

ST7760 800 MHz CDMA/800 MHz AMPS



The World's Leading Cellular Telephone Manufacturer



Service Manual Level III

ii

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Preface

Major A/L Differences: 725CV vs. StarTAC 800

Table 1: Core Logic

725CV	StarTAC 800
CIA	Enhanced Version (F4 mask)
56603 DSP - TQFP	1.0mm BGA version
68338 - 1.0mm BGA	Rev E ver in 0.8mm MAP package
CSP	1.0mm BGA CRIB (integrates CSP & RIB)
RIB	-

Table 2: Memory

725CV	StarTAC 800
8Mbit TSOP Flash	8 or 16Mbit, 0.75mm uBGA
4Mbit Character Flash	n/a
64K x 16 TSOP SRAM	64K X 16, 0.75mm uBGA
128 Kbit EEPROM - SOIC	128 Kbit EEPROM - TSSOP package

Table 3: Power/Charging

725CV	StarTAC 800
48 pin TQFP GCAP (TI)	48 pin GCAP Lite V2.2 (SPS)
no powercut support	powercut support
support for 1 battery only	main & aux battery support

Table 4: Accessories

725CV	StarTAC 800
Headset support	same
3 Wire Bus support	same
AMPS Data support only	AMPS & IS-707 async data & fax support
96 x 32 dot matrix LCD	same - smaller form factor

Specifications

Overall System

Function	Specification			
Frequency Range	824.04 - 848.97 MHz Tx, Channels 1 to 799, $f_{Tx} = 0.03 * N+ 825$ MHz Channels 990 to 1023, $f_{Tx} = 0.03(N-1023) + 825$ MHz 869.04 - 893.97 MHz Rx Channels 1 to 799 is $f_{Rx} = 0.03 * N+ 870$ MHz			
	Channels 990 to 1023, f _{Rx} = 0.03(N—1023) + 870 MHz			
Channel Spacing	30 kHz			
Channels	832			
Duplex Spacing	45 MHz (AMPS)			
Frequency Stability	\pm 2.5 ppm (AMPS), \pm 300 Hz of incoming Rx signal (CDMA)			
Operating Voltage	3.6-4.8 VDC			
Display	96x32 LCD			
RF Power Output	0.6 watts - 28.0 dBM into 50 ohms (AMPS, nominal) 0.25 watts - 24.0 dBM into 50 ohms (CDMA, nominal)			
Input/Output Impedance	50 ohms (nominal)			
Spurious/ Harmonic Emissions	Complies with Title 47, Part 22 of the code of Federal Regulations			
Audio Distortion	Less than 5% at 1 kHz; \pm 8 kHz deviation (transmit and receive)			
Hum and Noise (C-MSG)	32 dBm below <u>+</u> 8 kHz deviation @ 1 kHz (transmit and receive)			
Modulation	F3: ± 12 kHz for 100% at 1 kHz, AMPS (wide) 1M25D1W (1.25 MHz bandwidth) CDMA			
Transmit Audio Response	6 dBm/octave pre-emphasis			
Transmit Audio Sensitivity (AMPS)	± 2.9 kHz deviation (nom.) @ 97 dBm SPL input @ 1 kHz			
Transmit Duty Cycle	Variable - full, 1/2, 1/4, 1/8 rate (CDMA Mode)			

Overall System

Function	Specification
CDMA Transmit Wave- form Quality (Rho)	0.94
Receiver Sensitivity	-116 dBm (AMPS, SINAD, C-MSG weighted) -104 dBm (CDMA, 0.5% Static FER)
Alternate Channel Desense Protection	-60 db @ ± 60 kHz (AMPS)

Environmental

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 Ind dards for Land Mol (2) EIA IS-19 states th (3) EIA Standard RS3 (4) U.S. Military Stand mining the resistan peculiar to military (5) TIA/EIA/IS-98 Rec band Spread spect) EIA (Electronic Industries Association) Standard RS152B states the minimum standards for Land Mobile Communications, FM or PM transmitters 25-470 MHz.) EIA IS-19 states the recommended standards for 800 MHz cellular subscriber units.) EIA Standard RS316B states the standards for portable land mobile communications.) 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.) TIA/EIA/IS-98 Recommended Minimum Performance Standards for Dual-Mode Wide band Spread spectrum Cellular Mobile Stations. 		

Specifications subject to change without notice.

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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.

Replacement Parts Ordering

Motorola maintains a parts office staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Cellular products. Orders for all parts should be sent to the Motorola International Logistics Department at the following address:

Attn.: Global Spare Parts Department Motorola Cellular Subscriber Group 2001 N. Division St. Harvard, IL 60033-3674 U. S. A. FAX: 1-815-884-8354

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

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.



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DESCRIPTION

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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

Cellular systems are used to provide radiotelephone service in the frequency range of 824-894 MHz.

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.



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 highlow 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

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Theory of Operation

Receiver Circuitry

RF enters the phone via the internal antenna, A1, or via the accessory connector. RF switch U75 selects which antenna is used. The received RF signal is routed through monoblock duplex filter FL75. Then the RF signal is routed through either a direct path through RF switches U100 and Q100, or through additional gain and filtering stages, Q103, FL100, and Q150. The received signal then enters the Mixer U200.

The local oscillator input to the mixer is a 978-1004 MHz VCO, Q625 controlled by the IF/Synthesizer IC U200. The 109.65 MHz mixer output is routed to separate paths for AMPS and CDMA modes.

Transmitter Circuitry

The modulated TX Offset VCO signal is mixed with the 978-1004 MHz local oscillator signal in TX Mixer U401 to produce an 823-849 MHz transmit signal. This signal passes through filter FL401 and voltage controlled attenuator U400 which controls the TX output power. Then the TX signal is amplified by U450 and bandpass filtered by U475. The output passes through the monoblock duplex filter FL75 to RF switch U75 to either the internal antenna or the accessory connector.

Frequency Synthesizer Circuitry

The phone contains three PLL frequency synthesizers in the IF/Synthesizer IC U700. One synthesizer controls the tunable 978-1004 MHz main local oscillator, Q675. The second synthesizer controls the TX offset oscillator (internal to U700) which operates at a fixed frequency of 309.3 MHz for AMPS, and 309.6 MHz for CDMA. The TX offset signal is divided by 2 before going to the TX mixer. TX modulation occurs in the TX offset synthesizer in both AMPS and CDMA modes. The third synthesizer (also internal to U700) operates at a fixed frequency of 219.3 MHz for AMPS, 219.8 MHz for CDMA. 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, U325.

Block Diagrams

The block diagrams below shows the major RF Section and Audio Logic functional blocks, and Reverse and Forward Audio Functionality.



Figure 1: Audio Logic Functional Block Diagram

Accessory Connector Artena ţ RF Cotpley Defecter Þ Koato D Soun Daplex Filter ē 💱 2 FE_2.15V в+= *351* ТХ 2760 №9.60 t¥ ¥ 0012_0[0] မွမ RY- 10 Hamoro (Discret) ΞŪ X ZH N 122 FF 34M Summers Summers PAONOM9 ZH 🛛 922 RF QUIN 28 والمراهلاتها والمقار الطوران وا MEZ IC аţ to cupti Celamo Celamo Southz ANAIOG/ UNJINL TX/2.75Y ٦ ţ 219.5 NHZ CDMAF S400 109.8 MHZ TATX golaria 210 6 II H7 in the second l 7HM DSS Ceramo 154,8 M I II d mg BUR 16.8 MHz CDMA ZIFISYN FE_2.15V Į, ï \otimes \otimes VCA CH 5 8 ž ĩ Ŕ ñ, ć į Logic_275V Power Control CIA IC

Figure 2: RF Functional Block Diagram

uglo_275V

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Figure 4: Forward Audio Functionality



Transmit Power Control Circuitry

The power control signal controls voltage controlled attenuator U400 which is after the TX mixer. 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. In AMPS mode, the RF power range is +8 dBm to +28 dBM.

In CDMA mode the RF power range is -50 dBm to +24 dBm. In CDMA mode, 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 - AMPS Mode

AMPS discriminator audio is routed to U1900 to be digitized. All receive audio filtering and gain control is performed in the digital domain by DSP U1600. The processed RX audio is converted back to analog by U1900 and amplified by the GCAP IC U2000. The received audio is then routed to either the internal earpiece speaker.

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 - AMPS Mode

Audio from the internal microphone is amplified and converted to data by U1900. In AMPS mode, the digitized microphone audio is then sent to DSP U1600 which performs all compression, pre-emphasis, limiting, and bandpass filtering functions in the digital domain. All AMPS signalling (SAT, ST, DTMF) is also generated in the digital domain by DSP 1200. The digitized AMPS TX audio signal is converted back to analog by the U1900 and sent to the 154.65 MHz TX Offset VCO to modulate the transmitter.

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 U301 which modulates the 154.8 MHz TX offset VCO.

Block Diagram

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





 \equiv Theory of Operation \equiv

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TEST MODE/TEST MENU

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Test Mode/Test Menu

Introduction

Manual Test Mode software allows service personnel to monitor the telephone status on the display, and manually control telephone functions via the keypad.

Manual Test Mode operates at two levels:

- Status Display Level, which allows the phone to operate normally while providing status indications in the display.
- Servicing Level, which disables normal call-processing and allows commands to be entered through the keypad to manually control operation of the phone.

Status Display Level

Status Display Level is the power-up state in Manual Test Mode. Manual Test Mode is entered by momentarily shorting the test pin of the accessory connector J3 to ground, while turning the phone on. Use the MCEL 2000 (SLN6625A) and Test Cable (SKN4800A). See Figure 7: "Connections for Testing and Adjustments" on page 48

In this level of Manual Test Mode the phone will place and receive calls as normal, but the display shows status information. The first line of data indicates channel number, RSSI value, and call-processing mode. The second line of data indicates SAT frequency, carrier state, signaling tone state, power level, voice/data channel mode, Rx audio state, and Tx audio state. The format and explanation of this status information is given in Table 1 under "02# Radio Status Request." When dialing a phone number, the status display ceases when the first digit of the phone number is entered. The telephone number is displayed in the normal manner as entered. When the **Snd** button (or **End** or **Clr**) is pressed, the status information display resumes.

