RBECS - AN ADDITIONAL TOOL IN THE COMMANDER'S SOFTWARE ARSENAL

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INTRODUCTION

The Revised Battlefield Electronic CEOI System (RBECS) is a software package being fielded to supplant the familiar paper booklet SOIs, CEOIs, and other changing call sign and frequency systems used by the Armed Services and obtained from the National Security Agency (NSA). RBECS offers major unit commanders virtual autonomy in preparing operational call sign and frequency assignments, a somewhat radical departure from the former rigidly controlled Communications Security (COMSEC) accountability procedures. RBECS also offers the flexibility of revising operational CEOIs and SOIs virtually overnight, eliminating the long turn around time that has come to be expected for centrally produced material.

Begun under Army sponsorship as the BECS program to support the SINCGARS radio as a source of TRANSEC Key and ECCM data, as well as the SOI, the program has evolved to the stage of development where RBECS has been declared a DoD standard by the Joint Staff and will soon become a joint program with Army as lead service. Since the operation in Grenada, the various CINCs and services have voiced a requirement for a joint contingency CEOI for rapid deployment. RBECS provides the means for units to make their own systems to meet time constraints of any contingency. RBECS has had several modifications during its development to accommodate the particular needs of the services as well as the peculiar requirements of the joint commands. Consequently RBECS can easily assume its position in the modern world of joint warfare.

This paper describes the RBECS software package, its development, its functionality, and how it will supplant the familiar NSA-produced, paper-based changing frequency and call sign systems. It is a chronicle of a PC application superseding an industrial based publication/production effort of considerable size with a budget to match, while simultaneously improving field capabilities.

THE REQUIREMENT

To minimize the amount of useful information that an adversary can glean from unencrypted portions of transmissions over nonsecure single-channel radio nets, a directory of users and nets is prepared with frequencies, call signs, call words and suffixes that change randomly on a periodic basis. Frequencies are changed to thwart direction finding (DF) and jamming efforts, particularly those efforts based on manual methods. Call signs, call words and suffixes are changed to confound analytic efforts directed at establishing order-of-battle. This directory is called, depending on the particular service, the Communications-Electronics Operation Instructions (CEOI) or Signal Operation Instructions (SOI). Such a directory employed in a multiservice and/or multinational environment has come to be called a Joint CEOI (JCEOI).

An analogy may be drawn with a common user telephone network. A telephone network without a "phone book" is limited in utility to the numbers one can retain in memory or otherwise jot down in personal notes. Possession of the book opens communications possibilities that are virtually limitless. Likewise, the JCEOI/CEOI/SOI is the master key, so to speak, to single-channel tactical radio communications, serving two fundamental purposes: as a Directory and as a measure of Transmission Security (TRANSEC).

As a TRANSEC measure the JCEOI/CEOI/SOI is a COMSEC aid designed to impair the effectiveness of potential adversary Communications Intelligence (COMINT) collection efforts. This is accomplished through the random generation and daily change of call signs, call words, suffixes and frequencies. These measures limit the ability of a potential adversary to identify units through call sign/word reconstruction or to predict future call sign/word, suffix or frequency assignments. TRANSEC is also enhanced, where feasible, through the daily change of frequencies by making hostile DF and jamming operations more difficult to execute.

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GLOSSARY OF TERMS

SOI - Signal Operation Instructions. Contains daily changing call signs, suffixes and frequencies for tactical, single-channel, radio nets. Applicable to hopping and non-hopping radios. Term used by Army.

CEOI - Communications-Electronics Operation Instructions. Former Army name for SOI. Usage continues with other services.

JCEOI - Joint CEOI. When a CEOI applies to a joint operation.

Call Sign - A randomly assigned pseudonym for a unit or organization, hopefully unknown to the adversary. Usually a trigraph in the form, Letter-Number-Letter (LNL).

Call Word - Like a call sign but composed of a randomly assigned dictionary word or phrase. Usually preferred by aviation elements.

Suffix - A randomly assigned two-digit number, added on to the call sign to designate a particular person, position or function within a unit.

TRANSEC - Transmission Security. Measures taken to deny to the adversary information derivable from communications externals. Does not deal with message content, the province of Communications Security (COMSEC).

