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United States. Army.
American Expeditionary

[Report of Superior Board on
Organization and Tactics.]

U. S. Army Military History Institute

United States Army, American Expeditionary Forces, Superior Boards on Organization and Tactics

Report of Superior Boards on Organization and Tactics

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Report

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PROCEEDINGS OF A BOARD OF OFFICERS, CONVENED BY

THE FOLLOWING ORDER:

"General Headquarters, American Expeditionary Forces

General Orders)
No. 68) France, April 19, 1919.

EXTRACT

* * * * * * * * * *

BOARD OF OFFICERS TO CONSIDER TACTICS

AND ORGANIZATION.

Par. IX. 1. A board of officers, consisting of:

Major Gen. J.T. Dickman, U.S. Army;
Major Gen. J. L. Hines, U.S. Army
Major Gen. William Lassiter, U.S. Army
Brig. Gen. H. A. Drum, U.S. Army;
Brig. Gen. W. B. Burtt, U.S. Army;
Col. George R. Spaulding, Engineers
Col. Parker Hitt, Signal Corps,

is appointed to meet at these headquarters on April 21, 1919, to consider the lessons to be learned from the present war in so far as they affect tactics and organization.

2. The proceedings of previous boards on the subjects of staff organization, Field Artillery, Heavy Artillery, Cavalry, Infantry, Signal Corps, Engineer Corps and Medical Corps will be made available for the use of this board.

3. Such journeys as may be necessary for the members of the board to attend meetings thereof and return to their proper station are necessary in the military service.

* * * * * * * * * *

By command of General Pershing:

JAMES W. McANDREW,
Chief of Staff."

Official:
ROBERT C. DAVIS
Adjutant General.

- -

1. The Board met, pursuant to the foregoing order, at Chaumont, France on 27 April, 1919, present all the members, and thereafter at various times at Chaumont and at Trier, Germany. General H. A. Drum, G.S. ceased to be a member of the Board on 21 June, 1919, by reason of departure for the United States, in compliance with G.H.Q. orders. Lt. Col. F. E. Uhl, G.S. was appointed secretary to the Board by Par. 110, S.O. 123, G.H.Q., A.E.F.

2. The following report is submitted in compliance with the order convening the Board and the verbal instructions of the Commander-in-Chief supplementing that order. It is a study of the complete organization of an army operating with its own supply system. It includes all phases of such an organization. The conclusions arrived at and set forth herein are based upon the experience of the American Expeditionary Forces during the present war. The Board has had access to reports of minor boards convened in each arm and service to deduce the lessons of the war so far as these affected their own particular arms or services, and to make the necessary recommendations for further improvements; where it was thought desirable, the conclusions thus arrived at have been embodied in this report.

3. The field forces necessary for a great war will be so large that they must be organized into several field armies. In addition to field armies there must be the Directing Head and the Service of Supply. In order to show "the complete organization of an Army operating with its own supply system," the Board has discussed separately the Directing Head, the Service of Supply, and one complete field army, as well as their relation one to another.

Under the "Directing Head" are included the Commander-in-Chief and his staff. The troops under the immediate command of the Commander-in-Chief and constituting the G.H.Q. reserve are discussed under the appropriate headings in this report. These troops include such infantry and cavalry divisions as may be necessary, the general reserve of artillery and certain aviation, engineer, signal and other special troops.

The field army is considered to comprise three corps of four divisions each, and is organized so as to be a fighting unit complete in all respects as determined by our experience in this war.

The organization of the Service of Supply must necessarily be governed by the conditions under which the field forces are acting. The number of bases and the length of the line of communications will be determined by these conditions. Moreover, the Service of Supply organized for a single field army would, with slight increases, be sufficient for a field force comprising two or more field armies. In this report are shown the essential requisites of the organization of a Service of Supply. The strength

in personnel assigned to S.O.S. must be regulated by requirements of each particular case.

4. Subdivisions of Report. In view of the foregoing considerations, the matter to be reported on by the Board groups itself into the following principal subdivisions, namely:

The Directing Head;

The Separate Arms of the Combat Forces;

The Arms Combined;

The Administrative Services;

The Supply Services.

DIRECTING HEAD.

Analysis of Contents:

I. Command.

II. The Staff.

III. General Headquarters of the Forces in the Field.

IV. Chiefs of Arms.

V. Chiefs of Services.

THE DIRECTING HEAD.

COMMAND

5. No greater lesson can be drawn from the World War than that Unity of Command is absolutely vital to the success of military operations. All the activities of a separate military organization, large or small, must be controlled by the single mind of the commander.

It has not always been understood that much of the power and force of a military unit rests in the will, personality and character of the commander. No system of control must then be permitted which lessens in any degree the prestige of the commander. The idea of unity of command and the supremacy of each commander in his own sphere, subject only to the control of his superior commanders, must dominate our whole system and be fully inculcated in the minds of all.

Commanders up and down the scale of command must confer directly on all matters of large moment. It is important for superior commanders to maintain close personal relations with their subordinate commanders, keep them in their confidence and keep them informed of policies and the general trend of events.

It is necessary to keep the fact emphasized that members of the staff have no control or authority save only as the delegates and representatives of the commander whose will and intentions they reflect.

THE STAFF

6. A military command necessarily includes a great number of separate arms and services, each having its special part to play. The following are the usual components of a division, corps or army:

Arms:	Services:	
Infantry; Artillery Cavalry; Aeronautics.	Administrative Staff . . .	(Adjutant, (Inspector, (Judge Advocate, (Chaplains, (Provost Marshal.
	Technical Staff . . .	(Engineers (Signals (Medical (Motor Transport
	Supply Staff . . .	(Quartermaster (Ordnance (Transportation
	Headquarters Commandant	

It is obvious that the commander cannot, as an habitual thing, deal directly with so many separate executive agencies. He cannot possibly have the time and endurance to regulate their affairs so as to insure combined action, and also have the leisure for thinking out the plans and policies to be pursued. The load of routine direction and coordination must be taken from his shoulders by a small group of special assistants, each having a certain part of the work to direct.

The General Staff was incorporated in our military system because the need of an intermediary between the commander and his arms and services was in part appreciated. The General Staff was provided as a planning and coordinating agency. But "coordination" is a word open to a variety of interpretations. What we really need is a "Planning Staff" and an "Operative Staff." At the War Department the two agencies are separate, one comprising the great deliberative body of the General Staff charged with the study of our possible military needs and the formulation of military plans and policies; the other charged with putting the approved plans and policies into effect. In the tactical commands,--divisions, corps and armies--, the two agencies are identical; one small group of officers must assist the commander in preparing plans and then must issue the orders procuring combined action and making the plans effective.

Our experience in the war has shown conclusively that each commander must have a Chief of Staff who is his principal staff officer, and a small operative staff divided into sections, each section dealing with a particular class of duties, and hence with the arms or services charged with performing

those duties. After various experiments the duties have finally been classified into four sections, as follows: Personnel, Military Intelligence, Operations, and Logistics.

Personnel has to do especially with the human element; with recruiting and replacement; with discipline and punishments; with morale and welfare activities; with routine administration, records and statistics; with the operation of a Personnel Bureau dealing with efficiency reports, the promotion, assignment, transfer, elimination and replacement of officers, and with awards, honors and decorations. The activities of the Adjutant General, Inspector General, Judge Advocate General, Provost Marshall General, and Chaplains are embraced in this category.

Military Intelligence embraces all the activities involved in gathering, collating and disseminating information of the enemy, and includes secret service, topography and censorship.

Operations embraces the studies, plans, orders and movements necessary to provide for the strategical and tactical employment of the troops and includes liaison, training, organization and equipment.

Logistics embraces all that has to do with the supply of armies. As here used it covers the procurement, transportation, storage and distribution of supplies of all kinds, the replacement of animals and the essential activities incident to these functions, including construction, hospitalization and evacuation. The activities of the Engineer, Signal, Medical, Motor Transport, Quartermaster, Ordnance and Transportation services are embraced in this category.

The division of staff duties thus defined should exist at the War Department and should extend down through all the tactical commands to include the battalion. In units down to include a division, a Director with the necessary assistants must be at the head of each of the sections of the operative staff; their designation should be "Director of Personnel", (G-1), "Director of Intelligence", (G-2), "Director of Operations", (G-3), and "Director of Logistics", (G-4). In the lower units the staff officers already provided are assigned to perform duties corresponding to the above, that is, there is a Personnel Officer, (G-1), an Intelligence Officer, (G-2), and Operations Officer, (G-3), and a Supply Officer, (G-4).

7. The crucial questions in establishing our system of command and staff are to define clearly the channels of authority, to fix responsibility and to stimulate in each of the many members of the military machine the absolutely indispensable spirit of mutual confidence and mutual helpfulness.

Considering the great number and variety of the combat arms and auxiliary services and the imperative need of harmonizing their various activities and interests, it is unavoidable that the operative staff above referred to shall be interposed between the commander and his numerous subordinates. But it is equally indispensable to give to each subordinate all the initiative and latitude consistent with coordination so that each of these officers will feel stimulated to his utmost efforts.

In his Operative Staff the commander has a small group of officers freed from details of execution but cognizant of the working of the whole military machine who can, in close cooperation, work out together the plans enunciated by him and formulate the orders for putting these plans into effect. They are the ordinary channels of communication with the commander. But no difficult barrier is to be constructed between the commander and the heads of his different arms and services. They are the experts in their particular lines and where disagreements as to policy arise the commander is entitled to have their views direct. It devolves on the commander, and especially on his chief of staff to develop good feeling and a spirit of accommodat throughout the command. Each head of an arm or service must feel that he is in the confidence of the commander. Situations are explained and tasks are assigned in such a way as to define the part each is to play. The responsibility then lies with the heads of arms or services to choose the means and methods adequate to obtain the success of the operation as a whole.

The commanders of combat arms deal in all ordinary matters with the superior commander through whichever director is charged with the particular matter at issue, whether of personnel, intelligence, operations, or logistic Their responsibility is direct to the superior commander.

The services are more numerous than the arms, their interests are apt to be much more conflicting, especially in matters of supply, and hence their activities must be more closely regulated than in the case of the arms.

The question of responsibility hence often becomes acute. For these reasons, and also in order to reduce the amount of routine work coming direct to the commander, the immediate responsibility for the operation of the services should be placed on the directors of personnel and of logistics, respectively. The heads of the administrative services, while of course ultimately responsible to the commander, should be directly responsible to and under the orders of the Director of Personnel, G-1; and similarly the heads of the technical and supply staff should be directly responsible to and under the orders of the Director of Logistics, G-4.

8. It is important for commanders to watch carefully the working of their staff system to check overlapping. If it is found that the operative staff tends to absorb the functions of the arms or services, or if the latter fail to adapt themselves to team work, the remedy is to remove the individuals concerned and not to clog the system by improper distribution of duties. Thus it is inappropriate for directors of sections of the operative staff to build up bureaus of particular arms or services in their own offices. This practice confuses responsibility and violates the principle of independence of function. The heads of arms or services are the proper advisers as well as executors of all that pertains to their specialty.

9. The question arises whether the members of this operative staff shall be General Staff officers. This is largely a matter of a name. The important considerations are that all officers serving on this operative staff must have been educated in General Staff duties, and that they must be specially selected and detailed for duty in this operative staff for periods not exceeding four years. If these conditions are complied with, it does not matter what name they are given; and confusion of thought as to their fuctions may be avoided not only in the army, but in the country at large, by giving them the name "Operative Staff" as the name defining most nearly their true function. The name "General Staff" could then be reserved for the deliberative body of selected officers sitting in Washington to study and formulate our larger plans and policies, and for the Chiefs of Staff of tactical commands.

10. Supervision. The question often arises of the amount of supervision to be exercised within any particular Arm or Service by its own chief. On the one side it is pointed out that as the commander is supreme in his own unit

all business must be done through him or his operative staff; on the other, that after policies are decided, many details have to be worked out by conference between the chiefs of a technical or administrative service with the corresponding chiefs in the lower units.

It is obvious that the commander and his operative staff must have cognizance of what is going on in every part of the command, and that a separate system entirely outside of the regular chain of command cannot be tolerated. The only matter open for discussion is the practical one of how to get business done in conformity with this principle and so as to insure expeditious and intelligent carrying out of plans without friction.

The great services, such as Engineers, Signals, Medical, Quartermaster, Ordnance, are huge business organizations in which numberless details come up daily requiring adjustment and mutual understanding. If all of these details in a field army have to pass from a Chief of Service to his operative staff, thence to the operative staff of the next higher or lower unit, and so on to the next Chief of Service, it is evident that business would be clogged, that the operative staff would be absorbed in details and that the machinery at hand would not be employed to the best advantage. In practice the Chiefs of Service within a field army always have conferred directly, and always must do so, as to the execution of well-understood projects and as to the daily routine. Moreover, commanders of all grades will always want them to act in this way so long as they, or their operative staffs, are kept informed and can influence action if they so desire.

The solution of the matter then lies not in making a rigid rule dividing the field army up into closed compartments and affecting everybody, but in getting rid of the individual who fails or refuses to play in the team.

The principle to be laid down is that, in details affecting the routine of one service or the details of an approved project, the chiefs of arms or services of armies, corps and divisions confer directly, the chiefs of the superior units supervising and coordinating the work of the lower. Each subordinate chief, of course, must keep his operative staff informed of any essential detail of which it should be cognizant. This is Direct Supervision. But where new policies or new projects requiring general coordination are concerned, the chief of arm or service of the higher unit recommends

to his own operative staff the action to be taken, the same, if approved to be promulgated in the regular way in orders throughout the command. This is Indirect Supervision.

Both direct and indirect supervision are the rule in the staff of armies, corps or divisions. At. G.H.Q., or at the War Department, broad policies rather than detailed operations are involved; and here the supervision exercised by a chief of arm or service over the affairs of such arm or servic in the tactical commands must be of the indirect kind, namely, by recommendat to the C. in C. through the operative staff. By technical inspections, howev the chief of arm or service must keep in touch with the situation and needs o his arm or service throughout the tactical commands.

GENERAL HEADQUARTERS OF THE FORCES IN THE FIELD.

11. Much discussion has taken place during this war as to the relative location of the Commander-in-Chief with his special staff on the one hand and the main executive and administrative headquarters on the other; and also as to the determination of the personnel that should be at each of these headquarters. A solution which appears to meet the general case as well as any that can be devised is to have:

(a) A main headquarters, somewhat in advance of the base, where the heads of all the great administrative, technical and supply services are located, and where are also located such other immobile agencies as the C. in C. designates. These headquarters to be termed "G.H.Q."

(b) An advanced headquarters, moved from place to place as the progress of the campaign requires, where are located the C. in C., the Chief of Staff, and such members of the Operative, Technical and Administrative Staffs as the C. in C. deems necessary, and to be termed "Advanced G.H.Q."

G.H.Q. is always in the Zone of the Services of Supply. Advanced G.H.Q. may be either in the Zone of the Armies or the Zone of the Service of Supply.

The troops in the Zone of the Armies are under the various army commanders.

The troops in the S.O.S. are under a commanding general who habitually receives the C. in C.'s orders and instructions through the Director of Logistics,(G-4).

The principal office of the Director of Logistics is at G.H.Q., where are also located the offices of his immediate subordinates, the Chiefs of the Technical and Supply Services. The office of the C.G., S.O.S., is also at G.H.Q. If the Director of Logistics is at Advanced G.H.Q., he has a deputy who represents him at G.H.Q.

CHIEFS OF ARMS.

12. At the War Department and at G.H.Q. It is necessary to have at the War Dartment and at G.H.Q of the forces in the field, for each of the combat arms, an officer of large experience with a suitable staff to act as the focus for the technical development of each one of these arms. If there is no such definite agency for this purpose there is no progressive development, due to the lack of someone to push this development. Our experience has clearly shown this to be true. A strong impulse must come from the heart of the system, the War Department or G.H.Q.; otherwise there is sluggishness or at best sporadic activity. The high command through the General Staff must define the general policy; but a special agency for each arm must study, work out and keep up to date the means and methods applicable to tactics, training equipment and organization, so that a common doctrine in accordance with the general policy may be provided for each arm throughout the whole army. Furthermore, this agency must inspect so as to keep in touch and report on progress made.

For the foregoing reasons a Chief of Infantry, a Chief of Artillery a Chief of Cavalry and a Chief of Aeronautics with appropriate staffs, should be at G.H.Q. of the field forces and at the War Department.

The functions of Chiefs of Arms at G.H.Q. or the War Department, are defined as follows:

(a) To advise the C. in C. and the General or Operative Staff as to all matters affecting their special arms.

(b) To work out, in accordance with the general policy, the particular methods and means in tactics, training, organization and equipment necessary to keep their arms abreast of the times, including preparation of appropriate manuals and other literature, submitting their recommendations to the Chief of Staff.

(c) In connection with any particular campaign, to foresee the needs with respect to armament, equipment and ammunition of various types, and with respect to general or special reserves of troops to be held at the disposal of the high command, and to make timely recommendations thereon.

(d) To make technical inspections from time to time of troops of their arms.

(e) To exercise direct supervision over any troops or schools of their particular arms which are held under the immediate orders of the War Department, or G.H.Q.

13. In tactical units. The situation with respect to the chiefs of arms in the tactical units (armies, corps and divisions) is somewhat different. The commanders of the different arms of each unit are available to perform the functions involved. The duties which devolve upon the commanders of infantry or cavalry differ from those devolving upon artillery and aeronautics; for the former are concerned only with their particular commands, while the latter, in addition to commanding their own units, should assist in coordinating the employment of all the artillery or aeronautics of the whole army or corps or division as the case may be.

With respect to artillery, the essential reason for this is that the power of all artillery may be combined, and hence should be combined, so that while each element has its particular part to play, the action of all may be fitted into a general scheme for breaking down the enemy's resistance. Zones of action must be assigned so as to prevent unnecessary overlapping; the distribution of the ground available for positions must be made between the artillery of different commands; mutual assistance must be arranged for; allotments of guns and ammunition must be made to meet the special requirements of the action. For these and many other duties the action of a Chief of Artillery is required. His duties are, first, to employ his own guns and, second, to supervise the employment of the guns of the lesser units so that the plans of the commander may be carried out. He cannot employ his own guns or advise as to the employment of guns of lesser units so that their action will respond quickly to the needs of action unless he is in close touch with the views and intentions of the commander. Hence his post of command must be near that of the superior commander.

To secure a like coordination of all the aeronautic forces assigned the unit, the commander of aeronautics of each division, corps and army should also act as Chief of Aeronautics at each headquarters.

Besides exercising his proper functions of command, each such chief should:

(a) Act as adviser to the commander and his operative staff.

(b) Make inspections of his own arm throughout the unit concerned with respect to organization, training, materiel, equipment, and all other matters affecting efficiency, submitting suitable recommendations to the Chief of Staff based on these inspections and on study, investigation and experience.

(c) Supervise the instruction and training of all units of his arm in accordance with approved training policies.

(d) In accordance with the approved plan of operations, make the detailed plan for the troops under his direct command, and recommend, through the operative staff, such plans for all the troops of his arm as will promote coordinate action; exercise such supervision over all elements of his arm as will insure their employment in accordance with the approved plan.

(e) Apportion the supplies and material placed at his disposal; make such timely requisitions for supplies and material as will insure proper equipment; and organize and direct all disposition of material and supplies so as to insure the carrying out of the approved plan.

CHIEFS OF SERVICES.

14. In tactical commands. At the headquarters of each division, corps or army, there should be an Engineer, Signal, Medical, Motor Transport and Veterinary Officer (heads of the Technical Staff); a Quartermaster, Ordnance, Transportation, and Remount Officer (heads of the Supply Staff); and an Adjutant, Inspector, Judge Advocate, Chaplain, Provost Marshal, and Headquarters Commandant (heads of the Administrative Staff).

These officers work directly under G-1 or G-4, as the case may be, but their duties are analogous to those of the Chiefs of Artillery and Aeronautics as just described in the preceding paragraph.

15. At the War Department or G.H.Q. The duties of the heads of the great services, at the War Department or at the headquarters of the field forces, differ considerably from those of the Chiefs of Arms. As advisers to the C. in C. and the General and Operative Staff, and as charged with devising the ways and means for securing the technical development of their services in accordance with approved policies, their duties are analogous to those of the chiefs of arms. But they are largely concerned with logistics or pure administration and these are subjects which only indirectly affect the chiefs of arms.

The chiefs of the administrative services function under the orders of G-1, G.H.Q., and the chiefs of the technical and supply service under the orders of G-4, G.H.Q.

In order, however, that the heads of these great technical services may perform their duties intelligently, they must be constantly in touch with the situation existing in their special services throughout the theatre of operations, especially with respect to technical requirements and improvements. Hence they must be required to make frequent inspections, personally or by deputy, and submit the necessary recommendations for action to G-4, G.H.Q. They thus exercise indirect supervision over the operations of their services in the Zone of the Armies.

THE SEPARATE ARMS OF THE COMBAT FORCES

Analysis of Contents:

I. Infantry (including Machine Guns and Tanks).

II. Artillery (including Anti-Aircraft Artillery).

III. Cavalry.

IV. Air Service.

V. Engineers.

VI. Signal Troops.

VII. Medical Troops.

I INFANTRY

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INFANTRY

16. The following tactical lessons may be derived from this war:

A. The infantry remains the predominant and basic arm. No offensive can be launched without infantry. Victory cannot be assured without an aggressive, highly trained, disciplined and intelligent infantry which possesses in the highest degree the qualities of combined and individual initiative, determination and resoluteness. The functions and decisive tasks of infantry in modern war demand that it be composed of the best personnel and material available and that every effort be made to foster in it a high state of morale and esprit de corps. The new infantry armament coupled with the difficulties of leadership and the hardships of prolonged and constant fighting makes the infantry the most difficult to train and to control in battle. The foregoing conclusions dictate that the infantry of an army must be recognized as the basic arm and all other arms must be organized and made subordinate to its needs, functions and methods. Any other conclusion must lead to a curtailment of the infantry's offensive power and therefore to a curtailment of the offensive capability of the army.

B. It is believed that, from a tactical viewpoint, the war of the future will follow the tactics of that phase of the European War covered by the offensive and defensive battles of 1918, a combination of position and open warfare. It is probable, especially in the United States, that natural barriers as they existed in Europe will not always be found to protect an enemy's flanks.

Therefore, from the viewpoint of the larger units, the tactical principles of envelopment are those usually applicable to an army. The Division, on the other hand, utilizes the tactics of penetration as a rule while the Army Corps may be called upon for operations involving the principles either of penetration or of envelopment.

The foregoing conclusions should guide in the composition and organization of the larger units and decide the basic question of the two or three unit organization. The two unit organization is better

suited for the tactics of penetration, while the three unit system responds better to the requirements of the tactical principles of envelopments.

C. The well known necessity for a close association on the part of all other arms with the infantry is clearly illustrated in this war. In fact, the lessons of the war show that there must be a tactical subordination on the part of other arms to the tactics and the command of the infantry. Otherwise the offensive power of the infantry will diminish and may even be entirely lost.

To attain this tactical subordination, the organization of the higher units of all other arms should be based on their serving, in combat, specific infantry units.

The primary infantry combat units are the battalion and the brigade. The artillery, machine guns and other supporting units should be organized so as to provide suitable tactical and command association with infantry units.

D. This war has especially developed the machine gun, the air service and tractor artillery. The capebilities of these weapons and arms have had marked influence on tactics and organization which must be considered.

E. By far the most pointed lesson of the war relates to the tactical principles which should govern the conduct of an offensive seeking a decision. In reviewing the entire war from the viewpoint of the tactics of the offensive, we can divide the methods employed into two main classes as follows:

(a) The attack based primarily on the fire of artillery or "the artillery attack". This method was employed on the western front during 1915, 1916 and 1917, and developed what was known as the "limited objective attack". No discussion is required to illustrate the indecisive results of such attacks from the viewpoint of bringing the war to an end. In this form of attack the infantry was subordinated to the fire of the artillery. The Germans responded to this form by infantry counter-attack and prevented a final decision.

(b) The attack based primarily on the fighting and the advance of the infantry or "the infantry attack". This method was employed on the western front during 1914 and 1918 by both the Allies and the Germans. All arms were subordinated to the fighting of the infantry and its needs. The decisive results of this method of attack are known.

The composition and organization of our smaller as well as our larger units should therefore be based on "the infantry attack".

The salient characteristic of "the infantry attack", whether in position or open warfare, is continuous fighting for a long period. This requirement is met not solely by reserves but equally by the infantry and artillery strength and organization adopted for the division. A division weak in infantry must be frequently replaced. An exchange of divisions generally requires from two to three days during which period determined attacks cannot be launched. The stronger in good infantry the division is made, consistent with mobility, the longer it can continue in the fight and therefore meet the conditions stated above.

The present war has shown that it is only by the offensive that a decision can be reached, and that the infantry of an army must be prepared to bear the large percentage of the casualties in war.

The infantry must be aggressive. The stabilized trench warfare which prevailed in France in 1917 was due in a great measure to the lack of aggressiveness of the infantry of both sides. Infantry must be self-reliant. Too much reliance was placed by the infantry on the auxiliary arms and not enough on the means within the infantry itself. This tended to destroy its initiative. Infantry must be trained and controlled. There is more need for thorough training in the infantry than in any other arm, for the individual infantryman is thrown more on his own resources in battle than any other soldier, due to the dispersion in its lines in combat. Infantry is much more difficult to control than any other arm. This control can be secured only by well trained and competent leaders. Unfortunately, on account of our policy of unpreparedness, such men were not available and untrained soldiers thrown upon their own resources or under untrained leaders were too often found in the line of battle. This oftentimes

jeopardized the chances of success and unquestionably increased the casualties in our ranks.

To obtain the full measure of success the training of infantry should be such that the individuals not only know what is to be done but how to do it. This can only be accomplished by having trained men from which to draw our replacements.

These men should be trained in peace. It will not do to wait until the enemy is upon us to begin to train for war. Every man that we expect to utilize in war should have the benefit of training in peace for the role he is expected to play. It is unfair to the individual that he should be called upon to enter upon the hazardous duty of war without a thorough knowledge of what is expected of him and of how to care for himself upon the march, in camp and in battle.

To defeat the enemy, infantry must be prepared to close with him. It is only by advancing upon the enemy that his morale may be broken and that he may be driven from his position. To accomplish this we must gain fire superiority.

Fire superiority can no longer be gained by thickening the firing line as formerly, because of the casualties that would result therefrom under modern fire conditions. This superiority must, therefor, be gained by maneuvring for position so as to deliver a more effective fire and by the use of automatic and auxiliary weapons. The necessary fire superiority can be so obtained without increasing the number of men exposed to the hostile fire, the fire of the enemy can be kept down and our own infantry can advance and close with the enemy.

The combat division as at present organized has proven successful in the present war. The Board is of the opinion that with certain modifications hereinafter recommended it should be retained.

17. Armament: The Board recommends armament as follows:

(a) Rifle Company to retain present armament.
(b) Infantry regiment armed as follows:
Magazine rifle and bayonet
Automatic rifle
Automatic pistol
Machine Gun
37 m/m gun
Light Howitzer.

Armament for Special Purposes, to be issued when needed:

Grenade discharger
Trench knife
Hand grenade
Rifle grenade

Armament to be discarded:

Stokes mortars.

18. Ammunition Supply: The supply of infantry ammunition does not present, to any degree, the difficulties involved in the supply of artillery ammunition, at least so far as the movement of this ammunition up to infantry regimental dumps is concerned; because infantry ammunition, except for pyrotechnics and 37 mm., is all of one type, namely, small-arms ammunition. This ammunition can be handled in bulk and moved readily in trucks up to dumps to which regimental combat trains may come to draw. The real difficulties of infantry ammunition supply lie in the movement from the forward dumps to the firing line, and this is a question of light infantry carts and of man handling. The movement from the rear to the forward dumps can be handled by the Divisional Supply Train and the records and reports can be kept by the Division Ordnance Office, both of these agencies operating under the direction of G-4 of the Division.

19. Rifle Company: The Board believes that the strength of the Rifle Company should be 6 officers and about 250 men, organized in accordance with the Provisional Infantry Drill Regulations, A.E.F.

It is strongly urged that all personnel in excess of a fighting strength of four platoons of four full squads each and such company and platoon headquarters personnel as is absolutely necessary for combat, be kept out of action in a place of reasonable security within the Divisional Area to be used for prompt replacement of losses in action.

20. Rifle Battalion: The Board recommends that the infantry battalion consist of the following:

(1) Battalion Headquarters:
1 Battalion Commander - Lieutenant Colonel
1 Second in Command - Major
4 Staff Captains or Lieutenants. (1 lieut. for Signal Offic
Necessary enlisted men, including Signal Section carried administratively in Regimental Headquarters Company.
(2) 4 Rifle companies
(3) 1 Machine Gun Company.

21. Infantry Regiment: The Board recommends that the Infantry Regiment be organized as follows:

(1) Regimental Headquarters.
(2) 3 Battalions of 4 Rifle Companies and 1 Machine Gun Company each.
(3) 1 Howitzer Company.
(4) 1 Headquarters Company.
(5) 1 Supply Company.

Regimental Headquarters to consist of:

1 Colonel, Commanding
1 Lieutenant-Colonel, 2nd in command
1 Operations Officer (Head of Staff) - Captain
1 Administrative and Personnel Officer - Captain
1 Machine Gun Officer - Captain
1 Signal Officer - Captain or Lieutenant
1 Intelligence Officer - Lieutenant
3 Lieutenants - Munition and Gas Officers and Assistant Operations Officer
3 Chaplains.

Regimental Headquarters Company to consist of:

3 Officers (1 Captain, 2 Lieutenants, one of whom commands Reg. Sig. Det.) and the following sections: Staff, Band, Intelligence, Orderly and Signal.

Supply Company:

As at present organized, increasing enlisted personnel to provide two men for each four line team in regiment.

Howitzer Company:

The Board recommends that, until a suitable arm is developed to replace the 37 m/m, Stokes and accompanying guns, the Howitzer Company as recommended by the Infantry Board be organized but that its armament consist of six instead of three 37 m/m guns, that the Stokes mortar be replaced by a light howitzer when such weapon is provided, but that the 37 m/m on account of its proven value be retained unless it is definitely determined that the howitzer adopted can replace it as an infantry weapon. The 37 m/m is a most excellent adjunct to the infantry and should not be discarded unless a weapon thoroughly capable of replacing it is procured. The Stokes mortar should be discarded as an adjunct to an Infantry Regiment.

Experience has shown that the Stokes Mortar has no place in an Infantry Regiment, for the following reasons:

Lack of mobility
Difficulty of ammunition supply
Inaccuracy
Limited range
Difficulty of concealment

The inaccuracy of the gun has increased the difficulty of supply of ammunition since a considerable expenditure of ammunition is necessary to reach a given target.

It is understood that the range of 900 yards has now been increased by improved ammunition to 1600 yards.

Signalmen: The Board is of the opinion that all the Signalmen in a regiment should be infantrymen and not mixed Signal Corps and Infantry as now organized.

Machine Guns: Each regiment to have its machine gun companies organized as at present, with an increase of enlisted personnel necessary to insure the supply of carrying parties for ammunition in battle.

It has been found necessary to supply these carrying parties by detail from Rifle Companies. This method has not proven satisfactory and has depleted and scattered the personnel of the Rifle Companies, without really providing efficient carrying parties.

Each Machine Gun Company to be permanently assigned to a battalion of the regiment and to be assembled as occasion demands for technical instruction under the Regimental or Brigade Machine Gun Officer.

It is believed that proper technical instruction of these companies can be secured in this way, and it is only by having a Machine Gun Company assigned as part of his Battalion that a Battalion Commander will learn to properly handle it and learn to think of his Battalion as four Rifle Companies and one Machine Gun Company. This is the conception that he must carry with him into battle and it must become instinctive through daily training.

22. Infantry Brigade:

Brigade Headquarters:

1 Brigadier General
1 Brigade Staff Officer - Major (Head of Staff)
1 " " " - Major (Machine Gun Officer)
1 " " " - Captain (Operations & Training)
2 " " " - Lieutenants (1 intelligence 1 Supply)
2 Aides-de-Camp
2 Signal Officers - Lieutenants, Signal Corps (Message Center and Communications) With Signal Section.

Headquarters Detachment. - consisting of Staff Section and Signal Section, the latter detailed permanently from the Signal Corps and carried administratively in the Division Signal Battalion.

2 Regiments of Infantry.

23. Infantry Division. While the Board is alive to the fact that the tendency of stabilized warfare was to decrease the mobility of units by attaching to them auxiliary arms and services which have no part in mobile warfare, it is of the opinion that the only reductions that should be made in the present Infantry Division are:

(a) Cavalry to form a part of Corps troops and to be assigned to divisions according to needs of service;

(b) Trench Mortar Battery to be abolished;

(c) Trains to be reduced as recommended hereafter.

The Board recommends that the Infantry Division be organized as follows:

Division Headquarters - as recommended hereafter.
2 Brigades of Infantry
1 Brigade of Field Artillery as at present constituted
1 Motorized Battalion of 2 Companies Machine Guns
1 Regiment of Engineers
1 Signal Battalion as recommended hereafter
1 Air Squadron of about 10 planes
1 Company of Military Police
1 Headquarters Troop
Trains reduced to conform to proposed reduction of auxiliary arms.

It is realized that the Regiment of 155 m/m Artillery might not in all cases be required as a part of a Division and that its permanent assignment thereto will in no small degree decrease its mobility. This gun has proven itself so important and the full regiment has been so usefully employed, however, that the Board is of the opinion that the full Regiment should be retained.

Similarly the entire Regiment of Engineers and the Motorized Battalion of Machine Guns are recommended to be retained, because the experiences of this war have demonstrated the necessity for their retention.

24. Chief of Infantry. The Board recommends that a capable infantry officer be assigned to duty as Chief of Infantry.

The great importance of the infantry arm would seem to justify the detail of such an officer, with suitable staff, whose business it would be to keep informed of the improvements in equipment, armament, training and organization of infantry and to make recommendations to the Chief of Staff upon all infantry subjects, including its personnel.

This officer, by inspections, could standardize the instruction in the different units and the Board believes his detail would have a marked effect upon the efficiency and prestige of that arm.

The Board considered carefully the proceedings of the Board on Organization of the Infantry convened by par. 174, S.O. 98, G.H.Q., A.E.F., 1919, and concurs in their recommendations as to equipment but recommends further tests and consideration of the type of limbered combat wagon designed by the Equipment Section, G-1, G.H.Q., A.E.F., in September, 1918.

