BRIEF OF TESTIMONY OF ARMY GROUND FORCES REPRESENTATIVE
ON
COMMUNICATION EQUIPMENT
BEFORE
WAR DEPARTMENT EQUIPMENT BOARD

SECRET
AUTH: CG, AGF
INITIALS:
DATE: 19 Dec 45

SECTION I

BRIEF OF ARMY GROUND FORCES EQUIPMENT REVIEW BOARD REPORT AND COMMENTS THEREON BY THEATERS.

(Note: 1. PR refers to Preliminary Report of AGF Equipment Review Board (Cook Board).

2. A-V refers to annexes to Cook Board report.)

1. Systems Engineering:

a. (PR 38/88 a, b and c, and R1/1 a to f) - Cook Board states, in effect, that future development of signal equipment must be guided by the predominant need for an engineered integrated system that will extend from the lowest to the highest echelon and laterally between units to include all components of the fighting team.

b. Comments from Theaters: All concurred. ETO amplified concurrence with remark that it was not believed practicable to attain complete integration under a single agency without losing principle of command responsibility. Stated that technical development and training should be by one common agency but tactical handling by using arm.

2. Integration:

a. (PR 39/89 and R2/2 a, b, c and d) - Cook Board states, in effect, that ground force communications must be as integrated as to permit interchangeable use of wire or radio channels, or any

[redacted]

Delete paragraph 19 c on page 9 and substitute the following:

c. (PR 40/89i & R 6-8/10a, 8/10a, 8/10b, c, d). Does not concur in the proposed plan for ground-air communications. Believes that this should be made the subject of future study.

[redacted]

combinations thereof, without the user being aware of same. Development must insure not only improved equipment but improved adaptability for use in an integrated system

b Comments from Theaters Concur. MTO emphasized urgency of need for development of equipment for integration

3. Security Equipment.

a (PR 39/89 b and h, and R3/3 and 6/9) - Cook Board states, in effect, that increasing and indiscriminate use of telephone has made development of speech security equipment mandatory and of the highest precedence

b Comments from Theaters Concur MTO added that security equipment should be developed for use on both radio and wire and should be an integral part of terminal equipment MTO did not concur in need for a small authentication device

4 Radio Relay Systems

a (PR 39/89/c and R4/4) - Cook Board states, in effect, that radio relay equipment should be further developed to provide a simple, small, lightweight unit for use forward as far as the infantry battalion.

b Comments from Theaters. Concur ETO added that equipment should be provided with appropriate remote control devices.

5 Carrier Systems:

a (PR 39/89 d and R4/5) - Cook Board states in effect, that multiple channel carrier systems are indispensable in an integrated communication system

b Comments from Theaters: Concur and add that equipment must be lightweight and capable of operation over field wire, cable and/or radio circuits

6 Radio Equipment.

a. (PR 39/89 e and R4-5/6 a - f) - Cook Board states, in effect, that research and development of radio equipment must be continued with a view to engineering equipment to fit into an integrated ground force communication system

b Comments from Theaters. Concur

ETO — added, strive for standardization of parts

MTO — added, strive for standardization of a series or family of sets

AFPAC — added, recommendation that antennas and high speed field equipment be further developed

7 Wire Equipment.

a (PR 40/89 f (1) - (3) and R5/7 a - e) - Cook Board states, in effect, that switchboards and terminal equipment should be reduced in weight and size and made more flexible and simple of operation, wire and cable should be reduced in weight and size with increased conductivity, reels and reel units should be improved for-all-round serviceability

b Comments from Theaters. Concur

ETO — added, necessity for silent hand wire laying equipment and necessity for more flexible and rugged multiple position board for higher headquarters

MTO -- added, development of the following portable automatic switchboards, headquarters intercommunication equipment, a special type vehicle for wire laying and recovery

AFPAC — added, development of improved fault locators and rapid splicing equipment

8. Teletypewriters

a (PR 40/89g and R6/8) - Cook Board states, in effect, that development of a lightweight, portable teletypewriter for use with wire and/or radio is essential to provide forward unit commanders with the fastest and most accurate means of communication presently known

b Theater comments: Concur

MTO — added, facsimile and associated automatic cipher devices also should be improved for front line use

9 Air-Ground Identification and Communication Equipment

a (PR 40/89i and R6-7/10 a-d) - Cook Board states, in effect, that development of equipment must be continued to provide adequate methods and devices for integration of A-G communications with ground force systems

b. Theater Comments: Concur

ETO — added, high priority should be given this development

AFPAC — added, that required equipment should be held to an absolute minimum

10 Radar Equipment

a (PR 40/89j and R8 and 9/11 a and c) - Cook Board states,

in effect, that continued emphasis must be placed on reduction of size and weight. Field of use is unlimited.

b. Theater Comments None

c Subject will be discussed in detail under Radar.

