~~Confidential~~                    Register No. 181

## WAR DEPARTMENT
### OFFICE OF THE CHIEF SIGNAL OFFICER
### WASHINGTON

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## FINAL REPORT
#### OF THE

## RADIO INTELLIGENCE SECTION, GENERAL STAFF
## GENERAL HEADQUARTERS
## AMERICAN EXPEDITIONARY FORCES

1013

30 April 1959

This document is re-graded "CONFIDENTIAL" UP
of DOD Directive 5200.1 dated 8 July 1957,
and by authority of the Director, National
Security Agency.

Paul S. Willard
Colonel,     AGC
Adjutant General

Classification changed to RESTRICTED
By authority of
HAROLD G. HAYES, Col., Signal Corps
Acting Chief, Army Security Agency

By WILSON G. CAMPBELL, 1st Lt., SigC
1 April 1946

NO ACCOUNTING NECESSARY

REGISTRATION CANCELLED
by
Authority Hqs, ASA ltr dated 27 Oct 45
2d Ind 11 Mar 46, signed:
HAROLD G. HAYES, Col., Signal Corps
Acting Chief, Army Security Agency

~~Confidential~~

Register № 181

WAR DEPARTMENT
OFFICE OF THE CHIEF SIGNAL OFFICER
WASHINGTON

FINAL REPORT

OF THE

RADIO INTELLIGENCE SECTION, GENERAL STAFF

GENERAL HEADQUARTERS

AMERICAN EXPEDITIONARY FORCES

TECHNICAL PAPER

OF THE

SIGNAL INTELLIGENCE SECTION
WAR PLANS AND TRAINING DIVISION



UNITED STATES
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## FOREWORD

The report contained herein was prepared by Lt. Col. Frank Moorman, G.S., in December 1918, when he was Chief of the Radio Intelligence Section, General Staff, General Headquarters, American Expeditionary Forces. No changes, additions, or deletions have been made therein. This report merits most careful study by signal intelligence personnel.

WILLIAM F. FRIEDMAN, *Cryptanalyst,*
*Chief of Signal Intelligence Section,*
*Office of the Chief Signal Officer.*

JUNE 25, 1934.

(III)

GENERAL HEADQUARTERS

GENERAL STAFF, SECOND SECTION (G-2, A-6)

FRANCE—*January 2, 1919.*

From: Frank Moorman, Lt. Col., General Staff.
To: Chief, G-2, A.
Subject: Report of G-2, A-6.

In accordance with your verbal orders, I submit the following report on the Radio Intelligence Service (G-2, A-6).

PART I. In order that the most important part of this report may be easily found, recommendations for the future of this service are presented first.

PART II. Gives under paragraphs numbered to correspond with those of Part I a discussion of the reasons for the several recommendations.

PART III. A brief account of the activities of the Radio Intelligence Section, American Expeditionary Forces, from its organization to its practical disbandment.

# FINAL REPORT OF THE RADIO INTELLIGENCE SECTION, GENERAL STAFF, GENERAL HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES

## PART I

## RECOMMENDATIONS

### A. DUTIES OF SECTION

1. Enemy codes and ciphers.—There should be maintained, at General and Army Headquarters, code and cipher officers prepared at all times, day or night, to receive, decode, and translate enemy messages.

These messages are ordinarily received first at Army Headquarters where they are decoded and the information contained communicated to those interested.

In case the message cannot be decoded at Army Headquarters it is forwarded by telegraph or messenger to General Headquarters where greater facilities and a more numerous personnel enable making a detailed study, impossible at the Army. Usually messages so forwarded are solved too late to be of real value, but the keys are immediately telegraphed to the Army for use in decoding similar messages which may later be received.

For the rapid exchange of these messages there must be provided ample telegraph facilities.

The personnel deemed necessary for code and cipher work is given in paragraph B.

Information obtained from messages should of course be communicated through or by authority of the A.C. of S., G-2.

The nature of the information will determine to whom it should be sent.

There should be a free exchange of information between Radio Intelligence Officers at General and Army Headquarters.

The various methods of solution will be given in a separate report by code officers of the section. As this report is not complete I will be unable to see it before it is submitted to you, but I have entire confidence in the officers charged with its preparation.

The principal source from which enemy messages are received is the system of radio stations called "field intercept stations", which are established at suitable intervals along the hostile front. They are furnished and operated by the Signal Corps as requested by this section.

Telephone listening stations have furnished a few messages either in clear or code, but the precautions recently taken by the enemy have practically eliminated this source of information.

In addition to the field intercept stations there have been established in Europe radio stations for copying messages exchanged by high-power stations far from the front. While some very interesting and valuable information has been obtained from these messages, the codes and ciphers used are in general too difficult and require too many men for their solution to enable them to be handled efficiently by a field force. The copying of these messages can very well be handled in the field when necessary, but their solution is regarded as a function of the War Department. However important the messages may be, they cannot have the same pressing tactical importance possessed by those transmitted by field stations,

2. Goniometric service.—This service has for its object the location of enemy radio stations and their grouping so as to show organization limits.

Stations are established at suitable intervals along the front and charged with obtaining bearings of all stations active during the day.

These bearings are transmitted several times daily to Army Headquarters where stations are plotted on a map.

Lines are then drawn from each station to all others with which it communicated during the day.

So long as each station exchanges messages with those at the next higher or next lower headquarters a very good idea of the enemy battle order can be obtained by a study of the map so prepared.

The several schemes adopted by the enemy to lessen the value of this service are discussed in paragraph A-2 of Part II.

3. Aeroplane service.—This service reaches its highest value in a fairly quiet sector in trench warfare. In a very active sector it is still useful. In a war of movement it appears quite useless.

The general plan of work should be to provide one or more stations to listen constantly for aeroplanes and when one is heard to notify the field goniometric stations of its call. The goniometric stations will then take simultaneous bearings at regular intervals reporting them by direct wire or radio to one of the goniometric stations designated as "control stations." The control station will determine the location and direction of flight of the aeroplane and will notify the Army Radio Intelligence Officer who in turn sends a warning to the designated pursuit squadron of the Air Service.

In the meantime the station designated to listen for aeroplanes will copy all signals transmitted and inform the Army Radio Intelligence Officer, whenever possible, of the enemy batteries about to fire and the area about to be shelled. This information is passed on to the counter battery officer or the troops about to be shelled as the case may be.

Owing to the doubtful value of this service, the small amount of work required at General Headquarters, and its close relationship to the goniometric service, the goniometric officer is charged with its supervision in addition to his other duties.

4. Press service.—For copying official bulletins and press dispatches of various governments a "press station" should be provided at the headquarters of each army and at General Headquarters. The messages are turned over directly to an officer designated by the Chief of G–2, A. This section acts only as liaison between the Signal Corps and G–2, A, for this service.

5. Translation and classification of enemy documents.—This service translates and extracts from enemy documents information in regard to signal communications in general and radio procedure and the use of code and cipher in particular.

Lists showing conventional radio, light, and other signals, are published from time to time and distributed to those interested.

Information of interest to the Signal Corps is furnished directly from this office.

6. Receipt and distribution of documents—Procurement and care of office equipment.— This service receives and distributes all documents, incoming and outgoing, of the section, and arranges for the procurement of supplies and office equipment.

7. Security service—Listening stations.—This service, through radio-control stations established by the Signal Corps, receives copies of all radio messages transmitted by American stations. Assuming them to have been copied by the enemy, they are examined to see what information might have been obtained. Faults in transmission and misuse of code are brought to the attention of those concerned and an effort made to prevent a repetition.

The Signal Corps assignment of call letters to radio stations is examined and any faults in the system liable to give information to the enemy pointed out.

Instructions for the assignment of code names to organizations and places are issued to troops and the use of such code names supervised with a view of preventing the giving of information to the enemy.

Listening-station reports are examined with a view of determining whether or not information has reached the enemy through indiscreet use of telephone or earth-telegraphy at the front. Misuse of these means of communication is reported to commanders for appropriate action.

Extracts giving enemy messages copied by listening stations are furnished the code and cipher section.

Arrangements are made for "listening in" on trunk lines from Corps, Army, and General Headquarters for the purpose of detecting and reporting use of telephone for transmission of indiscreet, trivial, or personal messages.

The security officer has representatives especially trained for the work at Army, Corps, and Division Headquarters.

At brigade, regimental, battalion, and company headquarters, officers are detailed by organization commanders to supervise the security service under instructions from security officers at higher headquarters. These officers are expected to perform their regular duties in addition to supervising the security service.

8. Policy regarding preparation and use of trench codes.—The work of preparation of codes and ciphers is handled by the Signal Corps after consultation with this section.

Distribution lists are furnished the Adjutant General who has the books distributed as requested.

9. Training of listening-station operators.—The technical instruction is given by the Signal Corps. This section gives only general instructions as to the purpose of this service and examines operators as to their ability to speak the enemy's language.

10. Policy as regards carrier pigeons.—The carrier-pigeon service has no connection with the work of this section. The determination of policy should be left to G-4, and this section relieved of any duty in that connection.

11. Reports.—The following reports are considered necessary:

(a) Copies of all tactical messages in code or cipher. Prepared by code section at G.H.Q. Distributed as required to code officers including those of Allies and at our War Department.

(b) Keys for solution of tactical codes and ciphers. Prepared by code section at G.H.Q. Copies to code officers and to radio intelligence officers of Armies.

(c) Naval, diplomatic, and miscellaneous codes and ciphers, and keys for their solution. Prepared by code section at G.H.Q. Copies to code officers.

(d) Daily code section reports. Shows all messages decoded during the day. Copies to Chief G-2, A, to Battle Order, and to Allies.

(e) Weekly code section report. Gives new methods of attack of enemy messages, new devices adopted by the enemy, and any notes of interest in regard to activity or use of particular codes or ciphers. Also gives a brief summary of the work accomplished by the code section during the week. Prepared by the officer in charge of codes and ciphers. Copies to Chief G-2, A, and to War Department.

(f) Daily radio intelligence report. Gives any information of special interest in regard to the day's work. Prepared by the Radio Intelligence Officer at G.H.Q. Copy to Chief G-2, A.

(g) Special radio intelligence report. Gives identification of enemy units and other useful information obtained from decoded messages. Prepared by Radio Intelligence Officer at G.H.Q. Copies to Chief G-2, A, and those interested.

(*h*) Grouping of enemy field stations. Gives list of enemy organizations and call letters of stations pertaining to each. Also gives alphabetical list of enemy call letters with location and organization to which each pertains. Prepared daily by Goniometric Officer from telegraphic reports from Armies. Copies to code officers, to Chief G-2, A, and to Battle Order.

(*i*) Enemy field radio stations. A periodic report giving information as to activity, grouping, and probable purpose of enemy stations. This report includes a discussion of the probable significance of enemy activity. During the last months of the European War the enemy used field radio stations in connection with his aeroplane registration flights. For this reason the report on these aeroplane registration flights was included in the report on Field Radio Stations. Prepared by Goniometric Officer. Copies to War Department, Commander in Chief, Chief G-2, A, Allies, all Armies, Battle Order, and such others as may be ordered by the Chief G-2, A.

A copy of last report made by this section is enclosed and marked "A."

(*j*) High-power radio stations. Gives call letters and activity of fixed high-power stations in various parts of the world. Prepared by Goniometric Officer. Copies to Chief G-2, A, Allies, all Armies, and War Department.

(*k*) Listening-station reports. Gives information obtained from daily reports from listening stations. Copies of all American conversations considered dangerous are included. Prepared at stated periods by Security Officer at General and Army Headquarters. Copies to Chief G-2, A, Battle Order, and all Armies.

(*l*) Special report of Security Officer. This report is in the form of a letter for signature by the Adjutant General, addressed to appropriate commander. It calls attention to carelessness in the use of code and the improper use of telephone or other means of transmission of messages as shown by examination of intercepted radio messages, listening-station reports, intercepted telephone conversations, etc. It directs appropriate action be taken and reported to headquarters. Prepared by Security Officer as required at all headquarters.

(*m*) Weekly report of Security Officer. Made in the form of a memorandum to Security Officer at next higher headquarters. Gives notes on the events of the week, faults noted, action in each case, and recommends changes in code or system of work in order to simplify the methods of preparing and transmitting messages. Prepared by Security Officer at all headquarters.

(*n*) Reports from Armies. The attached copy of "Memorandum for Army Radio Intelligence Officers", dated October 11, 1918, marked "B", gives reports deemed necessary from Armies. These are in addition to (*i*) and (*m*) above.

(*o*) Reports from corps, division, brigade, regiment, battalion, and company. Same as (*i*) and (*m*) above.

(*p*) Intercepted messages. Prepared in duplicate by radio intercept stations on blanks furnished by the Signal Corps and forwarded to Army. Army retains one copy for decoding and forwards the other to General Headquarters.

(*q*) Record of calls. Prepared in duplicate by radio intercept stations on blanks furnished by the Signal Corps and forwarded to Army. Army retains one copy for use in grouping enemy radio stations and forwards other to General Headquarters.

(*r*) Bearings of enemy field radio stations. Prepared by radio goniometric stations on blanks furnished by the Signal Corps and forwarded to Army for use in locating enemy stations.

(*s*) Report of aeroplane registration flights. Prepared by aeroplane intercept stations on blanks furnished by the Signal Corps, and forwarded to Army for use in preparation of report of hostile aeroplane registration flights.

(*t*) Listening-station reports. Prepared in duplicate by listening station operators on blanks furnished by the Signal Corps. Both copies are forwarded to A. C. of S., G-2, of division, who makes a note of any action taken by himself and forwards original to A. C. of S., G-2, of corps.

A. C. of S., G-2, of corps takes appropriate action, makes a note to that effect on report and forwards it to Army. Army takes such action as appears necessary, makes a note to that effect on the report, and makes such extracts as are desired and forwards report to General Headquarters. The duplicate is transmitted by A. C. of S., G-2, of division, to the Division Signal Officer, or filed as deemed proper. In the latter case information of anything in the report indicating bad condition of Signal Corps lines is furnished the Division Signal Officer. In addition to the daily written report each listening-station operator reports at once and directly to the nearest commander anything of immediate tactical importance overheard. It then becomes the duty of such commander to see that suitable action is taken.

12. Liaison with Signal Corps.—This section is authorized to apply directly to the Signal Corps Officer in charge of the Radio Section at General Headquarters, and at the headquarters of each Army for such assistance as is required.

For the purpose of meeting such demands there is provided in tables of organization a suitable Signal Corps personnel and equipment.

13. Peace-time organization.—There should be organized and maintained at all times a complete unit of the Radio Intelligence Section which should serve as a training school for officers and men, and permit of experiments for improvement of this service. The necessary Signal Corps personnel should be provided and work actually conducted on a small scale, along the lines contemplated during a state of war.

Signal Corps apparatus should be studied, tested, and improved.

Code books should be published, studied, revised, and republished at frequent intervals, always having in mind the construction of a scientific code easy to use, difficult to solve, and containing words and phrases actually to be used in the event of war.

Officers of the Line and Staff Schools who in solving problems prescribe that messages are to be sent in code should be required to actually put them in code and report whenever it appears that changes should be made in the code books.

Attention is invited to paragraph A-13 of Part II, where the reasons why such an organization is necessary are discussed.

14. Army organization.—Three officers and eight clerks are recommended for duty at each army headquarters.

Conditions will vary so much that one can hardly prescribe in advance the exact duties of each.

In general, however, it may be said that of the three officers one should be designated as the Army Radio Intelligence Officer, one as his assistant, and one as Security Officer.

Of the eight clerks, one should be assigned to duty with the Security Officer, one as stenographer and clerk of the section, and six to general work of the section. These should be divided into three shifts of two each and assigned hours of work so as to maintain twenty-four hour service in the office. The particular duties of each should be determined on the ground after organization of the section.

