FM-E 101-10

WAR DEPARTMENT

STAFF OFFICERS FIELD MANUAL

&

ENEMY FORCES ORGANIZATION, TECHNICAL AND LOGISTICAL DATA

October 20, 1942

FM-E 101-10

STAFF OFFICERS'
FIELD MANUAL

ENEMY FORCES

ORGANIZATION, TECHNICAL, AND LOGISTICAL DATA

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FM–E 101–10, Staff Officers' Field Manual, Enemy Forces, Organization, Technical, and Logistical Data, is published for the information and guidance of all concerned.

This manual is a compilation of *enemy* information and data to be used as a guide for the operations in the field of the general staff or a similar staff group of all units in war.

Much of the data herein are not exact values but represent the best of available information. A constant fluctuation in the value of approximated data should be expected, to conform to the changes which develop in field conditions. In cases where experience has not indicated the limits of variation to be expected, a reasonable factor of safety should be allowed.

When information which will be of value in this manual is gained in the field, it will be forwarded to the Military Intelligence Service, War Department. Revision sheets and added data will be distributed as found necessary.

[A. G. 062.11 (7–11–42).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION

D(15); B(10); R(10); Bn(5).

(For explanation of symbols, see FM 21–6.)

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ENEMY FORCES
ORGANIZATION, TECHNICAL, AND LOGISTICAL DATA

PART ONE—GERMAN FORCES

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ORGANIZATION

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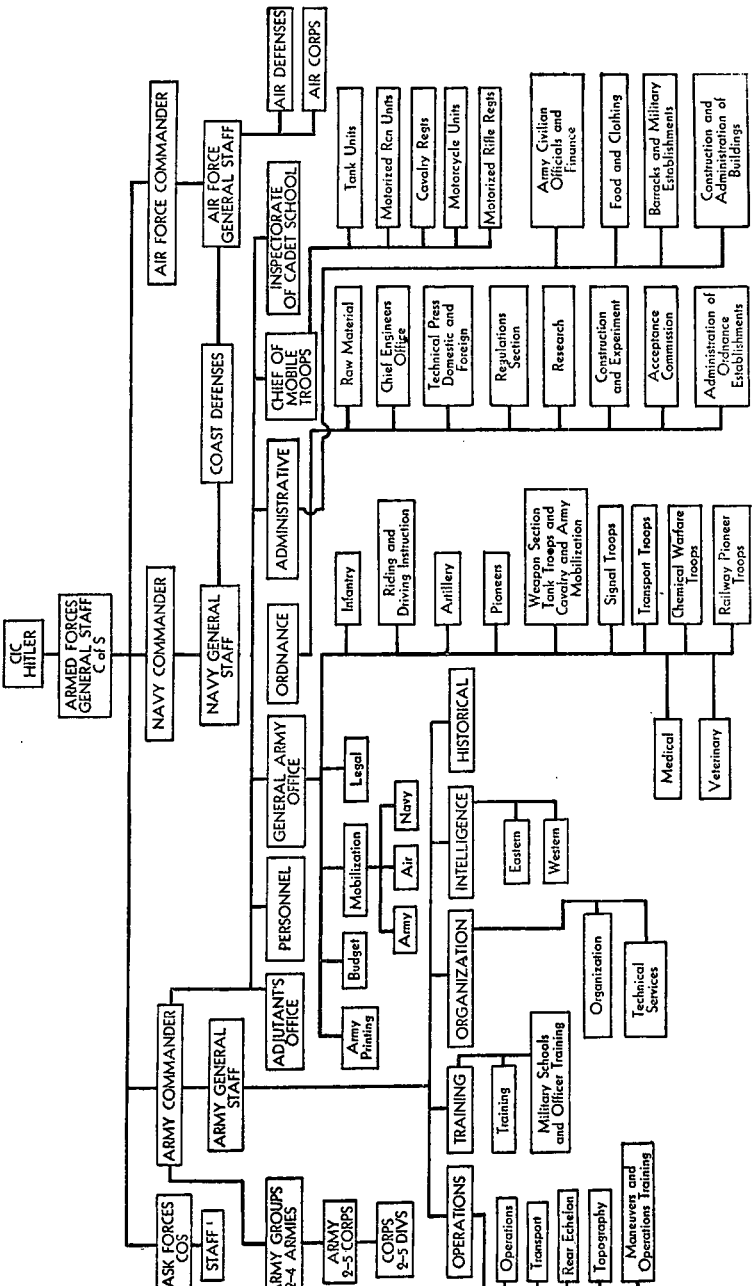
GOVERNMENTAL AND GEOGRAPHIC ORGANIZATION

■ 1. GOVERNMENTAL ORGANIZATION.—



[1] Staff picked from 3 arms by Task Force CO, after conference with Army, Navy, and Air Force commanders.

■ 2. GEOGRAPHIC ORGANIZATION.—

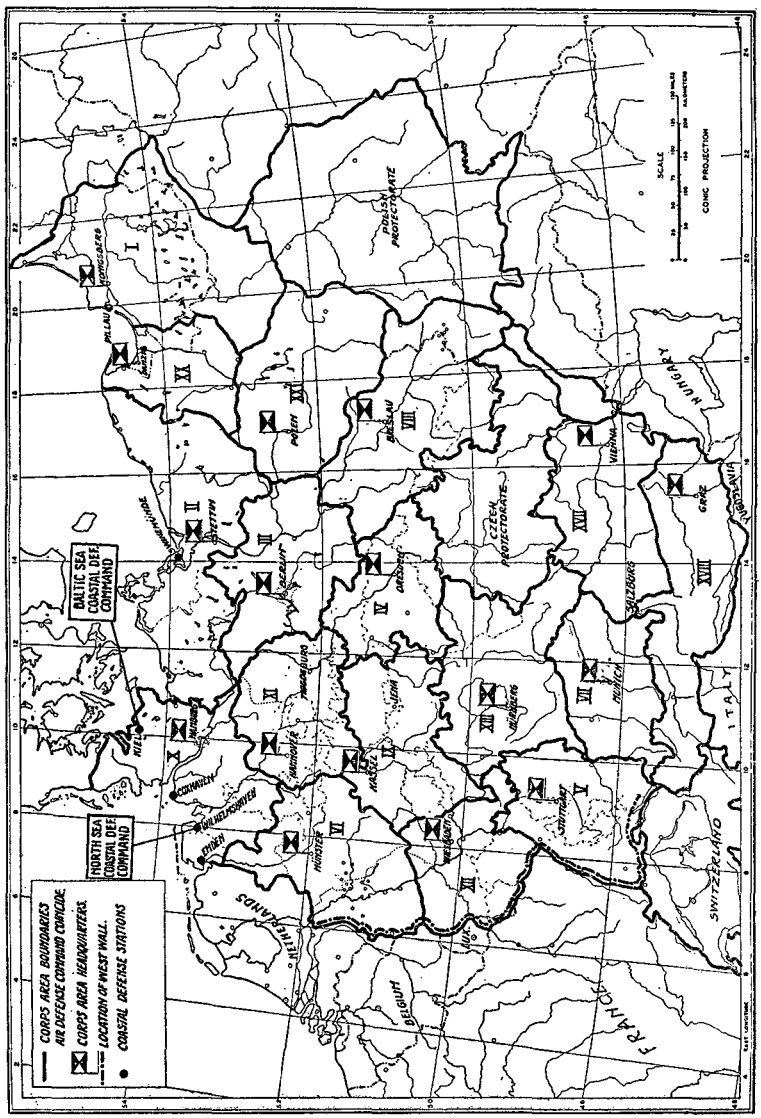
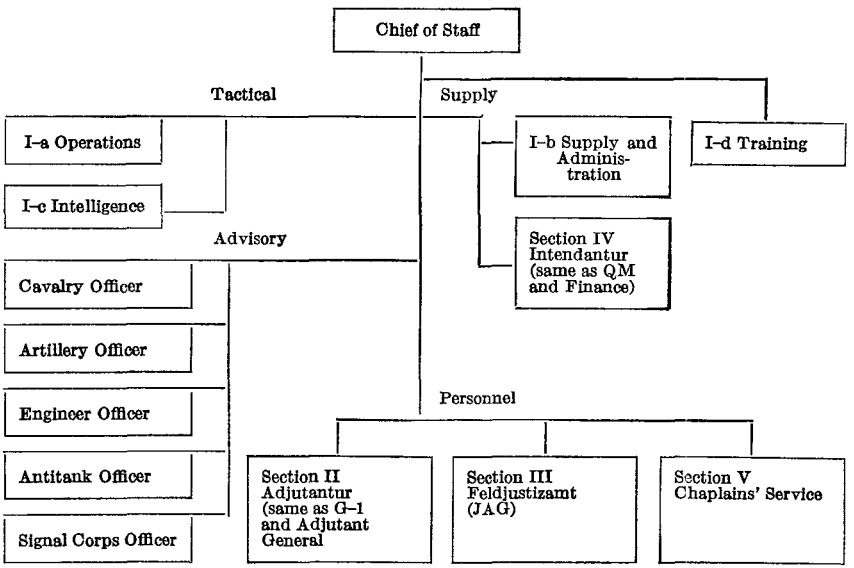


FIGURE 1.—Boundaries of corps areas.

SECTION II

STAFF AND FIELD FORCE ORGANIZATION

■ 3. STAFF OF UNITS.—*a. Army.*



b. Corps.—Same as army, except advisory officers are engineer, signal corps, and antitank. They command own arm within the corps besides advising corps and division commanders.

c. Division.—(1) Same as army, except that I–a, Operations, serves as Chief of Staff in addition.

(2) Only advisory officer is artillery officer who commands division artillery.

(3) The following officers believed attached to groups of division staff:

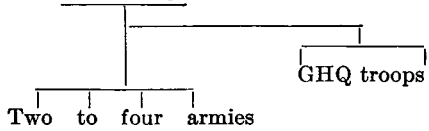
(*a*) *Tactical group:*

Division artillery officer.
Division engineer officer.
Division signal officer.
Antitank battalion commander.
Officer in technical charge of motorized transport.
Air liaison officer.

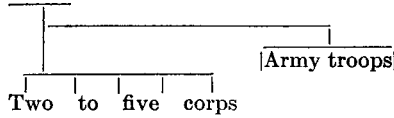
(*b*) *Supply group:*

Commander light columns and division train.
Division provost marshal.
Division postal service officer.
Engineer officer, Signal officer } Supply of material.

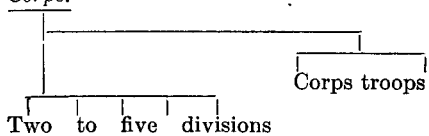
■ 4. ORGANIZATION.—*a. Army group.*



b. Army.



c. Corps.



■ 5. GHQ TROOPS.—GHQ troops include—

a. Mobile troops:
Tank units.
Antitank and heavy antitank units.

b. Artillery:
Medium, heavy, and superheavy artillery batteries.
Artillery observation battalions.
Observation balloons.

c. Engineers:
Engineer battalions.
Bridge construction battalions.
Bridging columns.
Road construction battalions.
Labor battalions.

d. Smoke battalions.

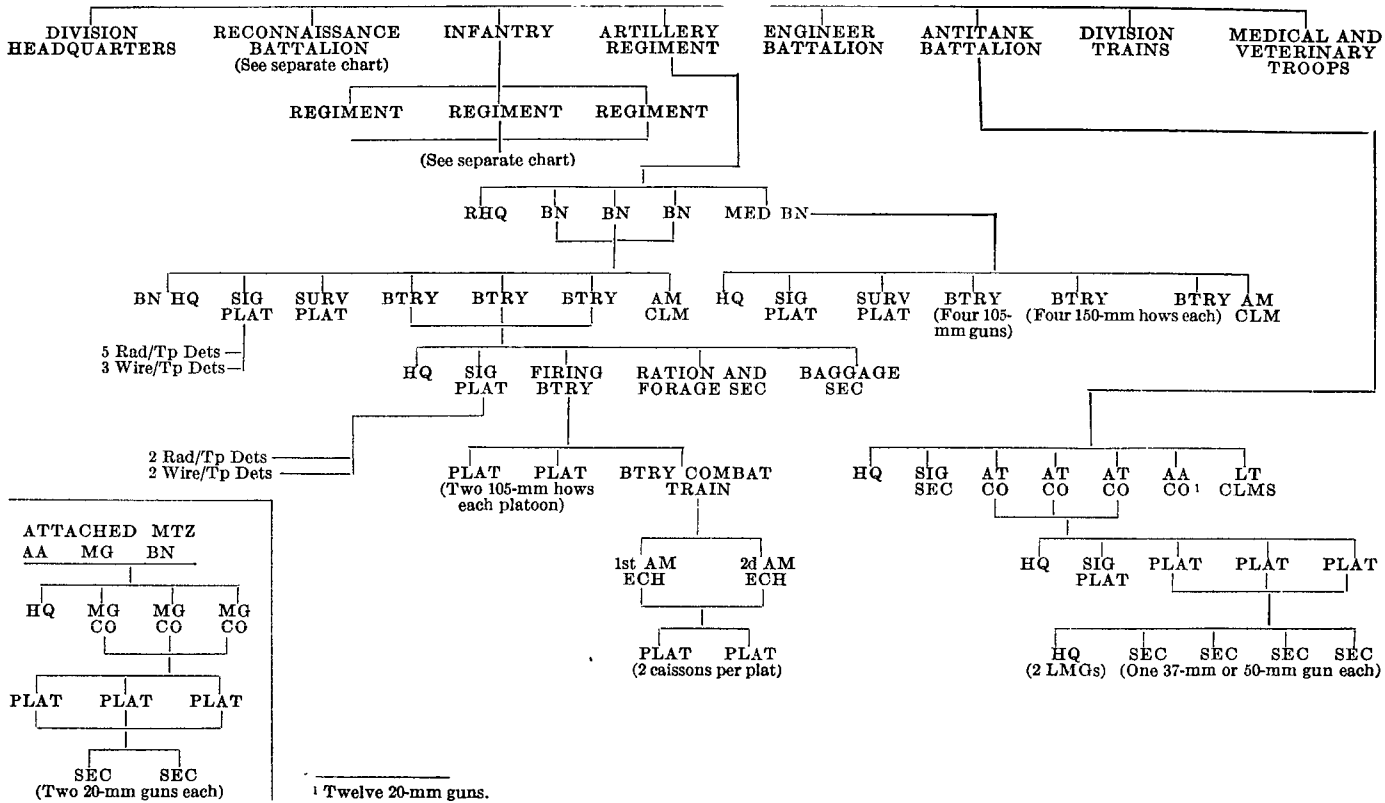
e. Signal Corps units.

f. Miscellaneous:
Survey (mapping) and meteorological sections, and propaganda companies.

g. Air force units:
Army cooperation units.
Air signal units.

SECTION III
DIVISION ORGANIZATIONS

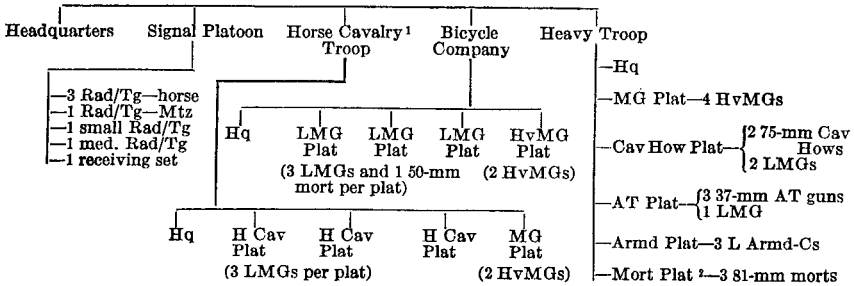
■ 6. INFANTRY DIVISION.—*a. Organization.*—



b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Machine pistols	5 LMGs	6 HvMGs	7 50-mm mortars	8 81-mm mortars	9 7.9-mm AT rifles	10 20-mm AA–AT guns	11 50-mm or 37-mm AT guns	12 75-mm cav hows	13 75-mm inf hows	14 150-mm inf hows	15 105-mm hows	16 105-mm guns	17 150-mm hows	18 Horses	19 Motorcycles	20 Motor vehicles	21 H-Dr vehicles	22 Notes
Div Hq	12	140	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20	12	26	----	
Div Recn Bn	15	560	----	24	8	3	3	----	----	3	2	----	----	----	----	----	213	30	48	3	
Div Inf:																					
Mtd Inf Plat	(1)	(31)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
How Co	(5)	(185)	----	----	----	----	----	----	----	----	----	(6)	(2)	----	----	----	----	----	----	----	
AT Co	(5)	(165)	----	(4)	----	----	----	----	(4)	(12)	----	----	----	----	----	----	----	(22)	----	----	
Bn	(25)	(813)	(48)	(36)	(12)	(9)	(6)	(9)	----	----	----	----	----	----	----	----	----	(5)	----	----	
Regt—total	[95]	[2, 993]	[144]	[112]	[36]	[27]	[18]	[27]	[4]	[12]	----	[6]	[2]	----	----	----	[480]	[45]	[80]	[204]	
Total Inf—3 Regts	285	8, 979	432	336	108	81	54	81	12	36	----	18	6	----	----	----	1, 440	135	240	612	
Div Arty:																					
105-mm Gun How Bn	----	----	----	(6)	----	----	----	----	(6)	----	----	----	----	(12)	----	----	(430)	(2)	----	----	
150-mm Gun How Bn	----	----	----	(6)	----	----	----	----	(6)	----	----	----	----	----	(4)	(8)	(435)	(2)	----	----	
Arty total	66	2, 615	----	24	----	----	----	----	24	----	----	----	----	36	4	8	1, 785	12	123	238	3 Bns 105-mm, 1 Bn 150-mm and 1 Obsn Bn.
AT Bn	23	595	----	18	----	----	----	----	12	36	----	----	----	----	----	----	----	80	170	----	
Engr Bn	26	851	----	28	----	----	----	----	----	----	----	----	----	----	----	----	52	28	87	19	
Div Vet Corps	6	228	----	----	----	----	----	----	----	----	----	----	----	----	----	----	188	----	10	----	
Div Med Corps	15	463	----	----	----	----	----	----	----	----	----	----	----	----	----	----	50	17	109	----	
Trains (Supply)	16	515	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	16	307	----	
Div totals	492	15, 379	432	430	116	84	54	81	48	75	2	18	6	36	4	8	3, 804	358	1, 122	879	
Attached Mtz AA Bn	21	800	----	----	----	----	----	----	36	----	----	----	----	----	----	----	----	137	147	----	

c. Reconnaissance battalion.—



STRENGTH:

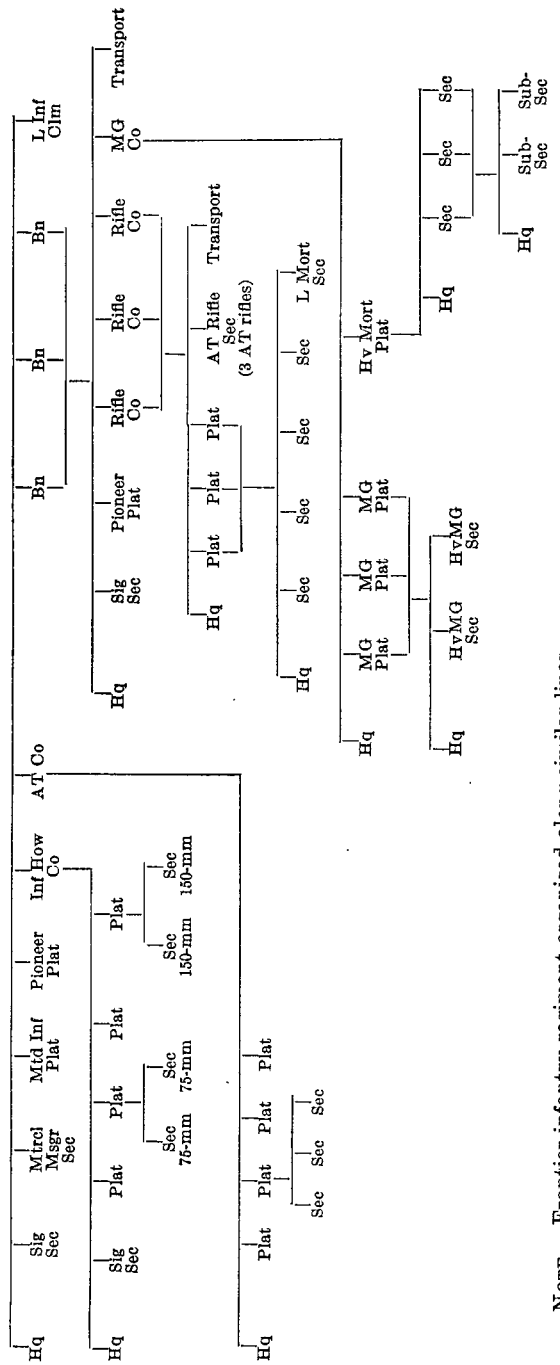
Unknown.

ARMAMENT:

24 LMGs.
8 HvMGs.
3 37-mm AT guns.
3 50-mm Morts.
3 81-mm Morts.
2 75-mm Cav Hows.

[1] Horse Cav Tr may have been replaced by another Bcl Co. Not confirmed.
[2] Not confirmed.

d. Infantry regiment (normal type).—



NOTE.—Frontier infantry regiment organized along similar lines.

■ 7. MOTORIZED INFANTRY DIVISION.—*a. Organization.*—

b. Table of organization.—

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Unit	*Officers*	*Enlisted men*	*Machine pistols*	*LMGs*	*HvMGs*	*7.9-mm AT rifles*	*20-mm AA—AT guns*	*37 or 50-mm guns*	*50-mm mortars*	*81-mm mortars*	*75-mm inf hows*	*105-mm hows*	*150-mm hows*	*Rifles*	*Pistols*	*150-mm inf hows*	*Bicycles*	*Motorcycles*	*Notes*
Div Hq				2															
Mtz Rcn Bn				24	25		10	3	3		2								
Inf:																			
Mtz Regt				(118)	(36)	(27)		(12)	(27)	(18)	(6)					(2)			Some Mtz Divs on Russian front have 2 Regts and 1 Mtrcl Bn. Composition is extremely flexible.
Total Inf—3 Mtz Regts				354	108	81		36	81	54	18					6			
Art:																			
150-mm How Bn				(6)									(12)						
105-mm How Bn				(6)								(12)							
Total Mtz Arty Regt	89	2,156		18								24	1						Mtz Arty Regt consists of 2 Bns 105-mm Hows and 1 Bn 150-mm Hows.
Div AT Bn	23	595		12				36											
Div AA Bn							12												
Pioneer Bn	26	945		28										823	151		33	15	
Sig Bn	18	363		4															
Med Bn																			
Div Tns																			
Div Totals	14,000		228	442	133	81	22	75	84	54	20	24	12			6			

■ 8. PANZER (ARMORED) DIVISION.—*a. Organization.*—

b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 LMGs	5 HvMGs	6 50-mm mortars	7 81-mm mortars	8 20-mm guns	9 37 or 50-mm guns	10 47-mm guns	11 75-mm inf hows	12 150-mm inf hows	13 75-mm hows	14 75-mm guns	15 105-mm hows	16 150-mm hows	17 Light Pz Kw I	18 Light Pz Kw II	19 Light Med Pz Kw III	20 Med Pz Kw IV	21 TOTAL 1st-line tks	22 Armored cars	23 Motorcycles	24 Motor vehicles	25 Notes
Div Hq	30	170														5						25		
Tk Regt	80	2, 224	12	355			69	102					30			22	58	102	30	162		179		
Tk Bn			(4)	(115)			(21)	(34)					(10)			(6)	(19)	(34)	(10)	(54)				3 Bns per Regt.
Mtz Rifle Brig	179	4, 939	284	70	45	30		15		16	4													
Mtz Rifle Regt	(70)	(1, 960)	(110)	(28)	(18)	(12)		(6)		(8)	(2)													2 Regts per Brig.
Mtz Bn																								2 Bns per Regt.
Mtrcl Bn	(28)	(947)	(58)	(14)	(9)	(6)		(3)																
Div Arty Regt			18											24	12									
105-mm How Bn			(6)											(12)										2 Bns per Regt.
150-mm How Bn	(21)	(536)	(6)												(12)									
Sig Bn	18	363	17																					
Engr Bn	26	849	9																			33	156	
Mtz Recn Bn		757	74	2	3		48		4			2									48*	120		*24 may be Mk. II tks.
Mtrcl Co	(4)	(152)	(18)	(2)	(3)																			
Armd-C Co	(5)		(25)				(24)																	2 Cos per Bn.
Mtz AT Bn	23	595	18					12	18															
AA Bn	25	625	8				24	9																
20-mm Co			(2)				(12)																	2 Cos per Bn.
37-mm Co			(2)					(9)																
Div Trains	60	1, 208																						
Div Totals: Total Personnel (approx.)—16,466. Total Vehicles for trans.—2,925 Total Tanks—201.																								

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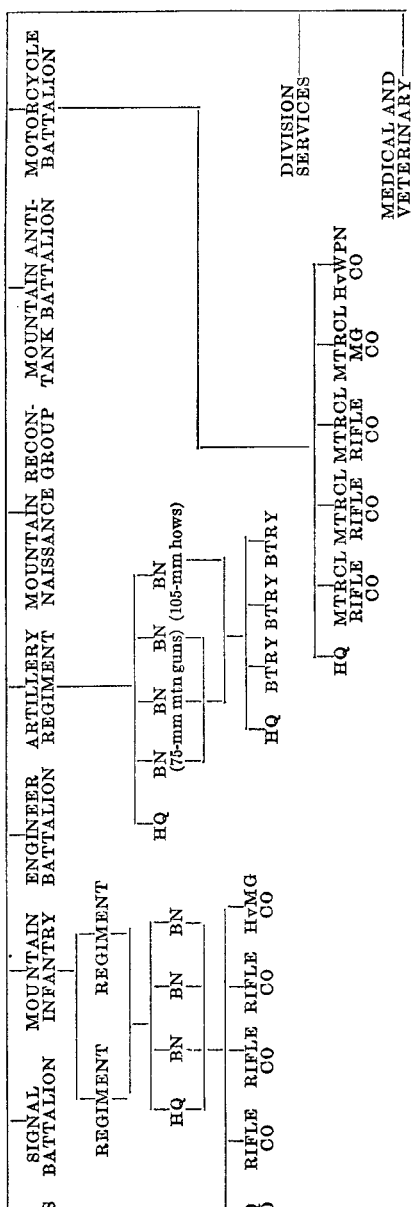
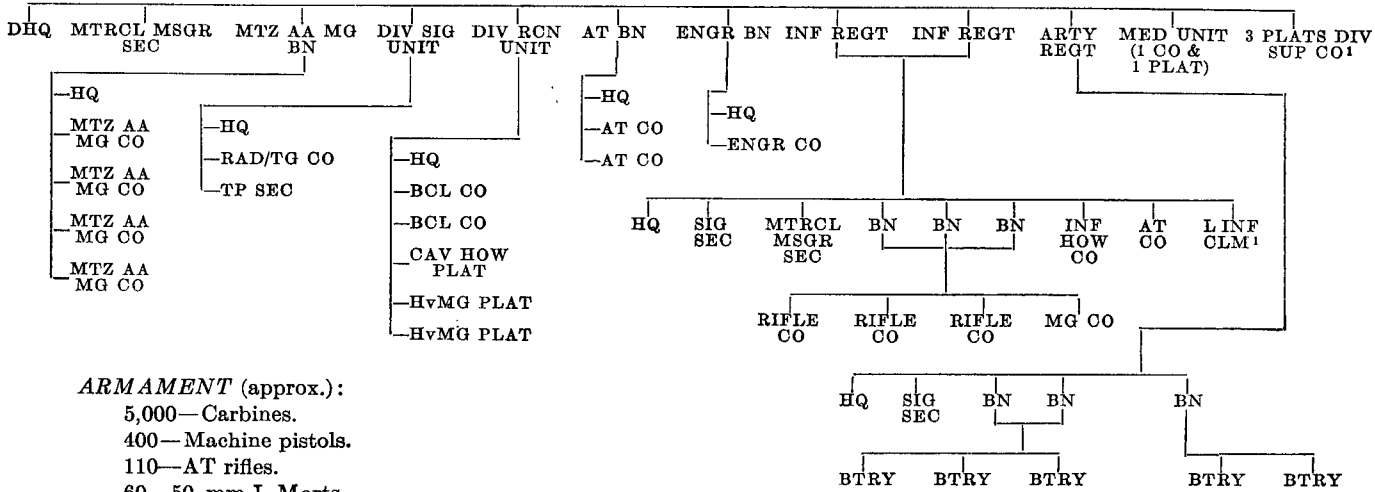
■ 9. MOUNTAIN DIVISION.—*a. Organization.*—



b. Table of organization.—

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Unit	*Officers*	*Enlisted men*	*7.9-mm AT rifles*	*LMGs*	*HvMGs*	*20-mm AT—AA guns*	*50-mm mortars*	*81-mm mortars*	*37 or 50-mm guns*	*75-mm mtn inf guns*	*75-mm pack howz*	*105-mm mtn howz*	*Animals*	*Motorcycles*	*Trucks*			*Notes*
Div Hq	200																	
Mtn Inf:																		
Bn	(12)	(1,180)	(3)	(35)	(10)		(9)	(6)	(2)	(2)			(370)	(12)	(25)			
Regt—2 Bns	(3,500)		(9)	(174)	(42)		(27)	(18)	(12)	(6)								
Total Inf—2 Regts	7,000		18	348	84		54	36	24	12								
Mtn Arty Regt:																		
75-mm Mtn Gun Bn				(6)							(12)							
105-mm How Bn				(6)								(12)						
Total Arty Regt	2,245			24							36	12						Arty Regt is composed of 3 Bns 75-mm mtn guns and 1 Bn 105-mm Hows.
Div Sig Bn	18	456											56	28	102			
Mtn Recn Gp	575			24	8	3	3	3	3		2							
Mtn AT Bn	618			18					30									
Engr Bn	15	420		28														Carries trestle-bridge equipment, no pontons.
Mtrcl Bn	1,050		3	58	14		9	6	3	2								
Med & Vet Units	927																	
Div Services	901																	
Div Totals	14,402		21	500	106	3	66	45	60	14	38	12						

■ 10. AIR-BORNE DIVISION.—



ARMAMENT (approx.):

5,000—Carbines.
400—Machine pistols.
110—AT rifles.
60—50-mm L Morts.
36—81-mm Morts.
8—75-mm Inf Hows.
2—75-mm Cav Hows.
30—20-mm AA & AT MGs.
200—LMGs.
60—HvMGs.
30—37-mm AT guns.
32—75-mm Mtn Hows.

STRENGTH (approx.):

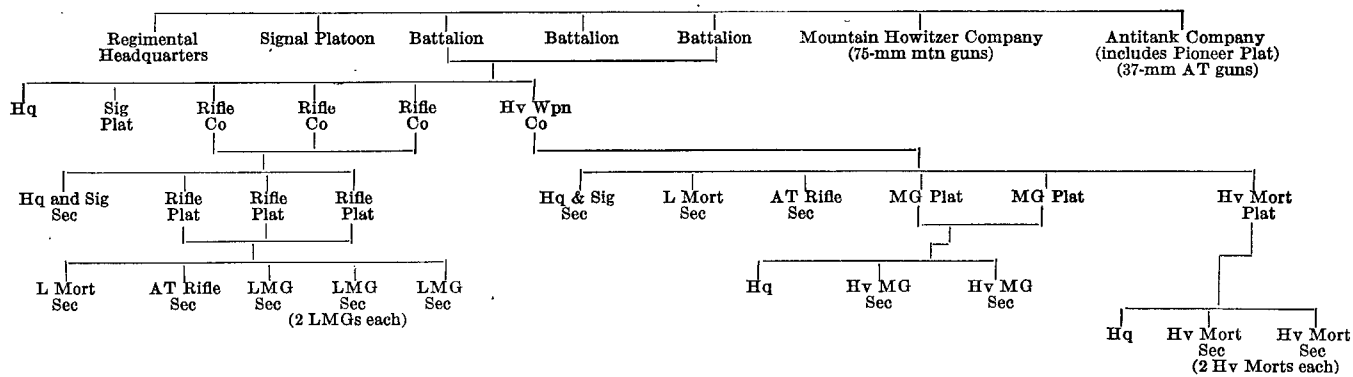
O—270.
EM—7,130.

[1] Without vehicles.

SECTION IV

MISCELLANEOUS COMBAT UNITS AND AIR FORCE

■ 11. PARACHUTE REGIMENT.—



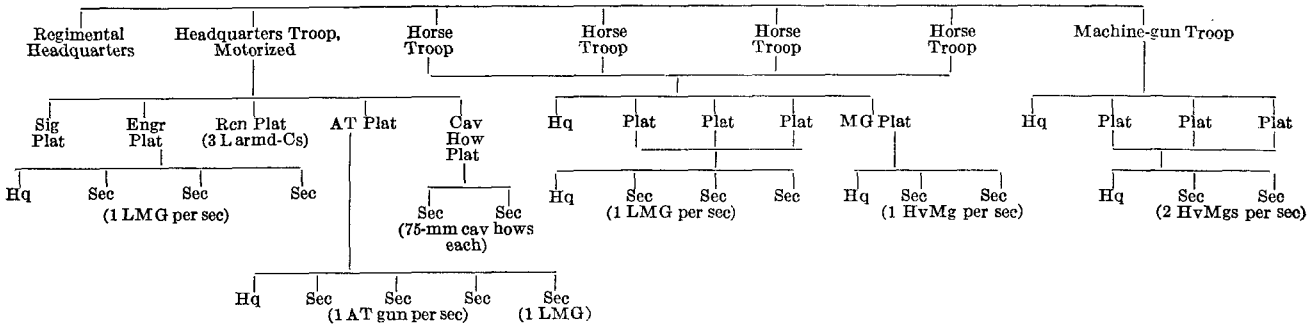
ARMAMENT (Battalion):

4 81-mm Morts.
10 50-mm Morts.
72 LMGs.
8 HvMGs.
62 Machine pistols.
Carbines and 7.9 AT rifles.

STRENGTH:

Regiment, approx.—2,000.
Battalion, approx.—550.

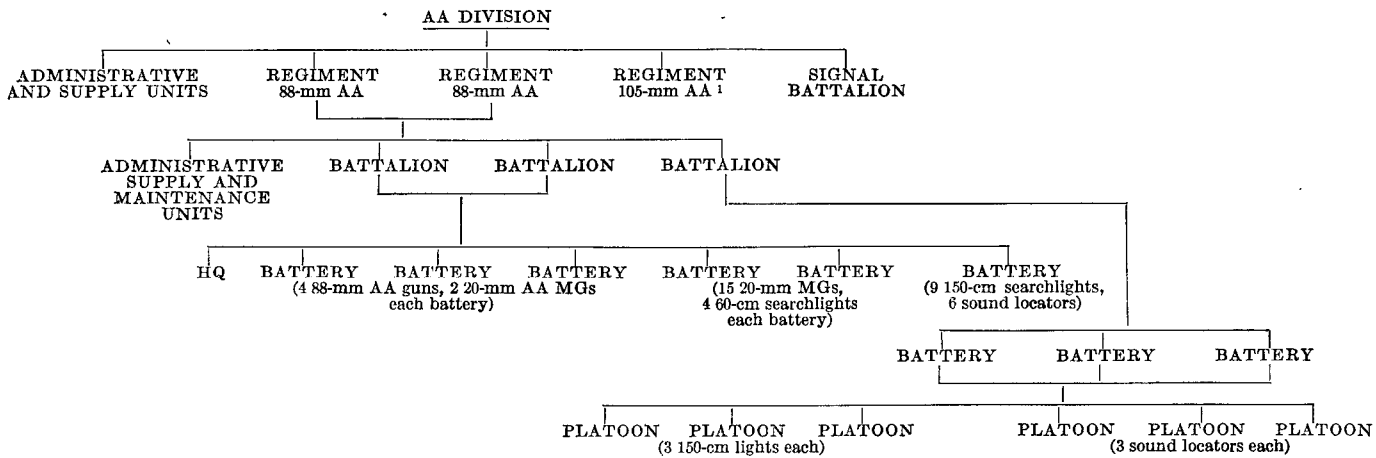
■ 12. HORSE CAVALRY REGIMENT.—



ARMAMENT:

	LMG	HvMG	37-mm	75-mm
Regt	40	20	3	2
Hq Tr	4		3	2
Horse Tr	9	2		
MG Tr		12		

■ 13. ANTIAIRCRAFT TROOPS.—AA Corps is largest unit. At least four were known to exist in 1940. AA Corps consists of two or more AA Divisions plus auxiliary units.



