

C-E Planning



5-1. Introduction

Under the C-EMS structure, the C-E plans—and engineering—result from the staff planning methods used to develop C-E (signal) estimates and plans. At the higher levels of the command structure particularly, the C-E plans and orders developed provide only general guidance in the scheme of C-E support.

This chapter covers the functions involved in the C-E planning process. The list of functions presented here may be used as a planning guide for using communications resources, to include the installation, operation, and maintenance of C-E systems that satisfy user requirements. The planning functions involve responsibilities at all echelons; only their scope changes according to the planning needs of each command level. Additional information on C-E planning, procedures, and formats is in FM 24-16.



5-2. Relationship Between C-E Planning and Engineering

General guidance is of little value to the equipment team installing a circuit; therefore, at some point, planning must become engineering and provide detailed technical information. At that point, a detailed C-E (signal) order must be issued to activate the C-E system. The C-E order must satisfy the needs established or determined during the planning phase.

a. The amount of technical detail contained in the C-E order will vary with the level at which it originates; the higher the echelon in the organizational structure, the less the required detail. Even at the implementing level, C-E orders may not be specific if SOP's and other fixed directives are available and provide detailed implementing instructions. Obviously, if the C-E system can be activated with a simple, easily understood order, the communications needs of the supported command are more effectively satisfied. For this reason, standard procedures, preplanned interface, and standing instructions are established.

b. Specific functions of the planning elements are as follows:

- Preparation of C-E plans, estimates, and orders.

- Maintenance of records.

- Assessment and allocation of resources.

- Validation of user requirements.

- Preferential services.

- Issuing technical directives.

- Introduction of new equipment.

- Frequency management.

- Assignment of call signs.

- Contingency planning.

- Recording user locations.

- System security.

- Provision for messenger service.

- Directory service.

c. Engineering functions may be identified as distinct from planning functions but, in reality, are often inseparable from planning. Engineering functions are listed here to show their relationship to planning and are covered in detail in chapter 6.

- Network layout.

- Traffic engineering and diagrams.

- Circuit routing lists/bulletins.

- Traffic diagrams/bulletins.

- Line route maps.

- Multichannel systems and radio net diagrams.

- System performance analysis.

- Electronic counter-countermeasures.

Figure 5-1 shows a logical progression of planning and engineering functions.

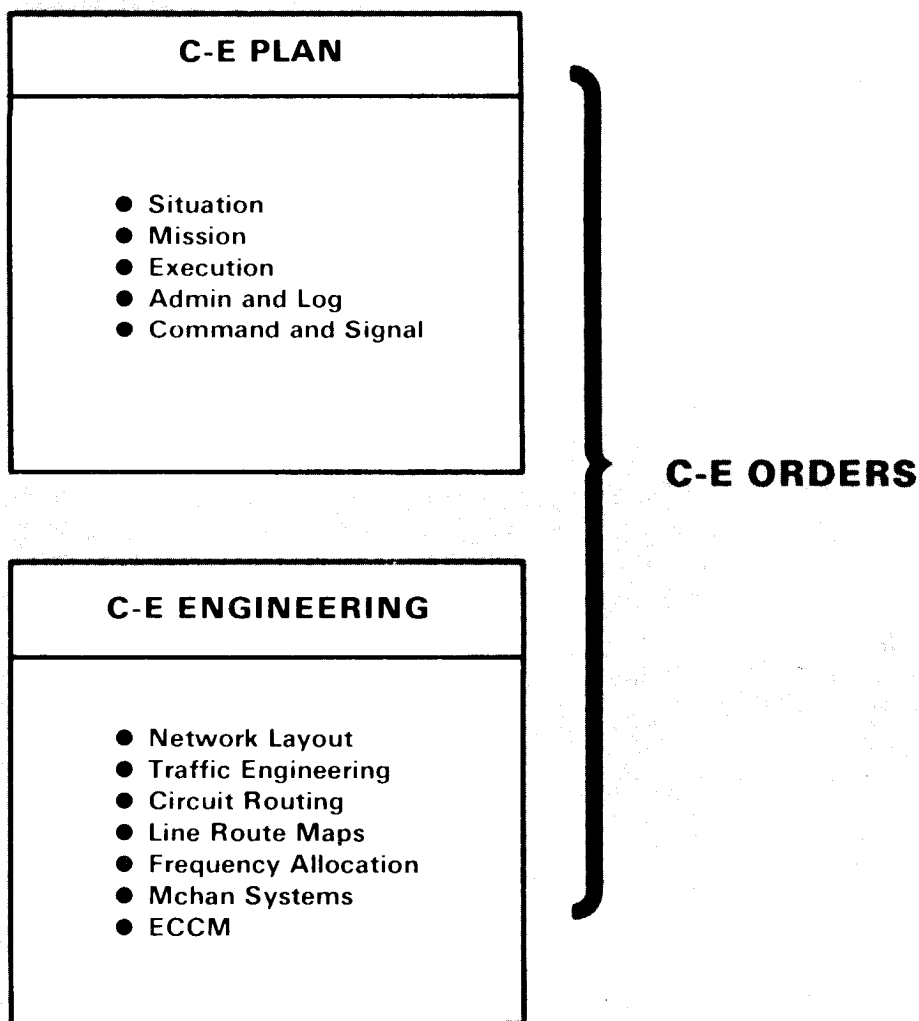


Figure 5-1. Progression of Planning and Engineering Functions

5-3. Preparation of C-E Estimates, Plans, and Orders

a. The C-E estimate is a continuing process that is seldom recorded, except at high command levels. However, if time permits, estimates may be kept at any level and used in preparing plans for future operations. Revision of the C-E estimate occurs constantly as new facts are introduced.

b. The C-E plan is based on paragraph 5 of the C-E estimate. It contains instructions and information about providing C-E support for the command as a whole. Specifically, the C-E plan—

- (1) Assesses the situation.
- (2) Defines the mission.
- (3) States the proposed method of execution.
- (4) Lists the administrative/logistical plan.
- (5) Lists the C-E instructions in effect and location of command posts.

c. C-E orders are combat orders that govern the installation, operation, and maintenance of the C-E facilities and systems that support strategic and tactical operations. They include the C-E portion of command operation orders, C-E operation orders, standing operating procedures (SOP), communications-electronics operation instructions (CEOI), diagrams, maps, overlays, and sketches—all of which are required for effective management and operation of the C-E system. The C-E orders are issued in the same format as the C-E plan and include annexes as needed for supplemental information.

d. SOP's and CEOI's are issued as needed and according to FM 24-16.

