MOTOROLA

Date: 26th April 2002

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

Re: Form 731 Confirmation Number: EA543727 with FCC ID: ABZ99FT5000.

Dear Mr. Perrine;

Motorola Inc. herein submits its response to the 16th April 2002 request for information in Correspondence Number 22631.

EMC

Q1) Statement clarifying maximum conducted power. EMC reports report 3.0 W while the SAR reports 3.1 W. CFR 47 section 90.541 (c) limits power to 3.0 W.

R1) The radio submitted for SAR measurement was tuned to its maximum adjustable power setting using specialized software that is **not** available to the dealer or end user. The CPS (Customer Programming Software) available to the dealer allows the power level of each channel to be programmed to "Low Power" (1.2 watts) or "High Power" (2.75 watts) **only**.

These two power levels are factory-adjusted to a tolerance of ±0.1 watt at several frequencies across the operating band, and this information is stored in the radio. The operating frequency of the channel being programmed is used to choose the power output setting that is appropriate for that frequency. This method gives a very accurate and predictable output power setting which is not subject to variations due to errors in customer or dealer power measurement equipment

Q2) New occupied BW plots. Reference levels in the provided plots do not clearly agree with conducted power.

R2) New plots are attached in Addendum A as follows (a note stating "0 dB = 3.0 Watts" has been added to each plot):

PAGE 6 - Amended Exhibit 6F-5 2500 Hz Audio Modulation Only
PAGE 7 - Amended Exhibit 6F-5 2500 Hz Audio and TPL Modulation

PAGE 8 - Amended Exhibit 6F-5 2500 Hz Audio and DPL Modulation
PAGE 9 - Amended Exhibit 6F-5 2500 Hz Audio and Low Speed Trunking Modulation
PAGE 10 - Amended Exhibit 6F-5 DTMF Modulation Only
PAGE 11 - Amended Exhibit 6F-5 DTMF Modulation and TPL Modulation
PAGE 12 -Amended Exhibit 6F-5 DTMF Modulation and DPL Modulation
PAGE 13- Amended Exhibit 6F-5 DTMF Modulation and Low Speed Trunking Modulation
PAGE 14 - Amended Exhibit 6F-5 2000/3000 Hz FSK Data Modulation Only
PAGE 15 - Amended Exhibit 6F-5 2000/3000 Hz FSK Data and TPL Modulation
PAGE 16 - Amended Exhibit 6F-5 2000/3000 Hz FSK Data and DPL Modulation
PAGE 17 - Amended Exhibit 6F-5 2000/3000 Hz FSK Data and Low Speed Trunking Modulation

Q3) Block diagram.

R3) Block Diagrams have been attached in Addendum A as follows:

PAGE 18 – Transmitter and Frequency Synthesizer Block Diagrams
PAGE 19 – Frac-N Synthesizer IC and VCO/Buffer IC Internal Block Diagrams
PAGE 20 – Transmitter Audio Path and Microcontroller Block Diagram

Q4) Additional test procedure details such as write ups, drawings, photographs and calculation for radiated power testing. It is not clear that the substitution method was used and what the final measured value is. Please provide additional test data as appropriate.

R4) Radiated power is measured in accordance with TIA/EIA-603-A section 2.2.17. The data presented was corrected for losses using the substitution method, as specified in TIA/EIA-603-A section 2.2.17.2 (d). This procedure is attached in Addendum A:

PAGES 21-22 – TIA/EIA-603-A Procedure for Average Radiated Power Output

A photograph of the test setup for radiated power and radiated spurious emissions is attached in Addendum A:

PAGE 23 – OATS Radiated Power Test Setup (Photo)

The EPR data supplied as Exhibits 6A-3 and 6A-4 has been amended to show the radiated power in watts as well as dBm, and are attached in Addendum A:

PAGE 24 – Amended Exhibit 6A-3 - RF Output Data – ERP (746, 762 MHz)
PAGE 25 – Amended Exhibit 6A-3 - RF Output Data – ERP (776, 794 MHz)

Q5) Additional test procedures for radiated spurious, and conducted spurious tests. It is not clear if all frequencies in the test range were scanned. It appears that only harmonic frequencies were tested. Please, provide additional test data as appropriate.

