Before the
Federal Communications Commission
Washington, D.C. 20544

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| In the Matter of | ) | WT Docket No. 98-143 |
| | ) | |
| 1998 Biennial Regulatory Review -- | ) | RM-9148 |
| Amendment of Part 97 of the Commission's | ) | RM-9150 |
| Amateur Service Rules. | ) | RM-9196 |
| | ) | |

To: The Secretary
Federal Communications Commission

c.c.: Chairman William E. Kennard
Commissioner Susan Ness
Commissioner Michael Powell
Commissioner Harold Furchgott-Roth
Commissioner Gloria Tristani

Comments of Edward E. Mitchell, Ham Radio Online

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## 1. Summary

I am writing in support of the ARRL proposal to simplify the Amateur licensing structure from six licenses to four. The ARRL proposal would eliminate the Novice

license and change the entry-level licenses to the Technician[1] class license (for VHF and UHF access only, no telegraphy requirement) and to the General class license (for entry to HF operations, with 5 wpm telegraphy requirement). The proposal would also reduce the Advanced and Extra class telegraphy requirements to 12 wpm.

The ARRL proposal is a significant and positive step towards bringing the Amateur service into the 21st century. However, an additional logical simplification has been proposed by the National Conference on Volunteer Examiner Coordinators (NCVEC), via their comments filed in WT Docket 98-143. The NCVEC proposes a licensing system based on a telegraphy-free VHF/UHF only Technician license, a 5 wpm General Class license and a 5 wpm Extra class license. The major distinctions between the ARRL proposal and the NCVEC proposal are a reduction to three versus four license classes, and a reduction in the telegraphy requirement to 5 wpm for all classes requiring telegraphy proficiency.

Both the ARRL and the NCVEC proposals are good proposals. The NCVEC proposal goes slightly further than the ARRL proposal and for that reason, I believe it is the better of the two. Regardless, as publisher of Ham Radio Online, I put my support behind *both* the ARRL and the NCVEC proposals.

Telegraphy requirements in the Amateur Radio Service are a contentious subject. In my filing, I argue that there is a rational way to view arguments for or against telegraphy requirements. Specifically, the Amateur Radio Service exists to serve a public need. Therefore, the Amateur Radio Service requirements and structure must be optimized to meet the requirements of the public we serve. This perspective leads *to the rational argument for – or against – a Morse code proficiency requirement.* Literally,

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[1] The ARRL proposal calls for a new license naming scheme of Class A, B, C and D. I believe that the

since the Amateur service exists to serve the public, we must ask, “Does our society demand more telegraphers or more technicians and engineers?” If our society demands more telegraphers, than a telegraphy requirement is important. If our society has little demand for telegraphers, than a telegraphy requirement may hinder our effectiveness at producing more persons knowledgeable in the technical art of radio communications. The evidence strongly suggests that society has a large demand for engineers and a nil demand for telegraphers. Therefore, a logical conclusion is that the telegraphy proficiency requirement in the Amateur service is no longer serving a public need.

Some Amateurs argue against changes in the licensing structure, primarily because it represents “a change”. I argue, however, that change, especially in technology, is normal. Change occurs because new requirements arise that drive the creation of new technologies to solve new problems. Amateur Radio is a technology service that exists because it meets a public need. The public need for our service defines a set of requirements that are to be met by an Amateur radio service. In effect, the general public is the “customer” of Amateur Radio “services” and has produced a set of “service or product requirements” for us. The “needs” of our customer – the public – change over time and our “service” must be designed to provide the solutions that the public demands from us. This filing suggests realigning the Amateur Radio Service to reflect the contemporary service requirements demanded of us by our “customers”, which are the general public that grants us access to radio spectrum.

A number of existing rules in Part 97 surprisingly act to discourage innovation in the Amateur Radio Service. These issues are discussed in detail.

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existing license names should be retained and I use the existing class names in my comments.

Finally, limitations on training and drill participation within the scope of RACES are unnecessary and hinder Amateurs' abilities to serve the public.

## 2. Introduction

The ARRL, the FCC and the National Conference of VECs[2] (NCVEC), via their comments on the FCC NPRM, have proposed changes in Amateur Radio licensing in the U.S. I am writing to voice my support for the both the ARRL proposal, and the further refinement put forth by the National Conference of VECs which proposes a more substantive set of licensing and examination changes than is presented by either the ARRL or the FCC proposal. The ARRL proposes simplifying the Amateur licensing scheme to four licenses. The National Conference of VECs proposes simplifying the Amateur Radio Service's complicated six license scheme down to a simpler three license scheme, and retaining the traditional license names of Technician, General and Extra. On the contentious issue of Morse code proficiency requirements, the NCVEC proposes that the Technician class license require no telegraphy proficiency, and that the General and Extra class licensees require a 5 wpm telegraphy proficiency, particularly with regards to International regulations. Their proposal is well researched, logical, recognizes that tremendous changes have occurred in the telecommunications art, and correlates with CEPT licensing requirements, the realities of the Americans with Disabilities Act, and the limitations of VECs and license preparation publishers.

