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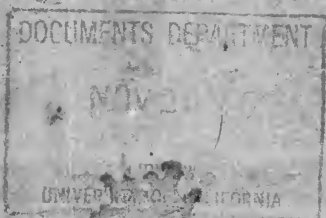
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**LIAISON**  
**FOR ALL ARMS**

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TRANSLATED FROM THE FRENCH EDITION  
OF DECEMBER 28, 1917

AT

GENERAL HEADQUARTERS

AMERICAN EXPEDITIONARY FORCES, FRANCE

JUNE, 1918

*Army*



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**No. 2**

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NOT TO BE TAKEN INTO FRONT LINE TRENCHES.  
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~~COMPANY OFFICERS.~~

# **LIAISON FOR ALL ARMS**

TRANSLATED FROM THE FRENCH EDITION  
OF DECEMBER 28, 1917  
AT  
GENERAL HEADQUARTERS  
AMERICAN EXPEDITIONARY FORCES, FRANCE  
JUNE, 1918

GENERAL HEADQUARTERS  
AMERICAN EXPEDITIONARY FORCES.  
OFFICE OF THE CHIEF OF STAFF.

FRANCE, *June 15, 1918.*

This revision of the French official pamphlet entitled "Instruction on Liaison for Troops of all Arms" is announced as the official manual on this subject for the American Expeditionary Forces.

Until modified by proper authority, its provisions will be strictly complied with in all exercises and operations.

BY COMMAND OF GENERAL PERSHING:

JAMES W. McANDREW,  
*Chief of Staff.*

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

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THE PRESENT INSTRUCTION  
ANNULS THE  
INSTRUCTION ON LIAISON FOR TROOPS  
OF ALL ARMS  
TRANSLATED AT THESE HEADQUARTERS  
FROM THE FRENCH EDITION  
OF DECEMBER 12  
1916



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# LIAISON FOR ALL ARMS

## I.—GENERAL CONSIDERATIONS.

### 1. The object of liaison is as follows:

To keep the commander constantly posted on the situation of the units under his orders, and to furnish him with a basis for his decisions.

To insure, between the various echelons of the command, between adjoining units and between the various arms of the service, the safe and rapid transmission of orders, questions, reports and information, and in a general way to insure all communications necessary to obtain a close co-operation, particularly between the infantry and artillery.

Consequently, to be complete, the liaison must secure the following communications:

- (1) From the front to the rear.
- (2) From the rear to the front.
- (3) Laterally between units co-operating in the same action.

It utilizes:

(a) Means of obtaining information (liaison agents, ground observation, aerial observation, liaison with airplane, liaison with balloon).

(b) Means of transmission:

Telephone and telegraphy.

Radio telegraphy and earth telegraphy (T. S. F. and T. P. S.)

Visual and acoustic signaling.

Various signaling (by arms, by panels, by fireworks).

Couriers.

Carrier pigeons, etc.

## II.—DUTIES OF THE CHIEF OF STAFF.

2. "In large units the Chief of Staff is responsible for the organization of the various systems of liaison, and for combining these various systems into such a general system as will best insure prompt and reliable intercommunication between the elements of the command."

His chief duties are:

To prepare the plan of liaison, i. e., instructions for services concerned, co-ordination of resulting technical proposals, and the definite drafting of the plan of liaison.

To follow up its execution.

To control the use of the different liaison methods.

To see that all necessary instructions concerning the working of liaisons are given upon their arrival to all units assigned to the command to which he belongs.

To see that in case of relief all standing orders concerning liaisons are properly transmitted.

To supervise through the signal officer the working of the liaison system within his unit (army, army corps and division).

### III.—PLAN OF LIAISON.

3. The organization of liaisons is worked out in a general plan, called "Plan of Liaisons," and appears in the defensive plans, engagement plans and operation orders. The plan is drafted at each echelon of the command.

It must be simple, concise, contain only such instructions as are necessary for the units for which it is intended, and not repeat any of the arrangements of this text. It provides only for the use of the customary means of liaison; new appliances and conventional codes, settled upon or altered at the last moment, might be badly applied and lead to mistakes.

The plan of liaisons gives, if necessary, the distribution and assignment of the means of liaison pertaining to the unit, and possibly of those which are assigned to it in addition.

It states:

(a) The organization (completed, in course of construction or planned) of the different telephone systems; the kind of construction of the lines (aerial, in communicating trenches, in open ditch or under ground).

(b) The distribution of the technical characteristics (wave length, sound, etc.), of the different radio-telegraphic stations (T. S. F. and T. P. S.), and, if necessary, the hours of communication assigned to each station.

(c) The organization of visual and possibly acoustic liaison.

(d) The codes of liaison by fireworks and by panels.

(e) The organization of liaison by carrier pigeons.

(f) The markings of airplanes and balloons assigned to liaison duties; the conditions under which the airplanes and balloons will operate.

(g) The distribution of station calls; the same call being assigned to stations of different nature (radio, earth telegraphy, visual and acoustic signaling, carrier pigeons), working for the same headquarters.

(h) The liaison personnel detailed with superior, adjoining or subordinate authorities. At the divisional headquarters this paragraph fixes the composition and assignment of the liaison detachments of artillery.

(i) Hours of mails and of daily reports.



Besides, there must be further added:

On the defensive, the instructions concerning the organization of liaison in case of reinforcement, or falling back.

On the offensive, the precise position of the liaison axis, the location of information centers and of the different telephone and visual signaling stations, whose organization must be foreseen; the assignment of laboring units, and measures taken for pushing forward the various liaison materiel.

All these arrangements are advantageously presented in the form of tables and diagrams.

4. The plan of liaison should not prevent officers of all ranks from meeting their subordinates frequently and personally, thereby gaining a first hand knowledge of the condition of the units commanded by these subordinates; neither should it prevent officers of the various arms who must work together, from meeting on the field of action and reconnoitering it together so as to insure complete co-operation.

*The failure of mechanical means of transmission will not excuse a commanding officer's remaining in ignorance of an important change which has occurred either in the situation of his own unit, or in that of neighboring ones; neither will it be an excuse for his failure to exercise the necessary personal supervision.*

# Part I.

## MEANS OF OBTAINING INFORMATION.

### CHAPTER I.

#### LIAISON AGENTS OF THE COMMAND.

##### DESIGNATION OF THE LIAISON AGENTS.

5. The experience of war has led to the following rules in regard to liaison in combat:

As a principle each large unit, army, army corps and division detaches a liaison agent (officer) to subordinate units.

It is in exceptional cases only that a liaison agent is detached from a large unit to a superior unit; this happens only when the command gives orders to this effect.

Within the brigade, it is the subordinate unit which detaches a liaison agent (officer, non-commissioned officer or soldier, depending on circumstances), to the superior unit.

Besides, each unit detaches a liaison agent to neighboring units.

The liaison agents are provided with special means of transmission (carrier pigeons, cavalrymen, cyclists, motorcyclists), if required by the nature of the operations.

These rules do not modify the instructions for the organization of liaison given by the special infantry and artillery regulations (see Appendix X). Although having their line of conduct mapped out for them, the liaison agents must nevertheless take notice of all interesting points, and also of all information which it might be useful to report. They cannot do this unless their military education is well developed and their judgment excellent. Their selection should thus be made with great care. On the other hand, the better they know the unit to which they are to be attached, its composition, officers, and moral condition, and the ground where it operates, the more useful and the more efficient they will be. It is therefore advantageous that they should become the permanent liaison agents with a certain unit (1).

##### DUTY OF LIAISON AGENTS.

6. It is the duty of liaison agents to give information on the situation of subordinate units.

They must also give information as to the manner in which orders have been executed.

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(1) These instructions apply only to liaison officers sent to brigades or units superior to brigades. Liaison agents of small units are usually transmission agents, who may be intrusted with easy and well defined duties outside of their regular duty as transmission agents.

Coming frequently into contact with the troops, they are able to give their leaders all explanations necessary to clear up the points in orders or reports which could not be interpreted accurately without knowledge of certain details.

It is well understood that the written or verbal reports of liaison agents do not excuse the chief of the inferior unit, in case important events should happen, from communicating direct to his superior officer all information about the situation of his unit, about his intentions or his opinion, nor from assuming definitely the burden of responsibility; nor does it excuse the chief of the superior unit from informing himself personally whenever that is possible.

#### USE OF CAVALRY OFFICERS AND NON-COMMISSIONED OFFICERS.

7. Cavalry assists in the liaison service under conditions determined by the commanders (division commander for divisional cavalry, etc.). This happens when the role of the cavalry permits; for example, during an attack against fortified positions when the cavalry is not held in reserve for pursuit or during periods of inaction (1) when the cavalry is not defending a sector.

### CHAPTER II.

#### ARTILLERY LIAISON AGENTS ATTACHED TO THE INFANTRY.

8. In order to act efficiently the artillery must be in close co-operation with the infantry, for whom it works.

This liaison is established:

By frequent meetings of infantry and artillery officers, whose command posts ought to be established *near one another, whenever it is possible*, provided that infantry and artillery command posts are assured the best conditions.

By liaison agents sent from the artillery to the infantry.

#### LIAISON DETACHMENT (2).

9. During the active period of defensive or offensive operations each group, sub-group or battalion of light or heavy artillery charged with supporting the infantry directly, details to it an officer, chief of the liaison, who commands a liaison detachment including:

Non-commissioned officers and privates as scouts and liaison agents.

(1) Taking into account, for this particular case, the necessity of carrying on instruction.

(2) As a principle the liaison detachment takes no part in the observation of fire; the latter is considered as a duty excluding all others, and is secured by a special personnel and under conditions which in each particular case are determined by the battalion commanders.

Telephone operators and signalers, with the necessary material (telephone, visual signaling apparatus, etc.).

His duty is (1) to supply information to the chief who detailed him about the situation and the needs of the infantry and to transmit the requirements of the latter in such a way that the batteries can make use of it, and to inform the infantry commander regarding the support which his own artillery unit can give.

The plan of liaison of each division fixes the composition and assignment of the liaison detachment to the first line battalions and regimental commanders.

Before setting out, the officer, chief of liaison, receives very precise instructions from the chief who sends him out, concerning:

- (1) Established fire programs.
- (2) The locations and fire possibilities of the batteries.
- (3) The ammunition expenditure allowed.
- (4) The kinds of supply for the batteries (proportion of shells of different kinds).
- (5) The plans concerning eventual changes of position.
- (6) The kind of information considered most necessary and most important.

In addition, the infantry commander to whom he is detailed must instruct him:

- (a) Before the operation:
  - (1) On the details of the plan of the infantry maneuver.
  - (2) On the conventional signals agreed to.
  - (3) On the successive locations of his command post.
- (b) During the operation:
  - (1) On the information he receives about the situation of his own advance line and that of the enemy.
  - (2) On his intentions.

Lastly, the chief of liaison, before his departure, must study carefully the sector in which his unit is working. This study must include not only a thorough examination of the battle map, and relief plans and photographs, but also visual reconnaissances carried out from observing stations affording good views over the region concerned.

He must prepare his maps and those of his subordinates marking the battalions' zones of action, limits of range, dead space zones, zones defiladed from ground observation and possible positions of future observation stations.

10. To communicate with the artillery he uses the telephone, buzzerphone, or, for want of these, visual signaling, utilizing his own personnel and possibly carrier pigeons.

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(1) The institution of the liaison detachments does not cancel the duty of light and heavy artillery officers (battalion and group commanders) to get frequently in touch with the chiefs of infantry units (regiment and battalion commanders), for whom most of the work is being done.

Besides, with the permission of the commander to whom he is detached, he can if necessary use the infantry's chains of runners and even its sending posts or radio and earth telegraphy. To use the latter methods, one of the combined sending and receiving stations of the regiment's earth telegraphy, worked by the personnel of the regimental radio-telegraphic section, is placed whenever possible close to one of the advance observation stations of the battalion or group (stations properly connected with the rear by telephone). This station works as a relay between infantry and artillery in case telephone communications should be interrupted.

The telephone liaison between the infantry and its supporting artillery is double: one circuit laid and kept up by the artillery, one laid and kept up by the infantry.

In a period of inaction, this double liaison between artillery and infantry must systematically follow different routes; on the contrary, when these two circuits have to be extended in the course of an advance, and time must be gained in the installation and personnel must be spared, a common route or two routes very close to each other may be adopted.

As a principle, the chief of the liaison goes with the unit commander to whom he has been assigned by the plan of liaisons; but it goes without saying that the fulfillment of his duty may oblige him to absent himself momentarily (reconnaissances, controlling the work of the detachment, resuming contact with his unit).

In this case, he leaves a non-commissioned officer and the necessary liaison personnel with the commander of the infantry unit.

11. These instructions should control the organization of liaisons between infantry and artillery in a period of inaction. The purpose is always the same: to give the infantry in due time the efficient support of the artillery. The importance of the methods used varies according to circumstances.

### *CHAPTER III.*

#### *OBSERVATION.*

##### *I.—GROUND OBSERVATION.*

12. The powerful means of observation that are used today (observation from airplane and balloon, and aerial photography), ought not to bring about the neglect of ground observation.

Aerial and ground observation complete and corroborate each other; ground observation provides information that aerial observation, which works only intermittently, cannot give; ground observation is therefore as indispensable nowadays as it used to be in the past.

## KINDS OF OBSERVATION STATIONS.

13. Ground observation stations include:

The observation stations of command.

The observation stations of artillery.

Observation stations for information, whose field of action is quite extensive and whose main duty consists in locating hostile targets, particularly hostile batteries in action.

Observation stations of artillery command.

Observation stations of range finding and of fire control, whose name is self-explanatory.

A mere mention of the latter will suffice, and, in what follows, only observation stations of command will be discussed. One must remember, however, that observation stations of artillery, and especially the observation stations for information, will always participate to a certain degree in the work of the observation stations of command. The latter may, of course, eventually be used by the artillery.

## A.—OBSERVATION DURING A PERIOD OF STABILIZATION.

14. During a period of stabilization, as in combat, observation is continuous. In both cases it is necessary to be informed as to the enemy, not only as a protection against his attacks, but also, and chiefly, to do him as much damage as possible.

*Trench warfare is neither a truce nor a guard service; it is a phase of battle. It is necessary that the enemy should feel that he contends with a vigilant hatred.*

In the end, a patient and continuous observation always furnishes valuable information on the work of the enemy (hours of relief or replenishing; hours and places when the enemy works; the most used approaches); on his defensive organizations (new works, flank emplacements, machine guns, minenwerfer, posts of command, observation stations, etc.), and on offensive preparation. All this information makes it possible to inflict heavy losses on the enemy by a timely and pitiless stroke delivered at weak points. It is indispensable in anticipation of an attack, which contingency it is always the duty of a commanding officer to foresee.

## ORGANIZATION AND WORKING OF OBSERVATION.

15. Each echelon of command uses one or more observation stations. If necessary, additional observation stations are created so that no part of the enemy lines visible from our lines should escape observation.

The organization and work of ground observation are covered by a special pamphlet of the plan of defense of the sector.

This pamphlet includes:

(1) A general map of the location of the observation stations, clearly indicating the zone observed by each one of them.

(2) A panorama from each one of the observing stations.

(3) A diagram of telephone and other liaisons established between the observation stations on the one side and the corresponding posts of command on the other.

(4) A general description of the workings of the observation service, the stations which are permanently and temporarily occupied, the personnel of each of them, contribution of artillery observation stations to the observations of the command, transmission of information, special regulations of some of the observation stations, etc. (for example, repetition of certain signals given by the first lines).

Stations to be occupied permanently (day and night) are determined after a thorough inspection. They should watch the enemy with a maximum of efficiency, while at the same time the observation personnel ought to be reduced to a minimum.

#### ORGANIZATION OF OBSERVATION STATIONS.

16. The organization of the observation stations ought to be particularly well done from the point of view:

Of convenience of observation.

Of protection (sheltered station of observation, or at least station communicating with a shelter).

Of concealment (camouflage of the station and of the paths leading to it).

A superior commander determines the location of the stations and their construction where several commands are interested in establishing an observation post.

Each observation station is provided:

With special instructions (personnel attached to the station, duty roster, sector to be watched, points of that sector which are to be watched with special care, transmission of information).

With an "observation notebook" in which all observations made will immediately be entered.

With a copy of the battle map on a 1/5000 scale brought up to date. The battle map (scale 1/5000) is chiefly for the use of infantry units in order to enable them to discover all the characteristic points of the country they occupy, to locate guiding points, to study roads of advance, and on the other hand to enable them to locate all the interesting features of the enemy lines of defenses. Reciprocally the infantry collaborates in the drawing up of the 1/5000 maps, by means of the information which it supplies, chiefly through its observation service.

Each station, if necessary, may also be supplied with a copy of the 1/10000 or the 1/20000 maps. It is also supplied with a map of the ground seen from the observation station, with a panoramic sketch of it, and with the material necessary for observation (G. O. No. 49, 1918, A. E. F.). The observation material belongs to the units, not to the sector.

