

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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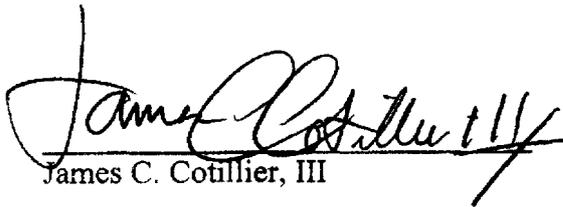
In the Matter of)	
)	
1998 Biennial Regulatory Review)	WT Docket Number <u>98-143</u>
Amendment of 47 C.F.R. §97)	
Amateur Radio Service Rules.)	
)	
FCC Report and Order)	FCC Report and Order 99-412

To: The Secretary
Federal Communications Commission

**COMMENTS BY JAMES C. COTILLIER, III, IN SUPPORT OF THE PETITION
FOR PARTIAL RECONSIDERATION FILED BY WORMSER, ADSIT AND
DINELLI IN THE ABOVE-CAPTIONED MATTER**

DATE: 18 May 2000

Prepared by


James C. Cotillier, III

Cc: Chairman William E. Kennard
Commissioner Susan Ness
Commissioner Michael Powell
Commissioner Harold W. Furchtgott-Roth
Commissioner Gloria Tristani

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ABSTRACT

James C. Cotillier, III, a licensed Amateur Radio operator and primary control operator of radio station WA6IYH, representing himself, hereby respectfully submits these Comments to the Commission, assembled, in strong Support of the Petition for Partial Reconsideration filed in the matter of the above-captioned proceeding on or about 17 January 2000, and amended 22 February 2000, by Messrs. Alan J. Wormser, Frederick V. Adsit and Michael J. Dinelli (hereafter, "Wormser *et al.*").

Having thoroughly reviewed both Wormser, *et al.* and the Report and Order¹ referenced by same, 65 Fed. Reg. 6548, *et seq.* (hereafter "FCC 99-412"), I find the comments of petitioners Wormser *et al.* to be meritorious and compelling, and I strongly support the basis and purpose of their petition.

The Comments submitted herewith do not propose fundamental amendments to Wormser, *et al.*, but do seek further to elucidate their exposition, and in some specific areas, suggest particular and specific enhancements.

The format of this Filing is to follow the structure of the Petition of Wormser, *et al.*, by commenting on specific sections, as follows:

EMPHASIS ON TECHNICAL QUESTIONS
APPLICANTS REPEATING FAILED TESTS
AMATEUR EXTRA CLASS TELEGRAPHY EXAM

This Comment proposes:

- **A greater emphasis be placed on *demonstrated technical knowledge* by means of the examination system**
- **A greater attention be placed on the technical *quality* of questions in the examinations, independent of *quantity***
- **Immediate retakes of failed tests be disallowed**
- **A means be implemented for correcting for random guessing**
- **A two-tier scale be instituted for Morse code proficiency across the three classes of Amateur certificate**

¹ FCC REPORT AND ORDER 99-412, 65 Fed. Reg. 6548 *et seq.*; WT Docket 98-143; RM-9148; RM-9150; RM-9196.

II. EMPHASIS ON TECHNICAL QUESTIONS

1. It has been pointed out by the Commission² that there has been a trend toward amateurs as *users of commercial equipment*, as opposed to the past common practice of amateurs as *designers and manufacturers* of their own receivers, transmitters and ancillary equipment. Some have contended that this is an indication that the Amateur Radio service is slowly evolving into another “buy and talk” service, analogous to GMRS or even FRS.³

2. Without addressing the validity of such a claim, it remains that the amateur license conveys technical privileges which are not enjoyed by licensees of “buy and talk” services, and that is the authority to maintain, support and modify commercial *and* “homebrew” equipment as desired, and in fact to construct such equipment, as commonly done in the past, completely from discrete hardware and electrical components.

3. Analogous to technical certificates in other services (e.g., the General Radiotelephone Operator License, “GROL”), an Amateur Radio license attests *prima facie* that the holder is certified by the Federal Government to be competent to effect such technical work on equipment used in the amateur service. This work, if improperly performed, could cause a spectrum of ill effects, ranging from nuisance interference to other services, to personal injury and even death, as a result of dangerous voltages and radio frequency energy levels, which are commonly found in transmitting equipment of any vintage.

² FCC Report and Order 99-412 at 44, footnote 175, in reference to duly noted Comments.

³ General Mobile Radio Service; Family Radio Service.