25. Machine Guns. The proper organization for Machine Guns must be based on the power and limitations of machine guns, experiences in the present war, tactics and combat efficiency.

A machine gun is one of a number of infantry weapons; it is a mechanical device for delivering infantry fire and by means of which there is obtained greater concentration of fire, and increase in rate, control and direction of fire.

The machine gun must be prepared to attack with the infantry, and to hold the ground infantry has gained. It must protect flanks of advancing infantry and be prepared to fill in gaps. It must be able to support attacking infantry by direct or indirect overhead or flank fire and to deliver massed fire.

The organization of Infantry must be such as gives the greatest efficiency in offensive combat, defensive being a secondary consideration.

The Battalion is the Combat Unit and proper organization and training of this unit with all its infantry weapons is of the utmost importance.

In the operation of the Battalion to-day the machine guns form a very essential part of the organization nor can we conceive of a situ-

ation that will not include machine guns.

Organization and training of the battalion must be based on combat and if machine guns are a part of the battalion in combat they must be an integral part of its organization. The battalion is not a complete unit without the machine gun weapon.

There is a tendency on the part of some machine gun officers to favor separate machine gun organization or Corps. This loses sight of the principle that machine guns exist solely to increase the combat efficiency of the infantry and it is the general combat efficiency that must be constantly kept in mind rather than the highly technical training of any special corps or unit.

The best results cannot be obtained by separating machine guns from battalion organization and training and attaching them in combat or on special occasions. A Battalion Commander must be trained, and constantly pursue his work under conditions approaching combat as nearly as possible. Likewise all officers of rifle companies and machine gun companies must train with the most complete conception of the battalion in combat.

The following lessons are taken from the war:

1. The principle as laid down in the IDR, of the Battalion being the combat unit, is correct.

2. It is also proven that machine guns form an essential part of this unit.

3. That, in offensive or defensive action there can be but one command exercised over the battalion and this command must be exercised over all its weapons.

4. Failures on the part of battalion commanders to give definite and complete instructions to machine gun units attached to their battalions, or failures of machine gun officers to function properly with the battalion have been causes of not getting the best support or fire effect from machine guns.

5. In the advance, the present organization of the machine gun company does not provide sufficient men for ammunition carriers. Detailing ammunition carriers from rifle companies is objectionable, as

it weakens these companies and in action men will quit the work and return to their organizations.

6. Divisional machine gun units have been constantly used and played an important role in operations.

If a machine gun unit forms an integral and essential part of a battalion in combat it should be a part of the organization of the battalion and train with the battalion in all periods of battalion training. The machine gun unit should be complete in itself and it should not be necessary to draw on other units for additional personnel. During periods of infantry company training the machine gun units may train separately or be assembled for the purpose of machine gun drill and machine gun technical instruction and training.

The machine gun as a weapon is still in the process of evolution. Improvements are constantly being made and new ideas are being formed concerning the mechanism of the gun and fire effect. It is therefore important that there be in the service a machine gun school or training center to which officers and N.C.O's. of the various units are sent, from time to time, to receive the latest and most thorough machine gun training. This center should test and report on new machine gun material or equipment and constantly work on means or methods of increasing the fire effidiency of machine guns.

If we consider the second role of the machine gun as delivering mass fire, this can be performed by drawing companies from reserve battalions or by using the divisional machine gun units.

Machine gun officers must first be infantry officers, trained to work as infantry. Vice versa, infantry officers must be familiar with the mechanism and functioning of machine guns and have an appreciation of their power and limitations and know how to use them tactically.

26. Conclusions. 1. The number of machine guns under the present divisional organization seems to be about properly balanced.

2. The present organization is not entirely satisfactory.

3. A machine gun company should be a part of each infantry battalion.

4. There should be a separate divisional unit of great mobility, which augments the divisional reserve, and which is available for

special missions or for increasing the barrage or massed fie. During the war there has been a constant increase in the proportion of machine guns and there may be some advantages in increasing the divisional unit to four companies.

5. There should be a machine gun officer on the regimental, brigade and divisional staff who prepares training memoranda for the machine gun units, supervises their technical training, makes frequent inspections and during operations is prepared to advise and inform his commander on machine gun matters.

27. Recommendations. 1. That the infantry battalion be reorganized to consist of four rifle companies and one machine gun company.

2. That the present divisional motorized Machine Gun Battalion be retained.

3. That the size of the Machine Gun Company be increased to provide two to four extra men per gun as ammunition carriers.

4. That a machine gun officer be added to staff of Regiment and Brigade.

5. That in periods of company training the machine gun companies be assembled for drill and technical instruction and training under the Regimental, Brigade or Divisional Machine Gun officers.

6. That provision be made for an Army Machine Gun Training Center as a permanent institution.

The Board considered the proceedings of the Machine Gun Board convened by W.D. Cablegram A-104 and the Machine Gun Board convened by S.O. 61 G.H.Q., A.E.F., 1919. It concurs in their recommendations as to improvements in equipment. The proceedings of these Boards attached hereto.

28. Tanks. The entry of the United States into this war found the Army without any provision for the use of tanks. Such tanks as have been used by our forces were procured from the French authorities.

In the attack of a position, despite the heaviest artillery preparation and though preceded by a barrage, the Infantry always found that some enemy machine guns, hidden in dugouts, concrete emplacements or fox-holes, escaped the artillery fire and were ready to meet and hold

up the advancing troops. To overcome this the tank was developed.

The use of tanks in this war has demonstrated their great moral effect. They increase the morale of friendly infantry and have a very demoralizing effect upon the enemy. Their value as an adjunct to an infantry command in battle is assured for this reason if for no other.

Heavy tanks have proven themselves also of material value in breaking the way for infantry through barbed wire entanglements and in reducing machine gun nests.

Tanks, as used in this war, are of two kinds, heavy and light. The role of each is the same, to assist the infantry to advance.

The heavy tank has generally been used in front of or accompanying the leading infantry wave. The light tank follows with the supports or reserves. The light tank must be assisted by pioneers in crossing trenches wider than six feet.

The type of tank has changed several times in this war and will undergo in the future many developments. The desire is to secure an armored vehicle carrying a light gun and machine gun capable of accompanying infantry across any terrain and through serious obstacles.

Tanks, on account of their poor observation, must have their objectives definitely pointed out to them by the infantry. A medium tank of high speed has been planned to be used as a raiding tank in rear of the enemy lines, but it has not been used in battle.

The tank should be recognized as an infantry supporting and accompanying weapon incapable of independent decisive action. The infantry must accompany or follow the tank, otherwise no ground will be held. There is no such thing as an independent tank attack.

With the above principle in view, tanks should be organized for association with and combat as part of an infantry command. As an Infantry organization, the Tank Service will necessarily be decentralized in regard to schools, depots, personnel and technical training, but it should be under the general supervision of the Chief of Infantry and should not constitute an independent service. The Chiefs of Artillery and Infantry must cooperate with the Ordnance Department in the technical development of tanks and tractor artillery.

While a Tank Service is required to handle the question of supply, personnel, etc., there is no combat need for a larger tactical organization than a battalion of three companies of about 15 tanks per company. Such an organization would be suitable to operate in a Corps. The personnel, especially the combat personnel, should be detailed from the infantry for service with the tanks to insure the desirable team work, etc.

However, the Tank Service should be a part of the G.H.Q. reserve, available for attachment to Armies, Corps and Divisions in such numbers as each situation may dictate.

Tanks should not be assigned as a permanent unit of a Division. They decrease its mobility and frequently the terrain over which a Division operates is such as to preclude the use of Tanks.

Exercises of infantry accompanied by tanks should be held frequently to familiarize the infantry with the use of tanks, as well as their powers and limitations.

For coordination throughout the Division and with adjoining units, the Commander of the tanks acting with the Division should be directly under the orders of the Division Commander. On the other hand, there would be better coordination within any infantry battalion front and the Battalion Commander would exercise more influence on the attack if the tanks were under the Infantry Battalion Commander.

The commander of the <u>heavy</u> tanks should be under the orders of the Division Commander and the commander of the light tanks under the Commander of the assault or leading infantry battalion.

It is believed that all tanks should be armed with one or more guns of about 75 m/m caliber and with as many machine guns as their capacity will allow.

II. ARTILLERY

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ARTILLERY

INTRODUCTORY

29. The war brought out a great development in the use of artillery. In the number of guns, absolute and relative, in the number of different calibers, in the proportions of heavy and very heavy guns, in the number and types of ammunition and in the expenditure of ammunition we have reached figures unheard of before in war.

As presenting a picture of the development reached, the following tables have been prepared. They are prepared from the best data immediately available but are not complete in all respects; they do not show all the various calibers employed, nor do they give any idea as to the variety of ammunition. But they are sufficiently exact to give a good idea of the number of guns used in supporting our troops in the various important engagements. The four critical dates in the operations of American troops have been selected in preparing these tables, because the figures for these dates are the most accessible, namely, July 29, the crossing of the Ourcq by the 1st Corps (moving warfare); September 12, the attack on the St. Mihiel salient (attack on fully prepared positions); September 26, first day of Argonne offensive (fully prepared positions); November 1, the 1st Army in the Argonne (moving warfare).

30. In computing the following statistics the infantry strength in rifles and automatic rifles of an American combat division is considered to be 13,000 (paper strength 13,698); that of a French combat division to be 3,500 (paper strength, 3,756).

OURCQ RIVER -- 29 JULY 1918.

Exclusive of Trench Mortars

CORPS	RIFLES	GUNS			GUNS per 1000 RIFLES		
		Division	Corps	Aggregate	Division	Corps	Aggregate
1st US	13000	144	88 (1)	232 (2)	11.07	6.77	17.84

NOTES: (1) Includes only these guns in position this date. There were actually 144 corps guns assigned to the 1st Corps on this date but the older and less mobile types had not reached position at this time.
(2) Includes only Divisional and Corps Artillery. A considerable number of heavy guns pertaining to the VIth French Army were in operation in the army sector, but their numbers are not now available.

ST. MIHIEL -- 12 SEPTEMBER 1918.

Including about 200 Trench Mortars among divisional guns. These Trench Mortars did not take part in the attack.

CORPS	RIFLES	GUNS				GUNS PER 1000 RIFLES			
		Div.	Corps	Army	Aggregate	Div.	Corps	Army	Aggregate
1st US	52000	680	282			13.07	5.42		
4th US	39000	588	225			15.07	5.77		
5th US	23000	372	168			16.17	7.30		
TOTAL	114000	1640	675	221(1)	2536	14.38	5.92	1.94	22.24

NOTE: (1) Including a small number of army guns which supported the holding attack of the 2d Colonial Troops.

MEUSE-ARGONNE - 26 SEPTEMBER 1918.

Exclusive of Trench Mortars

CORPS	RIFLES	GUNS				GUNS PER 1000 RIFLES			
		Div.	Corps	Army	Aggregate	Div.	Corps	Army	Aggregate
1st US	39000	420	126	103	649	10.77	3.23	2.64	16.64
5th US	39000	504	131	130	765	12.92	3.36	3.33	19.61
3d US	39000	524	106	150	780	13.43	2.72	3.84	19.99
TOTAL	117000	1448	363	383	2194	12.37	3.10	3.27	18.75

MEUSE ARGONNE -- 1 NOVEMBER 1918.

Including Trench Mortars

CORPS	RIFLES	GUNS				GUNS PER 1000 RIFLES			
		Div.	Corps	Army	Aggregate	Div.	Corps	Army	Aggregate
1st US	39000	480	80			12.31	2.05		
5th US	26000	392	120			15.07	4.61		
3d US	26000	360	80			13.84	3.07		
TOTAL	91000	1232	280	210(1)	1722	13.53	3.07	2.31	18.92

NOTE: (1) Approximate.

FIRST DAY AMMUNITION EXPENDITURES.

CALIBER	SEPTEMBER 12		SEPTEMBER 26		NOVEMBER 1	
	Total	Days of Fire	Total	Days of Fire	Total	Days of Fire
75	402,100	1.30	322,400	1.02	300,000	
105	22,000	1.36	49,000	1.16		
155How	57,000	1.02	57,000	0.75	60,000	
155GPF	9,150	0.61	31,500	1.50	20,000	

31. At the commencement of the war in 1914, both sides advanced with the artillery then available. For 1000 rifles the British were supposed to have 6.8 guns, the French 4.6, and the Germans about 6.4. The unexpected elements were the German and Austrian heavy guns and the vast expenditure of ammunition.

After the German offensive failed on the Marne, the battle on the Western front stabilized. On the Eastern front comparative stabilization also resulted after the Tannenburg battles. From that time on neither side was able to get through the opposing lines without blasting the way through. The first example of this was when the Germans massed on the Russian left in Galicia in 1915 with infantry and guns, and, driving their way through there, forced a retirement of the whole Russian line. The Russians were short of guns and short of ammunition and could not meet the German concentrations.

In all the German offensives of the spring and summer of 1918, they massed great quantities of guns and ammunition for a drive at a selected point. Where they acted more or less by surprise, as in their earlier attempts, they got through; and, having abandoned the idea of limited objectives, they kept going until their own energy was exhausted; there was very little to oppose them once they had broken through. By July 15th, however, the Allies had caught the new idea. They correctly located the place of attack and by violent and persistent fire on the troops concentrating for the attack, they broke it up and took the heart out of it, so that only in isolated places did minor penetration occur. Our own troops had previously, in May at Cantigny, shown the possibilities of artillery fire in breaking up a threatened offensive.

Similarly in our own attacks, the infantry was covered by the intense fire of great masses of artillery and thus assisted through the enemy's prepared positions. The infantry then progressed until stopped by hostile resistance, when it waited for the guns to come up and repeat the operation. Obviously, as the enemy's prepared positions became less and less formidable, the amount of artillery required to support these successive attacks could be reduced, assuming of course that our advantage in man power continued.

The proportion of artillery to rifles is then a variable function, and depends upon the nature of the campaign, the mission assigned and the difficulties to be overcome.

LESSONS OF THE WAR.

32. Cooperation. We have been shown repeatedly during this war how indispensable it is to have close cooperation between the combat arms. To the lack of cooperation many tragic incidents are to be ascribed.

Cooperation is assured only where it has become a habit. It becomes a habit only when the arms are continually associated together in practice and when personal acquaintance and mutual confidence have been established. It is impossible for a complex machine to work unless its parts are adjusted and oiled and duly controlled.

The Infantry and artillery which are to work together in combat must train together and must live together to the greatest extent possible. Similarly the cavalry and horse artillery and the aeronautics and artillery must be very closely associated. For this reason our troops should be grouped in training areas, so that personal acquaintance may be established, so that combined action may be frequently practiced, and so that superior officers may learn how to handle the combined arms. Each arm required separately the elements of its technique; but the adaptation of technique to battle conditions can be assured only by means of tactical exercises of the combined arms.

During combat, groups of artillery are designated to work habitually with certain groups of infantry. Thus, in a division, one of the regiments of 75's works habitually with one infantry brigade, and the other regiment of 75's with the other brigade. The artillery regimental commander is in close association with the infantry brigade commander personally or by liaison officer, and these two officers should think and work together in carrying out common missions. Similarly a group of corps artillery is associated with each division, the group commander having his command post close to the divisional artillery commander, so that support when needed may be quickly asked for and quickly given.

33. This close association of infantry and artillery commands does not involve, however, parcelling out the artillery among the minor infantry commands and making of the division a number of small separate combined commands. This would mean losing the ability to concentrate and to adapt the power of the artillery to meet the larger phases of the action. The commander must preserve the ability to use his artillery in this larger way, and to influence its action when he sees fit through the intermediary of his divisional artillery commander. Hence the command of associated artillery does not pass to subordinate infantry commanders except in the case of special groups assigned to carry out certain definite missions.

34. This brings us to the problem of accompanying artillery. Much difficulty was experienced in recent campaigns in getting a successful solution of this problem, due in part to the inherent difficulties of keeping up with the infantry a gun which cannot be dragged by men, and in part to the inexperience of all concerned and the lack of practice in cooperative action. Artillery must render this close support to foot troops. Sections, platoons, or batteries must be assigned to infantry commands to move to positions where they can surely know the infantry's immediate needs and meet them. The psychological assistance thus rendered is often as great as the material assistance. One solution of this problem from the artillery point of view lies in the provision of a tank mounting or dragging a 3-inch gun, and transporting the ammunition and perhaps the personnel to forward positions. If the divisional artillery is tractorized or given caterpillar mounts, as now seems possible, a certain proportion of its guns could be given armored protection similar to that of the tank. Experiments should be carried out to develop means of transportation of this kind; but in the meantime our present types of artillery must be trained to do the work. Against a broken or inferior enemy the problem is not very difficult; and, even against a well prepared and stubborn enemy, ways and means may be found if both the infantry and the artillery have practised together.

35. Fire Action. An aggressive and intensive employment of fire is demanded of the artillery. This applies not only during crises of attack

or defense, but during the whole time the opposing troops are in contact.

It is necessary to study continually the enemy's dispositions not only in the front lines but also in the rear. His troops are arranged in depth. The proportion in the front echelons depends largely upon whether his intentions are offensive or defensive. In rear are his reserves, his supply dumps, his headquarters, his routes of communication, reinforcement and supply, his system for transmitting orders and information. No part of this vital machinery must be allowed to work uninterruptedly. His front line troops must be made to feel that they are in the most dangerous position of all; but if his reserves are continually under fire they get no rest or relief from the strain; if headquarters are shelled the staff does not work to advantage; if the supply system is constantly interfered with on the roads and at the dumps his front line troops suffer; if the transmission of orders and information is stopped, confusion results. The object must be, in short, to harry the enemy front and rear so as to destroy his morale, lower his vitality and weaken his will to fight.

In offensive action, while a portion of the guns are used to harass the enemy's service of the rear and prevent reinforcement and communication, the great mass of the guns is used to smother his front line troops and neutralize his artillery. The fire is directed especially upon his key or strong points, on machine-gun nests and all critical points selected by the infantry. As the infantry progresses, the fire is lifted to critical localities in rear according to prearranged signal, or, if the infantry so prefer, by time schedule, thus preventing reinforcement and interfering with retreat. Artillery liaison officers must move with the infantry commanders and keep the guns informed of the infantry needs. The guns move forward by echelon as the attack progresses.

In defensive action, the artillery must break up the attack <u>before it starts</u> by intense fire on the enemy's concentration areas in front, his reserve positions in rear, and the routes of approach from rear to front. This fire commences as soon as the enemy's intention to attack is guessed, is kept up intermittently, and becomes violent as soon as evidence is gained that his troops are being massed in front. Barrage

lines should be established in front of our outposts and in front of our lines of resistance, and fire opendd on these lines when the proper infantry commanders so demand.

A large expenditure of ammunition and a large wastage of guns is to be anticipated from this mode of action, but experience in this war has shown that the ammunition and guns must be furnished so as to make such a mode of action possible.

The foregoing applies especially to attacks of penetration against a stubborn enemy where a more or less carefully worked out plan of action can be prepared. In enveloping attacks, in advance and rear guard actions, in recontre engagements, the successful employment of the guns depends largely on the quick initiative and dash of artillery commanders, on their skill in getting the guns rapidly to good positions and bringing fire to bear on the important targets of the moment. This war has offered us little opportunity for work of this nature, but another war, at least in its earlier phases, may be full of such opportunities, and our artillery must be prepared to take advantage of them.

36. Counter-battery. The enemy guns must be kept dominated so as to protect our infantry. Counter-battery is the especial function of corps artillery, but it is often necessary for divisional artillery to assist. Divisional artillery is almost wholly employed in supporting or protecting its own infantry during periods of attack or defense. But these periods are intermittent. The action of the enemy's guns is apt to be continuous, and none of ours must be idle.

The corps artillery commander organizes the counter-battery system, allotting to divisional artillery commanders the counter-battery work to be done in restricted areas immediately in front of their own line, but employing the corps artillery for the greater proportion of the work. In order that the corps artillery commander may properly supervide the employment of all the artillery of the corps, he has an executive known as the Heavy Artillery Commander who is in immediate charge of the corps artillery guns. At the command post of this latter officer is the forward artillery information center which is the nerve center for collecting all artillery information from the front and rear, and for

transmitting quickly this information to all concerned. It is connected with the flash ranging sections, forward observation stations, balloons, corps artillery groups, divisional artillery commanders, aeroplane service, and with the headquarters of the corps artillery commander. All information from the front is rapidly gathered, tested and disseminated from this station; and, similarly, from the corps artillery commander's headquarters comes all information gathered from other sources as to the enemy's dispositions and intentions. Thus the Heavy Artillery Commander is kept constantly informed of the activity of the enemy guns, and can quickly bring concentrations of fire to bear upon those which are active. He likewise employs certain guns on harassing and interdiction fire, in accordance with instructions received from the corps artillery commander, in whose office the enemy's dispositions, movements and intentions are continually studied and systematic plans made for effectively damaging the enemy and interfering with his activities.

The organization for conducting counter-battery thus comprises: the Corps Artillery Commander with his headquarters staff for operations and intelligence; the Heavy Artillery Commander; the information center; the forward observation stations; and an effective communication system. The machinery operates continuously in moving warfare, its degree of effectiveness depending upon the means of communication available. In very rapid continuous movements, communication may be limited to radio and motorcycle; when movement is checked telephones are installed. The essential things are to have a system for locating the enemy's guns, and an organization for making prompt and orderly use of this information in bringing fire to bear.

37. War of Movement Our training both in tactics and in technique must be based on the war of movement, since this type of warfare alone is productive of decisive results.

A skillful technique is indispensable and is acquired only by much study and practical experience in conduct of fire; but ability to operate successfully in moving warfare is to be gained only if officers and men frequently carry on their practice under conditions simulating those of moving warfare.

Regimental and battalion commanders must have larger experience in employing their commands on a varied terrain to meet tactical situations; and battery commanders must know how to adjust fire under all sorts of difficulties. In actual warfare a large proportion of the fire of artillery may have to be conducted at nighttime, while, in daytime, fog, snow and rain are apt to be the normal conditions.

Adjustment, or at least registration of fire, is the greatest problem. When the artillery passed from stabilization to movement in this war, one of its greatest lacks was a fully organized system of observation and quick communication adapted to the new conditions. The positions of the enemy guns and of his infantry were not known as had been the case in trench warfare, and the machinery for getting this information, for quickly transmitting it, and for promptly securing adjusted fire were not adequate. A highly trained technical staff is needed. As the infantry moves forward, artillery regimental commanders, or their technical staff, must locate and assign observation stations and registration areas to the battalions; and battalion commanders must see that communication is quickly established and that adjustment is secured at the first opportunity, whether on the actual target or upon registration points. Communication by radio must be employed to a large extent. Aeroplane assistance is most essential and its value will be very greatly enhanced with the successful development of radio telephony. Flash and sound ranging sections must form a part of the artillery command and must be skilled not only in locating the enemy's guns and his infantry dispositions, but also in adjusting fire in the ordinary way, and by means of high bursts.

38. Long Range. The great proportion of artillery work takes place in the immediate support and protection of the infantry at ranges up to about 6500 yards. But long range work is important. As described in preceding paragraphs, the enemy may be very seriously damaged by fire directed against his reserves in rear of the front line, and against his whole system of command, communication and supply. This system may be said to extend back for at least 18,000 yards from his front line positions while the center of gravity, so to speak, of the system is probably within 11,000 yards of the front line.

It is accordingly important that all of our guns, including our divisional guns, shall have ranges up to, approximately, 11,000 yards; and that, in our corps artillery, should be included a certain proportion of guns capable of attaining a range of at least 18,000 yards.

During the campaigns just concluded, guns, having ranges very much greater than those just described, were employed to fire on great concentration camps, aviation fields, or railroad junctions in rear of the opposing lines, as well as upon centers of military manufacture and supply. Undoubtedly fire of this kind is of value as it may interfere seriously with the movement of troops and the ordinary operation of the service of the rear; while it may greatly impede manufacture and supply, due to the tendency of employees to seek cover during the bombardment and thus delay work. A small proportion of these very long range weapons is hence deemed essential.

39. Motorization. Motorization of all types of military vehicles is progressing at a very rapid rate. What would have been deemed impracticable a few years ago in this line is now an everyday affair, and evidently the limit of motorization by no means has been reached. It has been possible, due to motorization, to employ many types of heavy artillery and to supply them with ammunition. In fact, all of our existing types of artillery now in use in Europe are motorized, except the 75 mm.

The tractors supplied for our heavy guns have been of two types- the wheel type and the caterpillar type. The wheel type proved very useful on the European terrain where roads are plentiful and where gun positions were usually on the sides of the roads. The wheel type, however, has been replaced by the caterpillar in order to give greater mobility across country. The caterpillar tractors did excellent work for us in the latter months of the campaign. The horse had about reached his limit and many units were consequently immobilized. Fortunately the caterpillar tractors pertaining to heavy artillery regiments became available in certain areas and could be used, not only for the work of their own regiments, but also for moving guns of all description for long distances into position in the front lines, and for bringing up ammunition and

supplies. These tractors were employed almost continuously on these duties in bad weather, night and day, and stood the test very well.

In May, 1919, the two 75 mm. regiments of the 3d Division stationed in Germany were tractorized and, after less than four weeks' training, were submitted to an 8-day test involving continuous maneuvering across country and marching on roads. A total distance of about 150 miles was covered, and the last day's march was about 39 miles. A horse drawn brigade could not have been expected to go through the test, as laid out, without undergoing excessive losses in animals and great fatigue and hardship to the men. The tractors finished the test with only a reasonable number of casualties. It would have been desirable to halt for a day's overhauling, so as to prevent deterioration, but the tractors were evidently ready to go on if conditions had so required. As for the men, the very notable thing was the total lack of straggling, and the fact that they arrived at the end of each day's journey fresh and ready for work.

Of course, this test did not involve the difficulties of winter warfare, but it showed that, under conditions existing, the tractors could do practically all that the horse could have done and more.

If we could state that all our future campaigns would be in a country like Europe or the well-inhabited parts of the United States, we would probably soon be able to agree to give up the horse in favor of the motor for 75's as well as for the heavy artillery, it being evident that, by modifications and developments, now well within reach, the motor equipment now available can be adapted to meet the conditions of warfare in a country having good roads. The adaptability of the motor to countries like Mexico is, however, not yet fully established. In order to carry on development, and to satisfy ourselves as to the limitations on motorization, it is recommended that one 75 mm. regiment in each brigade of divisional artillery be motorized and that the other remain horse drawn for the present.

40. It may be foreseen that the replacement of the horse by the motor will produce very important changes in artillery materiel and artillery methods. Thus, our guns may be mounted on caterpillar mounts

and the carriage designed so as to give all-around as well as high-angle fire. The caisson, originally designed as a horse drawn device for carrying ammunition, may be replaced by trailers carrying a useful load relatively much greater than that of the caisson. Furthermore, motorization will permit us to store reserve batteries complete, ready for use at very short notice, thus eliminating the necessity of collecting and training horses after war is declared.

41. Aviation and anti-aircraft artillery. Undoubtedly aviation will affect to a greater and greater extent the tactics of future warfare. Offensively, aviators may make use, not only of bombs and machine guns, but also of cannon or torpedoes. For defense against aeroplanes, the artillery on the ground will have greater and greater responsibilities. In the zone of the armies the troops on the line, or at rest in reserve, as well as their supply depots and command posts, must all be protected; while in the rear zones, manufacturing establishments and towns must be protected.

If, due to caterpillar mounts, our ordinary field pieces secure the ability to execute high-angle as well as all-around fire, they will assist in the struggle against the aeroplane; but special types of guns, having high velocity and hence low time of flight, must be provided.

In the tactical units, anti-aircraft guns should form a part of the regular artillery commands, being assigned to armies and to corps as needed. For the defense of the areas in rear, such as important cities, important manufacturing centers,etc., special groups of anti-aircraft artillery must be employed, which must work in close cooperation with our aviation service. There is no good reason for making anti-aircraft artillery a separate arm by itself. It should be a branch of artillery, specially organized to fulfill its special mission, but managed through the established artillery commanders.

42. Gas. The use of toxic gasses played a larger and larger part in this war so long as stabilized conditions were maintained. A very large proportion of our daily casualties were due to gas. During moving warfare gas played a less prominent but still very important part. On the defensive it could still be used without limit, but on the offensive strict limitations had to be enforced.

A weapon so formidable as this having once been brought into play, it is hardly possible that it will not appear again in future warfare. Our military plans should accordingly be made on the basis that it is a most important factor to be taken into account.

Toward the close of this war the ordinary guns of the artillery were the principal agents for propelling and scattering toxic gases. Special gas projectors were discarded after we had passed from stabilized to moving warfare. In order, however, that we may not be caught at a disadvantage, research should be directed toward evolving perfected means of employing, as well as of guarding against, this very formidable weapon of modern warfare. The possibility of employing very large capacity bombs, dropped from aeroplanes, is to be specially studied.

43. Field Artillery and Coast Artillery. This war has shown that the heaviest guns may be employed to accompany and serve the mobile army. The question of the relation of the Field and Coast Artillery has, consequently, arisen. It is accordingly necessary to consider to what extent the functions of these two branches of artillery are assimilated to one another.

The artillery which is to accompany the mobile army must of necessity be steadily trained and accustomed to work with mobile troops in order that the appropriate associations may be established for insuring combined effort. This artillery must likewise be organized to meet field conditions and so as to fit in to the organization of the other arms; and, finally, it must be habituated to marching and campaigning.

The artillery which defends our harbors is now charged with placing and operating mines and with serving the guns of the fixed defenses. The service of mine defense is a highly specialized one, requiring an expert personnel. The service of the harbor defense guns is likewise a specialized service, the equipment to be used, the methods to be employed, and the organization appropriate being all adapted to meet the particular conditions involved. Such heavy high-power guns as may be assigned the mobile army might be used for harbor defense, but they would not operate as advantageously as guns mounted in fixed defenses, manned by personnel especially trained for the service involved, and provided with all the accessories needed for long-range fire over water.

Analysis of the duties involved in harbor defense indicate that these duties assimilate more nearly to the naval than to the military service. Our primary line of defense is the fleet. Submarines and hydroplanes form the second line of defense; while mines for channels and guns on shore constitute a thied line. Submarines, hydroplanes, and mines are all appropriate naval means of defense. The service of the guns of a harbor fortress may be said to differ essentially from that of the service of the guns of a ship only in that a ship is floating and a fortress is not. Both fire across water, with guns of like weight and power, to hit a ship as the target.

Upon the navy rests already the main responsibility for keeping hostile ships from our shores. The whole responsibility may properly and logically be put on the navy.

All of the artillery pertaining to the army should be mobile, organized for fiedd warfare, accustomed to field conditions, and associated closely at all times with the infantry or cavalry with which it is to fight.

44. Organization. Experience in this war has shown that artillery organization must be established on a very flexible basis, since the number of guns actually serving with divisions, corps or armies have varied greatly depending on the particular mission involved. The number of guns actually serving with our divisions and corps was always greater than the tabular allowance, --- sometimes two or three times greater ---, the excess being provided either from reserve divisions or else from the French General Reserve of Artillery. These conditions will undoubtedly be characteristic of any important war in which we may be engaged in the future and our organization must consequently be adapted to meet them.

45. An appreciation of the relative functions of divisional, corps and army artillery is necessary in order to devise a suitable artillery organization.

It is the function of divisional artillery to furnish close and immediate support and protection to its infantry, especially by firing upon the enemy's infantry, by destroying machine-gun nests, and by destroying material objects which interfere with the progress of the infantry.

It is the function of the corps artillery to neutralize or destroy the enemy's artillery, to interfere with or prevent the enemy's reinforcement or withdrawal, and to impede his service of the rear by fire directed on the important roads, supply dumps, command posts, reserve units and concentration places immediately in rear of his front lines.

It is the function of army artillery using long range guns, to fire upon areas well beyond our infantry lines, to strike great railroad junctions, concentration camps, aviation fields, manufacturing centers, -- thus serving to assist in paralyzing the enemy's service of the rear,

The foregoing definition of functions must be taken as general in character; in practice no sharp line of distinction should be attempted. The division may be thrown more or less on its own resources and required to do all or part of the necessary counter-battery work, as well as a great deal of the harassing and interdiction of enemy areas. Corps artillery may be used to overcome the obstacles which immediately block the infantry; and army artillery may be used to perform some of the functions above allotted to corps artillery. But, in general, the great bulk of the artillery is assigned to divisions and to corps and used to protect and support the infantry by carrying out missions as described above. Divisions and corps have the machinery of liaison and observation necessary to procure quick cooperation between the infantry and the artillery, and hence they should have all the guns which ordinarily work in direct support of the infantry. In order for army artillery to take any regular and important part in supporting the infantry, an additional and overlapping scheme of liaison would have to be installed. Guns of very long range are assigned to army artillery for the purpose of striking areas far in the enemy's rear where important activities are concentrated, but which are far beyond the immediate reach of our infantry. If they are to be used to amplify the work of corps guns, they are assigned, temporarily or otherwise, to the corps.

46. To the division there should be assigned permanently a certain quota of artillery deemed capable of meeting the average minimum requirements of combat. This assignment should be permenent so that the infantry and the artillery may become closely associated one with another. The

amount, as deduced by the experience of this war, for a division of two brigades of two regiments each, is a regiment of light guns to support each infantry brigade and a regiment of howitzers to do destructive work and, when necessary, counter-battery work. This brigade of artillery should be an organic part of the division and should not be separated from it except when such separation is absolutely unavoidable. It is urgently necessary that it should remain with its own infantry.

To the corps should be assigned normally an amount of artillery deemed necessary to meet average conditions of service. Even when the warfare becomes stabilized, counter-battery and harassing and retaliatory fire must go on. In no case during important operations have our corps been provided with less than 80 guns. For breaking through long-prepared positions, we have had as many as 280 guns serving as corps artillery, while in moving warfare 85 guns have been about the average. Three regiments, of 24 guns or howitzers each, are deemed the proper normal quota of corps artillery. While these would constitute the organic artillery of the corps it may be expected that the regiments or parts of them may be sent to reinforce other corps if necessity dictates; but the permanent machinery for handling the corps artillery should always pertain to the corps and accompany it whereever it goes. This includes the Corps Artillery Commander and staff, a Heavy Artillery Commander and staff, the forward information center, flash ranging sections, and the ammunition section.

