US ARMY
SIGNAL CENTER AND SCHOOL
FORT MONMOUTH, N.J.

SSTS 56008A
INFORMATION SHEET

COMMUNICATIONS CENTER PLANNING

Section I. GENERAL

1. OBJECTIVES

a. To discuss the general factors involved in the initial planning of large fixed or semi-fixed communications centers.

b. To show how the planning factors are embodied in the form of communications center floor plans.

2. INTRODUCTORY INFORMATION

a. Since no two communications centers will have identical missions, it is impossible to create a "perfect" equipment floor plan that can be efficiently used for all situations. Therefore, the layout of equipment in a fixed or semi-fixed communications center will be based upon variables, which are better known as "planning factors."

b. These planning factors are the result of operating experience of various types of fixed or semi-fixed communications centers. Certain factors are more critical in nature than others, especially floor planning. It goes without saying that, once in operation, a poorly planned communications center would be most difficult to adjust.

This information sheet supersedes SSTS 56008, Communications Center Planning.

c. To determine the over-all requirements for a communications system that must support a major military operation requires a thorough knowledge of the capabilities and limitations of the communications center. The right combinations of circuits, equipment, and skills can be a definite asset to the communications system; conversely, the wrong combination can cause a decrease in the efficiency of the communications system.

d. Continual evaluation of our man-machine combination must be made to insure the highest possible efficiency. Certain adjustments can be made based upon continuous studies of load curves, precedence percentages, and speed-of-service versus cost-of-service.

Section II. PLANNING FUNDAMENTALS

3. COMMUNICATIONS CENTER ORGANIZATION

a. There can be no hard and fast rules governing organization of fixed or semi-fixed communications centers. This is principally due to the fact that in most cases the communications centers operate under Tables of Distribution (TD's) as compared with tactical units which operate under Tables of Organization and Equipment (TOE's). Generally, the TD of any given organization is based upon the assigned or expected mission.

b. From both administrative and operational viewpoints, it is essential that the communications center be organized along well-defined functional lines; this means grouping similar operating elements under one single head, rather than forming a great number of complex cellular units. Further, a well-defined chain of command permits a more methodical and reasonable approach to the time-honored problem of cross-training personnel. For example, it is highly desirable, if not a necessity, for clerical personnel in the terminal section to have a working knowledge of the teletypewriter; they can then be pressed into service to expedite message traffic during periods of emergency and/or high traffic load (fig. 1). Cross-training also permits a better understanding of the problems encountered by other members of the particular section or team.

Figure 1. Cross-training will prevent this.

c. From a study of figure 2 (a type communications center organization), it can be seen that the officer-in-charge of the communications center controls his operation and administration through four distinct branches and one separate section. All operational elements are separated from administrative and service elements. This functional separation permits better control. The one exception to purely functional organization is the separate branch for all cryptographic activities; for security purposes this branch is separated from the operations branch, which performs relatively few classified duties.

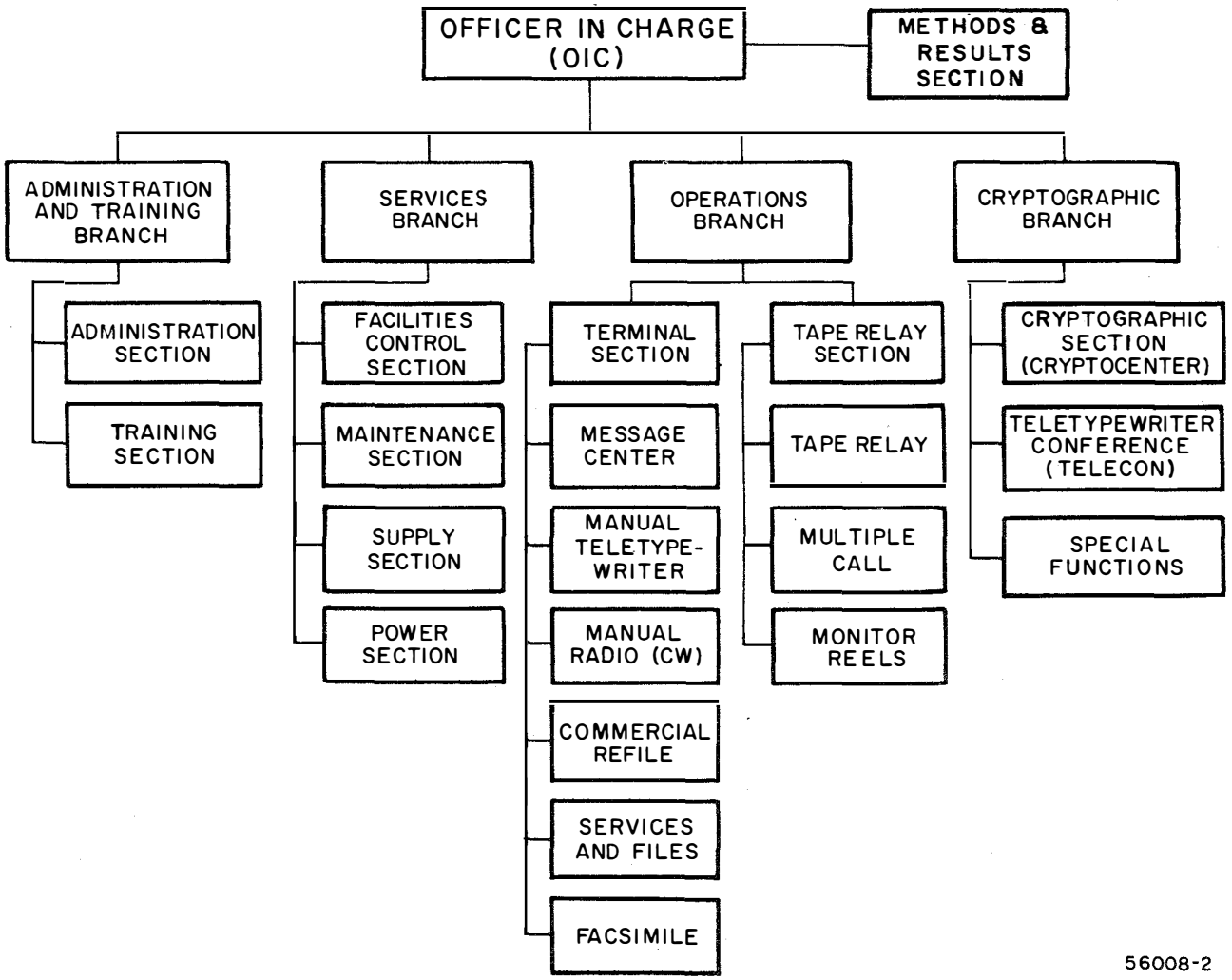

Figure 2. A type communications center organization.

4. PLANNING FACTORS

When charged with detailed planning, the wise communications center staff officer will formulate some sort of checklist to insure that no point is overlooked or slighted. Such a list might well consist of the planning factors that are discussed here in some detail. The following items should constitute the absolute minimum planning factor checklist for the communications center planner. The military situation or local conditions may alter such a checklist and in many cases change the relative importance of the several items.

a. Location. Will the headquarters be --

(1) Land base - inland?

