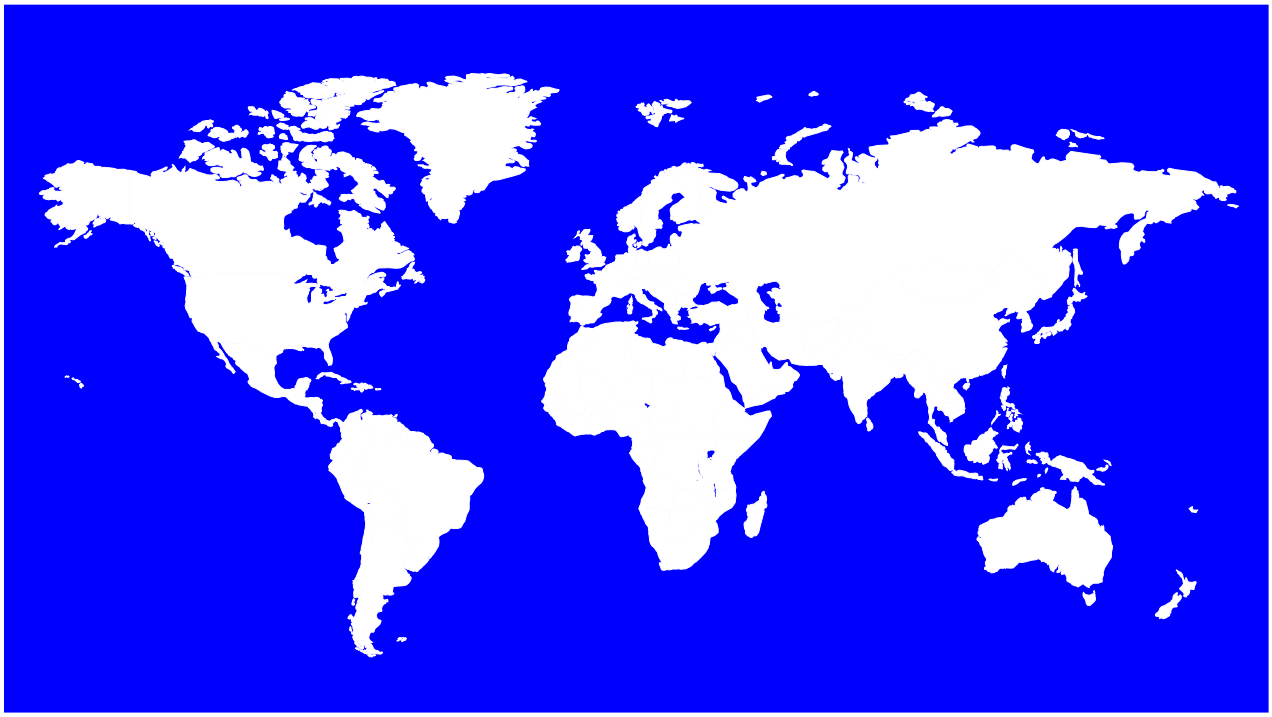
MOTOROLA

Cellular Subscriber Sector

CDMA SC925



The World's Leading Cellular Telephone Manufacturer

Service Manual

Level II

Preface

Specifications

Table 1:

Function	*Specification*
Frequency Range	1720-1780 MHz Tx, Korea Channels 1 to 599, f_{Tx} = 0.05 * N + 1750 MHz 1810-1870 MHz Rx Korea Channels 1 to 599 is f_{Rx} = 0.05 * N + 1840 MHz
RF Channel Bandwidth	1.25 MHz
Duplex Spacing	90 MHz
Frequency Stability	$\pm$ 300 Hz of incoming Rx CDMA signal
Operating Voltage	5.2-9.0 VDC (+ 6.2 VDC nominal)
Display	96x32 LCD
Max. RF Power Output	0.2 watts (23.0 dBM) into 50 ohms
Input/Output Impedance	50 ohms (nominal)
Spurious/ Harmonic Emissions	Complies with Title 47, Part 22 of the code of Federal Regulations
Vocoders	8kbps, 13kbps, EVRC
Transmit Time Error	+/- 1 us
Modulation	1M25D1W (1.25 MHz bandwidth) CDMA
Transmit Duty Cycle	Variable - full, 1/2, 1/4, 1/8 rate (CDMA Mode)
CDMA Transmit Wave-form Quality (Rho)	0.94
Receiver Sensitivity	-104 dBm (CDMA, 0.5% Static FER, 8kbps vocoder)

Table 2:

Function	***Specification***
Temperature Range	Operational -30°C to +60°C (-22°F to +140°F) Storage -55°C to +85°C (-67°F to +185°F) Thermal Shock -40°C to +85°C (-40°F to +185°F) meets Mil. Std. 810C
Shock	Exceeds EIA Standards RS152B (Section 15) and IS-19
Drop	Exceeds EIA Standards RS316B and IS-19
Humidity	95% Relative Humidity; meets EIA Standard IS-19
Vibration	Exceeds EIA Standards RS316B and IS-19
Salt Fog	Salt Solution fog at 35°C (95°F), tested for 48 hours
Dust	140 mesh blown silica flour test, tested for 5 hours
NOTES: (1) EIA (Electronic Industries Association) Standard RS152B states the minimum standards for Land Mobile Communications, FM or PM transmitters 25-470 MHz. (2) EIA IS-19 states the recommended standards for 800 MHz cellular subscriber units. (3) EIA Standard RS316B states the standards for portable land mobile communications. (4) U.S. Military Standard 810D establishes uniform environmental test methods for determining the resistance of equipment to the effects of natural and induced environments peculiar to military operations. (5) TIA/EIA/IS-98 Recommended Minimum Performance Standards for Dual-Mode Wide band Spread spectrum Cellular Mobile Stations.	

Specifications subject to change without notice.

Foreword

Scope of Manual

This manual is intended for use by experienced technicians familiar with similar types of equipment. It is intended primarily to support basic servicing, which consists primarily of mechanical repairs and circuit board replacement.

Authorized distributors may opt to receive additional training to become authorized to perform limited component repairs. Contact your regional Customer Support Manager for details.

Model and Kit Identification

Motorola products are specifically identified by an overall model number on the FCC label. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them.

Service

Motorola's regional Cellular Subscriber Service Centers offer some of the finest repair capabilities available to Motorola Subscriber equipment users. The Cellular Subscriber Service Centers are able to perform computerized adjustments and repair most defective transceivers and boards. Contact your regional Customer Service Manager for more information about Motorola's repair capabilities and policy for in-warranty and out-of-warranty repairs in your region.

General Safety Information

Portable Operation

DO NOT hold the radio so that the antenna is very close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if it is held in the same manner as you would hold a telephone handset, with the antenna angled up and over your shoulder. Speak directly into the mouthpiece.

DO NOT operate the telephone in an airplane.

DO NOT allow children to play with any radio equipment containing a transmitter.

Mobile Operation (Vehicle Adaptor)

As with other mobile radio transmitting equipment, users are advised that for satisfactory operation of the equipment and for the safety of personnel, it is recommended that no part of the human body shall be allowed to come within 20 centimeters of the antenna during operation of the equipment.

DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere. Mobile telephones are under certain conditions capable of interfering with blasting operations. When in the vicinity of construction work, look for and observe signs cautioning against mobile radio transmission. If transmission is prohibited, the cellular telephone **must be turned off** to prevent any transmission. *In standby mode, the mobile telephone will automatically transmit to acknowledge a call if it is not turned off.*

All equipment must be properly grounded according to installation instructions for safe operation.

Portable/Mobile Telephone Use and Driving

Safety is every driver's business. The portable telephone should only be used in situations in which the driver considers it safe to do so. Use of a cellular portable while driving may be *illegal* in some areas.

Refer to the appropriate section of the product service manual for additional pertinent safety information.

MOTOROLA
Cellular Subscriber Sector

CONTENTS

CDMA SC925

Description

Cellular System Overview

NOTE

The following description is intended only as a preliminary general introduction to cellular systems. This description is greatly simplified and does not illustrate the full operating capabilities, techniques, or technology involved in cellular systems.

Overall Concept

A cellular system provides higher call handling capacity and system availability than would be possible with conventional radiotelephone systems that require total system area coverage on every operating channel. The cellular system divides the system coverage area into several adjoining sub-areas, or cells.

Each cell contains a base station (cell site) which provides transmitting and receiving facilities. CDMA is a "spread spectrum" technology, which means that it spreads the information contained in a particular signal of interest over a greater bandwidth than the original signal.

With CDMA, unique digital codes, rather than separate RF frequencies or channels are used to differentiate subscribers. The codes are shared by both the mobile station and base station and are called "pseudo-random code sequences". Since CDMA is a spread spectrum technology, all users share a range of the radio spectrum.

CDMA cell coverage is dependent upon the way the network is designed. For each system 3 characteristics must be considered: coverage, quality, and capacity. These 3 must be balanced for desired lever of performance.

