

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	RM-10867
Amendment of Part 97 of the Commission's)	
Rules Governing the Amateur Radio Service to)	RM-10869
Implement Changes to Article 25 of the)	
International Radio Regulation Adopted at the)	RM-10870
2003 World Radiocommunication Conference)	

Via the ECFS

Reply to Comments of Earl S. Gosnell III Made on 13 April 2004
by Leonard H. Anderson

Mr. Gosnell's Comment consisted mainly of two attachments to attempt showing the efficacy of Morse Code telegraphy and therefore the necessity in retention of the telegraphy test for Amateur Radio license examinations. One is a previously-published document by Andrew Roos apparently sent to the Council of the South African Radio League. Other administrations' rulings and regulations are not a subject here, therefore I would dismiss such an example from consideration. However, the second attachment is a textual copy of a Los Angeles Times newspaper story dated 4 November 1988 and bylined to Ralph Vartabedian. This second attachment is both dated and contains a number of errors due to considerable selective editing and reportage. That second attachment is the subject of my Reply to Comments.

Please allow me to state that I am a retired electronics design engineer with no vested interest in any professional or amateur radio activity or educational institution nor with any of those who have commented on this petition or Rule Making. All of the following comments are those of a private citizen fortunate to experience a half century in the radio-electronics industry and military of the United States, that including radio communications.

A. The Newspaper Article Itself And Its Date

1. The full title of the Los Angeles Times newspaper article is *Old SOS Lives On It's Morse to the Rescue* according to the Archives section of the Los Angeles Times website.¹ It was written by Ralph Vartabedian and appeared in the Home edition of the Los Angeles Times on 4 November

¹ www.latimes.com The Los Angeles Times has an average daily printing of 1 million (1.3 million on Sunday) with home delivery over a 45,000 square mile area larger than the state of Ohio.

1988. According to Mr. Gosnell's supplemental attachment, writer Ralph Vartabedian is bylined as *Times Staff Writer*. According to the Los Angeles Times website, Ralph Vartabedian is a *Roving Correspondent* at the National Section.² At 2083 words this can be called a *long filler piece*.³ Given the tone of words and subject slanting it can also take on a *deus ex machina* quality which is against modern methods and for moral virtues of simplicity.^{4 5}

2. The date of the article must be placed in scrutiny of other activities in all of radio. At this time (1988) there was a build-up of hobbyists' interest in the creation of a no-telegraphy-test Amateur Radio license. That eventually resulted in the Commission's Notice of Proposed Rule Making (NPRM) concerning the creation of a new, sixth Amateur Radio license class called *Technician*.⁶

3. The personal computer age was upon the public in the seventh year of the introduction of the IBM PC into both business and personal activity worlds. Bulletin Board Systems (BBSs) had proliferated all over the nation with tens of thousands of the non-electronic public communicating in ways thought impossible a decade prior. Some BBSs were networked nationally and internationally. Personal Computers as *word processors* were rapidly rendering conventional typewriters obsolete. *Networking* of agencies such as the National Aeronautics and Space Administration (NASA) had been clearly seen on television, along with communications occurring from many NASA sites during a space flight. None of that was happening via manual telegraphy.

4. The International Maritime Organization (IMO) had already begun planning something

² That may or may not be a euphemism for *free-lance writer who is regularly called for contributions*. The Times staff listings delineate between Staff (regular employees) versus such free-lancers or *stringers*.

³ *Fillers* are an established item in newspaper periodicals. Originally named to literally *fill* space in set newspaper pages, in the electronic age of computer-composed typesetting, they can be inserted with more flexibility to eliminate unused space and total print-run size. *Fillers* are not necessarily *news* per se in being of widespread interest, but they can be useful to a small group of readers or simply as *human-interest stories*. In a search of the Los Angeles Times website Archives (available from 1985 onwards), most of the articles about Amateur Radio can be journalistically placed in the human-interest category.

⁴ The *devil in the machine* concept is one of stressing some unspoken evil due to complicated systems, in this case perhaps the displacement of telegraphy skills by more modern methods of communications. In earlier times at the start of the industrial revolution there were actual riots by *Luddites* fearing that they would lose their jobs due to introduction of production machinery.

⁵ Simple methods need simple skills. By championing simple methods, more complicated methods and theory can be ignored as unneeded. That preserves the *status quo* and saves the championing individual from having to learn new skills and not harbor any personal resentment about their acquired skills no longer found useful.