(2) Land base - port?

(3) Island base?

b. Mission. Will the headquarters be a theater, theater army, or an independent command? What units will be attached or assigned to the headquarters which will require communications center support (comm guard)?

c. Size and Type of Operation.

(1) What is the size of the operation, with regard to geographical space involved? This will have an important effect upon the extent of our communications system, especially the tape relay facilities. Tape relay stations must be carefully located so as to serve large troop concentrations.

(2) What is the type of operation -- one involving land masses, oceanic areas, or a combination of both?

d. Housing. What types and quantity of housing are available at the chosen locations? Close coordination is required between the inside plant engineer and the Corps of Engineers because the Corps of Engineers is responsible for building construction, ventilation, temperature and humidity control, the primary power source, and utilities such as heat, light and water. The several choices for housing are:

(1) Existing buildings. These must satisfy space requirements, and have floor strength to support heavy communications equipment such as tape relay equipment, facilities control patch panels, and distributing frames.

(2) Temporary buildings. These are of frame construction based on standard type plans which must meet climatic requirements, and be capable of modification to provide for cable runs, cable ducts, ventilation, heating, lighting and sanitary facilities. Such plans are available through the Corps of Engineers.

(3) Prefabricated buildings. Use of this type of building is generally to be considered an emergency measure where climate or length of expected usage would preclude more permanent housing. For example, in oceanic and arctic operations we might choose prefabricated buildings of the "quonset" type. They are easily erected and dismantled using unskilled labor, may be moved to new locations should the military situation dictate and, by virtue of their shape, will withstand relatively severe winds if properly ground-anchored.

e. Message Traffic Engineering.

(1) The communications center traffic planner must now consider the most difficult of all planning factors, the determination of --

(a) Circuit/channel requirements.

(b) Teletypewriter equipment requirements.

(c) Power requirements.

(d) Communications networks.

1. Tape relay networks.

2. Crypto on-line network(s).

3. Manual teletypewriter (switched) network(s).

4. Special purpose radio-telegraph (CW) net(s).

5. Special purpose radio-teletypewriter (RTT) net(s).

(2) To arrive at the final estimate of required channels and equipment, we must obtain the estimated traffic load for all units to be served.

(3) Teletypewriter facilities should be designed to handle a given volume of traffic in a given period of time. The major factors affecting this capability are the load curve (amount of traffic, by precedence, that is transmitted throughout the day) and the speed of service (time required to clear the traffic). Teletypewriter traffic, unlike telephone traffic, can withstand certain delays on routine and deferred messages. This means that we can take advantage of periods of little or no traffic to move the low precedence traffic that has been delayed during busy hours. This factor enables us to engineer the channels on an average hour criterion, based on precedence and load curve, rather than for peak period or busy hour. Thus, we can make efficient use of trunk circuits and equipment. Regardless of established criteria, continuous studies on load curves and precedence percentages should be made to determine any need for adjustment.

Section III. PLANNING TECHNIQUES

5. COMMUNICATIONS CENTER LAYOUT PRINCIPLES

a. Grouping Operating Elements. There is probably no subject more important than this single item. Unless certain sections and subsections are physically grouped according to their functional relationship, no reasonable degree of efficiency results. Since all communications centers have three responsibilities -- receipt, transmission and delivery of written-record messages -- it is imperative that there be a focal point for the preponderance of these duties. This focal point for unclassified messages is the terminal section and, for classified messages, the cryptographic section (fig. 3).

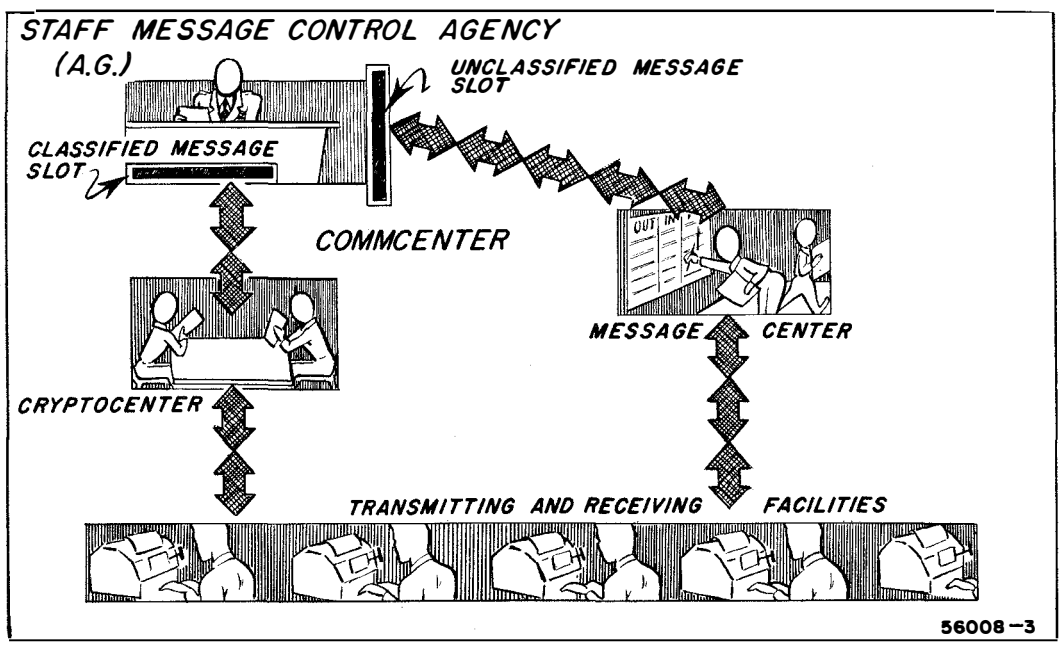

Figure 3. Communications center message traffic flow.

(1) This diagram shows the flow of written-record messages to and from the communications center. As you can see, we must cooperate to the fullest extent with the staff message control agency (operated by the adjutant general) in the planning phase of communications center engineering. It is most desirable, if not mandatory, to have the terminal and cryptographic sections located adjacent to the adjutant general-staff message control agency (AG-SMCA). Message traffic is passed from one agency to another by use of message "pass-through" slots or passages.

(2) If the building configuration does not permit such an arrangement, early planning should consider the advisability of pneumatic tubes, horizontal endless belt system(s), or vertical endless belt system(s) as appropriate. It cannot be stressed too greatly that much time and manpower will be needlessly consumed unless we achieve some form of automation. This thought can be more fully expressed by referring to the diagram in figure 4, which shows an ideal configuration for the staff message control agency, the terminal section and the cryptographic section.