(1) SOP's cover those features of operations that lend themselves to a definite or standardized procedure without loss of effectiveness. In the absence of specific orders to the contrary, compliance with SOP is required. The major command staff will publish an SOP to provide instructions for those operations or activities that are considered normal and routine. The staff will also publish one for those situations that require rapid reaction by the command when the situation may not permit the issuance of any other instructions. These instructions may be included in the communications portion of the command SOP. The C-E officer also develops an SOP for his section to facilitate planning

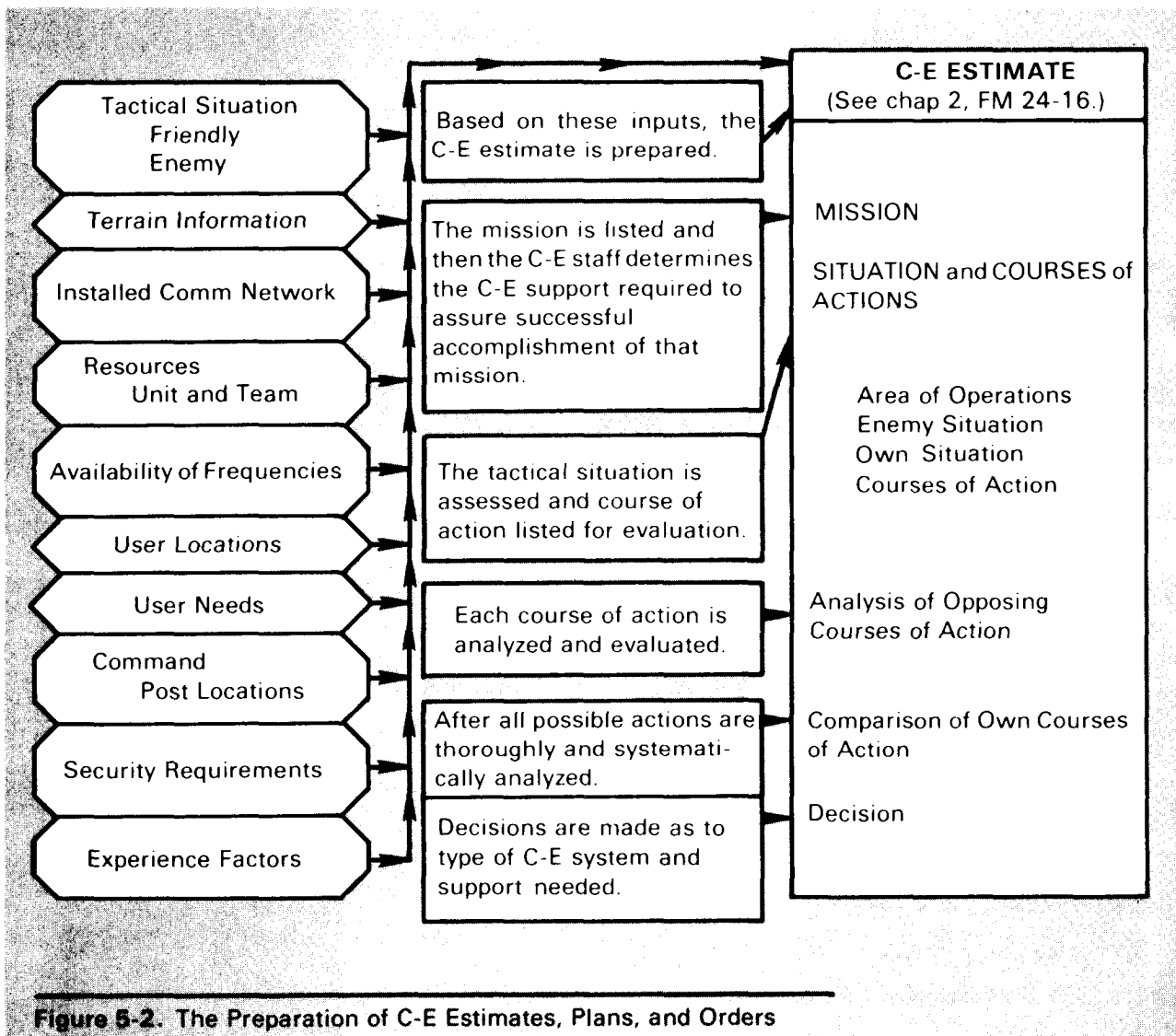


Figure 5-2. The Preparation of C-E Estimates, Plans, and Orders

and operations, and to insure that all elements of the section are aware of their assigned responsibilities and instructions. The senior signal unit and each of its subordinate units will prepare SOP's to provide instructions for the operation of each unit. Normally, the further down the line in echelon and operational level, the more detailed and specific the SOP becomes.

(2) The CEOI contains a series of instructions issued for technical control and coordination of communications-electronics operations of a command or activity. The automated CEOI is prepared and published by the Director, National Security Agency (NSA), and shipped directly to the COMSEC custodian of each command. Manually prepared CEOI's are produced locally. (See AR 105-64.) Subordinate C-E officers determine the distribution of CEOI items within their units and distribute the CEOI extracts required by their commands or units.

5-4. Procedures

a. The preparation of C-E estimates, plans, and orders closely parallels the planning and decision-making cycle followed by the commander and his staff. For a specific operation, this cycle starts with a mission statement, a commander's concept, and a command estimate; progresses into a command operations plan; and ends with the issuance of a command operations order. The C-E officer and his staff participate directly in the development of command estimates, plans, and orders. C-E estimates are developed to assist the commander in his overall estimate of the situation.

b. During the planning phases, the C-E officer advises the commander and other members of his staff on the capabilities and limitations of the available C-E support and develops a signal plan for each tactical plan. The C-E officer develops the instructions and information pertaining to the provision of signal support for the command as a whole, as well as administrative and logistics information to be incorporated into the command operations order. The C-E estimates, plans, and orders prepared by the major command should be concerned primarily with policy direction, operations, concepts, systems objectives, and special communications requirements for the use of the senior supporting signal units and subordinate major commands.

c. Remember that for the C-E system to function properly, it must be planned properly. And for it to be planned properly, there must be a free and continuous flow of information between the C-E staff and the CSCE.

d. After estimates have been made, plans developed, and orders written, the orders are published, distributed, and implemented.

5-5. Maintenance of Records

a. Records pertaining to C-EMS functions will be kept in accordance with AR's 340-2 and applicable 340-18 series. Table 5-1 is a summary of the types of C-EMS records normally retained by the C-E section at major command headquarters and at senior signal units. The records may be in the form of documents, cards, messages, diagrams, overlays, photographs, or whatever form that can be best utilized and maintained. C-EMS records will be standardized in both format and content. Records are retained according to procedures established by each major command. Table 5-2 is an example for corps.

b. Permanent records will not be maintained by signal organizations below TCC(A) and signal brigade levels. Permanent records for corps and division will be incorporated into the records of their respective major commands. Within a theater of operations, permanent records of C-EMS operations pertaining to system status and performance, use of equipment and supplies, personnel and training, experience data, and user requirements will be centralized at theater army level or the senior combat zone command. When required, theater army or the senior combat zone command will supply information derived from these permanent records to CONUS. The report is called the Communications System Information Summary.

Summary of Records

C-E ESTIMATES & PLANS	Issued at all echelons IAW instructions and guidance from higher headquarters.
C-E ORDERS	Normally issued as the C-E annex to the operations orders of the command or of the senior signal unit.
CIRCUIT ROUTING CHARTS/ BULLETINS	Prepared by C-E staffs for issue to subordinate units.
TECHNICAL DIRECTIVES	Issued at all echelons as implementing instructions for the provision of service, network changes, or imposition of restriction measures.
CSCE/CNCE LOGS	Record of system or nodal operational events, including information related to reporting, restoration of service, and ECCM.
TELEPHONE DIRECTORY	Published by major commands for use in their command and area systems.
CIRCUIT RECORDS	Maintained by operating facilities at each node (CNCE, CESE).
COMSEC RECORDS	Maintained by COMSEC section at all levels.
REPORTS	Information which originates at communications nodes and includes such key reports as: operational resources reports, trouble reports, activation/deactivation reports, traffic status reports, and special communications authorization requests.
SPECIAL REPORTS	Unstructured reports which indicate compliance with or implementation of technical directives, special orders, etc.