⁶ Without access to the Commission's Reading Room, this commenter must use the Internet to search. The original NPRM and Report and Order are not available electronically. What was considered the no-code-test Technician NPRM in 1990 as proceeding 90-53 then appears on the ECFS now as General Docket 90-53, New England Area (Region 19) Public Safety Plan.

new in 1979. Called the Global Marine Distress and Safety System (GMDSS), it was implemented as part of the 1988 Safety Of Life At Sea (SOLAS) convention. GMDSS does not use manual telegraphy nor any quaint romantic notions of radio officers tapping out a last telegraphy message from a sinking ship; instead it uses an automated radio system on-board which communicates to and from Inmarsat satellites.⁷ The IMO agreed that all maritime nation members begin implementing GMDSS in 1993 with completion in 1999.⁸

5. At the time the Times newspaper story was published, there were some sharp divisions of opinion in parts of the larger world of radio in regards to telegraphy both as a safety instrument and as a means of communication. Those whose interests were embedded in certain notions would be upset at the changes and seek to inform others of the wonders of their favorites. Anyone with some powers of persuasion can influence a writer covering many different things for a newspaper.

6. What was not foreseeable in 1988 was that the no-code-test Technician class license became a reality in 1991; the personal computer had become a common communications device; that GMDSS became a reality worldwide.⁹ Radio telegraphy has had its day but that day was already in twilight in 1988, quickly darkening.

B. Implication Of The United States Military Having A Backup Plan In Telegraphy

7. To quote the first paragraph of the Times article, “...*But what if this technological masterpiece [communication satellites] should go haywire or be knocked out by an enemy attack? The Pentagon’s sophisticated communications net could go silent and leave troops groping for leadership.*” Neither military nor civilian government communications is solely dependent on one form or mode of communications, well before 1988 as well as up to the present time. Those *troops groping for leadership* have only to pick one of several means of communications at their disposal then as now.

8. There had been a progressive cut-over to communications satellites for world-wide

⁷ Details on GMDSS can be found at the United States Coast Guard Navigation Center website at www.navcen.uscg.gov/marcomms/gmdss/ plus the IMO website at www.imo.org

⁸ This included NAVTEX receivers for automatically receiving and printing safety reports such as storm warnings. The Telecommunications Act of 1996 included Commission privilege of substituting the required telegraphy-tested radio officers on board ships with those having GMDSS licenses. International GMDSS implementation was completed in early 1999.

⁹ That no-code-test Technician class would have 38% of all United States Amateur Radio licensees by spring of 2004. In 2002 the Census Bureau would report that one in five American households would have some sort of Internet access. In early 1999 the United States Coast Guard would cease monitoring the old 500 KHz International Distress Calling Frequency that an earlier SOLAS Convention had implemented following the disastrous sinking of the Titanic in 1912.

communications in the military at the time of the Vietnam War.¹⁰ The United States Navy had already implemented a Very Low Frequency (VLF) alert system for submerged submarines which used encrypted data mode.¹¹ Land-based units had a variety of radio systems from small-unit Very High Frequency (VHF) sets and High Frequency (HF) sets in manpack carry with Receiver/Transmitter (R/T) modules with higher power amplifiers and networking connections in vehicular and fixed location versions for larger force groups. Line-Of-Sight (LOS) radio relay terminals in VHF up into microwave frequency ranges served as semi-permanent networking. Troposcatter radio terminals could cover up to 500 miles with multiplex voice and data channels. Common field deployment of VHF and HF radios could select NVIS or Near-Vertical Incidence Skywave single-bounce from the ionosphere out to 300 mile ranges. Higher-power HF sets could span the world if necessary. Ultra-High-Frequency (UHF) military aviation frequencies could be used in covert operations with relay through satellites or airborne relay stations to minimize detection.¹² There is **no single system** in the military inventory now nor in the 1980s or 1990s.

9. As a maintenance and operations supervisor Non-Commissioned Officer (NCO) in the United States Army, this commenter was quite aware of several contingency plans in place 1954 through 1956 for Far East Command Headquarters, then located in Tokyo, Japan. The **only** use of radio telegraphy at that time at that location was as a tertiary contingency level using a single 30 Watt RF output World War Two era transportable receiver-transmitter, an AN/GRC-9.¹³ The primary long distance communications means was Army HF station ADA which had not operated using manual telegraphy for long distances since 1948.¹⁴

¹⁰ That can be found at www.gordon.army.mil in its history pages plus the archives section of the *Army Communicator*, the Signal Corps magazine for signalmen. Fort Gordon is the Signal Center, United States Army.

¹¹ Unofficial information is available at www.fas.org/man/dod-101/sys/weapons/index.html link listing. The Foundation of American Scientists (FAS) website did have complete drawings and communication units for Trident class submarines at one time, but parts of that website are presently undergoing construction and it may have been moved or deleted. Due to the sensitivity of information on cryptographic communications, it is unlikely that any technical details will ever be made public by the USN.

¹² The previous publication of Field Manual FM 24-24, *Signal Data References: Signal Equipment*, of December 1994 (public release from Army Training and Doctrine Command Digital Library) was TC 24-24, dated 3 October 1988, may have been in public release but that is not yet confirmed by this commenter. There has always been a catalog of Army Signal equipment since 1955 from this commenter's personal inspection. Partial descriptions and contract awards of communications systems have been in public view in electronics industry trade publications such as *Defense Electronics* since the 1960s.

