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ROBERT D. HEINL, JR., U. S. M. C.

WAR DEPARTMENT

**STAFF OFFICERS'  
FIELD MANUAL**



**PART TWO  
TECHNICAL AND LOGISTICAL DATA**

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# STAFF OFFICERS' FIELD MANUAL



## PART TWO

### TECHNICAL AND LOGISTICAL DATA

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PREPARED UNDER DIRECTION OF THE  
CHIEF OF STAFF

1932



UNITED STATES  
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# STAFF OFFICERS' FIELD MANUAL

## PART TWO

### TECHNICAL AND LOGISTICAL DATA

WAR DEPARTMENT, \*

WASHINGTON, *January 10, 1933.*

Part Two, Technical and Logistical Data, Staff Officers' Field Manual, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

DOUGLAS MACARTHUR,

*General,  
Chief of Staff.*

OFFICIAL:

C. H. BRIDGES,

*Major General,*

*The Adjutant General.*



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## FOREWORD

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The Staff Officers' Field Manual should be considered as a compilation of principles, information, and data to be used as a guide for the operation of the staffs of all units and territorial commands, in peace and war, rather than a set of rules and regulations to be rigidly and blindly followed.

The manual will be published in three parts as follows:

**PART ONE. Staff data.**

- Chapter 1. Staff principles and functions.  
2. Orders, reports, forms, and abbreviations.  
3. Maps and special military symbols.

**PART TWO. Technical and logistical data.**

- Chapter 1. Weapons and ammunition data.  
2. Field engineering data.  
3. Signal communication data.  
4. Evacuation data.  
5. Supply and transport data.

**PART THREE. Organization, road spaces, and camping areas.**



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## STAFF OFFICERS' FIELD MANUAL

## PART TWO

## TECHNICAL AND LOGISTICAL DATA

## CHAPTER 1

## WEAPONS AND AMMUNITION DATA

1. **Tables.**—The following tables contain data regarding weapons and ammunition of special interest to troops in the field. Armament for the cannon and artillery vehicles in the 75-mm regiment, horse artillery, cavalry division, is the same as that listed for the 75-mm gun regiment in Table III. In horse artillery, cannoneers are mounted, whereas in horse-drawn artillery they ride on caissons and limbers.

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TABLE I.—*Weapons and their transport in infantry brigades and light tank company, infantry division*

2

Item	Weight, lbs	Total <sup>17</sup>	One infantry brigade										Tank Co	
			Total Brig	Brig Hq & Hq Co	One infantry regiment									
					Total Regt	RHQ & Hq Co	Serv Co	How Co	One infantry battalion					
									Total Bn	Bn Hq & Hq Co	3 Rifle Cos	MG Co		
Gun, machine, cal. .30, with ground tripod <sup>1</sup>	95	144	72		36					12			12	
Cart, MG, equipped and loaded <sup>2</sup> or	725	144	72		36					12			12	
Mount, wheeled, MG, equipped and loaded <sup>2</sup>	370													
Cart, MG, ammunition, equipped and loaded <sup>3</sup>	800	144	72		36					12			12	
Pack, MG, cal. .30 <sup>4</sup> <sup>5</sup>	230	144	72		36					12			12	
Pack, MG, ammunition, cal. .30 <sup>4</sup> <sup>6</sup>	266	144	72		36					12			12	
Gun, machine, tank, cal. .30 <sup>7</sup>	35	14												14
Gun and carriage, 37-mm M1916 or M1916A <sup>18</sup>	346	12	6		3			3						
Cart, 37-mm gun, ammunition, equipped and loaded <sup>9</sup>	953	12	6		3			3						
Pack, 37-mm load, No. 1 <sup>4</sup> <sup>10</sup>	265	12	6		3			3						
Pack, 37-mm load, No. 2 <sup>4</sup> <sup>11</sup>	341	12	6		3			3						
ack, 37-mm gun, ammunition, load No. 3 <sup>4</sup> <sup>12</sup>	307	24	12		6			6						
Gun, 37-mm and tank cradle	87	10												10
Mortar, trench, 3-inch	110	12	6		3			3						
Cart, mortar, 3-inch trench, equipped and loaded <sup>13</sup>	970	12	6		3			3						
Cart, mortar, ammunition <sup>14</sup>	981	12	6		3			3						
Pack, mortar, 3-inch, trench <sup>4</sup> <sup>15</sup>	294	12	6		3			3						
Pack, mortar, ammunition <sup>4</sup> <sup>16</sup>	284	36	18		9			9						



Rifle, U. S., cal. .30, M1903, without bayonet.	8.69	7,484	3,742	38	1,852	57	149	14	544	32	486	26	-----
Bayonet	1	5,832	2,916	-----	1,458	-----	-----	-----	486	-----	486	-----	-----
Rifle, auto, cal. .30	15.8	648	324	-----	162	-----	-----	-----	54	-----	54	-----	-----
Pistol, auto, cal. .45	2.7	4,260	3,050	60	995	90	44	99	254	38	54	162	160
Tank, 6-ton (see Table IV)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24

<sup>1</sup> Machine gun with water jacket filled weighs 42 lbs.

<sup>2</sup> Load includes gun and tripod, 5 filled ammunition chests (250 rds ea), 1 water chest, and 1 accessory and spare-parts case.

<sup>3</sup> Load includes 11 filled ammunition chests (250 rds ea) and 3 water chests.

<sup>4</sup> Issued in lieu of cart transport to organizations specifically designated by the War Department.

<sup>5</sup> Includes cavalry-type saddle (75 lbs), machine gun and tripod (95 lbs), hangers, etc. Same as Cavalry. (See Table IX.)

<sup>6</sup> Includes cavalry-type pack saddle (75 lbs), 8 filled ammunition chests (250 rds ea), hangers, etc. Similar to Cavalry but larger load.

<sup>7</sup> Mounted in tank. In addition each tank carries 1 spare gun and 2 emergency tank tripods.

<sup>8</sup> 37-mm gun carriage, M1916, used with cart, 37-mm gun carriage, M1916A1, used with pack, transport. (For Cavalry, see Table IX.)

<sup>9</sup> Includes cart, 224 rds ammunition in 14-16 rds chests, etc.

<sup>10</sup> Includes cargo-type pack saddle (90 lbs), tripod assembly, axle assembly, accessory chest, and brush and staff.

<sup>11</sup> Includes cargo-type pack saddle (90 lbs), gun and cradle, 2 wheels.

<sup>12</sup> Includes cargo-type pack saddle (90 lbs), six 16 rd ammunition chests. (For similar load in Cavalry, see Table IX.)

<sup>13</sup> Includes cart, mortar, and 36 rds ammunition (12 boxes).

<sup>14</sup> Includes cart and 36 rds ammunition.

<sup>15</sup> Includes cargo-type pack saddle (90 lbs), mortar, and one box (3 rds) ammunition.

<sup>16</sup> Includes cargo-type pack saddle (90 lbs), 4 boxes (12 rds) ammunition.

<sup>17</sup> To obtain total for one infantry division unite Tables I and II.

TABLE II.—*Small arms and automatic guns in supporting units of the infantry division*

Item	Weight, lbs	Total	Division headquarters and special troops					Light field artillery brigade				Engineer regiment					QM Regt
			Div Hq & Hq Co	Hq Sp Trs	MP Co	Sig Co	Ord Co	Total Brig	Two 75-mm Regts	155- How Regt	Am Tn	Total Regt	RHQ & Serv Co	One battalion			
														Total Bn	Bn Hq	3 Cos	
Gun, machine, cal. .30, with AA tripod <sup>1</sup>	97	67						67	36	20	11						
Rifle, U. S., cal. .30, with- out bayonet	8.69	1,243	61				125					611	103	254	2	252	440
Bayonet	1	504										504		252		252	
Rifle, auto, cal. .30 <sup>2</sup>	15.8	487						463	282	132	45	24		12		12	
Pistol, auto, cal. .45	2.7	6,167	181	11	155	175	20	5,159	3,274	1,105	430	214	76	69	3	66	252

<sup>1</sup> The AA machine-gun tripod, M1918, weighs approximately 60 lbs.<sup>2</sup> The automatic rifle is undergoing service test in field artillery as an AA defense weapon on the march. Allowances tentative. Priority of issues under consideration.

TABLE III.—Cannon and artillery ammunition vehicles in the light field artillery brigade, infantry division

Item	Weight, lbs	Total Brig	One 75-mm gun regiment				155-mm howitzer regiment				Ammunition train		
			Total Regt	One battalion			Total Regt	One battalion			Total Tn	Am Btry truck	Am Btry wag- on
				Total Bn	C Tn	Gun Btry		Total Bn	C Tn	One How Btry			
Gun and carriage, 75-mm, M1897	4,586	48	24	12		4							
Caisson, gun, 75-mm <sup>1</sup>	4,960	144	72	36	18	6							
Limber, gun caisson, 75-mm <sup>2</sup>		192	96	48	18	10							
Howitzer, carriage and limber, 155-mm	9,485	24					24	8		4			
Caisson, 155-mm How <sup>4</sup>	3,949	72					72	24		12			
Truck, 3-ton	18,500	120					72	24	24		48	24	
Wagon, escort	2,110	24									24		24

<sup>1</sup> Includes gun caisson limber, loaded.

<sup>2</sup> Caisson and limber caisson carry total of 107 rds 75-mm gun ammunition.

<sup>3</sup> Limber used as gun and carriage limber carries 35 rds 75-mm gun ammunition.

<sup>4</sup> 155-mm howitzer caisson carries 14 rds ammunition. 2 caissons drawn by 1 tractor.

<sup>5</sup> Weight without load.

<sup>6</sup> Each load is 40 rds 155-mm howitzer ammunition.

<sup>7</sup> 12 trucks each carry 200 rds 75-mm gun ammunition; 36 trucks each carry 40 rds 155-mm howitzer ammunition.

<sup>8</sup> Each load is 100 rds 75-mm gun ammunition.

TABLE IV.—*Characteristics of tanks*

	6-ton tank, M1917	Mk VIII
Number in company.....	24; Hq Plat 9, three Plat of 5 ea.....	15; Hq Plat 6, three Plat of 3 ea.....
Maximum speed; favorable ground, mph.....	5.5.....	6.5.....
Maximum sustained speed, favorable ground, mph.....	4 in daylight; 2.5 at night <sup>1</sup> .....	3 in daylight; 1 at night.....
Speed, entrucked.....	3 mph at night, w/o lights; 5 mph at night w/lights; 8 mph in daylight. One 37-mm or one cal .30 machine gun.....	Two 6-pounders; five cal .30 machine guns.....
Armament.....		
Ammunition, tank (see Tables V and VI).....	238 rds per 37-mm gun; 4,200 rds per machine gun.....	104 rds per 6-pounder; 3,000 rds per machine gun.....
Crew.....	2.....	1 officer; 10 men.....
Ground pressure per sq. in., 10 inches submersion, lbs.....	4.4.....	4.9.....
Dimensions.....	Length over all.....	34 feet 2.5 inches.....
	Length, tailpiece removed.....	
	Width over all.....	12 feet 5 inches.....
	Width, sponsons in.....	9 feet 5.5 inches.....
	Height, over all.....	10 feet 2.5 inches.....
Fuel capacity, gallons.....	Ground clearance.....	20.75 inches.....
		240.....
		0.3.....
		72.....
		40.....
Miles per gallon, favorable conditions.....		
Total miles (fuel distance) average.....		
Maximum slope (degrees) without grouzers, favorable ground.....		
Maximum height of vertical wall over which tank will climb, ins.....	36.....	54.....
Maximum width of a deep revetted trench that tank will cross (feet).....	7.....	16.....

Fording ability, approximate depth, ins.....	24.....	24.....
Armor thickness, ins.....	(9).....	(9).....
Front.....	0.6.....	0.63.....
Turret walls.....	0.6.....	0.63.....
Sides.....	0.6.....	0.47.....
Rear.....	0.6.....	0.63.....
Top surface.....	0.31.....	0.236.....
Weight, tons (approximate).....	6.75.....	43.5.....
Weight, equipped, w/o crew, tons.....	7.25.....	

<sup>1</sup> Movement under own power on the march is undesirable on account of the resultant extensive overhaul and repair work.

<sup>2</sup> With ignition protected this figure may be materially increased.

<sup>3</sup> Armor gives protection against cal. .30 ammunition.

<sup>4</sup> Excludes ammunition, crew and equipment for 6-ton and crew for Mk. VIII.

TABLE V.—*Caliber .30 and caliber .45 ammunition in the infantry division*

	Caliber .30				Caliber .45 packed in 20-rd cartons
	A. P. packed in 20-rd cartons	Ball		Tracer packed in 20-rd cartons	
		Packed in clips and bandoleers	Packed in 20-rd cartons		
Number of rounds per shipping container.....	1,500	1,200	1,500	1,500	2,000
Gross weight.....	112	100	114	114	110
Carried on individual or in organization:					
Per rifle.....		<sup>1</sup> 40			
Per automatic rifle.....		<sup>2</sup> 60			
Per machine gun, MG Co <sup>3</sup> .....	200		3,750	50	
Per machine gun, AA <sup>3</sup> .....			1,500		
Per tank machine gun, mounted in tank <sup>4</sup> .....	840		2,520	840	
Per pistol.....					21
Carried in combat train:					
Per rifle, in Inf R Co.....	5	105		10	
Per automatic rifle, Inf R Co <sup>2</sup> .....	20	500		20	
Per machine gun, Inf MG Co <sup>3</sup> .....	280		2,000	250	
Per tank machine gun, Tk Plat, mounted in tank <sup>4</sup> .....	420		1,260	420	
Per pistol.....					5
Carried in QM Regt (field train):					
Per rifle in Inf R Co.....	10	30		5	
Per automatic rifle in Inf R Co.....	10	380		10	
Per machine gun, Inf MG Co.....	150		1,200	150	
Per tank machine gun, Tk Plat, mounted in tank <sup>4</sup> .....	420		1,260	420	
Per pistol.....					5
Carried at railhead: <sup>5</sup>					
Per rifle in Inf R Co.....	10	120			
Per automatic rifle in Inf R Co.....	10	380		10	
Per machine gun in Inf MG Co.....	150		1,200	150	
Per tank machine gun, Tk Plat, mounted in tank <sup>4</sup> .....	840		2,520	840	
Carried in corps QM Regt (corps train):					
Per rifle in Inf R Co.....	5	50		5	
Per automatic rifle in Inf R Co.....	10	250		10	
Per machine gun, Inf MG Co.....	125		1,000	125	
Per tank machine gun, Tk Plat, mounted in tank <sup>4</sup> .....	210		630	210	
Per pistol.....					5

<sup>1</sup> 60 rds per rifle in Engr Regt.<sup>2</sup> In 20-rd automatic rifle magazines; 500 rds per automatic rifle carried by Engr Regt.<sup>3</sup> Loaded locally in 250-rd ammunition belts.<sup>4</sup> Loaded locally in 50-rd ammunition belts. For active guns only.<sup>5</sup> Quantities for railhead are basic allowances and subject to change according to tactical situation.<sup>6</sup> Allowances are for machine guns in tank platoons, tank companies only, or 9 machine guns per company.



TABLE VI.—Infantry howitzer and light tank cannon ammunition

	37-mm gun, M1916		3-inch trench mortar	
	Shell, HE, for 37-mm gun, M1916	Canis- ter for 37-mm gun, M1916	Shell, HE	Shell, smoke
Number of rounds per shipping container.....	60	60	3	3
Gross weight, lbs.....	121	121	43.5	45.9
Carried in organizational transport:				
Per 37-mm gun, Inf How Co.....	<sup>1</sup> 224			
Per 37-mm gun, Inf Tk Co <sup>2</sup> .....	198	40		
Per 3-inch trench mortar, Inf How Co <sup>3</sup> .....			66	6
Carried in combat train:				
Per 37-mm gun, Inf How Co.....	200			
Per 37-mm gun, Tk Plat, Inf Tk Co <sup>4</sup> .....	99	20		
Per 3-inch trench mortar, Inf How Co.....			90	9
Carried in QM Regt (Div Tn):				
Per 37-mm gun, Inf How Co.....	100			
Per 37-mm gun, Tk Plat, Inf Tk Co <sup>4</sup> .....	99	20		
Per 3-inch trench mortar, Inf How Co.....			48	3
Carried at railhead: <sup>4</sup>				
Per 37-mm gun, Inf How Co.....	200			
Per 37-mm gun, Tk Plat, Inf Tk Co <sup>4</sup> .....	198	40		
Per 3-inch trench mortar, Inf How Co.....			90	9
Carried in corps QM Regt (corps train):				
Per 37-mm gun, Inf How Co.....	100			
Per 37-mm gun, Tk Plat, Inf Tk Co <sup>4</sup> .....	99	20		
Per 3-inch trench mortar, Inf How Co.....			48	3

<sup>1</sup> Transported on 37-mm gun ammunition cart in 14-16 rd chests.

<sup>2</sup> Transported in ammunition racks in tank.

<sup>3</sup> Transported on mortar and mortar ammunition carts.

<sup>4</sup> Quantities for railhead are basic allowances and subject to change according to tactical mission.

<sup>5</sup> Allowances are for 37-mm guns in tank platoons, tank companies only, or 6 guns per company.

TABLE VII.—Grenades and pyrotechnics, infantry division

Unit	Grenades		Pyrotechnics	
	Hand, fragmentation	Rifle (1, 2)	Signals, ground, assorted	Lights, position
Number of rounds per shipping container.....	10		30	100
Gross weight.....	18.75		35	45
Carried in organization: Signal Co.....				300
Carried in combat trains:				
Per Inf R Co.....	108		120	30
Per Inf Regt and Bn Hq (incl tanks).....				30
Per Inf Regt and Bn Hq (except tanks).....			96	
Per Inf Co (except MP Co, How Co, and Serv Co) not otherwise provided for.....				30
Per Inf Co (except MP Co, How Co, Serv Co, and Tk Co) not otherwise provided for.....			24	
Carried in QM Regt (Div Tn):				
Per Inf R Co.....				15
Per Inf Regtl and Bn Hq Co (incl tanks).....				15
Per Inf Co (except MP Co, How Co, and Serv Co) not otherwise provided for.....				15
Carried at railhead:				
Per Inf R Co.....	432			30
Per Inf Regtl and Bn Hq Co (incl tanks).....				30
Per Inf Co (except MP Co, How Co, and Serv Co) not otherwise provided for.....				30
Carried in corps QM Regt (Corps Tn):				
Per Inf R Co.....	54		60	15
Per Inf Regtl and Bn Hq Co (incl tanks).....				15
Per Inf Regtl and Bn Hq Co (except tanks).....			48	
Per Inf Co (except MP Co, How Co, and Serv Co) not otherwise provided for.....				15
Per Inf Co (except MP Co, How Co, Serv Co, and Tk Co) not otherwise provided for.....			12	

<sup>1</sup> The lachrymatory rifle grenade is of little value in combat and is therefore not included in allowances. It is valuable in civil disturbances, and carried for these special operations.

<sup>2</sup> Pending availability of a satisfactory combination hand and rifle fragmentation grenade or a satisfactory rifle fragmentation grenade, hand fragmentation grenades only are provided. Upon availability of combination hand and rifle fragmentation grenades they will replace the hand grenades with like allowances. If the rifle fragmentation grenade is made standard the allowances of the rifle and hand grenades in the several echelons of reserve will be as follows:

	Rifle grenades	Hand grenades
Per Inf R Co:		
In C Tn.....	108	
At railhead.....	216	216
In corps Tn.....	27	27

TABLE VIII.—*Ammunition for organic division artillery*

Unit	75-mm gun regiment				155-mm howitzer regiment			
	Rds per piece	Rds per battery	Total rds	Vehicles used <sup>1</sup>	Rds per piece	Rds per battery	Total rds	Vehicles used
Each battery.....	195½	782	782	6 caissons and limbers, 107 rds ea; 4 carriage limbers, 35 rds ea.	42	168	168	12 caissons, 14 rds ea.
Each battalion combat train.....	160½	642	1,926	18 caissons and limbers, 107 rds ea.	120	480	960	24 3-ton trucks, 40 rds ea.
In artillery brigade ammunition train.....	100	400	4,800	12 3-ton trucks, 200 rds ea, and 24 escort wagons, 100 rds ea.	60	240	1,440	36 3-ton trucks, 40 rds ea.
Total within the division.....	456	1,824	21,888		222	888	5,328	
In corps QMO train <sup>1</sup> .....	120	480	5,760		60	240	1,440	
Aggregate.....	576	2,304	27,648		282	1,128	6,768	

See footnotes at end of table.

