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MSE Communications in the Corps/Division

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Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

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PREFACE

Purpose and Scope

This manual prescribes Mobile Subscriber Equipment (MSE) operational doctrine for MSE units at echelons corps and below. It is the first manual in a series; FM 11-37 addresses MSE for small-unit leaders and FM 11-38 addresses MSE management and control. To understand the operational environment which these units support, readers should refer to the following companion manuals: FM 100-5, FM 71-100, and FM 100-15. To understand the underlying principles and total signal corps mission, readers are referred to FM 24-1. Although FM 11-30 dictates specific doctrine for MSE deployment and employment, it does not replace leader judgement on how to best use MSE assets. This manual is primarily intended to inform signal leaders and soldiers about internal MSE signal unit operations. As such, it provides a technical description of the network and emphasizes the command and control (C^2) and logistical requirements of corps and division MSE signal units. This manual should be used with FM 11-50 and FM 11-92.

This manual contains doctrine based on historical system performance. As further fielding and use continue, it is expected that some doctrine may require revision. These changes will be included in the next revision.

User Information

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CHAPTER 1

Supporting the AirLand Battle

1-1. Introduction

This chapter covers what AirLand Battle (ALB) doctrine means, how it affects the business of warfare, the impact it has on the Signal Corps, and the impact the Signal Corps has on the ALB concept.

1-2. ALB Doctrine

The term AirLand combines two fields of combat and suggests the vastness and dynamic activity of the anticipated combat environment. FM 100-5 details the four tenets of ALB: initiative, agility, depth, and synchronization. Synchronization depends on reliable and flexible communications (Figure l-l). The Signal Corps' mission is to provide the field commander with quality communications. This allows him to exercise command and control (C^2) over the forces needed to seize and retain the initiative which leads to defeating Threat forces.

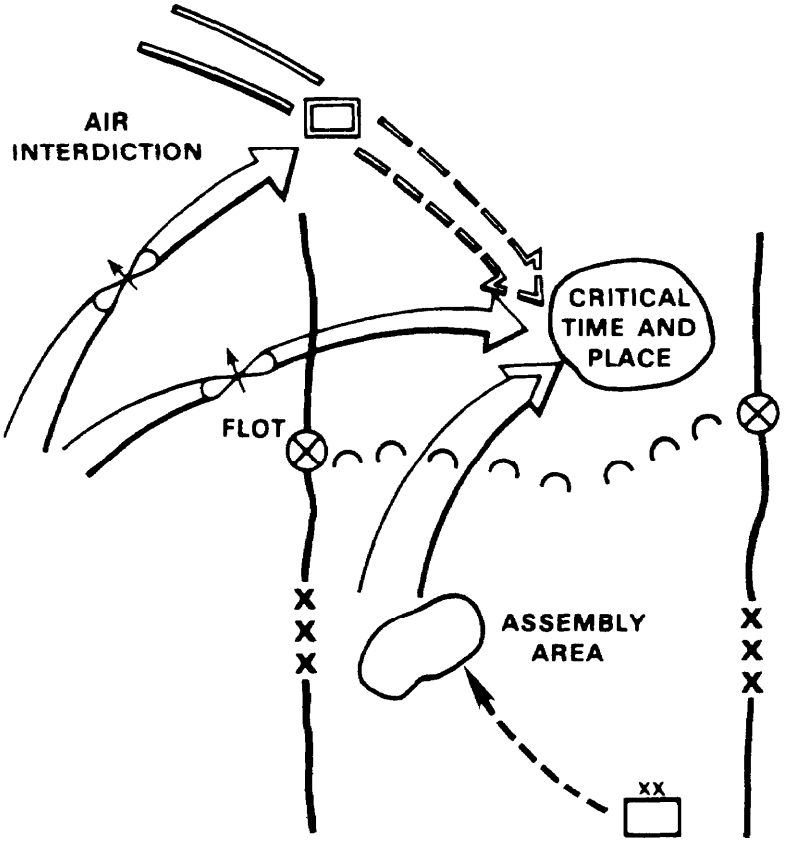


Figure 1-1. Synchronization.

1-3. Battlefield Dimensions

a. ALB involves close, deep, and rear operations (Figure 1-2). What relationship exists among these three arenas and what is their combined impact on the course of battle?

(1) Close operations comprise those current activities of major committed combat units and their immediate combat support (CS) and combat service support (CSS) elements that support the current fight. At any echelon, close operations include the close, deep, and rear operations of subordinate elements. Deep and rear operations impact on close operations which bear the ultimate burden of victory or defeat.

(2) Deep operations are activities directed against enemy forces not in contact designed to influence the conditions in which future close operations will be conducted. They must be focused against those enemy capabilities which most directly threaten the success of projected friendly operations. Successful tactical deep operations shape the battlefield to create the conditions for future victory.

(3) Rear operations are activities behind elements in contact designed to ensure freedom of maneuver and continuity of combat and sustainment operations and C^2. While they may have little immediate impact on close ground operations, they are critical to future operations, assuring the commander the agility to take advantage of any opportunity without delay.

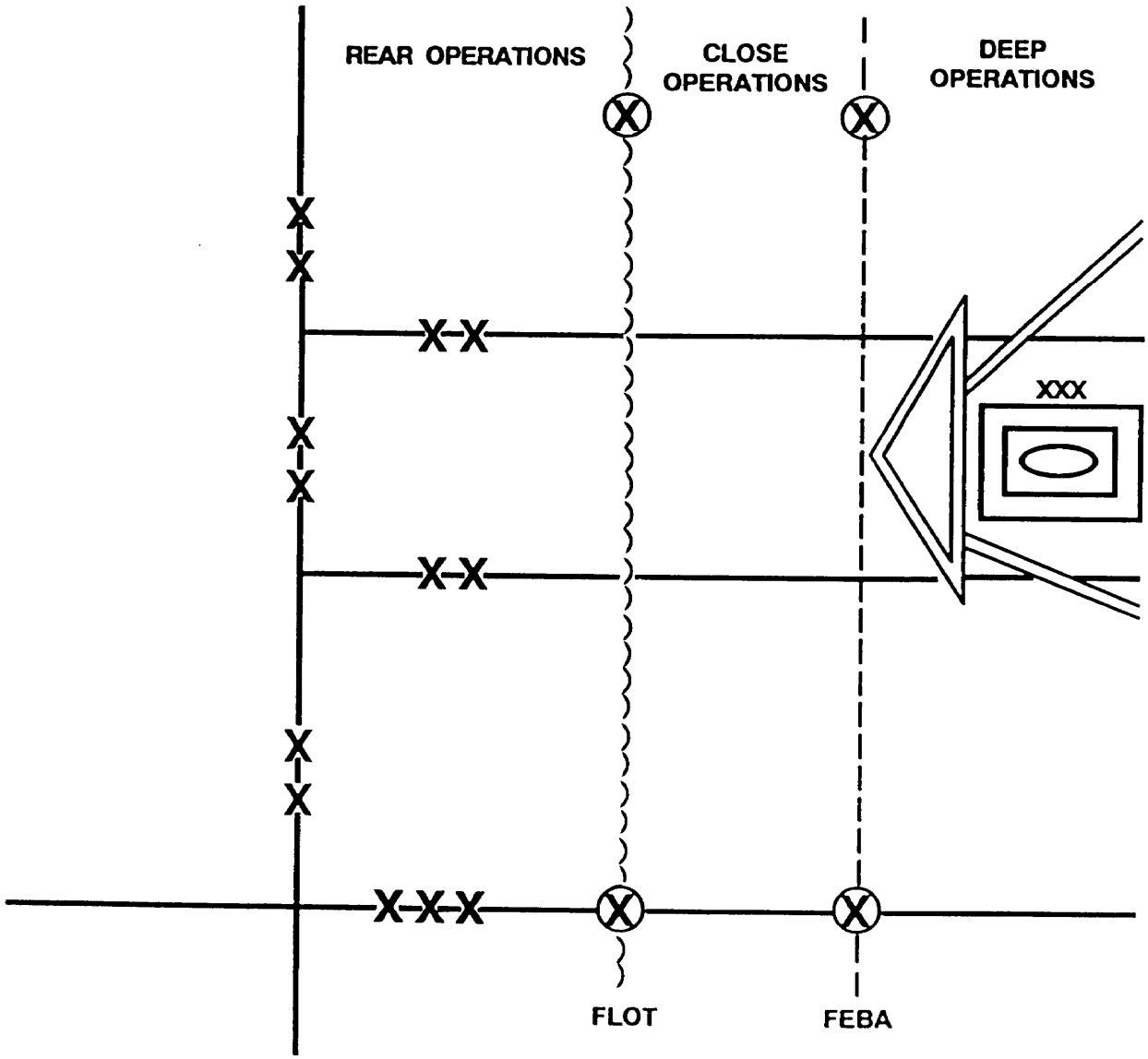


Figure 1-2. ALB operations.

b. The Signal Corps' challenge is to provide communications that gives the commander the capability to exercise effective C^2 across the length and breadth of the battlefield.

1-4. Meeting the Challenge for Victory

a. Success on the AirLand Battlefield depends on the Army's ability to fight in accordance with four basic tenets: initiative, agility, depth, and synchronization. Superior performance in combat depends on three essential components. First, superb soldiers and leaders with character and determination who will win because they simply will not accept losing. Second, it depends on sound, well-understood doctrine for fighting. Third, it depends on weapons and supporting equipment sufficient for the task at hand. In the final analysis, and once the force is engaged, superior combat power derives from the courage and competence of soldiers, the excellence of their training, the capability of their equipment, the soundness of their combined arms doctrine, and above all the quality of their leadership.

b. The special contribution of the Signal Corps to victory on the AirLand Battlefield depends on four basic considerations:

- The commander's ability to convey his intent to subordinate commanders/leaders.
- Flexible and reliable communications.
- Automation of planning and operations processes.
- The leader's technical and tactical proficiency.

c. The commander has the basic responsibility of painting the common battle picture for his subordinate commanders/leaders. This ensures a complete understanding of his intent and ensures initiative, continuity, and coordination of the effort. This battle picture may best be sent out through the area communications system. The area communications system must be reliable and provide quality transmission media from anywhere on the AirLand Battlefield. The activity level in this environment will be intense. The amount of transmitted intelligence/data makes automation desirable particularly in the areas of planning and operations. These conditions also dictate the need for all signal leaders to have a higher level of tactical proficiency. In most cases, the users of the communications assemblages provide their own site security. This situation requires an increased knowledge of tactics and common tasks. This knowledge ensures survivability of equipment and personnel and sustains the Area Common-User System (ACUS).

1-5. Conclusion

When we consider the implications in a communications dependent ALB environment, it is obvious that our role as signal leaders is great. We must know and understand the commander's intent in order to adapt existing communications systems to support the current operation and to ensure mission success. Extending communications over the battlefield to support the maneuver commander's main effort is the challenge we face.

CHAPTER 2

C^2 Communications Architecture

2-1. Introduction

a. The only purpose of C^2 is to implement the commander's will in pursuit of the unit's objective. The system must be reliable, secure, fast, and durable. It must collect, analyze, and present information rapidly. It must communicate orders, coordinate support, and provide direction to the force in spite of enemy interference, destruction of command posts (CPs), or loss and replacement of commanders. The ultimate measure of C^2 effectiveness is whether the force functions more effectively and more quickly than the enemy.

b. Force level information is exchanged by means of the network which is shown in Figure 2-1. The Army Tactical Command and Control System (ATCCS) is an integrated system of equipment, software, information, and staff. This system allows tactical commanders and staff at each of the five battlefield functional areas to plan and control their operations and to coordinate these with other functional commanders. ATCCS consists of the automated C^2 systems for the battlefield functional areas and the communications links between and among the control systems.

c. Information management is the policy, process, and procedures used to manage information systems and services. It includes, but is not limited to, resources and activities that create, gather, manipulate, classify, store, display, retrieve, secure, transmit, disseminate, or access elements of information. Elements of information may be visual, aural, or electrical. Information management occurs at strategic, theater/tactical, and sustaining base levels.

(1) Strategic information is required by theater Army, joint or combined commands, defense, and other federal agencies to execute national policies and theater goals.

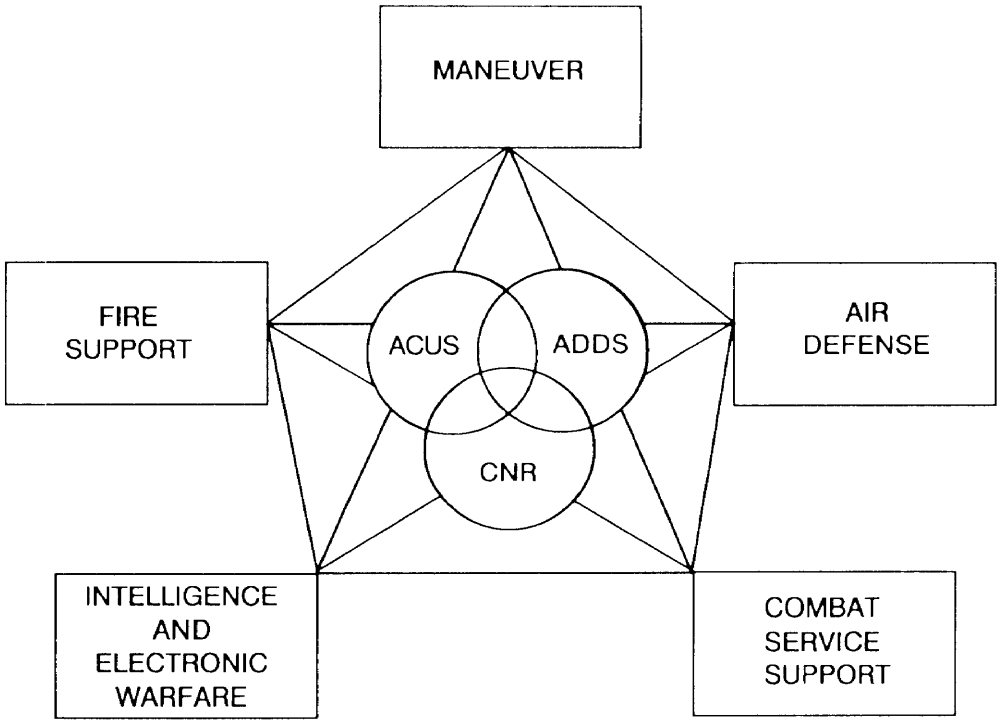


Figure 2-1. ATCCS.

(2) Theater/tactical information is used in the theater of operations, normally at corps level and below, and is required to conduct maneuver warfare. Tactical information includes unit status, unit employability, fire support capabilities, supply routes, key terrain, avenues of approach, and Threat disposition, capabilities, and intentions. It includes information systems needed to direct, coordinate, and support combat power during peace, transition to war, and conflict. This information is processed from the fighting position to the successive command headquarters of the joint, unified, specified, or combined commands.

(3) Sustaining base information is primarily concerned with base operations and training. Sustaining base information systems function during peace, mobilization, deployment, employment, and sustainment of the fighting force.

d. Personnel responsible for information management coordinate, process, and manage information vertically between the strategic, theater/tactical, and sustaining base; and horizontally and vertically between the five major functional areas. The effectiveness of this force level information exchange network is the key to the Army's success to fight IAW the four basic tenets of ALB. The tenets are initiative,

agility, depth, and synchronization. The ALB C^2 system must facilitate the commander's ability to operate, delegate authority, and exert leadership from any critical point on the battlefield.

e. The Information Mission Area (IMA) has five disciplines: automation, communications, visual information, records management, and printing and publications. As defined below, the five disciplines encompass strategic, theater/tactical, and sustaining base information. The IMA responsibilities of the assistant division signal officer (ADSO) address only those aspects of the tactical environment, systems, and services.

(1) Automation is implementing processes or procedures using automated electronic equipment in tactical and nontactical environments. The technologies include, but are not limited to micrographics, word processing, copiers, printing, communications, decision aids, and general-purpose data processing.

(2) Communications is disseminating information through transmission, emission, or reception of signs, signals, writing, images, sounds or data of any nature using audio, visual, electro-optical, or electromagnetic systems.

(3) Visual information is using sound and visual material or processes to communicate information. Visual information includes, but is not limited to, motion pictures, still and motion photography (combat camera), television, audio, graphic art, and audiovisual libraries.

(4) Records management is managing and maintaining documentation. It includes distribution, use and disposition, storage, declassification, and the implementation of responsibilities under the freedom of information and privacy acts. Media includes correspondence, reports, forms, directives, publications, electronic mail/messages, mail, magnetic tape/disk, and electro-optical storage/retrieval. The Information Services Support Office (ISS0) was formerly the administrative services branch/division. The ISS0 is responsible for the Battlefield Information Services (BIS).

(5) Printing and publications is the process for producing documents on media such as micropublishing, plate making, press work, photocomposition, and binding for issue and distribution. For the most part, this is accomplished through Signal Corps channels to the garrison/wartime director of information management.

f. C^2 communications is not limited to Mobile Subscriber Equipment (MSE). MSE is only one part of the equation. The Army provides the commander with the tactical communications architecture to support

corps and division C^2 on the battlefield. This architecture consists of --

- The Area Common-User Voice Network.
- The Combat Net Radio (CNR) System.
- The Army Data Distribution System (ADDS).

2-2. The Area Common-User Voice Network

a. Corps backbone system. MSE is the area common-user voice communications system in the corps. It is the backbone of the corps communications system and provides voice and data communications from the corps rear boundary forward to the division maneuver battalions' main CP and rear CP. It also provides commanders and staffs with a switched communications system which includes--

- Secure telephone service.
- Secure facsimile service.
- Secure mobile radiotelephone service.
- Secure data transmission.
- CNR network access.

b. Messenger service. There is no messenger service at the corps or division level. When messenger service is required, the signal office is responsible for determining routes and schedules. The G3 is responsible for tasking units for vehicles and personnel. To compensate for the lack of a record traffic system, user-owned and -operated terminals are relied on to transfer messages through the area common-user system. Subscribers dial the intended recipient and send the message.

c. MSE operations. MSE operations consist of five functional areas:

- Area coverage.
- Wire subscriber access.
- Subscriber terminals.
- Mobile subscriber access.
- Systems control.

The five functional areas represent the major roles and capabilities of the system. The first four describe equipment and capabilities available to the user for unit C². The fifth provides the signal commander with facilities to C² MSE assets. Appendix A shows typical site configurations.

d. Area coverage. The network of line-of-sight (LOS) multichannel radios and the interconnected local and long-distance switching nodes provide area coverage. Covering the battlefield with network access points and facilities to route communications to the desired subscriber (Figure 2-2) provides wide-area communications to commanders and staffs for C², sustainment, and operations and intelligence. Each MSE corps network includes at least two gateway connections to the echelons above corps (EAC) communications network and adjacent corps. Adjacent divisions in different MSE corps networks maintain at least one link between themselves.

(1) The heart of the MSE network is the node center (NC). Each NC consists of--

- One AN/TTC-47 node switch (NS). An operations group (OG) shelter and a switching group (SG) shelter comprise the NS.
- One node management facility (NMF).
- Four LOS AN/TRC-190(V3) ultra high frequency (UHF) radio assemblages.
- One radio access unit (RAU).
- One node support vehicle (NSV).
- Two 10 kilowatt diesel generators.
- Five 5 kilowatt diesel generators.

(2) The NS provides network tandem switching with flood search routing. The NS also can provide technical management of nodal communications facilities.

(3) LOS radios (AN/TRC-190(V)) provide the transmission media between NCs and the NS with its extension nodes. LOS radios also link the remote RAU to the NS. Substitute radio systems can be used for the AN/TRC-190 in specific applications where terrain is restrictive or extended range is desired. These substitutes can be either tactical satellite (TACSAT) or digital troposcatter (TROPO).

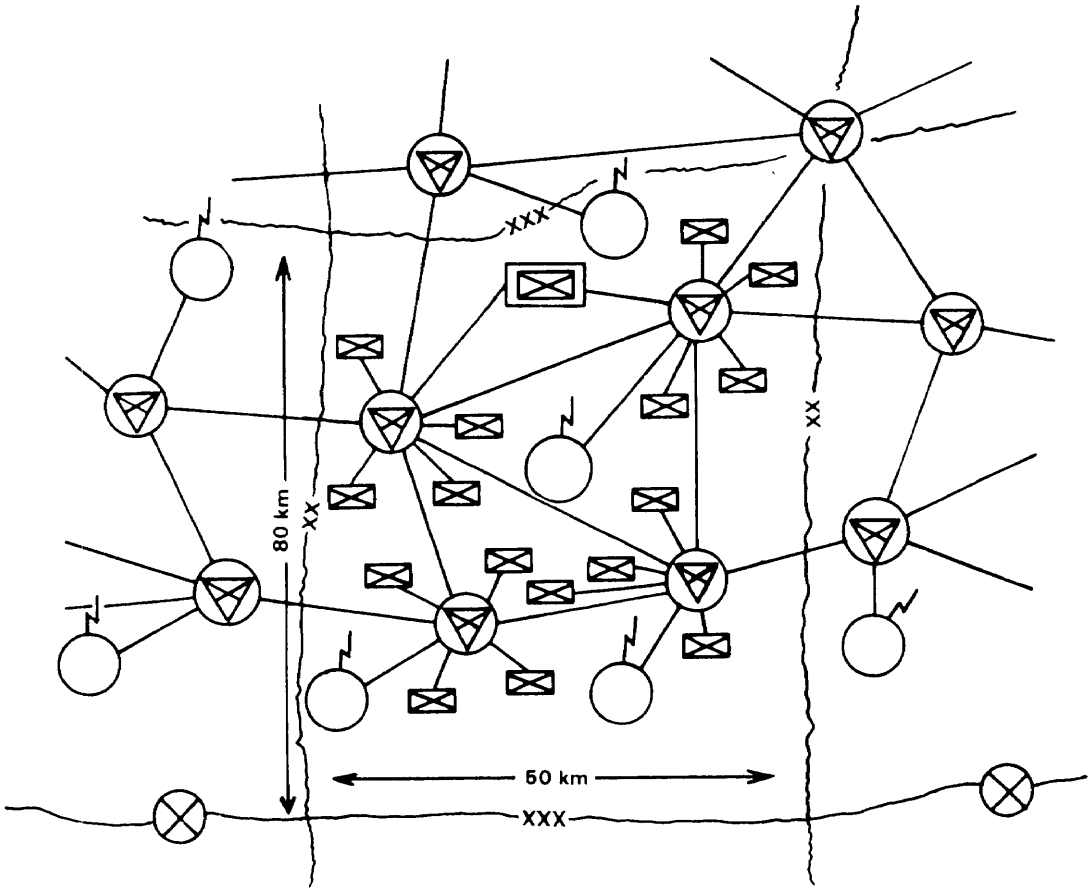


Figure 2-2. Typical division deployment. (Symbology is explained in Appendix B.)

(4) The RAU (AN/TRC-191) provides network access to mobile radiotelephone subscribers. The RAU can be deployed adjacent to an NC (local) or can be remoted by means of the LOS radio (AN/TRC-190(Vl)).

(5) MSE can interface with TACSAT (AN/TSC-85A and AN/TSC-93A) which can extend radio transmission range when LOS radio is unavailable or radio range is insufficient. TACSAT can provide an internodal link between widely separated NCs in the same corps or can install a gateway link between NCs of adjacent corps. TACSAT provides secure analog and digital transmission. Signal network managers can use TACSAT to deploy transmission assets forward during exploitation or penetration operations in the deep battle. TACSAT can provide a communications link with higher echelon elements such as theater Army or continental United States (CONUS).

(6) TROPO radio terminals (AN/TRC-170(V)) from EAC can be substituted for MSE LOS radios. The terminals provide secure transmission of analog and digital traffic over ranges from LOS to 240 kilometers (150 miles). Each of the two terminals can transmit one system of 8 to 144 trunks. Signal organizations use the terminals for node bypass and extended range communications. TROPO companies (heavy and light) are assigned to EAC units. TROPO (heavy) companies use the (V2) model with an optimum transmission range of 240 kilometers (150 miles). TROPO (light) companies use the (V3) model with an optimum range of 160 kilometers (100 miles). Transmission ranges largely depend on propagation factors.

e. Static access to the system. Wire subscriber access provides network access to static terminal users. The AN/TTC-46 large extension node switch (LENS) or the AN/TTC-48 small extension node switch (SENS) provides this service. Signal support of wire subscribers consists of installation, operation, and maintenance (IOM) of the NS, LOS radios, cable (CX-4566 and CX-11230/G), and junction equipment (J-1077 distribution box or TD-1234 remote multiplexer combiner (RMC)). The user is responsible for connecting the WF-16 field wire to the junction equipment and providing power for the RMC.

(1) The LENS provides local switching and network access for up to 176 digital subscribers. A large extension node (LEN) provides service for large concentrations of users, such as corps support command (COSCOM)/division support command (DISCOM) or corps/division main. The LENS consists of an OG shelter and an SG shelter. The AN/TRC-190(V4) LOS radio provides network connectivity.

(2) The SENS provides local switching and network access for 26 subscribers (AN/TTC-48(Vl)) or 41 subscribers (AN/TTC-48(V2)). A habitual relationship may be established and maintained between extension nodes including LOS teams and the division CP. The same relationship may be established with corps combat units' CPs (that is, armored cavalry regiment (ACR), artillery brigades, or air defense artillery (ADA) brigades) (Figures 2-3 and 2-4). While a habitual relationship may be desired (for tactical familiarity and ease in support), MSE extension nodes do not revert to a reserve role when the supported CP/unit assumes a reserve role. In these situations, MSE extension nodes are assigned a revised support role. Habitual relationships may be reestablished when the affected elements return to an active role. In the corps area of operations, essential C^2 facilities (division main CP, corps main CP, corps rear and tactical CP) should be provided dual LOS network connectivity. This entails assigning additional and redundant extension facilities (small extension nodes (SENs)/(LENs)).

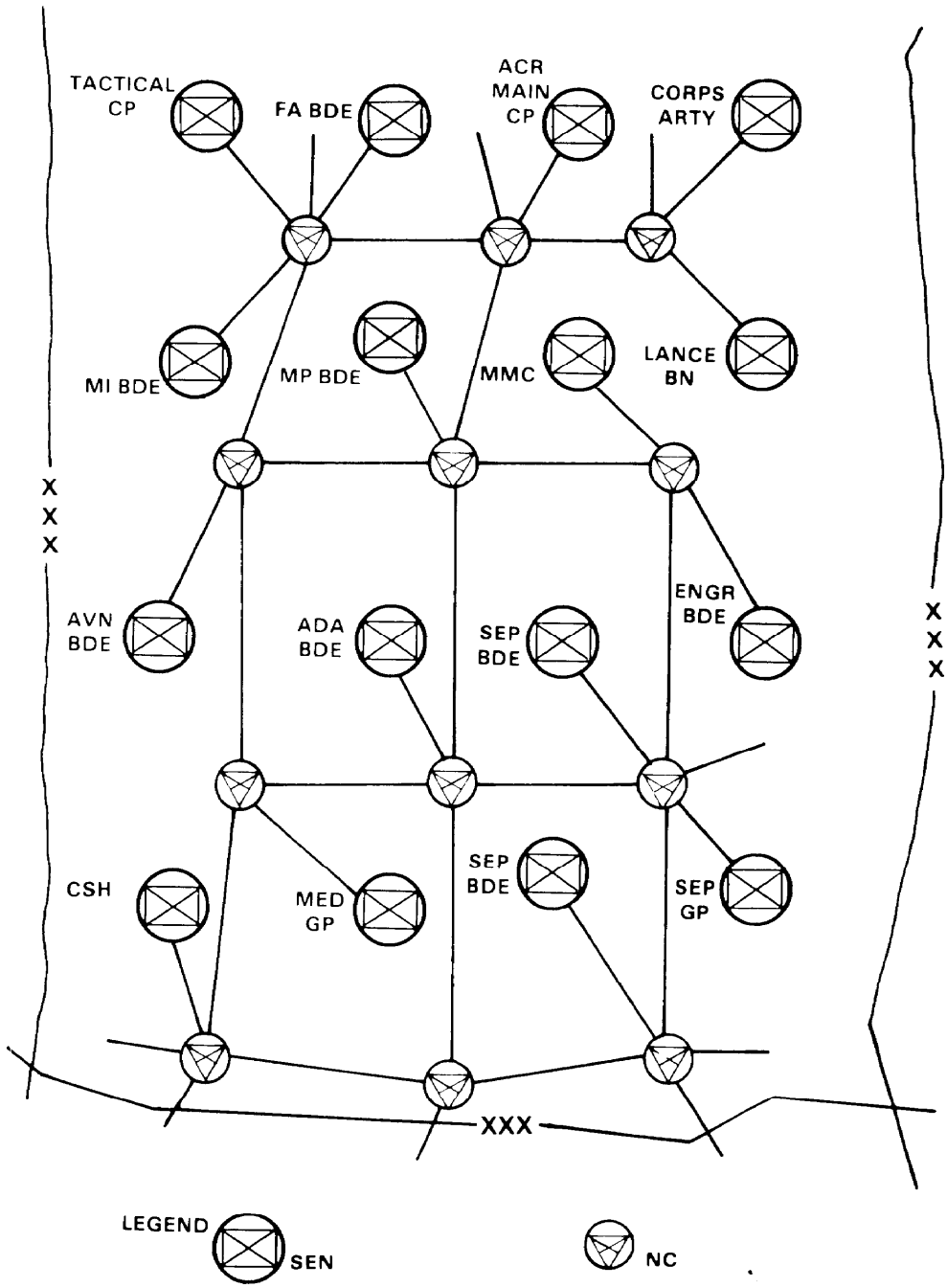


Figure 2-3. Typical corps SEN deployment.

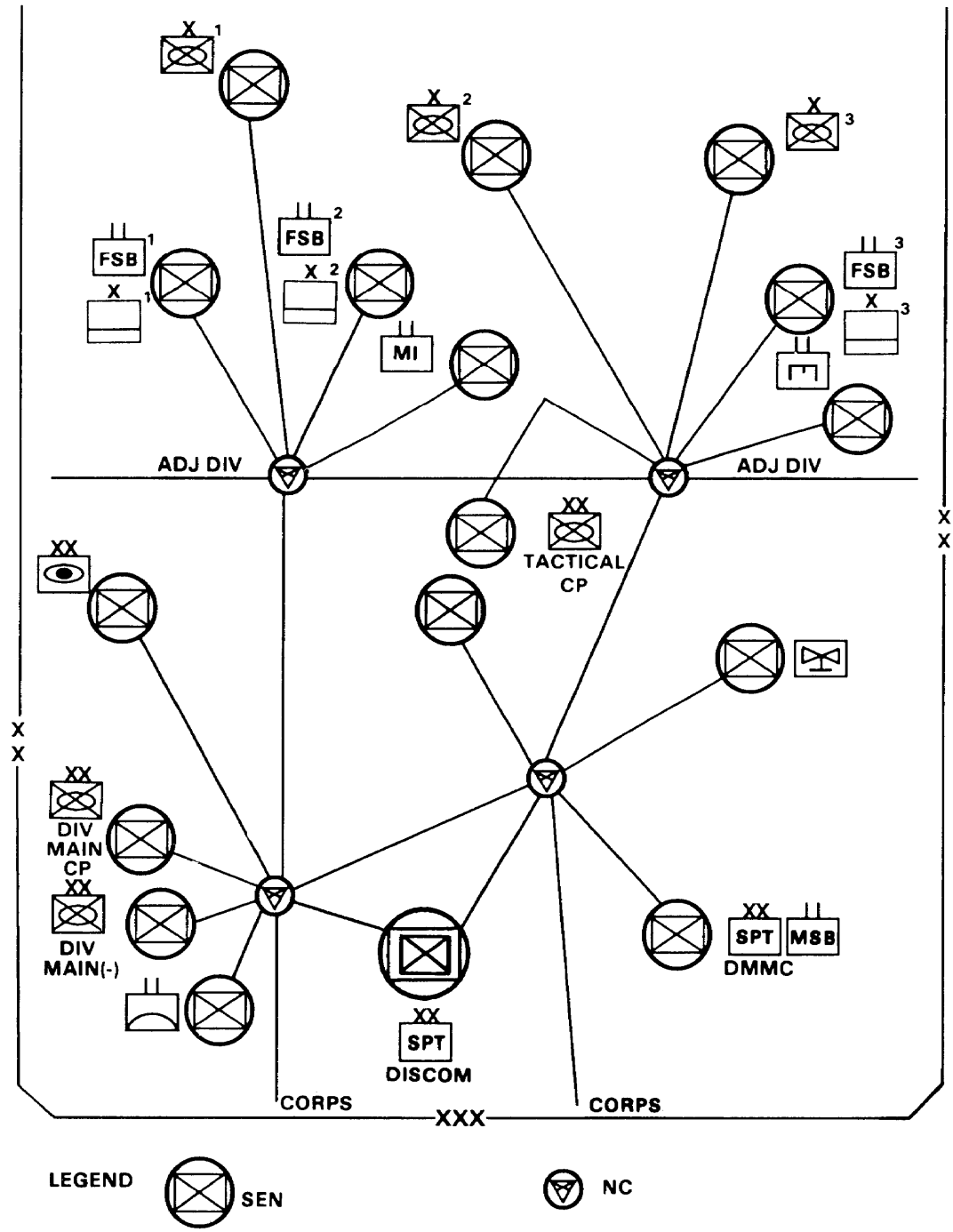


Figure 2-4. Typical division extension switch deployment.

(3) The AN/GRC-224 super high frequency (SHF) radio may be used to enhance CP survivability by remoting the LOS radio from the extension node switch and the supported unit.

f. Terminal equipment. The subscriber terminal functional area covers user-owned and -operated MSE equipment. Subscriber terminal equipment includes--

- TA-1035 digital nonsecure voice terminal (DNVT).
- TSEC/KY-68 digital subscriber voice terminal (DSVT).
- AN/UGC-144 communications terminal (CT).
- AN/UXC-7 lightweight digital facsimile (LDF).
- AN/VRC-97 mobile subscriber radiotelephone terminal (MSRT).

(1) Users are responsible for installing, operating, and maintaining their subscriber terminal equipment. The user is responsible for connecting and maintaining wire lines to the distribution box or RMC installed by the supporting signal extension node. Signal soldiers and leaders are responsible for ensuring the user is knowledgeable in procedures for completing connections and assisting with troubleshooting.

(2) Subscriber terminals provide the user voice and data access to the MSE network. Data terminals interface with the network through 16 kb/s data ports in the DSVT or DNVT.

g. Mobile access to the system. The mobile subscriber access functional area consists of signal and user equipment. This enables the commander and staff to communicate while moving throughout the battlefield.

(1) The user-owned component is the MSRT. The MSRT provides the user the capability to dial up and communicate with any discretely addressed MSE subscriber. The MSRT (AN/VRC-97) consists of a DSVT and an RT-1539(P)/G very high frequency (VHF) radio with a vehicle antenna kit.

(a) The RT-1539(P)/G MSRT radio and the RAU's radio are identical and interchangeable. In the MSRT or RAU, the radio operates in a full duplex mode with a high and low frequency band for transmit and receive channels. In the RAU, the radio transmits in the high band and receives in the low band. This procedure is reversed when the radio is used in the MSRT configuration. The MSRT has the following capabilities:

- Automatic random channel selection for each call.

- Automatic radio frequency (RF) transmit level adjustment.
- Automatic receiver sensitivity adjustment.
- Stand-alone field kit (SAFK).
- DSVT remote capability.
- Range extension using elevated antenna.

(b) The mobile subscriber uses the DSVT as the primary access terminal. The DSVT provides cryptographic facilities for the MSRT and has a 16 kb/s data port for interface of data devices (facsimile, communications terminal). The MSRT can be removed from the vehicle and operated using the SAFK.

(2) The mobile subscriber gains network access through the RAU. The signal planner deploys RAUs to provide battlefield coverage. One RAU can provide a 15 kilometer (9.3 mile) radius area coverage (planning range) in the area of operations (Figure 2-5). Following initial affiliation, mobile subscriber affiliation is maintained automatically as he moves from one RAU's range to another (Figure 2-6). If the mobile subscriber is engaged in a telephone conversation and leaves the servicing RAU's range, the conversation is terminated and must be redialed.

h. Network control. The AN/TYQ-35 system control center (SCC) is the primary signal C^2 facility for MSE network operations. (The current SCC is known as the SCC-1. In this manual, the SCC-1 is referred to as the SCC. During the fielding of the 7th Corps, the SCC-2 will be fielded and will completely replace the SCC-1.) The SCC provides the signal commander automated facilities to aid in network planning, systems engineering, network management, and dynamic operational management of all MSE materiel and personnel. Corps SCC assets are deployed on the basis of one per division and two per corps. FM 11-38 provides detailed information on SCC facilities and network management and control procedures.

(1) The corps SCC (including subordinate division MSE assets) controls the MSE network when deployed as a corps system. The concept of a corps-managed area network is a major change in signal doctrine.

(a) In a corps network, the network management/control element is the corps signal officer/brigade commander's headquarters. The corps signal officer is responsible for ensuring area communications support throughout the maneuver area of operations. It is expected that division MSE assets will require corps augmentation to fulfill this requirement.

