MOTOROLA

27th November 2001

Mr. Martin Perrine
Authorization & Evaluation Division
Federal Communications Commission Laboratory
7435 Oakland Mills Road
Columbia, MD 21046

Re: Form 731 Confirmation Number: EA102247 with FCC ID: AZ492FT4846.

Dear Mr. Perrine;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322, herein submits its response to the 29th October 2001 request for information in Correspondence Number 21079.

Q1) Start and stop frequencies for conducted emissions test in exhibit 6D. Test report exhibit 7h makes a general statement about frequency range however data plots in test report exhibit 6D show frequency ranges that differ from expected. Please clarify.

R1) The conducted emissions of the station were measured to the 10th carrier harmonic (approximately 4.9 GHz), as indicated in Exhibit 7H. The software used to generate the conducted emissions graphs in Exhibit 6D was configured to set the frequency range of the graphs only as large as necessary to show all detected spurs. The fact that the graphs stop short of the 10th carrier harmonic indicates only that no spurs were detected outside of the ranges shown on the graphs.

Q2) Photograph of radiated spurious emissions test setup. Per CFR 47 section 2.974(e).

R2) Please see the attached addendum to Exhibit 7 for photographs of the radiated spurious emissions test setup.

Q3) A statement summarizing all major operating modes of this unit (i.e. repeater, telephone line in transmit out, other). Please include a discussion of what "duplex" modes are supported e.g. half, full (telephone) to half (radio), full (repeater mode), half (repeater mode) etc.

R3) The PDR 3500 can operate in repeater (full-duplex radio) mode, or in non-repeater (half-duplex radio) mode. The unit cannot interface directly with a PSTN. The unit can be ordered with options which provides a baseband wireline audio/data interface for connection to external aftermarket equipment, such as a console or modem. This baseband interface can be full- or half-duplex, depending on the system configuration, to route received audio/data to the peripheral device and to transmit audio/data from the peripheral device. All transmit data and audio, regardless of whether it arrives via the wireline interface or the receiver, is routed as a baseband signal through the same path in the Station Control Module for filtering before transmission.

Q4) A statement and diagrams describing the equipment setup for the various tests and for the corresponding data plot. Please include a discussion of where audio signals were input, major operating modes used (see question 3), and relevant equipment parameters.

R4) Please see below for descriptions of test configurations. Diagrams are per relevant Test Method sections of EIA/TIA-603.

6A. RF Power Output Data

The station transmits through a Weinschel 30dB attenuator into an HP8481A Power Sensor connected to an HP8901A Modulation Analyzer. 13.8VDC is supplied directly to the Power Amplifier from an HP6033A System Power Supply, which measures current consumption of the Power Amplifier. No audio is injected during this test.

6B-1. Audio Response,
6B-3. Modulation Limiting versus Frequency, and
6B-4. Modulation Limiting versus Audio Level

Audio is injected into the Wireline port of the station from an HP8903B Audio Analyzer. The station transmits in Half-Duplex mode (the Receiver is inactive). The RF signal from the station's transmitter is demodulated by an HP8901B Modulation Analyzer with no filters active. In 6B-1, the level of the demodulated audio is measured by the HP8903B Audio Analyzer. In 6B-3 and 6B-4, the deviation of the transmitted signal is measured directly by the Modulation Analyzer.

6B-2. Low Pass Filter Response

Audio is injected into the Wireline port of the station from an HP8903B Audio Analyzer. The station transmits in Half-Duplex mode. The RF signal from the station's transmitter is demodulated by an HP8901B Modulation Analyzer and the resulting audio is fed into an HP3582A Audio Spectrum Analyzer.

6C. Occupied Bandwidth

Tones for 6C-1 and 6C-2 are injected into the Wireline port of the station from an HP8903B Audio Analyzer; the station operates in Half-Duplex mode. The digital signals used in 6C-3 and 6C-4 are test patterns generated internally by the station; the station operates in Half-Duplex mode for these tests as well.

In 6C-5, the station operates in Full Duplex mode, with the test pattern being injected into the station's Receiver via RF from a Motorola R2670 Communication System Analyzer. This was necessary because no other means was available to make the station transmit the test pattern.

In all cases, the transmitted RF from the station is routed to an HP8595E Spectrum Analyzer.