¹³ Long since obsolete, the *Angry-Nine* set was considered a *last resort* for optional manual telegraphy or Amplitude Modulation voice in 1953. Bimonthly tests were never successful and that level was replaced with a local Army unit's AN/GRC-26 HF radio sets in a truck-mounted hut with a tow-behind diesel motor generator set for electrical power. The GRC-26 had a 400 Watt minimum RF output capability and had teleprinter terminals for radio tele-printer circuits and with a large wire antenna kit for long-distance radio circuits. Local distance, up to 5 miles, communications range were always available with the AN/PRC-6 handheld VHF transceivers.

¹⁴ Major communications mode was 60 word per minute teleprinter via frequency-shift keying. ADA traffic was 220 thousand messages relayed per *month* in 1955. United States Air Force assumed HF responsibility

10. Both the USN and United States Coast Guard (USCG) maintained radio telegraphy afloat primarily for the IMO responsibility and SOLAS. By 1960 their major long-distance communications means was teleprinter on shipboard as well as fixed-point to fixed-point messaging.¹⁵ USCG continued to monitor the International Maritime Distress Frequency of 500 KHz until 1999.

11. The United States Air Force (USAF) was the primary ignitor of interest in single-channel HF Single-SideBand (SSB) communications shortly after World War Two, especially for the former Strategic Air Command (SAC) airborne missions.¹⁶ The technical advantages of HF SSB were quickly picked up by commercial electronics as well as other branches of the United States military. By 1988 SSB voice was the predominant mode on Amateur Radio HF bands.¹⁷ USAF had begun down-sizing their HF networks ten years prior to 1988 and into the local airspace control via flying command centers, those linked with military communications satellites.¹⁸

12. Manual telegraphy does not lend itself well to communications security, adding another layer of non-radio work to encrypt and then decrypt message text. This introduces another possibility of human error already burdened by having a telegraphy specialist at each end of the radio circuit. For that reason, USN ships were already being outfitted with radio-teleprinter equipment in 1940 that included on-line encryption-decryption.¹⁹

in 1963 and the station facilities were closed in 1978.

¹⁵ From personal and informal communications both at maritime facilities and with USN and USCG personnel during the 1970s.

¹⁶ Multi-voice-channel SSB on a 12 KHz total bandwidth was already employed by both commercial and military users in the 1930s, essentially replacing the open-wire telephone lines with a radio circuit and adapting already-existing four-voice-channel *carrier* equipment. Each *carrier* equipment bay is a hard-wired version of SSB modulation-filtering-demodulation to frequency-multiplex four 3 KHz voice bandwidths into a 12 KHz bandspace.

¹⁷ From direct aural observation. No United States radio receivers need be licensed and anyone here can listen...with the only exception being to the 1 GHz cellular telephone band.

¹⁸ The most widely-known is the Airborne Warning And Control System (AWACS) featuring a huge aerodynamic radar dome. Lesser-known are those with smaller radomes now named *Joint Stars*. The high speeds of jet aircraft, along with reduction in aircrew, do not allow the time luxury of manual telegraphy modes. Voice and data modes permit various levels of on-line cryptography to insure communications security. USAF world-wide communications was already re-formed with integration to other major military branches according to the Hanscomb Air Force Base website. More information there is available in the downloadable USAF communications history book, *From Flares To Satellites*.

¹⁹ Known by various alternate names, the *Sigaba* saw uses in all military branches during World War Two and was responsible for USN communications security to coordinate the naval fleet that won the Battle of Midway. This is mentioned in David Kahn's *The Codebreakers: A History of Cryptography*, a New York Times bestseller non-fiction work in the early 1960s. A *Sigaba* variant is on display in the radio room of the floating museum of the USS Pampanito fleet submarine in California. The *Sigaba* system was not compromised by any foreign agency during World War Two.

C. Misrepresentation Of Telegraphy Communication Rates

13. The Times article third paragraph states, “*It [telegraphy] is a seemingly tedious procedure but skilled operators can transmit and receive faster than most secretaries can type.*” While that may be somewhat true of the formation and cognition of telegraphy character patterns, military and commercial telegraphy operators have been required to use a typewriter themselves to receive telegraphy at rates greater than 20 words per minute.²⁰ *Most secretaries* of 1988 and several decades prior to that were capable of 60 words per minute sustained effort on all-mechanical typewriters in an office environment.²¹ That claim is erroneous by simple informal observation.