11. Survey Equipment

a (PR 40/89k and R 9/12) - Cook Board states, in effect, that an urgent requirement exists for electronic survey devices and that an essential consideration in the development of such devices, is the communication system and equipment for survey control

b. Theater Comments None

c Subject will be discussed in detail under Survey, Meteorology and Navigation.

12. Television:

a. (PR 40/89l and R 9/13 a - c) - Cook Board states, in effect, that development of television and its applications should be vigorously pursued.

b. Theater Comments Concur.

c. Subject will be further discussed under Radar.

13. Modulated Light Beam Equipment.

a. (PR 40/89m and R 11/17) - Cook Board states, in effect, that the possibilities of use of light beams as a medium of communication, especially for close in, short range, requirements, should be vigorously investigated.

b. Theater Comments: Concur.

AF AC — added, research should be made into additional uses for this type of communication medium for air-ground, ship-shore, and artillery observation requirements.

c. Infra-red will be discussed under Radar.

14. Direction Finding

a. (PR 41/89 n & R 11/18) - Cook Board states, in effect, that development of lightweight, accurate, and sensitive direction finding devices is essential.

b. Theater Comments: Concur.

15. Dry Batteries:

a. (PR 41/89o and R 11/20) - Cook Board states, in effect, that research and development is necessary to provide batteries with high ratio of power output to weight, and with unlimited shelf life.

b. Theater Comments: Concur.

CTO - added, that standardization should be stressed.

16. Power Units.

a. (PR 41/89p and R 11/21) - Cook Board states, in effect, that an extensive research and development program is indicated to produce a lightweight, long life, family of power units capable of operation on fuels available in the field.

b. Theater Comments: Concur and stressed importance of standardization and adaptability to available fuels.

a. Photographic equipment.

(1) (R 10/15 a - c) - Cook Board states, in effect, that although in general military and commercial equipment are interchangeable, there is a requirement for development of certain cameras, portable laboratories, and processing methods for strictly combat military uses.

(2) This subject will be further discussed under Survey, Meteorological and Navigation.

b. Meteorological Equipment.

(1) (R 10/16) Cook Board states, in effect, that although military equipment closely parallels US Weather Bureau equipment, certain modifications are highly desirable to adapt commercial equipment to military use.

(2) This subject is discussed in detail under Survey, Meteorological and Navigational Equipment.

SECTION II

COMMENTS ON MATTERS NOT COVERED

BY

COOK BOARD

18. a. The use of atomic energy together with long range guided missiles traveling at supersonic speeds necessitates a long range, continuous research and development project to develop a super-automatic communications system for the control of countermeasures against these weapons.

b. Research and development of communication and electronic countermeasures and counter-countermeasures must be vigorously pursued concurrently with the development of communication and electronic devices.

c. Research and development of deception devices and their use and possibilities necessitates a continuous, long range program.

d. Continuous and vigorous research and development must be carried out in the field of detection and ranging in order to fully utilize the mediums of sound and light as well as the presently popular radio means known as "radar".

SECTION III

COMMENTS ON BOOK BOARD REPORT

19. Army Ground Forces concurs in Section XVIII and Annex 4, subject to further detailed study with the following exceptions

a. (Pr 39/68c and R 2/1c and 2b). Does not concur in the proposal to have one agency train all communications personnel and operate all complex equipment. Believes that this should be made the subject of future study.

b. (R 4/). States that the number of radio sets and components should be kept to a minimum consistent with superior communications.

c. (R 5/6f). Does not concur that any unit commander should be able to talk to all others without resorting to types of equipment used by other units.

20. Additional Comments:

a. (Pr 39/69d and R 4/5). In the development of new carrier terminal equipment, considerable research should be undertaken on the possibilities of inclusion of adequate security as an integral part of said terminal equipment.

b. (PR 41/69n and R 11/18). Development of direction finding equipment should encompass considerable research into methods

of postive identification of transmissions on which bearings are being taken.

c. (PR 38/88a, c and R 1/1a - f). In the development of equipment for communication use, emphasis must be placed on the production of items which are designed for military use and are completely capable of being fitted into and becoming an organic link in or part of an engineered, integrated communication system.

SECTION IV

ADDITIONAL ITEMS

21. The following types of communication equipment, not included in the Cook Board Report, and discussed in detail in Section V of this report, should be considered in any future research and development programs.

