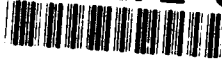


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Communication Education: The Systems Approach

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Thesis: The United States Marine Corps Operational Communication Chief requires comprehensive knowledge of the integration of tactical communications systems, but the current education system fails to prepare Marines for this critical position. The Marine Corps enlisted communication training pipeline needs to continue transitioning to the Systems Approach to Training (SAT) to adequately prepare communicators for today's complex, systems-oriented battlefield. This paper addresses quality, funding and joint curriculum issues.

USMC; Command and Control; C2; C3; C4I;
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COMMUNICATION EDUCATION: THE SYSTEMS APPROACH

Submitted to
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COMMUNICATION EDUCATION: THE SYSTEMS APPROACH

OUTLINE

THESIS: The Operational Communication Chief requires comprehensive knowledge of the integration of tactical communication systems, but the current education system fails to prepare Marines for this critical position. The Marine Corps enlisted communication training pipeline needs to continue transitioning to the Systems Approach to Training (SAT) to adequately prepare communicators for today's complex, systems-oriented battlefield.

- I. OccFld 2500 and its current education system
 - A. Three basic MOSSs comprise OccFld 2500.
 - B. Current education systems is series of stovepipes.
- II. Problems of the current system
 - A. The lack of emphasis on systems first identified at the 1989 conference.
 - B. Front End Analysis of OCCFLD 2500 completed June 1992.
- III. Corrective action underway
 - A. Communication Systems Chief Course began 1991.
 - B. Operational Communication Chief Course began 1992.
 - C. MCCES instituting Systems Approach to Training and returning to traditional instructor-student forum.
- IV. Problems remaining
 - A. Lack of training slots at CSCC and OCCC.
 - B. No AN/TTC-42s available for training.
 - C. OCCC fails to provide adequate training in the joint environment.
 - D. There is no screening for selection to attend OCCC.
- V. Recommendations
 - A. An in-depth screening process is needed to ensure only the best qualified Marines are sent to OCCC.
 - B. Adequate funds are needed to rectify shortages in the number of seats and equipment in CSCC and OCCC.
 - C. OCCC's curriculum must be refocused to better emphasize joint operations.
- VI. Summary

COMMUNICATION EDUCATION: THE SYSTEMS APPROACH

When dialing 911, a caller in distress has several expectations--that there will be a quick response; that the response will be appropriate and sufficient to meet the crisis;... Similarly, when the Nation faces a crisis, it expects much of the same of its armed forces: that they possess the versatility to respond wherever, whenever and however they are required;... Marines are uniquely qualified to respond to emergency 911 calls, whether in Liberia, Southwest Asia, Bangladesh, the Philippines or Somalia, because they are on-scene, ready and capable.(4:4)

The analogy drawn between the United States Marine Corps and our nation's 911 emergency response network is astonishingly accurate in many respects. This is a particularly cogent comparison with regard to command, control, and communication. Both institutions have highly centralized command and control infrastructures that are dependent on communication. It is ironic that communication is largely taken for granted, but is essential to the successful prosecution of the myriad of assignments the Marine Corps may face today. While technology has continued to evolve unchecked during the last twenty or more years, the Marine Corps has struggled to keep pace with this evolution. One glaring example of the Marine Corps' failure to keep pace with technology is the enlisted communication education system which has remained unchanged for over 20 years.

The operational communication chief, a Gunnery Sergeant, is one of the most critical links in providing communication for the Marine Air Ground Task Force (MAGTF).

His technical expertise must be diverse to facilitate successful connectivity of information systems, the lifeblood of the MAGTF, throughout the theater of operations. The current education system fails to prepare Marines for this critical position by not providing them with comprehensive knowledge of the integration of tactical communication systems. Although the Marine Corps enlisted communication training pipeline has recently made progress in emphasizing the Systems Approach to Training (SAT), it must fully transition to the SAT to adequately prepare its operational communication chiefs for today's complex, systems-oriented battlefield.