Single Generation or Consolidated System - A JCEOI, CEOI, or SOI that encompasses all possible tactical radio users in an AOR, regardless of command level or echelon.

Independent System - A JCEOI, CEOI, or SOI generated by itself, without regard for superior, subordinate or adjacent organization. However, only the assigned frequency plan (in the case of a contingency system) may be used, to ensure minimum frequency conflicts.

Contingency System - A JCEOI, CEOI, or SOI designed for wartime purposes. In the case of a paper system it is on-the-shelf, ready to go on call up of a unit. In the case of RBECs produced systems it is a set of files (the unit's database) ready to be generated, printed, and/or distributed upon notification of call up. The latter case allows for last minute additions, deletions, and corrections, a luxury not afforded by centrally-produced systems.

Operational System - A unit's regular day-to-day JCEOI, CEOI, or SOI. Based on frequencies allocated for use in a specific area.

Training System - Similar to the Operational System. Loosely indicates a unit's mission and location. Units with a training system tend to be located in CONUS and are not in daily proximity to a potential adversary.

Exercise System - A JCEOI, CEOI, or SOI created specifically to support a particular exercise in a specified area. Specially allocated set of frequencies only for the planned duration of the exercise.


TRANSEC Key - The bit pattern that determines the frequency-hopping behavior of the SINCGARS radio.

ECCM Data - The frequency hop set, the lockout frequencies, net IDs, etc. required by SINCGARS. Used in conjunction with the TRANSEC key.

Umbrella JCEOI/Supporting Force Concept - The scheme of employment for JCEOI/CEOI/SOI where the AOR is divided up into logical, manageable pieces based on organizational, mission, or community-of-interest lines.

Air Force, Navy and Joint Commands (CINCs and JTFs) are specifically exempted from changing frequency requirements for a variety of reasons ranging from safety to the practicalities of radio frequency propagation and the availability of frequencies in certain bands.

Based on technical improvements in recent years in the secure voice arena, the TRANSEC aspect of CEOI/SOI has become somewhat obscured regarding its original purpose and intent. Changing call signs on fully secure nets have been designated as optional.* Frequency-hopping radios such as SINCGARS have also obviated the need for changing frequencies in many cases. At the same time however, the emergence of more fully developed joint warfare doctrine and viable joint warfare command entities, has significantly increased the requirement for a JCEOI in its capacity as a directory, as well as the integration of service CEOI/SOI with JCEOI as a cohesive, interoperable system covering the Area of Responsibility (AOR).

CHANGING CALL SIGN & FREQUENCY SYSTEMS GO JOINT

Originally, changing call sign and frequency assignment systems were generally service-oriented. However, driven by relatively recent "real world" operations such as Just Cause and Desert Storm, Joint CEOIs have become a reality. The lessons learned in each of these joint operations have contributed to the formulation of a scheme of employment for changing call sign and frequency systems called the Umbrella JCEOI/Supporting
Force Concept. The concept is based on a series of relatively small, independently generated systems oriented on specific communities of interest, or organizational entities. Such a scheme is in contrast to a single, consolidated system that encompasses the top level all the way down to the platoon level. Regardless of the style of JCEOI system, both require consideration of interoperability and of frequency resource availability for the place of deployment. RBECS provides the user with the capability to deal with these areas of concern on a local, direct contact basis.

Interoperability

From an interoperability viewpoint, a single generation system provides maximum interoperability since every unit and every net can be made known to every single-channel tactical radio user, provided that one holds the complete JCEOI. In the case of a two corps plus sized force, a complete JCEOI, executed in a paper media, results in a rather large complex of booklets. On the other hand, if the idea of a changing call sign and frequency system is pursued on a unit basis (i.e., divisions and separate brigades having independently generated systems), tying all units together under one command umbrella JCEOI can be accomplished successfully if a few basic things are recognized. If communities of interest are recognized, joint net names established that are standardized throughout the world, and training is focused to promote uniform JCEOI/CEOI/SOI procedures, potential drawbacks to a system of independent generations can be overcome. Thus the logistic and security benefits of the smaller independent systems can be realized and the corresponding failings of a single generation system avoided. With routine liaison and coordination at unit interface boundaries, as there should be for a variety of matters, no noticeable loss of interoperability should be experienced using independent systems as compared to a consolidated system. The top level Umbrella JCEOI of the CINC of an AOR is made interoperable with the lower level CEOI/SOI systems of the supporting forces through coordination, liaison and exchange of systems as required at natural interface points. Figure 1 illustrates the relationship between a JCEOI (the umbrella) that contains the various high level command elements and the call sign and frequency systems of the supporting elements that prosecute the battle. A given AOR may have one, several or all of the elements shown. The wavy line indicates a functional as well as organizational separation between senior command elements and those service-oriented, supporting force entities. Adjacent supporting force elements or those that interact, exchange call sign and frequency information to ensure interoperability. Vertical exchanges are also made as required.