6D. Conducted Spurious Emissions

Audio is injected into the Wireline port of the station from an HP8903B Audio Analyzer. The station transmits in Half-Duplex mode. The RF signal from the station's transmitter is routed to an HP8566A Spectrum Analyzer.

6E. Radiated Spurious Emissions

A dummy load is connected to the Transmitter port of the station. A tuned, unity-gain, monopole antenna is connected to the Receiver port on the station. The station operates in Half-Duplex mode, and is keyed up remotely via a cable connected to the Wireline port.

6F. Frequency Stability

The station operates in Half-Duplex mode and is keyed via a cable connected to the Wireline port. Frequency error is measured with an HP8901B Modulation Analyzer.

6G. Transient Frequency Behavior

The Transmitter output of the station is run through an RF attenuator, then through a Narda 3020A bidirectional coupler and into an HP8901B Modulation Analyzer. The output of an HP8657A Signal Generator is connected to the port on the 3020A which couples into the Modulation Analyzer input. The demodulated signal output of the Modulation Analyzer is connected to the vertical input of a Tektronix 3032 Digital Oscilloscope. The trigger input of the Oscilloscope is connected to the forward power detect voltage from the station's Power Amplifier. The Modulation Analyzer is set for a 15kHz Low-Pass Filter and no High-Pass Filter. The station operates in Half-Duplex mode.

Q5) Additional data for radiated spurious emissions test in exhibit 6E for the following conditions
a) Freq. 488.0125 / 30 W power, 12/25 kHz BW (non repeater). (This data should complete the series of data reported on pages 1, 2, 3, 4, 6, and 7).
b) Freq. 476.0125 / 5/30 W, 12/25 kHz BW for "repeater" mode. (This data should complete the series of data reported on pages 5)
c) Data for other major operational modes if relevant.

R5) The word "Repeater" on page 5 is simply the name of the unit as entered by the test facility in the results spreadsheet and does not indicate the operating mode employed for the test. The unit (Transportable Digital Repeater) was tested in half-duplex (non-repeater) mode only, as there is no EIA specification for testing radio equipment in repeater (full duplex) mode, and FCC Type Acceptance is applicable only to the subject Transmitter.

Additionally, the Receiver and Transmitter are separate, individually-shielded modules with only non-RF digitized audio/data routed between them. (Refer to Exhibit 9A: Front View with Covers Removed.) The only RF outside of these modules is conducted through double-shielded coaxial cable. (See Figure 10: Interconnect Diagram on page 9-23 of PDR 3500 User's Manual.) This physical and electrical isolation minimizes RF coupling between the modules.

Q6) Statement describing the expected cause for the variation of Spurious radiated emissions between the two channel BWs measurements. This unexpected variation was noted in test report exhibit 6E page 1 and 2.

R6) The expected causes for the variation between the 12.5 kHz and 25 kHz channel spacings may be derived from error such as cables being moved between the two scans, etc.

The radiated emissions test was repeated for both channel spacings, with consistent results between the two. Please see the attached addendum to Exhibit 6 for the new data.

Q7) Quantar RSS software user manual mentioned in the Users Manual.

R7) Please see attached copy of the *Quantar RSS Users Manual*. This Manual contains Motorola copyrighted materials and proprietary information and is provided to the FCC as a requirement for FCC Certification. Motorola is requesting that the FCC add this Manual to the Confidentiality Request document.

Q8) Statement discussing the minimum/maximum values for the software control settings discussed in exhibit 10B. Include values for deviation, frequency, and power.

R8) The software adjustments discussed in Exhibit 10B do not directly determine the operating parameters of the station, such as deviation, frequency, and power. The purpose of these alignments is to set reference levels in the station to ensure the accuracy of the operating parameters as set elsewhere in the Radio Service Software. Because of the nature of the alignment process as a feedback loop, and because the alignment points are fixed, there are no defined minimum or maximum values for the alignments.

Once these alignments are performed during manufacturing or servicing, the operating parameters for deviation, frequency, and power can be specified accurately in the "Channel Information" section of the RSS. (This process is discussed beginning on page 7-4 of the *PDR 3500 Basic Service Manual*.) When setting the channel information, the following ranges apply:

Deviation: 2.500 kHz, 4.000 kHz, or 5.000 kHz.
Frequency: 470.00000 MHz to 494.00000 MHz.
RF Power: 20 W to 120 W indicated in RSS, which corresponds to 5 W to 30 W from the station. (For a more detailed explanation of this translation, please see item 3 under "Channel Information" on page 7-4 of the *PDR 3500 Basic Service Manual*.)