Attention is invited to enclosures "C" and "D" which contain reports and recommendations from Radio Intelligence Officers of the American First and Second Armies in France.

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## B. PERSONNEL

1. **General Headquarters.—**

(*a*) Officer in charge (1).

(*b*) Assistant to officer in charge (1).

(*c*) Officer in charge of codes and ciphers (1).

(*d*) Code men: 2 to 4 officers and 4 to 8 clerks for each code used by the enemy.

(*e*) Cipher men: 1 to 6 officers and 2 to 12 clerks, according to the variety and difficulty of ciphers used.

(*f*) Goniometric and aeroplane service: 1 officer and 1 or 2 clerks.

(*g*) Translation and classification of enemy documents: 1 or 2 officers and 2 to 6 clerks.

(*h*) Receipt and distribution of documents. Procurement and care of office equipment: 1 officer and 1 or 2 clerks.

(*i*) Security service. Listening stations: 1 officer and 2 or more clerks.

(*j*) Stenographers and typewriters: 1 chief clerk and assistants as required.

2. **Army Headquarters.—**Three officers and eight clerks, of whom one officer and one clerk should be assigned to security service.

3. **Corps Headquarters.—**One officer for security service.

4. **Division Headquarters.—**One officer for security service.

5. **Brigade, Regimental, Battalion, and Company Headquarters.—**One officer for security service.

## PART II

## DISCUSSION OF RECOMMENDATIONS

### A. DUTIES OF SECTION

1. **Enemy codes and ciphers.**—One of the features of the European War is the remarkable advance in the scientific preparation and careful use of code. Ciphers have been practically abandoned for use by field forces and codes have become so complex and each is used for so short a time that the furnishing of an inadequate force to decode enemy messages is a total waste.

While it is very true that one well-trained man can, given time and sufficient material, solve almost any code, it is also true that by the time one man can solve a code such as those used by the Germans in the Western Front in 1918, a new code will be in service and the information gotten from the old code will be so old as to have lost its value.

Confronted with this situation in 1918, and finding it impossible to handle all German codes, we deemed it better to concentrate on a few and so get some useful information while it still remained "useful."

The real code man, the one making original solutions, has a difficult task. He must fix his mind absolutely on the work in hand.

If his feet are cold, if he is hungry or thirsty or ill, if the office is noisy, if the light is bad, if he is wondering what became of his bedding roll during the last move or what kind of a billet he will get after the next one, his work is certain to suffer. On the other hand, if he is so far from the point at which messages are copied that it requires many hours for them to reach him, the value of his solutions when made will be much reduced. For these reasons I have recommended that he be located at some semipermanent point near enough to the front to permit of rapid and sure communication and far enough away to insure against frequent changes in location.

Diplomatic codes and ciphers present a very different aspect. They are used over long periods of time. The information contained in them suffers less by delay. They are handled by experts in well-equipped offices where facilities for handling them are practically unlimited. The result is that their solution is very difficult and requires many men over long periods of time. There appears no good reason why a field force should attempt to handle work of this kind. Although it was done in a few cases at these headquarters, the general practice was merely to send copies of intercepted messages to Washington. This of course entailed a long delay in transportation. Recent advances in radiotelegraphic instruments should enable such messages to be copied directly by radio stations in Washington and relieve this office of the necessity of this work.

2. **Goniometric service.**—As codes became more difficult to solve, an increasing importance was attached to the radio goniometric service.

Changing stations indicated a changing front. The grouping of stations betrayed the grouping of commands. Increased activity or an increased number of stations followed an increase in the number of troops.

Especially during the last year of the war, both sides made every effort to reduce the amount of information furnished the enemy by the location and distribution of stations,

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The inaccuracy of goniometric instruments at first required a number of readings of each station before an average could be taken and the approximate location determined. The practice of changing call letters daily or oftener was an effort to prevent any considerable number of readings being recorded on the same station. This was quickly followed by improvement in the instruments so that it became possible to determine with considerable accuracy the location of a station from a single reading.

The daily change of call letters, however, made necessary the taking and transmitting of complete lists of bearings every day.

It then became the practice to designate the location of a station by three letters, according to a system devised by the French.

If on one day a station, say GMR, was reported at ABC, and the next day station GLX was reported at ABC, they were assumed to be the call letters of the same station, and if GMR had been identified as pertaining to the nth division GLX was reported to code officers as belonging to the same division.

By following the calls of particular stations from day to day the system of assigning call letters was learned, so that in some cases it was possible to determine in advance what the call of a certain station would be.

This information was of value in case the goniometric stations failed to get a bearing on any one day.

Another useful result of the study of call letters was the determination of army boundaries. The Germans had adopted the scheme of sending many messages across army and divisional boundaries in order to prevent the accurate groupings of stations belonging to any one organization.

It was, however, noticed that on account of the great number of stations it was necessary to assign the same call letters to several stations. They, therefore, arranged their calls in two groups. The first group would be assigned to the first, third, fifth, etc., armies from one flank and the second group to the second, fourth, sixth, etc., armies from the same flank.

It would then appear that if GMR could be identified as belonging to any even-numbered army (numbers being assigned serially from a flank) that any other army using that same call must be even numbered. By checking, station by station, on a map on which all stations were plotted, and underlining calls of even-numbered armies in red, and those of odd-numbered armies in blue, one could determine with certainty and precision army limits.

To confuse our code men the enemy next began sending false or meaningless messages. It naturally occurred that more often than otherwise messages exchanged within the division were real while those which crossed divisional boundaries were meaningless.

This practice was made use of by our code men to check up their decisions as to whether or not a particular message in an unsolved code was real or not. If it was known to have crossed a divisional boundary the presumption was that it was meaningless and could be discarded. On the other hand if there were other evidence that the message was meaningless the presumption was that it had crossed a divisional boundary. By working these two devices of the enemy against each other much useful information was obtained.

The foregoing is given merely to show the unlimited possibilities for the exercise of ingenuity in this service and to indicate why specific rules for its handling are not given.

In this, as in other activites of radio intelligence work, the conditions in the next war may be and probably will be greatly changed. It is therefore possible to give only a general idea of the object of the work and trust to the officer having charge of it to devise means for attaining that object. (See Enclosure E, "Report of Goniometric Subsection".)

3. **Aeroplane service.**—Although this service was of some value, it is distinctly adapted to trench warfare. That such warfare is costly and indecisive and likely to be resorted to only

when neither side feels strong enough for a vigorous offensive seems reasonably certain. Moreover, it requires a narrow front, compared to the force engaged, with flanks absolutely protected. In view of this it seems very doubtful if our armies will ever again engage in such a war. If this is true there is little use for the radio intelligence aeroplane service. It should, however, be kept in mind and studied in our schools with a view of its use if needed.

4. **Press service.**—This service requires only good instruments and good operators furnished by the Signal Corps and good translators furnished by G–2, A. It has only general interest for the radio intelligence service.

5. **Translation and classification of enemy documents.**—The full possibilities of this service were not appreciated until just before the signing of the armistice and no adequate provision was made for handling it.

In October many captured documents relating to the Signal Service and the use of codes began coming to this office. Many of them were very useful, but of a highly technical nature which the regular translators of G–2, A, could not handle. The Signal Corps was not provided with translators. Many of the documents were of particular interest to this section and this was the only section having men with both the technical knowledge and familiarity with the enemy language necessary to insure proper translation.

It is certain that provision should be made for handling this work in the event of war with any highly civilized nation.

There will be submitted later a report of the enemy's liaison service now being prepared by an officer of this section. I will be unable to see this report before its submission to you, but have entire confidence in the officer charged with its preparation.

6. **Receipt and distribution of documents—Procurement and care of office equipment.**— This service was not originally contemplated, but on account of the great number of documents coming into and going out of the office and the constant calls for special equipment, it was found necessary and an officer detailed for that purpose. This officer has amply justified his existence and should be provided in the future. (See Enclosure F, "Report of Adjutant of the Section.")

7. **Security service—Listening stations.**—This service, almost unthought of in 1917, was established by practically all belligerents in 1918. (See Enclosure G, "Report of Security Subsection.")

In our own service its scope should be greatly enlarged. It should include all means of giving false information to the enemy and of keeping real information from him. That part which relates to codes and the use of our own means of transmitting information should be handled by the Radio Intelligence Section under the supervision of the officer having general charge of the entire service. Only officers who have made a scientific study of codes and the information to be obtained from them, even when they cannot be solved, are in a position to know what will or will not give information to the enemy.

One of the main duties of code men is that of taking advantage of the enemy's mistakes. It is hardly possible that we will ever have a sufficient number of trained code men to handle the business of an army in the field. It will therefore be necessary to entrust to untrained men the duty of coding and decoding messages. If this is done carelessly the enemy will certainly take advantage of the situation and obtain information of the greatest value. Our own experience in the St. Mihiel and the Argonne-Meuse Battles furnished ample proof of this.

An effort to control the use of code by the issue of orders and instructions was unsuccessful. Commanders were too busy to give the matter their personal attention and subordinates to whom code work was entrusted were changed too frequently to permit of all being familiar with the rules and the absolute necessity of following them,

The policy of writing a letter to the appropriate commander in the case of each offense was then adopted and many letters sent out. Only a few of these were answered and in these cases the action taken was entirely inadequate. In one case an officer was reprimanded by his commander. In others the excuse was made that officers did not know or were too busy or thought they were justified in their action. That these unanswered letters or those in which action did not suit the case were not followed up was due at first to the inadvisability of worrying commanders too much with the question of code when their time was fully taken up with the more urgent and important matter of actual combat. Later the signing of the armistice made further action unnecessary.

In any case the writing of letters to commanders is too slow and cumbersome a method of handling the matter. The commander cannot possibly give his personal attention to the question of whether or not message number 506 was properly encoded. He therefore refers the letter to some overworked staff officer, usually an inspector general, who files it, awaiting a favorable opportunity to make the investigation. When the turn of this letter is finally reached it is found that the responsible officer perhaps has been transferred or is sick or can find no record of the message and does not remember of it having been sent out. In the few cases where connection is actually made with the responsible officer, the whole matter is so old that it has lost its interest. Under our system of control it has been everybody's business to carry out instruction in reference to use of code. The natural result has been that it has been nobody's business and in trying to check up and eliminate faults we have found great willingness and ability to refer us to someone else. Some doubts probably as to exactly which one of several persons, but certainly to someone else. This is the natural result of our system.

I have recommended an officer at each headquarters from the company up who shall be definitely responsible for this service. When faults occur it will be his business to know by whom they were committed and to take steps to prevent a repetition. When faults are noted by officers at higher headquarters it should then only be necessary to inform the responsible officer and direct him to call on the offender for an immediate accounting. The result will be that when an officer decides to save time by disregarding some of those "exasperating and useless" instructions from General Headquarters, he will be called on for an explanation before he has had time either to forget or get transferred, sick, or wounded. The case being fresh, will seem more important. Finally, the designation of a particular officer at each headquarters who is definitely responsible for this service will insure at least one officer familiar with instruction to whom the others can go for advice or explanations.

Whether or not these officers should also receive orders from and assist in the work of the general security service, I am not prepared to say. It occurs to me, however, that they would be very useful in that respect and if so they should cooperate in every way.

A discussion of the German system of control of the use of code and means of transmitting messages will show something of the possibilities of this service.

The first indication of such a service in the German Fifth Army was the arrival of a man named Jaeger. He appeared to have been sent there to correct the many faults then common in this Army. He was energetic, efficient, and enthusiastic, but he made one mistake. At that time, the Germans were using a code so arranged that each solution gave automatically nine others. This code was used for many weeks without change, but messages after being encoded were enciphered by a key changed every few days, sometimes daily, and different in each division. It contained less than one thousand words with the result that many words had to be spelled letter by letter. Such spelled words were of much assistance to us in the solution of new keys. Jaeger made it one of his duties to reduce the number of spelled words and sent many messages calling attention to carelessness in the use of code, unnecessary repetitions, and other faults of which our code men had been taking full advantage. These messages

were always signed in code. The code did not contain the name Jaeger, so the signature had to be spelled. Its appearance was quite characteristic and was easily recognized by our code men. It so happened that the identification of this name gave us forty solutions among what we called the "spelling groups" which when once found rendered the remaining solutions easy and sure.

The result was that our code men watched eagerly for the Jaeger messages whenever a new key appeared. A particularly bad break on the part of some operator was pretty sure to draw one of these messages so that each mistake did double duty in helping us. Later a Lieutenant Bum was detailed as Jaeger's assistant and he also signed his messages, but his name was not as useful to us as Jaeger's. It was soon noticed, however, that Jaeger's work was having its effect. Mistakes and instances of carelessness became more rare, the use of spelling groups fell off very materially, and our difficulties greatly increased. Finally, both Jaeger and Bum disappeared or merely stopped signing their names, but their work went on. Before the signing of the armistice there was known to be a security officer at each regimental and higher headquarters, and one at each battalion headquarters was suspected. Had an equally efficient control of this service been in force in the German Armies six months earlier our Radio Intelligence Service would have lost a large part of its value.

The other duties assigned to the Radio Intelligence Security Service, though important, are merely incidental to their main duty of controlling the use of code and lines of information.

8. Policy regarding preparation and use of trench codes.—After one failure, the Signal Corps prepared a trench code book which had the entire approval of this section and was probably better than any other in use on the Western Front. Nevertheless, faults were discovered and corrected from time to time and others, no doubt, exist. The closest liaison between this section and the Signal Corps should continue to be maintained in order that full advantage may be taken of the knowledge of codes obtained by the study of those used by the enemy. It should also be noted that our security service makes a careful study of American messages and is in better position than any other service to find and point out technical faults in the code books.

On account of the uncertainty of the courier service and their refusal to carry heavy packages, the lack of interest in the distribution of code books by other departments and urgent need of making distribution on time, the work of distributing the trench code books was taken over by this section.

I believe this was a mistake. The Adjutant General has the necessary machinery for distribution. He should be furnished distribution lists and informed when the books are to be in the hands of troops and then attend to the actual distribution.

General Orders No. 172, these headquarters, gives the present regulations governing the distribution of these books.

In the recommendations covering duties of this section the distribution of code books is omitted.

9. Training of listening station operators.—The Signal Corps having the facilities and instructors necessary for this duty has actually handled it. This section has given general instructions as to requirements of operators and examined them as to their knowledge of German.

10. Policy as regards carrier pigeons.—This subject is sufficiently covered in paragraph A–10, Part I.

11. Reports.—The reports recommended in Paragraph A–11, Part I, are those actually in use at the time of the signing of the armistice. They are regarded as quite sufficient for the time but should be freely changed when deemed advisable.

12. Liaison with the Signal Corps.—The Signal Corps is in a position to do more to help the work of this section than any other organization.

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In the fall of 1917, the advice of officers of Allied armies was asked in the matter of our own organization. We were strongly advised to provide our own personnel and equipment complete without reference to the Signal Corps.

As this action would cause much unnecessary duplication and as the Signal Corps had officers and men with technical knowledge and experience, which we could hardly hope to duplicate, it was decided to ask them to furnish equipment and the men required for its technical control.

This decision has been amply justified by the result and no change is recommended.

It should be pointed out, however, that the closest relations between the Signal Corps and this section are essential. At General Headquarters and at the headquarters of each army there should be a Signal Corps officer with authority to act for the Chief Signal Officer to whom this section can go directly with requests for service of any kind. It is also important that the Radio Intelligence Officers at General and Army Headquarters be so familiar with Signal Corps work that, while making no unreasonable demands, they will take full advantage of the latest advances of science and allow no useful powers to deteriorate through lack of use.

13. **Peace-time organization.**—One of the greatest difficulties of this section was the finding of men suitable for the work.