Frequency Resources

A major concern when constructing a JCEOI/CEOI/SOI for deployment purposes is frequency resource availability. If host country approval is required, there is little one can do ahead of time in the way of frequency assignment. On the other hand, if host country approval is not of concern, contingency CEOIs could be designed based on a frequency plan using virtually the full VHF-FM spectrum. Such a frequency allocation scheme allows complete deconfliction within major units, such as a division, since virtually every radio user within the division will have a discrete frequency, at least within that particular band. Obviously there are different considerations in other bands such as the HF band and the UHF band, particularly for airborne usage. It is desirable to design systems capable of deployment virtually anywhere, thus lessening the logistic and administrative burden of managing multiple contingency systems.

To help accomplish this end, an integrated frequency utilization scheme for the VHF-FM band has been agreed to by the Marine Corps and the Army that overlays nine different frequency plans on a list of several hundred contingency frequencies selected for "universal" utilization. These plans provide a reasonable allocation of discrete and common use frequencies for each Army division, separate brigade, armored cavalry regiment (ACR) and Marine Expeditionary Force (MEF).
The block of common use frequencies is sufficient to minimize the unit reuse ratio and internal interference. The design of the nine plans is such that any of the Army or Marine units can operate side-by-side, with minimal frequency interference, if deployed to any of their designated primary or secondary AORs. However, some deconfliction on the ground among U.S. and with Allied units is expected to be required in any event. The latter considerations regarding frequency allocations are particularly important when designing paper-based JCEOI/CEOI/SOI to be pre-positioned as on-the-shelf contingency systems. When employing RBECS, last minute frequency changes can be accommodated quite easily.

SUPPLEMENTARY INSTRUCTIONS

Another step toward achievement of a high degree of interoperability was the creation of a standardized list of Joint Nets. Now, in joint usage, a designation of CINC 6 for a net, for instance, indicates to all that it is a Tactical Missile Alerting Net broadcast over UHF satellite in the voice mode. A JTF 82 net is a Joint Task Force Naval Fire Control net on HF-SSB. These standardized nets are all listed and defined with all necessary details in the Supplementary Instructions (short titled JCEOI SUP 1). JCEOI SUP 1 is a common supplementary instruction designed and approved for use by each CINC in conjunction with the JCEOI applicable to the AOR. Thus each CINC will have a common set of net definitions and will be working to a common set of procedures for tactical communications. JCEOI SUP 1, although published in conjunction with paper-based contingency JCEOI, is intended to form the basis of CINC-prepared JCEOI as RBECS fielding is completed.

At the supporting force level, each service provides its own supplementary instructions for use with its own system of CEOI/SOI. The Army, for instance, uses FM 24-35-1, Signal Supplementary Instructions, to promulgate non-changing, procedural material that users of tactical radios need for efficient communication. The Marine Corps currently relies on two NSA-produced booklets, KAV 500 SUP 1 and KAV 539 SUP 1, to provide the non-changing supplementary instructions for its Atlantic and Pacific CEOI systems. The joint usage, JCEOI SUP 1, was modeled after the service instructions and potential conflicts have been avoided.

When using RBECS to produce either a joint or service system, the user will find a built-in capability to write in a limited number of free form notes (i.e., supplementary instructions) that can obviate the need to carry an extra document. Up to 30 pages worth of instructions can be created. However, JCEOI SUP 1 will remain an integral part of the overall JCEOI/CEOI/SOI scheme of deployment, serving as the baseline for joint net definitions and other essential information that cannot be repeated in every system produced.