Table 5-1. Summary of Records

Legend:

- (S) = short term retention—retained only through completion of the required implementation actions or only as long as the service continues to be provided. Most area company level CNCE records are in this category.
- (M) = mid-term retention—retained 60 days. Area battalion level CSCE records are normally in this category.
- (L) = long-term retention—retained for periods up to 180 days. C-EMS records of a signal group fall in this category.
- (I) = Indefinite retention—C-EMS records for purposes such as broad planning, trend analysis, performance analysis, or historical reference are retained for an indefinite period. Records of TCC(A) and signal brigade are in this category.

Item	Originator/ Recipient	Action	Retention Category
Operational Resources Record	Co HQ/CNCE	Send to Bn HQ daily; log entry	S
	Bn HQ/CSCE	Review; send consolidation to brigade HQ daily	M
	Bde HQ/CSCE	Consolidate and review. Send monthly summary to C-E Sec	M
	C-E Sec	Review; retain for system performance analysis	L
Trouble Record	CNCE	Send to Bn CSCE; log entry	S
	Bn CSCE	Log entry; issue restoration instructions or forward to Bde. CSCE major outages and interference reports	S
	Bde CSCE	Log entry; issue necessary restoration instructions; forward. interference reports to C-E Sec; file for historical summary	M
	C-E Sec	Review interference reports for corps frequency action or forward to TA as required; file for system performance analysis	L
Activation or Deactivation Record	CNCE	Send to Bn CSCE; log entry	S
	Bn CSCE	Log entry; forward to Bde CSCE responses to Bde technical directives; record in circuit routing chart/bulletin	
	Bde CSCE	Log entry; record in circuit routing chart/bulletin	M
Traffic Status Record	CNCE	Reviews and sends to Bn CSCE daily; log entry	S
	Bn CSCE	Log entry; review and forward node reports to Bde CSCE	
	Bde CSCE	Log entry; distribute to Traffic Br; send weekly summary to C-E Sec; file for historical summary quarterly	M
	C-E Sec	Distribute to Traffic Br; retain for system performance analysis	L
Special Communication Authorization Request	Co HQ/CNCE	Review and recommend to Bn CSCE; log entry	S
	Bn HQ/CSCE	Approve if within installed resources and notify Co HQ; otherwise forward to Bde HQ. File for historical summary	M
	Bde HQ/CSCE	Review and approve if within available resources and notify. CSCE concerned. Otherwise forward to TA for approval. Retain for historical summary	L
	C-E Sec	Review and approve. Issue technical directive	I
Circuit Records	CNCE	Maintain circuit cards for circuits at nodes and extension links	S
	Telephone/Teletype- writer/Data Switch	Maintain record of node subscribers	S
Telephone Directory	C-E Sec	Prepare and publish. Provide updates monthly; distribute to Bde units	L
	Bde CSCE	Distribute to Bn HQ	S
	Bn CSCE	Distribute to nodes	
	CNCE	Implement in directory service	S
CNCE/CSCE Logs	CNCE	Retain	M
	Bn CSCE	Retain	L
	Bde CSCE	Retain	L
Circuit Routing Lists/ Bulletins	Bde CSCE	Prepare and update. Distribute to Bn CSCE	L
	Bn CSCE	Distribute extracts to nodes; update as changes occur	M
	CNCE	Log entry; implement	S

Table 5-2. Records Keeping: Corps

Item	Originator/ Recipient	Action	Retention Category
Technical Directive	C-E Sec	Prepare directives to brigade headquarters	L
	Bde HQ/CSCE	Prepare work orders for issue to Bn HQ	M
	Bn HQ/CSCE	Prepare work orders for Co HQ	S
	Co HQ/CNCE	Issue verbal instructions to platoon HQ or CNCE; log entry	S
	CNCE	Circuit card entry	S
C-E Estimates/ Plans	C-E Sec	Prepare and distribute within headquarters and to signal brigade	I
	Bde HQ/CSCE	Prepare brigade plan and distribute to Bn HQ	I
	Bn HQ/CSCE	Prepare Bn plan and distribute to Co HQ	L
	Co HQ/CNCE	Prepare node plan	M
C-E Orders	C-E Sec	Prepare signal annex to HQ operations orders	I
	Bde HQ/CSCE	Initiate circuit and traffic engineering; issue C-E operations orders and technical directives to Bn HQ	L
	Bn HQ/CSCE	Prepare work orders for Co HQ	M
	Co HQ/CNCE	Issue instructions to platoon HQ or CNCE; log entry	S
	CNCE	Circuit card entry	S

Table 5-2. Records Keeping: Corps cont'd

5-6. Assessment and Allocation of Resources

To meet the communications needs of force deployment in the best possible way, C-E requirements must first be evaluated. Then, available resources are allocated to satisfy valid needs to the greatest extent possible.

a. Resources, in the C-EMS context, include communications equipment with associated power generators and vehicles; communications operations, planning, and engineering personnel; frequencies and systems facilities, such as channels, trunks, subscriber terminal equipment; and messenger service.

b. Assessment and allocation are performed at all levels where responsibility for systems planning and engineering, control, and operations are performed, and are continuing processes. All signal unit commanders are responsible for assessing and allocating their resources under the guidance and policy of the major commander. Commanders must know the relationships between personnel and crew-served equipment configurations.

c. A data base is established and maintained to provide accurate and timely information about the status of resources and proposed network changes. It is periodically updated, preferably daily, by node or facility commanders who report to the controlling CSCE. The data base is not necessarily computerized, although it probably will be. It is used—

- (1) To determine the availability of personnel and the operational status of equipment for establishing systems.
- (2) For extension or reconfiguration of systems.
- (3) For restoral action after damage to the network.

d. Communications resources status information will be maintained in CSCE data bases for use by major C-E staff sections and signal unit commanders. The data base includes information on—

- (1) Personnel/equipment teams status.
- (2) Available stocks of selected critical items.
- (3) Maintenance levels.
- (4) Communications specialists in theater training.

(5) Resources in transit.

(6) Status of organic communications resources of nonsignal units.

e. The CSCE supporting a signal unit makes recommendations on the allocation of resources based on system status, anticipated requirements, current and projected availability of resources, and the major command priorities. However, the controlling signal commander actually does the allocation using signal orders, technical directives, and similar documents as a guide. Allocations are normally made in response to—

(1) Trouble reports.

(2) User communications requirements.

(3) Orders from higher headquarters.

f. While priorities for resources allocation are a command decision based on operational necessity, the key thought in allocation is economy of resources. Two important factors that relate to the economy of resources are—

(1) Alternate systems must be kept to a minimum. Maximum use of channel capacity must be accomplished by using common-user circuits.

(2) The allocation of dedicated circuits and subscriber terminal equipment—over normal SOP distribution—must be closely monitored.

5-7. Responsibilities for Assessment and Allocation

a. For assessment and allocation to be fully effective, guidelines must be established by the headquarters of the highest echelon signal organization. The guidelines should delineate—

(1) Responsibilities.

(2) Delegation of authority to commit resources.

(3) Issuance of specific instructions as to the extent a unit may expend its capability (including the numbers and types of teams for which commitment may be made without referral to the next higher headquarters). This applies particularly to system restoral actions executed on the basis of system integrity and operational priorities.

b. To insure adequate responsiveness and flexibility in providing communications support, the extent of the commitment of communications resources by the next subordinate command will be established by each command echelon. The extent of commitment will be between 80 and 90 percent of available resources. Authority to commit resources to the threshold level should apply both to installed and uncommitted equipment and to personnel. When requirements for resources cross command lines, the decisions will be made by the headquarters with control over the unit involved.

c. In planning for the effective employment of the allocated resources, the time element is a major governing factor, especially where restoral action is concerned. Calculations for restoral of service must consider the point of availability of the resources and travel time to the point of installation. For example, a shelter in a transportable configuration may be removed from its prime mover and transported by heavy lift helicopter, while the organic vehicle proceeds to the site by road.

