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WAR DEPARTMENT  
OFFICE OF THE CHIEF SIGNAL OFFICER  
WASHINGTON

NOTES ON THE LIAISON SERVICE AND  
THE LIAISON INTELLIGENCE SERVICE  
OF THE GERMAN ARMY DURING  
THE WORLD WAR

1015

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of the Director, National Security Agency.

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OF THE GERMAN ARMY DURING  
THE WORLD WAR

TECHNICAL PAPER  
OF THE  
SIGNAL INTELLIGENCE SECTION  
WAR PLANS AND TRAINING DIVISION



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**TABLE OF CONTENTS****PART I. LIAISON SERVICE**

	Page
A. Peace organization.....	1
B. Development during the war.....	2
C. Organization and command at the end of the war.....	4
I. Administration.....	4
Chief of the Signal Service.....	4
Commanding General of the Signal Service.....	5
Signal Service Adviser.....	5
Army Signal Commander.....	5
Corps Signal Commander.....	5
Divisional Signal Commander.....	6
Fortress Signal Commander.....	7
Signal officers of lower units.....	7
II. Signal units assigned to the various tactical formations.....	8
1. Army group.....	8
2. Army.....	8
3. Corps.....	8
4. Division.....	8
5. Regimental and lower units.....	8
D. Means of communication.....	10
1. Telegraph.....	10
2. Telephone.....	10
3. "Utel".....	11
4. Wireless telegraphy.....	12
5. Ground telegraphy.....	15
6. Lamp signaling.....	16
7. Rockets.....	17
8. Message-carrying projectiles.....	17
9. Carrier pigeons.....	18
10. Messenger dogs.....	18
11. Runners, etc.....	19
E. Field service regulations for the Signal Service.....	20
F. Precautions for maintaining the secrecy of communication.....	21
1. Restriction of traffic.....	21
2. Telephone discipline.....	21
3. Use of codes and ciphers.....	21
4. Camouflage.....	22
<b>PART II. LIAISON INTELLIGENCE</b>	
A. Wireless intelligence.....	24
B. Listening stations.....	26
C. Success of liaison intelligence service.....	31

## FOREWORD

The following remarks are extracted from the final report, dated January 2, 1919, submitted by Lt. Col. Frank Moorman, G.S., who during the World War was Chief of the Radio Intelligence Section, General Staff, General Headquarters, American Expeditionary Forces. In dealing with the results obtained by the various services conducted by his section, he said:

### "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 I have entire confidence in the officer charged with its preparation."

The report mentioned in the foregoing extract was prepared in January-March 1919, by Capt. Phillip B. Whitehead, F.A., and is presented below without any changes, additions, or deletions. This report merits careful study by signal intelligence personnel.

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

JUNE 22, 1934.

(v)

## PREFACE

The following notes on the Liaison Service and Liaison Intelligence Service of the German Army are compiled mainly from original documents, part of which were captured by our troops and part of which have been received in translation from the French and British. These documents have been studied in the light of experience gained as a code officer.

It is not possible with the material at hand to give a full account of the German Liaison Service. The study of this subject was not undertaken until near the close of the war and consequently the material collected is incomplete. The purpose of this study has therefore been restricted to the pointing out of the main features of the German Signal Service and estimating its effectiveness.

(vii)

## NOTES ON THE LIAISON SERVICE AND THE LIAISON INTELLIGENCE SERVICE OF THE GERMAN ARMY DURING THE WORLD WAR

### PART I

#### LIAISON SERVICE

##### A. PEACE ORGANIZATION

In peace the personnel of the Signal Service was drawn from the Telegraph Troops (Telegraphentruppen), and consisted of:

Six Prussian telegraph battalions and seven fortress telephone companies.

One Saxon telegraph battalion and one fortress telephone company.

One Wurttemberg telegraph company and one fortress telephone detachment.

Two Bavarian telegraph battalions.

The officers were drawn mostly from the engineers and pioneers, some from the infantry and railway troops. The uniform of the telegraph troops was similar to that worn by the pioneers, but a shako was worn, and the shoulder straps bore a "T."

In January 1917, the telegraph troops were separated from the communication troops, to which they formerly belonged, and were organized as a separate corps under the Chief of the Field Telegraph Service (Chef der Feldtelegraphie), who also controlled the telegraph and telephone systems in Germany.

(1)

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## B. DEVELOPMENT DURING THE WAR

It would not be possible with the material now available to give a full account of the development of the German Signal Service during the war. At the outbreak of the war the telegraph and telephone (with ground circuit) were the chief means of rapid communication. Wireless, as a means of liaison in the field, was still in the experimental stage and was used only by the larger units. Ground telegraphy was unknown. The Liaison Intelligence Service was at best in a rudimentary stage, although the possibilities of wireless interception were undoubtedly foreseen and provided for at the outbreak of the war. In consequence of the rapid development of the Liaison Service along new lines, there were during the first 3 years of the war radical changes in organization and a great increase in the personnel employed. The two outstanding features in the development of the German Liaison Service during the war are:

1. A constant improvement in the technical appliances employed and remarkable ingenuity in overcoming the difficulties caused by the increasing shortage of material.
2. The attainment of a remarkably high standard of discipline in the protection of communication against interception by the enemy.
3. A large degree of success in gaining information regarding the enemy through the interception of his signal traffic.

During the winter of 1917-18, especial attention was paid to training the signal troops for war of movement. The following order lays down the principles which were to be followed in this training:

### SECRET

COMMANDING GENERAL OF THE SIGNAL SERVICE 1,

*January 16, 1918.*

The present situation must be utilized with all available means to train the individual signal formations both technically and tactically for movement warfare. The offensives in Italy and in Russia (Riga, Ossel) and our attack at Cambrai have shown that the signal troops have not had sufficient training and experience in attack. In particular this applies to the younger commanders of signal formations of every kind.

\* \* \* \* \*

In general there will be a period of 3 weeks for the training in movement warfare of the divisions withdrawn from the front or in reserve behind the front. This relatively short period must be used by all means to train the signal troops so that they shall be readily controlled by their commanders. They must be trained for the special tasks of movement warfare (attack) and their equipment must be completed. Every commander and officer must exert himself to the utmost to train the troops under him thoroughly and get them well in hand. There is no time now for leaves and recreation.

In general the training period will be divided into three parts. The first period will comprise the military and technical training of the soldier, the second will be devoted to the training of the separate units, and the third to the coordination of the means of communication in cooperation with other arms by taking part in the maneuvers of units up to the division. The details of the training program are left to the army commanders.

\* \* \* \* \*

In order to prepare the officers of the signal troops for the tasks ahead of them, the Corps and Division Signal Commanders are to instruct them, to set them tasks, to carry out maneuvers, and to make sure that their officers take part in the field exercises to be carried out under the direction of the general staff.

\* \* \* \* \*

By order of the Commander in Chief a special training field for signal troops has been set aside south of Namur. Signal units which are in special need of instruction will be sent there to complete their training. The course will begin on the 21st of this month.

A somewhat earlier order is interesting in this connection as showing the lessons derived by the staff from the work of the Signal Service in the Cambrai attack.

STRICTLY SECRET

COMMANDING GENERAL OF THE SIGNAL SERVICE 1,  
Charleville, Dec. 18, 1918.

TO ARMY SIGNAL COMMANDER 14

The following lessons for the signal troops have been gained in the Cambrai attack of November 31 and December 1.

*Preparation.*—Since an attack can only hope to be successful when it comes as a complete surprise to the enemy, all preparations must be carefully concealed and camouflaged. To this end there must be the strictest telephone discipline and control of signal traffic.

It is necessary to have maps kept constantly up to date. They must show all lines and places for additional important telephone centrals, headquarters, dugouts for signal equipment carefully thought out in advance. There must be a plan prepared for the advance of the communication services.

*Transportation.*—The signal troops must move forward with the staffs, since they have much work to do before the arrival of the combat troops.

*During the battle.*—Since the commanders must be well forward, the signal communications must keep pace with them constantly in their advance.

*Artillery and trench mortar.*—Telephone and other means of communication must be established before the arrival of the artillery and trench mortars, in order that they may open fire as soon as they are in position.

*Personnel and material.*—Signal personnel and material must be very liberally estimated. The formations on the ground or in reserve are not sufficient for offensive operations, since many rearrangements have to be made during the preparations for the attack. Telephone communication in the Cambrai attack was not reliable on account of the shortness of the time and the lack of material and personnel. As a result, reinforcement suffered and was at times doubtful.

### C. ORGANIZATION AND COMMAND AT THE END OF THE WAR

In the following notes attention will be mainly directed to the organization and functioning of the German Signal Service as it existed in the last year of the war. During this time there was very little change in the organization and employment of the Signal Service except in minor details. From this it may be inferred that the existing organization was regarded as satisfactory both for trench warfare and war of movement. The material available does not permit of a complete reconstruction of this organization. But it is believed that the main outlines as given below are substantially correct.

*General principles governing the organization of the German Signal Service.*—The nature of the Signal Service requires that it be under dual control—one tactical, the other technical. Each commander of troops in the field is responsible for the maintenance of signal communication in the area of his command. He must apply for such equipment and personnel as may be necessary for this purpose. Signal units assigned to him are under his exclusive orders in regard to their tactical employment and discipline.

On the other hand, it is the duty of the signal commanders to maintain the technical efficiency of the Signal Service and to secure the technical coordination of the entire system. To this end all branches of the Signal Service are under the control of a staff section which is responsible for the technical administration of the service in all its forms. Signal commanders are the advisers of the staffs to which they are assigned in regard to all technical questions and for suggestions as to the tactical employment of the service. Signal commanders "*can only hope to be successful if the higher command keeps them informed continuously and in good time, in regard to the situation and their plans for some time ahead.*"

From army headquarters downward, the higher formation was, in principle, responsible for establishing and maintaining communication with lower units.

#### I. ADMINISTRATION

**Chief of the Signal Service.**—At the head of the Signal Service of the armies in the field is the Chief of the Signal Service at Great Headquarters (Chef des Nachrichtenwesens Gr.H.Q. Sr.Maj.). This officer was the adviser to the Chief of the General Staff in all matters relating to the Signal Service, and the Executive Chief of all signal units in the theater of operations, on the lines of communication, and in the home territory, as well as those in occupied territory and in fortresses. With him rested the ultimate decision in all questions relating to the service except those as to the tactical employment of the troops. In all questions of policy and technical administration the Chief of the Signal Service possessed unrestricted control over the Signal Services of the armies in the field. The only exception to this, so far as can be ascertained, was that the decision as to the adoption of new types of apparatus rested with the Ministry of War. In matters relating to the tactical employment of the signal troops in the maintenance of communication between the various units and commands, he acted on the orders of the Commander in Chief.

The staff of the Chief of Signals included an Inspector of Signal Troops and an officer charged with administering the signal units serving G.H.Q. (Nachrichtenoffiziere des O.H.L.) These comprised telephone and radio sections.

**Commanding General of the Signal Service.**—Immediately under the Chief of the Signal Service, the command of the Signal Service in each of the three main theaters of war was exercised by a General Officer (Nachrichtengeneral 1, 2, and 3) with the powers of a brigade commander. The commanding officer for the Western Front was "Nachrichtengeneral 1" with headquarters at Mezieres-Charleville.

