Exhibit 7. Measurement Procedures ----47 CFR 2.1041

This exhibit presents a brief summary of how the measurements were made. All radios under test were powered by Motorola 3.6V rechargeable Lithium Ion Batteries listed as item 7 in exhibit 7.7.

7.1. **RF Power Output** -- Pursuant to 47 CFR 2.1046

Method of Measurement: *Adaptation of TIA/EIA-603 clause 2.2.1 for Pulsed Measurements*

During normal use, the RF output power of the transmitter is automatically adjusted in discrete steps over the range from rated power to approximately 34 dB cutback in response to changes in received signal strength. For testing purposes only, the service manual describes the procedure to use radio embedded test software to measure the highest level of transmitter power. This measurement is made with an antenna connector through a 30 dB attenuating load using RF power meter.

Due to the TDM pulsing, an average reading power meter will not correctly display the pulse average power as it must be corrected for the duty cycle of the pulse train. The Motorola R2660C Service Monitor used for radio servicing provides this compensation. Another instrument which may be used is the Hewlett Packard model 438A which was used to take the data reported herein. When the H.P. 438A Power Meter is used, a compensation factor is entered to the meter as an offset, depending on which mode of operation the radio is transmitting: for 1:6 multiplexing, an offset of 7.78dB is used (this is the default mode for test purposes); for 1:3 multiplexing, an offset of 4.77dB is used; and for the Packet Data Mode, an offset of 1.71dB is used.

7.2. **Occupied Bandwidth** -- Pursuant to 47 CFR 2.1049

Method of Measurement: *Adaptation of TIA/EIA-603-1 clause 2.2.11*

1) Set the radio for measurement of RF output power using the power test procedure in the Service Manual which sets the radio to transmit mode per part 2.1049 (h), and attach it to a spectrum analyzer through an attenuator. The analyzer is to be set for peak detection, a span of 100 kHz, and a sweep period of at least 20 seconds. The video bandwidth is set to at least 3 times the resolution bandwidth.
2) Use a 30 kHz resolution bandwidth to assure that essentially all of the transmitted energy is measured, obtain a “rainbow” curve and adjust the analyzer setting so that the crest of the curve lies at the 0 dB reference location.
3) Reduce the resolution bandwidth to 300 Hz and the video bandwidth to 3 kHz to characterize the transmitter emission on-channel and adjacent channels spectral performance characteristic. This is portrayed as trace 2 on the analyzer display of Figures 6-5 through 6-16.

4) Overlay the applicable emission mask (G mask or EA mask) on the analyzer display as trace 3.
5) Compare traces 2 and 3 to ensure that trace 2 never exceeds trace 3.
6) Repeat step 1 through 5 for maximum and minimum output power settings.

7.3. **Radiated Spurious Emissions** -- Pursuant to 47 CFR 2.1053

Test Site:

Motorola EMC Lab
8000 W Sunrise Blvd
Plantation, FL 33322

Method of Measurement: EIA/TIA-603-1 clauses 2.2.12 and 5.2.12

The equipment is placed on the turntable, connected to a dummy RF load and placed in normal operation using the intended power source. A broadband-receiving antenna (2–10 GHz), and dipole antennas (for the lower frequencies), located 3 meters from the transmitter picks up any signal radiated from the transmitter and its accessories. The antennas are adjustable in height and can be rotated for horizontal or vertical polarization. A broad band RF amplifier (1–10 GHz) was used to amplify the frequency band above the fundamental frequency. A spectrum analyzer covering the necessary frequency range is used to detect and measure any radiation picked up by the antenna.

The transmitter is modulated with a pseudo random digital signal and is adjusted to obtain peak reading of received signals wherever they occur in the spectrum by:

1. Rotating the transmitter under test.
2. Adjusting the antenna height.

The testing procedure is repeated for both horizontal and vertical polarization of the receiving antenna. Relative signal strength is indicated on the spectrum analyzer connected to this antenna. The spectrum analyzer resolution bandwidth was set to 10kHz for emissions below 1GHz, and 1MHz for higher frequency emissions. To obtain actual radiated signal strength for each spurious and harmonic frequency observed a standard signal generator with calibrated output is connected to an antenna, adjusted to that particular frequency. The signal generator output level is adjusted until a reading identical to that obtained with the actual transmitter is observed on the spectrum analyzer. Signal strength is then derived from the generator and appropriate cable losses due to set up. Actual measurements for maximum and minimum output power settings are recorded in Exhibit 6.1

