



Level 3 Service Manual

Personal Interactive Communicator



Model A009
GSM / GPRS 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.

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 A009 Personal Interactive 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.

Computer Program Copyrights

The Motorola products described in this manual may include Motorola computer programs stored in semiconductor memories or other media that are copyrighted with all rights reserved worldwide to Motorola. Laws in the United States and other countries preserve for Motorola, Inc. certain exclusive rights to the copyrighted computer programs, including the exclusive right to copy, reproduce, modify, decompile, disassemble, and reverse-engineer the Motorola computer programs in any manner or form without Motorola's prior written consent. Furthermore, the purchase of Motorola products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license or rights under the copyrights, patents, or patent applications of Motorola, except for a nonexclusive license to use the Motorola product and the Motorola computer programs with the Motorola product.

About This Service Manual

Using this service manual and the many suggestions contained in it assures proper installation, operation, and maintenance of A009 communicators. Refer any 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 provides assistance to service personnel in testing and repairing A009 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 A009 communicators, and also to provide procedures and processes for repairing the units at Level 1 and 2 service centers including:

- Unit Swapout
- Repairing of mechanical faults
- Basic modular troubleshooting
- Testing and verification of unit functionality
- Initiating warranty claims and sending faulty modules to Level 3 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 ".

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 Hi-Tech Centers will perform level 4 (full component) repairs.

Customer Support

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

Ordering Replacement Parts

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

Specifications

Table 1. A009 Specifications

General Function	Specification
Frequency Range EGSM	880-915 MHz Tx 925-960 MHz Rx
Frequency Range PCS	1850-1910 MHz Tx 1930-1990 MHz Rx
Frequency Range DCS	1710-1785 MHz Tx 1805-1880 MHz Rx
Channel Spacing	200 kHz
Channels	174 EGSM; 274 PCS; 374 DCS
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz EGSM, 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 + 1.4V ±5% up to 6.63V Mid Rate Charger = 5.9V ±0.3V VPA (CLA) Supply = 4.4V ± 5% Battery Operating Voltage = 3.0V (radio shutdown voltage) to 4.2 V Max
Transmit Current	Typically 250 mA avg, 2.0A peak in phone mode with speaker accessory attached
Stand-by Current	Typically 8 mA (DRX2)
Dimensions	97.1 mm x 71.5 mm x 27.1 mm (3.8 inches X 2.8 inches X 1.1 inches)
Size (Volume)	150 cm ³ (9.1 cubic inches)
Weight	160 grams (5.7 ounces)
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Type	3.6 V nominal Lithium Ion
Battery Life	Talk Time 125 to 160 minutes Standby 80 to 125 hours
Viewing Window Size	60 mm x 40 mm
Display Type	1/8th VGA poly-silicon active matrix color LCD
Display Size	240 x 160 pixels
Display Lighting	White LED front light, user selectable auto or manual
Transducer Loudness	95 dB at 5 cm
Keypad Type	Metal popple-dome array

Transmitter Function	Specification
Maximum RF Power Output	33 dBm ±2 dB EGSM, 30 dBm ±2 dB PCS and DCS
Output Impedance	50 ohms (nominal)
Spurious Emissions (Allocated Channel)	-36 dBm from 9 KHz 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) Class II	< 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

Table 1. A009 Specifications(Continued)

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

Digital Data Function	Specification
GPRS	3D/1U (MS class 4, type 1) w/o encryption, 3D/1U with encryption, ETSI SMG 31
USSD	Phase II Unstructured Supplementary Services Data
STK	Class III or higher
Circuit Switched Data/FAX	9.6 kbps max.

Internet Function	Specification
WAP	Wireless Application Protocol 1.1 gateway

Product Overview

Motorola A009 communicators use triband technology that allows messaging and cellular telephony while roaming across the global system for mobile communications (GSM) 900, 1800, and 1900 MHz ranges. The communicator also provides personal digital assistant (PDA) capability that features a number of built-in applications, programmability to support third-party applications, and a high-resolution color display.

The A009 communicator supports general packet radio service (GPRS) in addition to traditional circuit switched and short message service (SMS) 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 re-connect 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.

Features

A009 communicators use the most advanced, self-contained, sealed, custom integrated circuits (ICs) 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 A009 communicators.

- Lower voltage technology provides increased standby and talk times
- Tri-band (GSM900/digital cellular system (DCS)1800/personal communications services (PCS)1900) capability
- Tri-coder/decoder (CODEC) that allows Full Rate, Half Rate, and Enhanced Full Rate modes of transmission
- Enhanced QWERTY keyboard
- 1/8 video graphics array (VGA) (240 x 160) low-temperature poly-silicon (P-Si) color display
- External headset
- VibraCall™ feature
- 3-pin RS232 connection
- Language support for prompts, SMS, and the phonebook
- Calling name presentation
- Display animation
- Call divert interrogation
- Supports GPRS, circuit switched, and SMS networks
- Concatenated SMS
- Wireless application protocol (WAP) 1.1 compliant
- Email transports include SMS email, post office protocol (POP)3, WAP email, subscriber identity module (SIM) Toolkit, and EmailVClient™
- Supports Phase II unstructured supplementary services data (USSD)

- SIM Toolkit (STK)
- Core PDA applications include message manager, contacts / address book, micro-browser, calendar / scheduler, tasks / to-do list, memo / note pad, express beaming, calculator, infrared data association (IrDA) beaming, welcome tour / out-of-box service provisioning, wireless modem, SIM Toolkit, games, news / sports / weather channels, and email
- Support for third-party applications
- Infrared (IR) port
- TrueSync[®] synchronization

Enhanced Keyboard

The keyboard integrates both QWERTY keyboard and phone keypad functionality for ease of use. The product supports the English keyboard, and optionally a French keyboard, at this time.

- Ten (10) user defined hot keys are available. The user assigns the number keys (0-9) to specific applications (i.e. 1-messages, 2-alarm, 3-online help) using the control panel.
- Keys have a positive tactile feel, giving the user physical feedback. Electronic audible key "clicks" are also be available, with user having option to enable / disable.
- The keys have backlighting and the display has front lighting for readability in low-light conditions. Operation of the lighting is automated but can be overridden by the user.
- All special characters reside in single pull-up menu on the display (ALT-SYMBOL).

WAP 1.1

The A009 communicator uses the Phone.com browser. 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.

USSD

This is a service 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 special network functions, such as help lines.

SIM Toolkit

The SIM Toolkit standard extends the role of the SIM card beyond its initial role as an essentially passive network access and speech security implementation by making it a key interface between the mobile terminal and the network. Using the SIM Toolkit, the SIM card can be programmed to carry out new functions. These include the ability to manipulate the menu structure of the mobile terminal to provide new, tailored options for a high degree of personalization.

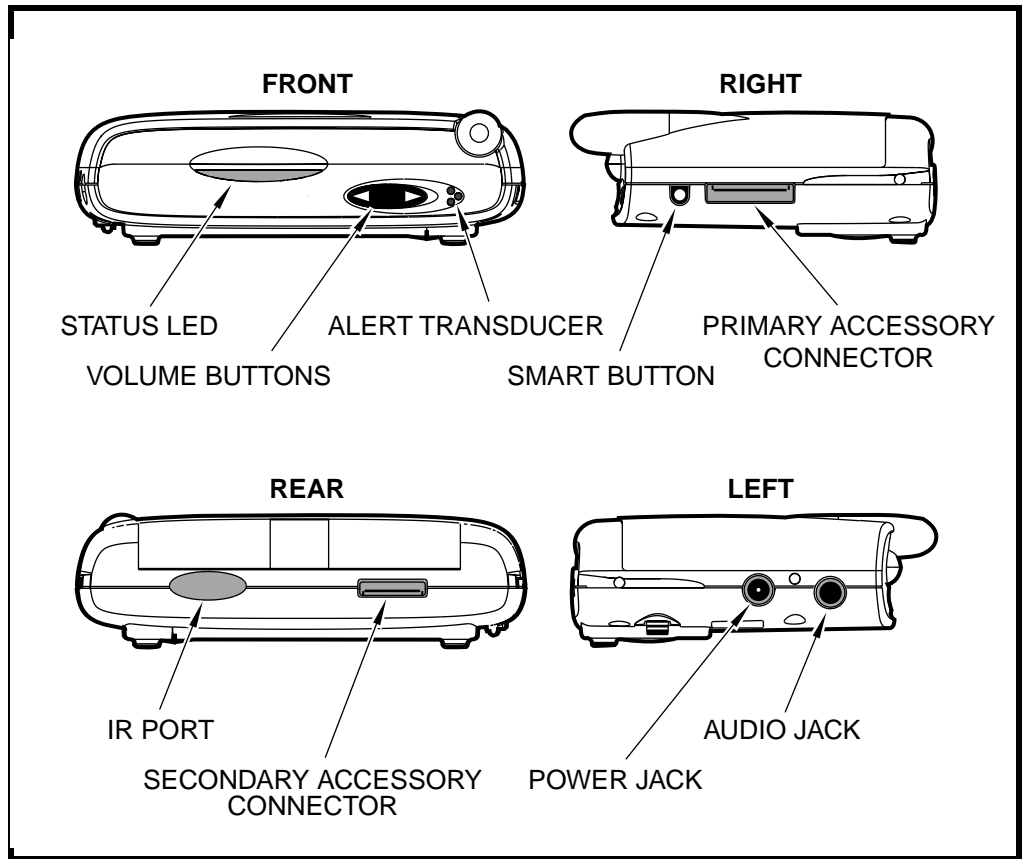
IR port, TrueSync[®], and IrDA

The IR port supports TrueSync[®] synchronization with computer and applications, backup / transfer of information such as address book and calendar to and from other devices, sending information to a supported printer, beaming information from device to device (including Palm[™], Revo[™], and Windows[®] CE devices). IrDA is also supported.

General Operation

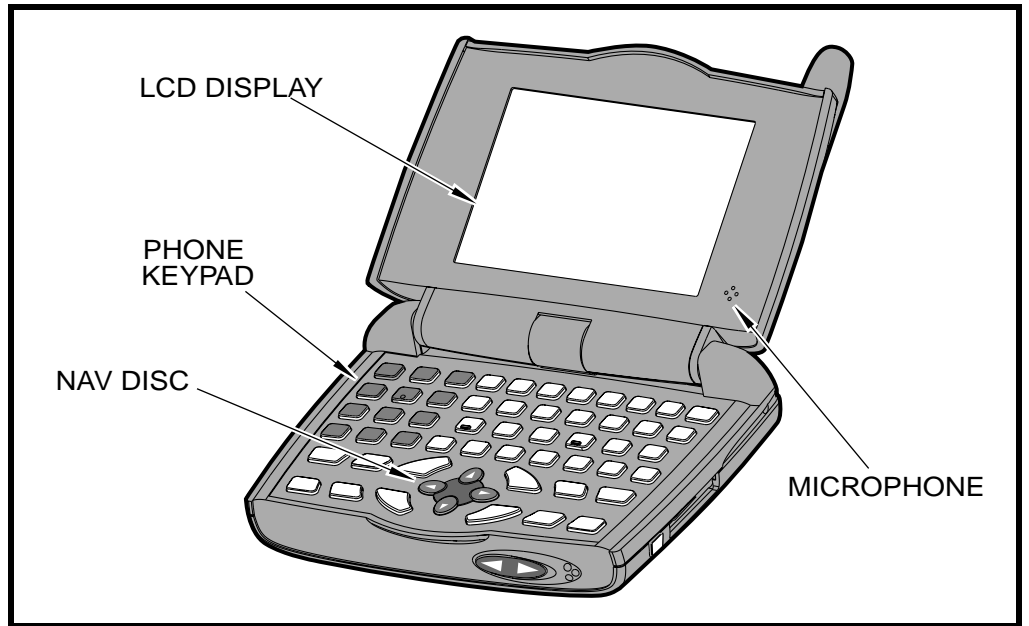
Controls and Indicators

The communicator's controls and input / output (I/O) ports are located on the front and sides of the device and on the keyboard (see Figures 1, 2 and 3). The keyboard is a fully functional QWERTY keyboard that has been enhanced by adding an embedded phone keypad as shown in Figure 3. Indicators, in the form of icons, are displayed on the liquid crystal display (LCD) (see Table 2). A light emitting diode (LED) status indicator (alternating red / green for incoming call, blinking green for home network, blinking yellow for roaming, and blinking red for out of range) is located on the front of the device just below the Nav Disc. An IR port for printing, synchronization, and beaming information to other devices is located on the rear of the communicator.



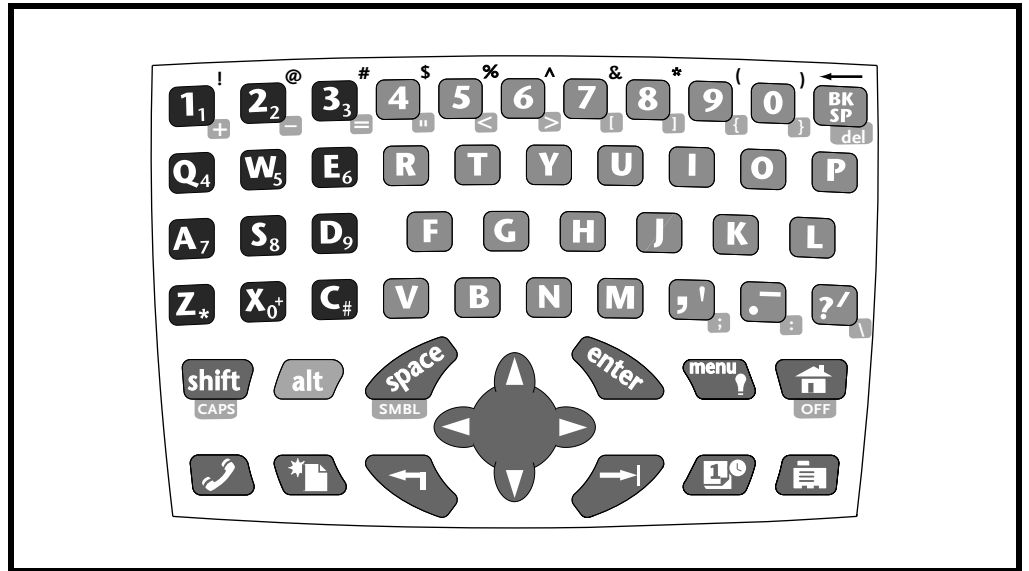
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Figure 1. Exterior Controls and I/O



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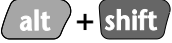








Figure 2. Communicator Controls and I/O



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Figure 3. Communicator Keypad

Table 2. Control Keys and Buttons

Button	Description
	Press to turn communicator on.
	Press to turn communicator off.
	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.
	Press once to capitalize a letter or access shift characters 0-9.
	Press once to access ALT characters. Press once during CAPS-lock mode to access ALT characters.
	Press to turn on CAPS lock.
	Press during an active call to decrease/increase the volume.
	Press for symbols and additional characters.
	Use to scroll through menus and text.
	Press to place a phone call; activates the Phone Keypad.
	Press to access Calendar functions.
	Press to access the Contacts list.
	Press to access the Main menu. Press and hold to turn on/off the backlight.
	Press to prepare and send an SMS message.