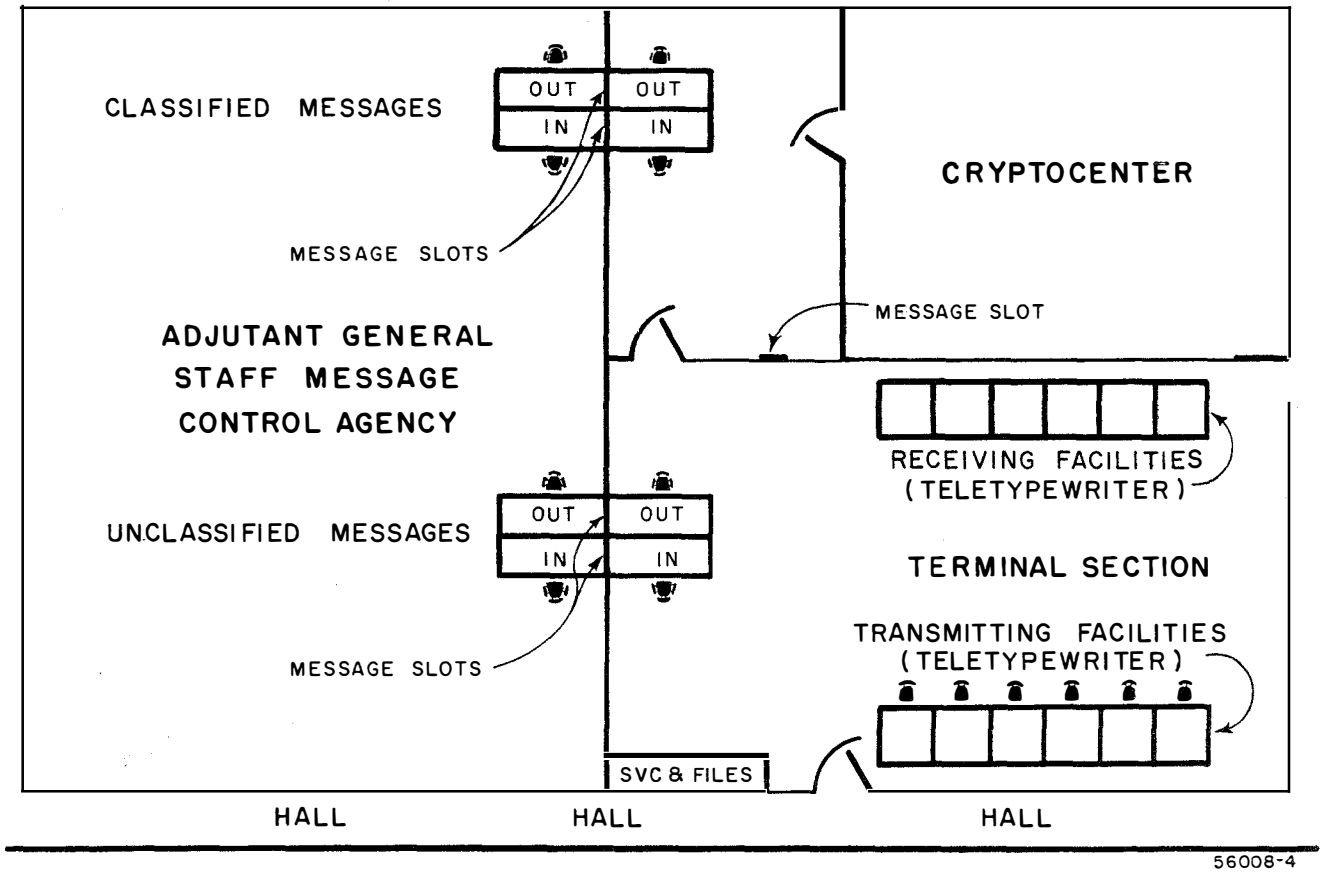

Figure 4. Staff message control agency-communications center configuration.

b. Aisle and Operating Space. Next in importance is the efficient layout of equipment and desks so as to provide adequate aisle space between various sections and functions. We must also consider operating space which will permit access to operating and administrative positions without interference with persons who are working. We must provide adequate space for easy access to equipment for maintenance purposes, since it is not always feasible or practicable to evacuate equipment for all types of repairs. There are no hard and fast rules on this subject but it is desirable, wherever possible, to make allowance for 2-1/2 feet of maintenance space. Less space reduces the efficiency of maintenance personnel.

c. Minimum Movement. Equipment and desks should be so arranged that movement of personnel is kept at an absolute minimum. A study of message traffic flow will reveal the necessity for providing some efficient means of passing messages from the routing (outgoing) clerks to the transmitting operators. The transmitting operators should never have to leave their positions to obtain messages or to return transmitted copies. One suggested means is to provide a table on casters that can be rolled along the transmitting position. Another method would provide each transmitting position with an "IN" basket to contain messages awaiting transmission. Regardless of the method or means we use to pass message traffic to and from the operators, such traffic must be handled so that it is separated by precedence.

6. FUNCTIONAL REQUIREMENTS

Within a communications center each section and subsection has certain requirements which must be considered in the planning stage. These requirements will vary with the assigned or expected mission of the organizations to be served. The communications center planning staff should be aware of all requirements and consider them one by one in such planning. The principal requirements of each element are discussed in the following paragraphs.

7. METHODS AND RESULTS SECTION

Since all requirements of the methods and results section are of an administrative nature, it is not necessary to locate its activities adjacent to the operating elements. In planning for this section we must give careful attention to the following considerations:

a. The methods and results section will need the capability of monitoring incoming and outgoing transmissions. This can be accomplished by patching a monitoring page printer to the various circuits for "sample" monitoring. Such a method requires one circuit from the methods and results section to the facilities control room where the actual patching is accomplished. Another method used quite frequently is to check the file copy of incoming and outgoing transmissions to determine discrepancies in originating and terminating message traffic.

b. We should locate the section, if at all feasible, adjacent to the office of the OIC, where it will be in a more favorable position to provide the OIC with message traffic data, results of investigations of complaints, and other information tending to reflect the operational efficiency of the entire communications center.

c. We can locate the section in two places if the tape relay station is remote from the balance of the communications center. It is not advisable to place the members of this section under the operational control of the tape relay station OIC; such organization would have a tendency to be prejudicial to the best interests of the section, which must provide the unbiased and absolutely true traffic evaluation to the communications center OIC.

d. For security reasons, traffic data of the cryptographic branch is often compiled by individuals within the branch. Under these circumstances, the cryptosecurity officer is obligated to see to it that accurate data is relayed to the methods and results section. Professional ethics dictates unbiased studies and reporting.

8. ADMINISTRATION AND TRAINING BRANCH

Since all requirements of this branch are of an administrative nature, it is better not to locate its activities adjacent to the operating elements. Locating the branch away from excessive movement and noisy equipment increases efficient performance of administrative functions. Preferably, the branch should be near the main communications center entrance so that it is accessible to the local staff and official visitors. This location has the added advantage of preventing or reducing interference with the operating elements.

