Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 97 of the	)	WT Docket No. 05-235
Commission's Rules	)	
To Implement WRC-03 Regulations	)	RM-10781, RM-10782, RM-10783,
Applicable to Requirements for	)	RM-10784, RM-10785, RM-10786,
Operator Licenses in the Amateur	)	RM-10787, RM-10805, RM-10806,
Radio Service	)	RM-10807, RM-10808, RM-10809,
	)	RM-10810, RM-10811, RM-10867,
	)	RM-10868, RM-10869, RM-10870

To: The Commission

COMMENTS BY JAMES K. BOOMER

The following comments are respectfully submitted in response to the *Notice of Proposed Rule Making* (The Notice), FCC 05-143A1, WT Docket No. 05-235 released on July 19, 2005.

I. Introduction

Some people and organizations have long sought removal of the Morse code requirement for amateur radio licensing. Their claims fall into two main categories: 1) Morse code is obsolete, and serves no purpose, even for emergency communications, because modern digital systems provide greater throughput with weaker signals than Morse operators can hear, and, 2) More people would become radio amateurs if the Morse code requirement were removed.

Interestingly, those who believe in 2), above, include manufacturers of amateur radio equipment (e.g. Kenwood) who would potentially sell more equipment if the amateur radio population increases. Indeed, Kenwood's opinions appear in several places in FCC 99-412 (WT Docket No. 98-143), and clearly point at removing as many "obstacles" as possible in order to maximize the number of radio amateurs (potential customers).

This document presents the facts, and shows conclusively the need to require the current 5 words-per-minute (WPM) Morse code proficiency test for all radio amateur licensees, operating on any allocated frequency.

II. Summary

It is mandatory that Morse code proficiency requirements be retained for amateur radio licensees in order for the amateur radio service to satisfy the emergency communications provisions of Part 97, Sections 97.1, 97.3, and 97.4 of the Commission's Rules. This is particularly critical in view of the worldwide terrorist crisis and the need for maximally reliable communications support for the Department of Homeland Security and other emergency services.

Amateur radio is an emergency communications asset, per Part 97 of the Commission's Rules:

II. BACKGROUND of the Notice erroneously states: "The Commission's Rules define the amateur service as a radiocommunication service for the purpose of self-training, intercommunication, and technical investigations by amateur radio operators. This definition reflects the principles that express the fundamental purpose of the amateur service in the United States…"

Indeed, the Notice fails to acknowledge following important emergency communications provisions of Part 97:

From Sec. 97.1 Basis and purpose:

"The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:
(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, **particularly with respect to providing emergency communications** (emphasis added)."

From Sec. 97.3 Definitions:

"(a) The definitions of terms used in part 97 are: …. 2) Amateur radio services. The amateur service, the amateur-satellite service and **the radio amateur civil emergency service** (emphasis added)."

"Sec. 97.407 **Radio amateur civil emergency service** (emphasis added)…"

Morse code will save lives, and provide effective communications when all other modes fail:

It is a proven fact that operators skilled in Morse code provide communications connectivity when voice, and all digital modes of communications fail.

Statistics do not support the claim that elimination of Morse code requirements will attract more people to amateur radio:

As shown in detail below, the total number of radio amateurs has decreased by 2.5% since the Commission announced the Morse code requirement relaxation to 5 WPM in December 1999. Furthermore, the number of Amateur Extra, Advanced, and General class licensees has actually decreased by 3% from January 2003 to August 1, 2005. Thus, the substantial reduction in Morse code requirements from 13 WPM for Advanced and General, and 20 WPM for Amateur Extra classes, to 5 WPM, has failed to produce an increase in the number of radio amateur licensees.

III. Discussion

Numerous petitions to eliminate the Morse code requirement for amateur radio licensees ignore of the need for Morse code for the emergency communications provisions of Part 97, Sections 97.1, 97.3, and 97.4. Accordingly, consider the following examples.