TABLE VIII.—*Ammunition for organic division artillery—Continued*  
KIND, PERCENTAGE, AND WEIGHT OF AMMUNITION

Item	75-mm gun				155-mm howitzer			
	Type	Per cent	No in box	Weight, lbs	Type	Per cent	No in box	Weight, lbs
Shell, HE (unfuzed).....	Fixed.....	66	4	95	Separate.....	99	Not boxed.	95
Shell, smoke (unfuzed).....	do.....	4	4	95	do.....	1	Not boxed.	93.11
Shrapnel (fuzed).....	do.....	30	4	115	do.....	( <sup>2</sup> )	2	215
Fuze, point detonating, superquick.....	Mk III.....	<sup>4</sup> 100	50	80	Mk III.....	<sup>4</sup> 100	50	80
Fuze, point detonating, short delay.....	Mk IV.....	<sup>4</sup> 15	100	51	Mk IV.....	<sup>4</sup> 22	100	51
Charge, propelling.....					Separate.....	100	4	68.2
Primer, percussion.....					Percussion.....	110	2,400	85

<sup>1</sup> An escort wagon carries 100 rds 75-mm gun ammunition, or 20 rds 155-mm howitzer ammunition. A 3-ton truck carries 200 rds 75-mm gun ammunition, or 40 rds 155-mm howitzer ammunition. A 75-mm gun caisson limber used as carriage limber carries 35 rds, and used as a caisson limber carries 37 rds ammunition. A 155-mm howitzer caisson carries 14 rds ammunition.

<sup>2</sup> The desired quantity of 75-mm ammunition is 150 rds, and 155-mm ammunition, 75 rds. The quantities 120 and 60 are based upon available transportation.

<sup>3</sup> Not normally required with 155-mm howitzer assigned to divisions and corps.

<sup>4</sup> Percentage based on HE and smoke shell.

TABLE IX.—Weapons and their transport in cavalry brigades and armored-car squadron, cavalry division

Item	Weight, lbs	One cavalry brigade									Armored-car squadron			
		Total	Total Brig	BHQ and Hq Tr	One cavalry regiment									
					Total Regt	RHQ and Hq Tr	Band	MG Tr	One cavalry squadron					
									Total Sq	Sq Hq	2 trs	Total Sq	Sq Hq	3 Armd-C Trs
Gun, machine, cal. .30, with ground tripod <sup>1</sup>	95	48	24	12			12							
Pack, machine gun, cal. .30 <sup>2</sup>	230	48	24	12			12							
Pack, machine-gun ammunition, cal. .30 <sup>3</sup>	220	144	72	36			36							
Gun, machine, light, cal. .30, with tripod <sup>4</sup>	28	192	96	48					16		16			
Pack, light machine-gun <sup>5</sup>	192	96	48	48					16		16			
Pack, light machine-gun ammunition <sup>6</sup>	186	96	48	24					8		8			
Gun, machine, cal. .30, with AA tripod or mount <sup>7</sup>		16	8	4			4							
Gun and carriage, 37-mm, M1916A2 <sup>8</sup>	145	12	6	3			3							
Pack, 37-mm gun and carriage <sup>9</sup>	224	12	6	3			3							
Pack, 37-mm gun ammunition <sup>10</sup>	226	24	12	6			6							
Gun, submachine, cal. .45 <sup>11</sup>	13.9	36										36		36
Gun, machine, cal. .30, tank <sup>12</sup>	35	72										72		72
Gun, machine, cal. .50, aircraft type <sup>13</sup>	52	36										36		36
Rifle, U. S., cal. .30	8.69	4,392	2,156	60	1,048	73		93	294		294	80	8	72
Pistol, automatic, cal. .45	2.7	6,050	2,886	88	1,399	147	29	176	349	3	346	278	11	267

See footnotes at end of table.

TABLE IX.—*Weapons and their transport in cavalry brigades and armored-car squadron, cavalry division—*  
Continued

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Item	Weight, lbs.	Total	One cavalry brigade									Armored-car squadron		
			Total Brig	BHQ and Hq Tr	One cavalry regiment							Total Sq	Sq Hq	3 Armd-C Trs
					Total Regt	RHQ and Hq Tr	Band	MG Tr	One cavalry squadron					
									Total Sq	Sq Hq	2 trs			
Car, armored <sup>14</sup>	9,000	36										36		36
Car, light, AA machine gun <sup>15</sup>		16	8		4			4						
Saber, cavalry	2 8	3,448	1,724	20	852	39			271	3	268			

<sup>1</sup> Machine gun with water jacket filled weighs approximately 42 lbs.

<sup>2</sup> Includes cavalry-type pack saddle (75 lbs), machine gun and tripod (95 lbs), hangers, etc.

<sup>3</sup> Includes cavalry-type pack saddle (75 lbs), 8 ammunition chests each containing 250 rds in belts at 20.75 lbs, or 124.50 lbs, hangers, etc.

<sup>4</sup> Modified tank-type machine gun, with modified tank-type emergency tripod, replacing the machine rifle.

<sup>5</sup> Includes cavalry-type pack saddle (75 lbs), light machine gun (28 lbs), 2 ammunition chests 400 rds each in 150-rd belts, accessory chest with accessories, etc., and 150 rds ammunition.

<sup>6</sup> Includes cavalry-type pack saddle (75 lbs), 1,600 rds ammunition in 4 ammunition chests, 400 rds each in 150-rd belts, hangers, etc.

<sup>7</sup> Under development. Mounted on car, light, AA machine gun. (Note <sup>15</sup>.)

<sup>8</sup> Modified 37-mm gun carriage, without wheels and with special trails.

<sup>9</sup> Includes cavalry-type pack saddle (75 lbs), 37-mm gun and carriage, hangers, etc.

<sup>10</sup> Includes cavalry-type pack saddle (75 lbs), four 16-rd ammunition chests 34 lbs each, hangers, etc.

<sup>11</sup> Gun with empty drum magazine, 100 rd, weight 13.9 lbs, with loaded drum 18.5 lbs, 20-rd magazines or 50-rd drums may be used.

<sup>12</sup> Similar to light machine gun, except guns are on mounts in armored cars; one in dual mount; one in AA mount.

<sup>13</sup> On mount in armored car.

<sup>14</sup> In future development armored cars will be designated as light, medium, and heavy. The weight shown is that applying to a medium car.

<sup>15</sup> Under development. (For armament see note <sup>7</sup>.)



TABLE X.—Small arms and automatic guns in supporting units of the cavalry division

Item	Weight, lbs	Total	Division headquarters and special troops						75-mm gun Regt	Engr Sq	Div. Tn <sup>2</sup>
			Total	D H Q and Hq Tr	Hq Sp Tr	Slg Tr	Light Tk Co <sup>1</sup>	Ord L Maint Co			
Gun, machine, cal. .30, with AA tripod.....	97	18							18		
Rifle, U. S., cal. .30.....	8.69	699	166	129				37		303	230
Rifle, machine, cal. .30 <sup>1</sup> .....		6								6	
Rifle, automatic, cal. .30.....	15.8		141						141		
Pistol, automatic, cal. .45.....	2.7	2,465	538	185	11	177	155	10	1,658	93	176
Saber.....		13		13							

<sup>1</sup> The light tank company is attached from Infantry. For armament see Tables I and IV.

<sup>2</sup> Suitable weapon for march AA defense purposes not yet adopted.

<sup>3</sup> Transported in vehicles. Will be replaced in engineer squadron by weapon not yet determined.

TABLE XI.—*Small-arms ammunition in the cavalry division*

	Caliber .30				Caliber .45 packed in 20-rd cartons	Caliber .50			37-mm gun		Ton- nage
	A. P. packed in 20-rd cartons	Ball		Tracer packed in 20-rd cartons		Packed in 10-rd cartons			HE shell	Can- ister	
		Packed in clips and band- oleers	Packed in 20-rd cartons			A. P.	Ball	Tracer			
Number of rounds per shipping container.....	1,500	1,200	1,500	1,500	2,000	280	280	280	60	60	
Gross weight, lbs.....	112	100	114	114	110	106	106	96	121	121	
Carried on individual or in organization:											
Per rifle, on individual.....		90									
Per machine gun MG Plat, MG Tr, ammuni- tion pack <sup>1 2</sup> .....	250		3,950	50							
Per machine gun, AA, MG Tr <sup>2</sup> .....	250		1,350	150							
Per light machine gun, Cav Tr <sup>3 4</sup> .....	20		1,810	20							
Per tank machine gun, Armd-C Tr <sup>5 6</sup> .....	210		1,680	210							
Per tank machine gun, Tk Co, mounted in tank <sup>6 10</sup> .....	840		2,520	840							
Per cal. .50 machine gun, Armd-C Tr <sup>7</sup> .....						150	1,200	150			
Per subcaliber machine gun <sup>8</sup> .....					500						
Per pistol, on individual.....					21						
Per machine or automatic rifle.....	50	400		50							
Per AA machine gun, F A Regt.....			1,500								
Per 37-mm gun, Cav MG Tr.....									64		
Per 37-mm tank gun <sup>11</sup> .....									198	40	

## Carried in combat train:

Per rifle	5	100	5							
Per machine gun, MG Plat, MG Tr	250		3,000	100						
Per machine gun, AA Sec, MG Tr			1,500	150						
Per light machine gun, Cav Tr	10		500	10						
Per tank machine gun, Tk Plat, mounted in tank <sup>10</sup>	420		1,260	420						
Per cal. .50 machine gun, Armd-C Tr					70	560	70			
Per pistol					5					
Per 37-mm gun, Cav Tr								120		
Per 37-mm tank gun, Tk Plat <sup>11</sup>								99	20	45
Carried in division train:										
Per rifle		60	5							
Per machine gun, MG Plat, MG Tr	400		6,000	100						
Per machine gun, AA Sec, MG Tr			1,500	150						
Per light machine gun, Cav Tr	10		600	5						
Per tank machine gun, Armd-C Tr <sup>9</sup>	250		1,500	125						
Per tank machine gun, Tk Plat, mounted in tank <sup>10</sup>	420		1,260	420						
Per cal. .50 machine gun, Armd-C Tr <sup>9</sup>					70	560	70			
Per submachine gun					1,000					
Per pistol					5					
Per 37-mm gun, MG Tr								60		
Per 37-mm gun, Tk Plat <sup>11</sup>								99	20	43.5

<sup>1</sup> 250 rds carried in gun pack, 1,000 rds carried in ammunition pack in Tr Hq, 3,000 rds carried in ammunition packs in gun squad.

<sup>2</sup> Loaded locally into 250-rd ammunition belts.

<sup>3</sup> 950 rds carried on gun pack, 1,600 rds, or 800 rds per gun, carried in ammunition pack. (Chest capacity 400 rds in 3 belts. Ammunition loaded in belts of 150 rds capacity.)

<sup>4</sup> Loaded locally into 150-rd ammunition belts.

<sup>5</sup> Loaded locally into 50-rd ammunition belts.

<sup>6</sup> The armored car has rack capacity for 4,200 rds cal. .30 ammunition in eighty-four 50-rd belts. This quantity serves both guns.

<sup>7</sup> Tentative; loaded locally into metallic belt links. Reserve carried in truck.

<sup>8</sup> Tentative; loaded locally into five 100-rd drum magazines.

<sup>9</sup> Tentative.

<sup>10</sup> Same as Infantry. (Table V.)

<sup>11</sup> Same as Infantry. (Table VI.)

TABLE XII.—*Pyrotechnics for the cavalry division*

	Cartridge, Very	Signal, ground, assorted	Lights, position
No of rounds per shipping container.....		30	100
Gross weight.....		35	45
Carried in combat train:			
Per projector, ground <sup>1</sup> .....		18	
Per Very pistol.....	18		
Per cavalry troop.....			30
Per signal troop.....			300
Carried in division train:			
Per projector, ground.....		18	
Per Very pistol.....		9	
Carried at railhead:			
Per cavalry troop.....			30

<sup>1</sup> The projector, ground, supersedes the Very pistol.

TABLE XIII.—*Ammunition for organic cavalry division artillery*

The ammunition listed for 75-mm gun regiment in Table VIII applies to this regiment, modified by deleting the allowances for artillery brigade ammunition train and corps QMC train, and inserting the following:

Unit	Rds per piece	Rds per battery	Total rds	Vehicles used
In cavalry division QMC train....	114	456	2,736	Carried in 28 escort wagons or 1½ ton truck, 100 rds ea.
Total within the division.....	470	1,880	11,280	

TABLE XIV.—*Characteristics of field artillery*

Caliber and type	Kind	Ammunition					Extreme range (yds)	by Traverse permitted carriage (mils)	Rates of fire (rds per min)		
		Projectile and fuze	Approximate weight (lbs)		Burst effect (yds)				Prolonged	Short bursts	
			Complete rd	Complete rd packed	Range	Lateral					
						Day of fire					
2.95-inch mountain gun.....	(Shrapnel (fixed).....	16	---	22	---	300	14,500		1	3	
	(Shell, HE.....	12	---	19	100	20					
75-mm pack howitzer, M1.....	(Shrapnel (fixed).....	16	20	25	150	25	300	{ 15,600	105(6°)	3	6
	(Shell (semifixed).....	18	22	27	5	25		{ 9,000			
	(Shrapnel (fixed).....	16	20	25	150	25		{ 6,700			
75-mm gun, M1897, horse-drawn.....	(Shell, Mk I (fixed).....	12	17	22	5	25	300	{ 8,800	105(6°)	3	6
	(Shell, Mk IV (fixed).....	14	19	25	5	25		{ 12,500			
75-mm gun, M1, horse-drawn.....	(Shrapnel (fixed).....	17	21	35	150	25	300	{ (1)	800(45°)	3	6
	(Shell, Mk IV (fixed).....	15	24	34	5	25		{ 14,880			
75-mm gun:											
When tractor drawn.....	Shrapnel (fixed).....	17	21	35	150	25	300	{ (1)	800(45°)	3	6
When portée.....	Shell, Mk IV (fixed).....	15	24	34	5	25		{ 14,880			
105-mm howitzer, M1.....	(Shrapnel (fixed).....	33	42	56	---	---	200	{ 6,540	800(45°)	2	4
	(Shell (semifixed).....	33	42	56	10	40		{ 11,960			
4.7-inch gun, M1906.....	(Shrapnel (fixed).....	60	---	88	---	---	180	{ 10,500	140(8°)	1	3
	(Shell, HE.....	45	---	73	10	50		{ 12,000			
155-mm howitzer (Schneider), M1918.....	(Shrapnel (separate loading).....	95	102	115	---	---	150	{ 10,800	105(6°)	1	3
	(Shell (separate loading).....	96	103	107	15	70		{ 12,400			
155-mm gun, M1918 (GPF).....	Shell (separate loading).....	96	122	148	15	70	100	17,500	1,065(60°)	1	3
8-inch howitzer, Mk VIII½, M1917.....	Shell, HE.....	200	110	220	---	---	100	12,960	144(8°)	¼	½
240-mm howitzer, M1918.....	Shell (separate loading).....	345	381	428	---	---	60	16,400	355(20°)	¼	½
Trench mortar, 6-inch model Mk I.....	Shell (fixed).....	53	54	---	---	---	150	1,850	1,775(100°)	4	6

See footnotes at end of table.

TABLE XIV.—*Characteristics of field artillery—Continued*

Caliber and type	Time to em- place	Approximate total weights (gun, carriage, and filled limber) <sup>1</sup>	Transport				Marches		Remarks	
			Piece		Ammunition		Average rate (mph)	Average day's march		
			Method	Number of loads	Method	Rounds per vehicle				
2.95-inch mountain gun.....	3 minutes.....	830	Pack.....	4	Pack.....	10	3½	20	Shell is HE.	
75-mm pack howitzer, M1.....	Do.....	1,300	Do.....	6	Do.....	8	3½	20		
75-mm gun, M1897, horse-drawn.....	Do.....	4,600	6-horse team..	1	Caisson body.....	70	3½	20	Shell is HE or chemical.	
					Gun limber.....	35				
					Caisson limber.....	37				
					Wagon.....	100				
					Truck.....	200				
75-mm gun, M1, horse-drawn.....	Do.....	4,600	Do.....	1	Caisson body.....	70	3½	20	Do.	
					Limber.....	11				
					Wagon.....	100				
75-mm gun:					Truck.....	200				
When tractor drawn.....	3 minutes.....	4,600	{Tractor.....	1	Caisson body.....	70	4	30	Do.	
When portée.....	5 minutes.....			1	Gun truck.....	60	8	60	Do.	
105-mm howitzer, M1.....	3 minutes.....	5,300	{6-horse team} or tractor..}	1	Caisson body.....	8	4	30	Do.	
					Limber.....					80
					Truck.....					
4.7-inch gun, M1906.....	5 minutes.....	9,818	5-ton tractor..	1	Caisson body.....	80	3½	30		
					Truck.....					
155-mm howitzer (Schneider), M1918..	10 minutes.....	9,600	Do.....	1	Caisson body.....	14	3½	30	Do.	
					Truck.....	40				

See footnotes at end of table.



155-mm gun, M1918 (GPF)-----	1 to 6 hours..	29, 150	10-ton tractor--	1 {Trailer----- Truck-----	16 40	3½	30	Shell is HE or chemical. Gun under development has maximum range of 26,000 yards.
8-inch howitzer, Mk VIII½, M1917----	1 to 4 hours..	21, 700	Do-----	1 {Trailer----- Truck-----	20	3½	30	
240-mm howitzer, M1918-----	3 to 12 hours.	58, 600	Do-----	3 {Trailer----- Truck-----	10	3½	30	Shell is HE.
Trench mortar, 6-inch model Mk I-----	2 hours-----	925	Truck-----	1 Do-----	100	8	60	

<sup>1</sup> Limit of time fuze.

<sup>2</sup> Maximum load, 243 pounds.

<sup>3</sup> Maximum load, 16,320 pounds.

<sup>4</sup> Weights will vary, depending on model of carriage and on kind of ammunition carried.