Deficiencies in the Marine Corps enlisted training pipeline were first identified in 1989. Since then, many changes to correct these problems have been implemented. To adequately describe the changes to the operational communication field (OccFld 2500) that are either underway or proposed, one must first examine the existing structure of this system to provide a framework for further discussion.

OccFld 2500 CAREER PIPELINE

Marines in OccFld 2500 are responsible for the installation, interconnection, and operation of electronic equipment used to transmit data. They must also perform preventive maintenance on telephone, teletype, switching,

radio, and cryptographic systems that are essential links in command and control operations.

Three major disciplines comprise OccFld 2500: wire, radio, and the communication center. The field wireman is responsible for constructing, operating, and maintaining wire networks that link key outposts, control points, and headquarters with reliable paths for telephone, teletype, facsimile, and digital data messages. The field radio operator's duties include setting up and tuning radio equipment, antennas, and power supplies; establishing contact with other stations; making changes to frequencies or cryptographic codes; and maintaining equipment at the first echelon level. Communication Center Operators work in message and communication centers in the FMF and at bases, posts, and stations. The operators' responsibilities include processing, recording, and typing incoming and outgoing message traffic.(8:3.75)

The enlisted communication training pipeline begins when Marines are assigned Military Occupational Specialty (MOS) 2500 and subsequently sent to the Marine Corps Communication-Electronics School at 29 Palms, California, upon completion of recruit training.

Formal MOS schooling for enlisted communicators begins at one of three basic MOS courses specializing in either wire, radio, or communication center operations. Each Marine emerges from these courses as a field wireman (2512), field radio operator (2531), or communication center

operator (2542), trained exclusively in their MOS. The next formal MOS school that these communicators will attend will be at an intermediate level course either as Staff Sergeants (radio operators and communication center operators) or as Sergeants (field wiremen). Three separate intermediate level schools prepare Marines to serve as chiefs in their respective MOSs; no cross-training occurs at this level. Marines receive one of the following MOSs after completion of an intermediate level course: 2519, wire chief; 2537, radio chief; or 2549, communication center chief. Prerequisites required for the intermediate level communication courses are proficiency, rank as stated above, and two years service remaining. Figure 1 depicts the OccFld 2500 career pipeline from entrance as a basic communicator through the most senior enlisted communicator billet. The figure graphically depicts that no cross-training between MOSs occurs until the Marine becomes an operational communication chief as a Gunnery Sergeant. (8:3.87)

The operational communication chief is the senior operational communication noncommissioned officer that directly assists the communication-electronics officer (CEO). He must be knowledgeable about equipment capabilities and system integration of all elements of communication (wire, radio and communication center). His duties include inspecting communication units to determine equipment and operational readiness and supervision of

