ORGANIZED RESERVES
HEADQUARTERS WASHINGTON UNITS
Rooms 3602-18 Munitions Bldg.
Washington, D. C.

WWMcC-d-ak

November 20, 1934.

SUBJECT: Examination

TO: Major William F. Friedman, Sig-Res.,
Office of the Chief Signal Officer,
War Department, Washington, D. C.

1. Under date of October 16, 1934, you stated in a 1st Indorsement to this Headquarters that pressure of work had prevented completion of the thesis required in connection with your examination for promotion, and that the completed thesis may be expected about October 31st. To date same has not been received.

2. Information is requested as to the status of this matter.

W. W. McCAMMON,
Colonel, Infantry,
Senior Instructor.

OCSigO 201-Friedman, W.F.
Major, Sig-Res. 1st Ind. 3

Friedman, W.F., Major, Sig-Res., OCSigO, Washington, D. C., November 24, 1934 - To: Senior Instructor, Organized Reserves, Washington Units, Rooms 3602-13 Munitions Building, Washington, D. C.

The required thesis in duplicate is being submitted herewith.

William F. Friedman,
Major, Signal Reserve.

Attached:
Thesis in duplicate.

THE DUTIES OF THE OFFICER-IN-CHARGE OF THE SIGNAL INTELLIGENCE SERVICE, GHQ.

Thesis submitted by William F. Friedman, Major, Sig-Res., in connection with examination for Certificate of Capacity for promotion to the grade of Lieut. Colonel.

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1. Introductory note as to sources of data. - a. In preparing this thesis the writer has had access to the files of the Chief Signal Officer, including those of current as well as historical information. Among many other documents, the following may be mentioned:

(1) Tables of Organization, Signal Intelligence Service
(2) Technical Papers of the Signal Intelligence Section, War Plans and Training Division, Office of the Chief Signal Officer.
(3) Army Regulations pertaining to codes and ciphers.
(4) Letters pertaining to the work of the Signal Intelligence Service.

b. In addition, files pertaining to the World War, as contained in the World War Records Division of The Adjutant General, have also been studied. Among the latter were the following:

(1) Final report of the Officer-in-Charge of the Radio Intelligence Section, General Staff, GHQ, AEF (G-2 - A6)

(2) Final report of the Code Solving Subsection (G-2 - A6)
(3) Final report of the Cipher Solving Subsection (G-2 - A6)
(4) Final report of the Goniometric Subsection (G-2 - A6)
(5) Final report of the Security Subsection (G-2 - A6)
(6) Final report of the Administrative Subsection (G-2 - A6)
(7) Final report of the Radio Intelligence Officer, First Army, A.E.

2. Basic authority for the Signal Intelligence Service. - a. Basic authority for the establishment of the Signal Intelligence Service is given in AR 105-25, March 15, 1933, as amended by Changes No. 1, August 21, 1934. Par. 2 e thereof now reads as follows:

> "2. Duties of the Chief Signal Officer. - In addition to such other duties as may be prescribed, the Chief Signal Officer will have immediate charge, under the direction of the Secretary of War, of the following:
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> e. The preparation, publication, revision, storage, accounting, and distribution of all codes and ciphers required by the Army, and in time of war the interception of enemy radio and wire traffic, the goniometric location of enemy radio stations, the solution of intercepted enemy code and cipher messages, and laboratory arrangements for the employment and detection of secret inks.
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> 3. Unit signal officers. - a. A chief signal officer will be detailed for every expeditionary force and a Signal Corps officer as unit signal officer will normally be detailed for each corps area and every tactical unit larger than a brigade containing Signal Corps troops. When no unit signal officer has been so detailed in orders, the senior Signal Corps officer present for duty with the command will act as such. The unit signal officer will be a member of the staff of his commanding officer. He will be charged, under the direction of his commanding officer, with the command, in so far as relates to operations, of signal troops not assigned or attached to subordinate units. The unit signal officer is also charged with specific duties as follows:
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> (3) Preparation, publication, storage, accounting, and distribution of codes and ciphers.
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> (8) Supervision of the installation, maintenance, and operation of the signal communication system, including the message center, of the unit.
>
> (9) Supervision of such activities pertaining to the meteorological, signal intelligence, pigeon, and photographic services as affect the unit."
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> * * * *

b. Based upon the foregoing authority, we may now study the following extracts from a directive given the Chief Signal Officer by the Secretary of War, in a letter dated April 24, 1930, dealing specifically with the Signal Intelligence Service:

> "5. Upon mobilization the various activities of this service will operate at the following headquarters:

a. Under the War Department:

(1) The preparation of all means of secret communication employed by the Army in peace and war including secret inks, except that, upon its organization, GHQ will begin the preparation of field codes and ciphers required for current replacement for subordinate units.