Security

High Speed Cipher Devices

Radio

Universal Retransmission Devices

Remote Control Devices

Modulation Devices

Antenna Equipment

Wire

Coaxial Cable

Rapid Pole Line Construction Equipment

Voice Frequency Teletype

Light and Sound Equipment

Countermeasures

Miscellaneous

Public Address Systems

Destruction Devices

Fire Direction Center

~~SECRET~~

SECTION V

DISCUSSION AND RECOMMENDATIONS CONCERNING INDIVIDUAL ITEMS BEFORE THE BOARD

POLICY MATTERS

22. Communication Systems, Engineering and Integration:

Past experience has proven that any communication system is only as good as its weakest link Equipment developed under military characteristics set up by the various branches has given little or no consideration to inter-communication between components or elements of any command or between commands Future development must emphasize the provision of communication equipment capable of use in a system that is engineered or tailored for a specific mission This system must provide a commander with constantly available, reliable, and fast communications to all components of his fighting team from any location within his command by utilizing either radio or wire channels or any combination of electrical means The provision of such a service necessitates an engineered communication system that is completely integrated from highest to lowest echelon as well as laterally

23 Security Equipment

The predominant need in the field of communication equipment, to fulfill the desires and needs of the majority of commanders, is adequate security equipment The telephone has come to occupy a unique and very essential place in our lives today It is by far the primary daily means of communication Military commanders and their staffs constantly and habitually use the telephone to avoid writing messages. Continually

increasing demands for telephone service plus the ever present indiscriminate use of voice transmission for communicating classified data, makes the development of speech security devices an absolute "must" of the first priority The present lack of such equipment has often been termed "The Enemy's Secret Weapon."

24 Radio Relay Equipment.

Probably the outstanding addition to the field of communication during the past war was radio relay equipment, or "radio link" as it was commonly known. This equipment provides a means for the rapid installation of multiple high quality telephone and telegraph channels between any two points Further development along this line is essential in order to provide simplified, lighter weight, highly mobile and portable equipment for use at least as far forward as front line Infantry Battalions. This will provide front line units with readily available, rapidly installed, reliable telephone and telegraph facilities that are easily made a part of an overall integrated communication system

25 Countermeasures

The perfection of new devices is one of the most important — and spectacular — of all scientific accomplishments Such devices have greatly increased the effectiveness of fighting forces, and in some cases have decided the outcome of entire campaigns However, a task of equal importance is the development of countermeasures against scientific devices that may be used by the enemy. for whatever a device may be, there can be developed a countermeasure against it to completely or partially nullify its effectiveness. One outstanding example of the importance of countermeasures research and development is the VT fuse The Joint and Combined

Chiefs of Staff seriously considered not using the VT or proximity fuse after it had been developed, because countermeasures had not been developed against such a device and great concern was shown as to the probable seriousness of the situation, should the Germans discover our "secret weapon" and turn it against us. Countermeasures research and development must be given at least co-equal importance with development of new weapons and devices.

26. Ends to be sought:

a. General - lightweight, smaller, more compact and reliable equipments, easily serviced and requiring a minimum of maintenance attention and replacement. Weatherproof, stable wet and dry weather characteristics, stable and efficient performance at required operating altitudes and otherwise capable of withstanding the rigors of military field operation.

b. Radio - reliable radio communication with a minimum of types and numbers of sets.

(1) Series of short and medium range sets to integrate the radio facilities of all components of a fighting team of Division or smaller size, primarily voice communication.

(2) Series of medium and long range vehicular sets for voice, teletype, facsimile and manual radio telegraph intercommunication consistently at distances of 25, 50, and 100 miles.

(3) Relay equipment to provide single and multiple channel voice and teletype facilities to supplement wire carrier channels as far forward as front line Infantry Battalions.

c. Wire - lighter weight, longer range, more durable field wires and cable. Carrier, switching, station, and line equipment must be developed for strictly military use rather than utilizing commercial components to improvise military equipment.

d. Security Equipment - ultimate would be to have all such devices built into and made an integral part of the radio, wire, or other type of equipment as required. Such equipment would insure security of transmissions of voice, teletype, facsimile or manual telegraph.

27. Mobility of Communication Facilities:

a. There is a requirement for mobile communications centers for use by Ground Force units. Consistent reports from the European and Mediterranean Theaters, where headquarters were constantly moving, as well as from the Pacific Theater, where headquarters were involved in numerous amphibious operations, indicate that the present equipment design policy which definitely avoids the use of special vehicles or of restricting standard vehicles to solely communication use should be reconsidered. Numerous reports, official and unofficial, have been received which describe how locally improvised mobile installations providing improved working conditions for the operating personnel and protection and mobility to the equipment installed therein, were an absolute necessity for successful communications. Troops in the field have been required to expend considerable time and effort to improvise these mobile installations. Often times due to lack of materials and adequate engineering ability, damage to equipment has resulted or the efficiency of operation of the equipment and operating personnel has been considerably lowered.

b. A thorough and exhaustive study should be conducted as part of a research and development project to impart the desired and required mobility to communications equipment installations, with a view to either modifying present design to permit procurement and issue of complete pre-assembled mobile equipment or engineering typical installations and then procuring parts kits for issue with instructions for making the mobile installations.