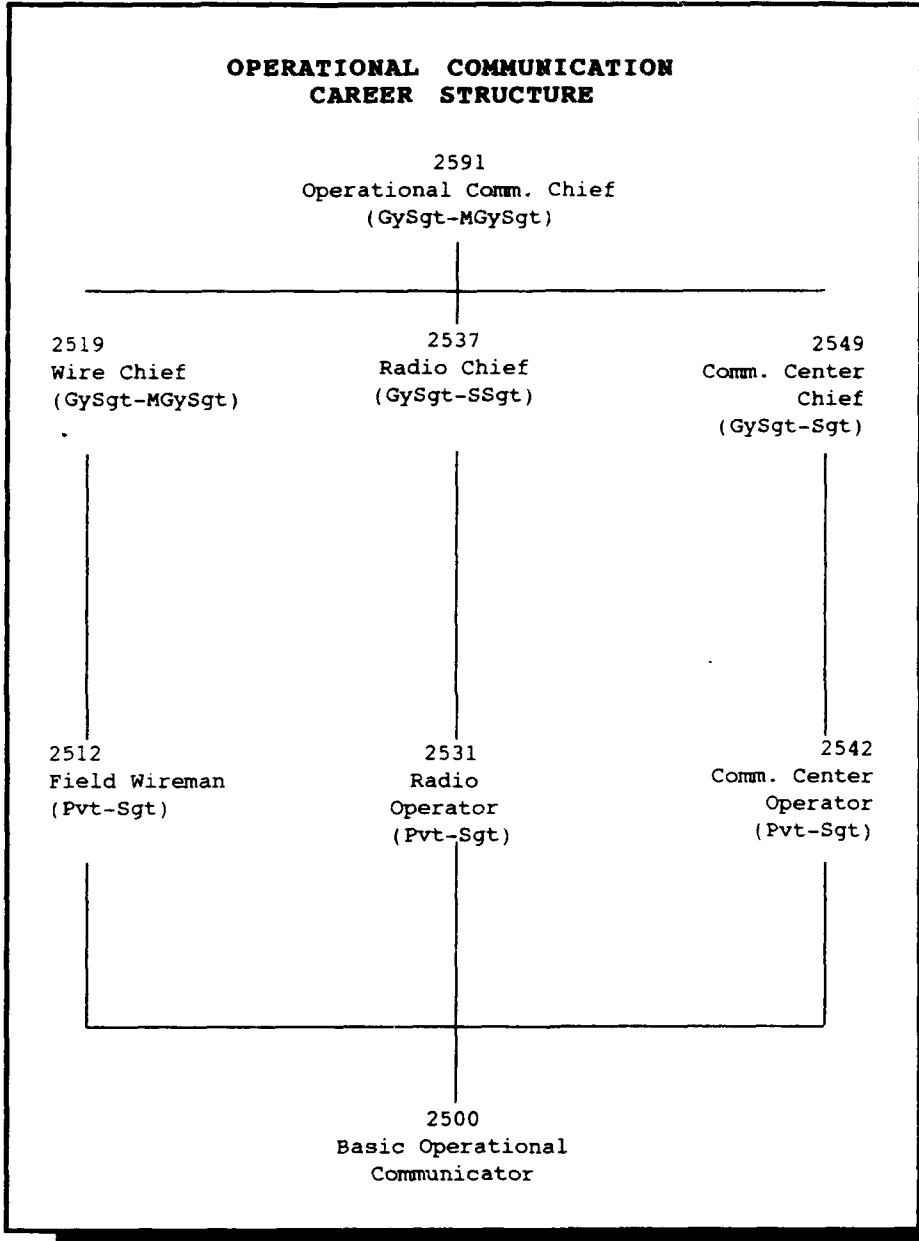


Figure 1: Operational Communication Career Structure Chart

personnel installing, operating, and maintaining wire, radio, and communication center facilities.

The first time cross-training between the three communication MOSs occurs is at the senior level Operational Communication Chief Course. The communication training pipeline is not structured to provide formal instruction in adjacent communication fields prior to the senior level. The assumption is made that Marines will acquire a working knowledge of adjacent MOSs during their careers. That this has proven to be a fallacy is evidenced by the majority of Marines attending OCCC without having sufficient cross-training.(1)

REMOVING THE STOVEPIPES

Operational communication chiefs must attain proficiency in all facets of communication systems to support joint operations and tactics in increasingly larger theaters of operation. The enlisted communication training system still trains its communicators via linear channels commonly known as stovepipes. Communicators trained along stovepipe channels have no lateral cross-training at either the beginning or intermediate level. This system produces communicators who are proficient in their own MOS, but have virtually no knowledge of adjacent systems. At present, the narrow focus in the training pipeline does not provide operational communication chiefs with the broad-based, systems-oriented knowledge they require to establish a

viable communication network for a MAGTF in a large, joint theater.