155-mm gun, M1918 (GPF)-----	29, 150	10-ton tractor--	1 {Trailer----- Truck-----	16 40	3½	30	Shell is HE or chemical. Gun under development has maximum range of 26,000 yards.
8-inch howitzer, Mk VIII½, M1917----	21, 700	Do-----	1 {Trailer----- Truck-----	20	3½	30	
240-mm howitzer, M1918-----	58, 600	Do-----	3 {Trailer----- Truck-----	10	3½	30	Shell is HE.
Trench mortar, 6-inch model Mk I-----	925	Truck-----	1 Do-----	100	8	60	

TABLE XV.—Ammunition for organic corps artillery brigades

Unit	155-mm howitzer regiments				155-mm gun regiments			
	Rds per piece	Rds per battery	Total rds	Vehicles used	Rds per piece	Rds per battery	Total rds	Vehicles used
Each battery.....	42	168	168	12 caissons, 14 rds ea.....	16	64	64	4 trailers, 16 rds ea.
Each battalion combat train.....	120	480	960	24 3-ton trucks, 40 rds each.....	60	240	480	12 3-ton trucks.
In corps Arty Brig ammunition train.....	60	240	2,880	72 3-ton trucks (3 Am btrys), 40 rds ea.	80	320	1,920	48 3-ton trucks (2 Am btrys) 40 rds ea.
In corps QM train.....	60	240	2,880		40	160	960	Quantity based on available transportation.
Total in corps.....	282	1,128	13,536		196	784	4,704	

# KIND, PERCENTAGE, PACKING, AND WEIGHT OF AMMUNITION

Item	155-mm howitzer	155-mm gun				Remarks
		Kind	Per cent	No per box	Weight (lbs)	
Shell, HE (unfuzed) -	See Table VIII -	Separate -	80	Not	95	In estimates of ammunition supply, unless specific data to the contrary are given, the following will be used:
Shell, smoke -	do -	do -	10	boxed	93.11	
Shrapnel -	do -	do -	10	2	215	To load artillery brigade ammunition train vehicles at an ammunition refilling point. 1 hour.
Fuze, point detonating, superquick.	do -	Mk III -	100	50	80	To unload artillery brigade ammunition train vehicles at an artillery ammunition distributing point. ¾ hour.
Fuze, point detonating, short delay.	do -	Mk IV -	30	100	51	To load artillery battalion combat train vehicles at an artillery ammunition distributing point. ¾ hour.
Charge, propelling -	do -	Separate -	100	2	102	To unload artillery battalion combat train vehicles at battery positions. ¾ hour.
Primer, percussion -	do -	Percussion -	110	2,400	85	To load motorized artillery battalion combat train vehicles at an ammunition refilling point (the same as ammunition train vehicles) 1 hour.

TABLE XVI.—*Ammunition for organic corps antiaircraft artillery regiment*

(Quantities are based on capacity of authorized transportation. Allowances in Tables of Basic Allowances are considered as ideal, but with present transportation can not be transported)

Unit	3-inch gun battalion, gun batteries				Machine-gun battalion, machine-gun batteries			
	Rds per piece	Rds per battery	Total rds	Vehicles used	Rds per piece	Rds per battery	Total rds	Vehicles used
Each battery.....	164	656		4 trucks at 132 rds each per btry, 32 rds in each gun prime mover.	2,400	28,800		Eight 300-rd metallic belts loaded in 8 ammunition chests transported on truck with machine gun.
Battalion combat train.....	132	528	1,584	12 trucks at 132 rds ea.....	1,995	23,940	95,760	6 trucks at 15,960 rds ea.
Railhead or dump.....					4,000	48,000	192,000	Held in reserve in accordance with tactical mission.
Corps QMC train.....	231	924	2,772	21 trucks at 132 rds ea.....	2,660	31,920	127,680	8 trucks at 15,960 rds ea.
Total.....	527	2,108	16,324	45 trucks at 132 rds ea..... 12 prime movers at 32 rds ea.....	11,055	132,660	530,640	14 trucks at 15,960 rds ea, 48 prime movers at 2,400 rds ea; remainder railhead.
Machine guns in gun battery.....					2,400	9,600	28,800	Carried in gun batteries in eight 300-rd metallic belts in eight ammunition chests on vehicles with machine gun.
Aggregate.....					13,455	142,260	2559,440	

<sup>1</sup> HE shell packed 4 per box; gross weight 155 lbs (in fiber containers).

<sup>2</sup> Proportions are 20% armor piercing, 80% ball, and 20% tracer, each packed 280 rounds per box (28 10-rd cardboard containers). Weights are as follows: Armor piercing and ball cartridges, 106 lbs; tracer cartridges 96 lbs.

TABLE XVII.—Characteristics of coast artillery (mobile) weapons

	Caliber and type	Ammunition			Traverse permitted by carriage	Rate of fire (rounds per piece per minute)	
		Kind	Approximate weight one complete round	Range extreme		Prolonged	Short bursts
RAILWAY	8-inch gun.....	Shell, HE <sup>1</sup>	Pounds 270	Yards 21,300	Degrees 360	½	1
	12-inch mortar.....	do. <sup>1</sup>	700	14,650	360	½	1
	14-inch gun.....	do. <sup>1</sup>	1,862	40,000	{ 37 } 360	½	½
TRACTOR	155-mm gun (GPF).....	do.	120	17,500	60	1	3
ANTIAIRCRAFT				Vertical	Horizontal		
				Feet	Yards		
	3-inch M1 and M3 on trailer mounts M1 and M2.	Shrapnel, shell.....	29	25,800	12,600	360	25
		HE shell.....	23	29,100	14,200		
	3-inch M-1918 on trailer mount M1918	Shrapnel, shell.....	26	24,000	12,000	360	15
	75-mm gun M1916 on mount M1917 on White truck.	do.....	19	19,600	10,600	240	10
	Caliber .50 machine gun M1921 on tripod AA machine gun mount M-1.	Fixed ball, tracer.	(10)	12,000	7,500	360	450

See footnotes at end of table.

TABLE XVII.—*Characteristics of coast artillery (mobile) weapons—Continued*

	Caliber and type	Time to emplace in firing position or change from firing to traveling position	Piece transport	Ammunition transport		Total weight, piece and carriage (approximate)	Width of track	Marches	
				Type	Rounds per vehicle			Average rate per hour	Average day's march
RAILWAY	8-inch gun.....	2 to 3 hours to emplace; 1½ to 2 hours to put in traveling position.	Railway car...	Railway car.	96.....	Tons 87	Ft. In. 4 8½	Mi. 20	Miles 200
	12-inch mortar.....	do.....	do.....	do.....	48.....	88	4 8½	20	200
	14-inch gun.....	3 hours <sup>1</sup> .....	do.....	do.....	25.....	365	4 8½	15-20	200
TRACTOR	155-mm gun (GPF).....	2 to 3 days <sup>2</sup> ..... 1 to 6 hours.....	Tractor, 10-ton	Truck...	14 per truck ton.	12	7 6	3½	25
ANTI-AIR-CRAFT	3-inch M1 and M3 on trailer mounts M1 and M2.	10 to 15 minutes.....	Towing truck ¾-ton.	do.....	44 per truck ton.	8	5 6	12	125
	3-inch M-1918 on trailer mount M1918.	20 to 50 minutes.....	Towing truck	do.....	do.....	7	5 0	8	90
	75-mm gun M1916 on mount M1917 on White truck.	20 to 40 minutes.....	Self-propelled	do.....	65 per truck ton.	4½	5 2	15	160
	Caliber .50 machine gun M1921 on tripod AA machine gun mount M-1.	.....	(?)	do.....	5,333 per truck ton.	( <sup>3</sup> )	(?)	(?)	(?)

<sup>1</sup> Field ammunition only given here. Ammunition for use against armored ships not considered.

<sup>2</sup> Weight of projectile only.

<sup>3</sup> Total traverse of 7° on the carriage when gun is put in position on track without base ring.

<sup>4</sup> 360° traverse when gun is mounted on prepared emplacement with base ring.

<sup>5</sup> 8 hours required for position indicated in note <sup>3</sup>.

<sup>6</sup> 2 to 3 days for emplacement indicated in note <sup>4</sup>.

<sup>7</sup> Not yet determined for this matériel.

<sup>8</sup> 44 pounds when packed.

<sup>9</sup> Weight of tripod and guns (3 loads) 320 pounds (gun, 70 pounds).

<sup>10</sup> Box of 280 rounds, 106 pounds.



TABLE XVIII.—*Ammunition for organic heavy field artillery brigade, GHQ reserve*

Unit	155-mm gun regiment				240-mm howitzer regiment			
	Rds per piece	Rds per battery	Total rds	Vehicles used	Rds per piece	Rds per battery	Total rds	Vehicles used
Each battery.....	16	64	64	4 trailers, 16 rds ea.....	20	80	80	Eight 3-ton trucks, 10 rds ea.
Each battalion combat train.....	60	240	480	12 3-ton trucks, 40 rds ea.....	22	88	176	Sixteen 3-ton trucks, 11 rds ea.
Total per regiment.....	76	304	1,824		42	168	1,008	
Total per brigade.....	76	304	5,472		42	168	2,016	

## KIND, PERCENTAGE, PACKING, AND WEIGHT OF AMMUNITION

Item	155-mm gun				240-mm howitzer regiment			
					Kind	Per cent	No per box	Weight, lbs
Shell, HE (unfuzed).....	See Table XV.....				Separate.....	100	Not boxed.....	345
Shell, smoke (unfuzed).....	do.....							
Shrapnel.....	do.....							
Fuze, point detonating, superquick.....	do.....				Mk III.....	100	50	80
Fuze, point detonating, short delay.....	do.....				Mk IV.....	37	100	51
Charge, propelling.....	do.....				Separate.....	100	2	168
Primer, percussion.....	do.....				Percussion.....	110	2,400	85

TABLE XIX.—*Ammunition for organic GHQ prorata tractor-drawn and portée, light field artillery brigades*

(For kind, percentage, packing, and weights of ammunition, see Table VIII)

Unit	75-mm gun regiments, tractor drawn				75-mm gun regiments, portée			
	Rds per piece	Rds per btry	Total rds	Vehicles used	Rds per piece	Rds per btry	Total rds	Vehicles used
Each battery.....	140	560	560	8 caissons, 70 rds ea.....	60	240	240	Four 3-ton trucks, 60 rds ea.
Total in regiment.....			3,360	48 caissons, 70 rds ea.....			1,440	
Total in brigade.....			10,080	144 caissons, 70 rds ea.....			4,320	

TABLE XX.—*Small arms and automatic guns in corps troops*

	Total	Special troops								Corps Arty	AAA Regt	Corps Engr Serv	Corps Tn
		Total Sp Trs	Hq & Hq Co AC	Sig Bn	MP Bn	Serv Bn	Field Rmt Dep	Ord Co (Am)	Ord Co (Hv Maint)				
Gun, machine, cal .30.....	83									83			
Rifle, U. S., cal .30.....	7,914	1,472	124			958		124	266	125		3,926	2,391
Rifle, automatic, cal .30.....	472									472			
Pistol, automatic, cal .45.....	11,941	1,980	553	488	632	95	154	46	32	6,395	1,941	816	809

TABLE XXI.—*Small arms and automatic guns in army troops*

	Total	Special troops			Army Sig Serv	Army Ord Serv	Rmt Dep	AAA Brig	Army Arty	Army Engr Serv	Army Tn QMC
		Total Sp Trs	Hq & Hq Co	MP Bn							
Gun, machine, cal. 30.....											
Rifle, U. S., cal. 30.....	13, 127	86	86			854				10, 876	1, 311
Rifle, automatic, cal. 30.....	89								89		
Pistol, automatic, cal. 45.....	15, 933	1, 413	626	787	1, 411	332	523	5, 582	702	2, 501	499

For cavalry division see Tables IX, X, XI, and XII.

TABLE XXII.—75-mm pack howitzer and howitzer and ammunition transport

Item <sup>1</sup>	Weight, lbs	One regiment			
		Total Regt	One battalion		
			Total Bn	C Tn	How Btry
Howitzer and carriage, 75-mm pack, M1 (in firing position).....	1,269	24	12	---	4
Packed as follows:					
Howitzer tube.....	340	24	12	---	4
Cradle and top sleigh.....	335	24	12	---	4
Bottom sleigh and recoil mechanism.....	331	24	12	---	4
Front trail.....	352	24	12	---	4
Rear trail and axle.....	354	24	12	---	4
Wheel and breechblock.....	344	24	12	---	4
Pack, ammunition <sup>2</sup> .....	312	360	180	120	20

<sup>1</sup> The types and quantities of other pack loads, all utilizing the saddle indicated in note <sup>2</sup>, are listed in Tables of Organization.

<sup>2</sup> The weight given includes one Phillips cargo type pack saddle complete (less bridle and halter rope), necessary pack load accessories, and pack load.

TABLE XXIII.—Ammunition for organic 75-mm pack artillery

Unit	75-mm pack howitzer regiment			
	Rds per piece	Rds per battery	Total rds	
Each battery.....	40	160	160	20 pack loads, 8 rds ea.
Each battalion combat train.....	80	320	960	120 pack loads, 8 rds ea.
Total in regiment.....	120	480	2,880	360 pack loads, 8 rds ea.

Item	Kind, percentage, packing, and weight of ammunition			
	Kind	Per cent	No in box	Weight, lbs
Shell, HE (fuzed) <sup>1</sup> .....	Semifixed.....	90	4	105
Shrapnel (fuzed).....	Fixed.....	10	4	107

<sup>1</sup> Cartridge case, loaded with zone charges; HE shell, M 41 with M39 fuze attached packed together. Weight estimated.

TABLE XXIV.—*Characteristics of chemical munitions*

(Shell and grenades filled with FM are solely for training purposes)

Munition	Agent and weight of filling (average)	Weight of complete munition (average)	Lateral distance to which agent is thrown (yards)	Persistency of agent	Effective range of weapon (yards)	Effective <sup>1</sup> length of cloud from 1 munition (favorable conditions)	Marking on munition
Grenade, rifle, Mk I.	WP, 9.3 ozs. CNS, 7.2 ozs. FM, 8.5 ozs. CN, 3.5 ozs.	24.3 ozs. 22.2 ozs. 23.5 ozs. 17.4 ozs.	WP, 15. CNS, 5. FM, 5. CN, none.	WP, 30 secs. CNS, 30 mins. FM, 30 secs. CN, 45 secs.	265	100 yds.	WP smoke, 1 yellow band. CNS gas, 2 green bands. FM smoke, 1 yellow band. CN gas, 1 green band.
Grenade, hand, Mk. II.	WP, 9.3 ozs. CNS, 7.2 ozs. FM, 8.5 ozs. CN, 3.5 ozs.	18.8 ozs. 16.7 ozs. 18.0 ozs. 11.9 ozs.	WP, 15. CNS, 5. FM, 5. CN, none.	WP, 30 secs. CNS, 30 mins. FM, 30 secs. CN, 45 secs.	35	do.	WP smoke, 1 yellow band. CNS gas, 2 green bands. FM smoke, 1 yellow band. CN gas, 1 green band.
Candle, lac., CN, fast, MI.	CN, 3.2 ozs.	16 ozs.	None.	2 mins.	43	200 yds.	CN gas, 1 green band.
Candle, lac., CN, slow, MI.	CN, 13.6 ozs.	22 ozs.	do.	5 mins.	15	500 yds.	Do.
Candle, lac., CN, slow, MII.	CN, 4.5 ozs.	20 ozs.	do.	2 mins.	39	300 yds.	Do.
Candle, smoke, HC, MI.	HC, 28 ozs.	32 ozs.	do.	3 mins.	15	100 yds.	HC smoke, 1 yellow band.
Candle, smoke, HC, MII.	HC, 20.5 ozs.	25.5 ozs.	do.	2 mins., 40 secs.	34	50 yds.	Do.
Infantry, 75-mm. mortar shell, MII.	WP, 1.8 lbs.	10.5 lbs.	WP, 10.	WP, 30 secs.	2,000	100 yds.	WP smoke, 1 yellow band.
155-mm shell, Mk II (How).	HS, 10.55 lbs. CG, 10.7 lbs. WP, 15.2 lbs. FM, 14.2 lbs.	95 lbs.	HS, 8. CG, 8. WP, 15. FM, 8.	HS, 1 wk. <sup>2</sup> CG, 10 mins. WP, 3 mins. FM, 3 mins.	12,000	HS, 8 by 30 yds. CG, 100 yds. WP, 250 yds. FM, 100 yds.	HS gas, 2 green bands. CG gas, 1 green band. WP smoke, 1 yellow band. FM smoke, 1 yellow band.

<sup>1</sup> Effective length of cloud given for each munition is approximate and will vary considerably depending on terrain and weather.<sup>2</sup> HS persists from one day to several weeks depending on terrain, weather, and degree of atomization when dispersed.

TABLE XXIV.—*Characteristics of chemical munitions—Continued*

(Shell and grenades filled with FM are solely for training purposes)

Munition	Agent and weight of filling (average)	Weight of complete munition (average)	Lateral distance to which agent is thrown (yards)	Persistence of agent	Effective range of weapon (yards)	Effective length of cloud from 1 munition (favorable conditions)	Marking on munition
75-mm shell, Mk II.	HS, 1.25 lbs. CNS, 1.25 lbs. WP, 1.8 lbs. FM, 1.65 lbs.	12 lbs.	HS, 4 CNS, 4 WP, 10 FM, 6	HS, 1 wk <sup>a</sup> CNS, 30 mins. WP, 30 secs. FM, 30 secs.	8,500	HS 4 by 15 yds. CNS, 200 yds. WP, 100 yds. FM, 50 yds.	HS gas, 2 green bands. CNS gas, 2 green bands. WP smoke, 1 yellow band. FM smoke, 1 yellow band.
Chemical bomb, MI, (30 lbs).	HS, 8.7 lbs. WP, 12.5 lbs. FM, 11.75 lbs.	28.3 lbs. 32.0 lbs. 31.3 lbs.	50	HS, 1 wk <sup>a</sup> WP, 3 mins. FM, 3 mins.	From any altitude.	200 yds.	HS gas, 2 green bands. WP smoke, 1 yellow band. FM smoke, 1 yellow band.
Airplane dispersion.	Wing tank <sup>a</sup>	Wing tank <sup>a</sup>	Depends on wind.	HS 1 wk <sup>a</sup> FM, 3 mins.	Radius of action of plane.	1,700 yds. long, altitude of plane, 50 to 100 ft.	HS gas, 2 green bands. FM smoke, 1 yellow band.
	HS, 159.5 lbs. FM, 216.5 lbs.	HS, 210 lbs. FM, 267 lbs.					
	Belly tank <sup>a</sup>	Belly tank <sup>a</sup>					
	HS, 319 lbs. FM, 433 lbs.	HS, 440 lbs. FM, 558 lbs.					

<sup>a</sup> HS persists from one day to several weeks depending on terrain, weather, and degree of atomization when dispersed.<sup>a</sup> The belly tank is a tank suspended from the fuselage of the plane, while the wing tank is suspended from the wing of the plane. A plane carries two wing tanks, one near each end of the wing. The wing tank holds about one half as much chemical agent as the belly tank.

TABLE XXV.—*Characteristics of principal weapons of chemical troops*<sup>1</sup>

(Shell filled with FM are solely for training purposes)

Caliber	4.2-inch chemical mortar, MI <sup>2</sup>	4-inch chemical mortar, MI <sup>2</sup>	Livens projector, MI <sup>3</sup>	Portable chemical cylinder	DM irritant candle, MI
Number per company.....	8.....	8.....	200.....	150.....	As needed.
Agent and weight of filling (pounds).....	CG, 6.0..... CNS, 6.2..... CN, 5.3..... WP, 7.45..... FM, 7.45..... HS, 5.6.....	CG, 6.6..... CNS, 7..... CN, 6.4..... WP, 9.35..... FM, 8.45.....	CG 28.7.....	{CG, 32.5..... CND, 28.5.....}	DM, 2.
Number of rounds, per piece per regiment.	53.....	53.....	1 per projector.....	One filling per cylinder.	
Number of rounds per box.....	2.....	2.....	1.....	2.....	10.
Weight of box of ammunition (pounds).	65.....	65.....	85.....	143 filled, 83 empty	140.
Displacement of box (cubic feet).	1.28.....	1.28.....	1.6.....	4.....	3.3.
Weight, 1 round, complete (pounds).	25.....	25.....	65.....	48 filled.....	9½.
Marking on munition.....	{CG gas, 1 green band..... CNS gas, 2 green bands..... CN gas, 2 green bands..... WP smoke, 1 yellow band..... FM smoke, 1 yellow band..... HS gas, 2 green bands.....}	Same as 4.2- inch chemi- cal mortar.	{CG gas, 1 green band.	{CG gas, 1 green band; CND gas, 2 green bands.	{DM gas, 1 green band.

<sup>1</sup> Chemical regiments are GHQ troops and are not an organic part of the infantry division, but may be attached to or operate with an army, corps, or division. The chemical regiment is motorized. A mortar squad consisting of eight men and one corporal is equipped with one hand cart with a 4.2-inch chemical mortar and one hand cart loaded with 10 rounds of ammunition. For long-distant movements, the men and carts are transported in a light cargo truck which is not an organic part of the regiment. The ammunition squad is equipped with two hand-drawn carts each loaded with 10 rounds of ammunition. The ammunition squad is also transported for distant movements in a light cargo truck.