4. For users of “buy and talk” services, modifying and maintaining transmitting equipment without appropriate certification (e.g., GROL and related certificates) remains a clear violation of Federal statute.

5. The dilution of *verified* technical knowledge, sufficient to carry out all facets of the class of operation for which the licensee is certified, is a severe disservice to Amateur Radio and indeed to public welfare itself. In strong opposition to those comments, which have been filed in favor of reducing technical standards and rigor in the Amateur service, I submit that Amateur Radio has always been, and continues to be, a fundamentally technical privilege, whose participants must continue to demonstrate requisite *engineering* proficiency.

6. It has also been pointed out that recent engineering advances, such as ever higher densities of component integration, make the modification and support of new commercial equipment out of the financial reach of many individual amateurs, due to the cost of specialized tooling, assembly and test equipment. While that is indeed true in this arena, it must be remembered that these new techniques have not altered the laws of Physics, and it is still possible, satisfying and instructive to build equipment from traditional discrete components – as well as from prepackaged kits – with tools and techniques available to nearly every amateur.

7. The need for *demonstrated knowledge*, practically or through detailed written examination, is fundamental and must continue to be addressed robustly.

8. To address the issue of question count on exams, it should only be necessary to point out that there is certainly no conceivable written examination which would allow us to test every detail of technical knowledge, and thus we have no choice but to aim for a threshold of knowledge and deem that sufficient for our purposes. A higher number of questions merely provides a more finely graduated ruler with which to do the measuring.

9. But this is only to our advantage *as long as the questions are well thought out*, and thus I advocate placing higher emphasis on quality than quantity. The body(ies) charged with constructing the examinations should continue to be receptive to input from the technical community at large, to maximize the utility of every question to be included. Then, corrected for guessing using a method such as described below, the value of each test would be optimal.

10. A representative example of a question that could be improved comes from Element 4B (in use prior to 15 April 2000):

- E7B02 (B)
How many states does a decade counter digital IC have?
- A. 2
 - B. 10
 - C. 20
 - D. 100

This is probably not the best use of question space, especially if the examination has a limited number of questions: it is commonly known that the prefix *dec* means *10*.

11. An example of a better use of technical question space might be:

A parallel resonant circuit (“tank”) consisting of an inductance of L millihenries and a capacitance of C microfarads resonates at 7.1 MHz. Which of the following can be done to change the circuit so that it resonates at 14.2 MHz?

- A. Double either the value of L or of C, but not both
- B. Quadruple either the value of L or of C (but not both), or double both the value of L and the value of C
- C. Reduce by 75% the value of L or the value of C (but not both), or reduce both L and C by 50% of their respective values
- D. Lower the circuit Q by a factor of 2 by adding an appropriate resistance

The correct answer is (C), as evidenced by inspecting the formula for the resonant frequency of an L-C circuit:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

12. This kind of question has the advantages that:

- The knowledge being tested is likely to be used in actual amateur practice: the frequencies 7.1 MHz and 14.2 MHz are within amateur frequency bands, and this is a circuit modification that is likely to be needed at some point in amateur operation
- It is not just “memorize formula, plug in numbers” – it asks for a *practical approach* to problem solving
- It does not require advanced techniques to solve, but is not trivial
- The distracters all sound plausible to a person who is merely guessing

13. This question is appropriate for General class or higher, since the critical formula is (and has been) part of the required knowledge base for those classes.

14. The fewer the questions on a given examination, the more measurement value each one must have.

III. APPLICANTS REPEATING FAILED TESTS

15. In support of Wormser, *et al.*, I first submit the following personal and anecdotal narrative.

16. On the evening of 14 April 2000, I appeared before a VE⁴ panel in California in order to take the Element 4B examination, in partial fulfillment of the requirements for amateur Extra class. Although a necessary level of decorum was enforced at the session, the acoustics and geometry of the room were such that some conversations between other examinees and the VE's could be overheard, and this could not be avoided.

17. I completed my examination in roughly twenty-five minutes, then stood on line for the panel of examiners to take and correct my answer sheet. I was on line for some time, and during that period I personally observed another applicant request, and be granted a retake of an element just failed. As I was packing my personal effects in preparation to leave the session, I believe (but am unsure) that the same applicant attempted the examination a third time.

18. In a subsequent conversation after the examination was secured and closed down, one of the VE's told me privately that he and colleagues at times see examinations where there are so many incorrect answers, that random guessing is the only reasonable explanation.