Every precaution is taken to keep the enemy from locating the observation stations (camouflage, and instructions posted at the entrance of each station, to which visitors of all ranks must strictly conform). Discipline cannot be too strict here. One must take notice of the fact that an observation post which is not fired upon is not necessarily one that has not been located. It is best, indeed, to leave unmolested stations which have been found out, in order that the enemy may not construct others, better protected or disguised. It often happens that these stations are not destroyed until the day when it will be really advantageous to deprive the enemy of their use, as in the case of attack.

#### PERSONNEL OF OBSERVATION STATIONS.

17. The personnel of an observation station is furnished by the unit to which it belongs.

It is chosen with care from among the ablest non-commissioned officers and men of the organization.

The training of the observers devolves upon the commanding officer of the unit who must:

First let them acquire, by a detailed study of the land, of the panorama from the observation post, of the battle map and of photographs, a thorough knowledge of their sector of observation.

Teach them the use of the material of their observation posts.

Guide their investigations by showing them by concrete examples, in so far as it is feasible, the significance of the various things that can be noticed in the enemy organizations.

Teach them to explore their sector methodically and to take note of their observations thoroughly and accurately.

#### WORK OF THE OBSERVERS—REPORTS.

18. The observer's duty consists in signaling immediately all indications tending to show an impending attack on the part of the enemy. They must also note all the manifestations of the enemy's activity which they are able to ascertain, and all the unusual facts which they can possibly gather. The reports of the observers are transmitted every day by the official channels at the prescribed time.

In each regiment, the intelligence officer gathers these reports, examines them and transmits them to the regimental commander. Those which are particularly interesting are transmitted to superior echelons; those relating to the defensive organization of the enemy are carried over to a copy of the battle map, scale 1/5000; they are submitted to the divisional topographical section and reproduced in the next edition of the map.



### CO-ORDINATION OF OBSERVATION WORK.

19. It is indispensable that the work of the observation stations be co-ordinated (division of duties, guiding of the observers in their work, in order to verify the truthfulness of information coming from other sources, etc.).

This work of co-ordination devolves upon the chief of the Second (Intelligence) Section in the army, and in the army corps and division upon a staff officer specially picked from the brigade, and upon the intelligence officer in the regiments.

These officers frequently visit the observation stations in order:

To acquire a thorough knowledge of their sector.

To keep their superior officer posted on the working of the service.

To make the observation work as useful as possible by immediately giving the commander of the units all information capable of helping the work of the unit's observers.

To stimulate the zeal of the observers by making them know the use which the commanding officer has been able to make of the information contained in their reports.

### UTILIZATION OF OBSERVATION STATIONS FOR RECONNOITERING THE TERRAIN OF THE ENEMY.

20. Staff officers and officers commanding troops should do their utmost to gain a perfect knowledge of the ground occupied by the enemy opposite them; they therefore use all stations from which ground can be seen, including the sectors of nearby units.

On each staff there should be at least one officer sufficiently familiar with the details of the terrain in front of the unit, who could be used as an observer in case of an offensive or defensive action.

Finally, it is necessary that artillery officers as well as airplane and balloon observers come into frequent contact with the chief of the infantry units for whose benefit they work, and that they study the terrain with them, not only by the battle map and by photographs, but also by use of observation posts.

### B.—OBSERVATION IN COMBAT.

21. Follow carefully, for the organization of ground observation in combat, the instructions given above for observation in a period of stabilization. Commanders of small units should choose an observation post permitting them, whenever possible, to follow the combat which develops in their zone of action. This also holds good for reserve units; they must, whenever they can, watch the events in the zone in which they may be called to fight themselves.

The commander of small units insures the permanency of the observation, assisted, if necessary, by some observers among

whom he divides the work, so that watching is continuous both in time and space. The post of a commander must be established near the post of observation. The choice of the latter precedes that of the former. He must also take into account, when choosing the location of his post, the necessity of making the liaison system as easy as possible and, in the case of regimental or higher command post, the fact that it must be possible for airplanes to drop messages near his post. The study of the zone of attack allows one to determine beforehand the probable location of future observation stations, and hence that of the posts of command. One must not forget that any indecision in the choice of a site for the post of command delays the creation of all liaison.

The above is applicable to the division as far as possible, while leaving the division commander within easy reach of his subordinate units, of his artillery and of the air units who help him.

Within the divisions, the ground observation system is completed, if the terrain offers good posts of observation with a wide view, by observation stations working for superior units (stations occupied by officers selected specially for that duty, and judiciously chosen observation stations for the information of the artillery).

Generally speaking the duty of the observers consists: in following the progress of the combat (movement of friendly as well as of enemy troops, activity of the two artilleries); in observing signals given by the advanced units or by airplanes, and, if necessary, in transmitting or repeating them according to orders received.

## II.—AERIAL OBSERVATION (1).

22. Airplane and balloon observers fulfill the same duty as ground observers, with but one advantage; their observation can cover all the ground that is of interest to the command. Besides, their aerial photographs furnish documents on the organization and on the activity of the enemy, which are of prime importance to all the echelons of the command.

On the other hand, thanks to the means of transmission which are used for communication between the airplane and the ground, and vice versa, the observer in the airplane can rapidly transmit the information he has received.

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(1) This deals only with aerial observation working for the immediate benefit of the command. The use of aerial observation in liaison with artillery is the subject of a special instruction pamphlet.

## CHAPTER IV.

### LIAISON BY AIRPLANES AND BALLOONS.

#### I.—AIRPLANES.

##### A.—WORK ASSIGNED TO AIRPLANES.

23. In combat, besides the various duties of reconnaissance which may be assigned to them by the commander, the work of aerial observers includes:

Watching the enemy in the zone of the combat.

Liaison of the commander with subordinate echelons.

Accompanying the infantry.

In an army corps, for instance, these duties may be distributed in the following way:

(1) One or several *airplanes of command* follow the general development of the combat, watch the enemy within the assigned zone, give information as to the distribution of his forces, indications of counter-attacks, etc.

(2) *Courier airplanes* are charged with the rapid transmission of orders from the commander and of valuable information about their own situation, that of nearby units and that of the enemy.

(3) *Airplanes for accompanying the infantry* (cavalry uses the same methods as infantry for its liaison with airplanes and balloons), as a rule one per division.

They follow the assaulting troops and reserves, observe signals of the firing line and of the command posts and transmit them to the general commanding the division, and possibly to the artillery radio stations, to the command posts of brigade and regiment.

They transmit to the infantry the orders of the division commander and, generally speaking, inform the commander of everything going on in the vicinity of the first line and behind it.

24. The airplane for accompanying the infantry is provided with distinctive signs (pennants, rows of lights, etc.), and besides makes itself known by a sound signal and a signal cartridge, both determined by the plan of liaison.

Its characteristics and the signals which it uses to communicate with the infantry ought to be familiar to all men of the units for which it works.

To prevent its appearance from giving the enemy a sure indication of an impending attack, and to make all concerned familiar with their own airplanes, it is indispensable that the airplanes accompanying the infantry fly frequently over the lines during the days of artillery preparation. Outside these periods they should fly from time to time in order to practice liaison with the infantry.

The airplane for accompanying the infantry rises above the advanced units to a height which must not exceed 1,200 meters. In certain cases it may be obliged to fly over the lines at very low height, but must not come below 600 meters except in case of necessity.

It must be the constant care of the crew to assist the infantry, noting exactly its position and its needs and conveying rapidly such information to the commander and the artillery.

### B.—MEANS OF COMMUNICATION.

#### (1) COMMUNICATION FROM THE AIRPLANE TO THE EARTH.

25. Airplanes communicate with the earth by means of:

(a) *Weighted messages* (1) for important indications, sketches and photographs intended for the command posts of army corps, divisions, brigades, and in exceptional cases of regiments.

To drop a weighted message the airplane comes down to a low height (about 200 meters) above the command post concerned, calls the attention of the addressee by one or several sound signals (fixed by the plan of liaison), and drops its message so that it falls in open ground. (The plan of liaison should prescribe, as far as possible, on what terrain weighted messages shall be dropped.)

In the course of the infantry's advance, supported by artillery fire of all calibers, it is difficult for an airplane to get through the very dense sheet of projectiles. At that moment it can drop messages on a command post located near the line of batteries only by remaining above that sheet, hence under bad conditions for carrying out its duty.

(b) *Radio telegraphy*, for urgent information (position of friendly troops, requests for artillery fire, lengthening of range, etc.), to the authorities whose receiving station is likely to hear it, i. e., to commanders of army corps, divisions, brigades, infantry regiments, artillery groups and battalions.

Such communications are made by using one of the codes of Appendix VI. Only such indications as are totally useless to the enemy may be transmitted in plain language.

(c) *Visual signaling and signaling by fireworks* (conventional signals of codes in Appendix VI) after having drawn attention by a sound signal (fixed by the plan of liaison) for communications intended for such elements as have no radio stations at their disposal and whose advance position does not permit the dropping of weighted messages.

With the fireworks used nowadays the airplane cannot possibly indicate which element it wishes to communicate with. Such signals are consequently intended for all elements constituting the large unit for whose benefit the airplane is working. The use of projectors, on the contrary, enables the

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(1) The message itself is placed in a metal box provided with a white or colored pennant which increases its visibility.

airplane to choose its correspondent. It is therefore advisable to try constantly to improve the latter method.

To be visible, visual and fireworks signals must not be used when the airplane is seen by the infantry against the sun or close to it.

Signal cartridges must always be fired from a height greater than 300 meters, and as much as possible upwards, to avoid confusion with the signals made by the infantry.

## (2) WATCH POSTS.

26. In order that the airplane signals and the messages sent by them may not pass unnoticed, in case the noise of the battle drowns the sound signals, a permanent watch post service must be secured by the radio officers, or by the officers in charge of the liaison near the posts of command of army corps, division, brigade, regiment, artillery group and battalion, as soon as the post of command is established. This service is carried on by observers within the battalions and companies. (The distribution of the personnel should be such as to insure simultaneously "observation" and "watch.")

## (3) COMMUNICATION FROM THE EARTH TO THE AIRPLANE.

27. The airplane receives communications from the firing line and from the command posts.

(a) *Firing line:* The line indicates its location:

1. *By means of position-marking panels.* All men carrying panels alternately open and shut their apparatus, taking care to set it facing the airplane with that side whose color stands out better on the surrounding ground. It is better to use many panels simultaneously during a fairly short time than a smaller number of panels during a longer time; thus, the line is automatically traced very quickly and clearly and troubles caused by forgotten panels are avoided.

To reduce the enemy's chances of spotting our line, the airplane observer must endeavor to reduce to a minimum the time required to take note of the new line.

*Panels* are folded up again as soon as the airplane signals "understood," and in any case after ten minutes.

2. *By means of Bengal flares* of certain color (fixed by the plan of liaison). These signals constitute the surest way of indicating one's position. It is important, however, to conceal them as much as possible from hostile view, by hiding them behind a screen, at the bottom or on the front side of a shell crater, while taking care that they remain visible to friendly observers.

*To avoid confusion it is forbidden to display position-marking panels or to light Bengal flares anywhere but on the line.* (This interdiction applies as well to patrols sent in front of the lines as to supporting or reinforcing units).

In order to distinguish clearly the signals made by our infantry from those which might be set by the enemy to impede

observation it is important to agree that panels or Bengal flares will be placed in groups of 2, 3, etc.

3. For want of marking panels and Bengal flares, the line uses all means available to indicate its location: signal cartridges of the 25 mm pistol or V. B., signal projectors sending series of alternated dots and dashes, waved handkerchiefs, pocket mirrors, etc.

The marking out of the firing line is carried out:

Either at an hour set beforehand, or on a prearranged line: for instance, the final objective or one of the successive objectives; or by order of the command transmitted by the airplane by means of the signal cartridges, "Where are you?" after having drawn the infantry's attention by a sound signal; or upon the company or platoon commander's initiative, when their unit cannot advance any farther; or when, compelled to fall back, it has succeeded in securing a hold on the ground.

*Orders for marking out should not be too frequent.* In principle the marking out will be done by panels.

Should the observer not see the panels, or should he see them badly, he will request another marking out, which will then be executed by means of Bengal flares.

In that case the company or platoon commanders will also signal their positions by means of one-color signal cartridges fired with the 25 mm pistol.

The line sends its request to the airplane by means of the same fireworks and according to the same codes as for communications with the rear (see codes of Appendix VI).

The airplane transmits these requests by radio to the general commanding the division.

(b) *Command posts.* The different command posts indicate their locations by means of the identification panels described in Appendix III.

Such panels are placed, either upon initiative from the command post to draw the airplane's attention, or at a fixed hour, by order of the higher command transmitted to the command post by the airplane under the same conditions as to the firing line. Hence, as soon as the airplane sends out the signal, "Where are you?" all command posts noticing the signal should mark their respective positions. The panels are removed as soon as the airplane has answered, "Understood."

Command posts of generals commanding army corps and divisions can communicate by radio with such airplanes as have a receiving apparatus.

All command posts can communicate with airplanes either by visual signaling or by means of their rectangular panels (described in Appendix III), using the conventional signals of Appendix VI.

As a rule, visual signals are repeated and panel signals left in place until the airplane has answered, "Understood" (preferably by projector signals).

## II.—BALLOONS.

## A.—DUTIES OF BALLOONS.

28. The divisional balloon, whose work it is to insure liaison for the infantry, carries as a distinctive mark one or more pennants attached to the rear or to the cable of the balloon. If a night ascension is deemed necessary in order to receive signals from the infantry, the balloon indicates its presence by means of a luminous signal lit at regular intervals.

Like the airplane for accompanying the infantry, its duties consist in:

Following the progress of assaulting troops and reserves.

Observing the signals from the line of the command posts, and transmitting them to the general commanding the division.

Informing the commander of everything going on in the vicinity of the firing line, and behind it.

Sending out, if necessary, to the advanced elements conventional signals provided for in the plan of liaison.

## B.—MEANS OF COMMUNICATION.

29. (1) *From the balloon to the command.* The balloon is directly connected by telephone with the divisional command post (balloon circuits) and with the army system.

It is besides provided with a radio apparatus enabling it to transmit its observations in case telephone communications should not work.

(2) *From the balloon to the firing line and to the advance command posts.* The balloon can communicate with the advance elements.

(a) In daytime by means of a cylinder which folds and unfolds at will, thus making signals corresponding to dots and dashes. These transmissions are limited to the two signals, "Understood" or "Repeat," preceded by the call of that particular post which the balloon addresses.

(b) At night by means of luminous signals, enabling it to send more complete messages, which, however, are always likely to be read by the enemy.

(3) *From the firing line and the advance command posts to the balloon.* In daytime, the firing line and the advance command posts indicate their positions to the balloon and communicate with it by means of the same methods as for communicating with the infantry airplane. However, the following should be noted:

(a) The balloon does not send out to the firing line the order to mark out the line which it occupies. Consequently it only observes the prearranged marking, or that ordered by the airplane.

(b) The balloon does not see the panels clearly.

(c) It can see the identification panels and the rectangular panels of the command posts only when they are inclined at a sufficient angle.

(d) Being far away from the lines it can hardly ever receive in daytime the signals made by the advanced elements with the 24 cm. projectors.

At night the balloon indicates its presence and position by lighting a luminous signal at regular intervals.

To this end, at an hour settled in the plan of liaison, the balloon sends out its call several times in succession and keeps its light up for five minutes.

The signalers of the different command posts take note of the direction of the balloon, orient their projector toward it, call up and then send their particular station call to the balloon until the latter sends it back. The balloon then takes them from right to left successively and receives their message, which it immediately transmits to the post of command by telephone or radio.

After these liaisons have been established the balloon observer watches the battlefield to catch any call which the different posts of command might send to him, and every 15 minutes he indicates his presence by two-minute calls.

As soon as he notices a call from a command post he starts communications with that post according to service regulations prescribed in Appendix V. Signals must be transmitted at low speed.

### III.—RECONNAISSANCES AND PRELIMINARY UNDERSTANDING.

30. Observations made for the use of infantry can be executed with good results only by experienced observers who have made a thorough study of the order of operations (or of the plan of defense) and of the ground.

The habit of working together is a capital factor of success, however, and preliminary understanding is always necessary.

It is especially indispensable, in case of attack, for airplane and balloon observers to complete the knowledge of the situation which they have been able to acquire by aerial observation and by the study of the order of operation, by acting in concert with the infantry command (usually at least down to battalion commanders), and by studying with them their zone of observation on the battle map, on photographs and in the observation stations.

Commanders of all ranks must favor by all available means the establishment of personal relations between infantry officers (company or battalion commanders) and observers. The latter should avail themselves of all opportunities, especially during the periods of inaction, rest or instruction, to get in touch with the units with which they have to co-operate in combat.



## Part II.

### MEANS OF TRANSMISSION.

#### NECESSITY FOR FREQUENT USE OF THE VARIOUS MEANS OF TRANSMISSION.

31. All the means of transmission herein mentioned have been made use of under the most varied circumstances. Each one of them has been as successful as might have been expected, although experience has shown that none of them has been absolutely reliable.

As a consequence:

It is necessary to provide every one of the ways of transmitting messages that can possibly be used, and moreover to organize each one of them as if it were the only one that can be relied on.

As nothing can be done at the last minute, and as troops will use in battle only methods with which they are thoroughly conversant, a *daily* use of all means of transmission is absolutely indispensable, if only by way of drill.