<sup>2</sup> The 4.2-inch chemical mortar has been adopted as standard and is being substituted for the 4-inch chemical mortar.

<sup>3</sup> Livens projectors, portable chemical cylinders and irritant candles are used in large numbers for special gas operations.

TABLE XXV.—*Characteristics of principal weapons of chemical troops*—Continued

(Shell filled with FM are solely for training purposes)

Caliber	4.2-inch chemical mortar, MI	4-inch chemical mortar, MI	Livens projector, MI	Portable chemical cylinder	DM irritant candle, MI
Effective length of cloud from 1 round (favorable conditions).	CG, 100 yards..... CNS, 500 yards..... CN, 500 yards..... WP, 250 yards..... FM, 100 yards..... HS, 5 by 20 yards..... CG, 10 minutes..... CNS, 2 hours..... CN, 2 hours..... WP, 3 minutes..... FM, 3 minutes..... HS, 1 week <sup>1</sup> .....	Same as 4.2-inch chemical mortar.	CG, 200 yards.....	{CG, 200 yards..... CND, 200 yards.....}	DM, 500 yards.
Persistency of agent.....	CG, 10 minutes..... CNS, 2 hours..... CN, 2 hours..... WP, 3 minutes..... FM, 3 minutes..... HS, 1 week <sup>1</sup> .....	do.....	CG, 10 minutes.....	{CG, 10 minutes..... CND, 2 hours.....}	DM, 3 minutes.
Range, extreme firing table values.	2,400 yards.....	1,075 yards.....	1,450 yards.....	Large, shoots several miles.	Large, shoots several miles.
Rate of fire per piece per minute:					
Prolonged.....	5.....	5.....	{1 round per projector per installation fired simultaneously by electricity.	{All cylinders fired at once by hand or electrically.	{All fired at once by hand.
Short bursts.....	15 to 20.....	15 to 20.....			
Time to emplace in firing position.	30 minutes.....	30 minutes.....	1 night operation (1 company chemical troops can install 200 projectors in 5 hours if projector close at hand).	One night. (1 company chemical troops can install 300 cylinders in 6 hours if carry is not over 2 miles).	1 company chemical troops can install 300 and fire same by hand in 2 hours.



				Projector	Base plate		
Weapon transport.....	{ Truck (1 squad, complete with carts): Hand cart..... Hand carry..... }	{ Same as 4.2-inch chemical mortar. }	Hand cart.....	2	8	Hand cart, 4.....	Hand cart, 10.
			Wagon.....	10	30	Wagon, 20.....	Wagon, 150.
			Truck, 3-ton.....	50	170	Truck, 3 T, 120.....	Truck, 3 T, 800.
			Man.....	1/2	1	Man, 1.....	Man, 4.
				Shell	Charges		
Ammunition transport.....	Hand cart, 10.....	{ do..... }	Hand cart.....	4	25	Hand cart, 4.....	Hand cart, 10.
Rounds per vehicle.....	Truck, 1 1/4-ton, 90.....		Wagon.....	15	75	Wagon, 20.....	Wagon, 150.
			Truck, 3-ton.....	90	550	Truck, 120.....	Truck, 800.
			Man.....	1	2	Man, 1.....	Man, 4.
Total weight, hand cart loaded (mortar or ammunition), pounds.....	425.....	445.....	425.....			365.....	310.
Width of track, hand cart.....	3 feet 6 inches 250	3 feet 6 inches 275	3 feet 6 inches.....			3 feet 6 inches.....	3 feet 6 inches.
Weight of weapon (pounds).....	{ Barrel, 92.....	{ Barrel, 92.....	{ Barrel, 110.....	{ Empty, 18.....	{ 9 1/4.....		
	{ Base plate, 99.....	{ Base plate, 120.....	{ Base plate, 35.....	{ Filled, 48.....			
	{ Bipod, 32.....	{ Bipod, 32.....	{ Shell, 65.....	{ Empty boxed.....			
	{ Tools, 27.....	{ Tools, 31.....	{ Charge 10.....	{ (2), 83.....			
Marches (average miles per hour with hand carts).....	2.....	2.....	2.....	2.....	2.....	2.....	2.
Average day's march with hand carts.....	12 miles.....	12 miles.....	12 miles.....	12 miles.....	12 miles.....	12 miles.....	12 miles.
Average day's march motorized.....	140 miles.....	140 miles.....	140 miles.....	140 miles.....	140 miles.....	140 miles.....	140 miles.

<sup>4</sup> Effective length of cloud given for each munition is approximate and will vary considerably, depending on terrain and weather.

<sup>5</sup> HS persists from one day to several weeks depending on terrain, weather, and degree of atomization when dispersed.

# *Characteristics and physiological classification of chemical agents*

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Agent	Characteristic	Physiological classification
HS.....	Persistent vesicant; deadly respiratory irritant; skin and eye casualties. Principal neutralizing and interdicting agent.	Vesicant.
CG.....	Nonpersistent; deadly lung irritant. Principal surprise agent.	Lung irritant.
CNS...	CN solution, type A; persistent; tear gas. Harassing agent.	Irritant.
CN....	Persistent; tear gas. Harassing agent.....	Lacrimator.
WP....	Screening agent.....	Smoke.
FM....	do.....	Do.
CND...	CN solution, type B; persistent; tear gas. Harassing agent. For training.	Lacrimator.
DM....	Nonpersistent; irritant smoke. Harassing agent.....	Irritant.

## CHAPTER 2

### FIELD ENGINEERING DATA

#### 2. Roads.—*a. Construction data* (1 mile; road, 9 feet wide).

	Plank	Rough macadam
Materials (weight in tons) .....	<sup>1</sup> 745	<sup>2</sup> 3, 115
Transportation of materials:		
Escort wagon only, loads .....	555	2, 240
1½-ton trucks only, loads .....	515	2, 080
3-ton trucks only, loads .....	258	1, 040
Labor (man hours) .....	<sup>3</sup> 7, 000	<sup>3</sup> 13, 000

#### *b. Maintenance data* (1 mile macadam road, 18 feet wide).—

(1) Favorable weather; average traffic: Two men and a supply of 1 cubic yard of stone per day.

(2) Very wet or thawing weather, and heavy continuous traffic: Average force of 30 men working 24 hours, and daily supply of 20 cubic yards of stone.

#### 3. Bridges.

##### *Floating bridges*

(This table gives the principal characteristics of floating bridges constructed of the standard equipage with which engineer troops are provided. In the division area the actual construction of bridges is always executed by divisional engineer troops; light ponton companies and heavy ponton battalions are transportation and maintenance organizations.)

	Footbridge	Light ponton bridge M1926 *	Heavy ponton bridge M1924
Length .....	528 feet per engineer combat regiment.	224 feet per bridge platoon. 672 feet per light ponton company.	208 feet per bridge platoon. 416 feet per company. 832 feet per heavy ponton battalion.
Traffic capacity.	Infantrymen in file at one yard distances.	Light tanks (7½ tons) and all other divisional loads except loaded 3 to 5 ton trucks.	All army loads including the 23-ton tank and the 155-mm GPF gun.

\* Modified equipage, heavy, M1869 (wooden pontons), may be substituted.

<sup>1</sup> 11,000 pieces hardwood 5 inches thick at 140 lbs. each.

<sup>2</sup> Stone at 2,700 lbs. per cubic yard.

<sup>3</sup> Materials delivered on work.

*Floating bridges—Continued*

	Footbridge	Light ponton bridge M1926	Heavy ponton bridge M1924
Ferrying capacity.	3 men per raft section.	25 infantrymen with arms per ponton, in addition to crew.	58 infantrymen with arms per ponton, in addition to crew.
Roadway-----	3 feet wide-----	One way-----	One way.
Time to construct.	15 to 30 minutes including assembly.	100 to 300 feet per hour depending on working conditions.	100 to 200 feet per hour depending on working conditions.
Transportation.	88 feet of bridge per truck-ton or in escort wagons.	Animal or motor drawn ponton wagons.	Motor trucks and trailers.

*Characteristics of fixed bridges*

	Artillery portable	Standard trestle	Pile trestle
Purpose-----	Bridging deep trenches.	Replacing destroyed highway bridges.	Replacing destroyed highway bridges over streams with deep water or soft bottom.
Dimensions..	12 feet long; roadway 7½ feet wide. In two sections of 720 lbs. each.	Bays 15 feet long; width of roadway 10 feet. Height of trestles variable. Weight of one bay with 20-foot trestle, 5 tons.	Same as for standard trestle.
Capacity-----	Divisional artillery 6,000 lbs. one 1-axle.	Heaviest army loads..	Same as for standard trestle.
Rate of construction.	10 minutes-----	An engineer combat company constructs from 30 to 100 feet of bridge per day. Materials on the site.	Same as for standard trestle.

**4. Water supply.**—The following shows requirements of water in gallons per day:

*a. In the field.*—(1) *Men.*—One gallon per man, cooking and drinking only; five gallons per man, all purposes.

(2) *Animals.*—Six to ten gallons per animal; depending on weather and amount of work done.

*b. In semipermanent camp or cantonment.*—Ten gallons per man and per animal.

**5. Demolitions.—a. Explosives carried by—**

	Pounds
Cavalry regiment.....	150
Engineer squadron (cav. div.).....	480
Engineer combat regiment.....	1,560

b. The following charges of TNT in pounds are required to produce craters in common earth of the diameter given. Charge assumed to be at a distance below the surface equal to one-half of the diameter of the crater:

Diameter of crater Feet	Charge Pounds
20	50
30	140
40	290
50	570

**6. Field fortifications.—a. Battle position.**—For general arrangement, depth, and frontages assigned units in defense, see Figure 1. The distances given in (1), (2), and (3) below serve as a guide only. The maximum and minimum may be increased or decreased depending upon the factors affecting the particular situation.

**(1) Centers of resistance.**

Dimensions of: Maximum yards, 1,000 by 900; minimum yards, 500 by 400.

Intervals between: Not more than 800 yards.

**(2) Strong points.**

Dimensions of: Maximum yards, 400 by 300 (may be larger on battalion and regimental reserve lines); minimum yards, 200 by 200.

Intervals between: Not more than 400 yards.

**(3) Combat groups.**

Dimensions of: Maximum yards, 150 by 75; minimum yards, 100 by 50.

**(4) Normal priority of work.**—The following list of priorities does not mean that each item of work is completed before the following item is begun. In practice, work proceeds simultaneously on several items. Those items which usually can be completed within six hours and which may be said to fall in the first group priority include machine-gun emplacements (open type); reasonable field of fire; squad trenches, simple standing type, on line of resistance; continuous obstacle in front of line of resistance; shallow connecting trenches between squad trenches on

lines within combat groups; command posts, observation posts, aid stations; camouflage.

1st.—Machine-gun emplacements.

2d.—Reasonable field of fire.

3d.—Fire trenches on line of resistance and support line.

4th.—Continuous obstacle in front of line of resistance.

5th.—Obstacles protecting combat groups of front line strong points.

6th.—Temporary command posts; observation posts; aid stations; routes of communication.

7th.—Completion of trenches and obstacles in front line strong points.

8th.—Fire trenches and obstacles on battalion and regimental reserve lines.

9th.—Completion of trenches and obstacles in centers of resistance.

10th.—Permanent command posts; observation posts; aid stations; shelters.

11th.—Completion and improvement of trenches and obstacles in the position.

*b. Works.*—(1) *Trenches.*—Simple standing trenches requiring 9 cubic feet of excavation per linear foot generally will be constructed first and later enlarged and improved.

*Rates of excavation; day work, single relief*

(Hard soil must be loosened with pick. Easy soil requires little or no picking)

Nature of soil	Suitable proportion of tools		Cubic feet excavated per man			Total		
	Picks	Shovels	1st hour	2d hour	3d and 4th hours	First 4 hours	Second 4 hours	8 hours
Hard.....	2	1	15	10	15	40	27	67
Average.....	1	1	23	15	22	60	40	100
Easy.....	1	2	30	20	30	80	53	133

(2) *Obstacles*.—A fully organized battle position requires obstacles approximating nine times the length of front held. A single belt of double apron fence 100 yards long requires—

34 posts, 5 feet long,  $3\frac{1}{2}$  to 4 inches diameter.

68 pickets, 2 to  $2\frac{1}{2}$  feet long,  $2\frac{1}{2}$  to 3 inches diameter.

1,400 yards barbed wire.

Labor: 25 man hours.

(3) *Clearing*.—Two man hours of labor required for clearing 100 square yards (10 by 10 yards) of brush wood and trees up to 12 inches in diameter.

(4) *Machine-gun emplacement*.—Simple shell hole type requires nine man hours and about 200 pounds of materials.

(5) *Shelters*.—(a) *Types*.

*Splinterproof* protect against rifle and machine-gun fire and splinters of high-explosive shells and grenades.

*Light* protect against 3-inch shells.

*Light shellproof* protect against 6-inch shells.

*Heavy shellproof* protect against 8-inch and larger shells.

*Heavy* should not be used in front lines on account of difficulty of exit. A heavy shelter for a platoon, with 30 feet of undisturbed earth cover, will require at least 10 days of continuous work.

(b) *Floor space provided*.

	Sq. ft.
Troop shelter per man occupying.....	9 to 12
Aid station, per litter.....	28
Command post:	
Platoon.....	100
Company.....	200
Battalion.....	400
Regiment.....	600
Brigade.....	800
Division.....	1,600

(6) *Camouflage*.—(a) Relative importance of the elements of successful camouflage are—

	Per cent
1st.—Proper choice of position.....	40
2d.—Camouflage discipline.....	25
3d.—Proper erection of camouflage material.....	20
4th.—Camouflage material used.....	15

## (b) Material for artillery and machine guns.

Gun	Sizes and weights of nets <sup>1</sup>
6-inch and larger.....	32 by 40 feet, 100 pounds.
3-inch.....	32 by 32 feet, 75 pounds.
Machine guns.....	10 by 10 or 16 by 16 feet, 45 pounds.

7. Penetration of projectiles.—a. Maximum penetration of 172-grain, caliber .30 bullet in inches.

Material	Range		
	200 yards	600 yards	1,500 yards
Armor.....	0.30	0.10	0.10
Gravel or broken stone.....	9	7	6
Brick masonry <sup>2</sup> .....	4	4	4
Concrete, 1-2½-5 mix.....	1.65	1.20	1.10
Oak.....	20	26	12
Sand, dry.....	12	11	11
Earth, loam.....	27	27	27
Greasy clay.....	60	40	30

<sup>2</sup> Greater penetrations may occur when bricks are laid in soft mortar and bullets strike in mortar.

b. Penetration of special weapons.—(1) Caliber .50 machine-gun bullets penetrate at short ranges up to 1-inch special steel (tank) armor.

(2) Armor-piercing bullets at most favorable ranges can penetrate special steel (tank) armor twice their caliber in thickness.

(3) 37-mm projectile fired from service piece with muzzle velocity of 1,300 feet per second penetrates .625-inch special steel (tank) armor at 300 yards.

(4) 37-mm projectile fired from service piece with muzzle velocity of 2,000 feet per second penetrates 1-inch special steel (tank) armor at 300 yards.

<sup>1</sup> Fish nets garnished with burlap, etc. These with posts, wire, etc., for erection are carried by the unit. In stabilized situations wire netting in rolls 6 by 30 feet is furnished.



## 8. Miscellaneous data.

*Minimum thickness in feet of overhead cover*

(Figures to the right of and below the heavy line are for shelters that normally would be constructed by cut-and-cover methods; those to the left are normally for surface shelters. The dividing line is not fixed as the determination of the type depends on the location, materials, and the labor and time available.)

Nature of cover	Rifle, machine-gun fragments	Size of projectile							
		Inches							
		3	4	6	8	10	12	16	18
Reinforced concrete.....	----	1.0	2.4	3.4	5.0	6.0	7.0	7.0	----
Masonry, solid: Brick, stone, plain concrete.....	----	1.5	3.6	5.1	7.5	9.0	11.0	11.0	----
Logs, 8-inch minimum diameter wired.....	----	2.0	4.8	6.8	10.0	12.0	14.0	17.0	24.0
Crushed stone.....	----	3.5	8.4	11.0	17.5	21.0	24.0	27.0	36.0
Tamped or packed earth.....	----	1.0	7.5	18.0	25.5	37.5	48.0	54.0	72.0
Loose earth.....	----	3.0	10.0	24.0	34.0	48.0	60.0	72.0	96.0
Cave shelters:									
Sandstone or granite.....	----	2.0	6.0	8.0	10.0	13.0	14.0	17.0	24.0
Soft limestone.....	----	3.0	9.0	11.0	15.0	20.0	21.0	27.0	36.0
Undisturbed earth.....	----	5.0	12.0	17.0	25.0	30.0	32.0	40.0	48.0

*Load table, engineer materials*

Item	Unit	Weight per unit, lbs	Number units per load		
			Escort wagon	1½-ton truck	3-ton truck
Camouflage:					
Wire netting.....	Roll (6 feet by 30 feet).....	40	40	80	100
Fish nets.....	Net (32 feet by 32 feet).....	75	15	25	35
	(32 feet by 40 feet).....	100	12	20	30
Pickets, wood, 2½ feet.....	Each.....	8	250	375	750
Posts, wood, 5 feet.....	do.....	9	200	330	500
Posts, iron, screw, 5 feet.....	do.....	9	300	330	650
Posts, iron, screw, 1½ feet.....	do.....	3	900	1,000	2,000
Road plank, 10 feet by 8 inches by 5 inches.....	do.....	140	20	22	43
Stone, broken.....	Cubic feet.....	100	28	30	60
Wire, barbed.....	50-yard coils.....	15	185	200	400
Wire, barbed, commercial.....	80 to 100 rod reels.....	100	28	30	60

*Principal items of a set of intrenching equipment*

(Carried by combat engineers at rate of six sets per infantry division, four sets per cavalry division)

Item	Infantry	Cavalry
Axes.....	26	13
Mattocks, pick.....	125	65
Saws.....	26	13
Shovels, D-handled.....	250	130
Sandbags.....	500	500
Tape, tracing, feet.....	3,000	3,000

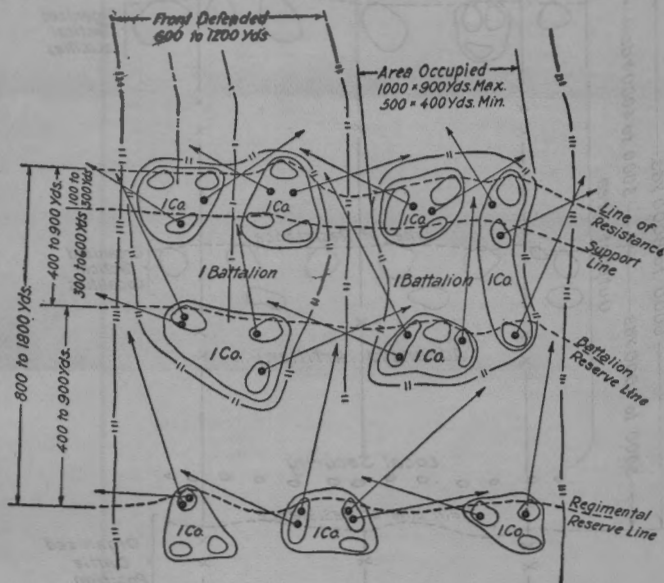


FIGURE 1.—Regimetal sector of a battle position

(This diagram shows centers of resistance, strong points, combat groups, frontages, depths, and possible disposition of machine guns. Distances are in yards. The distances given serve as a guide only. The maximum and minimum may be increased or decreased depending upon the factors affecting the particular situation.)