5-8. Validation of User Requirements

a. A tactical communications system must be designed and operated only within unit capabilities and only in direct response to the tactical mission.

Unit commanders and their staffs must neither request nor plan upon a communications system that exceeds the primary needs of the unit. Basic user (unit) requirements for communications are broadly prescribed in Army doctrinal publications and are reflected in the basis of issue (BOI) of terminal equipment authorized for user units. User requirements are also reflected in the amounts and capacities of switching and transmission equipment authorized for signal units providing C-E support.

b. The planning and engineering of a communications system for maximum effectiveness within available resources require precise identification and validation of user requirements.

(1) In the command communications system, most requirements are fixed, known in advance, and subject to little change.

(2) In the area communications system, requirements for common-user support are not as fixed as in the command system. Requirements will vary with troop deployment and changes in support of unit locations.

(3) The theater army C-E section will identify requirements for basic communications circuits and for support of the army in the field. The section will publish these requirements in an SOP as guidance for major commands and their supporting signal units.

c. The types and amounts of access communications to the command, area, and theater systems will be prescribed for the combat, combat support, and combat service support units on the basis of published doctrine, if available, or experience factors. In this way, a baseline network can be designed and installed to satisfy minimum essential user requirements. In addition to baseline requirements, tactical situations and changing environments require that a means be provided for users to obtain changes to their normal communications support when necessary.

d. The validation of new requirements begins when the potential user submits a request, either oral or written, to the CNCE supporting the unit involved. The CNCE grants the request if it has the capability and authority. Otherwise, the CNCE prepares a special communications authorization request (SCAR) and submits it to the next higher headquarters and subsequently to the unit with the resources to grant the request. Figure 5-3 shows the procedures for validation of user requirements.

5-9. Preferential Services

Preferential services are provided to users (usually select users) to insure continuity of operations or to improve responsiveness to situations.

a. In tactical C-E systems that employ manual switching, preferential services are usually provided either by dedicated circuits or by call supervision by telephone operators. Automatic switches, however, can and do provide preferential service by selective programing; there is no need to use dedicated services or the operator.

b. The following are some of the preferential services that can be provided by automatic switches.

(1) Assignment of precedence and preemption capability.

(2) Call forwarding.

(3) Conferencing (preprogramed, progressive, and broadcast).

(4) Off-hook service (direct access capability (DAC)), sometimes called a hot line.

(5) Assignment of a fixed directory number to selected mobile subscribers.

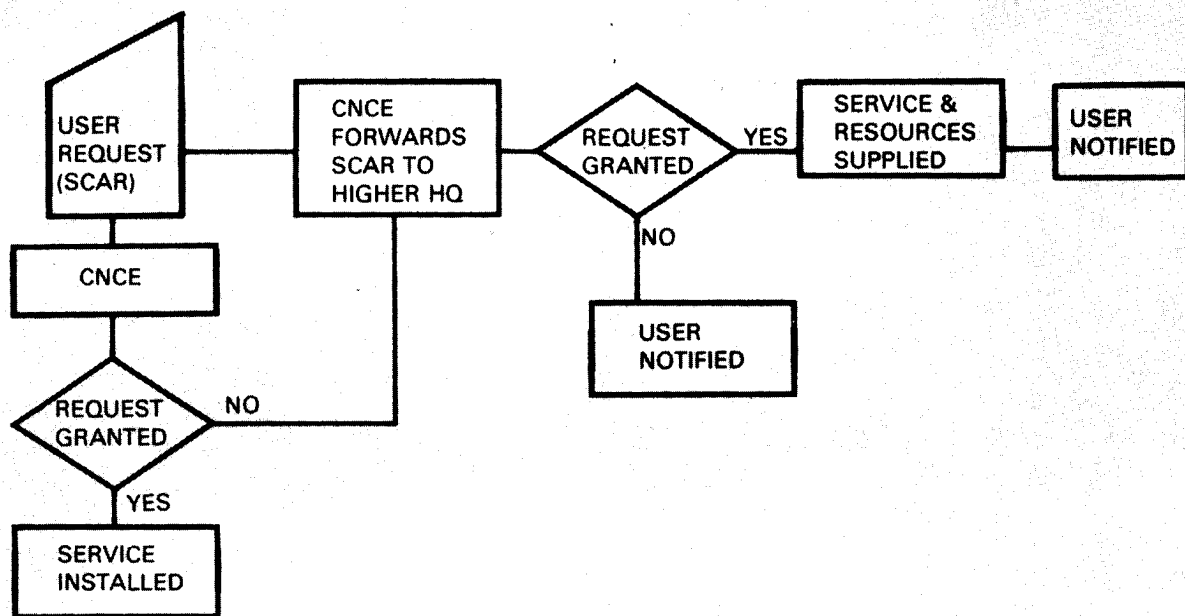


Figure 5-3. User Request Processing

c. Since the demand for preferential services usually exceeds the capability of the equipment, the services must be limited to those who really need them. Initial requests for preferential services should be submitted to the system planner during the design phase of the C-E system. After the C-E system is established and as the need arises, a potential user may submit a special communication authorization request (SCAR) to the commander of the node serving the user's organization. The decision on who gets preferential service will be made at the major command level. Authorized preferential services will be included in the SOP of the supporting signal unit and will be reflected in instructions to the CNCE's and automatic switches involved.

5-10. Issuing Technical Directives

a. A technical directive is used to initiate, govern, or order a certain action, procedure, or policy. The directive may be either oral or written; the lower the echelon, the more likely they are to be verbal directives.

b. For efficient functioning of the C-E system, there must be an unrestricted flow of technical information between C-EMS elements. Thus, technical directives are issued at all C-EMS echelons (fig 5-4) to provide amplifying instructions on procedures, standards, methods, and techniques used to implement major C-EMS decisions. Directives are also used to assist in system coordination and uniformity of operations. Guidelines on issuing and recording technical directives are as follows:

c. Technical directives are issued by C-E sections of major commands or by CSCE's to subordinate counterparts or signal units. Those directives that