Liquid Crystal Display (LCD)

The LCD provides a high contrast full graphics color display for easy readability. The LCD also features a high visibility front light for reading the display in low-

light conditions. The LCD is capable of displaying up to 160 lines of 240 pixels per line. Icons and indicators displayed on the LCD are shown in Table 3.



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

Table 3. Icons and Indicators









Icon	Description
	SMS application home screen icon
	Phone application home screen icon
	Contacts application home screen icon
	Calendar application home screen icon
	Tasks application home screen icon
	Memo application home screen icon
	Express application home screen icon
	Ringtones application home screen icon

Table 3. Icons and Indicators (Continued)











Icon	Description
	Alarm application home screen icon
	Calculator application home screen icon
	Control panel home screen icon
	Find application home screen icon
	Trashcan application home screen icon
	Help application home screen icon
	BeamAp application home screen icon
	Welcome tour home screen icon
	E-mail application home screen icon
	New voicemail status bar icon

Table 3. Icons and Indicators (Continued)
















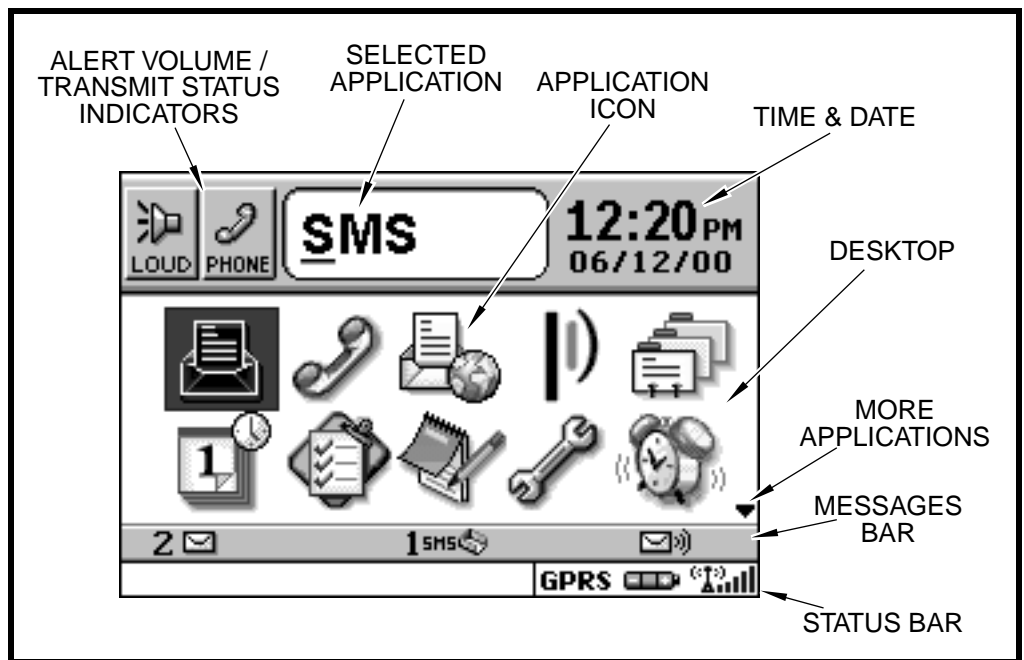
Icon	Description
	Signal strength indicator status bar icon
	No signal detected status bar icon
	Battery full charge status bar icon
	Battery 2/3 full charge status bar icon
	Battery indicator status bar icon Blue - 1/3 full charge Red - Low
	Communicator is connected to a charger status bar icon
	Communicator is connected to a data cable status bar icon
	Message sent status bar icon
	Communicator headset is connected status bar icon
GPRS	GPRS service is available status bar icon
	Communicator memory space is low status bar icon
123	Keypad numeric lock (numlock) is on status bar icon
	Voice call in progress status bar icon
	Roaming status bar icon
	Message waiting to be sent status bar icon
SHIFT	Shift lock is on status bar icon
ALT	Alt mode is on status bar icon
PDA	Communicator in PDA mode only status bar icon

Table 3. Icons and Indicators (Continued)

Icon	Description
	Unread text message status bar icon
	Message could not be sent status bar icon

User Interface

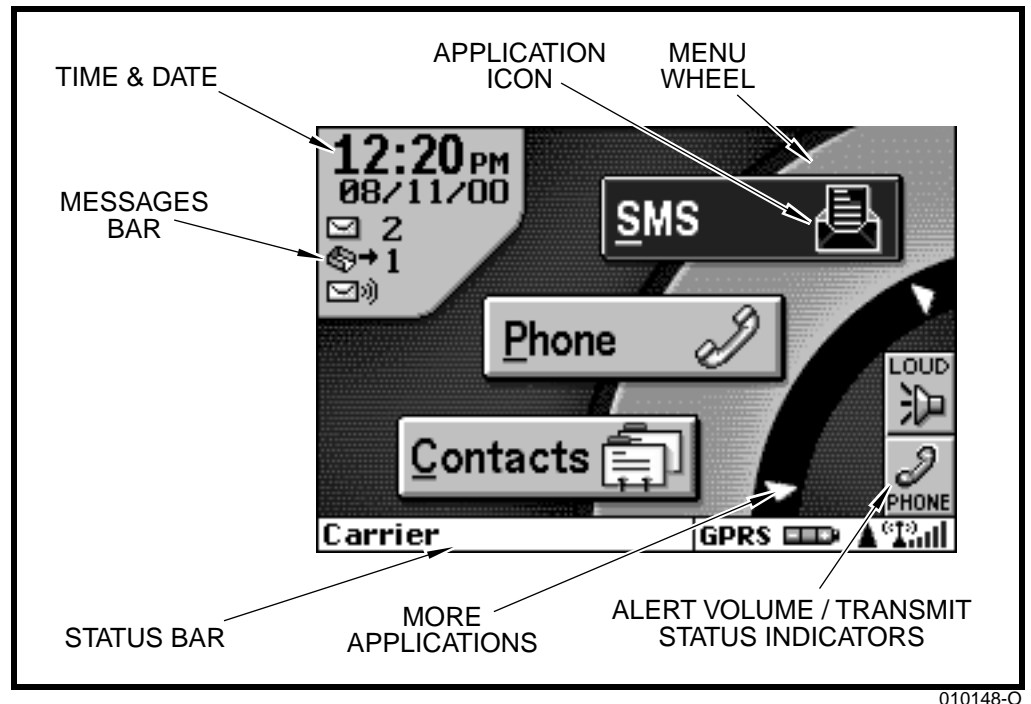
The A009 communicator user interface (UI) consists of graphic icons and menu lists that provide the user with a means for intuitively navigating through the



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Figure 4. Home Screen - Desktop Display

device's many applications and features. The home screen, user selectable for either desktop or menu wheel display formats, is shown in Figures 4 and 5, respectively. All available information is displayed on both home screen formats and selection is purely a matter of user preference.



010148-O

Figure 5. Home Screen - Menu Wheel Display

Refer to the appropriate A009 communicator user's guide listed in the "Related Publications" section toward the end of this manual for detailed information about use of the product.

Alert Modes

The A009 communicator provides the following alert options:

- Volume Adjust
- Alert Selection
- Vibrator Alert
- Silent Alert



Pressing a key will automatically end the alert.

Volume Adjust

Audible alerts can be increased or decreased to announce received messages or incoming calls. The user can select either Loud or Soft.

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



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.

Battery Gauge

The A009 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 A009 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 A009 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 A009 communicator. Use either the listed items or equivalents.

Table 4. Product-Specific Test Equipment and Tools

Motorola Model Number	Equipment Type	Application
DNP15986	Popple Dome Array Alignment Fixture ¹	Align popple dome array with controller board

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

Table 5. General Test Equipment and Tools

Motorola Model Number	Equipment Type	Application
SPN4604	Rapid Charger ¹	Used to charge battery and power device
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-8 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 troubleshoot device

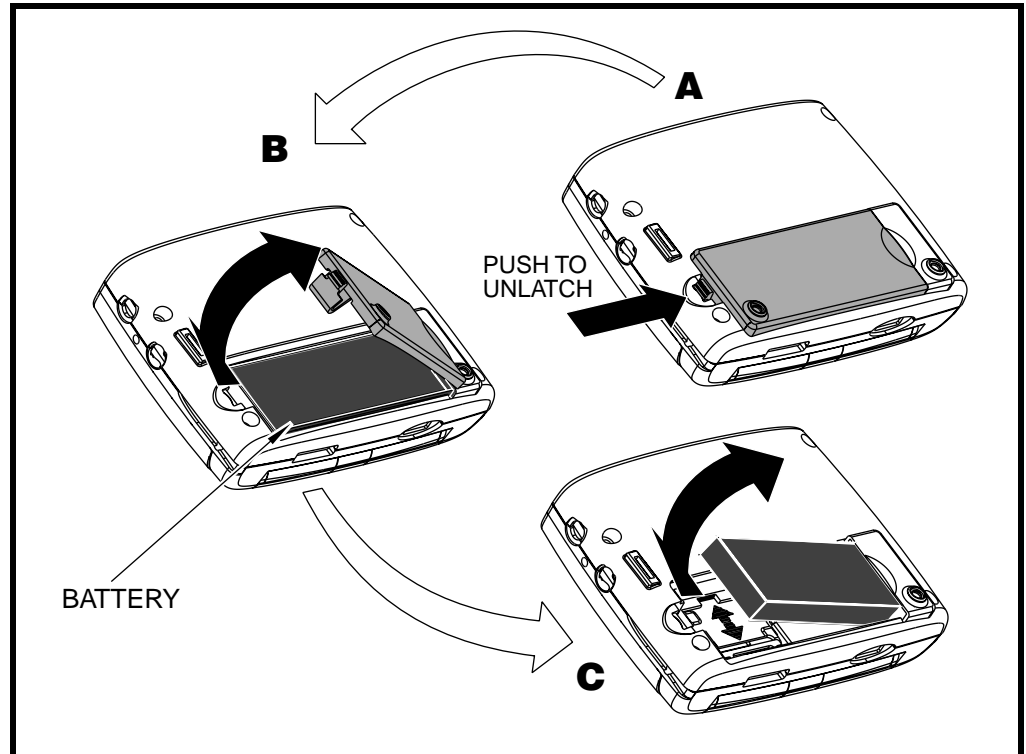
1. To order, contact Motorola Aftermarket and Accessories Division at (847)538-8000.

2. Not available from Motorola. To order, contact Hewlett Packard at 1-800-452-4844.

Disassembly

Removing the Battery

1. Ensure the communicator is turned off.
2. With the communicator flip side down, press the battery door latch in the direction of the arrow and lift the door to remove (see Figure 6A and 6B).



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Figure 6. Removing and Replacing the Battery

3. Lift the battery from the battery compartment as shown in Figure 6C.

Replacing the Battery

Reverse the battery removal process as follows:

1. Orient the battery with the contacts facing down, ensuring that the contacts on the battery are aligned with the contacts in the battery compartment. (see Figure 6C).

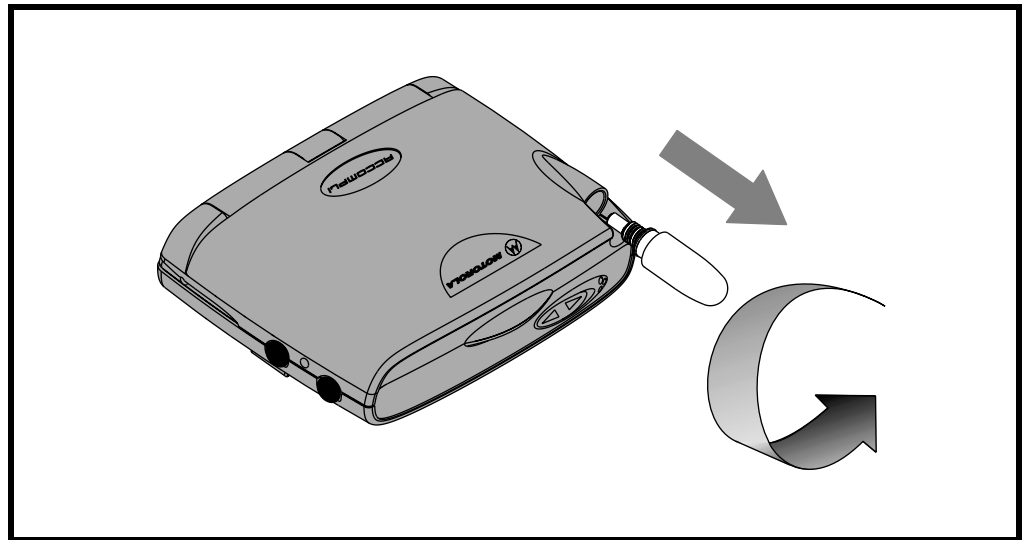


There is a danger of explosion if the Lithium Ion battery is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.

2. Slide the battery into the battery compartment and press the battery in place.
3. Align the battery door with the opening on the back housing.
4. Press down on the latch end of the battery door to close (see Figure 6B).

Removing and Replacing the Antenna

1. Unscrew the antenna by rotating it counterclockwise.
2. After the threads are completely disengaged, pull the antenna straight out of the flip housing assembly (see Figure 7).



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Figure 7. Removing the Antenna

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

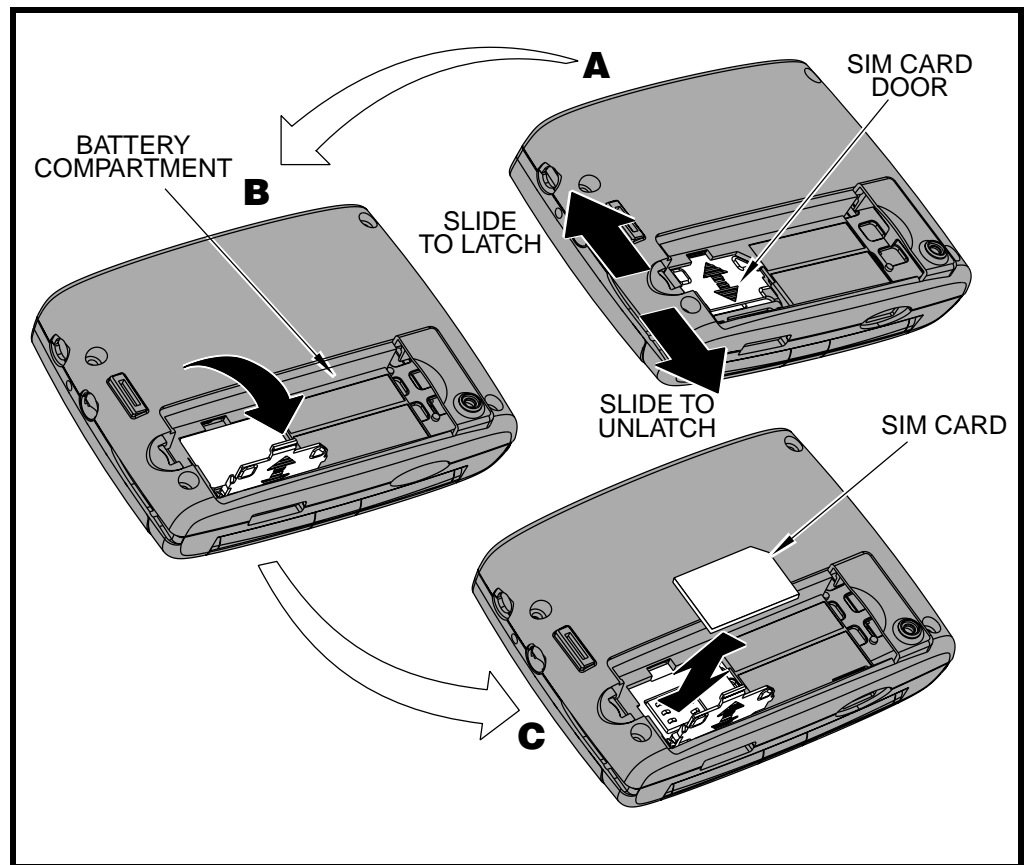


Ensure the antenna threads are properly engaged before tightening to prevent damage to the antenna or flip housing assembly.