Some of the CDMA benefits are:

- Improved call quality with better and more consistent sound.
- Enhanced privacy.
- Variable rate vocoder.

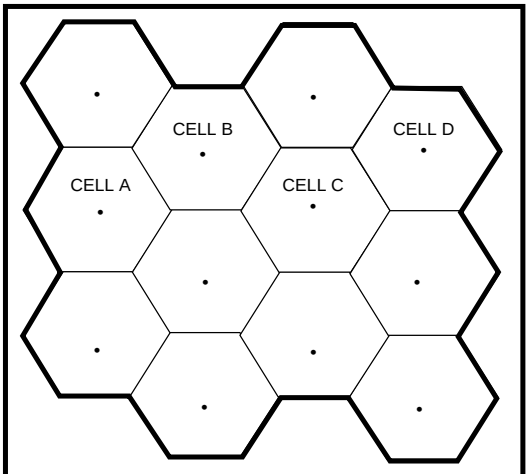


Figure 1: Hypothetical Cell System

Operation

In Figure 1: "Hypothetical Cell System", the area bounded by bold lines represents the total coverage area of a cellular system.

This area is divided into several cells, each containing a cell site base station which interfaces radiotelephone subscribers to the switching system.

Since there are no channels in CDMA, a user has a better chance of completing a call. Also, now there is no hard handoff between cell sites since all sites operate on the same frequency. This is called soft handoffs. In this system, subscribers in cell A & D simultaneously operate in the same frequency.

As a user moves from cell site to cell site, the base station monitors the signal strength of the user. Based on this signal strength, the base station decides which cell shall carry the call.

When a radiotelephone is in use well within a cell, the signal strength received at the cell site base station will be high. As the phone is moved towards the edge of the cell, its received signal strength decreases.

Signal strength information therefore provides an indication of the subscriber's distance from a cell's base station. This change is handled automatically, and is completely transparent to the user.

For example, assume that a cellular telephone initiates a call in cell A and then moves across the system area through cells B and C to cell D. As the phone moves into cell B, it is instructed to change to a different frequency that operates through the B cell on that frequency.

A similar change is performed when the phone moves from cell B to cell C and again when the phone moves from cell C to cell D.

In this example, the radiotelephone has operated in four cell sites, through four cell sites, and on the same spread spectrum without interruptions in voice communications. As the radiotelephone leaves a cell, the frequency on which the phone and base station were operating is made available to another subscriber in that cell.

Since this radiotelephone is dual mode, the radiotelephone can operate in either a CDMA system or Analog system.

Service Area

The area within which calls can be placed and received is defined by the system operator. (Because this is a radio system, there is no exact boundary that can be drawn on a map.)

If the portable is outside the radio service area, a **No Svc** (no service) message will appear on the phone's display, and calls cannot be placed or received. If this happens during a conversation, the call is lost.

Places where the ability to place or receive calls would be lost are in totally enclosed areas, such as underground parking garages, in buildings without windows, and in elevators.

This situation would be indicated either by the **No Svc** message illuminating, or by the sound of either a fast busy signal or a high-low siren signal when call placement is attempted.

General usage in buildings having reasonable glass area is usually quite good. However, it may be necessary to move closer to a window to ensure reliable operation.

Theory of Operation

Receiver Circuitry

RF enters the phone via the internal antenna A500 or via the accessory connector. RF switch S1 selects which antenna is used. The received RF signal is routed through monoblock duplex filter F2005. Then the RF signal is routed through either a direct path through RF switches U2012 and U2013, and preamp U2. The received signal then passes through amplifier U9914, Mixer 2011, IF filter FL60, and IF amplifier Q72.

The local oscillator input to the mixer is a 1920-1980 MHz VCO, U9915, controlled by the IF/Synthesizer IC U101. The 109.65 MHz mixer output is filtered by FL60 and amplified by Q72, then routed to the IF/Synthesizer IC U101 to be down-mixed again and demodulated.

Transmitter Circuitry

The modulated 199.8 MHz TX Offset VCO signal is mixed with the 1920-1980 MHz local oscillator signal in TX Mixer U400 to produce a 1720-1780 MHz transmit signal. This signal passes through filter FL2004 and voltage controlled attenuators U490 and U401 which control the TX output power. Then the TX signal is filtered by FL2003, amplified by U2006, bandpass filtered by FL0002, and amplified by TX Power Amplifier U2007. The PA output passes through the monoblock duplex filter FL2005 to RF switch S1 to either the internal antenna or the accessory connector.

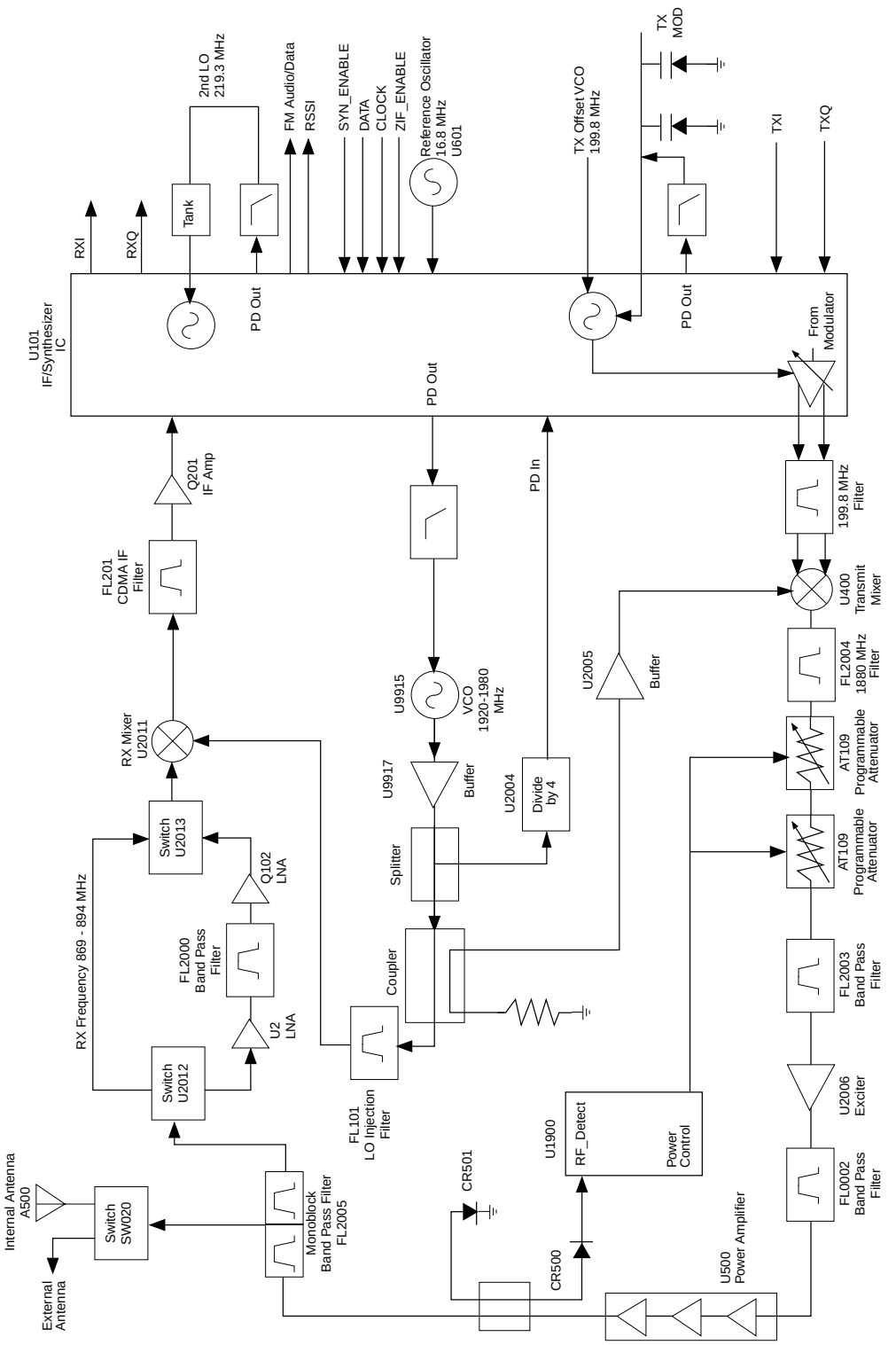
Frequency Synthesizer Circuitry

The phone contains three PLL frequency synthesizers in the IF/Synthesizer IC U101. One synthesizer controls the tunable 1920-1980 MHz main local oscillator, U9915. The second synthesizer controls the TX offset oscillator (internal to U101) which operates at a fixed frequency of 199.8 MHz. TX modulation occurs in the TX offset synthesizer. The third synthesizer (also internal to U101) operates at a fixed frequency of 219.6 MHz. This oscillator is divided by 2 and used to mix the received first IF signal down to baseband. All synthesizers obtain their frequency reference from the 16.8 MHz reference oscillator, U601. Active temperature compensation is employed using temperature sensor U122.