14. The last sentence in paragraph three is irrelevant, “*The fastest [manual] Morse transmission ever recorded was 84 words per minute, sent by an operator named T. L. McElroy.*” The implication that all telegraphy operators are capable of high rates is like saying all middle-distance track runners can do 4-minute-mile times because Roger Bannister did that. In informal observable manual telegraphy work, the nominal *sustained* throughput of good manual telegraphers is about 20 words per minute over a normal work day.²² Electro-mechanical teleprinters can sustain 100 words per minute for days on end, requiring only to be fed electrical power, paper, and ribbons.

D. Earth-shaking Emergency Communications Misrepresentation

15. In the Times fourth paragraph, it says, *Morse telegraphy may seem like a quaint anachronism - with its brass sounder and key operated by the world’s most basic tool, the human finger. In fact, however, it is sometimes vital to worldwide communications.*” Except for a few museum displays, this commenter knows of no such *worldwide communications* telegraphy circuit still using *sounders* for receiving, wired or radio. A human *hand* would be more properly a *basic tool*, courtesy of the grasping ability of an opposing thumb.

16. Following those sentences comes a revelation that is only partially true, “‘*When the Mexico City earthquake occurred [in 1985] and all the power went out, guess who was transmitting calls for international help? It was amateur radio operators using Morse telegraphy,*’ said Marcus Stevens, an official at the Federal Communications Commission.” There is no Marcus Stevens listed

²⁰ Like all military radio telegraphy Military Occupation Specialties (MOSs) of 1952, the Field Radio MOS school at Camp Gordon, GA (now Fort Gordon), required learning touch-typing on all-mechanical typewriters as part of telegraphy cognition training. Mechanical typewriters were supplied as standard equipment in mobile HF stations such as the AN/GRC-26. Such typewriters are a common fixture seen in film footage of World War Two communications stations.

²¹ This commenter took two semesters of typing in Middle School (then called Junior High School) in 1946-1947 using mechanical typewriters with unmarked key tops, a standard in typing classes then. Good grades required passing sustained typing tests at greater than 60 words per minute.

²² Receiving-only and using a typewriter to transcribe the message, plus allowing for normal human needs of calls-of-nature and one mealtime.

in the Commission's latest telephone directory nor does any search at the Commission's website show any trace of that *official*.²³ Perhaps that is a journalistic pseudonym not unknown in newspaper articles?

17. The Richter Scale 8.1 earthquake that struck Mexico City on 19 September 1985 was indeed serious and caused widespread damage. Despite electrical power outages over much of that city at the time, this did not prevent news services from communicating the event or filing stories via telephone circuits concerning the event.²⁴ If those communications got through, why was Amateur Radio considered the **only** means? Amateur Radio stations in Mexico rely on electrical power for station operation as much as anywhere else in Mexico and North America. There was no evidence found that the only surviving communications facility in the Mexico City region was battery-powered wired manual telegraphy or battery-powered amateur radiotelegraphy stations.²⁵

E. The *Reliable Standby That Sat Down On The Job*

18. In the Times fifth paragraph it is written, "*Advanced communications satellites can transmit 100 volumes of an encyclopedia in a second, whereas a journeyman Morse operator can send about 50 words per minute. But, if sophisticated space systems fail, a portable, battery-powered Morse transmitter would be invaluable.*" There is no attribution to either of those two sentences. First of all, communications satellites are designed to **relay** from one ground station to another and their designs are usually in the form of several *transponder channels* having a relatively medium-speed capability with a bandwidth comparable to an existing television aural-visual channel. If anyone wanted to send 100 volumes of an encyclopedia transcribed to text and graphics, the bandwidth would be that required for a rate of 500 to 1000 MegaBits per second.²⁶ Disregarding the

²³ There is one *Marcus Stevens* listed in the Commission's Amateur Radio license database, KA5VJE, Novice class, date of birth given as 25 March 1947, living in Florida. That Stevens would have been about 41 years old at the time of this newspaper article. It is journalistic practice to cite informants as *official sources* without revealing identities.

²⁴ Such was heard throughout North and South Americas and first widespread reported news came to most via broadcasting stations.

²⁵ The 17 January 1994 Northridge Earthquake in Los Angeles resulted in a widespread electrical power outage to a population of about 10 million for about half a day. Regardless, conventional communications means were able to function and relay the event to others. There are no verifiable reports that Amateur Radio was operational in the vicinity after the power blackout. While not as severe as in Mexico City in 1985, the Richter Scale 6.3 earthquake resulted in over 50 deaths and millions of dollars in destruction of buildings and some roadways. The Greater Los Angeles area is still an aerospace industry center and California has a high percentage of Amateur Radio licensees resident in this state.

²⁶ If one volume contains 150,000 words, that is about 900,000 characters; most encyclopedias have graphics and less text so that figure is a compromise for minimal graphics. 100 volumes would be 90 million characters. Since each character requires 10 bits of data, 100 volumes would require 900 million bits. At 6 characters per word, sending all volumes in one second would be a rate of 900 million words per minute!

problems of transfer rates to and from mass-storage devices, that stated equivalent speed rate is egregious for the 1988 time period.