Now is the time to implement a significant restructuring of the Amateur licensing and examination process to bring the Amateur service up to date with contemporary requirements. The ARRL proposal is good; but the proposal put forth by the National

[2] "Comments by the National Conference of VECs on Restructuring of the Amateur Service", filed with respect to WT Docket 98-143, RM-9148, RM-9150, RM-9196, on October 1, 1998, by Frederick O. Maia, W5YI, Chairman, NCVEC Rules Committee

Conference of VECs is more thorough and is the best proposal that addresses the issues related to the *future* of Amateur Radio.

I have been a licensed Amateur Radio operator for 26 years since first licensed at the age of 13. I have been involved in most all aspects of Amateur Radio including but not limited to satellite communications, HF operation, ATV, FM repeaters (including assisting in the construction of such systems), digital packet radio operation and especially in emergency communications and public service. I am a member of the ARRL, AMSAT, The SETI League, and the IEEE. Since 1995, I am the publisher of Ham Radio Online; the world's leading independent online web site devoted to Amateur Radio and telecommunications topics. Ham Radio Online is found on the Internet at http://hamradio-online.com and is currently read in 92 countries[3]. Professionally, I have worked in the high technology sector for the past 18 years, spending the last five years[4] at an internationally respected personal computer company where I was extensively involved in advising the company in regards to wireless communications opportunities. These opportunities included wireless data communications in short range, unlicensed PC peripheral radio devices, metropolitan area wireless technology solutions, through broadband, high speed wireless Internet access using MMDS, LMDS and 38 GHz millimeter wave technologies.

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[3] For the purposes of determining a country count for Ham Radio Online, the ARRL's DXCC Awards criteria, roughly, are used. The DXCC Awards list assigns the status of "country" to geographically distinct, but not necessarily "politically distinct" territories. For this reason, the country count, by political territories, is slightly less than 92.

[4] As of the fall of 1998, I am a full time graduate student at Gonzaga University and not currently employed in high tech.

## 3. Understanding the Impact of Technological Change on the Amateur Service

In viewing these restructuring proposals, it is essential to accept that change is normal – and essential for the amateur radio service to prosper in the 21st century. We must recognize and appreciate that we now live in the *digital era* of advanced communications technology. Today's licensing requirements for amateur radio do not reflect this change from analog to digital. Other changes, brought on by an expanding population, and greater expectations of communications technologies during times of need, are drivers of change in the amateur service. In this section I argue that change is normal, healthy and necessary for the Amateur Radio Service to prosper into the 21st century.

After 18 years working in the high tech computer industry, I've seen first hand the rapid pace of change in technology – what is "hot" this year, is obsolete in 18 months. Technologies, and the skills of the people, who build them, become obsolete rapidly unless they change, adapt and move forward. Those that fail to change end up as a footnote in the history books. If the Amateur service does not adapt and move forward, then it risks becoming obsolete and fading into the static of telecommunications history.

### *3.1 Understanding Technological Change*

To understand the impact of technological change, I present three examples of recent technology changes – and how these changes have resulted in obsolescence of familiar technology and procedures. These illustrations help us see how the public's demands for the services of Amateur Radio have changed – and how these demands necessarily drive changes in the requirements of the *new* Amateur Radio Service.

I recently climbed inside one of the very few still flying B-17 bombers from World War II, and also inside a German Heinkel HE-111. Historically, both aircraft had

separate radio operator positions. The B-17 had seats for the flight navigator, flight engineer and a radio operator who could communicate by CW. In the case of the restored HE-111, the Morse code key is still visible. Today's modern aircraft, by comparison, have reduced a formerly large crew down to 1 or 2 pilots. Two-way voice radios, and soon to come, wireless messaging and data links with in-cockpit weather and air traffic information, are used in place of Morse code[5]. Electronic navigation aids (VOR, NDB, LORAN, ILS, MLS, INAV and GPS) have replaced the need for a separate navigator. In the near future, GPS-based systems will render other navigation systems *obsolete*. *Technological progress has changed the requirements for the operation of a complex aircraft*.