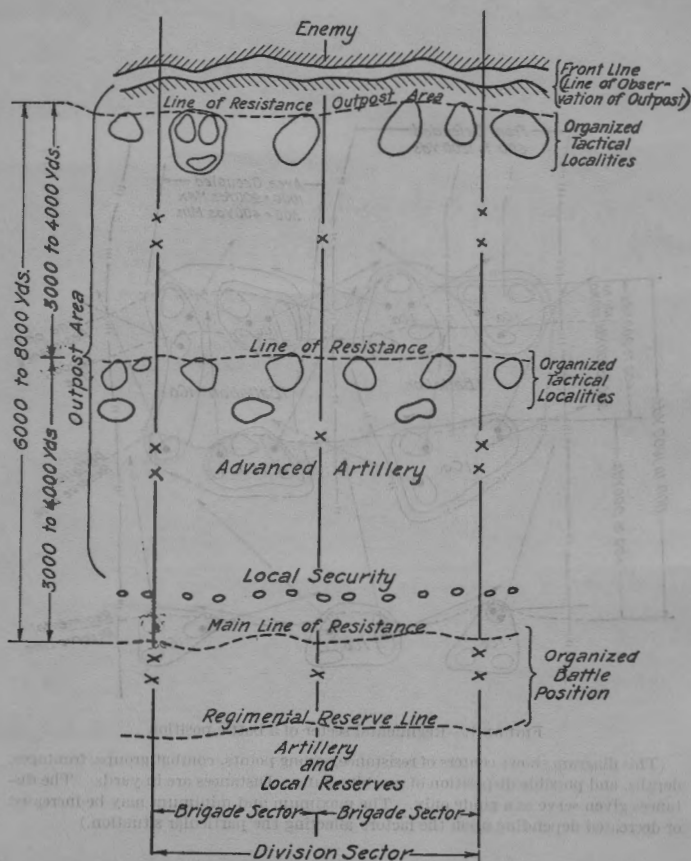


FIGURE 2.—A defensive zone with deep outpost area

(The distances given serve as a guide only. The maximum and minimum may be increased or decreased depending upon factors affecting the situation.)

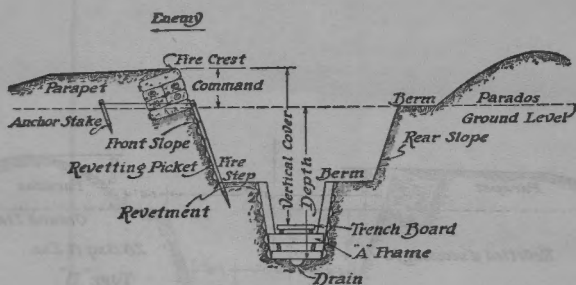
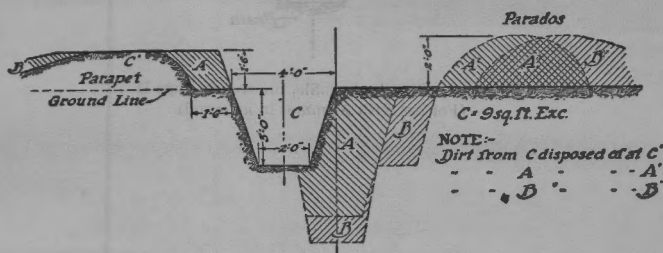
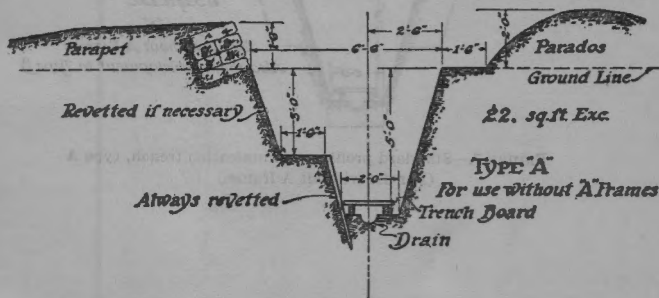


FIGURE 3.—Trench nomenclature

FIGURE 4.—Simple standing trench  
(Showing development into standard fire trench, types A and B)FIGURE 5.—Standard profile, fire trench, type A  
(For use without A frames in firm soil)

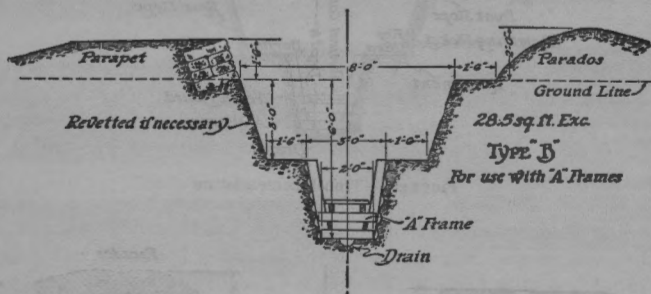


FIGURE 6.—Standard profile, fire trench, type B  
(For use with A frames in loose soil)

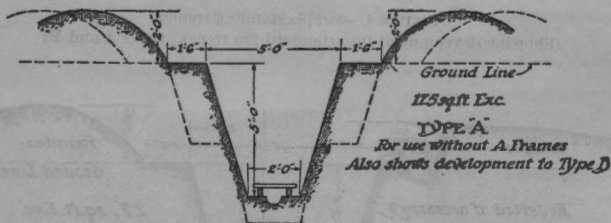


FIGURE 7.—Standard profile, communication trench, type A  
(For use without A frames)

## CHAPTER 3

### SIGNAL COMMUNICATION

**9. General.**—*a.* Signal communication comprises all the means employed to transmit messages and telephone conversations except in the cases of messages transmitted by mail or direct personal agency.

*b.* Due to the large areas involved and also to the rapidity of movement under modern battle conditions, adequate signal communication is essential to success in combat. It should be borne in mind that any system of signal communication whether wire, radio, visual, or otherwise must be operated as a complete, coordinated unit although this unit may be composed of many smaller component systems. All of the subordinate parts must be constituted, maintained, and operated in a uniform manner, thus making signal communication possible between any two or more headquarters in the entire system without confusion or delay.

*c.* Combat communication systems are usually temporary in character and must be so constructed initially as to render their immediate expansion or relocation possible, especially in forward areas. Such expansion or relocation must be capable of accomplishment without interruption to signal communication service.

*d.* Commanding officers and their staffs should realize that the installation of a signal communication system which will come within the requirements stated above necessitates careful advance planning, and for this reason it is essential that signal and communication officers be advised as early as practicable of contemplated plans for the movement of troops and of their probable future locations. The efficiency of any signal communication system will be materially influenced by the accuracy and brevity of messages prepared by staff officers and others who have occasion to originate messages.

*e.* The various means normally used for the transmission of messages in combat are listed below in their usual order of relative importance.

- (1) Wire (telephone and telegraph).
- (2) Radio (telegraph and telephone).
- (3) Messengers.
- (4) Visual.

10. **Wire.**—*a.* In the United States Army wire lines are usually complete metallic circuits. From division headquarters forward, and to some extent in rear of division headquarters, wire circuits are constructed of insulated, steel and copper standard, twisted-pair wire weighing approximately 130 pounds per mile. When new and in good condition, this wire possesses a talking range of approximately 15 miles.

*b.* For convenient reference, the amounts of twisted-pair wire (type W-110) issued to elements of an infantry division and a cavalry division are listed below. These amounts constitute the initial issue. The average monthly replacement rate in a long campaign is estimated at 50 per cent of the initial allowance.

#### *Infantry division*

Division signal company.....	80 miles
Two infantry brigades.....	128 miles
Artillery brigade.....	308 miles

#### *Cavalry division*

Division signal troop.....	60 miles
Two cavalry brigades.....	40 miles
Artillery brigade.....	104 miles

*c.* Wire which has been damaged by vehicles passing over it or whose insulation has deteriorated will cause a reduction in the talking range of any circuit of which it is a part.

*d.* Twisted-pair wire is usually laid on the ground by means of motor vehicles, horse-drawn wire carts, and, in forward areas and other locations where the use of vehicles is impossible, by hand.

*e.* Where wire communication is necessary between points separated by a distance greater than the talking range of twisted-pair wire circuits, open wire construction must be resorted to. Such construction may be of a very light-weight type using small-sized bronze wire fastened to insulators on poles which are as short and light in weight as conditions will permit. The maximum talking range of circuits constructed in this manner varies



from 25 to 50 miles. Considerably more time is required for construction of this type than is required to lay the same length of twisted-pair. Depending upon conditions of ground and weather a signal company can construct from one to several miles of this type of line per day.

*f.* Where military requirements for wire communication are similar to those for commercial long-distance service, the wire circuits are constructed in accordance with standard commercial telephone practice, and by the use of suitable loading devices, telephone repeaters, and similar apparatus the talking range can be extended to any distance required. This type of construction is very slow, several weeks being required by a construction company for circuits of 50 to 100 miles in length.

*g.* It is not usual practice to construct wire lines especially for telegraph service. Such service is usually provided by simplex-ing or phantoming existing telephone circuits. Telegraph service over twisted-pair field lines is secured by simplexing buzzers (a special type of telegraph instrument) on these lines. International Morse (radio) code is used. On other types of circuits regular telegraph equipment is generally used and American Morse code employed.

*h.* Division and higher unit commanders should endeavor to so locate their headquarters that full advantage may be taken of existing commercial and military wire circuits in the area in which their units are operating and, wherever possible, movements of higher headquarters should be along the route of existing wire circuits. Such practice eliminates much useless construction of field lines and provides better and more prompt service than can be secured otherwise.

**11. Radio.**—*a.* In general, radio may be considered as the most important auxiliary means of signal communication. For units of certain organizations, such as aircraft, mechanized forces, and other rapidly moving troops, radio frequently must be the primary means. Usually, a very short time is required to establish radio communication. The time varies from one to two minutes in the case of small sets to perhaps one hour for large sets. This latter time may be shortened considerably provided the sets are mounted in suitable vehicles.

*b.* The range in miles of any particular radio transmitter depends upon the elements incorporated in its design. The amount of power required for its operation is usually a fair index of its range. The amount of power which can be provided for

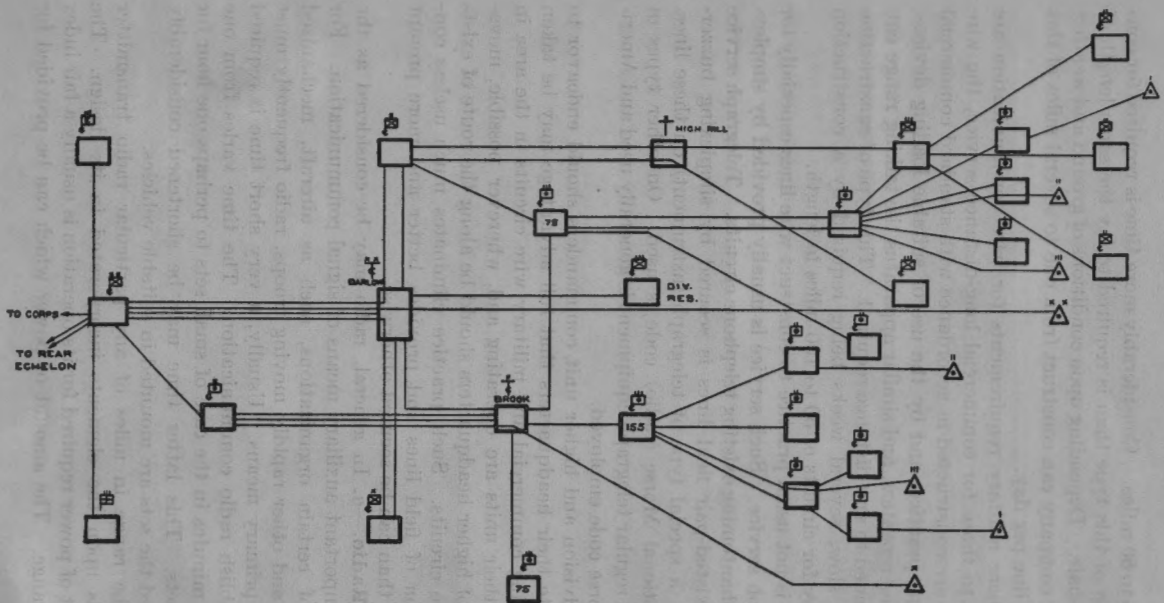


FIGURE 8.—Wire net, infantry division (local circuits are not shown)

a given type of set is governed by the tactical limitations as to size and weight.

c. Atmospheric conditions frequently limit the range of radio communication while they have but slight effect upon wire communication. Occasionally lightning storms and similar atmospheric disturbances will prevent the use of radio for a considerable period.

d. Since all radio messages are in effect broadcast in all directions, the encoding or enciphering of messages is essential in combat except when the interception of messages by the enemy can be of little value to him. When the tactical situation is such that time can not be spared for cryptographing and decryptographing, and when the information to be transmitted can not, if picked up by the enemy, be acted upon in time to influence the situation, a commanding officer or his representative may order the transmission of a message in plain language, *provided that he makes this authorization in writing over his signature.*

e. Radio sets require expert operators and expert radio mechanics. The number of channels over which radio communication can be maintained is limited by physical laws and unless the number of radio transmitters operating within range of each other is limited and their frequency is carefully controlled, it will be found that interference between transmitters will render radio communication impossible.

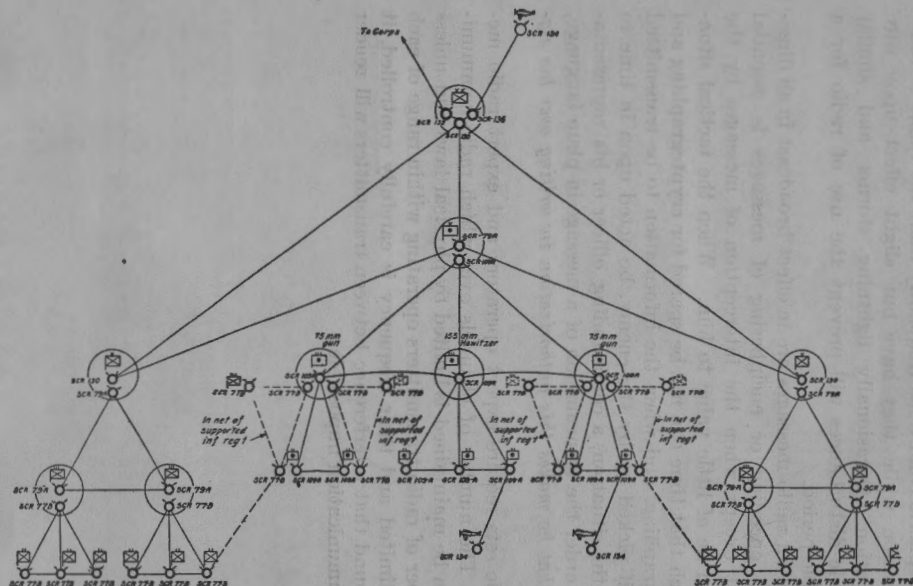


FIGURE 9.—Radio net, infantry division

(The infantry-artillery net is shown in broken lines, thus ----- . The principal radio channel of this net is between the infantry battalion and the artillery battalion. For purposes of simplicity this channel is not shown at all places on the diagram. When cavalry and aviation are attached to the division their sets operate as secondary stations in the division net.)

# Radio intercommunication chart, radio equipment, infantry division

Type No. SCR-	Organization to which issued	Transmitting frequency in kilocycles	Receiving frequency in kilocycles	Type of transmission	Can operate in net with radio set, type SCR-	Can transmit to radio set, type SCR-	Can receive from radio set, type SCR-	Source of power for transmitter	Remarks
77-B--	Signal company (for training purposes only); infantry regiments and battalions (war time); artillery regiments and battalions.	4, 100-4, 400	4, 100-4, 400	CW-----	77-B	77-B	77-B	Storage battery	This set will soon be replaced by the SCR-131 and SCR-161 described below.
131----	Signal company (for training purposes only); infantry regiments and in war time, battalions.	3, 960-4, 360	3, 960-4, 360	-----do-----	{ 131 161	{ 131 161	{ 131 161	} Hand generator.	{ Not yet issued. Will replace SCR-77-B in infantry units.
161----	Artillery brigades, regiments and battalions.	3, 760-4, 120	3, 760-4, 120	-----do-----	{ 131 161	{ 131 161	{ 131 161	} -----do-----	{ Not yet issued. Will replace SCR-77-B in artillery units.
79-A--	Infantry brigades and regiments; artillery brigade.	273-600	273-600	-----do-----	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	} Storage battery.	
109-A--	Artillery brigades, regiments and battalions.	600-1 000	273-1, 000	{ CW----- MCW----- Telephone-----	109-A 136	{ 109-A 136	{ 109-A 136	} -----do-----	

CW—Continuous wave.

MCW—Modulated continuous wave.

Radio intercommunication chart, radio equipment, infantry division—Continued

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STAFF OFFICERS' FIELD MANUAL

Type No. SCR-	Organization to which issued	Transmitting frequency in kilocycles	Receiving frequency in kilocycles	Type of transmission	Can operate in net with radio set, type SCR-	Can transmit to radio set, type SCR-	Can receive from radio set, type SCR-	Source of power for transmitter	Remarks
130---	Signal company and infantry brigades.....	273-545	273-857	CW-----	{ 79-A 130 132 136	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	{-----do-----	
132---	Signal company-----	150-350	100-1,000	{CW----- MCW----- Telephone--	{ 79-A 130 132 136	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	Motor-generator or gasoline engine driven generator.	{For use in corps net and communication with airplanes.
136---	do-----	333-857	333-857	{CW----- MCW----- Telephone--	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	{ 79-A 109-A 130 132 136	-----do-----	{For communication with airplanes and with rear echelon
134---	Airplanes-----	400-850	250-1,500	{CW----- MCW----- Telephone--	{ 79-A 109-A 130 136	{ 79-A 109-A 130 136	{ 79-A 109-A 130 136	Storage battery.	{Set installed in airplane for air ground and interplane communications.

CW—Continuous wave

MCW—Modulated continuous wave.