Q9) New transient frequency data for 12 KHz BW channel to account for the measurement system noise and signal generator coupling mentioned in exhibit 6G.

R9) Please see the attached addendum to Exhibit 6 for revised 12 kHz bandwidth data. Note that in order to eliminate the effects of the signal generator coupling, the test procedure was modified from EIA/TIA-603 as described below.

The original test procedure in EIA/TIA-603 (Item 2.2.19) specifies the RF level from the signal generator to be 30dB less than that from the transmitter under test, as measured at the test receiver. In this modified version of the test, the signal generator's RF level is adjusted to be 40dB less than that from the transmitter under test. All other parameters of the test procedure remain unchanged. This procedure modification reduces the coupling of the modulated signal from the generator to a level which does not cause the plot to cross the frequency stability limits.

Q10) Test tone frequencies used for the exhibit 6B-4 plots? In addition please provide plots for all three tone frequencies standardized in TIA/EIA-603, (300, 1000, and 3000 Hz).

R10) Transmitter deviation is presented as a function of modulation frequency in the plots in 6B-3 (Modulation Limiting versus Frequency). In those graphs, the modulating tone is swept from 100 Hz to 10 kHz. The frequency from 6B-3 which causes the greatest deviation (in this case, a 1 kHz audio tone) is used as the modulating tone in 6B-4, in which the audio input level is swept. Since other audio frequencies would generate lower deviation levels (as shown in 6B-3), the graphs in 6B-4 illustrate Modulation versus Audio Level results for the worst-case input frequency.

Q11) Strong and specific justification of for certification of this unit under CFR 47 parts 22 and 74.

R11) Certification is requested for the PDR 3500 as an Emergency Broadcast Transmitter under CFR 47 part 74.21(a). Being transportable in nature, this unit may, in situations of emergency, be deployed in place of damaged or destroyed communications equipment, or in addition to existing equipment. In such a situation, the station would be used to provide

or augment communications necessary for coordinating emergency rescue, relief, and/or law enforcement operations.

Motorola, Inc., hereby withdraws its request for the certification of the PDR 3500 unit as a mobile transmitter under CFR 47 part 22.

Q12) Clarification on confidentiality of schematics and parts lists. These items are included in the users manual. Update confidentiality letter as appropriate.

R12) Motorola, Inc., requests that confidentiality be maintained for all schematics and parts lists as described in the confidentiality letter. Although they are included in the users' manual, the manual is only available to paying Motorola customers, and Motorola can decline to provide manuals to any party at its discretion. If confidentiality is not granted, these schematics and parts lists, which constitute intellectual property of Motorola, would be made available for free to the general public and to competitors via the FCC OET web site.

Q13) A detailed description of the digital modulation system, per CFR 47 section 2.1033 (j13).

R13) The digital modulation scheme employed in the station, called ASTRO, is Motorola's implementation of the APCO Project 25 interoperability standard. For a theoretical description of the scheme, refer to Exhibit 6C.

All of the PDR 3500's modulating audio/data originates in a Digital Signal Processor (DSP) in the Station Control Module, where it is low-pass-filtered. Next, the signal is converted to analog and routed through a 6kHz low-pass reconstruction filter. Once in the Exciter, the signal is routed through two active, op-amp-based low-pass filters before reaching the modulation input of the VCO.

The entire digital and analog modulation system of the PDR 3500 is taken, unmodified, from Motorola's Quantar series of fixed base stations/repeaters. The Quantar's transmitter was first granted authorization by the FCC in 1992 with identifier FCC ID: ABZ89FC3773 (VHF high-power). The UHF Range 3 version, which shares its modulation system with all other Quantar transmitters and with the PDR 3500, was authorized in 1994 with identifier ABZ89FC4798. The Quantar stations have a field record of successful, interference-free operation, with thousands of stations deployed and still in use since the grants were issued.

Contact me at (954) 723-5793 if you require any additional information.

Regards,
/s/ Mike Ramnath
FCC Liaison
Email: mike.ramnath@motorola.com