9. SERVICES BRANCH

The principal problem to be met in this branch is one of over-all control; the organic sections will not be located together owing to their different operating characteristics. This type of difficulty is magnified if the tape relay station is located at some distance from the communications center. One typical solution would be to attach the required number of people from the services branch to the tape relay branch for administrative supervision. Operational control should be retained by the chief, services branch. The requirements of each section are as follows:

a. Facilities control section. This section is charged with operating a main distributing frame (MDF), circuit patching panels, and sufficient testing, measuring and monitoring equipments to provide the entire communications center with sufficient and reliable circuits (channels) for its actual and anticipated needs. Since all of the communications equipment in the communications center is connected to the patching panels and thence onward by cable or other systems to distant communication areas, it becomes necessary to locate the facilities control section or center adjacent to the largest communications center user: the tape relay station. The facilities control center (FCC) should be provided with a separate room to reduce the noise from other equipments and foot traffic. Visual contact with the principal user (tape relay) through a glassed wall is most desirable in order to provide personal contact between "controller" and "subscriber."

b. Maintenance section. This section is charged with the repair and maintenance of all signal equipment used by the communications center, with the exception of certain cryptographic equipment. Because of the diversity of such repairs, we may decentralize this section by locating the various repair teams near or within the area concerned. The teletypewriter repair teams constitute the bulk of the section, and should therefore be located reasonably near either the tape relay or the terminal functions. We must equip the section with wheeled carts to carry equipments between the repair shops and the operating elements. And there must be sufficient space provided for repair benches, test equipment, cleaning tanks and vats, spare equipment storage, and an adequate parts inventory. We may assign the last item (parts) to the supply section if we locate the supply section adjacent to the maintenance section. This method is often preferred, since it offers a more efficient control of stock levels of parts. In any case, repairmen should not have to travel beyond a room's length to obtain necessary parts, nor should they be forced by an involved internal requisitioning procedure to delay repairs while awaiting the parts. If the building configuration prevents such an arrangement, then the planner should consider locating the maintenance facilities farther away from the operating elements, if necessary, to gain sufficient space to stock parts within the maintenance shops.

c. Supply section. This section is charged with informal requisitioning and issue of expendable items for all elements of the communications center. The section must institute procedures to obtain supply experience factors; this requires a certain degree of exact record keeping. The most critical areas are teletypewriter parts, paper, tape and ribbons. It is most important to provide the company or battalion supply agencies with supply forecasts based upon a most critical study. Therefore, for physical planning purposes, sufficient space within the immediate area of the communications center must be provided to serve the day-to-day needs. The balance of the supplies could well be stored elsewhere. A good supply plan will preclude the unnecessary and wasteful practices of emergency requisitioning, hoarding, and borrowing, as well as numerous other malpractices.

d. Power section. This section operates the normal and standby power equipments for the communications center. Generally, such equipment consists of diesel generators ranging from 15 kw to 1,000 kw, according to the requirements of the communications center and the over-all power plan for the entire headquarters. It is safe to say that very few over-all plans for an entire headquarters will consider the absolute and entire needs of a communications center. Therefore, the communications center planner must not omit this essential item. The planner should determine his power needs and refer to the appropriate signal technical bulletins (TB SIG 322-series) to obtain the required number of each type of generator. It is most essential, during the planning stage, to prepare an accurate, detailed study of power requirements. The plan must allow for every conceivable item of electrically powered communications equipment as well as auxiliary items. We must also make allowances for expansion of the communications center. Where commercial power is not available, or is not dependable, three or more engine-generator sets are required for normal 24-hour per day operation. In such cases, we may plan to operate two sets in parallel or on a split load basis, with the third set serving as standby equipment. The three sets should be rotated to permit proper maintenance and inspection. All generators should be located where they will not cause annoyance from noise and exhaust fumes. The power building should be not less than 50 feet and, usually, not more than 100 feet from the building in which the communications equipment is installed.

10. OPERATIONS BRANCH

As in the services branch the principal problem to be met in planning for the operations branch will be over-all control, since the sections will not be located together owing to their different operating characteristics. Operational control difficulties become magnified if the tape relay station is located at some distance from the communications center. In such a case the planner should consider the possibility of creating a separate branch, with the tape relay chief reporting directly to the communications center OIC. The terminal section would then automatically change to branch status. Such reorganization would have five persons reporting directly to the OIC instead of four. Not only is it unnecessary to locate the tape relay station in the immediate area of the communications center, but often it is more desirable to locate both it and the facsimile subsection near the radio transmitters and receivers, provided that radio circuits predominate. Conversely, if wire circuits predominate, it is generally more desirable to locate the tape relay and facsimile functions near the wire (carrier) terminal. All other elements of the operations branch should be located in the general area of the communications center --specifically, in the terminal station area. The requirements of each section and subsection are discussed in the following paragraphs.

11. TERMINAL SECTION

This section operates the terminal station, which is the heart of the communications center. It consists of the following subsections, each having requirements peculiar to its function:

a. Message center. This element processes all incoming and outgoing unclassified message traffic, to include routing, logging, after-transmit checks of outgoing traffic; and logging, speed-editing and delivery of incoming traffic. The principal consideration is to locate the message center adjacent to the adjutant general-staff message control agency. Such a configuration should make it more feasible to render faster and more efficient service.

b. Manual teletypewriter. We should locate both the transmitting and receiving teletypewriters, perforators, and reperforators near the message center, so that we lose the least possible time passing message traffic to and from the two elements. This subsection includes the teletypewriter equipment connected to the tape relay station, the teletypewriter equipment connected to the manual teletypewriter switchboard, and the manual teletypewriter switchboard. Location of the switchboard is not critical; we can locate it anywhere in the general area of the communications center where it can receive the operational supervision of the senior teletypewriter operator. One suggested location is adjacent or close to the facilities control center to effect economy in circuitry.

c. Manual radio (CW). This element offers the most difficulty in planning because of its inherent operational requirements. Manual radio (CW) is required for normal ship-to-shore operations, to furnish communications for special task-force operations that cannot justify using radio teletypewriter (RTT) because of insufficient traffic, and to provide alternate means of communications in the event of total disruption by enemy action or weather. Before making the final choice of location, we should consider the following facts and hypotheses:

(1) If the CW facility is being planned to handle traffic only under emergency conditions when normal communications have been disrupted, the location of the CW facility must be reasonably near the headquarters, or within the headquarters, in order to render the expected service. Otherwise we must provide an alternative to such a location by engineering the facility for remote operation.

(2) If the CW facility is being planned to handle so-called normal traffic, its location must be within the headquarters, specifically in close proximity to the terminal station, and it may be engineered for either local or remote operation.

(3) The more fixed the headquarters becomes, or is planned to become, the greater the requirement for remote operation of the CW transmitters, to avoid annoying signals in the headquarters area.

(4) Regardless of location or mode of operation, we must install some sort of sound-proofing within the CW facility (shack), to preclude the signals from annoying the adjacent communications and staff sections.

d. Commercial refile. This subsection is introduced into the over-all communications center plan once we have decided to use commercial facilities on a time-distance or message basis rather than a leased circuit basis. If commercial refile is to be used, the planner must allow for additional teletypewriter equipments to be connected to the nearest commercial service. Generally, we place the commercial refile subsection near the message center for efficiency of operation. In addition, we must allocate space for a desk at the subsection for necessary logging and routing operations.

e. Services and files. This function, which can hardly be classified as a subsection, has the responsibility of the maintenance and temporary (24-hour) storage of file copies of sent and received traffic, originating and terminating registers, delivery receipts, service logs and rerun logs. The amount of space required generally depends on the number of outgoing and incoming teletypewriter positions in the station, since the file bins are arranged in accordance with the separation of traffic by channels of communications, or by transmitting/receiving positions. As a general guide, the service and files desk to be fabricated should be at least 30 x 60 inches, and possibly as large as 30 x 84 inches. At the completion of each operating day, all files, logs and registers are transferred to the methods and results section for statistical studies and files retention. Generally, the only items retained by the services and files element are service messages awaiting final action and the service log awaiting final close-out.

f. Facsimile. As previously discussed, we may locate this subsection in the general area of the communications center, or, if it is to act as a facsimile relay facility, at the radio station. In one instance the facility is serving the headquarters and should be within the headquarters area. In the other instance, it is not serving the headquarters and will not be located within or near the headquarters.