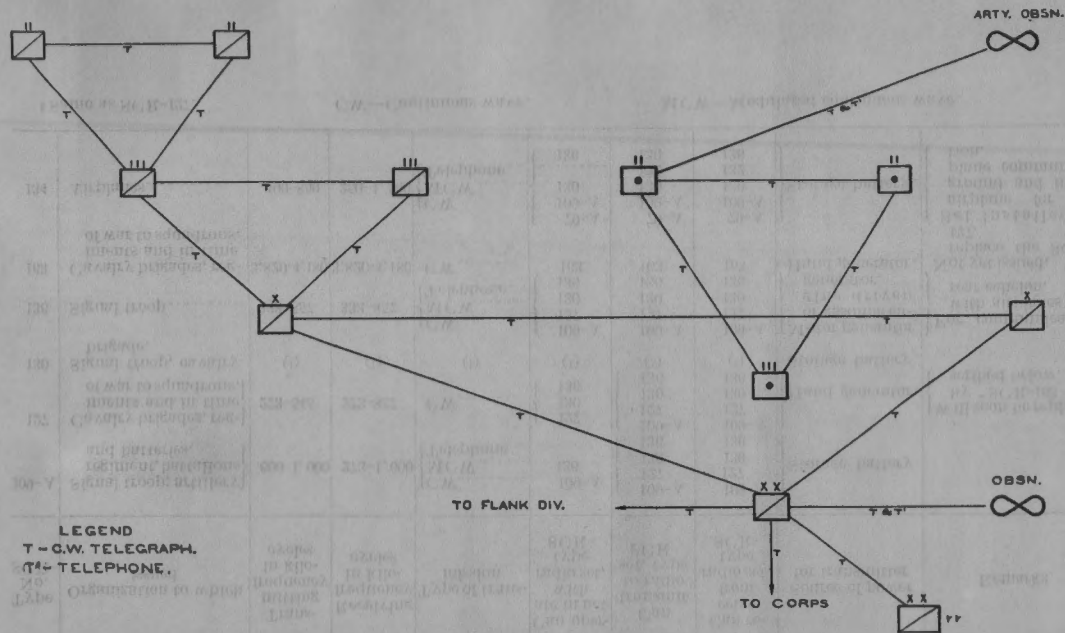


FIGURE 10.—Radio net, cavalry division (all communication is two-way)

# Radio intercommunication chart, radio equipment, cavalry division

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STAFF OFFICERS' FIELD MANUAL

Type No. SCR-	Organization to which issued	Transmitting frequency in kilo-cycles	Receiving frequency in kilo-cycles	Type of transmission	Can operate in net with radio set, type SCR-	Can transmit to radio set, type SCR-	Can receive from radio set, type SCR-	Source of power for transmitter	Remarks
109-A	Signal troop; artillery regiment, battalions and batteries.	600-1,000	273-1,000	{ CW MCW Telephone	{ 109-A 136	{ 109-A 127 136 136	{ 109-A 127 130 136	Storage battery.	
127	Cavalry brigades, regiments and in time of war to squadrons.	273-545	273-857	CW	{ 127 130 136	{ 109-A 127 130 136	{ 109-A 127 130 136	Hand generator.	{ Will soon be replaced by SCR-163 described below.
130	Signal troop, cavalry brigade.	(1)	(1)	(1)	(1)	(1)	(1)	Storage battery.	
136	Signal troop	333-857	333-857	{ CW MCW Telephone	{ 109-A 127 130 136	{ 109-A 127 130 136	{ 109-A 127 130 136	Motor generator or gasoline engine driven generator.	{ For communication with airplanes and rear echelon.
163	Cavalry brigades, regiments and in time of war to squadrons.	3,820-4,180	3,820-4,180	CW	163	163	163	Hand generator.	Not yet issued. Will replace the SCR-127.
134	Airplanes	400-850	250-1,000	{ CW MCW Telephone	{ 79-A 109-A 130 136	{ 79-A 109-A 130 136	{ 79-A 109-A 130 132 136	Storage battery.	{ Set installed in airplane for air ground and interplane communication.

<sup>1</sup> Same as SCR-127.

CW—Continuous wave.

MCW—Modulated continuous wave.



**12. Messengers.**—*a.* Messengers are of several classes, including runners, mounted messengers (horse and motor cycle), and under some conditions airplane messengers. Another type of messenger, the importance of which was demonstrated by its performance during the World War, is the homing pigeon.

*b.* The speed of any given type of messenger except airplane messengers and homing pigeons varies with the terrain and with road conditions. Homing pigeons fly approximately 45 miles per hour.

*c.* Messengers should be carefully selected to insure that they possess the necessary degree of intelligence, courage, and aggressiveness. Messenger service is under the control of the message center.

**13. Visual.**—Visual signals include those produced by means of signal lamps, pyrotechnics, and panels.

*a.* Signal lamps have a range from about one mile in daylight to a maximum of about 20 miles at night depending upon the terrain and atmospheric conditions.

*b.* Pyrotechnics are used both from the air and from the ground for the purpose of transmitting a limited number of previously designated messages by means of a pyrotechnic code.

*c.* Panels are provided for the purpose of signaling from the ground to aircraft and are of three classes:

(1) Marking panels, usually issued to Infantry for the purpose of outlining front lines upon calls from friendly airplanes.

(2) Identification panels which are cut in distinctive shapes for different units are displayed upon calls from friendly airplanes. They are removed when not in use.

(3) Code and distinguishing panels, also called panel strips, are strips of cloth or other material, rectangular in shape. They are used for two purposes; First, in conjunction with identification panels for the purpose of identifying the command post, and, second, for sending prearranged signals to an airplane.

**14. Message center.**—*a.* A message center is established at the headquarters of all tactical organizations larger than a company. The message center acts as a distributing point to which all incoming messages are delivered and from which all

outgoing messages are sent to the transmitting agency. The message center has access to all the means of signal communication which have been installed and employs the most adequate means available for each transmission. The message center does not receive, distribute, or otherwise handle mail. It is not organized or equipped to perform stenographic or clerical work pertaining to the different sections of the staff nor to prepare additional copies of incoming messages for multiple distribution.

b. Messages are classified as follows:

(1) Urgent (O).

(2) Priority (P).

(3) Routine (no symbol). All messages are considered routine unless otherwise designated.

c. Commanding officers and staff officers should be especially watchful that all messages conform to the following requirements:

(1) They should be as brief as possible.

(2) The means of transmission should never be designated by the originator of a message. The message center will use the best means available at the time to insure prompt delivery of the message.

15. Position of signal troops on the march.—a. In a command in which the commander marches in column with his troops, the signal troops should march near the normal position of the commander. This insures the maximum speed in beginning the installation of the communication system and makes it unnecessary for the signal troops to pass other troops in column. In a large command, such as a division, the signal troops move by echelon. One echelon with the necessary equipment and transportation marches near the head of the main body of the column which is following the axis of signal communication.

b. The foregoing requirements of position of signal troops on the march apply principally to a march where a meeting engagement is probable. Whenever a regiment or higher unit is being screened into the line by other troops or is marching to the relief of another unit on the front line and the new command posts' locations for the operation have been designated, detachments of signal troops sufficient to establish command post facilities should precede the columns.

c. Orders changing the location of a command post normally provide for the opening of the command post at the new location at the hour the command post closes at the former location. Signal agencies are installed and put in operation at the new location before similar agencies are discontinued at the former location.

**16. Signal operation instructions.**—*a.* Signal operation instructions are issued for the technical control and coordination of signal communication. They are prepared by the signal officer of the unit and are issued by authority of the unit commander. These instructions are of primary interest to signal communication troops. Units smaller than the division have little occasion to prepare signal operation instructions.

*b.* Signal operation instructions for a contemplated tactical operation are generally issued in advance of the operation. They may remain in effect during the entire operation or cycle of operations. They are issued or changed as circumstances require and not necessarily at fixed intervals.

*c.* Signal operation instructions are issued and distributed as separate items, each item being designated by a title descriptive of its contents and a number which is changed serially in successive editions.

*d.* (1) The items of signal operation instructions are indexed. Successive indexes are numbered serially. The index of signal operation instructions contains—

Heading: Unit, place, date and hour, title, and serial number.  
Title and serial number of each item.

Date and hour each new item or change becomes effective, if subsequent to the hour stated in the heading.

Authentication: As for a field order.

Distribution.

(2) *Example of index.**Index No. 8 to Signal Operation Instructions*

1st Division, YORK, PA.,

29 Sept. 27, 1 a. m.

Title of item	Serial No.	Remarks
General:		
Index to Signal Operation Instructions.	7	Supersedes No. 6, 30 Sept., 1:00 A.M.
Index to Regulations and Orders on Signal Communication.	1	
Distribution "S" for Signal Operation Instructions.	2	Supersedes No. 1, 30 Sept., 1:00 A.M.
Codes and ciphers:		
Army Field Code (AFC).....	1	
Geographical Appendix to AFC-1.	6	Supersedes No. 6, 30 Sept., 12 noon.
Division Field Code (DFC).....	5	
Geographical Appendix to DFC-5.	8	
Radio Service Code.....	2	Supersedes No. 1, 1 Oct., 1:00 A.M.
Meteorological Codes.....	1	
Air-Ground Liaison Code.....	1	
Air-Fire Control Code.....	1	
Map Coordinate Strips.....	4	
Decoding Chart, Map Coordinate Strips.	4	
Pyrotechnic Code.....	2	
Cipher key for cipher, type M94.	20	Supersedes No. 19, 30 Sept., 1:00 A.M.
Radio communication:		
Call signs and frequencies, I Corps net.	11	
Call signs and frequencies, 1st Division net.	17	Supersedes No. 16, midnight, 1/2 Oct.
Wire communication:		
Telegraph call signs, I Corps.....	4	
Telegraph call signs, 1st Division.	7	
Visual call signs, 1st Division.....	2	

By command of Major General A:

X,  
Chief of Staff.

OFFICIAL:

Y.

Asst. C. of S., G-3.

Distribution: S-2, plus 4 copies to 101st FA

e. Each item of signal operation instructions has a characteristic distribution, which includes only those units or individuals concerned. A distribution list covering all normal items of signal operation instructions is compiled, given a letter designation, and is published as an item of signal operation instructions. This list shows the distribution to the major subdivisions of the unit and provides sufficient copies for redistribution to staffs and lower units.

**17. Field orders for combat units.**—Paragraph 5 of the field order contains the following information in the sequence indicated. If the information contained in any of the subparagraphs is not necessary, the corresponding subparagraph is omitted and its letter designation is given to the next succeeding subparagraph.

*a.* Paragraph 5 *a* refers to the signal communication annex, if one is issued. If an annex is not issued, reference is made to the index of signal operation instructions. For example: "5. *a.* See Annex No. 3, Signal Communication," or "See Index No. 6 to Signal Operation Instructions."

*b.* Paragraph 5 *b* announces the axes of signal communication of the unit and the next lower units.

*c.* Paragraph 5 *c* announces the locations of command posts of the unit and the next lower units. Field orders may repeat instructions from signal operation instructions when it is desired to particularly emphasize them, as, for example, a pyrotechnic signal.

**18. Signal communication orders in divisions and higher units.**—*a.* In divisions and higher units, orders for signal communication for a particular tactical operation may, when time permits, be issued as a signal communication annex to the field orders of the commander. These orders may also be issued in fragmentary form, verbally or in short written messages.

*b.* The signal communication order is prepared by the unit signal officer subject to the approval of the unit commander. It has the same distribution as a field order; in addition, copies are distributed to the signal officers of lower units.

*c.* For the form of a signal communication order when issued as an annex to the field order, see Chapter 2, Part One.

**19. References.**—For further details of signal communication pertaining to all arms and services, see Basic Field Manual, Volume IV. For further information concerning Signal Corps activities, see the Signal Corps Field Manual. A general review of signal communication will be found in Basic Field Manual, Volume VIII.

## CHAPTER 4

### EVACUATION DATA

**20. Classification of casualties.**—All casualties are classified as follows:

Sick	<table><tr><td>Communicable</td><td>Slight</td><td>Walking</td></tr><tr><td>Noncommunicable</td><td></td><td></td></tr></table>	Communicable	Slight	Walking	Noncommunicable						
Communicable	Slight	Walking									
Noncommunicable											
Gassed	<table><tr><td></td><td>Medium</td><td><table><tr><td>Transportable</td><td>Recumbent</td></tr><tr><td></td><td>Sitting</td></tr></table></td></tr><tr><td></td><td></td><td></td></tr></table>		Medium	<table><tr><td>Transportable</td><td>Recumbent</td></tr><tr><td></td><td>Sitting</td></tr></table>	Transportable	Recumbent		Sitting			
	Medium	<table><tr><td>Transportable</td><td>Recumbent</td></tr><tr><td></td><td>Sitting</td></tr></table>	Transportable	Recumbent		Sitting					
Transportable	Recumbent										
	Sitting										
Wounded	<table><tr><td></td><td>Severe</td><td>Nontransportable</td></tr></table>		Severe	Nontransportable							
	Severe	Nontransportable									
Dead											

*a. Sick casualties.*—(1) The number of casualties from sickness is influenced by the following factors:

(a) Age.

(b) Physical condition.

(c) Length of service and training.

(d) Presence of communicable diseases.

(e) Type of duty.

(f) Climate.

(g) Race.

(h) Nativity.

(2) (a) Casualties from sickness and nonbattle injuries from front-line troops of a seasoned command in campaign, except in a particularly unhealthy region, cause an average daily increment of sick of about three fifths of one per cent (0.6%), or 144 cases per day for a division of 24,000 men. Of these two thirds, or 96, will remain under treatment in their own organizations (at aid station or dispensary) or in the divisional hospital station; one third, or 48, will be evacuated outside the divisional area, half of them recumbent and half of them sitting.

(b) A corps of three divisions and corps troops, totaling about 97,000 men, may be expected to evacuate about 194 cases daily. This requires 32 ambulances, the equipment of two-thirds of a hospital company for shelter one-fourth the capacity of an evacuation hospital, or six ward cars on a hospital train.

(c) For an entire field force the daily admission rate to hospital for sick and nonbattle injuries will be approximately .165

per cent. This will, after some months, cause a constant non-effective rate of about 4.5 per cent.

(d) Of the sick admitted to hospital in the theater of operations about 1.5 per cent die, 3 per cent will be invalided home, and 95.5 per cent will be returned to duty eventually. The average stay in hospital is 27 days.

b. *Battle casualties.*—(1) Experience has shown that the number of battle casualties to be expected is dependent upon many factors, all of which must be taken into consideration. Among these are—

(a) The resistance of the enemy; all factors that go to make up his combat strength.

(b) The character of the terrain and the organization of the ground.

(c) The relative amount of artillery employed on each side.

(d) The employment of gas.

(e) The equipment and state of training and discipline of our troops.

(f) Losses are usually heavier in an attacking than in a defending force.

(g) Infantry takes by far the greatest losses of any arm.

(h) Casualties are not ordinarily distributed uniformly along the front, being heaviest in those units having the most difficult missions.

(i) In small units losses may be very high. In larger units a progressively smaller proportion are heavily engaged each day, so their percentage of losses is smaller and tends to become more nearly a constant rate.

(2) The following table has been developed from the American experience in the active operations of the World War:

*Battle casualties, including killed, in per cent of the unit strength*

	Average for all days in line	Severe battle day	Maximum battle day
Infantry regiment.....	2.5 per cent.....	12-15 per cent....	35 per cent.
Division.....	1.0 per cent.....	6-8 per cent.....	12 per cent.
Corps.....	0.5 per cent.....	2-3 per cent.....	5 per cent.
Army.....	0.35 per cent <sup>1</sup> .....	0.7-1.5 per cent..	2.5 per cent.

<sup>1</sup> As this figure is for sustained active operations, the average for one or several armies over a long period of time would be less, and may be taken as 0.2 per cent.

(3) In estimating battle casualties in an army, an estimate based on front-line divisions to be engaged will usually be more accurate than if based on a rate for corps or the army as a whole.

(4) The battle casualties from an entire expeditionary force or theater of operations can best be estimated by using the rates incurred in the component divisions or armies, as the relative proportion of front-line troops to the total force will vary widely in each situation.

(5) The following data relative to battle casualties are approximately accurate for a severe engagement and can be used as the basis for calculations:

(a) In open operations the ratio of killed to wounded is about 1:5 and in trench operations about 1:4. Hence from 16 $\frac{2}{3}$  per cent to 20 per cent of all battle casualties are classed as killed.

(b) The transportation requirements of the wounded of a division with an 8 per cent casualty list are as follows:

	Per cent	
Dead.....	20	384
Able to walk to the collecting station but requiring transportation (sitting) to the rear.....	40	768
Require transportation recumbent.....	40	768
Of all casualties, about 1 per cent or 20 are nontransportable beyond the surgical hospital.		
	100	1,920
<hr/>		
To be evacuated from the division:		
Sitting.....	749	
Recumbent.....	749	
		1,498

(c) Of gunshot wounded about—

8.12 per cent die in hospital.

12 per cent recover in 15 days.

12.88 per cent recover in 15 to 30 days.

21.29 per cent recover in 30 to 60 days.

9.56 per cent recover in 60 to 90 days.

16.17 per cent recover after 90 days.

20 per cent are of no further military value.



The average stay in hospital for all gunshot wounded is about 90 days.

(d) Of gas casualties—

1.73 per cent die in hospital.

25 per cent recover in 15 days.

26.81 per cent recover in from 15 to 30 days.

24.44 per cent recover in from 30 to 60 days.

16.02 per cent recover after 60 days.

6 per cent are of no further military value.

## 21. Formula for computing number of beds required.—

The number of beds (in fixed hospitals) required after several months accumulation equals strength times daily admission rate times average days in hospital.

*Example:*

Strength of force, 2,000,000.

Strength of First Army, 1,000,000.

Admission rate for sick and injured, 0.165 per cent.

Admission rate for wounded on basis of army, 0.2 per cent.

Average days in hospital for sickness, 27.

Average days in hospital for wounded, 90.

*Solution:*

Beds required after several months—

$$\begin{array}{rcl} \text{For nonbattle casualties, } 2,000,000 \times 0.00165 & & \\ \times 27 & & = 89,100 \end{array}$$

$$\begin{array}{rcl} \text{For battle casualties in First Army, } 1,000,000 \times 0.002 \times 90 & & = 180,000 \end{array}$$

$$\begin{array}{rcl} \text{Total beds required} & & = 269,100 \\ & & = 13.45 \end{array}$$

per cent of the total force

## 22. Maximum capacity of means of transportation for casualties.

	Sitting	Recumbent	Average load	Average speed, miles per hour
Standard litter.....	1	1	0	2
Wheeled litter.....	1	1	0	2½
Escort wagon.....	9	4	5	3
Ambulance, animal.....	8	4	6	4
Ambulance, motor.....	8	4	6	12
¾-ton truck.....	6	2	4	12
2½-3-ton truck.....	16	6	7	10
Hospital train.....	700	300	500	20
Day coach.....	36-48			
Box car.....	20			

a. One litter squad can dress a patient, carry him 1,000 yards, and return in one hour. Wheeled transportation can load, drive 2,000 yards, and return in 40 minutes. A motor ambulance can load, drive 4 miles, unload, and return in one hour.

b. To calculate the time required to evacuate the field, or the number of ambulances required to evacuate in a given time, the following formulae may be used:

$W$ —number of wounded.

$t$ —time required for round trip.

$M$ —number of vehicles, ambulances, or litters.

$N$ —number of patients per load.

$T$ —time required or allowed.

$$T = \frac{W \times t}{M \times N} \quad M = \frac{W \times t}{T \times N}$$

23. Diagrammatic representations of the medical service.—Figures 11, 12, and 13 represent the medical service of a division, the method of evacuation and hospitalization of personnel during combat operations, the evacuation and hospitalization of animals, and the disposition of cases that become fit for duty.