A THREE STEP PLAN

The current plan for provision of JCEOI and the integrated use of supporting force systems, now and in the future, is a three step process. The steps range from an initial, on-the-shelf, paper contingency system, through interim local printing of RBECS output, to the final step with full electronic distribution capability.

The first step is virtually complete with paper contingency SOI/CEOI/JCEOI systems now on the shelf with all major commands. The second step is well underway with the fielding of the RBECS software and RDG. During this middle phase of system deployment, many commands are making use of local laser printers and office type copiers to reproduce their operational and exercise systems that are being generated by RBECS. Transmission of generated output to outlying units, in ASCII file format, by means of readily available modems and common protocols has been demonstrated in several major exercises and is now being practiced regularly.

Step three provides expanded decentralized generation of JCEOIs, CEOIs, and SOIs, by means of the RBECS software. Distribution, at lower levels will be by DTD, floppy disk, locally produced paper, or whatever methods are appropriate. At the higher levels, expanded use of file transfer techniques using modems and standard protocols is anticipated. The commencement of step three is contingent on the general availability of the DTD, which is currently scheduled to be available in quantity in 1995.

With the provision of a decentralized capability to generate and promulgate their own JCEOI/CEOI/SOI, field commanders and communicators alike will quickly find two key features:

a. The ability to make changes quickly.

b. The freedom to provide service to communities of interest rather than along strict organizational lines.

When provided with the adjunct capability to distribute a JCEOI/CEOI/SOI generation around the theater by electronic means, commanders and communicators will quickly learn that only needed portions need be extracted. The use of paper is then expected to decrease dramatically.
Figure 2 shows a typical RBECs system configuration. The essentials are a computer, the Random Data Generator (RDG), the RBECs software and a unit database (the task organization). With these elements a JCEOI/CEOI/SOI can be generated and then printed on a local printer, or be provided to another unit either directly or via file transfer over an existing network. Output can also be loaded into a Data Transfer Device (DTD). The TRANSEC key and ECCM data required by the SINCGARS radio is also generated on the same computer using RBECs. This latter data is then loaded into a DTD and subsequently downloaded into one or more radios to facilitate the frequency-hopping mode.

RBECs Characteristics, Capabilities, and User Requirements

The prime developer of RBECs has been the U.S. Army Project Manager for the Single-Channel Ground and Airborne Radio System (PM-SINCGARS), with substantial input from the National Security Agency (NSA) and the DoD Electromagnetic Compatibility and Analysis Center (ECAC), the latter acting in the capacity of a supplier to PM-SINCGARS. Actual coding was done by the ECAC support contractor, Illinois Institute of Technology Research Institute (IITRI). Although begun as an Army development, it became apparent, each Service, in one way or another has a requirement for something like RBECs and that many joint applications were awaiting its availability.

At the request of the Marine Corps, the Army imparted a number of features to RBECs that qualified it for joint application. Among these were the ability to handle call words and the ability to print physical paper output in the half-page format, a format preferred by the Marine Corps. Another format, in a half-page, two column layout, has also been provided for joint users. An 8 1/2 x 11 inch, full page format has been provided at the behest of the Navy to permit production of a master call sign book. The Army has retained its traditional quarter-page format. Although one of the main objectives of RBECs is to achieve a major reduction of paper in the battle space by making use of electronic data, the capability to continue the use of familiar paper systems has been provided to ease the transition. In all, there are four basic formats provided: Army, Marine, Navy and Joint. Now that RBECs has achieved the status of a joint standard, the program responsibility has been transferred to PM-JTACS(P) at Ft. Monmouth, NJ.

Users will find RBECs to be a mature, well planned item of software, designed to give units freedom from the long logistic tail that was characteristic of centrally produced JCEOI/CEOI/SOI material. The program itself is easy enough to use, but design of the SOI, CEOI, or JCEOI should be done by a user who also has familiarity with: the unit organization, the unit's standard and special purpose radio nets, the radio frequency allocation (RFA) for the unit, and the types, quantities and characteristics of the radios available to unit elements. A general familiarity with PC's, the DOS operating system, and the execution of different applications is helpful but a user need not be a computer specialist. During its initial development and subsequent upgrade for joint capability, the RBECs software has been subjected to an Independent Validation and Verification (IV&V) conducted by International Test Corporation (ITC) of Hunt Valley, MD.