This deficiency was first identified by senior communicators attending the Senior Communicators Conference in the fall of 1989.(7:1) One recommendation made during this conference was that formal schools at the intermediate (Sergeant and Staff Sergeant) level provide a basic knowledge of adjacent communication MOSs.(7:1)

A Front End Analysis (FEA) of OccFld 2500, dated June 1992, corroborated the need to examine the enlisted communication training pipeline to see if it adequately supported current FMF needs. The FEA supported the recommendation made at the Senior Communicators Conference that Sergeants and Staff Sergeants need to attain basic knowledge of adjacent communication MOSs along with expert knowledge of their own MOS.(5) By learning about adjacent MOSs, intermediate level communicators begin to develop their knowledge of communication systems that will better prepare them to be operational communication chiefs.

Acting on recommendations from the Senior Communicators Conference and the Front End Analysis, the Marine Corps Communications-Electronics School (MCCES) has taken aggressive steps to implement changes that will focus the enlisted training pipeline on systems. Two major changes to the training pipeline are already being implemented: consolidating the three intermediate level courses into a

single systems-oriented course and restructuring the senior level OCCC curriculum to also emphasize systems.

In 1991, the Communication Systems Chief Course (CSCC) replaced the Wire Chief's Course, the Radio Chief's Course, and the Communication Center Chief's Course as a single intermediate level school for Sergeant and Staff Sergeant communicators. CSCC emphasizes the Systems Approach to Training (SAT), which teaches the planning and installation of integrated communication systems, not the specific characteristics for particular pieces of equipment. Incorporating the SAT into training at this level is vital because it begins the cross-training that will prepare communicators to perform as proficient operational communication chiefs.

CSCC is structured around the Individual Training Standards (ITS) for wire, radio, and communication center chiefs. ITSs for all three communication MOSSs were incorporated into the curriculum, ensuring that graduates have a solid foundation in each communication discipline. Marines now receive their first exposure to adjacent communication MOSSs at the intermediate level school, CSCC. The diversity offered in the CSCC curriculum is depicted in Figure 2.(9:B.1-2)

The purpose of CSCC is to enhance students' expertise in their own field of experience and to expose them to other communication skill areas.(7:1) CSCC is not intended to be a refresher course for Marines who have been out of the

CURRENT CSCC INDIVIDUAL TRAINING STANDARDS

<u>TASK DESCRIPTION</u>	<u>MOS</u>
Plan Mobile Electric Power (MEPG) Support for Communication Operations	2500
Plan Equipment Grounding Procedures	2500
Prepare USM:TF And GenAdmin Messages	2500, 2549
Manage MIMMS Documents (LM2/DPR/ERO)	2500, 2519, 2537, 2549
Plan Wire Communications	2519
Plan Route for Field Wire and Cable Laying	2519
Plan a Tactical Switching Network	2519
Plan STU-III Operations	2519
Supervise Communications Security (COMSEC) for a Wire Section	2519
Supervise Maintenance Management Procedures	2500, 2519, 2537, 2549
Plan a Single Channel Radio System	2537
Plan UHF Multi-channel Radio Communication System	2537
Plan SHF Communications	2537
Plan SATCOM	2537
Plan ANDVT Operations	2537
Plan Integration of a Tactical Communication System into DCS	2537
Plan a Tactical Communication/Message Center	2537, 2549
Draft Communication Center Emergency Action Plan (EAP)	2549

Figure 2: Individual Training Standards currently being taught at Communication Systems Chief Course.(9:B.1-2)

communication field. Students attending CSCC should be experts in their own MOS prior to attending so they can concentrate on new concepts such as systems planning and communication systems of adjacent MOSSs.

One change that has been instrumental in making SAT effective in the CSCC curriculum is the reinsertion of traditional instructor-to-student classroom instruction. Fixed Mastery/Variable Time (FM/VT), more commonly known as self-paced instruction, has been eliminated. Instructor-to-student interaction facilitates more consistent instruction and a higher degree of student mastery.