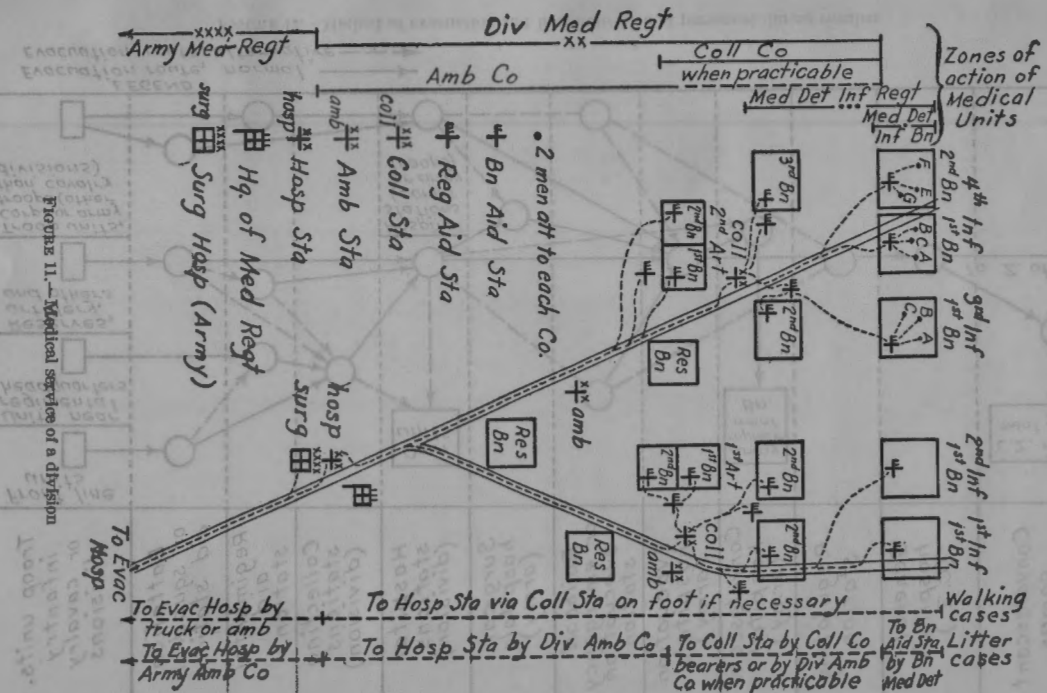


FIGURE 11.—Medical service of a division

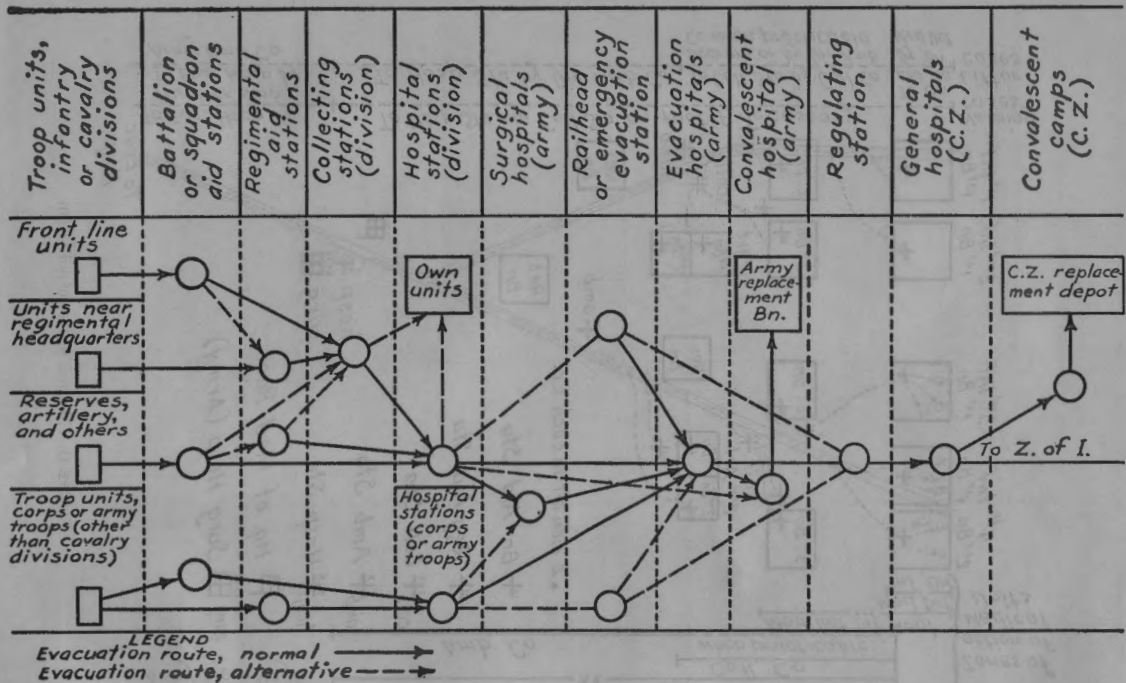


FIGURE 12.—Method of evacuation and hospitalization of personnel during combat

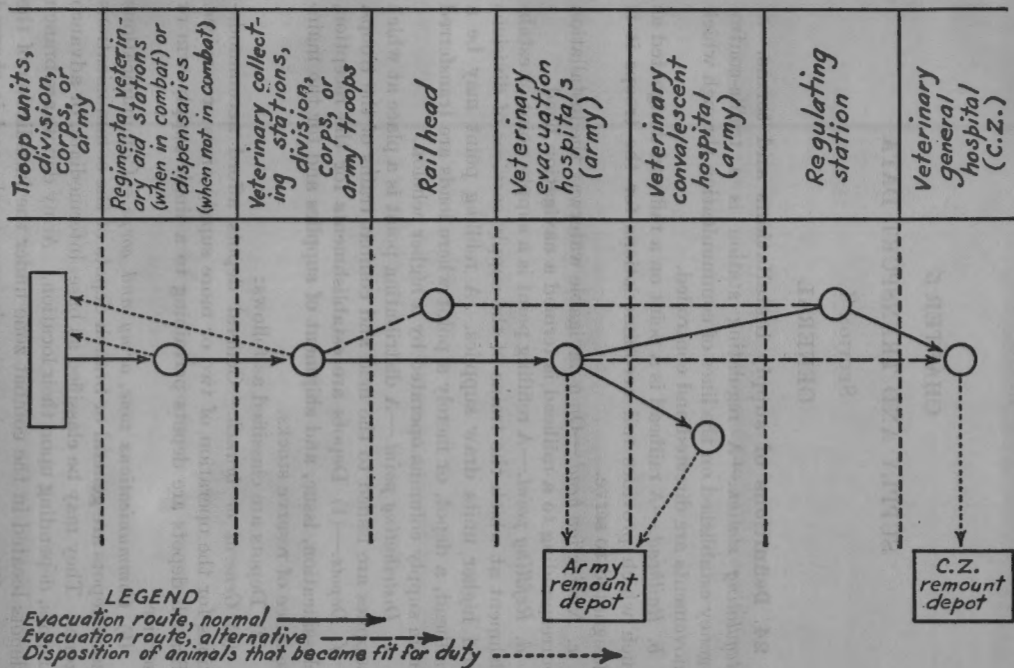


FIGURE 13.—Method of evacuation and hospitalization of animals

## CHAPTER 5

### SUPPLY AND TRANSPORT DATA

#### SECTION I

#### GENERAL

#### 24. Definitions of supply installations and terms.—*a.*

*Regulating station.*—A regulating station is a traffic-control agency established on the lines of communication through which movements are directed and controlled.

*b. Railhead.*—A railhead is a point on a railroad designated as such which provides rail accommodations for the troops it is designated to serve.

*c. Navigation head.*—On a navigable waterway the installation corresponding to a railhead is termed a navigation head.

*d. Refilling point.*—A refilling point is a supply point or establishment at which the trains of the supply services of divisions and higher units draw supplies. A refilling point may be a railhead, a depot, or merely a point where loads are transferred from supply columns operated by a higher echelon.

*e. Distributing point.*—A distributing point is a place at which supplies are issued to the field and combat trains of the troops.

*f. Depots.*—(1) Depots are establishments for the reception, classification, issue, and shipment of supplies and for the maintenance of reserve stocks.

(2) Depots are classified as follows:

(a) *General or branch.*—General depots afford accommodations for the operation of two or more supply arms or services. Branch depots are depots pertaining to a single supply arm or service.

(b) *Communications zone, army and corps.*—Communications zone depots are general or branch depots of the communications zone. They may be classified as base, intermediate, or advance depots, depending upon their location. Army depots are branch depots located in the combat zone under the jurisdiction of the army. When a corps is acting independently and is charged with primary responsibility for its supply, usually it will be

necessary to establish branch depots similar to army depots. These depots are called corps depots.

*g. Corps park.*—A place for the temporary storage of supplies, designated as such by the corps commander, located within the corps area, where the unit reserve is stored during periods when it is necessary to use the vehicles of the corps trains for other purposes. In stabilized situations the kinds and quantities of supplies so stored may be so increased.

*h. Division dump.*—A place for the temporary storage of supplies, designated as such by the division commander, located within the division area, where the unit reserve is stored during periods when it is necessary to use the vehicles of the division trains for other purposes. In stabilized situations the kind and quantities of supplies so stored may be increased.

*i. Daily train.*—The railway train arriving daily at a railhead with supplies for the troops which the railhead serves. A daily train may consist of one or more unit sections, each unit section being for a designated division or other unit or group of units of approximately the strength of a division.

*j. Procurement.*—Procurement is the administrative process of acquiring supplies or services. It is effected by purchase, requisition, establishment of credits, or a system of automatic supply.

*k. Requisitions.*—Requisitions are authoritative original demands for supplies required.

*l. Credit.*—A credit is an allocation of a definite quantity of supplies which is placed at the disposal of the commander of an organization for a prescribed period of time.

*m. Daily telegram.*—The daily telegram is the daily call made by a division or higher unit for the unit's daily requirement of Class I supplies. The daily telegram gives the strength of the unit in men and animals, the estimate of requirements of gasoline, oil, illuminants and fuel, and the railhead at which delivery is desired.

**25. Classification of supplies.**—*a.* For simplicity and convenience of administration, supplies required by troops in the field are divided into four classes, as follows:

(1) *Class I.*—Those articles which are consumed at an approximately uniform daily rate irrespective of combat operations or terrain, and which do not necessitate special adaptation to meet individual requirements; as rations, forage, fuel, gasoline, lubricants, and illuminants. This class embraces all articles which

can be handled in the field on the basis of a daily automatic supply.

(2) *Class II.*—Those authorized articles of equipment which, though consumed at an approximately constant rate, are for the personal use of the individual and necessitate special arrangements to meet individual requirements, as clothing and gas masks. The distribution of articles in this class is based on the actual strength in men and animals of the troop units and the records of sizes and experience tables. This class is furnished on periodic requisitions.

(3) *Class III.*—Those authorized articles of equipment for which allowances are established by Tables or Organization and Tables of Allowances, as arms and engineer, medical, ordnance, quartermaster, and signal equipment, including vehicles, both motorized and animal-drawn.

(4) *Class IV.*—Those articles of supplies which are not covered in Tables of Allowances and the demands for which are directly related to the operations contemplated or in progress. Among the important items of supplies included in this class are ammunition, fortification materials, aircraft gasoline and oil, fuel (for the operation of utilities), and construction materials and machinery.

b. Articles of supplies of Classes I, II, and III may, by reason of special stringency and the consequent necessity for exercising closer command control over issues, be transferred to Class IV, pending the reestablishment of the normal status of supply in those articles.

c. Requirements in Class I and II supplies are relatively constant from day to day. Requirements in Class III supplies are likewise relatively constant when applied to periods of weeks or months. Requirements in Class IV supplies, however, vary between wide limits. At times they are relatively light, then suddenly rise to large proportions, making sudden and heavy demands on supply establishments and means of transportation.

**26. Basis of computations for loads of cargo vehicles.**—The following table shows the information upon which to base computations for the loads of the cargo vehicles:<sup>1</sup>



Class	Unit	Allowances
Ration weights	Garrison	5.46 pounds per ration.
	Field	5 pounds per ration.
	Reserve (individual)	3 pounds per ration.
	Grain <sup>2</sup>	10 pounds per animal.
Gasoline allowances <sup>3</sup>	Truck or tractor	20 gallons per day. <sup>7</sup>
	Tank (in action)	30 gallons per day. <sup>7</sup>
	Car or motor ambulance	10 gallons per day. <sup>7</sup>
	Motor cycle	4 gallons per day. <sup>7</sup>
	Airplane <sup>4</sup>	10 gallons per 100 horsepower per day. <sup>4</sup>
	Armored car	30 gallons per day. <sup>7</sup>
Oil <sup>5</sup>	Tanks, tractors, and armored car.	1 gallon oil per 7 gallons gasoline. <sup>7</sup>
	All other vehicles	1 gallon oil per 15 gallons gasoline. <sup>7</sup>
Ammunition weights	.30 caliber ball	In clips and bandoleers, 100 pounds per box of 1,200.
	.30 caliber ball, tracer, and A. P.	In cartons, 114 pounds average per box of 1,500.
	.45 caliber pistol	110 pounds per box of 2,000.
	.50 caliber	106 pounds per box of 280.
	3-inch trench mortar	15 pounds per round.
	37-mm. gun	2 pounds per round M1916 gun; 2½ pounds per round M2 gun.
	Grenades, hand	1.9 pounds each.
	75-mm. gun	26.45 pounds per round. <sup>10</sup>
	155-mm. howitzer	113.8 pounds per round. <sup>10</sup>
	155-mm. gun	147.4 pounds per round. <sup>10</sup>
	240-mm. howitzer	430.2 pounds per round. <sup>10</sup>
	3-inch AA gun	38.75 pounds per round.
Baggage allowances <sup>6</sup>	General officer	150 pounds.
	Colonel or lieutenant colonel	100 pounds.
	Major	75 pounds.
	Captain or lieutenant	50 pounds.
	Company headquarters <sup>8</sup>	500 pounds.
Wagon and cart capacity	Wagon, escort, R. & B., 4-mule.	2,500 pounds.
	Wagon, escort, combat, 4-mule.	Do.
	Wagon, combat, infantry, 4-mule.	Do.
	Wagon, spring or mountain.	1,000 pounds.
	Cart, water, 2-mule	180 gallons.
	Cart, ration, 2-mule	700 pounds.

<sup>1</sup> Based on Tables of Organization and fundamental allowances where available. In some instances loads have been made to conform to weight and bulk capacity of the vehicles assigned.

<sup>2</sup> 10 pounds assumed as average for horses and mules.

<sup>3</sup> Aviation gasoline required.

<sup>4</sup> Allowance made on assumption that each airplane flies 1½ hours per day.

<sup>5</sup> Gasoline in containers weighs about 8 pounds per gallon; in bulk, 6.5 pounds.

<sup>6</sup> Oil in containers weighs about 9 pounds per gallon; in bulk, 7 pounds.

<sup>7</sup> Supply requirements are computed on the basis of an average expenditure of approximately 80 per cent of these allowances.

<sup>8</sup> Assumed as reasonable in the field or campaign.

<sup>9</sup> Company baggage includes such articles as necessary special tools, office facilities, records, and equipment, and which are not carried in the combat train.

<sup>10</sup> Average weight of various types, including proper percentage of components and packing. For 75-mm. gun, 30 per cent shrapnel and 70 per cent shell are assumed.

27. Approximate weights and dimensions of heavy items of equipment which may operate in the division area.— For field operation, all vehicles are figured with normal load and with tops up. Weights of cargo trucks, as given in the last column, may be considered as a maximum; many commercial vehicles of equal capacity will weigh less.

Item	Weight on axles		Overall dimensions			Total weight
	Front	Rear	Width	Height	Length	
	<i>Pounds</i>	<i>Pounds</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Pounds</i>
Ambulance, field (motor).....	1,815	2,725	74	94	192	4,540
Car, armored.....	3,500	6,500	72	84	186	10,000
Gun, 155-mm.....	11,400	18,500	106	65	389	29,900
Gun, 3-inch, AA.....	8,000	8,500	66	110	208	16,500
Howitzer, 155-mm.....	3,000	6,500	66	72	305	9,500
Tank, light fighting.....			71	91	187	15,000
Tractor, 5-ton.....			63	73	134	10,700
Tractor, 10-ton.....			84	93	162	21,500
Tractor, 2½-ton.....			58	66	120	7,700
Trailer, stock-room.....	6,500	7,500	86	101	145	14,000
Trailer, 3-inch field gun.....	5,500	8,200	61	64	169	13,700
Trailer, kitchen.....	2-wheel.		59	85	161	3,061
Trailer, cargo, 1½-ton.....	3,000	3,750	69	119	127	6,750
Trailer, tank, water, 250-gallon.....	2,300	2,900	60	65	127	5,200
Truck, balloon winch.....	6,870	10,100	72	97	200	16,970
Truck, cargo, ¾-ton.....	2,158	3,802	64	106	194	5,960
Truck, cargo, 1½-ton.....	4,000	6,000	70	112	220	10,000
Truck, cargo, 3-ton.....	6,275	11,225	86	120	219	17,500
Truck, cargo, 5-ton.....	7,800	14,700	82	126	260	22,500
Truck, gas compressor.....	6,500	8,200	80	92	212	14,700
Truck, shop, mobile maintenance (QM).....	8,450	15,700	93	126	273	24,150
Truck, shop, mobile maintenance (Ord).....	5,800	8,700	71	114	214	14,500
Truck, wrecking.....	6,000	10,730	93	126	273	16,730
Truck, 1½-ton, Signal Corps, technical.....	3,000	5,000	76	96	198	8,000
Truck, shop machine, light MI.....	5,800	8,700	71	114	214	14,500
Truck, small arms repair.....	5,800	8,700	71	114	214	14,500
Truck, spare parts (Ord).....	3,840	5,060	71	114	214	9,500
Truck, tank carrier.....	8,700	23,500	96	124	305	32,200
Truck, tank, gasoline, 750-gallon.....	6,405	11,895	85	104	276	18,300
Truck, tank, gasoline, 500-gallon.....	4,800	7,200	90	104	212	12,000

## SECTION II

### PRINCIPLES AND OPERATION OF SUPPLY IN THE INFANTRY DIVISION

**28. Division supply principles.**—*a.* From a supply viewpoint, there are two echelons of trains in the division from front to rear—combat and field trains (each for its own class of supply) and service trains. In theory, each echelon in rear keeps the echelon in front filled. However, this general practice is not adhered to when time and labor can be saved by any modification or when the tactical situation requires a departure therefrom.

*b.* In general, there are three methods of supply utilized in a division:

*Automatic* for Class I supplies;

*Requisitions* for Classes II, III, and IV supplies (except ammunition); and

*Special* for ammunition.

(1) Automatic supply of Class I supplies is effected normally by means of the daily train to the proper railhead. Quantities for the daily train are determined from the daily strength report of the division. On arrival of the daily train at the railhead, the railhead commander makes delivery to the division quartermaster, who, utilizing the transportation of the quartermaster regiment, takes over the supplies at the railhead and distributes them direct to organization or to their field trains at distributing points.

(2) Requisitions for Classes II, III, and IV supplies (except ammunition) may be either formal or informal, depending upon the tactical situation. Ordinarily, requisitions for these classes of supply are filled by the staff officer of the arm or service involved, either from stocks on hand or by withdrawals from depots, and are distributed through the regular Class I distributing channels. In certain situations, however, especially with field fortification materials, it may be desirable to establish special distributing points for issue of supplies of these classes.

(3) The following principles govern the system of supply of artillery and small-arms ammunition in the division:

(a) *Artillery ammunition.*

1. The allocation and distribution of ammunition, except small arms, for the Field Artillery of the division are the responsibility of the divisional artillery commander. A staff officer, known as the artillery brigade munitions officer, is provided by Tables of Organization to relieve the divisional artillery commander of the details of this and allied duties. There is also provided an artillery brigade ammunition train consisting of a train headquarters, two ammunition batteries, truck, and one ammunition battery, wagon. Each ammunition battery contains personnel for the handling of ammunition.

2. In campaign, regiments submit daily reports of ammunition expenditures to brigade headquarters. (Fig. 14.) The brigade commander causes these reports to be consolidated and forwards them to the corps chief of artillery who in turn allocates the necessary amount of ammunition to the division. (Fig. 15.) The brigade ammunition train, or such portion as is required, is sent to the refilling point designated, usually an army depot, and draws the ammunition needed. The train delivers the ammunition to destinations, usually distributing points, in the amounts and kinds that will correspond to the tactical missions assigned to the units of the brigade. The location of an artillery ammunition distributing point is selected with a view to having it—

- (a) Readily accessible to the combat trains of the artillery battalions;
- (b) On good motor roads from the rear providing a turn-around and connecting with other roads leading to the batteries;
- (c) Under cover and concealed from hostile air and ground observation;
- (d) With sufficient space available so that operations at the distributing point will not block traffic; and
- (e) Off main traffic routes wherever possible.