Block Diagram

The block diagram below shows the major RF Section functional blocks.

Figure 2: RF Functional Block Diagram



Transmit Power Control Circuitry

The power control signal controls voltage controlled attenuator AT109 which is after the TX offset mixer. U1900 compares a detected sample of the TX output signal with a variable reference voltage. A closed loop adjusts the Power Control signal such that the sampled RF signal level matches the reference level. The RF power range is -50 dBm to +24 dBm. The power control can operate in either open-loop or closed-loop modes. In open-loop mode, the power level is proportional to the received signal level. In closed loop mode, the power level is controlled by the CDMA cell, based on received signal strength at the cell site.

Receive Audio - CDMA Mode

Received CDMA OQPSK data (RX I, RX Q) is gain controlled and converted to digital by U1900. The 1.2288 Mb/sec. RX data stream is then decoded by the U1800 Modem IC to produce a signal containing only the desired data. The digital speech data is routed through the microprocessor U1100, decoded by the U1600 CELP Vocoder, and sent to U1900 to be converted into analog audio. The audio signal is then amplified by U2000 and sent to the earpiece speaker.

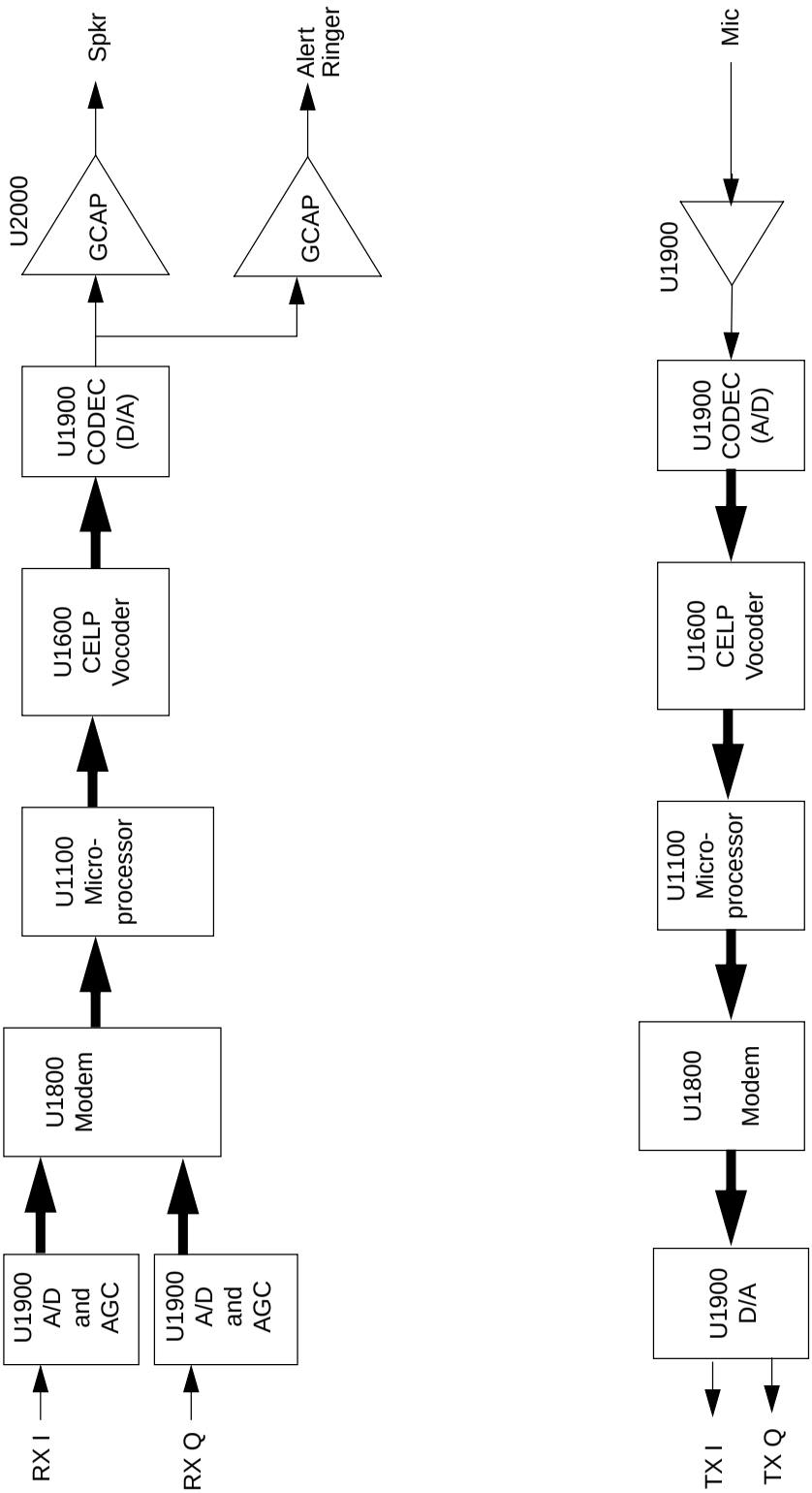
Transmit Audio - CDMA Mode

In CDMA mode, the digitized TX audio is processed by a CELP variable rate vocoder, U1600. The digital signal is then routed through microprocessor U1100 and processed by the CDMA Modem IC, U1800, which produces the 1.2288 Mb/sec. CDMA data stream. This stream is then converted to analog OQPSK signals (TX I, TX Q) by D/A U1900. The TX I and TX Q signals are sent to the IF/Synthesizer IC U101 which modulates the 199.8 MHz TX offset VCO.

Block Diagram

The block diagram on the following page shows the major audio and signalling sections.

Figure 3: Audio and Signalling Diagram



Test Mode/Test Menu

Introduction

Manual Test Mode and Test Menu software allows service personnel to suspend automatic call processing functions and manually control phone operation for diagnostic purposes. Parameters such as operating channel, output power level, muting, and data transmission can all be selected by entering the corresponding commands.

Manual Test Mode

To enter the manual test mode, press the following keypad sequence after powering up the telephone:

FCN 0 0 * * 8 3 7 8 6 6 3 3 STO

Table 2: "Test Commands For Manual Test Mode" on page 10 shows the test commands and the corresponding results.

Test Menu

A Test Menu allows a user to initiate Markov calls, place Service Option 2 calls and set Software Configuration Options. The Test Menu is intended to provide a simple mechanism to perform various test and software diagnostic functions.

When Test Menu is enabled, it is entered by pressing the FCN key twice. Refer to Step "09" on page 23 for information on how to enable/disable the Test Menu during NAM programming.

Almost every Test Menu command accepts a parameter or data in the scratchpad. The procedure for transferring the scratchpad data and executing the Test Menu command is as follows:

Step 1. Decide which Test Menu command is going to be executed.

Step 2. Enter the necessary user input into the scratchpad.

Step 3. Press the FCN key twice to activate the Test Menu.

Step 4. Press the volume keys until the desired Test Menu command is indicated on the display.

Step 5. Press the SND key to activate the command.

While the Test Menu is displayed, any keypress that is not volume or SND will also cause the menu to be exited without executing the current option. The Test Menu will also be exited whenever an incoming call is detected.

Markov Calls

During a Markov call, the "(G)ood" rate will be on the top line, and the "(T)otal" on the bottom line of the display. The display will cycle through all rates: (F)ull, (1/2) Half, (1/4) Quarter, and (1/8) Eight.

- Mobile originated Markov calls are performed by entering a telephone number and selecting a Test Menu option. Refer to the "Test Menu" section for further information.
- Mobile terminated Markov calls (Land to Mobile) are currently NOT supported.

Pressing the SND key initiates a Markov call with the number in the scratchpad. If scratchpad is empty, "1234567" is used.

Service Option 2

For Service Option 2 calls, the In Use indicator will come on, but the display will remain blank.

- Mobile originated Service Option 2 calls are performed by entering a telephone number and selecting a Test Menu option. Refer to the "Test Menu" section for further information.
- Mobile terminated Service Option 2 calls will be automatically answered.

Pressing the SND key initiates a Service Option 2 call with the number in the scratchpad. This feature has no value in AMPS mode.

SW (Software) DIP

Pressing the SND key initiates a one or more SW DIP functions based on the number in the scratchpad. Possible functions are:

1: Disables closed loop power control.

4: Forces vocoder to provide full rate voice (may be enabled at any time during a call).

128: Sets the conversation audio path to "audio out" and "audio in" on the external connector.

For example, to disable closed loop power control, the user enters the following key sequence:

1 + FCN + FCN + ^ + SND

Undo all SW DIP settings (default at power on) by pressing:

0 + FCN + FCN + ^ + SND

These may be combined to do more than one at a time. For example, 4 and 1 may be combined by entering 5 before entering menu and selecting SW DIP.

