR0530T1	MBR0530T1	
4887611L01	IFR7555	IFR7555	
5087951K01	SPKR	SPKR	
5109509A36	KM616FR4010	KM616FR4010	
5109509A39	CY62137V18	CY62137V18	
5109522E52	TC7SET32FU	TC7SET32FU	
5109522E53	NC7SZ125	NC7SZ125	
5109522E73	NC7WZ08K	NC7WZ08K	
5109522E74	NC7ST08	NC7ST08	
5109572E38	AC_717	AC_717	
5109730C38	UPG2117G,	GSM PA	
5109730C39	UPG2118K,	DCS PA	
5109730C47	NEC 2000-2	GSM PA	
5109730C48	NEC 2000-3	DCS PA	
5109731C32	MC33645	OVIC IC	
5109817F31	PST995PUR	PST995PUR	
5109817F45	nn	FET	
5109817F50	SP6680	Charge pump	
5109841C63	nn	Patriot RAM2.1 17x17	
5109879E50	79E50	Magic DM	
5109879E62	GCAP3	GCAP3 Rev 2.0	
5109879E73	GCAP3	GCAP3 Rev 2.4	
5109879E82	GCAP3	GCAP3 Rev 2.4S	
5109879E83	GCAP3	GCAP3 Rev 2.6S	
5109879E91	79E91	Magic DM	
5109923D50	23D50	PAC	
5109944C42	MC13709	RF FE IC	
5109962C20	STF202_22	USB Buffer	
5113814A15	MC13709	RF FE IC	
5162852A33	HSDL3202	IrDA	
5162852A59	MAX4599EXT	MUX SW	
5195015D07		Patriot GROM3	
5199443A01	43A01	FLASH	
5199471C03		Patriot GROM2	
5199470C03		Patriot GROM2 13x13	
5199491A01		Flash 64Mbit Whitecliff	
5199494A01		Flash 32Mbit Whitecliff	
5987947K01	MOTOR	VIBRATOR	
5987947K02	MOTOR	VIBRATOR	
9103769S04	69S04	FILTER	
9103769S05	69S04	FILTER	
9109069E04	SAFC1842	FILTER	
9109239M05	F6CE	FILTER	
9109239M12	F6CE	FILTER	
9109450C06	50C06	FILTER	
9109487U02	400MHz	IF SAW	
9188695K02	RCC012_01	Intarsia	

PT09LVLA03	CONN_J,	CONNECTOR
PT51BTNA17	TNA17	Patriot 13X13
PT51LVLA06	VLA06	PGA Socket
PT51LVLA95	VLA95	FET
PT51PLTA16	LTA16	Patriot 17X17
SHORT_RES0402	SHORT	SHORT