(2) The interception of enemy communications by electrical means, including the necessary goniometric work incident thereto.

(3) The detection and solution of secret or disguised enemy communications including those written in code, cipher, secret ink or those employing other means for disguisement.

b. At General Headquarters:

(1) The preparation of field codes and ciphers for employment by subordinate units to replace those previously prepared under the War Department during peace time.

(2) The interception of enemy communications by electrical means.

(3) The location of enemy radio transmitting stations by goniometric means.

(4) The detection and solution of secret or disguised enemy communications including those written in code, cipher, secret ink or those employing other means for disguisement.

c. At Headquarters of Field Armies:

(1) The interception of enemy communications by electrical means.

(2) The location of enemy radio transmitting stations by goniometric means.

(3) The solution of intercepted enemy code or cipher messages by the assistance of cipher keys and solved codes as furnished by the service at General Headquarters."

3. Position occupied by the Signal Intelligence Service in the GHQ Signal Service. - a. Coming now directly to the manner in which the Signal Intelligence Service fits into the organization of the GHQ Signal Service, we find a graphic picture of the latter organization in T/O 507-E shown in Appendix 1.

b. GHQ Signal Service consists of

1 Headquarters, GHQ Signal Service
2 Operation Companies
3 Meteorological Companies
1 Radio Intelligence Company
1 Construction Battalion

c. In T/O 507-S we are interested only in:

(1) Headquarters, GHQ Signal Service
(2) Radio Intelligence Company

4. Relations with Radio Intelligence Company, GHQ Signal Service. - a. The Radio Intelligence Company, GHQ Signal Service, is the technical agency which intercepts enemy electrically-transmitted traffic and locates enemy transmitting stations by goniometry or radio direction finding. Copies of all intercepted enemy messages and the goniometric data are furnished directly to the GHQ Signal Intelligence Service. Copies of the plain-language messages, if any, are immediately forwarded to the G-2 section of the General Staff.

b. The GHQ Radio Intelligence Company also intercepts our own radio traffic, for purposes of furnishing information to the Communications Security Section of the GHQ Signal Intelligence Service. This will be discussed in detail under Par. 9 below.

c. The functions performed by the Radio Intelligence Company, GHQ Signal Service, as given under a and b above are performed by a similarly organized Radio Intelligence Company, Army Signal Service; the data obtained are furnished to the Signal Intelligence Service, Headquarters Army Signal Service. This must be mentioned for reasons which will become apparent subsequently.

5. Organization of the GHQ Signal Intelligence Service. - a. Coming now directly to the GHQ Signal Intelligence Service, we find a graphic picture of its organization in T/O 508-W, shown in Appendix I. As shown in the table, this service consists of the following sections:

(1) Administrative
(2) Enemy documents
(3) Goniometric identification
(4) Communications security
(5) Secret inks
(6) Code and cipher compilation
(7) Code and cipher solution

b. Since T/O 503-S was approved the Signal Corps has been assigned the additional responsibilities of publishing, storing, distributing, and accounting of cryptographic publications. Although these added duties can be allocated to one of the sections of the code and cipher compilation section, it will be noted, nevertheless, that the additional work thus imposed upon the GHQ Signal Intelligence Service is of very great importance and will necessitate some expansion of the present authorized organization.

c. Each of the foregoing sections will be taken up in turn, the duties set forth, the relations with other sections, and all details connected with its efficient operation discussed.