Codes were almost unknown in our own army. The importance of care in their use so as to maintain their secrecy and avoid giving information to the enemy was entirely unappreciated. Previous to and during the St. Mihiel and Argonne-Meuse Battles, a great amount of valuable information was furnished the enemy through carelessness of our own officers and men in the use of code.

The following indorsement will illustrate the effort made from this office to insure care in the use of code. The fact that such efforts were largely unsuccessful was due to the almost total ignorance of officers in the matter of code and the difficulty of exercising control through commanders, who had neither the time nor the special knowledge required for the purpose.

### 3D IND.

Adjutant General, American E. F. Sept. 17, 1918.—To Commanding General, 1st Army.

 1. Returned.

 2. Steps will be taken to learn who was responsible for the misuse of code, brought to your attention in attached letter of September 7th.

 3. Since the organization of the 1st Army, the 1st Army radio stations and telephone operators have furnished information of vital importance to the enemy, in regard to your battle order, the organization of your divisions, the location and form of training of divisions in reserve, the location of heavy artillery and tanks while preparing for the attack, and the date the attack was to take place, as nearly as it could be ascertained by the telephone operators. Your attention has been called, by letter, to many cases of criminal carelessness in the use of our code and the transmission of messages in clear, or in a mixture of code and clear. Even messages entirely in code have, in general, been so carelessly prepared that the enemy will have no difficulty in solving the code.

 4. You are directed to conduct a rigid investigation in all cases of reported misuse of code, to take necessary steps to correct such misuse, and to bring to trial officers who willfully violate existing orders and instructions printed in the code book.

By Command of General Pershing:

Adjutant General.

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The remedy is thought to be the systematic instruction of our officers in time of peace and the placing of representatives of this section at all company and higher headquarters in time of war.

Small tactical code books should be prepared and frequently revised and republished. They should actually be used by student officers at the Staff and Line Schools.

In the matter of radio instruments, the present tendency toward continuous wave field sets of low power with sharp tuning and highly directive antenna will greatly increase the difficulties of unauthorized interception.

While one is forced to admit the apparent success of the directive antenna, I am convinced that electrical disturbances in any direction must produce reaction in all other directions. Just what form this reaction will take and how it can be detected is for the Signal Corps to find out. Experiments along this line should be conducted at the school in connection with the instruction in radio intelligence work.

The whole radio intelligence service should be organized and used as a training school for as many officers and men as can be supplied and should be charged with the duty of keeping posted on the advances made by foreign governments and adapting our own organization to conform to the latest inventions for transmitting or intercepting messages of all kinds.

If this is done we can hope to enter the next war with our organization fairly well perfected at its beginning instead of at its end.

14. **Army organization.**—This question appears sufficiently covered in paragraph A-14 of Part I.

## B. PERSONNEL

1. **General Headquarters.**—It is assumed that in case of operations even of a single army, either in our own or a foreign country, there will be organized an advance or General Headquarters, the location of which will be more permanent than Army Headquarters. Should this not be the case the personnel recommended for General Headquarters should be located in Washington and work under the supervision and control of the appropriate subsections of the General Staff.

In no case should the personnel be assigned to Army Headquarters. Their records and equipment are too bulky and the personnel too numerous to be readily moved while the necessary interruptions of work due to frequent moves will injuriously affect the work of the section.

(a) The officer in charge should have some knowledge of codes and ciphers and be thoroughly familiar with the powers and limitations of the Signal Corps. He should spend a large part of his time with the armies and maintain personal contact with the representatives of the Signal Corps and other services, who assist in or profit by the work of the section.

(b) The assistant to the officer in charge should be familiar with all phases of the work and be ready to take full charge of the office at any time.

(c) The officer in charge of code and ciphers should be familiar with all the usual methods of encoding and enciphering and should be capable of devising solutions applicable to any new or special methods adopted by the enemy. On this man more than any other will depend the successful reading of enemy messages. The most careful consideration should be given the matter of his selection.

(d) Code men, officers, and clerks should know the enemy's language. Before being sent to the front they should be carefully examined in the code section at Washington as to their suitability for code work. In case of doubt the applicant should be rejected. The officers in particular should possess to a high degree ability of independent thought and original research.

(e) While a knowledge of the enemy's language is not so essential for cipher as for code men, it is very desirable and no efforts should be spared to obtain suitable men familiar with the

language. The officers should be selected from those who have demonstrated ability for this class of work.

(f) The goniometric and aeroplane service should be directed by an officer familiar with radiotelegraphy. It is thought a Signal Officer detailed for duty with G-2 would be most satisfactory.

(g) Officers for translation and classification of enemy documents should, in addition to a good knowledge of the enemy's language, be familiar with technical expressions and names pertaining to the Signal Corps.

(h) The officer for receipt and dissemination of documents and procurement and care of office equipment needs no special qualifications in addition to those required of any officer.

(i) The security service should be conducted by an officer familiar with all activities of the Signal Corps, and the general principles governing the preparation and use of codes and ciphers. He will have constant need of all those qualities of tact, patience, and determination characteristic of the best army officers. His selection should be made with this in view.

(j) The chief clerk and at least one assistant should be expert stenographers and have, if possible, a knowledge of the enemy's language.

2. Army Headquarters.—The officers and clerks for duty at Army Headquarters should be selected from among the best at General Headquarters, and their places filled by new men from Washington or other source of supply.

In making these selections it must always be borne in mind that it is at Army Headquarters that information is received in time to be of real use and that it is the personnel at Army Headquarters who must be trusted to recognize important points and place the available data in shape to be of use to the troops. A British officer says that while the General Headquarters organization has its important role of making detailed studies for which the Army has neither the time nor facilities, and serves as a training school for army replacements, it is really the army organization that is "the point of the spear." "If the point is dull the spear fails in its mission."

3. Corps headquarters.—The security officer and clerks at corps headquarters should be selected from trained code men at General Headquarters and their places filled by new assignments.

4. Division headquarters.—The security officer at division headquarters should be selected by the Division Commander, and sent to General Headquarters for a course of training of at least 1 month.

5. Other organization headquarters.—The security officer at brigade, regimental, battalion, and company headquarters should be detailed by the organization commanders to supervise this service in addition to their regular duties.

## PART III

### HISTORY OF THE RADIO INTELLIGENCE SECTION, AMERICAN EXPEDITIONARY FORCES IN FRANCE FROM JULY 28, 1917, TO JANUARY 2, 1919

On July 28, 1917, this section was formed by the detail of Capt. (now Lt. Col.) Frank Moorman, Coast Artillery Corps, as officer in charge.

It was to function as a part of the Information Division of which Maj. (now Col.) A. L. Conger, General Staff, was chief, and which in turn was a part of the Intelligence Section of the General Staff with Maj. (now Brig. Gen.) D. E. Nolan, General Staff, as Assistant Chief of Staff, G–2, in charge.

The personnel of the Radio Intelligence Section was limited to its chief. There were no records. There was no material on which to work. There was a general idea that the section was to read German code and cipher messages, but how this was to be done, and the details of getting the messages were not specified.

On September 25, Lt. (now Capt.) H. A. Berthold, Coast Artillery Corps, was assigned to duty with the section and on October 11 one field clerk, Harry Block, reported for duty.

Most of the time from July 28 to October 29 was spent in a study of British and French methods and consultation with our own Signal Corps, as to their part in the service. Visits to both British and French offices were made and much valuable information obtained.

As American troops occupied no definite part of the front, an agreement was made with the French to permit American intercept stations to be established in the vicinity of the Meuse for the purpose of copying messages on which we could practice the methods of solution taught us by the French and British.

Arrangements were also made with the Signal Corps to furnish men and instruments for copying messages and transmitting them to us.

On October 29, 1917, we received our first messages copied by our own station at Gondrecourt. These messages were, however, few in number, as station was too far from the battle line.

A number of the messages copied by this section were meaningless practice messages transmitted by stations attached to the American Signal School at Langres. We spent considerable time on them thinking they were German messages. On learning the truth we took much pleasure in speculating on the worry they must be giving the German code men. Had we received such messages a few months later they would have been discarded almost at a glance as obviously "fakes." If these messages were copied by the Germans they must have caused some amusement as indicating the clumsiness of the Americans.

On November 12 an intercept station was opened at Souilly and from this time on messages came in so fast that we were unable to handle them all and the question of personnel for our office became of pressing importance.

Officers and clerks were obtained from all available sources. Some were detailed from divisions, some from replacement depots, some from Washington, and some from men reclassified at Blois. In the case of officers, we looked for men knowing German who were able to think. The difficulty experienced in finding men who could actually think without a guardian was surprising. It is to be hoped that one of the aims of the future will be to develop this ability in men chosen for code and cipher work.

(15)

In the case of clerks we required ability to work and requested men knowing German, whenever possible.

By first showing that we must have more men to handle work coming in and then calling attention of the Signal Corps to our increased personnel requiring more material with which to work, we soon had both our own office and the Signal Corps organization growing steadily. By the time the Americans actually took over a sector we had both the means and the experience for handling the work.

On January 30 we made our first weekly report with maps showing radio stations in the German Fifth Army and Detachment "C."

At about this time First Lt. (now Capt.) C. H. Matz, Infantry, was detailed to take charge of the work with our First Army. There was no First Army, but Lieutenant Matz was given the reports it was presumed he would receive at Army Headquarters, required to make deductions from them, and submit his reports as though the Army were actually in operation.

On April 3 Lieutenant Matz was given two clerks to assist in his work and all were moved to a separate room where they worked out their own organization and conducted a small-scale Army Radio Intelligence Section.

A special telegraph line was carried to his office where messages were received directly from the Signal Corps stations and acted on by him in all respects as would be done at Army Headquarters.

The subsequent history of this section is shown in reports of the First Army Radio Intelligence Officer, which are enclosed and marked "C", "H", "I", and "J."

The Second Army Radio Intelligence Section was formed on September 22d, by taking 1 officer and 2 clerks from the trained First Army Section and adding First Lt. (now Capt.) P. B. Whitehead, F.A., as officer in charge, and 4 clerks from G.H.Q. The officer and clerks taken from the First Army were replaced from G.H.Q.

Although the Second Army Radio Intelligence Section made all preparations for active service and submitted routine reports up to November 11, 1918, the signing of the armistice found it still untried in actual battle. A report of this section is enclosed marked "D."

For a few days after the signing of the armistice code and cipher messages continued to be received, but the number decreased very rapidly and this section found itself with so little to do that it was decided to make use of the personnel at other places where their special knowledge would make them of particular value.

Dates of arrival, relief, and duty to which assigned are shown below:

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| Name | Rank | Duty with section | | Transferred to— |
|------|------|------|------|------|
| | | From— | To— | |
| Moorman, Frank | Lt. Col | July 28, 1917 | | Still on duty with section. |
| Berthold, H. A | Capt | Sept. 25, 1917 | Nov. 18, 1918 | 3d Army. |
| Block, Harry | A.F.C | Oct. 13, 1917 | Dec. 18, 1917 | Purchasing Officer, Paris. |
| Matz, C. H | Capt | Dec. 20, 1917 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Ladwig, W. J | 2d Lt | Dec. 20, 1917 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Whitehead, P. B | Capt | Jan. 3, 1918 | | Still on duty with section. |
| Falk, E. H | 1st Lt | Jan. 4, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Vogel, E. J | A.F.C | Jan. 4, 1918 | Dec. 30, 1918 | Dist. of Paris. |
| Sellers, L. W | 2d Lt | Jan. 18, 1918 | Nov. 28, 1918 | G–2, B. |
| Graham, J. A | 2d Lt | Jan. 18, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Meeth, J. C | A.F.C | Jan. 24, 1918 | Dec. 3, 1918 | General Bliss. |
| McKenna, J. A | A.F.C | Jan. 24, 1918 | Dec. 3, 1918 | General Bliss. |
| Jacques, H. C | A.F.C | Jan. 24, 1918 | Dec. 3, 1918 | G–2, A–c. |
| Kilbourn, W. H | A.F.C | Jan. 24, 1918 | Dec. 6, 1918 | G–2, A. |
| Shook, S. S | A.F.C | Jan. 24, 1918 | Nov. 28, 1918 | G–2, B. |
| March, S. R | A.F.C | Jan. 24, 1918 | Dec. 3, 1918 | General Bliss. |
| Childs, J. R | 1st Lt | Feb. 1, 1918 | Dec. 3, 1918 | General Bliss. |
| Gilmore, R. W | 2d Lt | Feb. 1, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Osann, H. E | Capt | Feb. 24, 1918 | Apr. 30, 1918 | G–2, A. |
| Nathan, J. P | Sgt | Mar. 18, 1918 | Dec. 3, 1918 | General Bliss. |
| Dodge, W. O | A.F.C | Mar. 23, 1918 | | Still on duty with section. |
| Daney, G. W | A.F.C | Mar. 23, 1918 | Dec. 3, 1918 | Intelligence School. |
| DePierri, G. B | A.F.C | Mar. 23, 1918 | Dec. 5, 1918 | 2d Army. |
| Mangene, A. S | A.F.C | Mar. 23, 1918 | | Still on duty with section. |
| Perrie, A. L | A.F.C | Mar. 23, 1918 | Nov. 25, 1918 | G–2, A–6. |
| Lyon, W. C | A.F.C | Mar. 23, 1918 | Dec. 7, 1918 | A.G.O. |
| Gallagher, P. B | A.F.C | Mar. 23, 1918 | Sept. 2, 1918 | A.G.O. |
| Wahl, J. J | Col. Sgt | Mar. 30, 1918 | Dec. 5, 1918 | Organization. |
| Mehan, J. W | 1 cl. Pvt | Apr. 1, 1918 | Nov. 20, 1918 | Organization. |
| Graham, J. T | 1 cl. Pvt | Apr. 1, 1918 | Dec. 5, 1918 | Organization. |
| Frey, E. L | 1 cl. Pvt | Apr. 1, 1918 | Dec. 5, 1918 | Organization. |
| Tooliatos, H. N | Pvt | Apr. 4, 1918 | Dec. 5, 1918 | Organization. |
| Gussack, H | A.F.C | Apr. 8, 1918 | May 11, 1918 | G–2, B. |
| Anderson, E. S | Sgt | Apr. 11, 1918 | Dec. 5, 1918 | Organization. |
| Nourse, E. M | Capt | Apr. 14, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Guldner, E. R | Sgt. Maj | May 3, 1918 | Nov. 24, 1918 | G–2, A–4. |
| Rosenthaler, C. L | Sgt | May 4, 1918 | May 15, 1918 | Organization. |
| Eiseman, M. F | 2d Lt | May 7, 1918 | Aug. 10, 1918 | G–2, A–1. |
| Roosevelt, E. F | 1st Lt | May 9, 1918 | June 13, 1918 | Organization. |
| Townsend, | 1st Lt | May 9, 1918 | May 15, 1918 | A.G.O. |
| Coursall, N. M | 1st Lt | May 9, 1918 | June 14, 1918 | A.G.O. |
| Endrum, J. E | Pvt | May 10, 1918 | Dec. 5, 1918 | Organization. |
| Sailor, V. L | 1st Lt | May 13, 1918 | Dec. 5, 1918 | 3d Army. |
| Woellner, E. D | 2d Lt | May 13, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Gunster, J. F | 2d Lt | May 13, 1918 | Nov. 28, 1918 | G–2, B. |
| Millikin, D. D | 2d Lt | May 13, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Bromley, K | 1st Lt | May 13, 1918 | May 18, 1918 | A.G.O. |
| Thunder, J | Cpl | July 8, 1918 | Dec. 5, 1918 | Organization. |
| Friedman, W. F | 1st Lt | July 12, 1918 | | Still on duty with section. |
| Kennedy, F. J | A.F.C | July 20, 1918 | July 23, 1918 | A.G.O. |
| Bellgardt, H. K | A.F.C | Aug. 12, 1918 | Dec. 7, 1918 | A.G.O. |
| Bird, C. W | 1st Lt | Aug. 17, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |

| Name | Rank | Duty with section | | Transferred to— |
|------|------|------|------|------|
| | | From— | To— | |
| Snyder, S. A. | A.F.C. | Aug. 18, 1918 | Dec. 7, 1918 | A.G.O. |
| Sapp, Dew. T. | A.F.C. | Aug. 18, 1918 | Nov. 25, 1918 | G–2, B. |
| Visconti, W. A. | A.F.C. | Aug. 18, 1918 | Dec. 7, 1918 | A.G.O. |
| Billing, A. E. | 2d Lt. | Aug. 21, 1918 | Oct. 15, 1918 | Organization. |
| Hendricks, L. E. | Pvt. | Aug. 30, 1918 | Dec. 8, 1918 | Organization. |
| Robbins, L. W. | Bugler | Aug. 31, 1918 | Dec. 7, 1918 | Organization. |
| Kennedy, F. J. | A.F.C. | Sept. 2, 1918 | Dec. 7, 1918 | A.G.O. |
| Keener, R. K. | 1st Lt. | Sept. 19, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Works, A. M. | 1st Lt. | Sept. 20, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Skinner, H. C. | 1st Lt. | Sept. 20, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Norris, J. S. | 1st Lt. | Sept. 20, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Livesey, Fred'k. | 1st Lt. | Sept. 20, 1918 | Dec. 3, 1918 | Peace Commission. |
| Campagnoli, H. G. | 1st Lt. | Sept. 20, 1918 | Dec. 5, 1918 | Blois. |
| Scott, R. V. | Pvt. | Sept. 28, 1918 | Dec. 7, 1918 | Organization. |
| Chamberlain, R. | 2d Lt. | Sept. 20, 1918 | Oct. 16, 1918 | Organization. |
| Koeppler, J. L. | A.F.C. | Oct. 1, 1918 | Dec. 6, 1918 | G–2, A. |
| Heiman, H. J. | A.F.C. | Oct. 1, 1918 | Dec. 7, 1918 | A.G.O. |
| Kresser, S. L. | A.F.C. | Oct. 1, 1918 | Dec. 7, 1918 | A.G.O. |
| Bichwit, Leonard | A.F.C. | Oct. 2, 1918 | Dec. 7, 1918 | A.G.O. |
| Alberson, E. L. | Pvt. | Oct. 5, 1918 | Dec. 8, 1918 | Organization. |
| Hufnagel, C. H. | A.F.C. | Oct. 8, 1918 | Dec. 7, 1918 | A.G.O. |
| Kyle, C. C. | 1 cl. pvt. | Oct. 11, 1918 | Dec. 7, 1918 | Organization. |
| Scherer, L. E. | A.F.C. | Nov. 4, 1918 | Dec. 7, 1918 | A.G.O. |
| Tartalsky, Sm'l. | A.F.C. | Nov. 10, 1918 | Dec. 7, 1918 | A.G.O. |
| Montross, C. G. | 1st Lt. | Nov. 24, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |
| Jackson, Eugene | 1st Lt. | Nov. 24, 1918 | Nov. 30, 1918 | Mil. Gov., Treves. |

It appears that a recital here of the various incidents connected with our work will serve no good purpose. Those of special importance and the lessons drawn from them are shown in other parts of this report.

The one big lesson impressed upon those of the radio intelligence service in common with every other service of the American Expeditionary Force is the absolute need of preliminary training. Evidence of the high cost of the lack of such training has appeared on every side.

In the next war the radio intelligence should be able to render the most valuable service, but unless it can start with at least a few trained men its value will be very seriously reduced.

In concluding this report I think it proper to make official report of the fine service rendered by radio intelligence officers of our Allies, officers of our own Signal Corps and, above all, by the personnel of this section.

Colonel Cartier, from the French Ministry of War, has taken a real interest in our work and has been ready, willing, and able to help us at all times. His advice and assistance have been of the greatest service to us.

Captain Painvin, of the French Cipher Office, whose remarkable solutions of enemy codes and ciphers probably place him at the head of all code and cipher men of the Allies, has never been too busy to give us the benefit of his greater experience and skill.

Maj. M. V. Hay, General Staff, from the British War Office, has generously placed at our disposal the results of several years' work. He has never failed to respond promptly and fully to any of our demands for assistance.

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Capt. C. S. Wright, General Staff, in charge of the British Radio Intelligence Service, gave us most valuable assistance in the matter of our organization. He took the trouble to show in detail the British methods of work, pointed out the mistakes that had been made, and advised us as to the best way of avoiding the same mistakes.

Capt. O. T. Hitchings, in charge of the British Code Office, has cheerfully given us the benefit of his experience with enemy codes and ciphers, and permitted us to use his office as a training school for our own men.

To these five officers is due much of whatever success this section has had in handling the work assigned to it.

The following letter from A.C. of S., G-2, to the Chief Signal Officer, American Expeditionary Force, sufficiently indicates the invaluable service of our own Signal Corps in connection with Radio Intelligence,

GENERAL HEADQUARTERS
AMERICAN EXPEDITIONARY FORCES
GENERAL STAFF, SECOND SECTION (G-2)

FRANCE, *November 25, 1919.*

From:   A.C. of S. (G-2).
To:     C.S.O.
Subject: Work of R.S.S.C.

In view of the excellent work of the Radio Section of the Signal Corps charged with the duty of collecting information for use of this section, it is thought proper to bring the following to your attention.

The work of the section has made necessary the keeping of Signal Corps men on duty at all hours of the day and night under the most trying conditions. But for their cheerful and faithful compliance with the exacting requirements of our code section, much valuable information would have been lost.

In addition to furnishing regular confirmation of enemy battle order and frequent indications of relief, there have been many items of special importance. Among them the following are of interest:

On March 11, an entirely new code was placed in service by the Germans. This was considered of great importance as indicating that the long-expected German attack would soon take place. All available men were assigned for its solution. On March 13, a message in an old solved code was intercepted by the Signal Corps. It was from a station which had received a message in the new code. It reported that the addressee was unable to read the message and asked that it be repeated in the old code. From the call letters given in this message it was possible to find both the original message in the new code and the repetition in the old code. Comparison of the two gave a number of solutions which were at once communicated to British and French code men. With this as a start, rapid solution was assured, so that before the Germans themselves were really familiar with their new code it was being read by the Allies. The importance of this solution can hardly be overestimated. Failure to get all three of these messages correctly would have indefinitely delayed such a solution. When it is considered that the messages copied appear to the Signal Corps operator as simply a series of letters without meaning, that these are the hardest kind of messages to copy, that in order to be sure of getting the valuable messages it has been necessary to copy several hundred useless ones per day over long periods of time, and that copying is done under difficult conditions and through interference which confuses all but the best operators, it is possible to appreciate the fine work which has been done. In this one case a few minutes' inattention, a single mistake in call letters, or the missing of a few groups

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in one of the messages would have made the others useless. The American operators are the only ones who copied all three messages with sufficient accuracy to be useful.

On the afternoon of April 24, a message intercepted from the St. Mihiel Sector announced that an attack had been postponed on account of bad weather. At 1:25 p.m. and again at 1:52 p.m., April 25, messages were received ordering batteries to be at absolute attention and announcing that the barrage signal would be "BLUE." Troops were notified and took the necessary steps to meet the raid which took place that night.

At 9:05 p.m., April 28, a message ordering an attack for 1:00 a.m. was intercepted, telegraphed to this office, decoded, and the troops warned. Warning reached them thirty minutes before actual delivery of the attack. Without a well-organized system for copying and transmitting these messages this information would have been too late to be useful. It should be noted that in this case as in others the Signal Corps operator had no knowledge of the important nature of the message.

On June 14, 1918, a German message was intercepted stating that the enemy (French) was preparing an attack and giving instructions for meeting it. The French were notified. We were later informed by the French that they had planned an attack at the designated point and that on our information that the Germans were prepared to meet it, they had taken necessary action.

The goniometric, like the intercept service, has done excellent work. In spite of daily changes in call letters of enemy stations your goniometric stations have made daily location of nearly all enemy stations. The care and accuracy shown by operators has enabled us to follow the movements of enemy stations with precision and certainty. From such movements it has been possible to get much valuable information, obtainable from no other source, in regard to enemy intentions.

One case in particular deserves notice. Just before the American attack on the St. Mihiel Salient there were many indications that the enemy had withdrawn and the advisability of advancing the infantry without artillery preparation was seriously considered. The final decision to make the attack as originally planned was based on the evidence of the goniometric service that enemy radio stations were still active in their old locations.

The aeroplane stations have done their part. By reporting the location of aeroplanes registering for the enemy artillery they have enabled the air service to interfere with many hostile "shoots."

The telephone listening stations have furnished much valuable information in regard to the enemy. Perhaps the greatest value of these stations, however, has been their reports of American telephone conversation. By their conscientious work in reporting indiscreet American conversation they have done much to limit the information given the enemy by means of our own telephone.

Numerous memoranda and reports inviting attention to the work of individuals have been furnished you. It is not thought necessary to repeat these, but it is desired to express special appreciation of the work of two officers who have worked in close liaison with G-2.

Lt. Col. L. R. Krumm, Signal Corps, has, by his careful study of the needs of this section and his untiring efforts to meet these needs, been of the greatest service.

Maj. Robert Loghry, Signal Corps, who has had charge first of the Radio Section, First Army, and later of the group of armies, has, by his energy and enthusiasm, kept up the interest of his men and made the Radio Section of the Signal Corps a live progressive organization. When the section was short of men and equipment he arranged with the French Armies to help. He has maintained continuous and friendly relations with the French radio men ever since the organization of the Radio Section. The fact that during the past year there has been no case

of friction between the French and American services and no instance in which either has failed to help the other when needed is due very largely to the tact and good judgment of Major Loghry. In his relations with this section and the members of a foreign army Major Loghry's actions have been a credit to himself and the service he represents.

D. E. NOLAN,
*Brig. Gen., Gen. Staff, A.C. of S., G-2.*

The members of the Radio Intelligence Section, many of whom were selected from divisions because of their special abilities, have seen their less-gifted companions promoted ahead of them. They have accepted the situation because they were informed it was for the interest of the service. The natural desire of young men for more active service has been restrained for the same reason. There have been many applications for transfer to duty with troops, but in every instance where it was deemed desirable to retain applicant in this office, application was voluntarily withdrawn after the situation had been explained.

That there has been no case of lack of discipline requiring action of higher authority is due entirely to the high sense of duty of the members of this section and their sincere effort to meet all requirements.

The men of the Radio Intelligence Section have worked cheerfully and faithfully without regard to hours and have given their Government the very best they had of brains, energy, and good faith. Their Government is indebted to them for faithful service and I am proud to have served as one of them.

FRANK MOORMAN,
*Lieutenant Colonel, General Staff.*

LIST OF ENCLOSURES

A. Report on Enemy Field Radio Stations.
B. Reports required from Armies.
C. Final report First Army.
D. Final report Second Army.
E. Report of Goniometric Subsection.
F. Report of Adjutant of the Section.
G. Report of Security Subsection.

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## ENCLOSURE A
(Example of a report on Enemy Field Radio Stations)

GENERAL HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES

GENERAL STAFF, SECOND SECTION G–2, A–6

DISTRIBUTION "L"—GERMAN RADIO STATIONS

*Period of October 21 to October 31, 1918*

1. *Activity.*—West of the Meuse enemy radio activity showed a constant decline until October 23d. After this date activity became more steady but unusually slight. An average of five messages daily was exchanged during the period from the 23d to the 31st of October.

East of the Meuse, activity showed no important changes except for a sharp temporary rise on October 28th.

Between Etain and the Moselle activity remained very low during the period and it was clearly observed that the enemy was enforcing very strict discipline over the radio traffic in order to conceal his intentions and prevent the identification of organizations.

2. *Distribution.*—West of the Meuse, the period was marked by important changes in the distribution of enemy radio stations. The steady withdrawal of stations which began on October 17th, which was noted in our previous report continued until October 24th. Between the Aisne and the Meuse practically every enemy station disappeared including the important corps stations at Stenay and Beaumont. Prior to this, there had been considerable concentration of radio stations in this area. Beginning October 24th radio stations reappeared considerably in the rear of the former groups on a line which seemed to correspond generally to the Freya Stellung. Eleven new stations were found in this reestablishment, which continued for several days. The activity of the new stations, however, consisted chiefly of tests and calls, showing that the system was in process of organization rather than actually functioning. Toward the end of the period an apparent cessation of this reorganization was observed and indicated that the enemy's intentions of a withdrawal had been changed. None of the new stations showed any great activity nor functioned to any great extent. At the end of the period the whole system west of the Meuse seemed very vague.

East of the Meuse there was a general increase in the number of stations. There was a great concentration in the region of Etain with extensive lateral communication and camouflage which destroyed any appearance of defined groups. Practically all stations between the Meuse and Fresnes were linked together by intercommunication, showing the great care the enemy was taking to avoid clearly defined corps and divisional groups. On the whole the situation east of the Meuse showed nothing of importance but a constant tendency toward stabilization. Between Etain and the Moselle the most noticeable feature of the distribution of enemy radio stations has been the disappearance of a number of stations near the front line between the Moselle and Lachaussee.

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3. *Identifications.*—The following list of identifications is contained in a French report of October 15, 1918:

| Divfunka No. | | Divfunka No. | |
|---|---|---|---|
| 18 | 34th Division | 81 | 227th Division |
| 23 | 52d Res. Division | 82 | 37th Division |
| 26 | 213th Division | 92 | 5th L. W. Division |
| 30 | 238th Division | 112 | 214th Division |
| 40 | 1st Bav. Division | 125 | 236th Division |
| 46 | 52d Division | 146 | 10th Division |
| 52 | 108th Division | 151 | 25th Res. Division |
| 55 | 28th Division | 157 | 81st Res. Division |
| 56 | 228th Division | 159 | 2d Division |
| 63 | Namur (Instructions) | 173 | 192d Division |
| 68 | 83d Division | 174 | 9th Corps |
| 71 | 221st Division | 176 | 9th L. W. Division |
| 73 | 2d Guard Division | 183 | D. C. P. G. |
| 75 | 204th Division | 189 | 1st Bav. L. W. Division |

*Wireless camouflage.*—Strict discipline over the wireless traffic and extensive lateral communications have been in practice on our entire front, wherever there was a stabilization of stations. This practice on so large a scale destroys the appearance of former clearly defined corps and divisional groupings.

*Enemy intentions as indicated by radio.*—(a) On October 23d the meteorological station Z–34 was moved from the vicinity of Fleury to a position 12 kilometers to the rear, probably indicating that the enemy does not consider his line east of the Moselle secure.

(b) The great concentration of stations in the region of Etain and the extreme precautions used between this place and the Moselle to avoid the identification of groups indicates that the enemy intends resistance in this sector.

*Antiaircraft stations.*—Four antiaircraft radio stations have been located on the front occupied by Detachment "C". They are, however, very rarely heard. These messages send out warnings of the enemy airplanes in brief messages beginning "KUK" and giving the number and location of the planes. The most active of these stations is located northeast of Buxieres.

*Meteorological stations.*—Station Z–34 has been moved to the rear and is located about six kilometers northeast of Metz. No change has been observed in the location or procedure of stations Z–29 and Z–31.

*Expected attack indicated by T.P.S.*—An extremely nervous attitude has been indicated by the activity of ground telegraph stations in Detachment "C" during the past ten days. There was a gradual decrease from October 21st to October 26th. On the latter date the amount of ground telegraph communication increased. On October 27th there was again a marked decrease and our listening post operators reported that the German stations in the sectors of the 13th Landwehr Division and the 94th Division seemed to have been drawn back, leaving one outpost station. This phenomenon was noticed by listening post operators in the Bois D'Apremont prior to the American attack against the St. Mihiel Salient and is strong evidence that the Germans have been expecting an attack in this region.