To the army, no organic artillery should be assigned. There should be for our field forces a General Reserve of Artillery under G.H.Q., or, at home, under the War Department, which would comprise guns of all calibers available for reinforcing our several field armies as circumstances require. Guns of the type normally used in corps and divisions will form the major part of this reserve; but guns of special type, such as pack artillery, anti-aircraft artillery, trench artillery, anti-tank guns, and super-heavy artillery should all be included. This General Reserve of Artillery should be under the superior command of the Chief of Artillery, with immediate commanders for each subdivision to attend to training, when the organizations are out of the line, and to attend to

administration at all times. The Army Artillery Commander employs directly such super-heavy guns as are needed for very long range work; but he allots to corps and divisions the great mass of the reinforcing artillery assigned to the army. He is thus relieved of the administration of the affairs of this great mass of artillery and free to devote his time to his more essential duties of determining the guns and ammunition required, preparing plans for the employment of the artillery as a whole, and supervising the employment of all the artillery of the army to insure these plans being carried out.

The size and composition of our General Reserve of Artillery at home must be determined by our estimate of the troops required and the difficulties to be overcome in the most important theaters of probable operations. A rough estimate of a reserve proportioned to an army of 3 corps of 12 divisions is made in Paragraph 68 below.

47. The General Reserve of Artillery should exist in nucleus in peace time, capable of expansion to meet war needs. In our peace army there should exist and function artillery of each type that is to be employed in war, so that development may go on, and so that personnel, at least in reduced numbers, may have experience in the special methods appropriate for each type.

48. Ammunition Supply. The system of ammunition supply in vogue in our army during this war is, in general outline, as follows: The Chief of Artillery of an army estimates the ammunition needed for any definite project, as well as for average daily consumption, and shows the amounts to be held in army dumps, in corps and divisional dumps and with batteries. G-4 of the army has a call made for this ammunition from the rear. It is moved up to the army dumps and credits are given corps artillery commanders to cover allotments for definite projects, or to keep dumps and troops supplied up to the regular authorized allowances. Corps artillery commanders allocate ammunition to the divisional artillery commanders, and to the corps artillery, to meet their daily or extraordinary needs; and divisional artillery commanders, similarly, allocate to regimental commanders the ammunition for distribution to batteries. G-4 of the army has control of the receipts of ammunition at army depots and its issue

therefrom, while corps and divisional artillery commanders have control of the ammunition in their own dumps.

As for transportation, the corps artillery commander is responsible for the movement of ammunition from army dumps, and arranges with divisional artillery commanders the details of distribution, sometimes hauling by means of corps ammunition train to crops dumps, and sometimes direct to divisional dumps, as might be most convenient. Similarly, divisional ammuntion trains sometimes are required to haul from corps dumps only to divisional dumps, and then again to make the haul direct through to the batteries. Regimental combat trains have habitually drawn from divisional dumps. The whole system is necessarily very flexible, its operation depending largely upon the situation of the moment, the ruling consideration being to avoid double handling of ammunition wherever possible. Where light railways are available, the corps artillery commander arranges with G-4, and his transportation agents, for such assistance as can be given; but the movement, at least from corps dumps forward, has generally been by the trucks of the corps and divisional ammunition train, and by the caissons of the regimental combat train.

It has been patent to all familiar with the circumstances that our ammunition supply system has not operated smoothly. The system itself was essentially that in use in other armies, and, as shown by their experience, was not unsound; but we did not soon enough grasp the magnitude of the task involved and provide the large numbers of skilled personnel needed for receiving, sorting and issuing this ammunition at the dumps, and for forwarding it to the guns; moreover, we did not provide an adequate number of well equipped dumps.

49. It being assumed that it is the function of G-4, G.H.Q., to get the necessary quantities of ammunition forward to army dumps, an analysis of the essential elements involved in distributing ammunition from army dumps to guns may be made as follows:

(a) To get the ammunition deployed into corps and divisional dumps so as to relieve congestion at army dumps, and so as to facilitate rapid distribution when emergencies arise.

(b) To regulate distribution from these corps and divisional dumps

so that only the absolutely necessary amount of ammunition is scattered in battery positions, thus enabling the higher artillery commanders to check waste and distribute the ammunition to meet the requirements of combat.

(c) To select sites for dumps, on railway lines if possible, and properly located with respect to organization to be served and roads available; then to construct at these sites the necessary platforms for projectiles, shelters for powder and fuses, roads for incoming and outgoing traffic, --all with a view to safety precautions and concealment from observation.

(d) To provide for each of these dumps adequate trained personnel, acquainted with kinds and types of ammunition, and to receive, sort and issue the ammunition.

(e) To transport all ammunition from army dumps to corps and divisional dumps and to battery positions, so as to make the best use of all available means of transportation, railway, trucks and caissons, saving double handling wherever possible, and insuring the ammunition reaching the batteries in the kinds needed and at the times wanted.

50. Our experience has shown that it is indispensable to fix the responsibility for the working of this whole complex process as closely as possible on one definite agency. Of course, one agency cannot perform the work independently of assistance and independently of coordination. Thus, Railway transportation, dump selection and construction, and road traffic are necessarily matters involving special assistance and coordination; but these are merely incidents to the main executive problem of giving the necessary orders for regulating the flow of ammunition from army dumps to guns, and of controlling day and night the truck transportation required to move ammunition to the places where it is required.

51. The artillery is now charged with the foregoing responsibility. Recently it has been proposed that the Ordnance Department should man all dumps and ammunition trains and, acting under G-4, should take over the question of ammunition supply.

On the face of it this proposition looks promising. It fits into the existing diagrammatic scheme of supply and should apparently relieve

the artillery of an onerous burden, leaving it free to look only to the front and fight the guns. But closer examination brings up the question whether such a plan is the best for meeting the conditions of actual combat, and whether the responsibility for ammunition supply can properly be completely shifted to G-4 and the Ordnance Department.

If the Ordnance Department could have actually in being at the beginning of a war the trained personnel complete for manning dumps and ammunition trains, and if this personnel under its own officers could work in the field with troops and thus acquire practice and experience in field conditions, the proposition would undoubtedly have a great deal in its favor. But undoubtedly we will not be able to maintain such organizations in time of peace. All that we can hope for is a skeleton organization which can be expanded quickly on the outbreak of war. If this skeleton organization is to be valuable to work with troops it should be with the troops in time of peace so as to gain experience under field conditions; and if this condition is fulfilled it would be better to have them pertain to the troops which they will serve, on the general principle that loyalty should be toward the immediate commander and not toward some distant authority. It is obvious that the Ordnance personnel existing at the beginning of a war will all be required to carry on the work of construction and manufacture. We would seem more liable to be able to form our ammunition supply units quickly if we attached in peace time to our larger units of artillery a small skeleton personnel, charged with the study and practice of the problem of ammunition supply, and capable of quickly instructing the great numbers of recruits brought in on the outbreak of war to afford the necessary expansion.

But there is another and far larger question involved. Ammunition supply in the forward areas is not carried on as per a diagrammatic scheme. The requirements of ammunition must be foreseen and the resources, both of ammunition and of transportation, must be adapted quickly to meet rapidly changing conditions. The chain of responsibility ought to be continuous. The men who serve the forward dumps and those who man corps and divisional ammunition truck trains and regimental combat

trains should all be involved in the success or failure of the guns, and they should be responsible to the commanders of these guns. Ammunition is a vital concern to the artillery. Without it the guns are idle, and artillery commanders must inevitably carry a large part of the responsibility of seeing that the guns are kept active. They must give quick decisions during combat as to the distribution of available ammunition and get prompt action thereon. To get the ammunition up is just as much the function of the artillery as it is to get the guns up. It is a function of command. To introduce the Ordnance Department into the scheme of ammunition supply at the front is merely to introduce an additional agency charged with a portion of the work to be done. Responsibility, instead of being single, would be divided between the artillery and the ordnance.

For the foregoing reasons it is not thought desirable to introduce the Ordnance Department as an active agent in the distribution of ammunition in the forward areas.

52. The proposition is also frequently made that G-4 in divisions or corps should, without any intermediary agency, take over ammunition supply and run it from his own office. A careful analysis of the considerations involved, backed up by any experience in the matter, shows that this would necessarily mean dividing responsibility for the continued activity of the guns between G-4 and the artillery commanders. But, in addition, it would be wrong in principle to burden G-4 with such a duty. He is a staff officer specially provided to harmonize the operation of all the different services engaged in supply. If he absorbs the functions of the heads of these services, he will be overloaded with work, will not have the leisure or the outlook qualifying him to perform the larger duties for which he is provided, and he will confuse the whole system of responsibility.

53. It is believed that responsibility for ammunition supply should remain with the artillery. But it is very important:

(a) To prepare at once a manual of ammunition supply showing the organization needed and the duties involved.

(b) To make ammunition supply one of the essential subjects of artillery training, to be taught at our schools and practiced on the training grounds

and at maneuvers.

(c) To have a skeleton organization for ammunition supply for each artillery command from the battalion to the army, comprising a few permanent officers and noncommissioned officers specially instructed in the care, handling and movement of ammunition and the layout of dumps. If our military policy involves a reserve system, then reservists should be listed in sufficient numbers to make up the full quota of each ammunition supply unit.

At each artillery headquarters, from the battalion up to headquarters army artillery, there must be an ammunition officer with the necessary clerks; for each battalion there must be a combat train; and for each division, corps and army there must be dump and transportation personnel and the necessary ammunition trains.

54. Armament. For divisional artillery a gun and howitzer are needed.

The gun should fire a projectile of at least 15 pounds weight, should have an extreme range of at least 11,000 yards, the largest possible angle of traverse and of elevation consistent with strength and endurance of the mount, independent line of sight and panoramic sighting devide. The 75 mm. has proved very serviceable, but the new British 18-pounder looks more useful in that it fires a heavier projectile to a longer range. Our ordnance engineers should give us a gun having at least the power and mobility of the 18-pounder with, if possible, a wider angle of traverse on the carriage.

The howitzer should have the greatest power consistent with necessary mobility. Great rapidity of fire is not necessary, -- the task of the divisional howitzer being to destroy material objects which stop the infantry, such as houses and other masonry constructions, and to get at the personnel thus protected. The moral effect of a large shell bursting near infantry is far greater than that of a small shell. Taking both moral and material effect into consideration it is probably true that, for the same tonnage of ammunition fired, the 155 mm. will produce as much, if not more effect, than a smaller caliber. The 155 mm. has shown itself in this war to have the necessary mobility, when horse drawn, and now that it is motor drawn it appears to have an ample

margin of mobility. By retaining it for our **divisional** artillery as well as corps artillery we have an all-round gun that can be used interchangeably for both purposes. The division is in reality often required to do counter-battery work, because the **corps** cannot do it all, or because the division is acting more or less alone. For all these reasons it is considered that the 155 mm. should be retained as our divisional howitzer. It is the weapon that has stood the test in this war as a divisional howitzer both for ourselves and for the French. It is true that the British and the Germans have a lighter divisional howitzer; but they had these howitzers before the war began and could not very well change them. It is extremely doubtful if the French will adopt a howitzer lighter than the 155 for their divisions.

55. For Corps artillery, howitzers are needed for counter-battery and for destruction of specially resistant material objects; while guns are needed for counter-battery, as well as for harassing the area immediately in rear of the enemy's front lines, for interfering with reinforcements or retirement, and disorganizing his system of command, communication and supply.

The 155 mm. howitzer is the weapon especially adapted to counter-battery work. Its present extreme range, using the strong powder charge, is about 12,000 **yards**. It would be desirable to have this as a normal range, since the experience of this war has shown that a great deal of counter-battery had to be done at ranges of 12,000 yards, and even beyond. Until the ballistics of the howitzer are noticeably improved it will be necessary to use the strong powder charge, (D05), in larger proportions than heretofore permitted. The proportion of the strong powder to the weak should be 75 to 25.

The gun which has been most useful to our corps artillery, and which it has used with great effect in moving warfare for interdiction on the rear of the enemy's lines, is the 155 G.P.F., firing a projectile of about 100 pounds weight to an extreme range of about 17,500 yards. But the Germans, with their 150 mm. gun, get an extreme range of about 24,500 yards, and the British, with the horse-drawn 60-pounder, get a range of about 14,000 yards. The criticism to be made on the 155 G.P.F.

is that it does not give us a range proportionate to its weight.

We want a gun for corps artillery which will fire a projectile weighing at least 60 pounds to a range of 18,000 yards and yet be considerably more mobile than the G.P.F. Its total weight should not be more than 7 or 8 tons, to permit prompt occupation of positions, and also to avoid being held up by the smaller bridges of a country. No gun is now available having the foregoing characteristics. Study and experimentation should be carried on to produce one. If it is true, as reported, that our 4.7 gun is capable of a range of 15,000 yards with a 45-pound projectile, then this gun should be retained for the present; without it there is too big a gap between the mobility of the 75 mm. and that of the 155 G.P.F. Such a gun should assist materially in counter-battery, and carry on the work to ranges of which the 155 mm. howitzer is not now capable. The G.P.F. should be retained in the corps for counter-battery and interdiction, especially at the longer ranges.

Assuming then that the 4.7 gun, with a 45-pound projectile, is capable of a range of 15,000 yards, the brigade of organic corps artillery, recommended in Paragraph 46, should include:

A regiment of 155 mm. howitzers

A regiment of 4.7-inch guns

A regiment of 155 mm. G.P.F.

56. For heavy and superheavy artillery, to be used by the army, or assigned as needed to corps, there is required:

(a) A gun of about 6-inch caliber capable of a range of about 24,000 yards. This gun will be used for long-range interdictions and destructions, especially by the Army Artillery Commander.

(b) A heavy howitzer of about 9.6-inch caliber and a range of about 18,000 yards. This howitzer is needed to destroy material objects beyond the power of the 155 to destroy. It must have the mobility permitting it to follow the troops freely and to be pushed up fairly close behind the lines. It would be used primarily as a corps artillery howitzer. The 8-inch howitzer of older model, which were furnished our troops just before the armistice, were of little or no use due to their very short range; they are hardly worth considering for the future. The latest models of 8-inch, getting a range of about 11,000 yards, and the 240 mm.

howitzer may be used until a more efficient type has been devised.

(c) Superheavy guns transported, as a rule, on railway mounts. The guns of this type will be suitable for use in the mobile defense of our coasts at home, as well as for important operations abroad. Guns of about 8-inch and 14-inch caliber, and a howitzer of about 12-inch caliber, are required, with extreme ranges of at least 20,000 yards in the case of the howitzer, of 30,000 yards for the 8-inch gun, and 40,000 yards for the 14-inch gun.

57. For anti-aircraft artillery two types are needed: a high-velocity gun of about 3-inch caliber on a mobile mount for accompanying the troops under all conditions; and a high-velocity gun of about 4-inch caliber, on mobile or semi-permanent mount, for defense of important localities.

58. 60-inch searchlights carried on light trucks are necessary for use in connection with the anti-aircraft defense.

59. A mountain howitzer must be developed of about 3-inch caliber and effective up to ranges of at least 6000 yards. A shield is not necessary for this howitzer. It must be very simple, and very strong, and capable of being put together readily.

60. A trench mortar of about 6-inch caliber and a range of about 2,000 yards is deemed requisite. The Newton-Stokes is not sufficiently accurate. Experiments should be conducted with a view to producing a mortar, firing a projectile having a very large bursting charge, but yet a very mobile weapon suitable for transportation in trenches.

61. The armament above recommended may be summarized as follows:

CALIBER		WEIGHT OF PROJECTILE	RANGE	INITIAL VELOCITY
Gun	Howitzer	Pounds	Yards	f.s.
3-inch		15	11,000	
	155 mm.	98	12,000	
4.7-inch		45	15,000	
155mm GPF		96	17,500	
6-inch		100	24,000	
	9.6-inch	400	10,000	
8-inch		225	30,000	
	12-inch	750	20,000	
14-inch		1500	40,000	
3-inch AA		15		2600
4-inch AA		30		2600
	3-inch Pack Artillery	15	6,000	
	6-inch Trench Mortar	50	2,000	

C O N C L U S I O N S

Organization

62. No very radical changes in artillery organization are suggested by our experience in this war. The following general recommendations are made; for changes in detail, not inconsistent with these recommendations, see the Proceedings of a Board of Artillery Officers convened at G.H.Q., A.E.F., December 9, 1918, of which Brigadier General Andrew Hero, Jr., was President.

63. The Battery of artillery should comprise, normally, 4 guns; but for anti-aircraft artillery and superheavy artillery, a battery of 2 guns is to be recommended.

Light caissons should be assigned batteries of 75 mm. The ammunition for all other types of artillery should be in trailers hauled by tractors, or else in trucks. Tractorized 75 mm. batteries should have trailers, in lieu of caissons, and the design and test of a suitable trailer for this type should be immediately undertaken.

64. The Battalion (preferably termed "The Group") should comprise 3 batteries in the case of 75 mm. regiments, 4 batteries in the case of anti-aircraft artillery, and 2 batteries in the case of all the heavier types of artillery. The two-battery battalion is to be preferred for the heavier types of artillery because this organization lends itself best to association with the various infantry commands, and also to carrying out the variety of missions they are called upon to perform.

Each battalion should include an ammunition battery in addition to the gun batteries, providing the "combat train" for the battalion. This will be made up of the individual combat trains heretofore pertaining to each battery, the change being based on the experience gained in this war. The ammunition carried with each battery, plus that in the battalion combat train, should amount to approximately the following:

	ROUNDS PER GUN
75 mm.	300
155 mm.	130
4.7	100
155 G.P.F.	100
Heavier Types.	25 to 50
A.A.A..	50

The foregoing amounts constitute about a "day of fire."

65. The Regiment should comprise 2 battalions in the case of 75's and 3 battalions in the case of all other artillery.

The headquarters company now existing in each regiment should be broken up and one section, suitably organized, assigned to regimental headquarters and one to each battalion headquarters.

The signal details in batteries, battalions and at regimental headquarters should be largely increased to meet the requirements as actually developed during this war. (See Hero Report).

66. The Brigade of divisional artillery should comprise:

2 regiments of 75's, or 3-inch
1 " " 155 mm. howitzers
1 ammunition train, with personnel for manning divisional dumps (artillery personnel)
1 mobile ordnance repair shop (attached ordnance troops)

(1) The trench mortar batteries should be eliminated from the division as well as from the corps. In the General Reserve of Artillery there should be trench mortar equipment comprising a mortar of about 6-inch caliber, and reserve units should be assigned for the use of these mortars where occasion demands. Instruction should take place at artillery schools in the use of mortars.

(2) The divisional ammunition train is the link between the advanced divisional dumps in front and the corps or army dumps in rear. It must be prepared to transport both infantry and artillery ammunition. It should comprise 4 ammunition companies and 1 depot company, all commanded by a lieutenant colonel. Each ammunition company should comprise 27 3-ton trucks for ammunition transport; the trucks necessary for transporting men's equipment and cooking equipment should be additional in each company. The depot company should furnish the personnel for taking care of divisional dumps, for sorting ammunition and for unloading ammunition arriving from the rear and loading that going to the front. Its personnel must be fully instructed in the care of ammunition, and must be acquainted with all the different types of ammunition to be handled. (See Table of Organization #242, Series C., November 9, 1918.)

67. The Brigade of corps artillery should comprise, normally:

1 regiment of 155 mm. howitzers
1 " " 4.7-inch guns
1 " " 155 G.P.F. guns
1 " " Anti-Aircraft Artillery
1 battalion of anti-aircraft machine guns, of 4 companies of 12 guns each
1 ammunition train, with personnel for manning corps dumps (artillery personnel)
1 flash and sound ranging battalion, comprising 2 flash and 2 sound ranging companies (artillery personnel)
1 mobile ordnance repair shop (attached ordnance troops)

The corps ammunition train should comprise 4 truck companies, as described for the divisional ammunition train, and 3 depot companies, commanded by a lieutenant colonel. Three depot companies are required since at least one dump for corps artillery and two for divisional artillery will have to be manned.

68. General Reserve of Artillery. The type army considered in this report comprises 3 corps of 12 divisions. The organic artillery recommended above for the divisions and corps of this type army may be compared with the total number of guns of all calibers used by three corps of the 1st American Army in one of its principal offensives, in order to get some idea of what our single type army will have to draw from a General Reserve in order to reinforce its divisions and corps and supply the superheavy types for army artillery. The case of the Meuse-Argonne offensive of 26th September is taken because the available data is the most exact. Only the three corps serving west of the Meuse are considered, namely, the 1st, 3rd and 5th.

	1st American Army All guns except anti-aircraft and trench mortars.	Type Army Organic artillery of divisions and corps as proposed.	Difference
26th Sept. 1918.	2194	1080	1114

Thus, assuming that the organic artillery of the three corps and twelve divisions of our type army are all in the line, 1114 guns will be needed from the General Reserve to give the type army the same number of guns employed by the three corps of the 1st Army.

On the general analogy of the ratio of calibers in the 1st Army, these additional 1114 guns required by the type army may be enumerated as follows:

		Guns or Howitzers	
20	regiments of 75 mm	480	
10	" " 155 mm howitzers . . .	240	
6	" " 4.7-inch	144	
6	" " 155 G.P.F.	144	
1	" " 6-inch	24	
2	" " 9.6-inch howitzers . . .	48	
1	" " 8-inch	12	
2	battalions " 12-inch howitzers . . .	8	
2	" " 14-inch	8	1108

On the analogy of the above, the General Reserve of Artillery appropriate for field forces comprising two armies, or a total force of about 1,250,000 men, should be approximately as follows:

CALIBERS Gun	Howitzer	REGIMENTS	GUNS OR HOWITZERS	REMARKS
75		25	600	Part to be truck or trailer carried
	155	15	360	
4.7		10	240	
155 GPF		10	240	These two types to be combined if a single caliber can be provided capable of doing the work of corps artillery.
6"		2	48	
	9.6	5	120	
8"		3	36	
	12"	3	36	
14"		2	24	
Peak Art.	3	4	96	
AAA 3" & 4"		5	120	
A.A.M.G.		10 bns.	480	
Trench Art.	6"	12 btrys	72	

RECOMMENDATIONS

69. The following special recommendations are made:

(a) That artillery be stationed in the same general locality with the groups of infantry and aeronautics, or cavalry and aeronautics, with which it is to fight, so that combined training may be often practiced and the habit of cooperation acquired.

(b) That artillery have access to ample practice grounds and a liberal ammunition supply, and that, at different periods throughout the year, winter and summer, the artillery be required to carry out tactical exercises in which batteries, regiments and brigades take part, and in which fire will have to be brought to bear on designated targets under conditions as various and difficult as those ordinarily characterizing service conditions. Reconnaissance, observation, communication and registration to

be especially practiced and developed.

(c) That while moving warfare is made the basis of all training, the special requirements of artillery in stabilized warfare be studied, foreseen and prepared for.

(d) That a 75 mm. regiment and a 155 mm. regiment in each brigade of divisional artillery be motorized and active experimentation carried on to perfect, not only the motors, but also the gun mounts and ammunition vehicles suitable for motorized artillery, as well as the details of artillery service, (reconnaissance, for example) so far as these are affected by the substitution of the motor for the horse.

(e) That a Chief of Artillery, and a Field Artillery Board for experiment, be made a permanent part of our military system, charged with foreseeing artillery needs and recommending the ways and means for meeting these needs. Anti-aircraft artillery and its special methods, motorization of artillery and the changes it will induce, guns with long range and the appropriate methods for adjusting their fire, cooperation with aeronautics, — are a few of the matters demanding immediate attention, and the steady activity of a central artillery office is required to insure development being continuously pursued.

(f) That all the artillery of the Army should be mobile Field Artillery, organized, trained and habituated to work in open warfare with troops of the other arms and living in close association with them.

III. CAVALRY.

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C A V A L R Y

GENERAL CONSIDERATIONS

70. Prior to the outbreak of the World War the principal military nations of Europe maintained forces of Cavalry amounting to approximately eight per cent of the peace strength of their standing armies. The organization, armament and training of these forces had become standardized. The tactical unit was the squadron of about 150 men formed in double rank practically all of them carried the lance and the carbine or rifle. In action the principal reliance was placed on the fireless weapon, though importance to a varying extent was conceded to fire action.

In the American cavalry the tactical unit was the troop of about 100 men formed in single rank; all of the units were larger than in Europe and the main dependance was placed on rifle fire. There were no lances, but all ranks carried sabers and automatic pistols of large caliber.

71. The primary mission of Cavalry was to defeat the enemy's cavalry, and, after crossing the frontier, to break up his communications and thus to interfere with the mobilization and concentration of his armies. If outnumbered or defeated, to maintain as long as possible a protecting screen near the frontier and hold back the enemy's enterprises. As the masses of the hostile armies came into each other's presence, the cavalry was to disappear around the flanks or through gaps, and thereafter to be held for service as offered by opportunity, such as operations against the enemy's flanks or communications, in pursuit to overtake and harass the enemy's retreating forces, or in rearguard action to delay his progress to seize important points and hold them temporarily; to act as a mobile reserve to be hurried to critical points; to take advantage of fleeting opportunities and to reap the fruits of victory.

72. On the Eastern front the lance was soon discarded because it was cumbersome and interfered with facility of dismounted fire action. On the Western front there were no great cavalry battles as had been expected, because the enemy generally declined mounted combat in favor

of machine gun and rifle fire. Such mounted action as took place occurred in minor affairs and indicated that the combat of cavalry masses was a thing of the past and that the arme blanche was relegated to second place as a cavalry weapon. The disadvantage of an inferior carbine became apparent very early, but it was then considered to be too late to make a change and to train in accordance with a new theory of fire action.

The doctrine of the American cavalry for the last 50 years, based upon the rifle as the principal weapon, has thus been fully justified, and its correctness is now generally recognized.

R O L E

73. The experiences of this war furnish but few reasons for change in our doctrine of the strategical employment of Cavalry. The Air Service (Airplanes and Balloons) has rendered great assistance in the field of strategical and tactical reconnaissance. This service is however hampered, or even stopped temporarily, by wind, clouds, fog, and cover, or by air superiority of the enemy. The Intelligence Service of armies is now so well organized and developed in the use of observation posts, flash and sound ranging, interception of messages, listening-in, and other means of securing information, that it has become almost impossible for any but highly trained forces under favorable conditions to hide their movements for a considerable period of time.

It is probable, on the whole, that the greater part of distant reconnaissance, far within the enemy's lines, will be carried out by airplanes. For near strategical, and for tactical reconnaissance, Cavalry still is necessary, for there will always be situations when definite and reliable information can be secured only by actual contact. The Cavalry itself will, of course, make use of airplanes to facilitate the performance of its mission, including reconnaissance.

74. The tactical duties of Cavalry are as important as ever. When the detailed history of the campaign comes to be written it will be found that in the war of movement more use was made of Cavalry than at present is generally supposed; also that many opportunities for important achievements were missed owing to a variety of causes, among them improper

armament and training and deficient leadership of the European Cavalry. The Board sees no reason for change in the American conception of the tactical employment of Cavalry.

75. The nature of the theater of operations, the climate, and the character of the enemy have an important bearing on the role and extent of employment of mounted forces. When a continuous line of battle rests on impassable obstacles such as the English Channel and Switzerland, the operations may partake of the nature of a siege in which there is, for a time, little use for Cavalry, except on foot as infantry. On the other hand, in tropical, arid, or sparsely populated regions of wide expanse, such as South Africa, Asia Minor and North Mexico, the functions of a mounted force may be of great importance and its numbers would probably have to be increased far above the normal proportion.

Though difficulties of terrain are generally overestimated, marshes or partly submerged ground, and very rough country are not suited for the operations of mounted troops. Cavalry, therefore, is an arm of opportunity and its probable proportionate strength in an expeditionary force belongs to the domain of preliminary strategical study.

76. While reports from the Eastern front are not yet available, a large use appears to have been made of mounted forces. Opportunities for the employment of Cavalry were not lacking on the Western front during the periods of open warfare. In the Near East, General Allenby's brilliant campaign in Asia Minor illustrates once more what can be accomplished by energetic and well-commanded Cavalry under suitable conditions.

77. Bodies of Cavalry must be prepared to do a large part of their marching on secondary roads or across country, leaving the main highways for the supply trains of the army. Study, forethought, and peace-time practice are necessary to reduce the difficulties of such movements.

78. The necessity for Cavalry as a mobile reserve has been modified by the possibility of moving considerable bodies of infantry in motor trucks. This is especially true for distances greater than 100 kilometers. Repeated experiments by the French Army appear to show that in most cases a Cavalry command can march to and occupy a position less distant than

100 kilometers more rapidly than an equivalent force of Infantry moving in trucks.

79. It should be remembered that Cavalry is an expensive arm to organize, equip and maintain. Even when ample funds are available it is sometimes impossible to supply forage on account of lack of shipping facilities. With the growing scarcity of saddle horses it becomes more and more difficult to train men and animals for Cavalry purposes. Cavalry units should therefore be kept intact as far as possible and should not be frittered away by breaking up into small fractions or by requiring duty which can be performed by other available means. Except in case of great emergency Cavalry should be so handled as to conserve it at all times in excellent condition. Unreasonable demands for as short a period as ten days might put Cavalry commands out of action for months.

80. Cavalry is normally employed on a wide front. Its patrols should seek to pervade the entire territory between the belligerent armies Its fractions should increase in size and power from front to rear, with the infantry as the ultimate reserve. The smaller units should not hesitate to charge when a favorable opportunity presents itself. For the dismounted fire fight the action of larger bodies should be guided by the principles of Infantry combat. Up-to-date Cavalry should always take advantage of the experience gained by the other arms, especially the Infantry, and adopt the most improved methods without delay.

81. The mounted combat of large bodies of Cavalry is probably a thing of the past. While still possible against mounted units, modern machinery of war has become so effective, and the use of obstacles so general, that the masses affording large targets would be destroyed by fire action before they could reach their objective. Small units, however, perhaps up to a squadron, will still have opportunities for mounted action, especially against troops that are shaken by fire or are disorganized and in retreat. Instant decision is of utmost importance in such cases.

82. The cardinal principles of Cavalry are <u>mobility</u> and <u>fire power</u>. To maintain mobility we must have handy units, good mounts, thorough training, and highly efficient young officers. For fire power we must procure the greatest possible augmentation of automatic rifles, machine guns and

mobile artillery compatible with retention of mobility. Cavalry should be so mobile that it can move for long distances at rapid gaits and enter a fight without accompaniment of anything on wheels.

O R G A N I Z A T I O N

83. Bearing in mind the indispensable requirements of modern cavalry, namely, mobility and fire power, the following organization is recommended:

THE SQUAD: (Second and Third Platoons).

1 Corporal, gunner
6 Privates
1 Pack horse
7 Total enlisted.

Upon dismounting to fight on foot the squad would consist of one corporal with automatic rifle and four privates.

THE PLATOON:

1st Platoon

1 Lieutenant

1 Sergeant, 2d in command
1 Sergeant, in charge of led horses
2 Sergeants, on the right of sections of 2 squads each
1 Private, horse holder
30 Privates
35 Total enlisted.

2nd Platoon

1 Lieutenant

1 Sergeant, 2d in command
1 Sergeant, in charge of led horses
1 Private, horse holder
4 Squads
31 Total enlisted.

3rd Platoon

Same as second platoon.

Only the second and third platoons carry automatic rifles, a total of eight for the troop.

THE TROOP:

1 Captain		
2 1st Lieutenants	(One as second in command and in charge of led horses)	
2 2nd Lieutenants		
1 1st Sergeant		
2 Sergeants		
2 Buglers	with the captain	
2 Privates, Liaison		7
1st Platoon		35
2nd Platoon		31
3rd Platoon		31
Liaison and replacement		6
Out of ranks		
1 Mess Sergeant		1
3 Cooks		3
1 Clerk		1
		115

Total: 5 officers, 115 enlisted men.

For classification of the Troop see Table No. 504, WD, 1918.

THE SQUADRON:

To consist of headquarters and four troops; see Table 504, W.D., 1918.

THE REGIMENT:

To consist of headquarters, headquarters troop, supply troop, and three squadrons, about as in Tables of Organization No. 504, W.D., 1918, except as to the Machine Gun Troop. This makes the strength of the regiment of Cavalry 90 officers and 1734 men, with medical, veterinary and ordnance groups attached.

THE BRIGADE:

To consist of Brigade Headquarters, 2 regiments of Cavalry and a machine gun squadron of four troops. Total: about 4500 officers and men.

THE DIVISION:

The Division is to be composed of 2 brigades, with auxiliary services as stated in Table of Organization, No. 501, W.D., 1918, with reduced effectives, about 15,500.

In working out complete new tables of organization, the artillery regiment should be left intact, but reductions should be made in the Engineers, Signal Battalion, Military Police, Ammunition Train, Supply Train, Engineer Train and Sanitary Train in accordance with the diminished requirements. This would leave the division with an aggregate of about

13,500 officers and men, of whom about 7,300 will be in the Cavalry Regiments.

MACHINE GUNS:

The organization of machine guns has given rise to much discussion, the advantages and disadvantages being considered from technical and tactical points of view. Uniformity and efficiency in tactical as well as technical instruction can best be secured under supervision of an expert field officer.

Cavalry squadrons and regiments on independent missions should ordinarily have machine guns assigned to them, unless their movements are to be so rapid that machine guns would seriously delay them. For the purpose of obtaining practice in working together machine guns should be frequently attached to cavalry regiments and smaller commands during tactical exercises and extended maneuvers.

In campaign additional machine guns may be asked for from corps or army headquarters for special purposes.

It is believed that the machine gun troop should be of about the same size as the troop in the squadron, 115 men with 5 officers, formed into three platoons of one officer and twenty-eight enlisted men each.

The Board recommends the assignment of a squadron of four troops to each brigade, and a motorized squadron of two troops with armored cars to a division.

The machine gun organization of a division is then as follows:

	Guns
Brigade M.G. Squadrons: 2 squadrons, each of four troops	48
Division M.G. Squadron:	12
Total	60

There should be a machine gun officer with rank of lieutenant-colonel on the Division Staff, to have general supervision over the machine gun units of the division.

In each brigade one of the troops of the machine gun squadron should be provided with anti-aircraft mounts so as to be able to protect camps and picket lines. Similar provision should be made in the

divisional squadron.

ARTILLERY: The assignment of one regiment of Horse Artillery, caliber 75 mm, 24 guns, is considered satisfactory equipment for ordinary purposes. Under special conditions artillery of heavier caliber or special character can be temporarily attached from the corps or army organizations. A liberal supply of anti-aircraft artillery will in many cases be necessary.

LIAISON: The greatly increased importance of communication is apparent in every activity in the war of movement. However, it is thought there will not be sufficient time and stability to lay wires in advance of the Cavalry division. Communications from detachments and troops should be by mounted orderlies or runners; from squadrons, by orderlies or motorcylists; from the regiment, by motorcylists or wireless, and from higher units by the best means available.