The California State Railway Museum in Sacramento, California houses a beautiful collection of steam railway equipment, dating back more than 100 years. Unfortunately, there are not many steam trains still riding the rails, except as tourist attractions. Virtually all commercial use of stream engines has been replaced by the far more efficient and less costly diesel electric locomotives. Steam engines were mechanically complex and required a great deal of maintenance; they could not compete with the vastly better diesel electric. The steam railway became *obsolete*, replaced with better technology. The boiler workers who had maintained these marvelous beasts of fire and steam retrained and moved forwards with new technology – or became *obsolete*.

The National Weather Service will be replacing its nationwide weather network with a combination of new, automatic technologies including the satellite-based Emergency Managers Network (EMWIN) and the new "NWR 2000" initiative. In the latter, your local weather radio broadcast will be replaced with a computer synthesized

[5] VHF Omni Range (VOR) navigation stations still identify themselves with Morse code transmissions.

voice delivering instantaneously updated weather information as warnings and forecasts are issued by the meteorologists.

Each of these examples - the changes in aircraft radio and navigation, the obsolescence of the steam railway, and the replacement of the national weather radio system with a fully automated system, illustrate technological change. *Change is made to meet new requirements, to lower costs, to improve efficiency, or to improve safety. Technological change results in new technologies replacing old technologies that have faded into history. In similar way, changes – both in technology and society's needs – are the driving force behind the need for changes in the Amateur Radio Service. Change is creating new and different requirements for the Amateur service, and the Amateur service must change to meet these new requirements.*

## 4. What Does the Public "Need" From Amateur Radio?

Amateur Radio must now look forward to the 21st century. We can learn from the past, but we must not focus on solving the problems of the past 50 years. We must ask instead:

- What kinds of communications problems do we address next year, in five, ten or more years?
- What kinds of technologies will we apply to address these problems?
- Amateur Radio exists to serve the public: How are we adding value to the society that we serve and which grants access to the radio spectrum?
- *Specifically, what are the public "needs" that Amateur Radio should meet, and how do those "needs" translate into requirements for a modern Amateur Radio Service?*

Our current licensing system dates back many years, and is itself a modification of a system in place for decades before that. Proposals to restructure the Amateur service

must necessarily be forward looking. Hence, the FCC's NPRM requests feedback on whether the examination requirements should address digital technologies, whether telegraphy serves a role in meeting our society's communication requirements of the 21st century, and whether certain FCC rules are no longer applicable. These issues must be viewed within the context of what society demands from the Amateur Radio Service and how our mission should be defined to meet the requirements of that public.

We must define our mission in the next century in terms of what the public needs, not what is convenient for us because "it's always been that way". To meet our mission, we must recognize the requirements imposed upon us by the public, who ultimately is our "consumer". From these requirements, we can define the service and the licensing examination requirements to meet those goals.

Change is necessary, as illustrated by a recently published academic study. A study[6] by researchers at the University of Southern California and the University of Houston examined the process of innovation in the business world. Their findings apply to how we design a future Amateur Radio Service. According to Professor Gerard Tellis, companies must "*break out of the natural human trait that propels them to use yesterday's bag of tools to solve tomorrow's problems*" and "*must be willing to cannibalize before there is nothing of value left to cannibalize*". The lesson to Amateur Radio is frank: we must be willing to break away from our natural tendency to avoid change. We must seize the opportunity to propel Amateur Radio forward into the 21st century and to leverage our tremendous history and organizational structures for forward progress – "*before there is nothing of value left to cannibalize*."

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[6] "Study: Innovations come from abrupt shifts", UPI, September 28, 1998, see http://nt.excite.com/news/u/980928/10/businss-businessstudy

There is a strong inclination to look to the past for inspiration, and then tinker with a few items to put a new face on Amateur Radio. But mere tinkering does not fundamentally address the requirements of an Amateur Radio Service for the 21st century[7]. The FCC's WT Docket 98-143 has not chartered a particularly broad course, but offers important proposals to simplify many aspects of the Amateur Radio Service and seeks comments on the applicability of the telegraphy requirement and whether new technologies are adequately addressed. The next section addresses the argument for-or against – a telegraphy requirement, and is then followed by sections discussing specific rules changes that would bring the Amateur service up to date with contemporary public requirements.

### *4.1 A Rational Basis For-or-Against Telegraphy Requirements*

The FCC has requested input on the matter of telegraph proficiency requirements in the Amateur Radio Service. There are many critical policy issues and changing public requirements facing the Amateur Radio Service and the telegraphy issue is merely one point amongst many. Restrictive antenna regulations, FCC regulations that place surprising prohibitions on innovation (see section 7) and changing population demographics all have impacts on the ability of Amateur Radio to serve the public.