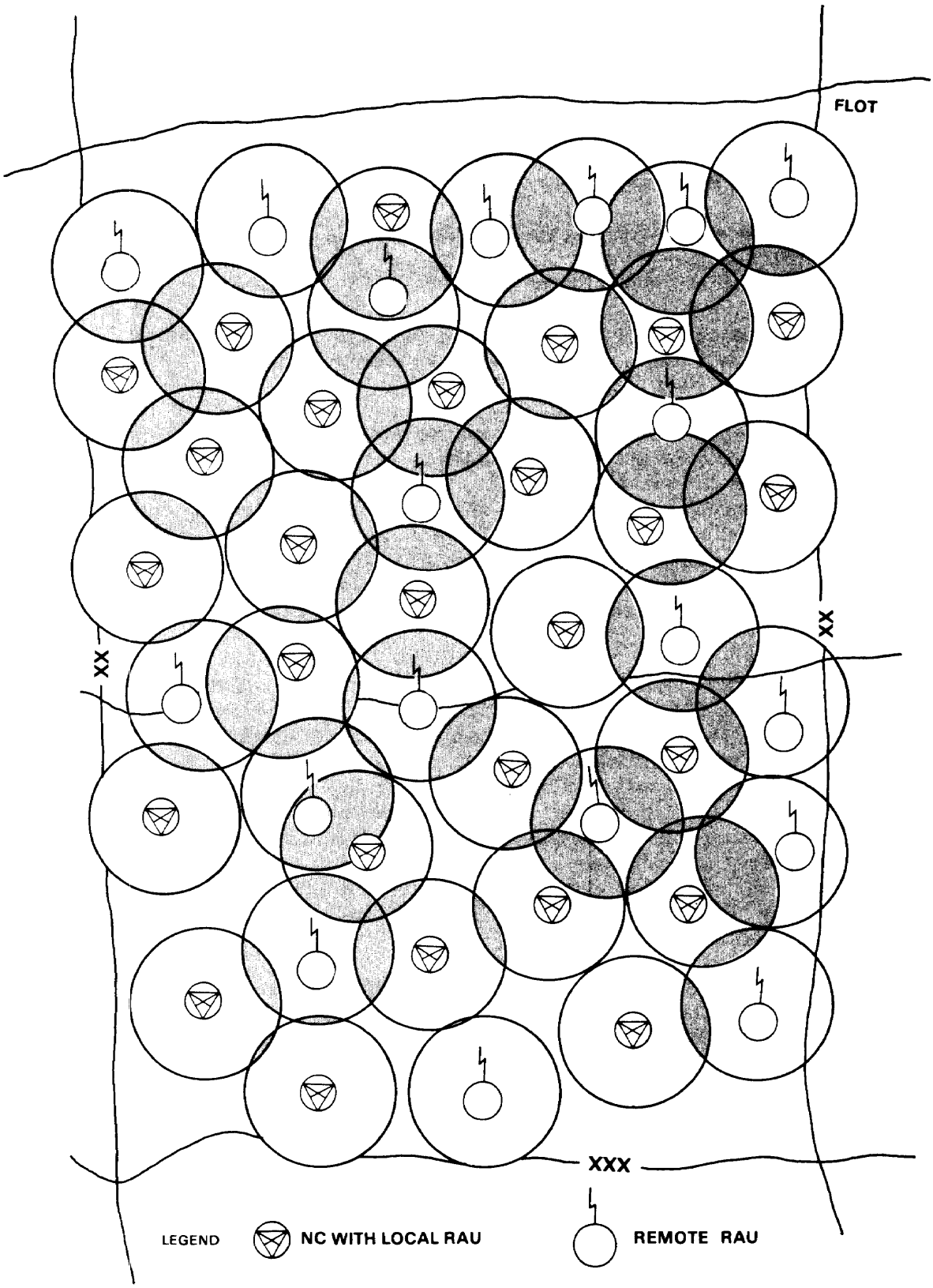


Figure 2-5. RAU deployment within a corps.

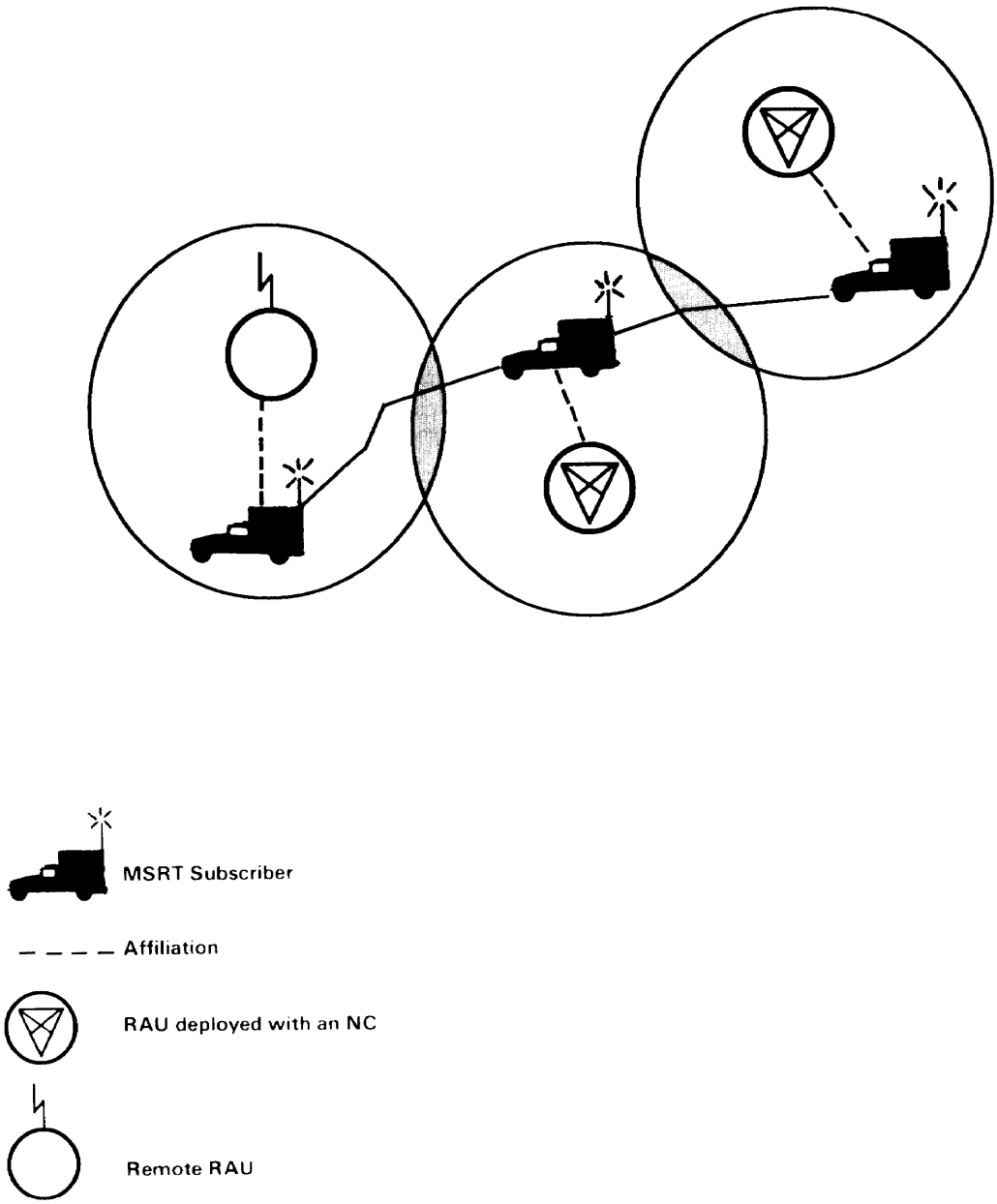


Figure 2-6. MSRT automatic reaffiliation.

(b) The division signal officer is responsible for using his unit's assets to support the C^2 needs of the division.

(c) The network manager designates one primary SCC and one alternate SCC. The primary SCC is responsible for corps network management and control functions. This is accomplished by using multiple-netted SCCs. Each one is responsible to the primary SCC as a potential alternate SCC and for discrete management/planning functions (for example, planning, frequency management, or team status). The division SCC is assigned an active role in performing specific and assigned network management tasks while subordinate to and under technical control of the corps primary SCC. It is necessary to provide management from corps level since it is that element which possesses the comprehensive corps MSE data base. The corps SCC AN/TYQ-35(V2) consists of a technical shelter, management shelter, and planning shelter.

(2) The division SCC AN/TYQ-35(Vl) consists of a technical shelter and a management shelter. When the division deploys independent of the corps, the management/control element is in the headquarters of the division signal battalion. The division SCC assumes the role of primary SCC when deployed without corps SCC support.

(3) The SCC deploys with an NC and gains network connectivity through the NS. The SCC is normally connected to the NS by .4 kilometer (.25 mile) CX-11230/G cable. Corps level SCC assets deploy with one SCC operating in the primary role and one in the alternate role to provide redundancy. The primary SCC updates the network data base in the alternate SCC automatically every seven minutes.

(4) The NMF AN/TSQ-154 provides the node commander (platoon leader) a shelter from which to direct nodal operations. The NMF contains the AN/UGC-74 data terminal used for sending reports to and receiving orders from the SCC. The NMF is the network interface between the SCC, the NCs, and the LENs.

(5) The network control terminal (NCT) AN/GGC-66 is the corps area signal battalion commander's interface with MSE system management operations . It is the means by which the commander follows the movement and status of his teams when they are deployed in the MSE network. The NCT is issued on the basis of one per corps area signal battalion.

2-3. CNR

a. The CNR system provides a communications means, independent of MSE, for C^2 within the corps in the division maneuver brigades, CS units, and CSS units. The primary role of the CNR is voice C^2 for the commander at brigade and below. The secondary role of the CNR is to provide a means of data transmission. When a CNR net is used for voice and data traffic, transmission quality may be degraded. If this occurs, consider designating the unit CNR nets as data-only or voice-only nets. The CNR architecture is based on having two types of single-channel systems: amplitude modulated (AM) and frequency modulated (FM). Examples of such radios include the AN/VRC-12 and the AN/GRC-106 radios. The future CNR architecture is also designed around two separate radio systems, each having unique characteristics and capabilities. These are the--

- Improved high frequency radio (IHFR).
- Single-Channel Ground and Airborne Radio System (SINCGARS).

b. IHFR provides the commander a tactical high frequency (HF) radio for C^2 in the corps and division. IHFR extends and complements the VHF-FM communications network. At this time, there is no requirement or capability for IHFR to interface with MSE. IHFR supports secure voice systems requiring a long-range capability and replaces the AN/PRC-47, AN/PRC-74, AN/GRC-165, and the stand-alone AN/GRC-106 radios. IHFR is fielded in three configurations:

- AN/GRC-193A (100 or 400 watt selectable (vehicular) HF radio).
- AN/GRC-213 (20 watt manpack/vehicular HF radio).
- AN/PRC-104 (20 watt manpack radio).

c. SINCGARS is a new family of VHF-FM radio sets which provide secure voice and data transmission capability to the commander. SINCGARS radio sets replace VRC-12 series radios on a one-for-one basis. The Battlefield Electronic CEOI System (BECS) is the frequency management tool for SINCGARS. SINCGARS can transmit voice and data across a broad frequency spectrum using a frequency-hopping technique. This technique results in a decreased threat of degradation associated with nuclear/ nonnuclear combat and electronic countermeasures (ECM). SINCGARS interfaces with MSE through the net radio interface (NRI) located in selected SENSs or LENSs. Table 2-1 shows the SINCGARS replacement plan (as determined through the operational facility (OPFAC) process).

Table 2-1. SINCGARS replacement plan.

SINCGARS MODEL	CONFIGURATION	REPLACES
AN/PRC-119	MANPACK	AN/PRC-25/77
AN/VRC-87	VEHICULAR SHORT-RANGE	AN/VRC-53/64
AN/VRC-88	VEHICULAR SHORT-RANGE DISMOUNTABLE	AN/GRC-125/160
AN/VRC-89	VEHICULAR LONG-/ SHORT-RANGE	AN/VRC-12/47
AN/VRC-90	VEHICULAR LONG-RANGE	AN/VRC-43/46
AN/VRC-91	VEHICULAR LONG-RANGE DISMOUNTABLE SHORT-RANGE	AN/GRC-160/125 AN/VRC-46
AN/VRC-92	VEHICULAR DUAL LONG-RANGE (RETRANSMIT)	AN/VRC-45/49
AN/ARC-201	AIRBORNE TRANSCEIVER	AN/ARC-54/131 AN/ARC-114 AN/ARC-186 (VHF-FM)

d. CNR operations in the MSE signal brigade/battalion are conducted in six networks. These nets provide the signal commander a means to communicate C^2 information and engineering of signal assets. Companies operate their own command/engineering nets but may not have their own SENs and RAUs operating in the same net. SENs and RAUs operate in the net of the company operating the NS to which they are connected. Node management communications are always accomplished on the company command/engineering net of the company to which they are assigned/ operational control (OPCON). NSs and LENs normally operate on their battalion's engineering net. Figures 2-7 through 2-12 show the structure of radio nets in the corps and division signal battalion.

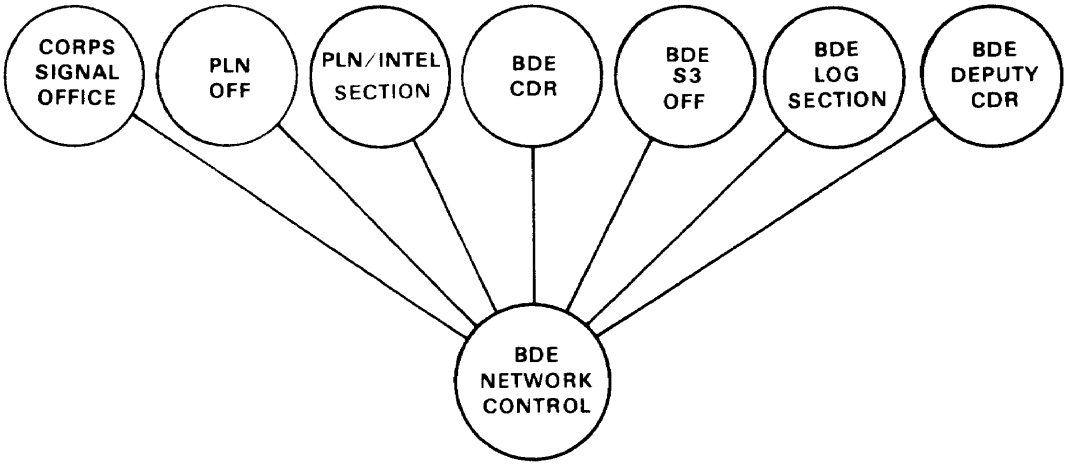


Figure 2-7. Corps signal brigade command/operations FM net.

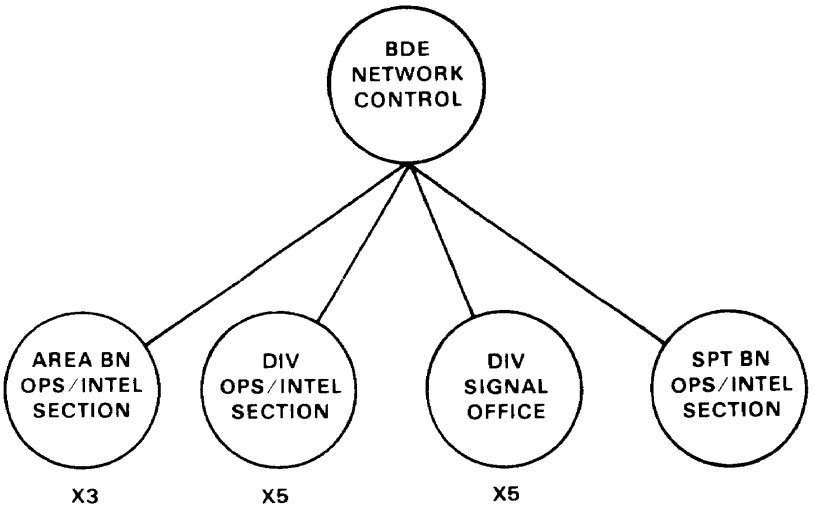


Figure 2-8. Corps signal brigade operations HF net.

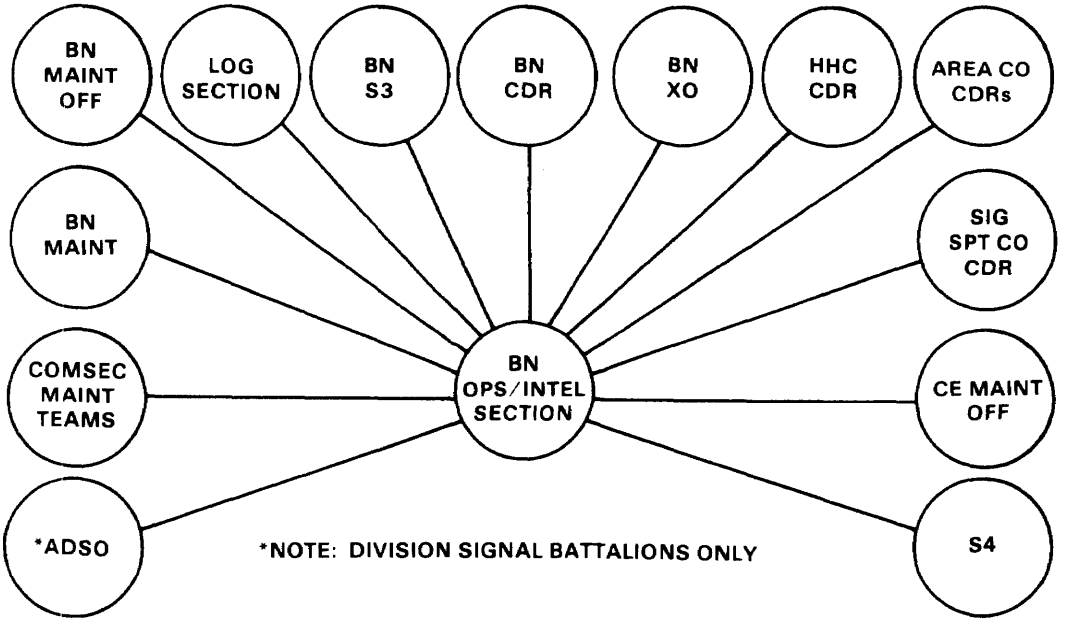


Figure 2-9. Corps and division MSE battalion command/operations FM net.

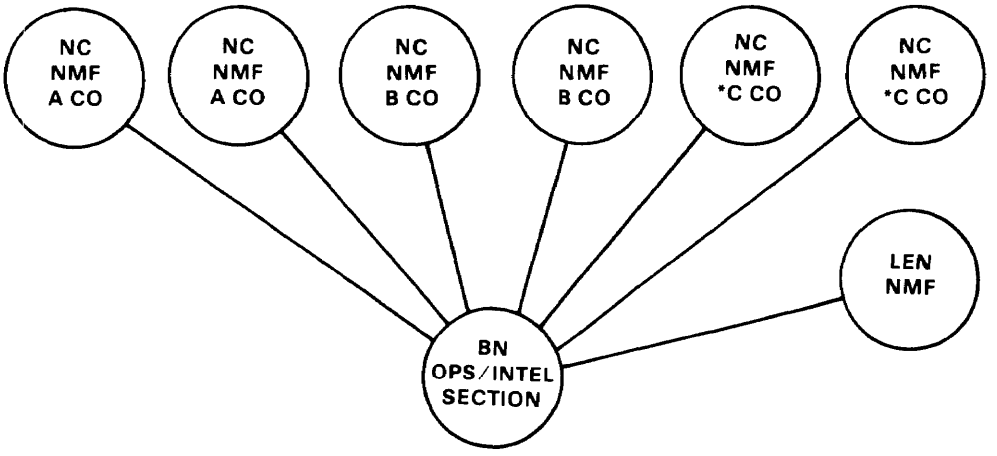


Figure 2-10. Corps and division MSE battalion's engineering net.

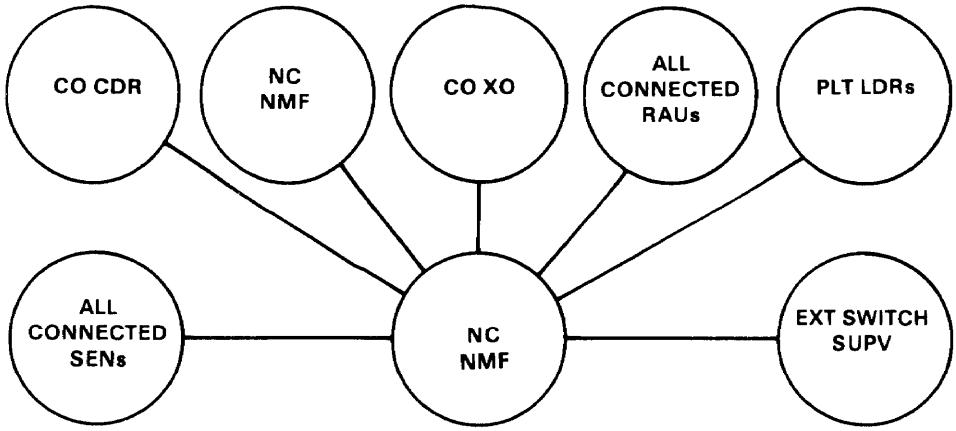


Figure 2-11. MSE company command/engineering net.

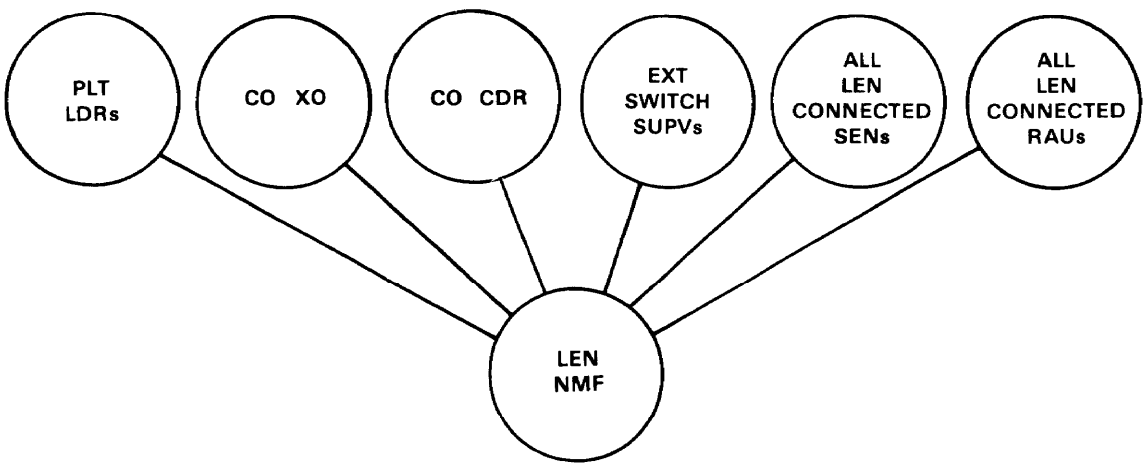


Figure 2-12. All MSE signal support companies command/engineering nets.

2-4. ADDS

a. Enhanced Position Location Reporting System (EPLRS) is a system for data distribution on the battlefield. EPLRS is a computer-based communications system designed to provide secure, jam-resistant, contention free, near real-time data transmission and distribution to subscribers. Additionally, EPLRS provides unit identification, navigational aids, and the automatic location reporting of tactical combat and CS forces. EPLRS uses integral dual level (CONFIDENTIAL/ SECRET) cryptographic security with over-the-air rekeying (OTAR), frequency hopping, and error correction encoding as ECM protection. An EPLRS community consists of a net control station-EPLRS (NCS-E) and up to 460 EPLRS user units (EPUU) operating on eight UHF frequencies from 420 to 450 MHz.

(1) Three host computer interfaces are available to connect data transfer devices to the EPUU. This allows direct information transfer from the sending computer to the receiving computer at data rates of up to 1.2 kb/s. These interfaces are--

- Standard interface X.25 - Most Army users and all new automated systems.

- Single-channel frequency shift keying (FSK) - Tactical Fire Direction System (TACFIRE), TPQ-36/37, automatic target hand off system.

- Data bus interface 1553 - Tracked vehicle and aviation applications.

(2) Division EPLRS architecture calls for 4 NCS-E and 12 EPLRS grid reference units (EGRU) to support a four EPLRS community array where each community covers a brigade-sized area. The NCS-E and GRUs are division signal battalion assets.

b. The Joint Tactical Information Distribution System (JTIDS) is an advanced radio system. It provides information distribution, position location, and identification capabilities in an integrated form for application to tactical military operations. The system distributes encrypted information at high rates and is resistant to jamming in a hostile electromagnetic environment. It can interconnect scattered sources and users of information. JTIDS also provides surface and airborne elements with a position location capability (within a common position reference grid) and a basic identification capability through the distribution of secure position and identity information.

c. The MSE packet network (MPN) is an ADDS using packet switching technology overlaid on the MSE area common-user voice network. With so many battlefield automated systems (BAS) on the AirLand Battlefield and their immediate need for a viable, responsive means of transmission, MSE was given the mission. The MPN will consist of packet switch nodes (PSNs) in each SENs, LENs, and NS. The PSNs form a network dedicated to data traffic. The user connects his BAS to the PSN at his location and sends data traffic to other authorized systems. Gateways connect the corps network to adjacent corps and EAC. Current plans require the BAS to use X.25 (standard) and transmission control protocol/internet protocol (TCP/IP) to ensure compatibility between systems/networks. The MSE system dedicates four trunks between NCs, two trunks on each link to a LEN, and one trunk to each SEN for connectivity. This allows a 16 kb/s flow of data from the SENS and a 64 kb/s flow from LENSs and NCs.

2-5. Battlefield Considerations

a. Deep operations are hampered by maneuver, fires, or command, control, and communications countermeasures (C^3CM). Complicated problems occur when the corps/division communications system must support a large maneuver unit with the mission of deep operations. Figure 2-13 shows a technique for extending MSE to provide C^2 for deep operations. MSE connectivity can be extended to the enclaves (islands of activity) through multichannel TACSAT, multichannel HF, TROPO, or host nation assets. There is an implied mission of enhanced site security in this scenario. Given the vulnerability of MSE sites to enemy action, communications redundancy becomes the key to success. TACSAT, HF, and FM must be included to complement MSE communications.

b. Close operations take place in the most lethal area of the battlefield. Because of the high potential for battle damage, signal planners must consider plans for renewal/recovery. MSE's flexibility and the SCC planning capability help signal leaders meet this challenge.

c. Rear operations present the signal leader with the most challenging problems on the AirLand Battlefield. These challenges exist in the need to provide area and site defense. CPs and signal sites have a greater responsibility for site defense. This means that all signal leaders must be tactically and technically proficient. Signal soldiers must reflect this tactical excellence. When the rear CP is deployed separately within the corps or division area, rear support can be provided by using a SEN from corps or division assets. Force CS and CSS are coordinated using a combination of MSE (area), FM and HF (CNR), and EPLRS (data).

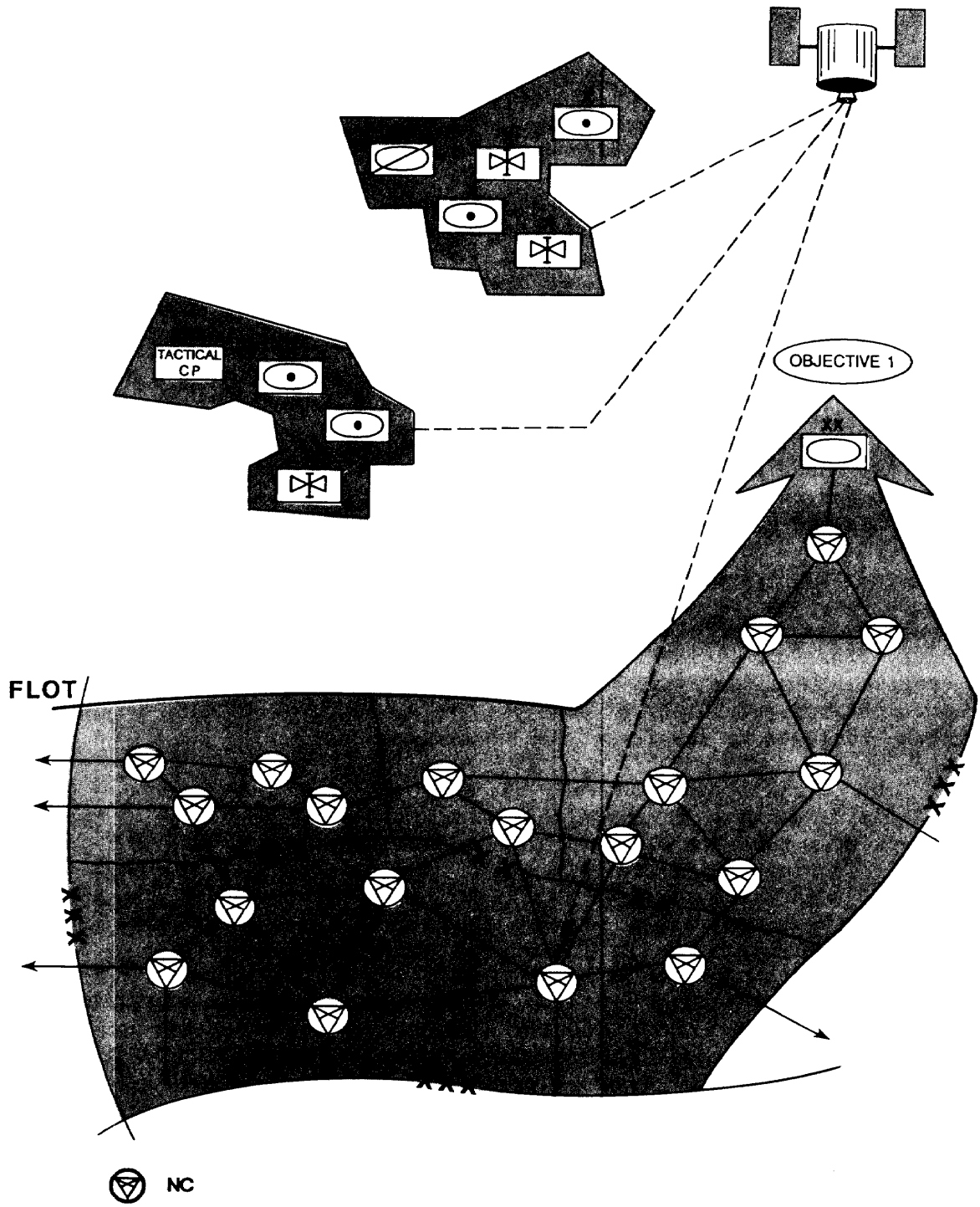


Figure 2-13. Extended MSE for C^2.

d. FMs 11-37, 11-38, 11-50, and 11-92 address node site requirements, MSE employment, and signal site security.

2-6. Conclusion

MSE is only one part of a three-part force communications architecture (see Figure 2-l). While corps and divisions require three types of tactical communications, MSE will carry the vast majority of the voice and data transmissions for these units to support C^2 and sustainment. MSE provides very limited support for corps and division deep operations. Its main contribution is to corps and division close and rear operations. With advice from the signal staff, the commander is responsible for using communications systems to best support his units. This support maximizes the units' chances for mission success.

CHAPTER 3

CS and CSS Communications

3-1. Introduction

a. Winning on the AirLand Battlefield requires synchronizing support from all levels. Corps CS and CSS units must be able to communicate with the theater. The tie-in between the theater communications system and the MSE system occurs as a result of the various interfaces specified in Appendix F.

b. MSE is only one part of the communications equation for CSS. All available communications means are needed to support the battlefield functional area requirements implied in Figure 3-1. Every leader should read FM 100-10 which reflects current battlefield support doctrine and FM 101-5 which reflects C^2 for commanders and staff. This chapter discusses the battlefield support communications and offers solutions for some of the challenges that face signal leaders.

3-2. Using the Area System

a. MSE is the primary secure/nonsecure communications system used by CS and CSS units. CS and CSS units deploy throughout the corps' and divisions' areas to provide the best possible support to combat units. Distances between support elements and their headquarters often exceed the range of organic single-channel radios.

b. The LENs and SENs (Figure 3-2) provide area communications system wire access to the COSCOM, DISCOM, CS and CSS brigades, separate groups, and separate battalions on a habitual basis. RAUs provide commanders and staff officers (who are authorized MSRTs) with mobile access to the MSE ACUS. NCs located near the corps rear boundary (Figure 3-3) interface with the EAC area telephone system. EAC area common-user communications interface is not restricted to these NCs; TACSAT allows EAC communications interface to take place anywhere it is needed on the battlefield. EAC interface also provides access to the other branches of service of the Department of Defense. The assets to affect this interface follow the rule of higher-to-lower, left-to-right, and supporting-to-supported.

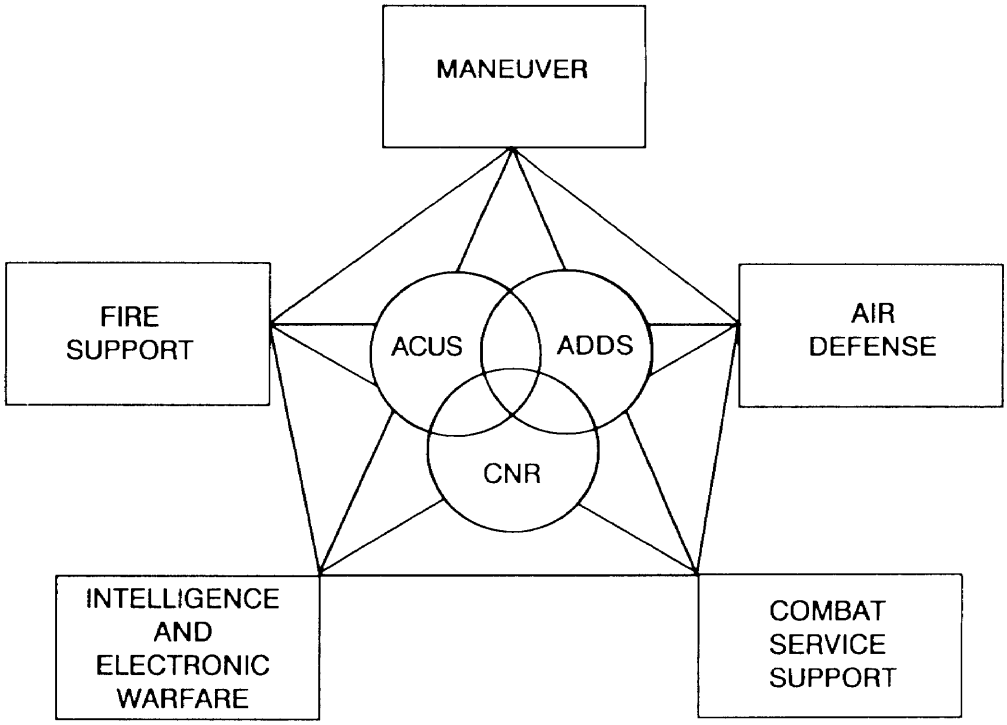


Figure 3-1. ALB C^2 system.

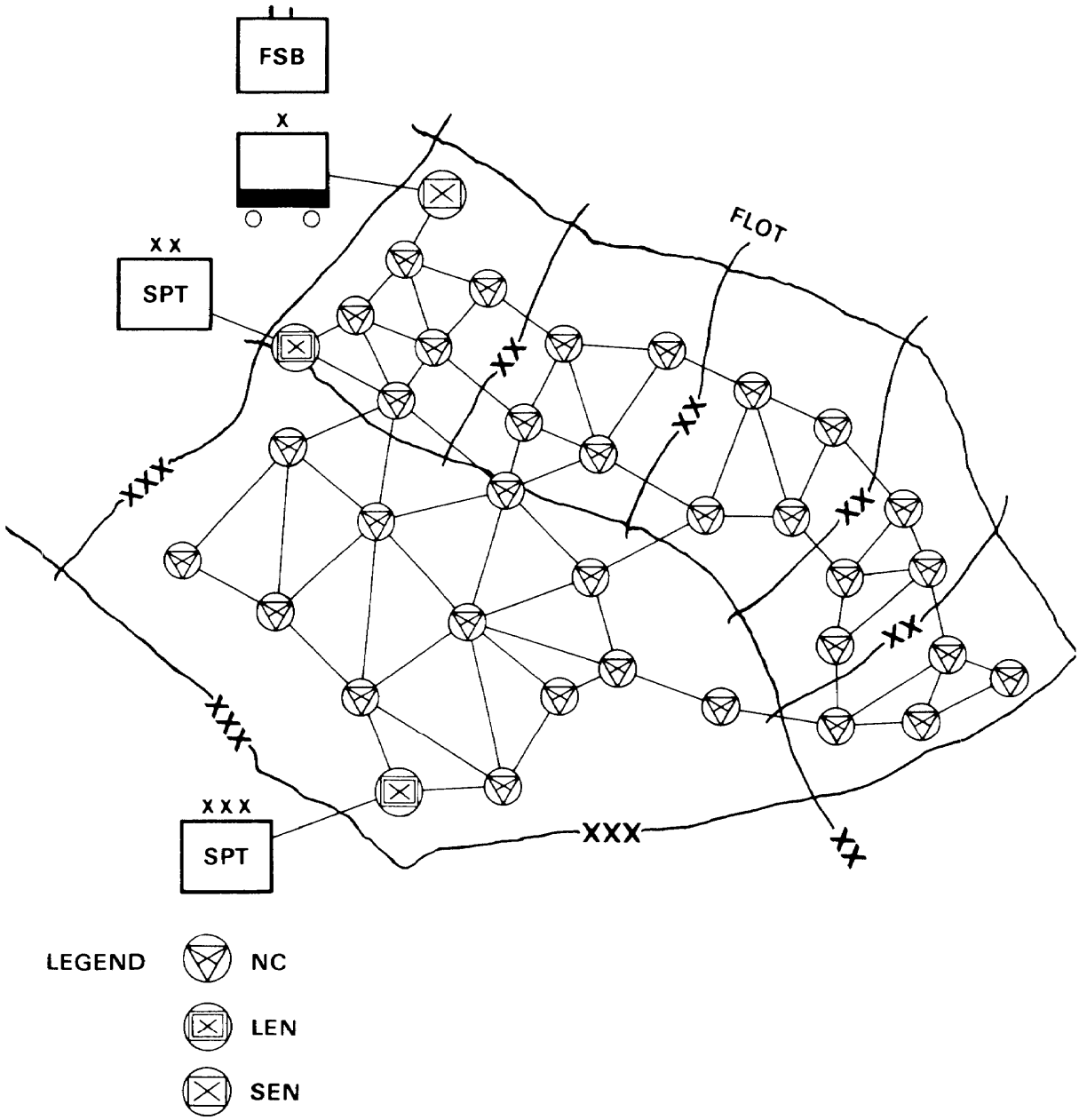


Figure 3-2. Area communications system access.