*General.*—Toward the end of the period considerable nervousness on the part of the enemy was observed east of the Meuse. Radio stations in the region of Etain were twice put on the alert and a number of tactical messages were intercepted in this area. The sharp increase of activity on October 28th strengthened this impression.

*Aeroplane registrations.*—Between Mouzon and Etain weather conditions permitted very slight aeroplane registration during most of the period. The last few days of the month, however, gave rise to an unprecedented activity, the greatest number of calls being forty on October 30th.

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The longest flight was one of four hours and eighty minutes on October 29th. One station (NAK) was twice called upon for battery work, on the 23d and on the 26th.

Between Etain and the Eply the amount of artillery adjustment for the last ten days was markedly disproportionate to the average state of visibility during that time. Ten or more planes were heard on seven different days. On October 30th signals were intercepted from 33 different planes. This great activity is apparently due to the fact that the enemy feared an attack between Etain and Pont-A-Mousson. The longest flight was reported on October 22d. This plane (NNZ), adjusted for two different batteries for five hours, indicated five targets, called for more than forty rounds to be fired, in addition to four salvos and signalled four brackets.

| | Radio station calls | Number of flights made | Registra-tion flights [1] | Batteries obtaining brackets [2] | Number of targets engaged [3] | Aggregate hours flown |
|---|---|---|---|---|---|---|
| Between Mouzon and Etain_____ | 146 | 139 | 97 | 36 | 98 | 122.2 |
| Between Etain and Eply_____ | 236 | 176 | 132 | 142 | 51 | 67 |

[1] All flights in which at least 1 round was observed.
[2] That is, when 2 rounds fell, 1 over the target and 1 short, giving an effective bracket.
[3] Any target which was signalled by the aeroplane and received at least 1 round.

*Interference with hostile ranging.*—Seven warnings were sent to the Air Service.

D. E. NOLAN,
*Brigadier General, General Staff, A. C. of S. (G-2).*

**ENCLOSURE B**
(Reports required from Armies)

GENERAL HEADQUARTERS, AMERICAN EXPEDITIONARY FORCES, GENERAL STAFF, SECOND
SECTION (G-2, A-6)

FRANCE, *October 11, 1918.*

MEMORANDUM FOR ARMY RADIO INTELLIGENCE OFFICERS:

In addition to reports required at the Army, the following will be furnished as indicated
in each case:

1. A daily telegram summing up activity during the past 24 hours.
    To this office and French G.Q.G.
2. Copies of listening station reports.
    To this office, by courier, after you have made necessary extracts.
3. Reports of solutions made by you of any code.
    To this office by telegraph.
4. Copies of ADFGVX messages in case of a considerable increase in volume.
    To this office by telegraph.
5. Copies of all reports required by the Army.
    To this office by courier.
6. Copies of all radio messages intercepted by stations reporting to you.   They may be
sent directly from stations or through your office, as you deem best.
    To this office by courier.
7. Copy of trimonthly radio station report and map.
    To this office and French G.Q.G. by courier.
8. Copy of your aeroplane report in case this is not included in trimonthly radio station
report.
    To this office by courier.
9. Copy of trimonthly listening station reports.
    To this office by courier.
10. Originals or copies of gonio station and aeroplane intercept station reports.
    To this office by courier.
11. Daily list of stations heard up to midnight of the preceding day.
    To this office and French G.Q.G. by telegraph.
12. In case of unusual changes in stations, a special report giving locations and call letters
as soon as obtainable.
    To this office and French G.Q.G. by telegraph.
13. Report on the 6th, 16th, and 26th of each month giving call letters used by each
station during the preceding five days.
    To French G.Q.G. by telegraph.
    Copy to this office by courier.
14. A daily sketch showing location of all stations with their call letters.   Stations exchang-
ing calls to be connected by lines.
    To this office and French G.Q.G. by courier.

The telegraphic address for reports to French G.Q.G. is: "Service Goniometric, French
G.Q.G."

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The mail address for reports to French G.Q.G. is: "Lieut. Buisson, Gonio Officer, French G.Q.G."

The telegraphic address of this office is: "R.I.S., G.H.Q., American E. F."

The mail address of this office is: "Radio Intelligence Officer, General Staff, G.H.Q., American E. F."

Report No. 1 will be encoded by use of the "Wabash" Code, a copy of which is in the hands of the French "Service Goniometric."

Reports Nos. 11 and 12 will be in the following form:

(1) Address.
(2) Words "Lignes Z."
(3) Number of stations whose locations have been accurately determined and whose locations and call letters follow:
(4) Word "dash."
(5) Location of first station.
(6) Call letters of first station.
(7) Word "dash."
(8) Location of second station.
(9) Call letters of second station.
(10) Word "dash", etc.
(11) Word "period" after call letters of last station accurately located.
(12) Words "Lignes Y."
(13) Number of stations whose locations have been approximately determined, and whose estimated locations and call letters follow.
(14) Word "dash."
(15) Estimated location of first station.
(16) Call letters of first station.
(17) Word "dash."
(18) Estimated location of second station.
(19) Call letters of second station.
(20) Word "dash", etc.
(21) Word "period" after call letters of last station approximately located.
(22) Signature.

Location of stations will be indicated by use of three letters.

The first letter will be that one appearing in the left margin of the French Special Plan Directeur, which designates the horizontal 5-kilometer strip in which station is located.

The second letter will be that one appearing at the top of the French Special Plan Directeur, which designates the vertical 5-kilometer strip in which station is located.

The third letter will indicate the exact location within the 5-kilometer square defined by the first two letters. For this purpose each 5-kilometer square is considered to be divided into twenty-five 1-kilometer squares lettered thus:

| A | B | C | D | E |
|---|---|---|---|---|
| F | G | H | I | J |
| K | L | M | N | O |
| P | Q | R | S | T |
| U | V | X | Y | Z |

It will be noted that the first two letters will indicate any one of several 5-kilometer squares. In special cases, where there is danger of confusion, the first two letters may be replaced by the numbers indicated in the plan directeur. In this case, the location of the station will be indicated by four figures and one letter.

Report No. 13, which will be transmitted at the earliest possible moment on the 6th, 16th, and 26th of each month, will be in the following form:

(1) Address.

(2) Last two of the call letters used by any station on the 1st, 11th, or 21st of the month.

(3) Last two of the call letters used by same station on the 2d, 12th, and 22d of the month.

(4) Same for 3d, 13th, or 23d.

(5) Same for the 4th, 14th, or 24th.

(6) Same for 5th, 15th, or 25th.

(7) Word "dash."

(8), (9), (10), etc., same information for some other station.

Continue to include all stations identified three or more times during the preceding period of 5 days. In case identification is missed on one or more days, indicate that fact by "XX" in place of last two letters of call for the day on which identification was missed.

The object of Report No. 13 is the determination in advance of the call letters for certain stations during the last half of each 10-day period.

The first of the three-letter call signs now used by the Germans is assigned for a period of 10 days, during which time it does not change.

The second and third letters are changed every day. These are arranged in lines each containing 10 pairs of letters. A station will be assigned one line, the pairs of letters to be used in turn, commencing in some cases on the right, in others on the left. As there are no duplicates in the list, it appears that in case the last two letters in the call used by any station on the sixth day of a 10-day period are the same as those used by any other station on the fifth day of the same 10-day period, the calls used on the 7th, 8th, 9th, and 10th days will be the same as those used by the other station on the 4th, 3d, 2d, and 1st days, respectively.

The French "Service Goniometric" will receive these reports from all Armies on the Western Front, and will then telegraph each Army a complete list of calls used on the fifth day of the 10-day period.

These should be compared with calls heard on the 6th. If duplicates are found, notify French G.Q.G. by telegraph, which will then send corresponding calls used from first to fourth days of period.

Call letters on the 31st are the same as those used on the 21st of the month.

Report No. 14 is required for verification of Army boundaries by a system devised by Lieutenant Buisson, which will be explained verbally at first opportunity. Outline maps for use in making this report will be furnished from this office.

Hereafter Reports Nos. 7 and 9 will be made trimonthly to correspond with the German trimonthly changes in call letters. They will cover the periods 1st to 10th, 11th to 20th, and 21st to last of each month.

In accordance with French practice, and on account of the importance of accuracy in transmitting enemy radio station call letters, all "umlaut" letters will be indicated by use of the simple letter followed by "E."

Thus Ä will be represented by AE, Ü will be represented by UE, etc.

Reports to be sent to or received from neighboring Armies will be arranged by mutual agreement between the Armies concerned.

FRANK MOORMAN,
*Lt. Col., G.S., American E. F.*

## ENCLOSURE C
### (Final report of First Army)

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HEADQUARTERS FIRST ARMY, AMERICAN EXPEDITIONARY FORCES
SECOND SECTION (G-2)

NOVEMBER 25, 1918.

RECOMMENDED ORGANIZATION OF RADIO INTELLIGENCE SECTION
AT ARMY HEADQUARTERS

#### I—OFFICE ORGANIZATION

1. *Personnel:*
    1 Captain
    2 Lieutenants
    8 Army Field Clerks and Noncommissioned Officers
    1 Draughtsman.
2. *Subdivision of section:*
    1 Captain, Chief of section: General supervision of entire section
    1 Army Field Clerk: Secretary and clerk for section
*Subdivision A:* Gathering of information about the enemy
            1 Lieutenant: In charge
    a. Codes and Ciphers
            3 Specially trained Army Field Clerks or Noncommissioned Officers
    b. Goniometric Work:
            2 Army Field Clerks or Noncommissioned Officers
            1 Draughtsman
    c. 1 Aeroplane Intercept
            2 Listening Stations
            1 Army Field Clerk or Noncommissioned Officer.
*Subdivision B:* Control of Communication Service within the Army.
    a. Supervision of use of codes.
    b. Supervision of telephone conversation near the front.
    c. Supervision of telephone conversation in the rear areas.
            1 Lieutenant: In charge.
            1 Army Field Clerk or Noncommissioned Officer.

#### II. TECHNICAL EQUIPMENT

*Maintained and operated by the Radio Section of the Signal Corps*

1. *Radio intercept stations.*—Number to be determined by extent of front covered by local conditions of terrain, and by variations in wave-lengths used by the enemy.
    Intercept stations to be able to intercept messages from all stations opposite army front up to and including enemy Army Headquarters stations.

Intercept stations to be connected by direct telegraph wire with office of Radio Intelligence Section.

2. *Goniometric stations.*—Number should be sufficient to allow one station for every 10 kilometers of front covered.

Goniometric stations to be mounted on motorized tractors, and to be equipped with radio transmitting and receiving outfits.

In addition one goniometric control station located in a central position to the goniometric stations and connected with the Radio Intelligence Section by direct telegraph wire. This control station to receive bearings at stated times from all goniometric stations and transmit them to the Radio Intelligence Section.

The control station to be the P.C.T. of a radio net which includes all goniometric stations, and to be always in communication with all goniometric stations.

During war of position, or whenever possible, goniometric stations to be connected with control station by direct telephone or telegraph wire. In such case the radio net to be maintained also for emergency use.

3. *Aeroplane control stations.*—Except in extreme cases one to cover Army front.

To be maintained in connection with goniometric control station and to listen in continually during daylight hours for enemy ranging aeroplane signals. Upon intercepting such signals to notify goniometric control station which in turn notifies all goniometric stations to take bearings on plane. These bearings are transmitted to the goniometric control station where the location of the plane is plotted. This location to be transmitted at once to the proper pursuit group, and together with the call letters of the plane and battery to the Radio Intelligence Section.

A radio station belonging to the Army Antiaircraft net to be maintained in connection with the aeroplane control station for the purpose of transmitting warnings of hostile ranging flights to pursuit groups.

4. *Listening stations.*—At least one to every division in line.

To intercept enemy T.P.S. and telephone conversations. To transmit important information immediately to nearest commander of troops and to forward daily reports of all intercepted enemy communications to division commander, and to Radio Intelligence Section.

To intercept all American telephone conversation overheard and to forward daily reports on same to Division Commander and to Radio Intelligence Section.

5. *Radio control stations.*—One at Army Headquarters.

To listen in continually for American radio messages and to furnish copies of all messages intercepted to Radio Intelligence Section.

6. *Telephone control.*—Telephone connection to be provided from Radio Intelligence Section to Army switch-board so that conversation passing through that board may be overheard at will.

7. *Wire connections.*—

        *a.* Telephone to Army switch-board (for communication).

        *b.* Intercept telephone to Army switch-board (for control).

        *c.* Telegraph to intercept stations.

        *d.* Telegraph to goniometric control station.

ORGANIZATION AND FUNCTIONING OF THE RADIO INTELLIGENCE SUBSECTION

A. *Function.*—The subsection of G-2, known as the Radio Intelligence Section, had for its function the gathering of information about the enemy from observation, to the greatest possible extent, of the enemy communication services, and the coordination and interpretation of the information thus obtained.

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B. *History.*—The Radio Intelligence Section of the 1st Army was assembled in part some time before the actual organization of the army itself. On June 12, 1918, an office was opened at Toul, consisting of one officer and two field clerks in order to form a nucleus, trained by actual experience in the work they were destined to perform for the section to be attached later to G-2 of the 1st Army. The sector covered by the work of this office extended from the Meuse to the Moselle.

On July 20, 1918, the personnel of this office was transferred to La Ferte sous Jouarre, Seine et Marne, to join the staff of the 1st Army, then forming. A preliminary study was being made of the sector which the 1st Army had planned to take over, when orders were received to cease work upon this sector. On August 13th the section moved with the remainder of G-2 to Neufchateau. Since upon the departure of the section from Toul another staff had continued operations in the Meuse-Moselle sector, the personnel of the Radio Intelligence Section of the 1st Army, with the exception of the chief, was transferred to Toul and was augmented by the personnel already there. Upon the transfer of the 1st Army headquarters to Ligny-en-Barrois the entire office at Toul was moved on August 30, 1918, to Ligny, from which point it operated during the St. Mihiel attack of September 12th.

The Radio Intelligence Section remained at Ligny after the establishment of an advanced P.C. of the Army headquarters until October 10, 1918, when it moved to the advanced P.C. at Souilly, where it remained until the close of hostilities on November 11th.

The total personnel which served at one time or another with the Radio Intelligence Section of the 1st Army is as follows:

| | |
|---|---|
| Capt. Charles H. Matz | Chief. |
| Lt. Robert W. Gilmore (Sept. 1-20) | Asst. Chief. |
| Lt. John A. Graham (Sept. 23) | Asst. Chief. |
| Army Field Clerk Wm. C. Lyon | Goniometric Section. |
| Army Field Clerk John A McKenna (Sept. 1-20) | |
| Color Sgt. John J. Wahl (Sept. 23) | |
| Army Field Clerk John C. Meeth | Code Section. |
| Army Field Clerk Henri C. Jacques | |
| Army Field Clerk Sterling R. March (Sept. 1-20) | |
| Sgt. Edgar S. Anderson (Sept. 23) | |
| Army Field Clerk Walter H. Kilbourn | Secretary. |

C. *Organization.*—The technical side of the work of observing the enemy's communication services was performed by the Radio Section, Signal Corps, 1st Army. This work consisted of the operation and maintenance of the necessary apparatus, stations, etc., by means of which the actual observation was made. All results were transmitted by the Radio Section to the Radio Intelligence Section for study and interpretation. Although these two sections were entirely separate and distinct organizations, the former belonging to the Signal Corps and the latter to the Second Section of the General Staff, the closest possible liaison and cooperation between the two was necessary.