Amateur Radio operators communicate using a wide variety of communications modes. Under the existing examination program, prospective Amateur operators must demonstrate proficiency in only one mode of communications, that of telegraphy (also referred to in this filing as "CW" or "Morse"). Thus, proficiency in CW is weighted heavily in the skill set required of an Amateur Radio operator. In 1990, the telegraphy requirement was eliminated for the Technician class license; since that time,

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[7] The ARRL's proposed Class A, B, C, and D license designators are unnecessarily confusing. Let us

approximately 185,000 new licensees have entered the Service through the “no code” Technician license.

Historically, CW served a critical and important role in communications. However, in 1998, commercial applications of CW have been replaced with the use of new and more efficient technologies capable of handling more traffic than can be handled by CW. New technology has eliminated the need for specialized radio operators trained in the use of telegraphy, and freed them to develop skills in contemporary communications technologies. While CW may serve a role in emergency communications, its use is greatly diminished from what it once had been; it is extremely rare today to hear of CW being used for primary emergency communications. New technologies relay more messages, faster, than CW. In the late 1980s, I participated in an earthquake disaster drill in California. As part of the exercise, hundreds and hundreds of messages were entered in the ARRL’s National Traffic System using packet radio technology. Unfortunately, at that time, much of the NTS relied on CW nets downstream to deliver the messages. The ability of packet radio to accommodate vastly greater bandwidth than existing CW nets resulted in the refusal of some CW nets to carry the high volume of traffic generated by this bona fide disaster exercise. The continued reliance upon CW for message traffic proved a hindrance to one of the five primary goals of the Amateur Radio Service specified in Part 97.1 for providing emergency communications. The reliance on CW traffic nets was a case of preserving a technology that no longer met the demands required by the society that we serve. *In effect, the demands of our modern society – with its vastly larger population than decades ago,*

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continue with the existing Technician, General, Advanced and Extra licenses.

*greater demand on communications during emergencies, and new technologies developed to meet those demands - has rendered CW traffic nets obsolete*.

No matter how much we personally enjoy using CW, or how much we personally enjoy World War II aircraft or steam locomotives – society's requirements, and the advance of technology to meet those requirements, has relegated all of them to a proud moment in history.

### *4.2 Does the Public Demand More or Less Telegraphers?*

The Amateur Radio Service exists to serve the public and is structured to meet the requirements of the society that we serve. Therefore, to determine whether or not there should be a Morse code proficiency requirement for Amateur radio operators is equivalent to asking "What quantity of Morse proficient operators are needed in today's society to meet the communications requirements of the public that we serve?" The FCC answers this question directly in Docket 98-143, paragraph 20, "E. Telegraph Examination Requirements", writing: "*We also stated that we believed that telegraphers would be in less demand than electronics and communications experts*."

*Thus, the rational argument for – or against – a Morse proficiency requirement in the Amateur service is a determination that the public-at-large requires more or less telegraphers*. If the public has requirements for more telegraphers, than the Amateur service should be structured to encourage the widespread adoption of telegraphy skills. If the public no longer has a requirement for a large pool of telegraphers, then the Amateur service should no longer require telegraphy skills or should only require skills sufficient to generate the quantity of telegraphers required.

### *4.3 Telegraphy Proficiency as a Filter*

There is widespread opinion that a telegraphy requirement is discouraging worthy people from participating in the Amateur Radio Service. Such persons have no interest in learning Morse code, yet desire to apply their skills and knowledge in advancing the radio art and serving the public. The Morse proficiency requirement is a dated requirement that does not develop skills required for the future, so they do not participate[8]. Since 1990, the introduction of the "code free" Technician class license has introduced approximately 185,000 new Amateurs to the Amateur Radio Service. Today, this block of "new" Amateurs represents almost 30% of all licensed Amateurs. In January 1997, Fred Maia, W5YI, published data showing that in 1996, the U.S. Amateur population grew by 1%. The combined total of General, Advanced and Extra class licensees actually *declined* during this period*;* only the growth of Technician class license holders (due primarily to the "code free" license) enabled a slim 1% growth. According to W5YI, almost no Amateurs were upgrading to higher license classes. In a broad sense, through these actions and the replacement of commercial telegraphy with new technology, society is telling us that telegraphy proficiency is no longer considered a high priority to meeting the public's needs for an Amateur Radio Service.