Removing the SIM Card

1. Remove the battery door and battery as described in the procedures.
2. Slide the SIM card door in the direction of the arrow to unlatch (see Figure 8A).
3. Rotate the SIM card door to the open position (see Figure 8B).

4. Lift the SIM card straight out of the SIM socket as shown in Figure 8C.



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Figure 8. Removing and Replacing the SIM Card

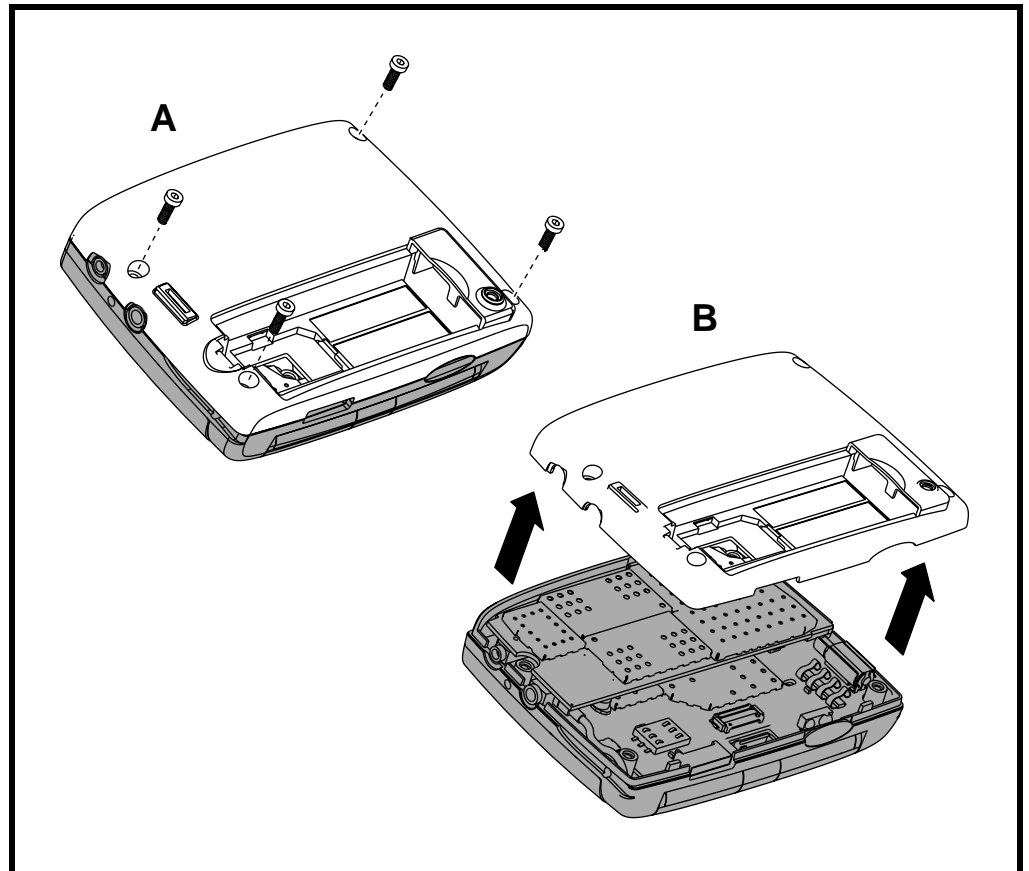
Replacing the SIM Card

Reverse the SIM card removal process as follows:

1. Carefully place the SIM card into the SIM socket. Be sure to observe proper orientation (see Figure 8C).
2. Close the SIM card door and slide in the direction of the arrow to latch and lock the SIM in place (see Figure 8A).
3. Replace the battery and battery door as described in the procedures.

Removing the Back Housing

1. Remove the battery door, battery, and SIM card as described in the procedures.
2. Using a Torx driver with a T-8 bit, remove the four screws from the bottom housing (see Figure 9A).



000961-A

Figure 9. Removing the Back Housing

3. With the screws removed, lift the back housing straight up to remove (see Figure 9B).

Replacing the Back Housing

1. Align the back housing with the front housing (see Figure 9B).
2. Press the back and front housings together.
3. Replace the screws and tighten to 3.6 in-lbs +/- .2 in-lbs.
4. Replace the SIM card, battery, and battery door as described in the procedures.



Do not over-tighten screws. Tighten screws to 3.6 in-lbs +/- .2 in-lbs.

Removing the Transceiver Board



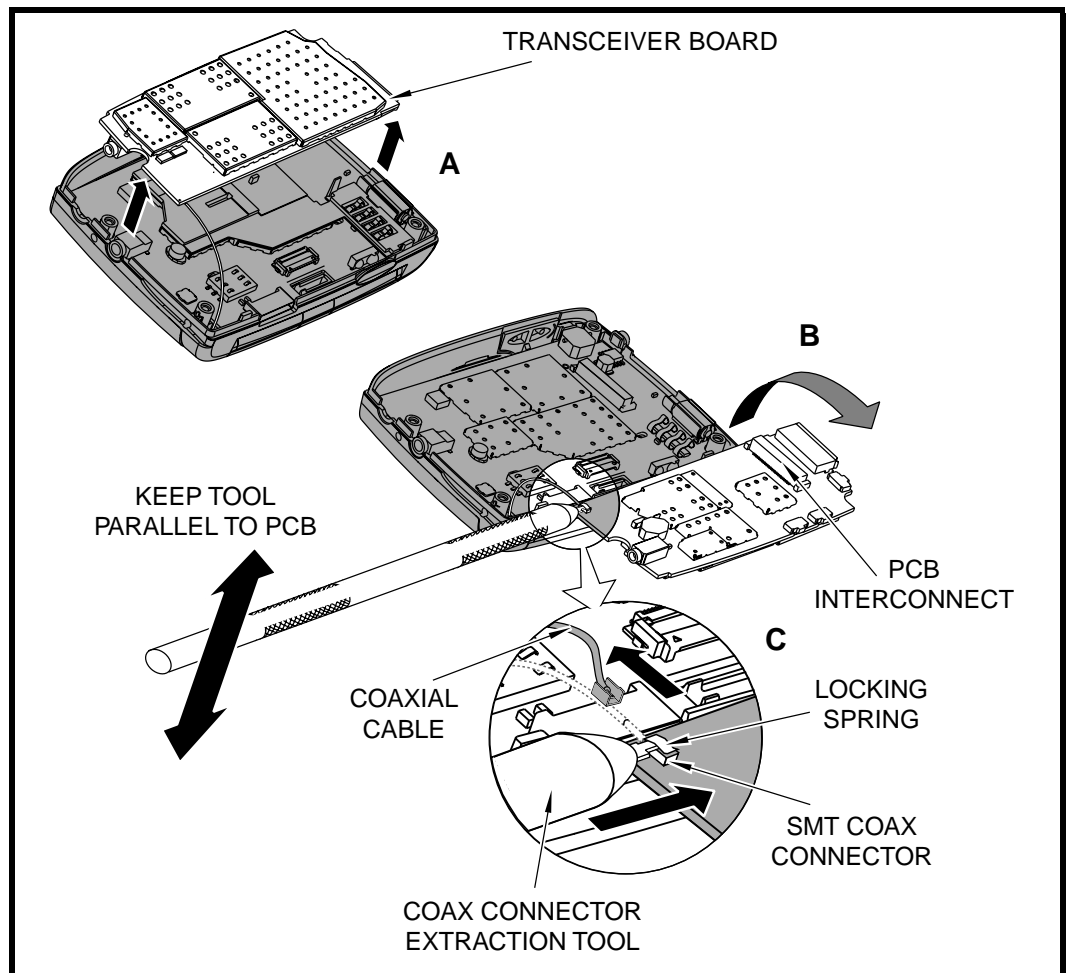
This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and possible component damage.

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



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

2. While holding the controller board immobile, carefully pull the transceiver board straight away from the controller board to separate (see Figure 10A).



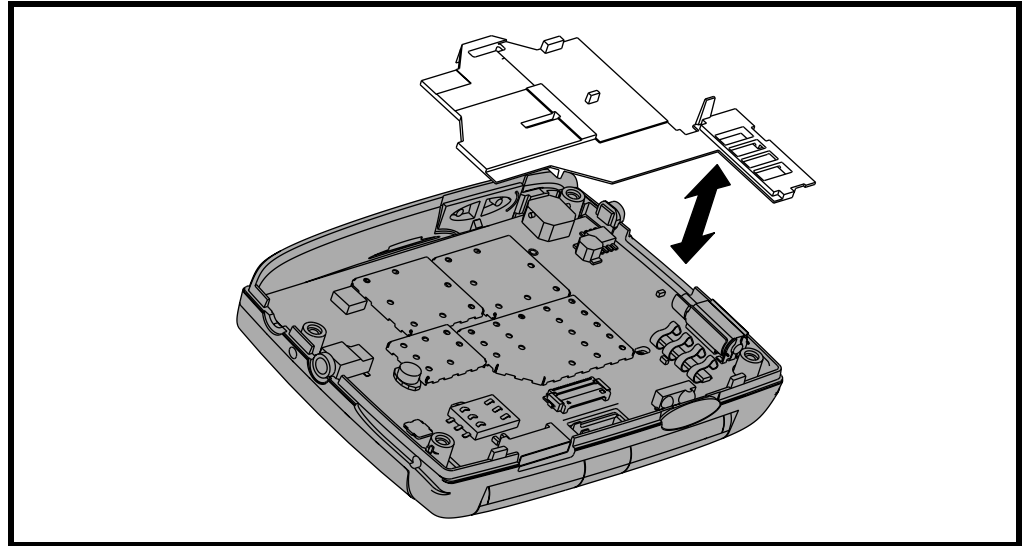
000910-A

Figure 10. Removing the Transceiver Board

3. Using the coax connector extraction tool, disconnect the coaxial cable from the surface mount (SMT) coax connector on the transceiver board (see Figures 10B and 10C).

Removing and Replacing the Board-to-Board Spacer

1. Insert the blunt end of the disassembly tool between the board-to-board spacer and the shields on the controller board and carefully slide the disassembly tool forward.



000957-O

Figure 11. Removing and Replacing the Board-to-Board Spacer

2. Lift the spacer to remove as shown in Figure 11.
3. To replace the spacer, ensure that it is properly aligned with the shields and battery contacts on the controller board, then gently press into place.

Replacing the Transceiver Board

1. Connect the coaxial cable to the coax connector on the transceiver board (see Figure 10C). Ensure the plug snaps into the receptacle, indicating it is locked in place.
2. Visually align the PCB interconnect connector on the transceiver board to the mating connector on the controller board, then press the two boards firmly together until the connector is fully seated and the boards are parallel with each other.

Removing the Controller Board



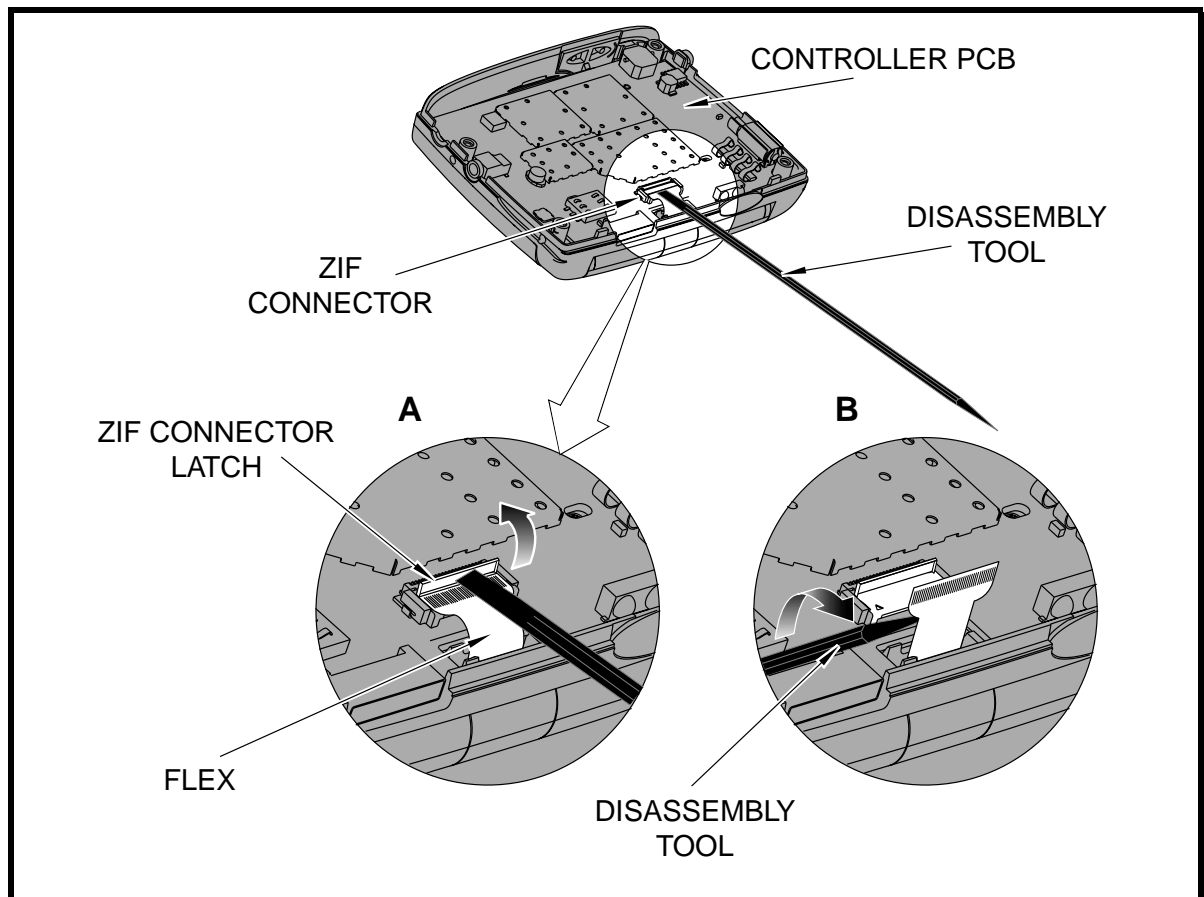
This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and possible component damage.

1. Remove the battery door, battery, SIM card, back housing, transceiver board, and board to board spacer as described in the procedures.
2. Using the blunt end of the disassembly tool, lift the zero insertion force (ZIF) connector latch (see Figure 12).



Do not use the base housing or controller board as a fulcrum point to pry the ZIF connector latch open or while disengaging the flex from the ZIF connector.

3. Carefully insert the pointed end of the disassembly tool between the flex and the controller board and gently remove the flex from the ZIF connector (see Figure 12).