A user oriented HELP function is available at each step of the program to assist the user and remind them of the options available. A rather extensive manual is also available to answer questions that may arise that are not completely answered by on-screen help.

For joint users, there is available an auxiliary software package called the RBECs Application Utility Package that provides a menu of functions to supplement and complement the RBECs software. Key among the features of the package is the capability to divert RBECs generated output to a file instead of sending it to a printer. When the user has the RBECs output in file form, it is then a simple matter to compress such a file and send it via modem to outlying commands. The utility package provides easy access to commercial software such as
PKZIP®, and PCPlus® to facilitate electronic distribution. Another objective of the utility package was to minimize the user's need to work directly with DOS functions thus precluding a need for additional training.

PRECURSORS TO RBECSS

1981 - Electromagnetic Compatibility Analysis Center (ECAC) working with an Army Combined Arms Combat Development Activity (CACDA) requirement, was to develop a Battlefield Spectrum Management concept. The study was to explore, among other things, the capability to generate CECI at division level, and the availability of a hand-held computer (HHC) device for CECI distribution purposes. Prototypes were developed but were found to be minimally useful primarily due to the limited state of development in the micro-computer industry at the time.

1986 - Testing of the Battlefield Electronic CECI System (BECS), a follow-on to the previous ECAC work. BECS was based on an HP-111 laptop computer that had severe limitations by today's PC standards. It had no hard drive and its operating system was unique to the manufacturer (not MS-DOS compatible). It was coupled to a friction feed, extremely slow printer, and the random generation was done using a secret software algorithm. The latter feature made the entire software package classified, and of course required distribution of initialization key, a cryptographic product. The CECI distribution device was to be the Electronic Notebook (EN), a development effort that lagged the BECS itself by about two years.

1989 - All fielding of BECS was made to the 2nd Inf Div in Korea, primarily for its capability to generate hopsets and the TRANSEC key for the SINCGARS radios.

1990 - Based on feedback from BECS testing, use in Korea, and the general "explosion" in PC technology, a development of Revised BECS (RBECSS) was initiated. Key goals: MS-DOS compatibility, virtual machine independence, unclassified software/hardware, and ease of use.

RBECSS is a rather large software program with many component files. It takes quite a bit of PC memory (7 MB) to run efficiently while avoiding writing generated material to the hard drive. The minimum requirements are a 286 machine or better with at least 2 MB of RAM. Although RBECSS will operate properly with a minimum of 512K of available RAM, the balance is employed in a RAM drive. The RAM drive is used to prevent writing anything classified or of potential intelligence value to the hard drive. In the case of a classified output, the user directs the output to the RAM drive to temporarily receive the generated files before copying them to a floppy disk or printing. Classified output sent to the hard drive permanently classifies the whole PC at the same level as the output, unless a removable hard drive is used. This is not a condition unique to RBECSS but simply a result of the physics of magnetic storage media. If the user already has a classified PC, they need not be concerned about isolating RBECSS output to a RAM drive. However, use of a RAM drive is essential in order to preserve a PC as unclassified. As a precaution against retention of classified material, even when using a RAM drive, a zeroization function is provided that will satisfactorily clear the RAM and sanitize it to the unclassified state.

RBECSS is designed to work properly with all versions of DOS from 3.3 through 6.x. However, DOS 6.x does require some minor adjustments to the operating environment. Use of the WINDOWS® environment is not recommended.

Incorporated into RBECSS is a sub-program called RSINISS that stands for Revised SINCGARS ICOM/Non-ICOM Support Software. This is the program that generates the TRANSEC key and ECCM data. The latter data are the hopsets, lockouts and net IDs for the SINCGARS radio that define the authorized and forbidden frequencies and the hopping pattern for each of the various nets that are to be established.

RBECSS FEATURES

- Machine Independent - 286 or better, 2 MB min.
- MS-DOS® Compatible - 3.3 through 6.x.
- All Service & Joint formats accommodated.
- Unclassified Software
- Random Input from RDG - No keying material required.
- No formal COMSEC accountability on output.
- Quick turn around on changes.
- Makes systems as large or as small as needed. Tailor output to forces on the ground.
- Supports Umbrella JCEOI/Supporting Force concept.
- Independence from central control.