19. While a *portable, battery-powered* transmitter might reach out 300 miles under any modulation or mode, it is hardly comparable to any communications satellite system then or now.²⁷ The IMO recognized that nine years prior to 1988 in beginning the planning for GMDSS and the EPIRBS automated, battery-powered emergency beacon system, all part of SOLAS.

20. While *journeyman Morse operators* can probably burst-transmit or receive at 50 words per minute, they cannot sustain such rates for long periods and require a typewriter equivalent instrument to transcribe the text data. If the *journeyman Morse operator* were to send 100 volumes of an encyclopedia at 50 words per minute, it would take him 34.2 years to complete, working around the clock, not stopping for any reason such as sleep, eating, or anything else. The comparison is ridiculous.

F. A General Quote Deserving A Dishonorable Discharge

21. Several quotes are attributed to Major General Leo Childs, Chief of Signal at Fort Gordon, GA, from 1988 to 1990.²⁸ It should be kept in mind that Chief of Signal is informed on all elements of the Army Signal Corps and that MG Childs would co-author an article for *Signal* magazine entitled *Information Management, The Army's Bold Move Into The Future*, printed in March, 1989.²⁹ Information Management is directly involved with Information Technology, both words having come about prior to 1988.

22. The Times article quotes MG Childs as saying, “*We see the Morse code as a dying art, but we refuse to let it die completely. Newer isn't always better. Even though it is old and slow, Morse is still the most reliable in difficult conditions.*” That is hard to believe, speaking as Chief of Signal of 1988, especially so when manual telegraphy was already beginning to disappear from Army communications practices. On-line cryptography was already present in land-unit communications, albeit as separate components, and the SINCGARS (SINgle Channel Ground Air

²⁷ The AN/PRC-104 was already operational in 1986 in the United States military. With a 20 Watt RF output maximum, it had full HF range and could transmit either on-off-keyed carrier or SSB voice while being carried on the back, using an automatically-tuned whip antenna. Present deployment of the PRC-104 is without any telegraph key and communications doctrine omits telegraphy modes. The 300 mile range comes from military practice of NVIS or Near-Vertical Incidence Skywave propagation for single bounce off the ionosphere. *Nevis* as NVIS is pronounced, has been operational doctrine in the Signal Corps for over two decades.

²⁸ Biography with photograph may be viewed at www.gordon.army.mil/ocos/rdiv/RGTNCO/chlds.asp. The title of *Chief of Signal* was a change instituted by MG Childs from the former title of *Chief Signal Officer*.

²⁹ *Signal* is the monthly membership magazine of the Armed Forces Communications Electronics Association (AFCEA), a professional organization comprised of both civilians and military personnel engaged in communications electronics. Website is www.afcea.org

Radio System) was in development and first field testing in 1988.³⁰

23. In the Times tenth paragraph, MG Childs is quoted as saying, “*As a matter of prudence, the Army keeps a basic Morse capability. Suppose our satellites were being jammed? The morse code is the last-ditch method.*” That is untrue. Jamming has **always** been a communications threat of **any** radio communications, any frequency band, from days of damped-wave *spark* to the present day. The developing SINCGARS, then in testing, promised a relief from all jamming except broad-band jammers and that was proven out successfully. Prior doctrine on jamming of communications was to change operating frequency or to relocate the station, providing as much natural shielding as possible. Emission control over transmitter output, built into field radio systems since days of World War Two, is effective in making a jammer unsure of a station’s location due to possible movement. Telegraphy was **never a shield** against jamming interference. Jamming can be severe enough to inhibit any continuous-wave signal reception. Frequency-hopping is the best cure.

24. Following, MG Childs is reported to have said, “*...In addition, even a distorted Morse signal can be interpreted, whereas a distorted voice transmission is virtually useless.*” That is egregious to the point of disbelieving any alleged attribution to a Chief of Signal. **No** signalman shall **interpret** any communication, ever. A military land person doesn’t **interpret** map coordinates for a *fire mission* of an artillery salvo. **Interpreting** those numbers can result in accidental fratricide. Search and rescue units cannot **interpret** a survivor’s location lest they go to the wrong location and waste valuable time.³¹ Voice transmission on and over battlefields is almost always distorted, the participants engaged in warfare. It is impossible to believe that MG Childs, given his service record of over three decades, has never noted that or considered that the NATO Phonetic Alphabet can be used to clarify important vocal information.³²

25. MG Childs is reputed to have said, “*The Army annually trains about 2,800 men and*

³⁰ The first SINCGARS manpack versions were sent to Army forces in Korea in 1989 and saw moderate deployment in *Desert Storm* military action in Kuwait-Iraq in 1991 for the liberation of Kuwait. With the *SIP* or SINCGARS Improvement Program, the manpack version is half the bulk and weight of the original AN/PRC-119. Operating over 30 to 88 MHz, SINCGARS uses digital voice and data modes with selectable internal communications security and selectable single-frequency or frequency-hopping (10 times per second) operation, all SINCGARS transceivers are very robust against either jamming or interception. According to the ITT Aerospace and Ground Division, Fort Wayne, IN, a quarter million SINCGARS transceivers had been built and fielded by the United States military at the end of 2003.