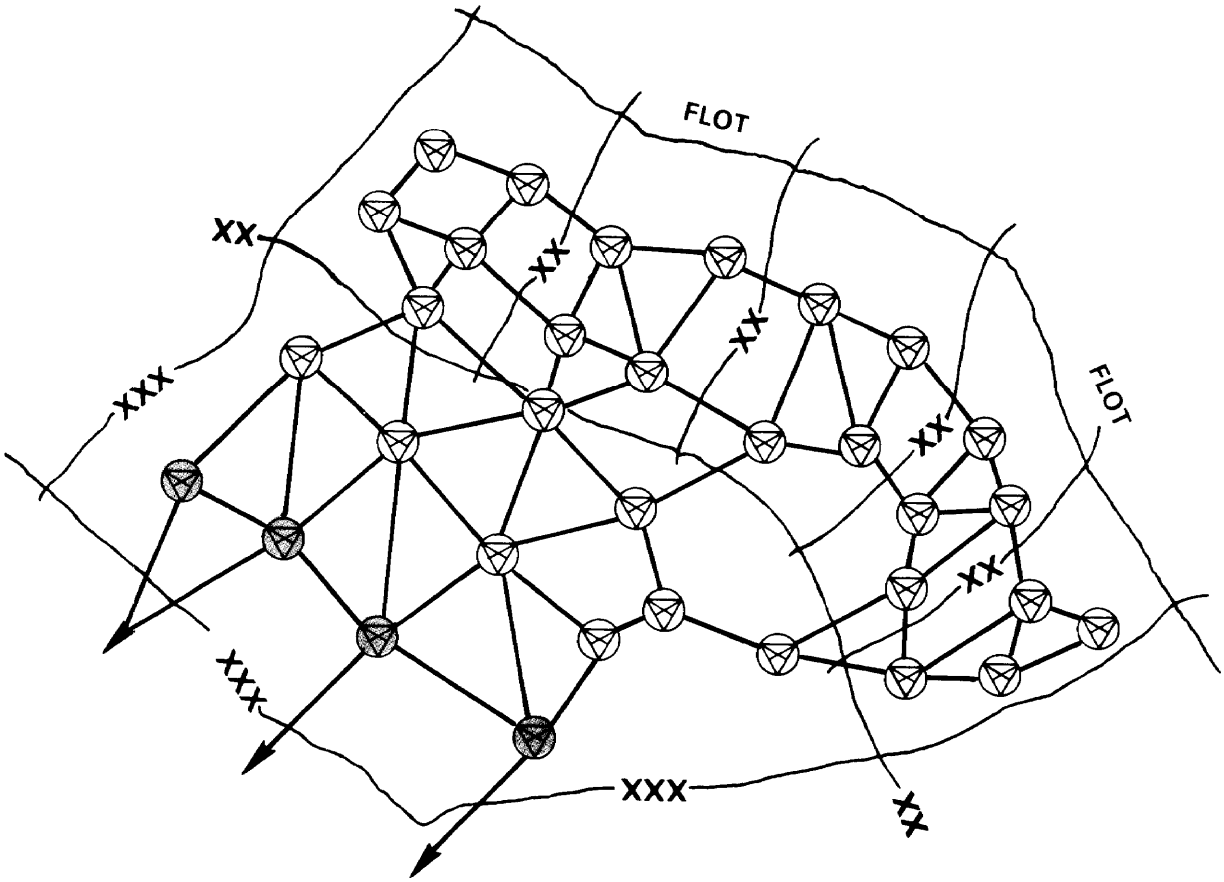


Figure 3-3. Example of area communications system access for CSS units.

3-3. Using CNR

CS and CSS units are spread throughout the battlefield. Due to the distances involved, we rely on HF, TACSAT, and FM radio to coordinate support when and where MSE area access is unavailable.

3-4. MSE Support of a Rear CP

When a rear CP deploys within the corps area, it can be assigned a SEN from existing corps or division assets. The rear CP must communicate with all elements that support rear operations. This communication includes the various commands, staff agencies, headquarters, response forces, tactical combat forces, bases, and base clusters in the rear area. Support for this connectivity may require the deployment of additional wire access (LEN or SEN) communications support from the corps and division MSE assets. All signal leaders should read and understand FM 90-14 which contains the doctrine for conduct of rear operations.

3-5. Supporting a Corps MSE Network

One of the biggest challenges to MSE unit leaders is ensuring that signal soldiers, deployed throughout the battlefield, receive the best support possible. All leaders, particularly junior leaders, must be resourceful, imaginative, and aggressive to ensure all areas of support (administrative and logistics) are provided. Coordination required to effect this scheme of support consumes much of the leader's time and effort. This results in an increased logistical management role for the leader. LENs and SENs can draw support from the units they are supporting. However, providing support to NCs, remote RAUs, and LOS relays deployed throughout the corps area requires using the area support concept (ASC). Corps extension nodes may operate in division areas. They fall under an ASC also.

3-6. ASC for MSE Signal Units

a. With MSE, signal elements can be assigned throughout the corps area as needed. We must adapt to the ASC once normal organizational lines are crossed. For example, when a corps NC (Figure 3-4) is needed to augment the MSE network in a subordinate division's area (Figure 3-5), that NC must draw its support from the unit responsible for signal unit support in that division area. That support comes from, or is coordinated by, the local division signal battalion.

b. If divisional MSE elements are used within the corps area, the corps signal brigade and subordinate battalions must be responsible for supporting those divisional MSE elements. Based on staff advice, the commander in the corps signal brigade must determine the area support zones and responsibilities each battalion will assume.

c. The current ASC applies to MSE operations. However, some unique logistics problems occur in MSE, specifically, fuel, rations, and electronic maintenance support.

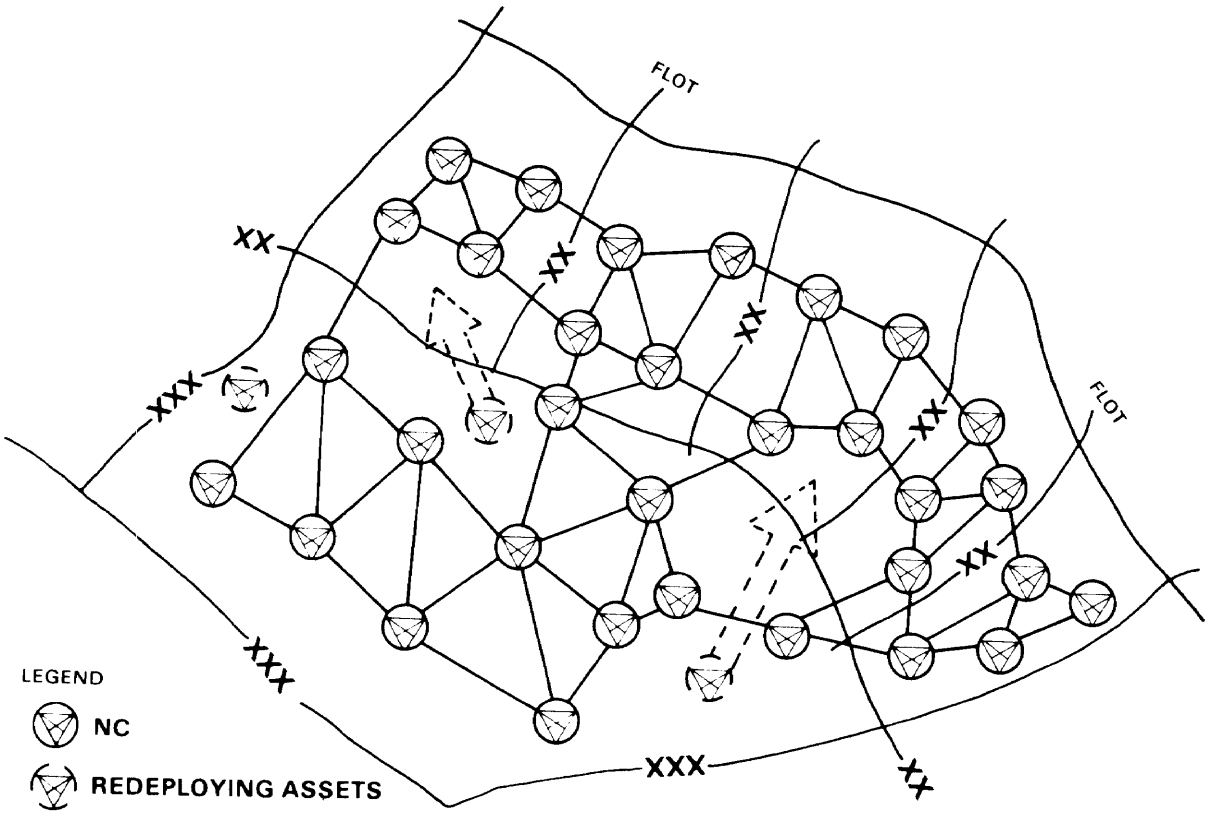


Figure 3-4. Corps redeploying NC.

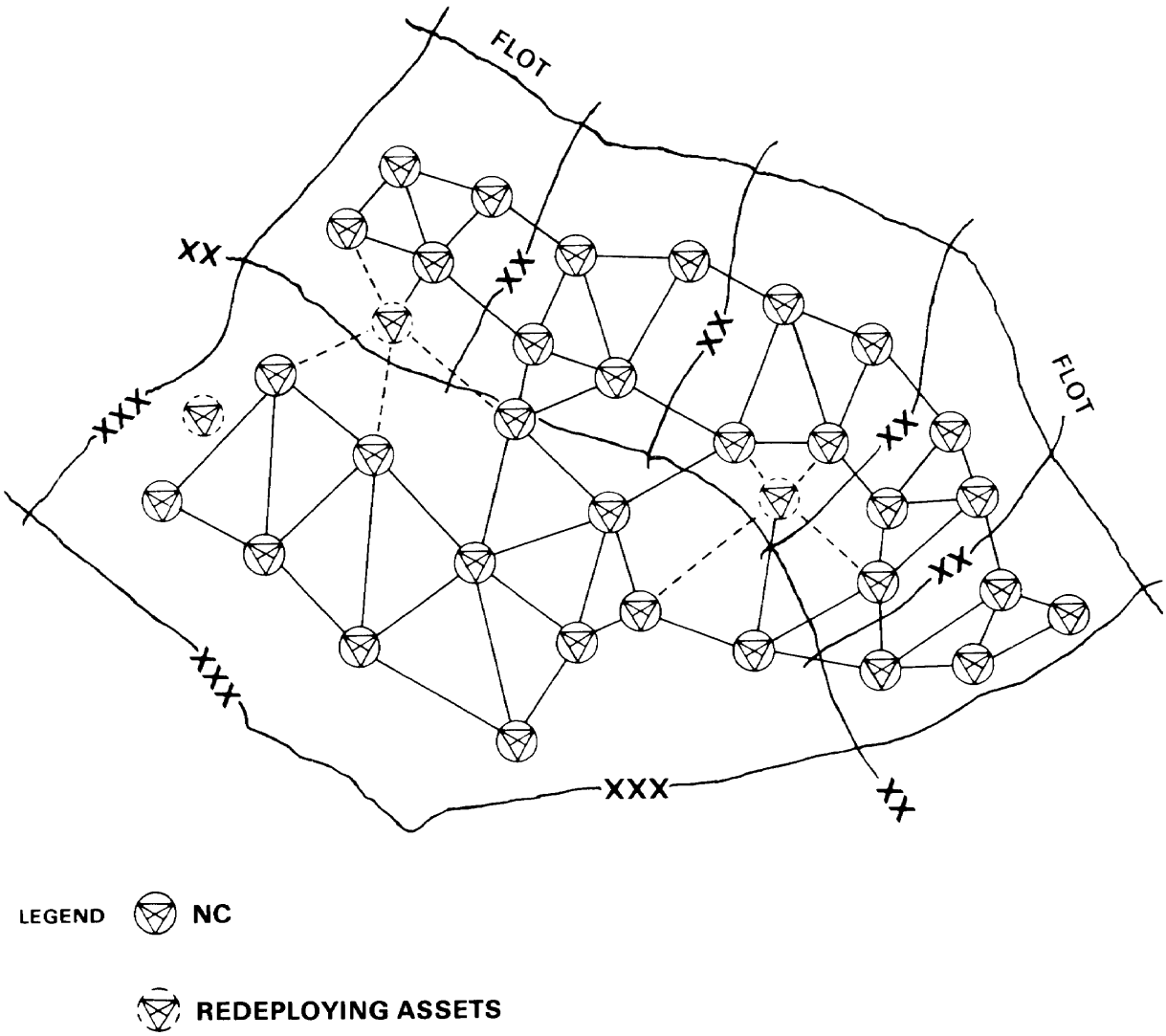


Figure 3-5. Movement to support a subordinate division area.

(1) Fuel. The NCs in a static operating posture are refueled, if accessible, by a parent unit tanker. Without tank truck accessibility, the NSV shuttles fuel from the unit tanker's position to the node. If it is more convenient, the fuel can be shuttled from an area support center to the node. If an NC is preparing to move, the movement order from the

SCC contains specific instructions on routing to the nearest area support center or an area support center which lies along the specified route, whichever is the most convenient or effective. Extension nodes receive fuel from the unit being supported. Remote RAUs and remote LOS radio facilities (V3 relay or V2 NATO analog interface (NAI)) are supported by their own NC (the parent/master NC). The SCC receives its fuel support from the NC to which it is connected. If an NC is not in the parent unit's area of logistical support responsibility, full support comes from the signal unit with support responsibility for that area.

(2) Rations. The parent unit is normally responsible for troop feeding. However, it may be more practical under some circumstances to apply the same scheme of ration resupply as is used for fuel resupply. The team chief maintains ration status, reorders when resupply is required, and informs the parent/master NC of ration status before moving. When requested, movement orders contain information on the nearest area support center or an area support center en route to the new location.

(3) Network maintenance.

(a) The signal battalion's ability to perform up to direct support (DS) maintenance on its mission peculiar equipment is vital to successful battlefield signal support. Responsive forward deployed organic maintenance is required to keep a widely dispersed network operational. Close teaming of operator and DS maintenance personnel, ready access to on-board spares, and mission essential prescribed load list (PLL) items are all critical to providing responsive network maintenance and ensuring the commander's ability to win the battle.

(b) Each signal battalion has an electronic maintenance facility (AN/TSM-182) and several spares facilities (AN/TSM-183) to support MSE. The maintenance facility is normally deployed with the battalion headquarters, and the spares facilities are deployed at each MSE node. DS maintenance teams are deployed as far forward as required to meet network priorities and battlefield mission needs.

(c) Network maintenance generally consists of operator troubleshooting, fault isolation, and system restoration by replacing defective items from on-board spares and the unit's PLL. Equipment status is reported to the parent NMF. It then becomes the node manager's responsibility to report equipment failures to the SCC via the record traffic system in the NMF.

(d) When faults are beyond the ability of the operator, a DS maintenance team is sent forward to repair the failed system on-site. Defective equipment and components are evacuated to the battalion electronic maintenance facility for repair. If repairs cannot be performed at the battalion DS maintenance facility, the equipment is evacuated to higher echelons of maintenance through normal logistics

channels. (The next update to FM 11-37 will detail network maintenance support.)

3-7. Conclusion

MSE is the primary tactical communications system for CS and CSS separate battalions and higher at echelons corps and below. MSE unit leaders must develop logistical support plans for their units to maintain continuous area communications support.

CHAPTER 4

Communications Assets in the Corps/Division

4-1. Introduction

The MSE network provides corps area communications in an ALB environment. A corps network can support up to a five-division corps or a geographic area spanning 23,250 square miles.

4-2. The Corps Signal Brigade

a. The standard corps signal brigade (Figure 4-1) is the center of the corps MSE network. It consists of an HHC, three corps area signal battalions, and a corps support signal battalion. It provides systems control of the corps area MSE network and provides technical control of the division signal battalions' installed components. The advantages of this arrangement are--

- Greater operational flexibility.
- Increased logistics support efficiency.
- Easier personnel management.
- Centralized MSE assets control.

The airborne corps signal brigade is slightly different in terms of organization and equipment. (See Appendix C.)

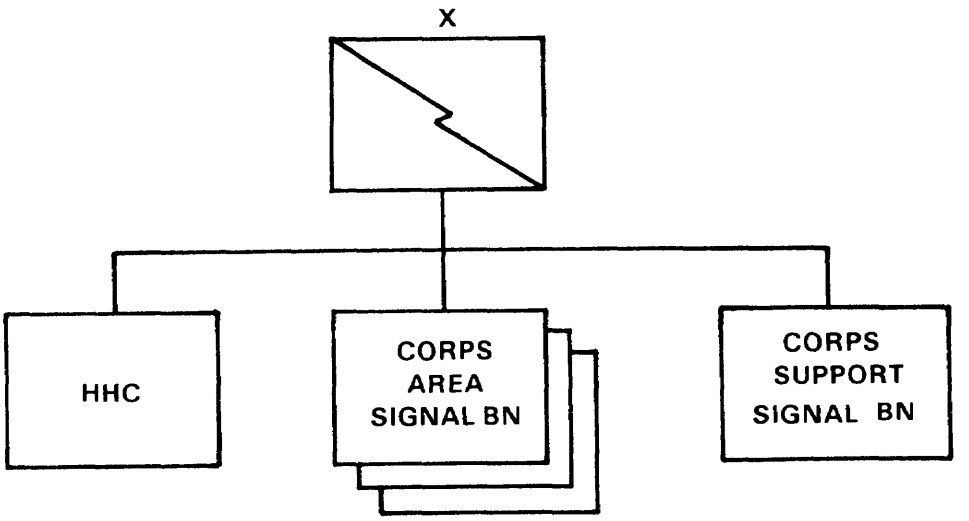


Figure 4-1. Corps signal brigade.

b. The HHC (Figure 4-2) consists of the brigade headquarters, the headquarters company, and the corps signal office.

(1) The brigade headquarters has a command section, administrative section, operations/intelligence section, and logistics section. The operations/intelligence section consists of the signal engineering branch, the network control branch, the plans/intelligence section, and the brigade communications security (COMSEC) office of record.

(a) The network control branch concerns itself with the MSE network. This branch installs, operates, and maintains two SCCs, one primary and one alternate. The SCCs, facilitate network management and control tasks with computer-assisted tools. These tools issue operational orders and directives to node managers, and receive and process return messages and reports from node managers. They also help in managing radio frequencies, COMSEC, equipment/personnel status reports, system activation/deactivation and reconfiguration including network radio links. (For more information on SCC functions, see FM 11-38.)

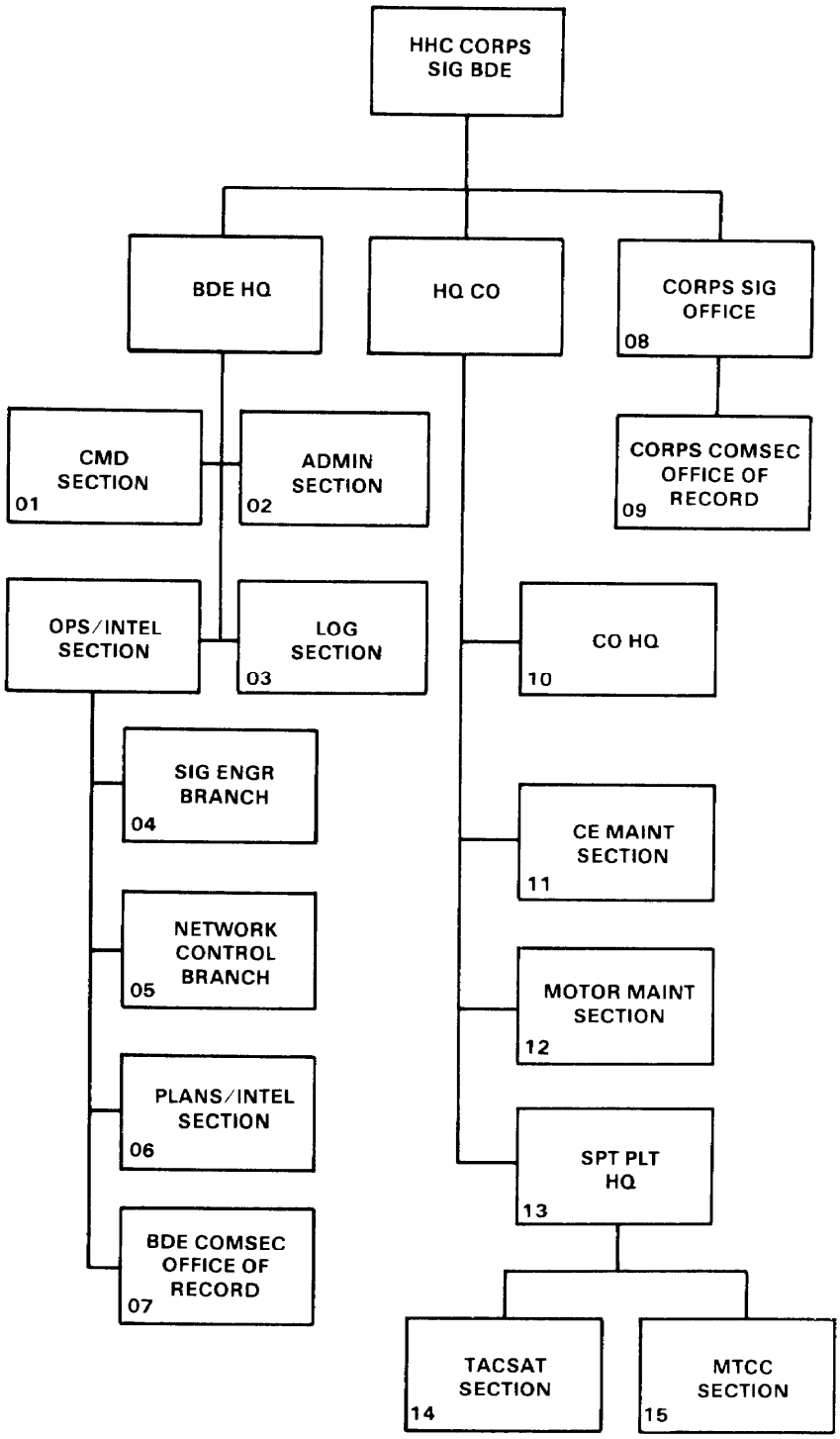


Figure 4-2. HHC corps signal brigade.

(b) Since the corps signal brigade manages and controls the MSE network when deployed in a corps area, the corps SCCs provide technical control of the five divisional SCCs. The SCCs cannot operate alone, they must be physically linked by CX-11230/G cable to an NS. The area signal battalion within the corps provides this NS. The SCC gains network access through the NS.

(2) The headquarters company has a company headquarters, a communications-electronics (CE) maintenance section, and a motor maintenance section. It may contain a support platoon which provides TACSAT communications and a modular tactical communications center (MTCC). Terminal integration with MSE communications assets extends area coverage throughout the corps, to and from the divisions, and during special contingencies.

4-3. The Corps Area Signal Battalion

a. The standard corps area signal battalion (Figure 4-3) consists of an HHC, three standard area signal companies (identical in equipment and personnel at the corps and division level), and a signal support company. For the airborne corps area signal battalion organization, see Appendix C.

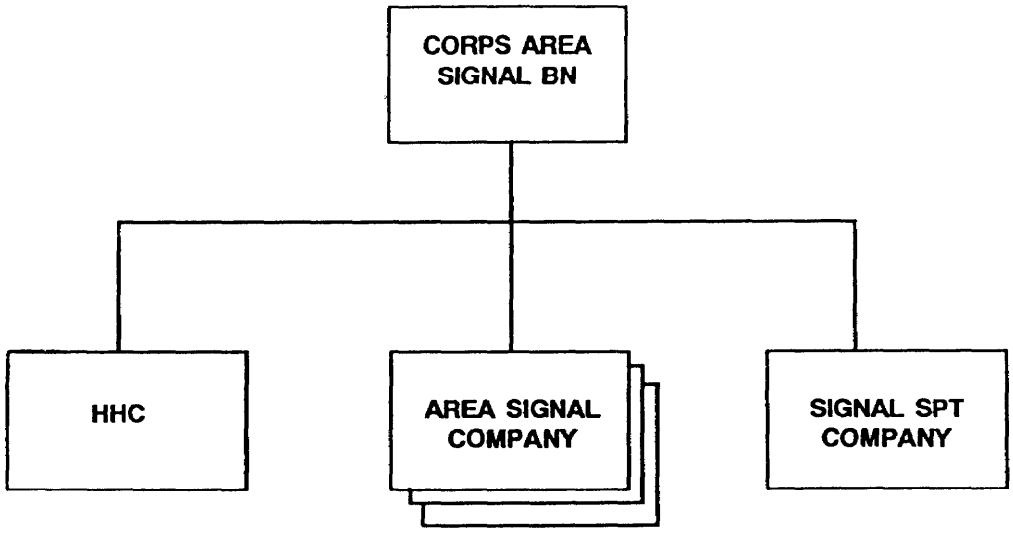


Figure 4-3. Corps area signal battalion.

b. The HHC (Figure 4-4) consists of the battalion headquarters and a company headquarters. The battalion headquarters consists of a command section, an administrative section, a logistics section, an operations/intelligence section, a CE maintenance section, a motor maintenance section, and a battalion COMSEC maintenance section.

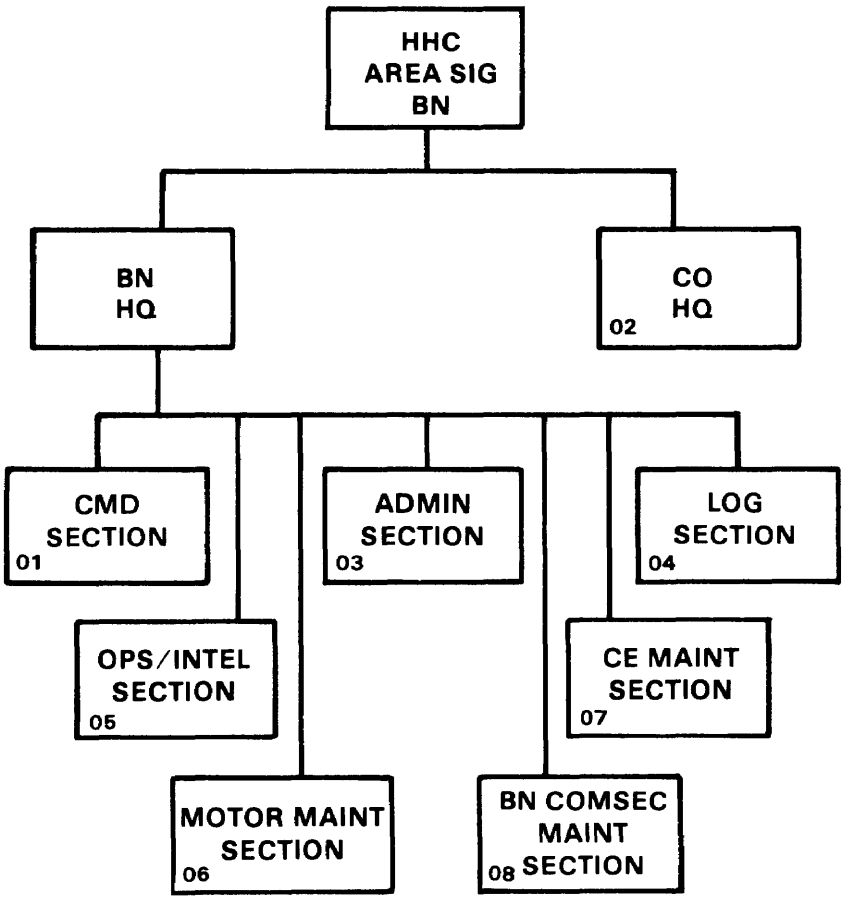


Figure 4-4. HHC corps area signal battalion.

c. Each area signal company (Figure 4-5) consists of a company headquarters and two nodal platoons. Each nodal platoon provides a management shelter and team, in the platoon headquarters, and has an NC section and an extension switch section.

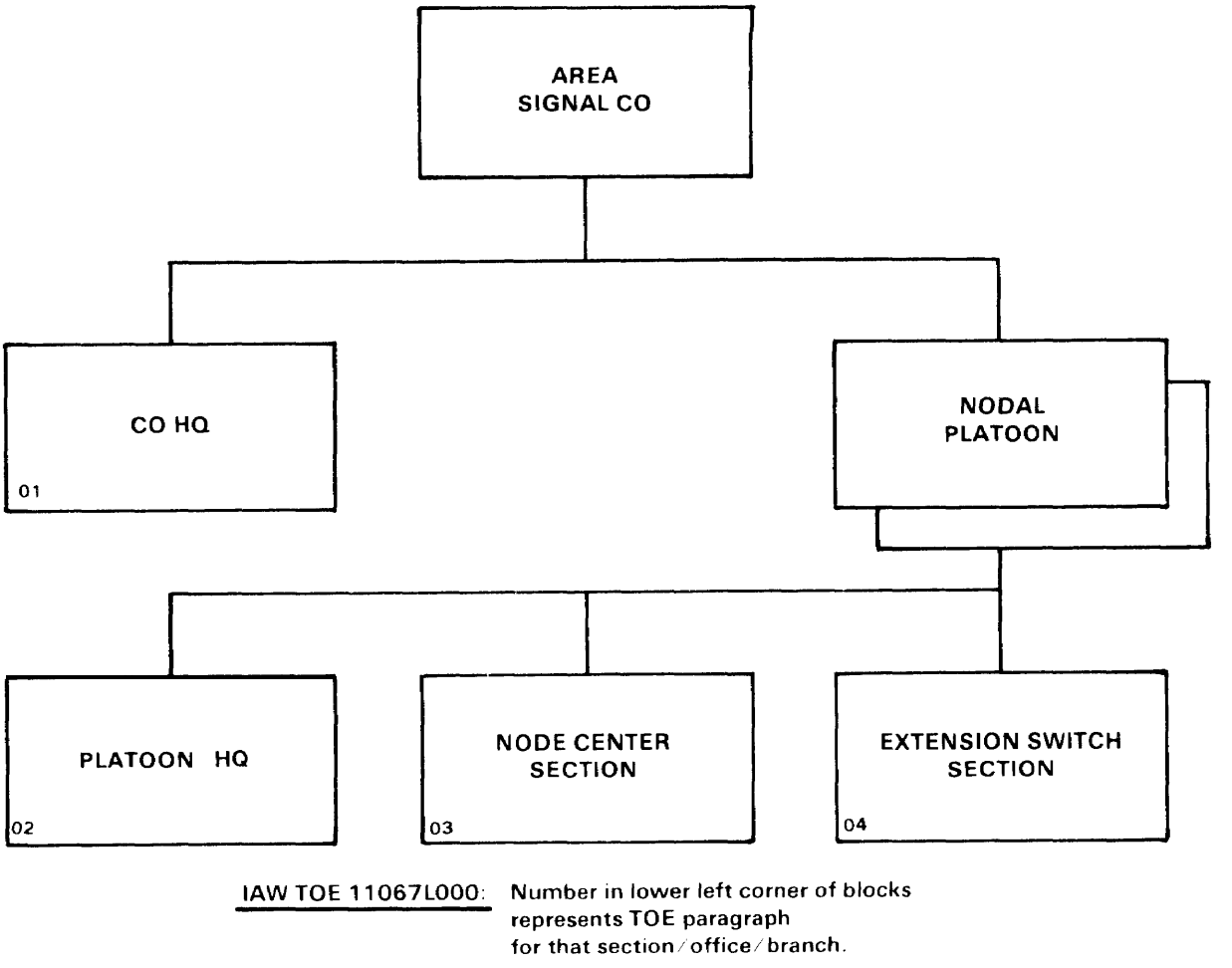


Figure 4-5. Area signal company.

(1) The NC section (Figure 4-6) has seven teams:

- One NS team.
- Four transmission system teams.
- One RAU team.
- One wire system team.

(a) The NS team consists of an operations facility, a switching facility, and a support vehicle. The NS team installs all NS interconnecting cables.

(b) Four transmission system teams deploy four LOS (AN/TRC-190(V3)) assemblages to support the NS.

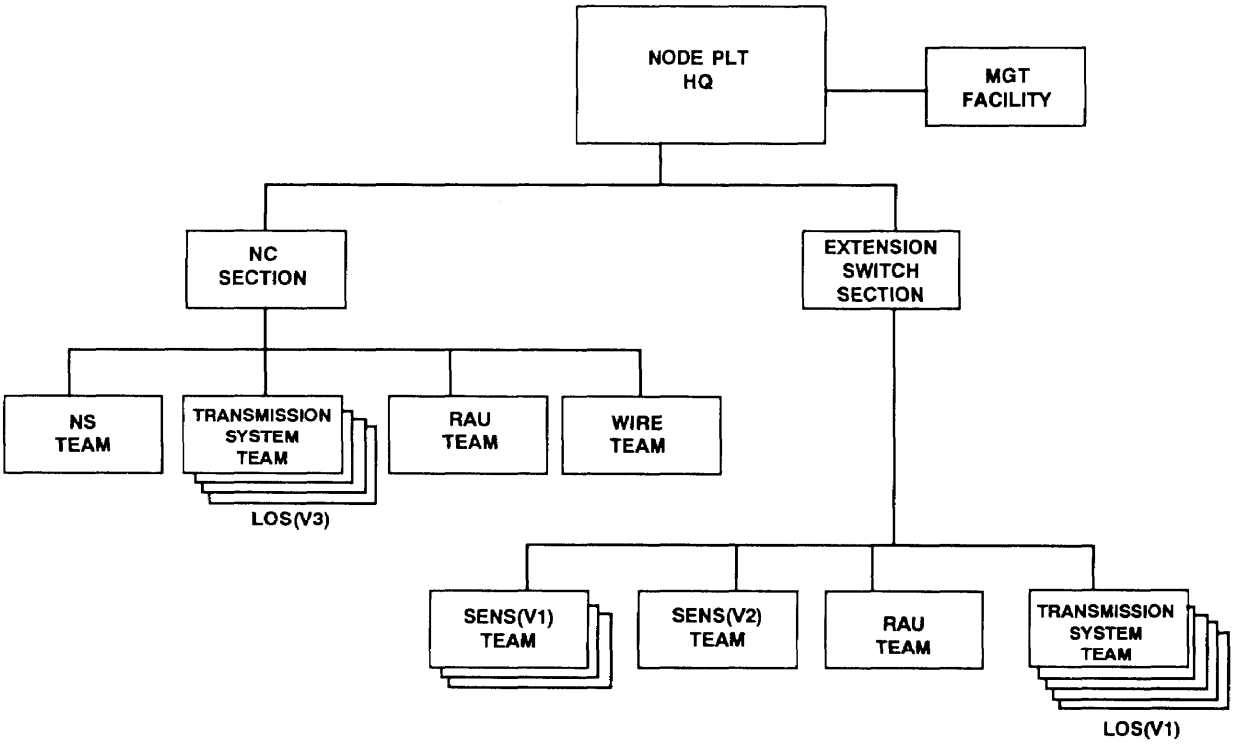


Figure 4-6. NC section and extension switch section.

(c) The RAU team consists of one RAU (AN/TRC-l9l), considered a local RAU in this section, and appropriate personnel.

(d) The wire system team lays out cable from the LOS assemblages and the RAU to the NS. The wire team also installs the CX-4566 26-pair cable and the J-1077 distribution boxes.

(2) The extension switch section (Figure 4-6) has 10 teams:

- Three SENS(V1) teams.
- One SENS(V2) team.
- One RAU team.
- Five transmission system teams.

(a) The RAU team in this section usually deploys in a remote configuration.

(b) Five transmission system teams deploy five LOS(V1) (AN/TRC-190(V1)) assemblages, one for each SENS and one for the RAU.

d. The signal support companies differ in the authorized number of equipment and personnel. The signal support company (Figure 4-7) in the corps area signal battalion has a company headquarters, a large extension switch platoon, and an extension switch support platoon. The large extension switch platoon has a large extension switch section and a cable/wire section. The extension switch support platoon (Figure 4-8) has an extension switch support section and a cable/wire section.

(1) The large extension switch section has 20 teams:

- One management shelter team.
- One LENS (AN/TTC-46) team.
- Eight SENS (AN/TTC-48) teams.
- One wire system team.
- Nine transmission system teams.

(a) The management shelter provides a technical supervisory facility for the platoon command element.