(1) If assigned to the terminal station, the principal problems to consider are running water for the facsimile darkroom and over-all operating space -- including a possible expansion factor, which must receive most critical attention. The location should be in the general area of the communications center, but does not have to be precisely in the terminal station, since such space should be reserved for the faster-moving message traffic.

(2) The planner must ascertain the requirements for facsimile service. If possible, he must determine the principal user(s) of the service, and the mode of operation used by headquarters to control outgoing and incoming transmissions, including distribution.

(3) Thus, the facility should be reasonably near the releasing authority, which may or may not be the adjutant general-staff message control agency. For example, if only one staff agency plans to use the facsimile service, there appears to be no necessity for cumbersome routing through the headquarters; but the planner should then be aware of the likelihood of assumption of control by the interested staff section. Therefore, due caution should be exercised. In any event, the adjutant general is charged with the final decision concerning control and distribution measures for all written-record communications.

12. TAPE RELAY SECTION

This section receives, transmits, and processes messages in tape form for the worldwide tape relay network or the theater tape relay network, or both, according to the specific signal plan for the station. As previously discussed, the tape relay station (section) may or may not be located near the remainder of the communications center; the very principle of tape relay dictates that a station serves, not one headquarters, but any number of headquarters on an integrated common-user network principle. In either event, the location of the station will not materially affect the operation or the internal organization for operation. The only material change in organization structure would be the possibility of creating a separate tape relay branch in the event of remote location.

a. Functions. The tape relay section consists of the following subsections which have requirements as indicated:

(1) Tape relay. This function is the very heart of the tape relay operation; the subsection is charged specifically with proper receipt of message tapes (including entry in number sheet, as appropriate), processing of received message tapes (excepting multiple call processing) and transmission of message tapes.

(2) Multiple call. This subsection is specifically charged with the responsibility of making a number of tapes for outgoing transmissions from a single incoming tape which has a number of stations being called.

(3) Monitor reels. This subsection is specifically charged with the responsibility for processing corrections, rerun and pull-back requests, investigating discrepancies in channel numbers, redirecting missent and misrouted transmissions, maintaining complete records of supervisory actions, and final filing of message tapes for the required period of time.

b. Equipment configuration. The principal considerations for arranging equipment are dictated by the type of available equipment.

(1) If the tape relay equipment is the type that separates the three functions into three consoles, such as the AN/FGC-38 or similar types, separate the various functions in such a manner as to provide three equipment banks: receiving bank, transmitting bank, and monitor reels bank. The multiple call processing unit (MCPU) is located at one end, or the center of either the receiving or transmitting bank. See figure 5.

(2) When using equipment such as AN/TGC-1 and AN/TGC-5, which have all of the receive, transmit and monitoring functions incorporated in one or two consoles, separate the various functions in such a manner as to provide no predetermined number of equipment banks. Consider storage of monitor tapes reasonably near the equipment banks. See figure 6.

(3) Keep all of the operating equipment adjacent to the facilities control center to reduce the circuitry.

(4) Provide space for expansion of the operating banks and for the resultant monitor reel storage.

(5) Consider equipment requirements for the multiple call processing unit. Such a unit requires one or more page printers for reproducing format lines 1 and 2, a minimum of four typing reperforators (TT-53/FG or similar equipment), one or more transmitter-distributors (TT-52/FG or similar equipment) and necessary switches, wiring and tables to fabricate the unit locally. (This item is not a standard item, as of the date of this publication.)

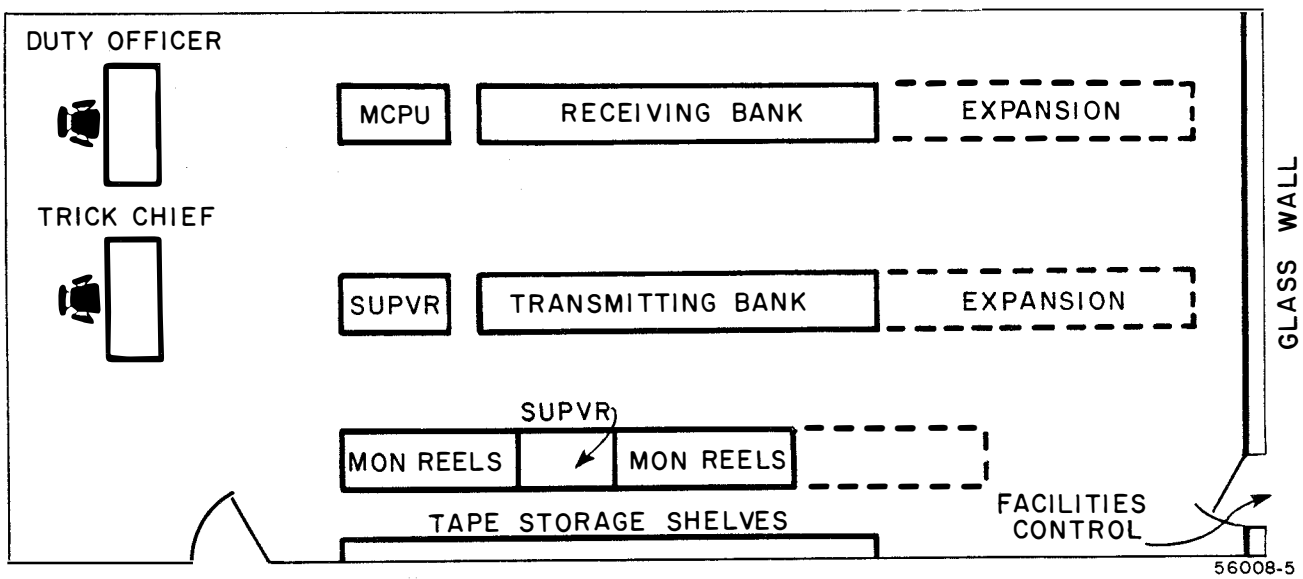

Figure 5. Type tape relay equipment layout for AN/FGC-38 or similar equipment (not to scale).