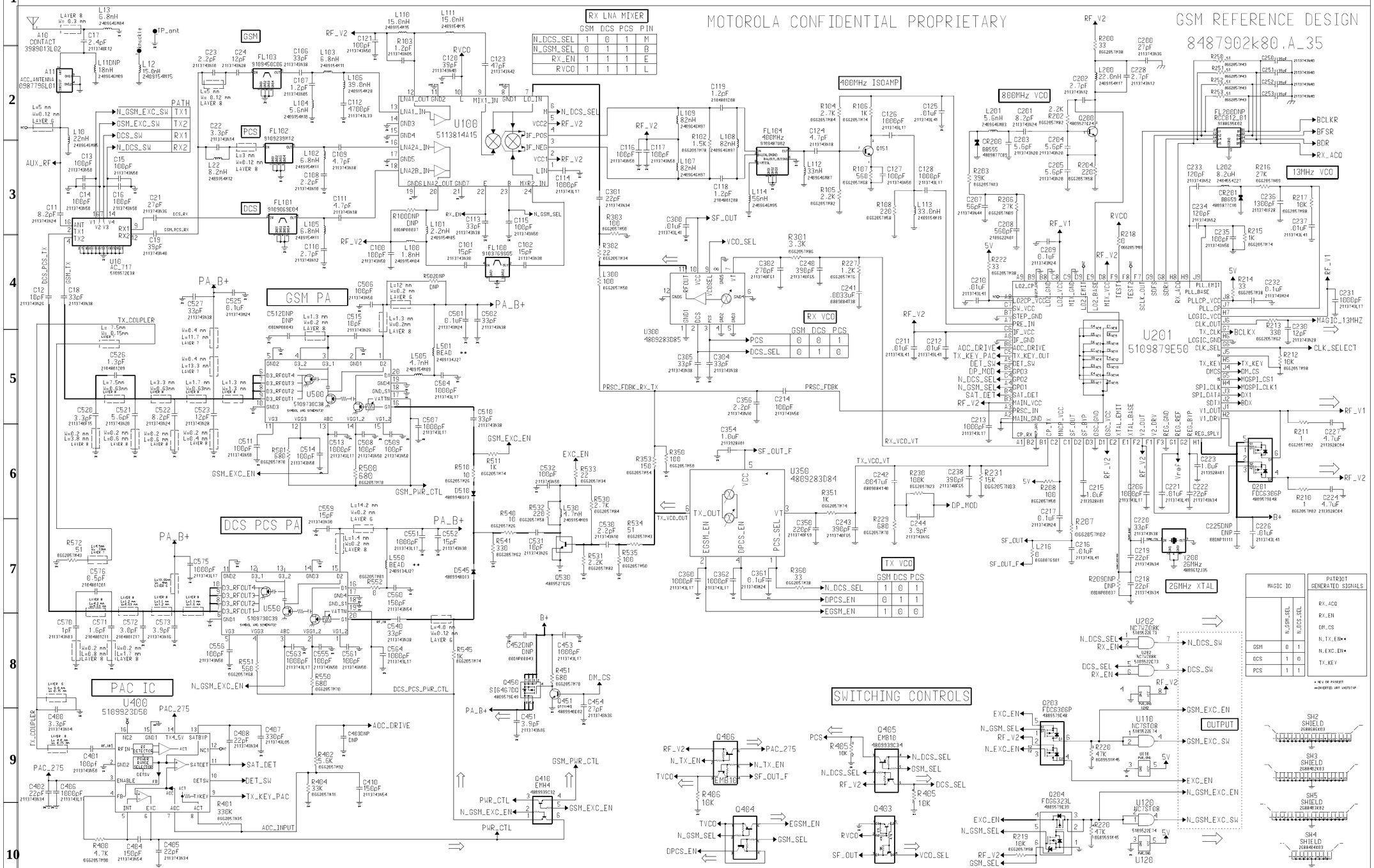
V.60g - BLOCK DIAGRAM (pg. 1/2)



V.60g - BLOCK DIAGRAM (pg. 2/2)