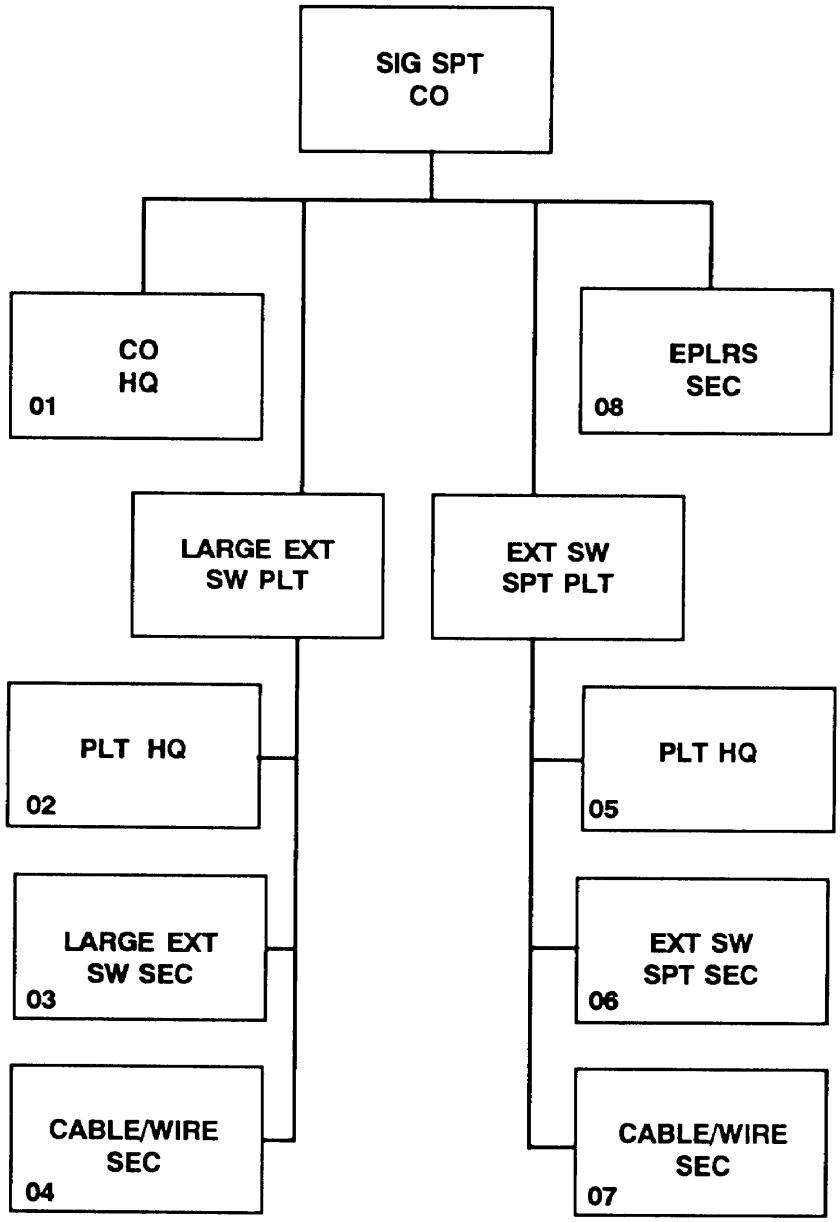
(b) The LENS consists of an operations facility, a switching facility, and a support vehicle.

(c) The SENS teams consist of six SENS(V1)s and two SENS(V2)s.

(d) The wire system team installs and maintains the CX-11230/G cables between the LENS and LOS radio shelters.

(e) Eight LOS(V1) assemblages and teams deploy with the SENS teams. One LOS(V4) (AN/TRC-190(V4)) assemblage and team provide connectivity between the LEN and two NCs.

(2) The cable/wire section has three cable/wire installation teams. These teams install the RMC TD-1234, CX-11230/G cables, CX-4566 26-pair cables, and J-1077 distribution boxes.



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Figure 4-7. Corps area signal battalion signal support company.

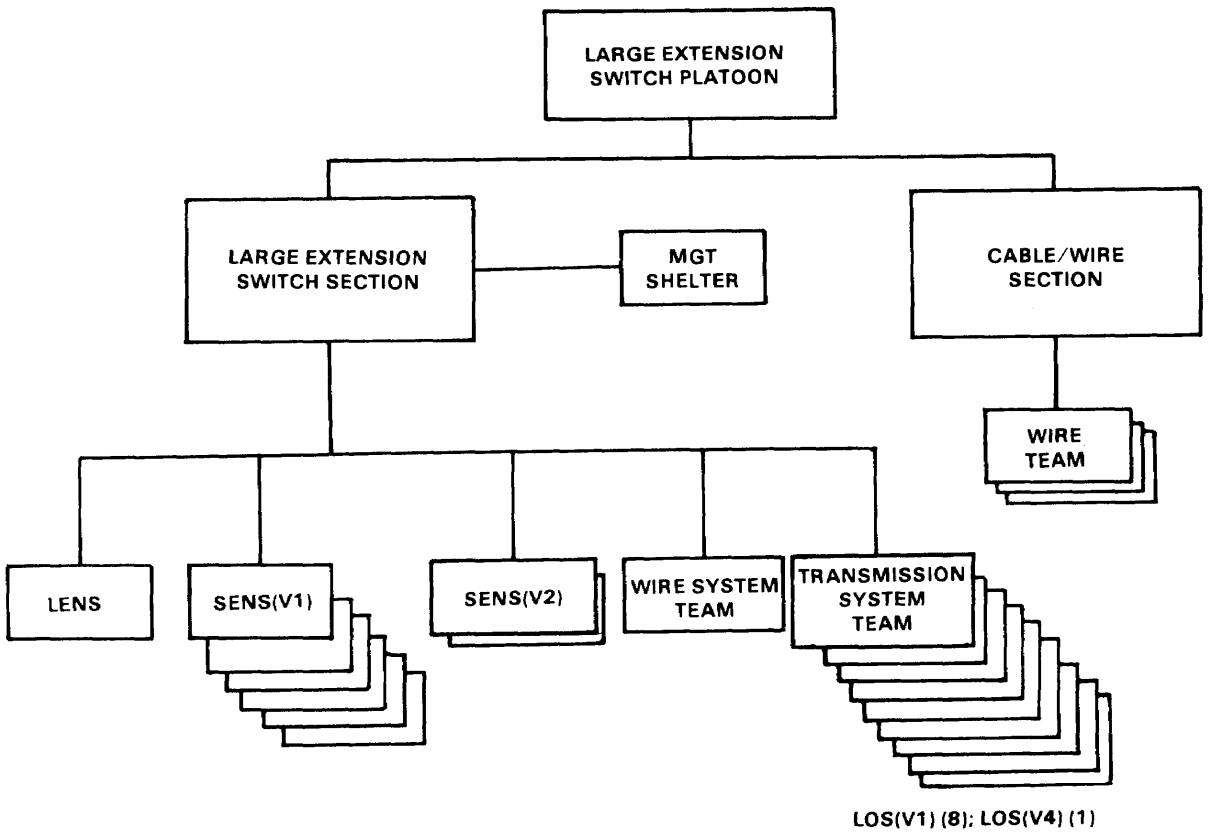


Figure 4-8. Large extension switch platoon.

e. The extension switch support platoon (Figure 4-9) has an extension switch support section and a cable/wire section. It will expand to include an EPLRS section when fielded.

(1) The extension switch support section has 19 teams:

- Eight SENS teams.
- One RAU team.
- Ten transmission system teams.

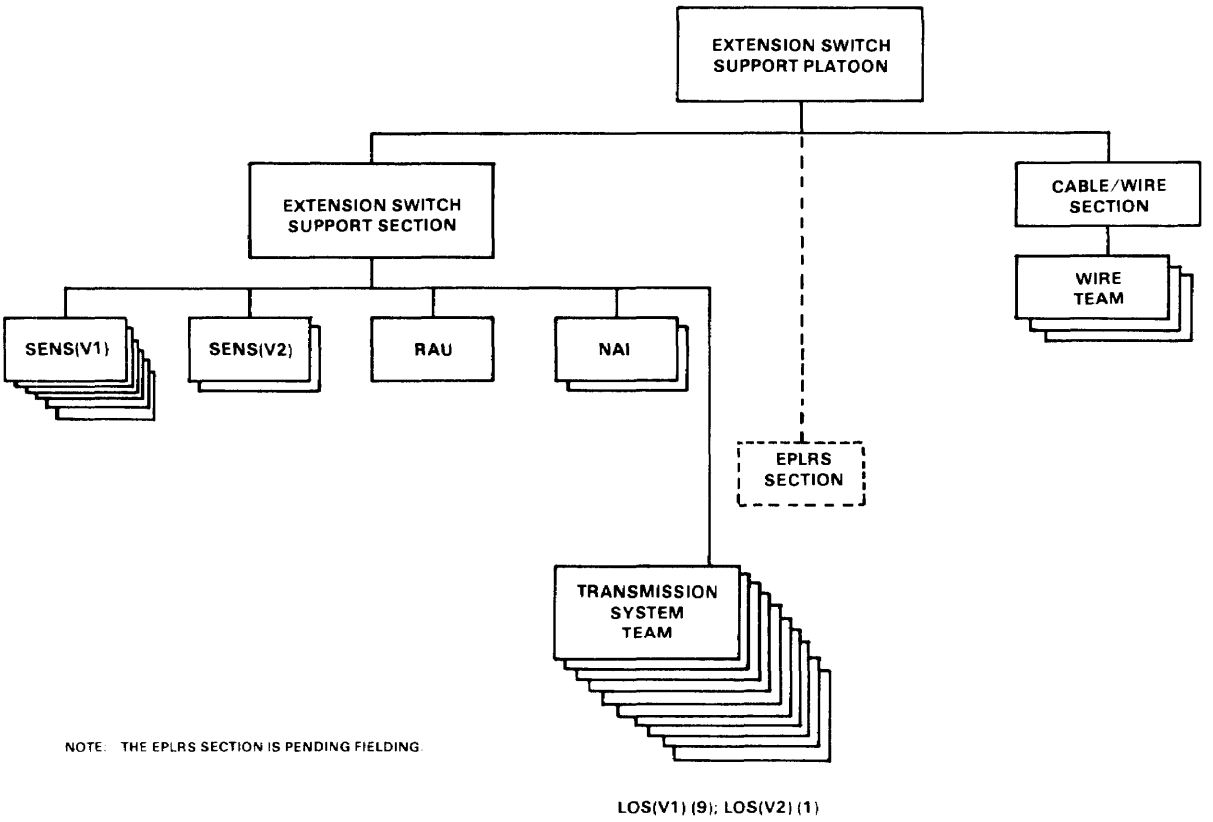


Figure 4-9. Extension switch support platoon.

(a) The SENS teams have six SENS(V1)s and two SENS(V2]s.

(b) The RAU generally deploys as a remote RAU.

(c) Eight LOS(V1)s support the small extension switches and one LOS(V1) supports the RAU. One LOS(V2) (AN/TRC-190(V2)) is available with two NAI converters CV-4002.

(2) The cable/wire section has three cable/wire installation teams. They install the CX-11230/G cables, CX-4566 26-pair cables, and J-1077 distribution boxes.

4-4. The Corps Support Signal Battalion

a. In addition to the three area signal battalions, the corps signal brigade has a corps support signal battalion (Figure 4-10). This battalion has an HHC, two area signal companies, and a signal support company.

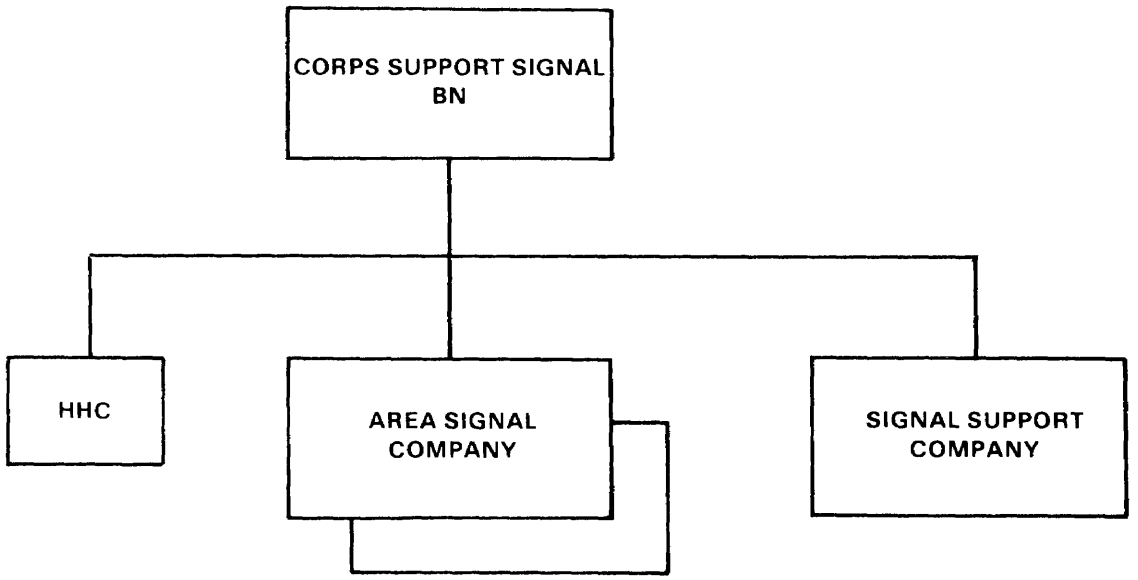
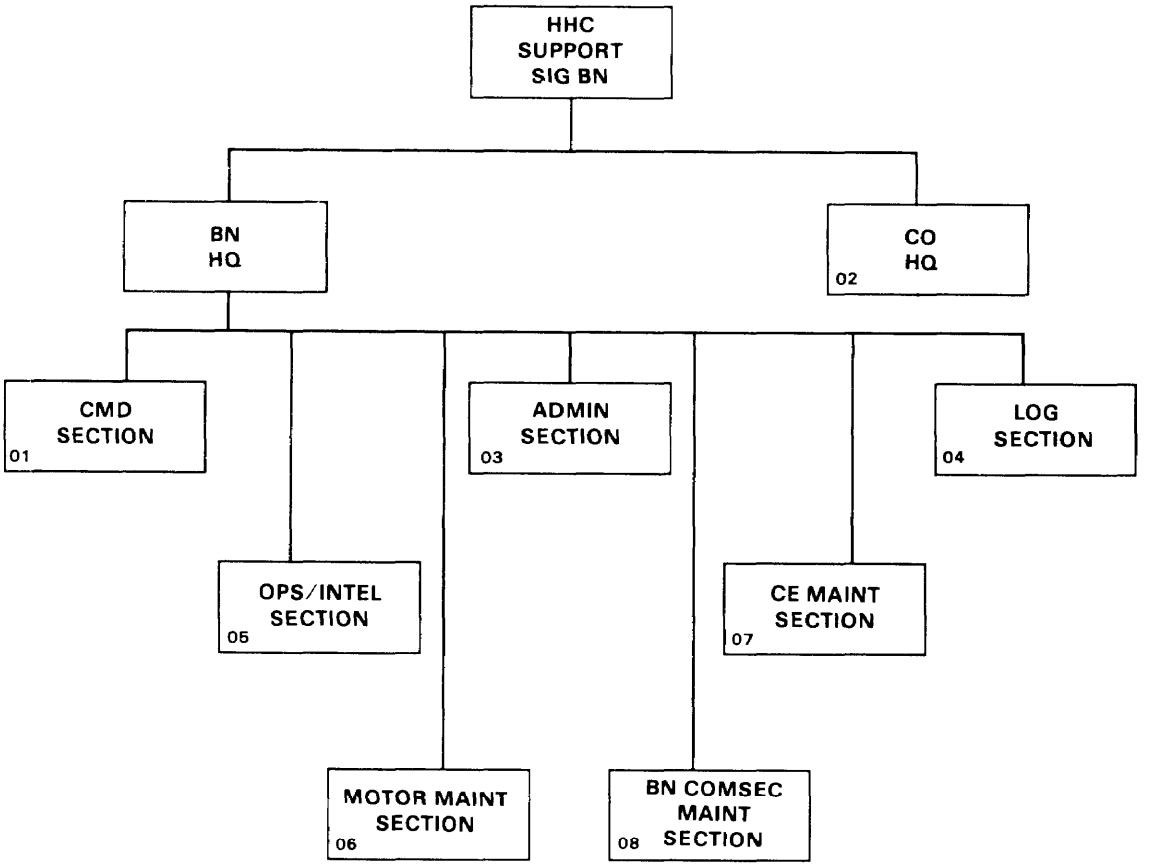


Figure 4-10. Corps support signal battalion.

b. The HHC (Figure 4-11) consists of a battalion headquarters and a company headquarters. The battalion headquarters consists of a command section, an administrative section, a logistics section, an operations/intelligence section, a CE maintenance section, a motor maintenance section, and a battalion COMSEC maintenance section. The corps support signal battalion provides communications throughout the corps area of operations through the efforts of the area signal companies.

NOTE: All area signal companies are identical throughout the corps and division.

c. The signal support company (Figure 4-12) has a large extension switch platoon and an extension switch support platoon. The structure and capabilities of these platoons are similar to those of the area signal battalion support company's. The large extension switch platoon (Figure 4-13) has a large extension switch section and two cable/wire sections. The management facility provides a technical supervisory facility for the platoon command element.



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Figure 4-11. HHC support signal battalion.

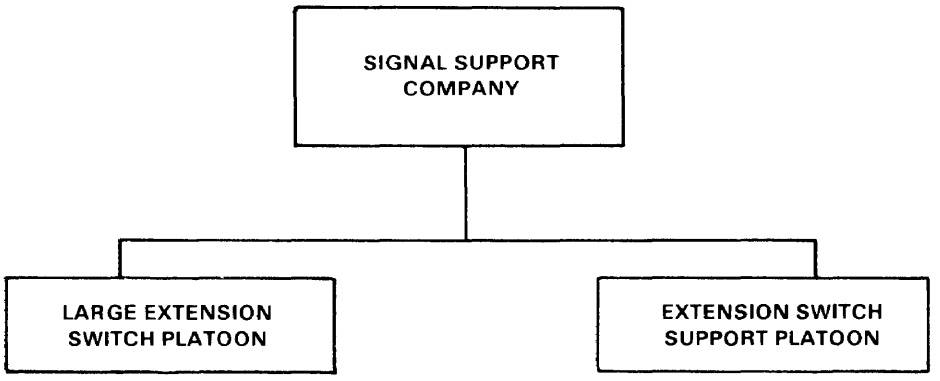


Figure 4-12. Signal support company.

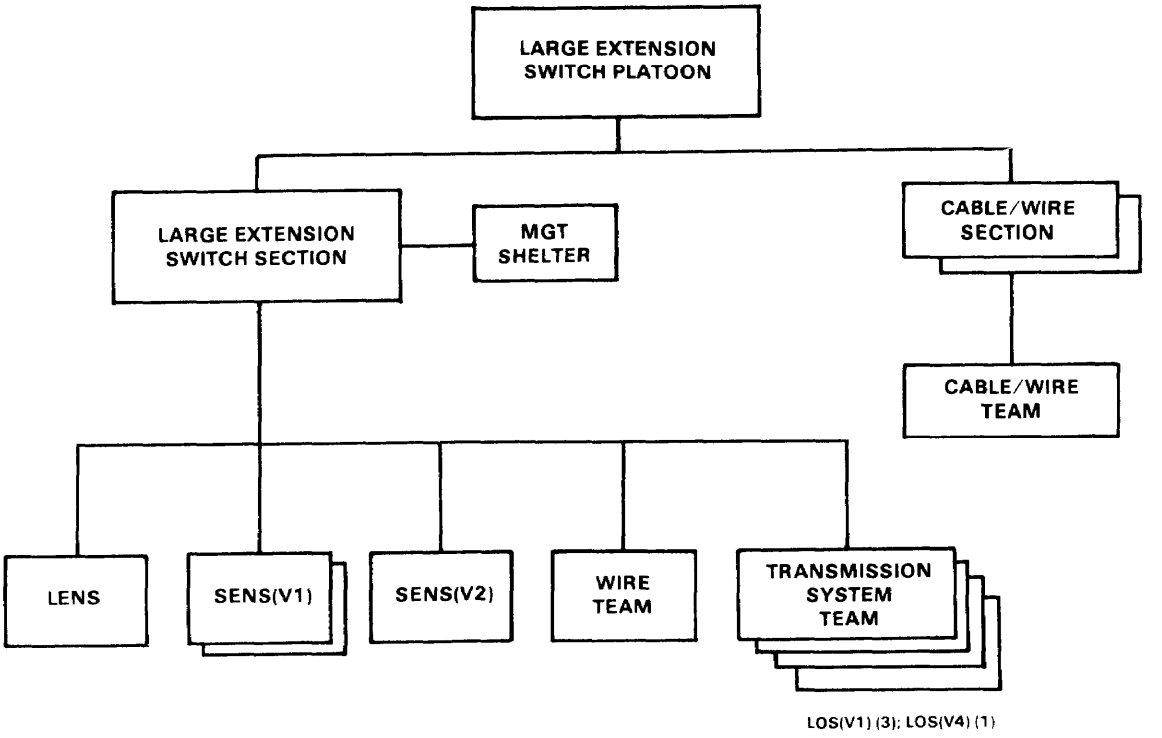


Figure 4-13. Large extension switch platoon.

(1) The large extension switch section has nine teams:

- One LENS team.
- Three SENS teams.
- One wire team.
- Four transmission system teams.

(a) The LENS team consists of the switching and operations shelters and a support vehicle.

(b) The SENS teams consist of two SENS(V1)s and one SENS(V2).

(c) The wire team deploys the CX-11230/G cables between the LENS and the LOS radio shelters.

(d) Three LOS(V1)s deploy with the SENS and one LOS(V4) deploys with the LENS.

(2) Each cable/wire section has a cable/wire installation team. These teams install the RMCs, CX-11230/G cables, CX-4566 26-pair cables, and J-1077 distribution boxes.

d. The extension switch support platoon (Figure 4-14) has an extension switch support section and two cable/wire sections.

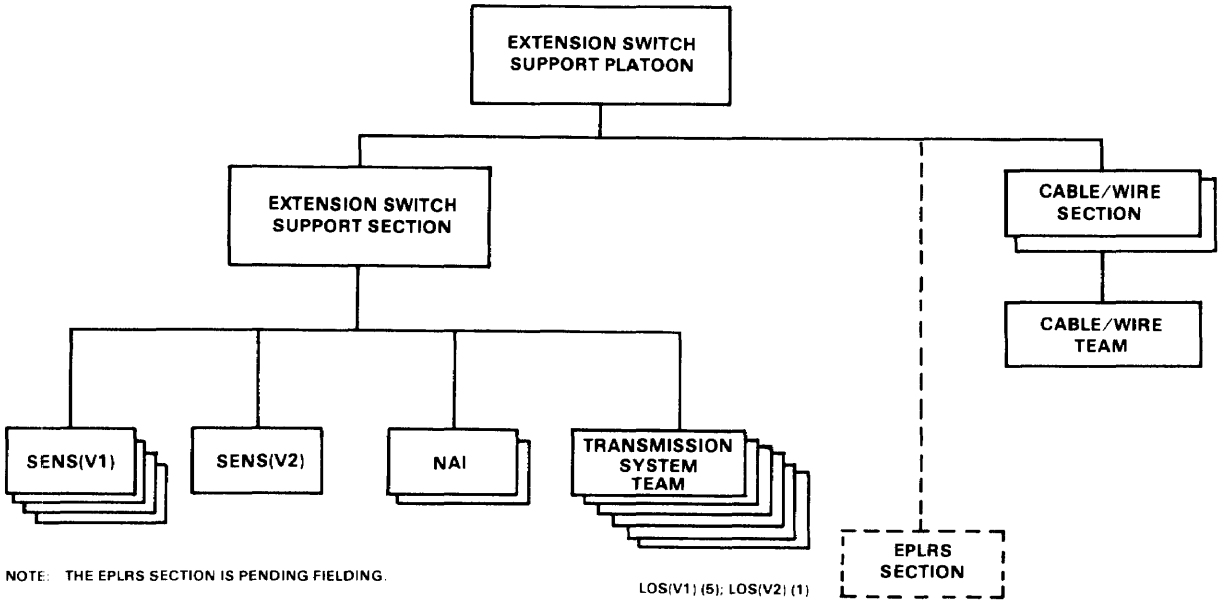


Figure 4-14. Extension switch support platoon.

(1) Each extension switch support section has 11 teams:

- Five SENS teams.
- Six transmission system teams.

(a) The SENS teams consist of four SENS(V1)s and one SENS(V2) .

(b) Five LOS(Vl)s deploy to support the SENS and one LOS(V2) deploys with the NAI converters.

(2) The two cable/wire sections have a cable/wire installation team. They install CX-11230/G cables, CX-4566 26-pair cables, and J-1077 distribution boxes.

(3) The EPLRS section will become an integral member of the extension switch support platoon when fielded.

4-5. The Division Signal Battalion

a. The division signal battalion (Figure 4-15) has an HHC, two area signal companies, and a signal support company and serves as a more forward deployed element in the MSE network. The battalion's structure is similar to a corps area signal battalion's structure except there are only two area signal companies at division. The division signal battalion provides communications support to major subscribers/CPs/ OPFACs throughout the division's area of operations and is used in light and heavy divisions. When required, the division signal battalion can function as a stand-alone organization.

b. The HHC (Figure 4-16) consists of a battalion headquarters and a company headquarters. The battalion headquarters has a command section, an administrative/logistics section, an operations/intelligence section, a division signal office, motor maintenance and CE maintenance sections, a division COMSEC office of record, and a COMSEC maintenance section. The operations/intelligence section installs, operates, and maintains the division signal battalion's SCC.

c. The structure, personnel, and equipment of the division area signal company are identical to the corps area signal company.

d. The division signal support company (Figure 4-17) has a company headquarters and a general support platoon. It is similar to the corps area signal battalion's signal support company in mission. However, it is organizationally and materially different.

e. The general support platoon (Figure 4-18) consists of an extension switch section, a wire section, and an FM retransmission section. The management facility provides a technical supervisory facility for the platoon command element.

(1) The extension switch section has five teams:

- One LENS team.
- One RAU team.
- Two transmission system teams.
- One wire team.

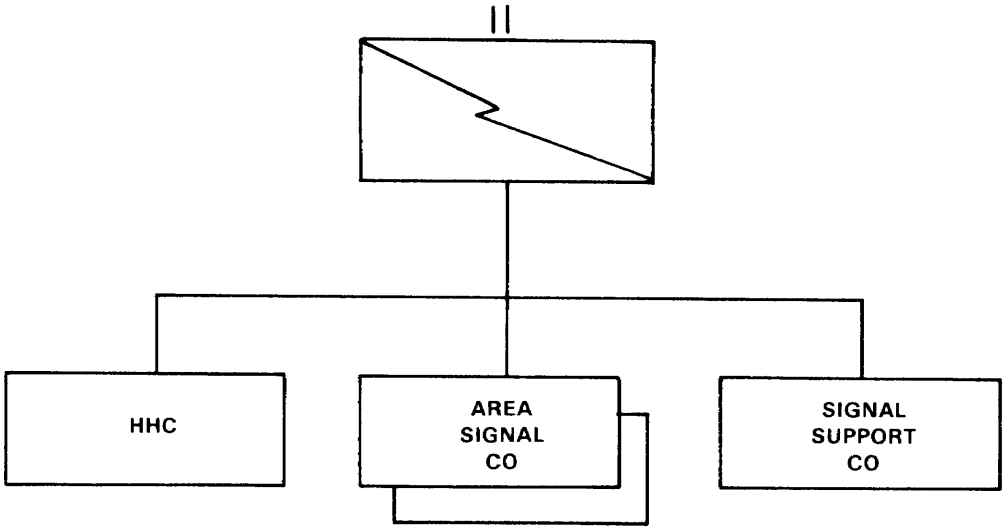
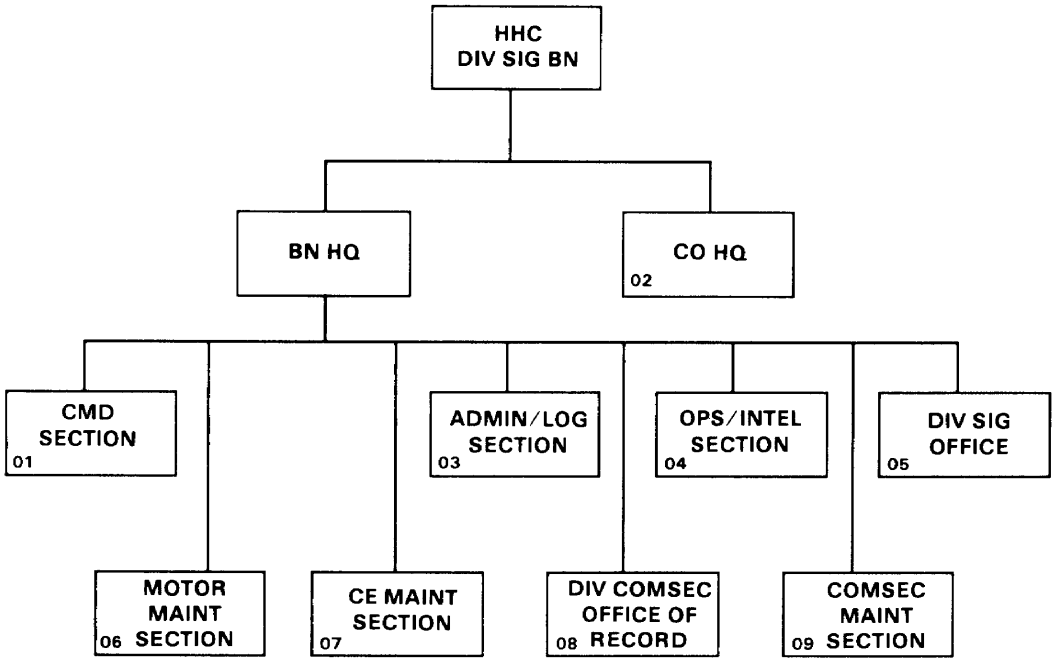


Figure 4-15. Division signal battalion.



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Figure 4-16. HHC division signal battalion.

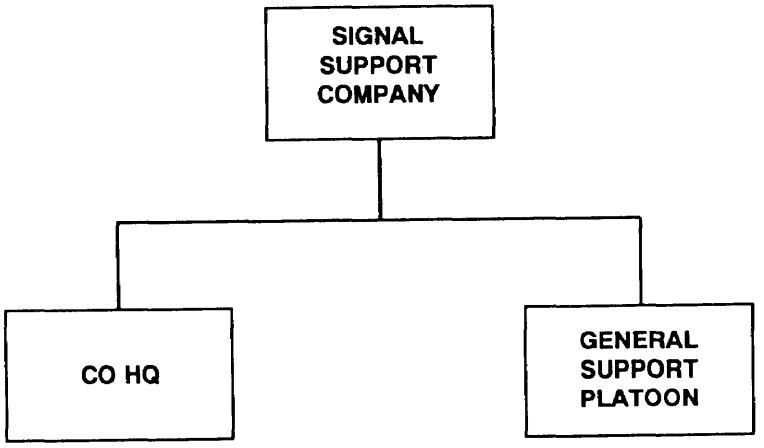


Figure 4-17. Division signal company.

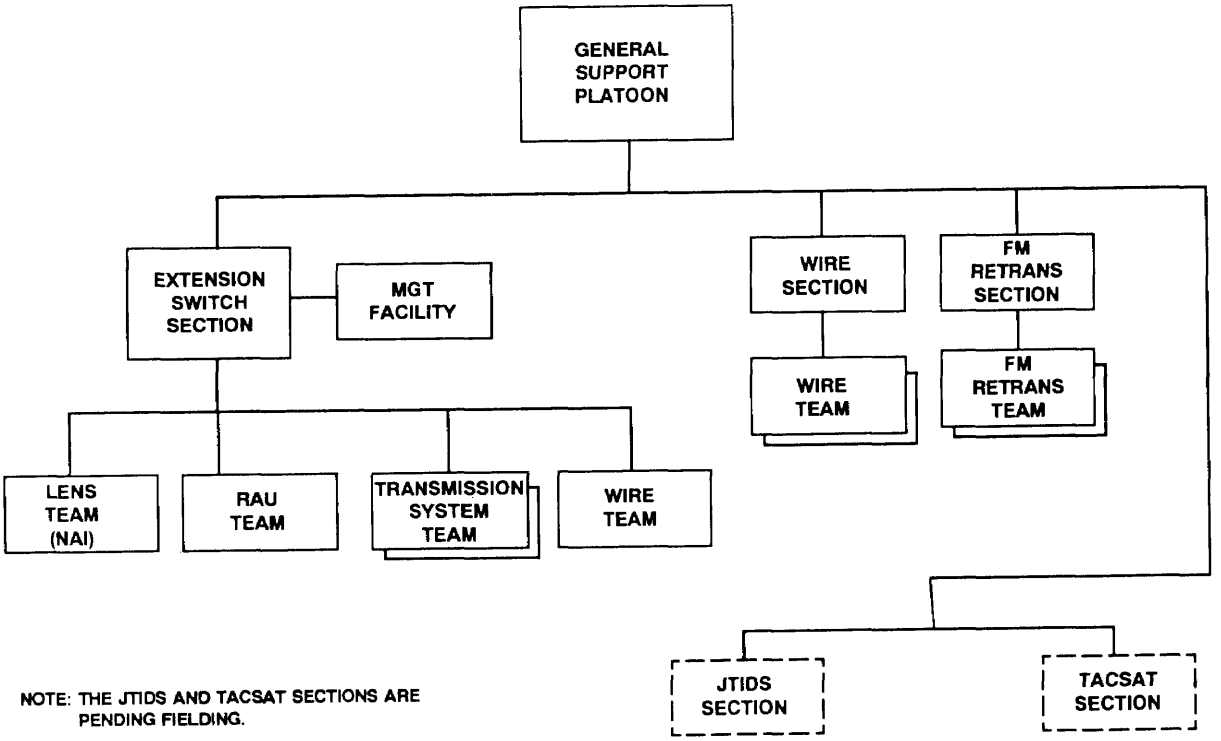


Figure 4-18. General support platoon.

(a) The LENS team is identical to the LENS team discussed earlier in this chapter. This LENS team can use an NAI converter when engaged in joint operations with NATO allies.

(b) The RAU team deploys in a remote configuration.

(c) One LOS(V1) deploys with the RAU and one LOS(V4) deploys to support the LENS.

(d) The wire team installs and maintains the CX-11230/G cable between the LENS and the LOS radio shelter.

(2) The wire section has two wire system installation teams. These teams install and maintain the wire and cable for the LENS's RMCs, J-1077 distribution boxes, and CX-11230/G cable. If needed, the wire teams can deploy with the remote RAU and LOS(V1) and assist in installing these assemblages.

(3) The FM radio retransmission section has two teams that provide single-channel retransmission stations for division level FM voice nets.

4-6. Employment Characteristics

a. The NCs are the hubs of the MSE network providing internodal connectivity (Figure 4-19). The NS is the main element of the NC. It provides network access to 24 local subscribers (that is, node and network management personnel) and to mobile subscribers through the RAU (local/remote) and MSRT. It provides network access for LENS and SENS. When providing a gateway between an adjacent MSE network or to the EAC network, at least two trunk connections are made. Division establishes at least one link to adjacent division(s). NC deployment is based on serviced CPs (extension nodes) deployment, topographical considerations (such as site availability and accessibility), LOS requirements, and network interconnectivity requirements.

b. Rapid initial network deployment requires installing a preprogrammed connectivity system. (FM 11-38 contains further information on the backbone system.) The assistant corps signal officer (ACSO)/ADSO and the S3/system control (SYSCON) plan the backbone system, the SCC issues the orders for execution, and the designated area signal companies provide the assets to install, operate, and maintain the NCs. Each NC is equipped with one 30-meter mast to extend the antenna height when the 15-meter mast is not sufficient. In an evolving network, each NC must connect to at least two other NCs via internodal radio links. For optimum service and survivability, at least three internodal links are required.