Handset Commands

Table 1:

Key	***Function***
*	Toggles the display to the next location (enters data displayed to buffer). When hit at last program step, the command is terminated (if required, information may also be programmed into the EEPROM). If the command relates to a test function with multiple data displays, the * key is used to pause scanning data or to step through sequential test functions. Entering the * key during a pause time resumes scanning.
CLR/END	Resets the location to presently programmed information (if the command allows user input).
#	Terminates command without changing any of the programmed information. Each command consists of at least two digits entered from the telephone keypad with the entry terminated using the # key. For commands that initiate an action that requires a response or that accumulates error counts, the # key terminates the test.
DIGIT	Enter digit value. If the value to be modified is filled or exceeded, the **CLR** must be pressed before more digit selections are allowed. This is valid only if the command allows user input.
For the GAIN and POWER phasing handset test commands only:	
SND	Send into HEX mode. Keys 0-5 enter immediately after the send key are translated into HEX A-F respectively.
VOLUME UP/DOWN	Increments/decrements the current data value. If the maximum value for this data location is exceeded then it is set to zero.
STO	Shortcut to save values and quit test command.

Test Commands

Table 2:

Keypad Entry	*Command Description*	*Status Display*	*Result*
#	SUSPEND		Terminate normal mode and enter Test Command Mode. This command is valid only when in normal mode. The # key must be held for 2 seconds to suspend with handset. Performs initialization as in the INIT test command.
01#	RESTART		Equivalent to turning power off, then on again.
02#	RADIO STATUS REQUEST	AAAZBB BCDEFG HI	Display the current radio status: **Handset Display Format:** AAA = Current channel (1000-1023 represented as A00-A23) Z = Blank - AMPS **Analog Mode:** BBB = RSSI reading (averaged) for this channel. C = Digital Color Code (data channel) 0-3 DCC, 4 invalid = SAT Frequency (voice channel) 0=5970 Hz; 1=6000 Hz; 2=6030 Hz; 3=No SAT Lock D = Carrier (0=OFF, 1=ON) E = Word sync status (data channel) and Signalling tone (voice channel) (0=OFF, 1=sync acquired/ON) F = RF Power Level (Steps 0-7) G = Reception Mode (0=voice channel, 1=data channel) H = Receive Audio (0=enabled, 1=muted) I = Transmit Audio (0=enabled, 1=muted) **CDMA Mode: (Not currently supported)** **Bit fields undefined**
03#	(NOT USED)		

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***
04#	INITIALIZE TRANS-CEIVER		Initialize the current radio as follows: 1. Carrier = OFF 2. RF power attenuation set to level 2 3. Signaling Tone = OFF 4. SAT transponding = OFF 5. Audio Path = TO INTERNAL SPEAKER 6. DTMF & Audio Tones = OFF 7. Receive Audio & Transmit Audio = MUTED 8. AMPS Mode If the radio is a CDMA only model (not dual mode), it will default to CDMA mode instead.
05#	CARRIER-ON		Turn on the carrier. **05#** turns the carrier on with a nominal value for the DAC for an output power level.
06#	CARRIER-OFF		Turn off the carrier. **06#** turns the carrier off.
NOTES: Use the PATH command (**35A#**) to select the audio path to test before using commands **07#** through **10#**. (Default path is to internal speaker and microphone).			
07#	RXMUTE		Mute receive audio.
08#	RXUNMUTE		Unmute receive audio.
09#	TXMUTE		Mute transmit audio.
10#	TXUNMUTE		Unmute transmit audio.
11X#	LOAD-SYNTH		Load the specified channel into the radio synthesizer. X-Enter up to 4-digits for the channel number. Channel numbers must be in the range of 1 to 1024. Narrow mode channel numbers not currently supported.
12X#	SET-ATTN		In AMPS mode: Set the AMPS RF power attenuation to the value specified (0-7). In CDMA mode: Set the TX gain adjust DAC to the value specified (0-255)
13#	(NOT USED)		
14#	STON		Enables continuous signalling tone.
15#	STOFF		Disables signalling tone.
16#-18#	(NOT USED)		

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***
19#	VERSION		Displays version corresponding to the two digit option x. The following table show the valid options for x: Decimal 00 Call processor 01 CDMA test command document number 02 Date 03 Time 22 DSP mask version 23 DSP patch version • The call processor (factory version) number in the format: 00 XXXX • The CDMA test command document number: 01 XXXX • The date the build was created in the format: 01JAN96 • The time the build was created in the format: xxyyzz where xx is the hour, yy is the minute, and zz is the second. • The version of the DSP mask xxxxyyyyyyzzzz where xxxx is the version, yyyyyy is the date, and zzzz is the device. • The version of the DSP patch xxxxyyyyyyzzzz where xxxx is the version, yyyyyyis the date, and zzzz is the device. All data fields can be viewed by hitting the * key repeatedly. To exit hit the # key.

Table 2:

Keypad Entry	*Command Description*	*Status Display*	*Result*
19X#	MULTI-VERSION		Displays version corresponding to the two digit option x. The following table show the valid options for x: Decimal 00 Call processor 01 CDMA test command document number 02 Date 03 Time 22 DSP mask version 23 DSP patch version • The call processor (factory version) number in the format: 00 XXXX • The CDMA test command document number: 01 XXXX • The date the build was created in the format: 01JAN96 • The time the build was created in the format: xxyyzz where xx is the hour, yy is the minute, and zz is the second. • The version of the DSP mask xxxxyyyyyyzzzz where xxxx is the version, yyyyyy is the date, and zzzz is the device. • The version of the DSP patch xxxxyyyyyyzzzz where xxxx is the version, yyyyyyis the date, and zzzz is the device.
20#-24#	(NOT USED)		
25X#	SAT/DSAT ON		Enable SAT/DSAT transponding. For AMPS mode, the bye following the opcode is the color code of the SAT frequency that the radio may expect to receive. The command only uses the narrow phase lock loop mode and locks only to the frequency selected (+/- 15 Hz). Valid color codes for X: 0 = 5970 Hz 1 = 6000 Hz 2 = 6030 Hz
26#	SAT/DSAT OFF		Disable the transponding of SAT/DSAT.

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***
27X#	CDATA		AMPS: Continuous Transmit Data on the reverse Analog Control Channel. CDMA: Random Transmit Data (RTD) on the reverse CDMA channel. Input — Action 0 — Start (AMPS) / Variable Rate (CDMA) 1 — Full Rate (CDMA) 2 — Half Rate (CDMA) 4 — Quarter Rate (CDMA) 8 — Eighth Rate (CDMA) 9 — Stop RTD (AMPS, CDMA)
28#	HITNON		Turn on high tone (Frequency 1150 Hz ± 55 Hz).
29#	HITNOFF		Turn off high tone.
30#	LOTNON		Turn on low tone (Frequency 770 Hz ± 40 Hz).
31#	LOTNOFF		Turn off low tone.
32#	INVM		Initialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogramming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber). This command may take a minute or more to complete; during which time the number 32 will be displayed. DO NOT turn off the radiotelephone until the normal servicing level display resumes.
33X#	DTMFON		Generates a continuous DTMF tone as specified by input X. Input X may be 0-9 for keypad DTMF, 10-18 for single low or high tone, and 20-25 for tripled low or high tone.
34#	DTMFOFF		Turn off DTMF tones.

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***

35X#	PATH		Change the audio path to A, where A =:
			0 = Hands free (selects input signal AUDIO IN @ J3-pin 8 and outputs audio signal AUDIO OUT/ON-OFF @ J3-pin 7; internal speaker and microphone are muted.)
			1 = Speaker (normal audio path; selects internal mic and outputs audio @ AUDIO OUT/ON-OFF @ J3-pin 7; internal speaker is muted.)
			2 = Alert (activates the alert transducer for as long as the # key is pressed. To prevent overstressing the alert transducer., DO NOT hold the # key down for extended periods.)
			3 = Handset (selects the internal mic and speaker.)
			4 = Mute (all audio paths and supplies are off, DSP put to sleep.) This command must be followed by a different AUDIO-PATH command (not MUTE) in order to guarantee proper DSP functionality. Failure to do so may result in a radio failure.
			5 = Internal MIC Test (routes the internal mic audio directly to AUDIO OUT/ON-OFF @ J3-pin 7, and routes audio input at AUDIO IN @ J3-pin 8 directly to the earpiece speaker.)
			6 = External Handset (selects input audio at AUDIO IN @ J3-pin 8, and outputs audio at AUDIO OUT/ON-OFF @ J3-pin 7; internal speaker and mic are muted, and sidetone is turned on.)
			7 = Reserved (not supported)
			8 = Reserved (not supported)
			9 = Boom MIC (selects input audio at AUDIO IN and outputs audio at AUDIO OUT/ON-OFF to headset connector; internal speaker and mic are muted, and sidetone is turned on.)
			This command enables all internal and external hardware controls necessary to route audio to/from the correct outputs/inputs.