When one of the methods employed turns out to be a failure, no time ought to be lost before making successive use of all other methods.

### CHAPTER I.

#### PERSONNEL INTRUSTED WITH THE MEANS OF TRANSMISSION.

32. The Signal Corps in large units, the Outpost Company, Signal Corps, and regimental signaling personnel in regiments, are intrusted with the service of electric and visual liaisons (and usually of acoustic liaisons).

This personnel includes for each unit a controlling authority and agents of execution.

#### 33. I.—GENERAL HEADQUARTERS.

*Controlling Authority.*

Chief signal officer.

*Agents for Execution.*

Signal corps battalions.

#### 34. II.—ARMY.

*Controlling Authority.*

Army signal officer.

Three assistants.

*Agents for Execution.*

One field battalion signal corps.  
 Two telegraph battalions signal corps.  
 One signal park.  
 If necessary, reinforcement elements.

35.

## III.—ARMY CORPS.

*Controlling Authority.*

Corps signal officer.  
 Two assistants.

*Agents for Execution.*

One field battalion signal corps.  
 One telegraph battalion signal corps.

36.

## IV.—INFANTRY AND CAVALRY DIVISIONS.

*Controlling Authority.*

Division signal officer.

*Agents for Execution.*

One field battalion signal corps, which secures the electrical and visual liaison necessary to the staff and command posts of the division, brigades, and of the divisional artillery (assisted by the telephone and radio personnel belonging to the divisional artillery staff).

37.

## V.—INFANTRY AND CALVARY UNITS.

*Controlling Authority.*

In an infantry or dismounted cavalry regiment the signal corps officer who commands the platoon of the outpost company which is attached to the regiment.

*Agents for Execution.*

One platoon of signal corps outpost company.  
 One platoon of regimental headquarters company.

38.

## VI.—ARTILLERY GROUP AND BATTALION.

*Controlling Authority.*

The senior liaison officer.

*Agents for Execution.*

See tables of organization.

## VII.—AIR SERVICE.

To each army corps, division, or heavy artillery squadron, is attached such signal corps personnel as is necessary to supervise and assure the efficient operation of the telephone and radio stations.

39.

## VIII.—SUPPLIES.

The supplying of telegraph, radio, visual and occasionally acoustic material is secured from the Signal Corps. (Fireworks and accessories of all kinds are furnished by the Ordnance Department.)

40. IX.—DUTY OF THE CHIEF SIGNAL OFFICER.

In every large unit the signal officer reports to the Third Section (Operations) of the General Staff.

He is under the technical authority of the signal officer of the next higher unit.

Officers in charge of liaison in regiments, radio and artillery telephone officers are under the technical authority of the signal officer of the unit to which their regiment belongs.

The signal officer in each unit is in charge of:

(1) Regulating and co-ordinating according to the commander's instructions the use of means of transmission (telegraphy, telephone, radio, earth telegraphy, visual and acoustic signaling).

(2) Directing the personnel's instruction.

(3) Developing the technical instruction in subordinate units down to the regiments, inclusive.

(4) Supervising upkeep of material and conditions of technical use.

(5) Securing replenishment of material.

## CHAPTER II.

### TELEPHONE AND TELEGRAPH COMMUNICATIONS.

#### I.—TELEPHONE SYSTEM.

41. In each army the telephone system includes:

A.—An army system.

B.—Regimental systems.

#### A.—ARMY SYSTEM.

42. Its organization is as follows:

Wire lines with many circuits, on poles or deeply buried, constitute a more or less close network. Large centrals are installed as a rule at the junctions of these lines, at headquarters or command posts of large units and close to the firing, observing and ranging organizations.

These organizations are connected with the centrals by permanent circuits as short as possible.

The centrals being supplied with large switchboards and manned by experienced personnel make it possible to connect stations rapidly both in depth and laterally.

Moreover, all arrangements are made in the centrals so that in case of need certain lines can be temporarily connected and looped together. Direct circuits of great length are obtained which are necessary for fire or command communications.

As the circuits pass through the centrals it is possible to section the lines and to make transfers of circuits in case of trouble, an advantage that would not exist in long direct circuits.

The army system must first serve normal needs, and it must also allow reinforcement or modification of the engaged units without causing thereby the disorganization of existing liaisons.

The system is built, kept up and operated by the different units of the signal corps.

The army system includes two distinct systems:

(1) A command system.

(2) A fire system.

Experience has shown and confirmed the necessity of both systems, whose respective roles are different.

Nevertheless, whenever it is possible, the circuits of both systems will naturally follow the same route and their centrals be installed on the same premises.

In that case the two switchboards will be entirely separated and the fire system circuits distinguished by a red mark.

A few intercommunication circuits connect the two systems.

A certain number of circuits are also reserved for the needs of certain special units, such as aviation, balloon service, anti-aircraft units.

The number of circuits assigned to each system and the number of reserved circuits depend on the importance of the lines and on circumstances (an inactive sector, offensive or defensive operations).

43. (1) **COMMAND SYSTEM.**—The command system is connected: at the rear, with the telegraph system of the Services of Supply (at Army Headquarters); at the front with the regimental systems (at regimental and artillery group posts of command). It furnishes the lines which are necessary for carrying out the commander's orders.

This system includes large centrals generally installed at headquarters and posts of command. It also includes less important centrals for parks, depots, hospitals, billets, etc.

44. (2) **FIRE SYSTEM.**—The object of the fire system is to enable artillery units to use under the proper conditions all necessary agents of ground and aerial observation by relieving them of the construction, upkeep, and operation of long lines.

The centrals serving this system are:

*Rear centrals*, located on lines parallel to the front (called rear main cable) at its points of junction with the various cables which extend from rear to front.

*Advance centrals*, established on the rear to front lines, near artillery groups.

If means and circumstances permit, advance centrals will be connected by an advance cable parallel to the front.

*Observation centrals*, installed near groups of observing stations.

*Aviation centrals*, installed on aviation grounds.

*Balloon centrals*, as a rule, one per army corps.

Observation and advance centrals may be merged into one if the advance centrals are sufficiently near the observing stations.

Lines running to the front can be extended beyond the observation centrals up to advance centrals installed in the front lines for use in an advance. All elements taking part in the

firing or adjustment (artillery battalions, balloon companies, general ground observing stations, centrals of sound ranging sections, ground observation ranging sections, artillery intelligence service, anti-aircraft centrals, etc.), are connected with each other by permanent circuits and are joined as a rule to the nearest centrals as follows:

Observing stations with observation centrals.

Artillery battalions with advance or rear centrals.

High power heavy artillery, balloons, etc., with rear centrals, etc.

These elements, especially artillery battalions, must have two permanent circuits (as a rule one for adjustment and one for conversation).

When a trench mortar group is constituted, it is connected with the nearest central of the fire system.

45. (3) *Reserved circuits.* Experience has shown that, to enable certain commanders and certain units to obtain speedy communications under all circumstances, or to use the same lines during several hours running, it is necessary to reserve permanently for them a certain number of circuits in the army system.

(a) *Aviation circuits.*—These circuits connect the aviation centers (where aviation centrals are installed) with the principal command posts and with the artillery units most frequently in communication with those centers.

As a rule, for an army corps, the following reserved circuits are provided:

One or two circuits between the army corps and the division command posts (command and artillery).

One or two circuits extended to the groups of corps heavy artillery.

Five or six circuits leading to properly selected centrals on the fire system to establish liaisons between aviation, the artillery battalions concerned, balloon central, etc.

One or two circuits with the nearest central of the command system.

In short, the aviation central is generally served by a set of 8 to 12 circuits, according to circumstances (extent of the sector, tactical situation, etc.).

(b) *Balloon circuits.* These circuits connect the balloon central:

With the central of each balloon company of the sector; with the army corps command post (command and artillery).

With properly selected centrals of the fire system in order to establish liaisons between the balloon central and the artillery groups and battalions, aviation central, adjoining balloon centrals.

The balloon central ought therefore to be installed close to a central on the fire system.

(c) *Anti-aircraft circuits.* The circuits reserved for anti-aircraft defense include, as a rule, for each anti-aircraft sector:

(1) *Towards the front.* These circuits connect the central of the anti-aircraft sector with the motor gun sections (day post and billet) and with the sections and semi-fixed posts.

(2) *Towards the rear.* These circuits connect the anti-aircraft central with aviation centrals, balloon centrals, adjoining anti-aircraft centrals, posts under control of independent anti-aircraft groups and the command system.

Liaisons towards the rear are carried out by units of the signal corps.

The operation of the anti-aircraft central is directed by the signal corps with the help of personnel from the artillery.

Liaisons towards the front and liaisons within the group are carried out by the telephone operators of anti-aircraft units assisted, if necessary, by units of the signal corps.

#### B.—REGIMENTAL SYSTEMS.

46. The regimental systems extend the army system with which they have numerous points of contact (centrals of posts of command of regiments and groups of artillery). They are built, kept up and run by regimental telephone operators. They include:

(1) Infantry regiment system, providing:

Liaison between regimental post of command and subordinate units down to the battalions, at least.

Liaison between infantry units (regiments, battalions) and the artillery which supports them.

Various necessary liaison (liaison with observing stations, lateral liaisons, etc.).

(2) Artillery group system, securing:

Liaisons between groups and subordinate elements (sub-groups, battalions, batteries, special observing stations, etc.).

(3) *Balloon company system*, connecting the special central of each of them:

With the posts of command of the units to which the balloon is assigned.

With the balloon central of the sector.

With a certain number of centrals on the fire system chosen so as to obtain through one single central communication with each of the artillery battalions which normally work with the company.

With the different points of ascension, with the camp, etc.

Moreover it is sometimes advisable to connect the balloon by a direct line with the groups, sub-groups or battalions for whose benefit it most frequently observes; this arrangement may in case of need form an emergency system.

During the advance in open country each balloon company is connected with the command post of the unit to which the balloon is assigned.

Telephone service of balloons is operated by the telephone operators of the balloon companies under supervision of the Signal Corps.

Balloon company centrals must be installed as close as possible to the centrals of the firing system.

(4) *Interior systems of units belonging to anti-aircraft defense and artillery intelligence service*; these are organized according to the needs of these different elements.

### C.—VARIOUS ARRANGEMENTS.

47. (1) *Advantages of the army system.* Its elasticity assures rapid connection with permanent posts; especially for artillery it facilitates concentrating fire and deployment; reliability and quality of communications; saving of personnel and material; possibility of using one of the two systems (command or fire) in case of interruption or congestion of the other one; permanent presence on the terrain of a strong framework to which large units and elements coming into the sector can connect without difficulty.

48. (2) *Homogeneousness of telephone system.* To really serve its purpose and secure the above mentioned advantages the telephone system must constitute a homogeneous whole from the army to the most advanced elements.

This requires:

Co-ordination of telephone and telegraph services of the different units (army, army corps, infantry division, regiments).

Continuity of purpose in planning and building the system

49. (3) *Plan of systems.* The general plan of the army system forms one of the paragraphs of the army's plan of liaison. It is worked out by the army signal officer, who is constantly kept informed of the situation and of the commander's intentions (1). It is approved by the chief of staff.

The general plan of the army system is communicated to each of the large subordinate units (army corps, division), which within its scope and according to its needs draws up the detailed plan of that part of the system which is assigned to it for construction, operation and maintenance. In each of those units the plan is prepared by the signal officer and approved by the chief of staff.

Plans of regimental systems are submitted for approval to the commander of the unit to which those regiments belong.

50. (4) *Construction of the army system.* The building and maintenance of the army system are carried out by the signal corps units of the army, army corps and division, and by reinforcement units assigned to the armies by the Commander-in-Chief.

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(1) The chief signal officer must be informed in due time of the plans for organizing or building railway lines, ammunition dumps, hospitals, etc., all organizations likely to bring hostile firing on the lines and centrals located in the vicinity.

The distribution of the work among the elements is made by the army on recommendation of the army signal officer.

This officer requests the commander to assign to him the necessary laborers for:

Earthwork of the lines, transportation of material, and building shelters for the centrals.

51. (5) *Operation of the army system.* (a) *Command system.* The large centrals of the command system are operated by the signal corps battalions of the units which they serve. However, centrals which are installed at the junction of two sections of this system, assigned to two different units, are operated, as a rule, by operators belonging to both these units.

Regimental and artillery group centrals are operated by the telephone personnel of those units.

(b) *Fire system.* Centrals of the fire system (if isolated), or switchboards reserved for the fire system (in stations common to both systems), are operated by the Signal Corps. The commander alone on recommendation from the signal officer may detail, if necessary, auxiliary telephone operators from the units served by those centrals.

52. (6) *Authorization for telephone service.* Authorization for telephone service of centrals is given by the *chiefs of staff.*

In urgent cases, the chief of the station allows the connection to be made and then asks for the permanent authorization.

53. (7) *Diagram and directory.* A diagram of all the systems, indicating the exact location of the different centrals and of the main permanent stations, and a directory giving for each central the list of telephone stations, are made up and kept up to date by the signal corps in each army, army corps and division. They are distributed to all parties concerned. In particular, a copy of each of these pamphlets is sent without delay to all units which arrive in the sector.

#### D.—LIAISON BETWEEN THE ARMY SYSTEMS.

54. It is incumbent upon the chief signal officer to secure the liaison between the systems of the armies, so that all changes in the composition or in the grouping of those armies may not cause important modifications in the organized systems.

#### E.—MISCELLANEOUS RECOMMENDATIONS.

55. (1) *Overhearing telephone communications.* Great precaution must be taken and the strictest orders given to keep the enemy from overhearing telephone communications.

For that purpose and as far as circumstances allow:

Build all lines with metallic circuit and perfectly insulated; a circuit with a leakage to the earth is just as dangerous as a line with a ground return.

Use the wooden pulley or other approved means as cable support, excluding metal hooks.

Take up each useless or worn out line.



Avoid long lines from the extreme front to the rear. Cut them, if necessary, by relay stations set up at the limit of doubtfully insulated lines. Communications over long lines are more easily overheard.

In conquered terrain, look for and take up lines buried by the enemy.

Whatever precautions are taken in building the lines, communications may be overheard at the front by special hostile listening posts, and at the rear by indiscreet people.

Consequently:

*Reduce to the indispensable minimum the number of messages containing such information as would be useful to the enemy (reliefs, numbers of units, planned operations, casualties, etc.).*

*Always cipher messages containing such information by using, according to circumstances, any regulation method of ciphering; the person who sends the message is responsible for the ciphering.*

56. (2) *Use of telephone.* The telephone is used either for exchange of communication between stations or for sending messages.

Connections are given by the centrals in the same order as they are asked for, exception being made for connections requested with the mention, "Priority."

Priority connections are always granted at once, interrupting, if necessary, conversation and message transmissions.

57. (3) *Discipline of use.* The telephone has necessarily a limit to its use, like all other means of communication. As long as this capacity is not exceeded the telephone is an excellent method of transmission; on the contrary, its efficiency becomes rapidly lower as soon as too much is required of it.

Consequently one must:

Proportion the extent and capacity of systems to the forces which are available for their upkeep. A small system which is well built, well kept up and well operated is always better than an overdeveloped one which is insufficiently controlled.

Limit the work required of every system to its possibilities.

These two conditions suggest the following observations:

(a) Avoid too many direct or specialized lines, the building of which is often not justified, either by their importance or by their traffic, and the control of which is generally very difficult. Telephones served by good centrals must be the rule. Direct or specialized lines can be built only with the authority of the chiefs of staff.

(b) Observe a strict discipline in the use of telephone.

The commander is the sole judge of the need for telephone and of the number of telephones to be assigned to a single unit. He regulates the priority.

It is incumbent upon the commander to cancel temporarily certain stations of secondary importance either every day at hours of congestion or during a period of operations.

(c) Never discuss unofficial matters.

(d) Impose upon others and upon yourself the use of the message instead of conversation; the officer who draws up a message is more brief and more precise, and there remains a record of the communication.

Conversation over the telephone must be considered as quite exceptional.

The misuse of the telephone is a mark of shortsightedness.

(e) Strictly avoid telephone communications, even by message, except in case of necessity.

Commanders of small units should not be called to the telephone at any time of the day or night to receive unimportant messages. The chief who makes an immoderate use of the telephone is improperly induced to consider it as a most convenient way of saving himself from the necessity of drawing up complete and clearly written orders.

Liaison by telephone between the command posts of the front line battalions and companies leads to abuses which are all the more regrettable because in that zone communications are particularly liable to be overheard by the enemy.

In sectors where such telephones are authorized the forward station must be sealed. The seals are broken only by order of the battalion commander, or in urgent cases by the company commanders upon their own responsibility.

## II.—TELEGRAPHY.

58. *Telegraphic liaison.* Telegraphic liaison extends from the army toward the front:

Down to army corps, in all cases.

Down to divisions, whenever the conditions of the lines make it possible.

Such liaisons are obtained either by laying telegraph wires or by appropriating telephone circuits.

The use of telegraphy guarantees discretion and rapidity and avoids congestion on the telephone lines.

The buzzerphone, when operated as a telegraph instrument, can be superimposed upon telephone circuits. It cannot be overheard even when operated over leaky or ground lines. It must be used on the forward lines.