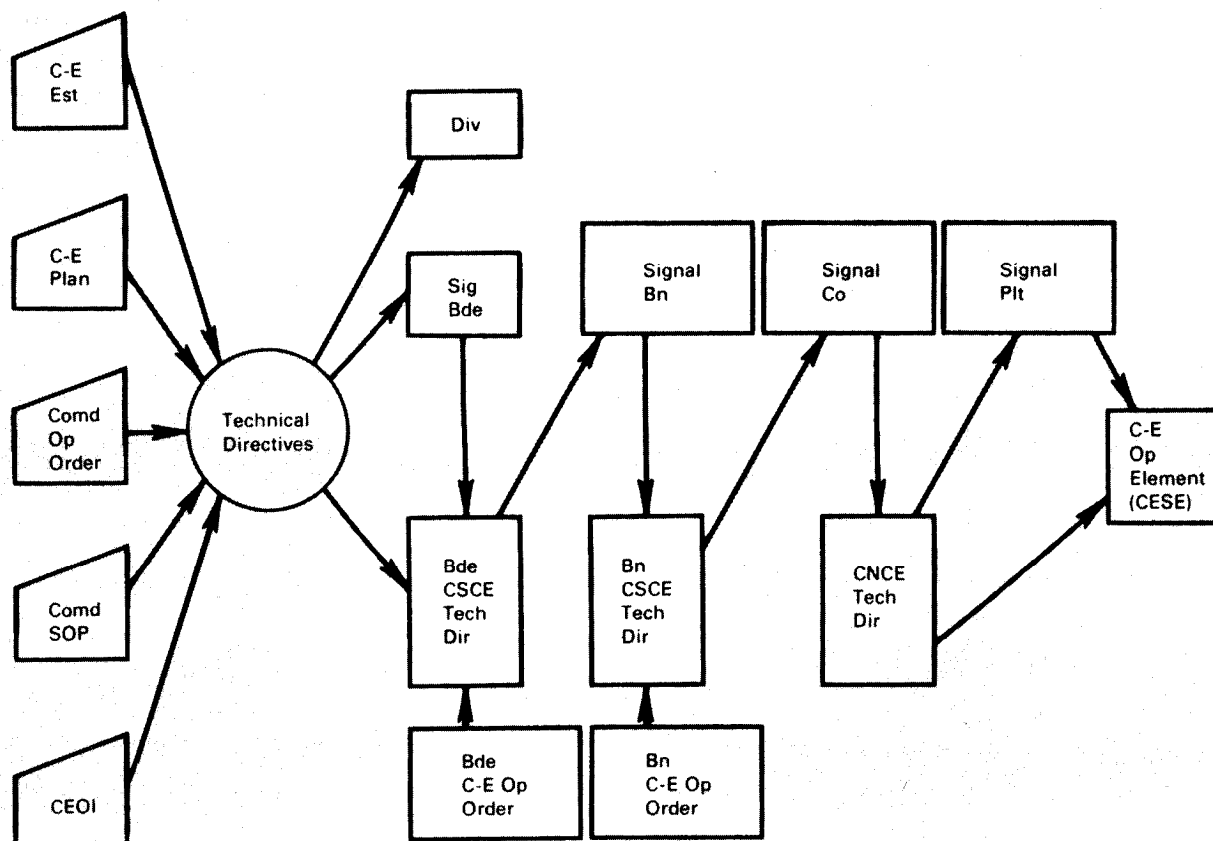


Figure 5-4. Flow of Technical Directives in the Corps

deal exclusively with technical C-EMS matters, not of a command nature, should flow through technical channels without regard to major command boundaries and the formal C-EMS structure. Typical technical directives issued within a corps are listed in table 5-3.

d. Technical directives pertaining to the allocation of resources and to changes in formal plans and orders are issued by the corps C-E section and by subordinate signal command echelons, in turn.

e. Technical directives relating to procedures, methods, and techniques are normally issued at the CSCE/CNCE levels. In some instances, they may be issued by the corps C-E section.

f. Certain technical directives are issued and applied under the same general rules that apply to formal orders. For example, some C-EMS directives impact on C-E matters and require authentication by the originating commander or his authorized representative. In this category are:

The allocation of resources.

Changes to command communications plans.

Modifications to command policies and directives.

g. The CSCE and CNCE concerned maintain a Master Station Log, DD Form 1753, to record technical directives issued and received, as well as their disposition.

Issuing Echelons for Type Technical Directives in the Corps

Directive	Issuing Echelon							
	Corps C-E Sec	Sig Bde	Bde CSCE	Sig Bn	Bn CNCE	Sig Co	CNCE	Sig Pit
1. Telecom Service Orders			x		x		x	x
2. Resource Allocations		x		x		x		x
3. Validation of Communication Requirements	x	x	x			x		
4. Change to Plans and Orders	x	x		x				
5. Circuit Routing List/Bulletin	x		x					
6. Mchan Systems Diag/Bulletin	x		x					
7. Radio Net Diag/Bulletin	x		x					
8. Traffic Diag/Bulletin	x		x					
9. Network Layout-Inst or Changes	x		x					
10. User Locations	x		x		x		x	
11. Patching Procedures or Instructions			x		x		x	
12. Testing Instructions			x		x		x	
13. Restoration Priorities	x							
14. Instructions for Troubleshooting			x		x		x	
15. Security Instructions	x	x	x	x	x	x		x
16. Traffic Handling Instructions	x		x		x		x	
17. Standards for Area Center Layout	x		x		x			
18. Standards of Construction	x		x		x			
19. Frequency and Call Sign Changes	x							
20. Teletypewriter & Data Routing Changes	x		x					
21. Modification of Automatic Switch Data	x		x				x	
22. Restrictive Measures Instructions	x		x		x			
23. Authentication Procedures	x		x					
24. Reporting Procedures			x		x		x	
25. System Lineup Procedures			x		x			
26. Messenger Schedules	x		x		x			
27. Telephone Directory Changes	x		x					
28. Telephone Operator Instructions			x		x			

Table 5-3. Issuing Echelons for Type Technical Directives in the Corps

5-11. Introduction of New Equipment

To meet the constantly changing needs of the tactical situation, new C-E equipment is continuously being designed, produced, tested, and introduced into the field. The objective is to provide improved technical capabilities in our communications system. In the process, new items must be introduced into the system with a minimum of confusion and disruption of service to users. Normal practice is to keep both the old and the new equipment operating in parallel. This allows continuance of service to the users and, at the same time, provides training time to operators and maintenance personnel. Then, as time—usually a specified time frame—goes by, the old items are withdrawn, evacuated, and either reissued to other

units that need them or packed and shipped to CONUS. Security is of prime importance and every effort must be made to keep the enemy from discovering whatever unique capabilities are provided by the new equipment.

a. Organizational levels of responsibility. A primary requirement in the introduction of new equipment is close coordination between CONUS planning personnel and theater army personnel. Shipping schedules, deployment phasing, logistical support, personnel, training, and use of new equipment training teams (NET) from CONUS sources should be closely coordinated. Prior to introducing new equipment, appropriate C-EMS elements should make detailed assessments of the operational characteristics and interface requirements for new equipment and then prepare the necessary changes to C-EMS policies, methods, and procedures.

(1) Theater Army. Within the COMMZ in a theater of operations, the theater army C-E section will control the introduction of new communications equipment.

(2) Corps. Within the combat zone, the corps will handle the introduction of new equipment.

(3) Division. The C-E sections of both corps and division will coordinate the introduction of new equipment for units in their respective commands.

b. Staff responsibilities. Each major command C-E staff is responsible for insuring that adequately trained personnel for both operation and maintenance, along with repair parts, special test equipment, and documentation, are available before commitment for operation is given. The major command C-E staffs also provide wide distribution of new equipment phasing-in schedules to insure smooth transition from old to new. As new equipment replaces old equipment, inventory changes must be updated and reported on the operational resources report.

5-12. Radio Frequency Management

Radio frequency resources (channels of the frequency spectrum) are in critically short supply and their use requires closely controlled, proper management. And because radio frequencies are so important, their allocation and assignment is a command function and a command responsibility. Each command must implement effective control procedures to insure that electromagnetic emissions conform to the policies of the higher headquarters.

The essential factors that must be considered in operational planning include frequency requirements and availability, assignment priorities, and geographic and technical limitations. Whenever possible, frequency sharing should be used. This can be accomplished through proper management, control, and training. Careful planning and management is a must to prevent mutual interference or saturation of any portion of the radio spectrum.