6. Functions of administrative section. - a. The administrative section comprises the following subsections, the duties of which will be described presently:

(1) Headquarters subsection
(2) Correspondence subsection
(3) Reproduction and tabulating machinery subsection
(4) Files subsection
(5) Communications subsection
(6) Guard subsection
(7) Liaison subsection
(8) Library and current information subsection

b. The headquarters subsection handles all matters relating to the general policies of the service, the obtaining and administration of personnel, quarters, office equipment and supplies for the service. The officer-in-charge of the GHQ Signal Intelligence Service maintains his office in this subsection.

c. The correspondence subsection comprises the necessary stenographic and typing personnel for conducting the large volume of correspondence of the whole GHQ Signal Intelligence Service. It is deemed best to have a fairly large stenographic and typing pool so that the work may be centralized.

d. The reproduction and tabulating machinery subsection makes copies of texts, tables, etc., required for the various sections. This will include mimeographing, multigraphing, and other methods of reproducing copies. In addition, there will be needed certain machines usually employed for accounting purposes, but easily adaptable to cryptographic and cryptanalytic work. The use of such machines very greatly reduces the amount of time and labor involved in code compilation and in making statistical studies in cryptanalytic work.

e. The files subsection is a central agency for maintaining the files and records of the entire GHQ Signal Intelligence Service.

f. The communications subsection may have direct telegraph wires to Army Signal Intelligence Service headquarters, to outlying intercept stations, and to other places (for example, Navy Signal Intelligence Service headquarters), for the purpose of avoiding all delays in the transmission and receipt of messages relating strictly to the technical work of this service, especially that of the solution section, where time is of the utmost importance.

g. The guard subsection has supervision of the special sentries assigned to patrol the quarters occupied by the Signal Intelligence Service at all hours of the day and night. It is felt that these special guards are necessary in order to prevent the surreptitious operation of enemy agents in the vicinity of the quarters where most of the vitally secret work is carried on.

h. The liaison subsection maintains the necessary contacts with the Signal Intelligence Services of Field Armies, with other arms, with branches of the General Staff, with the Navy Signal Intelligence Service in case of joint action, and with the Signal Intelligence Services of Allied Governments, if any. In other words, the section serves as a central agency for coordination of work with other Signal Intelligence organizations, or with other agencies concerned in the results obtained.

i. The library and current information subsection maintains a small but fairly comprehensive library of books having a bearing on signal intelligence activities and of books likely to be necessary as sources of information for particular use of the solution section. Files of certain newspapers may be necessary if they are not readily accessible at GHQ. Reference books of special types are also required for cryptanalytic work that may not be available at the library of GHQ.

7. Functions of enemy documents section. - a. This section is the depositary for documents relating to the signal service of the enemy in all its phases, but primarily as regards his signal intelligence organization, its agencies, operations, systems, and devices.

b. A small unit of translators is essential if the language of the enemy is different from our own. These persons must have some technical knowledge in signal intelligence in order to translate properly such documents in form suitable for our ready use.

c. The translators may also be called upon to assist personnel of the code and cipher solution section and for this reason also they must have a certain amount of training in cryptanalysis.

d. The importance of rapid forwarding of captured documents such as codes, cipher keys, files of cryptographed messages with their translations, to the Signal Intelligence Service is apparent. For this reason a special subsection is deemed advisable, the duties of which are to see that no time will be lost in bringing back captured documents and placing them in proper form for study by various interested personnel of the Signal Intelligence Service.

6. Functions of goniometric identification section. - a. The work of this section is primarily of interest to the Battle Order Section of G-2, and to the code and cipher solution section of the Signal Intelligence Service. It assists in enabling the latter to sort intercepted messages properly according to the enemy units from which they emanate and for which they are intended, since tactical messages rarely carry addresses and signatures in plain text, and externally carry few indications from which it may be determined whether two messages are in the same code, in the same cryptographic system, or in the same key.

b. This section works in close liaison with the Radio Intelligence Company assigned to GHQ. The latter intercepts the messages and records on them the location of the transmitting stations, as found by intersection from the radio-compass bearings taken on the emitted waves. The goniometric identification section records the locations and call signs of these stations on a suitable map, and from a study of intercommunicating stations, establishes the probable enemy radio nets. These nets are then analyzed with the point of view of identifying the units which the transmitting and receiving radio stations serve and this in turn, by noting the groupings which intercommunicating stations form, furnish valuable information concerning enemy order of battle.

c. Having identified the units in this manner, it is then possible to indicate on the intercepted messages the unit from which and to which they are coming and going, their location, the larger units to which they belong, etc. Thus, the messages can be sorted so as to isolate messages in the same cryptographic system, key, or in the same code. This is, of course, of primary importance to, and constitutes an essential preliminary step in solving the messages.

d. From the point of view of furnishing information concerning enemy order of battle, the work of this section is also of great value, since this information may be obtained at comparatively little expense, without entailing the loss of lives, and, moreover, in contrast to similar information obtainable from prisoners or spies, is not subject to psychological, or purposive distortion of the facts.