These changes have made significant progress, but two problems must be addressed to adequately prepare communicators for today's systems-oriented, joint environment. First, MCCES has no AN/TTC-42s, Unit Level Circuit Switches (ULCS), for practical application training. Because this piece of equipment is at the very heart of MAGTF communications, the total lack of hands-on training creates a significant void in the CSCC curriculum. Secondly, the limited number of course seats available does not train sufficient numbers of intermediate level communication chiefs to adequately support the FMF.

The AN/TTC-42 is the primary telephone switching center that serves as the nerve center for USMC tactical phone systems. Since the ULCS is integral to most MAGTF operations, developing plans utilizing the ULCS and learning

to operate the ULCS are both Individual Training Standards in the CSCC curriculum. However, MCCES does not own or have access to any AN/TTC-42s for hands-on training. Because of the critical role that AN/TTC-42s play in tactical communication, their absence leaves a large gap in the CSCC curriculum.

To rectify this deficiency, practical application training on the AN/TTC-42 must be provided to CSCC students. Ideally, two suites of equipment should be dedicated to MCCES for practical application training. Perhaps more realistic in today's increasingly austere economic climate would be to provide students with computer aided instruction (CAI) on the AN/TTC-42. While less effective than hands-on training, CAI would provide more detailed instruction than is currently available at MCCES. Another advantage to this approach for AN/TTC-42 training is that software for computer aided instruction is already available.

The second major deficiency facing CSCC is a shortage of school seats. Each class is designed to teach a maximum of 40 students per class; 240 students are able to attend CSCC annually.(12:1.2) Approximately 227 intermediate level chiefs attend CSCC each year, but more than 400 chiefs are promoted annually.(2) If the current number of school seats remains constant, over 40% of the Marine Corps intermediate level communication chiefs will not receive systems training at this critical juncture in their careers. To adequately

provide FMF units with chiefs that are knowledgeable in communication systems, more Marines must be permitted to attend CSCC.

To ensure that an acceptable level of intermediate level chiefs are formally trained, 75% of the 400 chiefs promoted annually would need to attend CSCC. An additional 60 seats would be required to train 300 chiefs annually. At an average daily cost of \$53.00 per student, per day, these 60 additional seats would cost the school \$194,000.00.(6) MCCES has adequate staff and facilities to support this increase now; the only obstacle is money.

PREPARING COMMUNICATION CHIEFS FOR THE FUTURE

The other significant change to the enlisted communication training system being implemented is the restructuring of the Operational Communication Chief Course (OCCC).(1)

OCCC is presented over 84 training days and is convened twice annually. The maximum student capacity is 40 per class according to the Course Descriptive Data; however, the limited availability of training dollars has reduced the average class size to 35 students per class. To attend OCCC, Marines must be a Gunnery Sergeant, Master Sergeant, or Master Gunnery Sergeant within MOSSs 2519, 2537, or 2549. No other selection criteria are used to screen students for this course.(8)

The former OCCC curriculum consisted of communication planning, management, and engineering in 15 Individual Training Standards. 328 of 573 total training hours were devoted to communication in amphibious operations, but none were devoted to communication in joint operations. Figure 3 depicts the extremely narrow scope of the former OCCC curriculum that focused almost exclusively on communication in amphibious operations.

Although not officially approved by Headquarters, Marine Corps, the newly restructured OCCC curriculum was first taught in the fall of 1992. The revised course introduced diversity by adding 15 new Individual Training Standards. OCCC does not adequately emphasize joint and systems-oriented concepts, but the incorporation of the systems approach to training reflects the beginning of change. The revised ITS for OCCC, depicted in Figure 4, reflect a much broader curriculum diversity.(6) OCCC is vastly improved over the previous course and makes improvements in preparing communication chiefs to perform efficiently in an increasingly integrated communication and data environment.(9)

Despite the improvements to OCCC, several problems still prevent this course from achieving its optimum effectiveness. Three problems need to be addressed: inadequate course seats, unqualified students attending OCCC, and the lack of emphasis on joint operations and systems integration.