The work of the Radio Intelligence Section may be divided into several classes:

(1) The location of enemy radio stations and the grouping of these stations into divisional, corps, and army "nets."

(2) The interception and decoding of enemy radio messages.

(3) The interception and decoding of enemy ground telegraph (T.P.S.) messages.

(4) The interception of enemy telephone conversations.

(5) The interception of radio signals from aeroplanes ranging for hostile artillery and the location of the planes sending these signals.

(6) The policing of our own telephone lines near the front for dangerous conversation which might be overheard by the enemy.

(7) The distribution of our own trench codes to divisions, corps, and army troops.

D. *Operation.*—(1) The location of enemy radio stations and the grouping of these stations into divisional, corps, and army nets.

Enemy radio stations were located by bearings from radio-goniometric stations located at intervals along the front. These stations were able to measure within a couple of degrees the direction from which the signals of an enemy radio station came. By the intersection of lines drawn from two or more of these goniometric stations in the direction of the enemy station a quite accurate map-location of the enemy station could be obtained.

If an important message was decoded the location of the station sending the message was obtained by this means, but the primary importance of the goniometric section was to locate daily all enemy stations heard and by connecting these stations by lines indicating an exchange of messages, to determine groups of stations belonging to divisions, corps, and armies.

The radio traffic of a division would normally be contained almost entirely within its own limits, and similarly with corps and armies, so that theoretically the intercommunication of stations should disclose clearly the boundaries of units. But actually the enemy, with the intent of destroying this source of information, indulged in a carefully regulated camouflage activity whenever possible, having stations communicate regularly across divisional, corps, and army boundaries, so that the grouping of stations into actual "nets" was very difficult. However, under very active conditions, the necessary traffic of stations was so great that camouflage was impossible and the various "nets" showed up clearly.

From the location of stations also the depth of the enemy echelons could be determined, as well as the presence of his troops in doubtful areas, and, during war of movement, the positions along which he was organizing resistance

(2) The interception and decoding of enemy radio messages.

Intercept stations were maintained at proper points along the army front to listen in continually for enemy radio messages. These stations were connected by direct wire with the Radio Intelligence office and intercepted messages were telegraphed in directly.

The enemy had in general use two separate codes and one cipher during the functioning of the 1st Army.

The first of these codes—a trinumeral type—was used principally for communication within divisions, and by certain miscellaneous units, such as artillery groups, etc. The code consisted of a base containing letters, syllables, phrases and code names, and a separate distortion table for each division and miscellaneous unit, which changed at intervals averaging ten days or two weeks. With a fair amount of text it was possible to decode messages in this code with considerable success. Except during times of great activity the enemy apparently took great care to prevent information of importance being sent in this code. However, identifications of units were often found from decoded messages, and occasionally more vital information.

During periods of activity, particularly during the St. Mihiel attack, the enemy used this code much more freely, and highly important information was obtained from decoded messages.

The second code employed groups of three letters commencing with K, R, A, U, or S. A separate code was used by each army, changing at intervals of from two weeks to a month. This code was very difficult of solution and on account of the great number of words and phrases and alternative groups which it contained, the principal study of it was done for each army by the code section of G.H.Q. All text received was forwarded to the code section of G.H.Q. where an exhaustive study was made of the code and all solutions were wired to the armies. Messages of considerable importance were sent in this code, but during the functioning of the 1st Army the code was never solved sufficiently to be of great value, though upon

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two occasions when a code was captured much valuable information was obtained from the messages.

The cipher employed was a very difficult substitution transposition type and was used only in time of activity; that is, during severe offensive or defensive action. It was apparently used between Army, corps, and division stations, and for messages of great importance. Messages sent in this cipher were practically safe from danger of solution.

In the spring of 1918 the enemy adopted a policy of the strictest caution and conservatism in regard to his code messages, with the result that when the 1st Army began functioning the possibility of obtaining information of value from these messages was decidedly less than during the earlier part of the war.

(3) The interception and decoding of enemy ground telegraph (T.P.S.) messages.

This was accomplished by listening stations located close to the front. T.P.S. stations have a very limited range and were used by the enemy only in his forward units. For this reason the messages sent were rarely of importance. The code used was generally the aforementioned 3-number type, and any messages which were intercepted were copied on the daily report sheets sent to this office by the various listening stations. Indications of considerable importance were obtained by a close watch of the activity of enemy T.P.S. stations, their approximate locations as determined by the intensity of their signals and by changes of their procedure in sending. Reliefs were often indicated in the latter manner.

(4) The interception of enemy telephone conversations.

This was accomplished by the same listening stations which intercepted enemy T.P.S. messages, but owing to the care which the enemy used in controlling his conversation and the location of his lines, no important conversations were overheard during the functioning of the First Army. As before, in the earlier days of the war, much information of vital importance was obtained from intercepted telephone conversations.

The value of listening stations for both T.P.S. and telephone conversations during war of movement was found to be considerably diminished, owing to the difficulty of maintaining close contact with the enemy long enough to install the necessary apparatus.

(5) The interception of radio signals from aeroplanes ranging for hostile artillery and the location of the planes sending these signals.

This service primarily belonged to war of position, since a complete system of telephone lines between goniometric stations and a control station from which warnings of these flights could be sent to air pursuit groups was necessary. During movement of the front it was necessary to move goniometric stations forward frequently so that it was practically impossible to maintain the proper telephone lines. Hence, with the exception of the brief time when the First Army was engaging in position warfare, this branch of the service received no opportunity to function at its full value.

During the earlier days of the war our allies on stable fronts, particularly the British, attained great success in the determination of the location of hostile ranging planes and the interruption of these flights through warnings sent to their own air service.

(6) The policing of our own telephone lines near the front for dangerous conversation which might be overheard by the enemy.

This was also accomplished by listening stations and a great deal of dangerous conversation was overheard during the functioning of the 1st Army. Such conversation was reported to the proper authorities for disciplinary action with a view to impressing the offenders of the dangers of loose conversation and its prevention in the future.

(7) The distribution of our own trench codes to division, corps, and army troops.

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Altogether five issues of the American trench code were placed in service, on the following dates: Suwanee, August 1, 1918; Wabash, August 24, 1918; Mohawk, September 21, 1918; Allegheny, October 12, 1918; Colorado, November 7, 1918.

FUNCTIONING OF THE RADIO INTELLIGENCE SECTION DURING THE ST. MIHIEL OPERATION

AUGUST 10 TO SEPTEMBER 16, 1918

The preparatory work of the Radio Intelligence Section for this operation consisted chiefly in a study of the enemy communication services in the St. Mihiel salient with a view to detecting any changes in organization or procedure prior to the operation which might reveal the enemy's intentions.

No change of any sort was observed until September 8th. At that time unmistakable signs of nervousness on the part of the enemy became noticeable along the southern side of the salient. The activity of radio stations in this region mounted steadily from September 8th to 11th. The radio station attached to the observation post on the Butte de Montsec was exceedingly active during this period, an indication that continual reports on movements within our own lines were required. On September 9th listening stations in the Bois d'Apremont reported abnormal telephone conversation within the German lines, and on the same date a listening station near Limey reported that enemy ground telegraph stations had apparently moved back. A similar phenomenon was noted by a listening station at Flirey on September 10th. This withdrawal of enemy ground telegraph stations to the rear was an indication of an echeloning in depth of the enemy's forces, and of a fear of surprise attack.

On the western side of the salient, however, conditions appeared more normal. The conclusion arrived at then was that the enemy anticipated an attack between St. Mihiel and the Moselle, but entertained less anxiety about the sector between Les Esparges and St. Mihiel.

However, for some days previous to the date set for the attack, indications from other sources of intelligence pointed to the intention of the enemy to withdraw from the salient, and every means available was adopted by the Radio Intelligence Section to detect any signs of such a withdrawal. Evidence from other sources that the withdrawal was imminent kept increasing, but no indication that it had begun was found from the enemy's communication service. Finally on September 11th, the day before the attack, the situation became acute. Strong evidence pointed to the fact that the enemy had already accomplished his withdrawal. However, on the evening of the 11th reports received during the day from goniometric stations disclosed the fact that all enemy radio stations were still in their normal positions and in operation—an impossible condition, had the enemy actually withdrawn. Hence, in spite of all other indications, the Radio Intelligence Section was able to show positively that the enemy still occupied the salient.

With the development of the attack it became evident that the enemy's communication service was at first thrown into considerable confusion. However, on September 14th, a reorganization along the new line became evident and quickly developed.

During the progress of the attack considerable information of importance was gained from decoded radio messages. This included identifications and the location of various P.C.'s, but particularly the warning of an enemy counterattack in the region of the Soulevre Farm in time to inform the troops concerned.

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FUNCTIONING OF THE RADIO INTELLIGENCE SECTION DURING THE ARGONNE-MEUSE OPERATION

SEPTEMBER 9–NOVEMBER 11, 1918

The work of the Radio Intelligence Section preparatory to the first main attack of the Argonne-Meuse operation consisted in a study of the enemy communication services west of the Meuse. Facilities for such a study in this sector were far less favorable than in the St. Mihiel salient, principally because the enemy made very little use of radio for his communications. For several days prior to the attack of September 26th signals of nervousness on the part of the enemy were observed, though to a less extent than had been observed before the St. Mihiel attack.

The attack of September 26th evidently disclosed to the enemy the need for a more complete radio organization west of the Meuse, for immediately upon the stabilization of the line, following the first phase of the offensive, a considerable concentration of stations in this region became apparent. This concentration began on October 1st, and by October 5th was practically complete. The distance of divisional stations from the front indicated that the enemy's forces were echeloned in great depth.

From the establishment of communication along the new line until about October 17th indications pointed to the intention of the enemy to hold the positions that he then occupied. Occasional identifications were obtained, including the location of corps headquarters at Stenay and Beaumont but, generally, decoded messages contained information of small importance.

However, on October 17th; a general withdrawal of radio stations west of the Meuse began. During the following week practically every station between the Meuse and the Aisne, a total of 17, many of which were close to the front, disappeared. This was strong evidence that the enemy was planning a withdrawal of his forces, and this evidence was confirmed by reports from other sources. On October 24th stations began to reappear west of the Meuse, but farther to the rear than before. It soon became evident that a reorganization of radio nets was taking place approximately along a line corresponding to the Freya Stellung. This seemed strong evidence of the enemy's intention to withdraw to this position. But about October 29th this reorganization ceased and, taken in collaboration with other information, it was decided that the enemy's plans for a withdrawal had been changed, and his new intention was to hold the line he then occupied.

In preparation for the second phase of the Argonne-Meuse operation an attempt was made to deceive the enemy as to our own intentions by allowing him to acquire false information by means of his own Radio Intelligence Service. Prisoners taken east of the Meuse, between Beaumont and Fresnes about October 20th declared that the enemy was fearful of an attack in the direction of Briey and Metz. Accordingly a plan was evolved to increase these fears and thereby divert his attention and his forces from the west of the Meuse. This plan consisted of establishing an army "net" of radio stations opposite the front Beaumont-Fresnes and sending messages between these stations in a cipher which the enemy could solve through apparent carelessness in its use. These messages were of a nature which would make the enemy think that an attack by this new "army" was imminent. Furthermore, telephone lines were established along the front in a manner which would enable the enemy listening stations to overhear conversation carried on over these lines. This conversation was also such as would indicate a coming offensive. This plan was put into operation on October 23d and was carried on until after the operation west of the Meuse started on November 1st. This camouflage apparently met with considerable success. Enemy radio stations were frequently given orders to be on the alert, and our own listening stations reported that on October 26th enemy ground telegraph stations were drawn back—both, very good evidence of the fear of an attack. It later developed that

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two enemy divisions were held in reserve at Metz even after the attack west of the Meuse began, because of the fear of an attack east of the Meuse.

The attack of November 1st apparently completely disorganized the enemy communication service west of the Meuse by the swiftness of the advance. On November, 3d however, an attempt at reorganization was observed east of the Meuse, but nothing of that nature west of the river, and it was accordingly concluded that the enemy would make no serious resistance until the Meuse was reached. To the south of Stenay the reorganization progressed rapidly, but north of that point the situation was very vague until the end of hostilities. This would indicate that the enemy forces in this region were in considerable confusion.

The attacks which were being carried on east of the Meuse at the close of hostilities had less effect in disorganization of the German communication service and the enemy maintained distinct wireless "nets" during his retreat.

Respectfully submitted.

CHARLES H. MATZ,
*Capt., Inf.*

## ENCLOSURE D
### (Final report of Second Army)

HEADQUARTERS SECOND ARMY, AMERICAN EXPEDITIONARY FORCES
SECOND SECTION (G-2, 9)

NOVEMBER 13, 1918.

REPORT ON ORGANIZATION AND WORK OF G-2, 9

(A) Personnel of the section:
3 Officers.
3 Army Field Clerks.
5 Enlisted men (clerks).
4 Telegraph Operators.

(B) Duties of each member of the personnel:
Officer in Charge—Capt. Whitehead:
Supervision of all work and reports of the Section.
Liaison with other sections of G-2, with other branches of the service, with neighboring armies, with G.H.Q. and G.Q.G.
Assistant to Officer in Charge—Lieut. Gilmore:
In charge of office during absence of Captain Whitehead.
Has given special attention to reports on listening stations, airplane intercepts, and collection of information from prisoners and documents.
Officer in charge of Code Distribution—Lieut. Falk:
Distribution of code books.
Reports on infraction of regulations regarding the use of codes by our own troops.
Chief Clerk—A. F. C. DePierri:
Receives and distributes all incoming messages, reports, and mail.
Typewriting and Stenography.
Responsible for form and appearance of reports and for their distribution when prepared and signed.
In charge of files and records of office.
Gonio { A. F. C. McKenna.
Pvt. Hendricks.
Tabulate all goniometric bearings and prepare daily station-location report from goniometric bearings.
Keep record of intercommunication of stations.
Keep list of permanent designation of stations and their daily call signs for each day.
Prepare daily and trimonthly map showing location and grouping of stations.

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(B) Duties of each member of the personnel—Continued.

Activity—Corp. Wolff:

Records all intercepted messages as fast as received and tabulates the activity of each station.

Calls attention immediately to unusual activity of any station or group of stations.

Keeps a record and a graphic chart of daily activity on army front and of activity of each station.

Keeps a daily record and chart of different kinds of codes used.

Prepares trimonthly chart of activity.

Decoding

A. F. C. March.
Pvt. Endrum.
Pvt. Robbins.

Decode incoming messages.

Prepare daily report on messages decoded.

Prepare telegraphic reports on new solutions.

Keep records of all code solutions received and sent out.

Code men work in three shifts as follows:

8:00 a.m. to 5:00 p.m.

3:00 p.m. to 12:00 m.

12:00 m. to 8:00 a.m.

Airplane Adjustment and Listening Stations—Corp. Krueger:

Tabulates reports from airplane intercept station and prepares daily and trimonthly summary of airplane wireless activity.

Tabulates reports from listening stations and prepares daily and trimonthly summary of activity.

Keeps graphic charts of airplane and T.P.S. activity.

(C) Records kept.—The records kept by this office are mainly in the form of reports, as follows:

Daily, by telegraph:

(1) Summary of activity for preceding day. Distribution: G.H.Q. File.

(2) List of stations heard during preceding day with their location by coordinates. Distribution: G.H.Q. G.Q.G. Armies on each flank. File.

(3) New solutions for enemy codes. Distribution: G.H.Q. Armies on each flank. File.

Occasional, by telegraph:

(4) Unusual activity or changes in number or location of Stations. Distribution: G.H.Q. Armies on each flank. G.Q.G. File.

Daily, written:

(5) Indications from activity of enemy liaison service. Distribution: A.C. of S., G-2, 2d Army. G.H.Q. 1st Army. Radio Officer, Signal Corps. File.