³¹ Human frailties were taken into account at the beginning of IMO’s quest for an automated distress system. While the thought of a brave radiotelegraphy operator tapping an urgent last message is emotionally pleasing in its romanticism, the IMO understood that terrified human beings, telegraphy trained or not, can make mistakes when facing immediate extinction. The GMDSS, coupled to a Global Positioning System signal, can send the correct information on location without emotion.

³² The present-day phonetic alphabet is that originally introduced for NATO (North Atlantic Treaty Organization) members’ voice communications in 1955. 1955 is approximately the time that MG Childs began his military career. The NATO phonetic alphabet was selected to fit the various spoken languages of NATO members.

women in Morse code for a variety of signal jobs in infantry, artillery, intelligence and even Special Forces. For example, Army commandos who are sent behind enemy lines to organize dissident civilians must be able to communicate clandestinely. They do it with Morse telegraphy that is transmitted in bursts too short to be located by enemy listening posts.” Agreed, the Army did provide radio telegraphy training at Fort Gordon up to the beginning of the 1970s, but only in the Field Radio Military Occupation Specialty (MOS). Since the reorganization of communications MOSs had eliminated the Field Radio specialty and that radio telegraphy has not been a requirement for communications for over a decade, there is no sure way to verify that manual telegraphy skills were taught at all in 1988. It should be noted that Army personnel do not, nor did they call Special Forces *commandos*. Such specialized personnel were *Rangers* in the 1950s, were popularized as *Green Berets* in the 1960s. The uniquely-British name *commandos* remained with the United Kingdom military since World War Two.

26. While the AN/GRA-71 *Coder-Burst Transmission Group* remained in Signal inventory in 1994, there is no evidence that it was used in the decade prior.³³ It transmits a pre-recorded telegraphy-coded message at about 300 words per minute. Probable use was likely to be intelligence information sent back from reconnaissance teams observing in *denied territory*. As such a 100 word *intel* message would require 20 seconds of transmission to complete. Twenty seconds is quite enough time for a 1980s-era broadband direction finder to get a bearing on such transmissions. The AN/PSC-3 would have been a better choice for *intel* teams to use, operating in the military aviation band of 225 to 400 MHz, using data transmission at 1200 words per minute equivalent rate, and supplied with both omnidirectional and directional antennas suitable for satellite relay.³⁴ The PSC-3 keyboard could be operated by any literate person, modeled on a standard *Querty* keyboard layout.³⁵ The same 100 word message would take only 5 seconds to transmit with a PSC-3.

27. There are just too many glaring untruths attributed to MG Childs based on doctrine and training occurring over four decades prior to 1988. The only *interpretation* this former signalman and longtime engineer can make is that all those attributions to MG Childs are patently **false**.³⁶

³³ Field Manual FM 24-24, 29 December 1994, page 4-47.

³⁴ FM 24-24, page 6-111. The frequency range was chosen to operate with airborne communications relay aircraft and the frequencies allow narrower antenna patterns. It is best to not reveal a presence at all when in *denied territory*, a euphemism replacing the old and trite phrase of operating *behind enemy lines*.

³⁵ Colloquial name, based on the letters on the top row of three alphabet rows, Q-W-E-R-T-Y.

³⁶ False reporting, fabrication of facts and figures, is not unknown to the editors of the New York Times and the Washington Post, as witness some relatively recent staff dismissals. That includes a Pulitzer Prize winner on the Post a few years ago who manufactured an entire series about an immigrant boy. That Prize was returned.

G. Seeing Sunspots Covering Ears And Minds

28. A USN *Senior Chief Petty Officer*³⁷ is quoted as saying, “*During the 11-year cycle of sunspots, you can run into times in certain areas of the globe where you cannot communicate with any of your equipment except with a Morse signal. A machine can do only so much. If it doesn’t get a quality transmission, you are going to get garbage. But, with Morse, no matter how much distortion there is, you can copy that signal. Only human hearing can do that.*” While fine for the 1930s when the communications mode choices were largely manual radiotelegraphy or amplitude modulated voice, such a statement runs counter to USN practices and experiences that were doctrine in the 1960s, two decades prior to 1988. The USN VLF encrypted-data alert broadcasts were already operational before 1988 and were constantly monitored by *radio machines* on surface ships in addition to submerged submarines.³⁸ Encrypted data communications on HF, again largely by *radio machines*, were in regular use prior to 1988.³⁹ In prehistoric HF radio communications of 1953 to 1956, this commenter experienced a total HF propagation blackout in the eastern Pacific for only an hour and a half as the single disturbance of any kind in three years.⁴⁰