5-13. International Frequency Control

Use of the radio frequency spectrum in all countries is governed through the United Nations (UN). The controlling agency of the UN is the International Telecommunications Union (ITU) which, through periodic international conferences, concludes treaties regulating the use of the radio spectrum, obtains standardization of methods and procedures, and minimizes interference. In addition, most ITU member countries impose additional regulatory measures beyond those required by international

treaty. Only those frequencies assigned and approved by the host country are to be used.

a. When the host country for US forces has a controlling government, the allocation of frequencies within that country is under the control of that government. Allocation and use of frequencies are diplomatic matters that are resolved by the heads of state or the official representatives of the governments involved.

b. After a base of operations is established in the host country, the task force commander continues negotiation on frequency allocations with the government of that country.

5-14. Frequency Management Channels

In all overseas commands involving large geographic areas and employing two or more armed services, a unified command is established—a theater of operations. The major Army, Navy, and Air Force headquarters are component commands within the theater.

Frequency management in an overseas area is under the control of the highest command present. If it is a unified command, the Joint Chiefs of Staff (JCS) provide policy guidance and the theater commander provides guidance to the component commands. Figure 5-5 shows the JCS management channels.

5-15. Theater Level Frequency Management

The theater commander exercises control over radio frequency usage within the theater through his joint staff. The Director of Communications Electronics (J6) has primary staff responsibility for frequency management in the theater. The office of the J6 includes a frequency management section with a trained frequency management officer as the section chief. He and his staff are responsible for the allocation and assignment of all frequencies used by US forces within the theater or zone of operations.

5-16. Theater Army Frequency Management

a. Theater Army (J6) Section Functions. The Frequency Allocation and Call Signs Branch, Plans Division, of the theater army C-E section is responsible for summarizing the frequency requirements of all subordinate commands. The branch then prepares frequency allocation lists which are published as the Frequency Allocation and Usage (FAU) list of the unified command. Thus, the branch performs frequency planning, coordinates the use of frequencies, and publishes frequency information to subordinate commands. In performing its functions, the branch participates in frequency planning with both higher and lower commands, and helps to insure that the policies and directives of higher echelons (fig 5-5) are being followed. The Frequency Allocation and Call Signs Branch also maintains records of frequency assignments, including a master list of frequency and call sign allocations and assignments for the entire Army area of operations.

b. Theater Communications Command (Army) (TCC(A)) Functions. The Frequency Allocation Branch of the J-6 section (CSPE) in the TCC(A) manages radio frequencies for the TCC(A). The branch is the primary point of contact in the TCC(A) for all radio frequency assignment actions. The branch coordinates frequency requirements and forwards authorized assignments to TCC(A) operating units. It also maintains records, prepares reports, and initiates all required actions regarding radio frequency matters for the TCC(A).

NOTE: In the standard C-E management structure, the TCC(A) ranks as a subordinate command of theater army and receives its frequency allocation through the TA C-E section (J6). In turn, the TCC(A) allocates frequencies to other TA subordinate commands for operation of the TCC(A). managed theater communications system. However, the theater commander may elect to have the Frequency Allocation Branch, TCC(A), perform all frequency management for the theater.

c. Frequency Management Considerations. Higher echelons (fig 5-5) and the host country may impose frequency and frequency related restrictions on theater army. These restrictions, plus those of the TA commander, will, in turn, be reflected in the frequency assignments and allocations to lower echelons. Generally, restrictions are related to the size of the TA area of operations, the requirements of the host country and allied forces, the types and quantities of equipment being operated, the limited frequency spectrum

U.S. Military Frequency Management Channels

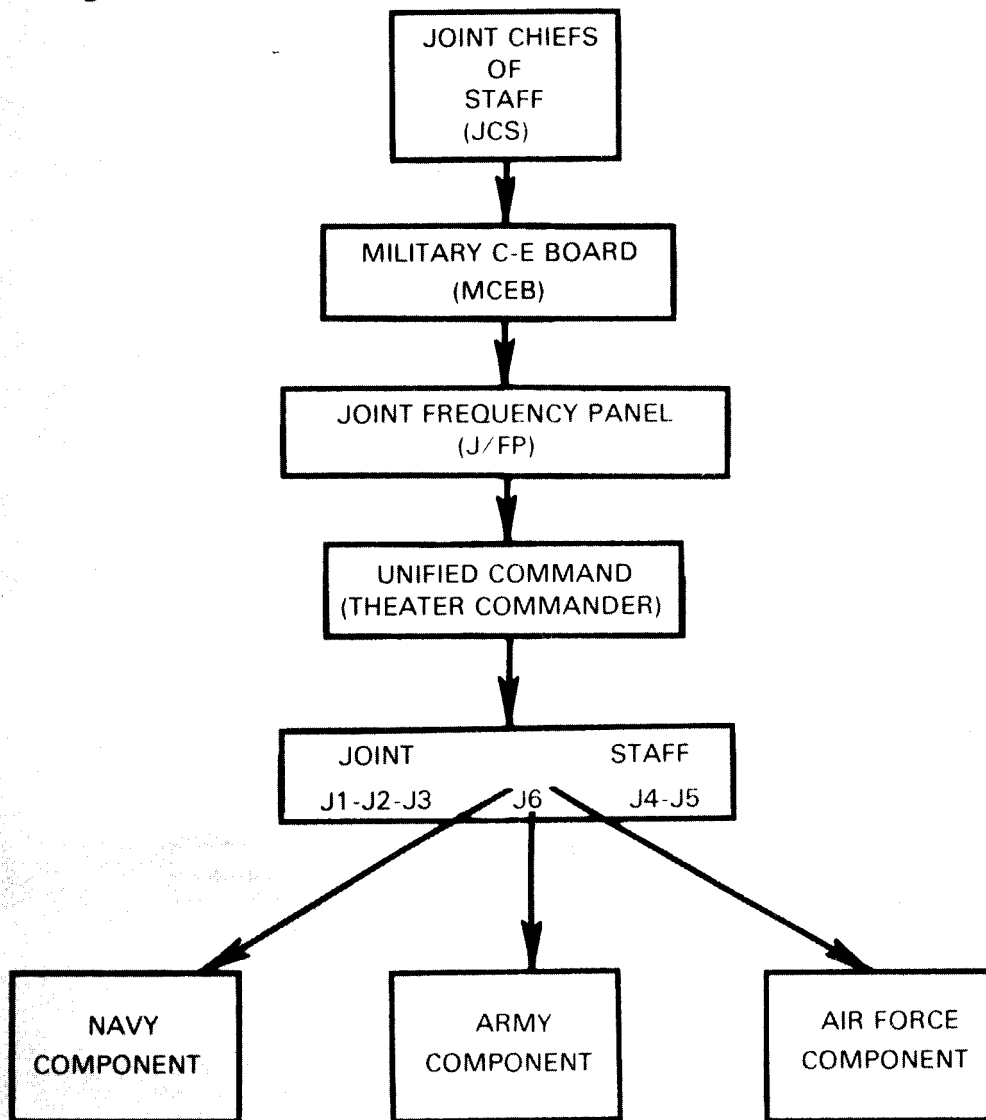


Figure 5-5. U.S. Military Frequency Management Channels

available, requirements for strategic communications, etc. The following items are typical of factors that must be considered in frequency management at the theater army level.

(1) Because requirements for tactical FM frequencies will greatly exceed their availability, frequency sharing must be used. The frequency list technique of assignment and allocation and interference charts must be used to avoid mutual interference.

(2) Subordinate TA units must submit justified frequency requirements at least 90 days prior to the date of anticipated use. If this is not possible, current assignments may be used until requests are processed and authorized. The TA commander is responsible for proper use of frequencies.