001064-O

Figure 12. Disconnecting the Flex

4. Insert the blunt end of the disassembly tool between the controller board and the front housing and carefully lift the controller board from the front housing assembly (see Figure 13).

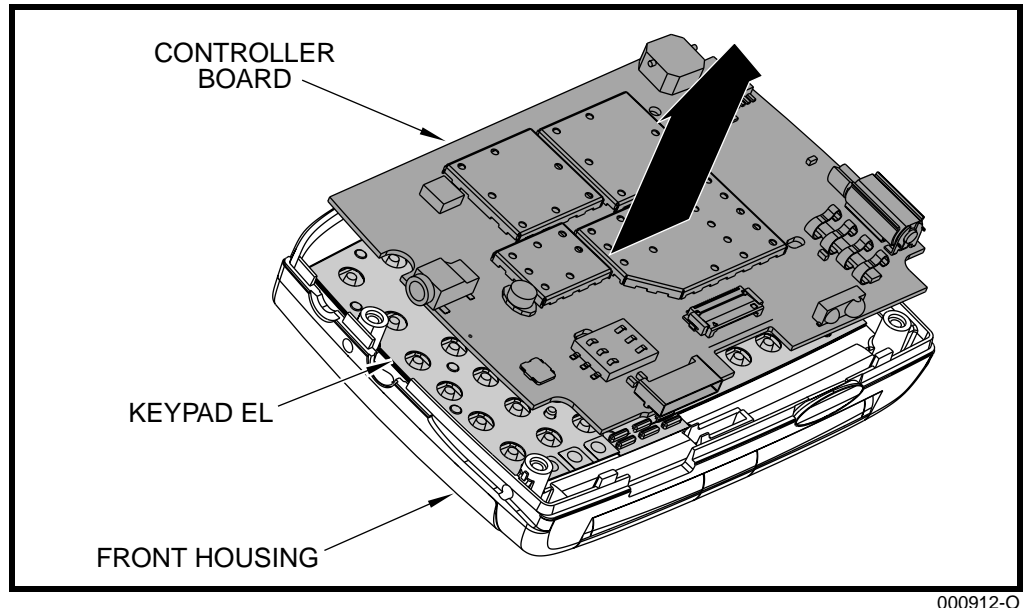
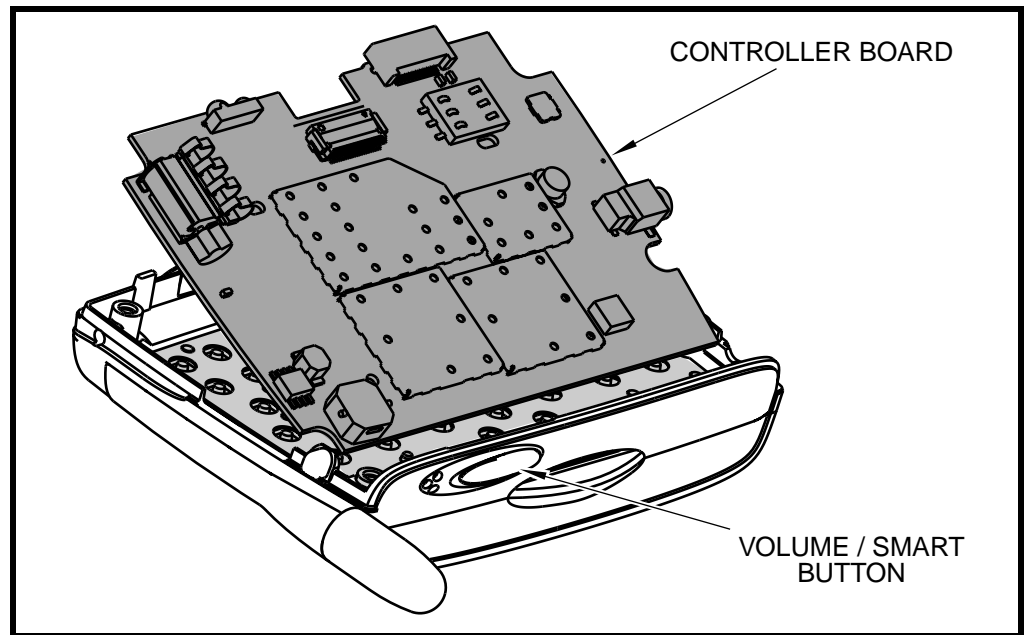


Figure 13. Removing the Controller Board

Replacing the Controller Board



001152-O

Figure 14. Replacing the Controller Board

1. Insert the controller board at an angle into the front housing, taking care to position the edge of the board under the volume / smart button. (see Figure 14).
2. Carefully insert the flex into the ZIF connector. Ensure the flex is properly seated in the ZIF connector.
3. Close the ZIF connector latch (see Figure 12).
4. Replace the board to board spacer, transceiver board, back housing, SIM card, battery, and battery door as described in the procedures.

Removing the Volume / Smart Buttons

1. Remove the battery door, battery, SIM card, back housing, transceiver board, board to board spacer, and controller board as described in the procedures.



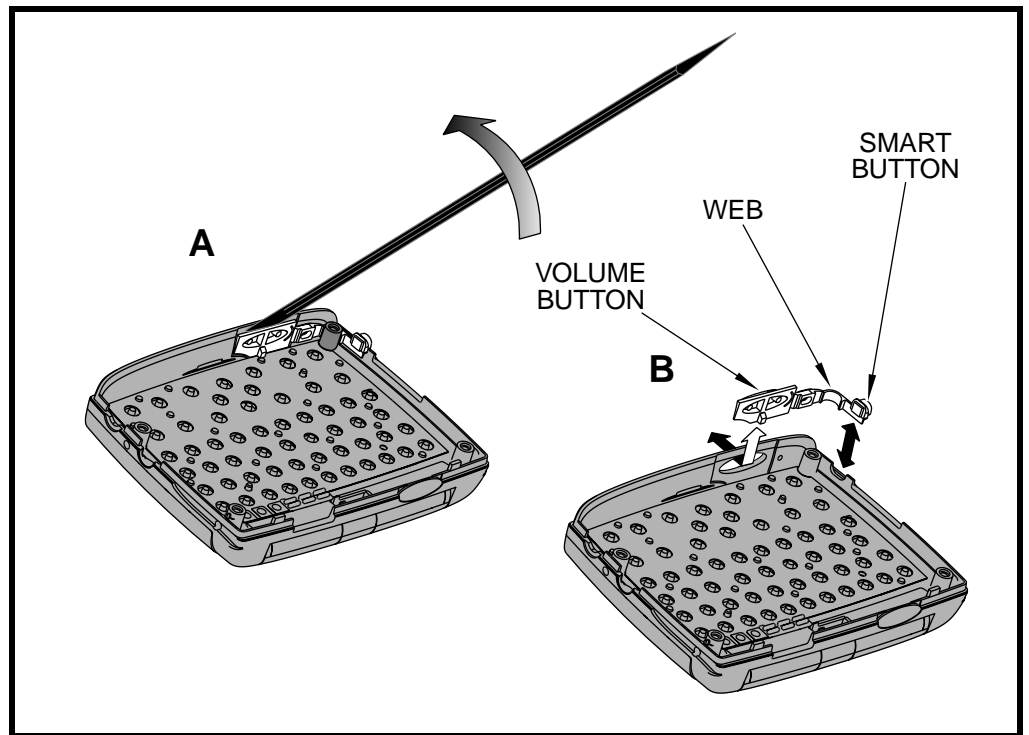
The volume button and smart button are connected together by a molded web to form a single part .

2. Insert the blunt end of the disassembly tool between the volume button and the front housing and carefully pull the volume button away from the front housing (see Figure 15A).



Use care when removing the volume/smart buttons to prevent damage to the buttons.

- Carefully lift the rubber volume / smart button from the front housing as shown in Figure 15B.



001011-O

Figure 15. Removing and Replacing the Volume/Smart Buttons

Replacing the Volume / Smart Buttons

Reverse the volume / smart button removal process as follows:

- Align the smart button with the recessed area on the front housing (see Figure 15B).
- Carefully insert the rubber connector (between the volume buttons and smart button) into the recessed area surrounding the screw post on the front housing.



The disassembly tool may be required to ensure that the rubber connector is fully seated in the recessed area surrounding the screw post.

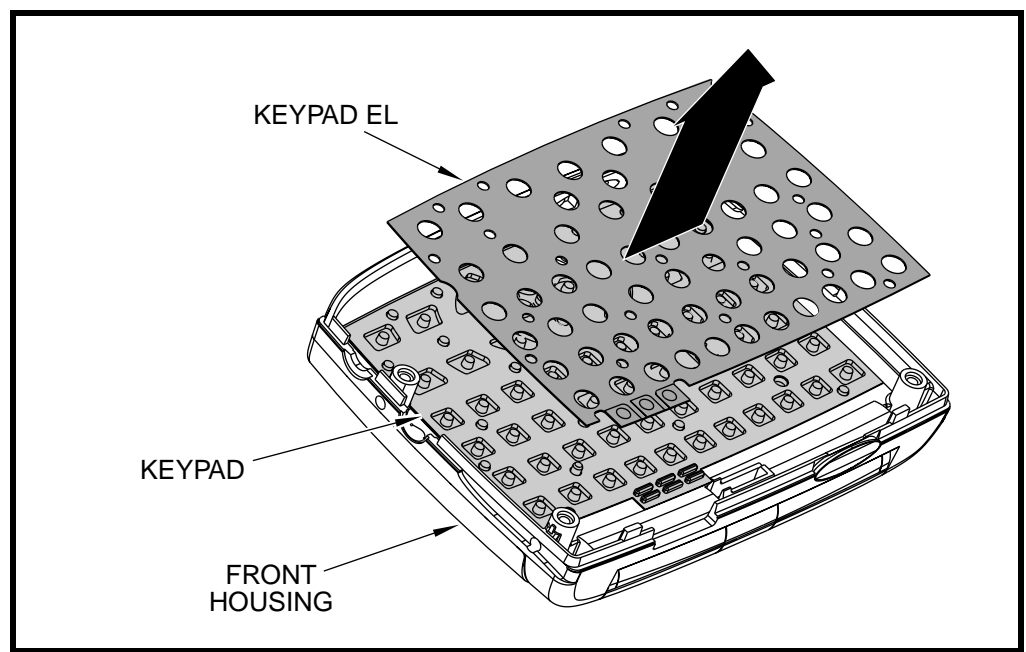
- Insert the volume button into the opening on the face of the front housing.
- Replace the controller board, board to board spacer, transceiver board, back housing, SIM card, battery, and battery door as described in the procedures.

Removing the Keypad Electro-Luminescent (EL) Panel and Keypad



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

1. Remove the battery door, battery, SIM card, back housing, transceiver board, board to board spacer, controller board, and volume / smart button as described in the procedures.
2. Insert the blunt end of the disassembly tool between the keypad EL panel and the keypad and lift the keypad EL panel to remove (see Figure 16).



000915-O

Figure 16. Removing the Keypad EL

3. Insert the blunt end of the disassembly tool between the keypad and the front housing and lift the keypad from the front housing (see Figure 17).

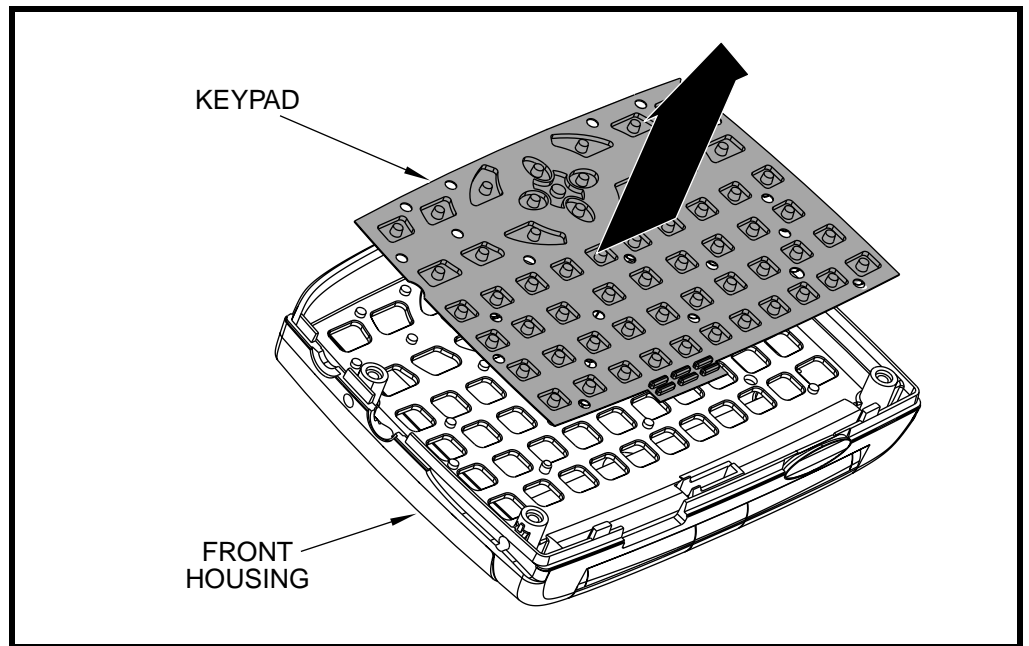


Figure 17. Removing the Keypad

Replacing the Keypad and Keypad EL Panel

1. Ensuring the keypad alignment holes are properly aligned with the pins molded into the front housing, insert the keypad into the front housing.
2. Ensuring the keypad EL panel alignment holes are properly aligned with the pins molded into the front housing, insert the keypad EL panel behind the keypad with the blue side facing out.
3. Replace the volume / smart button, controller board, board to board spacer, transceiver board, back housing, SIM card, battery, and battery door as described in the procedures.

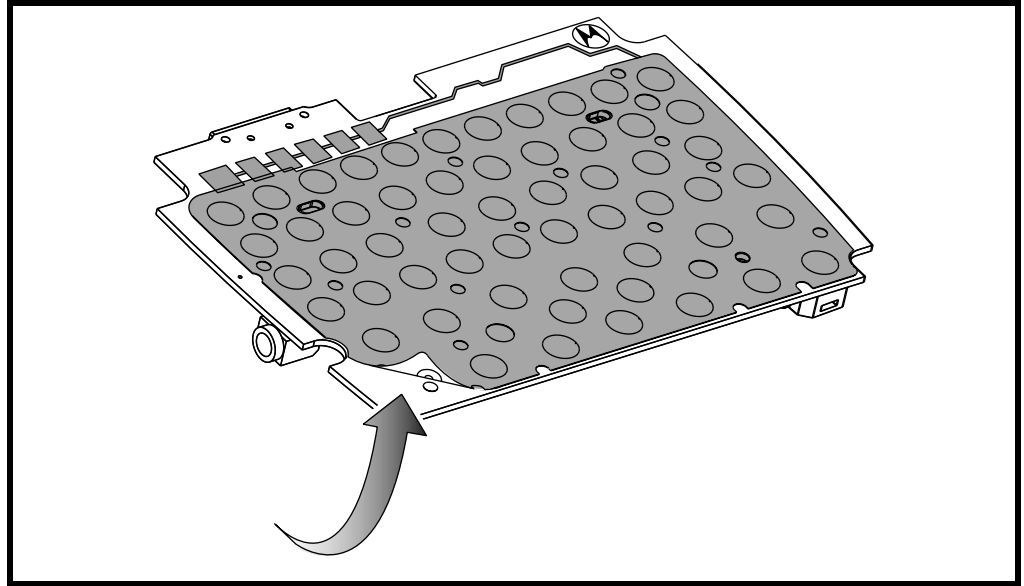
Removing the Popple Dome Array



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

1. Remove the battery door, battery, SIM card, transceiver board, board to board spacer, and controller board as described in the procedures.
2. Turn the controller board over to expose the popple dome array.