7.4. **Conducted Spurious Emissions** -- Pursuant to FCC Rule 2.1051

Method of Measurement: ANSI/TIA/EIA-603-1992 clauses 2.2.13

To obtain conducted spurious emissions data the equipment is connected to a low pass filter, which suppress the fundamental frequency. The radio is interfaced with a spectrum analyzer with sufficient dynamic range to permit the spurious emission level relative to the carrier level to be measured directly. Measurements at maximum and minimum output power settings are made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, or as high as the state of the art permits, except for that region within 50 kHz of the carrier. The spectrum analyzer is set to use a resolution bandwidth of 10 kHz for spurious emissions below 1 GHz, and 1 MHz for higher frequency spurious emissions. The video bandwidth is set to three times the resolution bandwidth for both cases.

7.5. **Frequency Stability** -- Pursuant to 47 CFR 2.1055 and 90.213

Frequency stability is independent of modulation scheme (QPSK, Quad-16QAM, and Quad-64QAM). Measuring the frequency accuracy of the iDEN time division multiplexed (TDM) transmitter needs special procedures for 3 reasons. First is the short (15 ms) nature of its TDM pulses, which preclude the use of an ordinary CW type digital frequency counter. Second, software in the radio prevents the radio from transmitting its TDM pulses unless it is receiving a signal on the trunking system control channel. Third, to maintain the very high stability (greater than that required by part 90 rules) needed for system operation, the radio transmitter frequency is controlled by an automatic frequency control loop in the radio's receiver which locks onto the system forward control channel produced by a FCC Authorized base station. This process results in electronically adjusting the initial frequency of the reference oscillator in the synthesizer section of the radio, which is used for both transmission and reception.

As a result, unlike traditional transceivers which do not frequency lock to a remote base station reference frequency, the transmitter frequency accuracy is essentially independent of the voltage and temperature induced variations of the subject transceiver’s frequency reference oscillator. Rather, the transceiver frequency stability is that of the remote base station, but degraded by any inaccuracy in the transceiver frequency locking process. This inaccuracy is primarily attributed to reference oscillator AFC resolution.

By locking onto a base station meeting the requirements of 47 CFR 90.213, which is necessary for the transceiver to function, the transceiver transmitter acquires the inherent 1.5 PPM or better stability of the base station. To assure attainment of the 1.9 PPM accuracy requirement of part 90.213 for this transceiver, the frequency error is measured when locked to ensure that it does not exceed 0.4 PPM.

Method of Measurement: (Proprietary)

Since the transmitter frequency is locked to the frequency of the base station via the receiver in this transceiver, frequency accuracy data was measured with the transceiver locked onto a base station transmitter emulated by a Motorola R2660C Service Monitor as shown in Figure 7-1. This was done using QUAD-16QAM time division duplex (TDD) characteristic of the transceiver wherein it was placed into a TDD mode of transmission as normally used to make a call to a landline phone.