(6) Intercepted enemy communications. Distribution: A.C. of S., G-2, 2d Army. G.H.Q. 1st Army. File.

(7) Map showing location and grouping of field radio stations. Distribution: A.C. of S., G-2, 2d Army. G.H.Q. G.Q.G. File.

(C) Records kept.—Continued.
Trimonthly:
(8) Enemy liaison service with map showing location and grouping of enemy
field radio and T.P.S. stations, and a graphic chart showing activity of
radio stations, airplane adjustment, ground telegraph and telephone.
This map should also show areas in which airplane adjustment was espe-
cially active.
Distribution:
A.C. of S., G-2, 2d Army.
G.H.Q.
G.Q.G.
Each Corps of 2d Army.
Armies on both flanks.
Chief Signal Officer.
Radio Officer.
File.
(9) Report on 6th, 16th, and 26th of each month giving call signs used by each
station during preceding five days. Distribution: G.H.Q. (by courier).
G.Q.G. (by telegraph). File.
Special Reports (when necessary):
(10) Infraction of regulations concerning use of code by our own troops, in the
form of a letter to the Commander of the Corps concerned, through the
Adjutant General.
(11) Special reports to A.C. of S., G-2, 2d Army, on any information of im-
mediate importance.
(D) Opinion as to the effectiveness of the organization as it stands:
The organization outlined above has been found to work well under present conditions,
but would need constant modifications to meet changes which are continually being made by
the enemy in his liaison service.
(E) Recommendations as to improvements which could be made:
(1) The goniometric work could be improved if one of the clerks were a man detailed
from the Signal Corps with a good theoretical and practical knowledge of radio-telegraphy and
radio-goniometry. In addition to the work now being done by this section, it would be the
duty of this man to keep a careful check on the operators at the field stations and report to the
signal officer as to the quality of work being done. It would also be an advantage if this man
could speak German to assist in the translation of technical documents and in the examination
of prisoners from the enemy radio service.
(2) No satisfactory means of getting reports from listening stations to this office promptly
has yet been devised. They have been coming in by mail from one to three days late. The
best method of getting these reports in would probably be by special motorcycle courier.
(3) Paragraph 98-E of "Intelligence Regulations" should be revised so as to permit of the
following reports being made by listening stations:
A report containing all intercepted enemy communications in clear, together with a state-
ment as to the relative activity of ground telegraph and telephone communication, and any
conclusions which the listening-set operators may have formed regarding enemy activity.
This report to go to G-2 of the Division, and through him to G-2 of the Corps.
A report containing all intercepted telephone communications or T.P.S. messages in clear
from our own troops. This should be sent to G-2 of the Division and forwarded through him to
the Chief Signal Officer of the Division.

A report containing all intercepted enemy communications either in code or clear, together with a statement as to activity and location of sending stations. This should be sent directly to G-2 of the Army, either by telegraph or special courier.

(4) For the best utilization of the aero-intercept service, the following arrangements are suggested.

The central station which intercepts the signals from airplanes and plots the goniometric bearings on airplanes should be connected by direct telephone line with the counter-battery report center and with the nearest antiaircraft observation post, alerts to be relayed by wireless from the antiaircraft post to the pursuit group and to all other antiaircraft posts simultaneously. Communication with the Sound-and-Flash Section should be established either directly or through the counter-battery report center.

(F) General estimate of the usefulness and probable future development of the service:

In the early stages of the war, codes were comparatively easy to solve and the work done on them was well repaid. Valuable information was also obtained from intercepted telephone conversation. Recently, however, owing to greater precautions on the part of the enemy, information from both of these sources was rapidly nearing a vanishing point. On this account, greater attention has been paid to the observation of the liaison service of the enemy. This is a field which will undoubtedly continue to yield good results. Future developments of this service should be in the direction of getting fuller information from prisoners and documents by which to interpret the facts collected by intercept and goniometric stations.

PHILIP B. WHITEHEAD,
*Capt., F.A.*

## ENCLOSURE E

### (Report of Goniometric Subsection)

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*Purpose of the goniometric service.*—The fundamental principle of this service is to determine the location of enemy radio stations.

From this information the following deductions may be made:

1. Gaining information regarding the enemy's order of battle, regardless of the actual contents of the messages.

2. Furnishing information which is of value towards the solution of trench codes.

3. Furnishing information to the Air Service regarding the location of hostile registering aeroplanes.

*Procedure of locating radio stations.*—The actual functioning of goniometric stations is under the supervision of the Signal Corps. These stations are installed along the entire front at approximately 10-kilometer intervals, the general locations of which are determined by these headquarters.

Telegraphic reports are received from each station at specified intervals containing the following information concerning enemy radio stations heard during these intervals:

　　*a.* Call-signs of hostile sending stations.

　　*b.* Bearings obtained on sending stations (expressed in azimuth).

　　*c.* Degree of accuracy of measurement (very good, good, or poor).

In case slightly varied measurements are obtained on the same station, an average is computed, taking into consideration the degree of accuracy.

The principal apparatus necessary to carry on work in this office is the "map board." This consists of a table of suitable dimensions to accommodate a map (1/80,000 scale) of the area concerned. Locations of gonio stations are indicated by placing a protractor (complete circle) on the map, with its center over the exact geographical position occupied by the station in the field, and with its zero degree mark pointing due north. A thread of suitable length is fastened at one end at the center of each protractor by means of a thumb tack, and at the other end to a small weight. To lay off a given bearing from a given station, move the weight attached to that station so that the outstretched thread will read the proper azimuth on the protractor.

The location of an enemy station is determined by the intersection of threads representing bearings obtained by two or more stations.

*Information obtained on enemy order of battle.*—Before any deductions can be made concerning movements of hostile units, as indicated by radio evidence, it will be necessary to have a comprehensive knowledge of the German forward radio organization.

Army headquarters and corps headquarters are supplied with sending stations, but these stations are generally only used during active operations, and are therefore usually difficult to locate.

Divisions in line are normally supplied with stations at headquarters of the division, brigade, regiments, and at the command post of the commander of the front-line troops. Stations the farthest forward, or which are located on high hills, are also used by observation posts. This organization, however, was not always strictly adhered to, probably due to an insufficient supply of material, in some cases only three stations having been used by a division.

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A complete divisional radio organization, called a (DIFUA) "group", is assigned to the division and moves with it. These groups are defined by the radio traffic within the division and by general characteristics which can only be observed after experience and careful study. During the latter months of the war the enemy introduced an extensive system of camouflage which rendered the determination of groups very difficult. This camouflage consisted of a methodical exchange of messages between forward stations in neighboring divisions or "lateral liaison."

One of the most significant changes to be observed is the withdrawal or disappearance of divisional and corps stations. A change of this kind will generally indicate that the enemy is contemplating withdrawal of his forces. The British observed that rear stations usually withdrew immediately preceding a general withdrawal of forces. Again, west of the Meuse, our service noted a similar withdrawal a few days prior to and during our last attack in that sector.

A general reduction in the number of radio stations in a certain area may be taken as an indication that the enemy does not intend or expect operations in this area.

On the other hand, a general increase in the number of stations in an area indicates that this area is being reinforced with additional divisions. A rapid increase of this kind was noted by the French in the sector between Rheims and the Argonne shortly before their attack in this region during August 1918.

Divisional reliefs may be detected by a sudden change of locations of forward stations in a divisional sector. However, due to the careful methods employed by the enemy, divisions are often relieved without any apparent change in the radio situation.

Before the offensive of March 1918 hostile intentions were indicated to some extent by the activity of the number of radio messages sent in certain sectors. However, due to carefully regulated simulated, or "fake", activity, an increase or decrease of radio activity can no longer be regarded as important. In fact, attacks are most likely to occur in such sectors where the activity is strictly maintained at a normal rate. The French were unable to observe any important changes in the radio situation or activity prior to the German attack between Soissons and Rheims on May 26, 1918, due to the enemy's thorough and strict vigilance over his radio activity.

*Information furnished to the code section.*—Since different hostile armies employ different trench codes, the code section is desirous of obtaining information which will enable it to sort intercepted messages properly according to codes.

It is therefore necessary to furnish daily lists showing the locations of all active stations and their call signs heard during the preceding day.

By means of a system of naming hostile stations arbitrarily, a given station could be followed in spite of the daily changing of call signs. This enabled the code section to detect signatures in messages and trace the movements of military units.

*Information furnished to the Air Service.*—Considerable hostile artillery registration was done by aeroplanes, which sent radio signals to the batteries.

Owing to the shorter wave length employed by registering aeroplanes, special goniometric instruments are installed for the purpose of locating these planes. After a certain plane has been located, this information is communicated immediately to the Air Service, for the purpose of sending out pursuit planes. Since registration planes usually carry on their work from behind the enemy lines and are not easily discovered by visual means, the Air Service has expressed its urgent need of this information.

Registration activity in certain sectors may be regarded as a barometer of hostile intentions. Thus an increase might denote the arrival of new batteries, either in preparation for an attack or to resist our attack.

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The following extracts from various weekly reports of the Goniometric Subsection are given as matters of interest and further explanation to what has been discussed above. They contain much valuable information.

## 1. RADIO PROCEDURE DURING RELIEFS

(Taken from report of Oct. 4, 1918)

*Activity.*—Great variations of radio activity were observed in the area between the *Argonne* and the *Meuse* during the week. The number of messages exchanged on October 2d was 16 times that of September 30th. A general increase was noted towards the end of the week.

Slight activity continued between the *Meuse* and *Etain.*

Between *Etain* and the *Moselle* activity was normal, with the exception of the 4th, when a decided drop was observed.

*Radio procedure during reliefs.*—The following translation of a German Document is taken from the French report for the week ending September 27th:

*Measures to be taken for camouflaging relief.*—The formations of the relieving division will first take possession of all telephonic, visual, wireless and ground telegraph apparatus and will replace this material as much as possible by a similar one. The visual posts of the 1/2 Section 7 will remain in position temporarily.

During the entire relief all telephonic conversation not concerning tactics, and all mention of relief, are forbidden in front of the line *Bussy-St. Christine.* Exception will be made regarding the distant combat group.

Telephonic intercourse of a tactical nature should also be reduced to what is absolutely necessary. Strictly observe the instructions of the D. I. in this matter.

Special care will be taken that no conventional names be used except those handed over by the relieved division. Even after the relief it is forbidden to pronounce openly names of persons or units.

At all wireless, ground, visual or telephonic posts it will be necessary to leave, for 24 hours following the relief, a detachment to instruct the relief in the characteristics, or peculiarities, of the personnel leaving the sector, to enable the relief to imitate as perfectly as possible the manner of working of the relieved unit. It will be necessary, for instance, for the reliefs of the wireless posts to continue furnishing the service, preserving the same general rate as that of the preceding service.

## 2. DEVELOPMENT OF ENEMY RADIO CAMOUFLAGING

(Taken from report of Oct. 11, 1918)

*Development of enemy radio camouflaging.*—The following translated from the French radio report of the week ending October 4th is of interest:

From close observation of the German Radio Service and from information obtained from captured documents a good idea is given of the importance which the enemy has attached to camouflage in this service. The practice started with the beginning of the intensive use of advanced radio service. Advanced enemy radio service began developing in the fall of 1916. Since the winter of 1916 and 1917, the enemy has sought to weed out any points of their system which would be of any use to us in determining their battle order.

The main steps taken in this direction have been as follows, in succession as here given:

Winter 1916–17. Abolishing groups of call letters with a common initial for each "net."

Spring 1917. Increased frequency and variety of changes in call letters.

Summer and Fall 1917. Abolishing collective calls (which proved useful for us) in reconstructing their groups. Development of lateral connections. The use of double and triple call letters. The replacement of call letters in limited sectors and the changing of call letters in divisional groups or between neighboring divisional groups. Abolishing the differences in their methods and reducing activity to that which was absolutely necessary.

Winter 1917–18. A daily change of call letters began early in March. Since the Spring of this year the enemy appears to have greatly developed camouflage by lateral communication. There have been found in certain documents recommendations to have advanced stations of divisional groups work with rear stations of neighboring groups, thus rendering it very difficult for us to group the stations by Divfunkas.

One of the chief characteristics of the German Radio Service is the uniformity of its operation. It is impossible to distinguish the different Divfunkas; that is, whether they are Prussian, Bavarian, Saxon, Wurtemberg, or if they are Austro-Hungarian units. Therefore, reliefs generally pass unnoticed. Naval groups are, however, clearly distinguished from the Divfunkas.

There have also been found in captured documents chapters recommending lectures to be given to the men in order to give them an idea of the real value of camouflage. This evidently constitutes a complication in the service and its rigid application cannot be enforced unless the operators and the station chiefs are aware of the importance of these measures and know that they themselves are closely watched by the listening stations placed in the rear.

## 3. SATELLITE STATIONS

(Taken from report of June 29, 1918)

One of the peculiarities of the system of wireless communication during the offensive was the following:

On several occasions, the wireless stations of the XVII Corps, VIII Corps, and XXXVIII Reserve Corps established advanced stations using the same call signs as the Corps Stations themselves. Such stations were apparently of much lower power, and worked only with the main directing stations.

Such stations apparently served advanced report centers or observation posts. For example, the VIII Corps, which was at *Candor* on the 10th of June, established an advanced station on the *Montagne de Lagny*.

The stations attached to divisional headquarters also established "satellite" stations. The latter used call signs of the principal station, with addition of a letter or figure: e.g., the satellite of the station DNJ was DNJ.1., and the satellite of the station DLK was DLK.A.

## 4. INDICATIONS OF WITHDRAWAL

(Taken from report of Sept. 19, 1918)

The following is taken from the French Radio Report for the week ending 6th September:

Observations of the past few weeks allow us to assert that often a premeditated withdrawal of the enemy is preceded by a withdrawal of rear stations, effected a little before the general withdrawal. It was seen especially in the *Guiscard* Sector and on the *Vesle* Front, that divisional stations retired several kilometers on the day before the troops fell back. Advanced stations seem, on the contrary, to follow the rear guards and do not withdraw until the last moment.

The latter observation was confirmed in the fact that radio stations in the *St. Mihiel* Salient did not withdraw until our troops had penetrated to their immediate vicinity.

## 5. ENEMY INTENTIONS AS INDICATED BY RADIO

(Taken from report of Sept. 19, 1918)

The above experience of the French may be applied to the Radio situation in Detachment "C" as developed during the past week.

*a.* On the 17th, meteorological station Z-16 moved from a position 5 kilometers to the rear. The enemy evidently does not consider his lines south of *Conflans* to be secure. On the other hand, station Z-17, about 5 kilometers south of *Metz*, has remained in its old position, indicating that the lines south of *Metz* are considered safe.

*b.* A concentration of radio groups has been noted in the area between the *Moselle* and *Chambley*, indicating that the enemy intends resistance in this sector.

## 6. WIRELESS ACTIVITY ON THE AISNE BATTLE FRONT

(Taken from report of June 6, 1918)

The following has been taken from the British report for the week ending 3d June 1918:

The activity of German field stations remained normal on the front of the attack until the morning of the 27th of May. The only suspicious circumstances noticed by the Armies on our right was that a few long-wave stations were heard tuning in a few moments on the 25th and 26th May, but these were not located. At midnight on the 26th/27th May, the activity suddenly became great and bearings were obtained on 60 forward stations before 1 P. M. on the 27th, when the enemy's advance compelled the withdrawal of the short-wave intercepting stations. The number of artillery stations heard rose suddenly from 5 or 6 to 20. The enemy's

aeroplane wireless activity had also remained very slight until the opening of the attack. No information is available regarding further developments in the short-wave wireless activity during the enemy's advance, but there was considerable activity of medium and long-wave stations (600-1,200 metres).