## CHAPTER III.

### RADIO-ELECTRIC COMMUNICATIONS, RADIO AND EARTH TELEGRAPHY.

#### (1) RADIO TELEGRAPHY.

59. Radio telegraphy is used for the following liaisons:

(1) *Radio aerial liaison*, between the ground and airplanes, and sometimes between airplanes.

(In addition, balloons are fitted with a radio apparatus which if necessary takes the place of telephone.)

(2) *Radio terrestrial liaisons* between ground stations.

Some stations (for instance, receiving stations of divisions, brigades, infantry regiments, artillery groups or battalions, etc.), are used both for aerial and terrestrial liaisons.

(3) *Simultaneous transmission* may occur to several receiving stations of weather forecasts, ballistic data, standard time, etc. It is possible with a single transmitting station to disseminate instantaneously down to artillery battalions messages which would involve great trouble if sent by telephone.

### I.—RADIO AERIAL SYSTEM.

60. With radio aerial liaisons it is possible:

(a) For airplanes, and possibly balloons, to send their observations concerning fire adjustment, and information relative to the situation and movements of friendly or hostile troops.

(b) For some of the ground stations to send orders or instructions to airplanes fitted with receiving apparatus.

(c) Possibly, for some of the airplanes, to communicate with one another during flight (pursuit or bombing duties).

The density of the radio aerial system will very probably reach in 1918 16 to 19 simultaneous airplanes per army corps front, i. e., an average of 5 or 6 airplanes per kilometer.

This result will follow the improvement in the apparatus, but will require particularly thorough training of all the personnel (observers, radio officers, operators of receiving stations).

### (2) RADIO TERRESTRIAL SYSTEM.

61. The radio terrestrial system includes:

(a) *An army system*, which provides the following liaisons:

Army to neighboring armies.

Army to army corps.

Army corps to neighboring army corps.

In addition, it secures liaison if necessary from the army group to General Headquarters.

This system includes sustained wave stations fitted up on light motor trucks.

Range: 100 to 250 kilometers, approximately, according to the aerial used.

(b) *An army corps system* which provides the following liaisons:

Army corps to divisions.

Army corps to air service sector.

Division to neighboring divisions.

Division to aviation centers.

This system includes sustained wave stations fitted up, as a rule, on automobiles, or, if need be, on light horse-drawn carts.

Range: about 50 kilometers.

(c) *A division system* which provides the following liaisons:

Division to brigades.

Division to advance information center of division.

Division to tanks.

Division to command airplane.

Division to artillery brigade.

This system includes sustained wave stations.

Range: 15 to 30 kilometers, according to the aerial used.

(d) *An advance system* which provides the following liaisons:

Division to regiment or brigade.

Regiment to neighboring regiments.

Regiments to direct support artillery (unilateral liaison).

This system includes portable damped wave apparatus.

Range: 4 to 8 kilometers, according to aeriels used.

By means of its battalion aeriels, the artillery receives signals sent by the regiments.

### (3) PLAN FOR THE EMPLOYMENT OF RADIO TELEGRAPHY.

62. Owing to the large number of radio stations simultaneously in operation within a limited area, it becomes necessary to have a strict organization to maintain order in the different systems and to avoid interference.

The emission of a radio station is characterized by:

(1) The nature of the wave emitted { Damped waves or sustained waves.

(2) The wave length.

(3) The sound peculiar to the emission.

(4) The station call (group of letters or numbers).

The distribution of these characteristics among the different systems and the different stations is given by the plan for the employment of radio telegraphy made out in each unit (army, army corps, division), by the signal officer of that unit. It is fixed by the plan of liaison.

The basic distribution of wave lengths and of station calls between the armies is made by the chief signal officer in the field. This distribution is altered every time changes in the order of battle make it necessary.

### RADIO OFFICER.

63. As a rule, an officer called *radio officer* is attached to each important radio station, and especially to the transmitting and receiving stations of army corps, division (1) or brigade staffs, and to receiving stations of divisional artillery, artillery groups and battalions, and air squadron landing grounds.

The duties of a radio officer are:

To see to the general installation of the station.

To supervise the transmission and reception of messages.

To insure the rapid transmission of messages to the commanders concerned.

(1) Supplied by the radio company of the signal corps field battalion.

To supervise the working of the panels for communication with airplanes.

To keep a record of any useful information which the station may receive.

## II.—EARTH TELEGRAPHY.

64. Earth telegraphy is used for liaison in the extreme advance zone, as it is the electrical method which is least hampered by bombardment.

*Principle.* The main parts of an earth telegraphy station are the following:

A receiving and transmitting apparatus (or a single receiving or transmitting apparatus).

A base, i. e., a piece of insulated cable, either buried or placed on the ground, the length of which as a rule is:

About 100 meters for the advanced station and 200 meters for the rear station.

All this arrangement is simple and easy to fit up. It may be entirely protected in dugouts or at the bottom of communication trenches, and thus be practically invulnerable.

*Range:* With an advance base of 100 meters and a rear base of 200 meters, a range of 2,000 meters can be expected, except in very unfavorable ground (sand, rock, or marshy soil with water close to the surface).

As soon as the distance between two command posts connected by earth telegraphy exceeds 2,000 meters a change of position for the rear station must be provided for.

## PRECAUTIONS TO BE TAKEN WHEN SETTING UP STATIONS.

### A.—ORIENTATION OF THE BASES.

65. The bases of two corresponding stations must be oriented relatively to each other.

The best arrangement consists in having two parallel bases, the centers of which are on a line perpendicular to both.

### B.—EARTH CONNECTIONS.

66. The bases are carefully grounded at the ends.

### C.—INTERFERENCE.

67. Wires for electric light or power with alternating current and telephone wires, especially single circuit lines, cause disturbances in neighboring earth telegraphy bases, which are likely to interfere with and even prevent reception.

Consequently, it is advisable to take the following precautions in such areas when earth telegraphy is used:

- (1) Place the bases some distance from telephone centrals.
- (2) Suppress all ground return telephone lines.
- (3) See to the insulation of the telephone circuits.

### D.—EMPLOYMENT OF EARTH TELEGRAPHY.

68. Earth telegraphy is normally employed to insure liaison between *regimental command posts* and *battalion command*

posts. Advanced divisional information centers are also provided with earth telegraphy apparatus.

#### E.—DENSITY OF EMPLOYMENT OF EARTH TELEGRAPHY.

69. Earth telegraphy stations must not be too numerous within a given area; otherwise there will be interference. In addition, a different sound is given to each of the neighboring stations.

This precaution and the use of station calls allow operators to receive those particular messages which concern them.

Should military circumstances require that a large number of earth telegraphy stations be used simultaneously, it is then necessary to fix for each of them a different time for periods of working.

### III.—SECRECY OF COMMUNICATIONS.

70. As the enemy can intercept radio-electric communications even more easily than telephone communications, *it is necessary that the strictest measures be taken to insure their secrecy: messages must not be transmitted by radio or earth telegraphy otherwise than in code.* (1).

It may also be mentioned that the compulsory use of a code considerably increases the efficiency of these methods of liaison, as a long sentence may be transmitted in code by means of a few simple signals.

## CHAPTER IV.

### VISUAL SIGNALING—ARM SIGNALING— SOUND SIGNALING—PANEL SIGNALING.

#### (I) GENERAL REMARKS.

71. The first two of the above methods of liaison are based upon the Morse code, and permit conventional signals or, under favorable conditions, short messages, to be sent; the last two methods can be used only for conventional signals.

#### II.—VISUAL SIGNALING.

##### A.—TECHNICAL CONSIDERATIONS.

72. (1) *Apparatus.* The lamps or projectors used for visual signaling are usually designated by the measure in centimeters of the diameter of the mirror.

At the present time they include:

(1) The 14 cm. electric projector, the range (2) of which 1 to 2 kilometers by day, and 3 to 4 kilometers by night.

(1) Airplane observers alone, in case of emergency, may send non-coded messages; these messages must be worded in such a way that the enemy may gain no useful information from them.

(2) Those ranges which correspond to observations with the naked eye are only given for reference. They not only depend upon atmospheric conditions, but also upon the state of the source of light (worn or new lamp and battery) and its more or less accurate adjustment.

(2) The 24 cm. electric projector, the range of which varies from 1.5 kilometers to 4 kilometers by day, and 3 to 8 kilometers by night.

(3) The 35 cm. projector, the range of which varies from 5 to 10 kilometers by day, and 5 to 15 kilometers by night.

(4) Projectors used on airplanes and fed by storage batteries or a small electric generator. Folding cylinder and luminous signals are used on balloons.

73. (2) *Colored lights.* The 14 cm. and 24 cm. projectors use white or red lights. The latter are used only for artillery intercommunication and for communication between artillery and infantry.

74. (3) *Efficiency.* In spite of rain, fog, smoke and natural obstacles which sometimes hamper and even prevent visual communications, experience has shown that in the hands of an experienced personnel this method provides excellent and rapid liaison, on the defensive as well as on the offensive.

75. (4) *Location of visual stations.* It is advisable that the selected stations not only allow communication from front to rear, but also, if possible, from rear to front, without the enemy's being able either to intercept the messages or spot the stations. As a matter of fact, a liaison is sure only when it is bilateral, i. e., when the receiving station is able to acknowledge receipt of the messages and answer them.

Even at worst, it must always be possible to signal from rear to front by means of simple visual signals or fireworks, giving the indications, "Understood" or "Repeat."

In the case of fixed stations, it is to a certain extent possible to conceal the beam of light from the enemy by inclosing it in a wooden tube, or limiting it by a screen in which a small hole has been bored. Better still, when the terrain is suitable, the stations and visual apparatus can be placed at the bottom of tunnels or narrow camouflaged trenches turned exactly in the direction of the corresponding station.

In the case of a temporary installation, efforts will always be made to place the station in front of a hedge, a curtain of trees or an embankment, in order to avoid the sky, a white frontage, or light colored ground as a background. The light from the apparatus is more visible when it stands out on a darker background.

The mirror must not be exposed to the sun, as it is necessary to avoid reflected light which would interfere with the reading of the signals. The apparatus must be placed in the shade or protected by a screen.

Lastly, it must be remembered that two transmitting stations placed close to each other cannot simultaneously send out messages in two neighboring directions, unless there is sufficient distance between them.

76. (5) *Change of position of the stations.* The greatest difficulty encountered when organizing visual communication

consists in locating the correspondent. It is therefore advisable that two stations which are to communicate shall not change their positions simultaneously. When a station is about to change its position, it first of all notifies its correspondent, and notes reference marks so as to be sure of finding it again later.

When there is a long distance to be covered it is advisable to make one or two intermediate halts of sufficient length to permit of the identification of the correspondent.

#### B.—USE OF VISUAL SIGNALING.

77. Visual signaling is used to send complete messages (in plain or in code) and conventional indications (see Appendix VI).

The messages are transmitted in the order in which they are brought to the visual station. The only exceptions are messages bearing the notation, "Priority" or "Urgent," which are always immediately transmitted, interrupting if necessary other transmissions already begun.

#### C.—VISUAL SYSTEM.

78. As a rule, visual stations are installed:

(1) In the vicinity of advance command posts or intelligence centers of divisions, brigades, regiments, battalions, companies, artillery groups and battalions, and close to observing stations, etc.

(2) On airplanes and balloons.

Those stations communicate with one another under conditions fixed by the plans of liaisons made out in each unit.

(a) *Visual centrals.* When the ground is suitable, it is profitable to install one or several central visual stations in each division to receive messages from certain given stations, and possibly from stations which have lost their correspondent. Such centrals must be organized under conditions as favorable as possible and connected by telephone with the general system.

(b) *Relay stations.* Owing to the distance, or to the configuration of the ground, it is sometimes imperative to install relay stations, avoiding, however, too great a number, as they considerably reduce the efficiency of the visual system.

(c) *Liaisons to be organized.* On the defensive, the plans of liaison indicate which are the communications that are to be permanently organized in order to double the main telephone lines.

On the offensive, the plans of liaison give, as exactly as possible, the probable location of the different stations in order to facilitate locating them.

#### III.—ARM SIGNALING.

79. Arm signals (Morse, semaphore, or conventional signals), can be of service in many cases. They are made either with the arms only, or, more often, with flags or other objects (see Appendix V showing the signals).



## IV.—ARRANGEMENTS COMMON TO VISUAL AND ARM SIGNALING.

80. (1) *Station calls.* Every visual or arm signal station is given a station call fixed by the plan of liaison and drawn from the same series as the station calls for radio or earth telegraphy.

A visual or arm signal station attached to a command already supplied with a radio or earth telegraphy station is given the same call as that station.

Every message or conventional signal transmitted by means of visual or arm signaling always begins with the addressee's station call, and that of the sender, separated by the word "from."

For instance, a transmitting station, I J, corresponding with a receiving station, A B, begins its message as follows:

A B from I J.

(2) *Secrecy of communications.* Every time the enemy is likely to intercept communications, the code of Appendix VI is to be cautiously used, and as far as possible coded messages only are to be sent.

## V.—SOUND SIGNALING.

81. An ordinary bugle can be used as a means of sound signaling. It may be used either with the regulation bugle calls or with conventional calls.

More powerful bugles may also be used—bugle blown by compressed carbonic acid gas, pump trumpet (1)—which in certain cases, particularly in foggy weather, are likely to be of service.

Airplanes use a sound signal, bugles blown by compressed air, klaxon horns and possibly machine guns, to draw the attention of elements with which they wish to correspond.

## VI.—PANEL SIGNALING.

82. Identification panels, oblong panels of command posts and position-marking panels are used for transmitting certain signals to airplanes and possibly to balloons. The description and directions for use of these panels are given in Part I, Chapter 4, Appendices III and VI, of these Regulations, and also in the "Regulations Concerning the Use of Aerial Observation in Liaison with Artillery."

## CHAPTER V.

## SIGNALING BY MEANS OF FIREWORKS.

83. Fireworks may be used for the transmission of a small number of prearranged signals and for marking out a position.

Experience has shown that it is objectionable to arrange a code of signals once for all. It therefore devolves upon each

(1) These are being studied.

army to regulate the use of fireworks, and to alter at the right time the arrangements made. The signals to be included in the code are chosen from those prescribed in the table of conventional signals of Appendix VI. Exceptionally, one or two additional signals may be used for an operation.

In order to avoid mistakes and abuse in the use of signaling fireworks it is absolutely necessary to take the following precautions:

Select lights which are easily distinguished from one another, base their meaning more on their shape than on their color (1), reserve the most characteristic and visible ones for the most important signals, etc. (2).

Give the codes a fairly long time ahead to all units arriving at the army, and likewise to the units concerned of the neighboring armies.

State for each sector, according to the situation, who is the commanding authority (battalion commander, captain, platoon leader), who has the right to use signals; otherwise there is a risk of alarms being given without reason and involving waste of ammunition.

Provide relays for repeating the signals when local conditions (lay of terrain, distance), make it necessary, and ascertain that artillery units concerned have located these relays and know to which advance unit each of them corresponds.

Carefully organize the service of artillery lookouts.

84. Together with other position-marking signals (panels, projectors), the infantry use Bengal flares to mark out the line they are holding.

As with signaling fireworks proper, no rules as to their use can be laid down once for all. The different types in use allow of a variety of methods (grouping of lights by twos and threes, use of different colors, etc.).

85. Lastly, the following method, which has already been used by some units, may be considered as firework signaling. It consists in giving the signal for some particular operation (an attack, for instance), by means of distinctive artillery firing carried out at a certain point, or at a height of burst decided upon beforehand.

The plan of engagement or the order of operations must clearly state which kind of fire is to be delivered, the point on which it is to be made, and the length of time which is to elapse between the beginning or the end of the signal and the launching of the operation.

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(1) The color may be used as a call, a given color, for instance, being assigned to each battalion or regiment, or used as an identification signal by varying it according to a simple rule made out beforehand.

(2) See Appendix IV: Signal and illuminating rockets and throwing devices.

## CHAPTER VI.

### COURIERS.

86. The role of couriers is defined by the drill regulations of the different arms.

Apart from the personnel prescribed by these regulations, a sufficient number of runners is detailed in each infantry unit to insure the liaisons within the unit itself and with the one above by means of chains of runners.

The chain of runners is made up of relay stations of runners (two or three runners to each station), sheltered and placed 150 to 300 metres apart, according to circumstances. It is under the command of a chief, who may be assisted by a few non-commissioned officers distributed among the stations, if the length of the chain should require it.

During periods of stabilization, although the complete set of relays is still kept up, only one out of every two or three are kept occupied for the daily transmitting service.

It is profitable that telephone relay stations, when there are any, should be at the same time runner relay stations. The runners may thus help in repairing the lines; in addition, if only one section of the line happens to be cut, time may be saved by giving the runners an open message to be telephoned through by the nearest relay which is still connected with the addressee.

When such combination of runners and telephone is used, the written message must nevertheless be taken to its address to confirm the telephone message.

### PARTICIPATION OF THE CAVALRY IN THE TRANSMISSION SERVICE.

87. When in a position to do so, divisional and corps cavalry provide the following, under conditions fixed by the plans of liaison:

Mounted couriers.