### *4.4 The Arguments For Telegraphy Proficiency*

Most arguments concerning the Morse proficiency requirement center on the historical, the emotional, the "disaster scenario" or the concept that Morse code acts as a

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[8] People who work in technology know that it is critically important to constantly learn new technologies and new skills in order to remain on the leading edge of their profession. Those who work on the trailing edge of technology often find their skills out of date and no longer relevant – and hence, out of work. As such, a smart career move is to focus on *forward-looking* technologies, rather than old technologies – no one can afford to spend time on old technologies that are likely to soon be obsolete. The nature of high tech work is directly applicable to the Amateur service – technologists do not see developing a telegraphy skill as a forward looking skill set. Therefore, a telegraphy requirement acts as a bona fide discouragement for such persons to pursue developing skills – and applying their knowledge for public benefit - in the Amateur service.

"filter" to keep people out of the Amateur Service[9]. I have never seen an argument for – or against – based on the rational question of whether or not society demands more – or less – telegraphers.

A popular historical argument is that CW was tremendously important in World War II, and to a declining extent, in the decades past the War. Therefore, CW might be important again in the future. This argument, however, ignores the changing requirements of the public we serve and presumes that "yesterday's bag of tools" will be used "to solve tomorrow's problems". History shows that technologies become obsolete over time and are replaced with improved solutions to meet the demands of the present, not the past. For example, during the Gulf war, Kuwaiti amateur radio operators transmitted clandestine intelligence reports using a variation of packet radio technology rather than CW.

The "disaster scenario" argument is that CW is critical to emergency communications. In reality, the use of CW during emergency communications has dwindled to an almost imperceptibly small percentage of total emergency communications. When floods occur in Texas, or in Grand Forks, North Dakota, or when hurricanes strike the south coast, Hawaii, or Florida, or when earthquakes or wildfires devastate the western U.S., primary emergency communications is handled overwhelmingly (close to 100%) by voice or packet radio technologies. When a disaster occurs, is society better off having a small group of radio operators, who happen to know but do not use CW? Or are we better off having a *large* group of radio operators who are

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[9] See Memorandum to the Telegraph Division, May 28, 1936, "Recommendation of Board of Directors, American Radio Relay League with Respect to Amateur Matters" in which K. B. Warner, the Secretary and General Manager of the ARRL requests that the telegraphy proficiency requirement been increased to 12.5 wpm to act as a more effective "filter" to reduce the number of amateur operators.

proficient in modern communications technologies? Modern problems are not demanding the use of CW as the communications solution.

### *4.5 We Have A Shortage of Engineers, Not Telegraphers*

No matter how much we as Amateur radio operators enjoy using CW[10] and desire to "keep Morse code alive"[11], the survey question should not be "Do hams like Morse code?" Instead, we should be asking "Does a Morse proficiency requirement meet our mission of serving the public?" To paraphrase the FCC's wording of "we believed that telegraphers would be in less demand than electronics and communications experts" we should ask "How many telegraphers does the United States require today?" Based on the available evidence[12] the answer is that this is a small number. The public we serve has a vastly greater demand for technicians and networking experts than for telegraphers. For example, in October 1998, the U.S. Congress passed H.R. 3736/S.B. 1732, which was subsequently incorporated into the $500 billion dollar omnibus appropriations bill. This legislation greatly increased the number of immigrant engineers who may be issued temporary visas to work in the United States in order to relieve an alleged "drastic shortage" of engineers and computer software specialists. No such legislation has been proposed to issue temporary visas to telegraphy specialists, suggesting that the U.S. has a much greater demand for engineers and computer scientists than it does for telegraphers. In actuality, the U.S. appears to have a significant excess supply of telegraphers relative to demand.

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[10] Under a previous callsign, I hold a 25 wpm ARRL Code Proficiency Certificate. I view the simplicity of CW communications and equipment as part of what I call "the magic of radio", which encompasses such magical moments as communicating over a 1,000 miles on milliwatts of RF, or communicating out of a canyon on UHF using tropospheric ducting – Magic!

[11] See WT Docket 98-143, paragraph 23, citing an ARRL survey stating that ""Among all amateurs, members and non-members, 57 percent favored retaining the Morse code requirement, while 35 percent regarded it as not relevant."

[12] Most all radio services have discontinued the use of Morse code transmissions.

Logically, the interests of the U.S. are to orient the Amateur service towards meeting the goal of creating more technicians and engineers than of telegraphers[13]. The need of electronic and radio communications specialists is increasing at a tremendous rate. Our Service's existing heavy weighting of the telegraphy requirement has produced an Amateur radio service that is no longer optimized to the needs of today's society. In a world of economic choices, the "public" will choose to use radio spectrum for the services that deliver the greatest public benefit. When a Morse proficiency requirement reduces the effectiveness of the Amateur service[14], the public can and does choose to re-allocate the spectrum to uses that it considers more economically effective.