OCCC INDIVIDUAL TRAINING STANDARDS	
LESSON DESCRIPTION	HOURS
Draft Plan for Amphibious Communications	328
Draft Unit Communion SOP	5
Recommend Procurement/Allocation of Comm Equip	2
Advise on Location, Echelonment, and Displacement of CP	4
Determine Total Power Requirements for Operations	17
Draft Communications Guard Shift	16
Draft Communication Termination Request and Telecommunication Service Request	24
Conduct Communitons Site Survey	3
Draft a Tactical Switching System Plan	59
Assist Commander and Staff in Comm Planning	15
Plan GMF Communications	24
Perform Systems Planning	18
Direct Communications Control Operations (SYSCON)	8
Coordinate Maintenance Management	34
Coordinate Embarkation of Communication Assets	16
TOTAL ACADEMIC HOURS	573

Figure 3: Individual Training Standards currently taught at Operational Communications Chief Course.(8:3)

PROPOSED OCCC INDIVIDUAL TRAINING STANDARDS

LESSON DESCRIPTION	HOURS
Communication Planning	57
Radio Fundamentals	18
Organization/Employment of Comm Assets	17
Digital Communication Terminals	8
Satellite Communications	24
Communications Control (SYSCON/TECHCON)	26
Electronic Warfare	18
Maintenance Management	36
Embarkation	16
Command Vehicles	13
Radio Equipment	36
Power Sources	17
Wire Systems/Procedures (ULCS)	35
Joint Planning Management	12
AN/GRC-201	4
Communications Center Fundamentals	34
Communications Center Equipment	14
Cryptographic Equipment	24
PLRS	8
Computer Literacy	30
Frequency Management	8
Wargames	40
LFTCPAC Communication Planning	40
Electronic Key Management System	8
Date Communications	14
TOTAL ACADEMIC HOURS	573

Figure 4: Proposed Individual Training Standards to be taught at the Operational Communications Chief Course.(13.B.1-2)

The first problem facing OCCC is that only 49% of all senior enlisted communicators will be able to attend this senior level course. Currently, only 80 students per year are able to attend OCCC at its maximum capacity. Since the Marine Corps gains approximately 140 new operational communication chiefs each year, this precludes 60 from attending OCCC. To ensure that an acceptable level of operational communication chiefs are formally trained, 75% (105) of the new chiefs would need to attend OCCC. This would require 25 additional seats annually; at an average daily training cost of \$53.00 per student, per training day, adding these 25 seats would cost \$110,000.00.(6) MCCES has the staff and facilities to adequately support this increase now; money is the only obstacle.

The second issue is the emphasis of the OCCC curriculum. Students spend approximately 82 hours on basic information such as radio fundamentals, communication center fundamentals, and computer literacy. Only 12 hours are allocated for Joint Planning, and no hours are dedicated to TRITAC (joint) communication systems.(10:B.1-2) This emphasis on communication fundamentals reflects that the course is used partially as a refresher course. Marines selected for OCCC should be communication experts that do not need training on rudimentary communication concepts. While OCCC employs the Systems Approach to Training in this course, the curriculum does not substantially emphasize systems. Time devoted to the refresher type courses listed

previously would be used more productively in studying Joint Planning or TRITAC equipment.

The final problem hindering the effectiveness of OCCC is the large number of unqualified students attending the course. Currently, no selection guidance or screening criteria ensures that students are qualified for the course. Many students are incorrectly assigned to OCCC for refresher training after serving in a non-FMF billet. The new curriculum offers a substantial amount of state-of-the-art technical information and focuses on student interaction to promote the optimum learning medium; using this course as a refresher is counterproductive to both the student and the class. To ensure that only the most qualified radio, wire, and communication center chiefs fill the limited number of class seats, a formal screening process should be established and centrally managed. A screening checklist with an inventory examination could be sent to assigning commands for completion. Once completed, the checklist/inventory should be returned to MCCES with a command recommendation on the prospective student.(3) MCCES would manage the screening process to ensure only qualified Marines were sent to the school.