The Commanding General of the Signal Service dealt with all matters relating to the Signal Service in his theater of war in accordance with instructions from the Chief of the Signal Service and in close cooperation with the commanders of the army groups and of the armies. He kept the chief of the service constantly informed of events and requirements and recommended any necessary measures in good time.

His duties included:

- (a) Uniform technical development and management of the Signal Service of the armies and between armies.
- (b) Allotment of wave lengths and the determination of cipher keys for wireless traffic in his theater of war.
- (c) Forwarding results of the intercept service to the army group.
- (d) Proposals for the distribution and concentration of forces for special objects.
- (e) Supervision of the technical service and efficiency of all signal troops in his theater of war.

**The Signal Service Adviser.**—On the staff of each group of armies there was a Signal Service Adviser (Nachrichtenreferant). His functions were purely advisory. He had no administrative or executive functions.

**The Army Signal Commander.**—The Army Signal Commander is on the staff of the Army Commander and is subordinate to the Chief of the General Staff. His immediate military superior (from a technical and disciplinary point of view) is the Commanding General of the Signal Service. He himself exercises the powers of a regimental commander over:

- (a) All signal units which, in accordance with the war establishments, are under the immediate control of the Army Commander.
- (b) All independent signal units allotted to the army, unless they have been allotted by the Army Commander to a corps, division, or fortress.

In the latter case they will be under the orders of the Corps, Divisional, or Fortress Signal Commander.

He deals with all matters relating to the Signal Service of the army in accordance with the instructions of the General Staff (telegraphy, telephony, wireless telegraphy, lamp, flare, visual, and sound signals, message-carrying projectiles, carrier pigeons, and messenger dogs).

He makes proposals for the employment and cooperation of the signal units in the army, and for the special systems of communication in the army area.

He supervises the work of the signal units on behalf of, and in accordance with, the instructions given by the Army Commander.

He is responsible that suitable preparations are made as required by the tactical situation.

He regulates the employment of wireless in the army area.

He is responsible for the maintenance and improvement of the technical efficiency of all signal units in the army.

He arranges for the replacement of personnel in all these units, as well as for the acquisition and supply of Signal Service stores throughout the army.

He corresponds directly with the depots and supply sections in all matters relating to the supply of stores and replacement of personnel (except as regards officers and aspirant officers).

**The Corps Signal Commander.**—The Corps Signal Commander is on the staff of the Corps Commander, and is subordinate to the Chief of the Corps Staff. His military superior (from a technical and disciplinary point of view) is the Army Signal Commander. He exercises the powers of an independent battalion commander over:

(a) All signal units which, in accordance with the war establishments, are under the immediate control of the Corps Commander.

(b) All independent signal units allotted to the corps, unless they have been allotted by the Corps Commander to a division.

In the latter case, they will be under the orders of the Divisional Signal Commander.

He deals, in accordance with the instructions of the corps staff, with all matters relating to the Signal Service in the corps (telegraphy, telephony, wireless telegraphy, earth-current telegraphy, lamp, flare, visual, and sound signals, message-carrying projectiles, carrier pigeons, and messenger dogs).

He makes proposals for the employment and cooperation of all signal troops and also for the special systems of communication within the corps area.

He supervises the work of signal units on behalf of, and in accordance with the orders issued by, the Corps Commander.

He is responsible to the Corps Commander for taking suitable measures as required for offensive and defensive operations.

He regulates the employment of wireless within the corps area.

He is responsible for the technical training of the signal troops in the corps.

**The Divisional Signal Commander.**—The Divisional Signal Commander is on the staff of the division. His military superior (from a technical and disciplinary point of view) is the Corps Signal Commander. He exercises the powers of a captain specially detached for duty over all signal units allotted to it.

He deals, in accordance with the instructions of the divisional staff, with all matters relating to the Signal Service in the division (telegraphy, telephony, wireless telegraphy, lamp, flare, visual, and sound signals, message-carrying projectiles, carrier pigeons, and messenger dogs).

He makes proposals for the employment and cooperation of all signal units in the division, and particularly for their cooperation with the regimental signaling detachments; he supervises their work on behalf of, and in accordance with the orders issued by, the divisional staff.

He is responsible to the Divisional Commander that suitable preparations are made for offensive and defensive operations.

He regulates the employment of wireless in the division.

He is responsible for the maintenance and improvement of the efficiency of all signal units in the division.

An order of December 23, 1918, of the One hundred and twenty-first Division gives a list of the chiefs of the various sections of the divisional staff and their duties. The duties of the Divisional Signal Officer (Divisions Nachrichten Kommandeur) are given as follows:

- (1) Deals with all questions relating to the means of maintaining communication.
- (2) Makes suggestions regarding the employment and coordination of the means of communication inclusive of those assigned to the division staff.
- (3) Supervises the training of the signal troops.
- (4) Looks after replacements in material and personnel.
- (5) Exercises control over telephone discipline and the use of code names.
- (6) Keeps an up-to-date map of the means of communication.
- (7) Looks after supply of lighting material.
- (8) Under instructions from the Chief of Staff he lays out a scheme of practice in sending messages.

In each divisional sector there was a permanent signal officer (Bodenstaendige Nachrichtenoffizier) who did not change with the relief of a division. His function was to act as adviser to the divisional signal officer, under whose orders he was placed during the stay of the division in the sector.

**The Fortress Signal Commander.**—The Fortress Signal Commander is on the staff of the Governor (or Commandant), and is subordinate to the Chief of Staff, or, if there is none, to the Governor (or Commandant).

The Fortress Signal Commander is under the orders (from a technical and disciplinary point of view) of the Chief of the Signal Service and of the Signal Commanders of the higher formations within whose jurisdiction the fortress lies. He exercises the powers of an independent battalion commander over—

(a) All signal units on the establishment of the fortress.

(b) Independent signal units allotted to the fortress, unless they have been allotted by the Fortress Commander to a corps, or division.

In the latter case, they will be under the orders of the Corps or Divisional Signal Commander.

He deals, in accordance with the instructions of the staff, with all matters relating to the Signal Service within the fortress (telegraphy, telephony, wireless telegraphy, earth-current telegraphy, lamp, flare, visual and sound signals, message-carrying projectiles, carrier pigeons, and messenger dogs).

He makes proposals for the employment and cooperation of the signal units in the fortress, supervises their work in accordance with the orders of the Governor (or Commandant), and is responsible to the Governor (or Commandant) that suitable preparations are made as required by the tactical situation.

He regulates the employment of wireless in the fortress.

He is responsible for maintaining and developing the technical efficiency of all signal units in the fortress.

**Signal officers of lower units.**—In each of the units below the division there was a signal officer. He was ordinarily detailed from the line and did not form a part of the Signal Corps. The commanders of the regimental signal troops were subordinate to the divisional signal officer only in technical matters and traffic control.

Information regarding the signal units below the division is contained in the minutes of a conference held by the divisional signal officer of the One hundred and twenty-first Division at St. Maurice on March 3, 1918. There were present:

The divisional signal officer and his adjutant.

The commander of the divisional telephone section with the officers of his section.

The commander of the divisional wireless section with two officers.

The commander of the divisional listening station group.

The balloon signal officer.

The commander of the divisional lamp signaling detachment.

The regimental signal officers.

Four infantry battalion signal officers.

The divisional artillery signal officer.

The signal officer of an artillery regiment with three artillery battalion signal officers.

The signal officer of the heavy artillery.

The signal officer of the pioneer battalion.

## II. SIGNAL UNITS ASSIGNED TO THE VARIOUS TACTICAL FORMATIONS

(For tables of organization see appendix A)<sup>1</sup>

The assignment of signal units to the various tactical formations and their equipment varied according to circumstances. The following data are compiled from a large number of captured documents and, while not entirely complete, are believed to be accurate and fairly representative.

### 1. The Army Group.

#### (a) Telephone detachment.

Two motor telephone construction sections.

Two telephone station sections.

#### (b) Wireless detachment.

### 2. The Army.

#### (a) Two army telephone detachments (Aferna).

#### (b) An army wireless detachment (Afunka).

#### (c) An army signal park.

#### (d) An army school for signal personnel.

#### (e) An army messenger dog depot.

#### (f) An army carrier pigeon section.

#### (g) A radio intelligence office.

### 3. The Corps.

#### (a) A corps telephone detachment (Gruferna).

#### (b) A corps wireless detachment (Grufunka).

#### (c) A motor telephone construction train (Kraftwagen-Fernsprecher-Bauzug).

#### (d) A carrier pigeon loft (Brieftaubenschlag).

#### (e) A radio intelligence office (Auswertungstelle).

### 4. The Division.

#### (a) Divisional telephone section (Diferna).

#### (b) Divisional wireless section (Divfunka).

#### (c) A listening station group (Arendtstelle).

#### (d) Two carrier pigeon lofts (Brieftaubenschlaege).

#### (e) A lamp signaling detachment (Div. Blinker Zug).

#### (f) Headquarters section (Stationzug).

#### (g) Balloon signal detachment (Bonach).

5. The regiment and lower units.—As a general rule no special signal units were assigned to formations lower than the division. "According to requirements signaling sections should be organized for the headquarters of every regiment, battalion, artillery Abteilung, etc., and signaling squads for every company, squadron, and battery."

With this object in view, the establishment provides for the personnel of a "nucleus" signaling section for every infantry regimental and battalion staff, and for every cavalry (or dismounted cavalry) regimental staff. These "nucleus signaling sections" are commanded by the "signal officers" of the respective regiments or battalions. It is left to the discretion of commanding officers to increase the strength of such nucleus signaling sections, in the event of urgent necessity, by attaching men from the unit. Such personnel will remain on the establishment of the unit and there will be no increase in the establishment.

Similar action must be taken in other arms of the service as requisite.

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<sup>1</sup>This appendix was not printed. A copy is on file in the office of the Chief Signal Officer.

In matters of discipline, officers commanding the signaling sections of infantry and cavalry (or dismounted cavalry) regiments will exercise the powers of company, etc., commanders over all the personnel under their orders.

The sole responsibility for the training, tactical employment, and cooperation of the signaling sections or squads within their jurisdiction will rest on the commanding officers, down to company commanders, etc.

The officers commanding regimental, battalion, etc., signaling sections will act as advisers to their commanding officers, and will submit proposals for maintaining and developing the efficiency of all officers, N.C.O.'s, and men of the regiment, battalion, etc., employed on work connected with signaling. They will have charge of the signaling apparatus, in accordance with the orders of their commanding officers.

The Signal Section (Nachrichtenzug) of a battalion consisted of an officer and 29 men distributed as follows:

Telephonists at relay stations and at battalion headquarters-----	4
Lamp projector operators-----	12
Rocket signalers-----	4
Breakdown squad-----	4
Meteorological stations and watchers against gas attacks-----	4
Miscellaneous-----	2

## D. MEANS OF COMMUNICATION

**1. Telegraph.**—The telegraph service was maintained by the lines of communication. Telegraph units were not assigned to formations in advance of Army Headquarters. A Lines of Communication Telegraph Administration (Etappen-Telegraphen-Direction) established and maintained telegraphic communication between the various headquarters down to the division. The instruments used were the Siemens high-speed telegraph (Schnelltelegraph), the Hughes telewriter (Fernschreiber), and the ordinary sounder (Klopfen). The first two systems delivered the messages in printed form and were used behind Corps Headquarters.