The No Code International (NCI) Petition claims that communication by Morse telegraphy is a recreational activity that reflects operator choice and preference, rather than necessity. The NCI Petition also claims that the Commission has previously determined that telegraphy proficiency, as a licensing requirement, "does not comport with the basis and purpose of the amateur service, and argues that compliance with the prior *Radio Regulations* was the reason that the Commission did not eliminate the telegraphy requirement earlier." Clearly, like the Notice, this petition ignores the need for Morse code to fulfill the stated intent of the amateur radio service to provide emergency communications in accordance with Part 97, Sections 97.1, 97.3, and 97.4 noted above.

The Coppola Petition argues that removing the telegraphy examination requirement would further enhance the value of the amateur service to the public as a voluntary non-commercial service resulting in expanding the existing reservoir of trained operators, technicians, and electronic experts within the amateur radio service, while doing nothing to prevent use of telegraphy on the air or otherwise prevent those interested in pursuing telegraphy proficiency from doing so. Clearly, this petition also ignores the need for Morse code to fulfill the stated intent of the amateur radio service to provide emergency communications in accordance with Part 97, Sections 97.1, 97.3, and 97.4 noted above.

The first National Conference of Volunteer Examiner Coordinators (NCVEC) Petition claims Morse code is obsolete due to the emergence of satellite and digital communication technologies. It further claims that Morse code testing is an unnecessary burden on applicants because most applicants who pass the code examination never use code for communications on the airwaves, and on volunteer examiners (VEs) and VE coordinators (VECs) because these examinations require extensive preparation and special equipment to administer properly. First, where is the proof of these allegations? Second,

like the Notice, and other petitions, this one ignores the need for Morse code to fulfill the stated intent of the amateur radio service to provide emergency communications in accordance with Part 97, Sections 97.1, 97.3, and 97.4 noted above. Furthermore, the NCVEC argument that Morse code testing should be ended because the amateur radio operator examination process does not require a practical demonstration in the ability to use any other mode of communication, is naïve and irrelevant.

The Holliday Petition claims that Morse code proficiency was a reasonable requirement fifty years ago, but continuing the Morse code examination requirement serves no useful purpose in the twenty-first century. It further claims that the Morse code examination requirement limits the number of people, especially those who are handicapped, who can take advantage of amateur radio as a hobby. First, this petition also ignores the need for Morse code to fulfill the stated intent of the amateur radio service to provide emergency communications in accordance with Part 97, Sections 97.1, 97.3, and 97.4 noted above.

Second, it fails to recognize that the FCC currently accommodates handicapped people in license examinations.

One petitioner for the elimination of the Morse code licensing requirement claims that "modern digital modes, readily available to amateurs, can deliver 'perfect copy,' *at higher data rates than even the most skilled manual Morse telegraphers could achieve*-under such poor signal to noise conditions that even the most skilled Morse operator *would be unable to even detect the presence of a Morse signal, let alone successfully decode it by ear."* This petitioner demonstrates a complete lack of understanding of radio communications.

Notwithstanding the above, Morse code is a necessary mode for amateur radio to fulfill its role as a reliable emergency communications asset, in accordance with the provisions of Part 97, Sections 97.1, 97.3, and 97.4 noted above.

Morse code vs. other digital communications modes:

With Morse code, we are looking for reliable connectivity, not high information rate transfer.

Modern receivers have noise figures of about 6dB, and digital signal processors that result in extremely narrow pre-detection bandwidth. So, let's compare the minimum required receiver radio frequency (r.f.) carrier input for PSK-31, single sideband voice, and Morse code modes.

The required carrier input power to a receiver for a given pre-detection carrier-to-noise ratio, with no added input noise, is:

$$C_i \text{ (dBW)} = (C_o/N_o)_{dB} + 10\log_{10}kT + 10\log_{10}B + F_{dB} \qquad \text{Equation 1}$$

Where,

C_i = Carrier input in decibels (dB) with respect to one Watt (dBW)

$(C_o/N_o)_{dB}$ = Carrier to noise ratio at the demodulator input in dB

k = Boltzmann's constant = 1.38×10^{-23} Joule per degree Kelvin

T = Temperature in degrees Kelvin (Standard temperature = 290 degrees Kelvin)

B = Predetection bandwidth in Hertz

F_{dB} = Receiver noise figure in decibels

Now, at 290 degrees Kelvin (standard temperature), $10\log_{10}kT = -204$; thus Equation 1 becomes:

C_i (dBW) = $(C_o/N_o)_{dB} - 204 + 10\log_{10}B + F_{dB}$

<u>PSK 31</u>

PSK 31 with QPSK modulation uses convolutional coding. Accordingly, a carrier-to-noise ratio of approximately 8dB is required into the demodulator for satisfactory coder operation and readable output.