There should be ten motorcycles, solo, and two pack wireless outfits at each regimental headquarters. The equipment at brigade and division headquarters should be as given in tables of organization.

For the Ordnance Department, Medical Department, and Veterinary Units, the personnel and equipment prescribed is deemed satisfactory.

DEMOLITION: Equipment of pack animals and outfits to be as at present prescribed.

SUMMARY OF ORGANIZATION:

3 platoons make 1 troop;
4 troops make 1 squadron;
3 squadrons make 1 regiment;
2 regiments and one machine gun sqdn. make 1 brigade;
2 brigades
1 regiment horse artillery } - make 1 division.
1 M. G. Squadron

The staff and auxiliary services for the various units as at present prescribed in tables of organization, with the amendments indicated, are deemed satisfactory.

84. The proportion of Cavalry that should be assigned to the higher units would vary greatly with circumstances. In trench warfare, for example, there would be practically no use for mounted cavalry. In a war of maneuver, however, the opportunities for the use of cavalry are as great as ever. Positions in which both flanks rest on impassable obstacles and which can not be turned are the exception in war.

For the normal case the assignment of two regiments of cavalry

as corps troops as stated in Tables of Organization, Series B, Nov. 1, 1 is considered satisfactory. The Board therefore recommends that a briga of cavalry be assigned to each army corps. Detachments can be made from this force to divisions as required.

For an army of 4-500,000 the Board recommends the creation of a minimum of three cavalry divisions, in addition to the brigades for Corps Cavalry.

The Board recommends that a command and reconnaissance squadron eight to ten airplanes be made an integral part of the cavalry division.

85. REPLACEMENTS.

To keep up the numerical strength and efficiency of the cavalry units it is indispensable that replacements be provided from time to time, consisting of men at least partially instructed, that is, able to ride and to use their weapons, and of animals broken and bridle-wise. Without an organization from which replacements can be drawn, the regiment in campaign soon become filled with inexperienced officers, raw recruits, and green horses from the range and from remount depots. Regiments with fine reputations would deteriorate rapidly and become a disappointment to their commanders and the government.

It is therefore recommended that for the Cavalry of the entire Army depots of sufficient number and strength be provided to maintain the brigades and divisions at full strength, as nearly as practicable.

ARMAMENT AND EQUIPMENT.

86. The Rifle. The trooper should be armed with the best rifle obtainable. The carbine is inferior in range and accuracy, and when firing rifle ammunition has a severe recoil. To arm troops with a weapon known to be inferior furnishes an excuse in advance for lack of determination in the attack.

The Pistol. The automatic pistol, caliber 45, is an effective weapon for individual combat at close quarters, is a favorite weapon with our troops and has much prestige in the West and South. It is therefore retained as part of the troopers armament.

The Saber. Unless we are ready to give up entirely the idea of the mounted charge by bodies of troops in ranks the saber should be retain

as the most suitable and convenient weapon for that form of combat.

The Bayonet: In order to place the dismounted cavalry soldier on an equal footing with the enemy, especially if fighting on foot, at night, or in a fog, the bayonet is adopted as part of the trooper's armament.

Bandoleers: Full advantage of the combination of mobility and fire power can only be secured by an increased supply of ammunition quickly available. A convenient way to carry extra ammunition is in a bandoleer around the horse's neck. This equipment is recommended for adoption.

Pack Animals: To carry the automatic rifle and a supply of ammunition, pack horses equipped with pack saddles are to be provided. To retain mobility the load should not exceed 180 pounds, made up approximately of the automatic rifle, an extra barrel, and 1800 cartridges. With the cartridges carried by the troopers the supply for the automatic would reach 3500, leaving 100 rounds per man in the dismounted squad. This is believed to be ample for a day's firing. In any case the pack horse can be taken back to the train for replenishment.

No change is suggested in the remainder of the equipment. It is presumed that steel helmets and gas masks will form part of the ordinary equipment when necessary.

TACTICS AND TRAINING.

87. The activities of Cavalry may be classified under three general heads:

(a) Mounted, which is the typical form of cavalry activity.

(b) Dismounted. In this case the troopers have recently descended from their mounts, the horses are under cover in charge of horse holders, and the troopers are expected to remount before resuming extended movement.

(c) Afoot. The troopers are separated from their horses and do not expect to mount. In many of the ordinary duties about the garrison or camp, such as going to and from stables or target practice, we have cavalry afoot, not dismounted cavalry. Also, when the animals are sent to the rear and the troops take their place in the trenches; or when the horses are left at home and the regiment is sent overseas without them, we have cases of cavalry afoot.

The clear distinction between dismounted cavalry and cavalry afoot will simplify matters very much, for in the former they have their own drill regulations, while in the latter the formation and movements should be those of the infantry, for example, guard mounting afoot, defence of a camp against night attack.

The principles of mounted tactics as taught in the American cavalry are believed to be correct, the control of action by personall leadership being emphasized in all units. The troops should have ample practice in operating on a broad front in widely disseminated formations, in maintaining constant liaison, and in assembling quickly for united action mounted or dismounted.

Close order drill, mounted, and training for attack, in units to include the squadron, are necessary for cohesion and discipline. A thorough course in equitation and the practice of bold riding across country will develop the highly valuable aggressive spirit.

Instruction in scouting, orientation, map reading, judging country, and minor tactical problems is of the highest importance to prepare for mounted detached action in campaign.

All cavalry soldiers should become quick and skillful with the rifle. Our present course of target practice should be continued and the field firing stimulated by availability of suitable terrain and diversity of problem.

For the automatic rifle the principle should be laid down that its best use is as a rapid single shot self loader, each shot being an aimed shot. Bursts of three or four shots should only be fired when there is a muzzle rest, and the whole clip should not be fired automatically except in great emergencies.

There should be practice with the pistol at all seasons of the year in addition to the regular target course.

Instruction in the use of the saber has been reduced to a simple process and should be continued.

Dismounted fire action is now the most important battle action of cavalry and should be frequently practiced. The principles are laid down in the drill regulations. As cavalry has not the numbers and hence not the depth of infantry, it must seek quick decisions, take advantage of its

mobility and look for the enemy's flanks. Its training must be such as to enable it to deliver a determined attack on foot, and it should be especially skillful and strong in delaying actions, making use of its automatic rifles and machine guns. It must learn to find cover for its led horses and to counteract the activity of enemy airplanes by moving and scattering.

Proper care of animals and equipment is essential to preservation of efficiency in a cavalry command. When the regular supply of forage runs short substitutes must be sought and every effort made to keep the animals from running down in flesh.

With the increased loads required to be carried by troops horses, in spite of the elimination of all non-essentials, much of the marching should be with the trooper on foot, and for that reason all cavalry soldiers should have marching shoes. Long and rapid marches can be made by cavalry with relatively little fatigue if the men be frequently required to dismount and walk. It is believed that this feature alone would have conserved the energy of many a mounted command which was ruined by practically continuous occupation of the saddle.

MISCELLANEOUS.

88. One of the most interesting experiences of the war is the clean-cut demonstration that responsibility for the condition of animals, equipment and transportation rests upon commanding officers. Their knowledge, initiative and energy should produce good results, even under adverse conditions. Without going into repetition of regulations the following may be emphasized:

1. Footing. Dry footing to be provided at once, the whole command to work if necessary.

2. Shelter. Protection against rain and also against cold wind to be provided as soon as possible. Nearly always easy to improvise in a country with woods or brush.

3. Feeding. At least three times a day, and so that not an ounce of the hay or grain ration can be wasted.

4. Clipping. Indispensable, to combat lice and other vermin.

5. Dipping. Only efficient cure for mange; to be put into operation as a preventative at the earliest indication of the disease.

6. Equipment. Inspection and relentless follow-up of orders will produce results.

7. Transportation. By stimulating the pride of teamsters transportation can be made clean and bright instead of dirty, rusty and dingy. In addition to the regular teamster one extra man should be assigned to duty with the team of four animals.

8. Veterinary Service. This should be encouraged by personal interest of commanding officers, and shoeing looked after with special care.

9. Horseshows. One of the most efficient and pleasant means of bringing up the condition of animals, equipment and transportation. The contests in equitation and competition in appearance of transportation not only set standards of comparison visible to all but arouse a spirit of emulation most beneficial in its results.

Carrying the Rifle. This has been a difficult problem for a long time. No satisfactory way of carrying the rifle on the saddle has yet been devised. The dead weight of 15 pounds is difficult to counterbalance, and, whether supported by the cantle or the pommel, tends to produce sores. The rifle interferes with the rider's leg and at rapid gaits gives rise to violent oscillations. Slung on the rider's back the rifle is irksome and causes fatigue to troops not hardened to this method.

Possibly the main objection to having the rifle on the rider's back dates from the time before posting replaced the square trot in our cavalry service. However, with the necessity of carrying increased loads on the horse to feed the automatic rifle and supply the equipment required by the trooper in modern war, it becomes imperative to reduce the non-elastic dead weight and the pressures causing sore back and extreme fatigue on the horse. Our infantry did carry their heavy pack in France and Germany, and while the board does not wish to lay down a dictum for all climates and conditions, it believes the time has come for the cavalry soldier to realize that it is up to him to make the sacrifice of slinging the rifle on his back and not putting it all on the horse.

Chief of Cavalry. A capable officer of long service and wide experience in the cavalry should be assigned to duty as Chief of Cavalry, with station in Washington in time of peace, and at headquarters of the armies in the field in time of war.

In conformity with general policies promulgated by the War Department this officer, with the necessary staff, would maintain a special center of information as to all matters pertaining to the cavalry arm, prepare manuals and courses of training; submit recommendations as to arms, equipment and organization in order to keep the cavalry up to date; formulate a doctrine for the cavalry of the army and by inspections secure uniformity of instruction and the attainment of the prescribed standard of efficiency. He would be consulted by the Chief of Staff in all matters pertaining especially to the cavalry, including remount stations, breeding farms, purchase of animals, maneuver grounds, stations of regiments, details of officers, and the numbers and equipment of cavalry forces in proposed expeditions.

The very fact that an officer of rank and force is stationed at the highest headquarters and charged with looking after their interests would raise the morale of the regiments and heighten the prestige of the cavalry.

CONCLUSION.

89. For several reasons very little American cavalry was brought to Europe and no considerable use was made of it in the field. This naturally led to some disappointment, especially when opportunities for the profitable employment of cavalry according to American ideas were observed. However, many officers and former non-commissioned officers of our cavalry served with credit in all the branches and activities of the army, both in the field of operations and the service of supply.

No war is like its predecessor. It is improbable that the conditions of Northern France will ever be reproduced on American soil The entire Western front would extend only one-third of the way across the State of Texas.

The lack of immediately decisive results generally makes its appearance when there is no efficient mounted force available to harvest

the fruits of victory. The campaigns in Palestine and the operations in Northern Italy during October and November 1918 furnish a basis for interesting comparisons with results obtained on the Western front.

On other fields and under different conditions our cavalry will find useful employment as in the past. With heightened mobility, increased fire power, and under command of alert, vigorous and enthusiastic officers, it can look forward to the opportunities of the future with confidence.

The conclusions and recommendations of a cavalry board consisting of Brig. Gen. E. L. King, Col. S. R. Gleaves and Col. J. C. Montgomery, U. S. Army, as stated in copy of report hereto appended, in so far as they do not conflict with the action of the Superior Board, are approved.

IV. THE AIR SERVICE

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THE AIR SERVICE.

90. Introduction. The American Air Service came into the war with only one or two squadrons in being, equipped with an inferior type of Training Plane. It was necessary to build or purchase the type of planes used on the front and in addition to train and instruct the pilots for them. At the same time, the squadrons had to be organized and the mechanics and other artisans instructed in their duties. All this preliminary, required assistance of every sort from both French and British sources. Instructors were obtained and planes and accessories were purchased.

Aviation being so new, it was in a constant state of evolution. New, faster and better types of planes were being constructed. The methods of handling them, (the tactics of flying) were changing. From the original, individual plane and pilot pursuing a given mission was developed the pair and finally the flight of three to six or more planes in formation. In general a formation came to consist of five planes flying at three different levels, in a "V" shaped form, under the direction of the leader, who was at the apex of the "V".

This development was coincident with the immense changes in the type and equipment of the plane. The armament grew from one machine gun to five; in one type, to the mounting of a small gun in addition to the machine gun; in bombing types, from those carrying a few small bombs to the giant types carrying nearly a ton of explosives. The power of the motors was greatly increased so that the speed and carrying capacity of the plane constantly grew in proportion. These great changes in the short space of three or four years were such that the lessons learned in one season were hardly available in time for use in the next.

91. Development. Tactics - The Air Service developed along the following general lines:

(a) Observation, contact and artillery registration.
(b) Distant reconnaissance and bombing operations.
(c) Aerial combat.
(d) Combat against ground troops.

All four of these functions will continue in the future and increase in scope. However, the last is susceptible of greater development,

The combat against ground troops did not become noticeable until 1918, and did not reach its maximum capabilities by the end of the war. This class of aerial work can be made more efficacious and decisive than the distant bombing operations and should receive the greatest attention.

In order to successfully combat this form of aerial attack, there appears to be no reason why an efficient and extensive Countor-aerial Service should not be developed. Hand in hand with the foregoing, there must be a Security Aerial Service, i. e., a service for the protection of the ground troops from aerial attacks.

The intimate association required between the ground troops and the aerial units assisting or operating with them demands that these two elements be an integral part of the same command - and as a consequence, the corps and divisions must have Air units regularly assigned to them. These units must move with them, and be considered just as much a part of the corps and division as the Infantry, Artillery and other arms.

On the other hand, the Aerial forces required for distant or strategical reconnaissance and bombing operations need have little association with the ground troops. The system of concentrating in the army troops, all protection, reconnaissance and bombing units, has not met the battle field needs and will be obsolete with future development.

Our experience then can be summarized as follows - The Air Service development, organization and utilization should be:

(1) Reconnaissance, contact, observation, and registration units to be integral elements of Divisions and Army Corps.

(2) Tactical combat and bombing units, and battle field security service units, to be integral parts of the Army Corps and the Army.

(3) Strategical bombing, reconnaissance and combat units, to be elements of the Army troops.

92. In General. Nothing so far brought out in the war shows that Aerial activities can be carried on, independently of ground troops, to such an extent as to materially affect the conduct of the war as a whole. It is possible, perhaps, that future wars may develop aerial forces of far greater extent than those provided in this war. It is safe to assume that Air forces will not be developed for war purposes to such an extent as to largely supplant ground and water forces, until such a proportion of the people become air-faring people

as now are known as sea-faring people. In other words, aerial activity must bear much the same realtion to the commerical life of the nation as at present sea-faring activities bear to public trade and commerce.

There are two factors for the present which must be considered- First, the expensiveness of the material and the provisions for its special maintenance. If it becomes possible to use in a war only Aerial forces, the matter of expense is not a paramount question. But, if on the other hand it is necessary to maintain ground and water forces for the war, then the expense of aerial forces must be considered and the Aviation provided must bear its proper relation to the other forces.

Second, the question of superior command must be considered. If a war should take place where only Aerial forces are used, question of authority between ground and air forces naturally would not arise, because the superior Command would rest in the proper Air Commander. When, however, ground forces are to be used, and so long as present conditions prevail, we believe ground forces will continue to be the major part of those provided, the authority must be vested in the Commander of the Ground Forces, and Aviation must continue to be one of the auxiliaries of the principal arm, the Infantry. For the present, all questions of Air tactics, Air strategy and employment of Aviation must be governed by the well known and established principles of military art. Superior officers must be so thoroughly well grounded in the fundamentals of war that this important auxiliary will be used always in pursuance of the paramount object.

93. Organization. The Tables of Organization already in use appear to be, in general, based on sound lines. Slight changes should be made in order to conform to the experience we have had. The principal ones to be noted are the following:

Divisions - The command and observation squadron should be smaller than the present type and should consist of about 8 or 10 planes. There should be in addition to this squadron, permanently attached to the Division, a Balloon Company, a Photographic unit and a Branch Intelligence office.

Army Corps - The squadron should consist of 19 planes and an organization of men and officers about as at present constituted. Combat (pursuit) and bombing squadrons should be added to the Corps Group so that the Air Force with the corps should be a complete force which will function as a unit under the most usual battle conditions.

Army - Combat, Observation and Bombing units about as at present constituted, due allowance being made for the Combat and Bombing units placed under the Army Corps.

Minor changes in the Tables of Organization and in the general administration of the Air Service are recommended by the Chief of that Service, which are concurred in by the Board.

V. ENGINEERS

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ENGINEERS.

94. Activities. The duties which the Corps of Engineers were actually fulfilling at the close of operations in France comprised:

Front line engineer operations of all kinds.

The supply of engineer material and equipment of all kinds, and of construction material; and the upkeep of the material and equipment.

All work of construction and the repair and maintenance of structures of every character in the territory under military control, except telephone and telegraph systems and other signal communication for the use of troops.

The operation of water supply systems, portable and fixed electric lighting systems and all other utilities of general service, except such as were particularly assigned to other services.

The furnishing of material and personnel for surveying, mapping and the issue of maps.

The operation of light railroads, including the internal signal communication for such operation.

The design, fabrication and operation of searchlights.

The design, fabrication and operation of sound and flash ranging devices.

The design, manufacture and issue of camouflage material, and the supervision of its use.

The production of timber, including firewood.

95. Services. There is no question that the functions of front line engineer operations, of engineer supply, of construction in general, and of the operation of utilities of general service should be assigned to the Corps of Engineers.

96. Mapping. The function of surveying and mapping and the issue of maps is most intimately connected in war with the 2nd Section, General Staff (G-2), and, in the present development of artillery, with the artillery service also. This activity is essentially an Engineer service, both in personnel and in material. In time of peace the systematic

preparation of maps of large areas must have expert technical supervision to secure the essential accuracy and efficiency, and the service should be continued by the same agency in war. Ground photography should be added, it being intimately connected with mapping and reproduction. The operation of sound and flash ranging devices should be transferred to the Artillery since they serve this arm exclusively.

97. Searchlights. The operation of searchlights is a technical general service operation. In its final development, this service was directed wholly to the detection of hostile airplanes and assisting friendly planes in laming. In this function it served both the air service and the artillery, without being an integral part of either. The retention by the Corps of Engineers of this activity, which it has satisfactorily developed and operated, is in the interest of the Army at large.

98. Light Railroads. The operation of light railroads should be directly administered by the Engineers. These lines are temporary in character; the construction feature is the dominant feature; their operation is physically disconnected from standard gauge operation and partakes of the service of distribution rather than the service of supply.

99. Standard Railroads. The operation of standard gauge railroads is a function whose assignment is not so easy to determine. It may be predicted, however, that if in any future war the construction feature is dominant, the Corps of Engineers will operate the railroads, while if an existing railroad system, in serviceable condition, lies in the theatre of war, the traditions of civil practice may result in its operation by a separate bureau. The Corps of Engineers should be charged with the early organization of this service, and the initial supply of personnel and material.

100. Camouflage. Camouflage material is material of construction, whose supply properly falls to the Corps of Engineers. The supervision of its use is closely connected with manufacture, and should be retained.

101. Lumbering. Experience has shown that lumbering and the production of other materials of construction in the zone of military operations can be best conducted by the Engineer Department, as an element of construction activities.

102. Chemical Warfare Service. The Chemical Warfare Service is not related to Engineer operations except that the installation of gas and flame projectors is essentially the work of Sappers. Procurement and supply of gas masks, gas for shells, and investigations looking toward further development of this Service is believed to be a proper function of the Ordnance Department. The Ordnance Department should also be charged with the design and manufacture of gas and flame projectors and other Chemical Warfare devices. All Division Engineer regiments should receive training in handling these devices but no special organization should be provided until war necessities prove them desirable.

103. Summary of Duties. The duties that the Corps of Engineers should perform in time of war, are, therefore -

All work of construction, and the repair and maintenance of all structures, of whatever character, in the territory under military control, as directed by military authority, except telephone and telegraph systems and other signal communication for the use of troops.

Military mining, demolitions, and protective measures against enemy mines; the use and operation of gas and flame projectors and other Chemical Warfare devices.

The operation of light railroads, including internal signal communication for such systems; searchlights, portable and fixed electric lighting systems, water supply systems, and all other utilities of general service, except such as are particularly assigned to other services. The operation of standard gauge railways unless these can be satisfactorily handled by existing civilian agencies or until a satisfactory Transportation Corps is organized.

The execution of surveying and mapping, including the production of maps; and ground photography.

The procurement, by purchase or manufacture, the storage and issue of all materials for constructions, for the organization of defense systems, and for all other operations assigned to the Engineer Department; and of all plant, tools, and appliances for such work, except Chemical Warfare devices, etc., furnished by Ordnance Department.

The above described duties are intended to include, among other activities: the construction, repair and maintenance of roads; of bridges and other means for crossing rivers and other obstacles; of shelter for troops and animals, including huts, hospital buildings, barracks and stables; of storehouses, shop structures, hangars, and flying fields, including in proper cases, the installation of the necessary machinery; of wharves, railroads, and light railroads; the provision of water supply, including sterilization in bulk, the provision and installation of baths, disinfectors, dipping vats, and incinerators; the installation of plumbing, sewage disposal and heating plants, the installation of machinery for refrigerating plants and laundries. Assistance to other arms in intrenching and organizing defensive lines; the organization and construction of rear lines of defense, construction of bomb proofs, observation stations, machine gun emplacements, and other special works of defense. The execution of special measures for destroying or overcoming enemy obstacles. The posting of signs for the direction of troops, including road signs, traffic signs, signs indicating the location of water points, and signs safeguarding troops against the use of impure water. The operation of electric light and power plants and water supply plants. The operation of shops for the erection and repair of railroad rolling stock, of construction machinery of all kinds, and for the manufacture of special appliances for engineer operations.

104. Fundamental Principles. Except when the special character of work absolutely requires it, as in Searchlight, Surveying, Mapping and Camouflage, no highly specialized units of engineers should be permanently assigned to the Fighting Forces.

The works of Water Supply, Electrical and Mechanical installation, shop operation and the handling of Engineer supplies together with other general engineering operations such as road and bridge construction,

in the zone of the Army proper, can better be handled by areas than by class of work.

Each Division, Corps and Army should have its own Engineer units for the engineering work which will ordinarily be encountered and these units should be trained and accustomed to work with the combat troops; to know their needs and how best to meet those needs. Such engineer units should find within themselves the necessary expert officers and men to solve the civil, mechanical, electrical, and sanitary engineering problems which will arise, and the necessary labor, skilled and otherwise, to do the needed work.

105. Proportion of Engineers. The number of engineer troops to be permanently assigned to Divisions, Corps and Army, must be based primarily on an offensive operation. If stabilization and trench warfare follow an offensive, special troops for the special constructions of underground warfare must be organized to suit the new needs. The name "Sapper" regiment should be done away with. Specialization in sapping is not to be desired because it is contrary to the offensive spirit. There is much in the name Pioneer Engineers and it should be retained.

In a determined offensive through an old stabilized front or in a rapid offensive after the break-through has occurred, Corps and Army Engineers are largely tied to the old areas and can not at once leap forward to help out Divisions. For this reason Divisions need with them a greater proportion of Engineers for offensive work than for defensive. In defensive operations it is simple, though it may not always be desirable, to send up Army Engineer troops to erect water points, build ammunition dumps, bridges, etc. In a rapid advance the Army troops are bound to be left far behind and Division Engineer units must solve their problems alone. An active enemy thoroughly trained in rear guard demolitions can make these problems extremely difficult.

106. Divisional Engineers. It has been recommended that the Engineer troops with a Division be reduced by the elimination of Regimental Headquarters and one Battalion. It is believed that this recommendation is based partly on the fact that in certain Divisions, the

temptation to use 1600 rifles in combat was so great as to cause a neglect of engineer work. The use of Engineers as infantry is not incorrect in emergencies. What was done incorrectly in this respect was to place Engineers "on idle alert" before the emergency arose. They can work on engineer work and still be "on alert". In the latter days of the war this error was not made.

It is believed that the lessons of this war justify no reduction in the Divisional Engineers but rather a slight increase to provide for the better handling of engineer supplies.

The number of wagons with the engineer regiment should be reduced by eliminating the special "tool box on wheels" and substituting a general purpose wagon as the platoon tool wagon.

The headquarters detachment of the regiment and the engineer train are neither of them large enough to function as separate organizations. The train should be combined with headquarters detachment and become an integral part of the regiment as recommended by the report of Engineer Organization Board, A.E.F., 7 April, 1919, paragraphs 15 - 19, and attached tables.

The Commanding Officer of the Divisional Regiment should be a Lieut. Colonel, as recommended by Engineer Board, rather than a Colonel. This reduction in rank is in substantial agreement with the Infantry Board's Report.

107. Corps Engineers. Experience has shown that one Pioneer Engineer regiment is insufficient for a Corps of more than two Divisions.

While Corps lines change from time to time, the Corps is after all a semi-territorial command. Corps Engineers must not only back up Divisional Engineers on maintenance of ways of communications, but they must also provide watering points, build shelters, prison cages, operate shops and lighting plants, establish and operate Corps Engineer Dumps, build Corps ammunition Dumps, provide maps showing all engineering activities, billeting accomodations, roads and bridges and their conditions, furnish engineer information of all kinds needed by the various sections of the Staff and the Divisions.

In the operations in France much of the above work was done by Engineers from the Army. The unnecessary entrance of Army Engineers into Corps areas should be avoided where possible. Confusion in billets, in responsibilities for work and difficulties in proper enforcement of work and police discipline all point to the fact that wherever possible, engineering work in Corps areas should be done by Corps troops.

Except for a detachment from the Printing and Survey Regiment for service under G-2 and for detachments from Camouflage Regiment, no specialized engineer units are needed in Corps. Two Pioneer Engineer regiments should be normally assigned to each Corps of three or more Divisions. If the Corps is composed of one or two Divisions, one regiment will suffice.

Special equipment in addition to the normal equipment of Pioneer Engineer regiments is needed. This should consist of water supply equipment, electrical and mechanical equipment, including electric light trucks, machine shop trucks, blacksmith shop trucks, carpenter shop trucks, pile drivers, etc.

A Ponton Train of 3 divisions of heavy bridge with one half a supply division is an <u>essential</u> part of the Corps Engineer organization. The ponton <u>wagons</u> should be designed to be <u>drawn</u> by motors, tractors, or horses as may be required.

Each Pioneer Engineer Regiment should be commanded by a Lieutenant Colonel as with the Divisional Regiments. A Colonel should be assigned as Commander of Corps Engineers. His Staff should be drawn entirely from his troops.

108. <u>Army Engineers</u>. Experience has aptly demonstrated that the following highly specialized units are needed as Army Engineer Troops:--

1 Battalion of 2 Companies - Camouflage.
1 " " 3 " - Searchlight.
1 " " 3 " - Survey and Printing.

Three Pioneer Regiments of Engineers will be needed for the engineer work in the Army Area and to back up Corps Engineers.

These Army regiments should be entirely motorized and have available proper road machinery, shops, pile drivers, and other heavy equipment as proposed in the detailed organization of Army Pioneer Engineer regiments by the Engineer Board on Organization (April 7, 1919, and attached tables).

A Ponton Train of 3 Divisions and 1 Supply Division, with wagons designed to be drawn by motors, tractors or horses as may be required, and a Motorized Water Train, with necessary water sterilizers, etc., are essentials.

This complement of Army Engineer troops should be with the Army at all times -- in training areas, during operations, or during the occupation of captured territory. A Colonel should be designated as Commanding Officer of Army Engineers. Like any other commander of troops he will need a staff of his own and a small headquarters detachment. The staff suggested in Paragraph 44, Board on Organization of Engineers is considered satisfactory. It is understood that this organization does not include any officers for special engineer work. It is purely a tactical headquarters. The various assistants to the Engineer Commander for shop work, for road work, for bridge work, for water supply, for searchlight, etc., should in all cases be the senior officer of the troops assigned to that work. These officers in turn will draw their headquarters from their own troops.

109. Special Troops and Labor Troops. No railroad, light railroad, road, forestry or engineer labor troops should be a part of the permanent organization of a Field Army.

The extent of the Army area, the character of the operations, and the locality, will determine the number and kind of such troops in a particular case.

In the Meuse-Argonne operations, the Chief Engineer of First Army had under his immediate control, at the signing of the Armistice, about 60 companies of engineer troops proper and 240 companies of labor troops. The depth of the Army Zone from front to rear, had, by the rapid

advance of the Army and the delay in the advance of the S.O.S. line, been increased from about 90 kilometers to 140 kilometers. Rarely should the depth of the Army Zone exceed sixty kilometers. In the latter case it should be unnecessary to assign to Army any large number of special railway, light railway, or road troops, either for construction, maintenance or operation. Engineer service battalions may be needed by Army during operations, in the ratio of four to one of engineers, exclusive of Pioneer engineers, or say to one Army 18 battalions each of four companies. These service battalions will come from a large engineer labor pool in the S.O.S., where they will be used when not needed by Army.

110. G.H.Q. Engineer Troops. For training, research, and to operate as replacement and manufacturing centers, there will be needed as General Headquarters Troops, one Regimental Headquarters and one Battalion each of the following specialized engineer regiments: Camouflage, Searchlight, and Survey and Printing. A Pioneer Engineer regiment will similarly be needed for school, research and manufacturing work along pioneer lines. It should be organized and equipped as are the Corps Regiments. This regiment will make proper detachment to Advanced G.H.Q. to serve under Headquarters Commandant for engineer work at these headquarters.

While the Chief Engineer of the forces is directly responsible for the proper personnel, equipment and training of these units and commands them for all such purposes, each unit forms essentially a separate Service under the Chief Engineer and will perform its duties best under a highly decentralized organization such as existed in the A.E.F.

VI. S I G N A L C O R P S

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SIGNAL CORPS.

111. Introduction. The United States went into the war with an entirely inadequate field communication system. In order to provide for the increase in the Infantry Division the Outpost Company was increased to a strength of 280 men as an emergency measure.. No provisions were made for signal communications of Corps Artillery, Air Service, or many other important organizations.

The experience of the war has been conclusive from the very beginning that communications were absolutely vital to military success and that our makeshift system, in spite of the brilliant work done by individual officers and organizations, could be greatly improved upon. The mixed Signal Corps and Infantry units in the Infantry regiment were a failure. The Artillery organization did not provide sufficient personnel for handling its own system of communications. The enormous growth of the system of radio communication made it imperative that there be a central control agency for assigning wave lengths and call letters and for general radio supervision.

As a result of the lessons of the war which were impressed from time to time on commanders and signal officers, a number of ways or handling communications grew up in the different divisions. The Signal Corps stood the test of the war largely because of the initiative of Signal Officers who took existing material and organizations and molded them to meet the needs of the situation. The intensive use of radio was controlled as far as wave lengths, calls and regulation was concerned by the Army Radio Officers.

112. Fundamental Principles. A system of communications has for its purpose the connection of the various Headquarters of a unit and the magnitude of this system depends upon the number of these Headquarters and the amount of communication which must pass from one to another. Within practical limits the force engaged on communications is independent of the organizational strength of the unit. The correct organization for the communication troops of a Division must be reached in two steps. The first step is to determine from higher authority the number of Headquarters which will be required to function within the Division and of the Character of the communications which must pass between them. The second step is to decide on the

organization within which the communications become either so specialized or so simplified that they can best be handled by the personnel of the organization. The communications from all higher headquarters down to the headquarters of these self contained organizations should be furnished by Signal Corps Troops. These points being settled, the matter becomes a purely technical Signal Corps problem into which enters the number of men and the types of material necessary to provide and maintain these communications. The opinion of the Signal Corps should have a strong influence in fixing the character of communication within these smaller organizations and the strength of organizational personnel which will be required for their operation.

113. Technical Supervision. It may be laid down as a fundamental principle that, any type of communication which can interfere with other authorized communications must be technically supervised by higher authority. This applies particularly to radio communication byt may apply with equal force to telephone and telegraph, and even visual, communications. It would, for example, be highly improper for each Infantry regiment in a Divisional attack to make up its own code of fireworks signals; in the same way on an advance into enemy territory where there remain excellent pole lines, it would be highly improper for the leading regiments to cut and divert these lines to purely regimental uses without the sanction of higher authority.

114. Organization. A study of the reports of Artillery Board and Infantry Board, in connection with the Signal Corps Board, leads to the conclusion that the Signal Corps organization, proposed by the Chief Signal Officer, A.E.F., must be modified to meet the desire of the Artillery and Infantry to retain their own communication troops. A new plan of organization should be devised by the Signal Corps to carry out the following principles:

(a) Infantry and Artillery communications pertain to these arms only and should be handled wholly by Infantry within the Infantry regiment, and wholly by Artillery within the Artillery brigade.

(b) The Division Signal Troops should comprise a battalion of about 15 officers and 300 men. This should be a two company battalion made up with regard to Divisional needs to supply the communications at Division Headquarters and down to, but not including, Artillery Brigade Headquarters and Infantry Regimental Headquarters. The Major of this battalion should exercise the functions of Commanding Officer, Signal Troops, as laid down in Paragraph 13, Directing Head. (See tables I, II and III, plan of Signal Corps organization, attached).

(c) The Corps Signal Troops should comprise a two company battalion of about 20 officers and 500 men organized along the general lines proposed by the Chief Signal Officer, A.E.F. (See Corps table, plan of Signal Corps organization, attached). Such other Signal detachments as are necessary to handle the special needs of the Corps will be assigned as required. The Commanding Officer, Signal Troops, of a Corps should be a Lieutenant Colonel, and he should exercise the functions laid down in Paragraph 13, Directing Head.

(d) The Army Signal Troops should consist of two battalions of the general type proposed for the Corps, together with such other Signal detachment as are necessary to serve the special needs of the Army. The Commanding Officer, Signal Troops, of an Army should be a Colonel, and he should exercise the functions laid down in Paragraph 13, Directing Head.

(e) The construction, maintenance and operation of Signal Corps utilities in the Service of Supply should be under the control of the Signal Officer, Service of Supply.

(f) The Chief Signal Officer should be at Headquarters of Armies in the Field (G.H.Q.) and his activities should be governed by the provisions of paragraphs 12 and 13, Directing Head. The Research and Inspection Division of the Signal Corps, and the Signal Corps Schools should be directly under his control.