One distributing point usually is sufficient for the divisional artillery. When the division is operating over a broad front or the road net is unfavorable, two distributing points may be established. The combat trains of the battalions and in emergencies

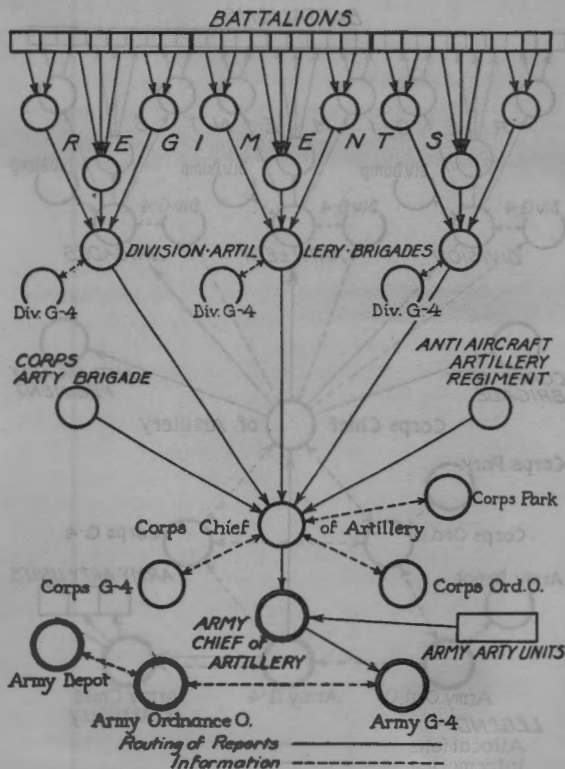


FIGURE 14.—Method of reporting expenditure of artillery ammunition

the ammunition vehicles of the firing batteries are available for drawing from the distributing points. In the usual case, the combat trains form the link between the ammunition train (distributing points) and the batteries. The selection of ammunition

distributing points is made by the munitions officer under the direction of the artillery brigade commander, subject to coordination by G-4 of the division. The allocation of ammunition to regiments is made by the divisional artillery commander, the

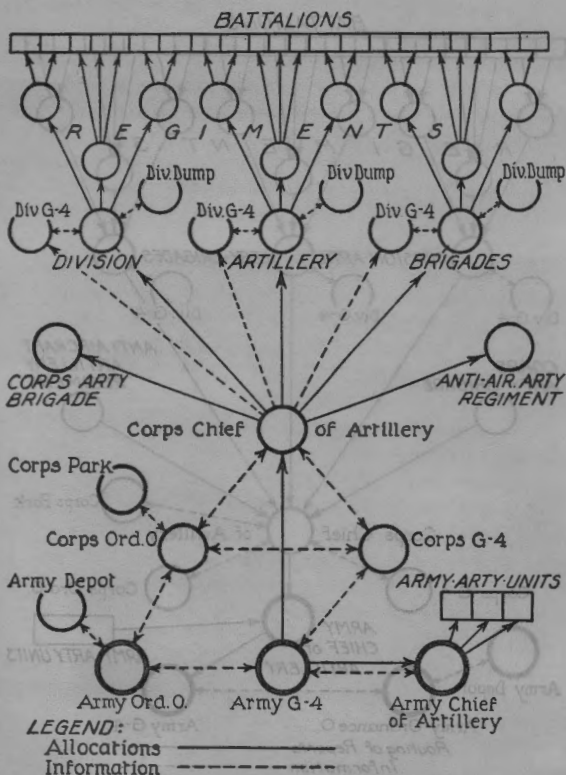


FIGURE 15.—Method of allocating artillery ammunition

details being worked out by the munitions officer.

3. The army chief of artillery, through the army G-4, recommends to the army commander the allocation of artillery ammunition; the army commander acts on these recommendations through the same channel.

(b) *Small-arms ammunition.*

1. The supply of small-arms ammunition is a function of the ordnance officer. The division ordnance officer forwards reports of expenditures of caliber .30, 37-mm gun and light mortar ammunition, grenades and pyrotechnics received from subordinate organizations, usually regiments, to the army ordnance officer, and a copy thereof to the corps ordnance officer. (Fig. 16.) These reports cover a designated period which is usually longer than that covered by the reports of expenditures of artillery ammunition. Upon information from the army, the corps allocates ammunition to the division and designates the refilling point. (Fig. 17.)
2. When the state of supply of the division requires general replenishment from the rear, the division ordnance officer arranges with the division quartermaster for the transportation of the necessary quantity from the refilling point to the places designated. These designations may be small-arms ammunition distributing points, the division dump, or both, depending upon the urgency of the demands from organizations.
3. Small-arms ammunition distributing points are established usually at the rate of one for each brigade of Infantry in the line.
4. The small-arms ammunition dump, usually at the bivouac of the division quartermaster train and consisting of the loads of small-arms ammunition carried on that train, may be used as a distributing point, or ammunition may be transported from it to forward distributing points as the need for ammunition arises. The infantry combat trains deliver the ammunition to points forward of the ammunition distributing points.
5. The transport necessary for the supply of small-arms ammunition is provided from the quartermaster regiment.
6. At all times it is the duty of the ordnance officers to encourage the use by troops during combat of the ammunition available from casualties.

**29. Trains of the infantry division.**—The various trains within the division are classified as combat trains, field trains, and service trains.

**a. Combat trains.**—Combat trains include all personnel, vehicles, and animals employed by regiments and smaller units for transporting ammunition and the reserve and special equipment

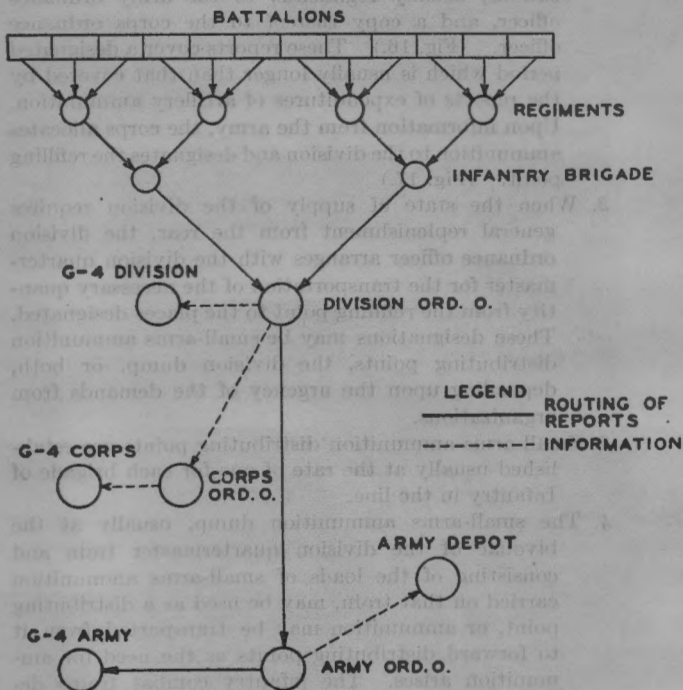


FIGURE 16.—Expenditure reports of infantry ammunition

required during combat. In addition, they include rolling kitchens and certain vehicles required for the technical service of engineer, signal, and medical troops.

(1) *Infantry and engineer.*—These combat trains carry the ammunition, rations, and other matériel which should be immediately available to the troops at all times. The new type roll-



ing kitchen has a capacity of one complete field ration and is now standard equipment for the infantry division. The remaining vehicles of the combat train carry medical supplies, signal equipment, and ammunition approximately equal in amount to that carried on the individual soldier and on the carts of auxiliary weapons.

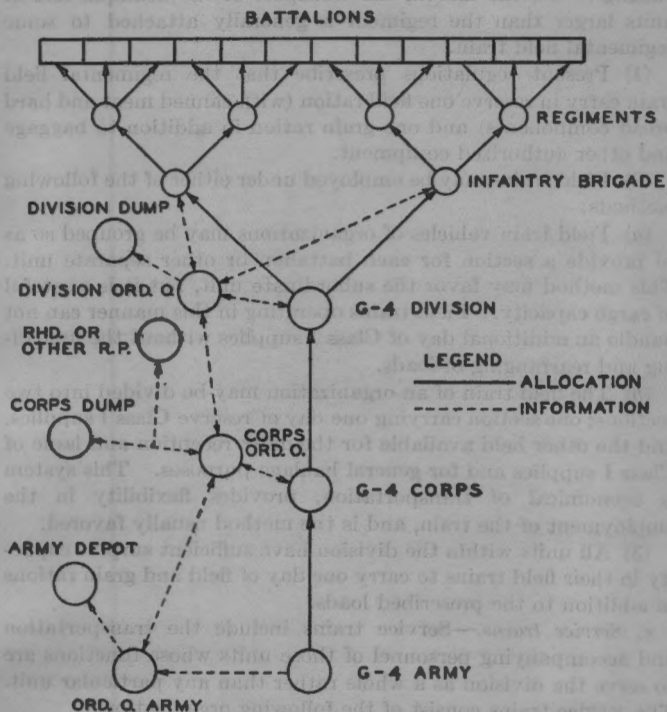


FIGURE 17.—Infantry ammunition allocations

(2) *Artillery.*—(a) The maintenance section of the artillery battery carries spare parts and the unconsumed portion of one day's ration.

(b) The battalion combat train carries approximately 160 rounds of 75-mm ammunition or 120 rounds 155-mm howitzer

ammunition for each piece of the battalion and the unconsumed portion of one day's ration for its own use.

*b. Field trains.*—Field trains include the personnel, vehicles, and animals of the various regimental service companies and service batteries employed for the reception, transportation, and issue of Class I supplies and the authorized allowance of baggage. On the march, the transport of the headquarters of units larger than the regiment is generally attached to some regimental field train.

(1) Present regulations prescribe that the regimental field train carry in reserve one field ration (with canned meat and hard bread components) and one grain ration in addition to baggage and other authorized equipment.

(2) Field trains may be employed under either of the following methods:

(a) Field train vehicles of organizations may be grouped so as to provide a section for each battalion or other separate unit. This method may favor the subordinate unit, but it is wasteful of cargo capacity. Field trains operating in this manner can not handle an additional day of Class I supplies without the unloading and rearranging of loads.

(b) The field train of an organization may be divided into two sections; one section carrying one day of reserve Class I supplies, and the other held available for the daily reception and issue of Class I supplies and for general haulage purposes. This system is economical of transportation, provides flexibility in the employment of the train, and is the method usually favored.

(3) All units within the division have sufficient surplus capacity in their field trains to carry one day of field and grain rations in addition to the prescribed loads.

*c. Service trains.*—Service trains include the transportation and accompanying personnel of those units whose functions are to serve the division as a whole rather than any particular unit. The service trains consist of the following organizations:

- (1) The quartermaster regiment.
- (2) The ammunition train.
- (3) The ordnance company.
- (4) Certain vehicles of the engineer regiment.
- (5) The medical regiment.

**30. Cargo capacities and prescribed loads of unit reserves in the quartermaster regiment.**—The cargo capac-

ities and prescribed loads of unit reserves in the quartermaster regiment of the infantry division are as follows:

*a. Cargo capacity:*

1 motor battalion (96 trucks of 1½ tons each).....	tons.....	144
1 wagon battalion (124 wagons of 1¼ tons each).....	tons.....	155

Total.....	do.....	299
17 tank trucks, 750 gallons each.....	gallons.....	12, 750

*b. Prescribed loads (unit reserves):*

Small-arms ammunition.....	tons.....	39
1 day's field ration.....	do.....	60
1 day's grain ration.....	do.....	35

Total.....	do.....	134
Gasoline in tank trucks.....	gallons.....	12, 750
Surplus capacity over prescribed loads.....	tons.....	165

**31. Class I supplies prescribed for the division.**—Present regulations prescribe that the following Class I supplies be kept within the division: (For ammunition reserves, see ch. 1.)

*Infantry division*

Where carried	Reserve ration (individual)	Field ration	Grain ration	Gasoline and oil in days of supply
On each man.....	1			
On each riding animal and on each animal-drawn vehicle for its animals.....			1	
On field trains.....		1	1	
On rolling kitchens.....		1		
On each motor vehicle.....				2
By quartermaster regiment for the entire division.....		1	1	1
Total.....	1	3	3	3

**32. Basis of computation for loads of cargo vehicles.**—See paragraph 26.

### SECTION III

## PRINCIPLES AND OPERATION OF SUPPLY IN THE CAVALRY DIVISION

**33. Division supply principles.**—*a.* The principles of supply for the infantry division (par. 28) are applicable, in general, to the cavalry division. However, due to the inherent characteristics of Cavalry, the methods of application of some of these principles will vary. The rapidity of cavalry action, for example, will often render impractical the issuing of formal administrative orders; administrative details being handled in such instances by means of fragmentary orders.

*b.* Experience has demonstrated that Cavalry must be prepared to accept at times a reduced standard of supply. Frequently it will be difficult to obtain the barest minimum of supplies, even though all available means of transportation not absolutely essential to the continuance of operations are employed in the task of collection and distribution.

*c.* The principles and methods for effecting automatic supply of Class I supplies for the cavalry division are, in general, similar to those given in paragraph 28 for the infantry division. However, the wide distances over which Cavalry may operate, its probable distance from a railhead, and the difficulty of dispatching and guarding convoys may at times necessitate intermittent supply at two or three day intervals, rather than daily supply. Meanwhile, the Cavalry subsists from its reserve supplies or resorts to local procurement.

*d.* The principles and methods of requisitioning for supplies of Classes II, III, and IV (except ammunition) for the cavalry division are, in general, similar to those given in paragraph 28 for the infantry division.

*e.* The following principles govern the system of supply of artillery and small-arms ammunition in the cavalry division:

(1) Since cavalry ordinarily is not called upon for sustained and continuous fire action, the ammunition within the cavalry division is usually sufficient. If, however, the projected operations of the division indicate that this supply will be insufficient, special arrangements for the supply of ammunition must be made

with higher headquarters. Refilling points must be pushed forward within reach of the trains of the cavalry division.

(2) Movement of small-arms ammunition from the refilling point is a function of the division ordnance service which arranges with the division quartermaster to furnish necessary transportation and labor.

(3) Movement of artillery ammunition from the refilling point is a responsibility of the artillery commander who, after obtaining the location of the refilling point and the amount of credit, arranges with the division quartermaster for transportation to move the artillery ammunition from the refilling point, either to a distributing point or to the battery positions direct.

(4) In the cavalry division there is no artillery munitions officer provided by Tables of Organization nor is an ammunition train an organic part of the artillery command. The cavalry division quartermaster train, however, includes in its normal load 114 rounds of ammunition for each piece in the regiment; a total of 2,736 rounds.

**34. Trains of the cavalry division.**—The various trains within the cavalry division are classified according to their functions as combat trains, field trains, and service trains.

*a. Combat trains.*—(1) *Composition.*—Combat trains include all personnel, vehicles, and animals employed by regiments and smaller units for transporting ammunition, and special equipment required during combat. In addition, they include kitchen and ration packs, spring or mountain wagons for cavalry, rolling kitchens, store and tool wagons, and certain vehicles required for the technical service of artillery, engineer, signal, and medical troops.

(a) *Cavalry troop.*—The combat train of the cavalry troop consists of six pack horses, one escort wagon, and one spring or mountain wagon. The six pack horses which frequently march with the troop carry prescribed loads as follows:

2 horses are loaded with picket line equipment.

2 horses are loaded with kitchen packs.

2 horses are loaded with rations.

The escort wagon carries approximately 105 rounds of rifle ammunition for each rifle carried by the soldier, five rounds of pistol ammunition for each pistol, and 520 rounds for each machine rifle. The spring or mountain wagons have no prescribed load. They are general utility vehicles and are loaded in accordance with the desires of the organization or higher unit commanders to meet the requirements of any particular situation.

(b) *Machine-gun troop*.—The combat train of the machine-gun troop, cavalry regiment, is composed of 18 pack horses, two escort wagons, and one spring or mountain wagon. The 18 pack horses which frequently march with the troop carry prescribed loads as follows:

2 carry picket line equipment.

2 carry kitchen packs.

2 carry rations.

12 carry machine-gun ammunition in belts packed in boxes.

The two escort wagons carry reserve ammunition and belt-loading equipment for machine guns, reserve ammunition for one-pounders, and spare parts and other equipment needed in combat. The spring or mountain wagon is a general utility vehicle with no prescribed load.

(c) *Artillery*.—The maintenance section of the battery consists of a rolling kitchen and a battery and store wagon. It carries maintenance equipment for the battery and the unconsumed portion of one day's rations. The combat train of each artillery battalion is composed of 18 caissons and 18 limbers, which carry about 160 rounds for each piece in the battalion, and a maintenance section, the load of which includes the unconsumed portion of one day's rations for the personnel of the combat train.

(d) *Engineer*.—The combat train of the engineer troop consists of pack horses, which frequently march with the troops, motor vehicles, and trailers. Its loads consist of the unconsumed portion of one day's ration with kitchen trailer, reserve ammunition for the unit, and an assortment of tools, demolition supplies, and other engineer equipment for use in the field. In the squadron headquarters and service troop, there are seven tool trucks which carry intrenching tools in the ratio of one truck for each cavalry regiment and three additional trucks. When the situation does not require the use of certain vehicles of the engineers, they are marched with the service trains of the division.

(2) *Rates of march*.—As a result of the difference in mobility of the various components of combat trains, it is evident that their special grouping according to economical rates of speed must be made for marching purposes. Pack and spring or mountain wagon elements normally march with the units to which they pertain. Grouped escort wagon elements follow at a slower rate. Grouped motor elements using the same or different routes operate under a separate schedule.

*b. Field trains.*—(1) Field trains include such personnel, vehicles, and animals of the various troops, service platoons, and service batteries as are employed by regiments and smaller units for the reception, transportation, and issue of the authorized allowance of baggage, rations, and forage.

(2) In the Cavalry, the field trains consist of escort wagons and motor trucks.

(3) The transportation wagons within the cavalry regiment are organically a part of each troop under the orders of the troop commander. They are not a part of a regimental service unit as in infantry and artillery regiments.

(4) The simplest method of operating the vehicles of the field train is to group them under the control of the regimental or separate unit supply officer. These vehicles may then be organized into squadron sections or into a regimental pool. When so grouped, they are known as the squadron or regimental field train. Such an arrangement as this simplifies, to a considerable extent, the drawing of Class I supplies and their subsequent transfer to the several troop units. The principle of grouping elements according to their economical rates of speed also applies to the field trains of all units.

(5) In the horse artillery regiment of the cavalry division, field train transportation for the batteries is furnished from the battalion combat train which is the service organization for the battalion. Vehicles are furnished the batteries in the same manner that the infantry service company furnishes the vehicles to the infantry rifle companies.

*c. Service trains.*—Service trains include the transportation and accompanying personnel of those units whose functions are to serve the division as a whole rather than any particular unit. The service trains consist of the following organizations:

- (1) The division quartermaster train.
- (2) The ordnance company.
- (3) Certain vehicles of the engineer squadron.
- (4) The medical squadron (less detachments operating with combat troops).
- (5) Vehicles of the attached aviation when not separated from the division.

**35. Cargo capacities and prescribed loads of unit reserves carried on the division quartermaster trains.**—The cargo capacities and prescribed loads of unit reserves carried on quartermaster trains, cavalry division, are as follows:

*a. Cargo capacity:*

1 motor transport company (24 trucks of 1½ tons each).....	tons..	36
1 motor transport company (24 trucks of 3 tons each).....	do..	72
Total.....	do..	108
1 wagon company (62 wagons of 1¼ ton each).....	do..	77.5
4 pack trains of 50 mules each.....	do..	20.0
Total.....	do..	205.5
5 tank trucks, 750 gallons each.....	gallons..	3,750

*b. Prescribed loads (unit reserves):*

Ammunition, small arms.....	tons..	46
Ammunition, artillery, 114 rounds per gun for 24 guns.....	do..	36
1 day's field rations.....	do..	21
1 day's grain.....	do..	54
Part of 1 day's gasoline and oil in drums (approximate).....	do..	12
Total.....	do..	169
5 tank trucks, 750 gals. of gasoline each.....	gallons..	3,750
Surplus capacity over prescribed loads.....	tons..	36.5

**36. Class I supplies prescribed for the cavalry division.**

Present regulations prescribe that the following Class I supplies be kept within the division:

	Reserve ration (individual)	Field ration	Grain ration	Gasoline and oil in days of supply
On each man.....	1			
On each riding animal or on each animal-drawn vehicle for its animals.....			1	
On kitchen pack or kitchen trailer.....		1		
On field trains.....	1	1	1	
On each motor vehicle (including that in vehicle tank).....				2
On the division quartermaster train for the entire division.....		1	1	1
Total.....	2	3	3	3

**37. Basis of computations for loads of cargo vehicles.**

See paragraph 26.