Based on this discussion, the logical conclusion is that a Morse code proficiency requirement is no longer demanded by the *public we serve*[15] and does not meet the needs of society today or in the foreseeable future. Thus, the rational argument against an Amateur Morse proficiency requirement is based on a demonstrated lack of demand for telegraphers. A rational argument in favor of a Morse proficiency requirement would be based on a bona fide and large demand for telegraphers. I am unable to find evidence that there is a demand for telegraphers or that our society desires using the Amateur Radio Service as a mechanism for producing more telegraphers. Therefore, I conclude that a

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[13]The Amateur Radio service exists, in part, as a service of self-study and education in technical skills. Through Amateur Radio, thousands of individuals have developed an interest in technology that developed into a life long career in technology, developing products and services to serve humankind. For example, I was first licensed at the age of 13. Shortly thereafter, an early Amateur radio satellite, OSCAR 6, was launched. My interest in listening to the spacecraft's signals led me, as a teen, to learn how to program a PDP 8E minicomputer. As a high school student I independently developed the mathematical solutions to track the OSCAR spacecraft in the sky by both azimuth and elevation. Not surprisingly, I entered college and earned a degree in computer science and went on to apply my wireless knowledge as a wireless technology analyst and advisor in one of America's best-known computer companies. My story is not unique. There are thousands of technologists who started in Amateur Radio – and who are today leading our country's economic success in communications and computing.

[14] "Clearly, we do not have nearly enough people to cover all of our needs [RACES obligations], in "RACES Works on Oahu", QST, November 1998, page 84.

[15] Surveys of Amateur Radio operators indicate a majority would like to retain a telegraphy requirement. However, Amateur Radio exists *solely* to serve the public, not to fulfill its own self-interests. Therefore,

general telegraphy proficiency requirement no longer meets the requirements of the public that the Amateur Radio Service exists to serve.

The ARRL has proposed steps towards accepting this conclusion by reducing the Morse code proficiency requirement to 5 wpm for the General class-equivalent license and 12 wpm for the Advanced and Extra class licenses. The proposal of the National Conference of Volunteer Examiner Coordinators has produced a logical alternative to our current licensing scheme putting in place a process of adapting the Amateur Radio Service to the public requirements of the 21st century, particularly with respect to the Morse proficiency requirement. Their proposal would reduce the Morse proficiency requirement to 5 wpm, and likely eliminate a Morse requirement if international regulations are changed, possibly in 2001. Even if the telegraphic proficiency requirement for licensing were changed, many Amateur Radio operators will voluntarily continue to use telegraphy (including me). Such voluntary uses of telegraphy would continue to maintain a reservoir of proficient telegraphic operators well in excess of the current demand for telegraphers.

An elimination of telegraphy requirements need not and should not mean a reduction in standards. Instead, the requirements for the Amateur service should evolve to be consistent with contemporary technical requirements, particularly in regards to modern communications technologies. Suggestions for these standards are described in the next section.

## 5. High Tech Amateur Radio and the Digital Era

In years past, a “radio” consisted of circuitry to implement oscillators, mixers, amplifiers, matching circuits, modulators, demodulators and other components to perform

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the relevant question is whether or not society in general has a demonstrated demand for telegraphers, not

signal creation and detection. Modern radios today are controlled by microprocessor technology. Microprocessors, in turn, use software to provide a variety of enhanced functions to the operation and control of radio components. Software also provides for new "applications" of radio technology such as signal processing, the automatic packet reporting system, electronic mail, online databases, digital imaging, data compression and error correction, "high speed CW"[16] and other applications. Today, some companies, such as Motorola, have announced the production of "software radios" – literally, radios whose modulation characteristics are altered through software control. "Software radios" enable a single radio device to implement a limitless variety of modulation schemes and communications protocols, providing for the utmost in flexibility (and experimentation possibilities!).

We live in a digital era. But the present qualifications for an amateur radio operator focus on narrow bits of radio technologies, not the overall set of technologies that are part of today's radio telecommunication systems. From today onward, a basic understanding of modern technologies is more valuable to the public than a similar knowledge of telegraphy. Time spent learning and maintaining proficiency in telegraphy is time not spent becoming proficient in the technologies of the modern era. From an examination perspective, prospective amateurs should have a basic understanding of the digital technologies used for control and operation of today's radio systems. Examination questions should be geared to ensuring a *basic understanding*, not

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whether those of us who are Amateurs "like CW".