28. Air-Ground Communication and Identification:

Basic integrated planning for Air-Ground communication and identification is essential. Development of methods and equipment to effect this plan must be continued.

COMMUNICATION SECURITY

A. Security Equipment:

29. Speech Scrambling, Teletypewriter and Facsimile Transmissions:

a. An urgent requirement exists for security equipments applicable to voice, teletypewriter and facsimile transmissions over both wire and radio facilities.

b. The equipment should be capable of handling the highest types of classified transmissions automatically and should incorporate a changeable feature, so that capture will not lead to reduction in the security of subsequent transmissions. The ultimate desired is an equipment complete with a suitable destruction device that can be built into all radio, telephone, teletypewriter and facsimile sets.

c. Cook Board stated that development of speech security equipment for radio is of paramount importance and that development of speech security equipment for telephone is required but is of lesser importance. Theaters concurred and add that equipment should not differentiate between wire and radio circuits and should be automatic.

30. Authentication Device:

a. There is a requirement for a small mechanical type authenticating device.

b. This device should be approximately the size of a wristwatch, legible at night, incorporate a suitable destruction device and

a variable feature which can be easily changed under combat conditions so that capture would not completely compromise the system.

c. Cook Board stated that a requirement exists for a small mechanical authenticator as described above. ATC and AFDAC concurred. AFC non-concurred, stating that device would be of little use due to loss and compromise and that its experience had developed little use for authentication equipment.

d. Military characteristics as outlined in paragraph 29b above state that loss of the device will not completely compromise the authentication system.

31. High Speed Code and Cipher Device:

a. There is a requirement for a device capable of enciphering and deciphering messages faster than currently available devices.

b. It should be capable of enciphering and deciphering up to a speed of 60 five-letter code groups per minute and operable by personnel not extensively trained in cryptography. It should provide copy suitable for direct transmission by facsimile and should incorprate a suitable destruction device.

c. Theaters have pointed out the need for secure encipnering devices capable of faster operation than those in present use.

B. Radio Equipment

32. Integrated Series of Radio Sets

a. There is a requirement for a family of short and medium range radio sets for front-line use to integrate the communications of and between the various arms.

b. The series or family of radio sets must be of similar design but, by utilizing different frequency ranges, will be capable of integrating the communications of and between infantry, artillery, armor, and air, where appropriate. Based upon weight, range, and method of use considerations the following types are required:

(1) Ultra-portable - extremely light, capable of being hand-carried and having short range.

(2) Portable - light enough to be man-packed and having medium range.

(3) Vehicular - capable of being vehicular mounted and having medium range.

c. Cook Board stated that requirement exists for an integrated radio system between the arms.

d. ETO and MTO concurred. PTO did not comment.

33. Medium and long range radio sets.

a. There is a requirement for a family of long and medium range radio sets.

b. All sets of this series should be capable of intercommunication by voice, teletype, facsimile and manual radio telegraph. Each set to be capable of vehicular operation, and to have interchangeability of basic components insofar as possible. Sets should be developed to provide consistent communications over the following ranges while the equipment is in motion

(1) 100 miles - suitable for mounting in portable shelter.

(2) 50 miles - suitable for vehicular operation.

(3) 25 miles - suitable for use as manpack equipment.

c. While theaters did not comment on the foregoing, ETO stated generally that radio sets should have interchangeability of basic components and ETO stated that development should be directed toward standardization of radio sets and reduction in number of types.

34. Radio Relay Equipment.

a. There is a requirement for multi-channel radio relay equipment of two types

(1) Lightweight type, suitable for use forward of division headquarters.

(2) Type suitable for use in rear of division headquarters.

b. Both types of radio relay equipments should be capable of transmitting speech, teletype and facsimile signals.

(1) The lightweight type must be capable of being manpacked. It must have very directional characteristics. This equipment should be provided with appropriate remote control systems. Antennas must have a minimum visibility to both aerial and terrestrial observation.

(2) The type of equipment for use in rear of division headquarters should have highly directional characteristics and should be the result of further research and development of the present types of multi-channel radio relay equipments.

c. Cook Report expressed the need for further development of existing systems and the need for extending the systems forward of division. STO concurred and added that appropriate remote control systems were required. AO concurred and added that small light weight systems should be developed. AFPAC concurred.

35. Wire-Radio Integration Devices

a. There is a requirement for the following wire-radio integration devices

(1) Remote control device.