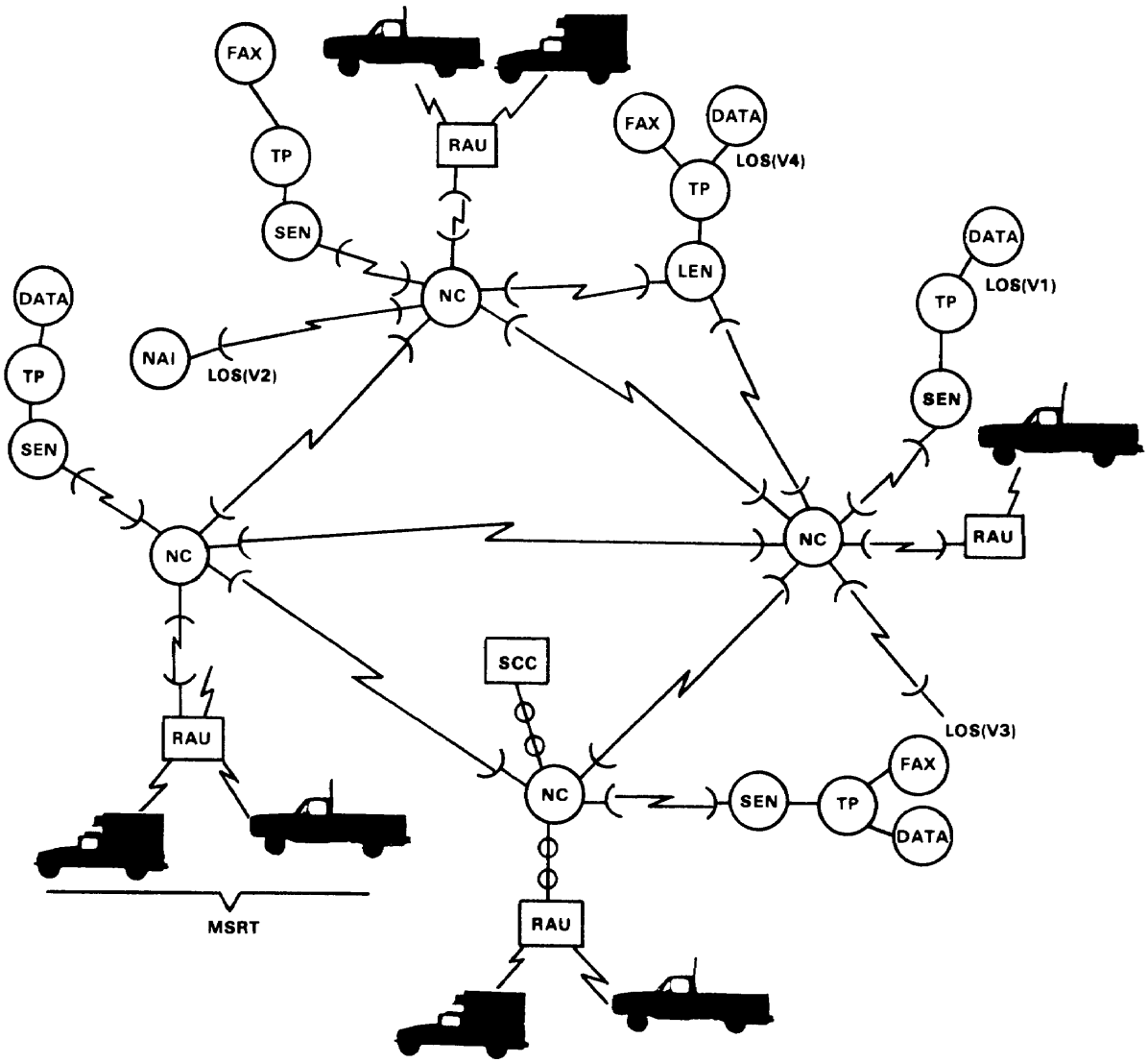


Figure 4-19. Internodal connectivity.

c. The LENSs serve 176 wire subscribers: 96 local (meaning they are connected directly to the LENS via 26-pair cables and J-1077 distribution boxes) and 80 remoted (using CX-11230/G ¼-mile cable and TD-1234 RMCs). The TD-1234s can be set out alone or two can be linked together in series using CX-11230/G cable. They provide access for up to

8 wire line subscribers each. If the user unit requires access for more than 8 subscribers, the RMCs are used in a paired configuration. Units that are adjacent to each other and have 8 or fewer subscribers each will use one RMC and CX-11230/G cable. The LENS can terminate up to 5 RMC groups.

d. The LEN can service CNR customers via a secure digital NRI [TSEC/KY-90). CNR customers access the MSE network through the LENS or SENS operator (Figure 4-20). After the operator completes the connection, the NRI functions automatically. Distribution of the TSEC/ KY-90 is: 1 per NC platoon in each of the area signal companies (42); 2 per signal support company, corps support signal battalion; totaling 44.

e. The RAUs are generally used in a local (collocated with an NS) and remote arrangement. This does not mean that both RAUs cannot be remoted. This depends on the availability of an LOS assemblage to support it. Because the RAU constantly emits a marker beacon declaring its availability to affiliated MSRTs, those RAUs closest to the forward edge of the battle area (FEBA) use emitter masking techniques. With this in mind, the node platoon leader/sergeant must make important tactical deployment decisions about signal security. (See Appendix D.)

f. Deployment of the LOS assemblages must be considered to minimize a node's radio signature. When used as an internodal link, the LOS(V3) can be deployed on hills up to 400 meters (¼ mile) (via CX-11230/G cable) from the node. If the distance exceeds 400 meters (¼ mile), the SHF radio link (Figure 4-21) can be used to prevent long cable runs. The same deployment considerations are valid for the LOS(V1) and the LOS(V4).

g. The LOS(V2) supports the NAI unit during combined operations (Figure 4-22). The SHF radio capability does not exist within the LOS(V2). If an LOS relay is needed to complete an internodal link, the LOS asset for that relay is provided as directed by the corps SCC. The NAI is located at selected NSs throughout the corps (Figure 4-23).

h. The MSRTs provide mobile access to the MSE network. The MSRT, AN/VRC-97 (Figure 4-24), accesses the system through the RAU and can receive or transmit voice, facsimile, or data traffic. When a RAU is en route to a new site, it has MSRT capability using radio number eight and the TSEC/KY-68 DSVT remoted into the cab of the vehicle. This capability enhances C^2 within the MSE battalions during movements.

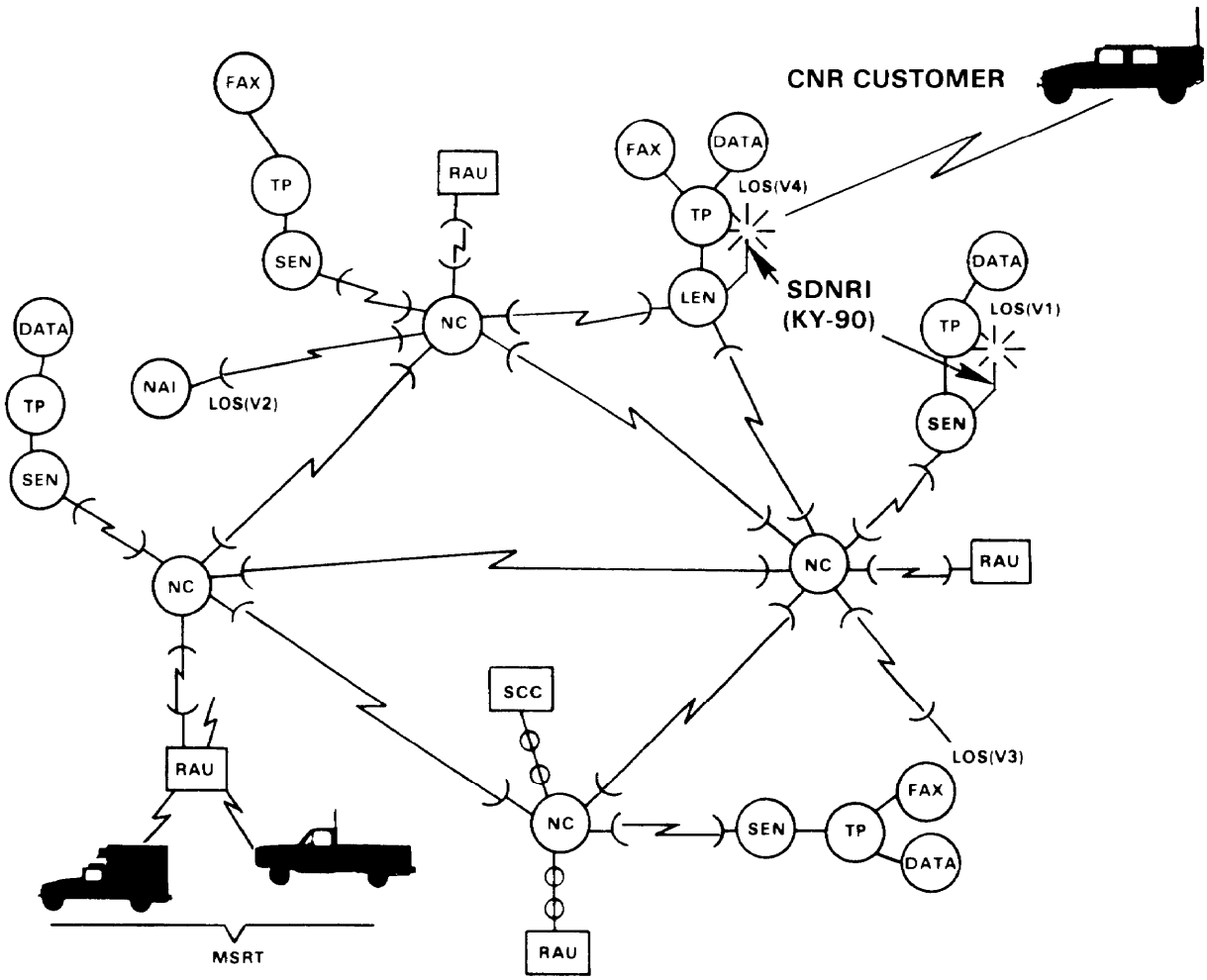


Figure 4-20. CNR interface with MSE.

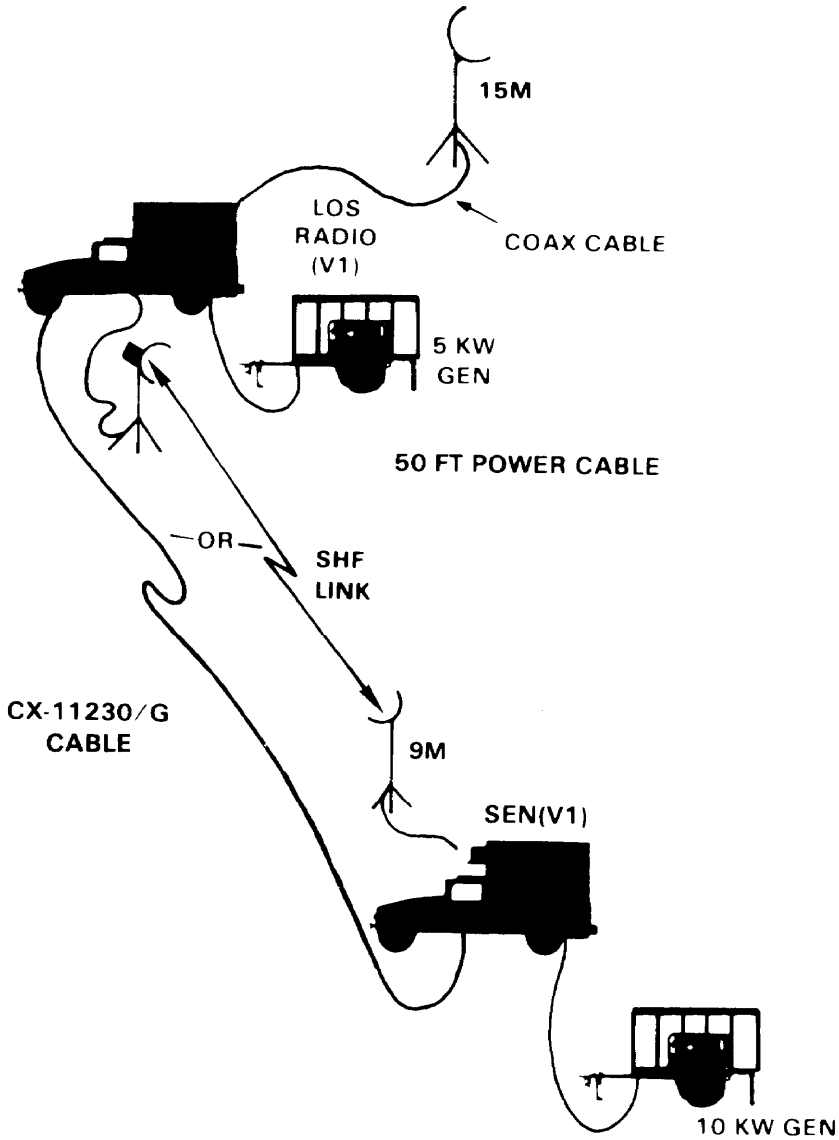


Figure 4-21. SHF radio link.

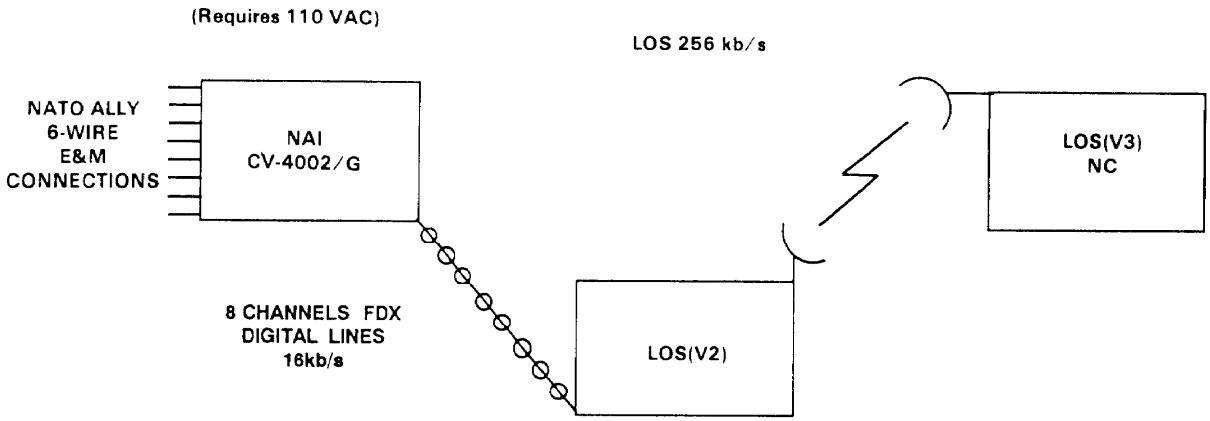


Figure 4-22. NATO/MSE interface using LOS(V2).

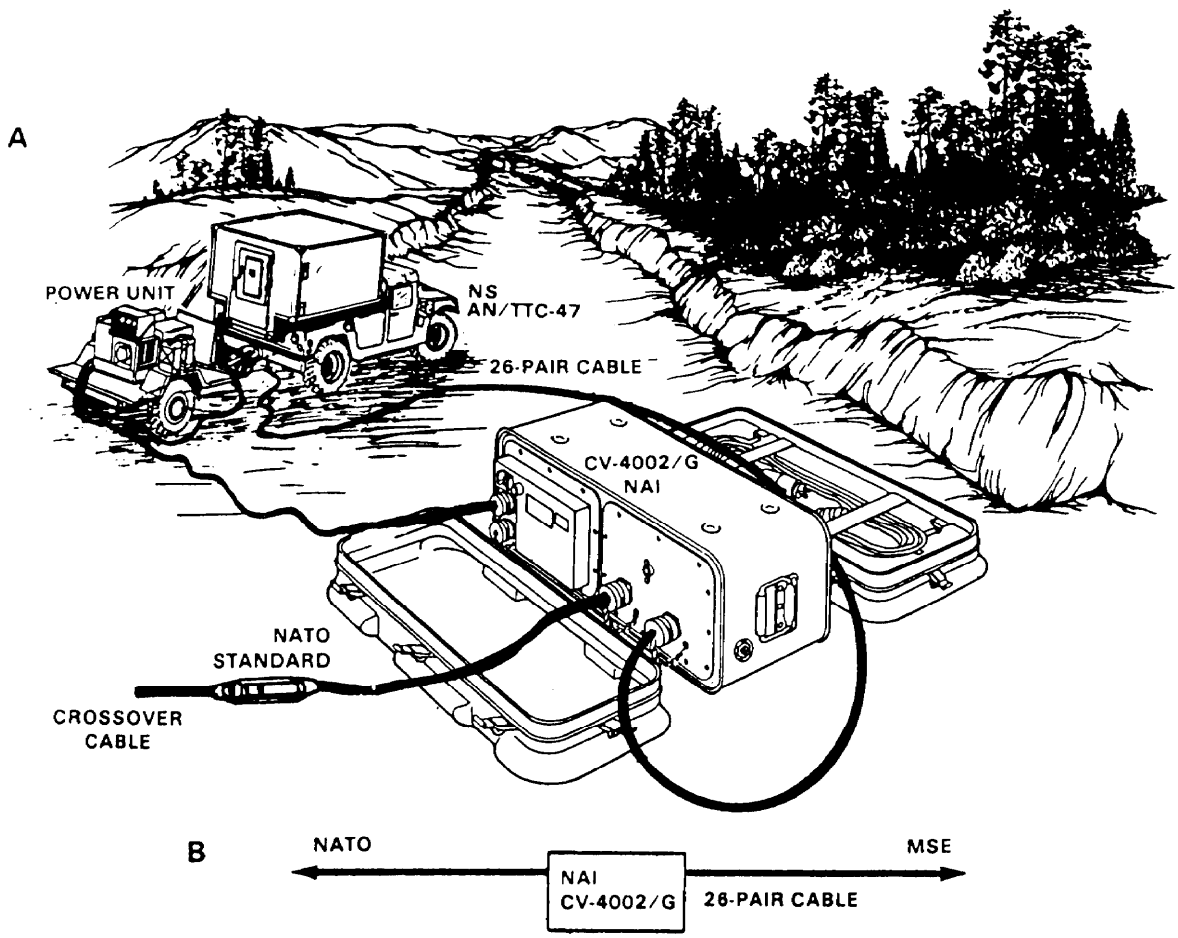


Figure 4-23. NAI deployment at an NS.

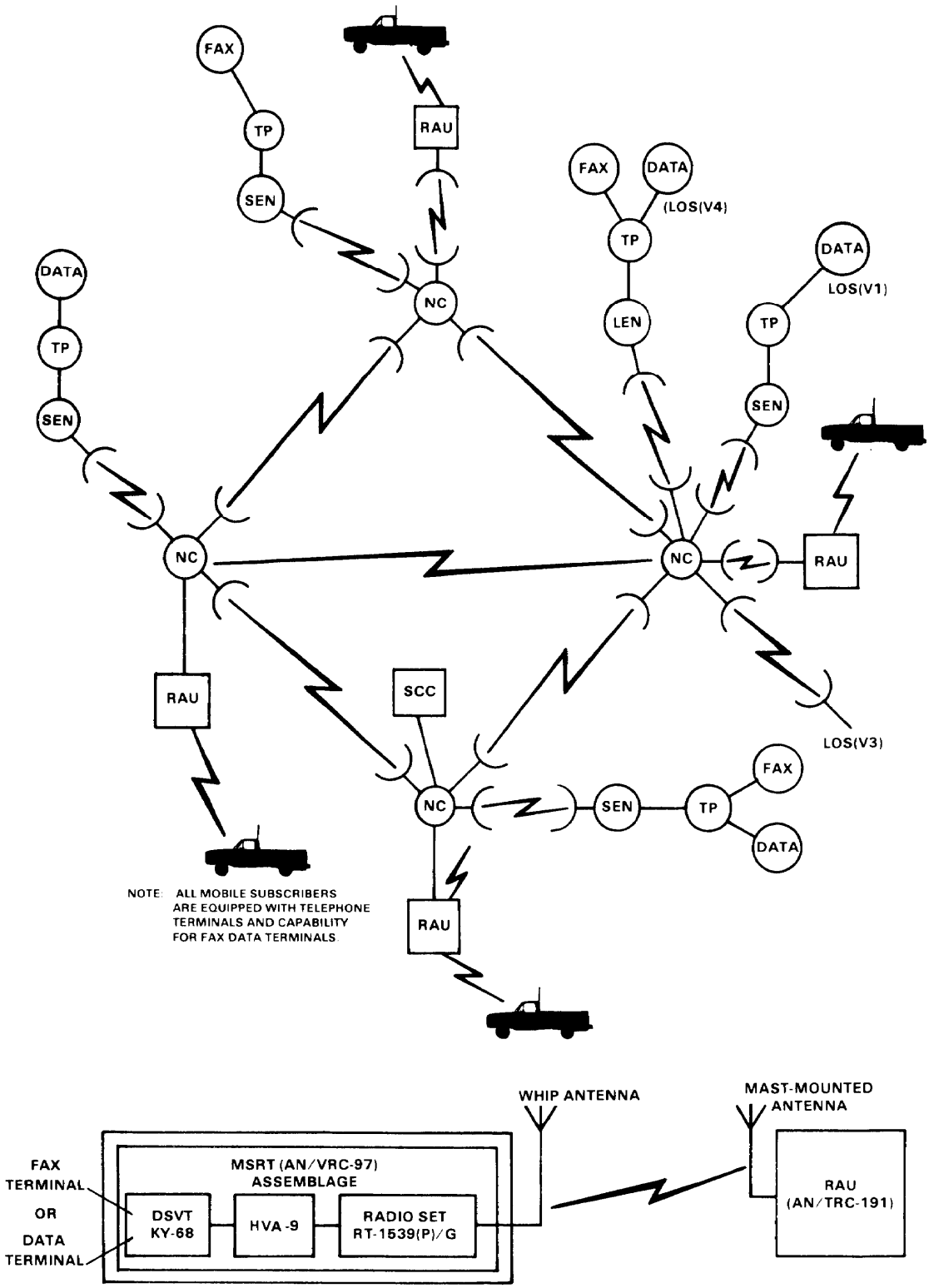


Figure 4-24. Mobile subscriber interface.

4-7. System Control

a. Upon deployment, the corps and division signal battalions relinquish control of their MSE signal assets to the corps signal brigade. To the maximum extent possible unit integrity is maintained. However, operational requirements may dictate an OPCON command relationship between division signal battalion MSE assets and corps/division assets.

b. The corps signal brigade manages and controls the corps MSE network by and through the corps SCC. Within a corps MSE network, a primary SCC and an alternate SCC are netted for replication of the primary/regulatory network data bases, displays, and processing services. This ensures continuity of operations. The primary SCC performs all automated network planning, management, and control for the corps. When in a corps network, the division SCC functions in an active role but remains under the technical control of the corps' primary SCC. The movement and placement of NCs are closely coordinated between the corps signal brigade and the division signal battalions. The actual movement of these assets on an area basis is under the control of the respective division and corps signal battalion commanders. The corps signal brigade is responsible for maintaining network integrity, coverage, and service (in static situations and dynamic reconfiguration) by reallocating nodes, trunks, extension assets, and area responsibilities. In a division stand-alone configuration, the division SCC assumes all these functions and accepts responsibility for the division network elements. FM 11-38 details systems management and control. (Appendix E shows standardized MSE CP configurations.)

c. Initial signal C^2 is exercised through CNR nets. After MSE system activation, restricting signal C^2 engineering traffic to the MSE system as much as possible decreases our vulnerability to Threat radio electronic combat (REC).

4-8. Conclusion

Each of the organizations plays a critical role in the successful employment of MSE. Effective MSE communications requires the coordination and cooperation of key staffs, tacticians, logisticians, and signal personnel.

CHAPTER 5

Corps/Division Signal Staffs and Responsibilities

5-1. Introduction

Since MSE is a corps-managed and -controlled communications system, some of the responsibilities and relationships that existed between corps and division signal staffs are changing. This chapter addresses the responsibilities of and the relationships between key signal personnel and staffs within the corps, division, and subordinate maneuver units.

5-2. SCC Control

a. To consistently respond to battle changes and communications requirements, the SYSCON directs the MSE area communications system and subordinate signal battalions at corps and division. Centralized corps SCC control ensures continuity of effort and economy of force and is consistent with corps support doctrine.

b. Timely technical control of the MSE network will require that orders, reports, and messages flow directly between the SCC/SYSCON and the NMFs. This technical information flow follows through the established chain of command to allow the commanders to manage their assets. The corps SCC must enhance and support the existing corps chain of command to ensure established lines of C^2 are not violated. This effort requires discipline and judgment from the system's planning and management cell personnel. This is particularly true when dealing with division signal battalions within the corps' area of operations.

5-3. SCC Responsibilities

Because of the common automated management functions organic to the corps and division SCCs, responsibilities and duties must be established between the corps SCC and the division SCCs. FM 11-38 covers specific SCC responsibilities, capabilities, and management techniques. Table 5-1 lists the SCC management responsibilities.

Table 5-1. Management responsibilities in a corps network.

CORPS SCC	DIVISION SCC
- CORPS AREA NETWORK MANAGEMENT AND CONTROL	- NCs WITHIN THE DIVISION AREA
- NC MANAGEMENT (INCLUDING DIVISION ASSETS)	- LENs/SENs WITHIN DIVISION AREA (INCLUDING CORPS ASSETS)
- LOS LINK MANAGEMENT	
- REMOTE RAUs (WITHIN CORPS SIGNAL BRIGADE AREA)	- REMOTE RAUs WITHIN DIVISION AREA
- GATEWAYS	- LOS FREQUENCY MANAGEMENT (UHF AND SHF) FOR DIVISION EXTENSION NODES BASED ON CORPS ALLOCATION
-LENs/SENs WITHIN CORPS SIGNAL BRIGADE AREA	
-CORPS AREA FREQUENCY MANAGEMENT AND ALLOCATION (VHF, UHF, AND SHF)	- SHF MANAGEMENT WITHIN DIVISION AREA
- CORPS COMSEC KEY GENERATION, MANAGEMENT, AND DISTRIBUTION	
- SHF MANAGEMENT WITHIN CORPS SIGNAL BRIGADE AREA	
- MANAGEMENT OF ALL UNCOMMITTED CORPS SIGNAL ASSETS	

NOTE: In a stand-alone division, the division SCC assumes all of the above responsibilities.

5-4. Information Flow

a. The corps and division SCCs must have direct access to essential information to exercise effective network control and respond to battle changes. Table 5-2 shows key battle information.

Table 5-2. Key battle information.

BATTLE INTENT OF CORPS AND DIVISION COMMANDER.
CURRENT AND FUTURE LOCATIONS, COMPOSITION, AND ACTIVITY OF FRIENDLY BRIGADE AND KEY BATTALION SIZE MANEUVER, CS, AND CSS UNITS.
THREAT UNIT LOCATIONS, SIZE, AND DIRECTION OF MOVEMENT.
KEY BATTLE REPORTS CONTAINING CRITICAL TACTICAL INFORMATION (KEY SPOT REPORTS, NBC REPORTS).

b. Information flow and established staff relationships are critical to signal mission success. Since the corps SCC is collocated with an NS, it may become isolated from the battle management process in the corps and division main CPs. Each corps and division battle staff representative must ensure the SCC staffs are informed of the tactical situation. The corps and division SCCs constantly exchange information. Therefore, a similar relationship must exist between the ACSO and the ADSO within the battle staffs. These staffs must interact (Figure 5-1) for integrated C^2 to succeed on the battlefield.

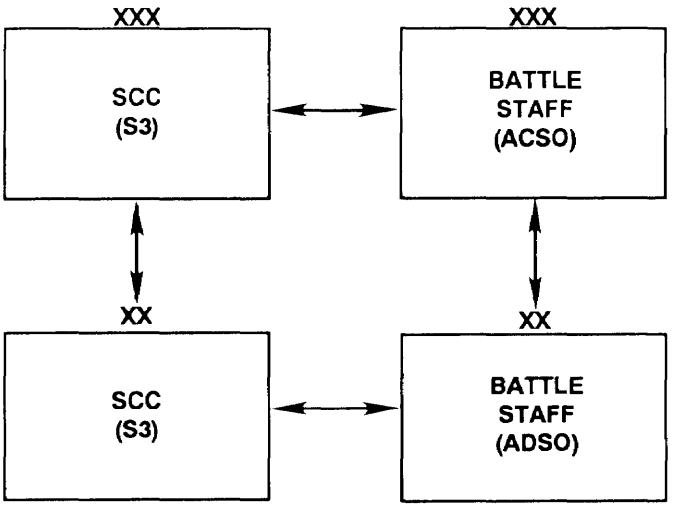


Figure 5-1. Corps and division battle staff interaction.

c. Just as corps and division staffs exchange overlays, plans, and orders using automated and manual methods such as maneuver control systems (MCS) and liaison officers (LNOs) the same relationship must, exist between the SCCs and the signal personnel within each battle staff. This required physical coordination, informal messenger service, or other measures beyond the capability of MCS, a facsimile terminal, or a telephone. This relationship is crucial when considering area responsibilities for key terrain within the corps and division areas. For the SCC to effectively manage the corps area signal network, it must stay informed of the tactical situation, especially terrain-related information.

d. The signal staff officer within each maneuver, CS, or CSS unit is also critical to the information flow. The signal staff officer must feed information about current and future locations of the units main CPs to the ACSO and ADSO cells (Figure 5-2). This ensures LENs SENs, and RAUs are available to provide communications support.

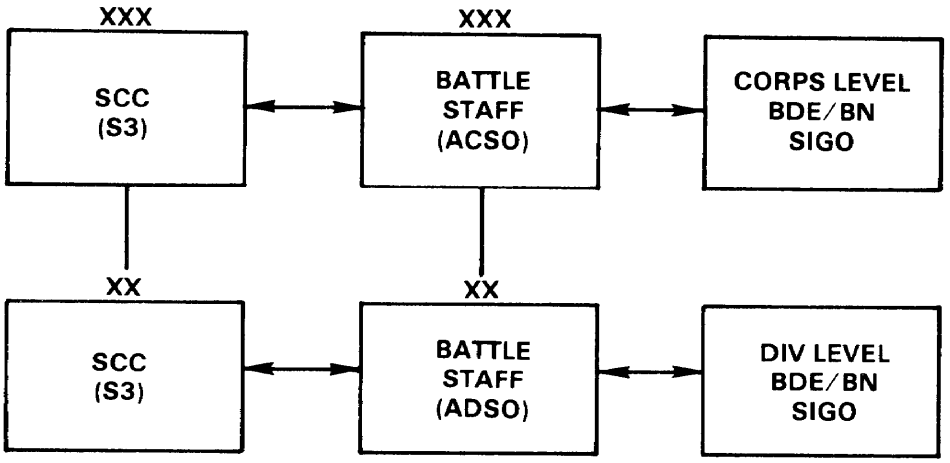


Figure 5-2. Corps and division information flow.

e. Although the SCC is a computer-based processor with great potential, it is only as good as the information fed into the data base. Accurate information is critical to successful planning and decision making within the S3/SYSCON. For more information on the SCC, refer to FM 11-38.

5-5. Corps Signal Brigade

The corps commander's communications needs are met through the organization of the signal brigade into mission-oriented communications packages (that is, NCs, LENs, SENs, RAUs, and respective LOSs). Current table(s) of organization and equipment (TOEs) directly support the mission-oriented package structure. Using these packages/teams requires proper planning and direction by the corps signal brigade C^2. The corps signal brigade commander and his staff are responsible for issuing directions from the SCC to these teams.

a. The corps signal brigade commander fulfills a dual-hat role. He is the corps signal brigade commander and the corps signal staff officer, a member of the special staff of the corps headquarters.

(1) As the commander, he--

- Commands, directs, and supervises the corps signal brigade.
- Directs the IOM of the corps communications systems and facilities required to implement plans developed by the corps signal staff and to support unit communications requirements.
- Advises the corps commander on all communications matters.
- Supervises corps signal communications use.
- Coordinates corps subordinate units and allied services/ forces integration with the total corps communications system.

(2) As the corps signal officer, he--

- Ensures adequate and continuous area coverage throughout the corps area.
- Provides additional nodal assets when expansion is required.
- Coordinates with the G1, G2, G3, and G4 in the same manner as the division signal officer. (See paragraph 5-7.)

b. The corps signal brigade staff provides guidance for corps communications network implementation. Staff sections are organized to plan and implement communications network design, OPCON, and administrative and logistics direction. The staff uses the corps communications plan taskings to develop the communications network. Active monitoring of the network's operational status ensures that it meets the corps' changing requirements. These responsibilities belong to the operations/intelligence section, in the brigade headquarters, which consists of four staff elements and personnel:

- Corps signal engineering branch.
- Network control branch.
- Plans/intelligence section.
- Brigade COMSEC office of records.

c. The corps signal engineering branch is part of the S3/SYSCON for the brigade and operates from an AN/MSC-25 shelter.

(1) The signal engineering branch--

- Conducts detailed systems engineering studies.
- Develops plans for establishing communications systems.
- Determines equipment suitability, adaptability, and compatibility with existing military communications systems.
- Determines installation and employment required to provide quality transmission over installed systems.
- Responds to frequency requests and maintains associated records for the brigade units.
- Integrates allied, joint, and commercial communications into the corps communications network.
- Analyzes traffic status reports.
- Maintains direct coordination with the SCC/SYSCON in the network control branch.
- Informs the SCC/SYSCON of current and future facilities' needs throughout the corps communications network.

(2) Key personnel and their responsibilities are shown below.

(a) The systems engineer, MAJ (25E), analyzes all traffic status reports and studies to optimize system capabilities.

(b) The traffic officer, MAJ (25E)--

- Determines the information network architecture supporting battlefield operations.
- Exercises network control.
- Conducts network analysis.

(c) The signal officer, CPT (25B); the telecommunications officers, CPT (25B) and (25D); the traffic officer, CPT (25E); and the data processing technician, CW4 (251A)--

- Assist the branch chief in engineering communications in their respective fields.
- Determine equipment suitability, adaptability, and compatibility with existing military and local communications systems.

- Verify the capabilities and limitations of equipment.
- Verify the quality of transmission facilities.

(d) The radio officer, CPT (25C)--

- Evaluates radio propagation data to determine RF allocation.
- Allocates frequencies to units in the brigade.
- Coordinates RF requirements.
- Maintains records, prepares reports, and initiates correspondence to corps headquarters on all frequency matters.
- Is responsible for engineering radio communications systems.

(e) The operations sergeant, MSG (31W)--

- Assists the branch chief and other officers.
- Coordinates and supervises the efforts of the enlisted technical specialists.

(f) The frequency management NCO, SFC (31W)--

- Assists the RF officer with frequency responsibilities.
- Assists the communications engineer officers in preparing detailed engineering plans.

(g) The programmer/systems analyst, SFC, SSG (74F)--

- Supervises, prepares, analyzes, edits, and tests computer programs.
- Conducts data system studies involving investigation, evaluation, and development of data processing systems.
- Prepares specifications and proposals documentation.
- Implements new or modified systems.

(h) The programmer analyst, SPC (74F), assists the programmer/ systems analyst(s).

(i) The TACSAT radio section chief, SFC (31Y)--

- Supervises, directs, coordinates, and manages the IOM of TACSAT systems.
- Plans and provides technical guidance for TACSAT use, maintenance, and logistics support.
- Prepares and interprets orders, system diagrams, related technical matrixes, and reports.

(j) The clerk typist, SPC, and clerk, PFC (71L), perform all typing and clerical work in the section.

(k) The graphics document specialist, PFC (25Q), draws charts, graphs, and other aids.

d. The network control branch provides the SCCs for the MSE system. It provides the following capabilities:

- MSE radio automated frequency management.
- Terrain analysis and path profiling.
- Automated system engineering functions.
- Equipment status reporting.
- COMSEC key management.
- Link and network load status.
- Personnel management data base.
- System traffic flow and grade of service.

Key personnel and their responsibilities are shown below.

(1) The operations officer, MAJ (25E)--

- Supervises the network control branch and the functions referred to above.
- Accepts responsibility as the regulator (authority and implementer) of essential networkwide operating parameters (that is, frequencies, COMSEC keys, nodal connectivity, electronic counter-countermeasures (ECCM), interfaces, and network software).

- Is accountable for planning, engineering, controlling, and maintaining network operating parameters.

- Assigns or reassigns variable network operating parameters.

- Distributes all operating parameters network (for example, signal operation instructions (S0I), signal standing instructions (SSI), operation orders (OPORDs), and SCC orders).

- Establishes relationships among network components (for example, leader-follower, master-slave, or controlling terminal).

(2) The network officers, CPT (25E) and LT (25C) (4 each) respectively, and the telecommunications officer, CPT (25B), assist the operations officer in executing his duties.

(3) The operations sergeant, SGM (31W)--

- Provides technical assistance, supervises, and assists in communications system control.

- Supervises the work activities of other enlisted personnel assigned to the branch.

(4) The MSE SCC supervisors, MSG (31W) (4 each) and MSE network controllers, SFC (31W) (4 each), are responsible for the 24-hour operation of the SCC.

(5) The MSE SCC operators, SSG (31F) (4 each), provide 24-hour system operation.

(6) Clerk typists, SPC (71L) (3 each), perform all typing and clerical work in the section.

e. The plans/intelligence section provides the planning, coordination, and supervision of plans and intelligence requirements for the brigade. Key personnel and their responsibilities are shown below.

(1) The plans officers, MAJ (25C) and CPT (25B)--

- Are responsible for operating the section.

- Report directly to the S3.

(2) The chemical officer, MAJ (74B)--

- Develops the training plans for the brigade's defensive chemical operations.

- Assesses chemical operations and training situations.

(3) The operations NCO, MSG (31W)--

- Coordinates the efforts of the enlisted technical specialist.
- Supervises the illustrator and clerical personnel.

(4) The plans NCO, SFC (31W)--

- Assists the branch officers in preparing plans and orders.
- Assists in all brigade training requirements.

(5) The chemical operations NCO, MSG (54B)--

- Assists the chemical officers in appraising chemical operations and training situations.
- Collects, prepares, and distributes material for chemical operations and training.

(6) The senior intelligence analyst, SSG (96B)--

- Assists in all brigade intelligence requirements.
- Provides technical assistance in preparing intelligence annexes.

(7) The clerk typists, SPC (71L) (2 each), prepare, distribute, and file the paperwork required to prepare extensive plans and training requirements.

(8) The graphics document specialist, SPC (25Q), prepares graphs, charts, and other visual aids for training or intelligence activities.

f. The brigade COMSEC office of record is responsible for the brigade COMSEC account. It also provides COMSEC logistics support for the control and distribution of internal brigade and subordinate battalion COMSEC material. Key personnel and their responsibilities are shown below.