[1] Organization of 105-mm AA Regt is not known, but is believed same as 88-mm.

■ 14. BICYCLE BATTALION.—

STRENGTH:
Unknown.
ARMAMENT:
36 LMGs.
8 HvMGs.
9 50-mm Morts.

■ 15. HORSE ARTILLERY BATTALION.—Battalion consists of:

Headquarters.
Signal platoon.
Survey platoon.
Meteorological platoon.
Three batteries.
Two platoons of 2 75-mm guns, 1 LMG, and 1 20-mm MG each.
Two ammunition echelons.

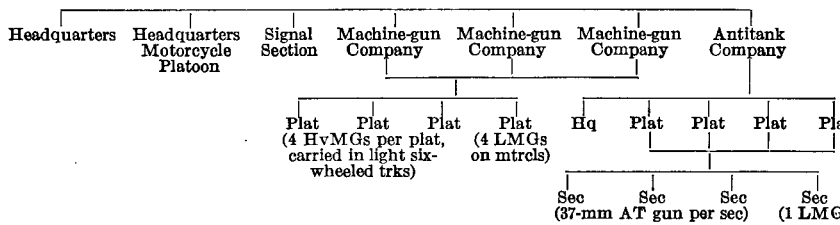
STRENGTH:

O—21.
EM—535.

ARMAMENT:

12 75-mm Mtn Hows.
6 LMGs.
6 20-mm AA and AT MGs.

■ 16. MOTORIZED MACHINE-GUN BATTALION.—



STRENGTH:

O—26.
EM—964.

ARMAMENT:

12 37-mm AT guns.
36 HvMGs.
20 LMGs.

■ 17. AIR FORCE UNITS.—*a. Organization.*—

No. of units involved	Unit	Planes	Personnel		
			Officers	EM Pilots	EM
	AIR FLEET	864–6, 561			
2 or more	Air Corps Air Corps	432–2, 187			
2 or more	Air Div Air Div	216–729			
2 or more	Wg Wg Wg	108–243	56	54	1, 225–1, 450
	Gp Gp Gp	54–81	18	18	400–475
	Sqdn Sqdn Sqdn	18–27	5	6	100–125
	Flt Flt Flt	2–3			

b. Command.—Goering is the supreme commander of all elements of the Air Force. As such he has control of—

All military aviation, to include: procurement of personnel and material, training, and the development of equipment, supply, tactical operations, air defense measures, AA artillery, civilian air defense, etc.

Civil and commercial aviation, and coordination with military aviation.

He is responsible to Hitler alone for all matters pertaining to the Air Force.

Units assigned to duty with the Army or Navy are controlled by an officer responsible to the Army or Navy commander concerned with the operations of such units, and to Goering for equipment and training.

SECTION V

SIGNAL, ENGINEER, AND CHEMICAL UNITS

■ 18. SIGNAL UNITS.—

Unit	*O*	*EM*	*Remarks*
Sig Bn, Inf Div	18	456	Hq Gp. Tp Co. Rad Co. L Sig Clm, partly mtz; 67 trks personnel, 35 trks equipment. Tp construction and operation. Rad construction and operation. Rad and Tp intercept. Cipher and interpreter Sec.
Sig Bn, Mtz Inf Div	------	--------	Believed as above but fully motorized.
Sig Bn, Armd Div	------	--------	Hq Gp. Armd Rad Co. Armd Sig Co. L Armd Sig Clm. Rad and Tp operation and maintenance. Command vehicles. Ciphers.
Sig Bn, Corps (Mtz)	24	757	Hq Gp. 3 Tp Cos. Tp Operating Sec. Rad Co. L Sig Clm.
Sig Bn, Armd Corps	16	329–406	Hq Gp. Armd Tp Co. Armd Rad Co. L Armd Sig Clm.
Sig Regt, Army	69	2100	Hq Gp. 1 Bn (Hq Gp, Tp opr. Co, Rad Co, L Sig Clm). 2 Bns (Hq Gp, Tp Opr. Co, Tp Co, 2 Tp Cons. Cos, L Sig Clm). Communication to Army troops and corps. Additional communication to subordinates as required.
Sig Bn, Mtn Div	------	--------	Believed same as Inf except horse or horse-drawn.
Sig Co, Cav Brig	5	201	8 Mtz Tp Subsecs, 2 horse 10 Mtz Rad Subsecs, 6 horse 1 Cipher Subsec (Expansion of Cav Brig to Div, probably Co became expanded to Bn)
Sig Sec, Tk Brig	------	--------	2 L Tp Subsecs. Rad and Comd vehicle Secs.

■ 19. ENGINEER UNITS.—

Unit	*O*	*EM*	*Remarks*
Bn, Inf Div	26	851	1 per Inf Div.—Hq. Sig Sec. 2 part Mtz Cos, 1 Hv Mtz Co, 1 bridge Clm. 1 tools Prk. 1 Sup Prk. Bridge work most important.
Bn, Mtz Inf Div	26	851	1 per Mtz Inf Div.—Hq. Sig Sec. 3 Hv Mtz Cos. 1 bridge Clm. 1 tools Prk. 1 Sup Prk.
Bn, Armd Div	30	845	1 per Armd Div.—Hq. 3 L Mtz Cos. 1 Mtz bridge Clm. 1 Sup Prk.
Bn, Mtn Div	15	420	1 per Mtn Div.—Hq. Sig Sec. 3 Cos. Carries trestle bridge equipment, but no pontons.
Bn, Cav Div			
Bn, GHQ	38	1249	Hq. Sig Sec. 3 Hv Mtz Cos. 3 bridge Clms. 1 tool Prk. 1 Sup Prk. Strengths of various units are same as equivalent in an Inf Div.
Part Mtz Co	4	186	2 per Inf Div.—Hq. 1 Sup Sec. 3 Plats, each of 3 Secs. 9 LMGS, 4 large and 6 small pneumatic boats. Men march; equipment carried in horse-drawn and motor vehicles. 200 AT mines, 1,750 pounds explosives, 400 yards barbed wire.
Hv Mtz Co	4	183	1 per Inf Div. 3 per Mtz Div. 3 per GHQ Bn.—Hq. 1 Sup Sec. 3 Plats, each of 3 Secs. Transported in 9 Trks, each carrying 1 noncom and 16 privates, 300 AT mines, 1 LMG, 1 power-driven saw, picks and shovels; and 3 Trks each carrying 12 men, explosives, ammunition, picks and shovels, 2,200 pounds explosives.
Bridge Clm, Mtz	6	184	1 per Inf Div. 1 per Mtz Inf Div. 1 per Armd Div. 3 per GHQ Bn.—Fully mtz. 2 Plats, each equipped with ponton bridge material. 1 Plat with motorboats, outboard motors, and pneumatic boat equipment. "Model B" equipage is carried.
Tool Prk, Mtz	2	48	1 per Inf Div. 1 per Mtz Div.—Fully motorized; carries battalion reserve of tools.
Sup Prk, Mtz	1	29	1 per Inf Div. 1 per Mtz Div. 1 per Armd Div.—Fully motorized and carries battalion reserve of explosives, ammunition, light tools, wire and smaller Engr stores. 800 AT mines, 4,400 pounds explosives.

■ 20. CHEMICAL WARFARE.—

	O	EM	Remarks
Chemical Bn	(approx.) 600		Hq. Sig Sec. 2 Cml Proj Cos. Decontamination Co. 4 cars and 20 trks per Co. Proj Co has 8 100-mm morts plus candles, cylinders, etc.
Other chemical possibilities:	------	------	Some tanks in Tk Regt equipped for emission of gas. Mtz Engr Bns believed to have flame throwers, gas sprayers driven by motor pumps, and smoke apparatus.
Chemical agents	------	------	Main agents as listed below, nothing new of importance believed discovered. Possible use of *ARSINE*. (1) Blister gases. German—"Yellow Cross." Mustard HS. Lewisite I. (2) Choking gases. German—"Green Cross". Phosgene CG. Diphosgene. Chloropicrin PS. (3) Nose gases (toxic smokes). German—"Blue Cross". DA. DC. DM. (4) Tear gases. German—"White Cross". CN. CA. Bromine compounds.
Offensive weapons and equipment.	------	------	*Aerial spray*—Low altitude, mixtures of mustard gas & lewisite, or either alone. *Chemical aerial bombs*—Highly developed by Germans. 22 lbs—toxic. 110 lbs—mustard, small or large burster for ground or personnel contamination. 550 lbs—mustard, time fuze for action about 300 ft. above ground, covers 6,000 sq. yds. Plain glass bombs or capsules, mustard gas. *Projectors*— 105-mm and 150-mm artillery shell, mixed with HE. Mortars are equipment of chemical troops. Also possible adaptation of 81-mm mort. Gas grenades. Gas cylinders. Gas mines. Bulk contamination from mobile spray units. Toxic generators, large number captured from French.

■ 21. SMOKE.—

	O	*EM*	*Remarks*
Smoke (Bn?) unit			Hq. Sig Sec. 3 Smoke Cos. 2 Sec per Co (120 men). 24 vehicles per Co. Eight 81-mm morts per Co, 24 per unit. 1 Co equipped for decontamination.
Smoke agents			Generators and candles—Berger type mixtures. Pressure type—Drums of CSA and compressed air cylinders.
Other smoke units			Arty shell—not favored. Armored Force vehicles—smoke-producing apparatus. Engr units—smoke to cover working parties and locations. Aircraft—curtains and screens, using titanium tetrachloride.

SECTION VI

CHARACTERISTICS OF MATÉRIEL

■ 22. INFANTRY AND CAVALRY WEAPONS.—

1	2	3	4	5	6	7	8	9	10	11	12
Weapon and caliber	*Weight in firing position (lb.)*	*Method of operation*	*Type of feed*	*Maximum rate of fire (rds. per min.)*	*Practical rate of fire-prolonged (rds. per min.)*	*Weight per round (lb. or grains)*	*Maximum range (yd.)*	*Maximum effective range (yd.)*	*Effective radius of burst-fragmentation (yd.)*	*Penetration (thickness, degrees, range)*	*Remarks*
"Karbiner '98 k." Mauser 7.9-mm.	8.58	Manual									
With bayonet	9.83										
"Schmeisser" Mach. Pist. 28/11 8.9-mm. or 9-mm.	9.7		20, 25, & 50 Box magazine.	500		185 gr		200			
With full mag. 50 rds	11.0			250-320 sust.							
"Steyr-Solothurn S. 1-100". 9-mm. (mach. pist.).	9.2		30 rd. Box magazine.			200 gr					
With bayonet	9.9										
"Pistole 08" (Luger) 9-mm	1.87	Recoil, semi-automatic.	8 rd. magazine.								
"Dreyse LMG 13." 7.9-mm		Air-cooled, recoil, auto, and semiauto.	25 rd. magazines.		150						Normally bipod mount, tripod for AA.
With mounting	26										
"Knorr-Bremse" 7.9-mm	22		25 rd. magazine.	500-2,000*.	150-200						*Claimed.
MG-34 (dual-purpose) 7.9-mm		Air-cooled	Metal belt of 10 strips 25 rds. each. Bands on drum for AA.	900	*110-120		*2,200				*Bipod or tripod, latter also for AA. LMG refers to bipod mount, HvMG to tripod.
Without mount	15½				300-350		3,800				

Trench Mortar, light, 50-mm	31	Manual, muzzle load, trigger fire. Direct laying.		60		1¾ lbs.	500	350	24		HE and smoke.
81-mm:											
Mortar, L 15	68.2	Muzzle load, by trigger, or by percussion.									
Mount	61.6				20–25	HE 9.6 lbs	5,000				Also smoke.
Base Plate	55.0										
Sight	2.2										
81-mm Mortar, S Gr W 34	125	Muzzle load, by trigger, or by percussion.				HE 14.3 lbs	65–2,070				
75-mm Inf How.—LMW 18		Breech	Manual	20	15–20	HE 14¼	3,900		20		
75-mm Close Support Inf How. L 13.		Breech	Manual	20	15–20	HE 10	5,600				
						HE 14	4,200				
150-mm Hv Inf How—S Inf G33.	3,300	Breech	Manual		4	80	6,000				
47-mm Self-Propelled AT Gun						AP 3.75				60–30–650 80–10–200	Armor protection.
75-mm Self-Propelled Assault Gun.							9,000				Armor protection.
25-mm Self-Propelled AT Gun (mtd on converted Pz Kw II).	18,000				20–25	AP 11.3 ounces		300		50–N–400 32–22–400	Road speed 24 mph. Cross country 16 mph. Penetrate 50 mm/100 yds/30°.
37-mm AT Gun		Breech	Manual		12	AP 1.68	4,400	400		33–N–650 43–N–330	Penetrate 25 mm/700 yds/30°.
						HE 1.37					
50-mm AT Gun (without mount).	650					AP 4.55		600			Penetrate 60 mm/400 yds/30°.
Grenade—PH 39	1.33	Manual				1.33					4½ sec. fuze delay action.
Grenade—M 24	1.25	Manual				1.25					5½ sec. fuze delay action.
20-mm AA/AT MG					100			300			Penetrate 22 mm/500 yds/normal.

There are also antitank rifles of 7.9-mm, 12-mm, 13-mm, and 15-mm calibers, effective against light armor at varying ranges up to 300 yards.

■ 23. ARMORED VEHICLES—*a. Tanks.*—

1	2	3	4	5	6	7	8	9	10	11	12 Dimensions (in.)			13	14	15
Type of vehicle	*Weight (tons gross)*	*Armament*	*Main armor*	*Crew*	*Maximum speed on roads (mph)*	*Spanning capacity (ft.)*	*Slope climb (degrees)*	*Safe ford depth (in.)*	*Vertical obstacle (in.)*	*Radius of action (miles)*	*H*	*L*	*W*	*Belly clear. (in.)*	*Communication*	*Notes*
Lt Tk—Polish	2.5	2 7.9 Hotch. or 1 20-mm AT.	10-mm	2	28	5′	45	20	16	85	54	102	72	12	Flag	
Lt Pz Kw I—German	5.7	2 LMGs	14-mm	2	32	4′7″	45	24		95	68	156	77	12	Rad/Tg	
Lt T. N.—H. P.—Czech	8.5–10	1 37-mm 2 HvMGs	25-mm	3–4	53	6′5″	40–45	16	32	125	88	182	81	16	Rad/Tp Flag Lamp	
Lt Pz Kw II—German	9	1 20-mm 1 LMG	15-mm	3	28	4′11″	45	32	23	125	66	178	72		Rad/Tg	
Lt Med A. H. IV—Czech	10	1 37-mm 1 MG	24-mm	3	53	6′7″	40–45	31	24	93	87	198	79	14	Rad/Tp Lights	
Lt Med LT35—Czech	11.5	1 37-mm 2 LMGs	25-mm	3	22	6′6″	40	31	31	70	94	194	90		Rad/Tp Lamp Flag	1 MG coaxial (37-mm).
Lt Med C. K. D. V. 8H—Czech.	16.5	1 47-mm 2 HvMGs	36-mm	4	27	7′6″	41	39	39	77	92	210	90	18	Rad/Tg Rad/Tp	1 MG coaxial (47-mm).
Lt Med Pz Kw III—German.	18–20	1 37-mm 2 LMGs	30-mm	3–4	28			35			90	197	90		Rad/Tg	1 MG coaxial (37-mm).
Med Pz Kw IV—German	22	1 75-mm 2 LMGs	43-mm	5	31			42			102	204	87		Rad/Tg Rad/Tp	1 MG coaxial (75-mm).
Hv Pz Kw V—German	36	1 75-mm 1 37-mm 3 LMGs	60-mm	7–8	20	11′6″		40	55	75–85	120	300	108		Rad/Tg Rad/Tp	37-mm and 75-mm are coaxial. Unconfirmed.
Hv Pz Kw VI—German	45	1 105-mm 1 37-mm 3 LMGs	75-mm	7–8	20	11′6″		40	55	75–85	120	300	108		Rad/Tg Rad/Tp	Unconfirmed.

b. Armored-car units.—

1	2	3	4	5	6	7	8	9	10	11	12			13
Type of vehicle	*Weight (tons—gross)*	*Armament*	*Main armor*	*Crew*	*Maximum speed on roads (mph)*	*Radius of action*	*Wheels x drive*	*Communication*	*Fuel capacity (gal.)*	*Belly clear. (in.)*	*Dimensions (in.)*			*Notes*
											H	*L*	*W*	
L Rcn Car	1.7	1 LMG	10-mm	2-3	40-50	175	4 x 2	Flag		18	63	120	66	
L—Tatra 30	2.5	2 LMGs	14-mm	3	37	155	6 x 4	Flag		23	78	156	58	
L—Horch 36 Sd. Kfz 221-2-3	4-7	1 20-mm 1 LMG	8-mm Visors/ 15-mm	3	30	155	4 x 4	Rad/Tg		7¾	71½	187	75½	Sd. Kfz 222 has Rad/Tp and 1 13-mm HvMG, 1 LMG.
Med—ASP 6	6.4	1 20-mm 1 LMG	14-mm	4	50	200-240	6 x 4	Rad/Tg Flag			96-108	197	90-108	
Med—ADKZ, Mk. I and Mk. II	7	1 AT gun 1 MG	14.5-mm	3	40			Rad/Tg						Very quiet—hydraulic drive.
Med—PA II or PA XXIV	8	5 LMGs	?	5			4 x 4	Rad/Tg Flag		12	97	240	86	
Med—PA IV	8.7	1 20-mm 2 LMGs	14-mm	5	35		4 x 4	Rad/Tg Flag		20	106	235	81	
Heavy—8-wheeled	9-10	1 20-mm 1 LMG	30-mm	4-5	53	250	8 x 8	Rad/Tg		20	108	210	96	
Heavy—ADGZ	11.5-12	2 HvMGs 2 LMGs	18-mm	7-12	50	186	8 x 8	Rad/Tg Flag		12	109	234	85	

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■ 24. FIELD ARTILLERY AND ANTIAIRCRAFT ARTILLERY.—*a. Field Artillery.*—

1	2	3	4	5		6	7	8		9	10	11	12		13
Weapon—type and caliber	*Weight of piece, traveling position with normal load exclusive of personnel (lb. approx.)*	*Piece transport*	*Weight of prime mover with normal load (lb. approx.)*	*Normal overall width, traveling position*		*Time to emplace or change from firing to traveling*	*Traverse*	*Normal rate of fire (rds. per min.)*		*Maximum effective range (yd.)*	*Approximate weight of ammunition*	*Unit of fire (rds. per piece)*	*Rate of march*		*Notes*
				Piece	*Prime mover*			*Short bursts*	*Prolonged*				*Roads*	*Cross-country*	
75-mm field gun															
105-mm howitzer										12,000	31.79				
105-mm gun										19,700	35				
150-mm howitzer										16,400	95.7				
150-mm gun										25,000	113.5				
210-mm gun															
240-mm gun															
210-mm howitzer										18,270	264				
240-mm howitzer															
300-mm howitzer															
305-mm howitzer															
280-mm gun															
305-mm gun															
380-mm gun															

b. Antiaircraft artillery.—

1	2	3	4	5	6	7		8	9	10	11	12
Caliber and model	*Length of bore (cals.)*	*Muzzle velocity (f/s)*	*Weight of shell (lb.)*	*Maximum range horizontal (yd.)*	*Maximum range vertical (ft.)*	*Rate of fire*		*Elevation*	*Depression*	*Traverse*	*Weight in action*	*Method of transport*
						Theoretical	*Practical*					
20-mm AA and AT gun (super-HvMG).	65	2,950	0.308	6,124	12,468	280	----------	90	0	360	1,012 lbs.	Towed by L tractor.
37-mm AA gun	50	2,800	1.4	8,744	15,600	150	----------	85	−10	360	1.7 tons	Towed by truck.
47-mm AA gun	----------	2,620	3.3	11,695	24,000	25	15	85	−10	360	1.7 tons	
75-mm AA gun, L/60	60	2,775	14.3	17,815	37,000	20	20	85	−3	360	2.9 tons	Tractor.
88-mm AA gun, L/56 [1]	56	2,750	19.8	16,000	37,000	25	15	85	−3	360	5.2 tons	Do.
90-mm AA gun	50	2,540	22.4	13,700	30,000	15	8	80	0	360	6.4 tons	
105-mm AA gun	60	2,950	32.2	19,100	42,640	15	15	80	10	360	11.7 tons	Do.
127-mm AA gun	50	2,500	55	19,500	42,000	20	12	90	0	360	----------	Do.
150-mm AA gun	----------	3,450	89	----------	66,000	15	10	----------	----------	----------	----------	

[1] Penetration of face-hardened armor plate, angle of impact of 20° to normal: at 500 yds.—4.2 in.: at 1,000 yds.—3.8 in.

■ 25. AIRCRAFT.—

1 Name, model, and class	2 Motors	3 Crew	4 Bomb load (lb.)	5 Ceiling (ft.)	6 Operating range (miles)	7 Operating speeds	8 Rate of climb (min. to/ft.)	9 Armor	10 Armament
Focke-Wulf Kurier — Heavy Bomber.	4	6		28,000	775–1,180	265 mph at 9,500 ft	2.5 min./3,280 ft.; 14.3 min./13,120 ft.		Cannon and MGs.
Heinkel—Bomber:									
HE—111 Mk. Va	2	4	4,400	26,200	2,110 with 2,200 lb.	280 mph at 14,000 ft	17 min./13,120 ft		3 flex. 50-mm MGs or cannon in nose.
HE—111 K. Mk. V	2	4	4,400	24,100	2,170 with 4,400 lb.	274 mph at 12,300 ft	16.8 min./13,120 ft		Same as 111 Mk. Va.
HE—111 K. Mk. LL1	2	4	2,200–4,500	24,100	1,000	252—272 mph*	2.1 min./3,280 ft		Same as above. *Type motor.
Heinkel—Bomber: 177	4	5	12,000	36,000	1,863–4,000	Max. 340 mph	30 min./20,000 ft		5 MGs.
Dornier—Bomber:									
DO—17	2	3	2,200	29,283	965–1,860; 1,200 at 210 mph.	Max. 288 mph	1.8 min./3,280 ft.; 17 min./19,680 ft.		8 flex MGs.
DO—215	2	4	2,200	27,230	1,044 at 264 mph	Max. 312 mph at 16,400 ft	1.8 min./3,280 ft.; 12.8 min./16,400 ft.		5 MGs.
Junkers—Bomber:									
JU—88	2	4	2,200–4,000	29,520	1,560 at 185 mph	Max. 320 mph at 15,580 ft	7.1 min./15,000 ft		3 Mgs.
JU—87—Dive bomber	1	2	1,320	27,890	498 at 186 mph	242–250 mph.; dive—430 mph.	8.5 min./13,120 ft.		2 MGs.
Messerschmitt—Fighter:									
ME—109	1	1	500	36,080	620 at 298 mph; 540 at 322 mph.	Max. 354 mph	3.8 min./13,120 ft	8-mm	2 MGs. 2 20-mm cannon.
ME—110	2	3	1,100		1,300 at 315 mph	Max. 370 mph	10.1 min./20,000 ft		4 MGs. 2 20-mm cannon.
Heinkel—Pursuit:									
HE—113	1	1		37,000		Max. 400 mph			2 MGs. 1 cannon.
Focke-Wulf—Pursuit:									
FW—187	2	2		38,700		Max. 400 mph	1.9 min./6,560 ft		4 MGs. 2 20-mm cannon.
FW—198	1	1		34,500	590 at 295 mph	Max. 370 mph	2,750 ft. per min		4 MGs. 2 cannon.

CHAPTER 2
MOVEMENT

SECTION I
FACILITIES

■ 26. ANIMALS.—*a. Animal-drawn transportation.*—
(1). 4-horse large field wagon (HF 2).
Characteristics:

Weight, empty	1, 760 lb.
Weight, loaded	4, 400 lb.
Weight behind each horse	1, 100 lb.
Length less pole	14.2 ft.
Cubic capacity	54, 000 cu. ft.

(2) 2-horse light field wagon (HF 1).
Characteristics:

Weight, empty	1, 342 lb.
Weight, loaded	2, 992 lb.
Weight behind each horse	1, 496 lb.
Length less pole	13.8 ft.
Cubic capacity	48, 100 cu. ft.

b. Number.—(1) Horses on hand in Germany:

December 8, 1938	*1937*	*1936*
3, 442, 700	3, 433, 800	3, 410, 300

Imports for 1938 numbered 19,576, so most of the imported horses must have been destined for the army.
(2) Horses in the German Army (November 1, 1941):

	Total
Cavalry Divisions	6, 000
Corps Cavalry Regiments (14 with 950 each)	18, 000
Horse-drawn Artillery (230 with 2030 each)	466, 900
Infantry Regiments (690 with 606 each)	418, 140
Divisions (230 with 4201 each)	966, 230
Total in German Army	990, 230

■ 27. MOTOR TRANSPORT.—*a. Total.*—(1) Estimated total motor-vehicle equipment (including tracked vehicles, but excluding armored vehicles and motorcycles) is slightly under 500,000 units in the German Army.
(2) Motor vehicle equipment of the Air Force and AA units is estimated about 135, 000 units.
(3) Civilian vehicles prior to the war:

Private cars	1, 300, 000
Commercial, etc	475, 000

b. Cargo truck.—Characteristics:
6-cylinder, water-cooled diesel motor.
120 hp European rating.
6 wheels, 2 axles (4 x 4, 2 dual tires).
Maximum speed, 45 mph.
Brakes—compressed air and hydraulic.

■ 28. AIR TRANSPORT.—*a. German transport aircraft.*—

1	2	3	4	5	6			7	8		9
					Load per aircraft				Total load		
					Personnel						
Model	No. of engines	Cruising speed (mph)	Cruising range (miles)	Radius of action at cruising (miles)	Crew	Troops	Freight (lb.)	No. of aircraft available	Personnel	Freight (lb.)	Remarks
Junkers 52	3	170	1,000	400	3	17		1,500 (approx.)	30,000		Normal load.
Do	3	170	250	100	3		5,000	1,500 (approx.)		75,000	Do.
Do	3	162	1,070	428	3		3,000	1,500 (approx.)		45,000	Do.
Do	3	162	780	312	3		5,000	1,500 (approx.)		75,000	Do.
Do	3	162	250	100	3		7,500	1,500 (approx.)		112,500	Do.
Do	3	165	830	332	3		5,000	1,500 (approx.)		75,000	Overload.
Do	3	165	300	120	3		8,000	1,500 (approx.)		120,000	Do.
Do	3	170	1,000	400	2	10–12		1,500 (approx.)	21,000		Parachutists.
Junkers 252	3	200									New type—few in service in 1942.
Junkers 90	4	199	1,300	520	3	40		40–50	1,935		Normal load.
Do	4	199	1,300	520	3		3x3 ton tanks	40–50		135x3 ton tanks	Do.
Do	4	230	1,080	432	3		13,000	40–50		585,000	Normal load with Jumo 211 engine.
Do	4	230	810	324	3		9,000	40–50		405,000	Normal load with B MW 132 H. engines.
Do	4	225	790	326	3		22,000	40–50		990,000	Overload.
Do	4	230	950	380	3		22,000	40–50		990,000	Assisted take-off.
Do	4	225	1,950	780	3		13,000	40–50		585,000	Extra fuel tanks.
Junkers 290	4				3–7	40					Improved Ju 90—few in service in 1942.
Heinkel 116	4	205 (max.)	2,795	1,112	4	16		16 under construction in 1940.			Converted mail and freight carrier.
Do	4	205 (max.)			4		3,200				
Blohm and Voss 142	4	217	2,700	1,580	4	20					Only a few—not in general use.
Do	4	217	2,700	1,580	4		4,000				

Blohm and Voss 222	6	170	4,400 to 5,600 (est.)	1,760 to 2,240		80+					New type—few as yet, increasing numbers expected.
Do	6	170	4,400 to 5,600 (est.)	1,760 to 2,240			22,000				
Focke-Wulf 200	4	230	1,200	480	5–6		6,000	Few			
Do	4	230	1,200	480	5–6	30		Few			Usually restricted to staff duty.
Junkers 86	2	200	700	280	4	10					Obsolete as transport.
Do	2	200	700	280	4		2,000				Few may still be in use.

b. Gliders.—(1) The glider types which are considered to be operational are:

Type	*Load*
D. F. S. 230	16 men or 2,834 pounds.
Gotha 242	23 men or 5,500 pounds.
Merseburg	40–50 men or 20,000 pounds.

(2) A fourth type, the Goliath, capable of carrying 140 men or 16 to 20 tons (35,000–40,000 lb.), has been identified, but it is not believed to be operational as yet.

(3) The Germans appear to favor the D. F. S. 230 for troop transport. This glider carries one complete German machine-gun unit of 10 men with all equipment and ammunition. This glider has a gliding range in still air of 35 miles from 10,000 feet, or 10 miles from 3,300 feet.

(4) The Gotha has been used primarily for freight carrying and can be towed by several different types of tug. The gliding range is not known.

(5) The Merseburg with its reputed load is wide enough to take a Pz Kw II tank, but with this load is too heavy to be towed by a single Junkers 52.

(6) The Goliath has a twin fuselage, each of which can accommodate 70 men or 17,500 to 20,000 pounds. Towing might be accomplished by a special, high-powered tug or a team of three Junkers 52's or four Messerschmitt 110's.

(7) The Germans are believed to have at least 4,000 gliders in operational use, with an adequate supply of glider pilots. The majority of the gliders are D. F. S. 230's. Thus, in one trip, the Germans should be able to transport 55,000 men or 15,000,000 pounds of supplies.

(8) A glider *Staffel* organized for transport consists of 12 to 15 airplanes.

c. Performance of glider tugs.—

Tug	*D. F. S. 230*			*Gotha 242*			*Merseburg*		
	Towed	*Miles*	*Cruising*	*Towed*	*Miles*	*Cruising*	*Towed*	*Miles*	*Cruising*
Messerschmitt 109	1	500	140						
Messerschmitt 110	1	1,230	140						
	2	1,050	140						
2 x Messerschmitt 110							[1] 1	280	140
Junkers 52	1	1,600	110	1	(?)	110	1	990	110
	2	1,410	110						
	3	1,270	110						
Henshel 126	1	630	120						
	2	490	120						
Henshel 123	1	350	110						
	2	260	110						
2 x Junkers 52							[1] 1	1,100	110
2 x Henshel 126							1	180	120
2 x Henshel 123							1	100	110
Heinkel 111	1	1,548	120						
	2	1,366	120						

[1] All-up weight 50,000 pounds. Tugs at maximum fuel capacity.

■ 29. RAIL TRANSPORT.—*a. Engines.*—Types:

(1) *Electric.*—Weight 102 tons; 4 traction wheels, 2 idlers on each rail; 6,000 hp; operate to 100 mph; haul 17 coaches.

(2) *General.*—Standardization has reduced types from 210 to 13. Some have maximum speed of 122 mph, but can only haul up to 250 tons. Some haul a maximum weight of 650 tons, at a minimum of 74 mph on the level, or 37 mph on a grade of 1 percent. Temporary maximum on the level, 87 mph. By a readjustment of carrying springs, can reduce axle pressure from 20 to 18 tons. Dimensions:

Locomotive:	
Total distance between axles (mm.)	14,525
Dead weight of locomotive (metric tons)	131.71
Service weight of locomotive (metric tons)	143.57
Tender:	
Dead weight of tender (metric tons)	34.3
Service weight of tender (metric tons)	82.3
Length of locomotive and tender:	
Over buffers (mm.)	26,520

b. Cars.—November 6, 1941 estimate of rolling stock:

Passenger cars	68, 942
Baggage cars	22, 028
Freight cars	650, 229

Ship cargo of 5,000 tons requires 500 cars to move.

There are estimated about 14,000 high-capacity cars, loading 40 to 50 tons.

NOTE.—See chart for availability of locomotives and rolling stock.

c. Facilities.—Electrified track in Germany is all standard, that is, 143.5 cms. Railroads constitute 78 percent of the total transport.

(1) *German Railroads.*—

(Greater Germany's economic estimate, November 6, 1941)

	1938 Old Reich and Austria	*1937 Czechoslovakia*	*1938 Poland*	*1940 France*	*1940 Netherlands*	*1939 Belgium*	*1940 Norway*	*1939 Denmark*
Motive Power								
Total locomotives	23,996	4,122	5,780	18,500	1,124	3,594	536	801
Steam	22,076	4,091	------	------	901	3,593	481	------
Gasoline	6	7	------	------	54	------	------	784
Small	1,130	------	------	------	------	------	------	------
Electric	784	24	------	------	------	1	55	------
Diesel electric	1,873	------	------	------	108	------	------	17
Total motor rail cars	------	532	------	700	197	45	86	565
Gasoline motor rail cars	------	------	------	------	44	------	------	------
Diesel motor rail cars	------	------	------	------	------	------	------	------
Electric cars	------	12	------	------	153	29	------	------
Total units of motor power	25,869	4,666	5,780	19,200	1,474	3,639	622	1,366
Rolling Stock								
Total freight cars	629,632	94,271	169,533	450,000	27,000	114,002	12,380	11,629
Closed freight cars (box)	223,795	[1] 33,594	------	------	------	------	------	------
Open freight cars (flat)	387,301	[1] 60,104	------	------	------	------	------	------
Tank cars	------	[1] 86	------	------	------	------	------	------
Refrigerator cars	------	[1] 91	------	------	------	------	------	------
Road service cars	18,536	------	------	------	------	------	------	------
Passenger cars	66,325	10,278	13,020	31,000	1,731	8,299	2,305	1,583
Mail cars	------	3,082	------	------	------	------	------	------
Baggage cars	21,580	[1] 3,082	------	------	------	------	------	723
Other vehicles	------	------	------	------	------	285	------	------
Total rolling stock	717,537	107,631	182,553	481,000	28,731	122,586	14,685	13,935

[1] Indicates state-owned.