29. The *sky is falling* hysteria surrounding alleged *total blackouts of radio propagation* is basically concerning HF radio path propagation due to severe disturbance of the ionosphere by nuclear explosions. Such does not severely effect VLF through MF spectrum *ground-wave* radio propagation nor the *line-of-sight* propagation of the VHF through microwaves portions of the spectrum. The problems of Electro-Magnetic Pulse (EMP) are, and have been, overcome by proper shielding and filtering design of military communications equipment plus test exposure to severe simulated EMP.⁴¹

³⁷ It is unknown if this rank existed in 1988. Chief Petty Officer and Master Chief Petty Officer ranks existed then.

³⁸ The less-than-friendly term *radio machines* refers to the alleged petty officer quote and, obviously, means automated data receivers capable of alerting anyone on board, as is the case on *Trident* class missile submarines.

³⁹ Enough of it was available for former USN Chief Warrant Officer John Walker, Jr., to steal all details and sell to the USSR for 18 years prior to his arrest in May, 1985. Walker was convicted of espionage and is serving a life sentence.

⁴⁰ Temporary backup plans involved less-secure, limited-capacity undersea multiple-voice-channel cable or sequential message relay through USN ships or USAF aircraft. Neither was used. Needless to say, the 24-hour concessionaire snack bar at the ADA Control Center was temporarily filled to capacity as many circuits sat idle.

⁴¹ Some of the details of EMP testing are in military equipment standards and some of it is still sensitive to public disclosure. If the effects of such EMP were such to destroy any or most radio equipment, it is likely to be strong enough to kill humans by the same effect. EMP was noted after the fact after the first two nuclear test explosions at the Trinity test site in 1945, disabling some of the vacuum tube instrumentation at the site. Vacuum tube circuitry is also susceptible to EMP damage. That destroys the popular urban myth among some long-time radio amateurs that such equipment will survive.

H. Allegations That Character Coding Influences Communications Hardware

30. In the 15th paragraph of the Times article, it states, “*There are two Morse codes - the international code and American railroad code - with some differences in the dot-dash combinations. The American code primarily uses sounders that produce clicks; the dots and dashes are distinguished by the time intervals between clicks. The international code normally uses and audio tone for the dots and dashes, making it easier to distinguish between them.*” All of that is false in many respects. There have been **dozens** of manual telegraphy codes innovated since the first Morse-Vail telegraphic relay service was established in 1844. Most of the variants involve different codings for the so-called extra letters of the alphabet in various languages.⁴² The *International Morse Code* character set was **standardized** some time ago by the International Telecommunications Union to enable better exchange of telegraphic communications.⁴³

31. Any particular character set of manual telegraphy has little to do with the electrical transmission or reception methods. The **first Morse Code** set was only numbers. The **second** set was a collaboration with Alfred Vail to include letters and common punctuation marks. The **first Morse Code** reception system was an electromagnet-driven ink pen writing on a paper strip. That evolved into the so-called *sounder* which was simply a semi-resonant chamber with striker taking the place of the former ink pen.⁴⁴ The **first** radiotelegraphy *aural* output of any telegraphy codes was the scratchy growling sound of arc-discharge damped-wave transmitters commonly called *spark sets*.⁴⁵ The **second** aural output of radiotelegraphy was simply the difference between levels of background noise heard over simple receivers listening to signals from high-speed VLF and LF rotary alternator transmitters. Reginald Fessenden’s *heterodyne* receiver, a much improved-sensitivity unit not using any active amplification means, used a low-power spark oscillator set near the frequency of a desired station, the precursor to the later *Beat-Frequency Oscillator* or BFO used in vacuum tube receivers to provide the now-familiar aural tone bursts of telegraphy. The aural output of this **third** method

⁴² The English written alphabet is only 26 letters. That other written languages have *extra* characters is a self-centered opinion held by native English speakers. Most of the world’s many languages are either syllabic or ideographic or combinations of both as in Japanese *Hiragana* versus *Katakana*. The length of time of various letters is alleged to have been an inspiration of co-inventor and financial mentor of Morse, Alfred Vail. That inspiration is said to have come from observing a typesetters’ type case and noting the frequency of occurrence of English letters in the written language.

⁴³ For the Amateur Radio Service, that character code set is referenced in §97.3 (a) (27) of 47 CFR Ch. 1 (10-1-03 Edition). That is found on page 618 of Volume 5 of Title 47 C.F.R.