(1) The COMSEC security technician, CW4 (250A)--

- Is responsible for operating the office.
- Serves as the signal brigade commander's COMSEC technical advisor.

- Receives distribution of COMSEC material from the material management section.

- Provides drop-off/pick-up point(s) for subordinate accounts.

(2) The COMSEC material management supervisor, SFC (72E), and the COMSEC material manager, SSG (72E), assist the brigade COMSEC office of record technician with his responsibilities.

g. The corps signal office's primary mission is to perform the signal management functions. These functions ensure adequate communications are provided to the corps commander for commanding and controlling his forces. The corps signal office--

- Advises the corps commander, his staff, and subordinate commanders on command signal matters.

- Prepares signal estimates, plans, and orders for guiding and directing subordinate commanders and signal units.

- Exercises technical supervision of signal activities within the command.

- Manages all operational and contingency COMSEC matters.

- Aids development of COMSEC operational plans and policy.

Key personnel and responsibilities are shown below.

(1) The assistant corps signal officer, COL (25E)--

- Oversees the operation of the corps signal office.

- Represents the corps signal officer in corps headquarters actions.

- Assists the corps signal officer in planning corps communications operations.

- Assists in preparing the signal annex of the corps OPORD.

- Assists in planning the corps' standing operating procedure (SOP).

- Provides signal assistance to the corps headquarters staff elements.

- Assists in planning automated systems and the corps telephone directory.

- Controls RF allocation and provides RF management for the corps.
- Coordinates host nation and allied signal interface.
- Manages/controls actions and responsibilities of the ISSO. ISSO responsibilities are related to the functions of--
  - Correspondence.
  - Classified document control policies and procedures.
  - Printing.
  - Forms/files management.
  - Publications management.
  - Official mail.
  - Reproduction.
  - Privacy Act/Freedom of Information Act.
  - Distribution.

Only three battlefield information services require central execution or a central POC. These are distribution, printing, and the Privacy Act/ Freedom of Information Act. The other battlefield information services occur at the user level and are the responsibility of the user to execute.

(2) The automation management officers, LTC (53C) and MAJ (53C) (2 each)--

- Plan, organize, and coordinate tactical automation support to the corps commander's C^2 systems.
- Integrate cryptographic, automation, and data transmission means to support automated C^2 systems.
- Provide technical direction for installing, operating, and maintaining data base and teleprocessing systems. This includes hardware and software interoperability for automated telecommunications and teleprocessing systems.

(3) The operations officer, LTC (25C)--

- Plans and supervises communications support for corps headquarters.
- Prepares signal plans to incorporate into corps plans and orders .
- Coordinates with other headquarters staff sections regarding their communications needs.
- Makes recommendations for signal troops procurement, use, and allocation to support the command.
- Determines signal training requirements for nonsignal units.

(4) The networking officer, MAJ (25E), plans, designs, and manages the integration and interconnectivity of tactical and nontactical information networks and communications systems.

(5) The radio officers, MAJ (25C) and CPT (25C)--

- Exercise staff supervision over radio communications activities.
- Prepare signal plans and orders and radio communications SOI items.
- Coordinate frequency allocation assignment and use.
- Report and process interface problems.

(6) The systems integration officers, MAJ (25B) and CPT (25B)--

- Manage force integration of information systems resources.
- Plan and coordinate with higher headquarters for information systems upgrade, replacement, elimination, and/or integration within units.
- Plan BAS and information systems integration.
- Provide staff supervision of analysis and software support and troubleshooting of automated systems.
- Manage and supervise automatic data processing (ADP) related areas.
- Design and develop command information systems.

- Monitor unique "application program" development.
- Supervise maintenance of tactical data bases.
- Plan newly assigned or attached unit data base integration.
- Provide automated resources security training.

(7) The CE officer, MAJ (25C), publishes the corps SOI items pertaining to message service, authentication tables, and CT routing indicators.

(8) The data processing technician, CW4 (251AO)--

- Manages personnel, facilities, and equipment assets in ADP sections.
- Conducts data systems analysis.
- Designs or redesigns data systems.
- Develops computer programs.
- Supervises and coordinates activities of personnel.
- Consults with staff officers and commanders to define priorities of tentative and continuing projects.

(9) The chief signal NCO, SGM (31W)--

- Assists the signal officer.
- Manages the signal office.
- Supervises and inspects the work of enlisted personnel in the section.
- Assists the signal staff in the technical appraisal of signal operations and training.

(10) The data processing NCO, SGM (74Z), assists the automation management officer in data transmission means to support C^2 systems.

(11) The operations sergeant, SFC (31W)--

- Assists the operations officer in collecting, preparing, and distributing material and data pertaining to signal operations and training.

- Assists in preparing signal orders and plans.

(12) The frequency management NCO, SFC (31W), assists the RF engineering officer with frequency allocation and control.

(13) The programmer/systems analyst, SSG (74F)--

- Supervises, prepares, analyzes, edits, and tests computer programs.

- Conducts data system studies involving investigation, evaluation, and development of data processing systems.

- Prepares specifications and proposals documentation.

- Implements new or modified systems.

(14) The programmer analyst, SPC (74F), assists the programmer/ systems analyst.

(15) The clerk typist, SPC (71L), performs all typing and clerical work.

(16) The graphics document specialist, SPC (25Q), draws charts, graphs, and other aids.

h. The corps COMSEC office of record maintains supervisory control over corps COMSEC assets through reporting channels for corps COMSEC accounts and reports to the theater COMSEC office of records as required. It also--

- Establishes priorities for issuing COMSEC materiel.

- Receives, processes, and controls all accounting transactions which affect COMSEC accounting records within the corps.

- Serves during crisis/contingency operations, as a holding area for bulk-sealed Armed Forces Courier System shipments destined for COMSEC accounts operated by corps subordinate units.

- Provides consolidated semiannual inventory reports.

- Provides central accounting for all classified COMSEC material in the corps and reports to the theater central office of record.

Key personnel and their responsibilities are shown below.

(1) The COMSEC security technician, CW4 (250A)--

- Serves as a cryptographic staff officer and supervises the corps COMSEC office of records.
- Provides centralized accountability reporting for corps COMSEC items.
- Receives distribution of COMSEC materiel from the Armed Forces Courier System.
- Provides drop-off/pick-up point(s) for subordinate accounts.
- Assists the signal officer by advising him on cryptographic matters.
- Conducts corps cryptographic facility inspections.

(2) The telecommunications supervisor, SFC (72E), and the telecommunications shift supervisor, SSG (72E), assist the COMSEC security technician in the responsibility for the corps account and oversight of the subordinate accounts within the corps.

(3) The telecommunications senior operators, SGT (72E) (3 each), and tactical telecommunications center operators, SPC and PFC (72E) (3 of each rank), apply correct procedures for cryptographic material storage, receipt, and use.

5-6. The Corps Area and Support Signal Battalions

a. The corps area and support signal battalions provide signal facilities that support plans developed by the corps signal staff and the corps signal brigade staff to support unit communications requirements. The corps area signal battalion's operations/intelligence staff section coordinates the installation of the 6 NCs, 1 LENS, 40 SENSs, and 13 RAUs. The corps support signal battalion's operations/ intelligence staff section coordinates the installation of 4 NCs, 1 LENS, 24 SENSs, and 8 RAUs. The SCC generates the orders to deploy these assets, but the S3 section oversees carrying out those orders. It also coordinates support for any assets from another signal battalion OPCON to their area of operation.

b. The key personnel of the two battalions are identical and are

(1) The battalion commander, LTC (25C)--

- Commands, directs, and supervises the area signal battalion.
- Directs the IOM of battalion communications systems and facilities for implementing plans developed by the corps signal staff to support unit communications requirements.
- Advises the brigade commander on all communications matters.

(2) The signal officer, CPT (25C)--

- Is responsible for the operation of the operations/ intelligence section.
- Plans and coordinates staff supervision of the master plans, requirements, and the battalion training program.
- Plans and supervises communications support for the signal brigade plan.
- Prepares signal plans for incorporation into signal brigade plans and orders.
- Coordinates with other headquarters staff sections regarding their communications needs.

(3) The radio officer, LT (25C)--

- Exercises staff supervision over radio communications activities.
- Prepares signal plans and orders and radio communications SOI items.
- Coordinates frequency allocation assignment and use.
- Reports and processes interface problems.

(4) The systems integration officer, LT (25C)--

- Manages force integration of information systems resources.
- Plans and coordinates with higher headquarters for information systems upgrade, replacement, elimination, and/or integration within units.
- Plans BAS and information systems integration.

- Provides staff supervision of analysis and software support and automated systems troubleshooting.
- Manages and supervises ADP related areas.
- Designs and develops command information systems.
- Monitors unique "application program" development.
- Supervises maintenance of tactical data bases.
- Plans newly assigned or attached unit data base integration.
- Provides automated resources security training.

(5) The operations NCO, MSG (31W)--

- Is the senior NCO.
- Provides technical assistance, supervises, and assists in communications system control.
- Supervises the work activities of other enlisted personnel assigned to the section.

(6) MSE network NCO, SFC (31W)--

- Provides technical assistance, supervises, and assists in communications system control.
- Provides technical assistance to section concerning NC switches.
- Supervises the work activities of other enlisted personnel assigned to the section.

(7) The nuclear, biological, chemical (NBC) NCO, SFC (54B)--

- Assists the S3 in appraising chemical operations and training situations.
- Collects, prepares, and distributes material for chemical operations and training.

(8) The intelligence NCO, SGT (96B)--

- Assists in all battalion intelligence requirements.

- Provides technical assistance in preparing intelligence annexes.

(9) The clerk typists, SPC (71L) (2 each), perform all typing and clerical work.

(10) The graphics document specialist, SPC (25Q), draws charts, graphs, and other aids.

5-7. The Division Signal Battalion

The division signal battalion's key personnel and staff sections are similar to those at corps. The two staff sections that ensure quality communications throughout the division are the division signal office and the operations/intelligence section.

a. The division signal officer, LTC (25C), is the principal advisor to the division commander for all division communications. He is a member of the division staff and commander of the division signal battalion. These two functions are separate but related. As a member of the division staff, the division signal officer presents the communications aspects for tactical operations for all staff planning. The duties and responsibilities of the division signal officer involve coordination with general and special staffs. He has access to the division chief of staff and consults directly on communications matters which affect the command. Normally, the division signal officer coordinates all communications matters with the general staff. As the division signal battalion commander, he commands, directs, and supervises the division signal battalion's efforts and activities to complete the mission. The division signal officer does not operate alone; he must coordinate with other elements of the division staff.

(1) The division signal officer works with the G1 on--

- Signal personnel assignment throughout the division.

- Personnel matters involving strength, replacement, and morale.

- Movement, organization, operation, internal arrangements, and space allocation for the headquarters or CPs.

- Headquarters internal operation and other administrative functions.

- Administrative support requirements.

(2) The division signal officer works with the G2 on--

- Communications counterintelligence.
- Threat signal document interpretation.
- Threat signal equipment evaluation.
- Special signal support for intelligence operations.
- Division ECM threat and ECCM procedures.
- Meaconing, intrusion, jamming, and interference (MIJI) reports evaluation.

(3) The division signal officer works with the G3 on--

- Tactical communications activities.
- Manipulative communications deception and tactical ECCM.
- Division signal unit organization, equipment, and capabilities.
- Advice on other signal units' communications capabilities and requirements .
- Personnel communications training.
- Combat operations communications.
- CP headquarters selection.
- Signal installation physical security.
- Preparation of signal annexes to the division SOP and division operations plans, including paragraph 5 of the division OPORD.

(4) The division signal officer coordinates with the G4 on--

- Specific issues related to CSS sustainment of MSE assets.
- Communications during deployment.
- Communications along main supply routes (MSRs) and lines of communication (LOC).
- Locations of CSS units.

- Communication links needed for major CSS elements.

(5) The division signal officer's staff supervision responsibilities are in COMSEC regulations, RF allocation and assignment, and division unit COMSEC logistics support. The signal battalion performs only classified COMSEC logistics support to the division. (The DISCOM provides unclassified COMSEC logistics support to the maneuver units and division headquarters.)

(6) In addition to staff and coordinating functions in the division, the division signal officer conducts active liaison with the signal officers of higher headquarters, adjacent headquarters, and military intelligence (MI) battalion (combat electronic warfare intelligence (CEWI)).

(a) The division signal officer consults higher headquarters on--

- Technical directives.
- SOP and SOI matters.
- Tactical plans for future operations.
- Signal personnel requirements.
- Commercial communications facilities use.
- Manipulative electronic deception and ECCM.
- RF allocation and assignment.

(b) He consults adjacent headquarters on--

- Signal support for the operation.
- Establishing lateral communications.
- Consulting with the G4 and DISCOM commander on COMSEC logistics support.
- Impending operation tactical plans.
- Current operation anticipated changes.
- RF allocation and assignment.

(c) He consults the MI battalion on--

- Manipulative electronic deception.

- ECCM.
- Electronic warfare (EW) plans, operations, and annexes.
- COMSEC.
- Frequency use.

(7) The division signal officer's communications training responsibility extends to all assigned division communications units. This responsibility includes skill qualification training and testing and division-level communications training.

b. The ADSO, MAJ (25E), works for the division signal officer and represents the signal battalion commander in most division staff actions. The ADSO and office are on the signal battalion TOE, yet they work on the division staff. The ADSO--

- Supervises the division signal office.
- Represents the signal battalion commander in division headquarters actions.
- Assists the division signal officer in planning division communications operations.
- Assists in preparing the OPORD signal annex.
- Assists in planning the signal portion of the division SOP.
- Provides signal assistance to the division headquarters staff element.
- Assists in planning automated systems and the division telephone directory.
- Controls RF allocation and provides division RF management.
- Coordinates host nation and allied signal interface.
- Manages/controls actions and responsibilities of the ISSO. ISS0 responsibilities are related to the functions of--
  - Correspondence.
  - Classified document control policies and procedures.
  - Printing.

- Forms/files management.
- Publications management.
- Official mail.
- Reproduction.
- Privacy Act/Freedom of Information Act.
- Distribution.

Only three BIS require central execution or a central POC. These are distribution, printing, and the Privacy Act/Freedom of Information Act. The other battlefield information services occur at the user level and are the responsibility of the user to execute.

c. The division signal battalion staff provides guidance for implementing plans to establish the division's communications network. It also implements and manages division COMSEC keys and IOM of division communications assets. The division signal battalion's staff sections are organized to plan and implement communications design, OPCON (in stand-alone mode), and administrative and logistics direction. The staff uses the communications taskings from the corps communications plan to develop the communications network. When operating in the stand-alone mode, it develops its own communications plan. Active monitoring of the network's operational status ensures that it meets the corps' changing requirement and its own. This responsibility belongs to the operations/ intelligence section. Key personnel and their responsibilities are shown below.

(1) The assistant S3, CPT (25B)--

- Is responsible for the operation of the section.
- Plans and coordinates staff supervision of the master plans, requirements, and the battalion training programs.

(2) The systems integration officer, LT (25C)--

- Manages force integration of information systems resources.
- Plans and coordinates with higher headquarters for information systems upgrade, replacement, elimination, and/or integration within units.
- Plans BAS and information systems integration.

- Provides staff supervision of analysis and software support and troubleshooting of automated systems.
- Manages and supervises ADP related areas.
- Designs and develops command information systems.
- Monitors unique "application program" development.
- Supervises maintenance of tactical data bases.
- Plans newly assigned or attached unit data bases integration.
- Provides automated resources security training.

(3) The tactical automated network technician, CW2 (250B)--

- Assists the systems integration officer.
- Plans, designs, and manages the switching networks (to include COMSEC key management), and the integration and interconnectivity of tactical and nontactical information networks and communications systems.

(4) The operations sergeant, MSG (31W)--

- Provides technical assistance, supervises, and assists in communications system control.
- Supervises the work activities of other enlisted personnel assigned to the section.

(5) The MSE network controller, SFC (31W), and the MSE supervisor, SFC (31W), are responsible for the 24-hour SCC operation.

(6) The MSE SCC operators, SSG (31F) (2 each), provide 24-hour systems operation.

(7) The NBC NCO, SFC (54B), collects, appraises, prepares, and distributes chemical operations and training material.

(8) The intelligence NCO, SGT (96B)--

- Assists in all battalion intelligence requirements.
- Provides technical assistance in intelligence annexes preparation.

(9) The radio team chief, SGT and the two single-channel radio operators, SPC and PFC (31C) respectively, install, operate, and maintain the operations radio net and associated equipment.

(10) The clerk typists, SPC (71L) (2 each), prepare, distribute, and file the paperwork required to prepare extensive plans and training requirements.

(11) The MSE transmission systems operator, PFC (31D), is responsible for operating and maintaining the assistant S3's vehicle.

d. The division signal office includes personnel and equipment in support of the ADSO. This office is part of the division special staff. It--

- Provides detailed planning and coordination for preparing and maintaining the signal portion of division SOP plans and directives.
- Assists and coordinates with other division headquarters staff elements.
- Prepares and distributes the division SSI and SOI.
- Assists in planning automated systems and the division telephone directory.
- Controls the RF allocation.
- Provides division RF management.
- Functions as part of the CSPE.
- Provides automation management.

Key personnel and their responsibilities are shown below.

(1) The automation management officer, MAJ (25E)--

- Plans, organizes, and coordinates all tactical automation to support the division commander's C^2 systems.
- Integrates cryptographic, automation, and data transmission means to support the C^2 system.

(2) The signal officer, CPT (25C); the data processing technician, CW2 (251A0); the data processing NCO, MSG (74Z); and the programmer/analysts, SFC, SSG, and SPC (74F) (1 each), assist the ADSO with his automation management responsibilities.

(3) The radio officer, CPT (25C), assists in radio communications and RF matters.

(4) The automation management officer, CPT (25B)--

- Manages information systems resource force integration.
- Plans and coordinates with higher headquarters for information systems upgrade, replacement, elimination, and/or integration within units.
- Plans BAS and other information systems integration.
- Provides staff supervision of analysis and programming support and troubleshooting of automated systems.
- Manages and supervises ADP related areas.
- Designs and develops command information systems.
- Supervises tactical data base maintenance.
- Plans newly assigned or attached units' data base integration.
- Provides automated resources security training.

(5) The telecommunications officer, CPT (253), provides expertise in data systems, operating systems software, teleprocessing systems, and associated networks.

(6) The data processing technician, CW2 (251A)--

- Manages personnel, facilities, and equipment assets in ADP sections.
- Conducts data systems analysis.
- Designs or redesigns data systems.
- Develops computer programs.
- Supervises/coordinates personnel activities.
- Consults with staff officers and commanders to define priorities of tentative and continuing projects.
- Allocates machine operating time to complete the mission.

(7) The tactical automated network technician, CW2 (250B)--

- Assists the telecommunications officer.
- Is responsible for planning division communications and cryptonetting.

(8) The operations sergeant, MSG (31W)--

- Assists the ADSO in collecting, preparing, and distributing signal operations and training material and data.
- Assists in preparing signal orders and plans.
- Develops, changes, and updates the division SOI.
- Supervises the work activities of other enlisted personnel assigned to the office.
- Establishes ADSO field operation.
- Assumes signal office operational responsibility in the absence of the officers.

(9) The data processing NCO, MSG (74Z)--

- Assists the data processing technician.
- Supervises the programmer/analysts assigned to the office.

(10) The frequency management NCO, SFC (31W), provides the expertise for RF management and allocation in the division.

(11) The programmer/analysts, SFC and SSG (74F)--

- Supervise, prepare, analyze, edit, and test computer
- Conduct data system studies involving investigation, evaluation, and development of data processing systems.
- Prepare specifications and proposals documentation.
- Implement new or modified systems.

(12) The programmer, SPC (74F), assists the programmer/systems analysts.

(13) The telecommunications senior operator, SGT (72E), and tactical telecommunications center operators, SPC and PFC (72E), prepare and maintain the division SOI and telephone directory.

(14) The clerk typists, SPC (71L) (3 each), provide office clerical support.

e. The division COMSEC office of record is responsible for the division COMSEC account. It also provides COMSEC logistics support for the control and distribution of internal division COMSEC material. Key personnel and their responsibilities are shown below.

(1) The COMSEC security technician, CW2 (250A)--

- Is responsible for operating the office.
- Serves as the COMSEC technical advisor to the division signal commander.
- Manages operational COMSEC matters for security, inspections, and COMSEC operations, plans, and policies.
- Implements COMSEC policy within the division.
- Performs command COMSEC facility inspections.
- Is responsible for COMSEC security investigations and reports.
- Establishes priorities for issuing COMSEC material.

(2) The COMSEC material management supervisor, COMSEC material manager, and COMSEC material management sergeant (SFC, SSG, and SGT respectively) account for and control cryptographic material and equipment.

f. In a stand-alone division, the key personnel and staffs are responsible for their aforementioned functions, and they must assume additional responsibilities normally conducted at corps level. The division signal officer assumes responsibility for advising the division commander, his staff, and division units on communications matters. These matters include using signal troops, communications facilities availability and augmentation, COMSEC, and how the division CP location affects communications. This information may be first passed through the chief of staff or general staff officers according to division SOP. Under the stand-alone division concept of operations, the division signal officer takes on more responsibility as every combat operation

requires detailed signal planning and coordination. To ensure proper planning, coordinating, and supervising of signal matters, the division signal officer uses the following written instructions and orders:

- Signal estimate.
- Signal plans.
- Signal portion, paragraph 4, division OPORD.
- Paragraph 5, division OPORD.
- Signal annex to division OPORD.
- Signal portion of the division administrative order.
- Signal battalion OPORD.
- ECCM portion of EW annex to the division.
- SOI.
- SOP.

The first eight must be prepared for particular operations. The SOI and SOP must always be current.

5-8. Conclusion

a. The accurate and timely reception of data/information needed to keep the corps communications network viable depends on the cooperation between the staff members at corps and division. Each staff member has specific functions aimed at providing a portion of the corps network. The information they provide is given to the SCC where computer assisted tools collate, store, and retrieve this information as needed.

b. The MSE network provides the communications facilities when and where needed to support the maneuver, CS, and CSS units, but the information pertaining to their communications requirements must be gathered and forwarded for action. Without the essential information flow from higher echelon to lower echelon to higher echelon, the MSE communications network would be ineffective and unable to fulfill its mission.

APPENDIX A

Typical MSE Site Deployment

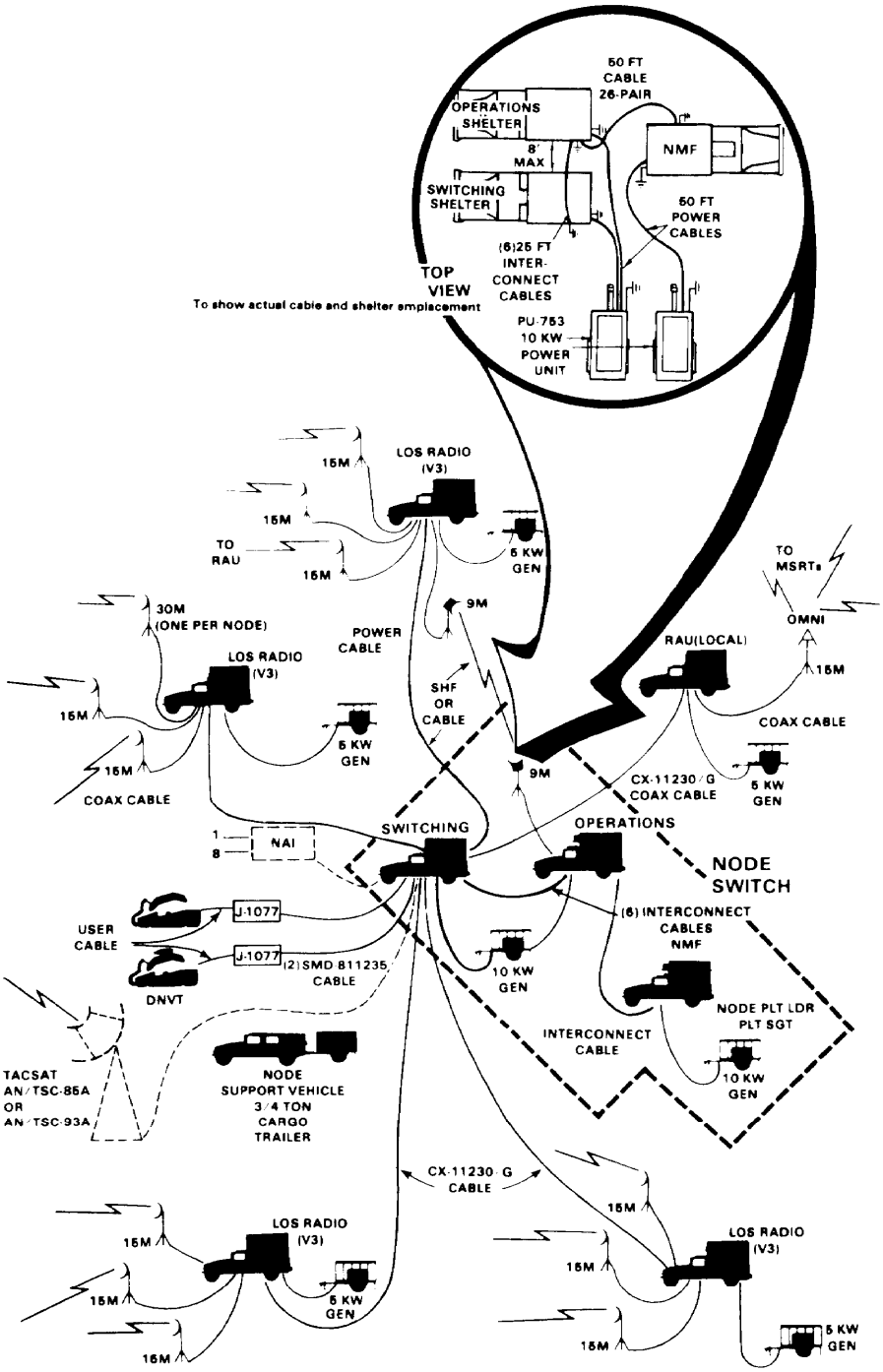


Figure A-1. NC site.

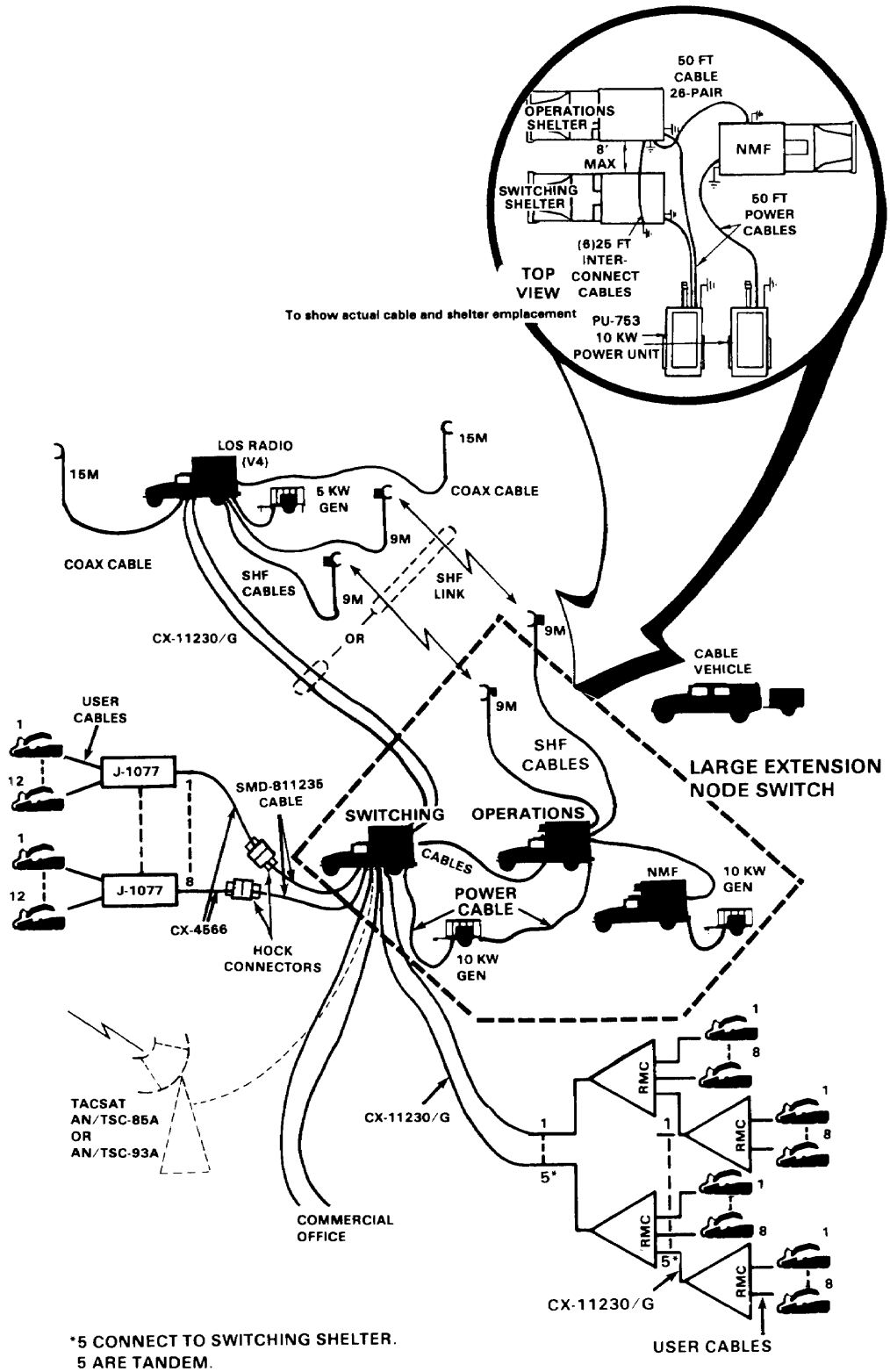


Figure A-2. LEN site.

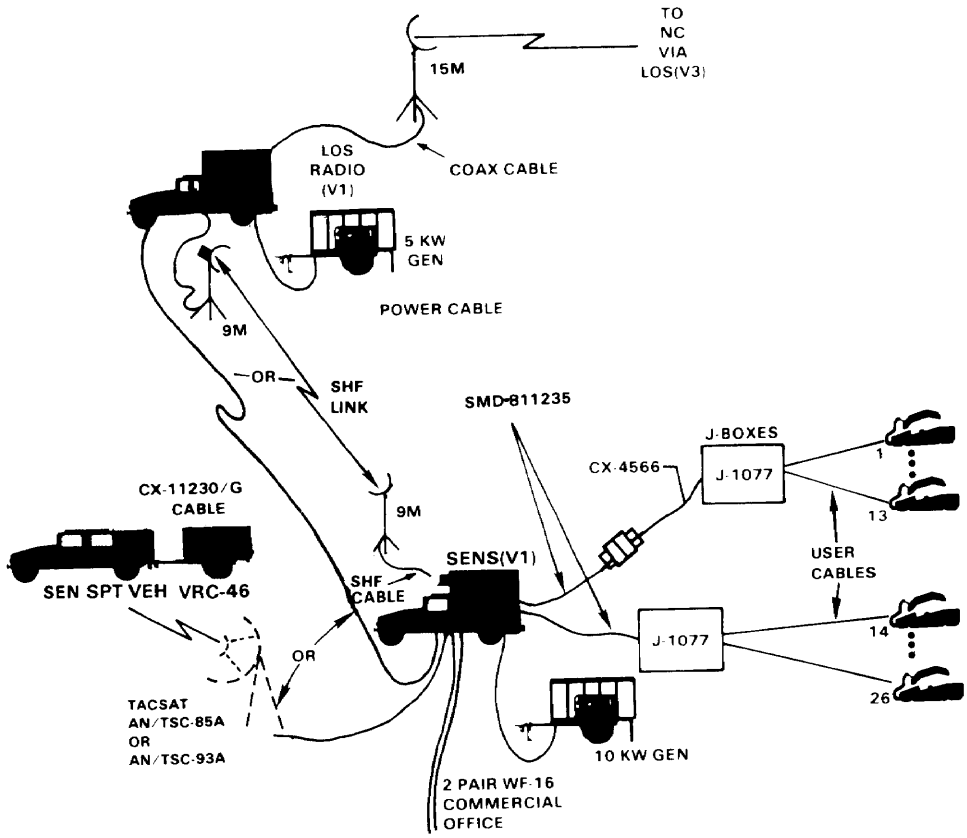


Figure A-3. SEN(V1) site.

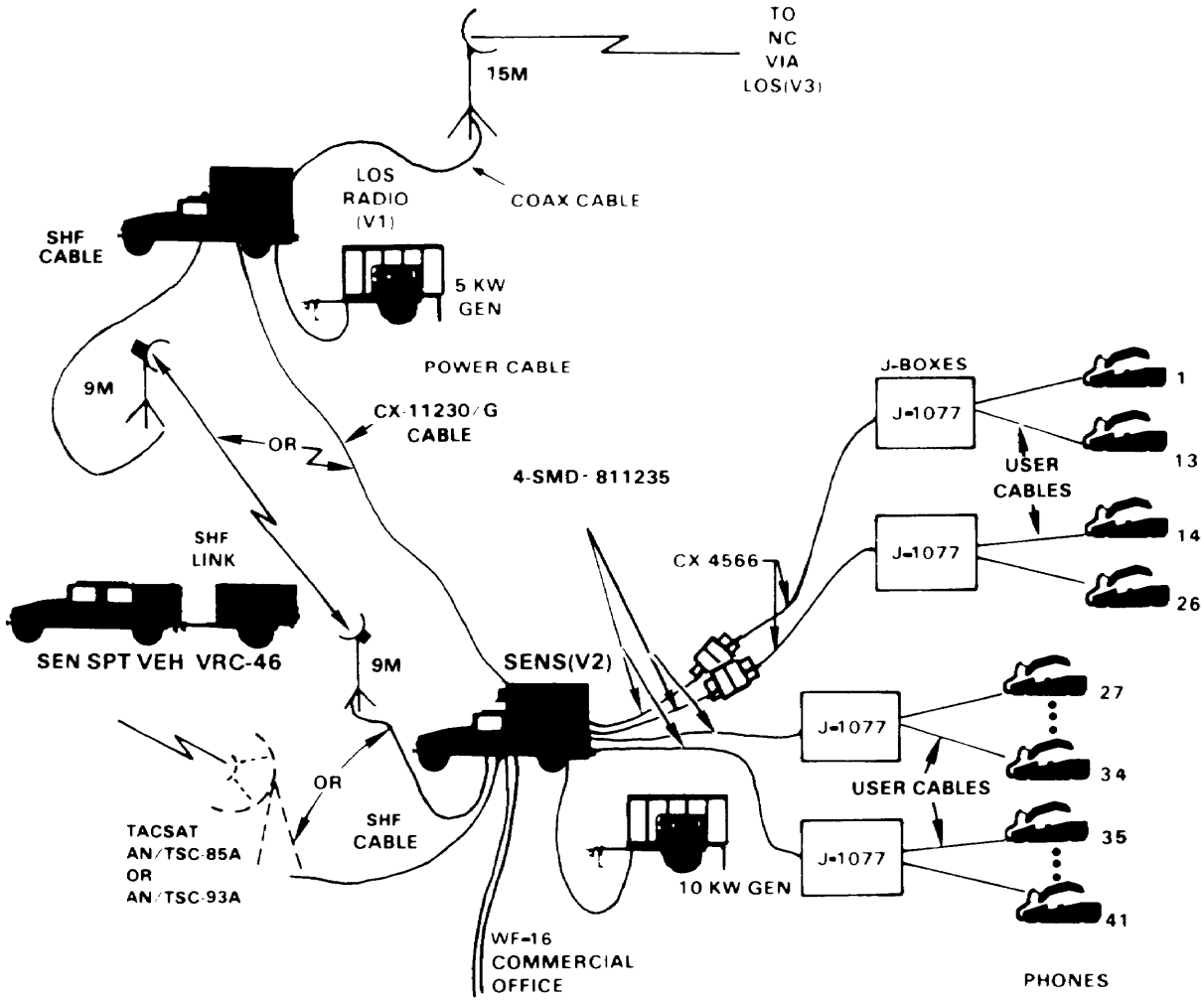


Figure A-4. SEN(V2) site.