- Using a non-metallic tool, like the flat end of the disassembly tool, separate the bottom left corner of the popple dome array from the controller board and carefully peel the array from the controller board (see Figure 18).

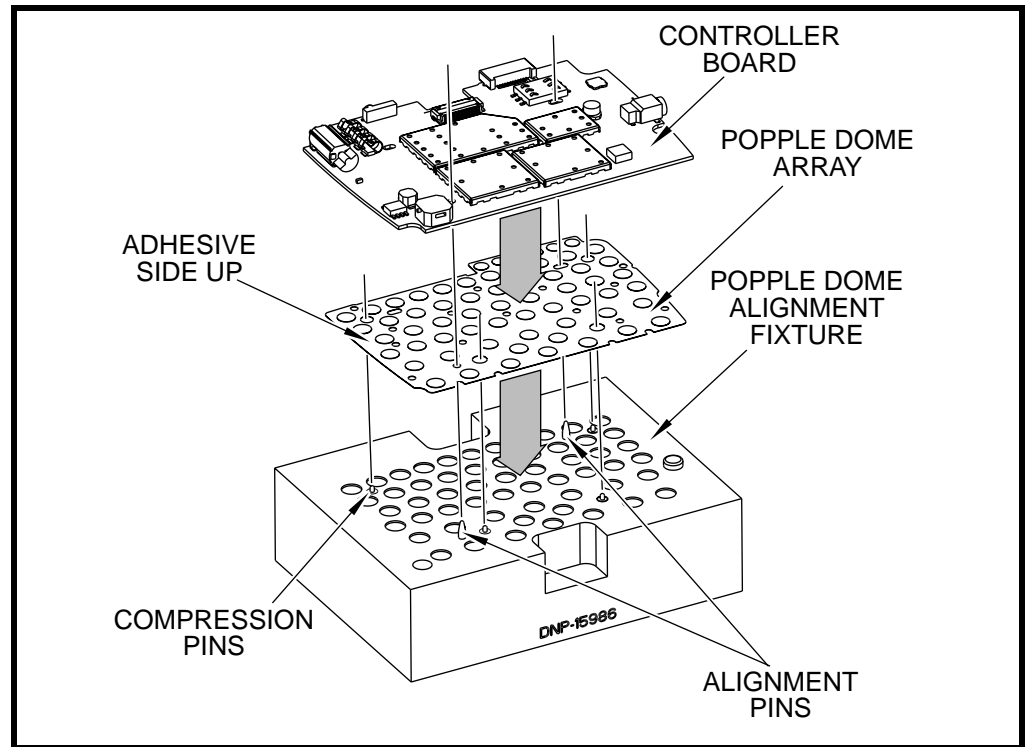


001009-O

Figure 18. Removing the Popple Dome Array

Replacing the Popple Dome Array

- Carefully remove the protective film from the adhesive backing on the replacement popple dome array.
- Ensuring the alignment holes on the array are properly aligned with the alignment and compression pins on the alignment fixture, place the array adhesive side up on the alignment fixture (see Figure 19).



000997-O

Figure 19. Replacing the Popple Dome Array

3. Ensuring the alignment holes on the controller board are properly aligned with the alignment pins on the alignment fixture, place the controller board on the alignment fixture.



Use care not to touch the adhesive side of the new array when placing the controller board on the alignment fixture. The controller board will rest on top of the compression pins until downward pressure is applied.

4. Using even pressure across the surface of the controller board, press down on the controller board to ensure that the array adheres to the controller board.
5. Lift the controller board straight up from the alignment fixture and turn it over.
6. Visually inspect the new popple dome array to ensure that proper adhesion has been achieved.



If the popple dome array is not in complete contact with the controller board, apply gentle pressure across the surface of the array until the entire adhesive surface adheres to the controller board.

SIM Card and Identification

Live SIM Card

A SIM card is required to access the existing local GSM/DCS/PCS 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



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

A transfer of codeplug information is required when the controller board is replaced. This information includes the unit's APC, serial number, and model number. Codeplug information can be transferred by using the appropriate communicator programming software (CPS).

A transfer of flexing information is required when the transceiver board is replaced. This information includes personal contacts and model options. Flexing can be accomplished by using MotoSeem software and an electronic man-machine interface (EMMI) box.

Creating a Master SIM Card

A master SIM card can be created using a SIM card reader/writer and the following procedure.

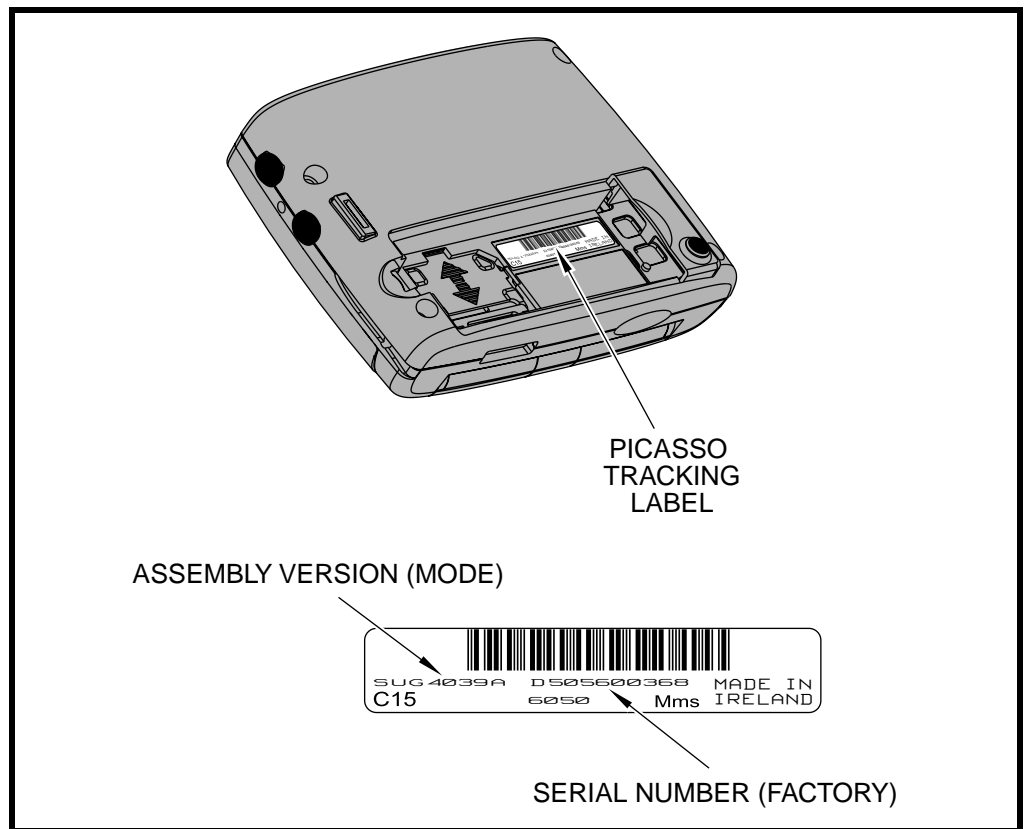
1. Insert the card to be copied into the reader.
2. Read the card.
3. Insert the card to be used as the master into the writer.
4. Copy and verify the master card.

Identification

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

Picasso Tracking Label

The number recorded on the Picasso label, when used with the mechanical serial number (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.



001008-O

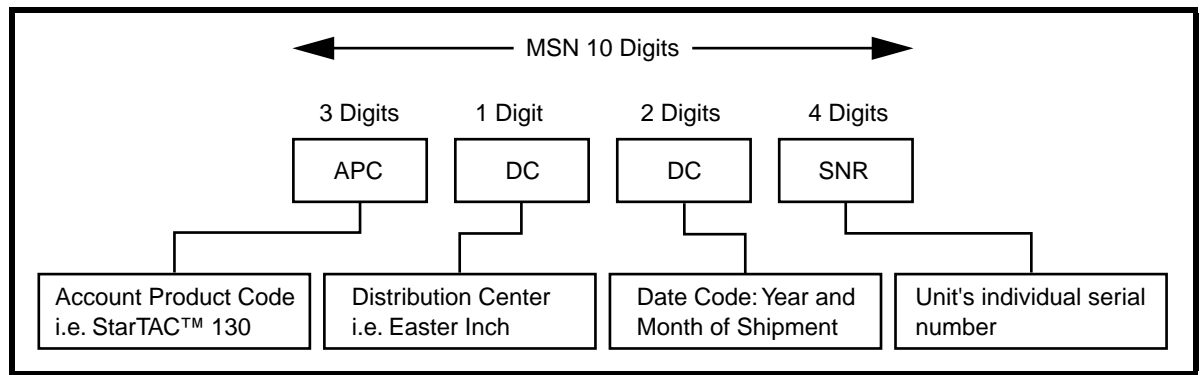
Figure 20. Picasso Tracking Label

Mechanical Serial Number (MSN)

The 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 (see Figure 21).

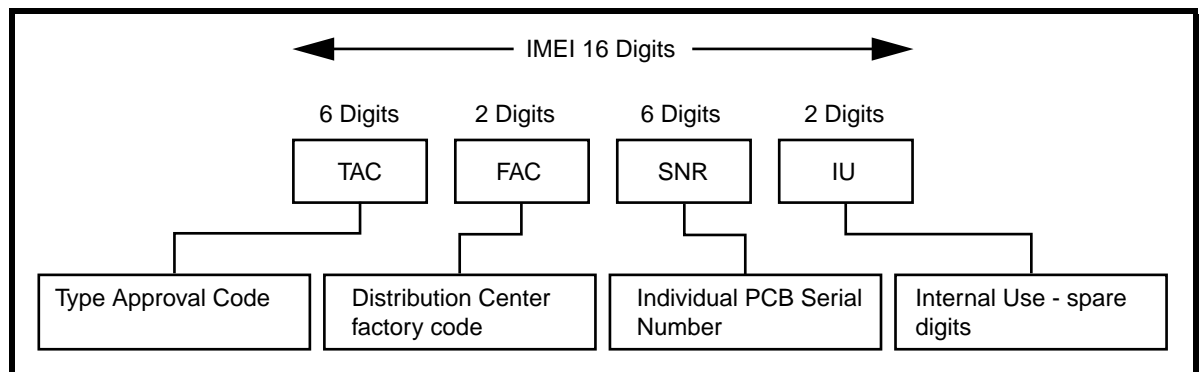


000807-O

Figure 21. MSN Label

International Mobile Electronic Identity (IMEI)

The IMEI number is an individual number unique to the printed circuit board (PCB) and is stored within the unit's memory. Figure 22 provides a description of the sections of this number.



000808-O

Figure 22. IMEI Label

Other label number configurations present are:

- **TRANSCIVER NUMBER:** Identifies the product type. Normally the SWF number. (i.e. A009).
- **PACKAGE NUMBER:** Identifies the equipment type, the mode and language in which the product is shipped.

Troubleshooting

Console Mode (Manual) Test

The Motorola A009 communicator is equipped with a manual test mode capability (console mode test). This capability allows service personnel to verify functionality and perform fault isolation by entering keypad commands.

To enter the console mode test:

1. From the desktop, enter the key sequence <?><?><?><c><o><n><s>.
2. A diagnostic menu will be displayed after several seconds.
3. Choose menu item 1 to test controller functions.
4. Choose menu item 2 to test transceiver functions.
5. Choose menu item 3 to exit to the desktop.

Tables 6 and 7 list available transceiver and controller test commands.

Console Mode (Manual) Test Commands

Table 6. Transceiver Test Commands

Test Command	Test Function/Name
Enter key sequence <?><?><?><c><o><n><s>	Enter console mode test
01<Enter>	Exit transceiver tests
07<Enter>	Mute receive (RX) audio path
08<Enter>	Unmute RX audio path
09<Enter>	Mute transmit (TX) audio path
10<Enter>	Unmute TX audio path
15xx<Enter>	Generate tone
16<Enter>	Mute tone generator
19<Enter>	Display software version number of Call Processor
20<Enter>	Display software version number of Modem
36<Enter> or 36x<Enter>	Initiate acoustic loopback
37<Enter>	Stop test
38<Enter>	Activate SIM
39<Enter>	Deactivate SIM
43x<Enter>	Change audio path
47xx<Enter>	Set audio volume
51<Enter>	Enable sidetone
52<Enter>	Disable sidetone
57<Enter>	Initialize non-volatile memory
58<Enter>	Display security code
58xxxxx<Enter>	Modify security code
59<Enter>	Display lock code
59xxx<Enter>	Modify lock code
60<Enter>	Display IMEI

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

Table 6. Transceiver Test Commands (Continued)

Test Command	Test Function/Name
993<Enter>	Display all display pixels
98xx<Enter>	Change GSM mode (primary access code)
20<Enter>	GSM 1800 (DCS)*
21<Enter>	GSM 900*
22<Enter>	GSM 1900 (PCS)*
23<Enter>	Dual Band 900/1800*
15xx<Enter>	Change Alert Mode (primary access code)
90<Enter>	Change to Vibrator Mode*
91<Enter>	Change to Ringer Mode*
36x<Enter>	Change Data Rate (primary access code)
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.

Table 7. Controller Test Commands

Test Command	Test Function/Name
Enter key sequence <?><?><?><C><O><n><s>	Enter console mode test
<x>	Exit controller tests
<t>	Stop current test
<space>	Next page
<1>	Color bar
<2>	Advanced color bars
<3>	Gray scale
<4>	Horizontal zebra
<5>	Vertical zebra
<6>	LCD ON
<7>	LCD OFF
<8>	Vibrator ON
<9>	Backlight ON (normal)
<a>	Backlight ON (phone)
	High frequency alert
<c>	Low frequency alert
<d>	Photo sensor
<e>	Photo sensor & backlight
<f>	Lid
<g>	Quick keypad
<h>	Full keypad test
<i>	Combined test
<j>	Processor stop
<k>	IR

Table 7. Controller Test Commands (Continued)

Test Command	Test Function/Name
<l>	Read/write port
<p>	Disable DB_CLK0
<q>	Accessory connector

Troubleshooting Chart

Table 8. A009 Troubleshooting and Repair 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 < 3.2V dc, recharge the battery using the appropriate charger. If the battery will not recharge, replace the battery.
	b.) Battery connectors open or misaligned.	Visually inspect the contacts on both the battery and the controller board assembly. Realign and, if necessary, either replace the battery or refer to a Level 3 or Level 4 qualified service organization for the battery connector replacement.
	c.) Controller board assembly or popple dome array defective.	Remove the controller board assembly. Substitute a known good assembly and temporarily reassemble the unit. Insert a battery and depress the PWR button; if unit turns on and stays on, disconnect the battery. Proceed to d.
	d.) Popple dome array defective.	Remove and replace the popple dome array on the customer's controller board assembly. Reassemble unit with customer's controller board (new popple dome array). insert a battery and depress the PWR button; if unit turns on and stays on, disconnect the battery and reassemble the telephone with customer's controller board (new popple dome array). If the fault has not been cleared, proceed to e.
	e.) Controller board assembly defective.	Reassemble the telephone with a new controller board assembly.
	f.) Flip housing assembly defective.	Disassemble unit and temporarily reassemble with a new flip housing assembly. Insert a battery and depress PWR button. Ensure unit stays on. If fault has been cleared, reassemble unit with the new flip housing assembly. If the fault has not been cleared, 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 defective.	Replace antenna as described in "Removing and Replacing the Antenna" on page 21.
	b.) Transceiver board assembly defective.	Remove the transceiver board assembly. Substitute a known good assembly and temporarily reassemble the unit. If the fault has been cleared, reassemble the unit with the new transceiver board assembly. If the fault has not been cleared, refer service to a Level 3 or Level 4 qualified service organization.