115. Artillery and Infantry. The Artillery Board has very properly recommended that the communications personnel in the Artillery regiment be doubled. The Infantry Board has, on the other hand, recommended a Signal detachment in the Headquarters Company of the Infantry regiment

which is far below the existing strength of the Signal section and which will not be able to properly provide Infantry communications. The exact determination of the strength and character of the communications personnel for both the Artillery and Infantry should be finally decided upon as a technical study. This can best be done in the case of the Artillery by a joint board of Artillery and Signal Corps officers and for the Infantry by a similar board of Infantry and Signal Corps officers. In the meantime, the following organization is recommended for the Infantry regiment. One captain on regimental staff as regimental signal officer; the Headquarters Company to include one Regimental Signal Section of 1 lieutenant and 54 soldiers and three Battalion Signal Sections each consisting of 1 lieutenand and 26 soldiers. All personnel to be Infantry. The internal organization of the Signal Section to conform, as nearly as practicable, to the organization proposed by the Signal Corps Board, Tables IV (A) and IV (B).

116. Signal Troops. Signal troops organized for service with combat units should be designated as part of the Line of the Army. The close association of Signal Troops with other fighting troops in a combat unit and the analogy with Engineer Troops, which are now a part of the Line of the Army, justifies this change. The Commanding Officer of Signal Troops should be known, for uniformity of terminology, as the Signal Commander. This conforms to the terms, Infantry Commander, Artillery Commander, etc.

117. Assignment of Duties. In principle the Communication Troops for each Artillery brigade, regiment and battalion, each Air Service, Anti-aircraft and Tank organization, and each seperate organization of other troops which require internal communications will be provided for in tables of organization after consultation with the Signal Corps on the technical requirements of the case, to insure standardization of equipment and sufficient personnel. The Signal Corps will provide the general net work connecting up these lower organizations and the higher Headquarters, will provide means of supervision and training in communications specialtiess for troops of other arms, will develop and supply thru the regular channels of the Signal Corps all technical equipment, and will install such technical equipment where special installation is necessary.

118. Photography. The Board believes that ground photography should be transferred from the Signal Corps to the Engineers. It was taken up by the Signal Corps at the beginning of the war because no other Service seemed to be in a position to handle; however, the Engineers now have an organization for map making, printing, lithography and photography, which can absorb the Signal Corps photographic functions without difficulty and relieve the Signal Corps from the responsibility for a Service which has no connection with communications.

The plan for the Proposed Organization of the Signal Corps, submitted by the Chief Signal Officer, A.E.F., has been carefully considered by the Board. A copy of this plan is attached hereto.

VII. MEDICAL CORPS

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MEDICAL CORPS.

119. Introduction. On September 10, 1918, a Board of officers of the Medical Department made a complete study of the then existing Tables of Organization for the Medical Department. The recommendations of the Medical Board as revised and brought up to date for reference to this Board affects the Fighting Forces as follows:

(a) Increases Medical Department Personnel attached to organizations to about 2-1/2% of organization strength (about double the present authorized maximum).

(b) Increases the Divisional Sanitary Train personnel from 51 officers and 951 men to 48 officers and 1063 men and re-organizes the train to consist of the following:

1 Train Headquarters.....	3 officers	16 men
1 Ambulance Service Bn.....(Bn. Hdqrs. and 4 Amb. Co.s each of 20 Ambulances)	6 officers	220 men
1 Field Hospital Bn.....(Bn. Hdqrs. and 4 Field Hospitals)	20 officers	328 men
1 Litter Bearer Bn. (4 Cos.)	9 officers	430 men
1 Divisional Med. Supply Unit..	1 officer	14 men
1 Division Laboratory.....	2 officers	7 men

(c) Eliminates from Sanitary Train all horse drawn vehicles of all kinds and all horses and substitutes therefor motor transportation.

120. Purpose. "Nothing affects the morale of an Army more favorably than the feeling among the men that if wounded they will fall into the hands of an efficient Medical Department and be well cared for" and conversely nothing perhaps affects the morale of the Army and nation more adversely than a feeling that the wounded are not being cared for and the dead are not promptly buried.

121. Divisional Organization. So large an increase in the attached enlisted personnel of the Medical Department of a Division as recommended by the Medical Board is not recommended. The Board believes that an increase of about 50% over present strength is justified for all infantry regiments and about 33% for all other units within the division.

The reorganization of the Sanitary Train as proposed is along the correct lines. A larger enlisted personnel than 84 men will be needed for an Ambulance Company of 20 Ambulances to provide reliefs, etc. About 75 men is thought to be correct.

The Litter Bearer Battalion should be thoroughly trained in searching the battlefield for wounded. This organization will be used also as a replacement and training center for supply of Medical personnel to combat units and for such sanitary work as may be needed.

As recommended by Medical Board the Ambulance Companies will be subject to call and reassignment by Corps Surgeon to other divisions. One Company at least must always stay with its Division.

The Field Hospitals should consist of two Surgical and two Medican units. One only of each will usually be erected, the others held in readiness to "leap frog".

122. Corps Organization. The Medical Personnel permanently attached to Corps should be held to a minimum. It is believed that existing allowances are ample, providing that prompt evacuation is provided for.

One Sanitary Train as recommended for Division should be provided.

The Corps is believed to be the proper agency for erection and management of Evacuation Hospitals in rear of Divisions. Army Evacuation Hospitals will ordinarily be too far in rear for Division ambulances to reach.

In addition to the Sanitary Train, therefore, each Corps should be provided with at least one Evacuation Hospital (consisting of 4 Field Hospitals Complete) for each Division assigned. For a Corps of 4 Divisions, three hospitals would usually be erected leaving one for emergency use.

123. Army Organization. In addition to Corps Evacuation Hospitals, Army should be supplied with four Field Hospitals for each Division. These include the so called Mobile Field Hospitals, Mobile Surgical Hospitals, etc., which should all be of one and the same fundamental type as the Divisional

Field Hospitals so as to be interchangeable at will. Added personnel should be assigned and special equipment provided as needed.

124. G.H.Q. Reserve. In addition to the Ambulance Companies assigned to Divisions and Corps, there should be a General Reserve of at least two Ambulance Companies for each Division, organized into an Ambulance Service very much as was the United States Ambulance Service, which served the French Army, but with the larger personnel as recommended for Division Ambulance Companies.

125. Equipment. No special Medical Wagon should be permitted. In lieu of the Sanitary cart an escort wagon should be assigned for Medical Supplies, etc., to each Battalion and one to each Regimental Headquerters.

Each Field Hospital should have with it two Dressing Stations. When necessary one company of Litter Bearers will be assigned to each Field Hospital. No cots are needed with Field Hospitals as bed sacks will serve. The entire Supply Tables of the Medical Department Manual should be carefully revised by officers who have had experience with Divisions, in order to make Field Hospitals, Regimental and Battalion supplies, etc., simple and adequate but easily transportable.

VIII. THE COMBINED ARMS

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VIII. THE COMBINED ARMS

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THE COMBINED ARMS

126. Introduction. In studying the manner in which the various fighting arms and the Services attached thereto may be best combined for successful modern combat, it is necessary to consider more than one Field Army.

Each Field Army should be so organized as to enable it to advance and fight in open warfare unhampered by the necessity for coordination and administering the great pools of reserve resources which are essential in modern war.

This latter function and the allocation to Field Armies of such proportion of the reserve forces as may be needed is the duty of the General Headquarters of the Field Forces. Under the Board's conception of organization, the great resources of supply and labor are pooled under the immediate control of the Director of Logistics at G.H.Q., and his subordinate, the Commanding General of the Services of Supply. The reserves in combat troops can not be so placed under a staff officer of the Commander-in-Chief, because the general reserve of each Arm must have its own Commander. All these reserve combat troops are grouped directly under the Commander-in-Chief and the G.H.Q. staff. They are later referred to as G.H.Q. Troops.

127. Field Army. A Field Army is distinctly a fighting force. Its great strength lies in its fighting divisions. The Board has decided that a force of twelve divisions is the greatest force which should normally compose a Field Army, believing that this is the greatest combat force which one commander can properly fight.

The Army Staff and the Army troops, the Corps Staff and the Corps Troops must be so organized as to form a strong framework of Staffs, Auxiliaries and Services into which mobile divisions may enter, be emplaced, and supplied; fight, be withdrawn and replaced, as the military situation requires and as G.H.Q. directs.

The Commander of the Field Army can not directly control the fighting of twelve divisions. Difficulties of communication and liaison

make it impossible for the Field Army Staff to be in intimate touch with the rapidly shifting conditions of battle. For this reason, the Field Army must have subordinate Commands to control the fighting of groups of divisions. These are the Army Corps.

128. Army Corps. The Army Corps is primarily a tactical command. It is the great Combat Group. The Corps Commander and his Staff coordinate and direct the fighting of a group of divisions. Ideally the Corps has no administrative or supply functions other than those pertaining to Corps Troops proper. In reality, however, under conditions of modern combat certain functions of supply must devolve upon Corps Staffs and they must be organized to accomplish them.

Divisions can not be permanently assigned to Corps. The tactical situation or requirements of logistics are almost certain to require that a division once withdrawn be sent into the fight again in a new area and under a new Corps Staff. Normally, however, each Corps will consist of four divisions, with two in the front line, one in immediate reserve and one at rest and the organic organization of Corps Staff and Corps troops should be based on the needs of such a Corps.

129. Division. The Division is the Combat unit. Composed as it should be of all Arms knit together by close association in training, on the march and in battle, it is the fighting team. It must be

a. Mobile.

b. Maneuverable.

c. Provided with sufficient resources of all kinds to live and fight.

It should have the maximum amount of infantry allowable and yet fulfill the above requirements, after having attached to it the necessary Auxiliary Arms and Services. Resources of which there is only occasional or temporary use in the division, or which if distributed in advance would lie idle much of the time, or be employed improperly or uselessly, have no place in a Division but should be assigned to Corps or Army.

130. Lessons of the War. Notwithstanding the above statement, this Board believes that the uncertainties of battle, the certain wastefulness of materiel, the enormous difficulties of liaison require a liberal view of what comprise the permanent needs of a Division. The Division must have resources at hand which will enable it to win - and the units which provide these immediate needs must "be integral parts of the division team, imbued with the divisional spirit, sense of comradeship and loyalty, that will guarantee service to the division in critical moments when the supreme effort must be made."

On the modern battle-field, the infantry battalion, regimental and brigade commanders are no longer mere infantry leaders. They are in reality Combat Leaders. They must coordinate the fighting powers of the many diverse fighting elements on the field. For success, there must be subordination on the part of the other Arms and Services to the tactics and needs of the Infantry.

So vital is this that the Board has decided in the case of machine guns to make the machine gun company which is to serve a battalion an actual integral part of the battalion. It has also decided that signal work within the infantry regiment must in the future be performed by an infantry signal section which is a permanent part of the regiment, just as in the Artillery Brigade, all interbrigade communications is taken care of by Artillerymen.

When light tanks are assigned to Divisions, they too should come under the immediate command of the Battalion Commander on whose front they are to operate.

In the case of the Artillery, Engineer, and Heavy Tanks when assigned, it is not advisable to split them up and assign them permanently to infantry units but there must be decentralization in training and battle to permit of proper command association, and proper authority and initiative must be given the subordinate Artillery, Engineers, and

Tank Commanders to permit them to serve their infantry units aggressively and well.

Habitually one of the regiments of light guns must train with one of the Infantry Brigades to the point that it actually feels itself to be a part of that Brigade. Of the Artillery regiment, the same battalion should, whenever possible, serve the same infantry regiment. Similarly one battalion of Engineers must learn to serve a particular infantry brigade, one company serving each regiment, the third serving the artillery regiment of that brigade.

In battle these subordinate Artillery and Engineer Commanders will see to it, by the closest kind of personal contact, that the unit which they are serving receives the full fire support it needs and has the roads, bridges, water, etc., it needs. Throughout his entire team, the Division Commander and his Staff must force this intimate, daily contact and cooperation, requiring at the same time the Senior Artillery Commander and the Senior Engineer Commander to so coordinate all the artillery fire and engineer work as to insure the success of the team and cinch the victory.

The heavy howitzers with the divisions are provided for destroying material objects which stop the infantry, such as houses and other masonry constructions and to kill the enemy personnel protected by such structures. They are also used in counter-battery work when the division has advanced beyond the protecting fire of Corps guns or when Corps guns are not adequate to give the counter-battery protection needed. Close association of command between these larger pieces and the smaller infantry units is not so essential as in the case of the light guns but aggressive tactics are just as important. The entire regiment may not be able to follow the Division as rapidly as may be desired but will certainly be up sooner if assigned to the Division than if merely attached from Corps. These howitzers have proved so useful to Divisions both for their material and moral effect that no reduction in the number assigned to divisions is recommended.

During the war the American Divisions had no organic aircraft or balloon units. Such of these as were needed were attached to Divisions from Corps. All officers of experience are convinced that in order to insure proper cooperation a Divisional Squadron consisting of about 10 planes, a photographic unit and a Branch Intelligence office should be organized for permanent assignment as an integral part of each combat division, to train, live and fight with the division at all times. One Balloon Company is also essential.

131. Supply and Evacuation. With the idea in mind of increasing the mobility of the American Divisions it has been suggested that there be reduction in the number of field hospitals and ambulance companies now authorized and that the divisional ammunition and supply trains be reduced to about one-half of their present size and based upon carrying in the Divisional Trains one day's fire and one day's supply rather than two days' as at present.

Our infantry division differs from the French and German Divisions in that we have two brigades of infantry instead of one. This is based on the idea of relief by brigade rather than by division. Under this conception the Divisional Staff, the Artillery, Engineers, Signals, the Trains, etc., must be able to remain in the fight for a period at least twice as long as divisions with but one infantry brigade. Extreme mobility of the division as a whole is not therefore so vital as is the need for an assured and proper support and supply of the troops involved. The American division as now organized is more nearly comparable to the traditional Army Corps of two divisions. Marching on one road the division requires something over ten hours to pass a given point.

A study of the supply of such a force has led the Board to conclude that there is no place in the Divisional Trains for both horse and motor drawn vehicles. If horse transport and motor transport are used on the same road for supply from refilling to distributing points, the motor transport is inevitably slowed down to the speed of the horse

drawn vehicles. The Board has decided therefore, that the horsed battalion of the Ammunition Train should be entirely eliminated; the Ammunition Train to consist of a headquarters as at present authorized, four truck companies as at present except that all trucks should be three ton trucks, a Mobile Ordnance Repair Shop as at present and a depot company of about 6 officers and 216 men about as provided in Tables of Organization, No. 242, Series C, W.D., but of Artillery Personnel. The Train to operate under the Divisional Artillery Commander and to supply both artillery and infantry ammunition.

It has been decided also that the horse drawn Ambulance Company should be motorized and the Sanitary Train reorganized as recommended by the Medical Board. The Board recognizes the fact that of the four Ambulance Companies so provided, but one company of 20 Ambulances will be needed when division is out of combat and that in combat many more than 80 ambulances may be needed.It is similarly recognized that but two field hospitals will be ordinarily needed but in order that Field Hospitals may be available to follow up in a rapid advance, it is believed absolutely essential that there be two in rolling reserve in order to "leap frog" forward. Chief Surgeons of Corps should recommend the withdrawal of 3 ambulance companies and two field hospitals from divisions not needing them.

The Engineer Train as such is eliminated. The horse drawn section and such trucks of the motor section as are always loaded (as the electric-light truck, map-reproduction truck, portable bridge truck, etc.) is made an integral part of the Engineer regiment. The remaining portion of the motor section is made a part of the Divisional Supply Train on the basis of a normal demand of 30 truck tons for ordinary engineer Supply of the division.

The Supply Train should be as at present authorized except that the Commander should be a Lieutenant Colonel, and four of the truck companies should be of 3-ton trucks rather than 2-ton. The number of trucks should not be decreased.

Divisional Train Headquarters should be eliminated. When it appears desirable to march the trains together as a unit, a Commander will be designated.

132. Tactics of the Road. One of the most impressive lessons of the war is that there are but few roads which are suitable for two way traffic during combat. Each division should have, when it is possible, two roads, one for up and one for back travel. Where this is impracticable, the attention of Corps must be invited to the fact and a Corps one way circuit established. An attempt to utilize a narrow road for both up and down bound travel inevitably spells failure.

During the early hours of an attack no transport of any kind should be allowed on the roads except the artillery moving up to support the infantry, the combat wagons of the troops of the assault, such Engineer and Signal Transport as may be absolutely necessary, and sufficient ambulances to handle the wounded.

As in the tactics of combat, cooperation and team work is of vital importance in the tactics of the road. G-4 who is directly responsible for this phase of the conflict must see to it that the Ammunition Train Commander, Sanitary Train Commander, the Quartermaster, Military Police and Engineers all keep in immediate touch with each other and with the troops they are to serve to the end that ration dumps, field hospitals, water points, ammunition dumps, etc., are established at points which are convenient and accessible but where the unavoidable congestion will least interfere with traffic.

During the early hours of a fight, Division G-4 must be supreme in so far as road control is concerned within his divisional area. Not until the division has advanced and conditions straightened out in rear should Corps Military Police step in and then only after Division G-4's have been thoroughly apprised of the Corps road plans. For the proper control of traffic a road telephone system within the division and within Corps is an essential. It should be separate from the tactical system

so it may serve in dispatching traffic. The Engineers should be charged with establishing this line, a special detachment being provided from Signal Battalion, if necessary.

133. Composition of Division. Fully realizing the arguments which have led others to recommend reductions in the present Division, this Board is of the opinion that the only reductions which should be made in the present Division are:-

(a) Cavalry to form a part of Corps troops and to be assigned to Divisions as needed.

(b) Trench Mortar Battery to be abolished.

(c) All horse drawn vehicles in Divisional Trains to be abolished except those of the Mobile Veterinary Hospital.

(d) Train Headquarters to be eliminated.

134. Division Table. The Board recommends the Division be organized as follows: The unit organizations in all cases should be as recommended by the Boards on the separate Arms except where recommendations of the separate Boards conflict with definite recommendations contained herein.

INFANTRY DIVISION — July 1, 1919.

	Com.	Enl.	Com.	Enl.
Division Headquarters & Headquarters Troop			54	325
2 Brigades Infantry each of	291	8972	562	17944
1 Brigade Headquarters	9	80		
2 Regiments Infantry each of	141	4446		
Regimental Headquarters	14	---		
3 Battalions each of	35	1284		
Battalion Headquarters	5	74		
4 Rifle Companies	24	1000		
1 Machine Gun Company	6	210		
1 Howitzer Company	4	100		
1 Headquarters Company	4	183		
1 Supply Company	6	221		
Attached Medical and Ordnance Personnel	8	90		
1 Brigade Artillery each of			266	5348
1 Brigade Headquarters	13	75		
1 Regiment 75 mm Motorized	73	1203		
1 Regiment 75 mm Horsed	73	1511		
1 Regiment 155 mm Motorized	79	1621		
1 Ammunition Train (Lt.Col.comd'g) each of				
Train Headquarters	4	28		
4 Truck Companies	12	584		
1 Ammunition Supply Company	6	216		
1 Mobile Ordnance Repair Shop	3	53		
Attached Medical and Motor Transport Corps Personnel	3	57		
Air Service consisting of			26	314
1 Divisional Squadron of 8 to 10 Observation planes, a Photo Section and Intelligence Personnel --est.	18	140		
1 Balloon Company	8	174		
1 Motorized Machine Gun Battalion (2 Co.)			16	381
1 Regiment Engineers (Pioneer)			53	1802
1 Field Signal Battalion			est. 15	300
1 Military Police Company			5	200
1 Supply Train (6 Co.) (Lt.Col.comd'g)			16	489
1 Sanitary Train			48	1015
			1081	28118

NOTE -- The unit organization in all cases should be as recommended by the Boards on the separate arms, except where recommendations of the separate arm Boards conflict with the definite recommendations of this Board.

An effort has been made to include in above table all changes recommended but lack of time has prevented a careful check of the table with all the detailed recommendations to be found in the text of the various Board reports.

135. Army Corps. As considered herein, an Army Corps consists normally of Corps Headquarters, the Corps Troops, and four Divisions.

Divisions are not permanently assigned to Corps. They come and go. The Corps Staff and the Corps Troops are responsible for the continuity and coordination of all activities in the Corps Area.

136. Corps Artillery. The Artillery Commander of Corps must be provided with sufficient organic artillery to dominate the enemy guns under average conditions.

He must also have an ammunition service with sufficient trucks and depot companies to enable him to distribute ammunition to the Corps Artillery and to Divisional Dumps and properly man these dumps. Heretofore flash and sound ranging activities have been carried on by Engineer troops of the Army. The Board is convinced that the personnel for this Service should be Artillery personnel and that a battalion of such troops should be made a part of the Corps Artillery Command. Heretofore, also, Anti-Aircraft defence has been under Army control. The Board believes that Corps should control all Anti-Aircraft defences in the Corps Areas and that there should be assigned to Corps organically one Regiment of Anti-Aircraft guns and one battalion of Anti-Aircraft Machine Guns.

Army Artillery should not fight any guns over the head of Corps in support of infantry. Frequently many more guns than are organically assigned to Corps will be needed on a Corps front. When so needed they must be assigned to Corps and be fought by Corps. This requires that the Artillery Commander's Staff and Service should be larger than might normally be needed if their duty was to fight only the normal Corps Artillery.

The Corps Artillery should therefore consist of:--

Corps Artillery Commander and Staff of about 10 officers and 15 men, and
One Artillery Brigade consisting of:--

1 regiment of 155 mm howitzers
1 regiment of 4.7-inch guns
1 regiment of 155 G.P.F. guns
1 regiment of Anti-Aircraft guns
1 battalion of Anti-Aircraft machine guns, of 4 companies of 12 guns each
1 ammunition train, with personnel for manning Corps dumps
1 flash and sound ranging battalion
1 mobile ordnance repair shop

The corps ammunition train should comprise 4 truck companies, as described for the divisional ammunition train, and 3 depot companies, the train to be commanded by a Lieutenant Colonel. Three depot companies are required since at least one dump for corps artillery and two for divisional artillery will have to be manned.

137. Corps Aircraft. The Corps Squadrons should consist of about 19 planes and an organization in men and officers of about the strength as at present provided. Combat (pursuit) and bombing Squadrons should be added to the Corps Group in order to provide Corps with a complete force which will function as a unit under battle conditions. Two observation and one bombing squadrons and a group of 3 squadrons of pursuit, with one Balloon Company, one photographic section and one intelligence section and one Air Park are required for each Corps.

138. Corps Cavalry. A brigade of two regiments should be provided for assignment to divisions as needed or for the purpose of quickly grasping an opportunity when a "break-through" has occurred.

139. Corps Sanitary Troops. Under present Organization Tables but one Sanitary Train of the Divisional Type is allowed for Corps, all evacuation hospitals being under the control of Army. The Board is convinced that Corps is the proper unit for the erection and control of the Evacuation Hospitals immediately in rear of division -- Army Evacuation hospitals will be too far back. For this reason it is recommended that four Evacuation hospitals be organically assigned to Corps. For insuring proper coordination in the evacuation of wounded, the Corps Surgeon may pool the Ambulance Companies of his divisions, leaving at least one company with each division at all times. He may similarly withdraw from divisions, as necessary, two of the four field hospitals assigned.

140. Corps Engineers and Labor. Experience has amply demonstrated that one regiment of Engineers and one regiment of Pioneer Infantry is entirely inadequate to perform the necessary construction needed by Corps.

During active operations, this want was filled by Engineers and labor troops from Army. These were administered directly by Army. The Board believes that whenever possible this entry into Corps Area of Army troops should be avoided. It is recognized that for Standard Gauge and Light Gauge Railroad construction and for Highway Construction as distinct from road repair and maintenance, in other words, constructions which run continuously from rear to front, agencies from the rear will operate satisfactorily, but for the area work in Corps area, and for backing up Divisional Engineers Corps troops must be provided.

The Board believes that two Pioneer Engineer regiments organized about as recommended by the Engineer Board and two Pioneer Infantry regiments as at present organized are needed by each Corps under average conditions. When more are needed they should come from the great labor pool in S.O.S., and be assigned to work under Corps on constructions desired by Corps.

141. Corps Signal Troops. "Two battalions of Signal Troops (one field and one telegraph) have provided more Signal Troops than the Army Corps has required. With a more scientific organization a less number of officers and men can do the work." One battalion of two companies, in all about 500 men, organized as proposed by the Chief Signal Officer, A.E.F., in letter of 18 February, 1919, is recommended.

142. Corps Table. The Board recommends that the Army Corps be organized organically as follows:

CORPS

	Com.	Enl.	July 1, 1919. Com.	Enl.
Corps Headquarters			67	436
4 Infantry Divisions each of	1082	28118	4324	112472
Division Headquarters & Hq. Troop	54	325		
2 Brigades Infantry	582	7944		
1 Artillery Brigade	266	5348		
Divisional Troops	179	4501		
Corps Artillery consisting of			400	8855
Corps Artillery Commander and Staff	10	15		
Brigade Headquarters	13	75		
1 Regiment 155 mm Howitzers (Motorized).	79	1621		
1 Regiment 4.7 Guns (Motorized)	79	1621		
1 Regiment 155 mm G.P.F. (Motorized).	79	1723		
1 Regiment Anti-Aircraft Guns 75 mm	55	1345		
1 Anti-Aircraft Machine Gun Battalion	28	742		
1 Flash and Sound Ranging Battalion	est. 20	400		
1 Corps Ammunition Train (Lt.Col.comd'g) consisting of -				
Train Headquarters	4	28		
4 Truck Companies	12	584		
3 Ammunition Supply Companies	18	648		
1 Mobile Ordnance Repair Shop	3	53		
1 Brigade Cavalry			est. 300	4000
Air Service consisting of			265	1535
2 Observation Squadrons	est. 85	375		
3 Pursuit Squadrons	102	575		
1 Day Bombardment Squadron	49	181		
1 Balloon Group (Hq. & 1 Balloon Co.)	est. 13	185		
1 Air Park	7	158		
1 Each Intelligence & Photo Sections	9	61		
2 Pioneer Regiments Infantry			202	6900
2 Regiments Engineers			106	3604
1 Ponton Train			4	170
1 Battalion Signal Troops			est. 15	500
1 Sanitary Train consisting of			160	1999
Divisional Train	48	1015		
4 Evacuation Hospitals	112	984		
1 Supply Train			16	489
1 Remount Depot			6	157
1 Mobile Veterinary Hospital			2	35
1 Military Police Company			6	200
			5972	141354

NOTE -- The unit organization in all cases should be as recommended by the Boards on the separate arms, except where recommendations of the separate arm Boards conflict with the definite recommendations of this Board.

An effort has been made to include in above table all changes recommended but lack of time has prevented a careful check of the table with all the detailed recommendations to be found in the text of the various Board reports.

143. Composition of the Field Army. As herein considered the Field Army consists of Army Headquarters, Army Artillery Headquarters, Army Troops, and three Corps each of four divisions.

144. Army Headquarters. As at present organized Army Headquarters is believed to be satisfactory. Complaint has been made that the Office of the Director of Logistics (G-4) has an insufficient personnel authorized. In the Board's opinion the G-4 office should not be built up into a large executive office with its personnel duplicating the personnel of the Supply Services. The heads of these Services should be the assistants of the Director, each for his own specialty. If it be necessary for G-4 to have in his immediate office an Assistant on Engineering, Ordnance, etc., these assistants should be drawn from the office of the Engineer Commander or Ordnance Officer as the case may be and this officer should act in the capacity of a contact officer between G-4 and his Service.

145. Army Artillery Headquarters. In the Board's conception of the organization of Army Artillery Headquarters, this office should not be an office in actual executive charge of fire. The guns which support the Infantry should be fought by Corps. Under conditions of stabilization, certain long range destructive or harassing fire may be done directly by Army but this will need no great executive force or complete liaison system as might be required were Army to fight the Combat guns. Under this conception, it is believed that Army Artillery Headquarters should be reduced as recommended by the Hero Board to 35 officers and 107 men. Its great functions are those of planning, coordinating, and distributing. The Army Artillery now carried in Tables of Organization should be placed in the General Reserve of Artillery serving directly under General Headquarters. The Anti-Aircraft Artillery with the Field Army should consist of a Headquarters and 3 Regiments.

146. Army Aircraft. The Air Service Board recommends and this Board concurs, that:--

(a) All Wing Organizations in the Army Air Service be eliminated, the functions of Wing Commanders to be fulfilled by Observation, Pursuit,

Bombardment and Balloon officers on the Staff of the Army Air Service Commander.

(b) That a Headquarters Squadron, to take the place of the Headquarters flight be provided in order to handle transportation and provide crews for Army Command Planes, temporarily withdrawn without their crews from other Squadrons. The personnel now provided for the various Wing Headquarters is more than ample to provide for such reorganization.

(c) That each Group except Corps Group have a Group Headquarters, four Squadrons, and one Air Park, attached personnel, with one Photographic unit and one E.I.O. to a Bombardment Group and two Photographic Units to an Observation Group.

(d) That the two Observation Wings now provided be reduced to two Observation Groups.

(e) That four construction squadrons be provided for each Army to supply the trained personnel for the rapid construction of airdromes as the line advances. Extra labor to be provided by G-4.

(f) That one Photographic Unit be assigned to each Army Air Service Headquarters.

147. Army Cavalry. For the purpose of grasping an opportunity should a "break-through" occur, for operations on the flank of the enemy if opportunity offers or for use as independent cavalry in advance of the Army, three Cavalry Divisions are thought by the Board to be necessary for each Field Army.

148. Army Tanks. It is impracticable to determine in advance what number of Tanks, heavy or light, will be needed by an Army. They are special weapons and should, like the heavier artillery, etc., be assigned to G.H.Q. Reserve.

149. Army Engineers and Labor. Except for a battalion each of Camouflage, Searchlight and Survey and Printing, there should be no highly specialized Engineer units permanently assigned to a Field Army. Water Supply, Electrical and Mechanical, Construction, Road and Bridge work can best be done by well trained Pioneer Engineer Regiments.

Three of such regiments should be with the Army at all times. The Ponton Train now authorized and a Water Train are essentials.

By the assignment of two regiments of Pioneer Infantry to each Corps, the Army labor troops can be reduced to three regiments of Pioneer Infantry. If more labor troops are needed, they should come from the labor pool in the Service of Supply.

150. Army Signal Troops. The Army Signal Troops should consist of two battalions of two companies each. Other signal detachments will be temporarily assigned by Chief Signal Officer of the forces as the need develops.

151. Army Sanitary Troops. The Medical Report recommends the assignment to Army of one Evacuation Hospital of 750 beds for each division of Army. In addition one Mobile Surgical Hospital of 250 beds for each Division and one Mobile Medical Hospital of 250 beds for each Division is recommended. This Board believes that the Evacuation Hospitals should be assigned to Corps and that all Mobile Hospitals should be of the same general type as the Divisional Field Hospital with such added personnel and equipment as may be needed for special service. It therefore recommends that for an Army of 12 Divisions, 48 Field Hospitals be provided for Army, 24 to provide the necessary Mobile Surgical and Medical Hospitals and the other 24 to be held in readiness for distribution by Army in emergency or for use in groups of four as extra Evacuation Hospitals (see also par.122). The Board is constrained to make this recommendation, believing as it does that wooden barrack hospitals or suitable buildings will not usually be available.

The Medical Board recommends that two Ambulance Companies per Division be provided for Army. The Board believes that for two Armies 36 companies should be in G.H.Q. Reserve but recommends that six companies be organically assigned to each Army.

152. Army Table. The Board recommends that the Field Army be organically organized as follows:--

ARMY

July 1, 1919.

			Com.	Enl.
Army Headquarters less Army Artillery Headquarters			186	726
	Com.	Enl.		
5 Army Corps each of	5872	141354	17616	424062
Corps Headquarters	67	438		
4 Infantry Divisions	4324	112472		
1 Brigade Artillery	400	8855		
1 Brigade Cavalry	est. 300	4000		
Air Service	265	1535		
Corps Troops	516	14054		
Army Artillery consisting of			277	6337
Army Artillery Headquarters	35	107		
1 Ammunition Park	57	1815		
Hq.& 3 Regiments Anti-Aircraft Artillery	est. 185	4415		
3 Cavalry Divisions			est. 2700	37800
Air Service consisting of			976	6868
Air Service Headquarters	est. 15	40		
2 Observation Groups	est. 390	2050		
2 Pursuit Groups	est. 280	1800		
1 Day Bombardment Group	est. 204	739		
1 Balloon Group	est. 43	913		
4 Construction Squadrons	est. 30	1010		
2 Air Parks	est. 14	316		
4 Military Police Companies			20	800
1 Battalion Engineers (Camouflage)			33	531
1 Battalion Engineers (Searchlight)			26	784
1 Battalion Engineers (Survey & Printing)			est. 26	784
3 Regiments Engineers (Pioneers)			159	5406
1 Ponton Park			5	185
1 Motorized Water Train			20	501
2 Battalions Signal Troops			30	1000
Sanitary Troops consisting of			606	4446
12 Mobile Surgical Hospitals	216	1080		
12 Mobile Medical Hospitals	216	1080		
6 Evacuation Hospitals	est. 168	1968		
6 Ambulance Companies	est. 6	318		
29 Truck Companies			74	2765
1 Supply Train			16	489
1 Remount Depot			29	782
1 Mobile Veterinary Hospital			4	144
3 Pioneer Regiments Infantry			303	10260
			23105	504760

NOTE -- The unit organization in all cases should be as recommended by the Boards on the separate arms, except where recommendations of the separate arm Boards conflict with the definite recommendations of this Board.

An effort has been made to include in above table all changes recommended but lack of time has prevented a careful check of the table with all the detailed recommendations to be found in the text of the various Board reports.

153. Composition of G.H.Q. Troops. All the reserves in Combat Units not definitely made an organic part of the Field Armies are grouped, each arm under its own Commander, directly under the Commander-in-Chief of the Field Forces and his staff. These troops are referred to as G.H.Q. Troops.

154. G.H.Q. Artillery. In the discussion of the Separate Arms, Artillery par. 68, the composition of the General Reserve of Artillery to serve two Field Armies is given as follows:--

	Guns or Howitzers
25 Regiments of 75 mm guns	600
15 " 155 mm howitzers	360
10 " 4.7 guns	240
10 " 155 G.P.F. guns	240
2 " 6" guns	48
3 " 8" guns	36
5 " 9.6" howitzers	120
3 " 12" howitzers	36
2 " 14" guns	24
4 " 3" Pack Artillery	96
5 " AAA 3" and 4"	120
10 Battalions of AA M.G.	430
12 Batteries of 6-inch Trench Mortars	72

The Hero Board recommends and this Board concurs that the General Headquarters Staff for this General Artillery Reserve should comprise about 59 officers with the necessary clerical force and enlisted personnel, the latter being estimated for purposes of this Board at 250 men.