Runners.

Guides.

Patrols assigned to guard some of the telephone lines (1). Fractions or groups of troopers thus detached are commanded by officers and non-commissioned officers from the cavalry.

## CHAPTER VII.

### MESSENGER DOGS—CARRIER PIGEONS.

#### A.—CARRIER PIGEONS.

##### (1) GENERAL REMARKS.

88. The principle of liaison by means of carrier pigeons is based upon the homing instinct of these birds.

(1) It is advisable, during periods of inaction, training or rest, to send a few troopers or non-commissioned officers to the various liaison courses to acquire the necessary training.

Pigeons taken to any spot and freed in the day time return to their respective lofts carrying messages which have been attached to them. The messages are sent to the addressee by telephone or by courier.

Carrier pigeons used for liaison are drawn from stationary or traveling lofts assigned to the armies.

As a rule, stationary lofts belong to the army within whose area they are situated.

Traveling lofts are distributed among the armies according to needs by the Commander-in-Chief.

The birds must not be confined at the stations longer than two days and three nights. Pigeons which are not made use of must be released when they have been confined two days.

Messages sent by carrier pigeons are written on tissue paper. Special pads are issued for that purpose at the same time as the pigeons: pads for ordinary messages for use during periods of inactivity, and checkered pads for sketch messages for use during active periods. The messages are folded and placed in an aluminum tube called "message holder," tied to the pigeon's leg.

Pigeons may also be provided with a "message holder pocket," in which larger size sketches and reports can be sent.

## II.—GENERAL INSTRUCTIONS CONCERNING THE WORKING OF CARRIER PIGEON LIAISON.

89. *Regularity.* The essential characteristic of carrier pigeon liaison is its reliability. Over and over again, and under most varied circumstances (even under the heaviest shelling, and through poisonous gas clouds), carrier pigeons have insured liaison between the first lines and the commanding authorities, even when other methods proved of no avail.

Experience has shown that 97% of the carrier pigeons regularly return to their loft: the loss, consisting of pigeons which have gone astray or become disabled, amounts therefore to 3%.

*Speed.* The rapidity of liaison depends upon the quality of the pigeons, upon atmospheric conditions, and upon the arrangements made to connect the lofts with the addressees.

(1) In clear weather (showers do not matter) the speed of the pigeon is very uniform.

1200 to 1600 meters per minute with the wind.

800 to 1000 meters against the wind.

1000 to 1200 meters if there is no wind to speak of.

Well trained birds can easily fly a distance of 100 to 200 kilometers.

(2) Snow, fog, and rain considerably hamper the pigeons, cause them to lose their bearings, reduce their speed, and shorten the distance they can travel.

However, fine drizzle or light mists are odds that a pigeon can overcome over a distance of 15 to 25 kilometers at a speed of 500 to 800 meters per minute.

(3) All necessary steps are to be taken to insure rapid transmission of messages that reach the loft, by using either telephone or liaison agents (troopers, cyclists, and motorcycleists). Priority is always given, in transmission by telephone, to messages brought by carrier pigeons.

To sum up, it may be calculated (taking into consideration the time required for the transmission of the message from the loft to the command post concerned) that it takes, on an average, twenty-five or thirty minutes for a message from a front line element to reach the command post of the general commanding the division.

### III.—LIAISON BY CARRIER PIGEONS.

90. The following liaisons can be insured by means of carrier pigeons:

- (1) Liaison between the advance elements and the commander.
- (2) Liaison between infantry and artillery.
- (3) Liaison between liaison officers and commands who have detached them.

(1) *Liaison between advance elements and the commanding authority.* As a rule, command posts of battalions or regiments in the front line must be provided with a complete station of carrier pigeons.

These stations can detach smaller posts of two or four pigeons each, placed in one or two infantry baskets, to each unit intrusted with special duties or one whose communications are threatened. The stations are supplied by the divisional lofts.

During periods of inactivity the use of pigeons serves a double purpose. It completes the organization of the service and the training of those in charge of it. It attains its full importance as soon as hostile artillery action jeopardizes the reliable working of other means of liaison.

(2) *Liaison between infantry and artillery.* Infantry pigeon stations may be used for sending messages to the artillery: the message is sent to the divisional command post, and the divisional artillery commander there forwards the message to its address.

It is often profitable to supply artillery liaison detachments with pigeons.

(3) *Liaison between officers detailed on special duty and the unit which has detached them.* Officers on special duty who are provided with carrier pigeons are able to send reports and sketches to the authority who has detached them much more rapidly than by any other method.

The use of this method of liaison gave excellent results in the last operations.

### IV.—SECRECY OF COMMUNICATIONS.

91. Although very few pigeons go astray, every precaution must be taken when intrusting pigeons with messages in plain

words that the information contained is unlikely to be of any use to the enemy.

#### B.—MESSENGER DOGS.

92. Dogs, which are swifter and less vulnerable than men, may in a great many circumstances take the place of runners. To be used as messengers, the dogs require careful breaking in and constant training.

The training of dogs for liaison purposes consists in applying and developing the characteristic instinct of those animals: their faithfulness and attachment to their master. It is imperative that messenger dogs be always tended by the same men, and officers and men must realize that they handicap the dog's efficiency by calling, petting or feeding him.

A dog which is to be used for a liaison is led away in leash by a stranger and tied up, some distance off, in the vicinity of the command post concerned. At the given moment, the metal box containing the message is attached to the dog's collar by any man, the dog is turned loose and with a sign of the hand shown the direction he is to take. The dog sets off at once, and returns to his master, who is close to the addressee's station.

Liaison in both directions requires lengthy training, and can only be obtained with particularly gifted dogs.

### CHAPTER VIII. MESSAGE-CARRIERS.

93. Special projectiles, called message-carriers, have been devised to make possible transmission of orders, or written reports, while reducing the use of runners and mounted couriers. The document to be sent is inclosed in the message-shell. (Before firing and whenever possible the addressee's attention is attracted, for instance, by a whistle.)

All these projectiles contain a smoke-producing composition, the combustion of which at the point of fall facilitates locating them.

According to the distance, they are used to transmit documents from the sender to the addressee either directly or by relays. Posts of runners when supplied with the necessary material are suitable for use as such relay posts.

### CHAPTER IX. ORGANIZATION OF LIAISONS IN CASE OF AN OFFENSIVE ACTION.

94. The organization of the liaisons is particularly difficult in the case of an offensive action; there is a large movement of troops, a greater artillery activity, hence an increase in the chance of having telephone liaisons broken, hence also changes

of location of the posts of command which require the establishing of new lines, etc.

These difficulties can and must be overcome, but it is essential to study them thoroughly.

It is necessary:

(a) That the initial telephone system be built with special care (lines classified and located in order to facilitate repairs; special protection of important lines).

(b) That the officers commanding the attack stay near the front, so as to watch the field of action, and that they change their position just as soon as the progress of the attack makes it necessary. They have thus a direct view of the advance units, and are ready to direct any change which may be necessary.

(c) That the successive changes of posts of command shall have been prepared; previous construction of command posts to be established within our lines, as well as construction of corresponding telephone liaisons; organization of construction gangs having the material necessary to build or to improve rapidly the successive posts of command.

(d) That the beginnings of telephone lines towards the command posts which are to be established in conquered territory shall have been pushed as far as possible (armored cable, which withstands passage of troops, and even of vehicles, must be used). These telephone lines end in a terminal box installed in a sheltered station built in the parallel of departure.

(e) That the plan of telephone system built on the ground which is to be conquered shall have been roughly mapped out in advance. To this end, it is necessary that a preliminary study be made of the probable location of the future command posts, which is done by studying the terrain and the battle map. It is also indispensable to make all dispositions necessary for the rapid construction of lines behind the troops of attack (preparation of material, organization of personnel, particularly of the gangs commissioned with the watching and repairing of the lines).

(f) That the signal work shall have been organized (division of signal gangs and of material).

(g) That the personnel of transmission (signalers, liaison agents, runners), shall have been especially prepared for the attack by thorough and frequent reconnaissance made, under the direction of officers, of the terrain which can be seen from ground observation stations; by study on the map or the battle map of the terrain which is not visible; by distribution of large scale sketches.

Trench warfare produces a regrettable tendency to neglect the study of the field of action. Every time a unit occupies a new sector the commanding officer of the unit must compel officers, non-commissioned officers and liaison agents to learn their way about as quickly as possible, not only inside the system of trenches, but outside as well.

(h) That the command posts be easily found, even by liaison agents unacquainted with the unit (routes clearly mapped out, places marked, for instance, by flags in daytime, and at night-time by lanterns with colored glass when this can be done without drawing the enemy's attention, or by any other special signs).

(i) Finally, and especially, that every possible way of establishing and keeping the liaison between the infantry and the artillery which helps the former be carefully provided for (artillery observers going about with infantry commanders; liaison with the batteries by wire, radio, earth telegraphy, visual signaling, flags, prearranged signals by means of rockets, Bengal flares, etc., which must be perfectly well known to all concerned).

## II.—AXIS OF LIAISON.

95. When the objectives to be reached are fairly distant the organization of liaisons beyond the starting position, owing to difficulties encountered and the lack of time, can be satisfactorily realized only by concentrating the personnel's activity and means in material on a small number of routes in the general direction of the advance.

The plan of the liaison of the army corps, in particular, assigns to each front line division a special route called axis of liaison.

An important telephone central fixed by the plan of liaison of the army is the initial point for the axis of liaison of each division.

It contains a certain number of telephone centrals with which the different posts of command and subordinate units are connected.

The locations of centrals planned beyond the parallel of departure, the number and the kind of construction of circuits which are to connect them, are fixed by the divisional plan of liaison, according to instructions in the plan of liaison.

When the importance of the advance warrants it, the army plan of liaison also assigns an axis of liaison to each one of the army corps.

This axis of liaison should follow the same route as that of one of the engaged divisions, in order to take advantage of work already completed.

On the other hand, when a near objective only is to be reached, several axes of liaison can be assigned to engaged divisions, for instance, one per attacking regiment or battalion.

## III.—ADVANCE CENTERS OF INFORMATION.

96. The advance center of information of the division operates close to one of the centrals, installed on the axis of liaison, and as far forward as possible. This center is in charge of gathering and transmitting as fast as possible information about the progress of the fight to the general commanding the division and to all concerned, and, if necessary, of transmitting forward orders and information coming from the rear.



The advance center of information is installed as close as possible to the visual signaling center of the division and to a command observatory. When this condition cannot be realized, the advance center of information must be in a position to communicate directly with them by telephone. Its location is shown by a sign board, which is lit up by night.

It is directed by a staff officer of the division, and includes:

A detachment of telephone operators.

A detachment of radio operators.

A detachment of signalers and, if necessary, one or several carrier pigeon stations.

Mounted couriers and, if necessary, runners.

The initial location of the advance center of information is always on this side of our first line. It must be completely organized before the attack.

Its fitting up must not alter the working of liaisons which normally connect the different commanders. When the chief of the center of information is sure, or simply suspects, that information or an order which has reached him has skipped for some reason an echelon of the command, he must inform this echelon as soon as possible in order to restore the normal hierarchic working of liaisons.

#### IV.—CHANGE OF POSITION OF THE COMMAND POSTS AND CENTERS OF INFORMATION.

97. The change of position of command posts and centers of information is always a delicate operation, causing a period during which the transmission of information and orders is not efficient.

These drawbacks will be reduced to a minimum by observing the following instructions:

(1) Never change the location of a command post (1) or of a center of information until the working of liaisons has been verified at the new location.

(2) Leave a detachment behind at the old location until the new one is in working order.

(3) Do not change simultaneously the location of the divisional command post and that of the advance center of information.

#### V.—ORGANIZATION OF COMMUNICATIONS IN CASE OF RAPID ADVANCE FOLLOWING EITHER AN ATTACK OR A WITHDRAWAL OF THE ENEMY.

98. (1) *Axis of Liaison.* In case of a rapid advance the axis of liaison assigned to each division is generally that of the main column; the axis of liaison of the army corps is that followed by the head division or by one of the head divisions. They are

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(1) Command post of regimental commander or of superior authority.

determined by the operation orders of the army corps or of the army.

The operation order of each division in action settles as exactly as possible the locations of the prescribed telephone posts, those of the successive centers of information, and the hours at which they must be ready to work.

99. (2) *Centers of information.* The centers of information are organized according to conditions settled by the operation orders. They form a series of elements, supplied with all the necessary liaison methods, and close to which the general commanding the division successively establishes his command posts.

An officer of the air service is attached to each divisional staff as a liaison agent. He obtains close to the center of information, if possible, an auxiliary landing ground of easy access. The commanding authority details to this ground the necessary personnel, and causes liaison to be organized between the landing ground and the center of information.

If an auxiliary landing ground cannot be found, telephone, radio, automobile and carrier pigeon liaisons provide for the rapid transmission of orders between the division and the squadron ground.

A center of information is changed only when the next one is in condition to work.

The center where orders and information from all sources must arrive is designated by panels (identification panels of the division) and signboards.

In certain cases, it may be necessary to establish army corps centers of information. Their organization and working are similar to those of the divisional centers of information.

## VI.—RE-ESTABLISHMENT OF CONTACT WITH THE ENEMY IN FRONT OF A FORTIFIED POSITION.

100. When contact with the enemy is resumed in front of a fortified position, the plan of work to be carried out and the plan of liaison must be drawn up in the different units without delay, in accord with the instructions of the commander.

Useless work and wasting of material are thus avoided.

## CHAPTER X.

### ORGANIZATION OF LIAISON ON THE DEFENSIVE.

101. The organization of liaisons in a sector must secure good communication in case of an attack and under the most difficult circumstances.

This organization must provide satisfactory liaisons not only between the habitual command posts of the different units but also between their observing stations and their command posts of combat.

It must be in accord with the plans of reinforcement drawn up for the sector concerned. Finally it must allow good transmission between the advance zone and the chief position of resistance between the commander, the infantry echeloned on the various lines of the different positions and the supporting artillery.

The plan of liaison is consequently strictly subordinate to the defensive organization. It forms a part of the plan of defense.

It always fixes the personnel and material assigned to the telephone, radio and visual stations (which are not used normally), and the conditions under which the working of the different liaison methods will be periodically tested.

### I.—TELEPHONE LINES.

102. The framework of the telephone system must adapt itself without difficulty to all emergencies considered for the defensive.

The location of centrals must be chosen, as far as possible, away from points likely to be shelled by the enemy (cross-roads, isolated houses, etc.).

All precautions are taken to avoid the telephone centrals being disclosed by the convergence of trench and pole lines.

The number of circuits in the different systems between the various centrals must be sufficient to provide all communications which may become necessary during the most active operations.

Stations which are not used normally must always be kept up in good condition; lines seldom used must be frequently tested and maintained in condition for use.

In the zone which is exposed to heavy hostile artillery fire all central and permanent telephone stations must be established in bomb proof shelters; telephone lines must be buried or at least placed in special open trenches, or along the side walls of communicating trenches.

The distribution of personnel in charge of keeping up the different lines is clearly defined. The necessary repair material is kept at hand.

### II.—RADIO-ELECTRIC COMMUNICATIONS.

103. All command posts of generals commanding divisions or brigades, or regimental commanders, in the advance zone as well as on the chief position of resistance, must include bomb-proof shelters for their different radio stations.

Command posts of front line regimental and battalion commander, also include bomb-proof shelters for the installation of sending and receiving stations.

The bases needed for these stations are given the maximum protection possible.

The working of these different stations is frequently tested.

### III.—VISUAL COMMUNICATIONS.

104. The different visual signaling stations, which are necessary in the advance zone and on the main line of resistance as a safeguard against interruption in telephone and radio communications, must be established at all times. Their organization includes:

1. Bombproof shelter for the personnel
2. Tubes in the direction of corresponding stations.
3. A special telephone liaison when the visual signaling station is not located in the immediate vicinity of an existing telephone station. It is advisable to locate each visual signaling station close to the command post it has to serve. This should be considered in the selection of command posts.

It is necessary to parallel the telephone system with a visual signaling system to be used in normal times; this is the best way to secure efficient visual signaling communications in time of need.

### IV.—STATION CALLS—CODES.

105. The station calls of stations which do not work in normal times must be determined and brought to the knowledge of the personnel who will take charge of those stations.

All commanders concerned must at all times be supplied with the list of station calls and with the set of codes to be used in case of active operations.

Besides, a sufficient stock of these is kept with the army, army corps or divisional staffs to be handed to reinforcing units upon their arrival.

### V.—FIREWORKS.

106. Each command post of brigade, regiment, battalion or company established in first line positions must at all times be supplied with a sufficient stock of fireworks corresponding to the signal codes in use or prescribed.

A supply must be prepared for units about to come into action, in accord with the plan of defense and the plan of reinforcement. Relay stations, either in the advance zone or on the line of resistance which might become necessary in order to secure the repetition of signals, are studied and organized.

### VI.—CARRIER PIGEONS.

107. Each command post of a battalion or regiment must be supplied with carrier pigeon stations. No pigeon will be released without carrying a message, if only to mention that the situation is unchanged.