Parameters:

$(C_o/N_o)_{dB}$ = 8dB

B = 30Hz

F = 6dB

Then, from Equation 1,

C_i (dBW) = 8 – 204 + $10\log_{10}30$ + 6 = -175.23dBW

<u>SSB</u>

SSB voice systems can provide satisfactory intelligible communications with a 6dB (C_o/N_o) into the demodulator.

Parameters:

$(C_o/N_o)_{dB}$ = 6dB

B = 1.8kHz

F = 6dB

Then, from Equation 1,

C_i (dBW) = 6 – 204 + $10\log_{10}1{,}800$ + 6 = -159.45dBW

<u>Morse Code</u>

Trained operators can reliably decode 5 words-per-minute (WPM) Morse code with a signal-plus-noise-to-noise ratio of 3dB into the receiver's demodulator. This corresponds to a carrier-to-noise ratio of 0dB. In addition, with well-shaped transmitter keying, a 5 WPM Morse signal can be reliably read in a 15Hertz bandwidth on a fading channel.

Parameters:

$(C_o/N_o)_{dB}$ = 0dB

B = 15Hz

F = 6dB

Then, from Equation 1,

C_i (dBW) = 0 – 204 + $10\log_{10}15$ + 6 = -186.24dBW

<u>System Performance Comparison</u>

From the above information, we see that Morse code provides an 11dB connectivity advantage over PSK-31, and a 27dB connectivity advantage over

SSB voice. This advantage is particularly significant in fading and noise environments. This means that a trained Morse operator can decode messages at weaker signal levels than a PSK31 or SSB voice system. That is, Morse code messages can be received when messages cannot be received by SSB voice or modern digital systems. Clearly, then, Morse code can provide emergency communications when no other mode of communications can.

It is a fact that external noise will raise a receiver's noise floor by an amount depending upon its noise figure, and the level of the external noise. However, the above relative system performance figures still hold. That is, Morse code will still provide an 11dB advantage over PSK31 and a 27dB advantage over SSB voice.

Statistics do not support the claim that elimination of Morse code requirements will attract more people to amateur radio:

Available amateur radio licensee statistics (http://ah0a.org/FCC/Licenses.html) are enlightening.

As of August 1, 2005, there were 661,301 licensed radio amateurs, whereas in April 2000, when the reduction of Morse code requirements to 5WPM began, there were 678,539 licensed radio amateurs. So the total number of licensed radio amateurs has decreased 2.5% since the FCC relaxed the Morse code licensing requirements. Hence, the claim that reduction of Morse code requirements would increase the number of radio amateurs is false.

IV. Conclusion

Amateur radio licensees must be proficient in Morse code to ensure communications connectivity in emergency situations, in order to satisfy the emergency communications provisions of Part 97, Sections 97.1, 97.3, and 97.4.

Morse code provides an 11dB connectivity advantage over PSK-31, and a 27dB connectivity advantage over SSB voice. This advantage is particularly significant in fading and noise environments. This means that a trained Morse operator can decode messages at weaker signal levels than a PSK31 or SSB voice system. That is, Morse code messages can be received when messages cannot be received by SSB voice or modern digital systems. This is key for emergency communications.

As of August 1, 2005, there were 661,301 licensed radio amateurs, whereas in April 2000, when the reduction of Morse code requirements to 5WPM began, there were 678,539 licensed radio amateurs. So the total number of licensed

radio amateurs has actually decreased 2.5% since the FCC relaxed the Morse code licensing requirements.

Statistics do not support the contention that the Morse code proficiency requirement for amateur radio licensing has had any impact on the number of radio amateur radio licensees, or kept interested persons from applying for amateur radio licenses. The amateur radio licensee statistics clearly show this (see the Internet, http://ah0a.org/FCC/Licenses.html).