(3) The higher command will allocate multichannel frequencies to theater army based on the operating frequencies of the equipment used in the theater. Restrictions on multichannel frequencies may be imposed by the host country or because of their use by other US forces and allies in the TA area.

NOTE: The ABM plan (FM 24-2) or other effective method of frequency assignment must be applied to obtain maximum use of each available multichannel frequency.

(4) Theater army must obtain individual approval for all HF communications that use skywave propagation or that transmits at more than 500 watts from:

The joint force (theater) commander;

The joint frequency panel (J/FP) of the US Military C-E Board (MCEB);

The Allied Radio Frequency Agency of NATO;

The host country; or,

A representative combination of the above.

(5) For HF communications that transmit at 500 watts or less, theater army must obtain a list of cleared frequencies from the joint force (theater) commander.

(6) For AM air-to-ground, tropospheric scatter, and satellite communications, the joint force (theater) commander or the Department of the Army provides frequency allocations on an individual basis to TA.

(7) The joint force (theater) commander provides a list of authorized FM frequencies (30-76 MHz) to TA. Restrictions imposed by the host country and special operations will be included.

5-17. Corps Level Frequency Management

The corps C-E officer is responsible for providing radio frequency management support to all corps units and coordinates with theater army elements operating in the corps area. The Frequency Allocation Branch of the corps C-E section, under the supervision of the corps C-E officer, performs the frequency management functions. The section consolidates the justified requirements of all subordinate divisions and attached units and submits a request for frequency allocations to theater army. Within the Frequency Allocation Branch, the radio frequency officer, assisted by the area communications chief NCO, coordinates frequency allocations, assignments, and use. His duties include but are not limited to:

a. Coordination of the implementation of the automated CEOI and other directives from theater army.

b. Coordinating frequency allocations and call signs with subordinate commands of the corps.

NOTE: When the CEOI is manually prepared, the radio frequency officer is directly responsible for implementing the CEOI and allocating frequencies and call signs, as opposed to a coordinating function. (See AR 105-64.)

c. Representing corps at radio frequency management conferences of higher headquarters.

d. Resolving the interference problems of subordinate units referred to the Frequency Allocation Branch for solution. All problems are reported to higher headquarters.

e. Maintaining records of all frequency assignment within the corps area of operations.

f. Receiving, processing, and forwarding to higher headquarters the radio frequency requirements for all C-E operations in the corps area.

5-18. Division Level Frequency Management

The division C-E officer, who is also the division signal battalion commander, is responsible for frequency management within the division. He supervises the division C-E section which includes a radio officer who, in turn, performs/supervises the frequency management functions as follows:

a. Determining the frequency needs of the division prior to moving into an area of operations. A list of the types and numbers of emitters to be used is submitted to the corps C-E section, along with a request for frequencies.

b. Resolving interference problems within the division. Unresolved problems are referred to the corps C-E section.

c. Making frequency and call sign assignments to assigned and attached units of the division. Assignments are selected from the list of frequencies and call signs authorized by corps. Normally, subordinate units of the division are permitted to use only their assigned operational frequencies. However, the brigade commander may authorize a changeover to spare frequencies when interference occurs. The division radio officer is notified immediately about the interference problem and the changeover.

NOTE: When an automated CEOI assigning frequencies and call signs is used, the division radio officer is responsible only for its distribution and coordinating its implementation. In cases of interference, he forwards reports of changes to alternate frequencies and call signs to the corps C-E section.

d. Coordinating with the radio officers of the other divisions to establish common frequency usage and to solve interference problems.

5-19. The Automated CEOI

The National Security Agency (NSA) prepares, publishes, and forwards the automated CEOI to theater for further, controlled distribution with the theater. The automated CEOI is based on input frequency requirements and unit lists within the theater which are submitted to NSA (or gathered by ASA teams). A computer is used to assign both frequencies and call signs on a randomly accessed, nonpredictable basis. This precludes duplication of call signs and minimizes the interference of frequencies. The CEOI includes alternate frequencies for use in isolated cases of interference problems.

a. Call Signs. The automated CEOI includes call signs which are assigned to a unit, not to a net. Each call sign is a letter-number-letter (LNL) combination that is pronounced phonetically; e.g., A1B is alpha one bravo. Two-word call signs (as described in ACP 119) will no longer be used. The system of randomly assigned, daily changing suffixes (similar to the telephone directory arrangement) is used to expand the basic LNL call sign.

b. Changes to the CEOI. The C-E officers at division, corps, and theater army are responsible for the management of call signs and other aspects of the automated CEOI. Each C-E officer distributes CEOI material to the subordinate using units and is responsible for its proper use. Routine changes to the CEOI, such as additions, deletion of authorized frequencies, changes in organizations, etc., may be forwarded direct to NSA or through the ASA support teams.

5-20. Contingency Planning

a. Contingency planning is performed continually at all echelons to provide direction in anticipation of force redeployment or specific emergency situations that could disrupt or threaten the continuity of communications networks. Its purpose is to insure the rapid establishment, restoration, or rerouting of both user and C-EMS communications. Contingency planning should be included in the planning and design of a communications system or installation to insure its reliability; or, may be in response to planning requirements originated within the C-EMS structure to cover specific situations.

b. Communications reliability is the first consideration in all planning. To insure reliability, the C-E planner must provide a communications system with alternate means; train personnel to operate equipment properly during situations of stress and emergency; include in SOP's the requirement for dispersion and protection of critical communications facilities; and provide supply and maintenance support to reduce circuit outages to an absolute minimum.

c. The C-E officer is responsible for C-E contingency planning within a major command and provides planning guidance to subordinate signal units. The contingency plans of senior supporting signal units should be reviewed and approved by the C-E officer of the major command. Normally, the C-E officer of the major command will issue a planning directive specifying the conditions that constitute the contingency requirements. Typically, the conditions are damage resulting from enemy action, weather, a disruption due to fire, equipment failure, or other catastrophe. The guidance should also specify the degree of damage to be considered, such as loss or damage to a major equipment item, an entire node, or an extension link. Planning constraints are also provided regarding available resources and restoration priorities. Based on the guidance in the planning directive, appropriate echelons within the C-EMS structure will prepare contingency plans.

d. The major command contingency plan will generate the development of implementing plans by subordinate units. Specified restoral actions may include patching and rerouting, institution of restriction measures, or replacement of major equipment configurations and operating teams. Included in the contingency planning process is the requirement to dry-run the plan to determine its effectiveness and to provide a basis for required modifications.

e. Contingency planning must include a COMSEC element. Emergency plans must be prepared for use in case of natural disaster, enemy attack, and/or civil riot or uprising. Refer to AR's 380-40 and 380-41 for additional information.

5-21. Recording User Locations

a. Information regarding the location of users of communications facilities is essential both for accurate planning and engineering of communications systems and for communications support by communications nodes. Planners must be aware of all locations of supported users to include allies and other US forces, as well as Army units. User locations become more defined and detailed as an operation progresses and as information becomes available about current and future command post locations, to include main, TAC, etc.

b. C-EMS elements and the user have joint responsibility in recording user location: the user must report his current and planned locations; and, the C-EMS elements must keep all units involved in supporting the user aware of the locations.

(1) The C-E section of each major command maintains records of user locations and provides information to senior signal units concerning future unit arrivals, departures, and movements as soon as the information becomes available.

(2) The CSCE's maintain information on locations of major command headquarters, separate command headquarters, brigade, and group headquarters supported by the communications system for which they are responsible.