### VII.—LIAISON PERSONNEL.

108. The liaison agents and carriers who are detached to superior, inferior or adjoining authorities will be designated

by name; they will carefully reconnoiter the routes which bring them back to their posts.

The chains of runners to be organized in case of alarm are clearly defined and the unit which furnishes the detail designated; the shelters for the runners' posts are organized; frequent practice must be had to test the working of this means of liaison.

#### VIII.—CASE OF ALARM OR RELIEF.

109. As soon as the commander gives the order all dispositions prescribed by the plan of liaison become operative.

Any modification at the last moment is to be carefully avoided unless it is indispensable.

At all echelons the documents, plan of liaison and appended sketches intended for the reinforcement or relief units are kept up to date, in order to enable the latter to meet any emergency by their own means. However, when possible, it is advisable to leave for a few days, at the disposal of units arriving in the sector, a reduced personnel which will enable them to overcome rapidly all the difficulties arising from a new organization.

## Part III. TRAINING.

(See Section VII, G. O. No. 30, A. E. F., 1918.)

110. The proper functioning of liaison requires:

(1) That the commanding authority and its auxiliaries be perfectly acquainted with the possibilities of use and with the efficiency of the different liaison methods.

(2) That the personnel (officers, non-commissioned officers and men), assigned to the operation of each of these methods know thoroughly the use and maintenance of the material intrusted to them, and be used to working together.

(3) That the details of the present instructions be known and applied by all.

### ORGANIZATION OF TRAINING.

111. Officers and non-commissioned officers are instructed in the corps signal schools; men are instructed in the technical courses of divisional liaison.

### CORPS SIGNAL SCHOOLS.

112. A signal school operates in each corps.

This school is directed by an officer particularly qualified and assisted by a technical personnel appointed by the corps commander.

As far as possible, it is organized in the immediate vicinity of a camp and of an infantry training center, so that it can without difficulty make use of the terrain and accessory personnel for practical exercises.

Its purpose is:

(a) To improve constantly the instruction of officers and non-commissioned officers of the different units in charge of liaison.

(b) To diffuse knowledge of improvements in the material and in the methods of liaison.

This information includes:

(1) Course for officers, attended by:

Officers of the Signal Corps.

Officers in charge of liaison (infantry, artillery, cavalry).

Telegraph and telephone courses for non-commissioned officers and men attended by:

Non-commissioned officers of the signal corps.

Non-commissioned officers of all arms.

Radio telegraph course for non-commissioned officers, attended by:

Non-commissioned officers of the radio elements of all arms.

## (2) PRACTICAL EXERCISES

These exercises are based on plans of liaison on the offensive and on the defensive.

They are for:

The personnel attending the different courses mentioned above.

Staff officers who have to assist the chief of staff in the liaison.

Signal officers of the corps and divisions.

Non-commissioned officers of signal units.

If necessary, for airplane observing officers.

In addition, it is advisable for the following to attend the most important exercises:

Chiefs of staff of large units.

Officers of the centers of information and battalion commanders.

Air service officers.

Available regimental commanders and staff officers.

The complete course lasts about four weeks.

## EXERCISES AND MANEUVERS.

113. The different methods of liaison, including the liaison by airplanes and balloons, are simultaneously brought into play in all exercises carried out by units in the vicinity of the rest billets and in the training camps. Thus instruction given in the courses and within the units during their stay in rest areas is completed by general exercises under conditions as similar as possible to those of combat.





## **APPENDICES**

# A PROVISIONAL SIGNAL UNIT E

	INFANTRY						M. G. Co. 10
	Rifle Co. 12	M. G. Co. 1	Hdq. Co. 1	Infantry Obs. Int. Sec. 3	Total Regt.	4 Regts.	
1 (a) Accumulators, 4 volt, 100 amp. hr.	..	..	..	..	..	..	..
2 (a) Accumulators, 10 volt, 20 amp. hr.	..	..	..	..	..	..	..
3 (a) Accumulators, 40 volt, 3 amp. hr.	..	..	..	..	..	..	..
4 (a) Amplifiers, Type 3 Ter (French)	..	..	..	..	..	..	..
5 (b) Axes, hand.....	..	..	..	..	..	..	..
6 (b) Bags, tool, service, complete.....	..	..	1	..	1	4	..
7 (b) Bars, digging, standard.....	..	..	..	..	..	..	..
8 (b) Batteries, dry, No. 6.....	..	..	12	..	12	48	..
9 (b) Batteries, tungsten, Type «A» extra	..	..	40	2	46	184	..
10 (b) Batteries, Eveready, No. 703, extra	..	..	..	..	..	..	..
11 (a) Bells, vibrating, 50 ohm. or equiv..	..	..	8	..	8	32	..
12 (b) Books, field, message.....	..	..	100	..	100	400	..
13 (b) Buckets, water, canvas.....	..	..	..	..	..	..	..
14 (a) Bulbs, amplifier.....	..	..	..	..	..	..	..
15 (b) Buzzers, Service Model 1914.....	..	..	..	..	..	..	..
16 (a) Buzzerphones .....	..	..	8	..	8	32	..
17 (b) Cable, 10 pair, cotton covered, ft...	..	..	..	..	..	..	..
18 (b) Candles, lantern, stearic acid.....	..	..	..	..	..	..	..
19 (b) Carriers, buzzer and antennae wire	..	..	..	..	..	..	..
20 (b) Carts, wire, complete (2 horses)..	..	..	..	..	..	..	..
21 (a) Carts, wire, hand (Brouette Der'e)	..	..	..	..	..	..	..
22 (a) Cases, battery .....	..	..	..	..	..	..	..
23 (b) Cases, map.....	..	..	..	..	..	..	..
24 (a) Charging set, Type «D» (French)..	..	..	..	..	..	..	..
25 (b) Chests, packing.....	..	..	..	..	..	..	..
26 (b) Chests, tool, Mechanics No. 1....	..	..	..	..	..	..	..
27 (b) Chests, tool, Mechanics No. 2....	..	..	..	..	..	..	..
28 (b) Chests, tool, Electrical Engineers..	..	..	..	..	..	..	..
29 (b) Chests, tool, cable splicers.....	..	..	..	..	..	..	..
30 (b) Chests, tool, construction.....	..	..	..	..	..	..	..
31 (b) Clamps, splicing, 7".....	..	..	4	..	4	16	..
32 (b) Climbers with straps, pairs.....	..	..	..	..	..	..	..
33 (b) Clips, testing, Frankel or Muller Universal .....	..	..	..	..	..	..	..
34 (a) Compasses, prismatic.....	..	..	13	..	13	52	..
35 (b) Cord, lamp, feet.....	..	..	..	..	..	..	..
36 (b) Diggers, post hole, Ewan 6".....	..	..	..	..	..	..	..
37 (b) Discs, cipher.....	..	..	..	..	..	..	..
38 (a) Electrolyte, 28 Baume, in car- boys of 10 litres each.....	..	..	..	..	..	..	..
39 (b) Envelopes, message.....	..	..	..	..	..	..	..
40 (b) Flashlights .....	..	15	2	21	84	..	..
41 (a) Fuses, 1 amp., for 4 and 12 line boards .....	..	..	76	..	76	304	..
42 (b) Glasses, field Type D or EE.....	9	15	16	1	142	568	15
43 (a) Glasses, field, Huet 8 power.....	..	..	..	..	..	..	..
44 (b) Grips, buffalo.....	..	..	2	..	2	8	..
45 (b) Hammers, claw.....	..	..	4	..	4	16	..
46 (b) Hatchets, with handles.....	..	..	4	..	4	16	..
47 (a) Headsets, telephone.....	..	..	..	..	..	..	..
48 (a) Hydrometers, Baume.....	..	..	..	..	..	..	..

\*See Circular 55, C. S. O., May 12.

dix l.

# MENT FOR INFANTRY DIVISION.

GUN BN.		FIELD ARTILLERY						FIELD SIGNAL BN.						Total Infantry Division	Automatic Supply
Total 3 M. G. Bns.	75 mm. 155 mm. 58 mm. T. M. B.	75 mm. Hdq. Co.	155 mm. Hdq. Co.	75 mm. Regt. 2	155 mm. Regt. 1	Brgd. Hdq.	Total Art. Brgd.	Radio Co. «A»	Wire Co. «B»	O. P. Co. «C»	Bn. Hdq.	Total Bn.	Div. Int. Obs. Sec.		
..	..	2	2	2	2	2	8	..	..	..	12	12	..	20	..
..	..	2	2	2	2	2	8	..	..	..	23	23	..	23	..
..	..	1	1	1	1	1	4	6	15	20	6	47	..	47	..
..	..	..	..	..	..	..	..	4	4	5	..	9	..	13	..
..	..	9	12	9	12	4	34	..	12	25	..	37	..	37	..
..	..	..	..	..	..	..	..	30	100	500	10	640	9	332	..
..	6	12	16	48	52	12	166	..	..	..	..	..	..	166	..
..	..	6	8	6	8	2	22	..	..	..	..	..	..	54	..
..	25	25	25	25	25	100	175	100	100	200	..	400	..	975	..
..	..	..	..	..	..	..	..	4	4	6	2	16	..	16	..
..	..	..	..	..	..	..	..	36	..	..	..	36	..	36	..
..	..	..	..	..	..	..	..	5	36	20	2	63	..	63	..
..	..	..	..	..	..	..	..	..	8	..	2	10	..	42	..
..	..	..	..	..	..	..	..	..	..	50	..	50	..	50	..
..	..	..	..	..	..	..	..	200	200	400	100	900	..	900	..
..	..	..	..	..	..	..	..	10	22	..	..	32	..	32	..
..	1	3	4	9	10	3	32	..	6	..	..	6	..	54	..
..	1	2	3	8	9	2	28	..	12	10	..	22	..	28	..
..	..	..	..	..	..	..	..	7	14	..	12	33	..	33	..
..	..	..	..	..	..	..	..	4	4	8	2	18	..	18	..
..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..
..	..	..	..	..	..	..	..	..	4	..	..	4	..	4	..
..	..	..	..	..	..	..	..	..	1	1	..	2	..	2	..
..	..	..	..	..	..	..	..	..	11	20	..	31	..	47	..
..	1	3	4	9	10	1	30	1	10	2	1	14	..	44	..
..	8	18	24	66	72	18	230	..	100	200	..	300	..	530	..
..	..	..	..	..	..	..	..	8	8	12	2	30	..	82	..
..	..	..	..	..	..	..	..	..	..	500	..	500	..	500	..
..	..	..	..	..	..	..	..	..	12	5	..	17	..	17	..
..	..	..	..	..	..	..	..	14	14	30	4	62	..	62	..
..	..	..	..	..	..	..	..	..	..	..	2	2	..	2	..
..	..	..	..	..	..	..	..	1000	1000	1000	..	3000	..	3000	..
..	..	..	..	..	..	..	..	24	32	65	9	130	9	223	..
..	24	24	36	168	180	24	564	..	..	..	..	..	..	868	..
165	..	..	..	..	..	..	..	7	6	10	2	25	8	766	..
..	8	21	26	69	74	11	231	..	..	..	..	..	..	231	..
..	..	..	..	..	..	..	..	..	8	..	..	8	..	16	..
..	..	..	..	..	..	..	..	..	..	..	..	10	..	26	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..
..	4	9	10	33	34	..	104	..	..	..	..	..	..	104	..
..	..	..	..	..	..	..	..	6	..	6	6	18	..	18	..

	INFANTRY						MACHINE	
	Rifle Co. 12	M. G. Co. 1	Hdq. Co. 1	Infantry Obs. Int. Sec. 3	Total Regt.	4 Regts.	M. G. Co. 10	Hdq. Co. 3
49 (a) Insulators, wooden knob.....	..	..	..	..	..	..	..	..
50 (b) Jacks, wagon.....	..	..	..	..	..	..	..	..
51 (b) Kits, flag, combination, standard..	..	..	13	..	117	468	..	..
52 (b) Kits, inspectors, pocket.....	..	..	..	..	..	..	..	..
53 (b) Kits, soldering.....	..	..	..	..	..	..	..	..
54 (b) Knives, brushcutting.....	..	..	..	..	..	..	..	..
55 (b) Knives, Electricians.....	..	..	60	..	60	240	..	..
56 (b) Lanterns, candle.....	..	..	..	..	..	..	..	..
57 (b) Megaphones.....	..	..	..	..	..	..	..	..
58 (b) Motor cars, 5 passenger, touring..	..	..	..	..	..	..	..	..
59 (b) Motorcycles, Harley-Davidson without side-cars.....	..	..	..	..	..	..	..	..
60 (b) Motorcycles, Harley-Davidson, with side-cars.....	..	..	..	..	..	..	..	..
61 (b) Motor trucks, 4 wheel-drive, 1½ ton Special.....	..	..	..	..	..	..	..	..
62 (a) Nails, for insulators.....	..	..	..	..	..	..	..	..
63 (a) Panels, Artillery Brigade, white..	..	..	..	..	..	..	..	..
64 (a) Panels, Artillery Brigade, black...	..	..	..	..	..	..	..	..
65 (a) Panels, Artillery type, white.....	..	..	..	..	..	..	..	..
66 (a) Panels, Artillery type, black.....	..	..	..	..	..	..	..	..
67 (a) Panels, Identification.....	..	..	4	..	4	16	..	..
68 (a) Pannels, Infantry Brigade, white..	..	..	..	..	..	..	..	..
69 (a) Panels, Infantry Brigade, black...	..	..	..	..	..	..	..	..
70 (a) Panels, Infantry Division, white..	..	..	..	..	..	..	..	..
71 (a) Panels, Infantry Division, black...	..	..	..	..	..	..	..	..
72 (a) Panels, Marking.....	64	..	..	..	768	3072	..	..
73 (a) Panels, Rectangular.....	..	..	4	..	4	16	..	..
74 (b) Pencils, lead, dozen.....	..	..	12	..	12	48	..	..
75 (b) Pikes, wire.....	..	..	..	..	..	..	..	..
76 (b) Pliers, side-cutting 5".....	..	..	..	..	..	..	..	..
77 (b) Pliers, side-cutting 6".....	..	..	45	..	45	180	..	..
78 (b) Pliers, side-cutting 8".....	..	..	15	..	15	60	..	..
79 (a) Poles, sectional bamboo, (2 sec- tions, 2 meters each).....	..	..	..	..	..	..	..	..
80 (a) Projectors, 14 cm. with batteries..	2	2	12	..	38	152	2	..
81 (a) Projectors, 14 cm. (3 in case), com- plete with battery, cases.....	..	..	..	..	..	..	..	..
82 (a) Projectors, 24 cm. with batteries..	..	..	4	..	4	16	..	..
83 (a) Receiving sets, Type «A-1», com- plete (French).....	..	..	1	..	1	4	..	..
84 (a) Receiving sets, Artillery, Type «A-1», complete (French).....	..	..	..	..	..	..	..	..
85 (a) Receiving sets, T. P. S. (French)..	..	..	1	..	1	4	..	..
86 (a) Reels, breast.....	..	..	4	..	4	16	2	2
87 (a) Saws, hand, cross-cut, 24".....	..	..	4	..	4	16	..	..
88 (b) Screwdrivers, 8".....	..	..	4	..	4	16	..	..
89 (a) Sets, radio, Type «E-3», French, mounted on two Ford trucks each	..	..	..	..	..	..	..	..
90 (b) Sets, radio, Type «E-10», bis (French).....	..	..	..	..	..	..	..	..
91 (b) Sets, testing, magneto.....	..	..	..	..	..	..	..	..

\*See Circular 55, C. S. O., May 12.

1 (Continued)

GUN BN.		FIELD ARTILLERY						FIELD SIGNAL BN.						Div. Inf. Obs. Sec.	Total Infantry Division	Automatic Supply
Total 3 M. G. Bns.	75 mm. 155 mm. 38 mm. T. M. B.	75 mm. Hdq. Co.	155 mm. Hdq. Co.	75 mm. Regt. 2	155 mm. Regt. 1	Brgd. Hdq.	Total Art. Brgd.	Radio Co. «A»	Wire Co. «B»	O. P. Co. «C»	Bn. Hdq.	Total Bn.				
..	100	100	100	700	700	100	2300	..	..	..	..	..	..	2300	..	..
92	12	50	65	122	137	16	409	11	9	9	2	31	8	1008	..	..
..	3	6	8	24	26	6	83	7	6	6	4	23	..	106	..	..
..	..	..	..	..	..	..	..	1	4	5	1	11	..	11	..	..
..	4	8	12	32	35	..	104	5	12	15	..	32	..	32	..	..
..	..	..	..	..	..	..	..	75	75	280	10	440	..	784	..	..
..	2	3	4	15	16	..	48	12	30	50	5	97	..	97	..	..
..	..	..	..	..	..	..	..	..	..	..	1	1	..	48	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	..	..	1	1	1	3	6	..	6	..	..
..	..	..	..	..	..	..	..	4	4	5	..	13	..	13	..	..
..	..	..	..	..	..	..	..	1	1	1	2	5	..	5	..	..
..	100	100	100	700	700	100	2300	..	..	..	..	..	..	2300	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	1	..	..
..	..	3	4	3	4	..	10	..	..	..	..	..	..	10	..	..
..	..	3	4	3	4	..	10	..	..	..	..	..	..	10	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..	..
..	..	..	..	..	..	..	..	2	..	..	..	2	..	2	..	..
..	..	..	..	..	..	..	..	2	..	..	..	2	..	2	..	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3072	..	..
..	..	..	..	..	..	..	..	12	..	..	..	12	..	28	..	..
..	..	..	..	..	..	..	..	25	25	25	3	78	..	126	..	..
..	..	..	..	..	..	..	..	..	18	..	..	18	..	18	..	..
..	..	..	..	..	..	..	..	75	75	280	10	440	..	440	..	..
..	1	3	4	9	10	6	35	..	20	20	..	40	..	180	..	..
..	..	6	8	6	8	6	26	..	..	..	..	..	..	135	..	..
26	..	..	..	..	..	..	..	..	..	..	3	3	..	26	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	181	..	..
..	1	..	..	6	6	..	19	..	..	..	..	..	..	19	..	..
..	..	10	13	10	13	5	38	..	..	..	3	3	..	57	..	..
..	..	..	..	..	..	..	..	4	..	..	..	4	..	8	..	..
..	..	4	5	4	5	2	15	..	..	..	..	..	..	15	..	..
26	..	..	..	..	..	6	6	..	..	15	..	15	..	4	..	..
..	..	..	..	..	..	..	..	..	..	15	..	15	..	63	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..	..