(2) Universal retransmission device.

b. The remote control device shall be capable of controlling from the switchboard, the operation of the transmitter of any radio set which is connected by wire into the switchboard.

c. The universal retransmission device shall be capable of connecting any two radio sets together, thereby making a relay station, in such a manner that the transmitter will go on the air only when signals are to be passed and so that all normal transmissions will be automatically passed through the connected sets just as if they were normal relay stations.

36. Receiving Equipment

a. There is a requirement for a series of radio receivers.

b. Development will aim toward improving present radio receivers so as to

(1) end up with a series of receivers capable of covering the entire frequency spectrum used for communications yet consisting of the smallest number of separate units possible.

(2) Have improved reception characteristics.

c. The receivers described above are needed for security and information monitoring of friendly nets and monitoring of enemy nets for intelligence purposes.

37. Modulation Devices:

a. There is a requirement for improved modulation devices.

b. Research and development shall be aimed toward making a complete study of possible modulation techniques to ultimately result in improved modulation methods and devices which will give improved noise-free and undistorted radio transmission and reception.

38. Antenna Equipment:

a. There is requirement for improved antenna equipment.

b. Research and development must make a complete study of wave propagations and transmission. The ultimate results required are the following equipments:

(1) A series of antennas made up of the same basic components, having highly improved propagation characteristics and suitable for use on all types of vehicular and portable sets either in motion or stationary.

(2) A compact universal antenna kit which will provide an antenna coupling unit and several different types of antenna systems for use with any and all types of tactical radio sets used by the armed forces.

c. No comment from ETO. MTO stated requirement for antennas with improved transmission characteristics and for better coupling units. AFPAC recommended extensive antenna development program of whip antennas with directional feature.

C. Wire Equipment.

39. Wire and Cable:

a. Assault, Field, and Long Range Wire.

(1) There is a requirement for lightweight and more durable wires of the assault, field, and long range types.

(2) Development and research should be ever-continuing to produce wires of these types that have improved characteristics and are otherwise more desirable for military purposes. They should be more resistant to abrasion, easier to handle, of greater tensile strength, and capable of recovery and reuse. They should have longer talking ranges and be capable of quantity production as this proved to be one of the outstanding signal deficiencies of World War II.

(3) Cook Board stated further development is required to obtain better field wires. Theaters concurred.

40. Cable:

a. Multi-Pair.

(1) There is a requirement for a family of improved multi-pair cables, including appropriate connectors and terminals for installations in and about various headquarters.

(2) These cables should be of sufficient tensile strength to be self supporting in aerial spans.

(3) Cook Board stated requirement for improved cables. Theaters concurred.

b. Spiral-Four.

(1) There is a requirement for a lightweight, more durable spiral-four cable.

(2) Development should continue to produce a more rugged type of spiral-four cable of greater tensile strength which is self-supporting in aerial spans and with an improved type connector which is suitable for underwater installations.

(3) Cook Board stated requirement for improved cables Theaters concurred.

c. Coaxial.

(1) There is a requirement for a coaxial type of cable for use in connection with multi-channel carrier systems.

(2) This cable should be capable of transmitting a wide band of frequencies for use with multi-channel carrier systems. It should be suitable for aerial, surface, underground or subaqueous types of construction, convenient to handle and require a minimum of maintenance attention.

(3) AFPAC recommended development of coaxial type cable. Army Ground Forces concurs.

41. Transmission Equipment:

a. Multi-Channel Telephone and Telegraph Carrier.

(1) There is a requirement for multi-channel telephone and telegraph carrier systems consisting of components which can be manpacked

(2) These systems, consisting of terminal equipment, intermediate repeaters, modulators, etc., should be of sectional design using miniature components which can be built up as desired to give various numbers of channels.

(3) Cook Board states that present multi-channel carrier equipment requires further simplification and reduction in size and weight. Theaters concurred. AFPAC further recommends that carrier equipment should be designed which can be cut into the line between terminals and will be able to select several channels of the carrier without affecting the remainder of the system.

42. Line Equipment.

a. Reels.

(1) There is a requirement for wire and cable reels of lightweight construction that give improved mechanical protection.

(2) Existing needs particularly for rubber covered cables do not provide adequate mechanical protection. Development should continue to produce lighter weight reels for the various types of wire and cable which give improved protection to the equipment thereon.

b. Reel Units.

(1) There is a requirement for a family of reel units of the following types:

(a) Power driven - heavy duty - field wire and cable.

(b) Power driven - light duty - field wire.

(c) Manually operated - open wire.

(2) They should incorporate improvements for handling wire and cable and to alleviate present problems in maintenance of engines, clutches, brakes, bearings, etc.

(3) Cook Board stated necessity for improvement of power reels for handling wire and cable. Theaters concurred.

c. Wire Dispensers.

(1) There is a requirement for wire dispensers of the following types:

(a) Combat wire laying

(b) High speed wire laying.