Servicing Level

The servicing level allows service personnel to manually control operation of a phone by entering test commands through the telephone keypad. Parameters such as operating channel, output power level, muting, and data transmission can all be selected by entering the corresponding commands.

To enter the Servicing Level, press the # button while in Status Display level (powerup state of Manual Test Mode). In the Servicing Level, automatic call processing functions are disabled, and the phone is instead controlled manually by keypad commands. Table 2: "Test Commands For Manual Test Mode" on page 14 shows the test commands and the corresponding results.

NOTE

There is no Status Display when the phone is in CDMA mode.

CDMA Specific Features

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 S/W debugging functions. Items will be added to and deleted from the menu periodically.

When Test Menu is enabled, it is entered by pressing the FCN key twice. Refer to Step "09" on page 27 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. This feature has no value in AMPS mode.

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 SW DIP 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.

Test Mode

Also included in the software is a Manual Test Mode, which allows viewing the ESN, software version number, and programming the phone number (NAM).

To enter Manual Test Mode:

- (FCN) 0 0 * * 83786633 (STO)
 - (83786633 spells "TESTMODE" on the keypad).

This will cause the phone to enter the Test Command Mode. The display will show US.

Handset Commands

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 func- tions. 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 informa- tion.				
	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.				

Table 1: Handset Command Key Entry

Test Commands

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	AAAZBB	Display the current radio status:
	STATUS REQUEST	BCDEFG HI	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: Test Commands For Manual Test Mode

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: Test Commands For Manual Test Mode

and Status otion Display	Result
ON	 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 CDMA test command document number: 01 XXXX The date the build was created in the format: 01 JAN96 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 xxxxyyyyyzzzz where xxxx is the version, yyyyyis the date, and zzzz is the device. The version of the DSP patch xxxxyyyyyzzzz where xxxx is the version, yyyyyis the date, and zzzz is the device. All data fields can be viewed by hitting the * key repeatedly.
	and Status Display ON

Table 2: Test Commands For Manual Test Mode

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 xxxxyyyyyzzzz where xxx is the version, yyyyy is the date, and zzzz is the device. The version of the DSP patch xxxyyyyyzzzz where xxxx is the version, yyyyyis 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: Test Commands For Manual Test Mode

27X# CDATA AMPS: Continuous Transmit Data on the reverse Analog Control Channel. CDMA: Random Transmit Data (RTD) on the reverse CDMA 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) 2 Half Rate (CDMA) 4 Quarter Rate (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). 33X# DTMFON Generates a continuous DTMF tone as specified by input X. 33X# DTMFON Generates a continuous DTMF tone as specified by input X.	Keypad Entry	Command Description	Status Display	Result		
CDMA: Random Transmit Data (RTD) on the reverse CDMA channel.InputAction 00Start (AMPS) / Variable Rate (CDMA) 11Full Rate (CDMA) 22Half Rate (CDMA) 42Quarter Rate (CDMA) 828#HITNON28#HITNOFF30#LOTNON30#LOTNON31#LOTNOFF32#INVM32#INVM32#INVM32#INVM33X#DTMFON33X#DTMFONGenerates 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.	27X#	CDATA		AMPS: Continuous Transmit Data on the reverse Analog Control Channel.		
InputAction0Start (AMPS) / Variable Rate (CDMA)1Full Rate (CDMA)2Half Rate (CDMA)2Half Rate (CDMA)4Quarter Rate (CDMA)8Eighth Rate (CDMA)9Stop RTD (AMPS, CDMA)28#HITNONTurn on high tone (Frequency 1150 Hz ± 55 Hz).29#HITNOFFTurn on low tone (Frequency 770 Hz ± 40 Hz).30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber).33X#DTMFONGenerates 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.				CDMA: Random Transmit Data (RTD) on the reverse CDMA channel.		
0 Start (AMPS) / Variable Rate (CDMA) 1 Full Rate (CDMA) 2 Half Rate (CDMA) 2 Half Rate (CDMA) 3 Eighth Rate (CDMA) 8 Eighth Rate (CDMA) 9 Stop RTD (AMPS, CDMA) 28# HITNON 29# HITNOFF 30# LOTNON 31# LOTNOFF 31# LOTNOFF 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.				Input Action		
1Full Rate (CDMA)2Half Rate (CDMA)34Quarter Rate (CDMA)8Eighth Rate (CDMA)9Stop RTD (AMPS, CDMA)28#HITNON29#HITNOFF30#LOTNON31#LOTNOFF31#LOTNOFF32#INVM1Initialize 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).33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON <td></td> <td></td> <td></td> <td>0 Start (AMPS) / Variable Rate (CDMA)</td>				0 Start (AMPS) / Variable Rate (CDMA)		
2Half Rate (CDMA)4Quarter Rate (CDMA)8Eighth Rate (CDMA)9Stop RTD (AMPS, CDMA)28#HITNON70Turn on high tone (Frequency 1150 Hz ± 55 Hz).29#HITNOFF30#LOTNON10Turn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFF32#INVM10Turn off low tone.32#INVM11Initialize 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).11This 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#DTMFONGenerates 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.				1 Full Rate (CDMA)		
4Quarter Rate (CDMA) 828#HITNON28#HITNOFF29#HITNOFF30#LOTNON11#LOTNOFF31#LOTNOFF32#INVM32#INVM32#INVM33#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X#DTMFON33X# </td <td></td> <td></td> <td></td> <td>2 Half Rate (CDMA)</td>				2 Half Rate (CDMA)		
8Eighth Rate (CDMA) 928#HITNONTurn on high tone (Frequency 1150 Hz ± 55 Hz).29#HITNOFFTurn off high tone.30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber).33X#DTMFONGenerates 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.				4 Quarter Rate (CDMA)		
9Stop RTD (AMPS, CDMA)28#HITNONTurn on high tone (Frequency 1150 Hz ± 55 Hz).29#HITNOFFTurn off high tone.30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber).33X#DTMFONGenerates 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.				8 Eighth Rate (CDMA)		
28#HITNONTurn on high tone (Frequency 1150 Hz ± 55 Hz).29#HITNOFFTurn off high tone.30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming 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#DTMFONGenerates 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.				9 Stop RTD (AMPS, CDMA)		
29#HITNOFFTurn off high tone.30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber).33X#DTMFONGenerates 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.	28#	HITNON		Turn on high tone (Frequency 1150 Hz \pm 55 Hz).		
30#LOTNONTurn on low tone (Frequency 770 Hz ± 40 Hz).31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming 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#DTMFONGenerates 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.	29#	HITNOFF		Turn off high tone.		
31#LOTNOFFTurn off low tone.32#INVMInitialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming 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#DTMFONGenerates 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.	30#	LOTNON		Turn on low tone (Frequency 770 Hz \pm 40 Hz).		
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.	31#	LOTNOFF		Turn off low tone.		
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.	32#	INVM		Initialize non-volatile memory to all zeros. This command should be reserved for special situations where reprogram- ming will be required (such as memory chip or circuit board replacement or when a radiotelephone is to be reissued to a new subscriber).		
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.				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.	34#	DTMFOFF		Turn off DTMF tones.		

Table 2: Test Commands For Manual Test Mode

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 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: Test Commands For Manual Test Mode

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 13.
			Refer to "NAM Programming" on page 25 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: Test Commands	For	Manual	Test	Mode
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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. AMPS signalling (stop call processing test commands and PCM Loopback) Not supported - NAMPS signalling Not supported - Reserved for NAMPS expansion Not supported - Reserved for NAMPS expansion ScDMA signalling (stop call processing test commands and PCM Loopback) Not supported - Reserved for NAMPS expansion CDMA signalling (stop call processing test commands and PCM Loopback) 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) Start PCM Loopback CDMA T-Tester mode (channel must be set by LOAD-SYTH. Handset only). Not supported - CDMA force random data transmis- sion 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: Test Commands For Manual Test Mode

Keypad Entry	Command Description	Status Display		Result	
72X#	GAIN-PHASE		Program AM handset.	PS (only) gain phasing valu	ies through the
			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 comman for MOD, MIC	nd reprograms the EEPROM C, AUX, etc.	phasing values
			The value in X is entered,	X selects which step to start o it will start at step 0.	n. If no value for
			The command keys are defined in Table 1: "Handset Command Key Entry" on page 13.		
			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 instructions of	"Tests and Adjustments" on entering parameters from the	on page 47 for ne keypad.
			<u>STEP #</u> 00-04 05 06 07 08 09 0A 0B	AMPS GAIN PHASING <u>PARAMETER</u> MOD 0- MOD 4 Aux. audio path deviation MIC audio deviation DTMF deviation Data deviation SAT deviation Discriminator audio gain AFC WARP Analog	RANGE (HEX) 0-7 0-1 0-F 0-3 0-3 0-3 0-7 0-FF

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 con for Max.	nmand reprograms the EEPROM ph Power Level, Attenuator Slope Adjust	asing values , etc.	
			The valu X is ente	e in X selects which step to start on. I red, it will start at step 0.	f no value for	
			The con Commar	nmand keys are defined in Table id Key Entry" on page 13.	1: "Handset	
			NOTE: In made, th with the o	f you power down the radio after e power up sequence re-programs correct phasing values.	changes are the hardware	
			Refer to tions on	"Tests and Adjustments" on page 4 entering parameters from the keypad	7 for instruc-	
			Analog F	Analog Power Level Parameters:		
					RANGE	
			STEP #	POWER LEVEL	(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 P	ower Level Parameters:		
					RANGE	
			STEP #	POWER LEVEL	(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	

Keypad Entry	Command Description	Status Display		Result	
73#	PWR-PHASE				RANGE
(con't)			STEP #	POWER LEVEL	(HEX)
			0A	Ch. Gain Adj. 1 (Chan. 991-1023, 1-1	00) 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





ST7760

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 25 shows the minimum required Test Mode NAM programming steps. Table 4: "Test Mode NAM Programming Sequence" on page 26 lists all NAM programming steps, complete with parameters and definitions.



Table 3: Minimum Required Test Mode NAM Programming Steps

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 11.) 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 6.8 VDC power supply and an MCEL 2000 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 26 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.



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



Exits the programming mode without programming the NAM.