[16] High Speed CW uses computer software to generate extremely high speed Morse code transmissions such as 4000 or 8000 letters per minute. Such signals are transmitted using a computer to generate the keying via the computer's audio output port, and interfacing that the microphone input of the transmitter. Amateur radio operators use this technology to communicate via meteor scatter propagation modes at VHF radio frequencies. At first glance, this appears to be an innovative reason to demand telegraphy skills. However, in reality, HSCW is no different than pulse code modulation that just happens to use a coding scheme based on the Morse code.

necessarily *expert proficiency* in the new technologies (some of which are quite complex). Our exams should not require that you demonstrate expertise in software development, digital circuit design or signal processing. But they should require that you have a basic understanding and knowledge of how software and digital technology are being employed in radio communications today. That means a basic understanding of signal processing and modern data networking concepts, and an understanding of how digital technology is being employed in radio systems to provide processing gain, bandwidth reduction, frequency re-use and error reduction, and to implement system control functions.

Even though we have been in the digital era for some time, present FCC regulations often prohibit Amateur Radio operators from innovating using the latest technology: For example[17]:

- Current regulations place burdens on spread spectrum (SS) systems - techniques that are now state-of-the-art in unlicensed wireless systems and some cellular phone networks (our home's cordless phone uses direct sequence spread spectrum). 97.311 requires that you "Maintain a record, convertible to the original information (voice, text, image, etc.) of all spread spectrum communications transmitted" *for a full year*. You cannot realistically use SS technology for *routine* Amateur communications unless you are prepared to maintain a copy of every transmission you ever made. By law, we are prevented from adopting state-of-the-art technology for *routine* Amateur communications. As spread spectrum technology is now in widespread use in the commercial sector (CDMA digital cellular/PCS telephony, for example), this logging

[17] This list is adapted from "The Decline of Amateur Radio?", published in February 1997 at http://hamradio-online.com/1997/feb/opinion.html

requirement should be stricken from Part 97. Has the Commission ever found a need to review these existing communications records of any Amateur station?

- Paradoxically you *can* operate an unlicensed SS transmitter at the 1 watt power level in the Amateur bands at 902, 2400 and 5725 MHz and do anything you want - but not as an Amateur station! Unprotected and unlicensed Part 15 SS devices sharing the Amateur bands can do anything they want. Does this make sense to you?
- In 1996, the Tucson Amateur Packet Radio group had to fight hard for a special temporary authority to operate direct sequence spread spectrum communication technology in the Amateur bands. While the ARRL said it supported TAPR's efforts, it then opposed most of the details in the TAPR proposal.
- Legally, you can transmit digital data using data compression - but you must "Maintain a record, convertible to the original information, of all digital communications transmitted" *forever* (see 97.309(3)). This renders the use of data compression as a method of improving spectrum efficiency unusable for routine digital communications for data, voice or image operations. Merely using the popular PKZIP program to compress computer files before sending them over packet requires that you keep a copy of those files, *forever*. Does this make sense? Of course not – I strongly urge the Commission to strike this requirement from Part 97. By eliminating this record keeping requirement (has the Commission ever requested anyone to produce these records?), Amateurs can begin to employ data compression technology to improve spectrum utilization.

- Part 97 effectively prohibits Amateurs from adopting modern digital communications technology for *routine* day-to-day communications. Yes, you can experiment but forget about widespread adoption of your inventions.

As part of a rule rewrite geared to upgrading the Amateur Radio service to contemporary standards, unnecessary restrictions like those just described should be stricken from Part 97.

Amateur radio is caught in another bind, however, concerning its interfacing to the Internet. The Internet is becoming the glue that ties all forms of communications together, but Amateur radio may be limited in its ability to directly interface to the Internet. Amateur 56 kbps wireless modems are available - and there is no fundamental reason why we are not building 1 million bit per second networks. The technology is available off the shelf, today. However, wireless Amateur Internet access might conflict with extensive "content" restrictions regarding what is legal to transmit over Amateur radio. Communications systems of the present and the near future are all finding that they are enhanced through the capabilities of internetworking. Can Amateur Radio make use of the broad capabilities of the Internet without running into “content” restrictions? Or have we legislated ourselves into a dead end?