9. Functions of communications security section. - a. The work of this section is exclusively that of furnishing data for the supervision of our own signal communications from the point of view of their protection and the maintenance of security and secrecy in signal communication.

b. Its duties include the following:

(1) Study of our own messages to insure that the regulations governing cryptographic security are being observed. This involves analyzing radio messages transmitted by our own forces. The messages for this purpose are obtained by the Radio Intelligence Company assigned to GHQ and are forwarded to the Communications Security Section of the Signal Intelligence Service. The latter, of course, has the codes or ciphers and decryptographs the messages, devoting special attention to violations of the regulations essential to cryptographic security.

(2) Switchboard facilities are provided so that personnel of this section may cut in on important telephone lines and listen in on conversations for the purpose of noting indiscretions which might impair secrecy. Particular attention is devoted to listening for the mention of unit designations, plans of operation, troop movements and the like. It must be assumed that the enemy will attempt to intercept

and record such conversations by placing agents at strategic points suitable for this purpose. Direct tapping of the telephone wires is, of course, not necessary because by suitable apparatus the electrical currents may be detected by induction, amplified, and led away to a place where the conversations may be recorded with ease.

c. The personnel of this section should include a stenographer of considerable ability, so as to be able to record the conversations as rapidly as they are spoken, otherwise the evidence obtained might not be considered valid. All the listening-in personnel must be carefully selected for their discretion and integrity.

d. When serious violations are observed, one of two procedures may be followed. Under the first procedure a letter may be drafted, calling attention to the irregularities, and forwarded through the Adjutant General to the commanding officer of the organization concerned. If the violations continue and are of a serious nature, an inquiry may be held by the Inspector General's Department. Under the other procedure, it has been contemplated that an officer to be known as the Communications Security Officer would be designated in each large unit, whose duties would include the supervision of communications from the point of view of security. If this is the case, the liaison between the GHQ Communications Security Section and the unit security officer would be more direct. This would expedite the correction of irregularities leading to insecurity in communication by radio or other means.

10. Functions of secret inks section. - a. This section maintains and operates a laboratory for the preparation and detection of invisible writing fluids, and for the detection of other means of transmitting information to elude censorship, as for example, microscopic writing.

b. The subsection for preparation of secret inks functions only intermittently, when the G-2 section of GHQ desires to send out secret agents into enemy territory and must provide these agents with means for sending back information in a form that will escape detection by enemy censorship.

c. The subsection for detection functions continuously and is furnished its material by the censorship bureau. Documents suspected of containing invisible writing are passed through the various chemical tests, and if secret

writing is discovered the results of the examination are forwarded to G-2 for action.

d. This section works in closest liaison with the censorship agency, and also with the larger laboratory at the War Department, where better facilities and more personnel are available for research.

11. Functions of code and cipher compilation section. - a. This section comprises the following subsections, the duties of which will be briefly discussed in turn:

(1) Headquarters subsection
(2) Code compilation subsection
(3) Cipher compilation subsection
(4) Publication subsection
(5) Storage subsection
(6) Distribution subsection
(7) Accounting subsection

b. The headquarters subsection has charge of the administrative details relative to assignment of work to personnel, the use of the equipment, and the issue of supplies to the individual members of the section. All correspondence pertaining to the production, distribution, and accounting of codes and ciphers is initiated in the subsections and then passed through this office before going to the Administrative Section of the Signal Intelligence Service for signature and transmittal.

c. The code compilation subsection compiles new editions of authorized codes, as are required by field forces, principally for the Division Field Code, Air-Ground Liaison Code, Radio Service Code, and Map Coordinate Code. Special codes adapted for special usage or entirely new codes the need for which is determined by the Commanding General, GHQ may be compiled.

d. The cipher compilation subsection prepares cipher tables, cipher keys, or cipher alphabets as may be required for use in connection with the various authorized codes, cipher systems and devices. It also has as one of its responsibilities the technical supervision and coordination of such automatic cryptographic machinery as may be employed for secret intercommunication among the highest headquarters of field forces.

e. The publication subsection has charge of the details pertaining to the printing and physical reproduction of copies of codes, ciphers, cipher tables, and cipher keys. If practicable, it should have facilities for printing or lithographic reproduction entirely under its own control, in order that proper safeguards may be established over this phase of secret communication facilities. However, if this is not practicable the printing and reproduction facilities of the Adjutant General, GHQ, or of the Engineer Reproduction Plant, GHQ, will have to be employed. The subsection is also responsible for all proofreading of galley and page proofs.

f. The storage subsection is the receiving office for printed cryptographic publications and is responsible for their safeguarding while in storage. It is necessary to provide it with suitable storage facilities, safes being preferable, and also with armed sentries to patrol the quarters at all hours during the day and night.

g. The code and cipher compilation section will make the most use of the automatic machinery referred to under par. 6 g. Without such machinery the section would either have to have much more personnel or else codes would have to be replaced less frequently.