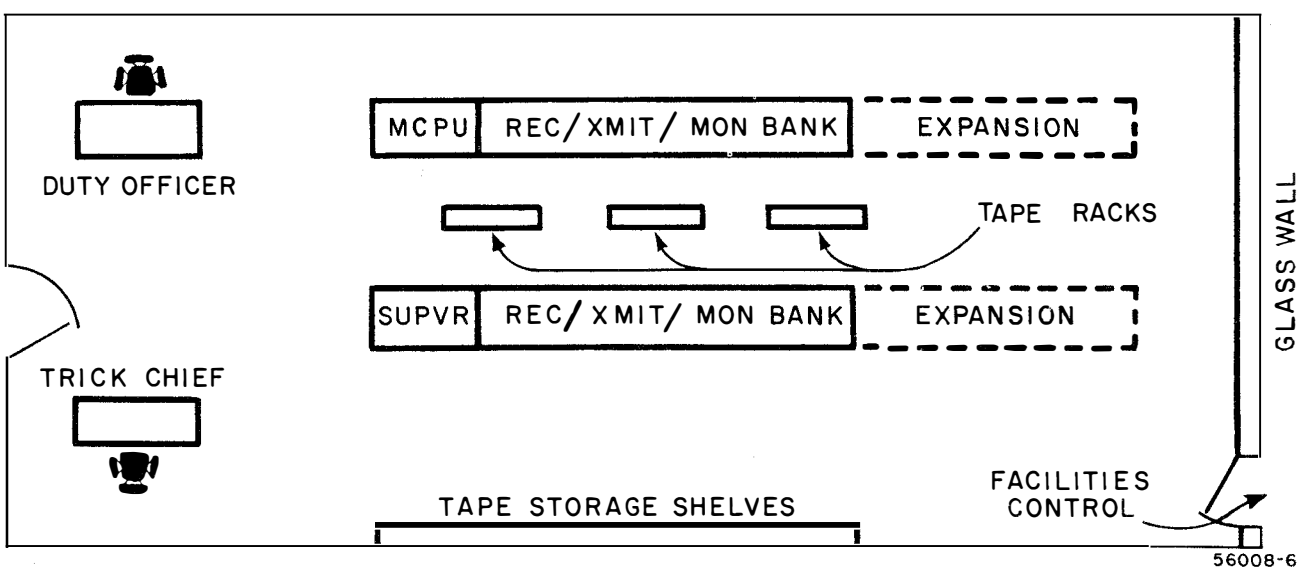

Figure 6. Type tape relay equipment layout for AN/TGC-1 or similar equipment (not to scale).

13. CRYPTOGRAPHIC BRANCH

The principal difficulty in planning for this branch is the need for complete knowledge of equipment types, sizes, weights and power requirements. Therefore, the planner should either have broad cryptographic experience or should consult someone who will aid him in his planning. Over-all control of the branch is slightly less difficult than for the other branches of the communications center, in that the cryptographic branch is seldom located in more than two separate areas. For sound operational control, it becomes necessary to locate the teleconference facility reasonably near the cryptocenter. If this is not feasible, an additional officer or warrant officer should be provided for the teleconference facility. Proper security for cryptographic equipment used in the teleconference facility must be provided at all times. Functionally, the branch operates as two sections: the cryptographic section which operates the cryptocenter, and the teleconference section which operates the teleconference facility. Other missions or functions may be assigned to the branch for further assignment to either of the two sections, as appropriate. The principal UNCLASSIFIED requirements of each section follow:

a. Cryptographic Section (Cryptocenter). This section is responsible for operating the cryptocenter for the particular headquarters, and for the proper handling (including storage) of cryptographic material utilized by that headquarters. The responsibility includes processing all incoming and outgoing classified and encrypted-for-transmission-only (EFTO) message traffic, except that sent by mail and couriers. It is most essential to locate the cryptocenter adjacent to the adjutant general-staff message control agency. Such an arrangement should make it feasible to render faster and more efficient service. The planner should consider the following points:

(1) The cryptocenter should be divided into two rooms, one for administrative activities and the other for all operational activities.

(2) Space must be provided within the cryptocenter for maintenance of all classified cryptographic equipment.

(3) Special tables, racks, bins and other related material must be fabricated locally; such items are not standard items, but are essential to the operations of the cryptocenter.

(4) The physical security requirements outlined in AR 380-40, Communications Security, and other cryptographic publications must be met. The planner is reminded that AR 380-40 indicates ONLY the minimum requirements for a cryptocenter, therefore consultation with a currently qualified crypto officer is indicated.

(5) Because of the inherently critical nature of the cryptographic field, a separate incinerator for routine and emergency destruction of classified waste (paper) must be provided. Joint usage of the headquarters incinerator is not normally recommended.

(6) The planner should make adequate provisions for storage vaults and safes in compliance with AR 380-40.

(7) Last, but not least, while the planner must be practical in his thinking and his planning, he must remember that SECURITY IS PARAMOUNT. It is essential to preserve a common sense attitude toward security, but it is equally essential to recognize the special sensitivity of cryptomatter.

b. Teletypewriter Conference (TELECON) Section. This section is responsible for operating the teletypewriter conference facility for the headquarters. The TELECON facility is designed for the express purpose of transmitting information pertaining to matters of high precedence which cannot be resolved satisfactorily or quickly enough by normal exchange of messages. Therefore such a facility must be located relatively near the general staff sections it will serve. See figure 7.

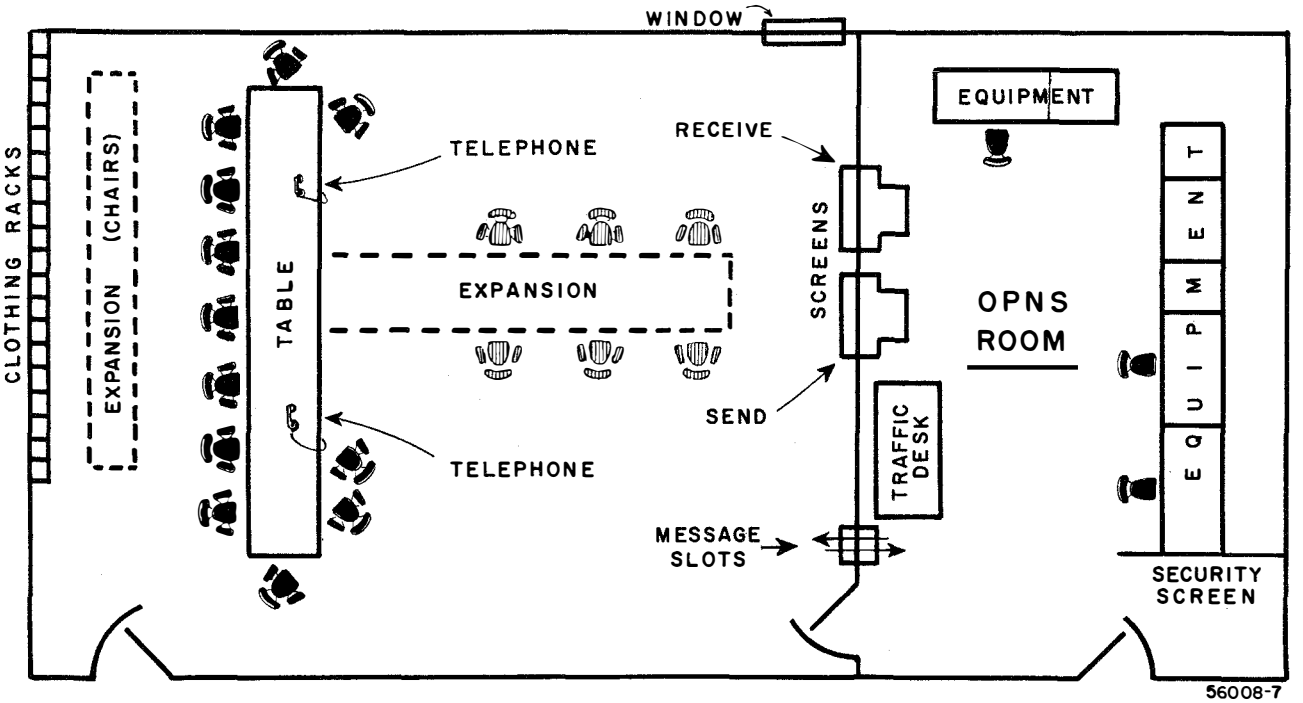

Figure 7. Type TELECON facility - single conference, capacity: 12 seated, plus expansion feature (not to scale).