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.

Table 4: Test Mode NAM Programming Sequence
Step	Factory Default	Description	
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	010 042 074 106	Station class mark (SCM). A 2 digit number assigned by the system operator. Indicates maximum power step, VOX capability, and number of channels used. CDMA only & Non-Slotted mode configuration CDMA only & Slotted mode configuration Dual Mode & Non-Slotted mode configuration Dual Mode & Slotted mode configuration	
05	Last digit of Access Over- load 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.	

Table 4: Test Mode NAM	Programming	Sequence
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Step	Factory Default	Description	
09 (con't)	0	 Display Pilot Set Status/AMPS Status Mode (Bit B7). CDMA: 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.	
		Markov error rate statistics in a call.	
		AMPS: In AMPS mode, setting this bit to 1 causes status information similar to current Motorola AMPS products to be displayed. The contents of the display depends on the channel being monitored.	
0 Test Menu (Bit B6). This bit allows the key Test Menu. Refer to "Test Menu" of Test Menu. 1 = enabled, 0 = disabled.		Test Menu (Bit B6). This bit allows the user to enable or disable the FCN key Test Menu. Refer to "Test Menu" on page 12 for further information on Test Menu. 1 = enabled, 0 = disabled.	
	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.		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 a one or two digit send sequence (speed dialing)		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.	

Table 4: Test Mode NAM Programming Sequence

Step	Factory Default	Description		
09 (con't)	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	0000000	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.		
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 chan- nels is 21. Enter 021.		

Table 4: Test Mode NAM Programming Sequence

Step	Factory Default	Description
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*	Preferred mode (Bit E6) . Normally set to 0. Bit 6 - 1 and Bit 5 - 1 = Analog preferred Bit 6 - 1 and Bit 5 - 0 = Analog only
	1*	Preferred mode (Bit E5) . Normally set to 1. Bit 5 - 1 and Bit 6 - 1 = CDMA preferred Bit 5 - 1 and Bit 6 - 0 = CDMA only
	0	Extended Address Method (Bit E4). Enter 0.
	0	Preferred Analog Serving System (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.

Table 4: Test Mode NAM Programming Sequence

* These bits will determine which modes of operation the radio will attempt when seeking communication with a Base Station. Care should be taken when either the CDMA only or the Analog only modes of operation are selected, because this configuration will cause a dual mode phone to operate as a single mode phone. Another issue to be aware of is that whenever Bit 5 is set to 0, no handoffs between Analog and CDMA mode can take place. No examination of the RF environment is performed when setting these fields.

[†] Setting these bits also effects the registrations that are transmitted by the Mobile Station. If bits are set such that the Mobile cannot receive any incoming calls (in CDMA mode), it is not necessary to send out any Registration messages. It should be noted that if all Mobile Terminated Call Preference bits are set to zero, that there would (in a spec compliant system) be no way for the Mobile Station to receive incoming calls.

Key Design Parameters

Display Characteristics

96 X 32 LCD display 0.4mm glass Seiko/Epson SED 1530 driver IC COB (Chip-on-board) on back on keyboard with heatseal to LCD panel 4 side mount backlight LEDs Designed jointly with TDMA StarTAC (Hurricane)

Key Design Issues

Vendor performance Mechanical fit (caused by 0.4mm glass requirement) Software compatibility - SED 1530 IC required







DISASSEMBLY

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.



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
- Plastic Prying Tool SLN7223A
- Antenna Tool SYN5233A
- Rear Housing Removal Tool SYN5367A
- Dental Pick
- Tweezers

Disassembly Procedure

Refer to the disassembly instructions and photo sequence on the following pages.

NOTE

Refer to Figure 6: "ST7760 Mechanical Explosion" on page 76, 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 and remove the battery from the housing.



Step 3. Use the antenna tool to remove the antenna.

Place the wide tip of the antenna in the large opening of the antenna tool.

Put the bottom of the tool on the grooves in the base of the antenna.

Turn counterclockwise until the antenna is free from the phone housing.



Opening Housing

Step 1. With flat surface of tool facing up, insert housing opener at a 45° angle. Make sure you can see top of tool in seam.



Step 2. Press and push corner outwards with left thumb while right hand twists phone like a rag.



Step 3. After phone has started to open, lift antenna well to release entire side.



Step 4. Using a small blade screwdriver, slide under housing all the way to corner and lift housing off corner.



Step 5. With flat surface of tool facing up, insert housing opener at a 45° angle. Make sure you can see top of tool in seam.



Step 6. Using index finger, pull housing off going straight across phone.



Board Removal

Step 1. Open the flex connector and pull out the flex.



Step 2. With your thumbs, pry the side tabs away from the board assembly to allow it to be easily removed. Starting at the top of the board, lift the board assembly out of the front housing.



Step 3. Pull the tape off of the microphone connector and pull the connector out.

Remove antenna tube.



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Step 4. Lift the white display clip off the transceiver board.



Step 5. Lift and separate the display and audio-logic board assembly from the transceiver board.

> To disconnect display board from audio-logic board, open flex connector and remove flex.

> The keypad easily lifts out of the front housing.



Flip Removal

Step 1. Using a dental pick, remove the adhesive strip off the base of the flip.



Step 2. Using tweezers, press the hinge pin button in and over toward the middle of the flip.

Also, move the hinge pin section above the button toward the middle of the flip.

Note: When reassembling the flip, the button will click back into place.

Remove the flip by pulling up on the hinge pin side and out on the other side.

The hinge shaft may come loose from the flip.



Speaker/Vibrator Removal

Step 1. Rest flip housing on a flat surface. Slip a dental pick between front housing and battery contacts.

Pry up to unsnap front housing and battery contacts.

The speaker, vibrator, and flex should be exposed.



Antenna Removal

- **Step 1.** Turn off the telephone.
- **Step 2.** Remove the battery from the housing.
- **Step 3.** Use the antenna tool to remove the antenna



Step 4. Put the radio face down into the test fixture, drawing number 8185677G01.



Step 5. Push the lever as shown into the holes of the radio



Step 6. Push the lever at the other end into the radio's Auxiliary Battery Holder.



Step 7. Turn the rod to insert the hook into the Auxiliary Battery Holder.



Step 8. Pull back the lever to pull out the rear housing of the radio.



Step 9. Turn the rod back to release the rear housing.



Step 10. Pull the lever back to release the radio.



StarTAC CDMA(Vader) Housing opener:

Part Number 8185677G01 Drawing Number 81D85677G Supplier **Edmik Inc.**

Gurnee. Il

Phone Number: (847)-263-0460

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TESTS AND ADJUSTMENTS

ST7760

Tests and Adjustments

Introduction

These phones allow keypad controlled calibration (often referred to as "phasing") of various operating parameters, as follows:

- Transmit output power
- TX deviation (SAT, DATA, DTMF, microphone)
- RX discriminator output

These parameters are stored in memory on the Logic Board and affect the operation of the transceiver. All transceiver units and all replacement RF/AL boards are shipped from the factory with these adjustments already made. However, if components are replaced, checking and adjustment of the parameters may be necessary. Checking and adjusting parameters is also useful as a troubleshooting/diagnostic tool to isolate defective components.

The adjusting parameters accessible through keypad commands are a subset of the complete complement of adjustments, but are the key parameters necessary for basic operation. Access to all adjustments requires a computer connected to the accessory connector (J3). In addition, the computer must be loaded with the proper diagnostic software.

Consult with Motorola regarding specific hardware and software requirements for the diagnostic computer.

Test Interface

Figure 7: "Connections for Testing and Adjustments" on page 48 shows the audio and RF connections to a communications analyzer when using the MCEL 2000 test interface, and SKN4800A test cable.

Adjustments

To properly check and adjust the adjustment parameters using keypad commands, perform the following procedures in sequence.

IMPORTANT

Only those memory locations referred to in the following procedure should be programmed. Data in other memory locations which are "Stepped through" during the procedure *must not be altered*.



Figure 7: Connections for Testing and Adjustments

Table 5: Test Cable Pin Out

<i>15 Connector To Test Interface</i>		
Pin Function		
1	RF Ground	
2	RF Out	
3	RF Ground	
4	Battery Feedback	
5	Manual Test	
6	N/C	
7	N/C	
8	Audio In	
9	Audio Out	
10	Battery Ground	
11	RTN	
12	СМР	
13	TRU	
14	External B+	
15	Analog Ground	

Keypad Button Functions

Below is a description of the non-numeric keys used during the keypad calibration procedure:



Toggles display to next location; on last program Step, enters new data into memory and exits command.



Restores displayed location to data originally programmed; useful to erase keypad entry errors.



- **Step 1.** Connect the test cable RF to a servicing analyzer, using a coaxial cable. Enter Manual Test Mode. Depress the # button. The display should show the ' prompt.
- **Step 2.** Enter **11434**# via the keypad to program the synthesizer for channel 434.
- **Step 3.** Enter **05***#* to key the transmitter.

TX Output Power Adjustment (Center of Band)

NOTE

The **73#** command is normally disabled. Adjustment of Transmit Output Power is not recommended. Consult Motorola for information about enabling the **73#** Transmit Power Adjustment Procedure. **Step 4.** Enter **73**#. The portable display will show Step number "00" on the left and the corresponding hex value for the TX output power on the right.

Power Step	<i>Output Power</i> (at antenna port, <u>+</u> 0.5 dBm)
00	28 dBm
01	28 dBm
02	28 dBm
03	24 dBm
04	20 dBm
05	16 dBm
06	12 dBm
07	8 dBm
08	Do not adjust
09	Do not adjust
0A	Do not adjust
0B	Do not adjust

Table 6: Output Power Levels

- Step 5. Using the * button to advance through the power steps. Adjust each of the power steps listed in Table 6: "Output Power Levels" for the values shown as indicated on the servicing analyzer. Make adjustments as described in Step 6 and Step 7.
- **Step 6.** Enter a 2-digit hexadecimal number via the keypad. This immediately updates the hex power level value, and the output power should change as indicated on the analyzer.

If the new entry does not produce the desired analyzer reading (i.e. too high or too low),

a) depress the **CLR** button and enter another 2-digit number, or

b) use the **VOL** button to incrementally increase the hex value to obtain the desired reading on the analyzer. (The volume control may not be used to decrease the hex value.)