12. Functions of code and cipher solution section. - a. This section comprises the following subsections:

(1) Headquarters subsection
(2) Distribution and records subsection
(3) Codes subsection
(4) Ciphers subsection
(5) Research and training subsection

b. The headquarters subsection has charge of the administrative details relative to the assignment of work to the personnel of the section, the use of the equipment, and the issue of supplies to the individual members of the section. All correspondence pertaining to the work of the section, material furnished it for solution, the results accomplished, and liaison with other branches and agencies pass through this office before going to the Administrative Section for signature and transmittal. It also prepares daily, weekly, or monthly reports on cryptanalytic activities, which reports are intended for the G-2 section of the GHQ staff and must be forwarded to that section for evaluation, coordination and distribution to all concerned.

c. The distribution and records subsection distributes manuscript sheets, copies of messages, documents, etc., as received from the reproduction subsection of the Administrative Section direct to the personnel working upon the particular code or cipher concerned. Its personnel also are employed in indexing, tabulating, making frequency studies, etc., for the cryptanalytic staff.

d. The codes subsection studies and solves enemy code systems, attempts to reconstruct the codes as completely as possible, and decodes enemy messages so far as the reconstruction of the codes up to that moment will permit.

e. The ciphers subsection does the same type of work except on cipher systems.

f. The research and training subsection has the following duties:

(1) To investigate such new code and cipher systems, apparatus, and devices as are submitted to the Signal Officer, GHQ, for consideration for use by field forces.

(2) To conduct a school for the training of enlisted and officer personnel assigned to duty in the Signal Intelligence Service of GHQ or Army. Such training will be essential for personnel obtained from sources other than the Chief Signal Officer because no other agency exists in the military service for training in signal intelligence activities.

13. Relations with other branches of Signal Intelligence Service. - a. The GHQ Signal Intelligence Service must maintain close liaison with the following other branches of the Signal Intelligence Service of the military establishment:

(1) Army Signal Intelligence Service. The signal intelligence service at the headquarters of each field army serves as a sort of forward echelon of the GHQ Signal Intelligence Service. Its personnel are trained only so far as will enable them to decipher and decode enemy messages for which the keys have been worked out by GHQ Signal Intelligence Service. The purpose here is to permit of speed in utilising the results that may be obtained from solutions of enemy messages intercepted within the radius of action of the field army.

At the same time, the Army Signal Intelligence serves as a source of material for work by GHQ Signal Intelligence Service, since the messages which are intercepted by the Radio Intelligence Company assigned to Army and which cannot be solved by Army Signal Intelligence Service are forwarded for solution to GHQ Signal Intelligence Service. The officer-in-charge of Army Signal Intelligence Service should have had adequate training and experience in the GHQ Signal Intelligence Service. His assistants do not require such thorough training, but obviously the more they have the better will be their work.

(2) War Department Signal Intelligence Service. The largest unit of the Signal Intelligence Service and the one best equipped to work with the more complicated enemy codes and ciphers should be located at the War Department in Washington. Here the non-military codes and ciphers of the enemy government are studied, as well as the codes and ciphers of enemy commercial houses, agents, etc. It may be that the GHQ Signal Intelligence Service is in a better position to intercept such material than is the War Department Signal Intelligence Service, in which case the former should spend no time trying to solve this non-military traffic but should merely forward it to Washington. On the other hand, the enemy's field codes and ciphers may be so complicated as to be beyond the ability of personnel at GHQ Signal Intelligence Service, in which case the War Department Signal Intelligence Service may be called upon for cooperation and assistance.