In 1917 experiments were being made with a system which was immune from interception. It is not known whether this proved satisfactory or was ever in use.

During active operations the Chief of the Signal Service allotted to armies and to groups of armies a certain number of lines from the Imperial Telegraph System and decided what new lines were to be constructed.

**2. Telephone.**—Telephone units were allotted to the various tactical formations as follows (for equipment see tables of organization in appendix A, p. 30)<sup>1</sup>:

(a) One army group telephone detachment to each group of armies.

(b) Two army telephone detachments (Aferna) to each army, numbered in two series, e.g., the Fourth Army had the 4th and 104th; Detachment C had 14th and 114th. Each of these included a headquarters section (Stationszug) and a motor telephone construction train (Kraftwagen-Fernsprecher-Bauzug). The latter were numbered in a series starting with 900.

(c) One corps telephone detachment (Koferna) to each corps.

(d) One divisional telephone detachment (Divferna) to each infantry division. These were numbered in series, as follows:

Active and high-numbered divisions. Divisional number (e.g., 11th with 11th Division).

Reserve divisions..... 400 divisional number (e.g., 424th with 24th Reserve Division).

Landwehr divisions..... 500 divisional number (e.g., 513th with 13th Landwehr Division).

Ersatz divisions..... 550 divisional number (e.g., 554th with 4th Ersatz Division).

Active Corps..... 600 Corps number (e.g., 607th with VII Corps).

Reserve Corps..... 700 Corps number (e.g., 712th with XII Reserve Corps).

(e) One cavalry telephone detachment to each cavalry division, the personnel of which, however, was not provided by the Signal Service, but consisted of officers and men belonging to the cavalry.

(f) In addition to the above there were mountain and fortress telephone detachments for special duties, as well as units in the G.H.Q. Reserve.

A telephone detachment consists of several sections, each carrying 25 miles of cable, which can be laid at the rate of about 1,000 yards in half-an-hour. In addition to air-line, two kinds of cables are employed. "Armeekabel", which has a covering of cotton (later this was replaced by paper string), and "Feldkabel", which is insulated with rubber.

With the advent of trench warfare the telephone became more extensively used than ever before. The conditions of trench warfare led naturally to the discovery and practical application of the fact that telephone conversation could be intercepted. It then became necessary to use a double metallic circuit thoroughly insulated from the ground and to enforce strict

<sup>1</sup> See note page 8.

discipline in the use of the telephone. In the latter part of the war, on account of the shortage of material, it became increasingly difficult to prevent leakage, and as a result telephone discipline was more strict in order to prevent information being obtained by the enemy. This went so far that the reports of our own listening stations showed the telephone to be very little used in quiet times.

In order to secure economy in the use of telephone equipment, the following regulations were prescribed:

- (a) New telephone connections may only be built, or old ones extended, to meet urgent tactical or administrative requirements. Every case must be carefully examined by competent authority.
- (b) In quiet sectors, the lines of existing special systems must be made available for general use. The number of so-called "Ia (operations) lines" must be restricted. Such lines can often be easily improvised in case of emergency by temporarily closing some of the lines available for general traffic.
- (c) Units carrying out reliefs must take over the existing systems of lines, unless tactical considerations render a change imperative.
- (d) All telephone lines, which do not meet an urgent tactical requirement, but are merely installed for the sake of convenience (e.g., most of the telephones in billets) are forbidden.
- (e) The use of field or army cable is only permitted for tactical purposes or in the construction of rear defensive lines. Cable must not be employed for any other purposes behind Corps Headquarters.
- (f) In villages which are habitually used as rest billets for divisions, the existing permanent local lines must be employed. Staffs must use the billets which are already provided with telephonic communication.

3. The "Utel."—In the spring of 1918, it became known through prisoners and captured documents that the Germans were using a new and mysterious means of communication known as the UTEL. According to one explanation which gained considerable currency this was a method of sending wireless waves in one direction only so that they could not be picked up by the enemy. It was finally found to be a system similar to the Fullerphone. It was used in connection with the telephone and consisted of an apparatus for sending Morse characters with a very weak direct current which were transformed by a buzzer into signals audible in the telephone receiver. Messages sent by this means could not be intercepted by any known means. The extent to which the Germans were able to supply their troops with this apparatus is not definitely known. To judge from the ignorance generally shown by prisoners in regard to the UTEL, it was not widely employed.

The following document (captured from the First Guard Division, September 26, 1918) gives a fairly clear idea as to the nature of the apparatus:

#### DIRECTIONS FOR USE OF THE UTEL

*Storage and transportation.*—During storage and long transportation the connection between the two cells should be removed, so that the battery cannot discharge.

(During long storage in a depot connected cells should be disconnected, and reconnected before placing in service again.)

*Placing in service for first time.*—Upon placing in service for the first time the charged cells should be inserted as indicated in the printed instructions and the wires connected with the battery binding posts. The telegraph key should then be closed to observe whether or not the vibrator buzzes.

(For adjustment the vibrator can be lifted with its iron housing from the case without loosening the wire connections.)

*Operation.*—Using a single line: If a single line is used care must be taken to place the grounds at least 300 meters back of the first-line trenches.

Calling: The line wire is fastened to post "a" and the ground wire to post "b/E" (both inside the case). The call battery is connected by inserting the double plug in the double socket under the cover of the battery box, marked "Call Current" (Rufstrom). The head-set plug is inserted in the socket marked "Telephone Head Set" (Kopffernhoerer), and the receiver is hung up or laid down with the *diaphragm side out*.

To call: The telegraph key is closed (whereupon the vibrator should buzz), the receiver is placed at the ear, and the call button (not the telegraph key) is pressed. The call relay at the receiving station is thereby operated which sounds the buzzer on the receiver and a loud signal is emitted. (If the call battery provided does not work over long lines—a resistance of more than 5,000 ohms—sufficiently well to operate the call relay at the receiving station, the battery plug should be removed and a larger battery found inside the case should be connected with the posts marked "Call Battery.")

Sending: Sending is done by the telegraph key.

Receiving: For receiving, the receiver is placed at the ear and the telegraph key is left closed so that the vibrator works continuously.

Relying: If station A is connected with station B, and B with C, by UTEL, both lines can be connected through for the traffic of A to C by inserting one plug of the connecting cord in the "Connecting Socket" (Anschlussklinke) of one UTEL, and the other plug in the "Relaying Socket" (Vermittlungsklinke) of the other UTEL, the first UTEL working toward A and the second UTEL working toward B. Station B can then listen in by the aid of the UTEL plugged in the "Connecting socket" (Vermittlungsklinke).

Telephone traffic: The UTEL contains a socket for connecting a telephone in the circuit. No use may be made of this possibility, because it can be intercepted.

*Maintenance.*—The call relay should be tested from time to time for sensitiveness and sticking of contacts. By removing a screw in the back side of the relay box the relay can be lifted somewhat from the case so that all screws and contacts will be accessible.

The contacts on the relay, on the telegraph key, and on the vibrator must be kept clean, for which only a very fine steel file or fine emery paper should be used.

The cells should be examined upon the failure of the vibrator to operate and, if the potential has fallen below 0.8 volts (for each cell), should be changed.

The call battery should have a potential of 10 to 18 volts.

4. **Wireless telegraphy.**—At the outbreak of the war, wireless was comparatively undeveloped. The only wireless sets employed were long-wave sets allotted to higher units and cavalry formations. These were used considerably during the period of movement warfare in 1914, but when the armies settled down to trench warfare the use of wireless was discontinued almost entirely. The main difficulty in the use of wireless at that time was undoubtedly the lack of adequate protection against interception by the enemy. At that time ciphers were employed for secret communications. But ciphers such as could be handled by troops in the field were capable of being solved in a comparatively short time, thus putting the enemy in possession of all the information transmitted by this means. But under the conditions of trench warfare, the telephone was an erratic and unreliable means of communication, especially in times of great activity and heavy bombardment. Furthermore, with the introduction of listening sets, the telephone was open to the same danger of interception as radio. Accordingly, in 1916, a

type of short-wave wireless set suitable for use in trench warfare (Funken-Kleinstation) was developed. An order of March 15, 1917 (3d Bav. Inf. Div.) states that the practical utility of these sets had already been convincingly demonstrated during the battles of the Somme and in front of Verdun. From prisoners' statements it is learned that early in 1917 there was great activity in the manufacture of wireless equipment and the training of personnel. Several large schools were formed in the interior of Germany for the training of operators.

It was about the same time that the use of code books for the transmission of military dispatches in the field was found to be practicable. This undoubtedly had a great deal to do with the rapid development in the use of wireless which began early in 1917. The shortage in metal and insulating material for the maintenance of wire communication was undoubtedly another important factor. While these may be regarded as factors leading to the extensive use of wireless, yet, when once it had been tried out, its convenience and reliability, together with the ease and safety with which code could be employed, were sufficient to bring about its adoption on a large scale. This however, required the construction of a large amount of material and the training of a large force of more than ordinarily skilled and intelligent operators, so that it was not until the spring of 1917 that the number of wireless sets in use began to increase very rapidly.

During the last year of the war the German wireless service reached a high degree of efficiency both in the technical appliances used, in the training of personnel, and in tactical organization and employment. The apparatus employed, while of the same general type as our own, is said to have been superior in quality. Wireless operators employed in our intercept service state that the German operators were the best in the field. The tactical efficiency of the service was demonstrated in the operations both offensive and defensive of 1918.

The wireless units were at first assigned permanently to sectors, but as this was unsuitable to movement warfare it was abandoned and each division was assigned a wireless unit which moved with it constantly. During the winter of 1917-18 a great deal of training was devoted to movement warfare. Greater attention was paid to the technical training of the personnel and terrain exercises were carried out in connection with the maneuvers of the troops in the training area.

Wireless stations in the German Army may be classified according to their characteristics and according to the missions which they fulfill:

Fixed stations (high power stations and fortress stations).

Mobile stations (heavy and light field stations).

Corps stations, divisional stations, airdrome stations, aviation fighting stations for sending and receiving.

Mountain stations.

Large, medium, and small portable trench sets.

Artillery receiving stations.

Airplane stations for sending and receiving.

Airplane stations for sending only.

Airplane stations for receiving only.

Intercept stations (for picking up enemy messages).

Goniometric stations.

Wireless stations are allotted to all formations down to divisions, and are fixed or mobile as required, or adapted for use with aircraft or in mountain warfare. Intercepting and compass stations are also allotted for detecting the enemy's wireless traffic.

At each Army Headquarters there is an Army Wireless Detachment (Armee-Funkerabteilung) with 2 heavy wireless stations (range nearly 200 miles), 2 compass stations and 1 intercept-

ing station. In addition, each army area contained two or more meteorological stations, a number of "aviation fighting stations" (for receiving artillery adjustment signals) and a number of airdrome stations proportional to the number of aviation units in the area. These always move with their squadrons, but belong to the Signal Service, by which they are manned and worked. An Army Wireless Park is allotted to each army for the supply of material. The wireless troops at Army Headquarters are under the orders of the "Armee-Funkerkommandeur" (Akofunk), who works directly under the "Nachrichtenkommandeur."