(*Greater Germany's economic estimate, November 6, 1941*)—Continued

	1939 Hungary	*1938 Rumania*	*1938 Yugoslavia*	*1940 Greece*	*1937 Bulgaria*	*1938 Estonia Latvia and Lithuania*	*Grand Total*
Motive Power							
Total locomotives	1,848	3,527	2,309	384	659	729	67,909
Steam	1,813				655	715	
Gasoline						14	
Small							
Electric	33						
Diesel-electric	2	1			4		
Total motor rail cars	134	236				40	4,408
Gasoline motor rail cars	7						
Diesel motor rail cars	127						
Electric cars	33				4	4	82
Total units of motive power	2,015	3,763	2,309	384	663	773	72,523
Rolling stock							
Total freight cars	40,111	55,471	53,703	6,618	10,896	15,229	1,690,475
Closed freight cars (box)	15,722	23,681			4,445		
Open freight cars (flat)	24,389	30,240			6,259		
Tank cars		1,550			182	184	
Refrigerator cars					3	240	
Road service cars					7		
Passenger cars	3,473	3,612	5,130	809	687	1,615	149,867
Mail cars	79	305			44	45	
Baggage cars	1,100	527		89	242	109	
Passenger and freight vehicles							
Other vehicles					78	283	
Total rolling stock	44,763	59,915	58,833	7,516	11,947	17,281	1,868,913

(2) *Trackage.*—

1 Territory	2 Single or first track	3 Other main track	4 Yard track and sidings	5 Total trackage (kilometers)	6 Municipal systems	7 Electrified (kilometers)	8 Narrow gage	9 Standard gage	10 Density per 100 square kilometers
Old Reich and Austria				64,772.64	10,319	3,204.74	1,364.28	58,743.71	14.56 Aust. 8.63
Czechoslovakia	[1]11,343.61	[1]1,953.0	[1]262.4	13,774.2		77	[1]311.9	[1]12,984.7	
Poland	13,995	5,389	1,282	20,666	1,447	225	2,143	18,102	5.3
France				42,608		3,371			
Netherlands	1,657	4,394	2,307	8,358		1,129	None	8,358	
Belgium				4,839		69.1	None	4,839	
Norway				3,828		407.6	682	3,146	
Denmark				6,982.5		52			
Rumania	3,698	7,677	3,942	15,317		None	743	15,234	
Yugoslavia				9,945					
Greece				3,063.7					
Hungary	10,170.9	1,044.4	3,513.3	14,728.6	126	430.7	None	14,728.6	
Bulgaria			873	4,268		None	500	3,768	
Latvia, Estonia, and Lithuania	6,297	142	1,138.6	7,577.6		12			
Russia				85,498			998	84,500 (1.524 meters)	

[1] Indicates state-owned.

(3) *General facilities of railroad nets.*—

(*a*) *Hungary.*—Except in the great central plains of Hungary, the railroads naturally follow the river lines and cross the Carpathians at the most favorable passes. The most vulnerable feature of the whole network is that there are only five railroad bridges, across the Danube, in the country. Of these, two are at Budapest; one at Komarom; one east of Pecs; one from Dunafoldvar to Solt.

(*b*) *Poland.*—There are six main double-track lines connecting the railroad nets of Germany and Poland (north to south):

Berlin—Stettin—Gdynia—Tczew.
Berlin—Schneidemuhl—Tczew.
Berlin—Poznan.
Breslau—Poznan.
Dresden—Breslau—Ostrow.
Breslau—Katowice—Krakow.

When considering German troop movements across Poland, two main lines should be taken into consideration. They are—

Prague—Bohumin—Krakow.
Vienna—Bohumin—Krakow.

(*c*) From inspection it would appear that the related railroad nets in Germany and Poland are more suited to rapid concentration of large numbers of troops to the East Prussian area, than to the southeastern frontier of Poland.

(*d*) The main connections between Soviet and Polish rail nets are—

Leningrad—Polock—Molodeczno (single-track).
Moscow—Minsk—Baranowicze (double-track).
Moscow—Homel—Luniniec (single-track).

The German-Polish net is more adequate, strategically, than the Soviet-Polish net.

■ 30. WATER TRANSPORT.—*a. Tonnage available.*—(1) Total gross tonnage of German merchant vessels as of January 1, 1942:

3,875,414 (does not include 87 tankers of 624,747 gross tons).

(2) Special invasion-type barges:

3,000 barges.

(NOTE.—These barges are concentrated in the Lowlands and in French ports and each has a capacity of 5 tanks plus men and equipment. 200 barges will transport one armored division with its first flight of vehicles. Photo reconnaissance in May 1942 showed only 131 tank landing craft, 52 Siebel ferries, and 560 invasion barges.)

(3) Germany is building in Greek ports 300-ton concrete barges which are intended to carry 1,000 men each and two 25-ton tanks. Germany probably has in this area at the present time about 300 concrete barges, and it has been reported that the ultimate goal for the summer of 1942 is 1,000 such barges.

(4) It has been estimated that 5 tons of cargo space per man is required to transport overseas a modern fighting force with equipment and stores.

b. Invasion craft.—Craft available to the Germans for the invasion of England as of December 1941 included the following types:

(1) *Tank landing craft.*—The design of these craft is based on that of ordinary commercial barges, but with the addition of numerous watertight compartments. It is estimated that the time required to build one of these barges is between 6 and 8 weeks. Between 50 and 60 of these landing craft is the total believed available to the Germans in December 1941.

(2) *Invasion barges.*—The invasion barge is defined as having speed of 6 to 8 knots and drawing not over 4 feet of water forward and 6 feet aft. Displacement for 250 to 700 tons, averaging 400 tons. The trim could be quickly adjusted by the use of a powerful pump or pumps. Most of these barges are self-propelled, but a certain lesser number are dumb with bow conversion. The estimated number of barges of between 250 and 700 tons and self-propelled with a speed of 6 knots or over does not exceed 2,000. In addition, there are about 1,000 modern barges self-propelled with a displacement between 120 and 200 tons, capable of crossing the English Channel. The tank or troop-carrying capacity of this class of barge is probably not over one-third that of the 400-ton barge. In the case of the 400-ton barge a carrying capacity, after modification allowing for rapid unloading, is as given below for definite classes of equipment:

7 light or 6 medium, or 4 heavy tanks.
4 lorries or 6 tractors.
20 antitank or infantry guns.
10 gun-howitzers, or 4 antiaircraft guns.

■ 31. BRIDGES AND BRIDGE EQUIPMENT.—*a. Bridges.*—(1) Bridging columns transport and maintain bridging equipment, and the bridges are erected by the companies.

(2) The following bridges can be built by the division engineer battalion, but it

is to be noted that units of all arms, except artillery, have enough bridging material to cross small rivers without engineer help.

Equipment	*Load capacity in tons*	*Length in feet*
Type B ponton and trestle:		
Standard assembly, medium	9	252–270
Standard assembly, heavy	[1] 18	165–177
Special assembly, light	4	402–432
Special assembly, medium	8	234–264
Type K:		
Box girder and bridge	9	80
(4-girder construction)	19	64
	25	48

[1] Nominal rating. Will probably take about 27.

(3) All engineer companies carry timber of various sizes to build bridges up to 8 tons carrying capacity.

(4) None of the bridges carried in the division bridging column can carry more than 22 tons at the outside. For carrying across wet gaps loads heavier than can be taken by B equipment, rafts are constructed consisting of K box girder equipment supported on double piers made out of B equipment pontons.

b. Bridge equipment.—(1) *Equipment carried by units.*—(*a*) *Divisional engineer battalions.*

Two 4-ton pneumatic boats.
3½- and 5-ton wooden ponton and (steel) trestles.
Nine 18-ton steel pontons and trestles.
Assault boats.
Motor boats.
Outboard motors.

(*b*) *GHQ engineer battalions.*

9- and 18-ton steel pontons and trestles.
24-ton Herbert light alloy pontons.

(2) *Boats available.*—

Type	*By whom carried*	*No. carried*	*Dimensions*		*Capacity*
			Length (feet)	*Width (feet)*	
Pneumatic boats, large	Co (Mecz or part Mecz)	3	18	6	2¾ tons (2,240 lbs. per ton).
Do	Bridging Clm	12	18	6	2¾ tons.
Pneumatic boats, small	Co (Mecz or part Mecz)	6	10	4	616 lbs., 3 men.
Do	Bridging Clm	18	10	4	616 lbs., 3 men.
Assault boats (if with outboard motors 15–20 knots).	Bridging Clm	(?)	(?)	(?)	18 men.
Collapsible canoes	Bridging Clm	No details available, used for reconnaissance, probably holds 2 men.			

The motorboat carried by the bridging column is used only for assisting ponton bridging operations, *not* for transport of troops.

Pontons are also propelled by outboard motors.

Cable ferrying equipment consists of 2 tripods about 10 feet high, a drum of steel wire rope, etc. Tripods must be not more than 200 yards apart and easy to erect.

(3) *Pneumatic boats.*—(*a*) These boats correspond to the folding boat equipment in the British Army, and (roughly) to the assault boats of the American Army. They are made of rubberized fabric in the form of a ring which is bulkheaded off into several air chambers so that the boat cannot easily be sunk. They are in two sizes, the larger of which takes about 15 minutes to inflate by hand bellows.

(*b*) The larger size is 18 feet long and 6 feet wide and has an available buoyancy of about 2½ tons. Rolled and packed for transport the boat occupies a cylindrical space 7 feet long by 3 feet in diameter and weighs approximately 350 pounds.

(*c*) The smaller boat is 10 feet long and 4 feet wide, has a crew of 2 men, and an available buoyancy of about 600 pounds. This boat weighs 115 pounds.

(*d*) These boats are light for their load capacity and when inflated can be carried easily at the double, 8 men for the large and 2 for the small boat. Although stable they are somewhat cumbersome and slow in the water, being particularly difficult to control in a wind. Some form of rowlocks or loops is provided to assist in rowing or steering the boats when used singly or as rafts.

(*e*) Boats are provided with rings for lashing on superstructure for making rafts and bridges. Only improvised decking or decking borrowed from other equipment is used.

(4) *Motor boats.*—These boats are used only for assisting ponton bridging operations and not for the transport of troops. Only about six men can be carried, but boats are provided with 100-horsepower, 6-cylinder water-cooled gasoline engines. The equipment includes a grapple hook, a long length of steel wire rope for towing rafts, also a searchlight. The boats are capable of towing a triple 18-ton raft at 6 miles an hour. The boats will be invaluable in the construction of bridges with the Herbert equipment.

(5) *Outboard motors.*—There are three types of outboard motors in use. The latest of these is a model with a 3-horsepower, 4-cylinder gasoline engine used for towing in bridging operations or for ferrying (see also (4) above).

(6) *Ponton trailer.*—(*a*) The 9- and 18-ton bridge equipage is transported on 4-wheel trailers. The weight of the trailer is about 4,000 pounds, without the load. The load is about 6,000 pounds.

(*b*) To carry the bridge train's complement of 9- and 18-ton equipage, there are four types of trailer. All have the same chassis; they differ only in the arrangement of pins, grooves, etc. The trailer described above is the "ponton trailer"; on it are loaded one ponton and items of superstructure as described (sufficient to make one-half of a complete 9-ton raft). The names of the trailers and the respective loads involved are listed in the following table. Composition of the bridge train is described later.

Trailers for 9- and 18-ton ponton equipage

Name of trailer	*Items of load*
Ponton	1 ponton, 16 chess, 1 curb balk, 4 balk, 1 stiffener, 1 coupler, 2 clamps, 1 anchor, 1 communicating track.
Transom	1 transom, 16 chess, 1 curb balk, 4 balk, 2 trestle legs with guy poles, 1 connecting track.
Ramp	6 ramp balk, 32 chess, 2 curb balk, 1 connecting track.
Bank	1 seat (or 1 transom), 16 chess, 2 curb balk, 6 balk, 1 stiffening, 1 connecting track.

(*c*) Obviously the light ponton equipage has been designed with a view to those divisional loads which weight less than 5 tons. It is essential to get these loads across ravines and dry gaps as well as across streams. With that thought in mind, the light bridge train is to include relatively many trestles. Thus, the bridge train in the divisional battalion is to include—

40 light pontons.
6 trestles, complete.

(*d*) With these items will be sufficient units of superstructure to permit construction of 276 feet of mixed ponton and trestle bridge. Obviously, with the equipage of the train, a trestle bridge of 161 feet could be built.

(7) *3½- to 5-ton wooden half-pontons.*—(*a*) The pontons are 12 feet long by 5 feet beam and weigh about 300 pounds. They are gunwale-loaded and open, and can be used for the 3½-ton bridge or for the 5-ton bridge. The pontons, being open and splayed, can be nested for transport.

(*b*) To form the superstructure, roadbearers and chesses are in effect joined together and form complete units of roadway about 20 feet long by 2 feet wide. Any number of such units can be used side by side, five being used to form a 10-foot roadway.

(8) *9- to 18-ton pontons and trestles.*—(*a*) The ponton is similar to our own. The inner measurements are 24 feet 6 inches by 5 feet beam by 3 feet 3 inches, and the weight is about 1,600 pounds. In addition to a crew of four it has a carrying capacity of 15 men with field equipment of 10,000 pounds with 9-inch freeboard. Being undecked it is more suitable for ferrying than the British pontons, but has the disadvantage of a definite minimum of freeboard which must be strictly observed. When used in bridge or raft the pontons are gunwale-loaded.

(*b*) The superstructure consists of steel I-beam balks, 7 inches by 3 inches by 21 feet, weighing 350 pounds, and chesses 10 inches by 2 inches by 12 feet 3 inches, weighing 50 pounds. The load is also shared by heavy curb rails which are racked down at two places to intermediate transoms passing under the balks. Eight balks are used for the medium bridge and 14 for the heavy bridge. The equipment includes steel trestles; piers consist of single trestles for either the medium or heavy bridge, while floating piers are of one or two pontons, respectively.

(9) *24-ton Herbert ponton bridge and trestles.*—(*a*) The pontons are upward of 60 feet in length and divided laterally into eight or nine sections. They are of steel or light alloy, gunwale-loaded and are used to a minimum freeboard of 12 inches; the bow is provided with a raised bulwark to assist in the rough water experienced on large rivers. The ponton sections are decked and provided with hatches, and it is possible for the maintenance crew to rest and sleep inside. The ponton weighs approximately 10 tons and displacement with the freeboard mentioned is nearly 60 tons.

(*b*) The equipment also includes trestle piers, either of steel or pile timber construction. The latter are used for shore bays at river crossings or shallow dry gaps, while the steel trestles built up of standard parts can be constructed to a height of over 60 feet above foundation level and still carry the full load for which the bridge is designed.

(*c*) The main girders carrying the roadway are composed of sections in the form of pyramids 6 feet 6 inches high with bases 8 feet 3 inches long by 4 feet 6 inches wide. Transoms are hung in special stirrups from the apex of each pyramid and the transoms in turn carry the balk. A standard bay is 82 feet 6 inches, that is, ten pyramid sections, pin-connected.

(*d*) From the information available it is calculated that in standard bays the bridge would take loads of 18 tons; that is, medium tanks and artillery. However, with closer spacing of pontons thus reducing the length of a bay, the load capacity could probably be increased to take a 35-ton tank.

(*e*) The pontons are too large to be used conveniently on any but the largest rivers, and the construction and launching takes too long to be considered in any way as an assault operation. The Herbert equipment may therefore be classified as a semipermanent bridge, and its use is probably confined to back areas

(10) *Heavy tank rafts.*—(*a*) If the Herbert bridge is excluded, it will be noted that none of the bridges mentioned above are capable of taking 35-ton tanks, a few of which are known to have been used on the Western Front.

(*b*) There is evidence that a special heavy raft was used for these tanks, and was probably designed for the purpose. This consisted of a small box girder section (similar to the K-Brückengerät described in (11) (*a*) below) 60 feet long and supported at each end by a pair of double ponton piers. The exact load capacity of this raft is not known, but the available buoyancy of the complete raft as described would be over 45 tons, and the strength of the superstructure is, without doubt, proportionate. Loading of raft is by means of special 8-foot shore bays made of lattice girders.

(11) *Fixed bridges.*—(*a*) *Small box girder bridge (K-Brückengerät).*—This is almost a copy of our standard small box girder bridge. The principal members are similar, and the launching nose used is identical. The tracked load-carrying capacities and corresponding spans are probably equal to or greater than the following:

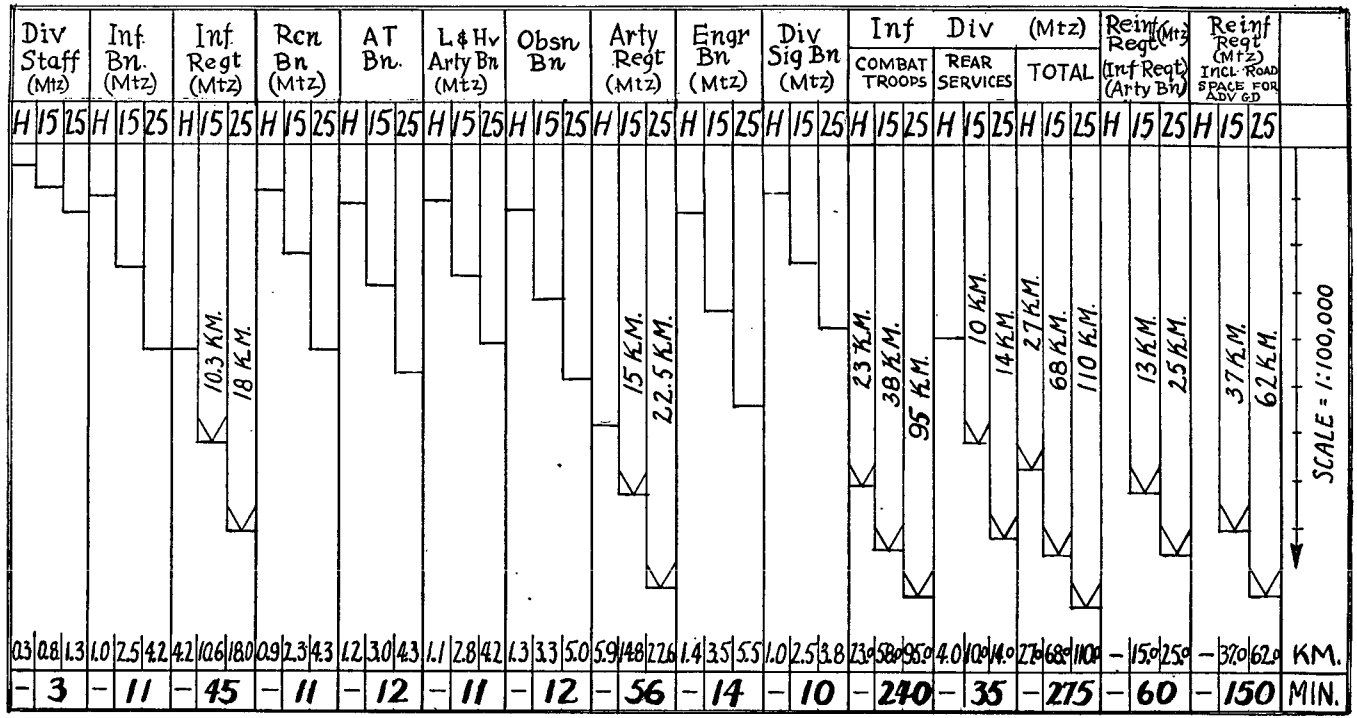
	Tons
4-girder, 48-foot span	25
4-girder, 64-foot span 2-girder, 32-foot span	21
2-girder, 64-foot span	10

(*b*) *Girder bridge.*—There is also a larger through-type sectional girder bridge capable of spanning gaps of at least 140 feet and probably capable of taking heavy loads. No definite details are available.

c. Data on movements by armored formations.—(1) The average rates of advance along roads by troops in German armored formations in the campaign in the west, 1940, are given in a captured official document as follows. (The advance is assumed not to be held up, and the roads average.)

	Wheeled vehicles		*Tracked vehicles*	
	Length of march	*Time taken*	*Length of march*	*Time taken*
	Km. (*Mi.*)	*Hrs.*	*Km.* (*Mi.*)	*Hrs.*
By day	50 (31¼)	2	30 (18½)	1¾
	100 (62½)	4½	60 (37)	4
	200 (125)	10	100 (62½)	6½
By night	50 (31¾)	3½	30 (18½)	3
	100 (62½)	6½	60 (37)	6

■ 32. MARCH TABLES AND ROAD SPACES.—*a. Road lengths—Infantry division.*—



b. Time lengths and road spaces—Armored division.—(1)

(2) A captured document, of recent date, gives the average length of a complete armored division on the march, including services, as follows. The division is marching in five groups, with 20 minutes interval between groups.

At the halt, or on the move at 10 kilometers per hour

(6¼ mph)---------- 120 km. (75 mi.) or 12 hrs.

On the move at 25 kilometers per hour (15½ mph)---- 170 km. (106½ mi.) or 7 hrs.

If the fighting troops alone are considered (without reconnaissance unit or attached troops, and without any tactical intervals), and are marching in four groups, with 20 minutes interval between groups, the above figures become—

90 kilometers (57½ mi.) or 9 hours.

150 kilometers (93¾ mi.) or 6 hours.

In both cases, 10 percent of all vehicles are deducted for traffic regulation duties.

For comparison, the length of a motorized division on the march is 75 percent of the above.

In compiling the above figures, the following intervals were reckoned:

	Yards
Between vehicles—	
At the halt, or on the move at 10 kilometers per hour	20
On the move at 25 kilometers per hour	25
Between units	50
Between formations	250

(3) A further document captured from another armored division states, probably correctly, that the following intervals are *normal:*

	Yards
Between vehicles on the move	25
Between units	100
Between formations and march groups	1,000 (2½ min.)

At speeds above 25 kilometers per hour, the distance between vehicles must be increased to as many yards as the speed is kilometers per hour. This has the effect of increasing the marching length by about 15 percent for every increase of 5 kilometers per hour in speed, so that the net gain in speed of advance is comparatively small.

■ 33. By Rail.—*a. Train make-up.*—Procedure is the same as ours. They use make-up yards, and send the trains to the departure yards as they are needed. The trains are all standard: infantry, artillery, and motorized. The trains never exceed 100 axles, or 50 cars. In addition there are interspersed special cars for antiaircraft defense. Each unit carries its equipment along with it.

b. Speed.—The average speed of a train, either troop, equipment, or supply, is 35 kilometers per hour.

c. *Number of trains to move units:*

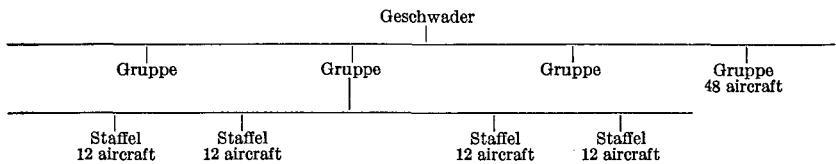
	Trains
Infantry regiment	8
Artillery regiment	11
Pioneer battalion	5
Supply services	7
Mountain division	80
Infantry division without motorized units	42
Infantry division complete	66

(24 trains used to carry the motorized equipment.)

■ 34. By Air.—*a.* The Germans are estimated to have approximately 1,700 transport aircraft, of which 1,500 are Junkers JU 52's. The remaining 200 are chiefly Junkers JU 90, the Focke-Wulf FW 200, and the Blohm and Vass BV 222 flying boat. The table given in paragraph 28 includes all types generally recognized as transports, with corresponding ranges and loads.

b. The Junkers JU 52 is the standard troop transport for the German Air Force. These aircraft have been organized into Kampfgeschwader (wing) z. b. V. (zur besonderer Verwendung—special duty). Each Geschwader has four Gruppen (groups). Each Gruppe is made up of four Staffeln (squadron). There are 12 aircraft in each Staffeln.

c. Each Geschwader (wing) thus has a normal complement of about 200 aircraft and is capable of carrying (1) an entire parachute regiment, plus equipment; or (2) 3,000 ordinary troops. The Germans have at least three and probably four Kampfgeschwader z. b. V. (special duty), plus several additional Gruppen for transport.



d. The following aircraft are required to transport the following units *in one trip:*

Parachute division @ 7,000 men (3 parachute rifle regiments plus divisional troops)	4 Geschwader @ 800 aircraft.
Parachute rifle regiment @ 1,700 men	1 Geschwader @ 200 aircraft.
Parachute rifle battalion @ 480 men	1 Gruppe @ 50 aircraft.
Parachute company @ 120 men (rifle or heavy)	1 Staffel @ 12 aircraft.
Assault regiment	1 Geschwader and gliders.
Air-landing division	900–1,000 aircraft.

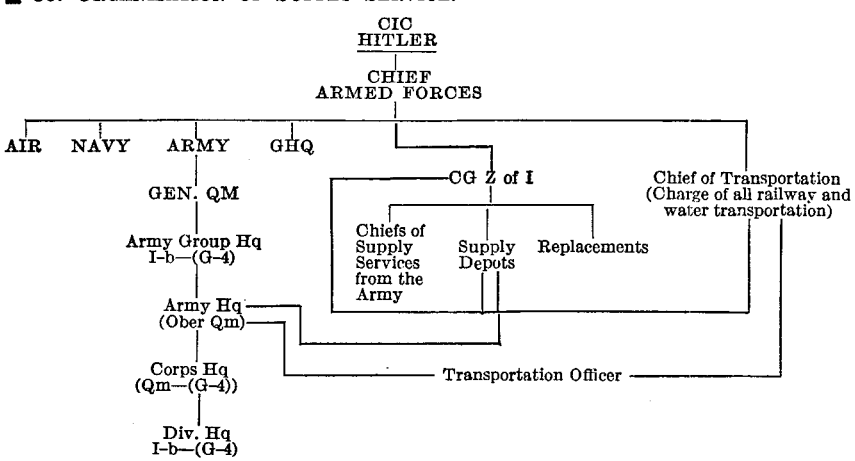
CHAPTER 3

SUPPLY

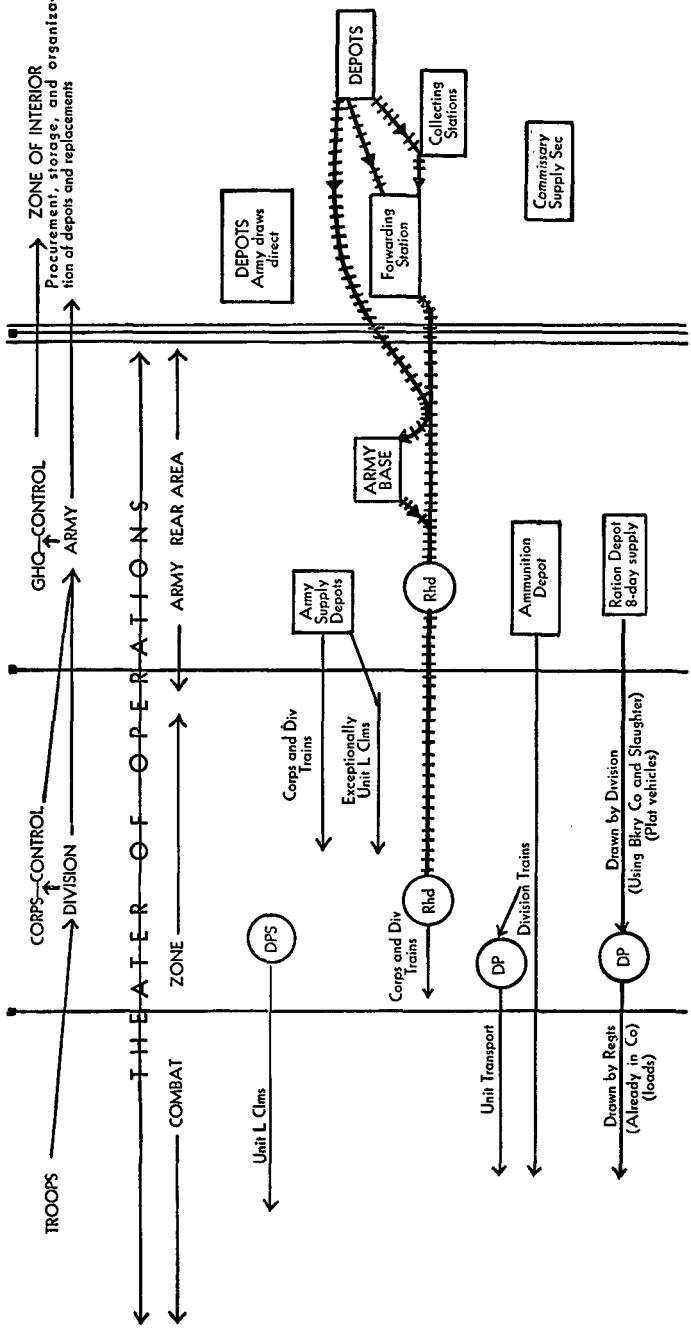
SECTION I

GENERAL ORGANIZATION

■ 35. ORGANIZATION OF SUPPLY SERVICE.—



■ 36. THEATER ORGANIZATION.—



NOTE.—Width and depths of zones are not prescribed, but determined by the situation. Trend is to eliminate all intermediate depots wherever possible.

SECTION II

CLASSES OF SUPPLY

■ 37. GENERAL CLASSES OF SUPPLY.—
Rations—Class I
Ammunition—
All other—

SECTION III

SUPPLY COLUMNS AND TRAINS

■ 38. SUPPLY COLUMNS AND TRAINS.—

Type	*Capacity (tons)*	*Distance per day (miles)*
Large motortruck column	60	125
Small motortruck column	30	125
Animal-drawn column	30	12.5–20
Mountain animal-drawn column	15	12.5–15
Pack train	5	12–15

■ 39. BASIC USE.—

GHQ Mtr Trk Clms, large	Transportation reserve for GHQ to use for Army sup, attached as needed to armies, corps, and divs.
Army Trk Clms	Maintain rolling reserves and assist in stocking parks and depots.
Corps Trk Clms, small	Augment Divs Clms and Sup Corps troops.
Div Trk Clms, small, Wagon Clms and Pack Tns.	Carry portion of first refill of Div Am. Haul from Div Rhd and Army (depots, transloading points) to DPs. 2 Trk Clms assigned to Arty Regt during combat as Arty Am Tn.
Lt Clms and Tns	Connect troops and Div Sup establishments, controlled (except combat Tns) by higher Hqs.

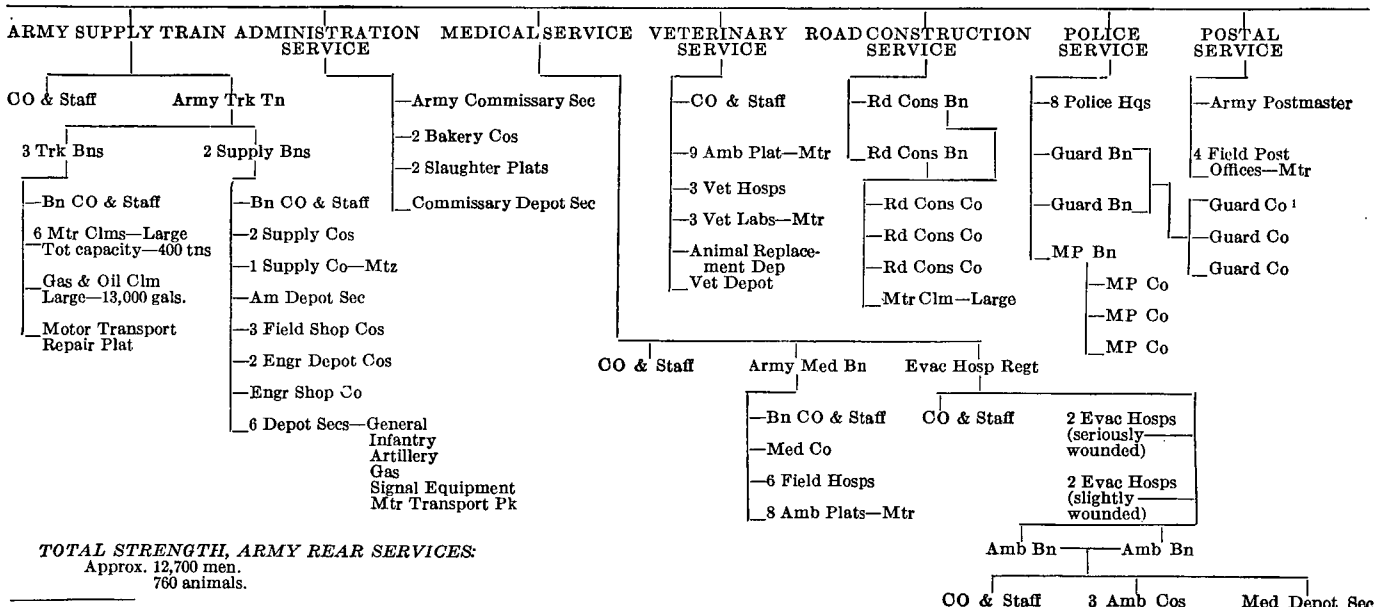
NOTE.—All trains organized as units of 15-, 30-, or 60-ton capacity. All supplies for issue and transportation made in 30-ton lots.

SECTION IV

SERVICE UNITS

(ARMY, CORPS, AND DIVISION)

■ 40. ARMY REAR SERVICES.—

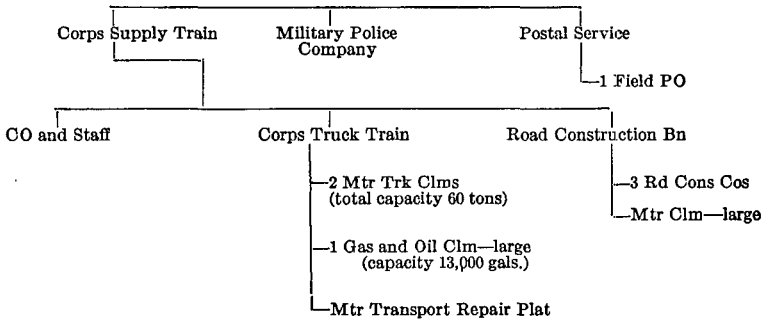


TOTAL STRENGTH, ARMY REAR SERVICES:
Approx. 12,700 men.
760 animals.

[1] Rifles, 6 LMGs, 3 HvMGs, each.

■ 41. ARMY SUPPLY.—Army carries major load of supply and evacuation in theater of operations. Establishes depots as far forward as possible. Army G–4 functions as our G–1 and G–4 combined. Deals directly with GHQ, G–4 or CG, Z of I on supply, and with representative of Chief of Transportation at Army headquarters. Army Base area receives supplies from Z of I by train: depots to forwarding station to Army. Includes administrative offices such as commissary or ammunition which fill requisitions and load trains from depots assigned. Practice is to eliminate intermediate depots as much as possible, but keep trains loaded in base area and ship as needed. Ammunition depots usually 20 to 40 miles in rear of front. 3,000 to 6,000 tons stock maintained. Commissary depot usually carries 8-day supply.

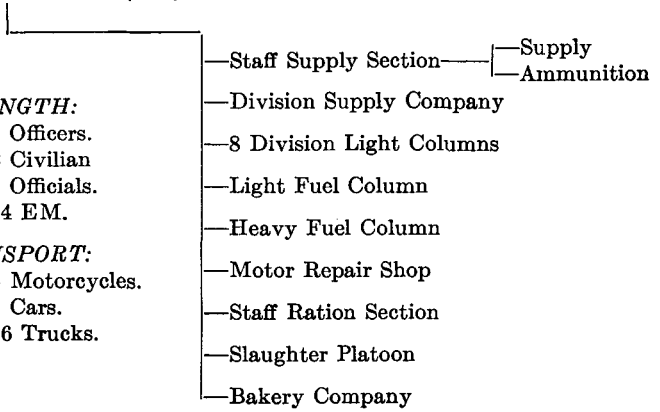
■ 42. CORPS REAR SERVICES.—



Strength:
800 men (approx.).

Supervises and regulates supply of divisions, corps troops, and attached troops.
Prorates supplies and establishes priorities.
Takes direct action only in an emergency.

■ 43. DIVISION SUPPLY (G–4).—



STRENGTH:
25 Officers.
12 Civilian Officials.
824 EM.

TRANSPORT:
26 Motorcycles.
21 Cars.
176 Trucks.

Combat Train.—Field kitchen and combat wagon per unit.
Ration Train.—Ration wagon and forage wagon per unit.
Regt and Bn Hqs have one truck added. Hauls from Div to Bn.
Baggage Train.—One truck per unit.
Infantry Regt has a horse-drawn ammunition column.

SECTION V

RATIONS

■ 44. CLASS I SUPPLY.—

a. Carried in the division.—

	Field ration	*Iron ration*
With each man	—	1 (reduced)
On each combat vehicle	—	1
In the field kitchen	1	1
In the unit ration train	2	—
In the division train	1	—
Total	4	3

Total weight of ration carried in the division: 94.4 tons (approx.).