Local generation of CECI/SOI with RBECSS requires the use of a Random Data Generator (RDG) ancillary device, AN/CSZ-9. The RDG is the source of a non-determinis-
tic random data stream on which call sign and frequency assignments are based. The RDG is a small, relatively inexpensive hardware device that connects externally to the host PC at a serial port (COM1 or COM2). It is designated simply as a Controlled Cryptographic Item (CCI) thus imposing minimal accountability requirements.\(^\text{12}\) The RDG was developed and produced for NSA by Pulse Engineering of Beltsville, MD.

The Data Transfer Device (DTD), AN/CYZ-10, is a complementary item of hardware that will securely hold crypto keys, the SINCGARS TRANSEC key, and the entire JCEOI/CEOI/SOI that applies to a major network of tactical radios.\(^\text{13}\) The DTD was developed for NSA by Group Technologies Corp. (GTC) of Tampa, FL, who also had the first production run. Subsequent production of the DTD, with a dramatic unit price reduction, is now at Allied Signal/Bendix of Columbia, MD. The JCEOI/CEOI/SOI and the TRANSEC variable are generated by RBECs and stored in a DTD for physical distribution. Electronic distribution also may be accomplished by file transfer methods over various communications links using standard protocols.

Although RBECs has been designed as a more or less machine-independent software package, the Army has elected to designate its Lightweight Computer Unit (LCU), CP-2112(V)2/U, a 486 lunch box style machine, as the machine of choice for use by RBECs. LCU’s are being procured by Army to cover all its active components as well as National Guard and Reserve force TO&E units of brigade size and larger. The RBECs application is planned for eventual inclusion into the Army’s Automated COMSEC Management and Engineering System (ACMES), a software bundle designed to handle a variety of communications managerial and security tasks. The LCU will host the ACMES package.

The Marine Corps is pursuing use of the LCU to support its operations. When loaded with a custom software bundle similar in purpose to the Army’s, to include RBECs, the host and software will serve as its Systems Planning, Engineering and Evaluation Device (SPEED). This team transportable, integrated system of automated tools can generate, store, present, disseminate, and maintain information essential for the allocation and utilization of communications resources. SPEED provides rapid communications planning to support maneuver warfare. RBECs, operating within the SPEED environment, will be used for its two primary functions, CEOI generation and the generation of the TRANSEC key and ECCM data for the SINCGARS radios.\(^\text{14}\)

**CONCLUSION**

Even though a spreading secure voice program may seem to be overshadowing the need for the TRANSEC aspect of JCEOI/CEOI/SOI, as long as single-channel tactical radio is part of the U.S. Forces communications inventory, the need for an accurate, timely, concise directory will be there. Additionally, the growing inventory of SINCGARS tactical radios, with increasing frequency-hopping usage, will expand the requirement for generation of TRANSEC keys and ECCM data. The capabilities of RBECs, employed as explained in the foregoing, will fulfill those needs.

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**THE AUTHORS**

Mr. Randt joined the National Security Agency in 1977 as an Electrical Engineer. A former Signal Corps officer, he has been involved in various aspects of Defense Department communications projects. In 1983 he obtained a Master’s Degree in Computer Science under the Agency Fellowship Program and became an applications programmer dealing with call sign and frequency generation systems. From 1987 to 1991 he was Chief of the Changing Call Sign and Frequency Systems Branch. The branch is responsible for design of all changing call sign and frequency systems published by the Agency for the various Services, civilian governmental agencies and selected allies. Mr. Randt is currently assigned as Principal Technical Advisor to the Off-Line Systems Division and serves as the NSA representative to the Joint Staff JCEOI/RBECs Working Group.

Major Jane H. Smith came to the National Security Agency in 1991. Her previous assignments include ROTC Instructor duty at Hofstra University, New York; 9th Infantry Division Artillery Signal Officer; 9th Signal Battalion Company Commander; and 6/52 ADA Signal Officer. She has an MS degree in Information Systems Management from the Naval Post Graduate School in Monterey, California. She is a member of the Call Sign and Frequency System Planning and Applications Branch and currently is the RBECs Program Manager for the National Security Agency.