Table 8. A009 Troubleshooting and Repair Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
3. Erratic, partial, or no display.	a.) Mating connections to or from flip housing assembly defective.	Remove back housing from unit, check general condition of flex. If the flex is good, check that the ZIF connector is fully pressed down and that the flex collars are flush with the plastic of the connector. Check ZIF to controller board assembly connections. If faulty connector, replace the controller board assembly.
	b.) Flip housing assembly defective.	Disassemble unit and temporarily reassemble with a known good flip housing assembly. If the fault is cleared, rebuild with new flip housing assembly.
	c.) Controller board assembly defective.	Remove the controller board assembly. Substitute a known good assembly and temporarily reassemble the unit. If the fault has been cleared, reassemble the unit with the new controller board assembly. If the fault has not been cleared, 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.) Controller board assembly defective.	Remove the controller board assembly. Substitute a known good assembly and temporarily reassemble the unit. If the fault has been cleared, reassemble the unit with the new controller board assembly. If the fault has not been cleared, refer service to a Level 3 or Level 4 qualified service organization.
5. 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.
	b.) Transceiver board assembly defective.	Remove the transceiver board assembly. Substitute a known good assembly and temporarily reassemble the unit. If the fault has been cleared, reassemble the unit with the new transceiver board assembly. If the fault has not been cleared, refer service to a Level 3 or Level 4 qualified service organization.

Programming: Software Upgrade and Flexing

Communicator programming software (CPS) is used to program unit options and, with an EMMI2D box, to program call processor applications. Contact your local technical support engineer for information about equipment and procedures for flashing and flexing.



An EMMI2D box is required for flashing.

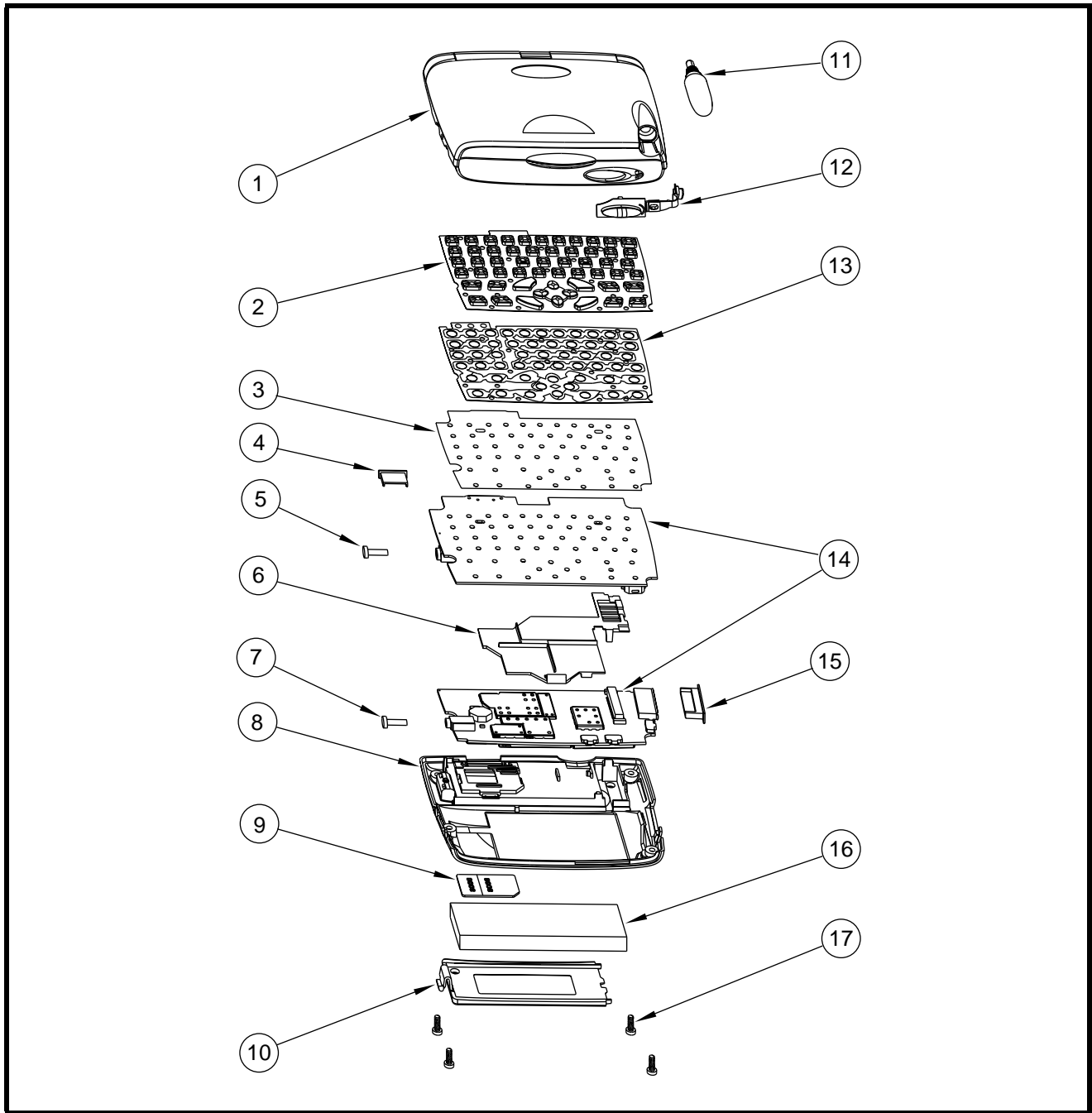
Part Number Charts

The following charts are provided as a reference for the parts associated with A009 Personal Interactive Communicators.

Related Publications

A009 Level 3 Service Manual	6881037B25
UK English Accompli 009 User's Guide	6881037B45
UK English Accompli 009 Quick Start Guide	6881037B50

Exploded View Diagram



001065-O

Figure 23. Exploded View Diagram

Exploded View Parts List

Table 9. Exploded View Parts List

Item Number	Motorola Part Number	Description
1	See Table 10	Assembly, Flip Housing
2	7586283K01 or 7586475K01	Keypad, English or Keypad, French
3	3986305K01 or 3986477K01	Contact, Popple Dome Array, English or Contact, Popple Dome Array, French
4	1586481K01	Cover, Secondary Accessory Connector
5	1586405K01	Cover, Power Jack
6	4386372K01	Spacer, Board-to-Board
7	15896406K01	Cover, Audio Jack
8	See Table 10	Housing, Rear
9	See Note 1	SIM Card
10	See Table 11	Assembly, Battery Cover
11	8586338K01	Antenna
12	3886281K01	Button, Volume/Smart Key
13	6562890F01 or 6586476K01	EL Panel, Keypad, English or EL Panel, Keypad, French
14	See Table 10	Board Set, Transceiver/Controller
15	1586402K01	Cover, Primary Accessory Connector
16	See Table 11	Battery
17	0362035B07	Screw, Thread Forming (4)

Notes: 1. Not available as spares for EMEA Service Centers.



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.

Housing-dependent Part Numbers

Table 10. Housing-dependent Part Numbers

Housing-dependent Part Numbers		
Part Description	Radar Blue	Accompli Silver
Flip Housing Assembly, US English	SHN7696	SHN7700
Flip Housing Assembly, UK English	SHN7885	SHN7887
Flip Housing Assembly, French	SHN7698	SHN7699
Flip Housing Assembly, German	SHN7697	SHN7701
Rear Housing	1586284K01	1586284K02
Replacement Board Set, A009, GSM Tri-Band, UK English, US English, French, European Spanish, German, Italian, Hungarian ¹	SUG2109	SUG2110

Notes:

1. Not available as spares for EMEA Service Centers.

Accessories

Table 11. Accessories

Part Description	Part Number
Battery, 700 mAh, Li Ion	SNN5600
Battery Cover Radar Blue Accompli Silver	SHN7896 SHN7894
Desktop Holder	SPN4886
Charger	SPN4872
Euro Plug	SYN7456
Plug	SYN7455
Headset	SYN8419
Holster	SYN8806

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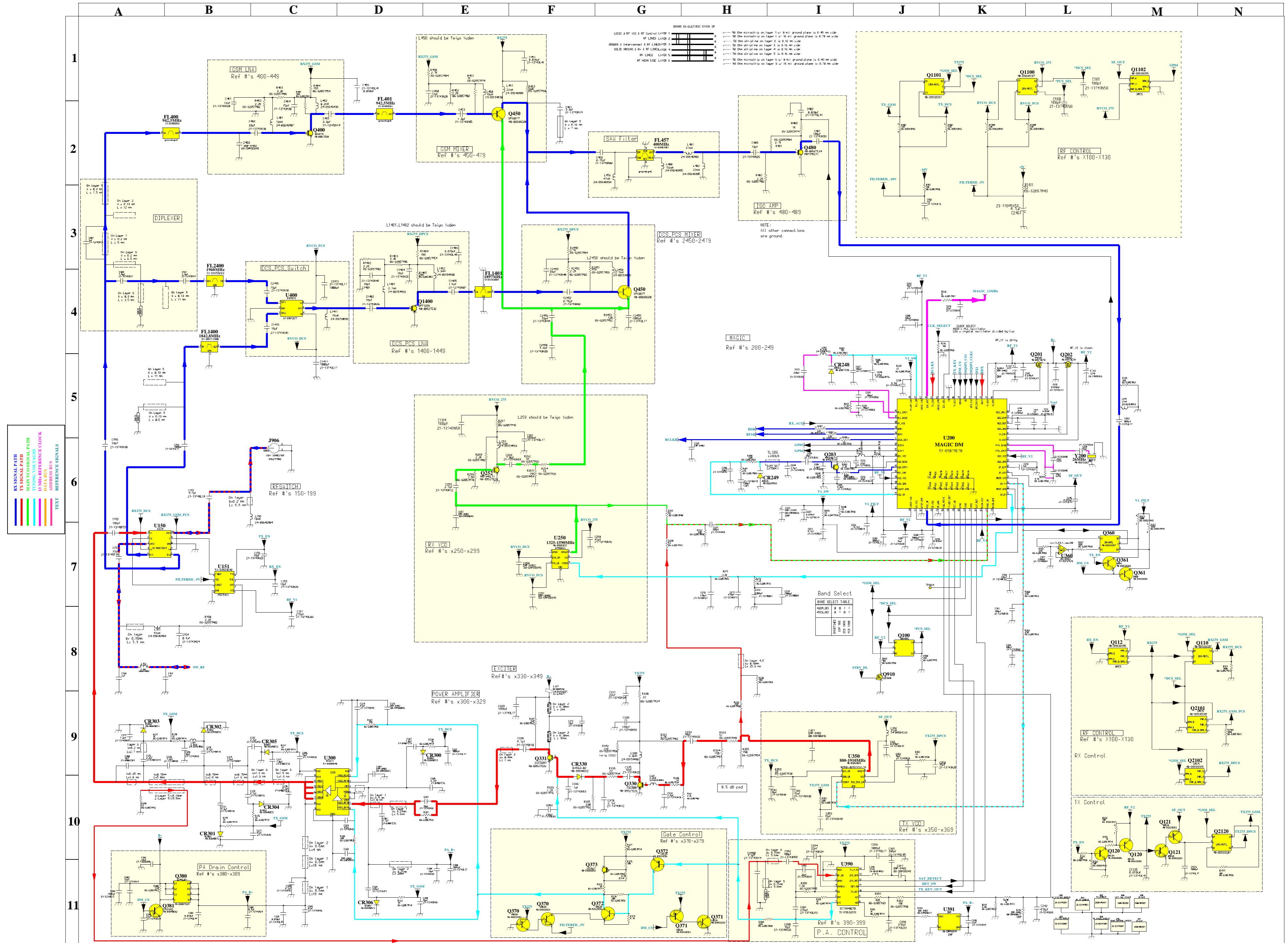
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- liquid crystal display (LCD)
 - defective
 - symptoms 40

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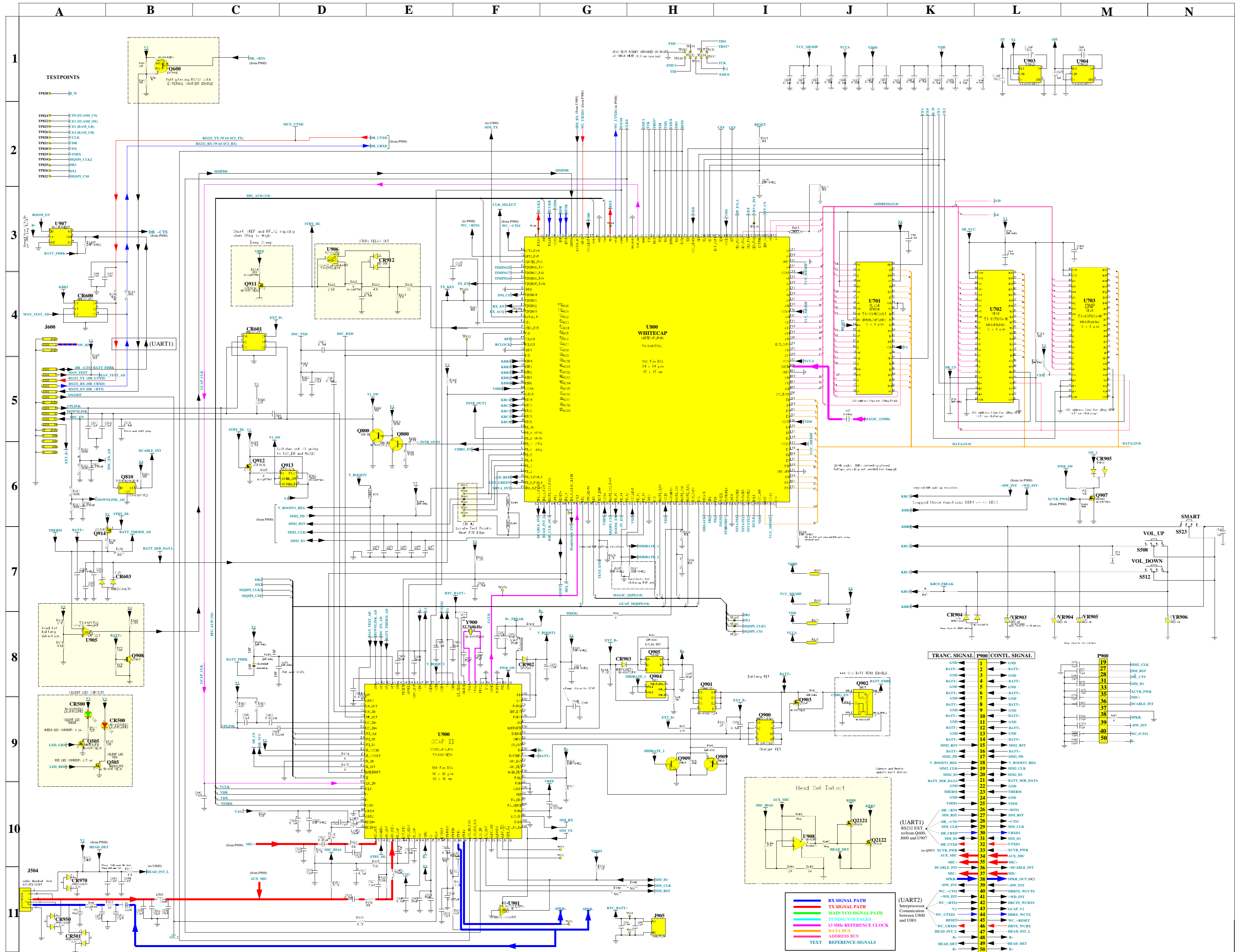
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A009 - RF SCHEMATICS