Each Corps Headquarters has a Wireless Station (Gruppen-Funkenstation or Grufusta), with a range of about 60 miles, 1 compass station and several receiving sets. The group wireless commander is known as "Gekofunk."

A Prussian War Ministry order of May 30, 1917, shows that the aeroplane jamming stations (Fliegerstoerer), which were formerly attached to Corps Headquarters, have become Corps Wireless Stations (Gruppen-Funkenstationen). These are numbered in a series from 500 upward. The same order shows that the heavy field wireless stations, intercepting stations, and compass sections (Richt-Empfang-Trupps), which were formerly attached to Army Headquarters but were numbered independently, have now been absorbed into the Army Wireless Detachment (Armee-Funkerabteilung). This means that the wireless organization has been simplified by amalgamating the previously existing independent wireless formations into centralized units at Army and Corps Headquarters.

On active sectors of the front each infantry division is provided with a divisional wireless detachment (Divisions-Funkerabteilung or Difua)<sup>1</sup> consisting of:

Two wireless sections, each provided with two large, five or six medium, four to six small portable trench sets and several receiving sets.

The ranges of these sets are as follows:

Divisional station-----	60 miles.
Large trench set-----	4-6 kilometers.
Medium trench set-----	2-3 kilometers.
Small trench set-----	½-1 kilometer.

Communication with aeroplanes is maintained by the wireless stations allotted to armies, corps, divisions, and artillery groups.

Each cavalry division has a cavalry wireless detachment, with 1 heavy and 2 light stations. The respective ranges are 190 and 60 miles.

Every field artillery regiment and foot artillery battalion has—

(a) One artillery wireless receiving section with three men to serve any receiving set that may be allotted to it.

(b) One or more artillery wireless officers, whose duty it is to take action on the messages received by wireless.

A Divisional Radio Section (Divisions-Funkerabteilung) has the following personnel: 2 lieutenants, 1 cffizierstellvertreter, 1 feldwebel, 10 sergeants, and 60 to 70 men. Part of this personnel is assigned to ground telegraph work. When the terrain is not good for ground telegraphy, all the division posts, including the advanced company posts, are radio posts.

Operators are supplied by radio schools at Darmstadt, Coblenz, Stargard (in Pommern), Fevain (15 kilometers west of Valenciennes), Oberstrofen, Ohrtdruhf, Strelitz, Hanover, one near Berlin and Namur, Belgium. At Stargard in Pommern there were approximately 150 men in all branches of telegraphy. There is a special school for intercept men at Namur.

<sup>1</sup> Formerly known as "Funker-Kleinabteilung" (Fukla),

A divisional station is generally composed of 1 sergeant and 5 men, with the following equipment:

1. Transmitter:

- (a) Induction coil.
- (b) Boschmotor (engine-driven generator, D.C., 200-volt).
- (c) Range of transmission 100 km.

2. Receptor:

- (a) One timer "G" or large size.
- (b) Crystal detectors.
- (c) One 2-lamp amplifier.
- (d) Storage batteries, 6-volt, for amplifier.
- (e) Dry battery, 90-volt, for amplifier.

The transmitter and receptor are combined in a pack set weighing from 60 to 80 pounds, exclusive of storage batteries and generator.

A regimental station is generally composed of 1 sergeant and 3 men, with the following equipment:

1. Transmitter:

- (a) Cabinet set comprising induction coil, H.T. condenser (with 3 variations for wave length).
- (b) Boschmotor, 200-volt, D.C., or sufficient storage batteries to operate coil.
- (c) Range with Boschmotor, 80-100 km., with battery 20 km.

2. Receptor:

- (a) Receiving cabinet containing timer "M", or middle size, 2 crystal detectors, buzzers.
- (b) One 2-lamp amplifier.
- (c) Storage batteries, 6-volt, for amplifier filament, 90-volt dry battery for plate.

Battalion stations have about the same personnel and equipment as a regimental station.

In battalion and regimental stations 1 sergeant and 3 men constitute a relief. A relief is on duty for a period of 14 days and is then off duty for an equal number of days. However, in quiet sectors or in case of shortage of operators reliefs are irregular.

Prisoners' statements show that all radio work is divided into highly specialized branches. For instance, practically no repair work is done by the men in stations.

Stations are seldom situated in villages or cities, those of regiments and battalions being in dugouts from 10 to 25 feet deep with fan for ventilation.

Artillery stations with receiving radio sets to catch signals from adjustment planes are situated some distance from batteries. The signals are sent to the battery by runner or telephone.

**5. Ground telegraphy.**—Ground telegraphy was an outgrowth of the listening station. It is not known at what date the Germans began the extensive use of ground telegraphy, but an order has been captured dated June 8, 1917, giving instructions for the use of code in ground telegraph messages. The order implies that considerable use was being made of ground telegraphy at that time.

Ground telegraphy was at first used only for transmission in one direction. An order of March 15, 1917 (3d Bav. Inf. Div.) prescribes that there should be three forward transmitting stations to work with one receiving station in the rear. In August of 1917, the listening stations formed a part of the ground telegraph section. Later the two services were separated. In the winter of 1917-18, when ground telegraphy was beginning to be extensively employed, it was made a part of and auxiliary to the wireless service. There are no special ground telegraph units.

Ground telegraphy was mainly used in the forward areas, i.e., between battalion P.C.'s, and regimental headquarters. The typical organization of a regimental sector appears to have been with one or two wireless stations at the P.C.'s of the battalion in line and one ground telegraph station usually at the P.C. of the middle battalion. As the use of ground telegraphy depended upon the character of the earth, the extent and organization of ground telegraphy was not fixed.

A pamphlet has been captured giving the results of careful geological study of different kinds of terrain and their suitability for earth telegraphy.

It has not been definitely ascertained what proportion of a wireless section is assigned to ground telegraph work. The following figures were given by prisoners captured in the St. Mihiel offensive:

The personnel includes 1 lieutenant, 1 under officer, 4 sergeants, 4 corporals, and 30 to 40 men.

The stations in the lines work with regimental headquarters and with each other. Traffic is restricted as much as possible. Verifications are sent only twice a day and messages generally only when an attack is about to be made. These messages are coded, but if the danger is great uncoded messages may be transmitted. The stations in the trenches receive their orders from the battalion headquarters.

The personnel of a station is from 2 to 5 men. A regimental station generally has 1 non-commissioned officer and 3 men. Some battalion stations only have 1 noncommissioned officer and 1 man.

The personnel of each station is relieved every 4 days and goes back to rest 4 days. Each relief brings its own supply of storage batteries.

The apparatus used for sending and receiving is a 4-lamp amplifier, a sender with a key, 1 static eliminator, 1 switchboard, coil and lamp to show the strength of the current, a field buzzer and 2 headpieces. The transmitter and receiver are each about as large as an infantry knapsack, and are portable. The current is obtained from storage batteries. Charging stations for the storage batteries are erected near the front line.

Since ground telegraph circuits are likely to interfere with telephone traffic, or vice versa, the following rules were laid down regarding location of stations. (1) In the forward zone, ground telegraphy was only to be used when no telephone communication existed. (2) In the rear zone, stations were to be erected as far from telephones as possible. This had the further advantage that both were not likely to be put out of action at once. Ground terminals are so laid as to be at right angles to telephone lines which might interfere with their work, and at the same time parallel to the ground lines of the stations they wish to work with. Under favorable conditions the stations can be heard at a distance of 2 or 3 kilometers. Call letters change every 10 days.

**6. Lamp signaling.**—Extensive use of lamp signaling (Blinker) was made by the Germans in the forward areas during trench warfare. The personnel required for a lamp signaling station is 1 noncommissioned officer and 4 to 6 signalers. These men are drawn from the regimental signaling detachments. The 1916 pattern apparatus (Blinkgerat 16) is actuated by dry batteries. It is easily portable and can be carried on horseback or on a bicycle. It is issued in three sizes:

Large signaling lamp, range about 6 kilometers.

Medium signaling lamp, range about 3 kilometers.

Small signaling lamp, range about 1 kilometer.

The 1917 pattern lamp is used for communicating with aircraft and observation balloons and has a range of about 5 kilometers.

The following table shows the allotment of 1916 pattern signaling lamps to the various units in a division:

*Equipment of staffs and troops with medium and small signaling lamps*

(War Ministry, No. 54/8-17. A. Nch. dated 4/11/17)

No.	Formation	Medium signaling lamps, M. Blink 16	Small signaling lamps, K. Blink 16
1	Division headquarters	4	-
2	Infantry brigade, headquarters	2	-
3	Infantry regimental staff	4	-
4	Infantry and jaeger battalions, also cavalry (rifle) regiments	6 <sup>1</sup>	2 <sup>1</sup>
5	Machine-gun company, machine-gun marksman company, dismounted machine-gun squadron, machine-gun detachment, or mountain detachment	4	-
6	Minenwerfer detachment of an infantry battalion	1	1
7	Division artillery commander	2	-
8	Field artillery regimental staff	6	-
9	Field or mountain artillery abteilung	10	-
10	Foot artillery regimental staff	4	-
11	Foot artillery battalion	12	-
12	Foot artillery battery	4	-
13	Observation group	6 <sup>2</sup>	-
14	Sound-ranging section	6 <sup>2</sup>	-
15	Army minenwerfer school	4	4
16	Minenwerfer battalion staff	4	-
17	Minenwerfer and gas-projector company	4	-
18	Pioneer company (including gas units)	2	-
19	Pioneer detachment of a cavalry division	2	-
20	Army telephone park	(3)	(3)

<sup>1</sup> Other cavalry regiments used as infantry must be temporarily equipped as such by the Army Signal Parks.

<sup>2</sup> Units having more than 6 survey posts may, if required, receive as many signaling lamps (M. Blink 16) as there are survey posts.

<sup>3</sup> For the present, about 10 percent of the total requirements of the troops within the army area.

**7. Rockets.**—These are sometimes fired from pistols and sometimes from signal throwers. Both these methods are used to request barrages. Luminous signals are employed by aeroplanes:

1. To show nationality.
2. To show aeroplane is an infantry plane.
3. For artillery barrages.
4. For liaison between the planes of a squadron in flight.

Bengal lights are used to mark the front line of the infantry in order to aid aeroplanes.

**8. Message-carrying projectiles.**—The Germans introduced message-carrying projectiles to transmit written messages from front to rear.

A message rocket (Meldewurfgranate) is used from the front line to battalion headquarters and from forward observing officers to artillery command posts. It is projected either by means of the 1916 pattern "stick" bomb thrower, or by a special "signal thrower" to a range of 550 to 650 yards with the old pattern and 1,100 yards with the new pattern.

The signal thrower (Signalwerfer) consists essentially of a rifle mechanism contained in a hollow steel rod, shod with a spike for planting in the ground. The rocket is made with a hollow shaft to slip over the rod of the signal thrower which contains the striker. The propellant charge and percussion cap are contained in the body of the rocket.

The signal thrower is primarily intended for projecting light signals, but can also be used for projecting message rockets. It is issued to all regimental staffs and units down to companies and batteries.

The light message shell (leicht Nachrichtenmine) is used between battalion, regimental, and brigade headquarters, and as a means of communication between infantry and artillery. It is fired from the light "Minenwerfer", the range being 1,422 yards.