RF SCHEMATIC



AL SCHEMATIC SIDE 1 OF 2

MOTOROLA CONFIDENTIAL PROPRIETARY

GSM REFERENCE
8487902k80,A_35
SHEET 1: LOGIC

Issue	Date

DISP Conn_22
J825
0987817K01

MIDRATE CHARGER

BATTERY CHARGER

BATTERY BLOCK

USB / RS232 DATALOG

EXT CONNECTOR
J850

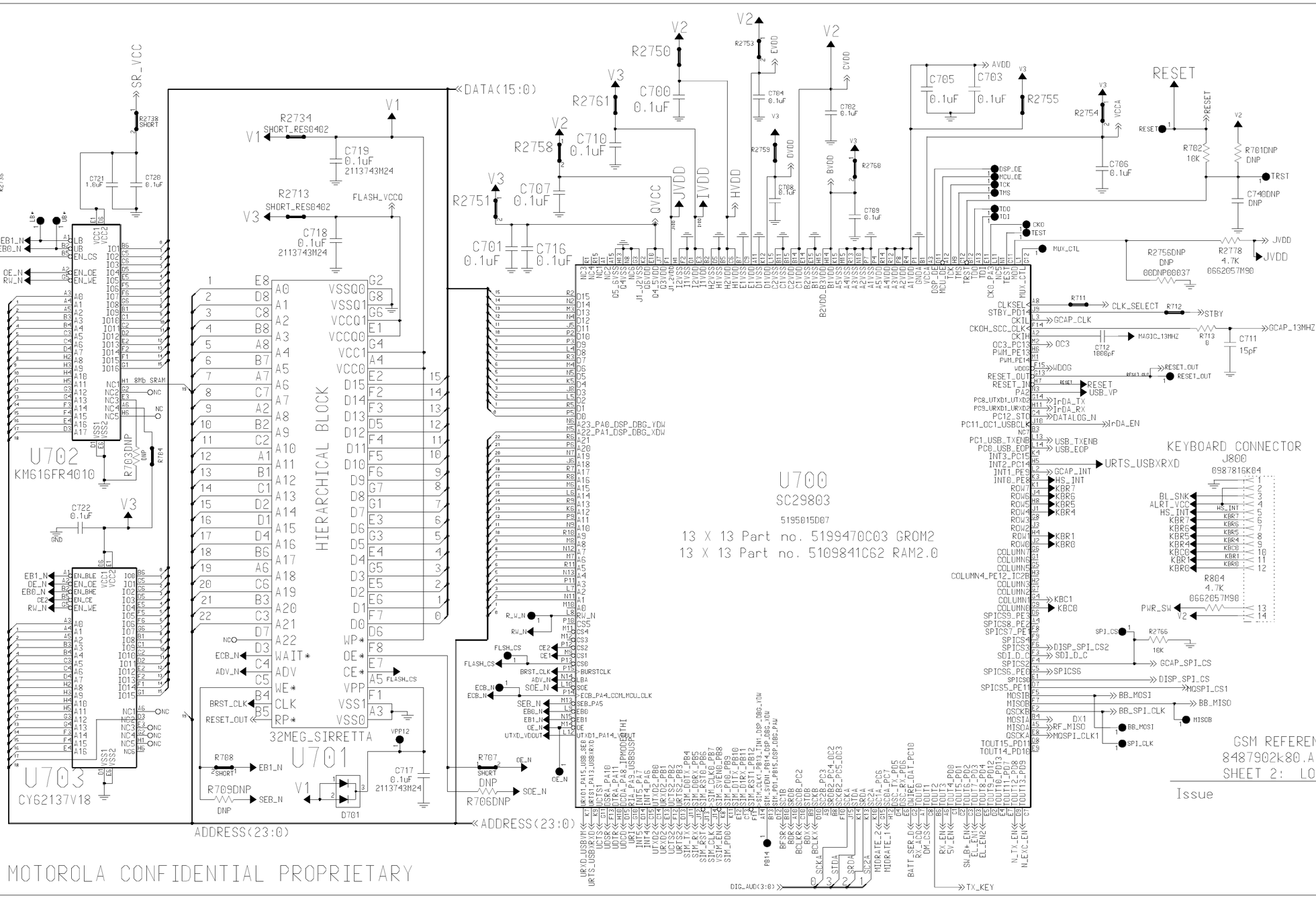
IRDA

PCB MOUNTED BUTTONS

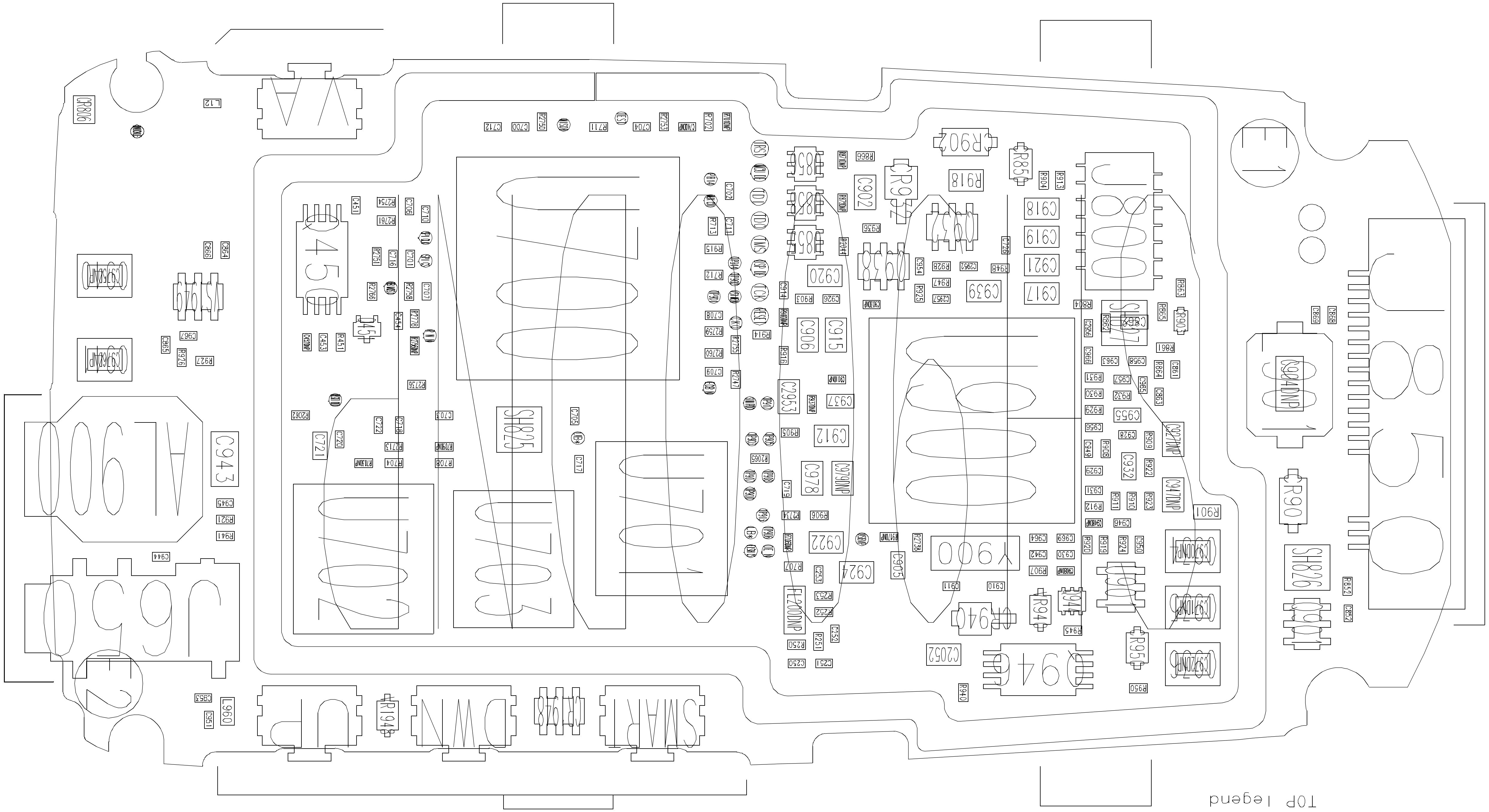