R5) RADIATED SPURIOUS EMISSIONS

The equipment submitted for OATS Radiated Spurious Emissions Testing was initially pre-screened using a GTEM (Gigahertz Transverse Electromagnetic) cell which meets the specifications of TIA/EIA-603-A section 1.5.36. IEC 60481-1 compliant signal processing software is used to convert the individual 3-axis dBµV field strength measurement into an OATS-correlatable value. The shielding of GTEM cell eliminates unwanted signals, allowing close inspection of the spurious emissions of the equipment with greater resolution and lower noise floor than is obtainable in an open area test site environment. Any measurable non-harmonically-related emissions are noted.

This pre-screening information is supplied to the agency performing the OATS measurement, allowing them to concentrate are areas where spurious emissions may be found. Note that the GTEM data itself is **not** submitted to the FCC, but only used as an aid to locate spurious emissions which may be overlooked due to ambient signal conditions in the OATS test site. For the case of the subject equipment of this application, no such non-harmonically related spurious emissions were found, and therefore were not reported.

Radiated spurious emissions measurements are performed according to the procedures of TIA/EIA-603-A section 2.2.12.2. A non-radiating load is attached directly to the antenna port of the transmitter without RF cable. Photographs of the test fixturing of the equipment are attached in Addendum A:

PAGE 26 – OATS Radiated Spurious Emissions Test Setup (Photo)
PAGE 26 – OATS Device Under Test with Non-Radiating Load (Photo)

CONDUCTED SPURIOUS EMISSIONS

The conducted spurious emissions plots of Exhibit 6F have been amended with non-harmonically-related emissions included. All emissions are significantly within FCC limits. The following are attached in Addendum A:

PAGE 27 – Amended Exhibit 6F-1 - 3 Watts, 746.500 MHz
PAGE 28 – Amended Exhibit 6F-2 - 3 Watts, 763.000 MHz
PAGE 29 – Amended Exhibit 6F-3 - 3 Watts, 776.500 MHz
PAGE 30 – Amended Exhibit 6F-4 - 3 Watts, 793.000 MHz
PAGE 31 – Amended Exhibit 6F-5 - 1 Watt, 746.500 MHz
PAGE 32 – Amended Exhibit 6F-6 - 1 Watt, 763.000 MHz
PAGE 33 – Amended Exhibit 6F-7 - 1 Watt, 776.500 MHz
PAGE 34 – Amended Exhibit 6F-8 - 1 Watt, 793.000 MHz

Q6) Additional test procedure details such as write ups, drawings, photographs for the conducted power test. It is not clear from the writeup on page 3 of 7 how the RF output power is measured.

R6) Conducted power is measured in accordance with accordance with TIA/EIA-603-A section 2.2.1.2. The transmitter under test is connected directly to and H-P model 435 or 438A power meter using two cascaded 20 dB attenuator pads (which also form the 50-ohm RF terminating load), without the use of an interconnecting RF cable. The calibration of the power meter, detector, and attenuator pads is verified on an annual basis. Other power measurement systems that may be used are correlated with this calibrated reference system before measurements are performed, and calibration factors are adjusted as necessary to obtain precise correlation.

A photograph of the calibrated reference power measurement setup is attached in Addendum A:

PAGE 35 – Conducted Power Measurement Test Set-Up

Q7) Statement clarifying 220 MHZ capability of the device. The users manual references a 220 MHZ antenna. Please clarify.

R7) The Owner's Manual supplied with this equipment is also supplied with similar equipment operating in the 220 MHz frequency band. References to 220 MHz operation, and specifically to the 220 MHz antenna on page 101 of the Owner's Manual (Exhibit 8 Part 2 of 2) should be ignored for the subject equipment of this application.

The factory tuning procedures of Exhibit 10C are reproduced from the factory Final Test and Tune Specification, which is also applicable to similar 220 MHz equipment. All references to 220 MHz operation should be ignored for the subject equipment of this application.

Q8) Battery end point the battery frequency stability was tested with.

R8) The battery end point voltage was specified as "radio reset voltage" in the lower left of the Frequency Stability vs. Supply Voltage graph of Exhibit 6H-2. The exhibit has been amended to make this parameter more prominent, and is attached in Addendum A:

PAGE 36 – Amended Exhibit 6H-2 – Frequency Stability vs. Supply Voltage

FYI CFR 47 section 27.53 (d) is not applicable for part 90 devices, per 27. The data reported on page 6I will not be reviewed.

SAR

Q1) RF safety warning to be fixed on the exterior of the battery referring to training in the users manual.

R1) A photograph of the rear view of the transmitter is attached in Addendum A showing the location of the RF Safety Label. It will be co-located above the FCC ID label. The label is in accordance with TIA/EIA TSB133 (draft) as of April 3, 2002.