A smoke-indicator cartridge (Rauchmeldepatrone), fired from a signaling pistol is used by airmen for dropping written messages.

**9. Carrier pigeons.**—In each army, the carrier pigeon service is controlled by the Army Signal Commander. Normally, each corps has a training loft (Korpsschlag); homing lofts (Heimatschlege), which are frequently mobile, are stationed near divisional headquarters.

Pigeon stations (Abflugstellen) are maintained at infantry and artillery command posts, and also with forward observing officers and infantry company commanders.

#### USE OF CARRIER PIGEONS FOR THE REGULATION OF ARTILLERY FIRE

(Captured document)

As it is impossible to maintain telephonic liaison between advanced artillery observers and their commands on active fronts, it seems highly desirable to use carrier pigeons to a much greater extent than has hitherto been done in the service of the artillery, and particularly to use them for the regulation of artillery fire. The necessity of the strictest economy in conserving our effective fighting strength in men, and on the other hand the ever-increasing shortage of telephone cable, make it all the more urgent that we should make greater use of pigeons, of which we have sufficient reserves.

An observation officer, with 16 pigeons at his disposal, should be able to regulate the firing of his battery according to the firing instructions. This means of liaison permits the artillery even in difficult cases, to direct its shots on the desired spot and to fire successfully upon the enemy after the range has been found.

Two methods of ranging should be carefully distinguished:

1. The observer himself directs the firing.
2. The observer directs the firing indirectly.

In the first of these cases, and this method is best suited for fighting on a large scale, the observer conforms to the instructions for the ranging of artillery fire by airplane. During the ranging the observer merely reports to the rear the points of impact of the shells and indicates the error to the right, to the left, or in front or behind the target. The officer in command of the battery directs the firing according to the information thus given.

The pigeon loft, connected by telephone or by radio with the artillery headquarters, transmits to the battery the message brought by the pigeons. If difficulties arise in the transmission of orders from the pigeon loft to the battery, if the battery is not at that time ready to open fire, or if it fires upon the enemy after the range has been found, the battery can communicate with the observer by means of visual or light signals or by means of signal flags fixed to a balloon carrying some distinctive mark.

**10. Messenger dogs.**—A messenger dog section (Meldehund-Trupp) is attached to each army headquarters. This unit acts as a training school where dogs and attendants are trained, and issued to corps and divisions as required. The army messenger dog sections train dogs received from Germany, instruct the attendants, and complete the training of dogs sent back from the front for further training. There was an army messenger dog school at Briey, which in September 1917 was attached to the army signal park at Metz.

Messenger dogs are allotted to the infantry signaling detachments; a maximum of 12 dogs may be allotted to a regiment and 6 to a battalion. Each dog requires an attendant and an assistant attendant. These men are detailed by regiments or battalions and sent to the army messenger dog section for a 4 weeks' course of training, after which they return to their units with trained dogs.

The dogs principally employed are of the German sheep-dog or wolf-hound breed. Messages are carried in a cylindrical tin case, about 6 inches long and 1½ inches in diameter, attached to the collar. The average time to carry a message between battalion and company headquarters (about a mile) is from 6 to 8 minutes. They should not be used for distances exceeding 2 kilometers. The attendants should also be trained as lamp signalers or carrier pigeon attendants.

**11. Runners, mounted orderlies, cyclists, motorcyclists, and flag signalers.**—When all technical means of communication fail, or when written reports and orders have to be transmitted, runners, mounted orderlies, cyclists, and motorcyclists are employed. In cases of special importance officers are used. Flag signaling can be employed under favorable conditions of ground and visibility.

Information regarding the number of men employed in the various branches of the signal services is difficult to obtain. The most definite figures available are found in two orders of the 121st Infantry Division (Nov. 8, 1917, and Dec. 19, 1917) assigning places in the leave trains. According to these orders the ration strength of the divisional signal detachment was about 400 men divided as follows:

	Men
Telephone detachment	210
Wireless detachment	50
Construction train	70
Listening stations (3 stations)	40
Carrier pigeon detachment	30

In April, 1918 the telephone detachment of the 225th Inf. Division had the following strength:

Officers and men	161
Animals	96
Vehicles	23
Motor truck	1

**E. FIELD SERVICE REGULATIONS FOR THE SIGNAL SERVICE**

(See Appendix A, Manual of Position Warfare for all Arms, pt. 9, secs. 72-215.)<sup>1</sup>

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<sup>1</sup>See note page 8.

## **F. PRECAUTIONS FOR MAINTAINING THE SECRECY OF COMMUNICATIONS**

The Germans were untiring in their efforts to prevent information reaching the enemy through defects or misuse of the means of communication. The fact that "The enemy is listening" was constantly kept before the minds of the troops by posters, lectures, and orders. In order to minimize the possibility of interception the following measures were used: (1) Restriction of traffic. (2) Telephone discipline. (3) Use of code or cipher whenever interception was possible. (4) Camouflage. The regulations can best be given in the form of translations from captured orders which will be found in the appendix.<sup>1</sup> The main points will merely be indicated here.

**1. Restriction of traffic.**—This was a precaution which was more and more strictly enforced as time went on. The Germans were fully aware of the fact that all their wireless and ground telegraph traffic and a large part of their telephone conversation was capable of interception, and that their codes and ciphers were capable of being solved, if a sufficient number of messages were intercepted. For this reason all important messages were required, in quiet times, to be sent by means which were secure against interception, e.g., by runner or by telephone lines which could be regarded as safe. Wireless was regarded as an emergency means of communication. Up to the spring of 1918, however, practice messages were sent regularly and in large numbers. But later wireless traffic was more and more restricted. During the latter part of 1918, practice messages were to a large extent eliminated or reduced to such extreme brevity as to give little material for the solution of codes and often only test calls were sent each day.

In some sectors, this was so well enforced that it was extremely difficult to get goniometric bearings on stations and determine their number, location, and grouping. In the St. Mihiel sector, for example, during September and October, an average of less than two messages per day was sent by wireless stations and these were usually very short, consisting generally of less than half a dozen 3-number or 3-letter code groups. Under these conditions it was not possible to obtain much information from the German wireless traffic.

**2. Telephone discipline.**—Within 3 kilometers of the front line, telephone lines were required to be constructed with double metallic circuit of insulated wire. No lines parallel to the front were permitted. Within this zone all telephone messages were also required to be sent in code except in cases of great emergency. No units, places, or names of persons could be mentioned even in code. For this purpose lists of code names for all units and places were furnished. These were frequently changed. But they were not to be changed at the time of a relief. These lists of code names were not allowed to be taken farther forward than regimental headquarters. Only officers and specially designated N.C.O.'s, were allowed to use the telephone in the danger zone. The telephone system of the forward zone was required to be entirely separate from that of the rear zone so that no through communications could be made.

**3. Use of codes and ciphers.**—The codes and ciphers used by the Germans have been exhaustively treated in a separate report. In this place it will be sufficient to enumerate the principal codes and ciphers employed and the regulations in regard to their use.

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<sup>1</sup>See note page 8.

## (a) The Three Number Code (Schlüsselheft).

This was a comparatively simple code and easily used. It was enciphered by means of a key (Geheimklappe) which could be readily changed. Its use was restricted to the zone in front of regimental headquarters and in this area it was employed for all means of communication, wireless, telephone, lamp, etc. It was put into use in March 1918, and took the place of a number of special codes (telephone codes, minenwerfer codes, etc.) which had previously been used in the forward zone.

(b) An extract from this code book (Auszug aus dem Schlüsselheft) printed on a single sheet of paper was carried by airplanes equipped with wireless apparatus. It contained only the service signals, the signals for regulating artillery fire, and the signals employed in infantry contact patrol work.

## (c) The Three Letter Code (Satzbuch).

This was a much more elaborate and difficult code which was used between regimental and higher headquarters.

## (d) The ADFGVX Cipher (Geheimschrift der Funker).

This cipher was used between corps and higher headquarters. It was not extensively used except in movement warfare. No copies of the keys used with this cipher are known to have been captured.

## (e) The Giant Airplane Code.

This code was employed only between giant airplanes and airdromes.

(f) A number of special codes have been captured. They consist mainly of mechanical devices for enciphering or encoding the signals for regulating artillery and minenwerfer fire. There was also a very simple code used by antiaircraft observation stations to signal the number, height, location, and direction of flight of hostile airplanes.

All messages in code sent by wireless or ground telegraph were encoded and decoded by the operators. This had several important advantages. The work was done by men specially trained for the purpose and thoroughly familiar with the code book. As a result, the Germans were able to use more complicated codes and ciphers than would have been possible if the work was to be done by the officers in command of troops. It also enabled them to enforce more completely the rules for the use of code. In fact, the Germans attained such a high efficiency in the use of code that by the end of the war very little could be done in the way of solving their code messages. Another advantage of having the code work done by the operators was that it rendered the code books less liable to capture than if they had been issued to officers who were frequently required to be present in the front line.

4. Camouflage.—From observation of German wireless operations and from documents, an excellent idea is obtained of the importance attached to camouflage in the advanced sections.

The development of camouflage dates from the fall of 1916. Since the winter of 1916–17, the Germans had sought to suppress everything in their organization which might reveal their order of battle. The principal measures thus employed had been:

Winter 1916–17: Suppression of call-name groups with an initial letter common to each line.

Spring 1917: Increased frequency in change of call names and greater variety in such change.

Summer and autumn 1917: Suppression of collective calling of several stations, which might reveal the organization of the different lines. Development of lateral communication. Use of double and even triple call names. Suppression of certain characteristics of service such as that of SSS (formerly used by some lines to announce the beginning of a

message), signatures of operators, etc. Reduction of activity to absolutely necessary traffic.

Spring of 1918: Commencing March 1918, daily change in call names. High development of camouflage in lateral communication dating from the spring of this year.

A captured order requires advanced divisional stations to communicate with stations of adjoining divisions, through which attempts to group stations by means of Divfunka are materially hampered. "Every effort", says the order, "must be made to conceal the true state of affairs from the enemy by deliberate transmission of wireless messages across the boundaries of formations. If, for example, as happened in the case of our opponents during the offensive against Italy, the wireless station of the headquarters staff of a newly arrived army immediately calls up all its corps stations in turn, as soon as it is erected, and sends them a general wireless message, this is tantamount to communicating the order of battle to the enemy."

One of the chief excellencies of German wireless is the uniformity of its working system. It is, in fact, impossible at present to distinguish between the various Divfunka, whether Prussian, Bavarian, Saxon, Würtembergian, or even Austro-Hungarian. As a consequence a change of stations usually passed unnoticed by us.

In 1918 great emphasis came to be placed on directional aerials and the use of the minimum power necessary for communication between stations.

The general impression obtained from these observations is that of the realization of the necessity and importance of camouflage possessed by the enemy operators. Certain chapters of captured documents also urge that talks be given to demonstrate the value of ruses or tricks to be introduced into wireless work. Such tricks constitute, of course, a complication of the operator's functions, and are permitted only if he and the station chiefs are fully aware of the importance of prudence and know that they are closely observed by listening-posts at the rear.

## PART II

## LIAISON INTELLIGENCE

## A. WIRELESS INTELLIGENCE

Comparatively little is known about the German Radio Intelligence Service. But the following facts have been ascertained from captured documents.