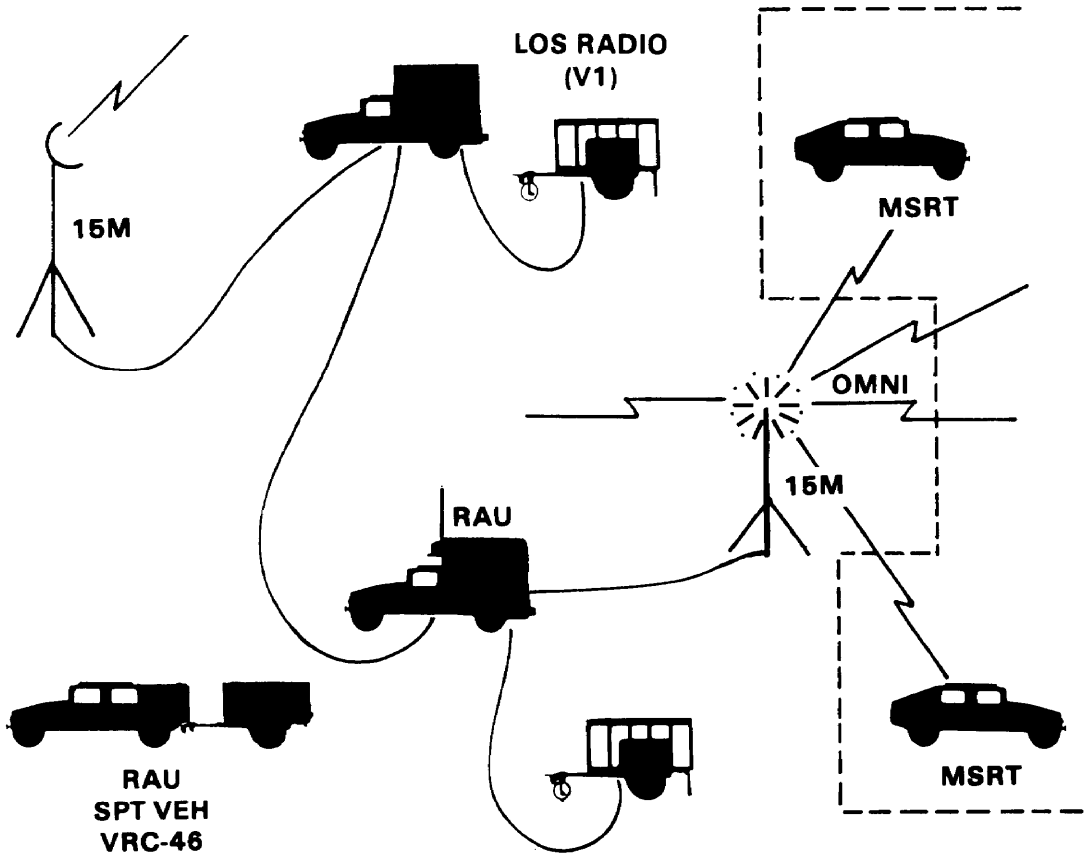


Figure A-5. Remote RAU site.

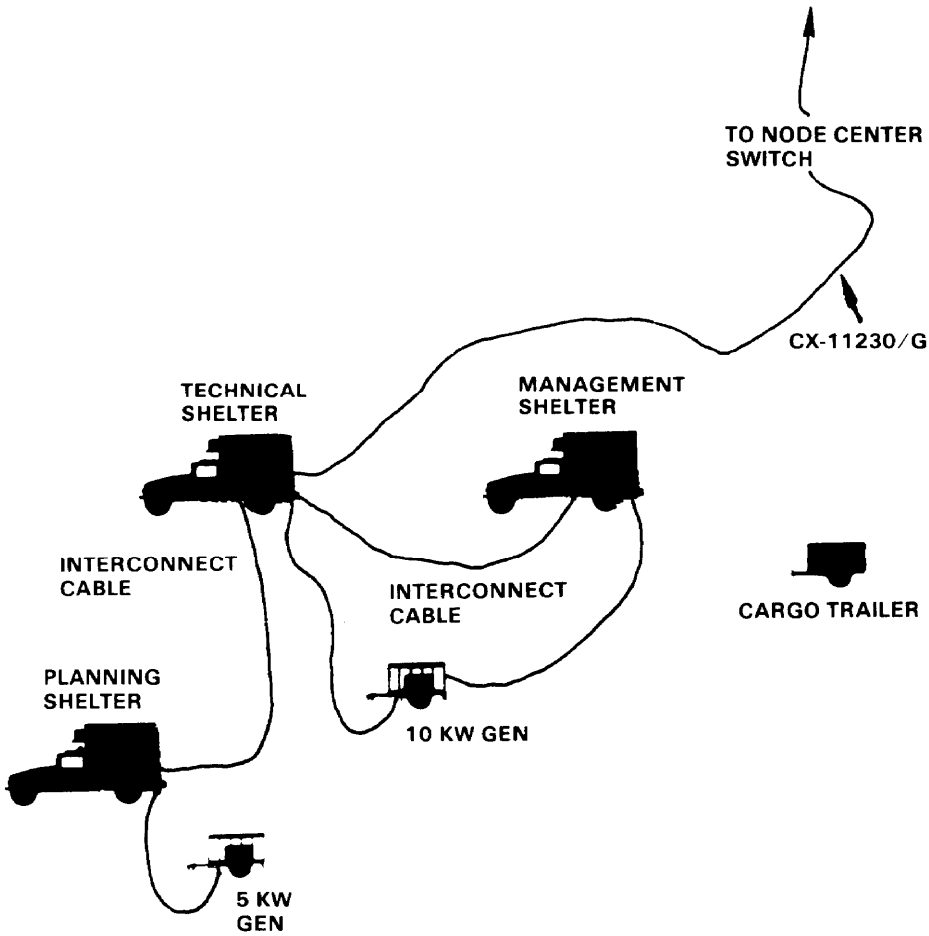


Figure A-6. Corps SCC site.

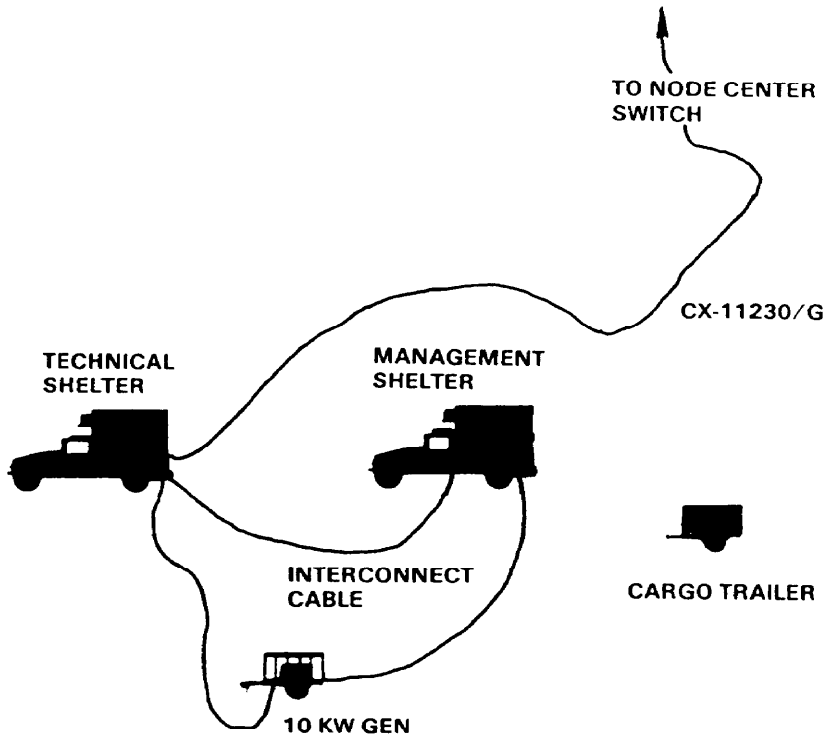


Figure A-7. Division SCC site.

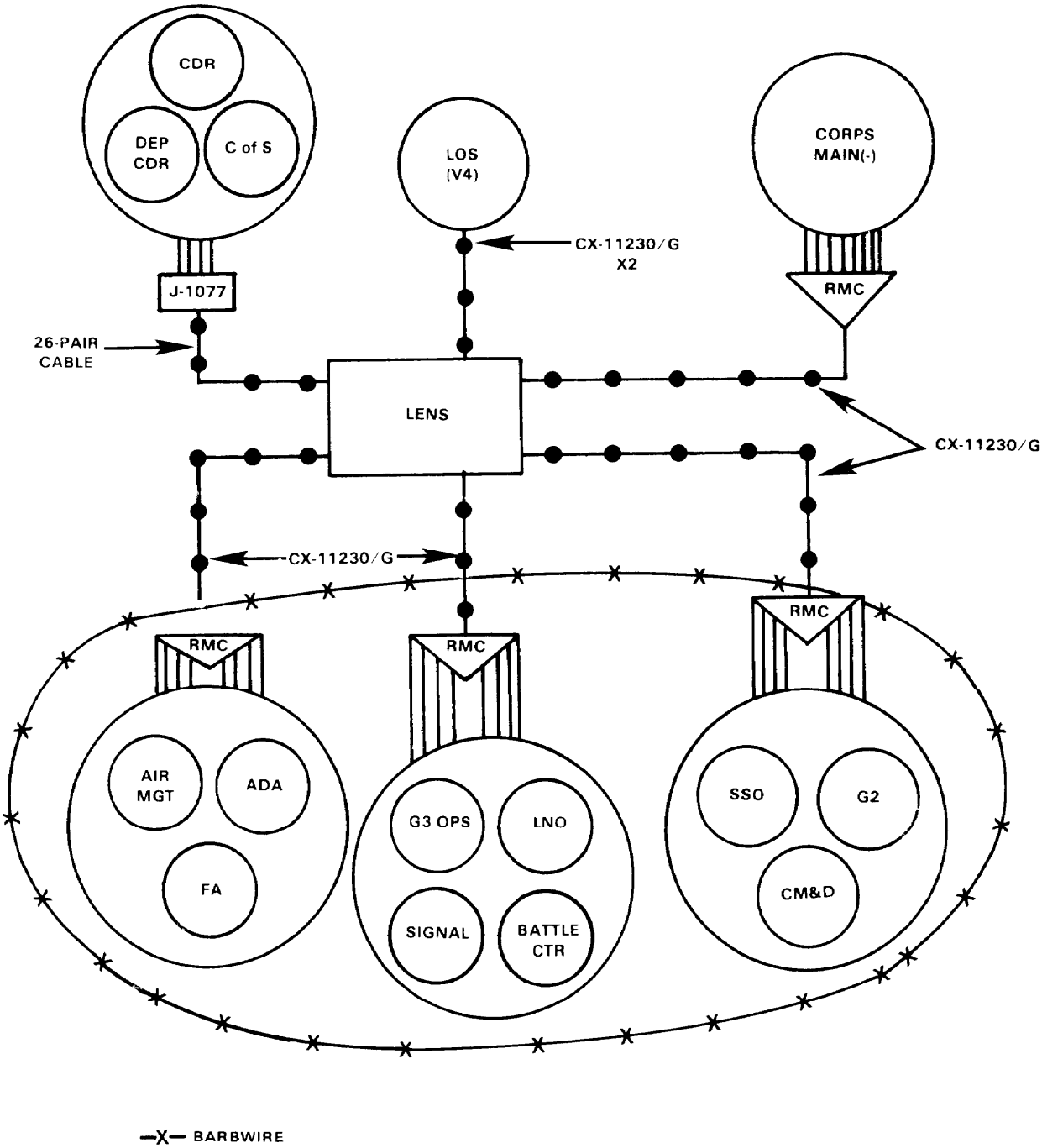


Figure A-8. Corps main CP using LEN.

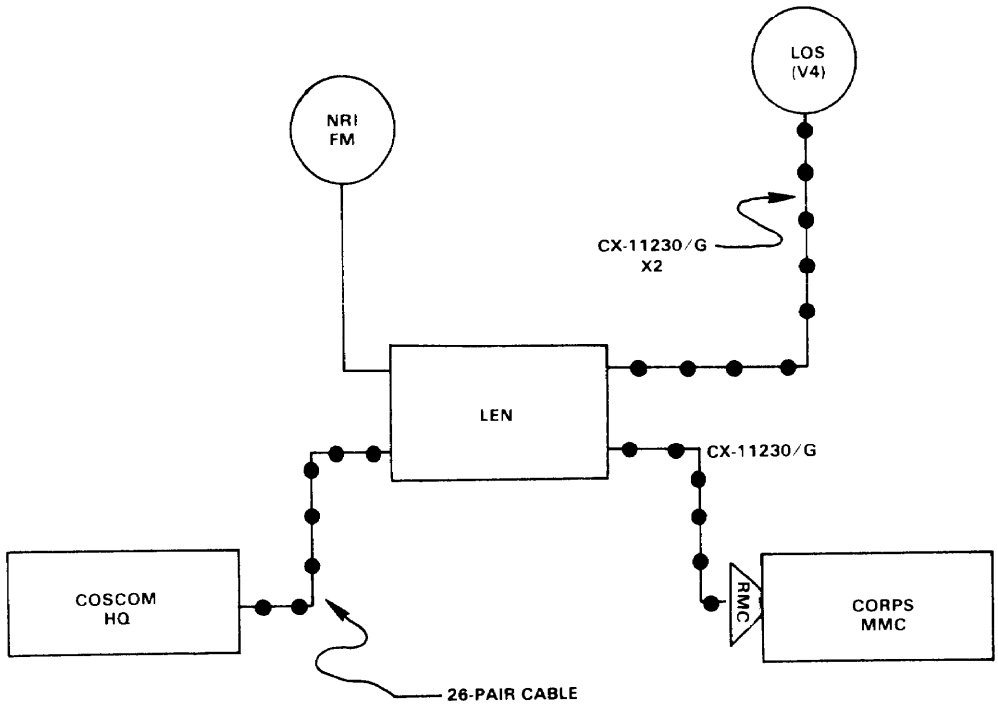


Figure A-9. COSCOM site.

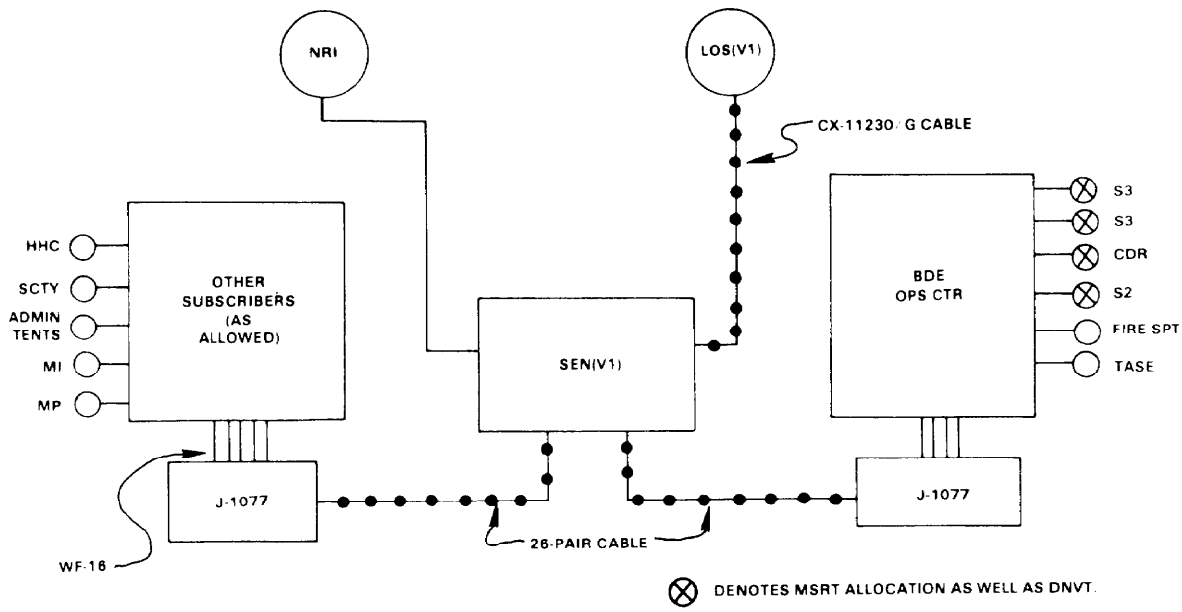


Figure A-10. Brigade main CP site.

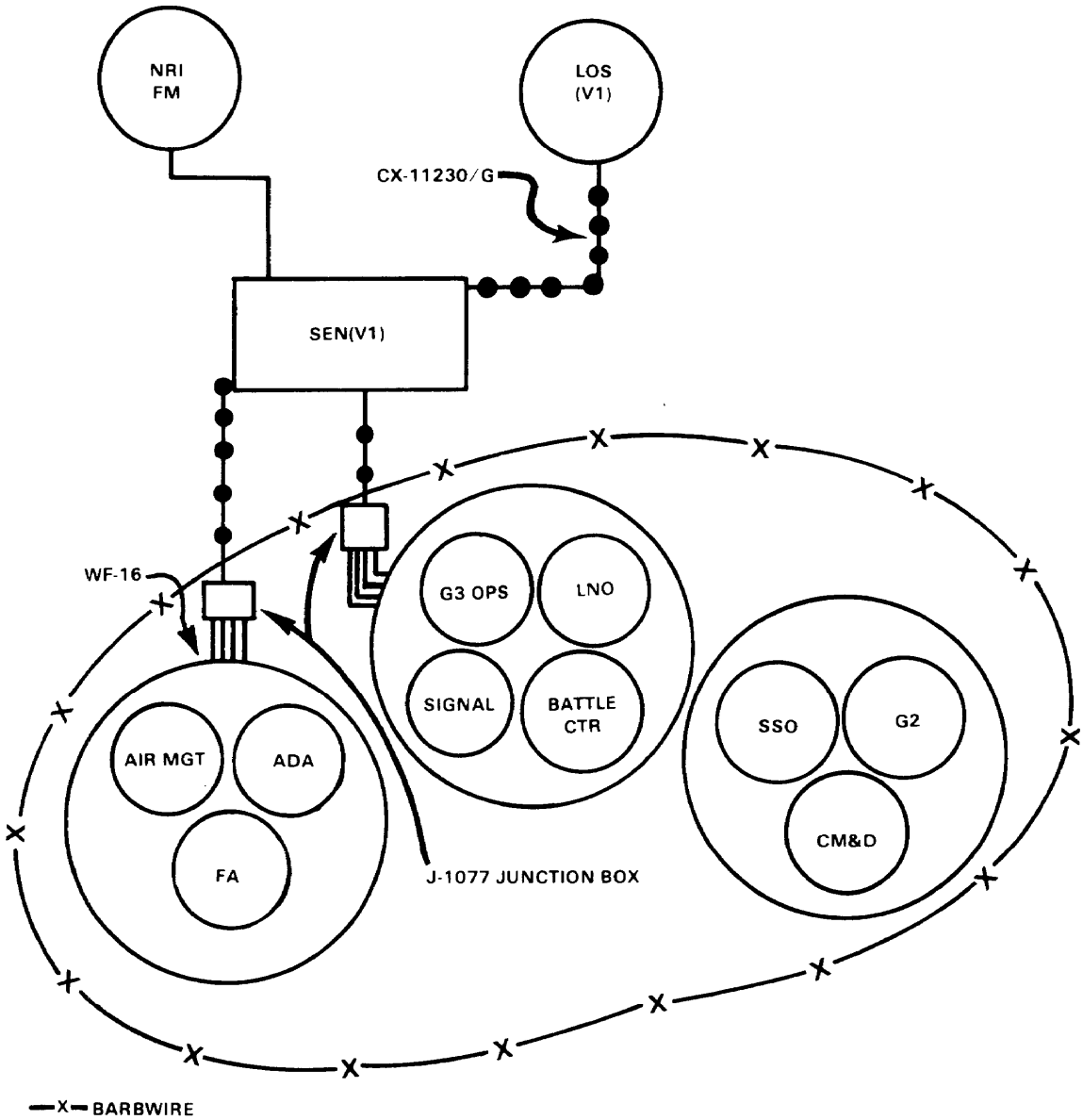


Figure A-11. Division main CP site.

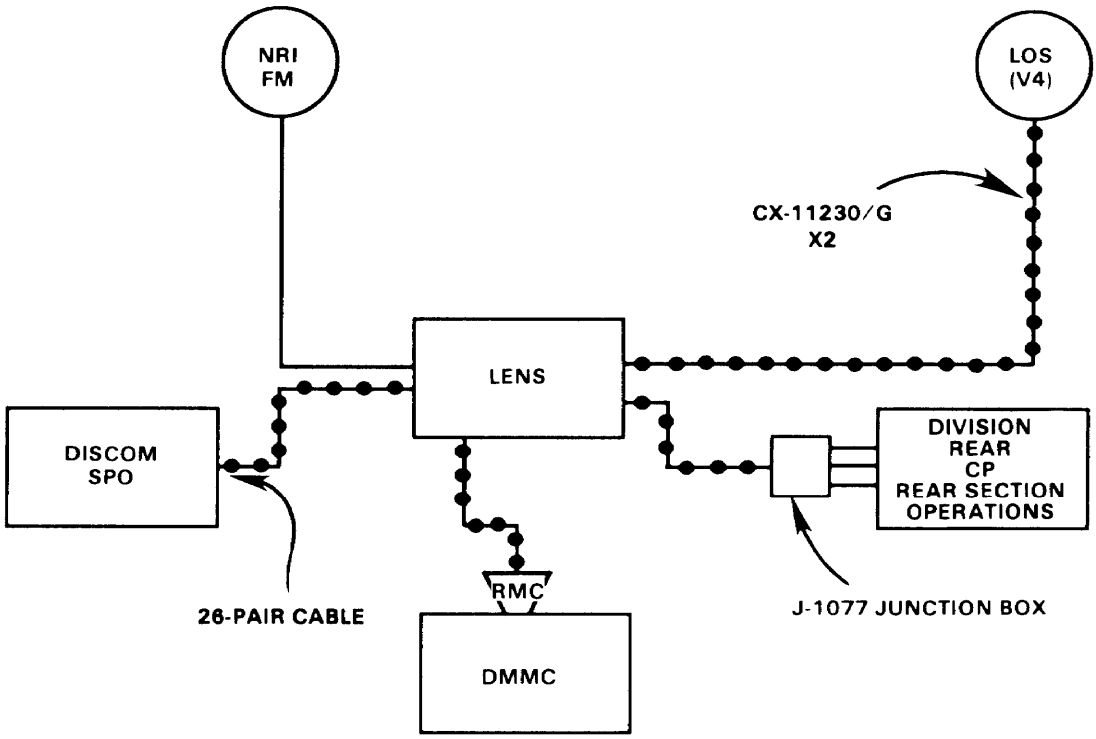


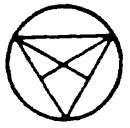
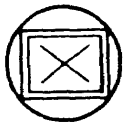
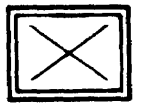
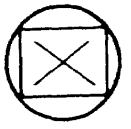
Figure A-12. DISCOM site.

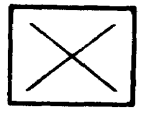
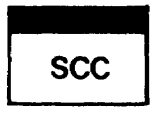
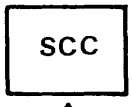
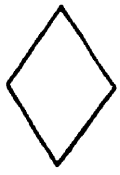
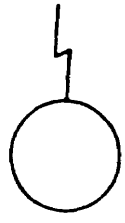
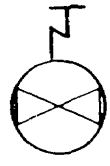
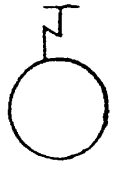
APPENDIX B

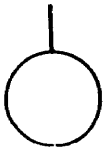
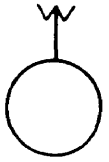
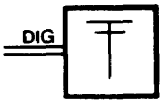
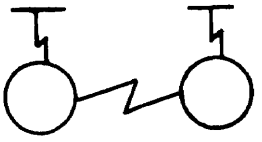
MSE Symbology and Equipment Nomenclature

B-1. MSE Symbology

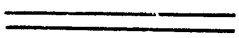
The following represents common NATO (STANAG 5042) symbology used to standardize MSE system architectural drawings.

	NODE CENTER	Trunk NC (triangle with an X for digital) and multichannel LOS connectivity (circle). Used on multichannel diagrams. Site designator is placed within
	NODE SWITCH	The NS alone in a switching diagram would be represented by a triangle with an X for digital. Used on switching diagrams. Site designator is placed within symbol.
	LARGE EXTENSION NODE	Trunk LEN (two concentric rectangles with an X for digital) and LOS connectivity (circle). Used on multichannel diagrams. Site designator is placed within symbol.
	LARGE EXTENSION NODE SWITCH	Trunk LENS (two concentric rectangles with an X for digital). Used on switching diagrams. Site designator is placed within symbol.
	SMALL EXTENSION NODE	Trunk SEN (rectangle with an X for digital) and LOS node connectivity (circle). Used on on multichannel diagrams. Site designator is placed within

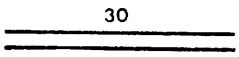
	SMALL EXTENSION NODE SWITCH	Trunk SENS (rectangle with an X for digital). Used on switching diagrams. Site designator is placed within symbol.
	SYSTEM CONTROL CENTER (PRIMARY)	The primary SCC deploys at corps/division. Used to control MSE network and connects directly into the NS or LENS. Site designator is placed within symbol.
	SYSTEM CONTROL CENTER (ALTERNATE)	The alternate SCC deploys at corps/division. Used to assist primary SCC. Site designator is placed within symbol.
	GATEWAY SWITCH	MESSAGE or CIRCUIT switch represented by a diamond. The GATEWAY switch provides connectivity between the following: network to network, corps to corps, theater to corps, DSN, AUTODIN, DCO, NATO, or commercial. The switch type and PRSL or RI are placed in the diamond.
	RADIO ACCESS UNIT	Multichannel/single-channel transmitter/receiver telephony (discrete address) operation.
	MULTICHANNEL LOS RADIO RELAY	Descriptive data may be indicated within the circle; for example, number of radio stacks in the assemblage or frequency band.
	MULTICHANNEL LOS RADIO	Descriptive data may be indicated within the circle; for example, number of radio stacks in the assemblage or frequency band.

	MOBILE SUBSCRIBER RADIOTELEPHONE	Single channel, discrete address, transmit/receive.
	COMBAT NET RADIO	Single-channel CNR. Descriptive data such as type (VHF or IHFR) or nomenclature may be indicated within or beside the circle.
	TELEPHONE TERMINAL	In this case, a 4-wire digital telephone terminal.
	TELETYPE TERMINAL	In this case, a 4-wire digital teletype terminal.
	NET RADIO INTERFACE FACILITY	
	FACSIMILE TERMINAL	
	DATA TERMINAL	
	LOS MULTICHANNEL RADIO LINK	
	RADIO LINK	In this case, LOS multichannel, an LOS multichannel radio link connecting radio facilities.
	SHF RADIO LINK	LOS, multichannel, single line connecting radio facilities using SHF.
	WIRE LINE/ CABLE LINK	A single line directly connecting wire line facilities; may be enhanced using symbology below.
	JUNCTION BOX OR FACILITY	A point of connectivity between differing sizes of cable; for example, several single pairs to a multipair.

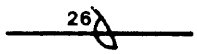
2-WIRE CIRCUIT



4-WIRE CIRCUIT



THIRTY 4-WIRE CIRCUITS

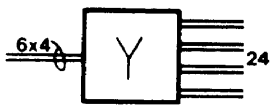


MULTIPAIR CIRCUIT OR CABLE

In this case, with number added to show 26-pair cable.

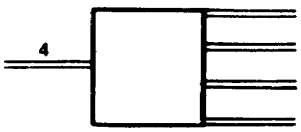


COAXIAL CIRCUIT OR CABLE



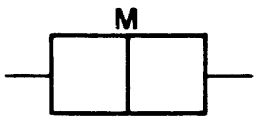
24

A junction of 24 each 4-wire circuits to 6 each quad 4 cables.



CDR
S1
S2
S3

Breakout of 4 each 4-wire circuits to show distribution.



INTERFACE POINT OR FACILITY

In this case manual (M) such as a STANAG 5040 Interface Facility.

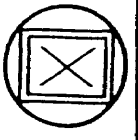
B-2. Equipment Nomenclature

Table B-1 shows MSE system equipment nomenclature.

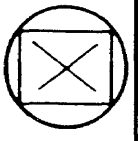
Table B-1. Equipment nomenclature.



NODE CENTER (NC)	
Node Switch (NS)	AN/TTC-47
●Operations Group	OL-413/TTC-47
●Switching Group	ON-306/TTC-47
●Distribution Box	J-1077
●Antenna, 30 Meter**	AB-1340/G
LOS Multichannel Radio Terminal, (LOS (V3))	AN/TRC-190(V3)
●Radio Set, LOS (UHF)	AN/GRC-226
●●Antenna, 15 Meter	AB-1339/G
●Radio Set, SHF* (Optional)	AN/GRC-224(P)
●●Antenna, 9 Meter* (Optional)	AB-1342/G
Radio Access Unit (RAU) (Local)	AN/TRC-191
●Radio Set, VHF	RT-1539(P)/G
●●Antenna, Omnidirectional, 15 Meter	AS-3886
Node Support Vehicle (NSV)	
Node Management Facility (NMF)	AN/TSQ-154
*May be Located in NS Operations Shelter (Optional)	
**Available for Use at LOS Sites	



LARGE EXTENSION NODE (LEN)	
Large Extension Node Switch (LENS)	AN/TTC-46
●Operations Group	OL-412/TTC-46
●Switching Group	ON-305/TTC-46
LOS Multichannel Radio Terminal (LOS (V4))	AN/TRC-190(V4)
●Radio Set, LOS (UHF)	AN/GRC-226
●●Antenna, 15 Meter	AB-1339/G
●Radio Set, SHF* (Optional)	AN/GRC-224(P)
●●Antenna, 9 Meter* (Optional)	AB-1342/G
●●1-TSEC/KY-90 (SDNRI)* (not provided for all assemblages)	
LEN Cable, Vehicle	
●Remote Multiplexer Combiner (RMC)	TD-1234
●Distribution Box	J-1077
Node Management Facility (NMF)	AN/TSQ-154
*May be Located in LENS Operations Shelter (Optional)	



SMALL EXTENSION NODE (SEN)	
●Small Extension Node Switch (SENS)	AN/TTC-48 (V1 & V2)
●Switchboard	SB-4303
●Distribution Box	J-1077
LOS Multichannel Radio Terminal (LOS (V1))	AN/TRC-190 (V1)
●Radio Set, LOS (UHF)	AN/GRC-226
●●Antenna, 15 Meter	AB-1339/G
●Radio Set, SHF* (Optional)	AN/GRC-224(P)
●●Antenna, 9 Meter* (Optional)	AB-1342/G
●●1-TSEC/KY-90 (SDNRI)* (not provided for all assemblages)	
SEN Support Vehicle	
*May be Located in SENS (Optional)	

Table B-1. Equipment nomenclature (continued).



RADIO ACCESS UNIT (RAU) - REMOTE	
Radio Access Unit (RAU)	AN/TRC-191
●Radio Set (VHF)	RT-1539(P)/G
●●Antenna, Omnidirectional, 15 Meter	AS-3886
LOS Multichannel Radio Terminal (LOS (V1))	AN/TRC-190(V1)
●Radio Set, LOS (UHF)	AN/GRC-226
●●Antenna, 15 Meter	AB-1339/G
RAU Support Vehicle	
SUBSCRIBER TERMINALS	
Mobile Subscriber Radiotelephone Terminal (MSRT)	AN/VRC-97
●Radio Set, (VHF)	RT-1539(P)/G
●Digital Subscriber Voice Terminal (DSVT)	TSEC/KY-68
Digital Nonsecure Voice Telephone (DNVT)	TA-1035/U
Lightweight Digital Facsimile (LDF)	AN/UXC-7
SYSTEM CONTROL CENTER (SCC)	
System Control Center, Corps and Division	AN/TYQ-35
●Planning Shelter (Corps Only)	OL-414/TYQ-35
●Technical Shelter	OL-415/TYQ-35
●Management Shelter	OL-416/TYQ-35
NATO ANALOG INTERFACE (NAI)	
Converter, NATO Analog Interface (NAI)	CV-4002
LOS Multichannel Radio Terminal (LOS (V2))	AN/TRC-190(V2)
●Radio Set, LOS (UHF)	AN/GRC-226
●●Antenna, 15 Meter	AB-1339/G
MSE SUPPORT EQUIPMENT	
Maintenance Facility	AN/TSM-182
Spares Facility	AN/TSM-183
Shelters, S-250/G and S-250/E	
High Mobility Multipurpose Wheeled Vehicle (HMMWV)	
Diesel Generator, 5 kW	PU-751
Diesel Generator, 10 kW	PU-753
Trailer, Cargo	

SCC

APPENDIX C

The Airborne Corps Signal Brigade

a. The United States Army's airborne corps recognizes and identifies the need to change the basic organization of the standard MSE corps signal brigade. The changes are not great but are important enough to be discussed (Figure C-1).

b. The airborne corps signal brigade HHC is identical to the standard corps signal brigade HHC except selected slots require parachutist qualified personnel.

c. The airborne corps area signal battalions are identical to the standard corps area signal battalions except for the third battalion. This battalion is an area/force entry signal battalion. Its HHC and three area signal companies are identical to the HHC and area signal companies in the other battalions, but the signal support company is changed. The LENS, LOS(V4), and NMF are deleted as are the RAU and its LOS(V1). One cable/wire section is also deleted. These deletions are replaced by long-haul multichannel HF. All personnel manning this battalion must be parachutist qualified.

d. The corps support signal battalion remains as it is. There are no changes or exceptions, nor any requirements for parachutist qualified personnel.

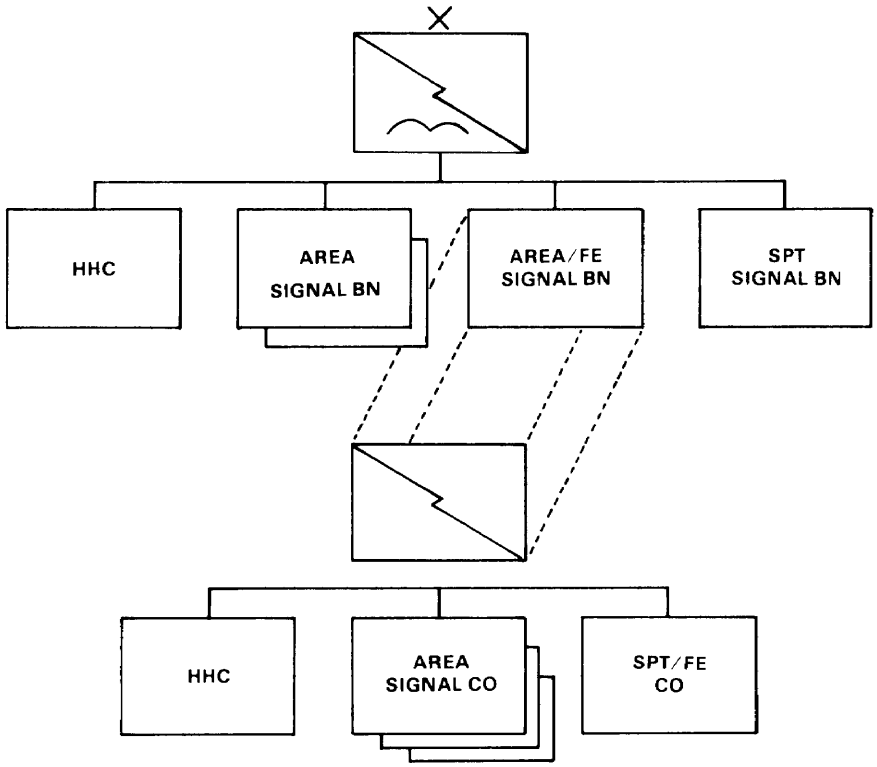


Figure C-1. Airborne corps signal brigade.

APPENDIX D

Electronic Warfare

a. Threat forces have extensive REC capabilities and will attempt to deny us using the electromagnetic spectrum. All signal leaders must aggressively use ECCM to ensure our success on the AirLand Battlefield. Every signal leader should read FM 24-33 which contains a detailed discussion of EW.

b. MSE has some automatic ECCM functions; however, the following manual functions must be considered when planning and deploying MSE:

- Spread frequency use throughout the VHF and UHF spectrums.
- Decrease the distance of LOS systems where possible.
- Practice and use terrain masking--particularly with remote RAUs.
- Rotate/stagger area coverage responsibility among all deployed RAUs on an alternating basis. (For example, one RAU is operating while another is installed and waiting for the order to activate and assume responsibility for area coverage of the same area. After one RAU is relieved of area coverage responsibility, it prepares to move to a new location.)
- Keep LOS systems that are perpendicular to the forward line of own troops (FLOT) to a minimum.
- Reduce electronic signature in CP areas--use SHF radio.
- Move often--do not allow NCs to become static.
- Enforce using MSE versus FM radio--particularly in signal units.

APPENDIX E

Standardized MSE CP Configurations

To create the most efficient, productive work environment under the most extreme/adverse conditions, the following CP configurations are suggested. (See Figures E-I through E-6.) These configurations may not suit every situation, but they provide a base from which a corps signal division/brigade signal battalion SYSCON can carry out its mission.