NOTE			
In orde	r to enter hex digits A thru F,		
depress	s the SND button followed by:		
0	hex A		
1	hex B		
2	hex C		
3	hex D		
4	hex E		
5	hex F		

Step 7. With all necessary adjustments made and power Step "0B" showing in the display, depress * to enter all updated data and exit the **73#** command.

Maximum Deviation Adjust

NOTE

Before SAT, DTMF, data, or microphone deviations can be adjusted, the maximum deviation must be checked (and adjusted, if necessary). Proceed as follows.

- **Step 8.** Inject an unbalanced 1kHz 2.24V rms audio signal at J3 pin 8 (TX audio in). Connect the audio generator ground lead to J3 pin 6 (audio ground). The audio signal source must be low impedance (or the injection signal must be measured at pin 10 to ensure the proper level of 2.24 V rms).
- **Step 9.** Enter the following commands:
 - **58**# to enable compandor
 - 10# to unmute TX audio
 - 356# to select external audio path
 - 11434# to place the telephone on channel 434

- Step 10. Enter 72#. Step 04 will be displayed on the left side of the display. Use the * button to toggle down to Step 0B (left side of display).
- Step 11. Read the peak deviation on the analyzer. If it is not in the range of 11 to 12 kHz (preferably closer to 12kHz). Use the volume control or enter numbers via the keypad (as explained in Step 6) to adjust the maximum deviation to fall within the 11 to 12 kHz range. (Make adjustments so that the deviation remains as close to 12 kHz as possible, without exceeding 12 kHz.).
- Step 12. Depress the * key to exit the 72# command. The display should show the ' prompt.

Microphone Deviation Adjust

- Step 13. Adjust audio generator signal level at J3 pin 8 (TX audio in) to 90 mV rms (still at 1 kHz).
- **Step 14.** Enter **11434**# to place the portable on channel 434. Enter **356**# to select the external handset audio path.
- Step 15. Read the average deviation on the analyzer. If reading is 2.05 kHz \pm 7% (corresponds to 2.9 kHz peak), proceed to Step 28.

If it is not, enter **72**[#], use the * button to toggle down to Step **05** (left side of display), and use the volume control or enter numbers via the keypad (as explained in Step **6**) to adjust for a microphone deviation of 2.05 kHz \pm 7%.

After adjustment, note the hex value for Step 05 and exit the **72**# command by repeatedly depressing the * button until the display shows the ' prompt.

Step 16. Enter 72#, use the * button to toggle down to Step 06 (left side of display), and enter the Step 05 hex value noted in Step 26. Exit the 72# command by repeatedly depressing the * button until the display shows the ' prompt. Remove the injection audio signal.

DTMF Adjust

- Step 17. Enter the following commands:
 - 09# to mute TX audio
 - **59**[#] to turn off compandor
 - 473# to set receive audio volume to level 3 (disables DTMF boost)
 - **335**# to turn on DTMF tone "5"
- **Step 18.** Read the peak deviation on the communications analyzer. If reading is 9.0 rad \pm 10%, proceed to Step 30.

If it is not, enter **72**[#], use the * button to toggle down to Step 07 (left side of display), and use the volume control or enter numbers via the keypad (as explained in Step 6) to adjust for a deviation of 9.0 rad \pm 10%.

After adjustment, exit the **72#** command by repeatedly depressing the * button until the display shows the ' prompt.

Step 19. Enter 34# to turn off the DTMF tone.

SAT Deviation Adjust

Step 20. Enter **251**# to enable a 6000 Hz SAT tone.

Step 21. Read the average deviation on the communications analyzer. If the reading is $1.4 \text{ kHz} \pm 10\%$ (corresponds to 2.0 kHz peak), proceed to Step 33.

If it is not, enter **72**[#], use the * button to toggle down to Step 09 (left side of display), and use the volume control or enter numbers via the keypad (as explained in Step 6) to adjust for a deviation of $1.4 \text{ kHz} \pm 10\%$.

After adjustment, exit the **72**# command by repeatedly depressing the * button until the display shows the ' prompt.

Step 22. Enter 26# to turn off the 6000 Hz SAT tone.

Data Deviation Adjust

- **Step 23.** Enter 14# to turn on the 10 kHz signaling tone.
- **Step 24.** Read the average deviation on the communications analyzer. If the reading is $5.7 \text{ kHz} \pm 10\%$ (corresponds to 8.0 kHz peak), proceed to Step 36.

If it is not, enter 72#, use the * button to toggle down to Step 08 (left side of display), and use the volume control or enter numbers via the keypad (as explained in Step 6) to adjust for a deviation of 5.7kHz $\pm 10\%$.

After adjustment, exit the **72**# command by repeatedly depressing the * button until the display shows the ' prompt.

Step 25. Enter **15**# to turn off the 10 kHz signaling tone.

RX Discriminator Adjust

- Step 26. Inject a -50 dBm, 883.020 MHz (channel 434) signal FM modulated with a 1 kHz tone at \pm 2.9 kHz deviation into the antenna port, using an SLN8576A antenna test adaptor.
- **Step 27.** Enter the following commands:
 - 08# to unmute the RX audio
 - 474# to set the receive audio volume to level 4
 - **356**# to select the external handset audio path
- Step 28. Enter 72#, use the * button to toggle down to step 0A (left side of display), and use the volume control or enter numbers via the keypad (as explained in Step 6) to obtain 100 mV rms $\pm 15\%$ at pin 7 of J3 (RX audio out).

After adjustment, exit the **72#** command by repeatedly depressing the * button until the display shows the ' prompt.

Step 29. Exit Manual Test Mode by depressing the **PWR** button. This completes the keypad adjustment procedure.

AMPS Call Processing

The transceiver is connected to an RF Communications Test System capable of AMPS and CDMA base station simulation and the test simulation and the test described below are performed. The external antenna on a Portable is RF coupled to the Test System. The phone is powered by a battery. All of these tests are performed on a pass/fail basis except where otherwise specified.

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

- **Step 1.** *Initialize:* Set the RF Communication Test System to provide an AMPS control channel at -50 dBm on channel 334.
- **Step 2.** *AMPS Registration:* Turn the mobile transceiver on and force an AMPS Registration.
- **Step 3.** *AMPS Page:* Page the mobile transceiver.

When the transceiver alert rings, answer the call using the FLIP for a Portable, the SEND key for a Mortable.

Verify that the mobile has transferred to the traffic channel and is transponding SAT.

Step 4. *AMPS Handoff:* Initiate a handoff to another AMPS traffic channel.

Verify that the mobile has handed off to the new traffic channel and is transponding SAT.

Terminate the call using the FLIP for a Portable, the END key for a Mortable.

Verify that the mobile has terminated the all and de-keyed the transmitter.

CDMA Call Processing

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.



TROUBLESHOOTING

ST7760

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.



Troubleshooting and Repair

The troubleshooting chart in Table 7, "Assembly Replacement Level Troubleshooting and Repair Chart," on page 56 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.

Symptom	Probable Cause	Verification and Remedy
 Phone will not turn on or stay on. 	a) Battery either discharged or defective.	 Measure battery voltage across a 50 ohm (>1 Watt) load. If the battery voltage is <3.4 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	1. Measure resistance across the two option connector solder connections on the RF side of the RF/Audio-Logic board.
	open.	2. If the switch measures open, replace the option connector.
	d) Keypad membrane	1. Replace the keypad membrane with a known good part.
	defective.	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, discon- nect 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.

Table 7: Assembly Replacement Level Troubleshooting and Repair Chart

	Symptom		Probable Cause	Verification and Remedy
2.	Phone exhibits poor reception and/or erratic operation (such as calls	a)	a) Defective antenna or damaged antenna connector	1. Make sure the antenna shaft ferrule is screwed into the antenna socket.
	frequently dropping, weak and/or distorted audio.			 Make sure pin on antenna coil is seated in antenna connector socket.
	etc.)			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.	 Gain access to RF/Audio-Logic board or keypad board as described in the "Disas- sembly" section of this manual.
				 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 defec- tive.	Replace defective speaker.
		b)	RF/Audio-Logic board defective.	Replace the RF/Audio-Logic Board (refer to symptom 1f Verification and Remedy).
7.	StarTAC 800 (CDMA) model 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.



Figure 8: Power Supply Block Diagram



REPLACEMENT PARTS

ST7760

Replacement Parts

ST7760

These Replacement Parts lists are applicable to the following models:

<u>Model No.</u>	<u>Country</u>
S8336A	Korea
S8339A	Hong Kong
S8342	China
S8345A	Australia
S8346A	Indonesia
S8347A	Thailand
S8348A	Philipines
S8351A	Singapore

Schematic Reference: 8409154T01 Xcvr SWF2819A

Table 8: Mechanical Parts List

Part Number	Part Description	Qty
SWF2819A	XCVR CDMA ST7760 BLK	1
SHN6849A	H&H CDMA STARTAC UNIQUE	1
SHN6850A	H&H CDMA STARTAC COMMON	1
SYN6729A	RF/AL BD CDMA ST7760	1
SYN6934A	DISP/KYPD BD ROCKET	1
0103850K01	ASSY FRNT HSNG DIGITAL	1

Table 8: Mechanical Parts List

Part Number	Part Description	Qty
0103851K01	ASSY REAR HSNG DIGITAL	1
0104866Z06	ASSY FLIP ST7760	1
3809423U01	ACTUATOR KYPD HURRICANE	1
0104976Z01	ASSY ANT FOX	1
0185624G01	ASSY LENS	1
0503856K01	GROMMET MIC DIGITAL RAE	1
0509472U01	ALERT GROMMET DIGITAL RAE	1
0704767Z01	SUPPORT KEYPAD BRD	1
3704947Z01	TUBE ANTENNA	1
4709038K01	SHAFT RIGHT CVR	1
5009135L07	MIC ELECT 6MM PINS	1
5403801S01	LABEL POWER AUDIO FLEX	1
5509242E01	HINGE GSM	1
0109035A0	ST7760 ASSY RF SIDE 1	1
0109035A0	ST7760 ASSY AL SIDE 2	1
5199383A01	IC FLASH ROM 512KX16 28F800B	1
8409154T01	PCB CDMA RAE MAIN	1
0109133U03	ASSY DISPLAY & KYBD	1