### 7. CHANGE IN LOCATION OF AN ENEMY OPERATOR, APPEARANCE OF NEW OPERATORS

(Taken from report of April 25, 1918)

a. The enemy is still using great care to hide the identity and movements of his stations. On April 28th our operator thought he recognized in Sector G-40 the same enemy operator and instrument previously heard in Sector G-20. It is possible that this station and several others are mounted on motor trucks.

(Taken from report of February 21, 1918)

b. On February 20th the German operator at station DX, Group G-35, accidentally signed his message "MD", then hastily corrected himself and gave the correct signature. Probably he had been an old operator at MD in the 56 Div., and was transferred to station DX in the Guard Ersatz Div. This supposition is confirmed by the fact that our operator noted a new German operator at station MD on February 19. Some significance may be attached to this maneuver for the following reason: Station MD has heretofore been one of the most active stations in the entire 5th Army. We may conclude, therefore, that only one of the very best operators would have been on duty there. There must be good reason, then, why the Germans have transferred an A-1 operator from an important station to a station of heretofore comparative inactivity. Possibly greater activity may be expected in the Guard Ersatz Division.

(Taken from report of September 6, 1918)

c. *Use of poor operators.*—During the past week it has become apparent that enemy operators in the 5th Army are of a poor grade. Evidently the better operators have been withdrawn for use in more active sectors.

(Taken from report of September 26, 1918)

d. *Appearance of good operators.*—Our operators noted that new enemy radio operators of excellent quality appeared on the 23d. One marine operator is reported. This change is especially apparent in the region west of the *MOSELLE*.

### 8. ENEMY RADIO STATIONS NUMBERED

(Taken from report of March 28, 1918)

It seems as though all the enemy field radio stations, in spite of changing call signs daily, retain a permanent designation in the form of numbers. Numbers as high as 45 have been identified.

In order to prevent our locating a station with its numbers, all the radio stations are evidently forbidden to use their numbers as call signs. These numbers are only alluded to in the body of the message, as for instance in morning reports.

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## 9. ENEMY WIRELESS CAMOUFLAGE

(Taken from report of April 11, 1918)

The following is taken from the British report for the week ending 1st April 1918:

There is evidence, documentary and otherwise, that the enemy has been devoting considerable attention to the prevention of leakage of information through the activities of his wireless system, and to attempts to deceive by means of fictitious activity. The curtailment of wireless traffic in the battle zone before the attack was part of this plan. Wireless activity may be expected to continue in sectors from which troops have been withdrawn, so as to cover the withdrawal. Abnormal silence in certain sectors may often be regarded with as much suspicion as abnormal activity.

E. H. FALK,
1st Lt., F. A.
E. D. WOELLNER,
2d Lt., Inf.

Nov. 26, 1918.

## ENCLOSURE F

### (Report of Adjutant of the Section)

The office of Adjutant of the Radio Intelligence Section has under its care the following duties:
1. Distribution of code books.
2. Distribution of coordinate strips and squares.
3. Distribution of liaison tables.
4. Publication of conventional signals used by the enemy.
5. Distribution of official mail and telegrams; coding and decoding of all telegrams.
6. Supplies of the section.

1. *Distribution of code books.*—An armed force in the field during combat or at rest is in need of code books as one of its requisites to assure success to its arms. The reason for using code at the front is to puzzle the enemy as to the present and future movement of troops; therefore, it is apparent that code books should be carefully taken care of and protected to the utmost so that they do not fall into the hands of the enemy.

It has been found necessary to create a central office at General Headquarters so as to simplify the work, to make distribution more speedy and to assure a good checking system in regard to code books.

At present this office receives a new issue of code books from the Code Compilation Section. After experimenting for some time as to the number of books to an issue it was found practicable to print 2,500 each time. Along with the code books we receive Emergency Tables which are issued down to companies, while the code books are distributed only as far down as battalions. After checking up the new issue we begin at once to pack them and get them ready to be distributed to an Army. It has been decided to wrap them in packages of 24 each, inclosing also 33 emergency tables. After a package is wrapped, it is checked, sealed and the corresponding number of the books in a package indicated on the wrapper. The packages are then stored and kept here until asked for by one of the armies. When a call is received for a new issue the books are either sent by courier or by Motor Despatch Service. In the case of the courier, they are sent as originally wrapped, but if sent by M. D. S. the inner wrapper is stamped "secret" and addressed in full; and as all secret documents they are sent in double wrappers. A standard form of receipt has been adopted for every issue, differing only as to the name of the code. To simplify its working all the receipts are made out at General Headquarters and sent along with the books. Each individual code book contains in a detachable form a receipt which is to be filled out by the officer who is responsible for that book. The forms of other receipts are made out as attached.

In the beginning when there was no large American force in France and when the different divisions were brigaded with the French or British armies it was found advisable to have the code books issued direct to the separate divisions and when obsolete returned direct to General Headquarters. However, since the formation of the different American armies this process has been eliminated and we send a whole issue of code books direct to the Asst. Chief of Staff, G–2, of the army in question and his office is responsible for the code books. Therefore, the only receipt that is remitted to us is the receipt of the whole issue. It has been found advantageous to destroy the code books as soon as possible after it has been assured that the code has

fallen into the hands of the enemy, and in such a case we are to be forwarded a certificate of destruction giving the numbers of the code books destroyed. A reserve supply of new books is to be kept at all times at the offices of the A. C. of S., G-2. When the working code has been captured by the enemy, the issue held in reserve is to be placed into immediate service; we in turn are to refurnish the A. C. of S., G-2 office with a new set. In order to meet this continued emergency our office keeps in reserve one or more sets of code books.

To keep track of the code books issued to the armies and other independent organizations, we have devised a double-entry book system. We record on the books the number of code books received, with the date; when they are issued to the armies, the number issued, and also the number of the books as individuals. We have to be very careful in the recording of code books issued to independent organizations because they usually receive a smaller number than is issued to an army. Again we have to reserve certain issues for each army and not supply anyone else with the same code book.

At times, when we hear that a code book has been captured, we see to it that a number of the obsolete books are returned to us for the use of our Code Schools and Divisions in training.

For further information regarding regulations governing distribution, see G. O. No. 172 G. H. Q., A. E. F.

2. *Coordinate strips and squares.*—The coordinate strips and squares are issued for the use of the office of the Radio Officer of an army. The Adjutant's office is, as in the case of the code books the central office of distribution, as far as the American armies are concerned. The French Headquarters supplied us with the coordinate strips as it was found practicable to have the same alphabet coordinates and more expedient to have them printed under the supervision of French Headquarters. As soon as we received said strips we had tables printed in an amount corresponding with the number of strips. Each American Army was supplied with 1,000 strips and 1,000 tables which were used by the aerial observers. When a coordinate strip or square fell into the hands of the enemy or was suspected, French Headquarters was to notify us of it and at the same time advise us when a new coordinate strip was to be put into service. We in turn telegraphed the Radio Officers of the different armies and the Chief Radio Officer of the Army Group, advising them of the date and hour that the new strips were to be placed in service. Instead of having coordinate strips named as in the case of code books they were numbered. The Armies were usually supplied with one or two strips as reserves, which were to be held in as secret a place as possible.

3. *Liaison tables.*—For the use of encoding signals of List No. 2, page 79, Liaison for all Arms, there has been issued to the American Armies certain tables which are changed from time to time. These tables and the coordinate strips and squares go hand in hand as they are both used by aero observers at the same time. The liaison tables contain phrases which are transmitted in code; they pertain to the general enemy situation at the front, while the coordinate strips with the aid of a map give the location of enemy positions wanted by our armies. This information is transmitted by wireless. Armies were instructed to notify this office immediately should there be reason to believe that a certain table had fallen into the hands of the enemy and we in turn were to notify by telegram the radio officers of the armies at the same time fixing the date that the new table was to take effect. The usual time given for changing tables was not less than 48 hours and not more than 72 hours after the sending of the telegram.

4. *Conventional signals.*—This office publishes whenever requested by the Officer in charge of this Section a new edition of the conventional signals used by the enemy for communication between aeroplanes and troops. These signals are compiled from reports captured by our forces, or our allied forces, or through intercept by radio, and put into phamphlet form. A

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sufficient number of these phamphlets is printed for distribution to the different armies and intercept stations.

5. *Mail distribution and telegrams, coding and decoding.*—All official mail and documents whether incoming or outgoing pass through this office and are from here distributed to the proper parties. Outgoing mail is distributed according to a list which shows the offices or officers to whom mail under a certain distribution should be sent. A copy of the codes in use by the various armies and also a copy of the General Staff code book are kept in this office as all coding and decoding of messages are cared for in the Adjutant's office.

6. *Supplies.*—All kinds of supplies whether expendable or nonexpendable are to be supplied through this office. The Adjutant is liable for everything that has been ordered from another department and at the same time he is to see that needed supplies are always at hand.

7. *Recommendation.*—It is my belief that it would be more practicable to make the Code Compilation Section part of the Radio Intelligence Section, so as to expedite and simplify the work on code books. Said section should include also a number of officers whose particular duty would be to study past and present code books and improve them and make the necessary changes.

HUGO CAMPAGNOLI,
*1st Lt., M. I. D.*

## ENCLOSURE G

### (Report of Security Subsection)

*United States Army Trench Code.*—The Trench Code now in use by our Army is a production based scientifically upon the actual solution of enemy Trench Codes; thus giving a practical code, that can be used as the best means of wireless communication with absolute security, but it is not "fool proof."

Actual use of our code has shown that, after all the care of producing a scientific, practical, and secure code, it is used very carelessly and thoughtlessly in the field. This abuse of the Trench Code has in nearly all cases been due to the offenders' lack of knowledge of the use of code as a means of communication. It is, therefore, absolutely essential that before a man uses code, he must be thoroughly familiar with all fundamental principles of code and with the means of communication he is going to use.

While General Orders and instructions given in the code book thoroughly cover the questions regarding the proper use of our Trench Code, it has been found that a strict surveillance of the actual use of the code is necessary to maintain discipline and to keep our code reasonably safe from enemy solution.

This surveillance of the actual messages sent by wireless is carried out in the following manner: A number of radio intercept stations are installed along the entire front occupied by our Armies. The duty of these stations is to intercept our Trench Code only. These are known as "Control Stations" and their sole purpose is to intercept all American messages which have been sent. The messages thus intercepted are sent in to the Control Officer. This officer must be thoroughly familiar with Trench Codes. He must be able to detect all infractions of instructions and General Orders covering the use of Code and Cipher. He must be able to suggest the best methods for using Trench Code and be so qualified that he can criticize intelligently and thoroughly the manner in which our Trench Code is being used in the field. His further duties are to see any weaknesses that make the present form of Trench Code vulnerable to enemy code men, and make recommendations in this way for improvements and corrections. In order to properly criticize and to detect any faults and weaknesses, the Control Officer must place himself in the position of the enemy code man and study our messages from the enemy viewpoint.

When messages are received by the Control Officer they are decoded and if any violations of General Orders or instructions are found in the manner in which a message has been encoded, a letter is sent through military channels to the officer commanding the unit in which the message originated, over the signature of the Commanding General. The officer commanding the unit concerned is requested to make an investigation and report the action taken in each case to General Headquarters.

A complete record is made of the original messages. The individual groups are recorded alphabetically or numerically as the case may be. This recording shows the frequency of recurring groups in the code and valuable information is thus obtained as to the deficiencies of the code in general and how these deficiencies may be corrected. From the statistics gathered in this way it will show whether or not the proper use of the alternate code values for a single word, letter, number, or phrase are being used and if null groups are being used in proper propor-

tion. One of the chief violations of instructions has been the insufficient use of null groups and second to this is the neglect of using the code variants.

Prompt and strict measures are taken when a message in the clear is intercepted. Documentary evidence proves that the enemy gained valuable information concerning our order of battle, etc., due to the carelessness in sending of clear English radio messages by operators and officers. Whether the message is of tactical value or merely irresponsible conversation does not matter, the enemy can make valuable deductions in all cases.

*Recommendations for the improvement of the control service.*—Due to the cessation of hostilities before all plans of the security service were put into operation, the following recommendations are made on a basis of probable practicability, but have not been put into actual operation:

1. Not only should the security service be an integral part of the section which is working on the solution of enemy codes, but the work of compiling trench codes should also be a subdivision of that section. In the past, suggestions for the improvement of our code were handled by means of memoranda in a more or less formal manner. Closer personal liaison and discussions would be more advantageous, as would also authority vested under one head.

2. During the war, messages were encoded by officers who were attached to the various headquarters, but whose duties were numerous besides that of encoding messages. The result was that very few officers were sufficiently acquainted with the importance of encoding properly, due to the fact that these officers were being continually changed, and evidently could not devote enough time to a thorough study of code work.

These difficulties could be overcome if the duty of encoding messages and having charge of the code book were assigned to the operator of the radio station. This system was used by the German army, and judging by our difficulties, was evidently quite successful. Stricter discipline, due to more direct action, could thus be maintained. Since the code book would then be continually at hand near the station, instead of in some officer's pocket not at hand, the sending of messages and decoding of messages received, would be greatly facilitated.

3. The security officer should control radio activity by means of issuing orders as to the number of messages to be sent by each station. Since the enemy makes deductions, based upon our radio activity, it is necessary to regulate the activity in such a manner as to mislead the enemy. Stimulated activity will ordinarily attract the enemy's attention to that sector, as will unusually low activity. It is therefore possible to divert his attention to a certain sector, while active operations are undertaken in another sector.

4. A strict surveillance of lateral liaison is necessary. By the term "lateral liaison" is meant the sending of messages between the forward stations of neighboring divisions. This will prevent the enemy from discovering, through accurate locating of our stations, the locations of divisional and Army boundaries.

*Control of telephone lines.*—In connection with the duties of the officer in control of the U. S. Army Trench Code should be added that of controlling and censoring long distance telephone conversation, known as the "Security Service".

Telephone control consists of a listening-in set, installed in the office of the control officer, which is connected to the main test board. Thus by calling the test board operator the listening-in set can be connected to any one of the long distance lines coming through the main telephone exchange.

A stenographer is detailed to listen in and report all conversations relating to troop movements, supplies, etc., and any other information given over the telephone which may be of any value to the enemy. The stenographer is also instructed to report any conversations relating to matters which may have been transmitted by telegraph. Matters of trivial nature are also reported. The latter conversations are eliminated so as to free the telephone lines of unnecessary traffic.

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A schedule is made comprising all the long-distance telephone lines. The schedule is so arranged that the listening-in set is connected to the different lines during their busiest periods of the day. This schedule can only be arranged properly after about 2 weeks of tests on the different lines in order to learn at what hours their busiest periods occur.

Intercepted telephone conversations which contain any violations of telephone censorship are copied and brought to the attention of the offender through military channels.

The following notice is given on the first page of the telephone directory.

*Important notice.*—Before using the telephone make yourself thoroughly familiar with G. O. No. 10 (1917), and G. O. No. 146 (1918) these headquarters.

Your conversation is very likely to be overheard by the enemy "Secret Service" and our own "Security Service." Both of these organizations are continuously on duty. The first is looking for any scrap of information as to organization, plans, movements, etc., of Allied troops, and any other information of value to their own government. The second will, in addition, report use of long-distance lines for unimportant or unnecessary conversations. Remember that long-distance lines are seriously overloaded. The building up of telephone circuits for some trivial purpose takes time and delays the transaction of important business.

By command of General Pershing:

JAMES W. McANDREW,
*Chief of staff.*

Official:
ROBERT C. DAVIS,
*Adjutant General.*

After the above means of prevention became thoroughly understood the violations were comparatively few.

E. H. FALK,
*1st Lt., F. A.*
E. D. WOELLNER,
*2d Lt., Inf.*

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