PAGE 37 – Rear View Showing RF Safety Label
PAGE 38 – Close-up View of RF Safety Label

Q2) Updated users manual to provide additional user training information. Please discuss in very clear terms the exposure dangers to the user and the user can control his/her RF exposure. Please include in your discussion the dual power mode of the radio, how to limit the duty cycle, and also the differences various body worn accessories make.

R2) Per our telephone discussion, the User Manual language satisfies the requirements of the FCC Rules. The manual provides detailed information on how the user can control RF exposure. Also, this language was accepted in previous FCC applications such as FCC ID: AZ489FT5817. It is, also, included in the proposed TSB133.

Q4) Data to validate the calculation made to account for power drift. Please provide: a plot of conducted power versus time (at least 30 minutes) for each of the batteries, a "shortened " scan SAR measurement that focuses in on the hot spot and makes a measurement in minimal time. A measurement for the highest SAR point for body worn and held-to-face configurations should suffice. For reference purposes please repeat the original measurement to establish that the configuration is the same as previously reported.

R4) Please find attached in Addendum A the characteristic curves of the conducted power versus time for each of the batteries offered with this product:

PAGE 39 – Transmitter Conducted Power Output vs. Time
HNN9008A NiMH High Capacity Battery
PAGE 40 – Transmitter Conducted Power Output vs. Time
HNN9009A NiMH Ultra High Capacity Battery
PAGE 41 – Transmitter Conducted Power Output vs. Time
HNN9010A NiMH Ultra High Capacity Factory Mutual Battery
PAGE 42 – Transmitter Conducted Power Output vs. Time
HNN9011A NiCd High Capacity Factory Mutual Battery

PAGE 43 – Transmitter Conducted Power Output vs. Time
HNN9012A NiCd High Capacity Battery
PAGE 44 – Transmitter Conducted Power Output vs. Time
HNN9013A LiIon Battery

Also, please find attached a separate file entitled "Shortened scan results.pdf" that presents the results obtained from the requested "shortened" S.A.R. measurements.

Q5) Additional validation data. Please include full manufacturer data, and SAR plot associated with the 2/12/02 validation mentioned on page 44.

R5) Please find attached a separate file entitled "additional scans_photos.pdf". The full manufacturer data requested can be found on pages 1 to 6, and the S.A.R. validation plots requested can be found on pages 7 to 10 of this file.

Q6) Tissue ingredients and daily measured parameters for the test liquids.

R6) Tissue ingredients and target tissue parameters are presented in section 4.3.2 of the submitted report (Exhibit 11B, page 10). The daily measured parameters are provided in the comment sections of the scans within Appendix A and B of the submitted report (Exhibit 11B, beginning on page 19). A summary of the daily measured parameters for the test liquid is offered in the table below.

Date	**Conductivity (σ) @ 835 MHZ**	**Dielectric Constant (εr) @ 835 MHZ**	**Conductivity (σ) @ 770MHZ**	**Dielectric Constant (εr) @ 770MHZ**
2/28/02	0.99	52.6	0.92	53.5
3/4/02	1.00	54.0	0.93	54.5
3/8/02	0.99	53.2	0.92	53.4
3/11/02	0.92	42.4	0.85	43.3
3/14/02	0.99	52.7	0.93	53.5

Q7) Additional test setup photographs. Please include photos at least for the highest SAR configuration for each set of tests as divided in your summary table.

R7) Please find attached a separate file entitled "additional scans_photos.pdf". The additional photos requested can be found on pages 11 to 12 of this file.

Q8) Updated uncertainty table. Please use the IEEE draft P1528 template.

R8) Per item #13 of the *OET 65 Supplement C EAB Part 22/24 SAR Review Reminder Sheet 01/2002* handed out during the February and April, 2002 TCB council meeting attached herein as "SARremindersheet.pdf", the tabulated total measurement uncertainty is nominal until the IEEE Std 1528 is completed. Much of the required information has to be supplied by the equipment manufacturer, which has not yet been officially supplied. Other items are based on results of studies currently underway. Our work is scheduled to be completed by the time IEEE P1528 is ratified and released. The total measurement uncertainty of +/-12.1 % (K=1) was stated in section 6.0 on page 14 of the original filing.

Contact me at (847) 576-3697 if you require any additional information.

Sincerely,

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Attachments:

Addendum A.pdf
Shortened scan results.pdf
additional scans_photos.pdf
SARremindersheet.pdf