The interception of enemy wireless messages was mainly carried on by the ordinary field stations during the times when they were not otherwise occupied. As each station was assigned certain periods (Verkehrzeiten) in which to communicate (e.g., the first 5 minutes in each quarter of an hour) it was free to listen for enemy traffic most of the time. There were in addition stations especially designated to listen only for enemy messages. In some cases listening stations were provided with aerials and listened for wireless as well as ground telegraphic communication, using probably the same receiving apparatus in both cases.

There were also goniometric stations, apparently one to each corps, with one or more in addition to each army.

The material collected by the intercept and goniometric service was utilized by offices (Auswertungstelle) both at corps and army headquarters. The extent to which the Germans were able to gain information through their Radio Intelligence Service is shown by captured documents.

A prisoner captured by the British in April 1917 stated that wireless operators were directed to intercept as many English messages as possible and send them to the section commander who forwarded them to army headquarters. There was a code office at Cambrai, with from 20 to 30 people under the direction of a professor of mathematics from Leipzig, personally known to the prisoner. The prisoner stated that there was a similar code office on the Russian front which succeeded in deciphering most of the Russian messages.

An important and highly developed branch of the German Radio Intelligence Service was the airplane wireless warning service which is described in the following captured document:

SECRET

JULY 7, 1918.

FLANDERS GROUP,  
Tenth Reserve Corps Headquarters.  
1c Art. Group Signal Commander No. 1/3231.

The observation of the enemy's airplane wireless traffic on the front of the corps, its exploitation and the transmission of warnings to divisions, are effected by the work carried out under Corps Signal Commander No. 710 in conjunction with Corps Wireless Detachment No. 518.

The following method of work is laid down:

(a) The enemy's artillery airplane signals a target in code (floating target, battery in action, column, etc.). The position of the target so signaled has to be transposed into German map coordinates and communicated as quickly as possible to the troops forming the target in question. The corps wireless detachment telephones the sig-

naling officer attached to the artillery commander of the division in line, who is personally responsible for rapidly transmitting the warning. The telephone lines from corps headquarters to the artillery commander are at the disposal of the corps wireless detachment for this purpose.

In order to verify the results and to utilize each particular instance, in case the signals are repeated, an early report from the troops is required. This report will be obtained from the troops concerned, by the signal officer attached to artillery headquarters. He will obtain answers to the following questions and will forward them as quickly as possible to the corps wireless detachment.

- I. Is there a battery at the location given (which?), or some other target?
- II. Was the battery firing at the time of the warning, or had it fired just previously? (Time?)
- III. Was the position engaged after the warning was received? (Time?)
- IV. From which direction? Type of gun or howitzer? Number of rounds?
- V. Was the warning received in time?
- VI. Was an enemy airplane observed, and in which direction?

(b) If the hostile airplane arranged with its battery, before leaving the ground, which target was to be engaged, it sends only the call of the firing battery, not the coordinates of the target. In this case it is important to locate the enemy's battery and the target engaged. The corps wireless detachment communicates with sound ranging section 73 and remains in communication for the duration of the registration. The corps signal commander arranges for good telephonic communication between the corps wireless detachment and sound-ranging section 73. The sound-ranging section endeavors to ascertain what battery is firing at the exact time and what target is being engaged. The information gained thereby enables a timely warning to be sent if the shoot is repeated.

## B. LISTENING STATIONS

Listening sets were first employed by the German Army during the year 1915. They were called "Arendtstationen," after the inventor Arendt. Their use and the information obtained from them was guarded with extreme secrecy. The secrecy with which the work was surrounded was responsible for a curious feature of the organization which persisted throughout the war. Operators were divided in two classes, interceptors (Dolmetscher) and linemen or electricians (Stoerungssucher). The latter were responsible for the installation of the ground leads and the care of the apparatus. The former, who were kept in ignorance as to the workings of the apparatus, merely listened and recorded what they heard. Later this distinction was partially obliterated and the "Stoerungssucher" were employed as interceptors for ground telegraph traffic. Listening for telephone conversation, however, continued to be done exclusively by the interceptors. In order to facilitate the work of policing their own lines, listening stations were furnished copies of the army signal map.

At the beginning, when the existence of the listening stations was not suspected, they rendered extremely valuable service, being able to intercept practically all telephone conversation. But from the middle of 1916 their existence was known and precautions were taken to prevent telephone conversations being overheard. However, the listening stations continued to render valuable service up to the end of the war.

When the existence of listening stations had become known on both sides of the line, their function became twofold: (1) To intercept enemy conversation and ground telegraph traffic. (2) To report "leaky" telephone lines and infractions of telephone discipline. In both of these respects, as captured documents show, the German listening service reached a very high state of efficiency.

The listening service was maintained and directed by the army. An order of February 25, 1917, established an Arendt section of the army, assigning to this section all listening stations and ground telegraph stations in the army area. It is not known what the status of these stations had been previous to this order. In July, 1917 all the Arendt sections of the Western Front were placed under a central exploitation office.

In Detachment C there were 16 listening stations. These were at first divided in groups for purposes of administration. Later (Nov. 28, 1917) they were assigned for administrative control to the divisions in whose area they were located.

It is clear that the listening service was permanently attached to the sector and did not move with the division. When the division was relieved the listening service passed under the control of the relieving division.

There were in August 1917 two listening posts in the area of the 121st Division (Asta 3 and 4) under the control post of the group at St. Maurice. In December a new listening post (Asta 5) was assigned to this group. The order states that the stations in the area of this division had been giving exceptionally good results, but that those in the sector of the 225th Division (on the left of the 121st) had not given sufficiently good results to warrant the establishment of a new station. In February 1918, by order of the corps commander, listening station no. 4 was transferred to the Etain sector. Listening station group of the 121st Division was to order the dismantling of the station. The ground leads were to be turned over to stations 3 and 5. In

March 1918 the numbering of these stations was changed to 252 and 253. Apparently all stations were at this time numbered consecutively along the entire front.

Early in April 1918 the 225th Division took over the sector of the 121st Division by side-slipping to the right. About the same time a complete reorganization of the listening stations in the corps area was carried out. Stations 251, 252, 253, and 255 were placed under the St. Maurice group and stations 254 and 256 under the St. Jean group. The St. Maurice group was assigned for rations to the telephone section of the 225th Division and the St. Jean group to that of the 8th Landwehr Division. Reports from stations 251, 252, and 253 were to be forwarded by the 225th Division and those of station 255 by the 10 Landwehr Division to St. Maurice. The reports of stations 254 and 256 were forwarded by the 8th Landwehr Division to Boinville and from there by motorcycle courier to St. Jean. In May station 255 was transferred from the St. Maurice group to the St. Jean group.

From the above account it is clear that the organization of the listening service was sufficiently flexible to allow of the best use being made of the equipment according to circumstances.

The following document gives a complete outline of the duties of listening station operators.

JANUARY 20, 1918.

Corps Signal Commander 605.  
(Combres Corps)

SECRET

Not to be taken into the front-line trenches.

#### REGULATIONS FOR LISTENING STATIONS

##### I. LISTENING SERVICE

1. The chief of the listening station is responsible that the listening apparatus be manned whenever interception is possible (by two men during times of great activity).
2. Linemen, when not otherwise occupied, may be used to intercept Morse signals. For this purpose all linemen are to be trained in intercepting Morse signals.
3. When an interpreter is taking a message and another can be heard at the same time, he is to arrange with the other interpreter to take it, so that both will be recorded.
4. When neither telephone conversation nor Morse signals can be heard, the tuning of the receiving apparatus is to be repeatedly changed in order to determine whether anything can be heard. Ground leads are to be frequently tested to see whether they are in good order.
5. French conversation and messages are to be given preference over German.
6. The decision as to whether an intercept is of importance does not in any sense lie with the operator or chief of station. Everything which can be heard is to be recorded and included in the report on the forms furnished by the army.
7. Words which are not understood are to be written down phonetically.
8. Any impressions which the operator may receive are to be noted in the margin, e.g., accent and pronunciation; old or young voice; excited, hurried, commanding, laughter, distance, etc.
9. Under impressions come such conclusions as the operator may form regarding the contents or purpose of the message. These are to be written down. The degree of certainty is also to be noted. The operator must not hesitate to state his conclusions. If he gets any further evidence, either confirming or disproving his conclusions, he is to add them to the daily report.

## II. POLICE OF THE LINES

10. Whenever tests of the ground leads show that they are out of repair, the station chief will send out a patrol.

11. Lines which have been broken by shellfire are to be repaired at once or as soon as circumstances permit. In case they cannot be repaired at once (e.g., in an exposed position by daylight) they are to be grounded temporarily at the furthest point which can be reached.

12. As far as possible, ground leads are not to be laid parallel to telephone lines.

## III. DAILY REPORT

13. Every intercept is to be entered in the form provided by the army. Time of interception and grounds used are to be put in the left column. Text and translation are to be written in the proper columns. Translation of French conversation is not required. On the right margin are to be put remarks.

14. When the interpreter is relieved he draws a line across the page and signs his name.

15. The report is to be closed and signed by the station chief at the appointed time, which at present is 5:00 p.m. He puts at the end a brief note on friendly and enemy activity, both in combat and communication and any special happenings at the station.

16. The report is made in four copies.

- (1) For control post.
- (2) For Divisional Signal Officer.
- (3) For corps.
- (4) For army.

17. T.P.S. and T.S.F. intercepts are *put on separate forms* (Morsebericht) and in four copies as above.

18. The report is sent by messenger to the control post as soon as finished.

19. In addition to the above report, the station chief is to write down the necessary data for the war diary.

## IV. SPECIAL REPORTS

20. Important or suspicious conversations are to be reported at once to the battalion P.C. and the control post. Note is to be made in the margin of the regular daily report of all conversations reported in these special reports. Important messages will be forwarded by the control post to the division, corps, and army.

21. Serious violations of telephone discipline are to be reported at once to the battalion P.C.

## V. PERSONS PERMITTED TO ENTER THE STATION

22. Only the following are allowed to enter the station:

- (a) Personnel of the station.
- (b) Immediate superiors, e.g., Chief of the group, Divisional Signal Officer, Corps Signal Officer, etc.
- (c) The commander of the sector in which the station is located.
- (d) Officers of mining troops provided with a pass from the divisional signal officer (but not N.C.O.'s or soldiers).

23. In times of great danger, soldiers are allowed to seek protection in the station. In such cases the apparatus is to be kept out of sight.

24. In case of unauthorized entry the personnel has the right and the duties of a sentinel. Officers are to be notified of the prohibition to enter the station. In case an officer insists on entering, the station chief is to report him by name.

#### VI. PROCEDURE IN CASE OF ATTACK OR CAPTURE

25. In case of an advance by the enemy, the listening apparatus is to be dismantled and sent to safety in the rear if possible or else destroyed beyond recognition by pounding with a hammer. All papers are to be destroyed.

26. In case of capture, operators are under no circumstances to tell what service they belong to.

27. Linemen when on patrol, are not to carry any of the apparatus with them. Before leaving the station the patrol is to agree upon some ordinary mission which is to be given as an explanation of their presence in no man's land in case of capture. Letters, notebooks, etc., are to be left behind.