⁴ VE('s): Volunteer Examiner(s); member(s) of a team of persons empowered to administer license examinations; under administrative supervision of Volunteer Examiner Coördinator.

19. To permit these practices, specifically the consecutive retaking of an element at one sitting, invites this kind of gross abuse, makes a mockery of the entire examination system, and is absurd. I propose two specific remedies, one in concert with Wormser, *et al.*, and a further proposal consistent with the spirit of their Petition.

20. Examinations have at least a dual role. One is to measure depth and breadth of knowledge learned from a pedagogy; another is to provide a predictor of the likelihood of success in later *practicing* the profession or craft just learned.

21. There have been comments to the effect that the amateur examinations can be weakened, and thus allow new hams to “learn on the job.” Since, as pointed out above, the misuse of transmitting equipment can, both directly and indirectly threaten property, life and limb, a modicum – and a fairly large one – of verified knowledge, cannot be compromised. This is fully in agreement with Wormser, *et al.* and with long-established practice.

22. A failed examination indicates a knowledge insufficiency; further study is indicated before the exam is retaken. This cannot be the case when an examinee immediately retries the same exam element.

23. To weaken the examination system by way of permitting instant retakes, reducing the number and depth of the questions presented, and at the same time not instituting a means of correcting against passing by repeated random guessing, is to compromise Amateur Radio as a service and indeed public safety itself.

24. *Recommendation.* In light of the foregoing, I propose that a mandatory waiting period between successive retakes of a failed examination be re-instituted. This is consistent with past practices of written examinations given under 47 C.F.R 97, *de jure*, and such re-institution would greatly enhance the credibility of such examinations.

25. To the extent that an examination is passed by resorting to guesswork, that examination has failed its intended purpose of measuring the applicant's level of existing knowledge: random answer choices, that happen to be correct, mean nothing.

26. *Recommendation.* I now further propose the adoption of a mechanism long used in the educational community⁵ to correct for random guessing, and so to improve the measurement accuracy of written examinations, and that is the assignment of *negative credit* for incorrect answers, for tests in the multiple choice format.

27. Typically, the examination is graded in this way: the correct responses are tallied, and from that number each *incorrect* answer results in the subtraction of one-quarter point; no action at all is taken for questions to which the examinee did not respond at all.

⁵ Educational Testing Service, College Entrance Examination Board, *e.g.*, *Scholastic Aptitude Test*.

28. Although on a point-for-question examination, this procedure would likely result in a fractional (“mixed number”) score, a much finer and more accurate measure of the applicant’s true knowledge is thus obtained. Techniques for correcting these examinations can be employed in such a way as not to place an undue additional burden on the administering VE’s and the VEC.⁶

29. This Comment does not specifically propose, but admits the possibility, that future examinations could be constructed whose questions have unequal point value, again consistent with academic practice. Since these would likely require more attention to correct than the present format, they would presumably only be used in atypical circumstances or with advanced and specialized topics.

⁶ The scoring can be scaled by an integral factor, say four; four points are given for each correct answer. A 50-question examination would thus have 200 possible points. At this scale, for each incorrect answer, *one* full point would then be subtracted from the total correct, and fractional scores are thus avoided.

IV. AMATEUR EXTRA CLASS TELEGRAPHY EXAM

30. Certainly, a large impetus for much of the discussion and rancor concerning Amateur Radio Restructuring surrounds the various proposals for amendments to the Morse code proficiency requirement⁷. The code itself, as a catalyst of discussion in its own right, appears to have drawn disproportionate fire, much of which, sadly, is based on personal preference, taste and emotion, and not on a solidity of fact.

31. Communication by Morse code radiotelegraphy (“CW”) has shown itself to be invaluable in urgency and emergency situations. There is no need here to proceed into technical detail or lengthy anecdotal justifications; there has been already been a thorough treatment in other Comments describing the value of CW as a communications medium when other modes can not be used due to technical reasons or atmospheric conditions.

32. Beyond the requirements of law and international treaty⁸, the simplicity of the code, coupled with internationally understood extensions such as the “Q” signals, and its bandwidth efficiency, clearly make the code an indispensable communications tool.⁹

⁷ Hereinafter, by “Morse Code” we mean “International Morse Code” – the code in common use today – as opposed to the original American Morse Code of Samuel Morse himself.

⁸ *Radio Regulations*, as amended, referenced by FCC 99-412 at 2, footnote 4..

⁹ C.f., References, [4].