	INFANTRY						MACHINE	
	Ride Co. 12	M. G. Co. 1	Hdq. Co. 1	Infantry Obs. Int. Sec. 3	Total Regt.	4 Regts.	M. G. Co. 10	Hdq. Co. 5
92 (a) Switchboards, telephone, 4 line mono .....	..	..	10	..	10	40	..	2
93 (a) Switchboards, telephone, 12 line mono .....	..	..	1	..	1	4	..	..
94 (b) Tape, friction, pounds .....	..	..	4	..	4	16	..	..
95 (b) Tape, rubber, pounds .....	..	..	2	..	2	8	..	..
96 (b) Telephones, camp, Model 1917....	..	..	25	..	25	100	1	4
97 (b) Telephones, Western Electric, No. 1375B .....	..	..	..	..	..	..	..	..
98 (a) Transmitting set, T. P. S. No. 2 bis (French) .....	..	..	4	..	4	16	..	..
99 (a) Transmitting set, portable, Type No. 3 (French) .....	..	..	1	..	1	4	..	..
100 (b) Typewriters, field, Corona .....	..	..	..	..	..	..	..	..
101 (b) Volt-ammeters, Western, Type 280. ....	..	..	..	..	..	..	..	..
102 (b) Wagons, instrument, Escort, Type SC. ....	..	..	..	..	..	..	..	..
103 (b) Watches, wrist, luminous dials....	..	..	14	..	14	56	..	..
104 (b) Wire, outside, T. P., ec., M. Ft....	..	..	..	..	..	..	..	..
105 (b) Wire, field, U. S. Standard, miles .....	..	..	..	..	..	..	..	..
106 (b) Wire, outpost, twisted pair, km....	..	..	30	..	30	120	1	2

(a) Items being obtained in France.

(b) Items being obtained in the United States.

\*See Circular 55, C. S. O., May 12.

(nued)

FIELD ARTILLERY							FIELD SIGNAL BN.							Div. Int. Obs. Sec.	Total Infantry Division	Automatic Supply
75 mm. 155 mm. 58 mm. T. M. B.	75 mm. Hdq. Co.	155 mm. Hdq. Co.	75 mm. Regt. 2	155 mm. Regt. 1	Bgd. Hdq.	Total Art. Bgd.	Radio Co. «A»	Wire Co. «B»	O. P. Co. «C»	Bn. Hdq.	Total Bn.					
..	6	8	18	20	..	58	..	..	..	..	..	..	..	102	..	
1	3	4	3	4	1	12*	..	..	..	..	..	..	..	16	..	
3	6	8	24	26	3	80	5	10	10	..	25	..	..	121	•	
..	..	..	..	..	..	..	2	5	5	..	12	..	..	20	•	
..	..	..	..	..	..	..	..	4	..	..	4	..	..	126	..	
12	12	16	48	52	12	172	..	..	..	..	..	..	..	172	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..	
..	..	..	..	..	..	..	3	..	..	..	3	..	..	7	..	
..	..	..	..	..	..	..	2	2	2	3	9	..	..	9	..	
..	..	..	..	..	..	..	1	1	5	..	7	..	..	7	..	
..	..	..	..	..	..	..	1	1	1	1	4	..	..	4	..	
..	20	25	20	25	20	85	40	49	60	..	149	..	..	290	..	
..	..	..	..	..	..	..	..	..	20	..	26	..	..	26	..	
..	..	..	..	..	..	..	..	45	..	..	45	..	..	45	..	
8	24	32	72	80	38	270	1	5	10	..	16	..	..	422	..	

## Appendix II.

### A.—DESCRIPTION AND USE OF PROJECTORS.

#### I.—35 CM. PROJECTOR.

##### (1) Type B.

*Description of the Material.*—The projector comprises:

(1) One short focus mirror, mounted on three adjusting screws and protected by a metallic box provided with a sight and closed by a hinged lid.

(2) One incandescent light, of low voltage, supported by a bayonet lamp holder fastened to the bottom of the metallic box.

(3) One small mirror fastened to the aforesaid holder and intended to screen the direct light of the lamp.

(4) One support socket, with a spring hinged lug and a stop limiting the downward motion of the lamp.

(5) One fastening hook for the projector elevating rope.

(6) One two-piece staff.

(7) One feed cable with a switch.

The whole is inclosed in a wooden box, which contains besides:

One bundle of cotton or gauze for cleaning the mirror.

Twelve spare lamps in a metallic box.

*Mode of use of the material.*—Connect the feed cable to the electric source.

Open the lamp lid and fasten it with the firing pin.

Turn toward the lamp the small mirror screening the direct light.

Operate the lamp by means of the feed cable switch and see that, during the transmission, the sighting tube is accurately directed towards the distant station.

*Adjusting the beam.*—To get the maximum efficiency from the projector it is absolutely necessary to have the beam of light as converging as possible. This result is obtained when the lamp has been accurately focused in the mirror. To this effect, move the mirror as follows:

Tighten the three adjusting screws, but not quite home, then unscrew them till they are even. Verify the adjustment in the meanwhile by flashing the beam horizontally on a vertical wall 20 or 30 meters distant. The luminous spot should be as small as possible and uniformly illuminated.

Projectors will have their lamps adjusted before being shipped.

*Care of material.*—Change the incandescent light when the bulb begins to darken.

Be careful to close the projector lid when not in use.



Clean the mirror with gauze or damp cotton whenever necessary.

## (2) Type C.

*Description of the material.*—The projector comprises:

One short focus metallic mirror fastened by three adjusting nuts and protected by a metallic casing and closed by a safety movable lid.

One incandescent electric light.

One jointed fork supporting the entire mobile part by means of a sighting handle fastened to the metallic casing.

One suspension ring on the end of this fork.

One feed cable provided with a key and a bayonet contact plug.

The whole is inclosed in a wooden case, which contains besides:

Twelve spare incandescent lights in a sheet metal box.

One cotton or gauze wadding for cleaning the mirror.

*Mode of use.*—Having set up the lamp at a suitable height for observing easily through the sight, connect the feed cable to the electric source.

Aim at the objective through the sighting handle so that it appears at the cross wires determining the sight center.

Make the required signals by means of the key.

*Remark.*—When the projector is normally fed from batteries it is absolutely necessary to use only the special bulbs which come with the apparatus to keep the cells from soon becoming unserviceable.

With such a mode of feeding, the lamp should not be used for continuous lighting.

To avoid impairing the mirror and to protect the incandescent light, close the lid as soon as the lamp is no longer in use.

*Adjustment and care.*—To insure normal efficiency of the lamp it is absolutely necessary to have the beam of light as converging as possible. This result will be secured when the lamp is accurately adjusted in the focus of the mirror.

The apparatus will be adjusted in a like manner before being shipped. But a lamp of somewhat different type, used as a spare lamp, may happen to be inaccurately focused. This should be remedied at once. To this effect, move the mirror by screwing or unscrewing the three adjusting screws to the same length.

A catch which must be freed by slightly pressing the mirror prevents these screws from becoming loose.

Control the adjustment by flashing the beam on a wall 20 meters distant. The luminous spot thus obtained should be as small as possible.

Clean the mirror, if necessary, with gauze or cotton wadding, after washing it with pure or slightly soapy water.

## II.—24 CM. PROJECTOR.

*Description.*—The apparatus comprises:

One projector with lid, aiming tube, cable and plug.

One belt with suspenders, carrying 2 bags, each of which contains 4 battery cells and a central bag carrying:

The key.

The contact plug.

Two spare lamps.

The box of the projector contains 8 battery cells and 3 spare lamps.

*Method of use.*—Put the plug in the socket.

Open the lid and aim at distant station by means of the aiming tube.

Signal by using the key with the right hand.

It is essential that the aiming tube be turned exactly in the direction of the distant station during the transmission of the message.

The apparatus may be held in the hand or put on any sort of a pedestal.

*Upkeep.*—Whenever the apparatus is not in use be sure to keep the lid closed so as to protect the mirror.

Avoid pulling the cable fastened to the bottom of the projector when taking it out of the box.

Avoid touching the mirror, which ought to be cleaned with gauze or cotton, and washed, if necessary, with clear water.

*Adjustment.*—The apparatus is adjusted when issued; however, it is possible that the light will be out of focus after the lamp has been changed. In order to focus it, flash the light on the wall, a few yards away, and carefully turn the screws which are around the mirror, until the flash becomes as brilliant and as small as possible.

## III.—14 CM. PROJECTOR.

This apparatus is analogous to the 24 cm. projector, but is smaller. It has one bag, which is carried over the shoulder.

## IMPORTANT NOTICE.

The battery cells or accumulators are very quickly used up if they are used continuously.

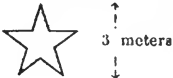
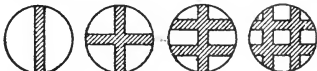
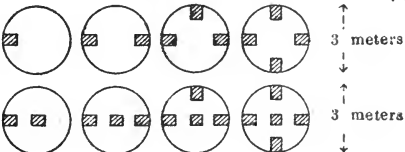


It is especially recommended never to use the apparatus for fixed lights.

The use of signal apparatus as a means of lighting is strictly forbidden.

# APPENDIX III.

## DESCRIPTION OF PANELS.

### IDENTIFICATION PANELS.

DESIGNATION OF UNITS	DESCRIPTION OF PANELS
Army Corps and Cavalry Corps Command Post. . . .	
Division Command Post. . . . .	<div style="text-align: right;">(1)</div>  <div style="text-align: center;"> 1st I. D.   2nd I. D.   3rd I. D.   4th I. D. </div> <div style="text-align: center;"> of the Army Corps. </div>
Command Post of the 1st Brigade of a Division. . . .  Command Post of the 2nd Brigade of a Division. . . .	<div style="text-align: right;">(2).</div>  <div style="text-align: center;"> 1st I. D.   2nd I. D.   3rd I. D.   4th I. D. </div> <div style="text-align: center;"> of the Army Corps. </div>
Regiment Command Post. . . . .	<div style="text-align: right;">(2)</div>  <div style="text-align: center;"> 1st Reg.   2nd Reg.   3rd Reg.   4th Reg. </div> <div style="text-align: center;"> of the Division. </div>
Battalion Command Post. . . . .	<div style="text-align: right;">(2)</div>  <div style="text-align: center;"> Battalion 1st Bat.   2nd Bat.   3rd Bat.   4th Bat. </div> <div style="text-align: center;"> forming unit   of a Regiment. </div>
(1) Each black band 40 centimeters wide. (2) Each black band 40 centimeters wide, Each black square 40 × 40 centimeters.	

*Remarks.*—Mounted cavalry use the same identification panels as infantry, with addition of the cavalry characteristic panel (a square with 2-meter sides, crossed by a black diagonal stripe). The latter need not be displayed if there is no possible doubt.

*Army Corps.*—A five-pointed star 3 meters in diameter.

*Division and Brigade.*—A circular panel 3 meters in diameter.

*Regiment.*—A semi-circular panel 3 meters in diameter.

*Battalion.*—A triangular panel with 2-meter sides.

*Remarks.*—The various command posts are differentiated by black stripes or marks arranged on each face as indicated in the above table.

### ARTILLERY IDENTIFICATION PANELS.

Every artillery battalion or group is equipped with an identification panel of its own, to be placed in the vicinity of its receiving station throughout work with airplane.

The identification panel marks out for observers the emplacement of the receiving station and furnishes a basis for panel signaling. It is made:

For the divisional artillery of a 4-meter square of white canvas, to which one or several movable black squares of 1.33 x 1.33 meters may be applied.

For long heavy artillery by a white canvas lozenge, 4 x 4 meters, whose diagonals are at a ratio of 2-3 and on which several movable black lozenges may be fixed 1.33 x 1.33 meters.



(2) *Command Post rectangular panel.*

A rectangular panel of 2 x .60 meters.

(3) *Artillery Signal panel.*

A rectangular panel of 4 x 1 meters.

(4) *Marking Panel.*

A panel, white on one side, neutral color on the other. (1.) Dimensions, 50 x 40 cm.

(1) Panels white on the one side, orange-red on the other are under experiment.

## Appendix IV.

### SIGNAL AND ILLUMINATING ROCKETS, AND THROWING DEVICES.

#### (1) SIGNAL ROCKETS.

Signal rockets at present in use are:

#### (a) ROCKETS AND SIGNAL CARTRIDGES.

Rockets.	V. B. Cartridges.	Cartridges for 25 mm. pistol	Cartridges for 35 mm. pistol. (Avia- tion.)
With large white stars .....	White parachute star .....	.....	.....
With large red stars .....	Red parachute....	Red .....	.....
With large green stars .....	Green parachute...	Green .....	.....
.....	One star.....	Illuminating with- out parachute...	One star.....
.....	.....	.....	Two stars .....
.....	Three stars.....	Three stars.....	Three stars.....
.....	Six stars.....	Six stars .....	Six stars.....
Caterpillar .....	Caterpillar .....	.....	Caterpillar .....
Yellow smoke.....	Yellow smoke.....	Yellow smoke.....	Yellow smoke.....
Flag .....	.....	.....	.....

#### (b) BENGAL FLARES.

Bengal white flare, 30 seconds.

Bengal red flare, 30 seconds.

## APPENDIX IV (Continued)

## (2) ILLUMINATING FIREWORKS.

(a) *Rockets.*

34 mm. rocket.

(b) *Cartridges.*

V. B. and 25 mm. pistol cartridges: One white star with or without a parachute, of the series "signal" fireworks.

(c) *Bengals.*

White Bengal, 15 and 30 seconds of the series "signal" fireworks.

## (3) THROWING DEVICES.

Very pistols, V. B. tromblons and rocket tubes are supplied by Ordnance Department (see Tables of Equipment).

## NOTE.

(a) *It is essential that the following precautions be taken, when a signal code for fireworks is made out:*

(1) For important signals, the most visible, the most characteristic and the most distinct signals must be used. Fireworks which might be mistaken for one another should be used only for signals which might be confused without too great danger.

(2) When use is made of fireworks belonging to the series of illuminating fireworks, they should be used for signals which cannot be used at night time.

(b) All fireworks belonging to the series of the "signal" fireworks are visible (more or less) during day and night time, excepting rockets and bombs with yellow or red smoke and the flag rocket, which are only visible in daytime.

(c) The need for signal fireworks varies greatly. The armies must make an estimate of the amount of material they will need, and make the arrangements necessary to get their supplies.

# Appendix V.

## MORSE SIGNALS—USE—RULES OF SERVICE.

### I.—MORSE ALPHABET.

#### ALPHABET.

a . —	i . .	s . . .
b — . . .	j . — — —	t —
c — . . .	k — . —	u . . —
ch — — — —	l . — . .	v . . . —
d — . .	m — — —	w . — —
e .	n — .	x — . . —
é . . — . .	o — — — —	y — . — —
f . . — .	p . — — .	z — — . .
g — — .	q — — . —	
h . . . .	r . — .	

#### NUMERALS.

1 . — — — —	6 — . . . .
2 . . — — —	7 — — . . .
3 . . . — —	8 — — — . .
4 . . . . —	9 — — — — .
5 . . . . .	0 — — — — —

The study of the Morse alphabet is made easier by classifying the letters in series of similar character. The table below is given as an example:

. e	— t	. — a	— . n
. . i	— — m	. . — u	— . d
. . . s	— — — o	. . . — v	— . . b
. . . . h	— — — — ch		
	— — . . z		
	— . — . c		
	. — — . p		
— — . g	— — . — q	. . — . é	. — . r
— . — k	— . — — y	. . — . f	— . . — x
. — — w	. — — — j	. — . l	

## APPENDIX V (Continued)

## SERVICE SIGNALS.

— . . . . —	b r	(Request that message be sent)
— . . . . —	a r	(end of message)
. . . . .	s n	(understood) (1)
— . . . . —	a s	(wait)
— . . . . —	?	(repeat)
— . . . . —	==	(separation)

(1) In visual signalling the signal «Understood» is sometimes abbreviated and expressed by one signal dot.