#### VII. GENERAL

28. In case of the transfer of a station to the sector of another division, all the personnel and material is to go with the station. There is to be no exchange of apparatus.

On January 15, 1918, an order of the divisional C.S.O. states:

"By order of the General Staff the Chiefs of Listening Stations are empowered to question prisoners and deserters who are taken in their sector regarding such matters as enemy telephone lines, location of P.C.'s, telephone central wireless stations, etc., which relate to the operation of listening stations. They are only allowed to ask questions which can only be answered in the front line in view of the enemy trenches. Station chiefs are to be informed of the capture of prisoners or deserters by company commanders. In sector I prisoners are to be promptly brought to the Provost Marshal at St. Maurice who will notify the chief of the listening station group at that place. After prisoners have been examined by the divisional intelligence officer they are to be sent by the Provost Marshal to the commander of the line of communication at Conflans."

By an order of Nachrichtengeneral 1 (Dec. 19, 1917), the following duties were to be constantly kept before the personnel of listening stations:

1. Information regarding the enemy.
  - (a) Interception of enemy telephone conversation.
  - (b) Interception of enemy T.P.S. traffic.
  - (c) Interception of enemy T.S.F. traffic as far as possible.
  - (d) Systematic investigation regarding enemy signal net in front of the station; participation in patrols; questioning of prisoners.
  - (e) Collection of information regarding enemy signal service in general.
  - (f) Gathering and sending back of enemy signal appliances.
2. Protection of German Signal Communication from interception by the enemy.
  - (a) Watching telephone communication in the front line.
  - (b) Watching T.P.S. communication.
  - (c) Writing down and reporting everything heard clearly by means of listening apparatus.
  - (d) Assisting the signal personnel of the troops in discovering leaks and short circuits.
  - (e) Constant explanation to the troops of the danger of being overheard by the enemy and of necessity of caution in the use of the telephone.

**3. Signal Service for the troops.**

(a) During active operations to listen for German conversation and ground telegraph messages and send them immediately to nearest P.C.

(b) During an advance to act as receiving station for ground telegraph stations with the advance troops. (Other documents indicate that listening stations were employed as receiving stations at battalion P.C.'s.)

In regard to the duties named under 1a-c above, the strictest secrecy is to be maintained. In regard to 1d-f and 2, on the contrary, the closest contact is to be maintained with the troops of the sector. Listening station chiefs are to explain the dangers of enemy interception fully to the troops in order that the disagreeable duty of reporting overheard conversation and breaches of discipline will not be made harder by misunderstanding and hostility on the part of the troops.

It is to be made clear to the troops that disciplinary action based on listening-station intercepts is not taken because of defects in the telephone lines, but because of violations of the regulations for the use of telephone in the danger zone.

On January 23 an order was issued by the corps signal officer that receiving operators of the wireless section and listening posts were to learn the American Morse Alphabet. The order was accompanied by a card on which the alphabet was printed.

Two orders (Dec. 31, 1917, and Feb. 2, 1918) show that the stations listened for mining operations as well as for T.P.S. and telephone. From instructions in other documents it appears that the ordinary apparatus and ground leads were used for this work.

Mining operations, if heard, are not to be reported to the P.C., but only in the regular written report, as this gives sufficient time for investigation. Listening-station personnel is strictly enjoined not to say anything about mining operations they may hear, as instances in which this rule has been violated have caused unnecessary anxiety among the troops. Arrangements were made to have all high-power electric current shut off for short intervals when mining operations were heard, in order to determine whether they were enemy or friendly. If the noise stopped when the current was shut off, they were friendly. For this purpose a direct telephone wire was put in between the listening stations and the central power station.

There was an army school for listening-station personnel at Jarny. This was at first (December 1917), a 1-week course. Later (January 1918) it was changed to 4 weeks for interpreters and 2 weeks for operators. One man was detailed from each station to attend the school. There was also held occasionally a school for officers and aspirants in addition to the regular course for enlisted personnel. Aspirants for commissions in the Signal Service were sent to a candidates school for general military training before being commissioned.

### C. SUCCESS OF LIAISON INTELLIGENCE SERVICE

During the early part of the war, when ciphers alone were used for wireless communication, the Germans were able to obtain a great deal of information from intercepted wireless messages. During the Russian campaign in 1914, the Germans were able to anticipate all the movements of the Russian armies through the interception and deciphering of orders sent out by the Russian General Staff.

That the Germans were able to solve enemy code messages is indicated by an order of December 5, 1917, that all intercepted French ground telegraph messages in groups of three numbers were to be telephoned *immediately* to corps headquarters as "they were of the greatest importance and often contained tactical reports and orders." It is very likely that the Germans were at this time in possession of a French code book, for an order of the 21st of March 1918 throws an interesting light on the enemy's lack of success in decoding enemy messages and methods employed to obtain solutions: "The intercepts of the listening stations have recently yielded a large amount of material regarding enemy ground telegraph traffic. However, it has been impossible to discover the contents of the messages. For this reason greater emphasis must be laid on gaining external evidence bearing on the meaning of messages. Prisoners are to be carefully examined and attempts are to be made to capture documents from enemy stations."

The listening stations apparently did not render satisfactory service in intercepting enemy ground telegraph communications, as the following extract from an order of the army signal officer (Feb. 23, 1918) shows. "The Morse intercepts of the listening stations up to the present can only be described as clumsy. No progress in this regard has been observed. In a recent case, a station reported that from 12.30 one French T.P.S. was extremely active. In spite of this the station made only 12 intercepts between 12.30 and 15.20 which in most cases consisted of only one or two numbers. This compares very unfavorably with the work of the wireless stations." On receipt of this order, instructions were issued by the Divisional Signal Officer that increased attention was to be paid to the training of the interpreters in receiving Morse signals by ear. Special emphasis was to be placed on learning to receive the groups representing letters and numbers, as a whole and not as a series of dots and dashes.

Prisoners captured by the First American Army in the St. Mihiel salient stated that on account of the great interference from motors and generators behind their lines they heard very few enemy conversations. They were able to intercept some of the ground telegraph calls and one man stated that they could tell from the change in ground telegraph operators when a relief was being made.

Officers of the 5th Guard Division and of the 2d Landwehr Division, captured by the First American Army October 4, stated that they were aware many hours in advance of our attacks of September 26 and October 4. They spoke with assurance of the detailed information they had of American units opposite them and declared that they were familiar with our plans. They declared that much of this comes through their interception of conversations and less from prisoners.

An enormous number of listening-station records were captured by our troops in the St. Mihiel offensive. Among these may be found long conversations practically complete. It appears that the German intercept operator was sometimes able to hear the conversation more distinctly than the persons engaged. An examination of these records shows that the lines most subject to interception were those between artillery observation posts and batteries. By care-

fully coordinating the information gained from these intercepted conversations the Germans must have been able to locate most of the French batteries, telephone centrals, and observation posts. The reports also show that the Germans gained a great deal of information regarding reliefs, projected attacks, etc.

The following specimens of intercepted conversation may be given as typical:

(NOTE.—X, XX, XXX, indicate different voices recognized by the intercept operator.)

- 12.12) allo X allo X allo G X allo G allo G qui est là? qui est là? comment? pour l'apres midi XX quatre et demie heures X bien, oui allo X allo combien avez-vous compte et quelle est la pièce et combien avez-vous pour la pièce? vous donnez reponse X 550 par pièce XXX  
 12.20) allo X allo X allo X allo XXX  
 12.22) allo X pour 10 heures X combien est-ce-que vous avez compte-vraiment allo

13.04) -----

- 13.55) X allo X allo X Qui est là? Montgirmont? allo X vous êtes toujours en retard X allo X comment? X oui X allo X allo

- 19.23) X Oui, allo tu restes à l'appareil X eh bien donnez-moi 514 XX Pour qui? X C'est pour le lieutenant XX Allo c'est Blanc? XX allo — Poste Blanc X Oui X Oui — Qui est-ce qui est a l'appareil? XX Allo, voulez-vous me donner 514? XX Oui, allo Poste Blanc — Allo c'est Poste Blanc? X Oui Oui XX Qui est a l'appareil, c'est Blanc? X C'est bon j'écoute XX Allo (10 mal) Oui, qui est-ce qui parle? XXX L'appareil ne fonctionne pas? XX Non, ça ne va pas XX Allo Poste Blanc, vous m'entendez? XX Je veux 514 X Allo Poste Blanc XX Qui est-ce — qui parle? X C'est Poste Blanc XX Donnez moi 514 X Allo, c'est 154? XXX Allo, vousavez parle avec 514? X Non — allo Poste Blanc. XXX Vous-avez parle? X Non XXX Vous m'entendez donc, pas? X Non, je n'entend pas XX Allo Poste Blanc XX Allo Poste Blanc X Oui XXXX Allo 1418 allo, qui est-ce qui parle?

- 17.50) Allo XX allo X comment c'est après le X mais je comprends rien allo parler plus haut s'il vous plait, mon ami XX allo X allo — je vous prie de parler plus haut, XX j'ai attendu tout le temps X allo c'est donc accorde XX c'est ça c'est accorde XXX allo qui est là, allo les Eparges, allo écouter, allo vous êtes là? — allo qui est-ce qui est là? — allo allo X allo XX allo X allo je vous prie — voilà tombe XX tombe en cette direction? X oui c'est ça allo — allo XX allo — il l'a refuse allo, vous-êtes encore là? allo — allo — allo allo X allo XX

- 18.10) Allo X allo — il y a encore quelque chose a rapporter XX ah X ce ne sera plus tant que — X la deuxieme compagnie en repos XX c'est pourtant — pour les bains X en cote — ah c'est important

A short daily report was made by each listening station control post giving the general impression of the day. The following may be given as a sample:

Control Post No. 8, February 11, 1918.

1. Enemy telephone conversation more active than on the preceding days. In general nothing was heard except exchange of calls, among which - -, - -, - -, - -, could be heard loud and clear although the usual and more frequent call signs appeared to come from a greater distance. About 12.30 telephone conversation was near and distinct. Two new names were heard, "Reine" and "Mainale", but not distinctly.

2. German telephone conversation light. Conversations, mostly in code, could be heard indistinctly. Report made to battalion P. C.

3. French ground telegraph traffic as usual.

The following extract from a report of an officer in charge of a listening station group indicates the ability with which the Germans were able to apply the information gained through their intercept service to the general tactical situation.

"According to information received from the artillery commander of the 82d Reserve Division, our artillery took under fire the quarry in the Malinbois (coordinates 5771)<sup>1</sup> at about 13.15, January 24, 1918. The report of listening station no. 8 for January 24, 1917—13.34, shows that the fire was apparently effective. An observer called up 'Gauchard' in great excitement and called for retaliatory fire on our trenches. The voice was recognized by the listening station operator as the observer whom this listening station has frequently heard calling 'Gauchard.' On the one hand, the post of the observer was discovered, and on the other hand, the information was obtained that 'Gauchard' is the central of an artillery group."