⁴⁴ Earphones or speakers had yet to come about and had to wait for Bell’s invention of the telephone and the emerging *receiver* held to the ear. Vacuum tubes had to wait for Fleming’s discovery of the vacuum diode in the late 1800s. Electro-magnet-driven pens on paper would later be used on very long wired telegraphic circuits such as the Trans-Atlantic Cable and required some very separate engineering to allow even, continuous ink delivery without contaminating unused paper with ink splashes.

⁴⁵ The *growling* sound is the repetition rate of the arc-discharge used to initiate the damped-wave oscillation at RF. That was highly variable in the first decades of radio communications.

of telegraphy reception is unknown. The **fourth** aural output is that of the active-device receiver using a BFO. Any of those early four methods of radiotelegraphy could use **any** known telegraphy character sets representing written language symbols.

32. The term *telegraphy* is also applied to the teleprinter as a generic name but has gone out of favor now and replaced by the even more generic *data* of the recent electronic aids to teleprinting.⁴⁶ Teleprinters' mechanisms of decoding and printing chose the character sets, not the other way around. All of those use the same length of a character code, individual bits of *5-level* or *8-level* being at binary levels of either *Mark* or *Space* determining the character selected. This symmetry of coding length serves to make smooth, continuous printing of mechanisms. It also serves to simplify electronic circuit decoding means of teleprinter signals and an easy determination of throughput rate.⁴⁷ The symmetry in coding length has little variation in required bandwidth for radio teleprinter communications as opposed to variable-length, dual-bit-length coding of manual telegraphy.

I. Ma Bell Tries To Sing The Last Song For Telegraphy?

33. The Times article quotes Burke Stinson, a public relations man for American Telephone & Telegraph Co. as saying, "*Telegraph was there before the telephone and carried on for years after. You have to appreciate that the written word carried - and still does carry - far more weight than the spoken word.*" That is all very true and that is precisely why **teleprinting** overtook and overwhelmed manual telegraphy beginning in the first few decades of the 1900s. Teleprinting did not need specialists at each end to do manual telegraphy. Anyone who could type could enter a teleprinter message or prepare a paper tape for sending, have the **same** text appear at both transmitting and receiving ends, the receiver text readable by the recipient without any need of transcribing anything. Being the first in a new field of near-instantaneous communications has **no** relation to being the best. Manual telegraphy simply lost out as slower, more error-prone, less efficient compared to faster, more accurate, efficient, and almost-automatic teleprinter systems.

J. The Mysterious Commission Official Does A Rabbit Trick

34. In the 19th and last paragraph of the Times article, alleged Commission official Marcus Stevens is quoted as saying, "*I can carry a very small Morse key in my pocket and transmit around the world. I don't think you will ever see the Morse code die. It is going to be difficult to find another method that is just as good.*" Mr. Stevens apparently does not need wires or a radio

⁴⁶ A June 1967 USN Electronic Systems Command training text, NAVSHIPS 0967-255-0010 is entitled *Principles of Telegraphy (Teletypewriter)*. Throughout this Reply to Comments, I have used the term *manual telegraphy* to denote that code which is *sent by hand and received by ear*.

⁴⁷ Claude E. Shannon's seminal 1948 paper establishing the relationship of communication rate versus noise versus error rate used the (then) common 5-level *Baudot* teleprinter character code as an example.

transmitter to communicate around the world, just a telegraph key. While that is revolutionary and perhaps Nobel-worthy in itself, it has yet to be demonstrated.⁴⁸ Unfortunately for manual telegraphy proponents, the method **did** die everywhere but in Amateur Radio. Manual telegraphy skills simply aren't useful for anything but satisfying the personal desires of long-tenured radio amateurs in regards to Amateur Radio licensing examinations.

Summary

The Los Angeles Times article in its 4 November 1988 Home edition has been shown to be a collection of half-truths, outright errors, and doubtful quotes from sources. It was generally inaccurate to the state of the radio communications arts in 1988 and woefully inaccurate to that state 16 years later. That paean to telegraphy has **no** place as any reference to any of the four Petitions for Rule Making of 2004 in regards to Amateur Radio regulation amendments. Neither Mr. Gosnell nor anyone else should use it as a reference text either for or against telegraphy use or testing.

I thank the Commission for allowing an independent citizen's viewpoint to be heard and with the ability to share a half century's accumulation of experience and knowledge in radio and electronics at work and in hobbyist activities.

Respectfully submitted this 16th day of April, 2004,

Leonard H. Anderson

Life Member, Institute of Electrical and Electronic Engineers
Veteran, U.S. Army Signal Corps, 1952 to 1960.
First Class Radiotelephone (Commercial) License granted 1956.
Former Associate Editor, Ham Radio Magazine
Retired electronics engineer, but retired only from regular hours of work.

10048 Lanark Street
Sun Valley, California
91352-4236

Internet: LenOf21@aol.com

⁴⁸ Other than on science-fiction shows on television.