(3) Corps Area and Department Signal Intelligence Services. If branches of the Signal Intelligence Service are established at the headquarters of corps areas and departments, liaison may be necessary between them and GHQ Signal Intelligence Service, for purposes of coordination, cooperation, and avoidance of duplication of effort.

b. It must also act in close liaison with the following:

(1) Censorship representative, GHQ. The censorship bureau will undoubtedly have offices in the Theater of Operations. Matters requiring cooperation between the Signal Intelligence Service and Censorship authorities in this region will require close liaison.

(2) Navy Signal Intelligence Service. The Theater of Operations may be located in such an area that direct liaison with Navy Signal Intelligence Service Afloat or Ashore is more conducive to good cooperation with GHQ Signal Intelligence Service than indirect liaison through the War Department Signal Intelligence Service, such direct contact should be established.

(3) Signal Intelligence Services of allied governments. - During the World War, the liaison that existed between the Radio Intelligence Section, G-2, GHQ, AEF, and the same service of French GHQ and British GHQ was most conducive to cooperation and elimination of duplication of effort. In case our government is engaged in a war conducted with Allies against a common enemy, such liaison may again be essential.

c. It will be seen from the foregoing that the activities of the Liaison Subsection of the Administrative Section, GHQ Signal Intelligence Service (par. 6d (7) above) are quite important and necessary for achieving the best results possible from coordinated efforts to solve all kinds of enemy communications.

14. Duties of the officer-in-charge of the GHQ Signal Intelligence Service. - a. It is the responsibility of the officer-in-charge of the GHQ Signal Service to administer the service under his charge in such a way that the functions of each section of his office, as outlined above, are efficiently conducted and that the service as a whole fulfills the mission assigned to it. He cannot be expected to be and, in fact, he may not be an expert cryptographer or an accomplished cryptanalyst, but he should know enough about these subjects to recognize the limitations that abound in practical work in these fields. He must realize first of all that the personnel assigned to him or selected by him are assumed to possess basic technical qualifications for the work and that if success does not crown their efforts or if it seems to him to come only too

slowly, this is inherent in the work itself: "supermind performances" are not the forte of cryptanalytic personnel, popular concepts to the contrary notwithstanding. It cannot be too strongly emphasized that cryptanalytic studies require a great deal of patience on the part of its working personnel; on the part of its directing and administrative personnel a similar degree of patience must be forthcoming. It is only rarely that spectacular situations and successes arise in the course of the work.

b. The last statement leads quite directly to a point which is touched upon with a certain amount of hesitancy but which nevertheless must be mentioned. As said before, signal intelligence is a specialty and its successes are rarely of a spectacular nature. They are, in this respect, quite different from the notable achievements which are much more frequently brought to light on the battlefield by brilliant tactics, resolute action, courage and fortitude. To those who have the good fortune to succeed on the battlefield, recognition and advancement come quickly, and this is of material importance toward the establishment and maintenance of a high stage of morale. But the successes of signal intelligence personnel, even when they do come (and they come only infrequently, very slowly, and most often as the result of long, hard labor), must usually be kept secret or, at the least, confidential. Consequently, these successes never can meet with popular acclaim and never can be awarded upon recognition until long afterward. If, under these circumstances, promotion and advancement come more slowly than they do in other fields of action, the result is apt to be detrimental to the morale of the plodders in the signal intelligence field. It therefore is incumbent upon the officer-in-charge of the signal intelligence service to see that his personnel is accorded recognition for efficient, conscientious work in the same degree and with the same benefits as is accorded deserving personnel in the combat zone.

c. Finally, it is extremely important that the officer-in-charge realize that a vital factor in attaining success in signal intelligence work is the fostering of a competitive spirit among all personnel concerned but at the same time repressing to the utmost any spirit of professional jealousy, and any

attempts to deprive others of credit due for good work, merely for the sake of personal advancement of the offender. The officer-in-charge of each branch of the Signal Intelligence Service, wherever located, must be constantly on guard to prevent such destructive forces from gaining a foothold among his subordinates for the good and sufficient reason, aside from the one of fair play, that whereas the spirit of competition on a purely scientific basis is conducive to the production of results, will spur on his subordinates to do their very best, and will bring about a good state of morale, the corroding spirit of professional jealousy based merely upon avidity for personal distinction and advancement will not only disrupt a good organization but will prevent the establishment and maintenance of real cooperation. It may be stated that in signal intelligence work, especially in that of cryptanalysis, cooperation and coordinated effort are absolutely essential. The efforts of even a good many individuals, if each works alone, will avail very little; only good teamwork will produce results and will bring success in the assigned mission.