36#	(NOT USED)		
37#	(NOT USED)		
38#	SND-SN	AABB	Returns serial number contents. If all bytes = 00, no serial number is programmed. Display four byte serial number in hexadecimal one byte at a time, along with a byte count. The * key causes the next byte/count to be displayed.
39#-44#	(NOT USED)		
45#	READRSSI		Returns the RSSI reading taken on the current channel. The number is displayed as a three digit decimal number.
46#	(NOT USED)		

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***
47X#	SET-AUD		Sets the audio level to the value specified by X. Audio level X is represented as 0 = lowest, 15 = loudest. Range of 8-15 has DTMF Feedback boost bit enabled.
48#	SIDETN		Enable sidetone. (Command **05#** must also be executed).
49#	SIDETF		Disable sidetone. (Command **06#** must also be executed).
50# - 54#	(NOT USED)		
55#	PROG-NAM	NAM	Programs the NAM through the handset. This version uses supports only currently required NAM fields and it supports programming of data logger bytes. At the last step, the user enters a 1 to begin programming the data logger bytes. Handset key entry is defined in Table 1: “Handset Command Key Entry” on page 9. Refer to “NAM Programming” on page 21 of this manual for programming details.
56#	AUTO-CYCLE		Puts the radio in autocycle mode (CDMA only). Exit this command with the # key. This command causes the radio to infinitely loop between 2 cycles. One cycle is the display/transmit and the other is standby. The display/transmit cycle has a duration of 90 seconds and the radio has the following setup: • Display has all 8’s showing. • Turn on variable rate random transmit data. • Carrier is enabled. The standby cycle has a duration of 4.5 minutes and the radio has the following setup: • Display is blank. • Turn off variable rate random transmit data • Carrier is disabled. This test command forces the radio into CDMA mode.

Table 2:

Keypad Entry	*Command Description*	*Status Display*	*Result*
57X#	CP-MODE		Select radio call processing mode. This command will set up the radio to operate in the mode selected and will also perform initialization as specified by the INIT command. The synthesizer will be reprogrammed to setup parameters for the mode selected. 0 AMPS signalling (stop call processing test commands and PCM Loopback) 1 Not supported - NAMPS signalling 2 Not supported - Reserved for NAMPS expansion 3 Not supported - Reserved for NAMPS expansion 4 Not supported - Reserved for NAMPS expansion 5 CDMA signalling (stop call processing test commands and PCM Loopback) 6xy SIMVC test command From the handset, x is the maximum rate and y is the minimum rate. Valid rates for x and y are: 4 - Full rate 3 - Half rate 2 - Quarter rate 1 - Eighth rate From the Computer, no parameters are accepted and Full rate is forced. (This is not supported yet) 7 Start PCM Loopback 8 CDMA T-Tester mode (channel must be set by LOAD-SYTH. Handset only). 9 Not supported - CDMA force random data transmission 12 Stop CPU - There is no way out of this except cycling power.
58#	COMPD-ON		Turns on the Compandor.
59#	COMPD-OFF		Turns off the Compandor.
60# - 67#	(NOT USED)		
68#	READ-MODEL		Read radio model type. Displays three radio model bytes: hardware (model), flex (type), and factory.
69# - 71#	(NOT USED)		

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***
72X#	GAIN-PHASE		Program AMPS (only) gain phasing values through the handset. Gain phasing depends on the call processing mode. It is the responsibility of the user to select the proper call processing mode before using this test command. This command reprograms the EEPROM phasing values for MOD, MIC, AUX, etc. The value in X selects which step to start on. If no value for X is entered, it will start at step 0. The command keys are defined in Table 1: “Handset Command Key Entry” on page 9. NOTE: If you power down the radio after changes are made, the power up sequence re-programs the hardware with the correct phasing values. Refer to the “Tests and Adjustments” on page 31 for instructions on entering parameters from the keypad. STEP # — AMPS GAIN PHASING PARAMETER — RANGE (HEX) 00-04 — MOD 0- MOD 4 — 0-7 05 — Aux. audio path deviation — 0-1 06 — MIC audio deviation — 0-F 07 — DTMF deviation — 0-3 08 — Data deviation — 0-3 09 — SAT deviation — 0-3 0A — Discriminator audio gain — 0-7 0B — AFC WARP Analog — 0-FF

Table 2:

Keypad Entry	*Command Description*	*Status Display*	*Result*
73#	PWR-PHASE		Programs power phasing values through the handset. Power phasing depends on the call processing mode. It is the responsibility of the user to select the proper call processing mode before using this test command. This command reprograms the EEPROM phasing values for Max. Power Level, Attenuator Slope Adjust, etc. The value in X selects which step to start on. If no value for X is entered, it will start at step 0. The command keys are defined in Table 1: “Handset Command Key Entry” on page 9. NOTE: If you power down the radio after changes are made, the power up sequence re-programs the hardware with the correct phasing values. Refer to “Tests and Adjustments” on page 31 for instructions on entering parameters from the keypad. Analog Power Level Parameters: STEP # POWER LEVEL — RANGE (HEX) 00 Power Step 0 — 00-FF 01 Power Step 1 — 00-FF 02 Power Step 2 — 00-FF 03 Power Step 3 — 00-FF 04 Power Step 4 — 00-FF 05 Power Step 5 — 00-FF 06 Power Step 6 — 00-FF 07 Power Step 7 — 00-FF 08-0B Do Not Adjust CDMA Power Level Parameters: STEP # POWER LEVEL — RANGE (HEX) 00 Attenuator Slope Adjust — 00-FF 01 Attenuator Offset Adjust — 00-FF 02 Clamp Adjust — 00-FF 03 VCA Slope Adjust — 00-FF 04 VCA Offset Adjust — 00-FF 05 PMax 1 (Chan. 991-1023, 1-100) — 00-FF 06 PMax 2 (Chan. 101-322) — 00-FF 07 PMax 3 (Chan. 323-544) — 00-FF 08 PMax 4 (Chan. 545-766) — 00-FF 09 PMax 5 (Chan. 767-990) — 00-FF

Table 2:

Keypad Entry	***Command Description***	***Status Display***	***Result***		
73# (con't)	PWR-PHASE		STEP #	POWER LEVEL	RANGE (HEX)
			0A	Ch. Gain Adj. 1 (Chan. 991-1023, 1-100)	00-FF
			0B	Ch. Gain Adj. 2 (Chan. 101-322)	00-FF
			0C	Ch. Gain Adj. 3 (Chan. 323-544)	00-FF
			0D	Ch. Gain Adj. 4 (Chan. 545-766)	00-FF
			0E	Ch. Gain Adj. 5 (Chan. 767-990)	00-FF
			0F	TX Gain Adjust 1	00-FF
			10	TX Gain Adjust 2	00-FF
			11	TX Gain Adjust 3	00-FF
			12	TX Gain Adjust 4	00-FF
			13	TX Gain Adjust 5	00-FF
			14	TX Gain Adjust 6	00-FF
			15	TX Gain Adjust 7	00-FF
			16	TX Gain Adjust 8	00-FF
			17	VC Sense Slope Adjust	00-FF
			18	VC Sense Offset Adjust	00-FF
			19	VC Sense Zero Adjust	00-FF
			1A	Available	00-FF
			1B	Not Available	00-FF

NAM Programming

Introduction

The Number Assignment Module (NAM) is a section of memory that retains information about the phone's characteristics, such as the assigned telephone number, system identification number, and options information.

Two methods are available to program the NAM using the keypad: Test Mode and User Mode.

Regardless of the method used, the NAM must be programmed before the phone can be placed into service. This chapter covers the NAM Programming steps for Test Mode NAM Programming.

Test Mode Programming

Table 3: "Minimum Required Test Mode NAM Programming Steps" on page 21 shows the minimum required Test Mode NAM programming steps. Table 4: "Test Mode NAM Programming Sequence" on page 22 lists all NAM programming steps, complete with parameters and definitions.

IMPORTANT

Consult with the System Operator regarding NAM information. Incorrect NAM entries can cause the phone to operate improperly or not at all.

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Table 3:

Service Type	*Minimum Required Programming Steps*
Single NAM	1, 3, 4, 6, 8, 9
Dual NAM (part A)	1, 3, 4, 6, 8, 9, 11
Dual NAM (part B)	1, 3, 4, 6

For Test Mode NAM programming, the portable must be in the Servicing Level of Manual Test Mode (See "Test Mode/Test Menu" on page 7.) To enter test mode, the Manual Test pin (recessed center pin of the J6 battery connector) must be momentarily grounded while powering up the phone. This can be accomplished in a variety of ways, such as by using a 7.5 VDC power supply and an MCEL 200 test cable or test plug. After powering up in test mode, press the # button to enter Servicing Level. Once in Test Mode Servicing Level, enter **55#** to place the phone in NAM programming mode. The display will show factory default NAM data or show new data as it is entered, scrolling from left to right. Sequentially step through the procedures shown in Table 4: "Test Mode NAM Programming Sequence" on page 22 using the * key. Enter new data as required, or skip past factory default values for parameters that do not need to be changed.