Each Section, Field Artillery, Heavy Artillery, Railway Artillery, Trench Artillery, and A.A. Artillery will need its own Section Headquarters to consist in all of about 38 officers and 118 men.

155. G.H.Q. Aircraft. The composition of the General Headquarters Reserve of the Air Forces for two Field Armies is difficult to determine, especially in view of the rapid developments which are being made in aircraft. The Air Service Board recommends, though the recommendation is not fully concurred in by the Chief of Air Service, A.E.F., that

"The G.H.Q. Reserve consist of two parts, one part to be organized into Aerial Division (see A below) and the other part to consist of a General Reserve (see B below). The G.H.Q. Reserve should never be less than one Aerial Division and the percentage shown in "B" below.

A. Aerial Division (Bombing Brigade (Night Wing
(Day Wing
(Pursuit Brigade (2 Day Wings

Each Wing to consist of three Groups of 4 Squadrons and 1 Air Park each with 1 Photographic Unit for each Day Bombing Group and one B.I.O.

B. Reserve 10% of all Observation, Pursuit, Day Bombing, Balloons, Air Parks, Construction, and Photographic Units. This percentage being of all Squadrons and Companies on the Front."

For the purpose of this Board, the recommendation of the Air Board is accepted as being indicative of what, from our war experience a G.H.Q. Reserve should be. It is realized that as improvements are made the composition of such a reserve will alter and that in any particular future case the proper reserve can be determined only after a thorough study of the concrete conditions, the amount of artillery, the improvements in aircraft, the enemy strength in the air and the Nation's ability to produce aircraft.

156. G.H.Q. Cavalry. The Board has decided that the type Field Army as herein considered should have 3 Cavalry Divisions assigned as an organic part of Army Troops, in addition to the Cavalry Brigade provided for each of the three Corps. Under certain conditions it is realized that all or part of this strength in Cavalry, six Divisions for two Field Armies, may be withdrawn from the Armies and formed into a G.H.Q. Reserve. The Board is of the opinion that in view of the assignment of this strength to the Field Armies, no G.H.Q. Cavalry in addition need be provided.

As recommended in the discussion of "The Separate Arms, Cavalry"; a Replacement Depot for Cavalry is an essential.

157. G.H.Q. Sanitary Troops. An Ambulance Service, organized about as was the United States Army Ambulance Service which served the French Armies, should be organized as a G.H.Q. Ambulance Service. In the opinion of the Board, this should consist for two Field Armies, each of 12 Divisions of about 36 Ambulance Companies, each of 20 ambulances, and about 1 officer and 75 men.

The Headquarters of such an organization should consist of about 20 officers and 115 men.

158. G.H.Q. Engineers and Labor. One Regimental Headquarters and one battalion each of the Survey and Printing, Camouflage and Searchlight Services and one Pioneer Engineer Regiment should form a part of G.H.Q. Troops to serve Advance General Headquarters and to perform the necessary work in connection with manufacture, engineer research, school, and replacement required.

159. G.H.Q. Signal Troops. At least one Battalion of Signal Troops organized as provided for Army Signal Troops to serve as an Advance emergency reserve Battalion.

160. G.H.Q. Tanks. The Board believes that no Tanks should be permanently assigned to a Field Army but that all should be held as a G.H.Q. Reserve for assignment to Armies as needed.

The Board believes that the Tank Service should be organized into Battalions of 3 companies each of about 15 tanks. A Battalion to have one company of Heavy Tanks and two companies of Light Tanks, the battalion headquarters being so organized as to provide the necessary personnel for salvage and repair. Such an organization is suitable for assignment to Corps. The number of Battalions assigned to G.H.Q. Reserve for two Armies should be six.

For research, training, and repair a Tank Headquarters or Tank Center will be necessary. This organization should consist of about 60 officers and 1000 men.

161. G.H.Q. Special Units and Detachments. Serving directly under G.H.Q. of the Field Forces, there will necessarily be other special troops and detachments. This Board has made no effort to provide for all of them. It is sufficient to state that in modern war, every effort must be made to develop and improve the arms, equipment and methods in use by the Combat Forces. For proper research, experimentation and training in new weapons and new methods, a large number of officers and men will be needed and these should serve directly under Combat Chiefs at G.H.Q. It is inadvisable to decide now on the number of such troops required, or as to their organization.

IX THE ADMINISTRATIVE SERVICES

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ADMINISTRATIVE SERVICES.

162. Director of Personnel. In accordance with the principles set forth in the chapter on the "Directing Head", all administrative departments dealing with personnel should come under the control of the Director of Personnel, G-1. At G.H.Q. and at each headquarters of an Army, Corps and Division, there should be a Director of Personnel, G-1, who is responsible to the Commandor for all matters connected with the personnel of the organization and who shall control the activities of the following offices and services operating at his headquarters.

The Personnel Bureau,
The Adjutant General's Department,
The Inspector General's Department,
The Judge Advocate General's Department,
The Provost Marshal General's Department,
Chaplains,
Welfare,
Any other Bureau dealing with Personnel.

The Director of Personnel will organize the Replacement Service and will arrange for the publication of the

Order of Battle,
Strength Reports and Graphics,
Statistics on Replacements and all other matters concerning personnel.

163. Personnel Bureau. The Personnel Bureau is a part of the office of the Director of Personnel, G-1, and the organization and operation of this bureau is one of his important duties. It is the agency for the immediate information of the Commander and Chief of Staff on the following subjects:

Efficiency reports of all officers,
Lists of officers suitable for assignment to command and staff duty,
Promotions, assignments, transfers, elimination and replacement of officers,
Examination and appointments of officers,

Award of all honors and decorations,

Promotion policies, personnel requirements and activities of all arms, corps, services and departments,

Liaison on matters of commissioned personnel with headquarters of all armies, army corps and divisions, and with cheifs of adminstrative, supply and technical services and with casual officers' depots.

164. Adjutant General. The Adjutant General at each headquarters should have charge of the following activities:

Routine Administration,

Records,

Adminstrative Orders,

Enlisted Personnel; classification of personnel,

Returns, strength reports and statistical reports,

Provision of office supplies and blank forms,

Circulation Permits and individual identification cards,

Recruiting,

Correspondence,

Military Postal Service for handling personal and official mail (exclusive of couriers and motor despatch service).

165. Inspector. The activities of the Inspector at each headquarters comprise:

Investigations of all kinds relating to efficiency, organization, camps, quarters interior economy, transportation, morals, messing,

Verification of money accounts,

Inspection of property and establishments,

Inspector General Personnel in cooperation with Personnel Bureau, G-1.

The Inspector General's Department is thus charged especially with inspections to determine the efficiency and discipline of the

troops as shown in matters of interior economy. Inspections to determine tactical and technical efficiency are usually made by the operative and technical staff. But the commander should frequently make his own inspections using his available staff officers to the best advantage to assist him in this very important matter and assigning them for this purpose as he sees fit. It is also reasonable that officers in charge of services like Hospitalization, Motor Transport and Supply should use certain of their officers for inspection purposes in order to assure themselves that their services are functioning properly

166. Judge Advocate. The Judge Advocate should;

Have general supervision of the administration of military justice,

Recommend to commanders respecting general courtmartial cases requiring their action,

Give advice, when called upon, on questions of law arising in the field forces and in their relations to other governments and their nationals,

Give advice, when called upon, in the drafting of orders and regulations involving the interpretation of laws or instructions from the War Department,

Judge Advocate personnel in cooperation with the Personnel Bureau, G-1.

167. Provost Marshal. The Provost Marshal should have the following functions:

Supervision and inspection of all matters relating to organization, training, material and equipment of the Military Police,

Maintenance of order,

Traffic Police,

Apprehension of deserters, absentees and stragglers,

Prisoners of war and custody thereof,

Returns of Prisoners of War,

Prisoners' inquiry office,

Cooperation with Allied police authorities,

Cooperation with Intelligence Section Police,

Supervision of all matters pertaining to control of officers and men on leave,

Personnel, in cooperation with Personnel Bureau, G-1.

In each Army, Corps and Division, the Military Police organizations are an integral part thereof and the Commander of the Military Police should in addition perform the staff duties required of the Provost Marshal.

168. The forces in the field should be self supporting as regards welfare and recreation. The Chaplains and a Welfare Service, independent of any civil organization, should assure this under the general supervision of the Director of Personnel, G-1.

169. Replacements. Too much stress cannot be laid on the necessity for an efficient replacement system, organized and functioning in time of peace and capable of immediate expansion at the outbreak of war.

The following main factors are necessary in a replacement system:

(a) A constant supply of officers and men drawn from the military resources of the nation and classified as to civil specialties.

(b) A number of depots in rear areas where the new drafts are segregated into arms of service and military specialties and trained individually.

(c) A number of depots in close association with combat divisions and other forces where the individually trained personnel is held immediately available.

(d) In the case of depots for mounted troops, a close connection between the remount service and the depots so that both men and animals can mutually benefit by the system of training and so that these depots can furnish both men and horses to combat troops.

The experience of the war has shown that far too much of the available man power of the country was utilized for the actual organization of combat and auxiliary units and that, later, many of these

completely organized units had to be partially or wholly broken up to supply individual replacements to the fighting forces. On the outbreak of war and for a long period thereafter, one-third of the available man power of the country should pass directly into replacement depots at home. At these depots they should be classified as to civil specialties, uniformed and partially equipped, and organized into replacement companies or battalions for transfer to the theater of operations. These temporary organizations should ordinarily disappear when the replacements are absorbed into the permanent rear area depots.

The operation of the replacement system in the theater of operations comes under the Director of Personnel, G.H.Q. He must organize a system to provide reasonably trained replacements, in the proper proportion for each combat and auxiliary arm and service and to handle the flow of men returning to duty from hospitals and other local sources, as well as the flow from the home depots.

The development of this system will depend on the many conditions of the character of the war and the location of the theater of operations. After passing through a main depot, the replacements should pass to depots for training in the arm of the service to which they are assigned by reason of civil training or needs of the service. These special depots should be closely associated with the schools of the various arms and, in the case of cavalry and other organizations using horses, should operate in close conjunction with the remount service so that men and mounts could both be furnished as replacements from these depots.

The replacement system is intimately connected with the Personnel Bureau, the Adjutant General's Office and other activities under the Director of Personnel; on the other hand, the supply of clothing, equipment and armament and the salvage of replaced supplies, together with the problem of feeding and quartering large bodies of men requires the closest cooperation with the Director of Logistics. The broad principles herein laid down and a study of the detailed arrangements developed in the war should be the guide to the future organization of the Replacement Service.

X THE SERVICE OF SUPPLY.

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THE SERVICE OF SUPPLY.

170. Responsibility. The whole responsibility for supply of the Army is vested in the Director of Logistics (G-4). The word supply as here used includes procurement, transportation, storage, and distribution of material of all kinds, replacements of animals and the essential activities incident to these functions including construction, hospitalization and evacuation. The activities of the Commanding General Services of Supply and those of the Supply and Technical Staff Services are embraced in the Department of Logistics.

Principal Office. The Principal Office of the Director is at the General Headquarters of the Forces. When an advanced General Headquarters is established it is possible that the Director will move to it, but he will have a Deputy in charge at the Main Headquarters. The office of the Commanding General, Services of Supply, may and usually will be at the General Headquarters.

171. Assignment of Duties. The following tables show the distribution and assignment of duties and activities belonging to the various sections, bureaus, and departments, under the Director of Logistics, (G-4).

172. The Director of Logistics. (Fourth Section, G-4). Primary responsibility for the supply, construction, and transportation, including location of railway and supply establishments.

Supply and transportation arrangements for combat.

Hospitalization and evacuation of the sick and wounded.

Red Cross activities in connection with hospitalization.

Remounts and veterinary matters.

All operations of the Services of Supply, not otherwise assigned.

Food conservation.

Anticipation of demands for supplies and transportation.

Assignment of all new units arriving in the theatre of operations.

Assignment of all labor and labor troops.

Allotments of tonnage and requisitions, priority of shipments.

Disposal of captured men and material.

173. Commanding General, Services of Supply. Service of territorial command in the Zone of the Services of Supply.

Equipment of troops in the Zone of the Services of Supply.

Supply, Sanitary and Telegraph Service.

Transportation.

Construction, Maintenance and Operation of Agencies of Supply.

Procurement, Care and Storage of Supplies, Material and Equipment.

174. Supply and Technical Staff Services.

(a) Quartermaster Department.

Pay of personnel and general disbursements.
Quartermaster Material, including clothing, subsistence, fuel and forage,
Remount Service,
Veterinary Service,
Laundries and Baths,
Disinfection of Clothing,
Salvage Service,
Q.M. Shops, Depots and Storehouses,
Cold Storage and Refrigeration,
Graves Registration Service,
Inspection Q.M. activities,
Technical Advice on organization, instruction, training, equipment and methods for Q.M. Corps formations.
Q.M. Corps personnel, in cooperation with Personnel Bureau.

(b) Medical Department.

Hospitalization and Sanitation.
Health of command and care of sick and wounded.
Collection and evacuation of sick and wounded.
Medical Department transportation, including ambulances and hospital trains.
Medical Department supplies.
Technical inspection of Medical organization and establishments.
Technical advice on organization, training, equipment and methods for Medical Department formations.
Medical Department personnel in cooperation with Personnel Bureau.

(c) Engineer Department.

Field Fortifications; military mines, subways and galleries,
Military bridges; searchlights, and camouflage,
Surveys and maps not otherwise assigned, in cooperation with G-2 C,
Engineer supplies, depots, storehouses, and shops,
Water supply and installation,
Supply of electric light and power,
Construction and maintenance of light railways, roads, wharves, shops and other buildings. Construction of railways and canals under military control. Operation of the light railways and quarries.
The organization of and initial operations of the Transportation Department,
Forestry Service, lumber and its production,
Sewage disposal plants and operation,
Bureau of fire prevention,
Training of Pioneer Engineer Regiments in the use of Chemical Warfare Devices both defensive and offensive and the organization, equipment and training of special engineer units for this Service, if desirable,
Technical inspection of engineer organizations, establishments and activities,
Technical advice on organization, instruction, training. equipment and methods for engineer troops,
Preparation of manuals and instruction pamphlets,
Historical photography of military operations, news and propaganda photography in cooperation with G-2,
Engineer Department Personnel, in cooperation with Personnel Bureau.

(d) Ordnance Department.

Ordnance shops, depots and storehouses,
Ordnance material, including artillery, small arms, machine guns, automatic rifles, pistols, grenades, tanks, periscopes, etc.,
Ordnance equipment,
Ammunition depots and Army dumps,
Ordnance supplies,
Supply of gas bombs, gas shells, and other similar material for Chemical Warfare,
Depots and Army dumps for material for chemical warfare,
Design and development of material for gas, smoke and incendiary offense,
Advice on use of chemical munitions,
Chemical laboratories and experimental stations,
Technical advice on instruction, equipment, and methods of Chemical Warfare formations,
Ordnance repairs,
Pyrotechnics,
Ordnance Department personnel, in cooperation with Personnel Bureau.

(e) Signal Department.

Signal Corps material,
Radio, visual, wire communications; message receipt and transmission; radio, telephone and telegraph services,
Pigeon Service,
Lines of information (installations and operations),
Signal Corps depots,
Preparation of codes and ciphers,
Technical inspection of signal organizations and establishments,
Meteorological service,
Research, investigation and development of signal appliances, including Sound and Flash Ranging devices,
Technical advice on organization, instruction, training, equipment, and methods for Signal Corps troops,
Signal Corps personnel, in cooperation with Personnel Bureau.

(f) Aeronautical Department.

Airplanes and balloons,
Aviation and aero stations,
Material,
Aerial reconnaissance, observation and photography, in cooperation with G-2,
Aerial combat and bombing,
Technical advice on organization, instruction, training, equipment and methods for Air Service formation,
Air Service personnel, in cooperation with Personnel Bureau.

(g) Motor Transport Department.

Procurement, inspection, storage, maintenance, technical supervision, evacuation and replacement of all motor vehicles,
Homogeneous grouping of motor vehicles,
Operation of motor vehicles,
Procurement, storage and supply of spare and repair parts, tools, accessories and supplies of all motor vehicles,
Establishment and operation of M.T.C. garages, parks, depots and repair shops,
Salvage in cooperation with Salvage Service,
Organization and technical training of M.T.C. personnel,
M.T.C. personnel, in cooperation with Personnel Bureau.

(h) Transportation Department.

Operation and maintenance of all railways (except Light Railways) and canals under military control,
Operation of inland water transport and ocean transport,
Compilation of statistics showing classified tonnage received at ports; that moved over railways; and that delivered at railheads,
Operation of terminals, including unloading of ships and transportation of goods to storehouses,
Procurement of railway supplies other than construction material,
Control of telephones and telegraphs for railway purposes,
Control and maintenance of all standard-gauge rolling stock and motive power,
Technical advice on organization, instruction, training, equipment, and methods for Transportation formations,
Transportation Department personnel, in cooperation with Personnel Bureau.

(i) Purchasing Department.

Purchase, procurement and inspection of all supplies,
Labor Bureau,
Cooperation between various services to prevent competition,
Consolidation of purchases of various Departments,
Personnel in cooperation with Personnel Bureau.

175. Additional Agencies. The following agencies may from time to time be necessary. They should not be developed into independent services. They should be placed under one of the Departments named above and the duties should be performed in a section of bureau of that Department.

Rents, Requisitions and Claims Bureau,
War Risk Insurance Bureau,
Army Service Bureau.

176. Headquarters Commandant. The Commandant of troops stationed at Headquarters will be charged with the following duties:

Command of Headquarters troops, Orderlies, Messengers, Mounts and Details,
Provost and other Guards,
Officers, Clerks and Soldiers' Messes,
Property Equipment and Transportation of the Headquarters.

177. Zone of the Services of Supply. This zone contains the primary Services of Supply and territorially will comprise, dependent on geographical conditions, certain sections; if two, an advance section and a base section. If necessary, "Intermediate" Sections may be established, the limits of which will from time to time be prescribed by the Commander of the Forces in the Field.

178. General Organization of the System of Supply. Experience has shown that the supply of troops can be effectively accomplished only by making a single agency responsible for its control. This agency must have at hand information as to the present and prospective state of supply and the capacity of every element of the supply system. It must have full authority to make changes necessary to meet a rapidly shifting situation. This agency is the Fourth Section, Director of Logistics (G-4). He exercises such supervision and control as may be necessary in regard to the functions of construction, supply, transportation, storage and distribution. This officer has his counterpart at all principal headquarters down to and including the Battalion.

179. The Director of Logistics is responsible for the initial procurement of all supplies, material and equipment necessary for all the troops in the theatre of operations and for all plants and establishments. He is also responsible for the care and storage of such supplies, material and equipment, and for their manufacture, salvage, repair and cleaning, and for the construction, maintenance and repair of all agencies necessary to accomplish these purposes. He is responsible that the supplies, material and equipment are maintained and distributed among the several depots in accordance with approved projects. He is responsible for the distribution of supplies, and for the allotment of all supplies to The Services of Supply and to the Combat Forces.

He will regulate, control, and administer the Supply System through the Chiefs of the Supply and Technical Services and the Commanding General, Services of Supply.

Where there is but one headquarters, the duties of the Director of Logistics include all the duties herein assigned to the Commanding General, Services of Supply, except those pertaining to territorial command and its incident administration. When the Director of Logistics is absent a Deputy will perform his duties.

180. Commanding General, Services of Supply. Exclusive of certain schools, training centers, or other formations which may be specifically excepted, the Commanding General, Services of Supply, commands the Zone of the Services of Supply and all troops and agencies therein. He is responsible for the discipline, police, sanitation and protection thereof. He is charged with the unloading of freight and troops from ships at all ports of debarkation, and with the transportation of all troops and supplies therefrom throughout the Zone of the Services of Supply. He is responsible for the construction, maintenance and operation of such utilities as may be necessary to accomplish these objects, including such railroad lines and rolling stock as may come within the control of the forces. He exercises general supervision over the initial equipment of troops arriving in the Zone of the Services of Supply and assists in the speedy refitting of troops withdrawn from the Zone of the Armies. In the Zone of the Armies he will be responsible through his agencies

for specific works of construction assigned to him from time to time by the Director of Logistics and for furnishing all organizations and personnel necessary to the proper administration of supply and service establishments in the Zone of the Armies so assigned to him. The maintenance andoperation of establishments in the Army Zone, herein created, will be under the supervision of officers on the staff of the Commander of the Army.

181. Section and Base Commanders. Under authority delegated to him by the Commanding General, Services of Supply, the Commanding Officer of each base, intermediate section, or advance section of the Zone of Services of Supply, will exercise command over the troops and establishments in his section and will be responsible for the discipline, police and sanitation of the area assigned him. He is particularly charged with responsibility for the efficient distribution and economical employment of labor organizations in his section and for the prompt unloading of vessels and transfer of freight from the wharves to depots within his own section, or to other parts of the theatre of operations inaccordance with instructions issued to him. He will facilitate the construction of wharves, depots and other works in his section and will supervise the various services of supply and transportation with a view to the expeditious movement, release, and return of railway rolling stock and motor transportation.

182. Army Service Area. That area included between a line drawn in rear of the elements (corps) which are in contact with the enemy, and the line separating the Zone of the Armies from the Zone of the Services of Supply, will be known as the "Army Service Area". Each Army Service Area will be commanded by an officer of suitable rank with the title of "Commander of the Army Service Area", who will be directly under the Commanding General, Field Army, or Army Group. Insofar as practicable it will be his duty to relieve the Commanding General, Army, of details incident to the administration and supply of troops in the Army Service Area.

The Commander of the Army Service Area will have charge of the [illegible] exploitation of local resources and the distribution of the products thereof. He will supervise the relations between American forces and the civil popula-

tion. He will regulate the use of special service troops and labor personnel at his disposal. He is responsible for the sanitation of his Army Service Area and is charged with the preparation and maintenance of billeting accommodations for all troops therein. He supervises the establishment in billets of incoming troops. He makes suitable provisions of rations, forage, fuel, bedding, and other supplies to meet their needs and particularly anticipates their demands for the first few days after their arrival.

Whenever two or more armies are combined to form an Army Group the Army Service Zones may, in the discretion of the Commander of the Field Forces, be combined and placed under the control of the Army Group Commander. In such event a Commander of the Army Service Area for the Army Group will be appointed who will be directly under the Commanding General of the Army Group. His duties in connection with troops in the Army Group will be in all respects analogous to these herein prescribed for the Commander Army Service Area.

The Commander of the Army Service Area will be provided with a suitable administrative, supply, and technical staff.

183. Agencies of Supply and Evacuation. The agencies of supply and evacuation comprise base, intermediate and advance depots; regulating stations (with "Regulating Station Reserves" attached), railheads, refilling points and evacuating and sorting stations; army depots; corps parks; divisional dumps; special area dumps and the necessary means of transportation and communication.

Depots. The word "Depot" used in this report will signify a Services of Supply establishment and the word "Army Depot" an Army establishment. Depots are usually located within the Zone of the Services of Supply. Their function is primarily to provide an emergency reserve of materials for the furtherance of military operations. In order to anticipate the demands of troops, or to fulfill a special mission, the stocks maintained at these depots may as a whole, or in part, be placed at the disposition of a Regulating Station for a definite period of time.

The Chief of each supply service is immediately responsible for his depots and establishments in the Services of Supply. In accordance with general instructions, he will anticipate the needs of the forces and will submit project for special plant, equipment and meterial required in the operation of his de-

partment, and after approval thereof he will maintain appropriate stocks of supplies at the various depots and establishments. With the approval of the Headquarters of the Field Forces changes in these projects and in the various lists of supplies will be made from time to time to correspond with the varying phases of military operation and terrain. Special attention will be devoted to the needs of troops arriving in the Zone of the Services of Supply, and arrangements will be made to furnish them prescribed equipment promptly, and without awaiting formal request. Whenever any shortage is indicated or anticipated in any important article of supply, equipment or transportation, and the necessity arises for special control of expenditures or for reduction of allowances, the chief of the service concerned will bring the matter to the attention of the Headquarters of the Field Forces (G-4), through the Commanding General, Services of Supply, with a view to suitable action.

Under the direct supervision of the Commanding General, Services of Supply, supplies will be obtained by request on prescribed agencies in the United States or by purchase. No purchasing agent or disbursing officer is, in general, concerned with the initiation of purchases or with the state of supplies in depots. The function of these officers is to purchase and inspect the supplies ordered, and, in co-operation with the transportation agencies, provide for their delivery and to make payments. Canvass will be made of all possible sources of supply with a view to taking full advantage thereof. The Purchasing Agent will from time to time inform the Commanding General, Services of Supply, and through him, the various supply departments, as to the character of supplies which can advantageously be obtained in the theatre of operations, with such data concerning time of delivery and other pertinent information in the case of specific articles as may be necessary to permit of intelligent determination as to the expediency of placing orders for the same. When preparing requests for procurement of supplies application should be made to the Purchasing Agent for latest information as to the state of the market and the feasibility of procurement of articles in question within the allowable limit of time.

Each depot or group of depots in the Services of Supply will be com-

manded by an officer of suitable rank and experience, who will be designated "Commanding Officer, _____ Depot". In accordance with instructions issued to him from time to time the Commanding Officer will exercise all the customary functions of a post commander, and will devote special attention to the protection of the stores in his depot against damage by fire or by improper storage or handling. By efficient management of labor at his disposal he will facilitate the prompt handling of incoming and outgoing freight, prevent congestion and speed up the turn-around of freight cars and other means of transportation. To this end all orders or requests for shipments of supplies emanating from any source whatever will be transmitted to the Commanding Officer, Depot, properly marked for the depot officer concerned. In accordance with instructions issued to him by the Commanding General, Services of Supply, the Commanding Officer, Depot, will determine priority of shipment, make allotment of cars, and by proper utilization and co-ordination of transportation agencies, expedite the movement of freight toward the front.

Each department having supplies at the depot will be represented by a depot officer and the necessary personnel to handle supplies pertaining to his department. It will be the duty of the Chiefs of Services to see that stocks, as a whole, are so balanced as to enable his depot to perform the particular mission assigned it. The Commanding Officer, Depot, will coordinate the activities of the various departmental depot officers, while leaving to them the internal management of their respective depot sections.

Each depot officer will keep the chief of his service in the Services of Supply periodically informed as to the stock on hand, and will issue supplies on requests approved by the Chief of his department or as hereinafter otherwise prescribed. He will supervise the unloading and loading of supplies pertaining to his service; will see that outgoing cars are properly marked. He will transmit information in regard to shipments to the consignee through prescribed channels in accordance with instructions to be issued from time to time. Under no circumstances will he arrange for transportation except through duly constituted transportation agencies under the general supervision of the Commanding Officer, Depot.

184. Regulating Stations. Based on traffic considerations, the territory occupied by troops in combat is divided into areas, to each of which is assigned a Regulating Station. A regulating station is that agency in the system of supply which directs and controls the movements of troops and material destined to or from the area which it is specifically designated to serve. The facilities at the regulating station consist essentially of a railway yard with receiving, classification, and departure tracks, and certain facilities for storage and handling of stocks of supplies herein collectively designated as "Regulating Station Reserves". For reasons of convenience other facilities may be established at the Regulating Station, but these are not invariably provided. To meet the needs of the shifting military situation in mobile warfare, regulating stations may be established from time to time wherever the necessary railway trackage already exists or may be quickly installed.

The Regulating Station is commanded by a Regulating Officer (R.O). who is a member of the 4th Section, (G-4), Headquarters of the Field Forces and exercises his command by virtue of authority delegated to him by the Commander of the Field Forces. He is assisted by a suitable staff representing the various departments and agencies of supply, including transportation. He has an executive officer, who relieves him of all details relating to the functions of military command and routing administration.

The Regulating Officer is responsible for the systematic orderly movement of supplies and reinforcements to organizations served by his station and for the evacuation of men, animals and materials therefrom. To him are sent all orders for, and information regarding, the railway transportation of men, animals, and material in his territory. He is advised in ample time of proposed changes at the front that affect supply operations and he makes appropriate dispositions accordingly. He co-ordinates the activities of departmental representatives at his station, determines the size of stocks to be kept in the yard, determines priority of shipments, makes the allotment of cars, and effects prompt release of railway equipment. He makes suitable drafts for supplies on designated depots to insure the necessary flow of supplies.

No shipments will be forwarded to any Regulating Station, nor to any point in the Zone of the Armies served by such station, except by order of the Regulating Officer, or in accordance with a definite shipping schedule previously approved by him. Officers commanding depots and others in charge of shipments are responsible that advance notice is given the Regulating Officer of all shipments made to his Regulating Station, or to the area which it serves. The flow of supplies thus arranged for normally reaches the Regulating Station in solid trains which are there broken up and reassembled in "ramos" (i.e., strings of cars), or trains for divisions, or large groups of non-divisional elements in the Zone of the Armies. Express, mail, and miscellaneous small shipments for the Zone of theArmies are received and sorted at the Regulating Station and forwarded in cars on the divisional trains.

To insure the daily flow of supplies to combat troops against interruption, due to irregular arrivals at the Regulating Station, the Regulating Officer, draws upon his Regulating Station Reserves, and such drafts are replaced at the first opportunity. The Regulating Officer is responsible for the maintenance of a sufficient emergency reserve and the storage facilities which pertain to the Regulating Station, as such, are not available for storage of miscellaneous material not needed for this purpose.

Whenever the operation of the railway facilities at a Regulating Station, or whenever the handling of trains in the areas served by such station, are taken over by the Field Forces, the work of railway operation will be handled by personnel from the Transportation Department, under the direction of a Division Superintendent, who will be responsible for the movement of cars in accordance with military requirements as indicated to him by the Regulating Officer.

A Division Superintendent, or other Transportation Department representative stationed at a Regulating Station, is a member of the Regulating Officer's Staff. It is his special function to assist and relieve the Regulating Officer in the discharge of his duties in respect of railway personnel, rolling stock, and other equipment required in conducting railway transportation, maintenance, and generally in all questions of a technical nature relating to the supervision of railway operation. All Regulating and Railhead officers

in the Zone of the Armies will be responsible to a Chief Regulating Officer (C.R.O.), at the headquarters of the Field Forces (G-4).

In all matters of discipline, sanitation, military administration and supply, all personnel at the Regulating Station is subject to the jurisdiction of the Regulating Officer in his capacity as a Military Post Commander In all matters of a technical nature relating to railway operation or maintonance and duties or employment directly in connection therewith, the Regulating Officer will exercise his control through the proper railway officers.

185. Railheads and Refilling Points. The railhead is the point on the railway at which troops or supplies are discharged and from which they are distributed. The refilling point is the place at which the supply trains belonging to divisions and the larger groups of non-divisional elements are refilled. The two may coincide, and the instructions hereinafter given as to railheads apply with equal force to refilling points. At or near the railhead will be maintained limited quantities of stores for emergency use, and, depending on transportation facilities, one or more days supply of rations, forage, fuel, gasoline, and other articles of approximately uniform daily consumption (Class I) from which divisional supply trains may be filled without holding them for the arrival of belated railway trains. When drafts are made upon these stocks the latter will be replenished from supplies brought up on the trains. Report will be made daily to the Regulating Officer as to stores on hand. Effort will be made to maintain balanced stocks of ration components.

Each railhead is commanded by a Railhead Officer (R.H.O.), who is directly responsible to the Regulating Officer for the efficient operation of the railhead. He is charged with the reception, unloading, custody and delivery of all supplies received at his station. He is warned by the Railway Transport Officer (R.T.O.) of the probable hour of arrival of trains and will make arrangements to unload all cars with utmost dispatch. These cars must be released within twenty-four hours after their arrival and as much earlier as may be practicable. He is responsible for the sanitation and appearance of his yard and all grounds adjacent thereto which may become littered up by reason of the use of the station by the troops. He will exercise particular

care not to encroach upon portions of the yard reserved for commercial purposes, whenever a railhead is located at a commercial station. Special precaution will be taken to keep clear the loading platforms and the ground near the tracks. Sales commissaries and other facilities not essential to the operation of a railhead as such will be established at or in the immediate vicinity of the railhead only upon the approval of the Regulating Officer. When so established the Railhead Officer will have no responsibility in connection therewith.

The Railhead Officer commands his station by virtue of authority delegated to him by the Commander of the Field Forces, through the Regulating Officer. He receives his instructions from the latter, and is assisted by suitable personnel which may include officers from the various supply departments. He will be furnished with railhead detachments of laborers for routine duty and he may call upon the local military commander for additional labor necessary to meet requirements for the situation at any time.

The Railhead Officer has associated with him a Railway Transportation Officer (R.T.O.), to assist in matters of railway operation in accordance with military requirements as indicated by the Railhead Officer. The Railway Transportation Officer is an officer of the Transportation Department, and, in all matters of railway operation reports to and receives his orders from his Division Superintendent. Both officers should endeavor by all means within their power to expedite the movement, release, and return of railway rolling stock, and to free the railhead as rapidly as possible.

Although serving in areas which are frequently under the control of commanders of tactical units, or in the Army Service Area, the personnel at railheads will not be assigned to such commands, nor will they be interfered with in the discharge of their duties connected with supply or transportation activities; but nothing herein shall be construed to deprive such tactical area commanders of authority fundamentally vested in them, such as police control, highway traffic control and the enforcement of measures for sanitation and safety.

186. Evacuation and Sorting Stations. Evacuation stations and sorting stations are established to handle the rearward movements of men, animals and material. An evacuation station is a place for the collection of men, animals and materials that have become unfit for use at the front and for which movement to the rear is contemplated. The personnel of these stations receives and cares for the items to be evacuated and at the proper time loads them on trains provided by the Regulating Officer.

Orders for the evacuation of men, animals and material are ordinarily issued by G-4, Army Headquarters, which should receive early notification of desired movements, so that the Regulating Officer may be given ample time to make arrangements for the necessary rolling stock. In an emergency during action, the officer-in-charge of an evacuation station may call directly upon the Regulating Officer forthe necessary railway equipment to evacuate the wounded, notifying G-4, at his first opportunity that he has made such call.

Sorting stations are railway stations to which evacuated men and material are sent from the evacuation stations and where they are sorted into special classes and thence shipped to their final destination at the rear. Sick and wounded are sent to the various hospitals; worn-out and broken material is distributed to depots or shops previously designated.