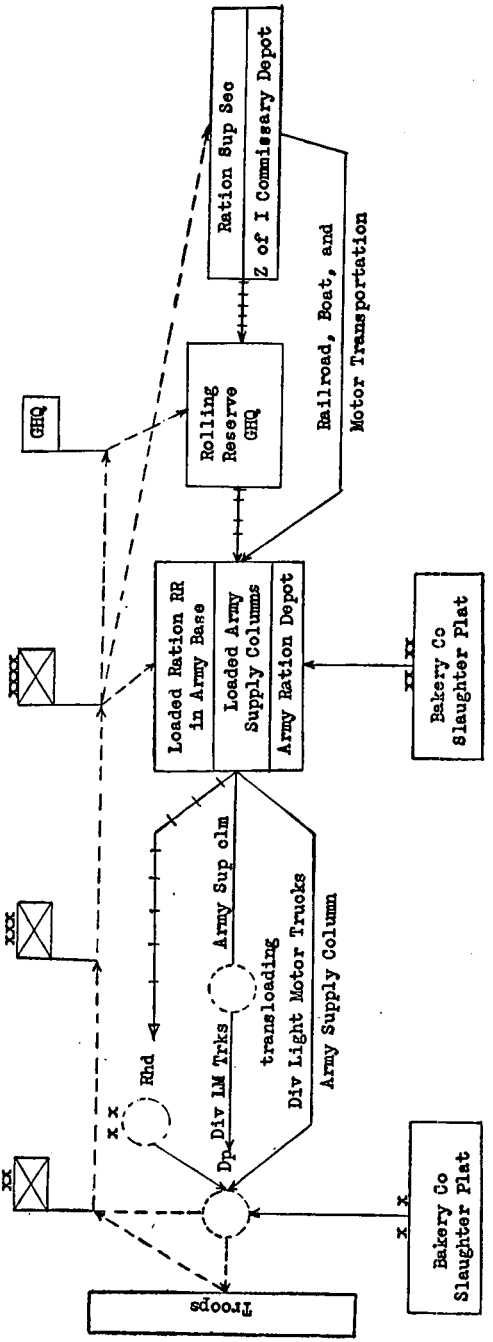
b. Weight of 1 day's ration (field).—

	Per man (lb.)	*Per division (tons)*	*Per 300,000 men (tons)*
Total weight (approx.)	2. 92	23. 6	420

c. System of distribution.—Division hauls from Army distributing point. Battalion and regiment haul from division distributing point. Company hauls from battalion distributing point. (If units are motorized, unit ration trucks draw from the division.)

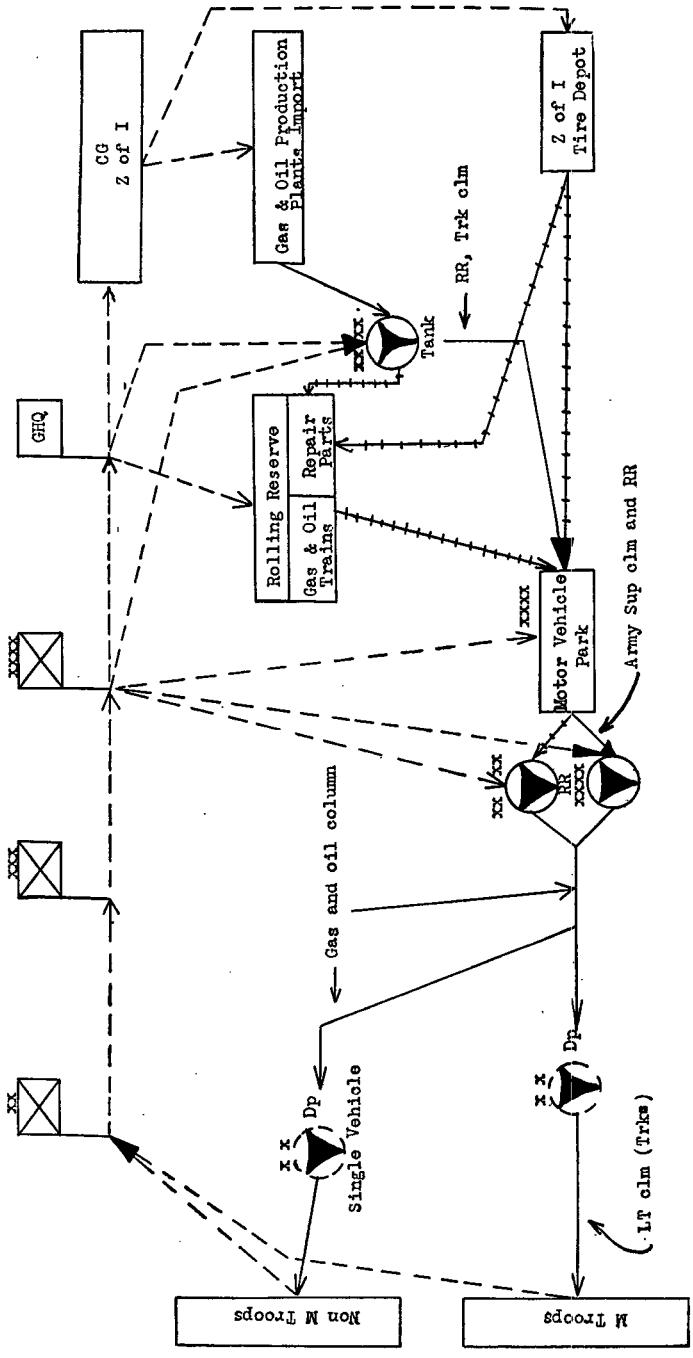
SECTION VI
SUPPLY DIAGRAMS

■ 45. RATIONS.—

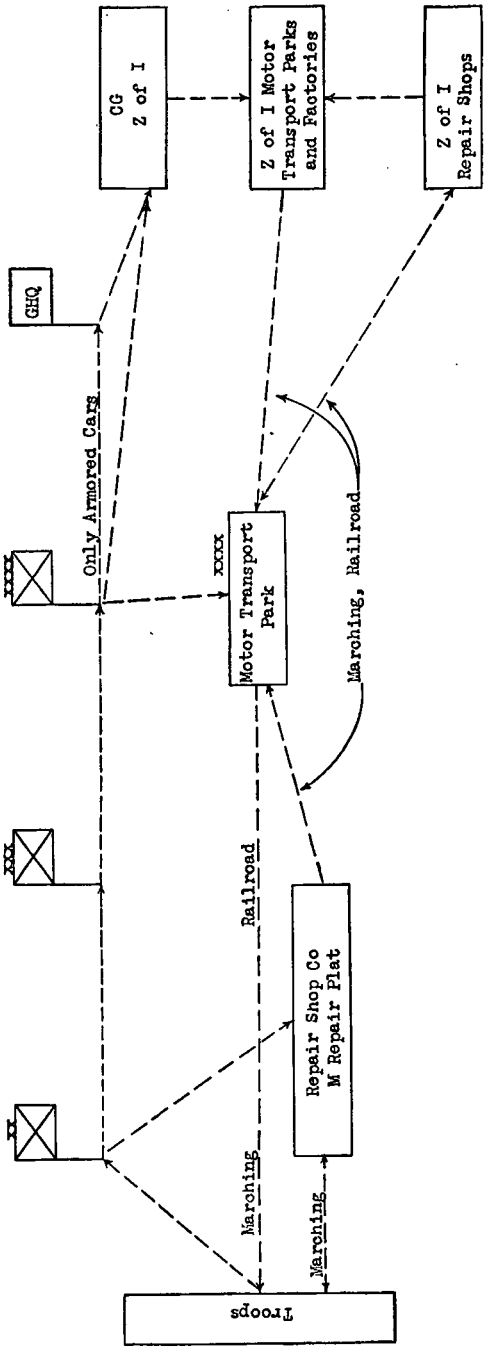


■ 46. AMMUNITION.—

Hauled by Div, Regt, or Bn L Clms to Regt, Bn, or Btry Am Pts and refill combat trains.
L Inf Clm of Regt transports munitions for L and Hv Wpns of Regt.
Arty Bn has L Arty Clm.
L Clms may be held as rolling reserve and Div Clm transfers to combat vehicles.

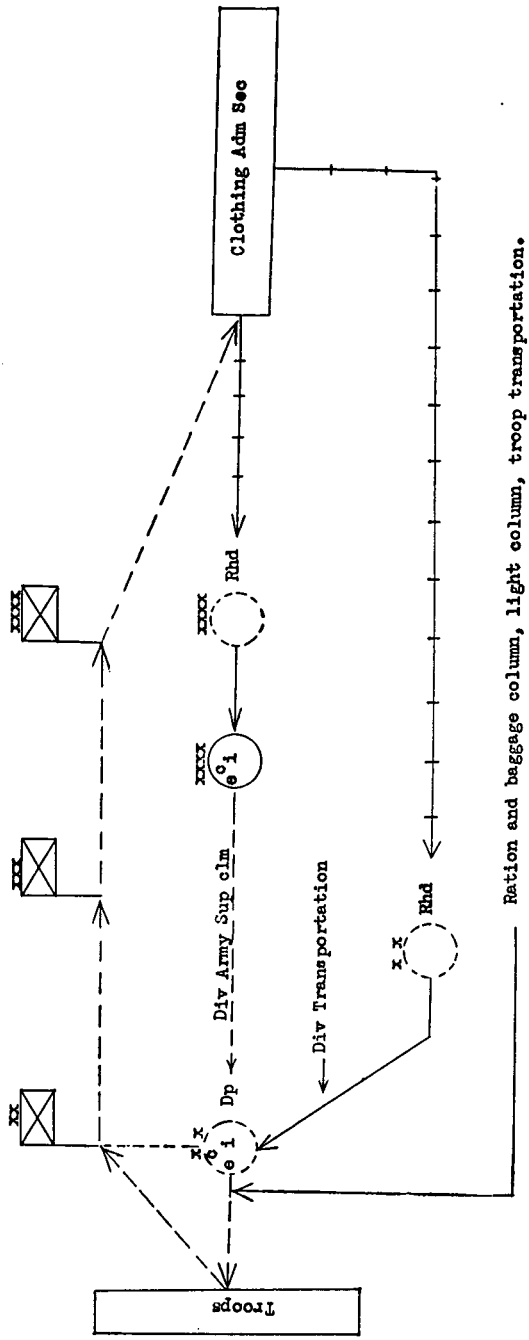


■ 47. GAS, OIL, AND TIRES.—



■ 48. REPAIR—MOTOR VEHICLES AND MECHANIZED EQUIPMENT.—

■ 49. CLOTHING AND INDIVIDUAL EQUIPMENT.—



SECTION VII

AMMUNITION DATA

■ 50. DIVISIONAL AMMUNITION QUOTAS.—

a. Combat allowance—that part carried by the men, combat vehicles or caissons.

b. Local reserves—that part carried by the unit light columns.

c. Division reserves—that part carried in the division columns.

d. Two ammunition quotas (units of fire) for all weapons of the division are carried in the division.

e. Ammunition quota for all weapons in an army is held on army columns or trains.

■ 51. UNITS OF FIRE (rounds).—

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Weapon	*Infantry units (including MGs and morts)*	*Cavalry units*	*Artillery units*	*Tank units*	*Engineers*	*Airplanes*	*Armored cars*	*Service units*	*Notes*
7.9-mm rifle or carbine	90	90	20		45			20	
7.9-mm LMG	2,500	2,500	1,000		1,000	2,500	2,500	1,000	
7.9-mm HvMG	4,500			4,500					
50-mm Morts	120								
81-mm Morts	30								
Field gun	180								
AA (88 or 75-mm)			300						
AA (37-mm)			1,500						
75-mm Inf How	200								
150-mm Inf How	125								
105-mm gun			125						
150-mm How			125						
150-mm gun			75						
210-mm How			50						
305-mm How									
280-mm How									
305-mm gun									
380-mm gun									
Hand grenades	40				40				
Rifle grenades	40				40				

■ 52. SCALE OF ISSUE OF AMMUNITION.—

Weapon	*On the man or with the gun*	*Co & Bn Res*
Rifle	90 rds per man, Rifle Cos 45 rds per man, all other Cos	40 rds per man.
Cavalry carbine	75 rds per man	
Machine pistol	192 rds per gun	
LMG	3,100 rpg divided between gun team and Co and Bn Res. 1,000 rpg in AT Co.	
HvMG	5,250 rpg divided between Co limbers and Bn Res	
Revolver	32 rpg	
Grenade		
81-mm mortar	48 rpg	
50-mm mortar	20 rpg	
37-mm AT gun in AT Bn	330 rpg	25 rpg.
20-mm HvMG	900 rpg	
37-mm AA gun	600 rpg	204 rpg.
88-mm AA gun	192 rpg	133 rpg.
105-mm How	102 rpg in Btry and Bn Clm	148 rpg in Div Clm.
105-mm gun	78 rpg in Btry and Bn Clm	72 rpg in Div Clm.
150-mm How	60 rpg in Btry and Bn Clm	90 rpg in Div Clm.

PART TWO—JAPANESE FORCES

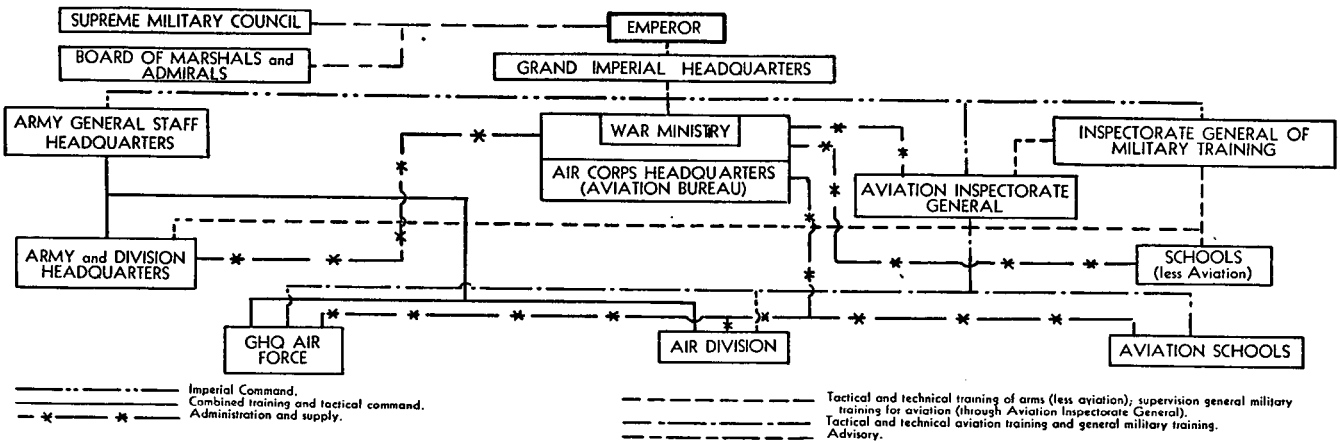
CHAPTER 1

ORGANIZATION

SECTION I

GOVERNMENTAL AND GEOGRAPHIC ORGANIZATION

■ 53. GOVERNMENTAL ORGANIZATION.—



NOTES.—
Ministry of War.—Administration, supply, and mobilization agency of the Army. Includes Chief of Army Air Corps, MP Hq, Army Fortification Department; Intendance, Medical, Veterinary and Civil Engineering Schools.
General Staff.—Comprises war plans, operations, intelligence, transport, historical, and topographical sections, and Gen. Staff College.
Inspectorate of Military Training.—Technical and tactical training except Air Corps and services under War Ministry. Drill and training regulations. Military schools except those under War Ministry, Gen. Staff and Inspect. Gen. of Aviation.
Aviation Inspectorate General.—Directly responsible to Throne only on aviation training. Subordinate to other three agencies on all other matters.
All four divisions are directly responsible to the Throne (except as noted above). They, and also the Supreme Military Council and the Board of Marshals and Admirals, are appointed by the Emperor.

■ 54. GEOGRAPHIC ORGANIZATION.—

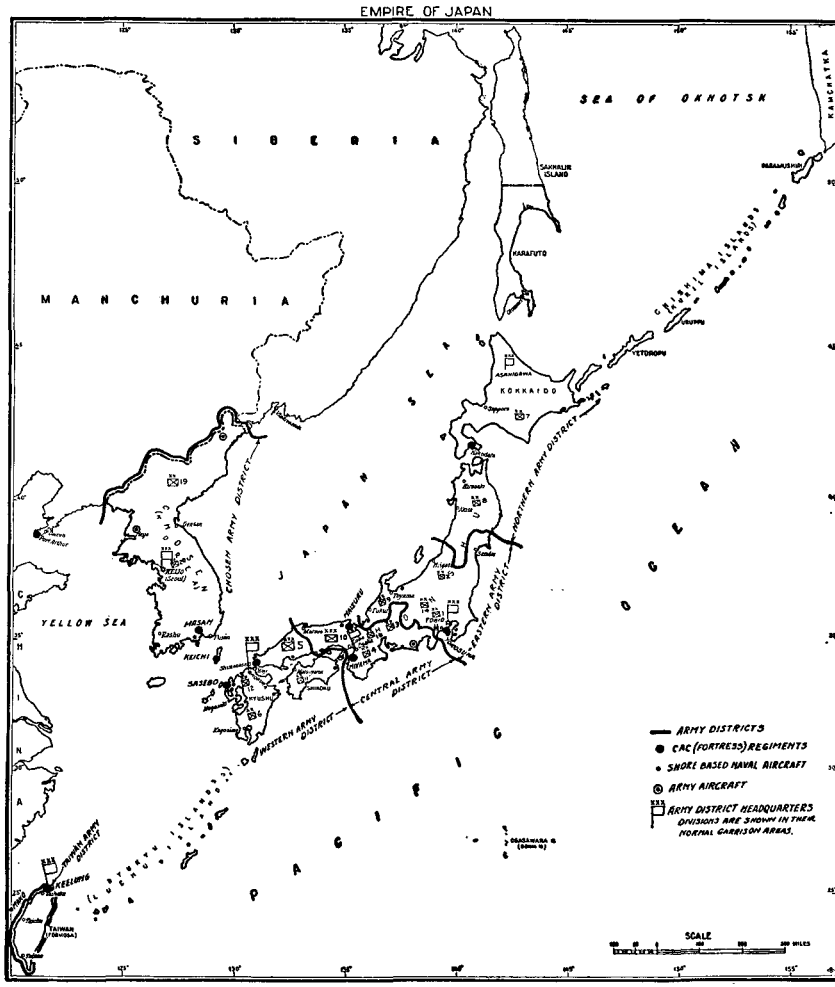


FIGURE 2.—Geographic organization of military forces.

SECTION II

TYPE ARMY ORGANIZATION

■ 55. TYPE ARMY ORGANIZATION.—The largest peacetime organization in the Japanese army was a division. Type army assignment is believed to be as follows:

ARMY HEADQUARTERS

INFANTRY	TANKS	CAVALRY	ARTILLERY	ENGINEERS
5 Inf Divs (1 with pack transport)	1 Regt (3-4 Bns)	1 Brig reinf by Bn Mtz Inf Bn of Horse Arty Hv MG Tr Mtd Engrs Co Armd-C Det	Regt Mtn Arty Brig Hv FA Arty Information Det 2 Regts AA Arty	Regt Engrs 10 Bridge Cos

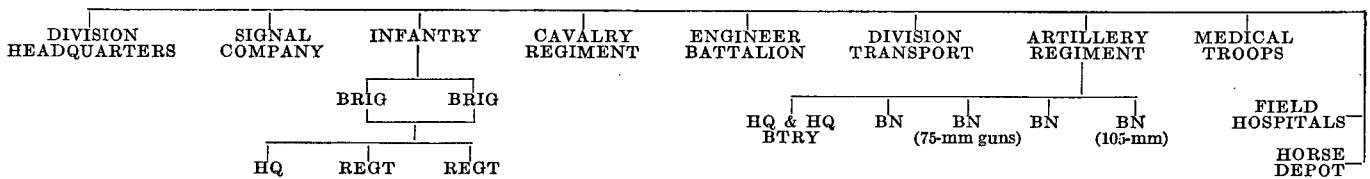
AVIATION	SIGNAL SERVICE	LINE OF COMMUNICATION SERVICE
Regt Bomb Avn Regt Pur Avn Regt Obn Avn Bln Regt Air Service Sig Det	Tg Regt Wireless Regt Slt Det	10 Deps 15 Transport Dets of 10 Wag Cos each 1 Mtr Transport Det of 12 Cos 4 Res Field Hosps 4 Evac Hosps 1 LC Hosp 1 Sick Horse Dep 1 Sn Det 5 Bns of 2d Res Inf 1 Tr of 2d Res Cav 1 Btry of 2d Res FA 1 Ry Regt 1 L Ry Regt 20 Labor Cos

STRENGTH:
110,000–135,000 Officers and men.
NOTE.—There is no Corps organization.

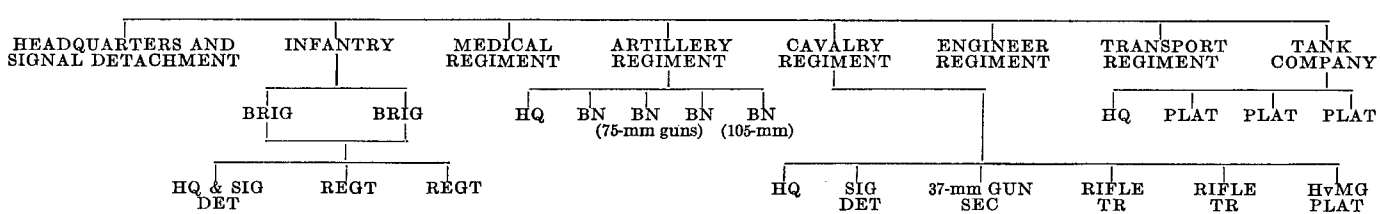
SECTION III

DIVISION ORGANIZATIONS

■ 56. INFANTRY DIVISION, OLD SQUARE TYPE.—



■ 57. INFANTRY DIVISION, ABBREVIATED SQUARE TYPE.—



58. INFANTRY DIVISION (Table of organization).—

1 Unit	2 Officers	3 Enlisted men	4 Horses	5 75-mm field guns	6 105-mm hows	7 75-mm mtn guns	8 70-mm inf cannon	9 HvMGs	10 LMGs	11 Rifles	12 Pistols	13 Sabers	14 Carts, transport	15 Cargo load, tons	16 Ambulances	17	18
Div Hq	17	91	52							41	39	45	12	2.5			
Sig Co	4	195	25							71	25	5	18	3.6			
2 Inf Brigs of 2 Regts each	358	14,780	1,730			16	24	96	288	11,606	2,172	608	444	181.6			
FA Regt	110	2,612	2,048	36	12				138	296	361	152	132	165			
Cav Regt	18	400	413					2	8	264	81	353	32	7.1			
Engr Bn	14	361	80							246	53	25	20	8			
Div Transport	27	2,744	1,893							145	73		1,680	336			
Med Troops	22	909	84										40		33		
Field Hosps	100	2,800	484										160		264		
Horse Dep	3	44	47										12				
Total Div	673	25,016	6,856	36	12	16	24	98	434	12,669	2,804	1,188	2,550	703.8	297		

Remarks

This organization was not adhered to in China for various reasons. Trend was toward a smaller and more mobile force with greater increase in automatic weapons. Strength in personnel varies with the type of division. A Tk Co is included and service units are cut considerably with the use of wheeled transport. Strength is believed about 18,000 officers and men.

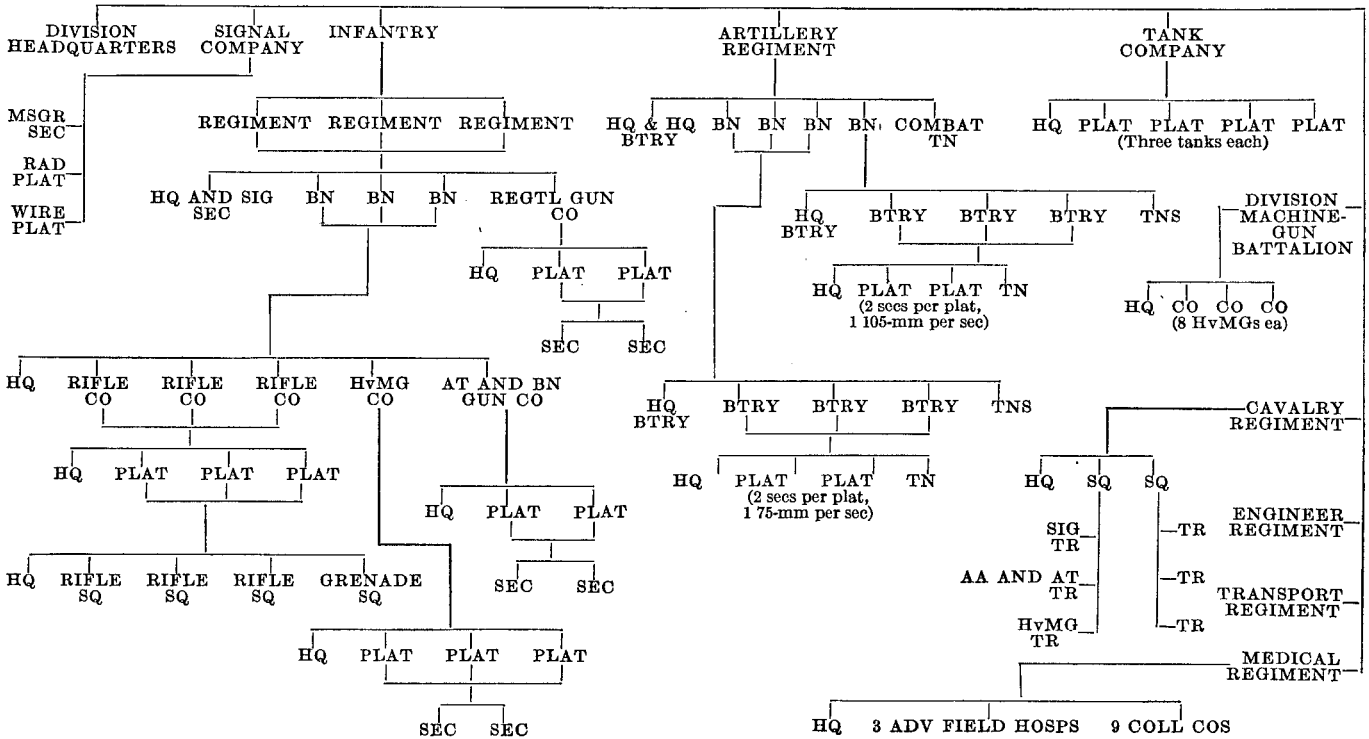
ARMAMENT:

Rifles (Inf and Cav)	7,464
Sabers (Cav)	412
LMGs: Inf Regt, 116 Cav Regt, 8 Tk Co, 30	502
HvMGs	52
Grenade throwers	340
37-mm AT guns	13
70-mm cannon	12
75-mm mtn guns	8
75-mm field guns	36
105-mm hows	12
Tks	15

About one-half of present Japanese divisions are believed to be organized as noted above. Others are believed to be organized as triangular divisions.

The composite units of this division follow the general organization of similar units in the new division except in strength of personnel and numbers of weapons.

■ 59. TRIANGULAR INFANTRY DIVISION.—*a. Organization.*—



b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Rifles or carbines	5 Pistols	6 Sabers	7 LMGs	8 HvMGs	9 75-mm guns, mounted	10 70-mm Bn guns	11 37-mm AT guns	12 75-mm guns	13 105-mm hows	14 Tks	15 Carts, am	16 Grenade dischargers	17 Horses	18 Cars	19 Motorcycles	20 Trucks	21 AA MGs	22
Div Hq	16	40	50	16	----	----	----	----	----	----	----	----	----	----	----	10	5	5	----	----	This is believed standard Japanese division organization, toward which they are working. About one-half of present division strength is organized as such, with other divisions organized as modified square divisions.
Sig Co	4	156	124	24	18	----	----	----	----	----	----	----	----	----	----	23	----	----	2	----	Trks are rad trks.
Inf:																					
Bn	(23)	(615)	(472)	(127)	(72)	(27)	(6)	----	(2)	(2)	----	----	----	(4)	(32)	(34)	----	----	----	----	
Regtl Gun Co	(3)	(72)	(41)	(32)	(6)	----	----	(4)	----	----	----	----	----	(8)	----	(43)	----	----	----	----	
Regt	(78)	(1,953)	(1,485)	(423)	(232)	(81)	(18)	(4)	(6)	(6)	----	----	----	(20)	(96)	(150)	----	----	----	----	
Total Inf—3 Regts	234	5,859	4,455	1,269	696	243	54	12	18	18	----	----	----	60	288	450	----	----	----	----	
Arty Regt	105	2,365	296	361	152	72	----	----	----	----	36	12	----	----	----	1,916	----	----	----	----	
Cav: 1st Sq: Sig Tr	(2)	(64)	(40)	(20)	(66)	----	----	----	----	----	----	----	----	----	----	(66)	----	----	----	----	
AA/AT MG Tr	(3)	(66)	(40)	(22)	(69)	----	----	----	----	(2)	----	----	----	----	----	(76)	----	----	----	(2)	
HvMG Tr	(3)	(49)	(20)	(10)	(52)	----	(4)	----	----	----	----	----	----	----	----	(56)	----	----	----	----	
2nd Sq	(12)	(297)	(297)	(21)	(309)	(12)	----	----	----	----	----	----	----	----	----	(330)	----	----	----	----	
Total Cav Regt	27	484	397	79	508	12	4	----	----	2	----	----	----	----	----	607	----	----	----	2	
Engr Regt	17	504	453	30	49	18	----	----	----	----	----	----	----	----	----	90	----	----	26	----	
Transport Regt	24	732	681	59	61	18	----	----	----	----	----	----	----	----	----	----	16	27	194	----	
Tk Co	6	119	48	10	13	16	----	----	----	----	----	----	13	----	----	----	2	8	8	----	
Med Regt	31	481	----	----	----	----	----	----	----	----	----	----	----	----	----	*36	----	----	----	----	*Pull 2-wheel cart amb.
Div MG Bn	14	312	127	68	25	----	24	----	----	----	----	----	----	----	9	62	----	----	----	----	
Div totals	478	11,052	6,631	1,916	1,522	379	82	12	18	20	36	12	13	60	297	3,194	23	40	230	2	

■ 60. INFANTRY DIVISION PACK.—
Differs from actual infantry division in that divisional artillery consists of 3 battalions of pack 75-mm howitzers. Infantry regimental mountain gun companies pack their ammunition.
All trains throughout the division are pack.
No tank company.
No light machine guns in the artillery.
Infantry has 48 heavy machine guns as against 52 in regular infantry.
Strength and armament details unknown.

■ 61. REINFORCED INFANTRY BRIGADE.—
Such units are known to exist. Their strength and composition are not known. They are believed to be more or less special Task Force organizations.

SECTION IV

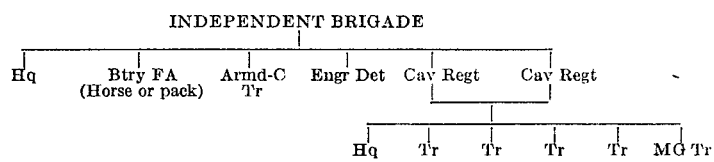
AIR FORCE AND MISCELLANEOUS COMBAT UNITS

■ 62. ARMY AVIATION.—*a.* GHQ Air Force is composed basically of wings. Air divisions exist as component parts of the GHQ Air Force. These do not replace the wings, but are administrative and tactical units for grouping regiments geographically and on basis of similarity of mission.

b. Air regiments are composed of squadrons. This seems to be an administrative measure, as assignments range from one or two to nine squadrons per regiment.

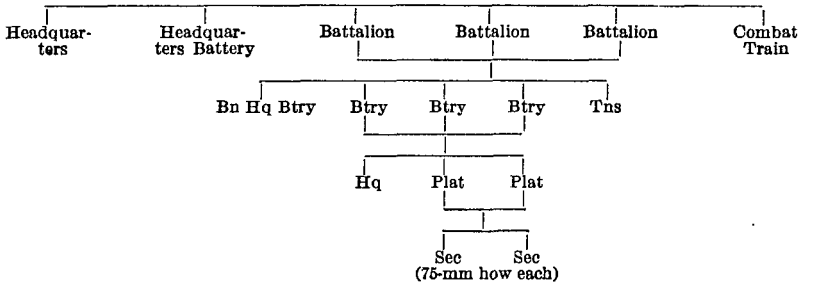
c. The squadron is the basic Japanese air unit. Composed of three flights, there are 13 to 16 pilots, including enlisted men, and nine or ten airplanes per squadron. Squadrons usually have more enlisted men pilots than officer pilots.

■ 63. NONDIVISIONAL CAVALRY.—



STRENGTH:
788 O and EM.
884 Horses.
ARMAMENT:
680 Carbines.
6 LMGs.
8 HvMGs.

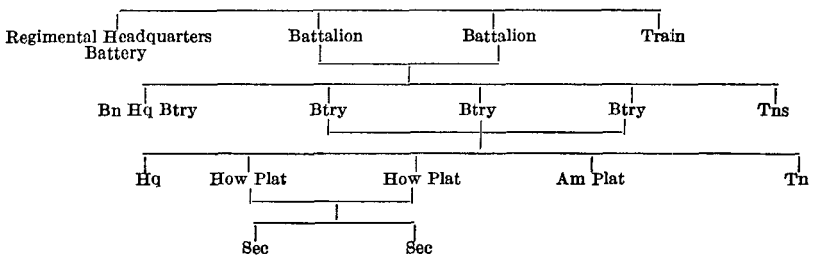
■ 64. 75-MM FIELD ARTILLERY REGIMENT, PACK DIVISION.—



Strength:
Unknown.
Armament:
Unknown.

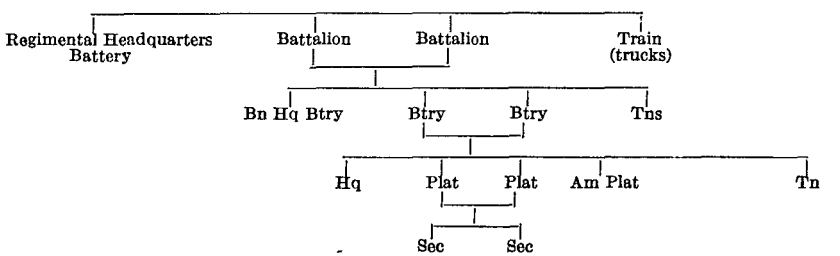
NOTE.—Independent regiment, pack artillery, is organized as above but with only *two* battalions. All transport is pack.

■ 65. REGIMENT, 155-MM HOWITZERS, HORSE-DRAWN.—



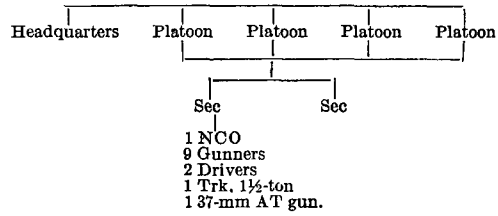
STRENGTH:
Unknown.
ARMAMENT:
Unknown.

■ 66. REGIMENT, 105-MM GUNS, TRACTOR-DRAWN.—



STRENGTH:
Unknown.
ARMAMENT:
Unknown.

■ 67. INDEPENDENT ANTITANK COMPANY.—



STRENGTH:
150 (approx.).
ARMAMENT:
8 37-mm AT guns.

NOTE.—These units are believed to exist as special troops with assignments to organizations as needed.