If a second phone number is to be programmed, step 11 bit 6 must be set to 1. This bit enables dual-NAM operation and will cause NAM programming steps 1-6 and 12 to be repeated for the second phone number.

NOTE

Changed NAM values are not stored until pressing ***** after Step 25 (Step 12 if a second phone number was entered.)

Test Mode NAM Programming Sequence

(*) Advances to the next programming step; also programs the NAM after the last programming step is entered. A valid value must be entered. Otherwise the phone will not advance to the next NAM step.

(CLR) Clears the entered information and displays previously entered data for the current programming step.

(#) Exits the programming mode without programming the NAM.

Table 4: Test Mode NAM Programming Sequence

Step	*Factory Default*	*Description*
01	00000	**Home System ID (SID) Number.** Number assigned by system operator for system identification.
02	00000100	**A OPTION BYTE.** The display for step 02 represents the status of eight options, A7 through A0. Bit A7 (msb) is programmed first, followed by A6-A0. Bits enter display on the right and scroll left.
	0	**Local Use (Bit A7).** If set to 1 phone will respond to local control orders in the home area or when the group ID is matched. Assigned by system operator.
	0	**Preferred System (Bit A6).** Applies to units capable of operating on two service systems (A or B). 0 = system B; 1 = system A.
	0	**End-to-End Signaling (Bit A5).** When enabled, the phone is equipped for DTMF signaling during a call. 1 = enabled, 0 = disabled.
	0	**Markov test override MSB (Bit A4).** Enter 0.
	0	**Markov test override (Bit A3).** Enter 0.
	1	**Bit not used (Bit A2).** Enter 1.
	0	**Markov test override LSB.** Enter 0.
	0	**MIN Mark (Bit A0).** Supplied by system operator. When enabled the user's area code will be sent with each call initiated or answered. 1 = enabled, 0 = disabled.
03	1111110111	**User 10 digit radiotelephone phone number (MIN).** 10_digits including area code; changing this value sets default for AOC. Number is assigned by system operator.
04		**Station class mark (SCM).** A 2 digit number assigned by the system operator. Indicates maximum power step, VOX capability, and number of channels used.
	010	CDMA only & Non-Slotted mode configuration
	042	CDMA only & Slotted mode configuration
	074	Dual Mode & Non-Slotted mode configuration
	106	Dual Mode & Slotted mode configuration

Table 4: Test Mode NAM Programming Sequence

Step	*Factory Default*	*Description*
05	Last digit of Access Overload Class	**Access overload class.** Specifies the level of priority assigned to the phone when accessing the system. Assigned by system operator.
06	000000	**Security code.** A 6-digit number supplied by the user. This number is used by the user to access or change “security” features such as the 3-digit unlock code or the service level.
07	123	**Unlock code.** A 3-digit number supplied by the user. If the lock feature is enabled by the user, the phone can be operated only by individuals who know the unlock code.
08	4	**Service level.** This 1-digit number supplied by the user allows various call placement restrictions if desired.
09	01100000 Test Menu enabled 00100000 Test Menu disabled	**B OPTION BYTE** The display for step 10 represents the status of eight options, B7 through B0. B7 (msb) is programmed first followed by B6-B0. Bits enter display on the right and scroll left.
	0	**Display Pilot Set Status/AMPS Status Mode (Bit B7).** These statistics are useful for testing handoff parameters. When enabled, this feature displays the strongest pilot offset in the “Active Set” (only member during Idle) on the top line of the display, and the strongest pilot in the “Neighbor Set” on the bottom line. Each line has the same format. The left most 3-digit number is the pilot offset, and the right number is a relative signal strength. IDLE HANDOFF (handoffs on a paging channel) occurs when a Neighbor pilot is judged to be better. That neighbor pilot will be promoted to the active set, and thus move to the top line of the display. SOFT HANDOFF (handoff on a traffic channel) occurs when a Neighbor pilot fulfills requirements set by the network, and the network directs the mobile to add the new pilot to the Active Set. Pilot Set status is enabled by setting Step #9, bit #7 to 1. Channel Statistics is disabled by setting Step #9, bit #7 to 0. **WARNING: Turning on this option makes it difficult to see the Markov error rate statistics in a call.**
	0	**Test Menu (Bit B6).** This bit allows the user to enable or disable the FCN key Test Menu. Refer to “Test Menu” on page 8 for further information on Test Menu. 1 = enabled, 0 = disabled.

Table 4: Test Mode NAM Programming Sequence

Step	*Factory Default*	*Description*
09 (con't)	1	**Paging Channel Message Filtering (Bit B5).** This bit limits the amount of paging channel messaging seen by the data logger debugging tool. A user not using this tool should see no noticeable difference in performance. 1 = enabled, 0 = disabled.
	0	**Portable Data Logging (Bit B4).** Enter 0.
	0	**Single Serving System Scan (Bit B3)**. This bit allows the user to enable or disable the serving system scanning on serving systems other than the phone's home serving system. If the phone has an odd Home System Identifier (Step 1), it's home serving system is A, otherwise it is B. If Single Serving System Scanning is enabled, only the home serving system will be scanned, otherwise both serving systems will be scanned. 1 = enabled, 0 = disabled.
	1	**Auto Recall (Bit B2).** When set to one, the user may access repertory by a one or two digit send sequence (speed dialing).
	0	**Disable Service Levels (Bit B1).** If set to 1, the service level (call restrictions) cannot be changed by the user.
	0	**Lock Disable (Bit B0).** When set to 1, the user cannot lock and unlock the phone unit via the 3 digit lock code.
10	00000000	**C OPTION BYTE** The display for step 11 represents the status of eight options, C7 through C0. C7 (msb) is programmed first followed by C6-C0. Bits enter display on the right and scroll left.
	0	**User Mode NAM Programming Disable (Bit C7).** When set to 1, User Mode NAM programming cannot be accessed.
	0	**Dual NAM System Registration Enable (Bit C6).** Enter 1 if dual NAM operation is desired (for models capable of dual system operation). Enter 0 for single NAM operation.
	0	**Test Mobile Enable/Auto Answer (Bit C5).** Enter 0.
	0	**Auto Redial Disable (Bit C4).** When set to 1, the user cannot access the 6-minute auto redial feature.
	0	**Three Wire Bus Speaker Disable (Bit C3).** This bit is used to disable internal handset speaker when adding V.S.P. option. 1 = handset speaker disabled, 0 = handset speaker enabled.
	0	**Bit not used (Bit C2).** Enter 0.
	0	**Selectable System Scan Disable (Bit C1).** When set to 1, the user cannot select the primary system.
	0	**Diversity Antenna (Bit C0).** (Extended systems only) 0 = Non-diversity, 1 = Diversity.
11	0334	**AMPS Initial paging channel.** There are 4 significant bits for the initial paging channel. For system A enter 0333 and system B enter 0334.

Table 4: Test Mode NAM Programming Sequence

Step	*Factory Default*	*Description*
12	0333	**AMPS Initial A system channel.** To initialize system A enter 0333.
13	0334	**AMPS Initial B system channel.** To initialize system B enter 0334.
14	021	**AMPS Dedicated Paging Channels.** Number of dedicated paging channels is 21. Enter 021.
15	00001000	**D OPTION BYTE**. The display for step 16 represents the status of eight options, D7 through D0. D7 (msb) is programmed first, followed by D6-D0. Bits enter display on the right and scroll to left.
	0	**Enhanced Scan (Bit D7)**. Enter 1.
	0	**Cellular Connection 1 (Bit E6)**. Normally set to 0.
	0	**Long Tone DTMF Enable (Bit E5)**. Normally set to 1.
	0	**Transportable Transducer Disable (Bit E4)**. Enter 0.
	1	**Bit not used (Bit E3)**. Normally set to 0.
	0	**Handset Test Mode Disable (Bit E2)**. Enter 0.
	0	**Failed Page Indication Disable (Bit E1)**.
	0	**Word Sync Scan Disable (Bit E0)**. Set to 1.
16	00100111	**E OPTION BYTE**. The display for step 16 represents the status of eight options, E7 through E0. E7 (msb) is programmed first, followed by E6-E0. Bits enter display on the right and scroll to left.
	0	**Bit not used (Bit E7)**. Enter 0.
	0	**Not used (Bit E6)**. Normally set to 0.
	1	**Not used (Bit E5)**. Normally set to 1.
	0	**Extended Address Method (Bit E4)**. Enter 0.
	0	**Not Used (Bit E3)**. Normally set to 0.
	1	**Config. for mob term using home SID, NID pair (Bit E2)**. Enter 1. 1 = Allow mobile terminated call while using a home (SID, NID) pair. 0 = Disallow mobile terminated call while using a home (SID, NID) pair.
	1	**Config. for mob term while SID roamer (Bit E1)** Enter 1. 1 = Allow mobile terminated call while a SID roamer. 0 = Disallow mobile terminated call while a SID roamer.
	1	**Config. for mob term while NID roamer (Bit E0)**. Enter 1. 1 = Allow mobile terminated call while a NID roamer. 0 = Disallow mobile terminated call while a NID roamer.
17	0	**CDMA: Slot Cycle Index.** TBD
18	Entry Required	**CDMA: SID (SID_NIDp).** Up to 5-digits.