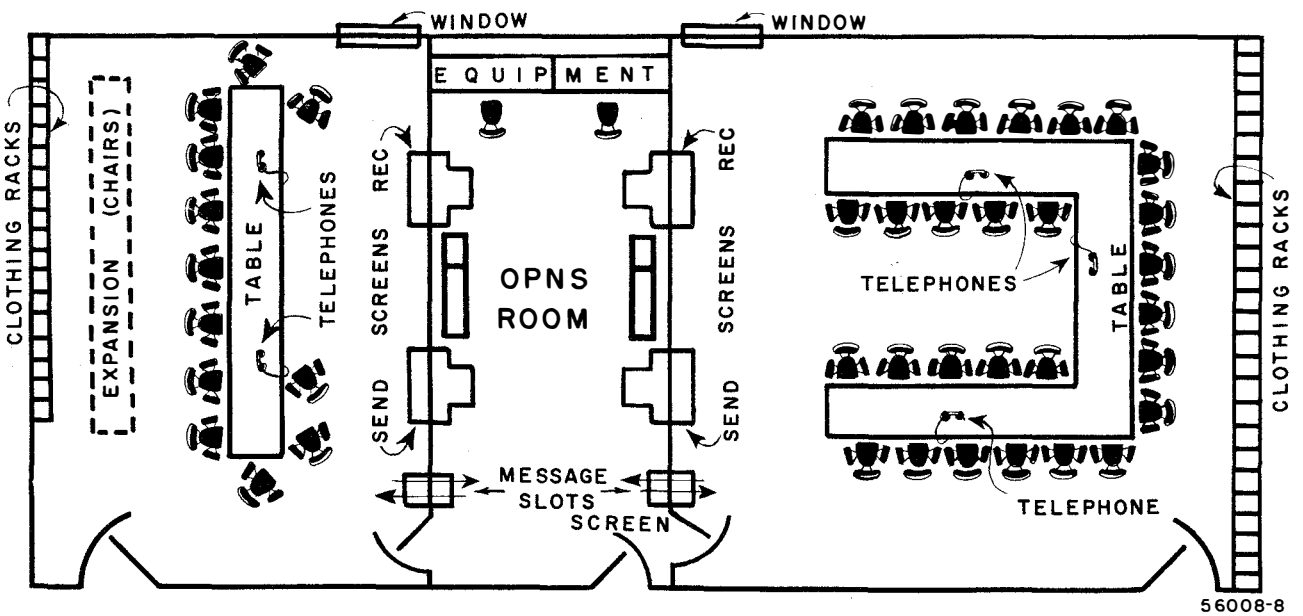

Figure 8. Type TELECON facility - double conference, capacity: 12 seated (Room #2), 18-28 seated (Room #1), plus 10 standees (Room #1) (not to scale).

(1) For a large headquarters, of theater or theater army size, two conference rooms are not considered too many.

(2) The operations portion of a TELECON facility should be separated from the conferee's portion by a reasonably soundproof wall.

(3) The operations portion of a TELECON facility should be capable of serving simultaneously two conferences, in two separate conferee's rooms, provided the physical configuration permits such an arrangement. Such planning will greatly reduce the personnel and equipment requirements, as well as consolidate all of the TELECON activities in one central location for better operational control.

(4) When two conference rooms are thus provided, the planner should give serious attention to room sizes. For example, one room might well seat 12 conferees, the other, 24. Such an arrangement permits the TELECON OIC to operate both a large and a small conference simultaneously. See figure 8.

(5) The planner must bear in mind that such a facility must be planned to include the most minute details, so as to adequately serve the needs of the headquarters general and special staff. Conversely, a poorly planned or inadequate TELECON facility can only bring extreme criticism upon the headquarters signal officer.

(6) Space and equipment must be provided for stand-by usage. Equipment failure, for any reason, must be expected during any conference.

c. Special Functions. This element is responsible for planning and performing all functions that do not readily fall within the normal operations of either the cryptocenter or the teleconference facility. Neither a general nor a specific treatment of this subject can be included for reasons of security.

APPENDIX I

INDEX TO POWER EQUIPMENT (15-1,000 KW)

CODED FACILITY-193	POWER EQUIPMENT-15KW	REFERENCE: TB SIG 322-193
General:	Individual portable, engine-generator sets. Gasoline-driven or Diesel-driven.	
Capability:	15-KWs, 60-cycle, 120/208-volt, or 240/416-volt, 3-phase, 4-wire (WYE-connected) at 0.8 power factor; convertible to 50-cycle, 240/416-volt, 3-phase, 4-wire opn.	
Application:	(1) Can be used singly to produce 15 KW power, or:	
	(2) A 3-generator set provides for operating any 2 of the 3 in parallel to produce 30 KW power.	

CODED FACILITY-194	POWER EQUIPMENT-30 KW	REFERENCE: TB SIG 322-194
General:	Individual portable, engine-generator sets. Gasoline-driven or Diesel-driven.	
Capability:	30 KWs, 60-cycle, 120/208-volt, or 240/416-volt, 3-phase, 4-wire (WYE-connected) at 0.8 power factor; convertible to 50-cycle, 240/416-volt, 3-phase, 4-wire opn.	
Application:	(1) Can be used singly to produce 30 KW power, or:	
	(2) A 3-generator set provides for operating any 2 of the 3 in parallel to produce 60 KW power.	

CODED FACILITY-195	POWER EQUIPMENT-60 KW	REFERENCE: TB SIG 322-195
General:	Individual portable, engine-generator sets. Gasoline-driven or Diesel-driven.	
Capability:	60 KWs, 60-cycle, 120/208-volt, or 240/416-volt, 3-phase, 4-wire (WYE-connected) at 0.8 power factor; convertible to 50-cycle, 240/416-volt, 3-phase, 4-wire opn.	
Application:	(1) Can be used singly to produce 60 KW power, or:	
	(2) A 3-generator set provides for operating any 2 of the 3 in parallel to produce 120 KW power.	