GySgt Kenneth W. Frentzel was assigned to the National Security Agency in 1991 as a Communications Security Analyst. His military occupational specialties include Tactical Communications Radio Chief and Radio Frequency Management Technician. He has served as a communications planner and frequency manager for several Marine Expeditionary Brigades as well as the communications operations chief for I Marine Expeditionary Force during Operation Desert Storm. He has participated in the evaluation of the SPEED communications control software system at the Electromagnetic Compatibility Analysis Center. GySgt Frentzel presently serves as a designer of CEOI as part of the Changing Call Sign and Frequency Systems Branch. He acts as primary interface to the Marine Corps in its planning for RBECs fielding.
NOTES AND REFERENCES

1. Although never actually considered to be cryptographic material, changing call sign and frequency systems produced by NSA did carry a cryptographic style nomenclature, and were handled with Accountability Legend Code four (ALC-4), which required a signature from the first recipient. The various services each implemented self-imposed accountability requirements on the NSA-supplied documents, fundamentally because the origin was NSA, leading to much unnecessarily complicated administrative overhead in managing the call sign and frequency documents. RBECs promises to eliminate such overhead.

2. At its CEOI production peak in the late 1980's, NSA could offer users a 60-day turn around on exercise material and 120 days on routine material. Operational priorities, as in Desert Storm, could shorten this standard cycle.

3. RBECs grew out of an Army development program (BECS) and for much of its early development life was tied to the SINCgars program whose project manager (PM) was based at Ft. Monmouth, NJ. In 1993, fundamentally based on the fact that RBECs had evolved into a de facto joint program, its management was shifted to PM-JTACS(P). It is anticipated that RBECs will ultimately become formally joint in the near future.

4. Joint Staff (J6) message, DTG 1822182 Oct 93, Subject: Revised Battlefield Electronic CEOI System (RBECs) Standard, designates "RBECs as the Joint Standard for the generation of JCEOI, ECCM Variables, and TRANSEC key for SINCgars and SINCgars compatible radios." It further characterizes RBECs as a de facto joint program and states an intention to declare RBECs a CAT IV Joint Program and appoint Army as the lead service under the provisions of DODI 5000.2 and CJCS MOP 77.


6. A distinction is usually made between a call sign and a call word from the point of view of their respective formats. In U.S. Military usage, the call sign is usually a trigraph configuration in the pattern, Letter-Number-Letter, (LNL). The call word is a pronounceable dictionary word or phrase. Both are selected at random and both serve the same function, namely as a pseudonym for the unit or organizational name.

7. The term SOI is an Army term. CEOI is used by all the other services and in joint usage. The terms are synonymous.

8. Memorandum of the Joint Chiefs of Staff, MJCS-121-88, dated 1 August 1988, Subject: Changing Tactical Call Sign and Frequency Assignments.

9. The realities of tactical communications, particularly in the VHF-FM band, are such that required deconflictions are significantly less than one would expect based solely on the numerical proximity of frequency assignments within or between organizations. Continually working in favor of the user, thus lessening the need for deconfliction, are the natural masking effect of certain terrain features that separate units and the natural statistics of individual radio transmit duty cycles. In the case of FM radios, the capture effect normally links the intended receiver with a transmission simply through natural proximity. The resultant on-the-ground deconfliction requirement is therefore generally less than the theoretical.


11. The RBECs Application Utility Package was created and is controlled by the National Security Agency and is available to legitimate users who make a request through command channels.

12. The original BECS program was based on an HP-111 laptop machine that rapidly became obsolescent in the computer technology explosion. The RBECs software is IBM/MS-DOS compatible and is virtually hardware independent, requiring a 286 or better machine. Another difference is that the RBECs software is unclassified since it does not contain a random generation algorithm as did BECS. The random generation process for RBECs is based on a Random Data Generator (RDG), AN/CSZ-9, designed to attach externally at an RS-232 serial port.

13. The DTD was originally to be for cryptographic variables only. The BECS system was to use a device called an Electronic Notebook (EN) for holding, transferring and displaying the SOI. Under RBECs, the latter functions have been incorporated into the DTD. The Army has designated the DTD as the Automated Net Control Device (ANC), AN/CYZ-10.