A009 - AL SCHEMATICS



TESTPOINTS

TP824	FB0 (FLASH_CS)
TP825	FB1 (FLASH_OE)
TP826	FB2 (RAM_LB)
TP827	FB3 (RAM_LB)
TP828	V_CLK
TP829	SDX
TP830	FSX
TP831	MOSPI_CLK2
TP832	DB2
TP833	DB2
TP834	DB2
TP835	MOSPI_CS

TRANC SIGNAL P900 CONTL SIGNAL

1	END	END
2	BATT_	BATT_
3	END	END
4	BATT_	BATT_
5	END	END
6	BATT_	BATT_
7	END	END
8	BATT_	BATT_
9	END	END
10	BATT_	BATT_
11	END	END
12	BATT_	BATT_
13	END	END
14	BATT_	BATT_
15	END	END
16	BATT_	BATT_
17	END	END
18	BATT_	BATT_
19	END	END
20	BATT_	BATT_
21	END	END
22	BATT_	BATT_
23	END	END
24	BATT_	BATT_
25	END	END
26	BATT_	BATT_
27	END	END
28	BATT_	BATT_
29	END	END
30	BATT_	BATT_
31	END	END
32	BATT_	BATT_
33	END	END
34	BATT_	BATT_
35	END	END
36	BATT_	BATT_
37	END	END
38	BATT_	BATT_
39	END	END
40	BATT_	BATT_
41	END	END
42	BATT_	BATT_
43	END	END
44	BATT_	BATT_
45	END	END
46	BATT_	BATT_
47	END	END
48	BATT_	BATT_
49	END	END
50	BATT_	BATT_

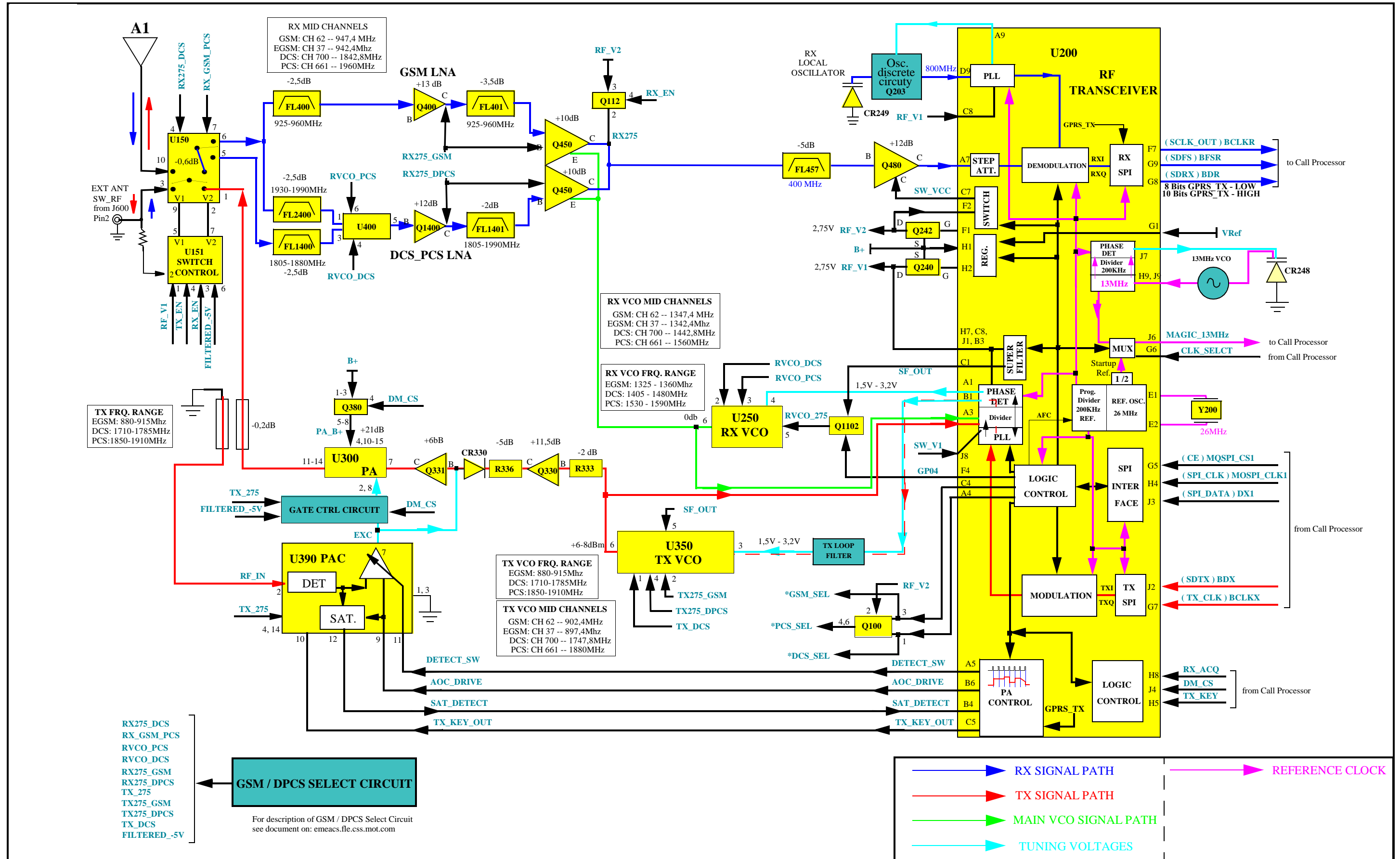
P900

19	SM2_CLK
27	SM2_RST
31	DB_CTS
33	SM2_IO
35	SCVR_PWR
36	DCABLE_INT
37	END
38	SPKR
39	DW_INT
40	WC_CTS1

- RX SIGNAL PATH
- TX SIGNAL PATH
- MAIN VCO SIGNAL PATH
- 13 MHz REFERENCE CLOCK
- DATA BUS
- ADDRESS BUS
- TEXT REFERENCE SIGNALS

(U907) SCVR_PWR
 (U908) DCABLE_INT
 (U909) SPKR
 (U910) DW_INT
 (U911) WC_CTS1

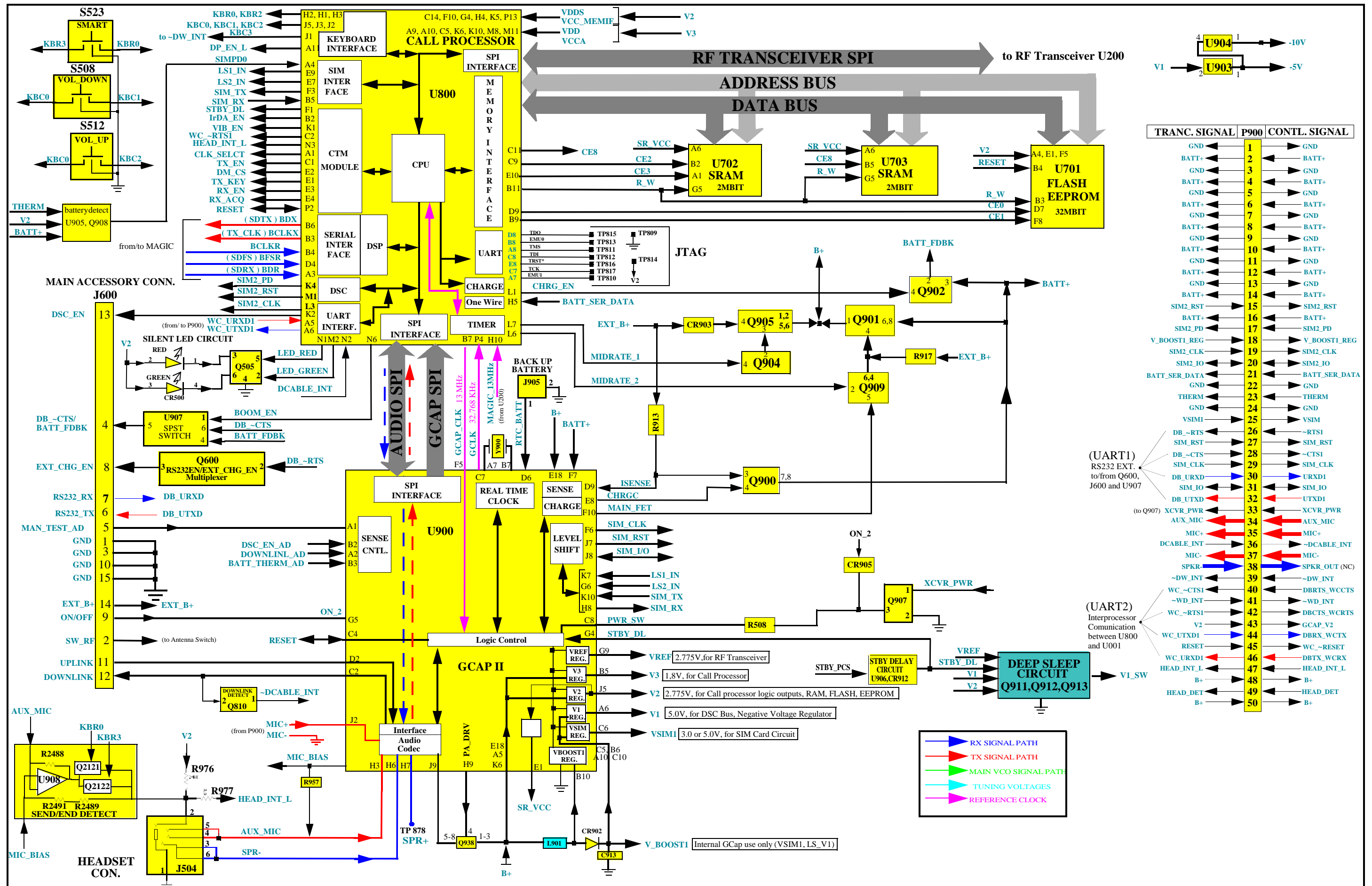
A009 - TRANSCEIVER BLOCK DIAGRAM - PAGE 1/2



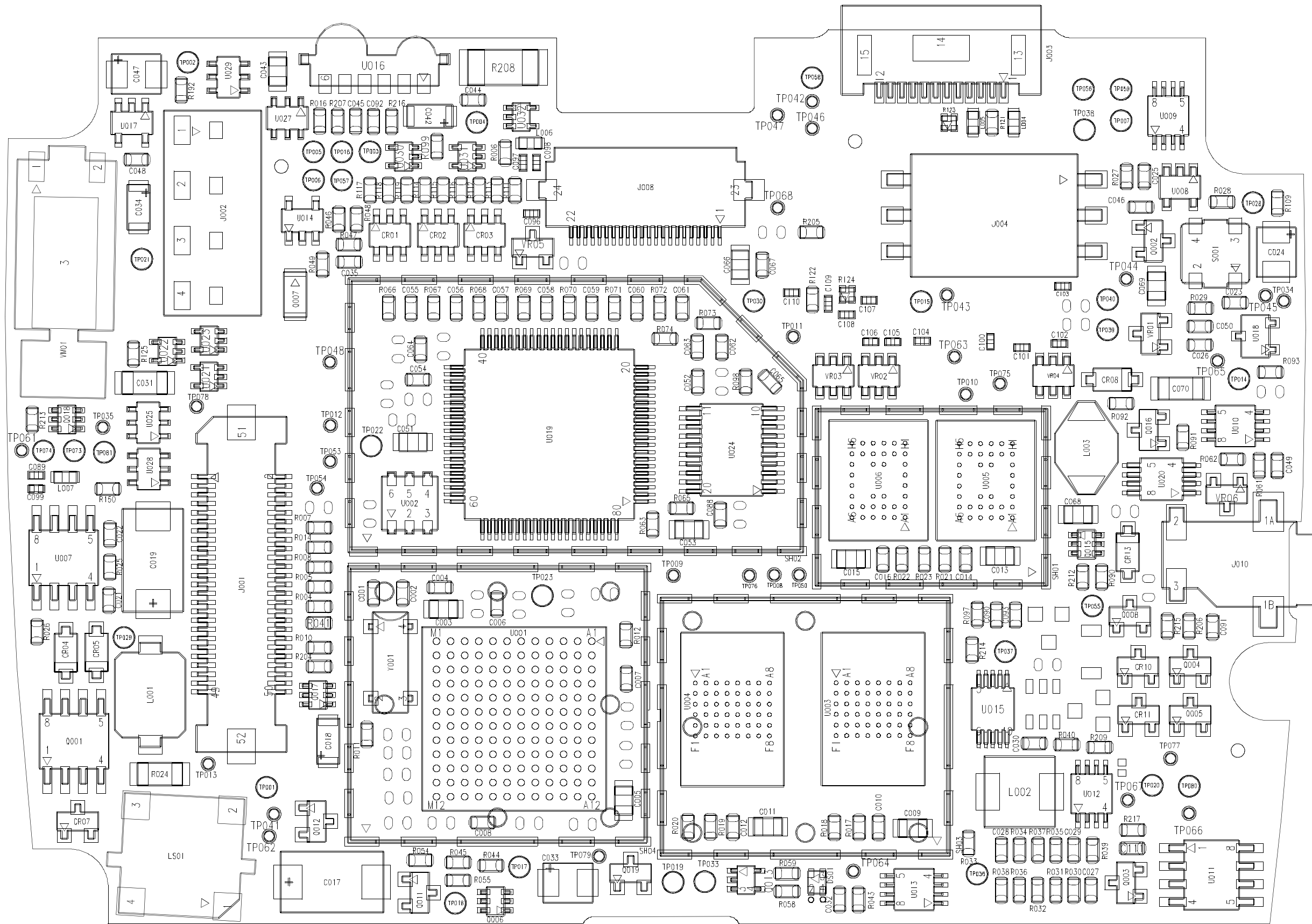
GSM / DPCS SELECT CIRCUIT

For description of GSM / DPCS Select Circuit see document on: emeacs.fle.css.mot.com