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
	0109035A08	ST7760 ASSY RF SIDE !
C00050	2113743N40	CAP CHIP 39.0 PF 5% COG
C00051	2113743N40	CAP CHIP 39.0 PF 5% COG
C00052	2113743N40	CAP CHIP 39.0 PF 5% COG
C00053	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00075	2113740F21	CAP CHIP REEL CL1 +/-30 5.6
C00076	2113743N35	CAP CHIP 24.0 PF 5% COG
C00077	2113743N35	CAP CHIP 24.0 PF 5% COG
C00078	2113743N40	CAP CHIP 39.0 PF 5% COG
C00100	2113743N40	CAP CHIP 39.0 PF 5% COG
C00101	2113743N18	CAP CHIP 4.7 PF +25PF COG
C00102	2113743N03	CAP CHIP 1.0 PF +25PF COG
C00104	2113743E20	CAP CHIP .10 UF 10%
C00105	2113743N40	CAP CHIP 39.0 PF 5% COG
C00106	2113743E20	CAP CHIP .10 UF 10%
C00107	2113743N18	CAP CHIP 4.7 PF +25PF COG
C00110	2113743F16	CAP CHIP 1.0 UF 16V +80-20%
C00150	2113743N40	CAP CHIP 39.0 PF 5% COG
C00152	2113743M24	CAP CHIP 100000 PF +80-20% Y

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C00154	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00155	2113743N40	CAP CHIP 39.0 PF 5% COG
C00156	2113743N09	CAP CHIP 2.0 PF +25PF COG
C00200	2113743N40	CAP CHIP 39.0 PF 5% COG
C00202	2113743N19	CAP CHIP 5.1 PF + 5PF COG
C00203	2113743L17	CAP CHIP 1000 PF 10% X7R
C00204	2113743N40	CAP CHIP 39.0 PF 5% COG
C00206	2113743L17	CAP CHIP 1000 PF 10% X7R
C00207	2113743L17	CAP CHIP 1000 PF 10% X7R
C00208	2113743N01	CAP CHIP 0.5 PF +25PF COG
C00250	2113743N40	CAP CHIP 39.0 PF 5% COG
C00251	2113743N40	CAP CHIP 39.0 PF 5% COG
C00252	2113743N12	CAP CHIP 2.7 PF +25PF COG
C00253	2113743N18	CAP CHIP 4.7 PF +25PF COG
C00254	2113743N16	CAP CHIP 3.9 PF +25PF COG
C00255	2113743N24	CAP CHIP 8.2 PF + 5PF COG
C00256	2113743N20	CAP CHIP 5.6 PF + 5PF COG
C00257	2113743N20	CAP CHIP 5.6 PF + 5PF COG
C00259	2113743L17	CAP CHIP 1000 PF 10% X7R

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C00300	2113743E20	CAP CHIP .10 UF 10%
C00301	2113741F13	CAP CHIP CL2 X7R REEL 330
C00302	2113743N42	CAP CHIP 47.0 PF 5% COG
C00303	2113743N40	CAP CHIP 39.0 PF 5% COG
C00304	2113743N24	CAP CHIP 8.2 PF + 5PF COG
C00305	2113743N14	CAP CHIP 3.3 PF +25PF COG
C00325	2113743L41	CAP CHIP 10000 PF 10% X7R
C00326	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00327	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C00328	2113743L41	CAP CHIP 10000 PF 10% X7R
C00350	2113743N40	CAP CHIP 39.0 PF 5% COG
C00351	2113743N40	CAP CHIP 39.0 PF 5% COG
C00401	2113743N03	CAP CHIP 1.0 PF +25PF COG
C00402	2113743N20	CAP CHIP 5.6 PF + 5PF COG
C00405	2113743N40	CAP CHIP 39.0 PF 5% COG
C00406	2113743N40	CAP CHIP 39.0 PF 5% COG
C00407	2113743L41	CAP CHIP 10000 PF 10% X7R
C00408	2113743N40	CAP CHIP 39.0 PF 5% COG
C00409	2113743N40	CAP CHIP 39.0 PF 5% COG

Table 9: Electrical Parts Lis

Ref Des	Part Number	Part Description
C00410	2113743N40	CAP CHIP 39.0 PF 5% COG
C00411	2113743N40	CAP CHIP 39.0 PF 5% COG
C00412	2113743N40	CAP CHIP 39.0 PF 5% COG
C00413	2113743N40	CAP CHIP 39.0 PF 5% COG
C00414	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00415	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00450	2113743N40	CAP CHIP 39.0 PF 5% COG
C00451	2311049A57	CAP TANT CHIP A/ P 10UF 10% 1
C00452	2113743N40	CAP CHIP 39.0 PF 5% COG
C00453	2113743N40	CAP CHIP 39.0 PF 5% COG
C00454	2113743N40	CAP CHIP 39.0 PF 5% COG
C00455	2113743G26	CAP CHIP 4.7 UF 16V +80-20%
C00456	2113743N10	CAP CHIP 2.2 PF +25PF COG
C00457	2113743N40	CAP CHIP 39.0 PF 5% COG
C00458	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C00459	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C00475	2113740F02	CAP CHIP REEL CL1 +/-30 .75
C00476	2113743E20	CAP CHIP .10 UF 10%
C00477	2113743N40	CAP CHIP 39.0 PF 5% COG

 Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C00478	2109622N06	CAP CER CHIP NPO CLASS I
C00600	2113743B23	CAP CHIP .330 UF 10% X7R
C00601	2113743L27	CAP CHIP 2700 PF 10% X7R
C00602	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C00625	2113743L41	CAP CHIP 10000 PF 10% X7R
C00626	2113743N40	CAP CHIP 39.0 PF 5% COG
C00627	2311049A89	CAP TANT CHIP 22 UF 4V 10%
C00628	2113743N40	CAP CHIP 39.0 PF 5% COG
C00629	2113743N07	CAP CHIP 1.5 PF +25PF COG
C00630	2113743N21	CAP CHIP 6.2 PF + 5PF COG
C00631	2113743N09	CAP CHIP 2.0 PF +25PF COG
C00632	2113743N40	CAP CHIP 39.0 PF 5% COG
C00633	2113743N40	CAP CHIP 39.0 PF 5% COG
C00650	2113743N18	CAP CHIP 4.7 PF +25PF COG
C00651	2113743N18	CAP CHIP 4.7 PF +25PF COG
C00652	2113743N26	CAP CHIP 10.0 PF 5% COG
C00653	2113743N21	CAP CHIP 6.2 PF + 5PF COG
C00654	2113743N05	CAP CHIP 1.2 PF +25PF COG
C00655	2113743E12	CAP CHIP .047 UF 10% X7R

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C00656	2311049A07	CAP TANT CHIP 1 10 16 A/P
C00657	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00658	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C00675	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00676	2113743L17	CAP CHIP 1000 PF 10% X7R
C00677	2113743L41	CAP CHIP 10000 PF 10% X7R
C00678	2113743N03	CAP CHIP 1.0 PF +25PF COG
C00679	2113743N03	CAP CHIP 1.0 PF +25PF COG
C00700	2113743E20	CAP CHIP .10 UF 10%
C00701	2113743N40	CAP CHIP 39.0 PF 5% COG
C00703	2113743N40	CAP CHIP 39.0 PF 5% COG
C00704	2113743E20	CAP CHIP .10 UF 10%
C00705	2113743N40	CAP CHIP 39.0 PF 5% COG
C00706	2113743E20	CAP CHIP .10 UF 10%
C00707	2113743N40	CAP CHIP 39.0 PF 5% COG
C00708	2311049A89	CAP TANT CHIP 22 UF 4V 10%
C00709	2113743N40	CAP CHIP 39.0 PF 5% COG
C00728	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00729	2113743M24	CAP CHIP 100000 PF +80-20% Y
Ref Des	Part Number	Part Description
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C00730	2113743L01	CAP CHIP 220 PF 10% X7R
C00731	2113743L01	CAP CHIP 220 PF 10% X7R
C00732	2113743L41	CAP CHIP 10000 PF 10% X7R
C00733	2113743L41	CAP CHIP 10000 PF 10% X7R
C00740	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00741	2113743M24	CAP CHIP 100000 PF +80-20% Y
C00750	2113743L41	CAP CHIP 10000 PF 10% X7R
C00751	2113743L41	CAP CHIP 10000 PF 10% X7R
C00752	2113743L41	CAP CHIP 10000 PF 10% X7R
C00753	2113743L41	CAP CHIP 10000 PF 10% X7R
C00754	2113743L21	CAP CHIP 1500 PF 10% X7R
C00755	2113743L41	CAP CHIP 10000 PF 10% X7R
C00756	2113743L41	CAP CHIP 10000 PF 10% X7R
C00776	2113928H02	CAP CER CHIP .22 UF 10V 10%
C00777	2113743L41	CAP CHIP 10000 PF 10% X7R
C00778	2113743L41	CAP CHIP 10000 PF 10% X7R
C00779	2113743L41	CAP CHIP 10000 PF 10% X7R
C00780	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C00781	2113743F18	CAP CHIP 2.2 UF 16V +80-20%

Table 9): E	lectrica	I Parts	List

Ref Des	Part Number	Part Description
C00782	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C00783	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C00784	2113743E20	CAP CHIP .10 UF 10%
C00785	2113743L41	CAP CHIP 10000 PF 10% X7R
C00786	2113743E20	CAP CHIP .10 UF 10%
C01017	2113743N40	CAP CHIP 39.0 PF 5% COG
C01058	2113743E20	CAP CHIP .10 UF 10%
C01060	2113743G26	CAP CHIP 4.7 UF 16V +80-20%
C02300	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02500	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02501	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02502	2113743M24	CAP CHIP 100000 PF +80-20% Y
CPL625	5803703S01	COUPLER CER 4 PORT 991MHZ SM
CR0300	4862824C01	DIODE VARACTOR
CR0475	4809606E05	DIODE DUAL SCHOTTKEY SOT- 143
CR0650	4809877C17	DIODE VARACTOR MA4ST340 SOD3
CR0651	4862824C01	DIODE VARACTOR
CR1008	4809788E06	DIODE ZENER 6.8V UDZ6.8B
CR1009	4809788E06	DIODE ZENER 6.8V UDZ6.8B