(2) (a) Combat dispensers should be expendable lightweight containers which can be carried and operated by front line troops with full complement of weapons and fighting equipment for laying lightweight field wire under combat conditions. They should be capable of use as a means of providing continuous telephone communication between men in motion and their immediate base.

(b) High speed dispensers are intended for use by troops not carrying full combat equipment but who may be assigned to communication duties under combat conditions. They should be applicable to high speed laying operations as from fast moving vehicles, projecting by means of the bazooka or rifle grenade, and laying from aircraft.

d. Rapid Pole Line Construction.

(1) There is a requirement for a system whereby pole lines can be rapidly constructed in tactical areas.

(2) Development and experimentation should be continued to produce a system and the necessary equipment to build tactical pole lines suitable for field wire, open wire and cable type construction at increased speeds. It should be capable of preassembling in so far as possible to minimize erection time in the combat area.

(3) MTO recommended development of rapid pole line equipment. AFPAC recommended development of lightweight poles for semi-permanent installations. Army Ground Forces concurs and believes that the above mentioned equipment will fill all requirements.

e. Splicing Methods.

(1) There is a requirement for a simpler and faster method of splicing assault and field type wires and cables.

(2) Research and development should continue to produce methods of splicing wire and cable facilities that are faster and require less dexterity than existing methods.

(3) MTO recommended that newly developed field wire should include facilities for making moisture proof splices. AFPAC recommended development of mechanical devices for r pid splicing of wire and cable.

f. Coils.

(1) There is a requirement for smaller and lighter weight coils of the following types:

(a) Hybrid

(b) Loading

(c) Repeating.

(2) In each case the terminals should be readily accessible for making wire connections thereto and for subsequent line testing purposes. They should be waterproof, possess stable electrical characteristics and arranged as general purpose types insofar as possible.

43. Switching and Station Equipment:

a. Telephone Central Office Sets.

(1) There is a requirement for Telephone Central Office Sets for use as follows:

(a) Division, Regimental and equivalent headquarters.

(b) Corps, Army and Army Group.

(2) (a) The Division and Regimental set should be designed for magneto operation and should be flexible to the extent that it will operate with additional positions where increased capacity is desired. It should be suitable for mounting and operation in shelters and vehicles.

(b) The Corps and Army set should include a multiple type switchboard of sectional "bookcase" type construction so that additional sections may be readily added as requirements for service increase. Design should permit either common battery or magneto operation. The set should be capable of mounting and operation in shelters or vehicles including trailer vans.

(c) Cook Board recommendations were essentially as indicated above. Theaters concurred. MTO added a recommendation to develop portable automatic systems for fast service in larger headquarters.

b. Switchboards, Telephone.

(1) There is a requirement for a lightweight portable type switchboard for combat units.

(2) This switchboard should be easily transported by man-pack. It should be capable of working in multiple with other similar units where added capacity beyond that of one switchboard is required.

It should be capable of being operated in the rain without additional shelter, and be arranged for operation with remote radio sets as part of the integrated communication system.

(3) Cook Board recommendations were essentially as indicated above. Theaters concurred.

c. Telephones.

(1) There is a requirement for improved telephones of the following types:

(a) Field.

(b) Sound Powered.

(c) Desk Set.

(d) Terminal Amplifier.

(2) Handsets should be so designed that the receiver can be comfortably placed against the ear while wearing the battle helmet. Parts as fabricated by various manufacturers should be interchangeable.

d. Teletypewriters.

(1) There is a requirement for further development of the teletypewriter to produce the following:

(a) Lightweight equipment.

(b) A system which operates on the voice-frequency basis.

(2) (a) Lightweight equipment should be capable of transportation by manpack for use in combat units. It should be mechanically and electrically reliable and waterproof. Every effort should be made to eliminate as many as possible mechanical moving parts from present type equipment by substituting electronic devices.

(b) Voice frequency teletype system should be suitable for operation over telephone channels It should be universally adaptable to the telephone system in order to eliminate the necessity for telegraph switchboards, telegraph repeaters and special items of switching and transmission apparatus peculiar to telegraph operation

(3) Cook Board recommends that present difficulties of weight, bulk, lack of ruggedness presently inherent in teletype equipment, be overcome to make this equipment usable as far forward as battalion commander Theaters concurred.

e. Repeaters.

(1) There is a requirement for repeaters capable of being manpacked.