(3) The CNCE's provide the locations of supported units by reporting unit arrivals or departures to controlling CSCE's using telecommunications service orders (TSO) or special communications authorization requests (SCAR) if communications service for new units has not been planned.

5-22. Security

a. Both communications security (COMSEC) and system security are responsibilities of the commanders at all echelons. And although the C-E officer at each echelon acts for the commander in all matters pertaining to COMSEC and system security, security is everybody's business—from the highest commander to the lowest ranking enlisted person.

b. COMSEC is the protection that results from all measures designed to deny unauthorized persons any information of value which might be derived from the possession and study of telecommunications; or, to mislead unauthorized persons in their interpretation of the results of such possession and study. COMSEC includes:

(1) Cryptosecurity.

(2) Transmission security.

(3) Emission security.

(4) Physical security (of communications security materials and information).

(5) The security of unclassified material which, if pieced together with other material, might reveal classified intelligence.

(6) Accounting for COMSEC material and CEOI items, to include maintaining records and data on COMSEC practices essential to maintaining required standards of system security. Data processing methods should be used for accounting purposes.

c. System security must be considered during the planning, engineering, and control of the communications system. It is especially important in laying out the network and disseminating information. Security is also a

prime consideration in assigning frequencies and call signs (implemented by automated CEOI). System security includes:

- (1) Specifying physical security requirements.
- (2) Insuring availability of appropriate COMSEC material (ciphers, codes, cryptographic equipment, key lists, key cards, etc.).
- (3) Specifying procedures for insuring security, such as the maximum time periods between call sign, frequency, and cryptographic key changes (if not specified in the automated CEOI).
- (4) Preparing policies to implement AR 380-40 and AR 380-41 regarding the accounting for and safeguarding of COMSEC material.
- (5) Analyzing traffic to insure proper use of COMSEC capabilities.
- (6) Engineering the communications system to insure communication security (for example, meeting "TEMPEST" and other standards).
- (7) Insuring the reporting of COMSEC violations and of practices dangerous to security.

d. At the national level, the US Communications Security Board (USCSB) establishes national COMSEC policy which is amplified and promulgated by Army regulations (AR's). C-EMS system security measures are established under the national COMSEC policy; they also comply with directives promulgated by the Department of Defense (DOD).

e. The theater commander is responsible for the enforcement of COMSEC in the command. He is assisted and advised by the theater C-E officer. Within the theater, C-E officers of major commands and commanders of signal units are responsible for integrating COMSEC policies and procedures into all C-EMS functions, from planning through implementation.

5-23. Messenger Service

a. Messenger service is the most secure means of communications available to all units. It is the most effective method for the transmission and delivery of bulky items. Although it is flexible and reliable, its speed depends on the mode of travel (foot, motor, or air), tactical situation, and terrain trafficability. Messenger service complements the multichannel command and area systems. It is used to insure continuing communications and to provide service not available or permitted over multichannel links.

b. Messenger service may be either scheduled or special.

(1) Scheduled service is used when unit locations are stable and when unit volume is large.

(2) Special messengers are used when either more rapid service or special handling is required.

c. The commander of the senior signal unit is responsible for operating a messenger service for the major commands in both the command and area systems (table 5-4). The C-E section of each major command establishes the requirements for messenger service and publishes the routes, schedules, and message relay points (in the C-E annex).

d. The commander of each communications node is responsible for the direct supervision of the messenger service provided by the node, for

Typical Messenger Service Responsibilities

Type Units	Typical Messenger Mission
Theater Army:	
<input type="checkbox"/> Messenger Co	Operates message relay stations, provides service between message relay station and relay points in COMMZ, TA area nodes, and subordinate command nodes. Air message service as needed.
Comm Cen Op Co	From each platoon(s) to supported units and message relay points.
Lge HQ Op Co	Local messenger service with HQ complex, supported units in assigned area of responsibility and message relay point.
Med HQ Op Co	Same as large headquarters operation company.
Small HQ Op Co	Same as large headquarters operation company.
Corps:	
<input type="checkbox"/> HHC, Comd Op Bn	Air messenger service from corps headquarters echelons to major subordinate units and area signal battalions. Motor messenger service for corps rear.
Telecom Cen Co	Messenger service from main to corresponding subordinate command headquarters echelon and units and to area nodes.
HHC, Corps Area Sig Bn	Service from battalion distribution point to area nodes and between battalions as designated by signal brigade CSCE.
Division:	
<input type="checkbox"/> Comd Op Co	Messenger service to major subordinate elements of division (air service from division aviation battalion).
Fwd Comm Co	Each forward signal center platoon (3) provides special messenger service within area of responsibility.

Note: For additional information on messenger scheduling and routing, refer to FM 24-16.

Table 5-4. Typical Messenger Service Responsibilities

coordination of schedules to meet location conditions, and for providing special messenger service.

5-24. Directory Service

a. Directory service is the preparation and distribution of telephone directories for and to all users of the tactical telephone system. The directories contain information concerning use of the directories and of the automatic telephone system. They include the assignment of telephone switchboard designation names and subscriber telephone numbers.

b. The preparation and updating of directories are currently performed manually. When facilities become available, these actions will be performed by automatic data processing. The distribution of directories is usually one echelon up, two echelons down, and to adjacent echelons.

c. A master directory (table 5-5) is prepared, published, and distributed by the C-E section of the TCC(A). It provides users with a basic understanding of the tactical telephone system (automatic or manual) and instructions on how to use the system.

d. The regional/unit directory is an extract from and an extension of the master directory. It is prepared, published, and distributed by the C-E section of major commands below theater.

Master Directory Format

Item No	Item	Location
1	Title	Front cover
2	Classification Warning	Front cover
3	Emergency Numbers	Inside front cover
4	Index	First page
5	General System Description <ul style="list-style-type: none"> a. Introduction to Automatic Function b. Extent of the Automatic System c. Telephone Addressing Scheme 	
6	Operating Instructions <ul style="list-style-type: none"> a. Local Calls b. PR-SL Zoning Chart c. Long Distance Calls d. Information Assistance e. Special Capabilities 	
7	Standard & Fixed Telephone Address Lists	
8	Telephone Installation/Repair/Complaints	
9	Notes	Last pages
10	Phonetic Alphabet	Inside back cover
11	Precedence System	Back cover

Notes:

1. Items 1 through 4 are standard requirements for either manual or automatic systems. Item 5 contains a brief description of the automatic telephone system and of the telephone addressing (numbering) scheme. It briefly describes the function, capabilities, and extent of the automatic system. It references FM 24-22 and FM 24-26 (with titles) for further detail.

2. Item 6 contains information in layman's terms to instruct the subscriber in using the telephone system. There are specific instructions pertinent to the automatic system, to include use of precedence, five-party conference, nine-party preprogramed conference, call forwarding, operator recall, and other special features unique to the automatic switch. Subscribers will be urged to study this section prior to using the automatic telephone system.

3. Item 7 contains standard telephone numbers for units and subscribers. These numbers are controlled by TCC(A) and include address lists (PR-SL's) of units throughout the theater.

4. Included also will be the master lists of the Fixed Directory Unit List (FDUL) and Fixed Directory Subscriber List (FDSL).

5. Item 8 lists instructions concerning telephone installation and repair and where to register complaints regarding service, etc.

6. Both master and regional/unit directories should include a PR-SL zoning chart for the theater of operations subject to classification restrictions. This will facilitate direct distance dialing throughout the automatic system by all users.

Table 5-5. Master Directory Format