SECTION V

SUPPLY UNITS

■ 68. JAPANESE TRANSPORT.—

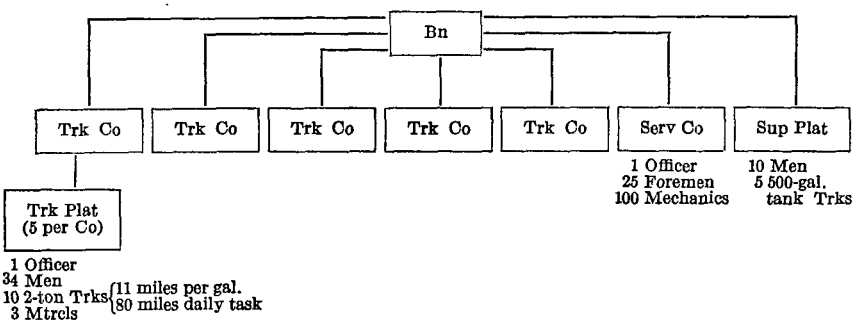
Unit	*O*	*EM*	*Remarks*
Div Transport Regt, Inf	------	------	Hq, 3 Trk and 3 Wag Cos. Four-wheeled Wags, carts, and Mtrs. Believed Trks will replace Wags when they are available and roads permit.
Transport Regt, proposed Inf Div.	24	732	Hq and 3 Mtr Cos. Each Mtr Co to include 3 autos, 8 Mtrcls, and 64 Trks.
Transport Regt, Pack Div	------	------	Same as normal Inf Div except all Cos consist of 3 Plats of 3 Secs of 5 Sqds of 10 pack horses each—total, 450 pack horses.

NOTE.—*These units carry rolling reserve of the division.* ■

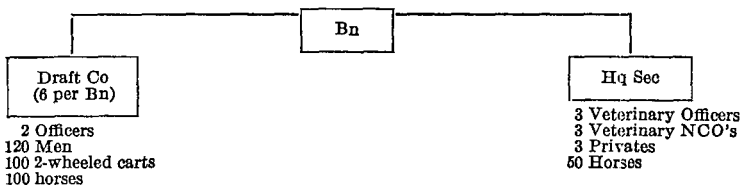
■ 69. TRANSPORT REGIMENT FOR TRIANGULAR DIVISION (ABOUT 18,000 STRENGTH).—*a.* It is believed that at present Japanese transport is only partially motorized. For the purposes of this study it has been arbitrarily decided to show the ammunition columns as motorized and the ration columns as horse-drawn.

b. Transport regiment, having total strength of 1,804, is composed of—

(1) Motorized ammunition battalion with strength of 1,061; 250 2-ton trucks having a capacity of 500 tons, five 500-gallon gasoline tank trucks; 20 automobiles and 75 motorcycles.



(2) Draft battalion, horse-drawn, with strength of 743; with 600 two-wheeled carts of 500 pounds capacity each, and 650 horses.



c. The organization carries—

(1) One day of fire for the division for all weapons including small arms. (This does not include the day of fire carried by the firing units.) Estimated weight 500 tons.

(2) Two days' rations for the personnel of the division and 2 days' forage for the 4,109 horses of the division. (This does not include the ration carried on the person.) Estimated rations for men, 50 tons for 2 days, include rice, barley, dried fish or tinned meat, salt and shoyu, plus ½ pound of vegetables or eggs when available. Weight 2.75 pounds per man per day. Forage is estimated at .013 tons per horse per day or approximately 100 tons for the 4,109 horses of the division.

CHARACTERISTICS OF MATÉRIEL

70. INFANTRY AND CAVALRY WEAPONS.—

1 *Weapon and caliber*	2 *Weight in firing position (lb.)*	3 *Method of operation*	4 *Type of feed*	5 *Maximum rate of fire (rds. per min.)*	6 *Practical rate of fire—prolonged (rds. per min.)*	7 *Weight per round (lb.)*	8 *Maximum range (yd.)*	9 *Maximum effective range (yd.)*	10 *Effective radius of burst—fragmentation (yd.)*	11 *Remarks*
Arisaka Rifle, M1905 6.5-mm	8.69	Bolt	Clip 5 rds.			.019	4,375	500		39″ long. Mauser type. Bayonet .8 lb., 16″ long.
7.7-mm Rifle, M1919		Bolt				.003 (proj.)				Modified bolt and stock shortened. Because of different caliber not likely to be issued.
Pistol, Pattern 26 (1893) (Smith & Wesson) 9-mm, double-action.		6-rd. cylinder				.002 (proj.)				Type is Smith & Wesson.
Nambu LMG, M1922 (permanent bipod), 6.5-mm.	22.44	Gas-operated air-cooled hopper-fed.	30-rd hopper.	500	100–150		4,375	600		Has an alternate tripod mount. No provision for single shots. No correction for windage or drift.
HvMG Model 3 (1914), 6.5-mm.	119	Gas-operated air-cooled.	Strip 30 rds.	500	200		4,375	1,300–2,400		Life of barrel, 40,000 rds. No correction for windage or drift. Pack horse transport.
Hv Grenade Thrower, M89, 50-mm.	10.5	Propelling charge	Hand		10–20		700	40–700	25–50	One man holds and aims thrower and fires by use of a lanyard, second man loads. Ammunition fuze, time or impact.
Inf Rapid-fire Gun, M94, 37-mm or less.	120	Full auto breech	Hand					2,500	Nil	Small, short-delay nose fuze. Used as close protection against tanks and armored cars.
Inf Bn Gun, M92 70-mm Rifled Gun.	178	Breech	Hand		10	8.8	2,800	300–1,500	40	
75-mm Mtn Gun, M14 (1908)	420	Oil recoil breech	Hand		10		7,675	2,100		
37-mm gun, M11 (1922) (obsolete).[1]										
HvMG M92 (1932), 7.7-mm	122	Hotchkiss air-cooled.		450	200–250		4,587	[2] 850		

[1] This gun is similar to U. S. obsolete 1-pounder. Has been replaced, but believed still in use.

[2] Most effective.

■ 71. FIELD ARTILLERY.—

1	2	3	4	5		6	7	8		9	10	11	12		13
				Normal over-all width traveling position				Normal rate of fire (rds. per min.)					Rate of march		
Weapon—type and caliber	Weight of piece, traveling position with normal load exclusive of personnel (lb. approx.)	Piece transport	Weight of prime mover with normal load (lb. approx.)	Piece	Prime mover	Time to emplace or change from firing to traveling	Traverse	Short bursts	Prolonged	Maximum effective range (yd.)	Approximate weight of ammunition	Unit of fire (rds. per piece)	Roads	Cross country	Remarks
75-mm Gun, M1906	4,500	Horse-drawn					120 mils			9,000–11,800	HE–13				Rapid fire gun—excellent sights.[1]
75-mm Mtn Gun, M94 (1934).	1,500	Pack					700 mils			7,500–8,750	12.8				
105-mm Gun, M1932		Tractor	5 tons				30°			12,000–20,000					
105mm Gun, M1925		Tractor	5 tons				30°	2	1	11,000–14,000					
105-mm How M91 (1931)		Horse-drawn					800 mils			Max.–11,500					
155-mm How M1915		Horse-drawn in 2 loads.					6°	6–8	1						
150-mm Gun M1929		Tractor					800 mils			Max.–27,340					

[1] All Japanese sights seem to be of good quality.

■ 72. ARMORED VEHICLES.—

1	2	3	4	5	6	7	8	9	10	11	12			13	14	15
											Dimensions (in.)					
Type of vehicle	Weight (tons gross)	Armament	Main armor (in.)	Crew	Maximum speed on roads (mph)	Spanning capacity (ft.)	Slope climb (degrees)	Safe fording depth (in.)	Vertical obstacle (in.)	Radius of action (mi.)	H	L	W	Clearance (in.)	Communication	Remarks
Tankette, M2592 (1932)	3	1 MG	.31–.55	2	30	4'9"	34	33	25	60	64	122	69	13	Flag	
Tankette, M2598 (1938)	3	2 MGs	.55	3	33	4'9"	34	33	25	61	64	123	69			2,500 rds. per gun.

L Tk, M2595 (1935) (see note).	7	1 37-mm 2 MGs	.25–.375	3	22						77	156	57		Flag	
L Tk, M2592 (1932)	5	1 MG 1 13-mm MG	.31–.43	3	28	4′6″	34	30	20		73	154	64	12	Flag	
L Tk, M2593 (1933)	7	2 MGs	.86	3	28	5′8″	42	32	20		72	176	71	15	Flag	Experiment as amphibian.
L Tk, M2595 (1935) (see note).	7.7	1 47-mm 2 7.7 MGs	.39–.47	3	22		40	38.4	31.2		78	177	78	14.4	Radio	120 rds. 47-mm; 1,350 rds. MG.
L Tk—copy of Vickers-Armstrong.	8.1	2 MGs	.51–.2	3	22	6′	45	36	29	96	82	180	95			
L Tk, M2599 (1939)	7	1 37-mm 1 MG	.63	3	12.5	6′4″	38	20		110	88	188	68			250 rds. 37-mm; 2,500 rds. MG.
Med Tk, M2589 (1929)	11.5	1 37-mm 2 MGs	.43–.67	5	20	8′6″	35	36		150	102	210	100	18	Flag	200 rds. 37-mm; 4,000 rds. MG.
Med Tk, M2590 (1930) (or 92 (1932)).	11.31	1 37-mm 2 MGs	.23–.67	5	27		38			147	102	210	100		Flag	200 rds. 37-mm 5,000 rds. MG.
Med Tk, M2594 (1934)	14	1 37-mm 2 MGs 1 Mort	.43–.67	5	28	10′6″	46	36	36	124	102	250	100	18		6,000 rds. MG; 120 rds. 37-mm; 100 rds. Mort.
Med Tk, 97 (1937)	14–15	2 MGs 1 47-mm	.58–.95	4	25–28	9′6″	40	38.4	39.4		117	267	98	14	Radio	Possible flame thrower.
Med Tk, 2599 (1939)	12	1 37-mm 3 MGs	.67	5	25	7′11″	40	39	33	160	110	220	100			250 rds. 37-mm; 2,500 rds. MG.
Hv Tk, 2596 (1936)	36	1 75-mm 1 37-mm 2 MGs	1.38	10	36	15′	40	50	33	175	110	372	128		Radio	500 rds. HE; 5,000 rds. MG.
Hv Tk, M2597 (1937)	35	2 37-mm 2 MGs	1.38	6	28	7′	45	50	42	128	114	293	118			2,000 rds. MG; 120 rds. 37-mm.
L Amphibian (1941)	7–9	1 37-mm 1 MG	.5–1.0	3							84	192	84			
Sumida six-wheeled armd-C, M2593 (1933).	7	1 MG 7 Rifles or LMGs.	Up to .61	6	Road 25 Rail 37						116	306	75			

NOTE.—L Tk M2595 (1935) listed first was originally classed as a tankette with a crew of 2 and weight 4 tons. This tankette may exist as such and the second L Tk of this classification may be an additional model.

■ 73. AIRCRAFT.—

1 Name, model, and class	2 Motors	3 Crew	4 Bomb load (lb.)	5 Ceiling (ft.)	6 Operating range (mi.)	7 Operating speeds (mph)	8 Rate of climb (min. to/ft.)	9 Armor	10 Armament
Fighter BFW, Messerschmitt 109	1	1		36,080	620 at 298 mph	Max. 354	3.8/13,120		4 MGs; 2 20-mm cannon.
Kawasaki 97 Fighter	1	1		32,000	335	Max. 300 at 15,000 ft.	5.5/15,000		4 MGs.
(Kawasaki Kawa 102) 98 Fighter	1	1				Max. 270 at 10,000 ft.			2 MGs; 2 20-mm cannon.
Mitsubishi 97 Fighter	1	1		29,000	375	Max. 265	7.5/15,000		4 MGs.
Mitsubishi 98 (Karigane II) (resembles Northrop A-17).	1	2				Max. 310			
Mitsubishi Zero Fighter (Type 00 Model 1 Sento Ki).	1	1		39,300	2,000 (approx.)	Max. 298			2 20-mm cannon; 2 MGs.
Nagoya Zero Fighter	1	1		32,810	6 to 8 hrs	Max. 344	Fast		2 20-mm cannon; 2 MGs.
Nakajima 96 Fighter (fragile) (resembles Boeing P26A).	1	1		Critical 13,000	312	Max. 240 at 7,000 ft.	6/5,000		4 7.7-mm MGs.
Nakajima 97 Fighter	1	1		33,000	389	Max. 280			3 MGs.
Seversky 98 Fighter (copy)	1	2	500		2,600	Max. 280	1/3,500		2 7.7-mm MGs and 20-mm cannon.
Mitsubishi Century Fighter	2			31,000	840	Max. 350			2 27-mm cannon.
Dive Bomber 96	1	3	1,100		250	241 Dive			3 7.7-mm MGs.
Kawasaki 97 Light Bomber	1	2	800	25,000	490	Max. 236			3 MGs.
Mitsubishi Kamikazi Light Bomber 97	1	2	661.3	30,000	450	Max. 260			3 MGs.
Mitsubishi Mitsu 103 Light Bomber	1		1,000	27,000	790	Max. 260			3 MGs.
Mitsubishi Mitsu 104 (Type 98) Light Bomber	1	2-3	3,300	25,000	260	Max. 250			3 MGs.
Light Bomber 97	1	2				Max. 280			
Light Bomber 99	1	2	1,364	24,288	6 hours	Max. 256	Fair		3 7.7-mm MGs.
Medium Bomber 98 (Mitsubishi 104)	1	2-3				Max. 299			2 20-mm cannon; 2 MGs.
Kawasaki (Kawa 95) Type 97 Heavy Bomber	2	3-5	4,400	24,500	1,250	Max. 245			2 25-mm cannon; 4 MGs.
Mitsubishi 97 Heavy Bomber	2	5-7	4,400	22,000	1,180	Max. 220			4 MGs.
Mitsubishi 98 (Mitsu 106) Heavy Bomber	2	5	2,200	23,000	1,180	Max. 220			1 cannon; 4 MGs.

Heavy Bomber 96	2	7	2,200	22,600	750	217–266			5 7.7-mm MGs.
Heavy Bomber 97 (modified)	2	7	3,000		1,800	Max. 230; cruise 150.	2.11/3,280	Seats	4 7.7-mm MGs; cannon.
Heavy Bomber 98 (Fiat B. R. 20, 1937)	2	7	6,614	29,500	2,400 (2,200lb.); 1,553 (med. load.)	Max. 281; cruise 235.	18/16,405		3 12.7-mm Breda and 7.7-mm Safat MGs.

■ 74. ANTIAIRCRAFT ARTILLERY.—

1	2	3	4	5	6	7	8	9	10	11
Type and caliber	*Weight*		*Elevation*	*Traverse*	*Range*		*Rate of fire*		*Emplace*	*Remarks*
	Gun and prime mover	*Gun and mount*			*Horizontal*	*Vertical*	*Maximum*	*Sustained*		
75-mm Gun, M1922	12,800 pounds	4,800 pounds	−10 to 85	360	11,000 yd.	19,725 ft.	15–20	12	10 min.	
105-mm AA Gun	13 tons	7 tons	0 to 85	360	19,400 yd.	36,000 ft.	12	10	1 hr.	
75-mm Gun, M1928		5,390 pounds	0 to 85	360	15,200 yd.	32,800 ft.		15		
20-mm Oerlikon		836 pounds	−10 to 85	360	5,450 yd.	12,200 ft.		120		

CHAPTER 2

MOVEMENTS

SECTION I

FACILITIES

■ 75. GENERAL.—*a.* In general, Japanese operations are from close bases. That fact permits deck loading and the use of a variety of small ships which could not be employed over a longer supply line. Food supplies need not be carried for long periods. In addition, the Japanese soldier requires very little ship space per man and, having been trained to live off the country and exploit its resources, he travels very lightly.

b. Japan's army is not as completely motorized as they desire, but, because of the types of country in which it has been operating, this has not proved a handicap. Coolie labor has been drafted for transport, and everywhere the transport system has been quickly organized around local available transport facilities by commandeering private cars, trucks, horses, wagons, bicycles, and boats. The great flexibility of the Japanese type of organization has made it possible for the Japanese army to overcome any difficulties which might have been expected to arise because of an apparent shortage of transport facilities.

■ 76. ANIMAL-DRAWN TRANSPORTATION.—The Japanese do not have motorized equipment available in sufficient quantity, and hence the wagon or two-wheeled cart plays a very important role in army transportation. No exact figures are available on the number of these carts which are being used, but a rough estimate, based on the computation of 600 two-wheeled carts for each transport regiment for each of the 82 divisions, and 400 carts for some 40 or more independent brigades and regiments, would indicate more than 65,000 such vehicles in use. These carts can be produced very quickly and inexpensively, and it is safe to say that the army has or can have as many carts as it needs.

■ 77. MOTOR TRANSPORT.—*a. Trucks.*—The Japanese Army is well supplied with light motor trucks (1½ to 3 tons capacity). The Nissan is a modified cab-over-engine design at 2-ton capacity. The Toyota is a faithful copy of the 1939 Chevrolet truck. Several types of heavy trucks, some powered with Diesel and some with gasoline engines, have been manufactured in Japan for several years past, but production has always been small. The standard prime mover of the Japanese Army is a six-wheeled vehicle of 3 to 4 tons capacity, powered with a 6-cylinder engine of approximately 90 horsepower. Two rear axles are used and the four rear wheels drive. The front end is of conventional design. It has an unusually high ground clearance. This standard prime mover is the chassis of the Japanese armored car. All privately owned commercial vehicles in Japan proper have been converted to charcoal burners, and it is possible that many of the Japanese army trucks used in Japan proper may have been converted to use this type of fuel.

b. Motor cars.—Only two types of passenger vehicles are manufactured in Japan at present. The Nissan, the standard seven-passenger automobile of the Japanese Army, is an adaptation of the 1935, six-cylinder Graham Paige. The Toyota Company began to manufacture in 1940 an European-type passenger car smaller than the Ford, with a wheel base of only 100 inches and a small six-cylinder engine. A large number of Fords and Chevrolets are available and this number has been materially increased by the acquisition of Ford factories and assembly plants in occupied territory.

■ 78. AIR TRANSPORT.—In 1941 it was estimated that the Japanese had sufficient aircraft to carry a force of 3,300 men. It is unlikely that production exceeds 50 airplanes per month. The table below lists the types of airplanes primarily designed for transport service, together with information concerning their performance.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Types	*Basic purpose*	*Description*	*Crew*	*Passengers*	*Armament (MGs)*	*Motors (all air-cooled)*	*Total horsepower*	*Maximum speed in mph*	*Cruising speed in mph*	*Maximum ceiling in feet*	*Range in miles*	*Wing span in feet*	*Weight empty in lbs.*	*Weight loaded in lbs.*
Nakajima 19 Bomber-Transport	A	TRM	1	----	----	2	1,740	217	186	----	2,484	72′2″	10,450	----
Mitsubishi "Hinazuru" (Air-speed "Envoy")	C	TEL	1	8	----	2	960	174	149	16,500	620	52′4″	3,775	5,850
Nakajima Douglas DC-2	C	SRL	3	14	----	2	1,420	217	186	23,000	1,302	85′	11,880	17,490
Douglas DC-3	C	SRL	----	24	----	2	*1,800	212	*191	*21,400	*2,125	95′	*16,857	*24,400
Fokker (probably obsolete)	C	RH	2	8	----	3	2,250	118	----	14,800	650	----	----	----
Junkers JU 52	C	STRL	2	14–17	2	3	*2,280	*189	*176	----	*1,000	95′11″	15,400	23,200
"Lockheed 14"	C	STM	4	10–12	----	2	*1,640	265	*216	26,300	*1,705	65′6″	*11,025	*17,500
Mitsubishi MC-20 Freight Carrier	A	STRL	3–5	11	----	2	1,800	----	162	----	1,620	82′	----	11,000
Nakajima A.T.	C	SRL	2	8	----	2	920	230	217	29,500	1,519	65′4″	7,656	10,736
N.K.K. T.K. 3	C	H	2	8	----	2	900	205	174	----	530	55′9″	5,940	9,020
Nakajima "Akatsuki" Cargo Carrier	C	L	2	4	----	2	1,500	205	155	----	3,725	85′5″	----	----
Tokyo Gasu Denki TR1	C	TL	2	4	----	2	480	180	155	19,700	1,120	47′11″	3,014	5,500

EXPLANATION OF SYMBOLS.—(A) Army; (C) commercial; (E) elliptical tip; (H) high-wing monoplane; (L) low-wing monoplane; (M) middle-wing monoplane; (R) round tip; (S) swept back; (T) tapered.

*No data available on actual performance of Japanese models; specifications given are for the original designs.

■ 79. RAIL TRANSPORT.—*a. Engines.*—(1) According to the last figures published (1937, for the year 1935–36) there were 4,235 locomotives (200 electric) owned by the Government. The average locomotive weighs 85 tons, and the average tractive effort is approximately 40 percent less than locomotives in the U. S. The principal classes of engines are the 4–6–2 passenger engine with double-truck tender, total weight 115 tons, and the 2–8–2 freight engine with double-truck tender, total weight 124 tons. Maximum axle weight is 15 tons.

(2) There were 808 engines owned by private companies.

b. Cars.—(1) *Passenger.*—In 1935 there were—

10,813 passenger cars with a total seating capacity of 689,201. Of these—
9,219 had a seating capacity of 529,139.
1,403 had a seating capacity of 142,613.
191 rail cars (electric cars)—seating capacity 17,449.

Ninety-nine percent of the cars are third class, and each has a seating capacity of 64 passengers.

The speed is never over 50 mph. According to the Tokyo Year Book of 1934, the highest speed of passenger trains has been increased to 64 mph for the 3'6" gage.

(2) *Freight.*—In 1937 there were (Government-owned)—

67,485 with a loading capacity of 892,442 metric tons:
36,224 box cars—loading capacity 456,446.
220 tank cars—loading capacity 2,596.
30,294 gondola-type—loading capacity 433,400.

In addition, private companies owned 10,989 freight cars.

c. Mileage.—(1) There are in Japan—

12,731 miles of railroads, operated by the state; 4,219 miles of railroads, operated by private companies; 1,410 miles of railroads, interurban and city trains.

(2) Of this total mileage only 1,347 miles are more than single track. Very little multiple track exists. Up to 1940, 244 route miles were electrified. Direct current is used, distributed by overhead trolley lines at 1,200 or 1,500 volts. The three large power stations are at Kawasaki, Akabane, and on the Shinaogawa River.

(3) No coal exists on the main island, the supply coming from Hokkaido and Kyushu and also from Chosen.

(4) Tokyo is the main traffic junction and from it there radiate more multiple-track railroads than from any other one point. Seventy-five percent of the electric mileage is around Tokyo.

(5) Recently the Shimonoseki Tunnel has been opened, so that there is a continuous railway service from Tokyo through Yokohama, westward along the coast through Nagoya, Osaka, Kobe, and along the inland sea to Shimonoseki. This is the only line where sharp grades are not encountered. The distance covered is 1,097 kilometers (686 miles). The line between Tokyo and Kobe is particularly vulnerable, since it crosses numerous rivers where they are widest just before they enter the sea, requiring a large number of long bridges. The same is true between Kobe and Shimonoseki but this particular section of the line is difficult to reach, since it is protected by the screen of islands that surround the inland sea.

(6) The most important lines are on the main island of Honshu. Of secondary importance is the southwestern island of Kyushu with the two important ports of Nagasaki and Moji. Of lesser importance are the northwestern island of Hok-

kaido and the island of Shikoku. South Sakhalin or Karafuto has a small network. The Honshu trunk line is double-tracked throughout. There are four tracks:

Tokyo–Yokohama (29 kilometers—18 miles).
Osaka–Kobe (128 kilometers—80 miles).
Kyoto–Akashi (95 kilometers—60 miles).

d. Leading local railways in Japan (last known figures).—

Title	*Open miles—Length of lines*	*Motive power*	*Feet-inches gage*
Bantan Railway	45.6	Electric	3'6"
Chichibu Railway	41.2	Electric and steam	3'6"
Chugoku Railway	49.5	Steam	3'6"
Echigo Railway	66.4	do	3'6"
Fuji Minoba Railway	20.9	do	3'6"
Geibi Railway	56.2	do	3'6"
Ibigawa Electric Railway	35.8	Steam and electric	3'6"
Iwate Keiben Railway	40.7	Steam	2'6"
Iyo Railway	35	do	3'6"
	3.4	Electric	3'6"
Joso Railway	31.9	Steam	3'6"
Kokura Railway	24.9	do	3'6"
Musashimo Railway	27.2	do	3'6"
Nagoya Railway	42.1	do	3'6"
	46	Electric	3'6"
Nankai Railway	42.9	Steam	3'6"
	35.4	Electric	3'6"
Omi Railway	27.5	Steam	3'6"
Shimabara Railway	26.2	do	3'6"
Tobu Railway	143.2	do	3'6"
	2.8	Hand	2'0"
Tomakomai Railway	25.5	Steam	2'6"
Tsukuba Railway	24.9	do	3'6"

e. Formosa.—Railroads in Formosa have—

200 locomotives.
600 passenger cars.
8,000 freight cars, mostly open, 10–20 ton capacity.

The Government railways operate 881 kilometers (550 miles) of 3'6"-gage railroad. Private companies operate 1,247 kilometers (775 miles) of 2'6"-gage railroad and narrower. The capacity of all double-track sections may be estimated at 48 pairs of trains. Crossing loops are short, and therefore trains of 30 cars and 750 tons are the maximum accommodated. The principal railway line runs through the western coastal area of the island, linking Kielung with Taihoku and Takao.

f. Manchuria.—(1) *Engines.*—

South Manchurian Railways:
500 locomotives, passenger and freight.
100 switching engines.
12 Diesel 4-car units.
State Railways:
1,250 locomotives.

(2) *Passenger cars*:
850—South Manchurian.
2,000—State Railways.
(3) *Freight cars*:
9,000—South Manchurian.
17,000—State Railways.

(4) The railway system has developed around the South Manchurian Railway Company, the main line being Dairen–Hsingking. The management of the company is in daily contact with the Kwangtung Army, with headquarters at Hsingking and Dairen. The main line is double-tracked. Other railways are State-owned and operated by the South Manchurian. The most important of these is the former Chinese Eastern Railway, cross-country from Manchuli to Suifenho (Pogranichnaya). The southern main line branches off the former at Harbin whence it runs to Hsingking and connects with the South Manchurian.

(5) The Chinese Eastern Railway was formerly part of the Trans-Siberian Railway. It has been duplicated by a northerly route, entirely in Siberian territory at a short distance from the Manchurian border. The Chinese Eastern was taken over by the Manchukuo State Railways in 1935 and incorporated into their own system. The gage was converted from the Russian 5-foot gage to standard. A connection with the Siberian railways system exists now only at Manchuli, where a break in the gage occurs.

(6) Other important trunk lines are Peking–Mukden, entering Manchuria from China at the point where the Chinese Wall reaches the sea; and the Antung–Mukden, a section in the overland route from Japan through Korea.

g. Korea.—(1) *Rolling stock (1937)*—	*For 1.435 m. gage*	*For .76 m. gage*
Locomotives	315	31
Passenger cars	754	75
Freight cars	3,444	319

A 1941 report gives—
400 locomotives.
900 coaches.
4,500 freight cars.

(2) *Passenger coaches.*—Passenger cars are few, speed is low, the rolling-stock locomotives and coaches are of the American style. The trains are light, consisting of up to 8-bogie carriages, weight behind tender 300 to 350 tons. All carriages are of the open-type; sleepers, American-style; baggage and mail cars are separate units.

(3) *Freight cars.*—Freight cars consist of four-wheeled and four-bogie cars; 15-, 20-, 30-, and 40-ton carrying capacity. There are few special cars in use.

(4) The railways are the principal land transport in Korea. Motor traffic is negligible except in the larger towns. The principal center of the railroad system is Seoul (Keijo) and Heijo. The ports are the termini. A considerable number of narrow-gage light railways serve as feeders from the outlying districts.

(5) The principal lines are a trunk line from Fusan via Keijo, Heijo to Shingshu on the Manchurian border; thence by a long bridge across the border to Antung and Mukden, where it connects via the Manchurian system with all parts of that country. The second main line runs from Keijo to the east coast at Gensan; thence to the northeast corner of the country, to the ports of Seishin, Rashin, and Yuki. Most of the other lines are in the western half of the peninsula.

(6) Existing routes into Manchuria are at Antung and at Kamisambo–Nanyo.

(7) New construction, now nearing completion, aims at provision of a second main south-north line and cross-country lines from harbors on the Japan Sea to Manchuria.

(8) Keijo–Taidan—167 kilometers, double track.

	Kilometers	*Miles*
(9) Government railways—standard gage:		
Route mileage	3, 867	2, 417
Double track	170	100
Total main line track	4, 037	2, 425
Sidings (approximately)	1, 000	625
(10) Government Railways—2′6″ gage:		
Route mileage	203	127
Sidings	30	20
(11) Private companies (railways and tramways):		
Route mileage	1, 327	830
(12) Bus routes:		
Route mileage	26,000	16, 250

■ 80. MISCELLANEOUS LAND TRANSPORT FACILITIES.—*a. Bicycles.*—Japan is one of the world's largest producers of bicycles and the bicycle is very widely used throughout the country. It is estimated that there are approximately 7,000,000 bicycles in Japan and their use as a means of transport should not be underestimated. There is a standard army type of heavy construction designed along English lines, with front- and rear-wheel brakes and large wheels. The Japanese army has made wide use of the bicycle in all campaigns of the present war. In practically all of its campaigns the Japanese army has seized private bicycles in the invaded territory and used them for transport purposes.

b. Motorcycles.—The standard motorcycle of the Japanese army is a twin-cylinder Harley-Davidson type of 1,500-cc displacement. This design has an unusually high road clearance, with large wheels, and is of very heavy construction. When used with a side car, a reverse gear is incorporated in the transmission. This is a satisfactory military vehicle. One design includes a mount for a 7.7-mm machine gun on the side car. Detachable shields can be fitted to both side car and motorcycle.

c. Motor tricycles.—The commercial motor tricycle (Sanrinsha) is a purely Japanese design developed during the past 12 years. With a rated capacity of 1,000 pounds, these light vehicles often carry a ton and have been used by the Japanese army in Japan proper and to some extent in North China and Manchuria. Engines vary in size from 300 cc to 1,000 cc; practically all are single-cylinder. The smaller type are chain-driven but the larger are shaft-driven. All have three speeds forward and one reverse.

■ 81. WATER TRANSPORT.—*a. Known tonnage as of December 7, 1941.*—

1	2	3	4	5	6	7	8	9	10	11
Gross tons	*Tankers*		*Combination vessels*		*Freighters*		*Public service vessels*		*Total all types*	
	No.	*Total tonnage*	*No.*	*Total tonnage*	*No.*	*Total tonnage*	*No.*	*Total tonnage*	*No.*	*Total tonnage*
1,000–2,000	3	3,299	36	51,251	240	364,820	2	2,731	281	422,101
2,000–3,000	1	2,417	39	100,041	187	465,336	9	21,562	236	589,356
3,000–4,000	1	3,271	29	96,727	147	502,266	11	38,913	188	641,177
4,000–5,000	0	0000	14	60,103	138	620,322	------	--------	152	680,425
5,000–6,000	5	27,672	14	75,998	167	927,124	------	--------	186	1,030,794
6,000–7,000	3	19,072	12	76,970	104	685,696	------	--------	119	781,738
7,000–8,000	11	80,517	9	68,223	47	340,502	3	21,962	70	511,204
8,000–9,000	13	106,103	5	42,459	30	253,888	------	--------	48	402,450
9,000–10,000	8	76,793	17	161,754	4	38,209	------	--------	29	276,756
10,000–12,000	14	141,775	15	164,073	--------	----------	------	--------	29	305,848
Over 12,000	5	90,916	8	125,731	--------	----------	------	--------	13	216,647
Total	64	[1] 551,835	198	[2] 1,023,330	1,064	[3] 4,198,163	25	[4] 85,168	1,351	5,858,496

[1] 13 of these, totaling 224,147 gross tons, have a maximum speed of over 18 knots and are probably operating as fleet auxiliaries. Tankers are of modern design and construction, 42 of the 64 having been built since 1927.

[2] 58 of these vessels, totaling 521,755 gross tons, have a normal sea-cruising speed of over 15 knots; 57 vessels, totaling 400,941 gross tons, were built during and since 1930; 80 vessels totaling 366,672 gross tons were built prior to 1920.

[3] Approximately 310 of these vessels totaling 1,150,000 gross tons have a maximum speed of 15 knots or over; 479 vessels totaling 1,683,374 gross tons were built prior to 1920; 382 vessels, totaling 1,674,949 gross tons, were built during and after 1930.

[4] The majority of Japan's public service vessels are ferries operated by the Ministry of Railways, principally between Japan and Korea.

b. Summary.—

	Number	*Tonnage*
Known ships as of Dec. 7, 1941	1,351	5,858,496
Estimated unreported construction 1940, 1941	38	210,395
Estimated unlisted vessels	105	300,000
Estimated ships as of Dec. 7, 1941	1,494	6,368,891

c. Seizures and acquisitions.—

Gross tons	*Number*	*Tonnage*	*Gross tons*	*Number*	*Tonnage*
1,000–2,000	46	66,115	7,000–8,000	7	52,042
2,000–3,000	33	80,818	8,000–9,000	2	16,437
3,000–4,000	22	75,379	9,000–10,000	1	9,877
4,000–5,000	5	23,455	Over 10,000	8	111,349
5,000–6,000	17	89,932			
6,000–7,000	11	71,222	Total	152	596,266

c. Seizures and acquisitions.—Continued.

Nationality of ships acquired or seized	*Number*	*Tonnage*
Axis	36	193, 899
Allied	90 (1 72)	280, 986 (1 235, 239)
French	24	114, 089
Neutral	2	7, 652
	152 (1 134)	596, 626 (1 550, 879)

1 Adjusted for Allied ships probably sunk or scuttled, or constructive total loss.

d. Estimate of Japanese shipping position as of June 1, 1942 (vessels over 1,000 tons).—

1	*2*	*3*	*4*	*5*	*6*	*7*
	Freighters and passenger vessels		*Tankers*		*Total*	
	No.	*Tonnage*	*No.*	*Tonnage*	*No.*	*Tonnage*
Estimated tonnage as of Jan. 1, 1942 (excluding losses)	1, 430	5, 817, 056	64	551, 835	1, 494	6, 368, 891
Estimated gains through capture, seizure, and acquisition as of June 1, 1942:						
(1) Allied	75	222, 450	3	12, 789	78	235, 239
(2) Axis	35	188, 786	1	5, 113	36	193, 899
(3) French	24	114, 089			24	114, 089
(4) Neutral	2	7, 652			2	7, 652
Estimated new construction (Jan. 1, 1942–June 1, 1942)	25	106, 000	3	19, 000	28	125, 000
	1, 591	6, 456, 033	71	588, 737	1, 662	7, 044, 770
Less:						
Estimated war losses (Dec. 7, 1941–June 1, 1942)	125	676, 091	14	102, 519	139	778, 610
Estimated marine casualties (Oct. 1, 1941–June 1, 1942)	8	25, 000			8	25, 000
	133	701, 091	14	102, 519	147	803, 610
Estimated tonnage available to the Japanese as of June 1, 1942	1, 458	5, 754, 942	57	486, 218	1, 515	6, 241, 160

e. Summary estimate as of June 1, 1942:

Estimated tonnage available to the Japanese as of June 1, 1942 (round figures)		6, 240, 000
Estimate of required tonnage June 1, 1942:		
Economic supply of Japan and her troops in China and Manchuria	3, 000, 000	
Naval auxiliaries	400, 000	
Lay-ups and repairs	700, 000	
Unusable types, domestic services, etc	100, 000	
Supply of troops and present transport needs in southern occupied areas	900, 000	
		5, 100, 000
Available tonnage for additional operations		1, 140, 000

f. Special transports.—The Japanese have developed a special type of transport to carry troops and small landing craft. The transports have sliding or rolling doors on their sides, permitting landing craft berthed on rollers to be rolled into the water fully loaded with men and equipment. At least some of the transports also have rear slide hatches, or ramps, with which to load and unload heavy equipment.

g. Landing craft.—Six types of these have been developed. Most of them are featured by double keels (for stability and strength) and by armored bows which can be dropped to permit field guns and small tanks to be run off the boats onto the beach. The armored fronts are capable of stopping .50-caliber bullets, but .30-caliber fire will penetrate the sides. The different types and some additional characteristics of the boats are as follows:

(1) *Type A.*—This is a large, open boat on the bow of which is a landing ramp which falls forward onto the beach, thus enabling guns to be wheeled off. The engine and coxswain usually are protected by bullet-proof plating. It is used by main landing forces. The approximate over-all length of the boat is 50 feet and the length at the water line is 41 feet. The length of the beam is 12 or 13 feet. The boats are propelled by low-speed two- or four-cylinder gasoline or Diesel engines and attain a speed of about 10 knots. It is estimated that the boats can carry 110 to 120 fully-equipped men.