LED INDICATORS

U900
GCAP3_180PBGA
HIERARCHICAL BLOCK
Rev. 2.6 Part no. 5109879E83

AL SCHEMATIC SIDE 2 OF 2

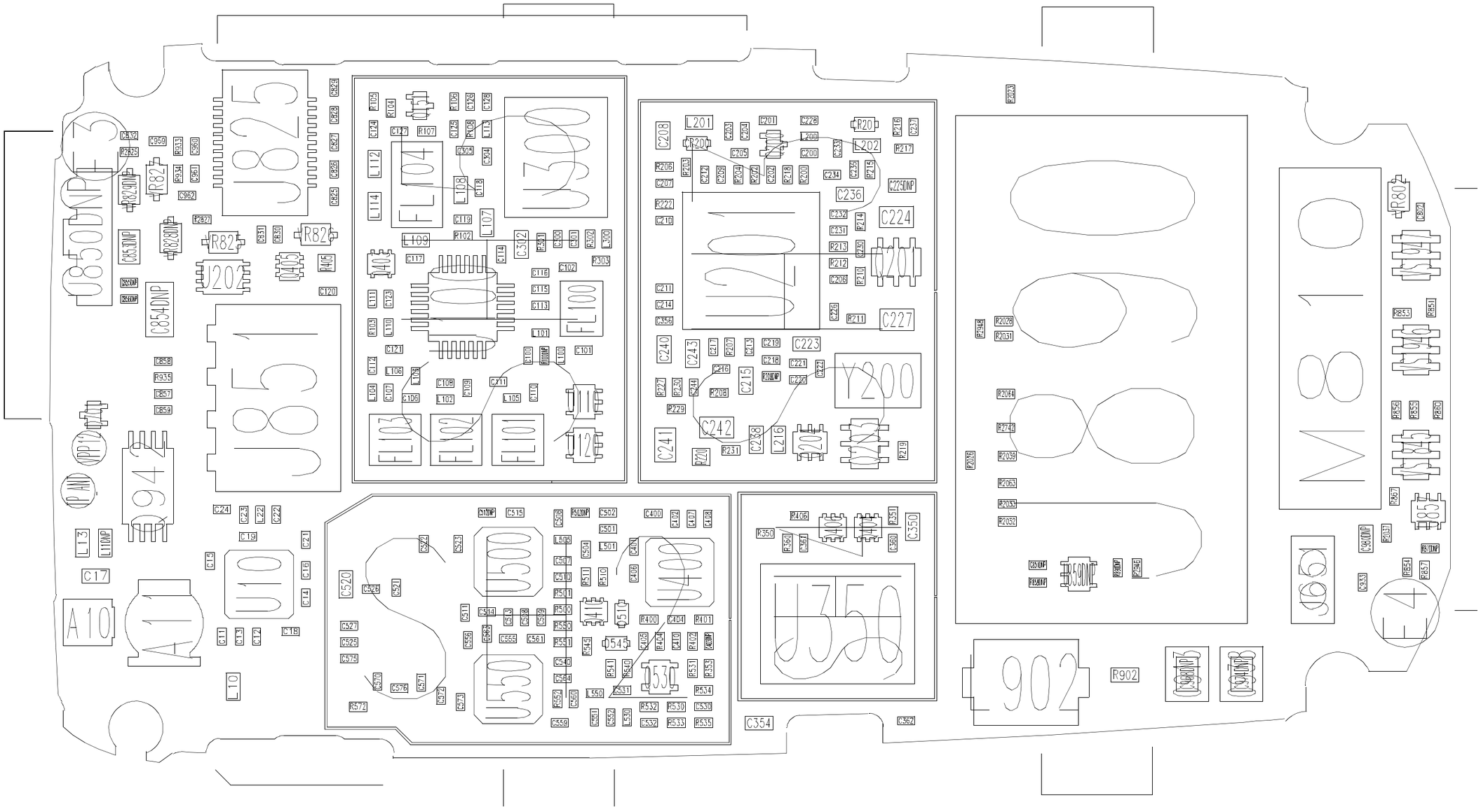


V.60g - BOARD LAYOUT - TOP SIDE

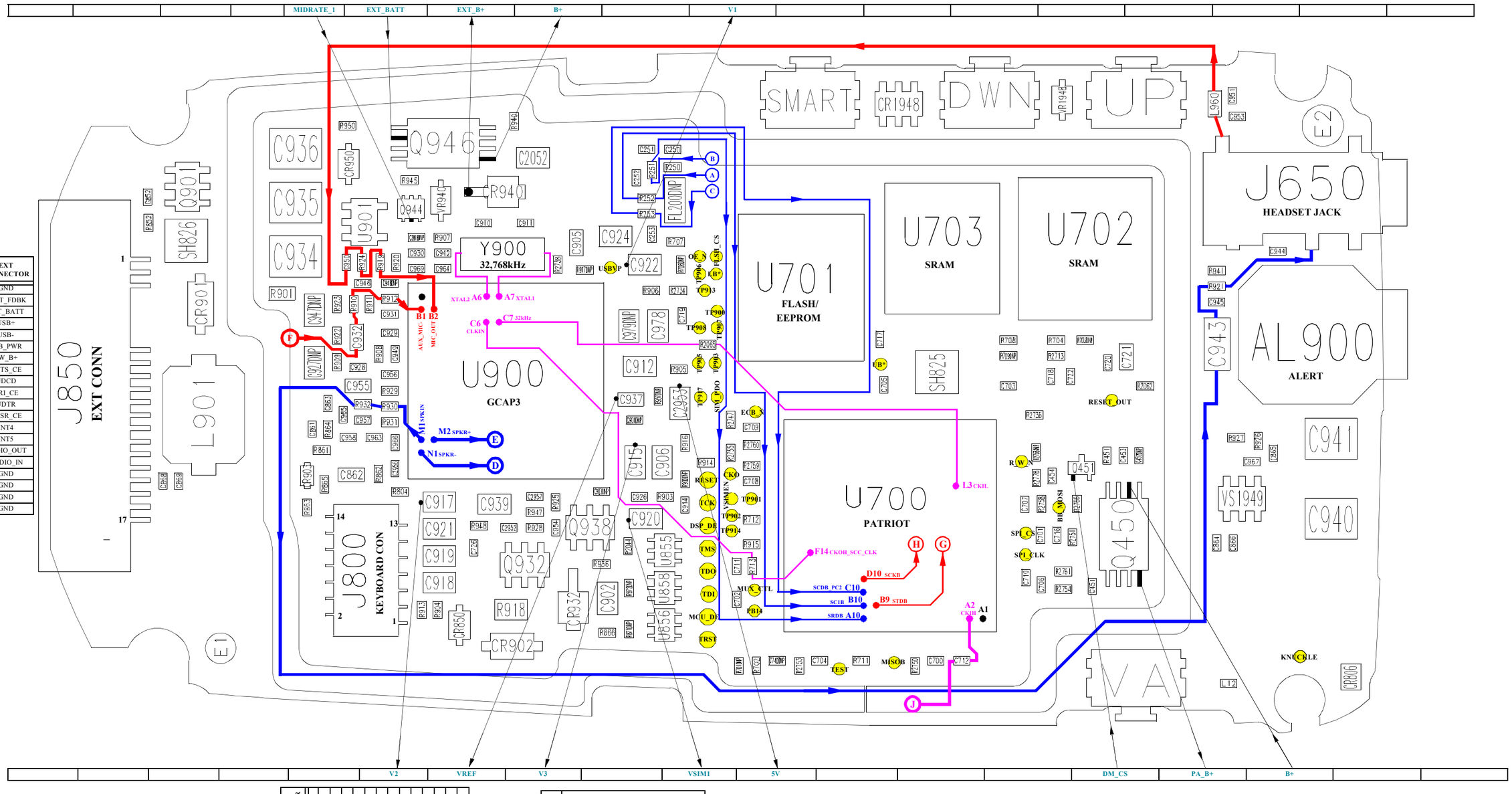


V.60g - BOARD LAYOUT - BOTTOM SIDE

Bottom legend



V.60g - SIGNAL FLOW - TOP SIDE

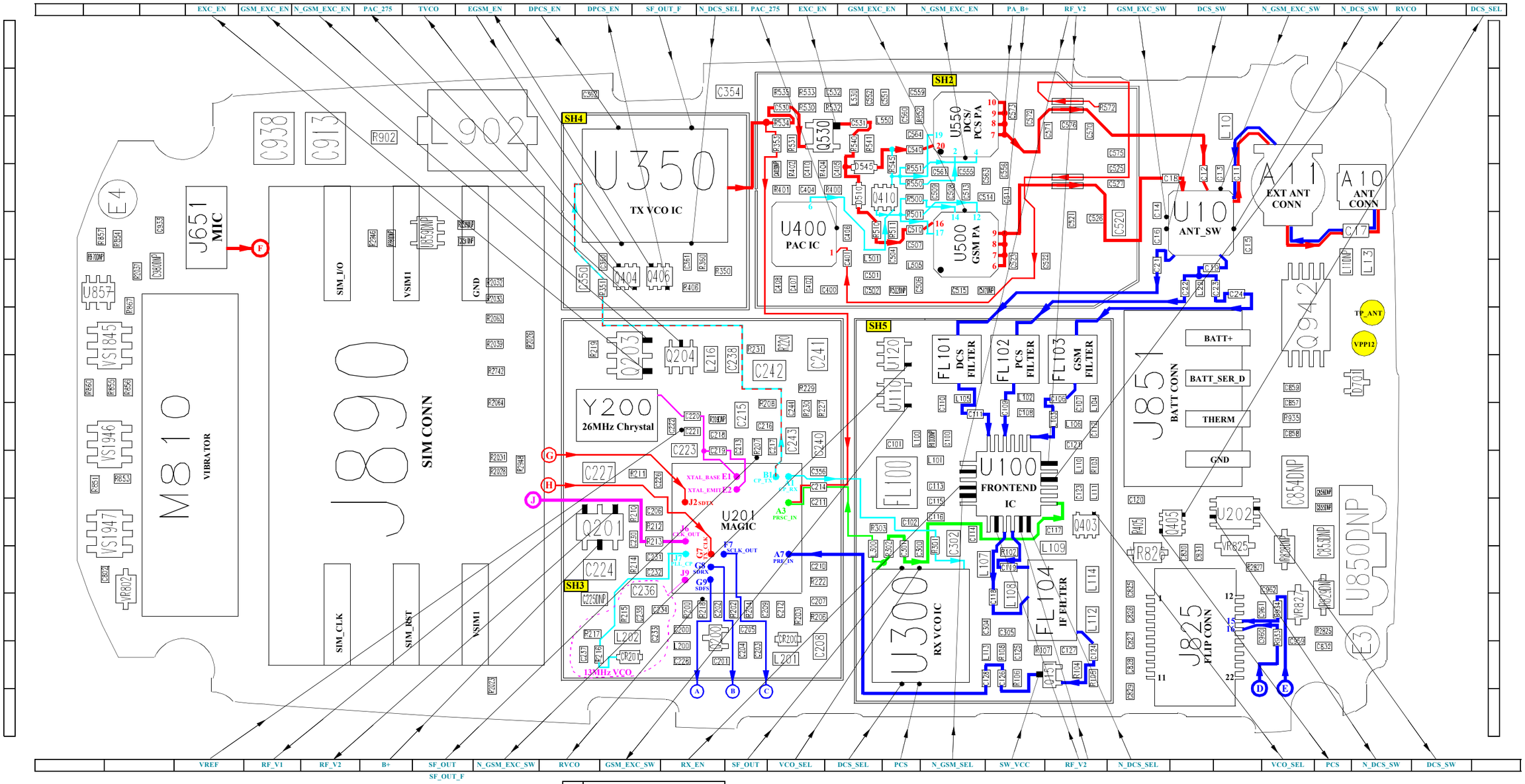


J850	EXT CONNECTOR