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
CR1060	4809606E02	DIODE DUAL ARRAY DAN222
CR1150	4809118D01	LED BICOLOR LNJ107W5PRA1
FL0075	9109361K03	FLTR SAW DUPLEX 850MHZ SMD
FL0100	9103913K02	FLTR SAW TX 881MHZ SMD
FL0200	9109303U02	FLTE CER LC 991MHZ 3225 SMD
FL0250	9109142L03	FLTR XTAL 109.65MHZ 5X7MM SM
FL0251	9103786K01	FLTR SAW IF 109.8MHZ SMD
FL0400	9103914K01	FLTR CER LC BP 155MHZ 4532 S
FL0401	9109247M03	FLTR SAW BP 836MHZ 3X3MM SMD
FL0402	9103913K01	FLTR SAW TX 836MHZ SMD
J00810	3909578M01	CONTACT BATT SMT
J00811	3909578M01	CONTACT BATT SMT
J00812	3909578M01	CONTACT BATT SMT
J00813	3909578M01	CONTACT BATT SMT
J01000	0909059E01	RECPT ZIF 16 POS SMD
J05000	0909195E01	SKT BOT ENTRY 2 POS
L00075	2409594M09	IND CHIP 10.0NH 5% ACCU-L
L00076	2409594M06	IND CHIP 5.6NH .5NH ACCU-L

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
L00077	2409646M12	IND CER MULT- ILYR 33NH 1608
L00102	2409646M07	IND CER MULT- ILYR 12NH 1608
L00150	2409646M02	IND CER MULT- ILYR 4.7NH 1608
L00151	2409646M70	IND CER MULT- ILYR 56NH 1608
L00152	2409646M05	IND CER MULT- ILYR 8.2NH 1608
L00200	2409646M08	IND CER MULT- ILYR 15NH 1608
L00201	2409646M09	IND CER MULT- ILYR 18NH 1608
L00202	2409646M03	IND CER MULT- ILYR 5.6NH 1608
L00203	2409646M70	IND CER MULT- ILYR 56NH 1608
L00250	2404574Z13	IND CHIP WW 220NH 2% 2012 SM
L00251	2404574Z13	IND CHIP WW 220NH 2% 2012 SM
L00252	2404574Z08	IND CHIP WW 82NH 2% 2012 SMD
L00253	2404574Z08	IND CHIP WW 82NH 2% 2012 SMD
L00300	2462587V27	CHIP IND 27 NH 5% 0805
L00400	2409646M47	IN CER MULTILYR
L00401	2409646M04	IND CER MULT- ILYR 6.8NH 1608
L00402	2409646M08	IND CER MULT- ILYR 15NH 1608
L00403	2409646M42	IND CER MULT- ILYR 2.7NH 1608
L00411	2409646M47	IN CER MULTILYR

Ref Des	Part Number	Part Description
L00600	2462587P24	CHIP IND 10000 NH 5%
L00626	2409167T13	IND CER MULTLYR 15NH 1608
L00627	2409646M10	IND CER MULT- ILYR 22NH 1608
L00632	2409167T18	IND CER MULTLYR 39NH 1608
L00650	2462587V27	CHIP IND 27 NH 5% 0805
L00675	2462587P09	CHIP IND 560 NH 10%
L00676	2409704K48	IND CHIP MULT- ILYR 82NH 2012
L00728	2409646M73	IND CER MULT- ILYR 100NH 1608
L00729	2409646M73	IND CER MULT- ILYR 100NH 1608
L00777	2462587Q44	IND CHIP 560 NH 10%
Q00050	4809939C03	TSTR DUAL NPN/ PNP UMH3
Q00100	4809527E24	TSTR NPN RF MRF949LT1 SC-90
Q00150	4809527E33	TSTR NPN RF MRF1047 SC70
Q00250	4809940E02	TSTR DIG NPN DTC114YE
Q00325	4809939C04	TSTR DUAL PNP/ NPN UMC3
Q00350	4809608E03	TSTR DIG PNP DTA114YE
Q00675	4809527E24	TSTR NPN RF MRF949LT1 SC-90
Q01008	4809579E14	TSTR FET DUAL P- CHAN 519934D
Q01060	4809579E24	TSTR FET P-CHAN 2SJ347 SC90

Table	9:	Electrical	Parts	List

Ref Des	Part Number	Part Description
Q01061	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q02500	4809579E12	TSTR MOSFET P- CHAN ML6302
Q02501	4809579E12	TSTR MOSFET P- CHAN ML6302
Q02502	4809579E12	TSTR MOSFET P- CHAN ML6302
R00050	0662057M98	RES. CHIP 10K 5% 20X40
R00051	0662057M98	RES. CHIP 10K 5% 20X40
R00052	0662057M98	RES. CHIP 10K 5% 20X40
R00100	0662057M52	RES. CHIP 120 5% 20X40
R00101	0662057M66	RES. CHIP 470 5% 20X40
R00103	0662057M01	RES. CHIP 0 5% 20X40
R00105	0662057M01	RES. CHIP 0 5% 20X40
R00110	0662057B47	CHIP RES 0 OHMS +050 OHMS
R00111	0662057M74	RES. CHIP 1000 5% 20X40
R00113	0662057M98	RES. CHIP 10K 5% 20X40
R00150	0662057M58	RES. CHIP 220 5% 20X40
R00151	0662057M34	RES. CHIP 22 5% 20X40
R00157	0662057B47	CHIP RES 0 OHMS +050 OHMS
R00200	0662057M42	RES. CHIP 47 5% 20X40
R00250	0662057M98	RES. CHIP 10K 5% 20X40

 Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
R00251	0662057M98	RES. CHIP 10K 5% 20X40
R00253	0662057M98	RES. CHIP 10K 5% 20X40
R00300	0662057M90	RES. CHIP 4700 5% 20X40
R00301	0662057M98	RES. CHIP 10K 5% 20X40
R00325	0662057M74	RES. CHIP 1000 5% 20X40
R00326	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R00327	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R00401	0662057M50	RES. CHIP 100 5% 20X40
R00402	0662057M50	RES. CHIP 100 5% 20X40
R00403	0662057M76	RES. CHIP 1200 5% 20X40
R00404	0662057M61	RES CHIP 300 5% 20X40
R00405	0662057M32	RES. CHIP 18 5% 20X40
R00406	0662057M61	RES CHIP 300 5% 20X40
R00407	0662057N06	RES. CHIP 20K 5% 20X40
R00408	0662057N13	RES. CHIP 39K 5% 20X40
R00410	0662057M01	RES. CHIP 0 5% 20X40
R00412	0662057M50	RES. CHIP 100 5% 20X40
R00413	0662057N06	RES. CHIP 20K 5% 20X40
R00414	0662057N13	RES. CHIP 39K 5% 20X40

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
R00450	0662057M26	RES. CHIP 10 5% 20X40
R00451	0662057M90	RES. CHIP 4700 5% 20X40
R00452	0662057N23	RES. CHIP 100K 5% 20X40
R00475	0662057M95	RES. CHIP 7500 5% 20X40
R00476	0662057M90	RES. CHIP 4700 5% 20X40
R00477	0662057M94	RES. CHIP 6800 5% 20X40
R00478	0662057N11	RES. CHIP 33K 5% 20X40
R00479	0662057N09	RES. CHIP 27K 5% 20X40
R00600	0662057M84	RES. CHIP 2700 5% 20X40
R00602	0662057M60	RES. CHIP 270 5% 20X40
R00625	0662057M52	RES. CHIP 120 5% 20X40
R00626	0662057M43	RES. CHIP 51 5% 20X40
R00627	0662057M52	RES. CHIP 120 5% 20X40
R00628	0662057M43	RES. CHIP 51 5% 20X40
R00632	0662057M43	RES. CHIP 51 5% 20X40
R00650	0662057M81	RES. CHIP 2000 5% 20X40
R00651	0662057M95	RES. CHIP 7500 5% 20X40
R00652	0662057M85	RES. CHIP 3000 5% 20X40
R00653	0662057M92	RES. CHIP 5600 5% 20X40

Ref Des	Part Number	Part Description
R00654	0662057N11	RES. CHIP 33K 5% 20X40
R00675	0662057M62	RES. CHIP 330 5% 20X40
R00676	0662057M84	RES. CHIP 2700 5% 20X40
R00677	0662057M76	RES. CHIP 1200 5% 20X40
R00678	0662057M62	RES. CHIP 330 5% 20X40
R00700	0662057M26	RES. CHIP 10 5% 20X40
R00703	0662057M26	RES. CHIP 10 5% 20X40
R00706	0662057M01	RES. CHIP 0 5% 20X40
R00709	0662057M26	RES. CHIP 10 5% 20X40
R00725	0662057N15	RES. CHIP 47K 5% 20X40
R00726	0662057M98	RES. CHIP 10K 5% 20X40
R00727	0662057M98	RES. CHIP 10K 5% 20X40
R00728	0662057M50	RES. CHIP 100 5% 20X40
R00729	0662057M26	RES. CHIP 10 5% 20X40
R00730	0662057M76	RES. CHIP 1200 5% 20X40
R00731	0662057M76	RES. CHIP 1200 5% 20X40
R00732	0662057M26	RES. CHIP 10 5% 20X40
R00752	0662057M50	RES. CHIP 100 5% 20X40
R01013	0662057M50	RES. CHIP 100 5% 20X40