CODED FACILITY-196	POWER EQUIPMENT-100 KW	REFERENCE: TB SIG 322-196
General:	Individual portable, engine-generator sets. Diesel-driven.	
Capability:	100 KWs, 60-cycle, 120/208-volt, or 240/416-volt, 3-phase, 4-wire (WYE-connected) at 0.8 power factor; convertible to 50-cycle, 240/416-volt, 3-phase, 4-wire opn.	
Application:	(1) Can be used singly to produce 100 KW power, or:	
	(2) A 3-generator set provides for operating 2 of the 3 in parallel to produce 200 KW power.	

CODED FACILITY-197	POWER EQUIPMENT-300 KW	REFERENCE: TB SIG 322-197
General:	Individual stationary, engine-generator sets. Diesel-driven.	
Capability:	300 KWs, 60-cycle, at either 2400/4160-volts, 3-phase, 4-wire (WYE-connected) or 2400-volts, 3-phase, 3-wire (delta-connected) at 60-cycle, and 83 percent of rated full load (249 KW) at 50-cycles.	
Application:	(1) Can be used singly to produce 300 KWs, or:	
	(2) A 3-generator set provides for operating 2 of the 3 in parallel to produce 600 KW power.	

CODED FACILITY-199	POWER EQUIPMENT-1000 KW	REFERENCE: TB SIG 322-199
General:	Individual stationary, engine-generator sets. Diesel-driven.	
Capability:	1,000 KWs, 60-cycle, at either 2400/4160-volts, 3-phase, 4-wire (WYE-connected) or 2400-volts, 3-phase, 3-wire (delta-connected) at 60-cycles and 83 percent of rated full load (830 KW) at 50-cycles.	
Application:	(1) Can be used singly to produce 1,000 KWs, or:	
	(2) A 3-generator set provides for operating any 2 of the 3 in parallel to produce 2,000 KW power.	

APPENDIX II

EQUIPMENT DIMENSIONS AND WEIGHTS

Type Nr.	Name	Width (in.)	Depth (in.)	Height (in.)	Weight (lb.)	Approx Floor Space (ft.)	Rear Access
AN/FGC-20	Teletypewriter Set	20	23	39	80	3 x 5	No
AN/FGC-25	Teletypewriter Set	60	24	42	170	5 x 5	Desirable
AN/FGC-38	Teletypewriter Set:						
	Rec Group	33	24	77-3/8	750	3 x 6	Yes
	Tran Group	27	43	67	530	2 x 8	Yes
	Mon Group	27	24	77-3/8	620	2 x 6	Yes
AN/FGC-39	Teletypewriter Set (Same as AN/FGC-38)						
AN/FGQ-1	TT Repeater-Mixer	26	22	30	250	7 x 3	Yes
AN/GGC-3	Teletypewriter Set	18	21	40	97	5 x 2	Yes
AN/TGC-1	Teletypewriter Set	24	24	65	439	2 x 6	No
AN/TGC-5	Teletypewriter Set:						
	Rec-Mon Group	20-1/4	23	67	303	5 x 5	Yes
	Trans Group	19-3/4	20-1/2	67	223	5 x 5	Yes
AN/TXC-1	Facsimile Set	34-5/8	17-5/8	10-3/4		3 x 4	No
BD-100	Telegraph Swbd	16	16	26	180	3 x 5	Yes
SB-65/FGC	Switchboard	27	18	84	510	3 x 5	No
TT-4/TG	Teletypewriter	22-1/2	19	28	47	3 x 5	No
TT-5/FG	Teletypewriter	21-1/2	18	42	200	3 x 5	No
TT-7/FG	Teletypewriter	36	24	42	405	4 x 7	Yes
TT-10/FG	Teletypewriter	22	22	42-1/2	711	3 x 5	Yes
TT-15/FG	Reperforator	13-1/2	11-1/2	16-3/4	73	3 x 5	No
TT-16/FG	Reperforator	13-1/2	13-1/2	15	83	3 x 5	No
TT-26/FG	Transmitter-Dist	8-3/8	19	9	42	Mounts on Equip.	
TT-52/FG	TT Dist-Trans	8-1/4	15-1/2	9	30	Mounts on Equip.	
TT-71/UG	TT Projector	39	33	81		4 x 3	No

APPENDIX III

EQUIPMENT AND DOCUMENT DESTROYING INCENDIARIES

1. General Description.

Type	Packed Volume	Packed Weight	Issuing Service
M1A1	1.1 cu ft	55 lbs	Chemical Corps
M1A2	1.1 cu ft	55 lbs	Chemical Corps
M2A1	.4 cu ft	25 lbs	Chemical Corps
AN-M14	.2 cu ft	10 lbs	Chemical Corps
M3	3.1 cu ft	117 lbs	Chemical Corps
M4	4.1 cu ft	160 lbs	Chemical Corps

2. Specific Uses, and Basis of Issue.

a. Cryptographic Equipment Destroyers, Incendiary, M1A1 and M1A2 are thermite incendiaries designed specifically for the emergency destruction of crypto-equipment TSEC/KW-2, TSEC/KL-1, and TSEC/KL-29.

Basis of Issue: CONUS - as authorized in TA 23-100.
Outside CONUS - 3 each per crypto-equipment.

b. Cryptographic Equipment Destroyer, Incendiary, M2A1 is a thermite incendiary designed specifically for the emergency destruction of crypto-equipment TSEC/KW-4.

Basis of Issue: CONUS - as authorized in TA 23-100. (See Note.)
Outside CONUS - 3 per crypto-equipment. (See Note.)

NOTE: 3 each per crypto machine held by Army Attaches and Military Assistance Advisory Groups when incendiaries are not otherwise authorized. 3 each per crypto machine held by other Army activities in sensitive areas, when incendiaries are not otherwise authorized, with approval of the Chief, U. S. Army Security Agency.

c. Grenade, Hand, AN-M14 is a thermite incendiary used for the emergency ignition of the M1A1, M1A2, and M2A1, in addition to other uses prescribed by the Chemical Corps.

Basis of Issue: CONUS - as authorized in TA 23-100, and others.
Outside CONUS - 2 each per M1A1, M1A2, and M2A1.

d. Document Destroyer, Emergency, Incendiary, M3 is a sodium nitrate incendiary kit designed specifically for the emergency destruction of bound and unbound cryptologic and other classified documents.

Basis of Issue: CONUS - 1 each per 70 pounds of classified documents, as authorized by commanders for installations with emergency destruction programs which are established in accordance with AR 380-5 and which are dependent upon emergency burning; or as prescribed in TA 23-100.

Outside CONUS - 1 per each 70 pounds of cryptologic or other classified documents.

e. File Destroyer, Incendiary, M4 is a cellulose nitrate-sodium nitrate kit that provides for interlacing the cellulose nitrate with the contents of the drawers in a file cabinet. Ignition is accomplished by electrical squibs.

Basis of Issue: Outside CONUS only - 1 each per 4-drawer file cabinet containing classified documents, when authorized by commanders.

3. Requisitioning Procedure. Requisitions for the above items will be submitted to the U. S. Army Chemical Center and Chemical Corps Materiel Command, Army Chemical Center, Maryland, in accordance with AR 725-5 and SB 725-350.

4. Reference. SB 725-1300-1, dated 6 October 1958.

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