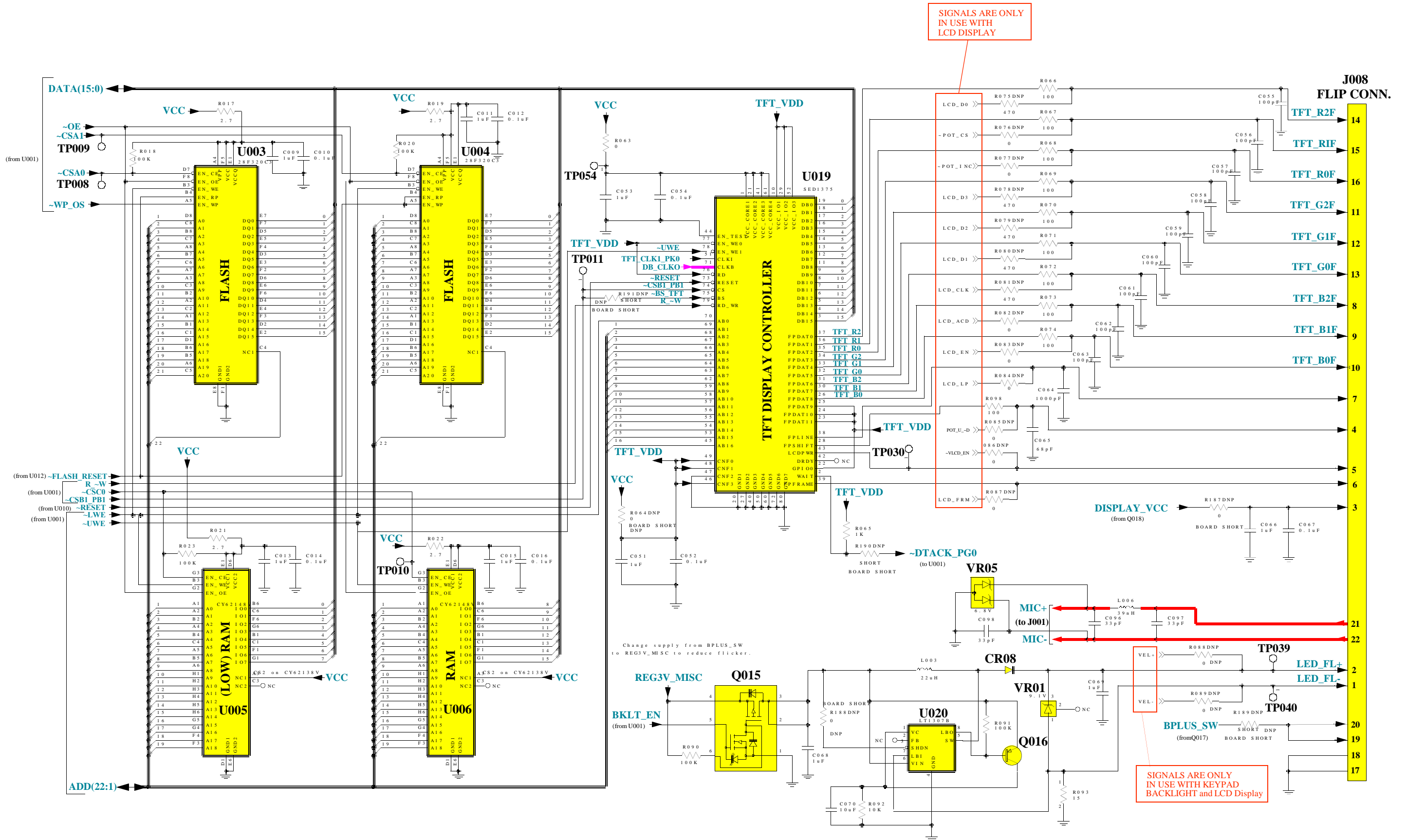
A009 - TRANSCEIVER BLOCK DIAGRAM - PAGE 2/2



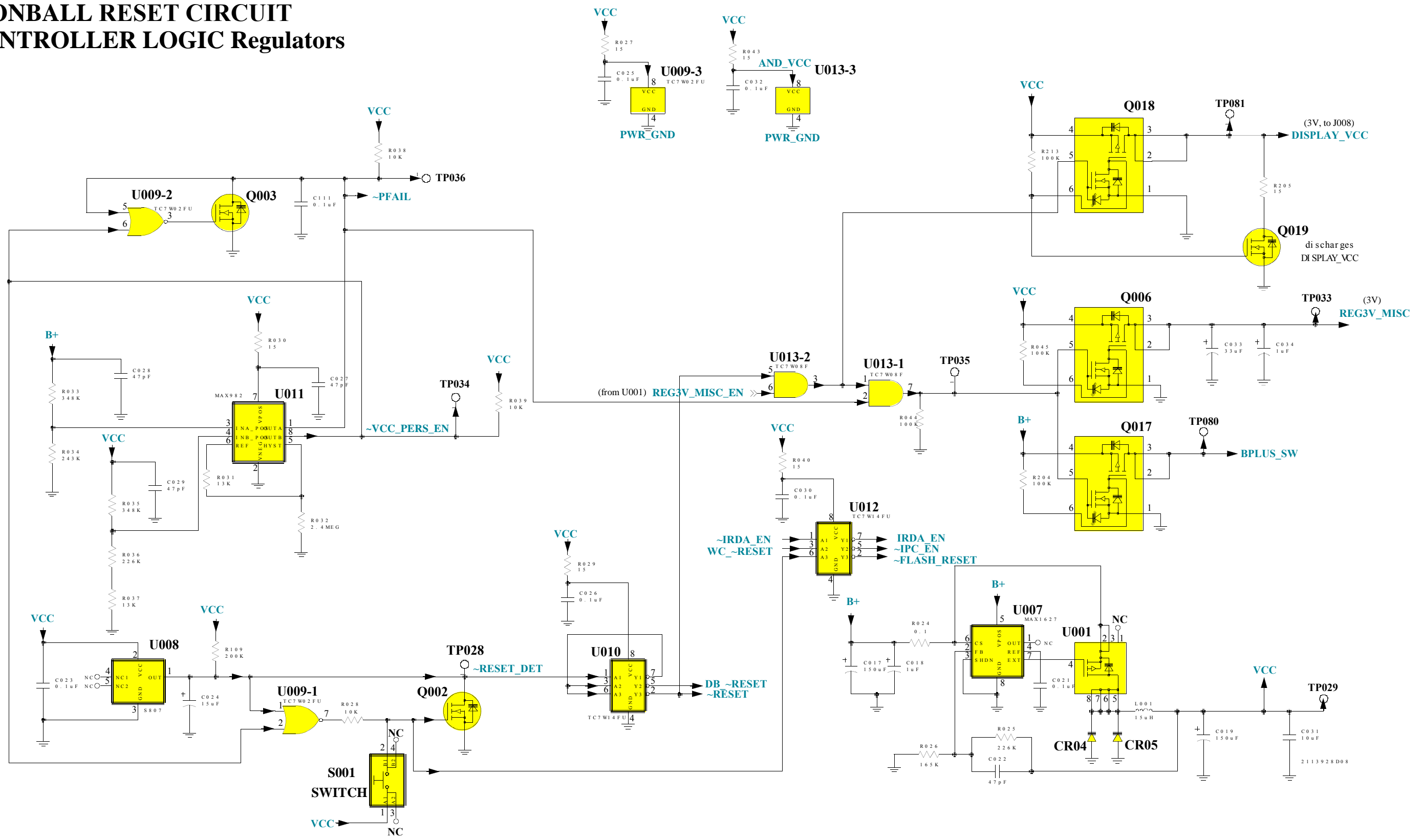
A009 - CONTROLLER BOARD LAYOUT



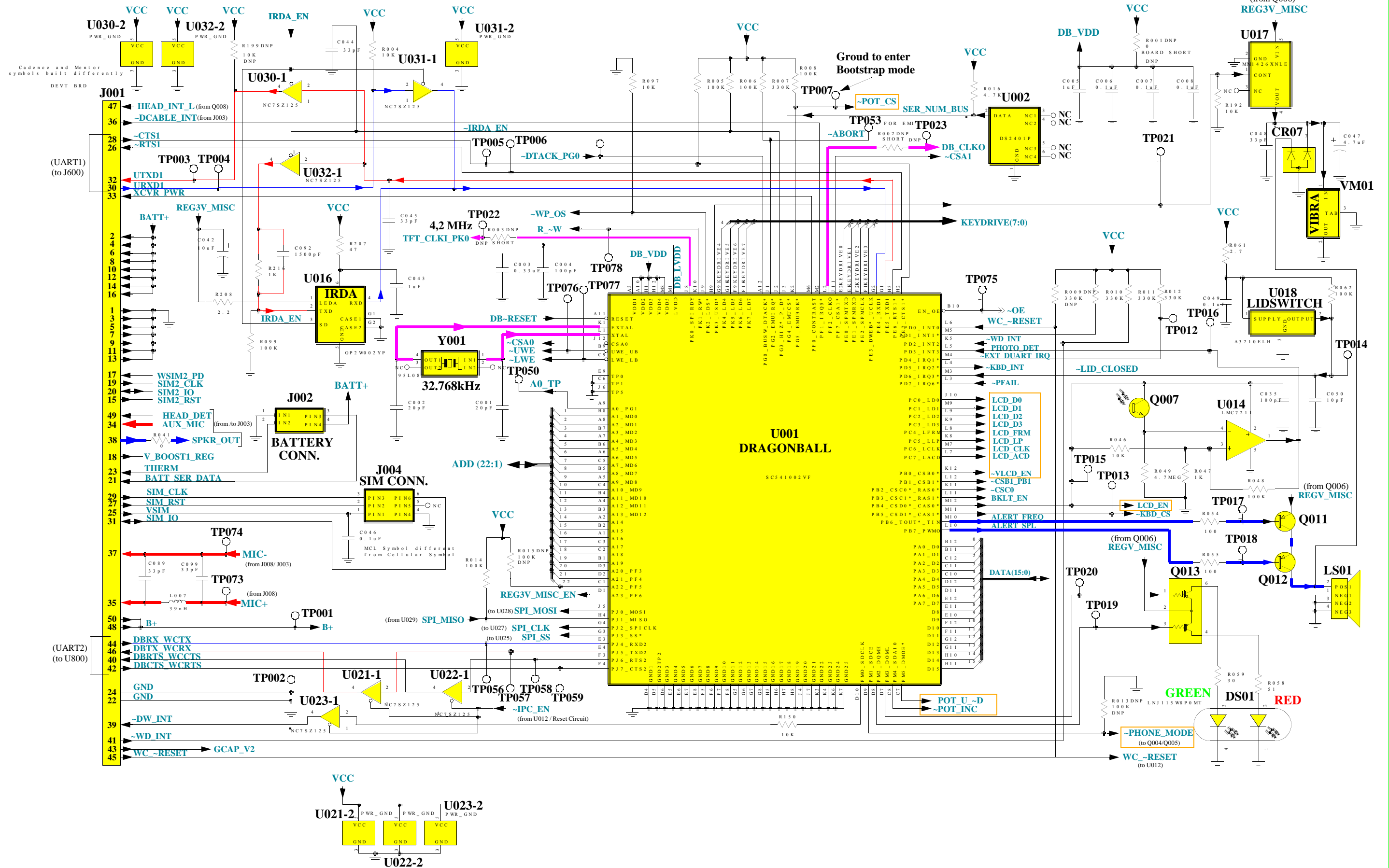
A009 - DISPLAY CONTROLLER SCHEMATIC



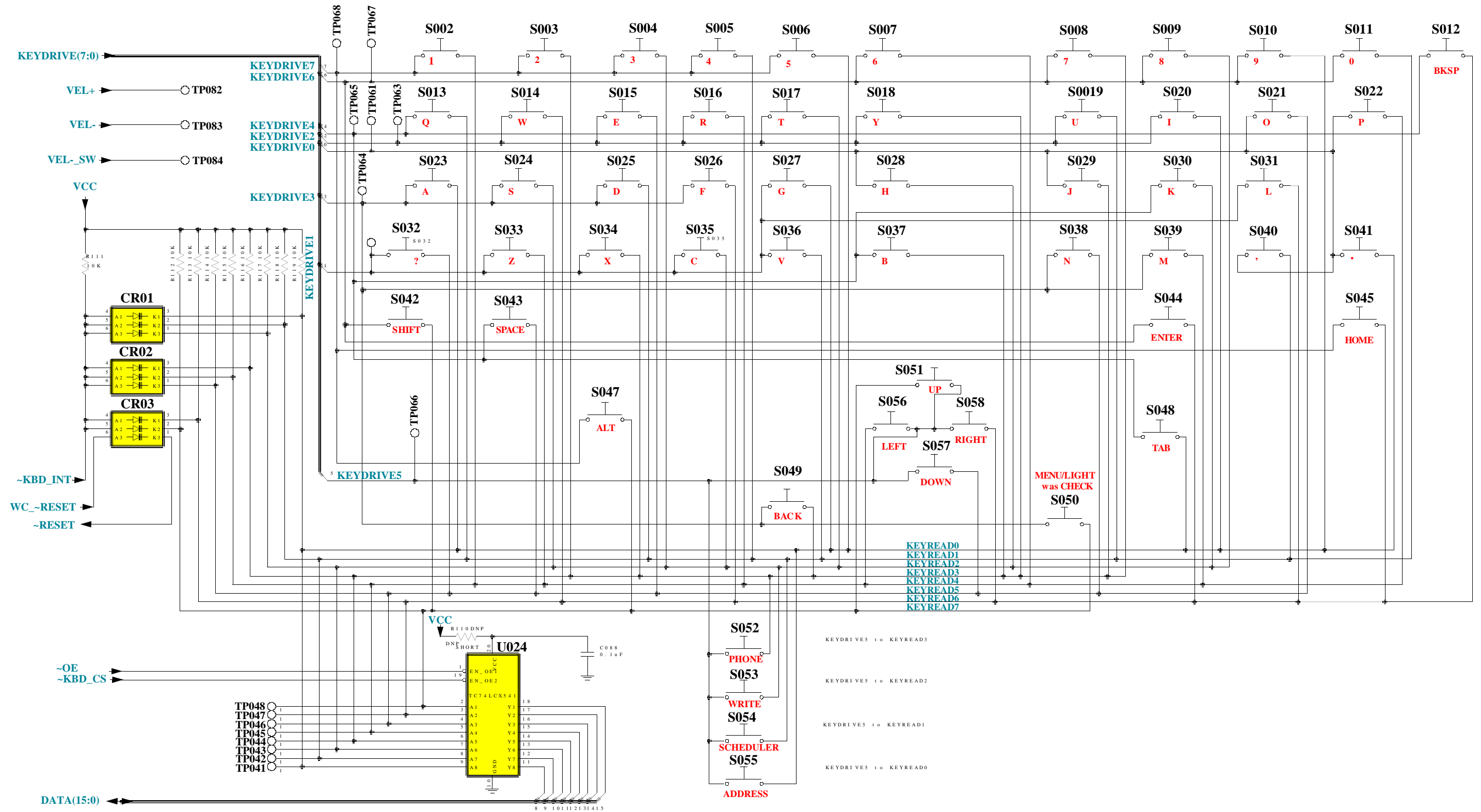
DRAGONBALL RESET CIRCUIT and CONTROLLER LOGIC Regulators



DRAGONBALL CIRCUIT



KEYBOARD CIRCUIT



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