(2) *Type B.*—This boat, small and of open type and holding 50 to 60 men, is used by the initial covering party. It has an over-all length of 20 to 40 feet and is powered with a two- or four-cylinder gasoline or Diesel engine. Some of the boats have bullet-proof shields and light machine guns in the bow.

(3) *Type C.*—This is an armored motor launch used for close support, reconnaissance, and maintenance of communication. It is approximately 40 feet long and has a beam of 12 to 13 feet. The boat, constructed of steel plate, is believed capable of attaining a speed of 15 knots.

(4) *Type D.*—It is used solely as a towboat, supplementing type A. The boat has an approximate over-all length of 30 feet and a beam of 10 feet. It is constructed of wood, and is similar to a standard motor launch.

(5) *Type E.*—This is an airplane-propeller-driven boat, about 50 feet long and 10 feet wide, which was designed for use in shallow or weed-infested water. About 10 feet of the forward underwater body rises above the water when the boat is going at full speed. The draft at light load appears to be not over 2 feet.

(6) *Type F.*—It is constructed of steel plates and is of two sizes—30 feet over-all and 40 feet. It has a beam of 12 feet and a speed of about 9 knots.

h. Motor torpedo boats.—Characteristics of the boats are as follows:

(1) Length: 32 feet, 6 inches to 49 feet.

(2) Beam: 6 feet, 6 inches to 9 feet, 9 inches.

(3) Body: Flat-bottom steel frame, wood planking.

(4) Motor: Radial-cooled aircraft engine with reduction gear and angle drive up to 400 ground-maximum horsepower.

(5) Armament: Two torpedo tubes mounted on each side, four depth charges, one machine gun.

(6) Crew: Three or four.

(7) Speed: 52 mph. or over.

(8) Endurance: 10 hours at full speed if about 1,150 gallons of gasoline are carried.

i. Tonnage calculations.—Various tonnage calculations for sea movement of Japanese forces, armament, and supplies have been estimated as follows:

(1) *Personnel and horses.*—The tonnage allowances for troops and horses vary according to the length of the voyage, route taken, and season of the year. In each case a margin is allowed for a certain quantity of stores, coal, ammunition, and vehicles.

	Long sea voyages (tons)	*Short sea voyages (5 days) (tons)*
For each man	5	3
For each horse	10	9

(2) *Matériel.*—For every 1,000 tons of Japanese shipping, various vehicles (loaded), tanks, and other equipment can be shipped as shown in the following table:

Trucks (3-ton)	12
Trucks (30-cwt—approx. 1½ tons)	23
Trucks (1-ton)	40
Tractors (field artillery)	50
Cars	40
Ambulances	30
Howitzers (105-mm)	50
Infantry guns (37-mm)	100
Tankettes	30
Light tanks	25
Medium tanks	15

(3) *Ship dimensions in relation to tonnage.*—The length, breadth, and draft of Japanese vessels in relation to tonnage is given in the following table:

Draft (feet)	*Length (feet)*	*Breadth (feet)*	*Approximate tonnage*
15	230	33	1,000
19	280	39	2,000
21	330	44	3,000
23	360	48	4,000
25	390	51	5,000
26	420	53	6,000
27	440	55	7,000
28	450	57	8,000
28	460	58	9,000
29	470	59	10,000

■ 82. ROADS AND BRIDGES.—*a. Japan.*—The published figures of road mileage in Japan are practically meaningless since they include all sorts of alleys, lanes, and unimproved roads, and give no indication of the kind of surface. The latest official figures, which were published in 1937, show a total of approximately 600,000 miles of roads. Of the 125,000 miles of road which are suitable for motor transportation, 100,000 miles are suitable the year round, and 25,000 during dry weather only. In 1935 there were approximately 120,000 bridges on roads suitable for motor transportation. Most of these are constructed to sustain a uniform load of 100 pounds per square foot. In 1937 there were 74,100 miles of highway bus routes in Japan. Because of construction difficulties, many sections of Japan are left without any roads, and connecting links between particular areas are very poor.

b. Taiwan.—The road system of Taiwan is laid out according to strategic necessity. A main truck highway runs from north to south through the western coastal area and upon it converge many feeder roads. The east coast, on the other hand is only poorly provided with highways. In 1936, the 11,300 miles of road were classified as follows: concrete—16; asphalt—140; macadamized—50; improved earth and gravel—10,094; unimproved earth—1,000.

c. Chosen.—With the exception of a few main roads, most of the roads in Chosen are either ordinary cart roads or earth covered with unrolled gravel. There are 17,375 miles of classified roads divided as follows: First-class roads (over 24 feet in width)—2,000 miles; second-class roads (18 to 24 feet in width)—6,200 miles; third-class roads (12 to 18 feet in width)—9,175 miles.

d. Manchukuo.—At the end of 1939 there were about 20,000 miles of roads in Manchukuo. Only about one-fourth of the roads were improved, these being chiefly earth, gravel, or clay. Bridges are well constructed of concrete and are suitable for military use.

e. Occupied China.—Roads in operation in this area total upward of 15,000 miles, in contrast to the prewar mileage of more than 20,000. A large proportion is of unimproved dirt, but main highways are largely surfaced. The surfacing is usually a low-cost type, consisting of clay or water-bound macadam, broken brick or stone, with gravel. Most of these roads are poorly maintained and the Japanese have made few improvements.

SECTION II
TROOP MOVEMENTS

■ **83. MARCH TABLES AND ROAD SPACES.**—*a. Marching ability of various arms.*—

Arms	*Pace, speed, and distance*						
	Marching pace (meters per minute)			*Marching speed (kilometers per hour)*		*Distance per day*	
	Ordinary	*Quick*	*Double*				
Infantry		86	145	4		24 km (usually continuous marching at 6 hours per day).	
				Type of pace	*Speed per hour*	*Classification*	*Distance (kilometers)*
Cavalry	100	220	320	¼	7	Brigade and group	65 to 97.5
				⅓	8	Reconnaissance unit	97.5 to 130
				½	9	Officers' reconnaissance.	130 to 195
				[1] ⅔	10		
				¾	11		
Mountain Artillery	86	145		Usually keep pace with the infantry.			
Field Artillery	86	220 (180)	320	For short distances figures are same as for cavalry.			
Horse Artillery	100	220	320	Same as for cavalry.			

[1] The ⅔ pace means that in 1 hour the troop does 40 minutes trot and 20 minutes walk.

b. Speed of armored force vehicles.—According to Japanese manuals a mixed mechanized force can cover between 60 and 70 kilometers (37–44 miles) in a day, the following being the normal speed on the march of columns of various types:

	Ordinary conditions		*Dim lights*		*No lights*	
	Km per hr	*Mph*	*Km per hr*	*Mph*	*Km per hr*	*Mph*
Tank regiment	8–12	5–7½	6–8	3¾–5	4–6	2½–3¾
Light tank company	12–18	7½–11	6–8	3¾–5	4–6	2½–3¾
Truck column	12–20	7½–12½	6–8	3¾–5	4–6	2½–3¾

The following speeds are those given in instructions to drivers and indicate the speed to be adopted on receipt of the corresponding signal:

	Km per hr	*Mph*
Low speed	6	3¾
Ordinary speed	12	7½
Fast speed	18	11

Full speed: As fast as the terrain will permit, but not exceeding 35 km per hr. (21¾ mph).

c. Length of various units on the march and intervals between them (in meters):

[Figures in parentheses are for pack-animal formations]

Name of units	*Combatant units*	*Heavy baggage (rations, ammunition and baggage)*	*Intervals between units*
Infantry:			
Army Headquarters	200	200	----------
Division Headquarters	150	150	----------
Company	75	----------	8
Machine Gun Company	110	----------	
Battalion (less unit trains)	440	95	20
With unit trains	580	(135)	
Infantry-Gun Company	170	25 (35)	----------
Regiment	2,100	370 (500)	20
Cavalry:			
Squadron:			
2-Section Unit	210	----------	15
4-Section Unit	120	----------	
Regiment:			
2-Section Unit	500	200	20
4-Section Unit	310	(320)	
Horse Artillery Battery	450	----------	----------
Machine-gun Company	550	----------	----------
Brigade (less trains)	3,000	800	----------
Trains	1,900		
Field Artillery:			
Battery (less supply vehicles)	220	----------	20
With Supply Vehicles	300	----------	
Battalion (less supply vehicles)	1,050	270	30
With supply vehicles	1,230		
Regiment (less supply vehicles)	4,000	1,000	----------
With supply vehicles	4,500		
Regimental supply vehicles	400	100	----------
Mountain Artillery:			
Battery (less supply vehicles)	220	----------	----------
With supply vehicles	330	----------	----------
Battalion (less supply vehicles)	1,230	(390)	30
With supply vehicles	1,400		
Regiment (less supply vehicles)	4,400	(1,500)	30
With supply vehicles	5,400		
Regimental supply vehicles	970	(250)	120
6-inch Howitzers:			
Battery (less supply vehicles)	320	----------	20
With supply vehicles	480		
Battalion (less supply vehicles)	1,550	400	30
With supply vehicles	2,000		
Regiment (less supply vehicles)	4,100	1,050	30
With supply vehicles	4,950		
Regimental supply vehicles	4,950	1,050	30
10-cm Gun Regiment	4,000	----------	----------
Heavy Artillery Brigade, Transport Unit	5,000	----------	----------
Field AA Artillery Unit	300	----------	----------

Name of units	*Combatant units*	*Heavy baggage (rations, ammunition and baggage)*	*Intervals between units*
Engineers:			
Company (less unit trains)	120	50	8
With unit trains	190	(60)	
Battalion (less unit trains)	260	120	15
With unit trains	400	(150)	
Field Searchlight Unit	170	45	
Bridging Train	2,000 (6,200)		
Transport:			
Company	1,600 (1,610)		
Horse Depot	130 (160)		
Heavy Truck Company	1,200		
Signals:			
Signals Unit	200 (230)		
W/T Platoon	60 (30)	20 (25)	
Field Telegraph Company	400 (500)	40 (45)	
Balloon Battalion	2,200		
Medical Unit	800 (240)		
Field Hospital	375 (440)		

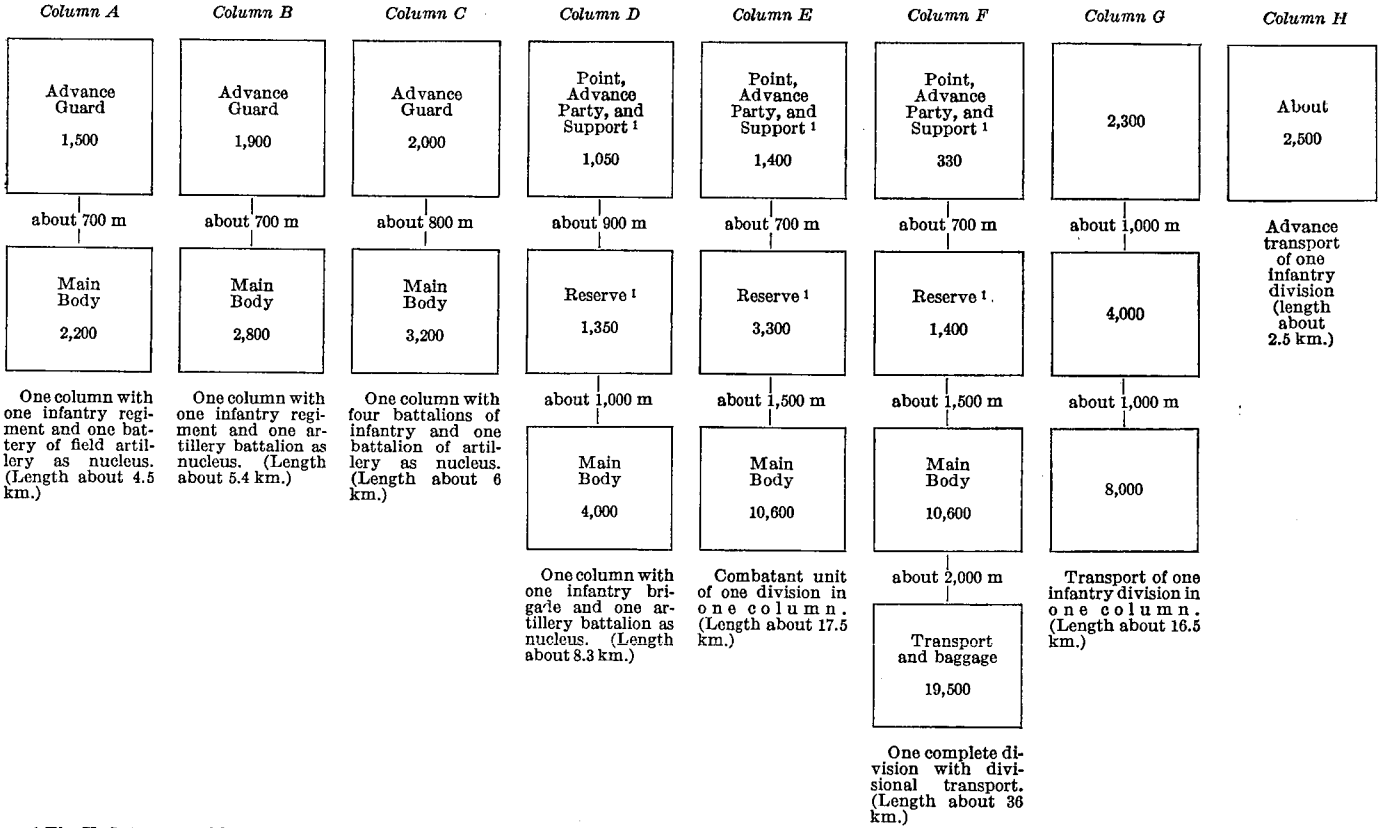
NOTES:

Foot units are calculated as marching in columns of 4.

The table is based on the 2-Japanese books: "Notes on Tactical Operations on the Continent" (TAIRIKU-SENJUTSO-SACYO-SANKO) and "Field Service Regulations" (JINCHU-YGMUREI).

d. Length of various columns on the march and intervals between (in meters).—

[The divisional trains are keeping intervals in accordance with a march with military precautions.]



[1] The U. S. terms used here are not necessarily the exact equivalents of those parts of the column to which they refer.

■ 84. RAILWAY TRANSPORTATION.—*a. Composition of trains and speed of railway.*—One train of Japanese rolling stock consists of 28 to 30 coaches and cars of different kinds. Its arrangement is as follows:

Elements	*Number of coaches and freight cars*
Locomotive	1
1st- and 2d-class passenger coaches	1
3d-class passenger coaches	10
Temporary passenger coaches	10
Covered freight cars	2
Partly covered freight cars	3
Cattle cars	1
Box cars	(omitted)
Flat cars	28
TOTAL	

Speed of train about 30 kilometers per hour.

b. Accommodation for men, horses, and materials.—

Single coaches, etc.	*Accommodation for men and horses*			*Artillery accommodation*				*Commissariat accommodation*	
	Officers	*Enlisted men*	*Horses*	*Heavy guns*	*Field and medium artillery with ammunition wagons*	*Mountain guns*	*Infantry guns*	*Empty trucks*	*Trucks*
1st and 2d class passenger coach.	30								
3d class and temporary passenger coach, or covered freight car.		70							
Cattle car or covered freight car.			12						
Box car and flat car				1	1	2	4	8	60 pack animals or 16 vehicles.

NOTES:

Medical equipment and engineering materials of a division are transported separately, about 49 coaches, etc., being required.

Each train can accommodate only 600 to 700 men of all arms, fully equipped.

c. Number of coaches, etc., required for transportation of division.—According to preceding table the number of coaches, etc., required by a regular four-regiment division is as follows:

Classification	*Number*	*Type of coach, etc. required*	*Number of coaches, etc. required*
Officers	773 men	1st- and 2d-class coach	26
Enlisted men	24,427 men	3d-class or temporary passenger coach.	349
Horses	8,150 head	Box cars or covered freight cars	680
Mountain guns	36 pieces	Flat cars	18
Infantry guns	56 pieces	do	14
Empty trucks	499 vehicles	Box cars and flat cars	63
Stores, etc., carried by transport units.	499 vehicles	do	32
Medical and engineering stores		Box cars	49
TOTAL			1,231 cars.

The above table shows that 1,231 cars, etc., are required for transporting a division. If one train is composed of 30 cars, etc., then 41 trains are required, and, if composed of 28 cars, then 43 trains are required. Therefore, the average number of trains required is 42.

d. Plan for rail movement.—

Troops	*No. 1 Bn Ammunition Train*	*Regtl Cmdr Inf Arty Inf Regtl Sig Sec (??)*	*No. 2 Bn*	*No. 3 Bn*
Commander	Major KIMURA	Col. SAKUMA	Major SUGIURA	Major TAKANOBU.
Officers	28	36	33	38.
Enlisted men	887*	714	827	876.
Train commander	1,909	1,713	1,715	1,701.
Station of departure	SHUKKEN (?)	SHUKKEN (?)	(??)	
Time	1910/11/12	0200/11/12	0440*/11/12	0500*/11./12
Arrive URAGUCHI	0630/11/12	1200/11/12	0650/11/12	1850*/11./12
Passenger cars		1		
Substitute (or temporary?) passenger cars.	17	13	17	(??).
Horse cars	13	13	6	7.
Baggage cars	7	9	8	(??).
TOTAL	31	36	33	(??).

*Practically illegible on original.
?? Illegible on original.

NOTE.—Totals as usual do not agree in most cases. It appears that all troop trains left at night—probably for security reasons.

e. Practical example of railway transportation of the Japanese army.—

SCHEME OF RAILWAY TRANSPORTATION OF THE 5TH DIVISION

[Mukden Army Nos. 850 and 851]

Units, men, and horses transported	*Quantities transported*			*1st- and 2d-class passenger coach*	*3d-class passenger coach*	*Temporary passenger coaches (covered freight cars)*	*Partly covered box cars*	*Cattle cars*	*Box cars*	*Flat cars*	*Rolling stock used*
	Men										
	Officers (including warrant officer, class I.)	*NCOs and EM*	*Horses*								
Headquarters, 11th Infantry Regiment; 1 Battalion, 11th Infantry Regiment (less Infantry-Gun Platoon)	31	740	152	1	1	10	2	13	1	----------	28
1 Battalion of the 11th Infantry Regiment; 5th Division Headquarters	57	710	119	1	1	10	2	10	2	1	24
1 Battalion of the 11th Infantry Regiment; 1 Infantry-Gun Company, 11th Infantry Regiment; 1 Antitank-Gun Platoon, 11th Infantry Regiment	30	719	134	1	----------	12	1	12	3	----------	29
Headquarters, 11th Infantry Regiment; Infantry-Gun Platoon, 11th Infantry Regiment; 1 battalion of the 41st Infantry Regiment; Infantry-Gun Platoon of the 41st Infantry Regiment	31	747	115	1	----------	12	2	11	3	----------	24
1 Battalion of the 41st Infantry Regiment; Infantry-Gun Company of the 41st Infantry Regiment; Antitank-Gun Platoon of the 41st Infantry Regiment	30	779	134	1	----------	12	1	12	3	----------	29
Headquarters, 41st Infantry Regiment; 1 Battalion of the 41st Infantry Regiment (less Infantry-Gun Platoon	31	740	152	1	1	10	2	13	1	1	29
Headquarters, 21st Infantry Regiment; 1 Battalion of the 21st Infantry Regiment (less Infantry-Gun Platoon)	31	740	152	1	1	10	2	13	1	----------	28
1 Battalion of the 21st Infantry Regiment; Antitank-Gun Platoon of the 21st Infantry Regiment	30	779	134	1	----------	12	----------	12	3	----------	28

Scheme of railway transportation of the 5th division—Continued

Units, men, and horses transported	*Quantities transported*			*1st- and 2d-class passenger coach*	*3d-class passenger coach*	*Temporary passenger coaches (covered freight cars)*	*Partly covered box cars*	*Cattle cars*	*Box cars*	*Flat cars*	*Rolling stock used*
	Men		*Horses*								
	Officers (including warrant officer, class I.)	*NCOs and EM*									
Headquarters, 21st Infantry Brigade; 1 Battalion of the 20th Infantry Regiment; Infantry-Gun Platoon of the 20th Infantry Regiment; Infantry-Gun Platoon of the 42d Infantry Regiment	30	719	107	1	----------	12	2	11	3	----------	29
Headquarters, 47th Infantry Regiment; 1 Battalion of the 47th Infantry Regiment (less 1 Company, and Infantry Platoon)	24	666	149	1	1	9	2	13	2	----------	28
Headquarters, 36th Infantry Brigade; 1 Battalion of the 47th Infantry Regiment (less 1 Company); Vehicular Company the Medical Unit of the 5th Division	27	753	114	1	1	10	1	12	2	----------	29
1 Battalion of the 47th Infantry Regiment (less 8th Company); Infantry-Gun Company of the 47th Infantry Regiment; Antitank-Gun Platoon of the 47th Infantry Regiment; Infantry-Gun Platoon of the 47th Infantry Regiment	25	700	105	1	----------	11	1	12	4	----------	29
Headquarters, 23d Infantry Regiment; 1 Battalion of the 23d Infantry Regiment (less 1 Company), and Infantry-Gun Platoon	24	666	149	1	1	9	2	13	2	----------	28
1 Battalion of the 23d Infantry Regiment (less 2d Company); Medical Unit, 5th Division (less Vehicular Company)	38	856	116	1	1	11	2	10	1	2	28
1 Battalion of the 23d Infantry Regiment (less 1 Company); 1st Field Hospital, 5th Division	74	681	110	1	1	10	2	12	3	----------	28
1 Company, 23d Infantry Regiment; Infantry-Gun Platoon; Antitank-Gun Platoon; Hospital, 5th Division	27	631	77	1	1	10	1	9	3	----------	25

One-half of the 5th Company, 5th Transport Regiment; 1 Company, 23d Infantry Regiment	8	420	198		1	5	2	17	3		28
(Same as above)	7	421	198		1	5	2	17	3		28
Battalion Headquarters, 5th Medium Artillery Regiment; 1 Battery, 5th Medium Artillery Regiment	14	293	221	1		3		19		7	30
1 Battery, 5th Medium Artillery Regiment	5	168	138		1	2		12	5		29
1st and 2d Field AA Units of the 20th Division						3	2		2	2	
1 Battery, 5th Medium Artillery Regiment; 1 Infantry-Gun Company, 45th Infantry Regiment	9	275	149		1	3		10	6		26
Headquarters, 42d Infantry Regiment; 1 Battalion, 42d Infantry Regiment (less Infantry-Gun Platoon)	31	740	152	1	1	10	2	13	1		28
1 Battalion, 42d Infantry Regiment; 1 Infantry-Gun Company, 42d Infantry Regiment; Antitank-Gun Platoon, 42d Infantry Regiment	30	779	134	1		12	1	13	2		29
1 Battalion, 42d Infantry Regiment; 1st Company, 5th Engineer Regiment	31	817	114	1	1	12	1	10	2		27
Headquarters, 11th Infantry Brigade; 1 Battalion, 13th Infantry Regiment	28	729	87	1	1	11	1	8	1		23
Headquarters, 13th Infantry Regiment; 1 Infantry-Gun Company, 13th Infantry Regiment	10	308	101	1		5	1	12	3		22
1 Battalion, 13th Infantry Regiment; Antitank-Gun Platoon, 13th Infantry Regiment; Battalion of the 13th Infantry Regiment	25	710	82	1		11	1	7	2		22
Headquarters, 6th Division; 1 Battalion, 13th Infantry Regiment	54	740	99	1	1	11	1	9	2	1	26
2d Squadron, 5th Cavalry Regiment; Divisional Signal Unit of 5th Division	15	401	203	1		5	2	18	1		27
Headquarters, 5th Field Artillery Regiment; 1 Company, 47th Infantry Regiment	28	380	164	1		6	1	15	5		28
Battalion Headquarters, 5th Field Artillery Regiment; 1 Battery, 5th Field Artillery Regiment; 1 Company, 47th Infantry Regiment	19	366	152		1	5	1	14	6		26
Same as above	19	366	152		1	5	1	14	6		26
Battalion Headquarters, 5th Field Artillery Regiment; 1 Battery, 5th Field Artillery Regiment; 1 company, 23d Infantry Regiment	19	366	152		1	5	1	14	6		26
2 Batteries, 5th Field Artillery Regiment	10	30	202		1	3		18	8		30
1 Battalion, 3d Independent Mountain Artillery Regiment	19	406	268	1		4		23	2		30

Scheme of railway transportation of the 5th Division—Continued

Units, men, and horses transported	*Quantities transported*										
	Men		*Horses*	*1st- and 2d-class passenger coach*	*3d-class passenger coach*	*Temporary passenger coaches (covered freight cars)*	*Partly covered box cars*	*Cattle cars*	*Box cars*	*Flat cars*	*Rolling stock used*
	Officers (including warrant officer, class I.)	*NCOs and EM*									
Headquarters, 1st Tank Battalion; 1 Company, 1st Tank Battalion	13	164	----------	1	----------	2	3	----------	2	19	27
1 Company, 1st Tank Battalion; 1st and 2d Field AA Units, 12th Division	10	294	----------	----------	1	4	4	----------	3	18	30
1 Company 1st Tank Battalion; 3d and 4th Field AA Units, 12th Division	10	294	----------	----------	1	4	4	----------	3	18	30
Half wagon line, 1st Tank Battalion; 1 Company, 45th Infantry Regiment; Infantry-Gun Platoon, 45th Intry Regiment	21	511	12	----------	1	6	1	1	2	19	30
Half Wagon Line, 1st Tank Battalion; 1 Company, 45th Infantry Regiment	20	469	----------	----------	1	5	2	----------	----------	20	28
Headquarters, 45th Infantry Regiment; 1 Battalion, 45th Infantry Regiment (less 1 Company, and Infantry-Gun Platoon)	24	666	149	1	----------	9	1	13	2	7	27

NOTES.—The units came from Korea. The movement of the whole division from Antung to Mukden lasted from Aug. 6 to Aug. 10, 1940. Destination was Tientsin.

■ 85. WATER TRANSPORT—*a Shipping capacity required for transportation of men, horses, and materials.*—

Classification	*Tonnage required*
1 man	3.
1 horse	9 (equals 3 men).
1 field gun	18 (equals 6 men).

b. Number of transports and tonnage required for transportation of a division.—There is a difference between the organization of the Japanese four-regiment division and the three-regiment division. The following is the number of transports and tonnage required for transportation of a regular four-regiment division.

Classification	*Quantity*	*Tonnage Required*
Men	25, 200	75, 600 (each man counted at 3 tons).
Horses	8, 150	73, 350 (each horse counted at 9 tons).
Guns	92	1, 656 (each gun counted at 18 tons).
Grand total		150, 606
Number of 3,000-ton transports required		150,606÷3,000=51.
Number of 5,000-ton transports required		150,606÷5,000=31.

c. Mileage and time required from Japanese ports to Chinese main ports.—

Destination	*Starting point*							
	Yokohama	*Nagoya*	*Osaka*	*Hiroshima*	*Nagasaki*	*Maizuru*	*Takamatsu*	*Kokura*
Darien	1,178 M	1,075 M	848 M	733 M	377 M	940 M	792 M	614 M
	92 H	83 H	65 H	56 H	45 H	72 H	61 H	57 H
Tang-ku	1,398 M	1,275 M	1,048 M	933 M	777 M	1,140 M	992 M	814 M
	108 H	99 H	81 H	72 H	60 H	88 H	77 H	63 H
Tsingtao	1,152 M	1,029 M	802 M	687 M	321 M	893 M	746 M	568 M
	89 H	80 H	62 H	53 H	41 H	63 H	58 H	44 H
Shanghai	1,648 M	1,025 M	798 M	683 M	464 M	889 M	742 M	564 M
	128 H	79 H	61 H	53 H	36 H	69 H	68 H	44 H
Canton	1,640 M	1,630 M	1,432 M	1,300 M	1,124 M	1,560 M	1,515 M	1,240 M
	127 H	126 H	110 H	100 H	87 H	120 H	116 H	95 H

NOTE: M=Nautical miles; H=hours.

d. Sea transport plan for part of 5th division when leaving Japan.—

Name of ship and tonnage	Units	Men			Horses	
		Officers	Enlisted men	Total	Number of horses	Total
ASO Maru (3,020 tons)	21st Infantry Brigade Headquarters.	4	63	26 O, 696 EM.	16	93
	21st Infantry Regiment Headquarters.	7	183		77	
	1st, 2d, and 3d Companies	15	540		-------	
SOMEDONO Maru (5,154 tons).	1st Battalion of the 21st Regiment (less 2d and 3d Companies).	10	181	36 O, 903 EM	83	204
	2d Battalion of the 21st Regiment (less 5th Company).	20	431		83	
	Divisional Signal Unit	6	241		38	
SINGAPORE Maru (5,852 tons).	3d Battalion of the 21st Infantry Regiment.	25	631	47 O, 1,324 EM	-------	245
	5th Company of the 21st Infantry Regiment.	5	150		-------	
	Infantry-gun Company of the 21st Infantry Regiment.	4	100		39	
	Antitank-gun platoon of the 21st Infantry Regiment.	-------	88		12	
	Cavalry Squadron	7	154		159	
	Engineering Company	6	201		35	
HAKODATE Maru (5,312 tons).	42d Infantry Regiment Headquarters.	7	183	42 O, 1,114 EM	-------	160
	1st Battalion of the 42d Regiment.	25	631		-------	
	9th and 10th Company of the 42d Infantry Regiment.	10	300		-------	
DAITO Maru (5,425 tons).	2d Battalion of the 42d Infantry Regiment.	23	631	45 O, 1,110 EM	-------	217
	3d Battalion of the 42d Regiment (less 9th and 10th Companies).	15	331		-------	
	Antitank-gun Platoon of the 42d Regiment.	1	48		-------	
	Infantry-gun Platoon of the 42d Infantry Regiment.	4	100		-------	

Point of embarkation ..... Hiroshima
Date of embarkation ..... Aug. 2
Destination ..... Fusan (Korea)
Date of disembarkation ..... Aug. 4

e. Translation of embarkation plan of 214th Infantry Regiment (33d Division), etc.—

Ship No.	*Name*	*Speed*	*Tons*	*Units*	*CO*	*Officers*	*Enlisted men*	*Total*	*Horses*	*Baggage (No. of packages)*	*Loading date*	*Jetty*	*Interpreter's comments*
842	TEIYO Maru	11.2	6,869	Div Hq	Maj. KIMURA	21	50.148	1,358	162	130.380	13th and after.	URAGUCHI	Figures do not tally with total and it is not clear to which units the various figures for officers and enlisted men refer. Presumably 7 Troop Mtn Arty. Meaning of "2.1" not clear.
				Div Sig Sec		8	78.130			8,650.50			
				MG Bn Cmdr		4	357.73			300.170			
				Mtn Arty		7	210.149			70.230			
				7.2.1.		6							
						7							
						45							
176	HIBURI Maru	10.0	4,364	Hq 2d Bn	Maj. SUGIURA	6	77	524	82	340		URAGUCHI	These figures do tally — in this case personnel probably refer to the units given opposite.
				No. 5 Co		5	124			240			
				No. 6 Co		4	143			300			
				½ No. 2 Bns MG.		4	100			70			
				One Sec Regtl Arty Tr.		1	60			70			
										Regtl Arty 2			
										236			
										MG 4			
448	CALCUTTA Maru	10.0	5,388	Regtl Hq; No. 3 Co; No. 4 Co; Main portion No. 3 Bn's MGs; Main portion Regtl Arty; Remainder of Sig Sec Mtd Plat.	Col. SAKUMA			913					I have not come across "mounted platoon" (joba shotai) before. Other details not given in original.

e. Translation of embarkation plan of 214th Infantry Regiment (33d Division), etc.—Continued.

Ship No.	*Name*	*Speed*	*Tons*	*Units*	*CO*	*Officers*	*Enlisted men*	*Total*	*Horses*	*Baggage (No. of packages)*	*Loading date*	*Jetty*	*Interpreter's comments*
272	GENZAN Maru	9.0	5,708	No. 7 Co.; No. 8 Co; ½ No. 2 Bn's MGs; No. 9 Co; Am Tn, 2/3 No. 7 Trs, Mtn Arty; Hq 33 Engr Regt; No. 2 Co Engr Regt.	Lt. Col. YAGI, 33 Engs.			932					Other details not given in original. 2-3 No. 7 Troop Mtn Arty suggests that 33 Mtn Arty Regt is also organized on the basis of 3 guns per troop instead of 4.
214	PANAMA Maru	10.0	5,287	Hq No. 3 Bn; No. 10 Co; No. 11 Co; No. 12 Co; ½ No. 3 Bn's MGs; 1/3 No. 8 Tr, 33d Mtn Arty.	Maj. TAKANOBU.			731					Other details not given in original. ⅓ No. 8 Tr—see note above.

CHAPTER 3

SUPPLY

SECTION I

ORGANIZATION AND RESPONSIBILITY

■ 86. SUPPLY METHODS.—*a.* Procurement and supply of base depots is the responsibility of the Minister of War for all classes of supply.

b. Base depots are the rear terminals of the line(s) of communication (LC), and are set up to receive, store, and forward all classes of supplies.

c. LC organizations are responsible for receiving, billeting, rationing, and forwarding replacements, men, and matériel, as well as supplies; for evacuation of casualties, prisoners of war, excess supplies, salvage, and captured equipment; for requisition of local supplies; for organization and operation of wagon trains from local equipment; and for local defense of LC installations.

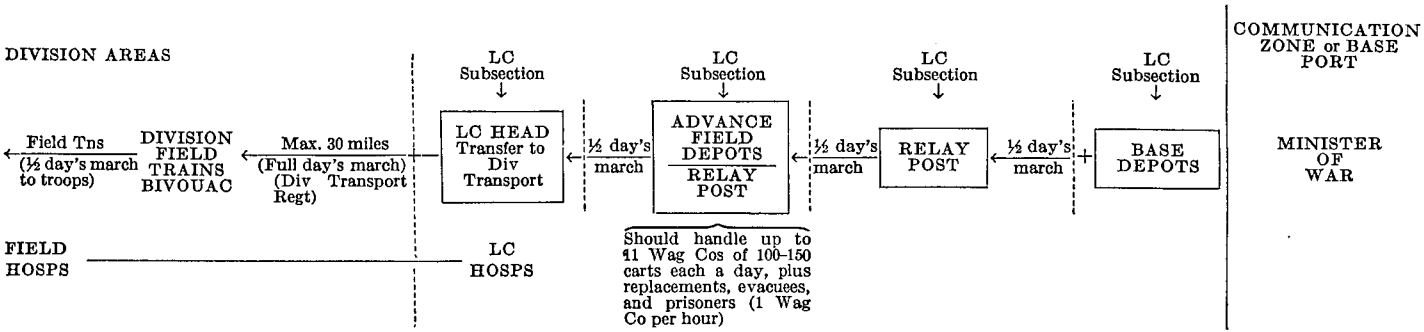
(1) Troops and local levies are at their disposal for carrying out these functions. These include headquarters, signal detachments, LC Wagon Companies (60 tons capacity each, 250 men per company, attached on basis of four per division and 4 per army troops), Trk Cos (about one-fourth the number of Wag Cos)., transportation supervision detachment (one per local company organized), LC hospital (one per division), reserve troops (LC defense), reserve engineers (road work and construction), light railway detachment (62 miles of track for base depot area), and Labor Troops (handling supplies and construction).