MCCES's transition to a Systems Approach to Training, reinstatement of lockstep training, addition of CSCC, and revision of OCCC are impressive steps that will enable the enlisted communication training system to develop more

proficient operational communication chiefs. The enlisted operational communication training system is at a critical juncture. It can either build upon these progressive measures and become one of the most responsive assets in the MAGTF or it can level out in its ascent and simply be another reactive element on the battlefield. The exchange of information is essential to the successful prosecution of any military campaign today and training our personnel to best facilitate this exchange is equally important. Martin Van Crevald summarizes the point well in his book *Command in War*:

...victory often depends not so much on having superior technology at hand as on understanding the limits of any given technology, and on finding a way of going around those limitations.

With exceptional lucidity, Dr. Van Crevald articulates the importance of maintaining our edge with proficiently trained personnel. Although the combined cost of increasing the class size of OCCC and CSCC will cost \$300,000.00, the return on this investment will be great. Success on the battlefield and lives saved will be the dividends of wise investments made to ensure the Marine Corps has effective and creative communication systems.

As the budget tightens and the theater of operations expands, the Marine Corps will become increasingly involved in joint operations. The Systems Approach to Training that

is being implemented at MCCES emphasizes this type of environment and provides the type of training that our enlisted communication chiefs need. However, SAT is still developing and must continue to evolve. The OCCC curriculum has been positively changed by SAT, but needs more emphasis on joint communication operations for this course to truly be systems-oriented.

A more premeditated selection and assignment policy is needed to ensure that only the most qualified Marines fill the limited number of seats at the Operational Communication Chiefs Course.

We have a prime opportunity now to breathe the life of progressive change back into the communication field in the Marine Corps. The only thing that is certain about communication in maneuver warfare is that it will be uncertain, and it will continue to change. The foundation of any 911 service is instantaneous, efficient communication. If the Marines are to provide this service for the nation, it too must have a sound communication network. This can only happen if our communicators understand how the bigger picture, the systems picture, facilitates an efficient communication network. Our challenge is to train to this new standard and not be shackled by convention.

BIBLIOGRAPHY

1. Allen, Kathryn A., Director, Communication-Electronics Operators School, Marine Corps Communication-Electronics School. Personal interview. 29 Oct. 1992.
2. Cole, Paul L., OCCFLD 25 Task Analyst, TE-31G. Personal interview. 3 Nov. 1992.
3. ---. Personal interview. 15 Jan. 1993.
4. "Dial 911 For Marines: One Call Gets It All." Staff Marine Corps Combat Development Center, Special Projects Office. 21 Jan. 1993.
5. "Front-End Analysis (FEA) Report, OCCFLD 25-Operational Communications." Naval correspondence. 17 Jul. 1992.
6. "Increase OCCC from 77 to 84 Training Days Beginning with OCCC 1-93." Point paper SCTS/CEOS. 29 Oct. 1992.
7. Lawless, J. D. "Course Descriptive Data for the Communication Systems Chief Course." Naval correspondence. 14 Nov. 1991.
8. "Military Occupational Specialities Manual (Short Title: MOS Manual). Marine Corps Order P1200.7L. 1 Apr. 1992.
9. Norton, H. R. "Course Descriptive Data for the Communication Systems Chief Course (CSCC, SSC: 25Q for MOS 2519, 25E for MOS 2537, or 253 for MOS 2549 as appropriate)." Naval correspondence. Undated.
10. ---. "Course Descriptive Data for the Communication Chief Course (OCCC, SCC: 25A, MOS: 2591)." Naval Correspondence. 17 Dec. 1992.