33. Nevertheless, many individuals and indeed at least one organization,¹⁰ have made a fundamental agenda of eliminating the amateur requirement for CW proficiency altogether, worldwide. This flies in the face of the vast corpus of data, including hundreds of accounts of successful uses of CW during times of disaster, individual emergency and armed hostilities, in which the use of other more complex modes was not an option. Indeed, if radio communications were destroyed altogether, one could, for example, make use of a flashlight to communicate a critical message, given knowledge of the code.

34. If one assigns a “value” to a mode of operation, defined as *capability* divided by *complexity*, it can easily be seen that the code medium, as quite capable, but requiring minimally complex transmitter circuitry, scores well against more complex modes, such as SSB or FM phone, which have higher information throughput per unit time, but much more complex circuitry, due to the modulation requirements. Any effort to sunset and eventually remove CW from the amateur’s repertoire is to do damage to the service as a whole.

¹⁰ *C.f.*, References, [3]; also *c.f.*, <http://www.nocode.org>, for its position statements.

35. Professional code training organizations typically contend that it is well established that the human brain processes the code differently at different speeds. Students first learning the code almost universally encounter “plateaus” as their proficiency increases; this is presumably due to a fundamental shift in the way the brain stores and retrieves the data. This is analogous to learning a foreign natural language: at first one learns the syntax and vocabulary, then speaks the language by real-time translating his/her native language expressions into the new language, and vice versa, thus producing halting speech, interrupted at points which are often unnatural to native speakers of the foreign language.

36. As proficiency increases, the learner merges into the realm of automatic speech, through deeply rooted reflexes, which mimic the native speaker, and communication is greatly improved.

37. I submit that the same is true for CW. A speed of 5 wpm is easily sufficient to prove that one knows the letters, figures and procedural signs; it is not a speed at which effective practical communication can take place.¹¹ This Comment does not specifically recommend a return to precisely 20 wpm, say, for the Extra class, but it does put forth that at least a two-tier system should be retained.

¹¹ Consider attempting to speak English by using a stopwatch, and allowing say, two seconds to elapse between each consecutive word. The listener would surely tire very quickly, pay less attention, and communication would be compromised.

38. *Recommendation.* As now established in the R&O, in order to become licensed, Extra class operators must have demonstrated a higher level of expertise than those of subordinate classes, in all examined areas – except in Morse code proficiency, which currently resides at a monolithic 5 wpm for all classes. I recommend at least one tier above 5 wpm be set aside as a specific requirement for Extra certification. This is consistent with the historical spirit of graduating advancement requirements as one advances in privilege, and establishes that the Extra applicant will be able to carry on CW communication, as with all other modes, in a *practically effective* manner.

39. This Comment does not intend to contradict Wormser, *et al.*, specifically, or any other filing which has put forth specific speeds for Extra, I merely hold that the concept of a tiered proficiency spectrum is consistent with the formalism of human learning and communications skills, and is consistent with the historical spirit of earned advancement.

40. As a practical matter, a simple and direct compromise between the required 5 wpm (below 30 MHz) and the traditional Extra required speed of 20 wpm, would satisfy the position put forth in this section; this would be the mean: of either 12 wpm or 13 wpm (the traditional speed required for General/Advanced). This is fast enough that operators at the top amateur class would have demonstrated their ability to communicate in this medium effectively, while at the time deferring to those who would view 20 wpm or higher as a mere affectation or status symbol. This Comment makes no proposal to increase the required Morse code speed for the Technician or General class above the current 5 wpm; it involves only the Extra class.

41. Additionally, the vast pool of operators in the classes General and Advanced, as defined before FCC 99-412, have, in general, already demonstrated the ability at least to receive and copy a Morse code text at the rate of 13 wpm. These operators would not need to be retested in the code, should they attempt to upgrade to Extra.¹² These would be automatically “grandfathered” in the code, along with existing Extra licensees of the same period.

42. I stipulate that a procedural difficulty might exist in the case of operators who have upgraded to Extra class under FCC 99-412 during the interim the R&O was in effect, but before enactment of the amendments being proposed here, who, for various reasons, had not previously been required to demonstrate 13 wpm proficiency. Those who were previously General or Advanced, of course, satisfy the proposed amendments *a priori*, but those who were not amateurs at all, or who were Novices or Technicians of either subclass, would not have satisfied the proposed code speed requirement for Extra. This proposal defers to the Commission for the disposition of that group of operators. However, in comparison to those who had previously demonstrated 13 wpm, this group would likely not be relatively large.