## II.—METHOD OF MAKING SIGNALS.

Morse signals are represented in radio, earth telegraphy and in visual signalling as follows:

The dot by a short flash.

The dash by a long flash.

With signaling flags: The dot is made by showing one flag or some similar object, and the dash by showing two flags or two similar objects.

Interval between two signals of the same letter equals the length of 1 dot.

## III.—SENDING OF SIGNALS.

In order that Morse signals may be legible, it is indispensable (especially in visual signalling):

- (1) That the cadence be not too quick.
- (2) That dots and dashes be very distinct from each other.
- (3) That successive letters be well separated.

The signalers will especially remember the following points:

- (1) They must work without haste.
- (2) They must exaggerate the length of the dashes.
- (3) They must separate two letters very distinctly, in order to allow the receiver to dictate each letter after having read it.

## IV.—SPECIAL INSTRUCTIONS FOR VISUAL SIGNALING.

*Direction of flash.*—It is very important that the flashes be sent exactly in the direction of the receiver.

In case the latter should not see the signals well he should send a series of dots . . . . .

The sending station must examine the apparatus, see whether its direction is correct and whether its lamp works well.

The receiver indicates the variation which he perceives:

(1) He quickens the cadence of the dots, if the light works worse . . . . .

(2) He slows up, if it works better . . . . .

(3) He sends — . . . . — (b r) when the light works normally.



## APPENDIX V (Continued)

**Transmission.**—As a rule there must be at least two men to a signaling station. At the sending station, one of them dictates the message one letter after the other to his assistant, who transmits them; a third may watch the distant station for breaks.

At the receiving station, one signaler reads the signals and then dictates them letter by letter to his assistant, who writes them down; a third stands by the instrument. In order to call another station, the sending station sends the call of that station several times. The latter answers with the signal — . . . . — . (b r).

The message is sent, word by word, and the receiving post sends one dot after each word if it has understood everything correctly; a question mark . . — — . . if it wants the word repeated.

At the end of a message the sending post sends the signals . — . — . (a r). The receiving post sends one dot if it has understood the message.

If it desires some of it to be repeated, it sends the last word which it understood followed by (?) . . — — . .

A station which changes its position warns the station corresponding with it by sending the signal CL (closed), followed, if possible, by the hour and the place where it will resume its work. Example CL— 17.00 Cor 140 (5 p. m. on 140).

The signal = (— . . . —) represents a hyphen.

### EXAMPLE OF TRANSMISSION OF A MESSAGE.

Station call of sending station: C<sub>3</sub>.

Station call of receiving station: F<sub>4</sub>.

C<sub>3</sub> wishes to send a message of 4 words to F<sub>4</sub>.

### TRANSMITTED SIGNALS.

Station C <sub>3</sub> .	Station F <sub>4</sub> .	Remarks.
F <sub>4</sub> F <sub>4</sub> F <sub>4</sub> .....	Understood	
F <sub>4</sub> from C <sub>3</sub> (—)...	b r	
1st word.....	dot.	
2nd word.....	dot.	
3rd word.....	? .....	F <sub>4</sub> has not understood the 3rd word.
3rd word.....	dot.	
4th word.....	dot.	
a r (end of transmission) .....	dot.	

# APPENDIX VI.

## I. SIGNALS MADE BY THE INFANTRY.

SIGNALS	PANELS USED FOR SIGNALLING TO THE INFANTRY AIRPLANE			By radio, earth tele- graphy, visual or acoustic	BY FIRE- WORKS	EXTRA SIGNALS FOR THE USE OF COMMAND POSTS OF I. D. OR BRIGADE, DIVISION OR REGI- MENT
	Battalion	Regiment	Division or Brigade			
OBJECTIVE REACHED				---		<p>Extrasignals whose meaning must not be fixed once for all, but must always be indicated in the orders.</p> <div>  1            2            </div>
REQUEST FOR BARRAGE FIRE.				---		
REQUEST FOR PREPARATORY FIRE FOR ATTACK.				---	Code fixed	
FRIENDLY LIGHT ARTILLERY IS FIRING ON US.				---	by the Generals commanding the armies,	
FRIENDLY HEAVY						

ARE READY TO ATTACK.						to the necessities of the moment and the supply of fireworks.	4
WILL NOT BE READY TO ATTACK AT THE HOUR SET.							5
WISH TO ADVANCE, INCREASE RANGE.							6
SUPPLY OF CARTRIDGES.							7
SUPPLY OF GRENADES.							8
UNDERSTOOD OR (1) MESSAGE RECEIVED.							9

(1) The signal "understood" (by panels) must be given after receiving each message sent by the airplane by means of radio. It is the only way the observer has of knowing whether his sending apparatus is working.

NOTE. -- The conventional signals made by radio, earth telegraphy, visual or acoustic means must be repeated several times to avoid all risk of their being confused with the call letters.

## APPENDIX VI (Continued)

## II. SIGNALS MADE BY THE INFANTRY AIRPLANE.

A. *By means of signal cartridges or projectors.*

I am the airplane of (X) division.....  
 Where are you? (order for marking positions) .....  
 Understood .....  
 Threatening counter-attack in the direction of my flight.....  
 Organizations I am flying over seem to be poorly manned.....  
 Order to attack under such and such conditions (as fixed in the plan of engagement) .....  
 Attack postponed (under conditions prescribed in the plan of engagement).....  
 Do you hear my radio?.....

Code to be fixed by army commanders according to emergencies.

B. *By Radio Telegraphy.*  
List No. 1.

ART Artillery.  
 AVI Enemy airplane.  
 BAV Anti-aircraft battery.  
 BCA Anti-tank battery.  
 BTA Battery in action.  
 BTO Battery occupied.  
 CAV Cavalry.  
 COV Train (convoi).  
 DIR Direction (followed by the name of the locality).  
 DRO Right at .....  
 EST East of .....  
 FDF Wire. . . . .  
 FRO Front (followed by a figure indicating the length in meters).  
 GAU Left at .....  
 IFC Infantry in columns.  
 IFD Deployed infantry.  
 IFR Massed infantry.  
 IDI Here available airplane.  
 NOR North of .....  
 OUS West of .....  
 PRF Depth (followed by a figure).  
 QUE Rear at .....  
 RAS Nothing to signal.  
 SUD South of .....  
 TAM Friendly troops.  
 TCF Railway train.  
 TET Head at .....  
 TRA Trenches.

## APPENDIX VI (Continued)

REG Airplane wants to adjust. (Signal to be sent after the objective has been designated, whenever the observer is in position to secure satisfactory adjustment.)

RLV Relieve me.

VRV Am coming to relieve you.

From 41 to 94 (do not use multiples of 10); designation of localities or important points.

Each army will be given the numbers which it may use. The numbers will increase from the left to the right of an army, in order to avoid error at the meeting point of two neighboring armies.

*List No. 2.*—Coded according to instructions laid down in Note No. 6385 from General Headquarters, dated March 6, 1918:

Communicating trench.

Trench.

Grenade flight at . . .

Command post of battalion at . . . .

Command post of brigade at . . . . .

Command post of division at . . .

Command post of regiment at . . . .

Indications of enemy attack at . . .

I do not see troops at . . .

Friendly troops at . . .

Friendly troops progressing at . . .

Friendly troops stopped while progressing at . . .

Friendly troops retreating at . . .

Enemy troops at . . . .

Enemy troops progressing at . . .

Enemy troops retreating at . . .

Very heavy enemy barrage fire at . . .

I see no points of fall at . . .

Friendly tank at . . .

Enemy tanks at . . .

Enemy machine gun at . . . . .

*List No. 3.*—Refer to table of radio signals made by the infantry.

## CODING OF CO-ORDINATES.

Co-ordinates will be coded as prescribed in Note No. 6385 from General Headquarters, dated March 6, 1918.

## Appendix VII.

### TRANSMISSION OF STANDARD TIME.

I. In every unit some radio stations are commissioned to receive every day standard time from the Eiffel Tower.

II. The Tower transmits standard time three times a day, i. e., at 10 a. m., at 10:45 a. m., and 11:45 p. m. (Greenwich time, the time used by Allied armies in France and by French railroads.)

At 10 a. m. it transmits a number of signals, of which only those transmitted in the last minutes should be retained.

From 9:45 to 9:59 a. m. a series of "N's" (— .) with 10-second intervals and ending with three dashes, the termination of which means 9:59 precisely.

From 9:59 to 10 a. m. a series of "G's" (— — .) with 10-second intervals ending with three dashes, the termination of which means 10 a. m. striking.

At 10:45 a. m. and 11:45 p. m. standard (Greenwich) time is transmitted in the following manner:

At the hour plus 44 minutes, a series of dashes during 55 seconds, 5 seconds silence, one dot at the hour plus 45 minutes.

At plus 46 minutes, a series of dash two dots during 55 seconds, 5 seconds silence, one dot at the hour plus 47 minutes.

At plus 48 minutes, a series of dash four dots during 55 seconds, 5 seconds silence, one dot at plus 49 minutes.

III. Standard time should be received as follows:

While the Tower is sending preliminary signals, the radio operator on duty will adjust his receiving apparatus and carefully watch the motion of the split second hand of a stop watch.

Just as the Tower sends the signal indicating the precise time, he will carefully note down the time of the watch. By comparing the watch time with the transmitted time he will get the correction to be applied to the watch.

To avoid any mistake, do not attempt to time the reference watch itself.

IV. The radio officer for infantry and artillery units, the local radio service for large unit staffs, are responsible for reception of standard time.

V. All advisable measures must be taken within the units to insure standard time transmission over the telephone to the most advanced units. The lists of units to receive daily time transmission should be posted in every telephone station.

APPENDIX VII (Continued)

VI. For transmission of standard time over the telephone, the transmitting operator will call up the receiving station and announce:

"Am going to transmit standard time at (such) hour."

He then watches the split second hand of a stop watch, taking into account the required correction, warns his correspondent 10 or 15 seconds before the time announced by calling, "Ready," and just as the split second hand passes on the required division he announces the time, calling, "Time." The receiving operator goes through the same performance as the radio operator when receiving from the Tower.

VII.—*Standard time transmission must be very carefully performed in order to avoid any mistake.* It is highly advisable that radio and telephone operators assigned this duty should be specialized.

Paragraph II, sub-paragraphs Nos. 1, 2 and 3, G. O. No. 79, H. A. E. F., Dec. 20, 1917, gives the manner of handling time on telegraph and telephone lines of the American Expeditionary Forces as follows:

"II. 1. Beginning at midnight, December 25, 1917, Greenwich time is announced as the standard time for the American Expeditionary Forces.

"2. The Signal Corps is charged with the telegraphic and telephonic distribution of this time. All business on telegraph lines will be suspended daily at 10:42 a. m., when the operator at H. A. E. F. will take control of the lines. Following the radio signals from the Eiffel Tower, a series of "N's" (— : — . —.) will be sent until 10:44. Then for 55 seconds a series of "T's" (— — —) are sent. At five seconds before 10:45 there is a pause, and at 10:45 exactly a dot is signaled, and business on lines may be resumed. At offices not reached by telegraph and where telephone centrals are installed, the lines will be reserved for time signals, beginning at 7:57 a. m., and the final time signal will be sent at 8:00 a. m., when business on the lines may be resumed.

"3. At each important telegraph and telephone office a clock or watch will be designated as the standard for local time by the signal officer in charge of the station, and such timepieces will be kept carefully regulated, if required, at least once per day.

"4. The Chief Signal Officer, A. E. F., will arrange for the distribution of time from H. A. E. F., and will prepare the necessary instructions to carry this order into effect."

## Appendix VIII.

### A SUMMARY OF THE ORGANIZATION AND WORKING OF CARRIER PIGEONS.

#### PERSONNEL.

##### (a) DIRECTING PERSONNEL.

- (1) One officer from each army corps staff.
- (2) One officer from each divisional staff.
- (3) One non-commissioned officer for each regiment or independent battalion (1). Besides, there is a non-commissioned officer stationed at the loft by order of the large unit working it. He is charged with the operation of the service; he inspects the stations at the front; lets out and shuts up the pigeons; supervises the wording of messages; numbers and files in a list the equipment intrusted to his care. He sees to it that the messages received at the loft are forwarded without delay.

##### (b) OPERATING PERSONNEL.

###### *Pigeon Keepers of the Stations.*

- (1) Two men for each divisional headquarters.
- (2) Two men for each brigade headquarters.
- (3) Eight men for each regiment of infantry.
- (4) Four men per artillery regiment.

This personnel is charged with the supervision, the care and the handling of the birds; with the sending of messages, and sometimes with the transport of the birds.

#### ORGANIZATION OF THE STATION.

Each station is composed of:

Two pigeon keepers.

The pigeons and the necessary material.

The liaison between the post and the pigeon loft is kept up by a flight of 12 pigeons, divided into three lots (designated by letters A, B and C) of four birds each.

One loft is made up by the necessary material and a complete squad of men. It is forbidden to bring to the posts texts of special orders on the use of the pigeons.

The relief is made every other day, or every third day (in the evening or at night). The birds relieved are not dismissed until next morning, one by one, and they then carry dispatches, by way of exercise. At each relief, the commanding officer retains the two flights if the circumstances require such action. A small post with two birds may be detached with a company on special duty. An infantry basket will then be used.

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(1) Under the supervision of the officer in charge of liaison.



# Appendix IX.

## CHARACTERISTICS OF FIREWORKS.

FIREWORKS AND THROWING DEVICES.	DISTINCTIVE MARKS	REMARKS
<b>ROCKETS.</b>		
Large (white, red or green) star rockets	Colored band.	
Caterpillar rocket.....	inscription on a	
Yellow smoke .....	label wrapped	
Flag .....	round the rocket	
Illuminating rocket of 34 mm.	head.	
<b>V. B. CARTRIDGES.</b>		
White with parachute .....	O.	
Red with parachute .....	R.	
Green with parachute .....	V.	
One star .....	*	
	*	
Three stars.....	* *	Marks in relief.
	*	
	*	
	*	
Six stars .....	* *	
	* * * * *	
Caterpillar .....	inscription on a	
Yellow smoke .....	yellow disc, stuck	
	on closing plug.	
<b>25 MM. CARTRIDGES</b>		
Red .....	R.	
Green .....	V.	
Illuminating without parachute.....	*	
	*	
Three stars.....	* *	Marks in relief.
	*	
	*	
	*	
Six stars.....	* *	
Yellow smoke .....	inscription and	
	yellow varnish on	
	closing plug.	
<b>.35 MM. CARTRIDGES.</b>		
One star .....	*	
	*	
Two stars .....	* *	
	*	
	*	
Three stars.....	* *	Marks in relief.
	*	
	*	
	*	
Six stars.....	* *	
	* * * * *	
Caterpillar .....	Label on base, yellow or red paint	
Yellow or red smoke .....	on plug.	
<b>BENGAL LIGHTS</b>		
Bengal white light .....	Color band	
Bengal red light.....		

# Appendix X. ORGANIZATION OF LIAISONS.

## ARTILLERY LIAISON.

In Corps Artillery and Divisional Artillery.

ATTACHED TO	PROVIDED BY	ESTABLISHED
Corps Commander.	Technical Liaison. Commander of Corps Artillery, 1 officer.	When commander Corps Arty. leaves Corps Commander.
Commander Corps Arty.	Regimental Commanders Corps Artillery, 1 officer.	Always.
Regtl. or Group Comdrs.	Battalion Commanders of Corps Artillery, 1 officer.	Always.
Battalion Commanders.	Battery Commanders of Corps Artillery, 1 N. C. O.	Always.
Comdr. Corps Arty.	Commander Corps T. M. Bn., 1 officer.	Always.
Comdr. Corps T. M. Bn.	Battery Commanders Corps T. M. Battery, 1 N. C. O.	Always.
Comdr. Corps Arty.	Commander Corps Artillery Park, 1 officer.	Always.
Division Commander.	Brigade Commander, Division Artillery Brigade, 1 officer.	When Comdr. Div. Art. Brig. leaves Div. Comdr.
Regtl. or Group Comdrs.	Battalion Commanders, Divi- sional Artillery, 1 officer.	Always.
Battalion Commanders.	Battery Commanders, Division Artillery, 1 N. C. O.	Always.
Comdr. Div. Arty. Brig.	Regiment Commanders, Divi- sional Artillery, 1 officer.	Always.
Comdr. Div. Arty. Brig.	Commander Divisional T. M. Battery, 1 N. C. O.	Always.
Comdr. Div. Arty. Brig.	Commander Divisional Ammuni- tion Train.	Always.
	Tactical Liaison.	
Commander of the unit with which it is as- signed to work or sup- port.	Commander of a Group, Regi- ment or Battalion of Corps Artillery, 1 officer (Liaison Chief). Such N. C. O.'s and soldiers with communication material as may be necessary.	When assignment is made.
Commander of the unit with which it is as- signed to work or sup- port.	Commander of a Group, Regi- ment or Battalion of Divisional Artillery, 1 officer (Liaison Chief). Such N. C. O.'s and soldiers with communication material as may be necessary.	When assignment is made.