Advances in ad hoc, dynamic Amateur networks for both data and digital voice - and the Internet - are just waiting to happen. *But ironically, those innovations are more likely to come from non-hams building high speed Internet access on the unlicensed "Wireless NII" bands, free of innovation-stopping regulation.*

The FCC must address these limitations on innovation in the Amateur service. If these rules are not changed, digital experimentation and the development of exciting new

applications will largely come to a halt. And the value of the Amateur Radio Service to the public will be diminished by these restrictive regulations.

## 6. RACES

The Commission has proposed to eliminate Radio Amateur Civil Emergency Service (RACES) licenses because the emergency communications routinely transmitted by RACES stations can also be transmitted by primary, club and military recreation stations. I support this proposed elimination.

Further changes should also be made to the RACES rules. The rules presented in 97.407(e)(4) state:

> "(4) Communications for RACES training drills and tests necessary to ensure the establishment and maintenance of orderly and efficient operations of the RACES as ordered by the responsible civil defense organization served. Such drills and tests may not exceed a total time of 1 hour per week. With the approval of the Chief Officer for Emergency Planning in the applicable State, Commonwealth, District or Territory, however, such tests and drills may be conducted for a period not to exceed 72 hours, but no more than twice in any calendar year."

Amateur radio operators, via RACES, are an integral part of disaster planning in numerous local communities across the country. Local communities implement disaster-training drills on an irregular basis depending upon the needs of the community and the served agencies. Local emergency planners can and do provide for drills of greater than 1 hour in duration, and sometimes more often than twice per year. Under this existing rule, Amateurs, by law, could be required not to participate in certain disaster exercises, or could be required to "walk off the job" after an hour of drill operations. Since many drills

have a duration of 1/2 to 1 full day, this could require that Amateurs be dropped from the exercise. It is not clear how this rule satisfies the public's need for emergency and disaster communications support by Amateur Radio operators.

If there is a bona fide need for restrictions to be placed on drill participation (I am not aware of any), then a more flexible limitation could be structured to limit total time to say, 16 hours each month. I strongly recommend that 97.407(e)(4) be structured to provide Amateurs and local emergency management planners with the greatest flexibility in how drills are conducted.

## 7. Conclusion

Today's technology is obsolete tomorrow. New demands and requirements cause new technical solutions to be invented. Through this process, technology grows and adapts to meet the contemporary requirements demanded by the public. Therefore, *change* – especially in technology endeavors like Amateur Radio – is normal and healthy. Docket 98-143 provides us with an opportunity to reshape Amateur Radio to meet the demands placed upon it by the public for the 21st century. We cannot and must not focus on the past but must instead look forward and adapt to the realities of today and tomorrow.

The FCC, the ARRL and the NCVEC have all proposed changes to the regulations concerning Amateur Radio. The ARRL's proposal is a step in the right direction – the NCVEC takes the process one step further in simplification and in the recognition of the changing role of telegraphy. I support both proposals.

Amateur Radio exists to serve a public need. In my comments, I have proposed an alternative way of examining the CW requirement for Amateur Radio licensing. The key is to ask "What quantity of CW operators does the public demand of the Amateur radio

service?" The telegraphy proficiency requirement is then viewed in terms of how it fills – or does not fill – a demand by the public for telegraphers. The available evidence is that the public does not have a demand for telegraphers that must be met by telegraphy requirements in the Amateur service. The public has an overwhelming demand for technically trained people who lack telegraphy proficiency, as illustrated by the passage of H.R. 3736. In this regard, the Amateur service must be structured to support the requirements of the public.

*Amateur Radio is poised to become the high tech hobby and public service of the 21st century*. No other activity combines high technology in wireless communications, digital communications, computer networking – and the opportunity for advancement of the state of the art while providing a genuine service to the public. Amateur Radio should be one of the most exciting areas of endeavor in the coming years, introducing youth to technology and to careers in technology, advancing the communications art through self learning and experimentation, providing emergency communications in times of disaster, and in serving the public. Let's ensure that our regulatory infrastructure and its concomitant licensing and examination requirements reflect contemporary requirements and demands – rather than the requirements of 20 or 50 years ago. Let's design an Amateur Radio Service for the 21st century.

Respectfully submitted by:

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November 9, 1998

*Certificate of Service:*

The American Radio Relay League submitted three Petitions which are being addressed in Docket No. WT 98-143. On November 9, 1998, I mailed this document to ARRL General Counsel Christopher D. Imlay, of the Law Firm of BOOTH, FRERET, IMLAY & TEPPER, P.C., 5105 Wisconsin Avenue, N.W., Suite 307, Washington, DC 20016 as required by Section 1.47 and 1.405 of the Commission's Rules (47 C.F. R. 1.47, 47 C.F.R. 1.405).

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