(2) LC handles supply forward to the LC head where it is transferred to the division transport regiments. These carry to the unit field trains.

(3) Lines of communication are set up along a main supply line (road, rail, or water). They have length without distribution in depth. They are generally set up on the basis of *one per division.* There is a great dependence upon commandeered equipment for supplemental transport.

d. There is very little supply movement except ammunition and rations. The Japanese soldier is taught to live off the country as much as possible in order to cut down on supply transportation. This is possible because of the nature of the terrain in which a great deal of his fighting is done. The individual soldier carries 1 day's ration and 5 days' supply of rice. The individual soldier's pack weighs about 60 to 65 pounds, including rations and ammunition. Principal method of supply transportation is a cart with about 400 to 800 pounds capacity. Change to motor transport is being made where and when possible.

■ 87. LINE OF COMMUNICATION.—



Inf Bn Combat Tns (pack), Inf Regtl Gun Co and Bn Gun Co Amn Plats (pack), and Regtl Combat Tns draw from advance points of issue of Div Transport. Regtl and Bn Tns of Div Arty do likewise.

Regtl Combat Tns of Hv Arty are supplied direct from LC.

LC is extended as force advances by adding relay posts.

Daily ration and forage require the capacity of one Transport Co per Div, one per army troops, and one per LC personnel.

Maximum daily output for LC is 660 tons.

Extensive use of motor or rail facilities modifies distances and installations, but the basic system remains the same.

SECTION II

SUPPLY DATA

■ 88. AMMUNITION SUPPLY.—The following table is an approximation of the amount of ammunition that is carried within the division:

Weapon	*Unit of fire (rd. per gun)*	*Regiment (rd. per gun)*	*Div transport (rd. per gun)*	*Div total (rd. per gun)*
75-mm Gun	300	303	277	580
105-mm How		178	160	338
75-mm Mtn Gun		156	60	216
70-mm Inf Cannon		160	80	240
37-mm Gun				
Grenades				
HvMG		9,600	5,875	15,475
LMG				2,970
Rifle		180	150	330

■ 89. RATION SUPPLY.—Three days of ration and forage supply are carried within the division: 1 day on the unit field train, and 2 days within the division transport.

PART THREE—ITALIAN FORCES

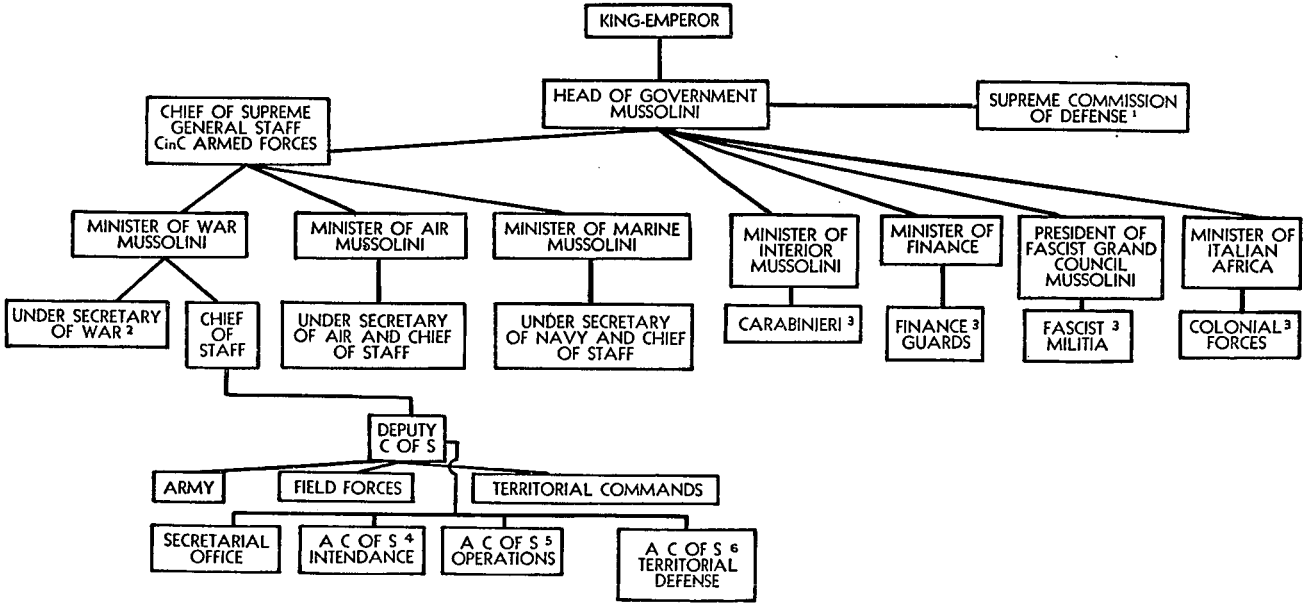
CHAPTER 1

ORGANIZATION

SECTION I

POLITICAL

■ 90. GOVERNMENTAL ORGANIZATION.—



1 Comprises high government officials and ranking officers of Army, Navy, and Air Force. Responsible for coordination of effort, decisions of policy, national organization and mobilization, development and utilization of resources, and State activities concerned with defense. Mussolini is chairman.

2 Office of the Under Secretary of War includes all administrative functions, plus access to advisory council of arms and services.

3 Subject to duty with Army, Navy, or Air Force in time of emergency.

4 Handles organization, mobilization, transportation, and services.

5 Handles territorial and colonial operations, training, military history, and intelligence.

6 Handles defense sectors, AA militia, and coast defense militia.

SECTION II

FIELD FORCES, ARMY AND CORPS

■ 91. ARMY.—*a. Army group.*—Composed of from one army with two attached corps to five armies.

b. Army.—Composed of two or more army corps.

c. Corps.—Organization of army corps is elastic. Composed of two or more divisions, three being normal number. Each type corps has a normal allotment of corps troops, and additional may be assigned as needed. See paragraph 92 for composition of these types of corps.

d. Divisions.—(1) Following is a list of types of Italian division (see charts for composition):

Binary Infantry Division.
Motor-Transportable Infantry Division (Metropolitan type).
Motor-Transportable Infantry Division (Libyan type).
Motorized Infantry Division.
Binary Infantry Division (Mountain type).
Alpine Division.
Fast-Moving ("Celere") Division.
Armored ("Corazzata") Division.

(2) Infantry Division Staff consists of—
Commanding General and Aides.
Chief of Staff.
General Staff:
Operations and Services.
Information.
Personnel and Administration.
Artillery Officer.
Engineer Officer.
Medical Officer.
Commissary Officer.
Veterinary Officer.

(3) Infantry Division Headquarters consists of—

	Officers	*Enlisted men*
Hq and General Staff	27	
Hq Troops:		
Hq Co	1	71
Topo Sec	1	6
Mtr Prk	1	27
MPs—3 Secs	3	195
Post Officer	1	3
TOTAL	34	302

■ 92. ITALIAN CORPS TROOPS (Table of organization).—

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Type of Corps	*Binary Inf Div*	*Motor-Transportable Inf Div (Metropolitan)*	*Motor-Transportable Inf Div (Libyan)*	*Mtz Inf Div*	*Binary Inf Div (mountain type)*	*Alpine Div*	*Fast-moving Div ("Celere")*	*Armored Div ("Corazzata")*	*Bn of Tks (med)*	*Mtz MG Regt*	*Arty Regt*	*Supplementary Corps Arty*	*Bn AA Arty*	*Cml Bn*	*Bn Engrs (artificers)*	*Ty-Tp Co*	*Rad Co*	*Various services*	*Cav Regt*	*Regt Bersaglieri*	*Combat Bn Fascist Militia*	*Army Arty Bns*	*Mixed Engr Bn (Artificer & Communications)*	*Mtrcl Co*	*Mtr Gp (Mtr Prk)*	*Remarks*
Normal	3								1	1	1	[1] 1	1	1	1	2	2	X	1	1	2	1				Additional Army Arty Bns and Engrs as needed.
Motor-mechanized				3				3			1							X					1			
Motor-transportable		2									1				1	2	2	X								
Fast-moving							3				1							X					1			
Motor-transportable			2						1		1			1				X					Regt	1	1	

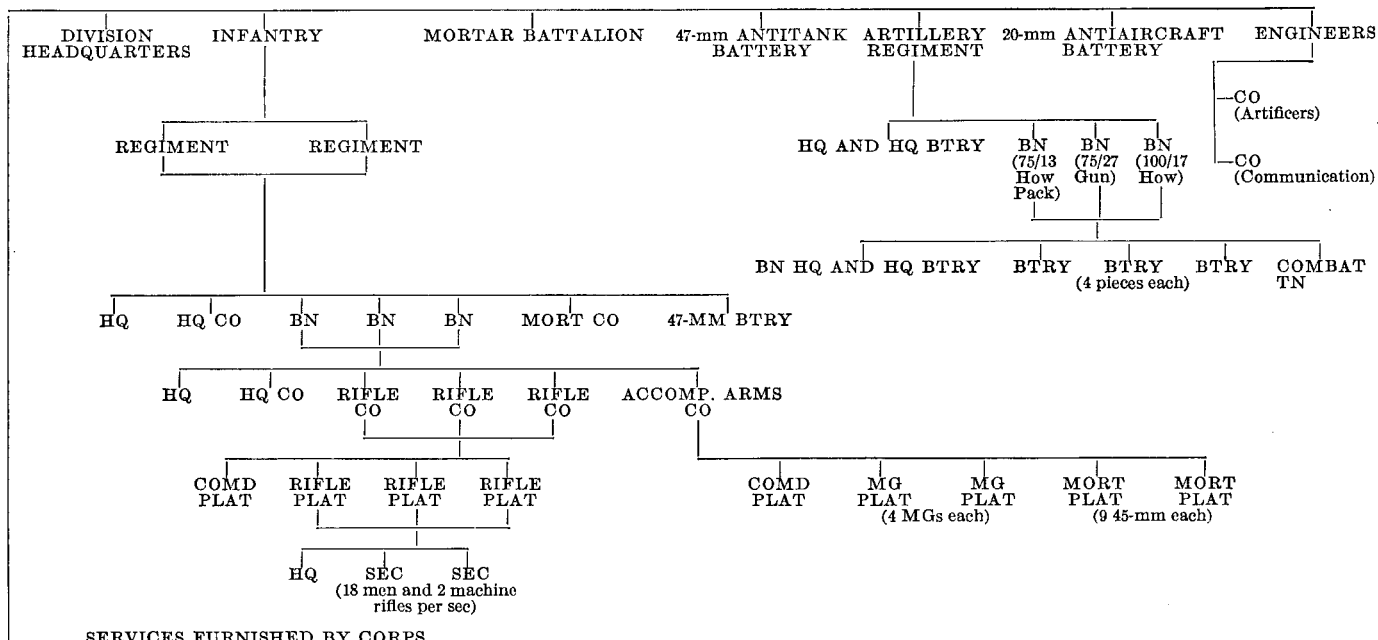
[1] This is an additional assignment of artillery over the Corps Arty Regt.

NOTE.—Troops listed in columns 10 to 26, inclusive, represent corps troops. Numbers indicate assignments to type corps.

SECTION III

DIVISION ORGANIZATIONS

■ 93. BINARY INFANTRY DIVISION.—*a. Organization.*—



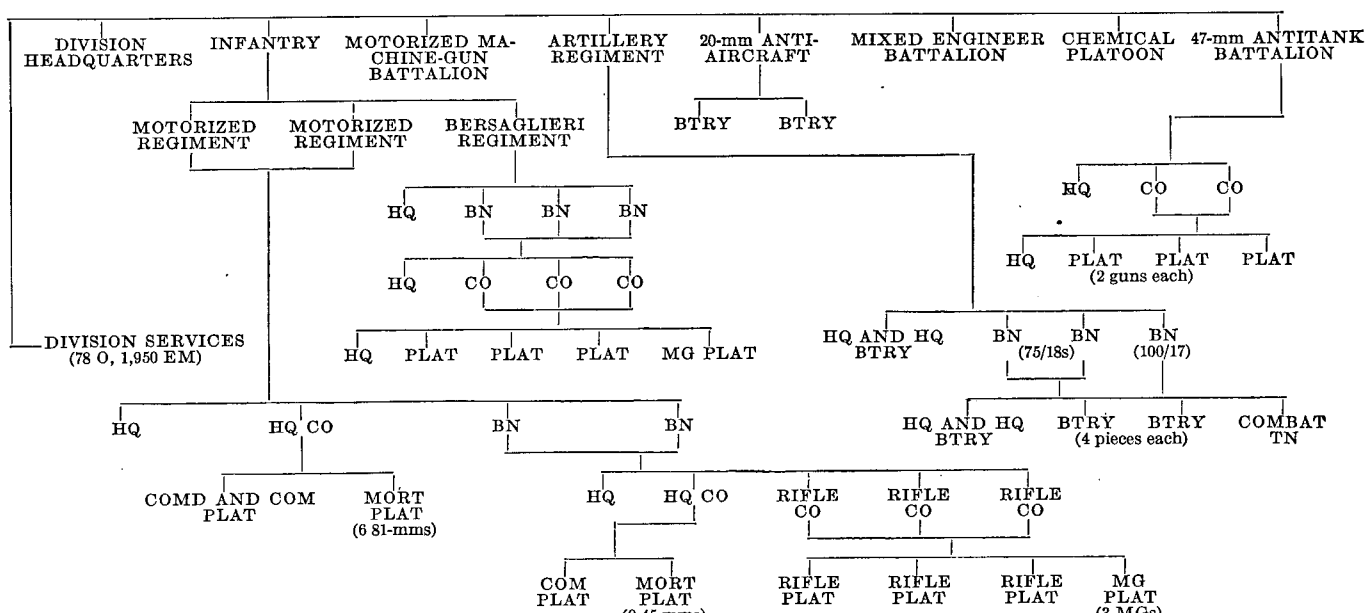
b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Machine rifles	5 MGs	6 45-mm morts	7 81-mm morts	8 20-mm AA guns	9 47-mm guns	10 75/13-mm hows	11 75/27-mm guns	12 100/17-mm hows	13 Animals	14 Bcls	15 Mtrcl	16 Autos	17 Auto carettes	18 Cargo trks	19 Tractors	20 Special trks	Remarks
Div Hq	34	302	-----	-----	-----	-----	-----	-----	-----	-----	-----	23	90	10	5	-----	10	-----	-----	
Inf Regt	(117)	(3,161)	(108)	(24)	(54)	(6)	-----	(8)	-----	-----	-----	(381)	(19)	(10)	(4)	(33)	(20)	-----	-----	
Inf—2 Regts	234	6,324	216	48	108	12	-----	16	-----	-----	-----	763	38	20	8	66	40	-----	-----	
Mort Bn	21	601	-----	-----	27	12	-----	-----	-----	-----	-----	12	4	2	1	10	13	-----	-----	
47-mm AT Btry	6	235	-----	-----	-----	-----	-----	16	-----	-----	-----	76	1	-----	1	4	5	-----	-----	
Arty Regt:																				
Hq and Hq Btry	(11)	(126)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	(10)	(4)	(9)	(2)	(6)	-----	-----	
Bn 100/17-mm Hows	(21)	(525)	-----	(6)	-----	-----	-----	-----	-----	-----	(12)	-----	(20)	(13)	(2)	(11)	(34)	(27)	(1)	Also 24 caissons.
Bn 75/27-mm Guns	(21)	(525)	-----	(6)	-----	-----	-----	-----	-----	(12)	-----	-----	(20)	(13)	(2)	(11)	(34)	(27)	(1)	Do.
Bn 75/13-mm Hows (Pack)	(22)	(829)	-----	(6)	-----	-----	-----	-----	(12)	-----	-----	(389)	(21)	(3)	-----	-----	(17)	-----	-----	
Arty Regt	75	2,005	-----	18	-----	-----	-----	-----	12	12	12	389	71	33	13	24	91	54	2	
20-mm AA Btry	5	117	-----	-----	-----	-----	8	-----	-----	-----	-----	-----	2	7	1	2	18	-----	-----	
Engr Co—Artificer	5	210	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	1	1	-----	7	-----	-----	
Engr Co—Communication	6	268	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	2	1	1	9	-----	1	
Med Co	7	133	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	1	1	-----	16	-----	-----	
Div totals	395	10,194	216	66	135	24	8	32	12	12	12	1,263	216	76	32	107	209	54	3	

■ 94. MOTOR-TRANSPORTABLE INFANTRY DIVISION, METROPOLITAN TYPE.—This has the same organization as Binary Infantry Division except that there are fewer animals and no mortar battalion. Basic transportation (except for personnel) has been added. Personnel transportation is furnished by the corps or army motor pool. The infantry regiment in this type division has the same organization and armament as that in the Binary Division. The strength varies by only a few less men. Strength: Officers, 117; enlisted men, 3,078. Artillery and other division units are motorized.

■ 95. MOTOR-TRANSPORTABLE INFANTRY DIVISION, LIBYAN TYPE.—This differs from the Metropolitan type in having a few more men, no animals, fewer 45-mm mortars, and more machine guns. It has all basic transport except that for personnel and matériel, which comes from corps motor pool. Infantry regiment of this type division has same basic organization. Strength: Officers, 111; enlisted men, 2,760. There are 36 machine guns and 27 45-mm mortars included in its armament. Artillery and other division units are motorized.

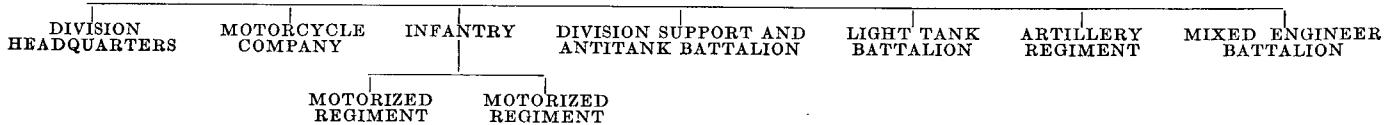
■ 96. MOTORIZED INFANTRY DIVISION (METROPOLITAN).—*a. Organization.*—



b.—Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Machine rifles	5 MGs	6 45-mm morts	7 81-mm morts	8 20-mm AA guns	9 47-mm guns	10 75/18-mm hows	11 100/17 mm hows	12 Bcls	13 Mtrcls	14 Autos	15 Auto carettes	16 Cargo trks	17 Special trks	18 Tractors	Remarks
Div Hq	38	320									84	31	9		8	1		
Mtz Inf Regt	(70)	(1, 770)	(54)	(18)	(18)	(6)					(8)	(27)	(4)	(59)				
Inf-2 Mtz Regts	140	3, 540	108	36	36	12					16	54	8	118				
Bersaglieri Regt	53	1, 556	54	24								871	3		41	2		
Mtz MG Bn	14	390		18							3		1	13				
Arty Regt:																		
Hq & Hq Btry	(13)	(130)									(7)	(9)	(5)	(6)	(12)	(1)		
Bn 75/18-mm Hows	(17)	(380)		(4)					(8)		(12)	(9)	(3)	(35)	(22)	(1)	(18)	Also 8 caissons.
Bn 75/18-mm Hows	(17)	(380)		(4)					(8)		(12)	(9)	(3)	(35)	(22)	(1)	(18)	Do.
Bn 100/17-mm How	(17)	(380)		(4)						(8)	(12)	(10)	(3)	(12)	(34)	(1)	(20)	
Total Arty Regt	64	1, 270		12					16	8	43	37	14	88	90	4	56	
2 Btrys 20-mm AA Guns	8	190					12				4	12	2		34			
Mixed Engr Bn	17	510									4	17	2		21	11		
Cml Plat	1	90									1			1	1	3		
47-mm AT Bn	15	270						12				6			48			
Div Services	78	1, 950		29								38	15	661	102	53		
DIV TOTALS	428	10, 086	162	119	36	12	12	12	16	8	155	1, 066	54	881	345	74	56	

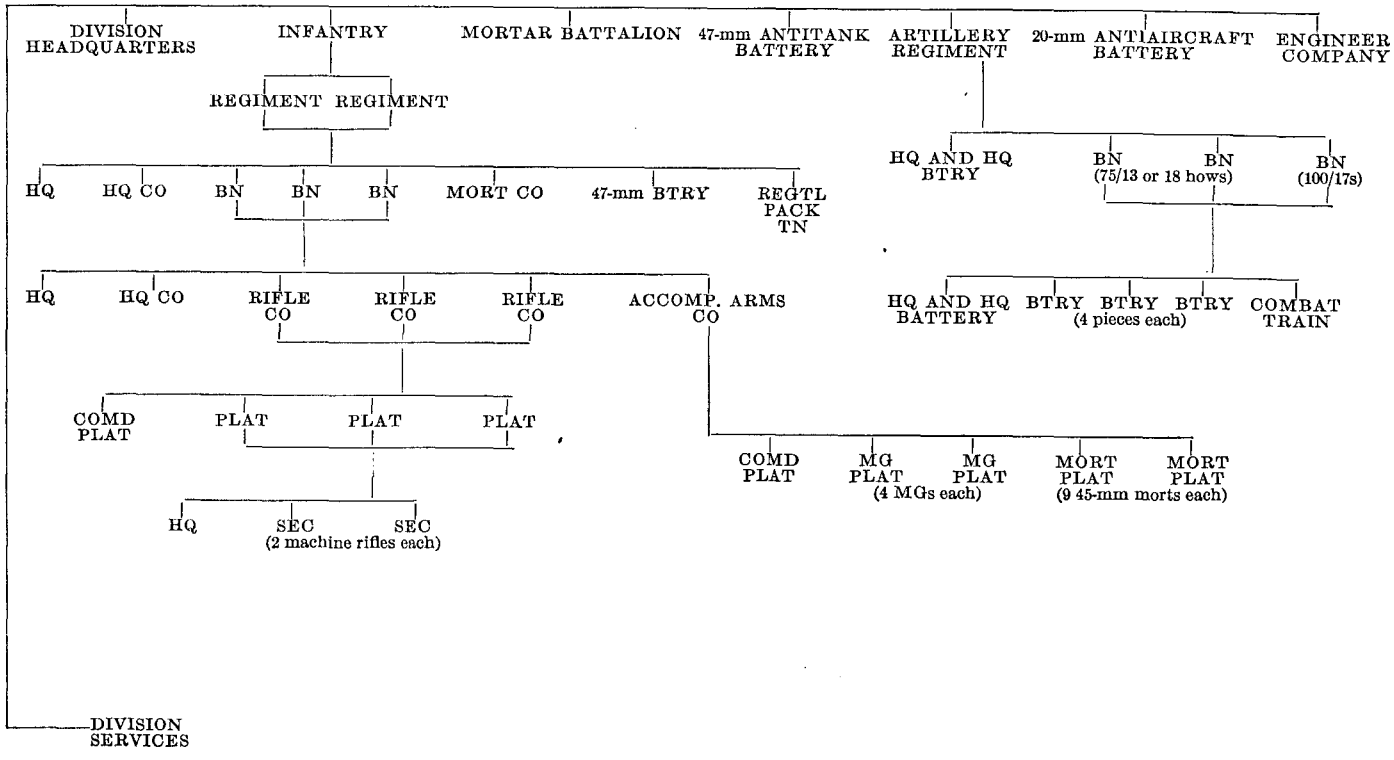
■ 97. MOTORIZED INFANTRY DIVISION, NORTH AFRICA.—*a. Organization.*—



b. Table of organization.—

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit	*Officers*	*Enlisted men*	*20-mm guns*	*37-mm or 47-mm guns*	*75-mm gun*	*100/17-mm guns*	*LMGs*	*HvMGs*	*AT rifles*	*81-mm morts*	*L Tks*	*Mtr vehicles*	*Mtrcls*
Div Hq	287						8					18	50
Mtrcl Co	163						10	5	4			5	119
Inf HQ	47											5	8
2 Mtz Inf Regts	3,502		16	32			162	50	60	18		282	94
Div Support and AT Bn	323		8	8						9		38	11
L Tk Bn	236										46	65	11
Arty Regt	1,602		24		24	12		18				219	31
Mixed Engr Bn	382											17	13
TOTALS	6,542		48	40	24	12	180	73	64	27	46	649	337

■ 98. BINARY INFANTRY DIVISION, MOUNTAIN TYPE.—a. *Organization.*—



b. Table of organization.—

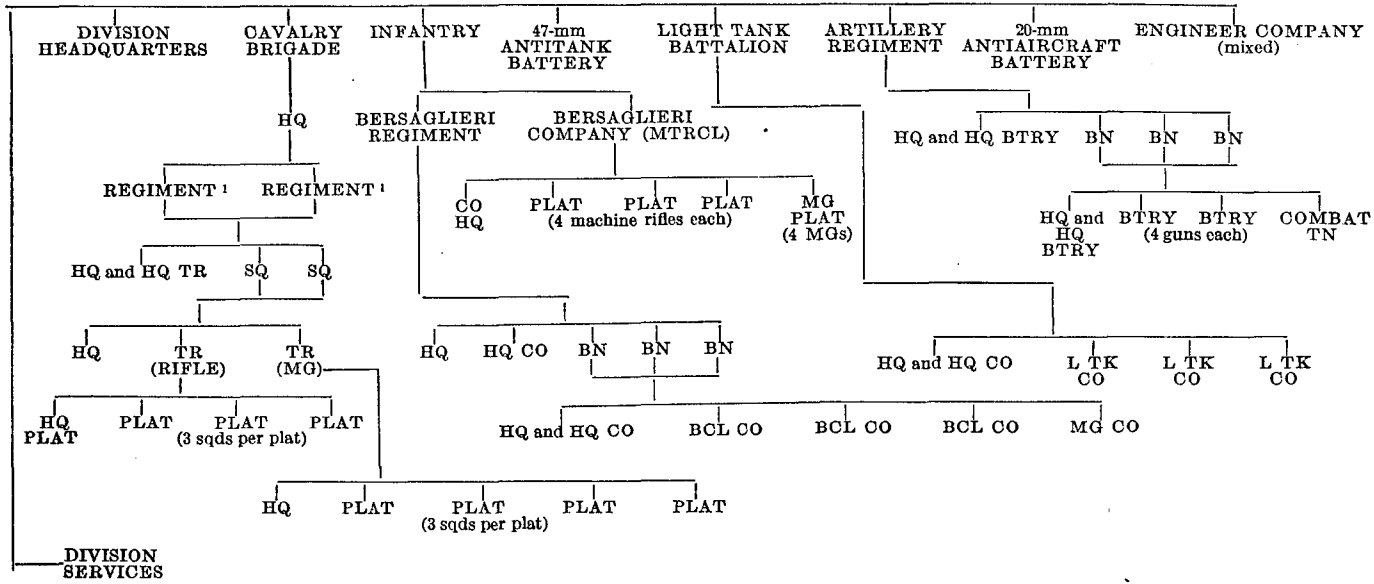
1 Unit	2 Officers	3 Enlisted men	4 Machine rifles	5 MGs	6 45-mm morts	7 81-mm morts	8 20-mm AA guns	9 47-mm guns	10 75/13- or 18-mm hows	11 100/17 mm hows	12 Animals	13 Bcls	14 Mtrcls	15 Wags	16 Autos	17 Auto carettes	18 Cargo trks	19 Remarks
Div Hq	34	302	-----	-----	-----	-----	-----	-----	-----	-----	23	90	10	-----	5	-----	10	
Inf Regt	(120)	(3,367)	(108)	(24)	(54)	(6)	-----	(8)	-----	-----	(493)	(20)	(10)	(2)	(4)	(33)	(20)	
Total Inf—2 Regts	240	6,734	216	48	108	12	-----	16	-----	-----	986	40	20	4	8	66	40	
Mort Bn	21	615	-----	-----	27	12	-----	-----	-----	-----	137	4	3	-----	1	21	-----	
47-mm AT Btry	6	311	-----	-----	-----	-----	-----	16	-----	-----	152	1	-----	-----	1	4	5	
Arty Regt:																		
Hq and Hq Btry	(12)	(125)	-----	-----	-----	-----	-----	-----	-----	-----	(60)	(10)	(4)	(11)	(1)	-----	(4)	
Bn 100/17-mm Hows	(25)	(1,160)	-----	(6)	-----	-----	-----	-----	-----	(12)	(705)	(21)	-----	(179)	-----	-----	-----	Pack battalion.
Bn 75/13- or 18-mm Hows	(28)	(1,100)	-----	(6)	-----	-----	-----	-----	(12)	-----	(609)	(21)	-----	(41)	-----	-----	-----	Do.
Total Arty Regt	93	3,485	-----	18	-----	-----	-----	-----	24	12	1,983	73	4	272	1	-----	4	
20-mm AA Btry	5	272	-----	-----	-----	-----	8	-----	-----	-----	119	6	-----	4	-----	-----	-----	
Engr Co	6	350	-----	-----	-----	-----	-----	-----	-----	-----	97	7	-----	-----	-----	17	-----	
Div Services	17	618	-----	-----	-----	-----	-----	-----	-----	-----	377	4	1	5	1	2	16	
DIV TOTALS	422	12,687	216	66	135	24	8	32	24	12	3,874	225	38	285	17	110	75	

■ 99. ALPINE DIVISION.—*a. Organization.*—

b. Table of organization.—

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Unit	*Officers*	*Enlisted men*	*Machine rifles*	*MGs*	*45-mm morts*	*81-mm morts*	*75/13- or 18-mm hows*	*Flame throwers*	*Animals*	*Bcls*	*Mtrcls*	*Wags*	*Autos*	*Auto carettes*	*Cargo trks*	*Special trks*	*Remarks*
Div Hq	33	235							56		10		2		2		
Inf:																	
Alpine Regt	(128)	(4, 650)	(81)	(27)	(27)	(18)		(28)	(1, 424)	(13)	(5)	(61)	(1)	(17)			
Total Inf—2 Regts	256	9, 300	162	54	54	36		56	2, 848	26	10	122	2	34			
Arty Regt:																	
Hq and Hq Btry	(11)	(130)							(46)	(1)		(5)	(1)				
Bn 75/13 or 18-mm Hows	(34)	(1, 350)		(6)			(12)		(741)	(3)		(43)					Pack battalion.
Alpine Arty Regt	79	2, 830		12			24		1, 528	7		91	1				
Cml Co	4	230							16	6				20		2	
Engr Co	6	350							97		7			17			
Div Services	55	1, 524		2					739	14	12	14	3	24	128	5	
DIV TOTALS	433	14, 469	162	68	54	36	24	56	5, 284	53	39	227	8	95	130	7	

■ 100. "CELERE" DIVISION.—*a. Organization.*—

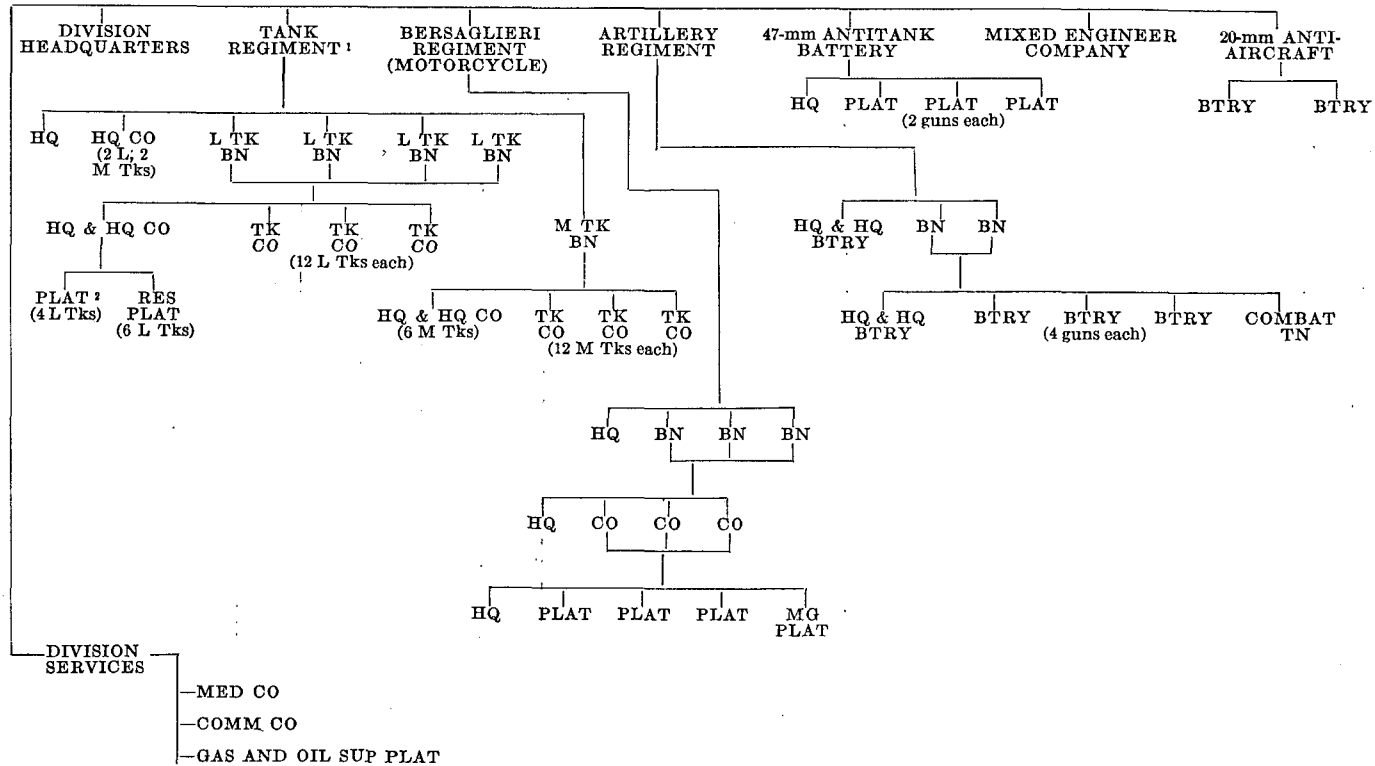


[1] Regiment usually has two Sqs of two Trs each. Both Trs may be rifle, or one rifle and one MG, or two rifle an d one MG Tr.

b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Machine rifles	5 MGs	6 20-mm AA guns	7 47-mm guns	8 75/18-mm hows	9 L Tks	10 Animals	11 Bcls	12 Mtrcls	13 Autos	14 Auto carettes	15 Cargo trks	16 Tracs	17 Special trks	18 Remarks
Div Hq	27	190							27	58	12	8		16			
Cav Brig.:																	
Brig. Hq	(7)	(75)							(64)	(3)	(8)	(2)		(3)			
Regt: Hq & Hq Tr	(12)	(110)							(80)	(10)	(12)			(15)			
Rifle Tr	(4)	(140)	(9)						(138)	(3)							
MG Tr	(5)	(120)		(12)					(156)	(3)							
Total Sq	(10)	(290)	(18)						(287)	(9)							
Total Regt	(37)	(810)	(36)	(12)					(810)	(31)	(12)			(15)			
Total Cav Brig	81	1,695	74	24					1,684	65	32	2		33			
Bersaglieri Regt—Bcl	96	2,540	81	27						2,216	178	4		37			
Bersaglieri Co—Mtrcl	6	170	15	5							160			4			
47-mm AT Btry	6	170				8				3				28			
L Tk Bn	21	270	16	122				61		34		1		4		10	
Arty Regt:																	
Hq & Hq Btry	(13)	(125)								(9)	(9)	(5)	(6)	(12)		(1)	
Bn 75/18-mm Hows	(17)	(390)		(4)			(8)			(11)	(11)	(3)	(42)	(21)	(20)	(1)	Also 8 caissons.
Total Arty Regt	64	1,295		12			24			42	42	14	132	75	60	4	Total 24 caissons.
20-mm AA Btry	5	110			8					2	7	1		9			
Mixed Engr Co	6	340	2						16	13	17	5		38		9	
Div Services	21	473		2						3	20	3		211		6	
TOTAL DIV	333	7,253	188	192	8	8	24	61	1,727	2,436	468	38	132	455	60	29	

■ 101. ARMORED DIVISION, "CORRAZATA"—*a. Organization.*—



[1] Unsatisfactory combat performance by light tanks has caused replacement by light medium Italian M13 or French Renault and Somua tanks. Infantry tank units have similar battalion organization, but older equipment.

