APPENDIX 6

TRANSCEIVER ALIGNMENT

Transmitter Tune-up Procedure

1. Power on the radio.

2. Put the radio in standby state. Lock the local oscillator to cellular channels.

3. Put the radio in transmit setup state. The transmit modulator is a voltage-controlled oscillator and its frequency is tuned to oscillate at 90 MHz by a phase-lock loop synthesizer. It takes less than 40 milliseconds for the frequency to settle down. The transmit frequency can be adjusted by varying the value in DAC #2. During transmit setup state, the power detector, the exciter, and the negative DC/DC converter are powered on. The mixer up-converter is keyed off so that no RF signal will be generated. The FET switch is turned off and the power supply is shut down to the power amplifier in order to guarantee less that -60 dBm spurious power output.

4. Put the radio in full duplex state. The power amplifier is keyed on by turning on the FET switch. The mixer up-converter is also keyed on to let RF signal go to the exciter and be amplified by the power amplifier.

APPENDIX 8

CIRCUITS TO SUPPRESS SPURIOUS EMISSIONS, LIMIT MODULATION AND ESTABLISH OUTPUT POWER LEVEL

A. TRANSMITTER SPURIOUS SUPPRESSION

A ceramic duplexer (IC101) employed between the power amplifier and the antenna.

B. CIRCUITS OR DEVICES EMPLOYED FOR LIMITING MODULATION:

Audio processors, IC403 and IC501, perform the following functions:

Microphone pre-amplifier
2:1 compressor
Pre-emphasis (+6 dB/octave)
Limiter (used to define the maximum transmit modulation deviation in FM mode)
3 KHz low pass filter
DTMF generator, used to generate transmitted DTMF when in FM mode.
TX data and TX SAT filters

C. DIGITAL MODULATION (AMPS)

Transmitted data is a 10 kHz Manchester encoded data stream. It passes a 4th order Butterworth low-pass filter with a 20 kHz 3 dB cut-off frequency to filter out sharp transitions and is fed to the FSK modulator.

D. DIGITAL MODULATION (CDMA)

A complete description of the baseband ASIC (2 pages) follows this Appendix.

Baseband Circuit

Baseband ASIC

The baseband ASIC is the interface component between the RF and digital sections, it performs the following major functions:

-Final down conversion of RX IF signal into I and Q (phase quadrature) paths.
-Channel filtering performed by 630 KHz low pass filters in above RX I and Q paths for received signal in CDMA mode.
-Analogue to digital conversion of these I and Q paths for CDMA mode (4 bit wide digital I and Q outputs) with automatic DC offset compensation provided by MSM device (I Offset and Q Offset).
-Digital to analogue conversion of TX IF signal for CDMA and FM modes (digital I/Q inputs, 130 MHz output to transmitter RF circuit).

In addition to the major functions (above), the baseband ASIC also performs other functions as follows:

-Analogue to digital input, this is multiplexed by IC53 to provide measurements of FM mode RSSI, phone temperature, battery temperature, RF PA detect voltage, and battery voltage.
-Synthesizer lock detect input (shuts down transmitter on detection of out of luck synthesizer).
-Divider for 19.68 MHz TCXO reference, providing reference signals TCXO/4 and CHIPX8.

In operation, the final down-conversion from 85.38 MHz RX IF to zero frequency I and Q channels is performed in the baseband ASIC using two mixers with 85.38 MHz local oscillators in phase quadrature. These local oscillator signals are derived from a single reference at 170.76 MHz, using the principle of division by 2 and exclusive or combination. The 170.76 MHz signal is produced by a phase locked loop, with the VCO active device being contained in the baseband ASIC, with external tank circuit and external fixed frequency synthesizer device IC43. This PLL uses the voltage controlled TCXO as frequency reference.

Transmitter IF signal generation at 130.38 MHz is performed by combining digitally generated I and Q signals. The two phase quadrature local oscillators are derived from a 260.76 MHz phase locked loop in a similar manner to the receive section, however in this case all of the PLL circuitry except for the tank circuit is contained in the baseband ASIC. During operation in FM mode, modulation is applied directly to the varicap tuned circuit of the 260.76 MHz VCO.

1) RX PARTS

CON101	ANTENNA CONTACT SPRING
DUP101	DUPLEXER FILTER
TR104, 105, 106	RF TRANSISTOR for LNA
D103	1'ST LNA SWITCHING DIODE
FL103	RX SAW FILTER
IC104	RF-LO DOWN CONVERTER
FL203	85.38MHz IF WIDE SAW FILTER for CDMA
FL102	85.38MHz IF NARROW SAW FILTER for FM

2) TX PARTS

IC101	ISOLATOR
PAM101	POWER AMPLIFIER
TR203	RF TRANSISTOR for TX BUFFER
FL201	TX SAW FILTER
IC205	IF-LO UP CONVERTOR
FL202	130.38MHz IF SAW FILTER

3) PLL/VCO

D301, 302, 303, 304	IF VCO OSCILLATION DIODE
VCO 201	OSCILLATOR for LO SIGNAL
VCT201	19.68MHz REF. OSCILLATOR
IC306	PLL FREQUENCY SYNTHESIZER

4) REGULATOR and TRANSISTOR

TR101	SWITCH TR for POWER AMP
IC202, 203, 207	3.6V DC Regulator
IC402	4.2V DC Regulator for Audio AMP
IC305, 405, 54	3.3V DC Regulator for Digital Circuit and DSP1627E
IC502	3.3V DC Regulator for MSM

5) DC/DC CONVERTER

IC701	DC/DC CONVERTER
D703	DIODE

6) IC

IC501	Mobile Station Modem IC
IC301	Base Band ASIC IC
IC605	8M FLASH MEMORY
IC601	2M SRAM
IC603	128K EEPROM
IC51	DSP CHIP for EVRC
IC406	CODEC IC
IC401	AUDIO AMP
IC604, 55	GATE (NOT)
IC303, 409, 53, 56	2 CHANNEL MULTIFLEXER

7) RESONATOR

X501, XTAL51	Resonator for MSM and DSP1627E

Mobile Station Modem (MSM) Section

The functions of this section are as follows:

-The CDMA core, which has data bus interfaces to the A to D and D to A converters in the baseband ASIC for RX and TX I and Q data, and performs CDMA coding, decoding, Pilot acquisition, data interleaving and de-interleaving, RX AGC control, TX AGC control and frequency control.
-Microprocessor core, with external interfaces for memory devices (FLASH and SRAM).
-Vocoder core, performing voice processing for both transmit and receive, with 8 Kbits/s data rate,
-RF interface.
-General purpose interface (keyboard and buzzer)
-Serial data port for external serial EEPROM memory.
-Interface to separate audio and data processors for FM mode IC19 and IC18 respectively).

The MSM has it's own 27 MHz clock, using crystal X2, this is divided by 2 in the MSM as it's main clock source.

APPENDIX 3

SEMICONDUCTOR FUNCTIONS

LIST OF SEMICONDUCTOR FUNCTIONS
FOLLOWS THIS SHEET

APPENDIX 7

CIRCUITS FOR ESTABLISHING AND STABILIZING CARRIER FREQUENCY

Frequency stabilization is achieved with a temperature compensated crystal oscillator (TCXO) as a reference oscillator. The reference oscillator maintains the output frequency of 19.68 MHz within ±1.5 ppm, and PLL.

The crystal oscillator consists of a crystal element, transistor oscillation circuitry, and a temperature compensation network. The network provides the equivalent capacitance deviation for temperature change.