Ref Des	Part Number	Part Description
R01060	0699278A15	RES CHIP 39 5% 1608 CASS PKG
R01061	0662057N34	RES. CHIP 300K 5% 20X40
R02500	0662057M50	RES. CHIP 100 5% 20X40
R02501	0662057M50	RES. CHIP 100 5% 20X40
R02502	0662057M50	RES. CHIP 100 5% 20X40
SH0001	2609473U01	SHIELD ZIF CDMA
SH0002	2609474U01	SHIELD VCO CDMA
SH0003	2609476U01	SHIELD TXME CDMA
SH0004	2609477U01	SHIELD PA CDMA
SH0005	2609478U01	SHIELD RXFE CDMA
SH0006	2609479U01	SHIELD RXIF CDMA
U00075	5109572E06	IC GAAS RF SW SPDT AS139-73
U00100	5109572E26	IC GAAS RF SW SPDT AS139
U00101	5109781E91	IC LV BIAS STAB/ ENN MDC5001T
U00102	5109768D06	IC TEMP SNSR LM60BIM3X SOT23
U00150	5109781E91	IC LV BIAS STAB/ ENN MDC5001T
U00151	5109572E26	IC GAAS RF SW SPDT AS139
U00200	5109940K22	IC MMIC GAAS MXR W/IF CNY91
U00250	5109572E26	IC GAAS RF SW SPDT AS139
U00325	4809718L06	OSC MOD TXCO 16.8MHZ SMD

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
U00400	5109923D29	IC CUST MXR/ XCVR ME2 20TSSOP
U00401	5109768D06	IC TEMP SNSR LM60BIM3X SOT23
U00450	5109730C10	IC INT PA GAAS 2.0W CDMA IPM
U00475	5803912K02	ISLTR CER TX 836MHZ 7MM SMD
U00625	5109731C04	IC RF CASCODE AMP SOT143
U00626	4809283D18	OSC MOD VCO 991MHZ SMD CDMA
U00700	5109879E10	IC BICMOS ZIF/ SYNTH 5105457W
U02300	5109923D33	IC CUST PAC MAX513EEE 16QSOP
VR0450	4813830A73	DIODE 2.7V 5% 225MW
VR1000	4809788E08	DIODE ZENER 8.2V UDZTE178.2B
Ref Des	Part Number	Part Description
	0109035A09	ST7760 ASSY AL SIDE 2
A00001	3909101E01	CNTCT ANT UPPER RAE
A00002	4209480E01	CLIP ANTENNA
A00003	4209480E01	CLIP ANTENNA
A00004	3909102E01	CNTCT ANT LOWER RAE
	4009060E01	SW TACTILE SMD
	4009060E01	SW TACTILE SMD
	4009060E01	SW TACTILE SMD
C01001	2113743M24	CAP CHIP 100000 PF +80-20% Y

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C01002	2113743N40	CAP CHIP 39.0 PF 5% COG
C01004	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C01005	2113740L32	CAP 39.0 PF 50V 2.0 %
C01006	2113743N40	CAP CHIP 39.0 PF 5% COG
C01007	2113743N40	CAP CHIP 39.0 PF 5% COG
C01008	2113743N40	CAP CHIP 39.0 PF 5% COG
C01010	2113743E20	CAP CHIP .10 UF 10%
C01011	2113928A01	CAP CER CHIP 1.0 UF 10V
C01012	2113743E20	CAP CHIP .10 UF 10%
C01013	2113928A01	CAP CER CHIP 1.0 UF 10V
C01016	2113743N40	CAP CHIP 39.0 PF 5% COG
C01051	2113740L32	CAP 39.0 PF 50V 2.0 %
C01052	2113743N40	CAP CHIP 39.0 PF 5% COG
C01053	2113743N40	CAP CHIP 39.0 PF 5% COG
C01054	2113743E20	CAP CHIP .10 UF 10%
C01055	2113740L32	CAP 39.0 PF 50V 2.0 %
C01056	2113740L32	CAP 39.0 PF 50V 2.0 %
C01057	2113740L32	CAP 39.0 PF 50V 2.0 %
C01100	2113743L41	CAP CHIP 10000 PF 10% X7R

Ref Des	Part Number	Part Description
C01101	2113743K15	CER CHIP CAP .100UF
C01102	2113743G26	CAP CHIP 4.7 UF 16V +80-20%
C01103	2113743L41	CAP CHIP 10000 PF 10% X7R
C01104	2113743L41	CAP CHIP 10000 PF 10% X7R
C01105	2113741F37	CAP CHIP CL2 X7R REEL 3300
C01106	2113743E20	CAP CHIP .10 UF 10%
C01107	2113743L41	CAP CHIP 10000 PF 10% X7R
C01108	2113743E20	CAP CHIP .10 UF 10%
C01200	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01201	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01301	2309121D09	CAP CHIP TANT 15 UF 10% 8.3V
C01400	2113743L41	CAP CHIP 10000 PF 10% X7R
C01601	2113743L41	CAP CHIP 10000 PF 10% X7R
C01605	2113743L41	CAP CHIP 10000 PF 10% X7R
C01611	2113743L41	CAP CHIP 10000 PF 10% X7R
C01613	2113743L41	CAP CHIP 10000 PF 10% X7R
C01614	2113743L41	CAP CHIP 10000 PF 10% X7R
C01615	2113743L41	CAP CHIP 10000 PF 10% X7R
C01616	2113743A27	CAP CHIP .470 UF 10% 16V

Ref Des	Part Number	Part Description
C01617	2113743L41	CAP CHIP 10000 PF 10% X7R
C01700	2113743L41	CAP CHIP 10000 PF 10% X7R
C01701	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01703	2113740L32	CAP 39.0 PF 50V 2.0 %
C01704	2113740L32	CAP 39.0 PF 50V 2.0 %
C01705	2113740L32	CAP 39.0 PF 50V 2.0 %
C01706	2113743E20	CAP CHIP .10 UF 10%
C01707	2113743L05	CAP CHIP 330 PF 10% X7R
C01709	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01710	2113740L32	CAP 39.0 PF 50V 2.0 %
C01720	2113743N40	CAP CHIP 39.0 PF 5% COG
C01721	2113743N40	CAP CHIP 39.0 PF 5% COG
C01722	2113743N40	CAP CHIP 39.0 PF 5% COG
C01723	2113743N40	CAP CHIP 39.0 PF 5% COG
C01724	2113743N40	CAP CHIP 39.0 PF 5% COG
C01725	2113743N40	CAP CHIP 39.0 PF 5% COG
C01730	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C01750	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01751	2113743N40	CAP CHIP 39.0 PF 5% COG

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C01770	2113743N26	CAP CHIP 10.0 PF 5% COG
C01771	2113743N36	CAP CHIP 27.0 PF 5% COG
C01901	2113743M08	CAP CHIP 22000 PF +80-20% Y5
C01902	2113743G26	CAP CHIP 4.7 UF 16V +80-20%
C01903	2113743E20	CAP CHIP .10 UF 10%
C01907	2113743L33	CAP CHIP 4700 PF 10% X7R
C01908	2113740F59	CAP CHIP REEL CL1 +/-30 220
C01909	2113741F07	CAP CHIP CL2 X7R REEL 180
C01910	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01912	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01913	2109622N06	CAP CER CHIP NPO CLASS I
C01914	2113743E20	CAP CHIP .10 UF 10%
C01915	2113741F33	CAP CHIP CL2 X7R REEL 2200
C01916	2113743E20	CAP CHIP .10 UF 10%
C01917	2113743N40	CAP CHIP 39.0 PF 5% COG
C01919	2113743E20	CAP CHIP .10 UF 10%
C01920	2113743E10	CAP CHIP .033 UF 10% X7R
C01921	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01922	2113743M24	CAP CHIP 100000 PF +80-20% Y

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
C01923	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01924	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01925	2113743L41	CAP CHIP 10000 PF 10% X7R
C01930	2113743E20	CAP CHIP .10 UF 10%
C01933	2113743M24	CAP CHIP 100000 PF +80-20% Y
C01934	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02000	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02001	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02002	2113928C03	CAP CER CHIP 1.0 UF 6.3V 10%
C02003	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02004	2113743E20	CAP CHIP .10 UF 10%
C02005	2113743E20	CAP CHIP .10 UF 10%
C02006	2113743E03	CER CHIP CAP .015UF
C02007	2113743E20	CAP CHIP .10 UF 10%
C02008	2113743E03	CER CHIP CAP .015UF
C02011	2113743A27	CAP CHIP .470 UF 10% 16V
C02014	2113743L17	CAP CHIP 1000 PF 10% X7R
C02019	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02021	2113743L41	CAP CHIP 10000 PF 10% X7R

Ref Des	Part Number	Part Description
C02022	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02023	2113743E07	CER CHIP CAP .022UF
C02024	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C02050	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02051	2113743M24	CAP CHIP 100000 PF +80-20% Y
C02099	2113743E20	CAP CHIP .10 UF 10%
C02100	2311049C21	CAP TANT CHIP 3.3UF 10V 10%
C02101	2311049C21	CAP TANT CHIP 3.3UF 10V 10%
C02400	2185736G01	CAP CER Y5V 22UF 10V 3225 SM
C10139	2113743L41	CAP CHIP 10000 PF 10% X7R
CR1000	4809653F02	RECT SCHOTTKY 1.0A UPS5817
CR1001	4809606E08	DIODE DUAL SCHOTTKEY RB715F
CR1002	4809606E02	DIODE DUAL ARRAY DAN222
CR1010	4813830A70	DIODE DL 5.6V COM ANODE
CR1011	4813830A70	DIODE DL 5.6V COM ANODE
CR1012	4813830A70	DIODE DL 5.6V COM ANODE
CR1013	4813830A70	DIODE DL 5.6V COM ANODE
CR2002	4809653F02	RECT SCHOTTKY 1.0A UPS5817
CR2003	4809606E01	DIODE ULTRA HIGH SPEED UMT P

Ref Des	Part Number	Part Description
CR2050	4809606E01	DIODE ULTRA HIGH SPEED UMT P
CR2100	4809924D06	DIODE SCHTTKY DUAL BAT54S
J00001	0909449B04	RECEPT MOD 15PIN INSMLD
J00101	2809454C02	PLUG LO PROFILE SMD 32 POS
J02000	0909705K02	JACK MOD 2.5 MM SMD
L02000	2485719G01	IND CHIP W 15UH 10% 3225 SMD
LS0001	5009365S01	ALERT 3V SMD RAE
Q01000	4809939C04	TSTR DUAL PNP/ NPN UMC3
Q01001	4809579E27	TSTR FET P-CHAN SI3441 6TSOP
Q01002	4809579E27	TSTR FET P-CHAN SI3441 6TSOP
Q01003	4809939C04	TSTR DUAL PNP/ NPN UMC3
Q01004	4809523E02	TSTR FET/ SCHTKY DIODE 8SOIC
Q01005	4809940E02	TSTR DIG NPN DTC114YE
Q01006	4809608E03	TSTR DIG PNP DTA114YE
Q01007	4809579E29	TSTR FET P-CHAN SI3443DV 6TS
Q01009	4809579E27	TSTR FET P-CHAN SI3441 6TSOP
Q01010	4809579E27	TSTR FET P-CHAN SI3441 6TSOP
Q01011	4809605E02	TSTR SIG NPN 2SC4617
Q01150	4809605E02	TSTR SIG NPN 2SC4617