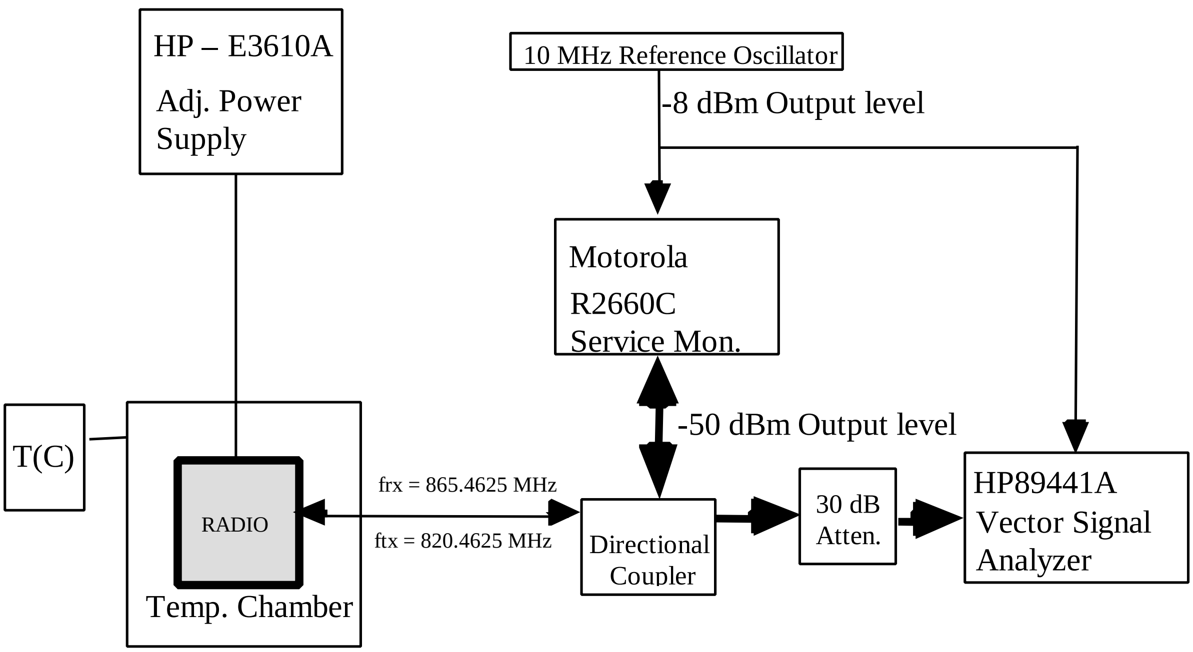

Figure 7-1: Transmit Frequency Accuracy Measurement Setup

During the test the transceiver was receiving a very high accuracy forward control channel frequency signal from the Service Monitor, and TDD transmitting a signal on the reverse control channel at a frequency 45.0 MHz lower corresponding to the normally assigned frequency separation. A Hewlett-Packard model 89441A signal analyzer was used to measure the centroid frequency of the emission. This instrument also was locked to the same high stability frequency reference as the Service Monitor.

The frequency of the transceiver was measured as operating voltage or temperature was varied, and compared to the frequency of the R2660C service monitor signal. This produced an error from the expected frequency separation of 45.0 MHz that was then recorded, and calculated in PPM relative to the expected transmission frequency.

7.6 **Power Line RF Voltage** -- Pursuant 47 CFR 15.107

Test Site:

EMI Research Facility
Florida Atlantic University
77 Glades Rd
Boca Raton, FL 33431

Method of Measurement: EIA/TIA-603-1 clauses 2.1.3 and 5.1.3.3

Connect the transceiver to the charger connected to the power line through a line stabilization network (LISN). Connect a spectrum analyzer of nominal 50 impedance to one terminal of the line stabilization network. The spectrum analyzer is then tuned to search for spurious outputs from 450 kHz to 30 MHz pursuant 47 CFR 15.107. Record all spurious outputs found. The spectrum analyzer is then connected to the other terminal of the line stabilization network and records all spurious outputs found. The power line conducted spurious RF Voltage is the largest reading obtained.

7.7. **Measurement Equipment List** ----- 47 CFR. 2.948

Test equipment used at Motorola EMI Lab:

1) Spectrum Analyzer: H.P 8563E, 9 kHz-26.5 GHz Spectrum Analyzer.
2) Communications System Analyzer: Motorola R2660C
3) RF Signal Generator: HP 8657B, 0.1 - 2060 MHz RF Signal Generator.
4) Power Meter
   - (One) Giga-tronics 8541.
   - (Two) H.P 438A.
5) Multimeter: H.P 34401A Multimeter.
6) Power Supply: Motorola 500 mAh 3.6V Lithium Ion Battery, Kit #: NTN8615A
7) Directional Coupler: H.P 778D, Dual Directional Coupler.
8) R.F Amplifier: JCA 110-213, 1 - 10 GHz, 20 dB Gain Amplifier.
9) Temperature Chamber: Tenney, model TJR.
10) Vector Signal Analyzer HP89441A
11) Computer: Toshiba 315 CDT model PA1262U-XCD, operating system: Windows 98

Test equipment used at FAU Research Facility:

1) Line Stabilization Network (LISN): Solar model 8028-50
2) Spectrum Analyzer: HP 8566B
3) Computer HP9121
4) Motorola Charger NTN8653