Table 4: Test Mode NAM Programming Sequence

Step	*Factory Default*	*Description*
19	00000	**CDMA: Network ID Number (NID of SID_NIDp).** Up to 5-digits.
20	11111	**Mobile Country Code (first 3-digits), IMSI 11 (1-digit), IMSI 12 (1-digit).**
21	Entry Required	**CDMA: Primary Channel.** System A up to 4 decimal digits.
22	Entry Required	**CDMA: Primary Channel.** System B up to 4 decimal digits.
23	Entry Required	**CDMA: Secondary Channel.** System A up to 4 decimal digits.
24	Entry Required	**CDMA: Secondary Channel.** System B up to 4 decimal digits.
25	0	**Data Logger Switch.** Enter 0. 1 = enabled, 0 = disabled.

Disassembly

Introduction

Before disassembly is started, the antenna connector cap at the top of the phone has to be removed to allow full separation.

Reasonable care should be taken during the disassembly and reassembly of the unit in order to avoid damaging or stressing the housing and internal components. Ensure that a properly grounded high impedance conductive wrist strap is used while performing these procedures on electronic units.

CAUTION

Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. Ensure that adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.

Recommended Tools

The following tools are recommended for use during the disassembly and reassembly of the phone.

- Anti-Static Mat Kit (0180386A82); includes:
  - — Anti-Static Mat 6680387A95
  - — Ground Cord 6680334B36
  - — Wrist Band 4280385A59
- Antenna Removal Tool PN TBD
- Rear Housing Removal Tool 8109972N01

Disassembly Procedure

The following information describes the procedure for removing and accessing various parts of this phone.

NOTE

Refer to Figure 6: “MicroTAC SC925 (CDMA) Mechanical Explosion” on page 44, as necessary, while performing the disassembly/assembly procedures.

Assembly Procedure

Once the unit is disassembled and the repair is carried out it then becomes obvious that to assemble the unit, the procedure is the reverse of that previously completed for disassembly.

Antenna Removal

Step 1. Turn off the telephone.

Step 2. Press down on the battery's tab, slide down, and remove the battery from the housing.

Step 3. Using the antenna removal tool, pry off the antenna cap.

Step 4. Remove the antenna assembly by simply pulling it out of the housing.

If it proves difficult to remove, remove it after separating the front and back housings.

Step 5. Remove the T-6 torx screw.

When re-assembling housing, use 20 in-ounces of torque to tighten screw.

Step 6. Align the phone on the rear housing removal tool. Line up the phone with the picture on the tool.

Pull the lever upwards to disengage the rear housing tabs from the front housing.

While tabs are disengaged, gently pull the rear housing off of the front housing.
When re-assembling, start putting the rear housing back on by putting the two tabs nearest the external connector in first.

Board Removal

Step 1. The front housing, containing all the internal circuitry, can now be lifted away from the housing removal tool.

Step 2. Carefully ease the Logic/RF board away from the Keypad/Display board, which connects to it via a 50 pin plug/socket connector.

When re-assembling press on the connector to make sure the connector is seated securely.

Step 3. The Logic/RF board can now be removed completely from the front housing.

Step 4. Lift out the Keypad/Display board by starting at the lower left hand corner of phone. Using your fingers lift the board up while slightly pulling the housing away.

After getting that corner started, the rest of the board lifts out from under the tabs easily.

When re-assembling phone, start in the upper right hand corner. Push board under tab and then put board under all of the tabs on the right hand side of housing. After the right hand side is seated, continue putting board under tabs working from the upper left hand corner of housing to low left hand side.

Step 5. The Keypad and Display easily lift out of front housing.

Tests

Introduction

This phone does not contain any keypad-accessible adjustment procedures. All adjustments must be performed under computer control using Automated Test Equipment in a Motorola service center.

Simulated over-the-air CDMA call tests may be performed using a CDMA communications analyzer with an RF connection to the phone. A connection diagram is shown in Figure 4. The audio connections are optional.

CDMA Call Processing Test

The following CDMA Call Processing test must be done in a single test sequence.

Step 1. *Initialize:* Configure the test system to the following set parameters:

a. A CDMA pilot on channel 777 with sector A power at -70 dBm and sector B power at -80 dBm.

b. An AMP traffic channel with a 6 kHz tone modulated at 2 kHz of deviation.

c. A CDMA traffic channel handoff message set to the corresponding AMPS traffic channel frequency with SAT color code 1 and power attenuation code 3.

d. A CDMA System Parameters Message with the following threshold data:

Pilot detection threshold (T_Add) = 28

Pilot drop threshold (T_Drop) = 32

Comparison threshold (T_Comp) = 5

Drop timer value (T_Tdrop) = 3

Step 2. *CDMA Slotted Mode Page:* Turn the mobile transceiver on and force a CDMA Registration.

Page the mobile with a Service Option 1 call.

Verify that the mobile establishes and maintains a CDMA call by measuring Rho

Step 3. *CDMA Softer Handoff:* Set sector B power to -75 dBm.

The mobile must report sector B as included in the Candidate set.

Increase sector B power to -65 dBm.

The mobile must report sector B to be added to the Active set.

Initiate a softer handoff and decrease sector B power to -80 dbm.

The mobile must report sector B to be dropped from the Active set.

Step 4. *CDMA Hard Handoff:* Perform a

CDM Hard handoff theo channel 691 while still in a Service Option 1 call.

Verify that the mobile hands off and maintains the call by measuring Rho.

Step 5. *CDMA to AMPS Handoff:* To perform a CDMA to AMPS handoff, send the CDMA traffic channel handoff message to the mobile transceiver and activate the AMPS traffic channel.

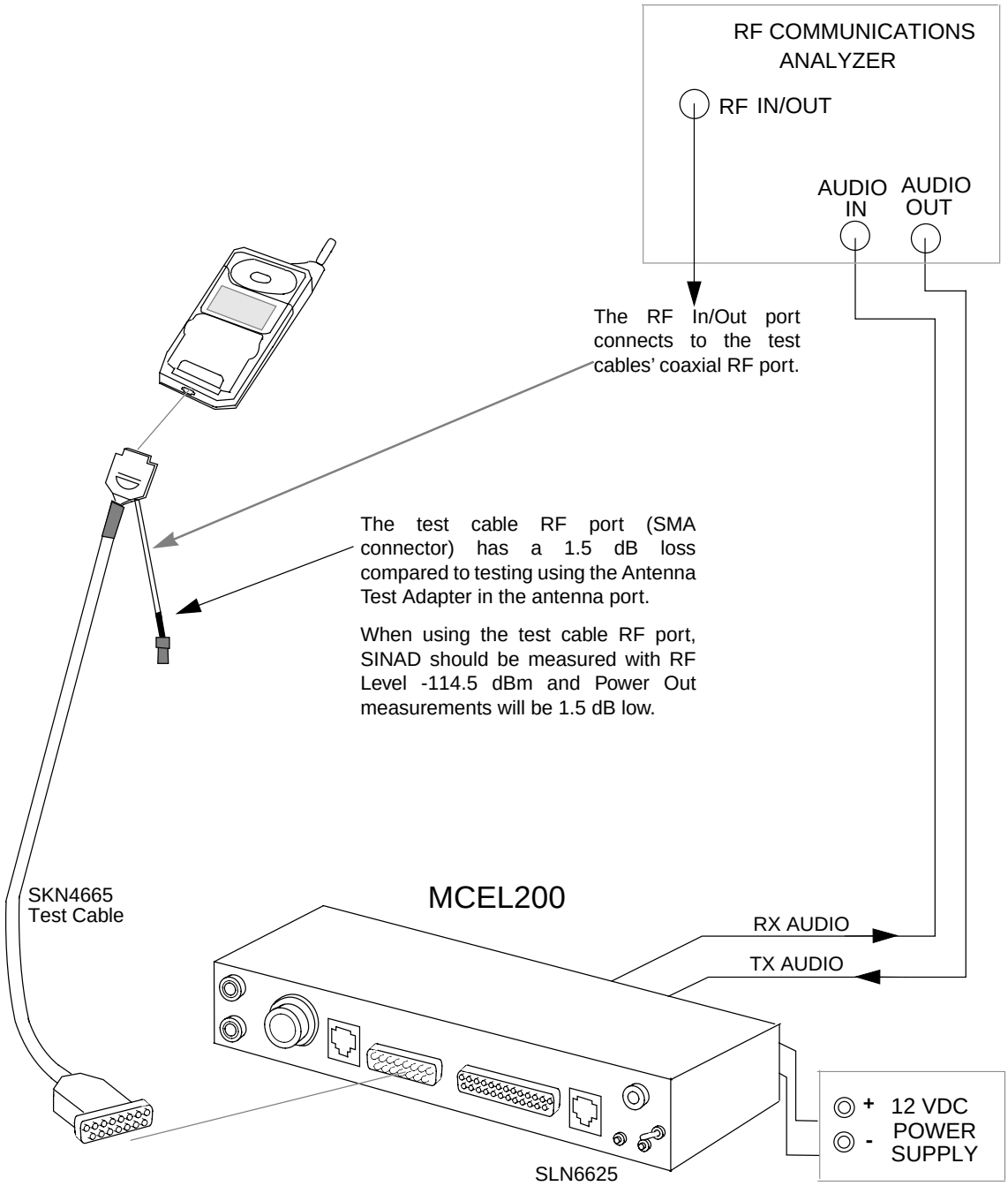
Verify that the mobile hands off to the AMPS traffic channel and is transponding SAT.