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
Q01151	4809605E02	TSTR SIG NPN 2SC4617
Q01300	4809579E12	TSTR MOSFET P- CHAN ML6302
Q01301	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q01703	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q01704	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q01705	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q01730	4809579E02	TSTR MOSFET N- CHAN 25K1830
Q01731	4809579E24	TSTR FET P-CHAN 2SJ347 SC90
Q01750	4809607E04	TSTR SIG PNP 2SB1132 SOT89
Q01751	4809940E03	TSTR DIG NPN DTC114TE
Q01900	4809608E03	TSTR DIG PNP DTA114YE
Q02050	4809939C02	TSTR DUAL NPN/ NPN UMH9
Q02400	4809608E03	TSTR DIG PNP DTA114YE
R01001	0662057N23	RES. CHIP 100K 5% 20X40
R01002	0662057N15	RES. CHIP 47K 5% 20X40
R01004	0680195M64	RES 0.24 OHM 1/ 2W
R01006	0662057N23	RES. CHIP 100K 5% 20X40
R01008	0662057M82	RES. CHIP 2200 5% 20X40
R01010	0609591M37	RES CHIP DUAL 10K 5% 0.63W

Ref Des	Part Number	Part Description
R01011	0609591M37	RES CHIP DUAL 10K 5% 0.63W
R01012	0662057M50	RES. CHIP 100 5% 20X40
R01018	0662057M90	RES. CHIP 4700 5% 20X40
R01070	0662057M50	RES. CHIP 100 5% 20X40
R01071	0662057M50	RES. CHIP 100 5% 20X40
R01102	0662057M01	RES. CHIP 0 5% 20X40
R01103	0662057M90	RES. CHIP 4700 5% 20X40
R01104	0662057N15	RES. CHIP 47K 5% 20X40
R01106	0662057N15	RES. CHIP 47K 5% 20X40
R01110	0662057M98	RES. CHIP 10K 5% 20X40
R01111	0662057M98	RES. CHIP 10K 5% 20X40
R01113	0662057N05	RES. CHIP 18K 5% 20X40
R01114	0662057N15	RES. CHIP 47K 5% 20X40
R01120	0662057M36	RES. CHIP 27 5% 20X40
R01125	0662057M90	RES. CHIP 4700 5% 20X40
R01130	0662057N15	RES. CHIP 47K 5% 20X40
R01133	0662057N15	RES. CHIP 47K 5% 20X40
R01150	0662057M50	RES. CHIP 100 5% 20X40
R01151	0662057M64	RES. CHIP 390 5% 20X40

Ref Des	Part Number	Part Description
R01152	0609591M25	RES CHIP DUAL 1K 5% 0.63W
R01203	0662057M01	RES. CHIP 0 5% 20X40
R01207	0662057M01	RES. CHIP 0 5% 20X40
R01300	0662057M01	RES. CHIP 0 5% 20X40
R01301	0662057N13	RES. CHIP 39K 5% 20X40
R01400	0662057M01	RES. CHIP 0 5% 20X40
R01600	0662057M98	RES. CHIP 10K 5% 20X40
R01603	0662057M01	RES. CHIP 0 5% 20X40
R01611	0662057V02	RES CHIP 10K 1% 1/16W
R01616	0662057M98	RES. CHIP 10K 5% 20X40
R01700	0662057M98	RES. CHIP 10K 5% 20X40
R01701	0662057M01	RES. CHIP 0 5% 20X40
R01702	0662057M98	RES. CHIP 10K 5% 20X40
R01703	0662057M98	RES. CHIP 10K 5% 20X40
R01704	0662057M98	RES. CHIP 10K 5% 20X40
R01705	0662057M98	RES. CHIP 10K 5% 20X40
R01706	0662057N10	RES. CHIP 30K 5% 20X40
R01707	0662057M98	RES. CHIP 10K 5% 20X40
R01711	0662057N15	RES. CHIP 47K 5% 20X40

Ref Des	Part Number	Part Description
R01712	0662057M54	RES. CHIP 150 5% 20X40
R01716	0662057M98	RES. CHIP 10K 5% 20X40
R01718	0662057M86	RES. CHIP 3300 5% 20X40
R01720	0662057N15	RES. CHIP 47K 5% 20X40
R01721	0662057N15	RES. CHIP 47K 5% 20X40
R01722	0662057N15	RES. CHIP 47K 5% 20X40
R01723	0662057N15	RES. CHIP 47K 5% 20X40
R01730	0662057M98	RES. CHIP 10K 5% 20X40
R01731	0662057N34	RES. CHIP 300K 5% 20X40
R01750	0662057N23	RES. CHIP 100K 5% 20X40
R01751	0662057N01	RES CHIP 12K 5% 20X40
R01752	0662057N11	RES. CHIP 33K 5% 20X40
R01771	0662057N39	RES CHIP 470K 5% 20X40
R01772	0662057B46	CHIP RES 10.0 MEG OHMS 5%
R01773	0662057B46	CHIP RES 10.0 MEG OHMS 5%
R01792	0662057M01	RES. CHIP 0 5% 20X40
R01794	0662057M01	RES. CHIP 0 5% 20X40
R01900	0662057M88	RES. CHIP 3900 5% 20X40
R01901	0662057M74	RES. CHIP 1000 5% 20X40

 Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
R01902	0662057M90	RES. CHIP 4700 5% 20X40
R01903	0662057M90	RES. CHIP 4700 5% 20X40
R01904	0662057N03	RES. CHIP 15K 5% 20X40
R01906	0662057N01	RES CHIP 12K 5% 20X40
R01907	0662057N27	RES. CHIP 150K 5% 20X40
R01909	0662057M94	RES. CHIP 6800 5% 20X40
R01910	0662057N27	RES. CHIP 150K 5% 20X40
R01911	0662057N15	RES. CHIP 47K 5% 20X40
R01912	0662057N20	RES. CHIP 75K 5% 20X40
R01913	0662057N03	RES. CHIP 15K 5% 20X40
R01914	0662057M01	RES. CHIP 0 5% 20X40
R01915	0662057M01	RES. CHIP 0 5% 20X40
R01916	0662057M98	RES. CHIP 10K 5% 20X40
R01917	0662057M98	RES. CHIP 10K 5% 20X40
R01918	0662057N01	RES CHIP 12K 5% 20X40
R01919	0662057M01	RES. CHIP 0 5% 20X40
R01930	0662057V07	RES CHIP 15K 1% 1/16W
R01931	0662057V07	RES CHIP 15K 1% 1/16W
R01932	0662057M90	RES. CHIP 4700 5% 20X40

Table 9: Electrical Parts List

Ref Des	Part Number	Part Description
R01933	0662057M90	RES. CHIP 4700 5% 20X40
R02001	0662057M01	RES. CHIP 0 5% 20X40
R02002	0662057M26	RES. CHIP 10 5% 20X40
R02003	0662057N11	RES. CHIP 33K 5% 20X40
R02004	0662057N19	RES. CHIP 68K 5% 20X40
R02005	0662057N37	RES. CHIP 390K 5% 20X40
R02006	0662057N11	RES. CHIP 33K 5% 20X40
R02007	0662057M74	RES. CHIP 1000 5% 20X40
R02009	0662057N37	RES. CHIP 390K 5% 20X40
R02011	0662057M01	RES. CHIP 0 5% 20X40
R02013	0662057N07	RES. CHIP 22K 5% 20X40
R02014	0662057N11	RES. CHIP 33K 5% 20X40
R02015	0662057N05	RES. CHIP 18K 5% 20X40
R02021	0662057M01	RES. CHIP 0 5% 20X40
R02400	0662057M43	RES. CHIP 51 5% 20X40
R02401	0662057N27	RES. CHIP 150K 5% 20X40
R11596	0662057M90	RES. CHIP 4700 5% 20X40
SH1000	2609475U01	SHIELD REFUSE CDMA
SH1001	2685608G01	SHIELD G CAP/ CIA
SH1002	2685609G01	SHIELD CRIB/DSP

Ref Des	Part Number	Part Description
U01000	5109923D32	IC CUST AUX BATT STTA22AV14
U01100	5109841C47	IC MCU 68338 PBGA
U01101	5199249A01	IC ROM LAZER D SSN DS2401P
U01201	5109522E17	IC SNGL NAND TC7S00FU
U01202	5109522E22	IC SNGL AND GATE TC7S08FU
U01300	5109509A16	IC SRAM 64KX16 KM616FS1010 B
U01400	5199353A01	IC EEPROM 16KX8 25128T2 20TS
U01600	5199338A01	IC DSP DSP56603 144BGA
U01700	5109962C09	IC ASIC CRIB 144BGA
U01701	5109781E93	IC VOLT REG 2.8V TK11228BVCB
U01760	5109781E79	IC SW ANAL SPDT MAX4544EUT-T
U01761	5109781E79	IC SW ANAL SPDT MAX4544EUT-T
U01762	5109781E79	IC SW ANAL SPDT MAX4544EUT-T
U01900	5109923D31	IC CUST CIA 29100GR2 102BGA
U02000	5109923D38	IC CUST BICMOS GCAP LT 48QFP
Y01770	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T



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CDMA ST7760 : BOTTOM SIDE BOARD OVERLAY



CDMA ST7760 : RF SCHEMATICS



CDMA ST7760 : AL SCHEMATICS SIDE 1 OF 4



CDMA ST7760 : AL SCHEMATICS SIDE 2 OF 4



CDMA ST7760 : AL SCHEMATICS SIDE 3 OF 4



CDMA ST7760 : AL SCHEMATICS SIDE 4 OF 4