The evacuation of sick and wounded men is under the general supervision of the Medical Department. Detailed instructions governing the evacuation of the wounded are prescribed in par. 192. The evacuation of wounded animals is supervised by the Remount Service, and conforms in general to the methods used in the evacuation of the sick and wounded. The salvaging of worn-out or broken material and the general supervision of its evacuation and ultimate distribution devolves upon the Salvage Service. In all of this work the actual evacuation is executed in co-ordination with the transportation service, 4th Section.

187. Army Supply Establishments. Army depots; corps parks; division dumps, and special area dumps contain more or less complete stocks of equipment, material, and supplies required by the various units indicated. In accordance

with the tactical requirements, as indicated by G-3, Army, these supply establishments will be located by G-4, Army, in consultation with the various supply officers concerned, and thereafter will be administered by the respective services to which they pertain, under the general supervision of G-4, Army. Within such broad general lines as may be prescribed by G-4, Army, with a view to simplification and co-ordination of practice, the various services will organize their own systems of supply and to that end will establish only such of these depots and dumps as best meet the needs of their respective services. In the establishment of these organs of supply, special attention must be given to questions of proper location and efficient layout with a view to facilitating and economizing transportation by standard gauge and light railways, motor trucks and animal-drawn vehicles. The possibilities of future expansion must be considered. The tendency towards multiplication of units and the dispersion of supplies must be specially guarded against, in order to prevent wastage of material and the difficulties and delays incident to moving stores in the event of an advance or retreat.

188. Classification and Methods of Supply. The system of supply herein prescribed contemplates that troops shall normally be encumbered with a minimum of impedimenta and supplies, thus insuring a maximum of mobility. The responsibility of supply has been placed upon supply agencies as hereinbefore indicated and the methods for issue of supplies have been so simplified that any essential article can be obtained, when needed, on short hours notice.

For convenience of administration, all supplies required by troops are divided into four general classes, viz:-

Class I:- All articles which are consumed at an approximately uniform daily rate irrespective of combat operations or terrain, and which do not necessitate special adaption to meet individual requirements, such as rations, forage, fuel, gasoline, lubricants, and illuminants, including dry batteries. This also will contain all articles which can be handled on the basis of a daily automatic supply.

Class II:- Authorized articles of clothing and equipment, which, though consumed at an approximately uniform rate, are for the personal use of

the individual and necessitates special arrangements to meet individual requirements, such as clothing, shoes, raincoats, brassards, gas masks, helmets, blankets and bedsacks.

Class III:- Authorized articles of equipment, of which allowances are established by Tables of Organization and Equipment, or by schedules of allowances published by the War Department or by Headquarters of the Field Forces, such as arms, engineer, medical, ordnance, quartermaster, and signal equipment, including vehicles, both motorized and animal-drawn.

Class IV:- Ammunition, construction material of all classes, engineer and ordnance material, and all articles of which the consumption varies sharply with operations, season, or terrain, such as barbed wire, bridge and road material, machinery, telephone and telegraph line material, lumber and forestry products (other than fuel), railway ties and rails and water supply equipment. Also all articles of an exceptional nature required for special purposes and all materials and supplies, which, by reason of extreme shortage, required special supervision in their distribution and use, such as certain medical supplies, photographic and lithographic materials, optical apparatus, chronometers and other instruments of precision.

Any article which normally belongs in Class II or Class III may, by reason of special stringency, be placed in Class IV pending re-establishment of normal status of supply. This will be done on orders issued by Headquarters of the Field Forces (G-4).

In the following description of procedure, the term "division" is used for convenience to indicate an adminstrative unit. For non-divisional elements the procedure will be substantially that prescribed for a division, with the exception that to facilitate delivery of supplies a number of these non-divisional elements may occasionally be combined to form a provisional supply group. Those regulations will also apply to schools, hospitals, camps and other formations in the zone of the Armies.

In accordance with the classification in preceding paragraph supplies will be obtained and distributed as follows:

Class I supplies, Rations, forage, etc.:- The distribution of articles in this class is premised on the actual strength in men and animals of the troop units as shown by records maintained by the Statistical Section of the division or statistical officers of non-divisional elements.

(a) The division supply officer will make up his requests for rations, forage, and fuel from date furnished him by the statistical section at division headquarters and they will be filled by the supply officer at the railhead or refilling point.

(b) The daily automatic supply of forage, fuel and rations is based on the actual strength of the organization in men and animals, or, on experience tables for gasoline, oils, and illuminants. This information is furnished by G-4 Corps or Division, to Army Headquarters (G-4), from data prepared for the Statistical Section. Army Headquarters (G-4) thereupon notifies the Regulating Officers of the number of men and animals of each division or other similar organizations belonging to the Army. Organizations in the Army Service Area not included in the above send similar strength reports to Army Headquarters, G-4, who similarly notifies the Regulating Officer, and at the same time gives him such special information as may be necessary to meet the requirements of each organization.

(c) The Regulating Officer may call upon the various supply depots supporting his station to forward necessary automatic supplies in either of two ways, viz:-

(1) By directing supplies to be made up into trains for through shipment to specified divisions or supply-groups; or

(2) By calling for shipment of supplies in bulk.

(d) Under the first method of procedure the supplies are loaded into cars in quantities indicated by the Regulating Officer, and each car is legibly marked on both sides in accordance with shipping instructions supplied by him. All cars for a specified unit are assembled and shipped as a "rame", (string of cars). Notice of shipment is transmitted by the Commanding Officer, Depot, to the Regulating Officer in time to reach the latter simultaneously with, or preferably before, the arrival of the cars. These

notices of shipments are at once passed to the Division Superintendent (or Railway Transportation Officer), who enters required data in a car-record book and makes up the trains or "rames" and dispatches them at the proper time to their destination accompanied by a "convoy" (special agent), when he thinks such convoy necessary. The Division Superintendent (or Railway Transportation Officer) will forward to the Railhead Officer in time to reach the latter simultaneously with, or preferably before, the arrival of the train or rame a "consist" thereof showing car numbers, contents and consignee.

In all cases the railway personnel will be given in advance such information as may be available as to probable makeup of rames and trains with destinations and proposed hours of departure.

On arrival at the railhead, cars are promptly unloaded under the supervision of the Railhead Officer, and the supplies are transferred to the divisional trains. On the other hand, divisional transportation, should not be kept waiting at the railhead unnecessarily, and the Railhead Officer will accordingly inform the Division Supply Officer of the probable hour of train arrivals in order that the divisional transportation may make suitable connections, if possible

At the time of making issues no allowance will be made for variations in troop strength occuring between the date on which organization strength reports are made and the date on which corresponding shipments of rations are issued, but issues will be made for the strength at time of drawing, record will be kept of issues as actually made and these will be balanced against the strength reports at stated intervals.

(e) Under the second method of procedure when the Regulating Officer calls for shipment of supplies in bulk, the following procedure will obtain:-

The supplies will be loaded by the depot officers on cars in such units and quantities as the Regulating Officer may determine to be most suitable for handling and distribution. Each car will be legibly marked on both sides to show character and weights or quantities of contents, and such other

simple data as may be required. Notices of shipment will include information as to car numbers, contents and weights or quantities in each car. Promptly on receipt of such notices the Regulating Officer will indicate to the Division Superintendent (or Railway Transportation Officer) the destination of the various cars and the provisional make-up of all rames or trains for the various railheads. Under normal conditions such advice as to "make up" can be prepared with a reasonable degree of accuracy twenty-four hours in advance of the scheduled hour of departure, but this provisional make-up will be followed by a final make-up as soon as it can be furnished. Upon arrival of cars they are marshalled by the railway personnel and dispatched to their distinations in accordance with make-up schedule.

In forwarding supplies in this manner carload lots or unit quantities will not be broken and it will not always be practicable to meet the exact requirements of a divisional or provisional supply-group. The method will thus result in over-issues or under-issues, as the case may be, which will require adjustment at stated intervals. A record book suitably ruled for plus and minus issues and net amounts due different organizations will be kept by the Railhead Officer and by the divisional supply officer with a view to making suitable adjustments in subsequent issues.

Class II Supplies:- (Clothing, blankets, gas masks, etc.).

(a) The distribution of articles in this class is likewise based on the actual strength in men and animals of the troop units as shown by statistical records, and in addition is based on records of sizes (for clothing, sh etc.), maintained by the regimental supply officers and determined by experien

The latter will furnish necessary data as to sizes to the division supply officer, who will consolidate them and keep them reasonably up to date by requiring reports at stated intervals. Whenever supplies become necessary he will prepare a consolidated request for his division and submit the same to Army Headquarters (G-4) for approval, and for determination as to what portion of the supplies shall be drawn from stocks in the Army depots. Any portion of the request which cannot be filled from sources at the disposal of the Army will be forwarded through the Regulating Officer to a storage dep previously designated by the chief of each supply department to furnish, for

particular unit or sector, the supplies of the character required. The depot will fill the request to the nearest unit package. Original packages will not ordinarily be broken. Upon receipt of requests, the depot officer will inform his Railway Transportation Officer as to his requirements for railway rolling stock and the latter will make the necessary arrangements. The Commanding Officer, Depot, will inform the Regulating Officer of projected shipment and the latter will establish order of priority and give such other instructions as may be pertinent. After the cars are placed by the railway personnel, they will be loaded by the depot personnel, and the procedure thereafter will be as heretofore described for carload lots of Class I supplies.

(b) During periods of stabilized warfare, or for troops in training areas, or under favorable conditions of service, and in accordance with experience accumulated as to rates of consumption, certain articles in this class of supplies may be placed on a semiautomatic basis; shipments may thus be made to the organizations on certain dates agreed in advance, due allowance being made for variations in strength.

(c) Variations indicated by (b), above, will be authorized only by order of the Headquarters of the Field Forces (G-4), on recommendation of G-4, Army.

Class III Supplies, (Authorized articles of equipment).

(a) Under the supervision of the Commanding General, Services of Supply, or the Commander of the Army Service Area, initial issue of authorized articles of unit equipment will be made without request to all troops arriving in their respective areas. Thereafter requirements for supplies will be transmitted by divisional units to the divisional supply officer, who will fill same from any supplies at his disposal in accordance with established schedules of allowances. If he cannot fill the entire request, he will forward the remainder of the request to Army Headquarters, where it will be filled by the proper Army Supply Officer from supplies actually held in Army establishments, or in depots on credit allotments, as hereinafter explained.

(b) Any portion of the request which cannot be filled from sources at the disposal of the Army will be forwarded through the Regulating

Officer to a storage depot previously designated by the chief of each supply department to furnish, for the particular unit or sector, the supplies of the character required.

Class IV Supplies, (Ammunition, construction material, etc.).

(a) Requirements for articles of this class are handled in the manner described for those of Class III, except that after the articles which are disposable within the Army have been furnished, the remainder of the request will be forwarded direct from Army Headquarters (G-4) to Headquarters of the Field Forces (G-4), where appropriate action will be taken.

In making shipments of supplies a list of contents or "loading slip", duly verified, will invariably accompany each car. For supplies shipped in closed cars, the slip will be tacked in a conspicuous place inside the car near the door and for supplies shipped in open cars, it will be placed in a durable envelope and tacked to the under side of the car near the middle in a place protected from the weather. In all cases notices of shipment containing necessary information as to car numbers, contents, weights or quantities, and the consignee will be transmitted to the Regulating Officer by the Commanding Officer, Depot, or other shipping officer in time to reach the Regulating Station simultaneously with, or preferably before, the arrival of the cars. The notice of shipment will contain reference to the identification or file number and the items on the requisition or order on which the shipment applies. A duplicate of such notice will be sent to the consignee. For organizations serving in combat areas, the notice will be sent to Headquarters (G-4) of the proper Army for transmittal to the consignee. For organizations elsewhere it will be sent directly to the consignee by the shipping officer.

Whenever articles are to be shipped from depots in less than carload lots to any division or supply-group, they will be properly marked with the name of the ultimate consignee and will be placed by the departmental depot officer in cars with similar small shipments destined for other units in the same command. No car will contain supplies furnished by two or more departments. Cars will be consigned to the corresponding departmental supply officer of the Army or other headquarters having jurisdiction and he will

arrange for delivery of contents to the ultimate consignee. Loading slips placed in such cars will give all data necessary to insure delivery to the original unit making the request.

Credits. (a) In order to expedite the supply of articles of any class, and to reduce necessity for sending formal requirements to Headquarters of the Field Forces, certain quantities of supplies stored in the various depots may be alloted to and placed at the disposal of Army Headquarters for a definite period of time. Such quantities of supplies will be called "credits", and after allotment will be subject to draft on demand directly from Army Headquarters without further reference to the Headquarters of the Field Forces. The purpose of alloting such credits is to assure Army Headquarters of a definite amount of supplies for the period stated, and at the same time, relieve the Army of the necessity of caring for them in Army depots. The Commanding Officers of the depots at which stores are actually located thus become "warehousing agents" for the Army for the amount of supplies covered by the credit allotment. Upon receipt of drafts from Army Headquarters for supplies covered by "credits", the Commanding Officer, Depot, will arrange through the proper regulating officer for necessary transportation, and will cause cars to be loaded by the proper departmental depot officer. One copy of each draft made against the credit will be sent by G-4, Army, to the Regulating Officer. By arrangement between G-4, Army, and the Regulating Officer, the orders may direct shipment in carload lots at a fixed rate for a number of days, and the railway division superintendent in such cases will take action to secure the rolling stock required.

(b) At the end of the period named in the credit allotment, all undrawn balances will revert to depot stock, but on request made prior thereto, a new credit will have been arranged by Headquarters of the Field Forces, (G-4) for the next succeeding period. Army Headquarters may, at its discretion, make similar credit allotments of supplies in Army Depots to subordinate units and establishments. Copies of documents making credit allotments will be forwarded to Army Headquarters, to the Commanding Officers of the depots, and to the chiefs of the services concerned. The latter will make arrangements to meet drafts on these credits. A "credit allotment" will not be confused with a demand or order for shipment.

Requests: (a) Requests will normally be filled from supplies actually on hand, or at the disposition of the various headquarters. Only under exceptional circumstances will requests be forwarded for action to higher authority while subordinate agencies still have supplies at their disposal from which such requests may be filled. In such cases the reasons for forwarding the requests to higher authority will be indicated.

(b) No request will include articles issued by two or more supply departments nor, when it can be avoided, will articles of different classes be listed in the same request. All requests for divisions, corps and army troops, or for non-divisional organizations that are forwarded to Depots will be in triplicate, and will bear a serial file number for the organization concerned. This number will be prefixed by an abbreviation indicating the department which issues the supplies covered by the requisition, as follows:-

"QM." for Quartermaster Department;
"MD" " Medical Department;
"Eng." " Engineer Department;
"Ord." " Ordnance Department;
"Sig." " Signal Department;
"Air" " Aeronautical Department;
"MTC" " Motor Transport Department.

The various items in each requisition will also be numbered consecutively. When approved by competent authority, one copy will be sent to the proper depot, with necessary shipping instructions; one copy will be returned to the supply officer initiating the request; and a third copy will be sent to the Regulating Officer indicated by the shipping instructions. All copies will be clearly marked to show the fact of approval, and the approving authority. After action by the depot, its copy may be forwarded to the chief of the appropriate department. All inquiries and correspondence concerning supplies will refer to the request and item number as given by the division, corps or army, and to any additional file numbers indicated by the approving authority for the purpose. Requests from non-divisional organizations will indicate the particular tactical command, if any, to which they are attached, in addition to the identification numbers given by the organizations themselves

Filling Requests: (a) Whenever a request cannot be completely filled, the approving authority or depot officer supervising the issues thereon will make notation on the various copies as to action that may be expected in respect to articles which cannot be supplied.

(b) When a storage depot cannot supply all articles called for on a request, it will forward such articles as may be available. The remainder of the request will be extracted to the proper chief of supply service. For supplies of Classes I, II, and III, action will be by telegraph, and the chief of service will at once forward to the depot the supplies necessary to fill the requisition. For supplies of Class IV, the chief of the supply service concerned will make issue at once, directly to the consignee, from any other depot at which the supplies may be had, or if not in stock, will direct purchase and delivery thereof. He will notify the depot officer of his action and will take steps to stock up his depot if the articles in question are of such a nature as to indicate future demand. Chiefs of supply services, when authorized by the Commanding General, Services of Supply, may keep the entire stock of certain classes of articles, of which the supply is limited, at one or more designated depots, and in such cases other depots will forward or extract thereto requests for these supplies.

(c) In general, when it is known that items cannot be supplied within fifteen days after receipt of requirements by the supply department concerned, they will be stricken from the request and the officer initiating the demand will be notified at once. Arrearages on requests will not be allowed to accumulate. Prompt action on each and every request must be taken within the limits of his power by each officer through whom it passes.

(d) Organizations will not duplicate on requests articles which they have called for on previous requests until they have received notice that such articles have been stricken from previous requests, provided, however, that:

Supply officers may at intervals of not less than fifteen days include in requests all items previously requested and not supplied, but they will indicate opposite each such item the number of times and the dates and

reference numbers of the requests on which it has been previously stricken out. A reasonable period must be allowed for transmission of requirements and for delivery of supplies.

The responsibility for, the necessity for, and the sufficiency and accuracy of, such requests, rests with the regimental or other similar commander; the final responsibility rests with the Division Commander. Whenever for any reason, in the opinion of G-4, corps, division or army, it may become necessary or advisable to "cut" a requisition, the chief staff officer of the appropriate supply service at the headquarters concerned will be consulted and he will indicate the order in which and the amount by which the various items in the request shall be cut to come within the prescribed limitations as to weight or bulk. To fix the responsibility for such reduction, he will make suitable notation on the request and initial the same.

Corps troops and army troops will send their requests directly to corps and army headquarters respectively. Other non-divisional elements will send their requests directly to the headquarters of the units to which they may be attached. In these cases the procedure to be followed for each class of supplies will be as outlined above.

When supplies are issued from depots to establishments, troops or for construction work in the Zone of the Armies, or are transferred from one supply service to another, the receiving officer will receipt for the supplie with a notation showing the organization or the work for which the supplies o materials are to be used. No further formal accounting for the supplies or materials will be required from the receiving officer (F.S.R.,Par.370). The same care will be taken of all equipment, supplies and material and the same economy in their use will be observed as if a formal accounting were required Commanding officers are charged with the duty of seeing that neither men nor organizations of their commands waste, make misuse of the supplies, material equipment furnished to them, or accumulate a surplus thereof. Organizations or individuals demanding much in excess of the average amounts required by other like units under similar conditions will be investigated, and proper action taken if waste, misuse or undue accumulation are discovered.

The chiefs of the various services of supply, either in person or by deputies, will make frequent inspections of the establishments of their departments in all parts of the theatre of operations, with a view to reporting upon any unauthorized use or misuse of equipment, supplies, or materials or any accumulation of the same beyond reasonable needs. In conference with the head of the Salvage Service, they will arrange for the salvage and speedy return to departmental establishments of all articles left behind by troops in the course of operations. Stores remaining in dumps or utilizable articles found on the field will be shipped to the nearest appropriate supply establishment still functioning in the vicinity. Such articles will not be returned to salvage establishments in the rear when other more convenient means of disposition are available.

189. Method of Supply in the Zone of the Services of Supply. Units in the Zone of Services of Supply will obtain their equipment and supplies in the following general manner, details of which shall be prescribed by the Commanding General, Service of Supply:-

(a) Articles of Classes I, II and III will be issued by supply depots on duly approved requests made direct to them. All requests will show amounts on hand, and no surplus over the authorized allowances will be asked for.

(b) Requests for equipment or supplies of Class IV, including all those for construction work, will be submitted to the chief of the Services of Supply concerned, who will, after approval, send them to the proper depot for filling. Credits for material for approved construction projects may be placed at the disposition of the officer-in-charge. These will be handled within the Services of Supply in a manner similar to that prescribed for credits given to Army Headquarters.

In authorizing credits and in making drafts upon storage depots for supplies for troops in the Zone of the Services of Supply, due care will be taken to protect the interests of troops in the Zone of the Armies and instructions to that end will be issued by the chief of each supply service to govern his establishments.

Copies of all orders and instructions of a general nature issued by the chief of any supply service for the government of his establishments will be forwarded to the Headquarters of the Service of Supply (G-4), and to Headquarters of the Field Forces (G-4), for information and file.

190. Agencies and Methods for Moving Troops. Troops are assigned to the various armies and subordinate units thereof for the prosecution of operations against the enemy, and subsequent to such assignment their movements are governed by military considerations. Troops are assigned to the Services of Supply for the construction, maintenance and operation of agencies necessary to support the combatant forces. Orders for the movement of troops presuppose suitable arrangements for their transportation and supply and provision for the replacement of casualties. The supervision of these functions, viz.:- operations, transport and supply and replacements devolve respectively on the 3rd (G-3), 4th (G-4) and 1st (G-1) Sections and these Sections at the various headquarters are accordingly concerned in the issue of orders affecting the movement of troops. With a view, therefore, of fixing responsibility, and ensuring central coordination between the various headquarters and staff sections concerned, the following regulations should govern the issuing of orders and the movement of troops pertaining to the Field Forces.

Prior to, or immediately upon their arrival in the Theatre of Operations, all troops will be given an initial assignment jointly by G-3 and G-4, Headquarters of the Field Forces. Their primary destination will be indicated by G-4 to the Commanding General, Services of Supply, who will accomplish the movement in accordance with instructions given him. The assignment of troops distinctly intended for combat or "line duty" may be determined by G-3, on his own initiative.

Organizations having been assigned to an army, or other independent combat unit, orders will thereafter be issued from Headquarters of the Field Forces:-

(a) For movement from the Zone of the Services of Supply into the Zone of the Armies.

(b) For movement from the Zone of the Armies into the Zone of the Services of Supply.

(c) For movement from one army or independent unit to another.

Organizations which have been assigned to the Services of Supply will move on orders issued from Headquarters of the Services of Supply:-

(a) Between points wholly within the Zone of the Services of Supply.

(b) From the Zone of the Services of Supply to establishments of projects in the Army Service Zone under the jurisdiction of the Commanding General, Services of Supply.

Organizations which have been assigned to an army, or an army group, will move on orders issued from the corresponding headquarters, provided that the movement is wholly confined to territory within the jurisdiction of such headquarters.

The 3rd Section, at Headquarters of the Field Forces, or at headquarters of other commands will supervise the actual issue of all orders for the movement of troops within the limitations above indicated. It will initiate and issue orders for the movement of all troops distinctly intended for combat or "line duty", but to insure the functioning of supply and auxiliary technical services, G-3 will advise G-4 of contemplated movements which may involve or concern such services. He will likewise advise G-1 of movements which may require special arrangements for replacements. The 4th Section will initiate and make suitable requests on G-3 for the movements of all troops of the supply and technical services, not distinctly intended for line duty, and G-1 will similarly make request for the movement of replacements, but nothing herein shall be construed to prevent the shifting of railhead detachments by the

Regulating Officers, nor to affect the automatic flow of replacement troops.

For purposes of information and record, copies of all orders and instructions directing the movement of troops will be transmitted to the 1st Section, which is charged with the preparation of the "Order of Battle", and with arrangements for replacements.

The division of duties and responsibilities at the headquarters of divisions, army corps, armies and other commands will conform in principle to the distribution above indicated.

Troop movement bureaus (T.M.B.) are established:-

(a) At the Headquarters of the Field Forces (G-4) for all movements in the Zone of the Armies, not otherwise hereinafter provided for.

(b) At Headquarters of the Services of Supply for all movements wholly within the Zone of the Services of Supply and for movements from that Zone to points within the Zone of the Armies.

(c) At Headquarters of Armies, troop movement officers in G-4 will be specially charged with the duty of making arrangements in consultation with the proper Regulating Officers for all troops movements within their respective army combat areas.

Railway Transportation Officers (R.T.O.) are stationed at ports and important railway stations to direct and supervise arrangements for transportation by rail of troops and their baggage and equipment. When large bodies of troops are moved, the Regulating Officers in the Zone of the Armies and the General Railway superintendents in the Zone of the Services of Supply arrange for assignment of such Railway Transportation Officers as are needed for temporary duty at entraining and detraining stations and at coffee and rest stations.

The Transporttation Department will furnish special railway equipment when required and, under the direction of the Regulating Officer, or other officer detailed for the purpose, will take charge of the movement of troops, troop baggage andequipment from point of origin to point of destination. It will assist in the movement of casual officers and

soldiers and will render every assistance possible through its regular representatives. The latter will take special precautions to insure the prompt delivery of baggage lost or left behind by officers or men.

191. Arrangements for Transportation. Arrangements for transportation by rail are made by the Railway Transportation Officer on application from the commanding officer, in accordance with the rules given below. When no Railway Transportation Officer is available, the commanding officer of a unit will make all necessary arrangements in conformity with these rules:

(a) Troop movements entirely with-in the Zone of the Services of Supply:- All movements of troops by rail in the zone of the Services of Supply are arranged for and supervised by agencies of the Transportation Department, as outlined in regulations issued by the Commanding General, Services of Supply.

(b) Troop movements from the Zone of the Services of Supply to the Zone of the Armies:-

When Troop movements originate in the Zone of the Services of Supply for destination within the Zone of the Armies, orders for movement will designate to the command to which the units will report, and will also designate the Regulating station or other primary destination. Transportation orders will normally direct movement to primary destination only. The Regulating Officer, or Railway Transportation Officer supervising the movement will make all arrangements for continuance of the movement designated by the army or higher commander and will control the same beyond the primary destination to the ultimate detraining point.

(c) Troop movements from the Zone of the Armies to the Zone of the Services of Supply:-

(1) For a movement not exceeding twenty officers or men, the Railway Transportation Officer will arrange for movement on regularly scheduled trains and will notify all concerned of the arrangements made.

(2) For a movement involving more than twenty men or requiring a special train, the Railway Transportation Officer will make application to the Regulating Officer. The latter will arrange for the movement and notify the Troop Movement Bureau (T.M.B.), at Headquarters of the Field Forces, of the arrangements asked for, in order that the Troop Movement Bureau may arrange for the movement if not promptly arranged locally. The Regulating Officer will notify the command of the time when cars will be spotted and ready for loading, the hour of departure and places where hot coffee will be furnished, and will send all necessary information to other officers concerned in the movement.

(d) Troop movements entirely within the Zone of the Armies:-

(1) When movements of troops belonging to an Army, involving travel over routes entirely within the Zone of the Armies, are to be handled by means of transportation not under the exclusive control of the Army authorities, application will be made by the proper commander to the Troop Movement Bureau, at Headquarters of the Field Forces and the latter will make all necessary arrangements.

(2) When movements of troops belonging to an Army, involving travel over routes entirely within an Army Zone, are to be handled by the Army authorities or by means of transportation exclusively under Army control, arrangements will be made by the Troop Movement Officer in G-4 at the Headquarters of the Army concerned.

An application for transportation will show the personnel, animals and equipment to be moved by rail, as follows:

1. Unit.
2. Destination.
3. Number of officers and men.
4. Tons of baggage.
5. Number of 2-Wheeled and number of 4-Wheeled vehicles.
6. Number of animals.
7. Authority for the move.
8. Time when command can be ready to move.

Advices reporting the forwarding of troops will show the primary destination of the organization, but will not, normally indicate the ultimate destination or detraining point. The first advice will report the name of the unit, the strength of the command, the name of the commanding officer, and the schedule arrangements and identification number. Subsequent advices will report the hour of departure, the expected hour of arrival, and will refer to the movement by the identification number. Such identification numbers will be assigned serially by each office arranging movements.

Railway Transportation Officers will act as intermediaries between officers in command of troops and railway personnel. Commanding officers of troops or detachments are responsible for the enforcement of all instructions from Railway Transportation Officers in regard to entraining, detraining and the conduct of personnel while aboard trains or within stations.

192. Evacuation of Sick and Wounded by Hospital Trains. Hospital trains are medical department organizations. As regards personnel, material, supply and maintenance of their equipment and disinfection, they are administered under the direction of the Chief Surgeon of the Field Forces. As railway units, they are operated under the direction of the officer to whom they are assigned and they are repaired by the Transportation Department.

Based on the recommendations of the Chief Surgeon of the Field Forces, or his Deputy, assignments of hospital trains are made by headquarters of the Field Forces (G-4) to Regulating Officers and to the Troop Movement Bureau, at Headquarters of the Services of Supply.

An officer of the Medical Department will be assigned to each Regulating Station as a member of the staff of the Regulating Officer, and as a representative of the Chief Surgeon, to whom commanding officers of hospital trains, assigned to that station, will be directly answerable in matters pertaining to Medical Department administration. He will be charged by the Regulating Officer with the duty of seeing that trains

are at all times ready to answer calls and are kept properly provisioned and stocked.

Evacuation from the Zone of the Armies:- The Chief Surgeon of the Field Forces will allot a requisite number of beds daily to each regulating officer, advising him by telegraph as to their number and location. These beds will be reserved for the exclusive use of the Regulating Officer to whom allotted, and daily notice of any change in these credits will be furnished him. In all questions arising as to bed credits, their sufficiency and location, the Chief Surgeon and Regulating Officers are authorized to communicate direct. The latter will assign destination to hospital trains in accordance with the information furnished, as provided for above, and the traffic conditions at the time of the evacuation. Information regarding transportation or combat conditions which might affect the allotment or location of beds reserved for him, will be promptly communicated to the Chief Surgeon of the Field Forces by the Regulating Officer.

G-4, Army, will furnish the Regulating Officer daily with all data bearing upon evacuations, in order that the latter may judge the sufficiency of trains and beds at his disposition, and take the necessary steps to correct a shortage in either.

Evacuation hospitals will report daily, or as often as may be necessary, to G-4, Army, or to the Regulating Officers as provided for below, the following information.

(a) Number of evacuable wounded, sitting or lying cases;

(b) Number of non-evacuable wounded;

(c) Number of evacuable sick, sitting or lying cases;

(d) Number of non-evacuable sick;

(e) Number of vacant beds.

(G-4), Army, considering the data furnished him as provided for above, together with such information regarding intended operations as may have a bearing on the evacuation situation, calls upon the Regulating

Officer for a hospital train, giving station and time it is desired to have the train placed; the number of officer, soldier and enemy prisoner patients; the number of sitting and the number of lying patients; the number of sick and the number of wounded patients, and the number of contagious cases. He will at the same time advise the commanding officer of the evacuation hospital concerned of the action taken.

The Regulating Officer upon the receipt of a call from G-4, Army, for a hospital train, will assign a train and arrange the necessary schedule, advising the evacuation hospital and G-4, Army, of the probable time of arrival and the period of time allotted for loading. The Commanding Officer of the evacuation hospital will be charged with seeing that the necessary steps are taken in order that the train may be promptly loaded in the time allotted.

The Regulating Officer will notify the commanding officer of the receiving hospital of the contents of each train, showing the number of officer, soldier and enemy prisoner patients; number of sitting and number of lying patients; number of sick and number of wounded patients, and the number of contagious cases; together with any other information which would facilitate unloading the train.

The Regulating Officer will notify the Troop Movement Bureau, at Headquarters of the Services of Supply, of all troop movements into the Zone of the Services of Supply, and arrange through that Bureau for return movements, indicating in each case whether movement at customary rate or rush handling is desirable under circumstances existing at the time.

In emergencies, when communication by telephone or telegraph is interrupted, or inadequate, rendering it impracticable to follow the channels of communication above prescribed, commanding officers of evacuation hospitals are authorized to communicate direct with the Regulating Officer and request a train, notifying G-4, Army, as soon as possible of the action taken. When necessary, a representative

of G-4, Army, may be stationed at the Regulating Station for the purpose of cooperating with the Regulating Officer in carrying out the provisions outlined above.

193. Evacuation in Zone of the Services of Supply.

Evacuation from hospitals in the rear of the Zone of the Armies will be provided for by the Troop Movement Bureau, at Headquarters of the Services of Supply, in accordance with requests made upon him for this purpose by the Chief Surgeon of the Field Forces. Secondary evacuations from hospitals in the Zone of the Armies, not functioning as evacuation hospitals, will be arranged for by the Chief Surgeon of the Field Forces, directly with the Regulating Officer concerned.

194. Supply Departments. Under the Director of Logistics, the various Supply Services should organize their departments about as indicated below.

195. Quartermaster Department. The Organization of this Department should follow the lines which have been found to be necessary and efficient. It should include the following Bureaus or Sections:

(a) Accounting. Review of money and property accounts. Charges against the Army by civilian transport agencies.

(b) Design and Maintenance. Maintenance, upkeep, and operation of buildings, power plants, etc. - designs, maps, charts, and plans - drawings of uniform articles - specifications.

(c) Personnel. In cooperation with the Personnel Bureau- Distribution, location and tables.

(d) Finance. Pay, mileage and financial transactions in general

(e) Salvage. Collection of abandoned, damaged, partly destroyed or captured property - Restoration or other disposition of this property - Supervision of kitchen economics - Control and operation of laundries - Recovery and distribution of lost and unclaimed baggage.

(f) Graves Registration. Acquisition of land for cemeteries - Location of cemeteries, their maintenance, control and preservation. Marking of graves. Registration of graves. System of registration and reports of burials. Employment of necessary civilian assistants. General supervision of the Burial Service and requisition for general supplies for same.

(g) Remounts. Purchase, inspection, reception, care, treatment, conditioning, training and issuing of public animals. Operation of remount depots and veterinary hospitals.

(h) Inspection. Investigations for the Chief Quartermaster. Safeguarding supplies against loss by fire, pilfering, or damage from weather or other causes. Instruction of new personnel in methods and systems of accounting and requisitions.

(i) Supplies. Requisitions on home depots. Purchase locally. Manufacturing from raw materials. Fuel and forage. Rations and general supplies. Gasoline and oils. Frozen and refrigerated meats.

(j) Veterinary Services. Care and treatment of sick animals. Meat inspection. Cooperation with Remount Bureau. Inspections and reports. Veterinary hospitals.

The Board believes that better results for the service as a whole will be obtained if the Veterinary Service is taken out of the Medical Department and made a Bureau in the Quartermaster Department, where its activities may be coordinated with the Remount Bureau and with other functions with which it is associated.

The detailed organization of the different units and formations necessary to carry on the work of this Department will be found in the Tables of Organization. Such number of these units and formations will be required as the theater of war demands.

196. Medical Department. This department performs in the service of supply all the functions of the Medical Corps in supply, hospitalization, transportation, and evacuation. There will usually be necessary the following office divisions:

Hospitalization; supplies, finance; statistics of sick and wounded and of epidemiology; personnel and replacements; evacuation; dental service; professional services; laboratories; general sanitation.