LEVEL 1

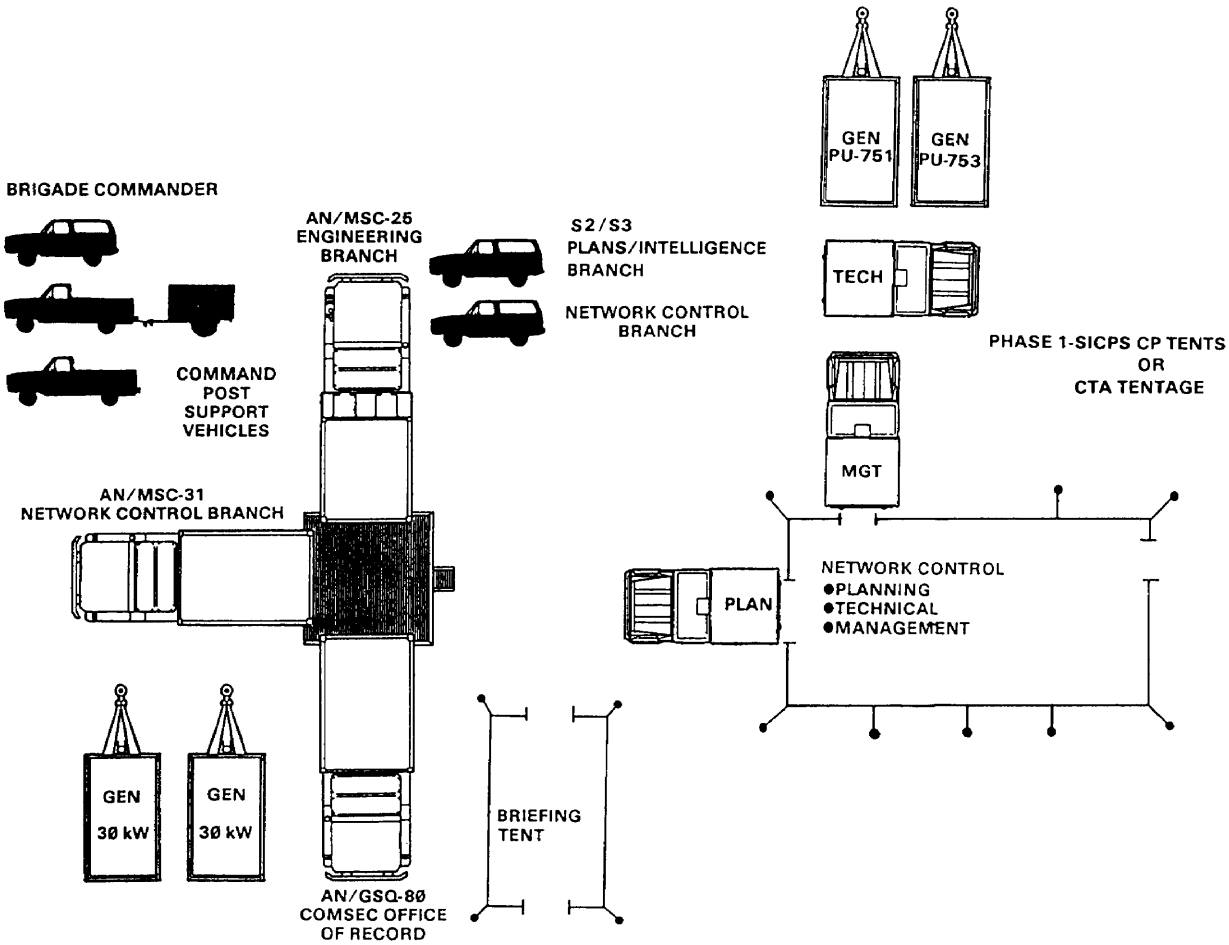


Figure E-1. Corps signal brigade tactical CP level 1.

LEVEL 2

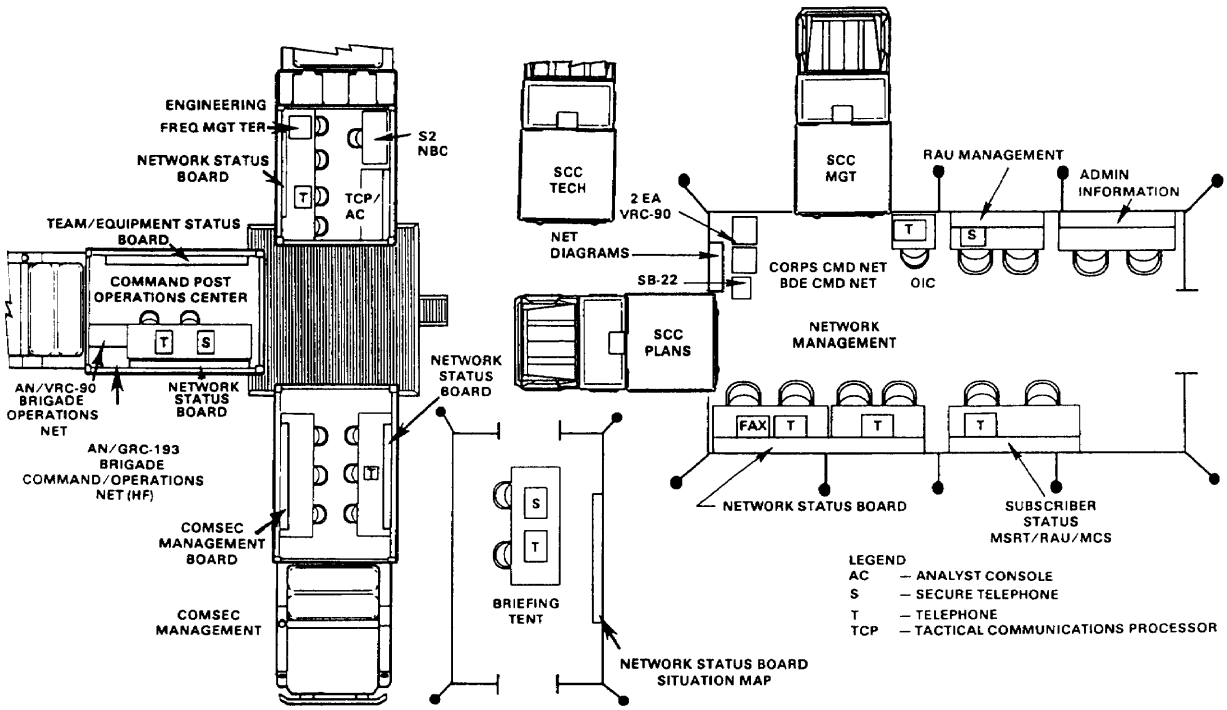


Figure E-2. Corps signal brigade tactical CP level 2.

LEVEL 1

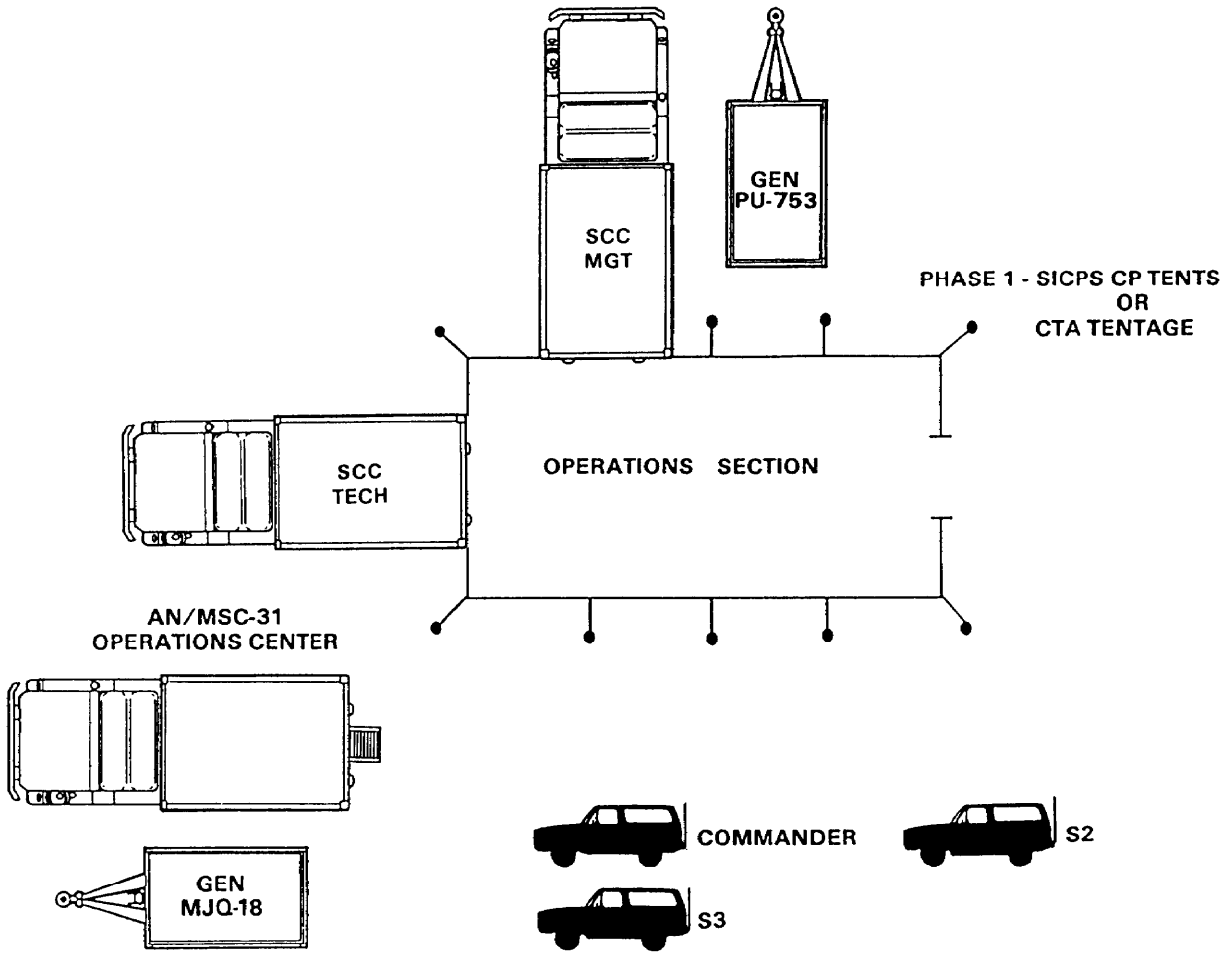


Figure E-3. Heavy division signal battalion tactical CP level 1.

LEVEL 2

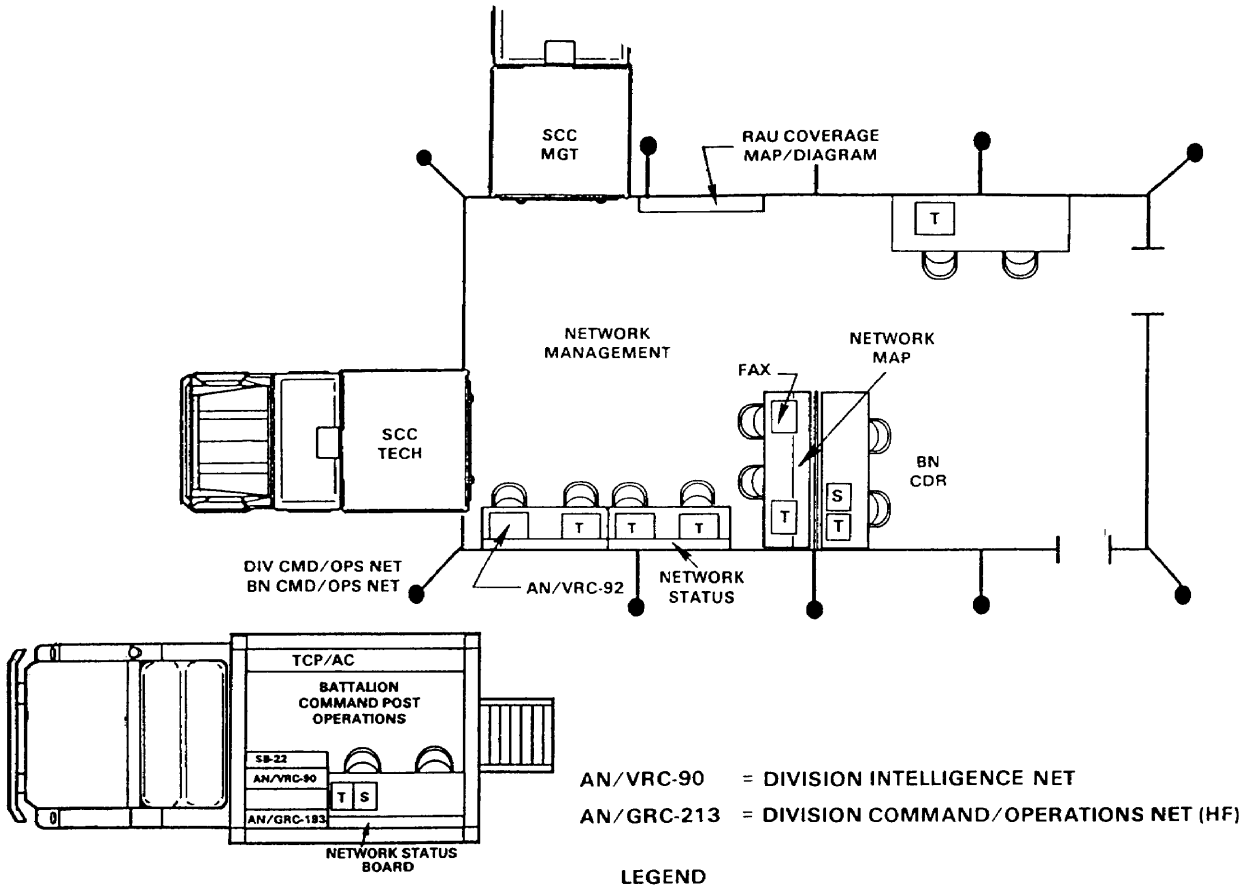


Figure E-4. Heavy division signal battalion tactical CP level 2.

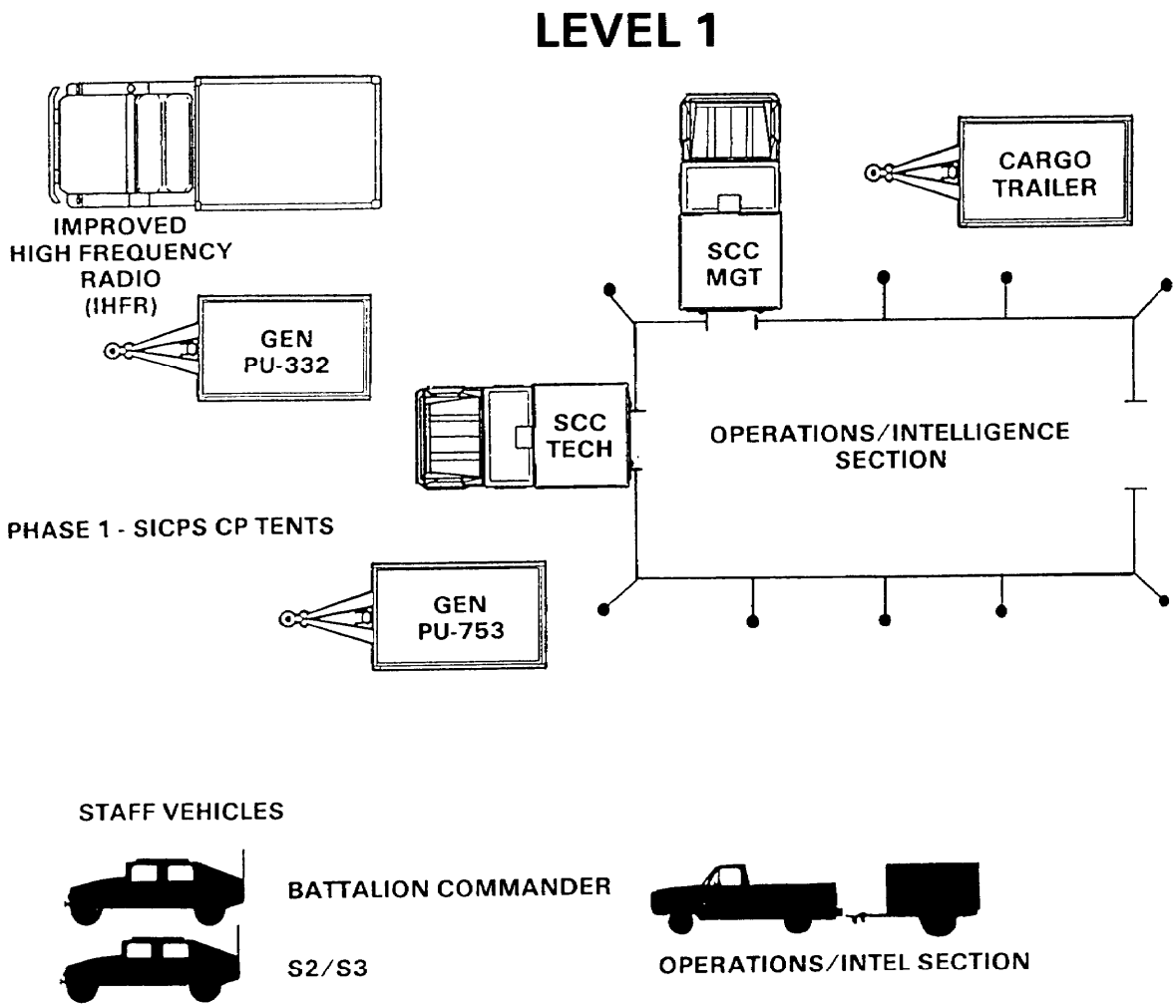


Figure E-5. Light, airborne, air-assault division signal battalion tactical CP level 1.

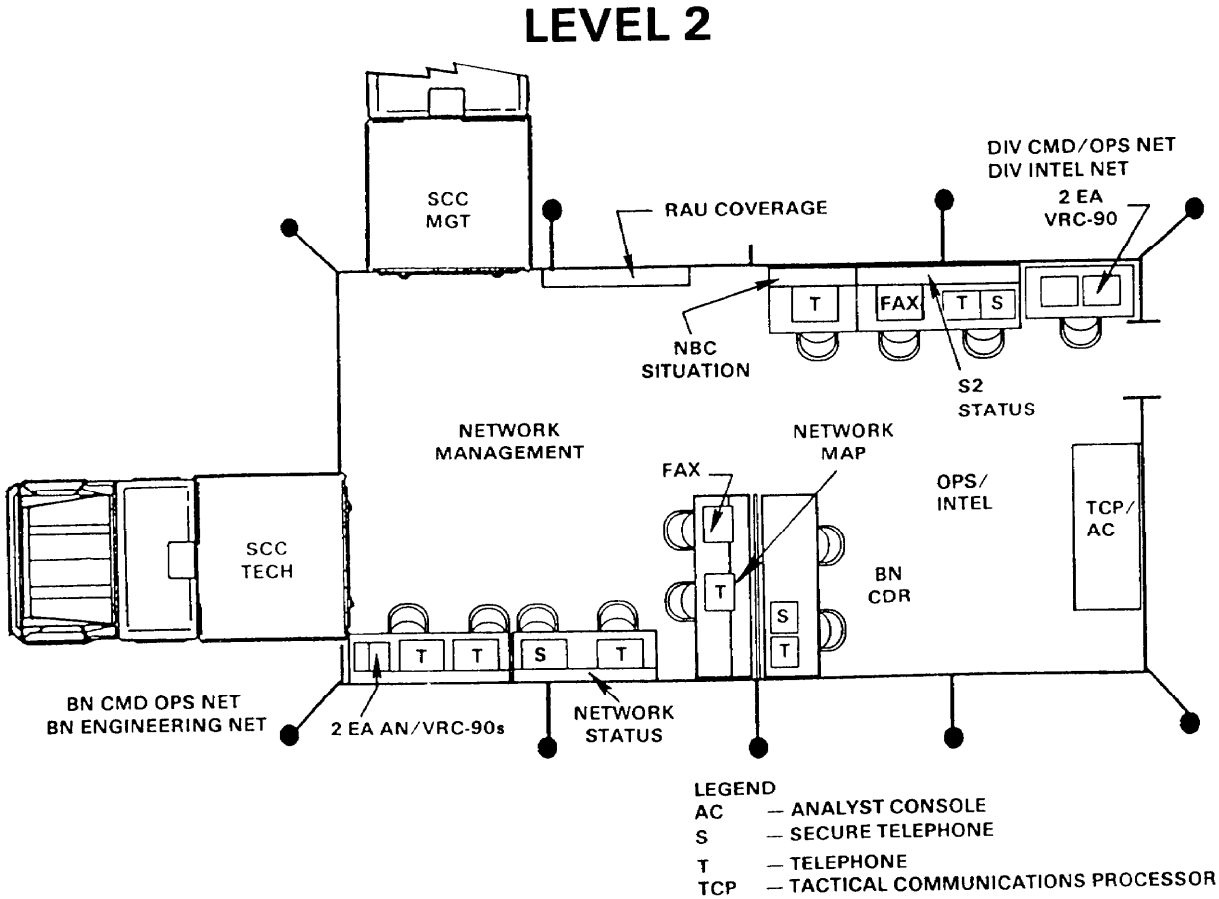


Figure E-6. Light, airborne, air-assault division signal battalion tactical CP level 2.

APPENDIX F

MSE Interoperability with EAC

F-1. Non-MSE Communications Interfaces

In the MSE network, access for analog communications is provided by the following.

a. The Tri-Service Tactical Communications (TRI-TAC) network provides NATO, defense switching network (DSN), and commercial office access at EAC.

b. At echelons corps and below (ECB), MSE communications will interface through an NS for NATO via an NAI.

c. DSN and commercial office access is provided through a LENS or SENS via single frequency and direct current closure line interface.

d. Army Tactical Communications System (ATACS) analog switches will normally access MSE through the TRI-TAC network.

e. Calls to EAC are routed via flood search until a gateway NS is found that has a digital transmission group (DTG) interfacing with TRI-TAC. The NS then routes the calls deterministically through the interfacing DTG to the TRI-TAC network as if the NS were a TRI-TAC switch.

f. Direct dialing is possible using area codes. Calls between corps, to DSN and NATO, or commercial offices are identified by area codes and routed to the required gateway (MSE, TRI-TAC) regardless of which numbering plan is used. Each switch must be programmed by the switch personnel for its home area code. The NS gateway to TRI-TAC will also have the corps area code for the interfacing DTG. The TRI-TAC switch will be programmed in the same way for the MSE NS gateway access into the corps network.

g. Calls routed through some gateways have the potential of call completion delays.

F-2. Interoperability Considerations for EAC to ECB Interface

Table F-1 gives the specified items to successfully interoperate between EAC and ECB communications systems. Technical parameters must be coordinated prior to deployment.

Table F-1. EAC and ECB interoperability.

Timing source	- Highest accuracy/stability source must be specified. The NS and the AN/TTC-39A have an atomic standard; the AN/TTC-39 does not. The NS and AN/TTC-39A can slave off of each other if necessary; however, when interfacing to the AN/TTC-39 the NS is the timing master and the AN/TTC-39 derives its timing from the NS. The AN/TRC-151 and TACSAT terminals have no timing standards. They derive their timing from the switch to which they are connected. (Except the AN/TTC-39 where timing is derived from the switch at the other end of the link.) The AN/TRC-170 has an atomic standard, so it can derive its timing from its own clock or it can slave off the NS or AN/TTC-39A.
Group rate	- TRI-TAC rates should be used for MSE LOS and troposcatter radio sets AN/TRC-170 (multiples of 16 in the range of 256 to 2048 kb/s). Group rates of 512 (32 channels at 16 kb/s per channel) are suggested. The ATACS rates (multiples of 48 in the range of 576 to 2304) should be used for satellite and LOS AN/TRC-151. Group rates of 576 are suggested for TACSAT and AN/TRC-151.
Cable modulation	- Diphase modulation should be used for TRI-TAC (satellite terminals with TRI-TAC port or MD-1026/GM and AN/TRC-170). Dipulse modulation should be used for ATACS (AN/TRC-151).
Cable length	- Maximum reels/miles allowed for bit rate (suggestions follow).
Cable adjust	- Transmit and receive at each end of cable link.
Signaling channel	- First for common channel signaling (CCS).
Routing channel	- Not applicable. No flood search routing to EAC.
Traffic channels	- Second through last (based on group rate and channel rate). Group rates of 576 and 512 are recommended for NS-EAC using 16 kb/s channel rate requiring 32 channels for each interface.
Control node	- Typically EAC (AN/TTC-39 or AN/TTC-39A) but could be either NS or EAC.
Glare	- Accept at slave node. Reject at master node.

F-3. Equipment Set Up for NS to EAC

a. The CX-11230/G cable is issued in ¼-mile reels. The reels of cable can be combined to accommodate distances of ½, ¾, and 1 mile. The following tables have three entries for the CX-11230/G cable: cable reels, cable transmit (xmit), and cable receive (rev). Cable reels give the number of reels used (1, 2, 3, or 4). Cable transmit and cable receive give the corresponding entries for the number of cable reels used.

NOTE: In the following tables, “lm” means 1 mile, “NA" means not applicable, and "No Adj” means no adjustment.

b. Table F-2 lists the cable adjustment settings for the NS to EAC via the AN/TRC-151.

Table F-2. NS to EAC via AN/TRC-151.

	NS	TRC-151	TRC-151	TTC-39/39A
Timing	Master	NA	NA	Slave/Master
Bit rate	576 kb/s	576 kb/s	576 kb/s	576 kb/s
Modulation	Dipulse	Dipulse	Dipulse	Dipulse
Cable reels	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4
Cable xmit	4/4/4/4	e/e/e/e	e/e/e/e	4/4/4/4
Cable rcv	1/2/3/4	b/c/d/e	b/c/d/e	1/2/3/4
CCS channel	1st	NA	NA	1st
RSS channel	NA	NA	NA	NA
Traffic channels	2-32	NA	NA	2-32
Control node	No	No	Yes	Yes
Glare	Accept	NA	NA	Reject

NOTE: The AN/TTC-39 must be set to SLAVE.

c. Table F-3 lists the cable adjustment settings for the NS to EAC via the AN/TRC-170.

Table F-3. NS to EAC via AN/TRC-170.

	NS	TRC-170	TRC-170/170	TTC-39/39A
Timing	Master	Group	Mission/Group	Slave/Master
Bit rate	512 kb/s	512 kb/s	512 kb/s	512 kb/s
Modulation	Diphase	Diphase	Diphase	Diphase
Cable reels	1/2/3/4	No Adj	No Adj	1/2/3/4
Cable xmit	4/4/4/4	No Adj	No Adj	4/4/4/4
Cable rcv	1/2/3/4	No Adj	No Adj	1/2/3/4
CCS channel	1st	NA	NA	1st
RSS channel	NA	NA	NA	NA
Traffic channels	2-32	NA	NA	2-32
Control node	No	No	Yes	Yes
Glare	Accept	NA	NA	Reject

NOTE 1: The AN/TTC-39 must be set to SLAVE.

NOTE 2: Mission entry for the AN/TRC-170 indicates the unit should use distant end for timing.

NOTE 3: Group entry for the AN/TRC-170 directs the unit to use whichever timing source is on the group entering the unit (for example, the NS or AN/TTC-39A; whichever it is connected to).

d. Table F-4 lists the cable adjustment settings for the NS to EAC via AN/TRC-173/174 radios.

Table F-4. NS to EAC via AN/TRC-173/174.

	NS	TRC-173/174	TRC-173/174	TTC-39A
Timing	Master	NA	NA	Master
Bit rate	512 kb/s	512 kb/s	512 kb/s	512 kb/s
Modulation	Diphase	Diphase	Diphase	Diphase
Cable reels	1/2/3/4	No Adj	No Adj	1/2/3/4
Cable xmit	4/4/4/4	No Adj	No Adj	4/4/4/4
Cable rcv	1/2/3/4	No Adj	No Adj	1/2/3/4
CCS channel	1st	NA	NA	1st
RSS channel	NA	NA	NA	NA
Traffic channels	2-32	NA	NA	2-32
Control node	No	No	Yes	Yes
Glare	Accept	NA	NA	Reject

e. Table F-5 lists the cable adjustment settings for the NS to EAC via AN/TSC-85A/93A (using TD-1337 TRI-TAC port).

Table F-5. NS to EAC via AN/TSC-85A/93A.

	NS	TSC-93A/85A	TSC-85A/93A	TTC-39/39A
Timing	Master	CNCE	Slave/CNCE	Slave/Master
Bit rate	576 kb/s	576 kb/s	576 kb/s	576 kb/s
Modulation	Diphase	Diphase	Diphase	Diphase
Cable reels	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4
Cable xmit	4/4/4/4	1/2/3/4	1/2/3/4	4/4/4/4
Cable rcv	4/4/4/4	1/2/3/4	1/2/3/4	4/4/4/4
CCS channel	1st	NA	NA	1st
RSS channel	NA	NA	NA	NA
Traffic channels	2-32	NA	NA	2-32
Control node	No	No	Yes	Yes
Glare	Accept	NA	NA	Reject

NOTE 1: CNCE entry for the AN/TSC-85A and the AN/TSC-93A is to designate that unit as the timing slave to the group coming from NS or AN/TTC-39A.

NOTE 2: Slave entry for the AN/TSC-85A and the AN/TSC-93A is to designate that unit as the timing slave to whatever source is available.

f. Table F-6 lists the cable adjustment settings for the NS to EAC via AN/TSC-85A/93A (using MD-1026).

Table F-6. NS to EAC via AN/TSC-85A/93A.

	NS	TSC-85A/93A	TSC-85A/93A	TTC-39/39A
Timing	Master	CNCE	Slave/CNCE	Slave/Master
Bit rate	576 kb/s	576 kb/s	576 kb/s	576 kb/s
Modulation	Diphase	Diphase	Diphase	Diphase
Cable reels	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4
Cable xmit	4/4/4/4	No Adj	No Adj	4/4/4/4
Cable rcv	1/2/3/4	No Adj	No Adj	1/2/3/4
CCS channel	1st	NA	NA	1st
RSS channel	NA	NA	NA	NA
Traffic channels	2-32	NA	NA	2-32
Control node	No	No	Yes	Yes
Glare	Accept	NA	NA	Reject

g. Table F-7 lists the cable adjustment settings for the NS to NS via the AN/TSC-85A/93A (using TD-1337 TRI-TAC port).

Table F-7. NS to NS via AN/TSC-85A/93A.

	NS	TSC-85A	TSC-93A	NS
Timing	Master	CNCE	CNCE	Master
Bit rate	1152 kb/s	1152 kb/s	1152 kb/s	1152 kb/s
Modulation	Diphase	Diphase	Diphase	Diphase
Cable reels	1/2/3/4	1/2/3/4	1/2/3/4	1/2/3/4
Cable xmit	4/4/4/4	1/2/3/4	1/2/3/4	4/4/4/4
Cable rcv	4/4/4/4	1/2/3/4	1/2/3/4	4/4/4/4
CCS channel	1st	NA	NA	1st
RSS channel	2d	NA	NA	2d
Traffic channels	3-64	NA	NA	3-64
Control node	Yes	Yes	No	No
Glare	Reject	NA	NA	Accept

GLOSSARY

Acronyms and Abbreviations

AC	alternating current
ACR	armored cavalry regiment
ACSO	assistant corps signal officer
ACUS	Area Common-User System
ADA	air defense artillery
ADDS	Army Data Distribution System
adj	adjacent
admin	administrative
ADP	automatic data processing
ADSO	assistant division signal officer
ALB	AirLand Battle
AM	amplitude modulated
AR	Army regulation
arty	artillery
ASC	area support concept
ATACS	Army Tactical Communications System
ATCCS	Army Tactical Command and Control System
attn	attention
AUTODIN	automatic digital network
AUTOVON	automatic voice network
avn	aviation
BAS	battlefield automated systems
bde	brigade
BECS	Battlefield Electronic CEOI System
BIS	Battlefield Information Services
bn	battalion
C^2	command and control
C^3CM	command, control, and communications countermeasures
CCS	common channel signaling
CDR	commander
CE	communications-electronics
CEWI	combat electronic warfare intelligence
cmd	command
CNR	combat net radio
co	company
coax	coaxial
COL	colonel
COMSEC	communications security
CONUS	continental United States
COSCOM	corps support command
CP	command post
CPT	captain
CS	combat support
CSH	corps support hospital
C-SIGINT	counter-signals intelligence
CSS	combat service support
CT	communications terminal
CTA	common table of allowances
CW2	Chief Warrant Officer, W2
CW4	Chief Warrant Officer, W4
DA	Department of the Army
DCO	dial central office
dep	deputy
DISCOM	division support command
div	division
DMMC	Division Materiel Management Center
DNVT	digital nonsecure voice terminal
DS	direct support
DSN	Defense Switching Network
DSVT	digital subscriber voice terminal
ea	each

EAC	echelons above corps
ECB	echelons corps and below
ECCM	electronic counter-countermeasures
ECM	electronic countermeasures
EGRU	EPLRS grid reference units
engr	engineer
EPLRS	Enhanced Position Location Reporting System
EPUU	EPLRS user units
EW	electronic warfare
ext	extension
FA	field artillery
fax	facsimile
FEBA	forward edge of the battle area
FLOT	forward line of own troops
FM	frequency modulation/ field manual (when used with a number)
freq	frequency
FSB	forward support battalion
FSK	frequency shift keying
ft	foot
G1	Assistant Chief of Staff, G1 (Personnel)
G2	Assistant Chief of Staff, G2 (Intelligence)
G3	Assistant Chief of Staff, G3 (Operations and Plans)
G4	Assistant Chief of Staff, G4 (Logistics)
gen	generator
gp	group
GRU	grid reference unit
HF	high frequency
HHC	headquarters and headquarters company
HMMWV	high mobility multipurpose wheeled vehicle
HQ	headquarters
HTF	how to fight
IAW	in accordance with
IHFR	improved high frequency radio
IMA	Information Mission Area
intel	intelligence
IOM	installation, operation, and maintenance
ISSO	Information Services Support Office
JTIDS	Joint Tactical Information Distribution System
kb/s	kilobits per second
km	kilometer(s)
kW	kilowatt
LDF	lightweight digital facsimile
ldr	leader
LEN	large extension node
LENS	large extension node switch
LNO	liaison officer
LOC	lines of communications (logistical routes)
log	logistics
LOS	line of sight
LT	lieutenant
LTC	lieutenant colonel
M	manual (in Appendix B only)
m	meter
maint	maintenance
MAJ	major
max	maximum
MCS	maneuver control system
med	medical
METT-T	mission, enemy, terrain, troops and time available
mgt	management
MHz	megahertz
MI	military intelligence
MIJI	meaconing, intrusion, jamming, and interference
MMC	Materiel Management Center
MP	military police
MPN	MSE Packet Network
MSB	main support battalion
MSE	Mobile Subscriber Equipment
MSG	master sergeant
MSR	main supply route
MSRT	mobile subscriber radiotelephone terminal

MTCC	modular tactical communications center
NAI	NATO analog interface
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NC	node center
NCO	noncommissioned officer
NCS	net control station
NCS-E	net control station-EPLRS
NCT	network control terminal
NICS	NATO Integrated Comunications System
NMF	node management facility
NRI	net radio interface
NS	node switch
NSV	node support vehicle
off	office/officer
OG	operations group
OIC	officer in charge
OPCON	operational control
OPFAC	operational facility
OPORD	operation order
ops	operations
OTAR	over-the-air rekeying
PCM	pulse code modulation
PFC	private first class
PLL	prescribed load list
pln	plans
plt	platoon
PRSL	primary switch location
PSN	packet switch node
RAU	radio access unit
rcv	receive
REC	radio electronic combat
retrans	retransmission
RF	radio frequency
RI	routing indicator
RMC	remote multiplexer combiner
RSS	routing subsystem
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
SAFK	stand-alone field kit
SCC	system control center (SCC-1 is the current SCC; SCC-2 when fielded will completely replace SCC-1.)
SDNRI	secure digital net radio interface
SEN	small extension node
SENS	small extension node switch
sec	section
sep	separate
SFC	sergeant first class
SG	switching group
SGM	sergeant major
SGT	sergeant
SHF	super high frequency
SICPS	standard integrated command post system
sig	signal
SIGO	signal officer
SINCGARS	Single-Channel Ground and Airborne Radio System
SOI	signal operation instructions
SOP	standing operating procedure
SPC	specialist
SPO	security, plans, and operations
spt	support
SSG	staff sergeant
SSI	signal standing instructions
SSO	signal staff officer
STANAG	Standardization Agreement
supv	supervisor
sw	switch
sys	system(s)
SYSCON	systems control
TACFIRE	tactical fire direction system
TACSAT	tactical satellite
TASE	Tactical Air Support Element
TCP/IP	transmission control protocol/internet protocol

tech	technical
ter	terminal
TOE	table(s) of organization and equipment
TP	telephone
TRADOC	United States Army Training and Doctrine Command
TRI-TAC	Tri-Service Tactical Communications
TROPO	troposcatter
UHF	ultra high frequency
US	United States (of America)
USA	United States Army
V	volt
veh	vehicle
VHF	very high frequency
VHF-FM	very high frequency-frequency modulation
xmit	transmit
XO	executive officer

REFERENCES

Required Publications

Required publications are sources that users must read in order to understand or comply with this publication.

Field Manuals (FMs)

24-1	Signal Support in the AirLand Battle
100-5	Operations
100-15	Corps Operation

Related Publications

Related publications are sources of additional information. They are not required in order to understand this publication.

Army Regulations (ARs)

310-25	Dictionary of United States Army Terms
310-50	Authorized Abbreviations and Brevity Codes

Field Manuals (FMs)

11-37	MSE Primer For Small-Unit Leaders
11-92 (HTF)	Combat Communications Within The Corps (How To Fight)
24-33	Communications Techniques: Electronic Counter-Countermeasures
34-62	Counter-Signals Intelligence (C-SIGINT) Operations

71-IOO (HTF)	Armored and Mechanized Division Operations (How To Fight)
90-14	Rear Battle
100-10	Combat Service Support

Forms

DA Forms

2028	Recommended Changes to Publications and Blank Forms

Standardization Agreements (STANAGs)

5040	NATO Automatic and Semi-Automatic Interfaces Between the National Switched Telecommunications Systems of the Combat Zone and Between These Systems and the NATO Integrated Communications System (NICS); Period 1975 to 1990s
5042	Military Telecommunications - Diagram Symbols

Projected Publications

Projected publications are sources of additional information that are scheduled for printing but are not yet available. Upon print, they will be distributed automatically via pinpoint distribution. They may not be obtained from the USA AG Publications Center until indexed in DA Pamphlet 25-30.

Field Manuals (FMs)

11-38	MSE System Management and Control
11-50	Combat Communications within the Division (Heavy and Light)

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