Data on order of battle of Signal Troops in Detachment C compiled from documents captured in the St. Mihiel offensive:

Army Det. C

Akonach 14 (Armee-Nachrichten Kommandeur)

Aferna 114,14. (Armee-Fernsprecher-Abteilung)

Afunka 14. (Armee-Funker-Abteilung)

Radio Intelligence Section (Auswertungsstelle)

Ara 14 (Arendt-Abteilung)

Comprised 16 Arendt stations

Armee-Nachrichten-Park 14, Metz

Advanced Signal depots at Xonville and Jarny

Arendt school at Jarny

Combres Corps (V Corps)

Grukona 605 (Corps Signal Command)

Gruferna 605 (Corps Telephone Detachment)

Grufunka 501 (Corps Wireless Detachment)

Brieftaubenschlag 131c (Carrier pigeon loft)

Kraftwagen-Fernsprecher-Bauzug 996

St. Mihiel Corps

Grukona 601

Gorze Corps

Grukona 738

<sup>1</sup> East of St. Mihiel.

## 121 Infantry Division

Divferna 121 (Divisions-Fernsprecher-Abteilung)

Divfunka 59

Erdtelabt. 121 I.D.

Arendtstelle 121 I.D.

Brieftaubenschlaege 346c, 348c

Bonach

O.H.L. Blinkerzug

## 235 Infanterie Division (from a Decknamen-Verzeichnis)

Bodenstaendige Truppen

Bonach 78

O.H.L. Stationzug 1158

O.H.L. Blinkzug 49

Divkonach 235

Div. Fernsprecher Abt. 235

Div. Funk. Abt. 22

Abhoerstelle St. Maurice

Abhoerstationen 250, 251

Bodenstaendige Offizier der Nachrichten Truppen 78 and 115

Brieftaubenschlaege 132c, 346c, 354c

Funken-Stationen

Div. Stat.

beim Gef. Std. D II

" K.T.K. D II Süd

" Gef. Std. D III

" K.T.K. D III Süd

bei der Kampfgruppe

Erdtel-Stationen

b. ehem. K.T.K. Schwalbe

" Gef. Std. D I

" K.T.K. D I rechts

" K.T.K. D I links

" Gef. Std. D II

Blinkstationen

bei der Div.

" " Gruppe

" Rgt. D II u. Kampfgr.

" " D I u. U. Gr. Nord

" Stütz II Pl. Qu. 4676

" Gef. Std. D I

" " " D I

" ehemal. K.T.K. Schwalbe

" K.T.K. D I Nord

" K.T.K. D II Süd

" Abschn. D I d

" Gef. Std. D II

" " " "

" K.T.K. D II Nord

## Blinkstationen—Continued.

bei K.T.K. D II Süd  
 " Rgt. D III u. U. Gr. Süd  
 " Vermittlg. Eber  
 " Stützpunkt I  
 " K.T.K. D III Nord  
 " K.T.K. D III Süd  
 im Abschn. D III f  
 " " D III d

## 78 Reserve Infantry Regiment

Divkonach 478  
 Divferna 478  
 Divfunka 180  
 4 medium stations (M-fuk)  
 1 large station (G-fuk)  
 1 light station (K-fuk)  
 1 receiving apparatus  
 4 artillery receiving stations  
 6 ground telegraph stations

## 225 Infantry Division

Divkonach 225  
 Divferna 225  
 Divfunka 175  
 Arendtstelle 225 I.D., St. Maurice  
 Abhoerstationen 251, 262<sup>1</sup>, 253, 254  
 O.H.L. Blinkerzug 49  
 O.H.L. Fernsprecher Bauzug 911  
 O.H.L. Stationzug 1158  
 Melde-Abteilung 225  
 Blinkstationen #1-20  
 Brieftaubenschlag #132c  
 Funkenstationen #1-8  
 Erdtelstationen #1-8

## 5 Landwehr Division

Sachs. Divkonach 505  
 Sachs. Div. Fernsprecher Abt. 505

## 4 Ersatz Division

Divkonach 554 Stationzug 1158  
 Divferna 554 Blinkerzug 49  
 Divfunka 123  
 Bonach 78

Arendtstelle Süd

## 8 Landwehr Division

Divkonach 508  
 Divferna 508

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<sup>1</sup> Probably 252.

- 10 Landwehr Division
  - Divkonach 510
- 10 Infantry Division
  - Divkonach 10
  - Divfunka 146
  - Divferna 10
  - Brieftaubenschlaege 133c, 137c
  - Arendtstationen 243, 244
- 227 Infantry Division
  - Divferna 227
  - Divfunka 155
  - Brieftaubenschlaege 133c and 137c
- 77 Reserve Division
  - Divferna 477
  - Divfunka 156
- Corps Signal Commander 605
  - Captain Jordan
  - Adjutant: Lieut. Boetzel
  - Radio Officer: Lieut. d. R. Reuter
  - Surveying Officer: Lieut. d. R. Uehlein.

#### DISTRIBUTION OF DUTIES

##### SECTION 1. ADMINISTRATIVE STAFF (ADJUNTANTEUR)

- Organization, use and training of the Signal Troops of a Corps.
- Coordination with other arms.
- Battle Order, War Diary.
- Carrier pigeons, Messenger dogs.
- Matters pertaining to officers: Personnel, Ersatz (with the exception of listening-set stations), orders, transfers, furloughs, exemptions, appointments, roster.
- Personnel matters of noncoms and men (with the exception of listening set-stations), Ersatz, promotions, orders, transfers, furloughs, exemptions, reengagement, muster roll.
- Matters pertaining to automobiles.
- Disciplinary and judicial matters.
- Gas defense.
- Matters of service on the staff.
- General matters of administration.
- Correspondence. Cipher.
- Printing regulations.

##### SECTION II. CENTER FOR TELEPHONE MATTERS

- Construction and operation of all telegraph and telephone lines within the corps limits. Station management.
- Special wires.
- Defensive battle, Michel (together with section III).
- Replacement of supplies.
- Supervision of supplies.
- Supervision of telephone substations.
- Map room; map material (except flash and wireless charts).
- Information on strength and equipment of telephone organizations.

## SECTION III. CENTER FOR WIRELESS TELEGRAPHY

The setting up and working of all wireless technical, signal apparatus in the corps area (wireless, flash, earth current telegraphy, listening-set stations, light, sight and sound signals, message shells).

Matters pertaining to key and code words.

Defensive combat, Michel (together with section II).

Replacement of supplies, superintendence of the wireless auxiliary stations.

Instructions on strength and equipment for wireless units.

## SECTION A. PLOTTING OFFICE

Plotting of the listening and wireless reports.

Supervision of our own wireless, and earth current telegraph sections.

Phone discipline.

Personnel matters of the noncoms and men of the listening-set stations; replacements, promotions, orders, transfers, exemptions, reengagements, muster rolls.

Officer Ersatz for listening stations.

Patriotic instruction, press, enemy aerial propaganda, defense against spies.

The following data regarding sector occupation is found in listening-station records captured in the St. Mihiel offensive.

The reports were daily and were headed with the serial number of the station (Asta) and with number of the division occupying the sector, e.g.

Asta 3, 20-5-18

5th Res. Div.

Records of Asta 3 cover the period from May 20, 1917, to August 30, 1918

5th Res. Div.	5-20-17 to	?
45th Res. Div.	7-31-17 to	8-30-17
240th Inf. Div.	9- 1-17 to	10- 4-17
121st Inf. Div.	10- 5-17 to	4-12-18
10th Ldw. Div.	4-13-18 to	5- 5-18
225th Inf. Div.	4-15-18 to	5-12-18
4th Ers. Div.	5-13-18 to	6-17-18
13th Ldw. Div.	6-17-18 to	8-30-18

Records of Asta 4 cover the period from May 25, 1917, to February 25, 1918

45th Res. Div.	6-17-17 to	8-29-17
240th Inf. Div.	8-30-17 to	10- 4-17
121st Inf. Div.	10- 5-17 to	2-25-18

Records of Asta 5 cover the period from May 16, 1917, to August 30, 1918

15th Inf. Div.	5-16-17 to	?
44th Res. Div.	5-17-17 to	6-14-17
45th Res. Div.	7- 4-17 to	8-31-17
240th Inf. Div.	9- 1-17 to	10- 7-17
121st Inf. Div.	10- 8-17 to	4-10-18
225th Inf. Div.	4-11-18 to	5-12-18
4th Ers. Div.	5-14-18 to	6-17-18
13th Ldw. Div.	7-20-18 to	8-30-18

Records of Asta 6 cover the period from April 27, 1917, to August 31, 1918

10th Inf. Div. 4-27-17 to 5- 1-17  
 15th Inf. Div. 5- 2-17 to 5-19-17  
 44th Res. Div. 5-20-17 to 10-30-17  
 45th Res. Div. 11- 1-17 to 12- 4-17  
 225th Res. Div. 12- 5-17 to 5-12-18  
 4th Ers. Div. 5-13-18 to 6-17-18  
 235th Inf. Div. 6-18-18 to 8- 9-18  
 KK 35th Inf. Div. 8-10-18 to 8-31-18

Records of Asta 8 cover the period from November 13, 1917, to June 30, 1918

208th Inf. Div. 11-13-17 to 11-26-17  
 11th Bay. Inf. Div. 11-27-17 to 1-12-18  
 82nd Inf. Div. 1-13-18 to 4-11-18  
 201st Inf. Div. 4-12-18 to 6- 5-18  
 208th Inf. Div. 6- 6-18 to 6-30-18

Records of Asta 250 cover the period from June 1, 1918, to August 31, 1918

KK 35th Inf. Div. 8-27-18  
 235th Inf. Div. 6-22-18

NOTE.—The location of the above stations is not known with sufficient accuracy to throw any light on division boundaries.

#### SUMMARY OF THE PRECEDING DATA

10 Inf. Div. Apr. 27, 1917, to \*May 1, 1917.  
 15 Inf. Div. May 2, 1917, to \*May 19, 1917.  
 44 Res. Div. May 17/20, 1917, to \*Oct. 30, 1917.  
 45 Res. Div. June 17, 1917, to \*Aug. 29/31, 1917.  
 240 Inf. Div. Aug. 30/Sept. 1, 1917, to \*Oct. 4/7, 1917.  
 121 Inf. Div. Oct. 5/8, 1917, to \*Apr. 10/12, 1918.  
 45 Res. Div. Nov. 1, 1917, to \*Dec. 4, 1917.  
 208 Inf. Div. Nov. 13, 1917, to \*Nov. 26, 1917.  
 11 Bav. Inf. Div. Nov. 27, 1917, to \*Jan. 12, 1918.  
 225 Res. Div. Dec. 5, 1917, to \*May 12, 1918.  
 82 Inf. Div. Jan. 13, 1918, to \*Apr. 11, 1918.  
 201 Inf. Div. Apr. 12, 1918, to \*June 5, 1918.  
 10 Ldw. Div. Apr. 13, 1918, to May 5, 1918.  
 4 Ers. Div. May 13/14, 1918, to \*June 17, 1918.  
 208 Inf. Div. June 6, 1918, to June 30, 1918.  
 13 Ldw. Div. June 17, 1918, to Aug. 30, 1918.  
 235 Inf. Div. June 18, 1918, to \*Aug. 9, 1918.  
 K.K. 35 Inf. Div. Aug. 10, 1918, to Aug. 31, 1918.

\* The records are not complete and do not in every case definitely indicate a relief at the last date mentioned. The dates marked with an asterisk are definitely indicated as marking a relief.