1	GND
2	BATT_FDBK
3	EXT_BATT
4	USB+
5	USB-
6	USB_PWR
7	SW_B+
8	UCTS_CE
9	UDCD
10	URI_CE
11	UDTR
12	UDSR_CE
13	INT4
14	INT5
15	AUDIO_OUT
16	AUDIO_IN
17	GND
18	GND
19	GND
20	GND

J800	KEYBOARD CONNECTOR
1	GND
2	ALRT_VCC
3	BL_SNK
4	ALRT_VCC
5	HS_INT
6	KBR7
7	KBR6
8	KBR5
9	KBR4
10	KBC0
11	KBR1
12	KBR0
13	PWR_SW
14	V2

A	BFSR SIGNAL TO PATRIOT
B	BDR SIGNAL TO PATRIOT
C	BCLKR SIGNAL TO PATRIOT
D	RX SPEAKER LINE -
E	RX SPEAKER LINE +
F	TX MIC LINE
G	BDX SIGNAL TO MAGIC
H	BCLKX SIGNAL TO MAGIC
J	MAGIC_13MHz TO PATRIOT

V.60g - SIGNAL FLOW - BOTTOM SIDE



A	BFSR SIGNAL TO PATRIOT
B	BDR SIGNAL TO PATRIOT
C	BCLKR SIGNAL TO PATRIOT
D	RX SPEAKER LINE -
E	RX SPEAKER LINE +
F	TX MIC LINE
G	BDX SIGNAL TO MAGIC
H	BCLKX SIGNAL TO MAGIC
J	MAGIC_13MHz TO PATRIOT

J825	FLIP CONNECTOR
1	V2
2	V2
3	RESET_OUT
4	GND
5	GND
6	GND
7	BB_MOSI
8	BB_SPI_CLK
9	SDI_D_C
10	DISP_SPI_CS
11	DISP_SPI_CS2
12	EL_EN1
13	EL_EN2
14	GND
15	SPK+
16	SPK-
17	GND
18	RTC_BATT
19	V3
20	NC
21	NC
22	NC

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S

T

U

V

W

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