(2) They should employ miniature components and in the case of larger type units, sectional design should be used to the extent that the equipment will be capable of being manpacked

f. Headsets, Handsets and Chestsets

(1) There is a requirement for lighter weight, more efficient and otherwise more comfortable equipment of this type in order to minimize fatigue from prolonged use. Every effort must be made to develop a standard headset, handset and chestset, with appropriate accessories, which can be used on any radio or telephone equipment, the components of which will be interchangeable wherever possible

g. Test and Trouble Equipment

(1) There is a requirement for the following test and trouble equipments:

(c) Fault Locators

(b) Test Boards

(2) (a) With the greatly increased use of cables and the tendency to employ higher frequencies for transmission, particularly over coaxial cables, it is important that improved fault location equipment be developed for use at test centers and by linemen in the field. It should be simple to operate and capable of detecting faults and potential faults which are generally not readily found by the more common methods of testing.

(b) Test Board should consist of the necessary jack panel, patching, testing and associated facilities to enable Wire Chiefs to properly install, line-up, maintain and patch communication circuits.

(3) AFPAC recommended development of means of quickly locating faults in wire and cable and outlined specific developments.

h. Facsimile

a. There is a requirement for improved facsimile equipment.

b. Research and development should continue to produce equipment with faster transmission characteristics as a possible means of replacing teletypewriter operation

D. Light and Sound

44. Sound and Flash Ranging Equipment.

a. There is a requirement for improved sound and flash ranging equipments

b Detailed characteristics are being presented by other Board witnesses

45. Communication Devices

a There is a requirement for a Modulated Light Beam Communication Device for use by front line troops

b The modulated light beam communication device should be capable of providing line-of-sight voice or telegraph communications between two points

c Further study should be made on the use of this equipment as a means of alleviating congestion in radio frequency spectrum

d Cook Board recommended that the development of modulated light beam equipment should be continued in order to provide additional means of communication between front line formations and particularly between armored vehicles for close-in communication ETO concurred MTO concurred stating development should be high priority AFPAC concurred stating possible additional uses, such as, for communication between ground and slow moving plane, for beach control, for artillery observation, etc.

46 Detecting and Ranging Devices

a There is a requirement for a variety of detecting and ranging devices

b. The entire subject of utilizing sound and light (including invisible light such as infra-red) for detection and ranging of ground targets in front line areas must be thoroughly investigated

47 Infra-Red Equipment - will be discussed by another Board witness under the subject "Radar"

E Countermeasures Equipment

48 Receivers or search and analysis equipment.

a. There is a requirement for countermeasures search and analysis receivers

b The search and analysis receivers should be capable of investigating the entire frequency spectrum for the presence of enemy or unknown signals Once the signals are picked up, this equipment should be capable of determining their directional bearing and their characteristics

49 Jammers

a There is a definite requirement for low, medium and high powered jammers

b, These jammers should incorporate automatic monitoring and tracking features and should be capable of jamming any and/or all known methods of communication and associated types of electronic equipments

c Further discussion is being presented by another Board witness under the subject of "Radar"

50 Intercept Devices

a There is a requirement for intercept devices of the following types

(1) Wire

(2) Sound

(3) Light

b These devices should be capable of intercepting transmissions over wires, transmissions utilizing frequencies beyond audible

range, transmissions over light beams and transmissions using invisible light. The devices must be light enough to be used by front line units

51 Direction Finders.

a There is a requirement for improved direction finders of the following types:

(1) Portable

(2) Mobile

(3) Airborne.

b. These equipments should be capable of locating enemy or clandestine stations accurately They should be more sensitive, simpler and quicker to set up and must have improved azimuth accuracy over present equipment All types should have sense determining features The three following types should be developed

(1) Portable - highly portable and capable of being man-packed by one man

(2) Mobile - a more elaborate equipment than that described above, capable of being operated from a vehicle or of being quickly and easily set up on the ground in order to make use of more elaborate antenna systems

(3) Airborne - equipment capable of being operated in small aircraft

c Cook Board recommended continuation of development to eliminate present inadequacies and provide suitable equipment covering the now usable frequency systems. MTO and AFPAC concurred ETO concurred and added that equipment should have improved azimuth accuracy,

52. Deception Devices.

a There is a requirement for a complete study of the subject of deception devices within the realm of electronics.

b Research and development should be aimed toward developing equipments which will be capable of recording and reproducing all types of radio and sound transmissions, including television and radar signals. The purpose of this equipment is to deceive the enemy by the use thereof into thinking that we have tactical equipment and personnel in places where we do not in fact have such tactical installations.

c AFPAC recommended development of deception equipment to the fullest extent and its application coordinated with the use of normal systems.

53 Anti-Jamming Devices

a There is a requirement for anti-jamming devices and/or methods.

b A complete study must be made of present and future communication and jamming methods and equipment with the ultimate result of developing a means of effectively overcoming enemy jamming of friendly radio transmissions.

F. Power Equipment

54 Batteries

a There is a requirement for more efficient and improved types of batteries.

b Research and development should continue to produce batteries with improved shelf life, increased capacities at high and low extremes of temperature and increased ratios of output to weight.

c. Cook Board recommended that basic research and development on dry batteries should be continued to provide increased shelf life and ratio of output to weight. ETO concurred and recommended that standardization be stressed. MTO and AFPAC concurred and mentioned specific features.