Step 6. *Exit.*

Table 5: Test Cable Pinout

10 Pin Connector To Phone		***15 Connector To Test Interface***	
Pin	***Function***	***Pin***	***Function***
1	Analog Ground	1	N/C
2	Ext. B+	2	TX Audio On/Off
3	TRU	3	Manual Test
4	CMP	4	N/C
5	RTN	5	N/C
6	Logic Ground	6	Ground
7	RX Audio Out / On-Off	7	N/C
8	TX Audio In	8	Reg. B+
9	Manual Test	9	RX Audio On/Off
10	Batt Feedback	10	N/C
		11	TRU
		12	RTN
		13	N/C
		14	CMP
		15	Ground

Figure 4: Connections for Tests



Troubleshooting

Introduction

Known good replacement parts and assemblies should be available to be used for troubleshooting by substitution, and for replacement of defective parts/assemblies. Defective circuit boards should be forwarded to the appropriate Motorola service facility for repair.

Refer to the "Replacement Parts" section of this manual for a list of replacement part descriptions and part numbers.

CAUTION

Many of the integrated circuit devices used in this equipment are vulnerable to damage from static charges. An ESD-safe workstation should be used whenever a transceiver is opened.

Troubleshooting and Repair

The troubleshooting chart in Table 7, "Assembly Replacement Level Troubleshooting and Repair Chart," on page 34 shows some typical malfunction symptoms and the corresponding verification and repair procedures. Refer to the disassembly instructions located in the "Disassembly" section of this manual for instructions on removing parts/assemblies.

Most of the troubleshooting procedures on the following pages require temporarily connecting DC power to the battery connector with the phone disassembled. The figure below shows the polarity of the battery connector.

Figure 5: Partial View of RF/Audio-Logic

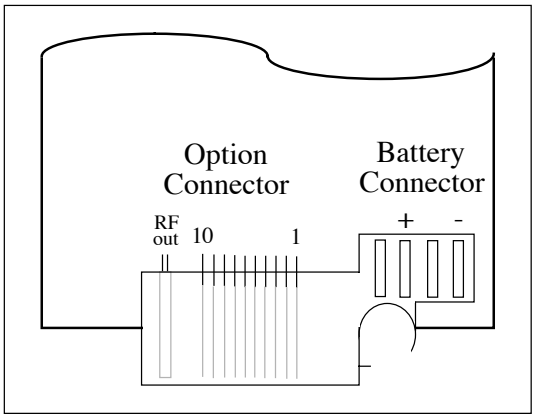


Table 7: Assembly Replacement Level Troubleshooting and Repair Chart

Symptom	*Probable Cause*	*Verification and Remedy*
1. Phone will not turn on or stay on.	a) Battery either discharged or defective.	1. Measure battery voltage across a 50 ohm (>1 Watt) load. 2. If the battery voltage is <6 V DC, recharge the battery using the appropriate battery charger. 3. If the battery will not recharge, replace the battery.
	b) Battery connector open or misaligned.	1. Visually inspect the battery connectors on both the battery pack and the transceiver, including the solder connections from the battery connector to the main PC board. 2. Realign the contacts or, if necessary, replace either the battery or battery connector.
	c) Switch inside option connector is open.	1. Measure resistance across the two option connector solder connections on the RF side of the RF/Audio-Logic board. 2. If the switch measures open, replace the option connector.
	d) Keypad membrane defective.	1. Replace the keypad membrane with a known good part. 2. Temporarily connect +6 V DC to the battery contacts. 3. Depress the **PWR** button; if unit turns on and stays on, disconnect the power source and reassemble the phone with the new keypad membrane.
	e) Keypad board defective.	1. Replace keypad board assembly with a known good assembly. 2. Temporarily connect +6 V DC to the battery contacts. Depress the **PWR** button. 3. If the units turns on and stays on, disconnect the power source and reassemble the phone with the new keypad board assembly.
	f) RF/Audio-Logic Board defective.	1. Remove the RF/Audio-Logic Board. Substitute a known good board. 2. Temporarily connect +6 V DC to the battery contacts. 3. Depress the **PWR** button; if unit turns on and stays on, disconnect the power source and reassemble the phone with the new RF/Audio-Logic board and re-test phone.

Symptom	*Probable Cause*	*Verification and Remedy*
2. Phone exhibits poor reception and/or erratic operation (such as calls frequently dropping, weak and/or distorted audio, etc.)	a) Defective antenna or damaged antenna connector.	1. Make sure the antenna shaft ferrule is screwed into the antenna socket. 2. Make sure pin on antenna coil is seated in antenna connector socket. 3. Replace the antenna with a known good antenna.
	b) Defective RF/ Audio-Logic Board.	Replace the transceiver board (refer to symptom 1c Verification and Remedy.)
3. Display is erratic, or provides partial or no display.	a) Defective display module.	1. Gain access to RF/Audio-Logic board or keypad board as described in the “Disassembly” section of this manual. 2. Check connection. If connection not at fault, proceed to b.
	b) RF/Audio-Logic board defective.	Replace the RF/Audio-Logic Board (refer to symptom 1f Verification and Remedy).
4. Alert ringer volume is distorted or too low.	a) Alert ringer defective.	Replace the defective speaker or alert ringer with a known good speaker or alert ringer.
	b) RF/Audio-Logic board defective.	Replace the RF/Audio-Logic Board (refer to symptom 1f Verification and Remedy).
5. Transmit audio is weak, distorted, or dead.	a) Microphone defective.	Replace defective microphone.
	b) RF/Audio-Logic board defective.	Replace the RF/Audio-Logic Board (refer to symptom 1f Verification and Remedy).
6. Receive audio is weak and/or distorted.	a) Speaker defective.	Replace defective speaker.
	b) RF/Audio-Logic board defective.	Replace the RF/Audio-Logic Board (refer to symptom 1f Verification and Remedy).
7. The phone does not sense when flip is opened and closed.	a) Defective reed switch or magnet on keypad board	Replace keypad board assembly or magnet/ flip assembly.

Replacement Parts

The phone houses the transceiver part number SWF2405A. This Level 1 Replacement Parts list is applicable to the following models:

Model No. _____

S6023A

Refer to Figure 6: "Mechanical Explosion" on page 38 for help identifying the spare parts.

PART NUMBER	DESCRIPTION	REF
SWF2405A	Transceiver Number	
0109120M01	assy front housing w/ flip and volume buttons	2
0109121M01	assy rear housing w/ antenna tube	3
0109426T01	assy antenna 1700 cdma	
0309002M01	screw 1.6x35	
0709293M01	bracket vibrator SC925	
0909179R01	recept 2 pos smd, vibrator j3100	
0909705K03	jack mod 2.5 mm smd, headset j2000	
0909888M01	recept xdcr smd, mic, j5000	
0909958J04	recept 10 pins w/batt w/ coax, j1000	
3009495M03	cable coax simi rigid rvw	
3209105L01	alert boot	
3209106L01	earphone jack boot	
3209107L01	microphone boot	
3809110L01	china cdma antenna cap	4
3909014B03	contact antenna receptacle	
3209333L01	lens adhesive	
309109L01	keypad cdma black	5
3909014B02	contact antenna receptacle	
4009060E01	sw tactile smd, volume	6
4009312L01	sw array keypad mylar dome	7
4082635T09	switch reed smt	
4082635T09	switch reed smd 16-20at	
4209099E02	clip shield	
4309006M01	spacer threaded	
5009076E02	speaker dyn earpc 20mm adhsv rng	8
5009157R02	xdcr alert 8.5x8.5mm smd	9
5009536H25	microphone assy elect w/int cap	
5909127D05	motor vibrator 1.3v 9k rpm conn	
6109112L01	lens cdma	10
7209005C06	lcd display module 96x32 pix	11

Figure 6: CDMA SC925 Mechanical Explosion