¹² Much earlier, both sending and receiving tests were required and administered by Commission personnel in a Morse code examination, at any speed.

V. CONCLUSION

43. The robust technical privileges extended to Amateur Radio licensees enable them to construct and operate complex and powerful transmitting equipment over a wide frequency spectrum without specific frequency/channel assignments and other restrictions found in other services. Commensurate with these wide-ranging privileges are wide-ranging exposures and opportunities for error. The higher the level of operational privilege, the higher is the operational *responsibility* of the licensee.

44. These margins for error can only be minimized *a priori* by means of a robust examination system so that applicants provide to the regulatory authority a demonstrated knowledge of the technical subject matter itself, and of all that pertains to it, such as rules, regulations and understanding of “best practices” sanctioned by industry as a whole.

45. Advantage should be made of the knowledge base, which has been gained in educational circles in the area of multiple-choice exam administration. Correction for guessing has been shown to be valuable. We must assume that an examinee either knows the correct answer, or does not. “Stumbling in” to a passing score must not be sanctioned.

46. It is true that we must balance this critical consideration against the desire to have Amateur Radio be an *amateur* service: as some commenters have pointed out, holding a university degree in Electrical Engineering or Physics is not a prerequisite for an amateur license. Indeed, a degree in Aeronautical Engineering is not required to be the pilot in command of a powered aircraft, but mishandling an aircraft's controls can cause damage, injury and death, just as can mishandling a powerful radio transmitter. Flying, even under the available *noncommercial* license, as well as Amateur Radio – a necessarily *noncommercial* service, both require demonstrated regulatory, technical and practical knowledge.

47. In both cases, *demonstrated knowledge* in the specific and related subject matter must be shown before it is reasonable to extend the respective privileges to the applicant. The responsibility of due diligence to verify an applicant's potential for correct operation rests on the regulatory authority, which is the custodian of the public trust -- in the case of wireless communications, that the viability and security of the nation's airwaves not be compromised.

48. Certainly, one of the most insidious and controversial areas of revision has been the Morse code requirement. However, the viability of the code through all of radio at large, and the technical superiority of this mode at times when other modes are ineffective, surely give it a permanent place in the amateur's repertoire.

49. Consistent with the spirit of earned advancement, Amateur Radio's top class ought properly to require the demonstrated ability to communicate *effectively* in the medium of CW. The code continues to sit on par with its counterpart media; to view it as merely a relic of a bygone era is to do it – and all of ham radio – an injustice.

50. For Amateur Radio to continue to live up to its charter of “advancing the radio art,” a corpus of operators is required who are indeed qualified for such a task.¹³

51. I believe that, as now written, FCC 98-143 would indeed weaken Amateur Radio as a whole, in the areas pointed out in this Comment, and by Wormser, *et al.* I strongly support their suggested amendments, which would ensure a return of sufficient central control and auditability that is so critical to a service with so large a breadth and scope as Amateur Radio. I hope that the Commission will review and reconsider the R&O, and implement the proposed amendments.

¹³ 47 C.F.R. 97.1 (b), as amended.

VI. IDENTIFICATION AND DISCLAIMING STATEMENT

52. These Comments are hereby filed by James C. Cotillier, III, representing himself, as of the date of submission, Amateur Radio Advanced class operator of station WA6IYH, license number L00223269. He also holds the General Radiotelephone Operator's License with Ship Radar Endorsement, license number P1-11-60439, which evolved from the Radiotelephone First Class License of the same number, with the same endorsement.

53. All statements and views presented in this document are those of James C. Cotillier, III, and are not necessarily the views of any organization past or present, of any regulatory body, or of any other person living or deceased.

REFERENCES

- [1] *Report and Order 99-412*, 65 Fed. Reg. 6548 *et seq.*, *RM-9148*, *RM-9150*, *RM-9196*; adopted 22 December 1999; released 30 December 1999.
- [2] *Petition For Partial Reconsideration (Revised)*, by Alan J. Wormser, N5LF, Frederick V. Adsit, NY2V, Michael J. Dinelli, N9BOR, filed 22 February 2000.
- [3] *Opposition of NCI to the Petition for Partial Reconsideration... Wormser...*, undated. NCI: "No Code International," an organization concerned with ridding all Morse code proficiency requirements from Amateur Radio, worldwide.
- [4] *Comments of Michael Keene, K1MK, in Support of the PETITION FOR PARTIAL RECONSIDERATION...*, dated 31 March 2000.

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