The Medical Department deals with the whole force, combat as well as supply and administrative services. Supply forms only a small part of its activities and is only a specialized form, consisting of manufactured articles expended by the Department itself for the sick and wounded under its own control.

This Department, in addition to its work with the ordinary sick and wounded, should have a wide supervision over all troops both in combat and in the Services, in matters of research, sanitation and prevention. It should control throughout the theater of war the highly specialized activities which detect, trace the progress of, and check the spread of communicable diseases.

A concentration of Base hospitals into centers of about 10,000 beds should ordinarily take place in the future. This permits economy in personnel, supply and supervision and is believed by the Medical Department to be the best solution of this part of the hospitalization question.

Very early in the campaign convalescent camps should be established in order to empty the hospitals and preserve the morale of the men. They will care for Class "B" cases until these are fit for Class "A". They will furnish Class "C" cases for the Services of Supply. Provision should be made for training, in special companies, of certain classes of defectives.

In order to insure that Combat Troops are not divested of their much needed trained Medical personnel, it is essential that all units

organized for S.O.S. services have with their organization their proper medical personnel. In a crisis there is certain to be a lack of trained Professional Medical officers and for that reason, Sanitary Corps officers must be assigned to all positions such as Adjutant, Personnel officers, and Medical Supply officers, and Q.M. officers to Q.M. supply positions.

197. Engineer Department. The Chief Engineer's main office should be at the main and permanent headquarters of the Forces, for this office is the seat of the great activities of the Engineer Department. Here and here only can the great coordinating work of the Engineer among themselves be properly administered. He himself should carry out the functions assigned to Chief Engineer, S.O.S., with an able officer as his Deputy. He will need in addition an office in the Advance Section, the Engineer Officer of which should be charged with all construction in that Area, and, as Deputy Chief Engineer under proper general policy instructions, should make immediate and suitable dispositions of the troops and equipment under his command to back up the engineer forces of the Army. Close cooperation between the Engineer officer of the Fighting Army and the Engineer officer of the Advance Section is absolutely essential to success. To insure this the Chief Engineer will desire to spend much of his time during operations in the Section Engineer's office of the Advance Section, where he will be readily available for conference with Advance G.H.Q., or Headquarters of the Fighting Forces.

For the accomplishment of Engineer duties in S.O.S. there will be needed:

At each base, intermediate and advance section. 1 Construction regiment (colonel commanding) of from 2 to 6 battalions.

Service battalions in the ratio of four to each battalion of the construction regiments.

The commanding officer of the construction regiment will be the Section Engineer. His office force will be drawn from his regiment. To enable this to be done without depleting the regiment, the following officer personnel is added to all construction regiments: one Lieutenant Colonel,

four Majors, four Captains, six First Lieutenants and six Second Lieutenants.

At each central depot. 1 Depot Battalion (4 companies)
1 Service Battalion
1 Shop Battalion

At each advance and receiving depot.
1 Advanced Depot Battalion (2 companies)
1 Service Battalion
1 Shop Company (at advanced depots only)

The formation of these depot detachments immediately on the outbreak of war is of the highest importance. The success of the engineer operations is largely dependent upon the efficiency with which engineer stores are distributed.

Shop organizations should be formed only for definite shops.

In the advance section. (In addition to troops normally under Section Engineer)

1 Railroad construction regiment
(colonel commanding) 2 - 5 battalions, and 2 - 5 grading trains.
1 Road regiment
(colonel commanding) 3 - 15 Road service battalions.
1 Light railway regiment
(colonel commanding) 2 - 6 battalions.
Service battalions in ratio of 4 battalions to each battalion of construction troops.

The officer personnel of these regiments should be the same as that recommended for the construction regiments, for the same reasons that led to the increase of the latter.

A considerable change should be made in the organization of the road troops. The work of such troops is chiefly manual labor, for which supervision, expert in character but limited in quantity, is required; and in connection with which a relatively small amount of skilled labor is necessary for the operation of road machinery. The practice of furnishing the supervisory and skilled personnel in one organization (technical companies) and labor in another (service battalions) leads to the atrophy of the commissioned and non-commissioned staff of the labor organizations. It is believed that far better results will be secured if each labor company is given the officers and sergeants necessary for its efficient functioning. This complement can be secured by making the commissioned

and higher non-commissioned grades the same as in a Pioneer company. Suitable provision for the reclassification and replacement of non-commissioned officers found unsuitable for their positions is made in the regimental headquarters, as the companies will not, under conditions to be anticipated, afford the facilities for the reduction of unsuitable material. It is contemplated that the road regiment will receive from the central engineer replacement depot, replacements of sergeants or prospective sergeants as required, and will return to the depot for other assignment, such former sergeants as have proved unsuitable.

The reclassification of sergeants in other service battalions is to be accomplished through the central engineer replacement depot.

In S.O.S. at large. 1 Forestry regiment (colonel commanding) of 2 or more battalions.

The railroad, light railroad, road and forestry regiments should operate directly under the Chief Engineer, the commanding officer of each being the assistant for that service on the staff of the Chief Engineer. Each in turn draws his assistants and office force from his own troops.

Office Chief Engineer. For the administration, supervision and inspection of the various activities of the Engineer Department, the Chief Engineer will need a large force. The size of this force and its organization will vary in accordance with the work. An organization along the lines of that proposed by the Engineer Board is satisfactory. There will be in general a division of the office, as follows:

(a) Construction. Plans, and supervision, of all installations, light railways and roads included.
(b) Supplies. Receipt, storage and distribution. Records, returns and classification.
(c) Purchase. In cooperation with the Purchase Department.
(d) Personnel and Records. In cooperation with the Personnel Bureau, G-1.

Replacements. For the replacement and reclassification of officers and men for all branches of the Engineer Service, an engineer replacement depot should be established at a convenient point in the territory of the S.O.S. One Pioneer regiment, with commissioned headquarters staff raised to that of a construction regiment, will form a suitable nucleus for such a depot.

General. It should be noted that these recommendations are purely advisory in character and only those units should be organized which are required by the special nature of the theater of war and the actual conditions therein.

198. Ordnance Department. The principal duties of this department are, Supply and Maintenance of Ordnance Stores, equipment, ammunition and material of all kinds furnished by it. To these should be added, the technical and engineering functions which are necessary in assisting supply and maintenance, and for compiling and furnishing technical information necessary for the correction of defects, and for the improvements in design. The organizations necessary for this purpose, include:

(a) Central office of control and direction.

(b) Base organization for supplies and ammunition.

(c) Intermediate and Advance Depots.

(d) Shop installations for maintenance, including one group for re-lining guns, re-building carriages and other major repairs.

This department will ordinarily require the following divisions or sections:

(a) Planning. Plans and policies. Supervision of operating divisions. Statistics and progress.

(b) Administration. Records. Messengers. Information. Finance. Audit and property files, prints and drawings.

(c) Personnel. In cooperation with Personnel Bureau, G-1.

(d) Aircraft Armament. Technical. Requirements. Supply. Maintenance.

(e) Artillery. Light and Anti-Aircraft. Railway and Heavy. Fire control.

(f) Motor equipment and tanks. Tractors. Tanks. Special Vehicles.

(g) Machine Guns, Small Arms, and Trench Warfare. Machine Guns and Automatic Rifles, Small arms and Ammunition. Trench Warfare Weapons.

(h) Ammunition. Technical. Supply and Storage. Salvage.

(i) Maintenance. Shop operation. Material and Machinery.

(j) General Supply and Storage. Construction. Depots. Transportation. Equipment and General Supplies.

The Chemical Warfare as a separate service should not be continued. All the development, experimentation with gas, and technical design of material, should be included in the functions of the Ordnance Department.

It has been proposed that the Ammunition Service be turned over to the Ordnance Department to be under their charge up to the "Using" services. The experience of our forces in this war does not lead the Board to recommend this departure from the methods employed, While these methods were not always without possibility of improvement, they succeeded. One can only conjecture on the greater success of some other scheme of supply.

The Board urgently recommends the detail of Ordnance Officers at all Line and Staff schools and for periods of duty at maneuvers and camps of instruction and with the larger Staffs and Commands. By an intimate association with the Combat units a mutual understanding and spirit of cooperation can be developed which can be most valuable to the service.

199. Signal Department. The strength of the Signal Department under the Director of Logistics will depend so much upon the size, character and existing communication facilities in the Theater of Operations that a definite statement of its operations of supply cannot be foreseen. Probably the following bureaus or sections will always be needed in whole or in part:

(a) Procurement and Supply. Records, Depots, Requisitions, control and checking of all property.

(b) Engineering. Plans, estimates and construction. Maintenance.

(c) Telephone and Telegraph. Operations, and general operating policies. Records, reports and inspections of permanent plant.

(d) Radio. Records of operation of radio. Developments. Policy. Inspection.

(e) Special Services. Meteorology. Research and Inspection. Pigeon Service. Signal Corps Schools. Historical Section.

(f) Personnel. In cooperation with Personnel Bureau (G-1). Recommendations for appointments, promotions, transfers and assignments.

A very approximate estimate of the personnel needed in the Service of Supply alone would be:

Two Signal Battalions of 500 men each.
Two Service Companies for detached soldiers.
One Radio Company.
One Replacement Battalion.
Pigeon and Meteorological Detachments.
Telephone Operators (women) for main and other headquarters should be provided when conditions permit.

200. Aeronautical Department. This department should handle the special equipment of Aviation only, and should be a part of the general service of supply. The necessary purchase and storage systems should wherever practicable be part of the general storage scheme and layout. The control and administration should be under the same general direction as all the service of supply.

It will no doubt be necessary to maintain certain special depots, repair, assembly and salvage plants for air craft material which can not be used for other types of equipment, but these are only special additions to the normal depots and plants required for the maintenance of the Army as a whole. The organization of this department will ordinarily require some or all of the following sections.

(a) Supply. Material. Accounts. Disbursements. Construction and Repair. Maintenance. Transportation, Stations and Equipment.

(b) Training. Pilots and Observers. Schools and Training Centers. Refresher courses.

(c) Personnel. In cooperation with G-1. Officer records of promotions, assignments. Pilots, observers, non-flying personnel.

(d) Balloons. Equipment and material. Schools and Training. Observers.

(e) Specialties. Armament with Ordnance Department. Radio and Meteorology with Signal Department. Information and Statistics.

Due to the fact that special training is necessary for the aviation personnel, it will no doubt be desirable to have certain schools, training centers and other plants which cannot be used for other military purposes. These centers of instruction will be established, without doubt, in any distant theater of war because of the changes in types of equipment and because refresher courses for pilots will be required. All these exceptional facilities for training should be controlled under the same system that is applied in the case of other technical services.

201. Motor-Transport Department. This department carries on the functions in the services of supply of the Motor Transport Corps. It is in general charge with the procurement and supply of motor equipment except tanks and tractors. It operates such convoys and trains as may be assigned to it and it trains and furnishes personnel when conditions and the situation permit it to do so.

The following Sections or bureaus may be necessary:

(a) Executive. Administrative. Supervises mail and files and records. General control of executive office force.

Personnel. In cooperation with G-1. Assignment, transfer and promotion of officers.

Accounts, Registration and Statistics. Property and financial accountability. Vehicle records. Statistics and history.

(b) Supply. Procurement and storage of supplies. Distribution and Requisitions. Purchases.

(c) Repairs. Assembly and repair shops. Shop Installation and equipment. Operation of shops and repair units. Salvage.

(d) Operation. Assignment and distribution of all motor vehicles. Operation and routing of convoys. Operation of pools and groups in the Zone of Services of Supply.

(e) Inspection. Periodical and Special inspections. Development. Design of new equipment. Standardization of existing equipment.

(f) Plans and Projects. Design, personnel and equipment for new projects. Location, plans, and follow-up of projects.

(g) Training. Schools for officers and men. Preparation of courses and manuals. Supervises training in Depots.

The following establishments have been found to be necessary and should generally form part of the installations maintained by this Department:

Reception and Service Parks.

Overhaul and Reconstruction Parks.

Organization Parks.

Schools.

Operating Groups.

Supply Depots.

A general observation of what should be the function of the Motor Transport Department is here included. It should provide the vehicles and maintain them in fit condition, supplying others when the first need repair, or are no longer fit for use.

Under General Order No. 75, War Department, 15 August 1918, vehicles were divided into two classes. First Class, - Those, the operation of which the Motor Transport Corps controls, in the United States and overseas, and for

the efficient functioning of which as transportation units, it is directly responsible. Second Class, - Those over which the Motor Transport Corps exercises merely technical supervision in the United States and overseas. This class includes such motor vehicles as are assigned by Tables of Organization to organizations such as divisions, corps troops and army troops. This separation of the functions of this department is correct, and experience shows that it should not be departed from. This opportunity is taken to re-affirm the soundness of the principle there expressed.

202. Transportation Department. In so far as the operation of railroads or canals is concerned, any one of the following situations may arise:-

First. - The Army will be in the position of a large commercial shipper over existing systems. The civilian personnel and equipment will handle all our troops and supplies. This is the ordinary and normal case in time of peace and in most theaters where war is likely to take place.

Second. The Army may operate its own terminals at the Base and other parts of existing systems and by the use of its own locomotives, cars and crews, supplement existing agencies of the same kind.

Third. The Army may take over, all or in part, an existing System and operate it with its own personnel or may build and operate an entirely new system.

The Department will necessarily be made up largely of practical railroad men of mature years and long experience in the work. The organizations will be built up along lines well understood and approved by the traditions of the railway service.

The Personnel for such a department should be gathered together from the Army, from civil life, and from recognized civil institutions, as well as from the commercial railway and water transport systems.

The Engineer Department is responsible for the maintenance of a skeleton organization for such a department, and during the early stages of a campaign the Transportation Department will function as a bureau of the Engineer Department. Later on in the campaign, if the military operation of railroads is an important function, the Transportation Department

will, doubtless, be separated from the Engineer Department and operate as a distinct Service. The skeleton organization and the plans for its expansion should therefore be based on such a later separation and the Transportation Department should operate from the first in a highly decentralized manner.

Water Transport Service. This service ordinarily will come under the Transportation Department and may operate transports when necessary. Usually, however, it will be concerned only with port operations, destinations for vessels, loading and unloading cargoes. It will be responsible for freight until it is turned over to the railways for shipment or until it is placed in storage at the port. Very probably, where canals or rivers are used for transport, it will operate lines of boats, especially when commercial lines fail or are inadequate. When necessity requires it, ship repairs will be undertaken.

203. Purchasing Department. It is probable that with the Supply Services of the Army there will always be necessary an agency charged with local purchases. This agency will prevent competition, in a measure fix prices, and become a local supply information center.

The Department should have at its head a General Purchasing Agent and be composed of officer representatives from the different supply services. The object of the Department is to make purchases, locate available supplies, maintain agents at suitable points for purchase and information, establish categories of supplies and designate specific services to purchase certain supplies for all departments. Some or all of the following sections or bureaus will be needed:

Statistics. Ascertains advance requirements. Arrangements for purchase.

Control. Vise of purchase orders. Regulation of prices.

Labor. Procurement, Organization, transportation, maintenance and discipline of civilian manual labor.

Technical. Coordination, utilization and development of special power projects.

Contracts and Adjustments. Preparation of contracts and adjustments of same.

Finance & Requisitions. Disbursements. Approval of requisitions for funds.

Accounts. Recording, compiling, and information of claims, contracts and arrangements for replacements.

Reciprocal Supply. Adjustments of replacements of raw materials.

204. Distribution of Supplies. One of the notable features of the Services of Supply of the American Expeditionary Forces was the distribution of the storage facilities in depth along the line of communication.

This principle is here emphasized in order that the facts should be brought out for future use. Supplies were actually stored as follows:

1/2 in Base Depots,
1/3 in Intermediate depots and
1/6 in Advance depots.

Ordinarily only a small part of the Supplies should be held near the front, as conditions at any time may require that the front be changed. It has occurred that a large part of the combat force has been suddenly moved to another part of the theatre of war, necessitating a complete rearrangement of the line of supply, depots, etc.

In the intermediate section, that is, somewhere in advance of the base and a considerable distance from the fighting front, an amount of supply (about 1/3 of the total) should be concentrated. This point should be especially selected near the junction of several railway lines or other lines of communication. The Supplies located here can then be readily sent forward in a new direction when that has been determined.

This storage can also be used to balance supplies which have been received in large lots at the several base ports.

At the Bases, storage will be arranged for probably one-half of all supplies. Stores so situated will be most advantageously placed to meet any situation which may arise. These will be the main reservoirs from which are drawn all supplies for the forward depots.

205. Tables of Organization. It has not been considered necessary to append to this report the detailed Tables of Organization for the numerous establishments of the Service of Supply as they existed in France.

These Tables will be always available when the necessity arises for the organization of a Supply Service. Units and organizations will be called for, which are demanded by the special situation and character of the theatre of war. No rule or estimate can be given in advance of how many or what kinds of units will be needed. This can not be finally determined until the actual situation confronts those who will be called upon to meet the problems of Supply.

206. Allotments of Troops. A rough estimate of troops needed for the Services of Supply is given here, based on conditions met in France. The force estimated to be in France early in 1919 was about three million men. There were in the several sections and generally throughout the Services of Supply the following approximate totals:

	Officers.	Men.
Base Section No. 1.....	4600	93000
Base Section No. 2.....	3800	90000
Advance Section	4900	100000
Headquarters	2300	15000
Depot Divisions and Casuals ..	3400	102000
Elsewhere	11000	240000
Totals ...	30000	640000

We can readily conceive of this number being approximately the number necessary to care for 2,400,000 men - or one man in the Supply Services for between 3 and 4 in combat.

It is impossible to assume beforehand that we will have in the Supply Service any certain conditions to meet. If we knew beforehand where the theatre of war was located, we could make a survey of the facilities and agencies in the area which could be used for the distribution and storage of supplies. We could make an organization, assign the troops, and allot the material and equipment which would be required.

Again we could assume a situation and build up on paper a Supply Service which would take care of the given forces to be used under the assumptions made.

Neither of these will exactly meet the general case, which is, an unknown situation in an unknown theater of war. The nearest estimate, or approximation which can be made, is to assume, that in any case, it will take one man in the Service of Supply to look after 3 or 4 in the combat forces. With a Field Army of 500,000 men we estimate that 140,000 men will be required in the Supply Services distributed about as follows:

Location.	Officers.	Men.
Base Sections (probably two) . . .	1800	40000
Advance Section	1000	22000
Headquarters	500	3000
Depots and Casuals	1000	25000
Elsewhere	2200	50000

The Director of Logistics will have to make such assignments and transfers as may be necessary. He would allot the forces under his charge in the manner best suited to the conditions, and for the purposes for which they could be most advantageously used.

There being no further business before it, the Board adjourned, sine die, on July 1st, 1919.

(sgd) J. T. Dickman,
Major General, U. S. Army,
PRESIDENT.

(sgd) J. L. Hines,
Major General, U. S. Army,
MEMBER.

(sgd) Wm. Lassiter,
Major General, U. S. Army,
MEMBER.

(sgd) W. B. Burtt,
Brigadier General, U. S. Army,
MEMBER.

(sgd) Geo. R. Spalding,
Colonel, Corps of Engineers,
MEMBER.

(sgd) Parker Hitt,
Colonel, Signal Corps,
MEMBER.

Superior Board on Organization and Tactics. G.O. 68, G.H.Q., April 19, 1919.

Wrapper Indorsement.

(Forwarding Report of A.E.F. Superior Board on Organization and Tactics).

G.H.Q., A.E.F., Washington, D.C., June 16, 1920. -- To the Secretary of War.

I. I have held the Report of the Superior Board in order that the important matters covered by it might be most thoroughly considered.

The recognized ability of the officers who composed the Superior Board entitles their opinions to great weight. But I think that the work of this Board was undertaken so soon after the close of hostilities that the members were unduly influenced by the special situation which existed during our participation in the World War. Thus, in my opinion, the recommendations of the Superior Board are based upon the necessities of stabilized warfare in Western Europe rather than upon the requirements of warfare of the character and in the theater upon which we are most likely to be engaged.

II. In view of the reorganization of the Army which must soon be decided under the recent Act of Congress, the question of correct organization, especially divisional, is of immediate and vital importance; and it is on this question that my views materially differ from those expressed by the Board.

III. Because of its great importance I desire to set forth my views on certain fundamental principles and my conclusions on divisional organization in some detail, as follows:

1. No one organization is best adapted to all situations.

2. Organization adopted must be elastic; this is secured by following underlying general principles and by adequate staffs.

3. Organization adopted in peace should be that best suited to most probable conditions of war in which the particular army may engage; elasticity being provided to meet possible unusual conditions and to permit rapid and greatest practicable expansion.

4. Mobility is one of the first requisites of organization.

5. Our army is most likely to operate on the American Continent and mobility is especially necessary under all probable conditions of warfare in this theater.

6. Our A.E.F. division (over 28,000 officers and men) was fairly suited to conditions in Europe but is entirely too unwieldy for war on this continent; the road and railroad situation alone is sufficient to justify this assertion.

7. Because our divisions did well in France is not a sufficient argument that the A.E.F. division was the best division that could be devised.

8. As a matter of fact, our division was so large that even during war of the character of that on the Western Front the division lacked mobility.

Hq'd. The Army War College OCT 31 1924

9. The fact that since the war all of the belligerents except ourselves have adopted a divisional organization which is much smaller than our own (hardly more than half) and based on radically different principles should cause us to consider whether we have drawn all the lessons from the European War.

10. Whatever the requirements of a war in Europe, a division for war on this continent should not exceed a strength of 20,000, and should preferably be less.

11. To secure this reduction which is essential to the principle of mobility, the division must be rigidly cut so as to include only those units which are <u>always</u> essential to enable it to fight and live under the most probable conditions under which it is to operate.

12. In reducing strength the first cut must be made in auxiliaries, and within the limits of strength allowed the division, the infantry must be kept at the greatest number practicable while providing the indispensable auxiliaries.

13. Such of the auxiliaries as are taken from the division as not <u>always</u> essential should be pooled in the Corps and Army and thus be available to be attached to divisions when needed.

14. Staffs of the division and of the auxiliary units thereof should be sufficient to meet the demands resulting from attaching additional units to the division to meet special situations.

15. The most cursory visualization of such a probable operation as a punitive expedition to Mexico shows an absurdly unnecessary number of auxiliaries in the division.

16. Careful consideration of various conditions of operations on this continent lead to the belief that the auxiliaries of the division may be about cut in half provided pools of these auxiliaries be kept in the Corps and Army to meet special needs; and the total number of auxiliaries for the whole army may be reduced by this method.

17. The reduction proposed in subparagraph 16 is still insufficient, and a reduction must be

made in infantry if the division is to be really mobile and able from column of route to put its combat units on the fighting line within a few hours.

18. For many reasons on which practically everyone agrees the infantry company should not be reduced below a war strength of 250 men; the alternative is, therefore, the reduction of the number of regiments in the division or battalions in the regiment or companies in the battalion.

19. Since no one advocates the reduction of the battalions in the regiment, that may be rejected.

20. The advocates of the four-regiment system base their arguments, in addition to an alleged greater driving power, on reliefs on the defensive and the passage of lines especially on the breakthrough of an organized position.

21. The arguments noted in subparagraph 20 have a certain value but in view of the German, French and British experience with a three-unit system it certainly can not be said that such arguments are conclusive even when positions are stabilized.

22. To predicate organization on the assumption that future wars will follow the course of the World War is basically wrong and more especially so for the American Continent.

23. The three-unit system lends itself more readily to tactical combinations (maneuver) than does the four-unit system.

24. The advocates of the organization as proposed by the Superior Board appear to acknowledge the fact stated in subparagraph 23, for they are careful to include in their arguments a statement that a division always attacks frontally, that its zone of action is strictly delimited and that it therefore has little or no occasion to maneuver.

25. The assertion that the division does not need to maneuver is not only false but dangerous doctrine. The degree of maneuver may differ but every combat unit must use different formations to meet different cases; in other words, it must maneuver. To teach otherwise is to kill initiative, introduce rigid rules and fail to reduce losses and increase results because all leadership will be confined to the higher commanders, if not to the higher staffs.

(Wrapper Indorsement continued)

26. The false doctrine that the division does not need to maneuver arises from our experience in the break-through and especially through the difficulties which we face and the errors which we committed and which it seems that many of us now prefer not to avoid and not to correct but to call "the lessons of the war".

27. The assertion in sub-paragraph 26 is a grave one and requires justification. Briefly stated the facts are: (a) In the massed attacks necessary to break through a stabilized position the front assigned each division was necessarily small: (b) The fact that the front was small (sometimes only a couple of kilometers) and the great depth of positions combined to cause us to assign a well-defined zone of action to each division: (c) The detailed information available, the ample time at the disposal of the higher staffs, the desire for the utmost secrecy, the masses of men and material employed, and especially the fact that many of our divisions and staffs were inadequately prepared, all conspired to induce the higher staffs to draft orders in great detail: (d) The facts just cited and the conceptions which we inherited from our Allies of limited objectives, intermediate objectives, lines of maneuver and similar artificial limitations and lapses from fundamental principles resulted in such rigid solutions by the army of all phases and details of an attack that army corps, much less divisions, had little latitude for initiative or maneuver. That many valuable opportunities were thereby lost must be apparent to every participant in the actions of the A.E.F. and to every student as well.

28. The true principle is that the necessity for maneuver always exists and that the only proper limitation on maneuver during the break-through is that imposed by the amount of available terrain.

29. Of first importance among the lessons of the war is the necessity of completing the break-through of a stabilized position in a single day.

30. Once the break-through has succeeded, whether by a single division or by several, the possibilities of maneuver become practically unlimited.

31. Fewer troops are required in exploiting the success than in the break-through and the three-unit system lends itself better to this condition than the four-unit system.

32. The length of time a division can stay in the line varies with the strength of the division in relation to front held and is not particularly affected by organiza-tio

33. The only way a large division can stay in the line longer than a small division is by reducing the front held per man.

34. Artillery can remain in the line longer than infantry, but every division at rest and in training should inviariably have its organic artillery with it; the only way that this result can be secured is to reduce the artillery permanently assigned the division to the lowest possible limits.

35. No discussion of organization can be complete without considering the machine gun, which is likely to increase in importance.

36. The slow introduction before the war of the machine gun into our service and the enormous expansion in the number of machine guns per thousand rifles which we made upon entering the war resulted in a high specialization of machine gun officers.

37. The fact that machine gun officers specialized and the further fact that the average infantry officer was not well instructed either in the technique or the tactics of the machine gun led to strong advocacy of a separate machine gun corps, or, failing that, of a virtual separation of machine guns and infantry through the organization of machine gun battalions.

38. The question at issue is, in either case, whether or not the machine gun should be a separate arm; if the machine gun should not be a separate arm then it should belong to the infantry battalion which is the real combat unit in war.

39. The advocates of the separate machine gun corps, and of the separate machine gun battalion as well, lay stress on the technical training of machine gun units and their employment in indirect laying and barrage fire.

40. The questionbbrought up in sub-paragraph 39, is simply whether or not the machine gun is an infantry weapon.

41. If the machine gun is not an infantry weapon but is to be used principally in barrage fire and by indirect laying then the machine gun should be confided to the artillery which is best fitted by its other training to handle fire of that character.

42. The truth is that the machine gun is purely an infantry weapon, its principal use is to supplement or replace infantry fire, and every infantryman must be trained in its use.

43. The machine gun will be employed in most cases in immediate connection with the infantry and therefore under the battalion commander and he must accordingly be thoroughly trained in its employment.

44. To be successfully used, and not forgotten, by the battalion commander the machine gun company must be a constituent part of the infantry battalion which, it can not be too often repeated, is the real combat unit.

45. Technical training in the use of the machine gun should be under the supervision of the Divsion Machine Gun Officer, who would also exercise command over such units as may be massed in special cases; it might also be well to provide a machine gun officer on the regimental staff.

46. In order that the battalion may not be too unweildy while still retaining the fire power and the maneuver ability which a real combat unit must possess, the battalion should consist of three rifle companies and one machine gun company; both rifle companies and machine gun companies should have a strength of about 250.

47. Correct organization demands an identical, as nearly as may be, staff system from the battalion to the War Department. One of the mistakes made in the A.E.F. was the failure to provide throughout such a system. Each unit should have a Chief of Staff and the four G's.

48. The divisional train should be reduced not only to perform to the general reduction in strength but also by cutting the amount of supplies carried from two to one day's; the motor transportation (approximately one-half that now assigned so taken from the division should be pooled in the Corps and Army. This pooling of transportation would probably permit a material reduction in the total transportation required.

49. Arguments for the four-division corps, the three-division corps, and the two-division corps can be advanced. The principal argument in favor of the four-division corps is that it is better suited to stabilized positions. It is repeated however, that our organization should be based on mobile warfare, and for this reason and in view of our resources the three-division corps is favored. During war it may, and usually will, be necessary to vary the number of divisions in the Army Corps. / In peace time it is desirable to organizeand train as many corps headquarters as our military establishment will permit. /

50. The division should have an observation flight of some eight planes; since it is only through the closest personal association that real cooperation between the air and ground can be obtained, and since the division habitually requires some air service.

(Wrapper Indorsement continued)

51. Whether or not tanks should be permanently assigned the division is a difficult question. On the one hand is the fact that tanks are usually best employed by concentrating them in favorable sectors and on the other hand is the necessity for closely associating the infantry and tanks. The employment of tanks must be expected to increase many-fold especially in a war of the character of the World War and the necessity for close association will increase correspondingly. Many further arguments pro and con might be presented; without further argument, though, it is believed that we might well replace the divisional machine gun reserve by a company of about fifteen tanks. This number of tanks is of course in no sense adequate for an attack on a stabilized front. The tanks for such a purpose must come from an army reserve. The fifteen tanks here proposed as a constituent part of the division should be considered purely and simply as a divisional reserve whether in attack or defense.

52. The principal considerations concerning the organization of the division may be summarized as follows: - The Division recommended by the Superior Board is so large as to be unwieldy, especially under conditions existing on this Continent. The division should be small enough to permit its being deployed from column of route on a single road in a few hours and, when moving by rail, to permit all of its elements to be assembled on a single railroad line within twenty-four hours; this means that the division must not exceed 20,000 as a maximum. The organization of the division, within the limits of allowable strength, must be such as to secure the greatest possible driving power under the most probable conditions; the division must, therefore, have the maximum of infantry and such minimum of auxiliaries and services as will <u>always</u> be required under the most probable conditions of service. Maneuver is essential and vital for <u>all</u> units under all conditions, but more especially so on the American Continent, and the organization adopted should be favorable to tactical combinations. The machine gun is purely an infantry weapon and it is vital that it be a constituent part of the <u>real</u> combat unit, the battalion. Proper and adequate reduction in the strength of the division can only be secured by abandoning the system of four in favor of the system of three and the adoption of the latter system is also advisable because it affords a greater number of desirable tactical combinations and therefore augments the possibilities of maneuver. A subsidiary, but none the less important, advantage in the smaller division is the fact that the division commander is able to exercise a more direct influence over his division than is possible in the larger division.

In effect the large division would, on the American Continent, have to be utilized as a small Army Corps, but such a use would materially reduce our efficiency per thousand men since the division is ill adapted for such employment.

53. In order to present the above ideas concretely it is recommended that the division be organized, with the approximate war strength of units as shown in outline below:

	Approximate Aggregate War Strength.
Division Headquarters	300
1 Infantry brigade of 3 regiments of 3 battalions each	11,000
1 Tank company (for new model tanks)	100
1 Regiment of field artillery of 3 battalions of 3 firing batteries and 1 ammunition battery each.	2,300
1 Battalion Engineers and Engineer Train	900
Signal Troops	300
1 Cavalry Squadron	400
Total Trains	1,500
1 Observation Flight (8 planes)	75
GRAND TOTAL	16,875

IV. The recommendations as to the pooling of auxiliaries must not be understood as implying a rigid and even distribution of such troops among corps and armies. On the contrary this pooling must be elastic and allotments to corps and armies must be made by G.H.Q. in accordance with the character and requirements of the particular operation.

Since in many cases the auxiliaries will be attached to, and in all cases must closely cooperate with, divisions, those troops and services which are pooled should in so far as practicable be so located in time of peace as to be habitually associated with divisions for training. The spirit of cooperation resulting from common understanding can be properly fostered only by such daily contact.

V. In deciding upon the type of transportation to be permanently assigned to divisions, it must be remembered that probable theaters of operations on the American Continent do not contain roads over which large numbers of heavy motor trucks can operate; unless it be during the short favorable season of the year.

In the sections of our country which are most favorable to exclusive reliance upon motor transportation, it should be comparatively simple to obtain such motor trucks as may be required. But properly equipped and trained animal drawn transportation is difficult to organize and almost impossible to improvise. It seems obvious that a large proportion of the transport permanently assigned to divisions should be animal drawn.

VI. The number of units to be maintained in time of peace is most important. Although it is apparent that the spirit of the law contemplates the maintenance of the maximum practicable number of "cadres", the actual decision as to the units to be maintained is left to the War Department.

The peace strength of the army being fixed and it being evident that this strength is inadequate for a great war, this question reduces itself to that of determining the most suitable distribution of the peace time nucleus to accomplish the greatest practicable and the most rapid expansion of our forces to meet the emergency of war.

It is the universal experience, based on the history of several centuries, that "cadres" are more difficult to train than individuals and our decision should be primarily based on this experience. However, in deciding upon the number of units to be maintained we must remember that we should not increase them to such an extent as to reduce the size of individual units below that necessary for proper training. In addition the strength of units must be sufficient to enable them to perform police duties or to engage in minor expeditions without an increase in the peace establishment.

If we consider the basic arm we find that we now have 65 regiments of infantry with a total allowed strength, under the new Act, of 110,000 men. We should if practicable maintain all these regiments. If we allow for tanks and assume that all units on foreign service should be maintained at war strength and that one division at home will also be maintained on a war footing, we should still be able to allot over 1,000 men to each of the remaining infantry regiments. One thousand men to the regiment gives sufficient men to meet ordinary training requirements and provides an efficient unit for immediate use in campaign. Such a unit would be particularly valuable in domestic disturbances or in peaceful occupation of the territory of backward neighbors because of the more perfect knowledge of their men on the part of officers.

I recommend that we maintain the 65 existing regiments of infantry and that from these regiments we form 21 divisions.

VII. Before forwarding these papers I have consulted certain able and representative officers, formerly with the A.E.F., who are now on duty at the General Staff College. The views expressed in this indorsement are in complete harmony with those held by the officers consulted.

(signed) JOHN J. PERSHING,
General of the Army.