55. Power Units:

a. There is a requirement for a series of dependable power units.

b. They should be capable of operating efficiently for extensive periods without replacement, with a minimum of maintenance attention, and on types of fuels supplied to troops in the field.

c. Cook Board recommended establishment of a fundamental research project in order to evolve a series of dependable power units of light weight and long life. Theaters concurred and recommended some specific characteristics, the most important of which was that the power unit be capable of operating on any type of fuel likely to be found in the field by adjustments which can be made by an average power unit attendant.

G. Photographic Equipment

56. Cameras.

a. There is a requirement for a series of still and motion picture cameras for combat use both on the ground and in the air.

b. This series of cameras must be designed specifically for use by the combat photographer.

c. Cook Board recommendations were essentially the same as those above. ETO made a specific recommendation. No comments from other theaters

57. Films and Processing

a. There is a requirement for improved films and processing methods

b. There must be developed new processes to simplify storage and handling of films and to reduce the time and amount of equipment required in the developing and printing process.

c. Cook Board recommendations were essentially the same as those above

58. Laboratory Equipments

a. There is a requirement for portable laboratories for high priority work in forward areas.

b. This equipment must be highly transportable and capable of producing multiple prints up to a size of 8" x 10" in a minimum of time.

c. Cook Board's recommendations were essentially the same as those above No theater comments

59. Identification Units

a There is a requirement for photographic identification units

b This equipment should be capable of taking front and unreversed profile views of the subject with one exposure and should provide the means for inscribing name, rank, serial number and other pertinent data on the film.

60 Projectors

a There is a requirement for improved projectors and screens for instructional, information and education, and recreational purposes

b In general this equipment should follow commercial design but must be more suitable for field use by combat units The most urgent requirement is for standardization of the equipment and its spare parts so that maintenance may be more easily carried on in the field

61 Detailed comments on photographic equipment requirements will be found in testimony presented by Engineer, Air Support, and Survey witnesses

H Special Vehicles

62 Aircraft

a There is a requirement for a type of aircraft suitable for messenger service -

b - The messenger aircraft should be specifically designed for its mission and should be capable of landing at and taking off from improvised landing areas

63 Wire and Pole Line Construction

a There is a requirement for improved types of vehicles associated with wire and pole line construction

b Development and research should continue to produce vehicles of advanced design and characteristics to simplify the erection of wire and pole lines and speed up the rate of construction thereof

64 Trenching and Plowing Devices

a. There is a requirement for improved equipments of the following types for placing wires and cables underground

(1) Trenching

(2) Plowing.

b Both of these equipments should be simple to operate, easy to maintain and capable of much faster operation than present types of equipment

I Miscellaneous

65 Public Address Sets.

a There is a requirement for Public Address equipment with improved military characteristics

b This equipment should be generally lighter in weight, more compact and more powerful than existing equipment for use in amphibious and psychological warfare operations

66. Destruction Devices

a. There is a requirement for destruction devices which can be readily attached to, and used with, various equipments as desired

b These devices should be small, simple to operate and universally capable of being attached to equipments for destructive purposes where it is considered capture is possible or imminent All devices associated with any particular equipment shall be capable of being operated from a central point conspicuously located on the equipment: Operation of these devices shall provide total destruction insofar as use and recognition of the equipment is concerned

67 Message Center Equipment.

There is a requirement for further research and development of equipment for use in message and signal centers.

68 Training Aids

a There is a requirement for continued research and development to produce all types of training aids by utilizing the latest advances in communications and electronics

b. This subject will be discussed further by another witness under "Radar"

69 Pigeon Equipment.

Use of pigeons as an agency of communication should be continued Therefore research and development should be continued toward devising better feeds and improved types of pigeon equipment

SURVEY, METEOROLOGICAL AND NAVIGATIONAL EQUIPMENT

A. Survey

Electronic Techniques
Light Survey

B. Meteorological

Radar Applications
Radio-sondes
Wire-sondes
Generators, hydrogen
Calcium Hydride Charges
Meteorological Sets
Controlled Devices

C. Navigational

Ground Systems
Radar Applications
Homing Devices
Beacons
Direction Finder

Note: Above subjects will be discussed in detail by other Board witnesses.

~~SECRET~~

~~ATTACHMENT~~

Ground to Ground Detections (mortar, personnel, vehicular)
Warning, Search and Surveillance Systems
Identification Systems
CC Cons
Relay Techniques
Fire and Searchlight Control Systems
Field Chronographs.

Note: Above subject will be discussed in detail by other Board witnesses.

~~SECRET~~