[2] Each tank has a flame thrower.

b. Table of organization.—

1 Unit	2 Officers	3 Enlisted men	4 Machine rifles	5 Mgs	6 20-mm AA guns	7 47-mm guns	8 Tk guns	9 75/27-mm guns	10 Flamethrowers	11 L Tks[1]	12 M Tks	13 Bcls	14 Mtrcls	15 Autos	16 Autocarettes	17 Cargo trks	18 Tractors	19 Special trks	20 Remarks
Div Hq	15	163	----	----	----	----	----	----	----	----	----	----	75	6	2	14	------	1	
Bersaglieri Regt—Mtrcl	53	1,556	54	24	----	----	----	----	----	----	----	----	871	3	41	----	------	2	
47-mm AT Btry	6	130	----	----	----	6	----	----	----	----	----	----	3	----	----	22	------	----	
Tk Regt	84	1,040	----	460	46	----	44	----	16	186	44	----	53	6	----	45	------	64	Machine guns and tank guns are tank armament.
Arty Regt:																			
Hq & Hq Btry	(13)	(125)	----	----	----	----	----	----	----	----	----	(9)	(9)	(5)	(6)	(12)	------	(1)	
Bn 75/27-mm Guns—T.D	(21)	(520)	----	(6)	----	----	----	(12)	----	----	----	(20)	(13)	(4)	(9)	(31)	(27)	(1)	Also 24 caissons.
Total Arty Regt	55	1,165	----	12	----	----	----	24	----	----	----	49	35	13	24	74	54	3	Also 48 caissons.
2 Btrys 20-mm AA Guns	8	190	----	----	12	----	----	----	----	----	----	4	12	2	----	34	------	----	
Mixed Engr Co	3	155	----	----	----	----	----	----	----	----	----	----	11	1	----	4	------	14	
Div Services	12	223	----	----	----	----	----	----	----	----	----	2	17	1	----	27	------	----	
DIV TOTALS	236	4,622	54	496	58	6	44	24	16	186	44	55	1,077	32	67	220	54	84	

[1] Replaced by Italian M13 or French Renault and Somua tanks.

SECTION IV

MISCELLANEOUS COMBAT UNITS AND ENGINEERS

■ **102. ARMY ARTILLERY REGIMENT.—**

Unit	*2* *Officers*	*3* *Enlisted men*	*4* *Machine guns*	*5* *149/35-mm guns*	*6* *152/37-mm guns*	*7* *152/13-mm hows*	*8* *210/8-mm hows*	*9* *152/45-mm guns*	*10* *260/9-mm hows*	*11* *305-mm hows*	*12* *Bcls*	*13* *Mtrcls*	*14* *Automobiles*	*15* *Cargo trks*	*16* *Tractors*	*17* *Special trks*
Hq & Hq Btry	19	105	------	------	------	------	------	------	------	------	12	3	3	9	------	3
Bn 149/35-mm Guns [1]	21	550	6	12	------	------	------	------	------	------	26	2	4	23	------	48
Bn 152/37-mm Guns [1]	21	595	6	------	12	------	------	------	------	------	26	2	4	23	------	48
Bn 152/13-mm Hows [1]	21	520	6	------	------	12	------	------	------	------	26	2	4	23	------	36
Bn 210/8-mm Hows [1]	19	545	6	------	------	------	12	------	------	------	25	1	4	16	------	4
Bn 152/45-mm Guns [1]	23	445	6	------	------	------	------	12	------	------	25	1	4	16	------	4
Bn 260/9-mm Hows [1]	23	520	6	------	------	------	------	------	12	------	25	1	4	16	------	4
Bn 305-mm Hows [2]	23	415	6	------	------	------	------	------	------	6	25	1	4	16	------	4
Regt Trac Prk	11	240	------	------	------	------	------	------	------	------	2	2	3	2	------	5
3 Trac Gps	42	768	------	------	------	------	------	------	------	------	42	3	12	21	270	18
TOTAL REGT	223	4703	42	12	12	12	12	12	12	6	234	18	46	165	270	174

NOTE.—Each battalion has 3 firing batteries. This is a normal regiment; however, a regiment may have a varying number of battalions.

[1] This battalion has three 4-gun firing batteries. [2] This battalion has three 2-gun firing batteries.

■ 103. ARMY ANTIAIRCRAFT REGIMENT (Table of organization).—

[Regiment may have varying number of battalions. Regiment is normally assigned to army artillery. Battalions detached and assigned to corps artillery.]

1	2	3	4	5	6	7	8	9	10
Unit	*Officers*	*Enlisted men*	*MGs*	*75-mm AA guns*	*Bcls*	*Mtrcls*	*Autos*	*Cargo trks*	*Special trks*
Hq & Hq Btry	7	65	----	----	7	3	3	5	2 (1 rad and com, 1 machine shop).
1st Bn: Hq and Hq Btry	3	55	----	----	4	6	2	5	
Sound Locator Sec	----	29	----	----	----	----	----	----	2 (S–L trks).
3 Btrys, 75/27-mm C. K	12	390	6	12	24	3	3	21	9 (2 mtr caissons and 1 fire-control trk, each btry).
Combat Tn	3	85	----	----	2	1	----	5	15 (am trks and 1 machine shop).
Total Bn	18	559	6	12	30	10	5	31	26
2d Bn: Hq and Hq Btry	3	55	----	----	4	6	2	5	
Sound Locator Sec	----	29	----	----	----	----	----	----	2 (S–L trks).
3 Btrys, 75/46-mm Mod. 34	12	405	6	12	24	3	3	21	33 (2 mtr caissons, 4 tracs, 1 fire control, 4 am trks and tlrs, each btry).
Combat Tn	3	90	----	----	2	1	----	5	18 (includes 12 am, 1 machine shop).
Total Bn	18	579	6	12	30	10	5	31	53
TOTAL REGT	43	1,203	12	24	67	23	13	67	81

■ 104. CORPS ARTILLERY REGIMENT (Table of organization).—

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unit	*Officers*	*Enlisted men*	*MGS*	*105/28-mm guns*	*149/13-mm hows*	*Bcls*	*Mtrcls*	*Autos*	*L passenger*	*Cargo trks*	*Tractors*	*Special trks*	*Remarks*
Regt Hq and Hq Btry	13	130	----	----	----	12	3	3	2	8	----	3	
3 Bns 105/28-mm Guns	63	1,590	18	36	----	78	18	12	15	63	81	54	Each battalion has three 4-gun firing batteries.
3Bns 149/13-mm Hows	63	1,710	18	----	36	78	18	12	15	63	81	90	
TOTAL REGT	139	3,430	36	36	36	168	39	27	32	134	162	147	

NOTE.—Each battalion has a headquarters, headquarters battery, 3 firing batteries and a combat train. Each firing battery has 4 pieces.

■ 105. PARACHUTE TROOPS.—Upon last information, these existed as small, experimental units. German instructors have taken over their training, and it is assumed that organizational data will conform to that of the Germans.

a. A parachute battalion consists of 29 officers and 297 men, organized into 3 companies, each with 62 machine carbines, 54 light machine guns, and a mining platoon for demolition work.

b. Personnel carry pistols, daggers, and hand grenades. There is also a communication section equipped with radio transmitters and air-to-ground receiving sets, and a medical section.

■ 106. GENERAL ENGINEER UNITS.[1]—

1 Unit	2 O	3 EM	4 Remarks:
Composite Co, Inf Div	6	350	Hq and 5 Secs. Combines Engr and Com functions.
Composite Co, Armd Brig	3	155	Hq and 4 Secs. Same functions as above.
Composite Co, Mtz Div	7	345	Hq and 4 Secs. Same functions as above.
Composite Bn, Mtz Div	17	505	Hq, 2 Cos and 1 Sec. Same as above.
Mtz Bn (Autocarreggiata)	16	465	Hq and 2 Cos.
Mtz and Wagon-Transported Bn	18	485	Hq and 2 Cos.
Mtz and Pack Bn	18	545	Hq and 2 Cos.
Wagon-transported Bn	16	525	Hq and 2 Cos.
Wagon-transported and Pack Bn	18	585	Hq and 2 Cos.
Pack Bn	18	725	Hq and 2 Cos.

[1] These are classed as general engr units and combine the ordinary functions of such with their communications functions.

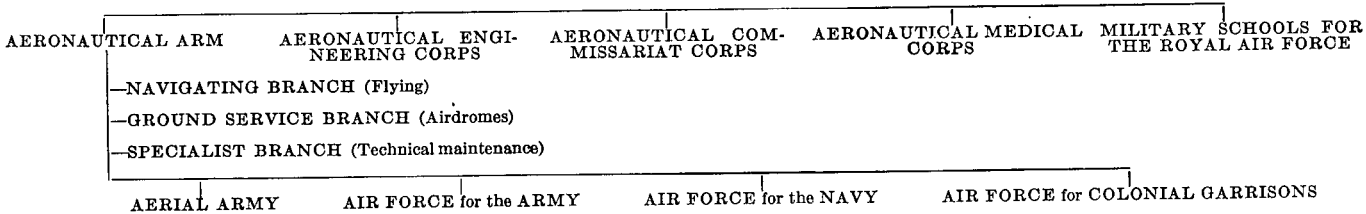
■ 107. SPECIAL-FUNCTION ENGINEER UNITS.—

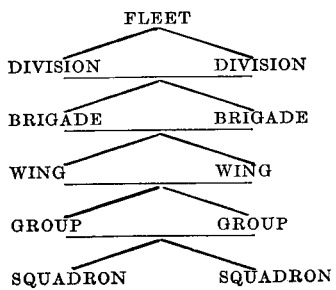
1 Unit	2 O	3 EM	4 Remarks
Bridge Co	2	133	4 Secs. L bridges.
Bridge Co	1	50	2 Secs. No. 1 metal bridge.
Ponton Bn—L Bridges	22	770	Hq and 2 Cos. 16 ponton trks and 8 trestle trks.
Ponton Bn—L Bridges with Bridge Hauling Unit.	21	695	Hq and 3 Cos.
Ponton Bn—Hv Bridges	18	800	Hq and 2 Cos.
Ponton Bn—Metal Bridges	25	556	Hq and 2 Cos.
Aerial Ropeway Bn	15	474	Hq and 2 Cos. Aerial ropeway type A–1 on heavy trk.
Balloonist's Sec	6	100	1 anchored balloon.
Cam Co	7	265	8 Secs.
Electrical Mechanic's Co	7	285	Hq and 4 Secs; Co Prk, 5 Secs.
Fire Fighting Co	6	285	Hq and 4 Secs.
Mining Bn	16	505	Hq and 2 Cos.
Photo Co	7	65	1 Sec 2 Sqds.
Slt Operators	6	168	3 Secs. 50-cm, 75-cm, and 90-cm Slts.
Water Sup Co	7	255	Hq and 5 Secs.

SECTION V

AIR FORCE

■ 108. ROYAL AIR FORCE.—





(Has two or more homogeneous Fighter or Bomber Air Divs)

(Two or more Air Brigades)

(Two or more Wings)

(Two or more Groups)

(Two or more Squadrons)

(Bomber Squadron consists of six initial and three reserve aircraft. All others consist of nine initial and three reserve aircraft.)

SECTION VI

BLACK SHIRT MILITIA UNITS

■ 109. COMBAT LEGION, CC. NN.—Consists of a headquarters and 2 battalions organized in the same manner as regular units. *Strength:* Officers, 63; enlisted men 1,630. *Armament:* 72 machine rifles; 14 machine guns; 18 45-mm mortars.

■ 110. CC. NN. BATTALION, MOTOR-TRANSPORTABLE.—Consists of headquarters and headquarters company and three rifle companies. *Strength:* Officers, 25; enlisted men, 682. *Armament:* 4 machine guns; 36 machine rifles.

■ 111. CC. NN. BATTALION, BICYCLIST.—Same organization as above unit. Armament other than 27 machine rifles is unknown. *Strength:* Officers, 21; enlisted men, 593; bicycles, 570.

NOTE: These Fascist militia units have been incorporated into the regular army divisions, excepting the motorized divisions .

SECTION VII

CHARACTERISTICS OF MATÉRIEL

■ 112. INFANTRY WEAPONS.—

1 *Weapon and caliber*	2 *Weight in firing position*	3 *Method of operation*	4 *Type of feed*	5 *Maximum rate of fire (rds. per min.)*	6 *Practical rate of fire—prolonged (rds. per min.)*	7 *Weight per round (lb.)*	8 *Maximum range (yd.)*	9 *Maximum effective range (yd.)*	10 *Effective radius of burst—fragmentation (yd.)*	11 *Remarks*
Rifle, 6.5-mm M91 Mannlicher-Carcano	8.6 lb			12						
Machine rifle, 6.5-mm Revelli	9 lb			120	40					
Pistol, 9-mm Gliserti:										
M1910	1.927 lb			14						
M34	1.615 lb			14						
Pistol, Beretta, 9-mm M34				14						
Machine Pistol, 9-mm Beretta										
Machine Pistol, 9-mm Brixia										

Grenade:									
Θ T O, M35 [1]	7.4 oz								Principally blast effect.
Breda, M35 [2]	7 oz								do
SRCM [3]	7 oz								do
Bayonet [4]	0.81 lb								
Machine Gun: 6.5-mm L Breda, M30	24.75 lb	Gas-operated, air-cooled.	25 rd. strip.	460				1,650	
6.5-mm Fiat M14	88.185 lb	Recoil-operated, water-cooled.		480				2,186	
8-mm Heavy Fiat, M14/35	88.625 lb	Gas-operated, air-cooled.	50 rd. metal link.	600			5,687	4,372 indirect	
Mortar:									
45-mm Brixia, M1935	34 lb	Breech-load, trigger-fire.	Hand	25–30		1	586		
Modified Stokes, 81-mm									
Inf Cannon, 65/17-mm	1,100 lb					11.4	7,000		
AT gun, 47/32-mm	660 lb			12–14		3.3	7,000		
AA Gun, 20-mm, Breda M35	677 lb	Gas-operated	12 rd. plate	220	120	AP. 308 HE. 297		2,730	
Machine gun, 8-mm Breda M37	84.23 lb	Gas-operated, air-cooled.	20 rd. mag.	450			6,343		

[1] Length, 3.4 inches; diameter, 2.1 inches.
[2] Length, 3.8 inches; diameter, 2.1 inches.
[3] Length, 3.1 inches; diameter, 2.5 inches.
[4] Blade 11.81 inches long.

■ 113. FIELD ARTILLERY.—

1	2	3	4	5	6	7	8	9		10	11	12	13		14	15
Weapon—type and caliber	Weight of piece, firing position, with normal load exclusive of personnel (lb. approx.)	Piece transport	Weight of prime mover with normal load (lb. approx.)	Normal over-all width traveling position (inches)		Time to emplace or change from firing to traveling	Traverse	Normal rate of fire (rds. per min.)		Maximum effective range (yd.)	Approximate weight of ammunition	Unit of fire (rds. per piece)	Rate of march		Employment	Remarks
				Piece	Prime mover			Short bursts	Prolonged				Roads	Cross country		
65/17-mm Gun	1,100						8			7,000	11.4					Inf. accompanying gun.
75/13-mm Mtn How	1,200						7			6,750	14.3				Mtn Div	
75/18-mm Mtn How		Pack								10,300	14.3				Mtn Div	
75/18-mm Gun How 1934	1,760						50			10,200	13.9				Div	
75/18-mm Gun How 1935	2,200						50			10,200	13.9				Div	
75/27-mm Field Gun, Mod. 06, 11, 12	2,000						52			11,000	14				Div	
75/34-mm Field Gun	2,500									13,500	14				Div	
100/17-mm How 1914	2,700						5			8,400	28				Div	
100/17-mm Mtn How 1916–1934	1,200						5			8,400	30				Mtn Div	
105/28-mm Gun	5,000						14			12,500	35				Corps	
105/32-mm Gun	9,000						60			17,400					Corps	
105/40-mm Gun	9,000						60			18,500	35				Corps	
149/13-mm How SK—1914	5,500						8			9,000	90				Corps	
149/19-mm How	11,200						60			16,000	90				Corps	
149/35-mm Gun	16,000									17,400	92				Army	
149/40-mm Gun	22,600						60			24,000	112				Army	
152/13-mm How	7,200						8			10,300	100				Army	
152/36.6-mm Gun	25,400						6			21,800	123				Army	
152/45-mm Gun	33,000						10			21,300	103				Army	
210/22-mm How	31,600						75			17,500	225				Army	
210/8-mm How	15,400						360			8,700	220				Army	
260/9-mm How							12			9,800					Army	
305/10-mm How	57,600						360			13,000	842				Army	
305/17-mm How 1917	67,500						360			19,200	772				Army	

■ 114. ARMORED VEHICLES.—

Type of vehicle	*2* *Weight (tons gross)*	*3* *Armament*	*4* *Main armor (in.)*	*5* *Crew*	*6* *Maximum speed on roads (mph)*	*7* *Spanning capacity (ft.)*	*8* *Slope climb (degrees)*	*9* *Safe fording depth (in.)*	*10* *Vertical obstacle (in.)*	*11* *Radius of action (mi.)*	*12* *Dimensions (in.)*			*13* *Belly clear. (in.)*	*14* *Communication*
											H	*L*	*W*		
Light C. V. 3 (33-35), or L 3-35	3-3½	2 8-mm MGs or 1 LMG and flame thrower.	.31	2	26	4'9"	45	26	24	55-60	51	126	55	9	Flag or Rad/Tg. Flame thrower, 110 yd.
Light Fiat Ansaldo, 3000 B (late model).	5	1 37-mm; 1 LMG	.629	2-3	20	5'	45	------	20	90	78	138	67	23	
Light Fiat Ansaldo, 3000 B	5	1 37-mm and 1 LMG; or 2 LMGs.	.709	2-3	13	5'	45	35	20	60	91	166	66	18	Obsolete.
Light L 5 21/30	5.8	2 8-mms or 1 37-mm.	------	2	13	4'11"	41	35½	24	(5 hrs.)	87	147	66	13	Flag or W/T. Obsolete.
Light L 6-40	6.4	1 20-mm; 1 8-mm	.984	2	22	4'3"	40	35	35	------	77	149	78	13	Rad/Tp.
Light Carro d'assalto	6-8	1 20-mm and 1 8-mm; or 2 8-mms.	1.02	3	20	5'10"	45	30	------	124	75	154	72	13	Rad/Tg and Rad/Tp.
Light Renault, R 35	11	1 37-mm; 1 LMG	1.57	2	12½	5'3"	40	31	33	90-95	97	158	72	14	Rad/Tg or flag.
Light M 11-39	11	1 37/40-mm; 2 8-mms.	1.12	3	20	6'7"	40	39½	31½	125	84	185	84	14	Being replaced by M 13/40.
Light M 13 (form M 11)	13	1 37-mm; 2 LMGs.	1.18	3	20-22	6'6"	45	36	32	112	83	193	86	16	Rad/Tg Cmd C.
Light M 13-40	13	1 47/32-mm; 4 8-mms.	1.18	4	19	6'11"	45	39½	30½	123	93	193	87	14	Rad/Tg.
Light Carro di Rottura	14.75	1 47-mm; 2 8-mms.	1.18	4	25	6'	40	30	23	186	87	176	84	16	Rad/Tp.
Medium Somua, S 35	18	1 47-mm; 1 LMG	1.57	------	29	7'10"	40	39	35	140	106	210	80	16	Rad/Tg and flag.
Medium Pesante, "P 25"	22-25	1 47/32-mm; 3 LMGs.	------	6	20	9'10"	------	47	42	------	108	300	102	------	

■ 115. AIRCRAFT.—

1 Classes of aviation	2 Motors	3 Bomb load (lb.)	4 Crew	5 Ceiling	6 Tactical operating range (miles)	7 Maximum speed per hour (miles)	8 Climb (time to/feet)	9 Armor	10 Armament	11 Remarks
FIGHTERS										
A. U. T. 18 (Umbra)	1		1			304			2 MGs	
Caproni Vizzola S. A. F. 5	1		1	31,160	373–620		6.3/19,680		1 cannon; 4 MGs	
Fiat CR 32	1	2112	1	26,240	525 at 211 mph	242	11/19,680		2 MGs	
Fiat CR 42	1	2112	1	31,300	480 at 150 mph	279	7/19,680		2 MGs	
Fiat G 50	1	2112	1	35,430	435 at 261 mph	299	5.2/16,400		4 MGs	
Macchi C 200	1	2112	1	32,470	435 at 280 mph	313	6. 5/19,680		2 MGs	
Meridionali RO 51	1		1			317	7/19,680		2 MGs	
Reggiane RE 2000 "Falcho I"	1		1	31,000	620 at 299 mph	329	6.3/19,680		2 MGs	
Macchi MC 202	1		1	34,000		(Est.) 350			2 MGs	
BOMBERS										
Savoia-Marchetti SM 85	2		1			317				Dive bomber.
Breda 88	2	2,200	2	32,140	1120 at 280 mph	352	11/16,400		2 cannon; 1 MG	
Caproni CA 311	2		3–4	27,300		270			3 MGs	
Cant Z 1007 Bis	3	2,200	5	26,200	1372	280	1550 per min		4 MGs	
Caproni CA 135 Bis	2	1,760	5	22,960	1240	273			3 MGs	
Fiat BR 20	2	2,200	4	29,520	1863	268	22.5/19,680		3 MGs	
Fiat CR 25	2	14–77	3	32,140	1180	286	12/19,680		3 MGs	
Piaggio P 32 MK II	2	3,520	3	26,240	1240	264	15/13,120		4 MGs	
Savoia Marchetti S. M. 79	3	2,200	4	27,880	1240	295	19.8/16,400		4 MGs	Bomber—reconnaissance.
Cant Z 506B	3		6	24,500	1240	236			4 MGs	Reconnaissance—bomber seaplane.
Caproni CA 312 Bis	2		3	19,680	560	248	13/13,120		3 MGs	Reconnaissance—bomber seaplane.

■ 116. ANTIAIRCRAFT ARTILLERY.—

1 Caliber & Type	2 Muzzle velocity (f/s)	3 Max. hor. range (yds.)	4 Max. eff. ceiling (ft.)	5 Weight of projectile	6 Rate of fire	7 Weight in action (tons)	8 Elevation to—(degrees)	9 Traverse (degrees)	10 Remarks
75/27-mm, C. K	1,675	6,600	13,150	14.5	15	4.64	70	360	Krupp gun mounted on lorry.
75/46-mm, Ansaldo Mod. 34	2,350	17,000	27,200	14.3	20	3.24	90	360	
75/50-mm, Ansaldo 1933	3,200	17,000	27,500–34,000	14.3	15–20	5	90	360	Tractor-drawn.
20/65-mm, Breda M35	2,750	6,000	8,200	.297	220	(lb.) 677	30	(wheels) 30 (tripod) 360	Motor transport drawn or 4 pack loads.
20/70-mm, Scotti	2,720	5,900	7,000	.275	120	(lb.) 501	85	360	Carried in vehicle
37/54-mm, Breda 39	2,620	7,700	13,500	1.76	70	----------	90	360	Mobile platform mounting.
76/40-mm, old Model 1917	2,264	9,000	15,750	14.5	15	----------	80	360	Stationary pedestal.
76/45-mm	2,463	10,900	21,000	14.3	----------	----------	----------	360	
77/28-mm	1,700	7,700	13,100	13.2	----------	2.47	73	360	
90/53-mm	----------	15,300	32,810	----------	20	6.8	----------	----------	Mobile mount, tractor-drawn.
102/35-mm	2,477	14,425	31,000	29	10–12	----------	70	360	
102/47-mm	2,950	16,500	32,800	33	8	----------	80	360	

CHAPTER 2

MOVEMENT

SECTION I

FACILITIES

■ 117. GENERAL.—*a. Transportation problems.*—The maintenance of Italian railroads in recent years has become very lax, due to the following factors:

(1) Production has been directed almost entirely toward military equipment.

(2) The terrific strain imposed on the railroads in moving troops and their equipment.

(3) The necessity of handling practically all imports by rail, due to the Allied Nations' blockade.

(4) The heavy demands made by Germany on Italian exports necessitates the movement by rail of the largest part of these commodities.

(5) The sale of Italian rolling stock causes the remaining trains to be loaded to maximum capacity with a conscquent lowering in operating efficiency.

b. Road transport.—The large quantity of cement in Italy makes road building relatively simple. However, the scarcity of trucks for internal transportation purposes, and the shortage of gasoline to operate them, nullifies the roads in relieving the transportation difficulties. Because of this shortage there has been a marked trend toward the use of oil engines and engines using a fuel with an alcohol base called Robur—a mixture of gasoline and ethylic and methyl alcohol.

■ 118. ANIMALS: TYPE AND ASSIGNMENT.—

Pack Animals:

Mules—Horse pack battalion; Arty and Inf Regts.

Sardinian horses—Normal type, Inf Regt; Mtn type, Alpine Regt; Inf Regt, Autotransportable; Inf Regt, Autotransportable, Libyan type; Combat Legion CC. NN. (Black Shirt militia); Cav Regt.

Riding Animals:

Saddle horses—Inf Regt, normal type; Inf Regt, Mtn type; Alpine Regt; Inf Regt, Autotransportable; Inf Regt, Autotransportable, Libyan type; Combat Legion CC. NN. (Black Shirt militia); Cav Regts.

■ 119. MOTOR TRANSPORT.—

1	2	3	4	5	6	7
Types available	*Number*	*Unit to which ordinarily assigned*	*Max. loads*		*Operating radius (miles)*	*Basic use*
			Personnel	*Supply (tons)*		
Automobiles		All parts of army				
Autocarrette		Inf, Alp, and Mtr Divs.				
Lighter trucks		Inf, Alp, Mtr, and Celere Divs.				
Heavy trucks		All parts of Army				
Tractors		Celere Divs and Arty Regts.				
Motorcycles		All parts of army				
Trucks—office		Autocentri and Tk Regts.				
Auto Ambulances		Autocentri				
Auto Busses		Autocentri				
Trailers		Autocentri and Tk Regts.				
Fiat Autocarro—18 BL			20–25	3.4	125	
Fiat Autocarro—18 BLR			20–25	3.93	125	
Fiat Autocassone—18 BL					125	
Fiat Furconcino—50 BM				.25	180	
Fiat Autocarro—621			20–25	2.4	100	
Fiat Autocarro—618 CM			12–15	1.24	187	
Fiat Autocarro—Dovunque 33.			20–25	1.98	176	
Fiat Autocarro—Dovunque 35.			20–25	1.98	208	
Fiat Autocarro—633 NM			24–30	4.94	235	
Fiat Trattore—Pesante Campale 26.				.99	125	
Fiat Trattore—Pesante Campale 30–30 A.				.99	125	
Fiat Trattore—Leggero 31				.49	100	
Fiat Trattore—Leggero 37			6	.99	137	
Fiat C. C. I. Trattore—708 CM.					44	
Breda Trattrice—PES 32				3.4	93	
Breda Trattrice—PES 33				1.99	93	
Ceirano Autocarro—50 CM.			20–25	4.9	140	
Ceirano Autocarro—50 CMA.					140	
Ceirano Autobagro—47 CM.				2.96	224	
Ceirano Autocarro—47 CM.			20–25	2.96	130	
Isotta Frashini Autocarro—D70NM.				2.96	200	
Isotta Frashini Autocarro—D80NM.			24–30	4.9	160	
Bianchi Mediolanum—1936.			20–25	2.96	135	
Bianchi—68 A			20–25	2.96	192	
O. M. Autocarretta—32–35				.79	100	
O. M. Autocarretta—36 P			10		100	

■ 119. MOTOR TRANSPORT—Continued.

1	2	3	4	5	6	7
Types available	*Number*	*Unit to which ordinarily assigned*	*Max. loads*		*Operating radius (miles)*	*Basic use*
			Personnel	*Supply (tons)*		
O. M. Autocarretta—36 M. T.				.89	100	
O. M. Autocarro—40 M. P.			12–15	1.18	250	
O. M. Autocarro—1 CRD			20–25	2.96	190	
O. M. Autocarro—3 BOD			24–30	4.90	190	
SPA Autocarro—25 C 10 RE.			16–20	1.70	180	
SPA Ambulanza—25 C 10 RE.					180	
SPA Frigorifero—25 C 10 RE.				1.30	180	
Autobus & Carro (SPA) Alpine 25 C 10 RE.			17–19		180	
SPA Autocarro—38 R			20–25	2.40	176	
SPA Autocarro—36			20–25	2.40	176	
Daimler Trattice da—100 hp.				4.90	75	
Daimler Trattice da—80 hp				3.90	75	
Lancia Autocarro — RO. NM.			24–30	4.90	180	
Lancia Autocarro — RO. BM.			24–30	4.90	150	

■ 120. AIR TRANSPORT.—

1	2	3	4	5	6
Type of plane	*Number available*	*Maximum personnel*	*Loads supply (lb.)*	*Operating radius (mi.)*	*Basic use*
S–73	24				Transport and bomber.
S–74	12				Do.
S–81	12	18	[1] 4,400	372	Do.
S–82	120	25	[1] 6,600	992	Do.

[1] Bomb load.

■ 121. RAIL TRANSPORT.—*a. Motive power.*—With the exception of the Po Valley line, all the main Italian lines now use electric traction. The Brenner line is double-tracked and electrified, but its electrification is of the tri-phase variety. Tri-phase electrification is a particularly vulnerable type. It is in use over most of the lines in Italy. Due to the strategic vulnerability of this type, the lines that have been electrified since 1933 have been supplied with direct current. This makes two kinds of electric current in use. Both the direct current and the tri-phase use overhead wires, and both use about the same voltage (3,000). Whereas the Italian industry uses 50 cycles a-c, the railroads use 16.6 cycles.

b. General railroad facilities.—In June 1939 there were in Italy 23,252 kilometers of railway. Of these, 16,981 kilometers were operated by the State, and 6,271 kilometers by private enterprise under State supervision. Of the State network, 4,856 kilometers were electrified.

(1) Reports of electrification of all Italian railroads, June 30, 1939, show:
Electrified ..... 6,736 km.
Non-electrified ..... 16,516 km (1 km=0.62137 mile).

(2) According to the latest information, Italian railroads operated by the State, December 31, 1938, comprised 16,354 kilometers of standard-gage track and 596 kilometers of narrow-gage track. Private railroads had 2,701 kilometers of standard and 3,570 kilometers of narrow-gage.

(3) The density of the Italian railroad net is 6.5 kilometers to the 100 square kilometers, as compared with the French density of 11.6 to the 100 square kilometers.

c. Railroads of Sicily (January 1, 1936).—

	Standard	*Narrow*
Real length	1,295 km	800 km.
Maximum grade	0.25 percent	0.40 percent.
Speed permitted roadbed	60–100 km	30 km.
Practical speed of passenger trains	35–57 km	20 km.

d. Rolling stock (standard and narrow) (June 30, 1939).—

Locomotives and rail motorcars:	
Steam	4, 283
Electric	1, 482
Others	665
Passenger and mail cars	8, 007
Baggage and freight cars	132, 734

■ 122. WATER TRANSPORT.—
Total tonnage available as of March 1, 1942—1,890,000 tons (est.).
Tanker tonnage available as of October 1, 1941—414,870 tons—61 ships.

■ 123. ROADS AND BRIDGES.—*a. Road types.*—

General types	*Capacities in vehicles per hour*	*Load capacities*	*Construction time per mile*
State roads—surface-treated and water-bound macadam.	Width: 27 feet plains, 16 feet mountains.	----------	----------
Provincial roads—surface-treated and water-bound macadam, bituminous conglomerate.	Width: 21 feet plains, 15 feet mountains.	----------	----------
Communal roads—waterbound macadam, bituminous conglomerate, unimproved earth and nonsurfaced.	Width: 18 feet plains, 6–9 feet mountains.	----------	----------
Autostrada—concrete	----------	----------	----------
Private roads—water-bound macadam, unimproved earth and nonsurfaced.	----------	----------	----------

b. Available road nets.—(1) Autostradas (superhighways):
Turin—Milan—Bergamo—Brescia.
Milan—Sesto C. (Lake Maggiore): (1) Branch to Varese, (2) Branch to Varese—Como road.
Padua—Mestre (Venice).
Genoa—Serravalle.
Pisa—Lucca—Pistoia—Florence.

Rome—Lido di Roma.
Naples—Pompeii.

(2) Main roads with right-of-way:
Turin—Vercelli—Novara—Milan—Brescia—Verona—Vicenza—Padua—Mestre (Venice).
Turin—Asti—Alessandria—Piacenza—Cremona—Mantua—Monselice—Padua.
Milan—Piacenza—Parma—Reggio Emilia—Modena—Bologna—Forli—Rimini.
Padua—Rovigo—Ferrara—Ravenna—Pesaro—Ancona—Pescara—Foggia—Bari—Brindisi—Lecce—Maglie
Grimaldi—Impera—Savona—Genoa—La Spezia—Pisa—Leghorn—Grosseto—Civitavecchia—Rome—Naples.
Fano—Foligno—Terni—Rome.

(3) Good roads:
Fiume—Trieste—Mestre (Venice).
Bologna—Florence.
Florence—Leghorn.
Brennero—Bolzano—Trento—Verona.
Consenza—Catanzaro—Reggio Calabria.
Palermo—Messina.
Catania—Messina.
Sardinia: Cagliari—Sassari.

C. Bridges.—Statistics only on military bridges constructed by the engineers.

Types of construction	*Capacity*	*Construction time*
Girder Bridge No. 1	20 tons on 2 axles	
Girder Bridge No. 2		
Cantilever Steel Truss	210 tons on 2 axles	
Girder Bridge No. 3—Lattice Girder	210 tons on 2 axles	
Footbridge No. 1—Floating Footbridge	67 lb./I. F	
Footbridge No. 2—Floating Footbridge	1 ton on 1 axle; 1.5 tons on 2 axles.	
Mountain Footbridge—Lattice Girder, deck type.	202 lb./I. F	
Ponton Bridge No. 0	3 tons on pontons; 5 tons on trestles.	
Ponton Bridge No. 1	11 tons on 2 axles	
Ponton Bridge No. 2	12–18 tons	
Ponton Bridge No. 3	672 lb./I. F	3 to 5 minutes per linear meter.
Raft "K"	6 tons	20 minutes by 5 men.
Cableway No. 1—3-cable shuttle	606 lb	
Cableway No. 2—3-cable, semicontinuous	441 lb	
Cableway No. 3—3-cable, semicontinuous	551 lb	

SECTION II

TROOP MOVEMENTS

■ 124. MARCH TABLES.—*a. Infantry.*—

Unit	1	2	3	4	5	6	7
	Time required for passing						
	Carriage roads		*Mountain track, mule track*				
	Speed: 4 km in 60 min.		*Speed: 250 meters of grade in 60 min.*				
	Formations						
	Men in column of threes, animals in single file	*Men in column of twos, animals in single file*	*10 percent grade*	*15 percent grade*	*20 percent grade*	*25 percent grade*	*30 percent grade*
Company of Body of Battalion	1m, 30s	1m, 42s	4m, 36s	7m, 35s	11m, 12s	15m, 30s	21m.
Rifle Company	2m	2m, 30s	6m, 35s	11m, 7s	16m	22m	29m, 25s.
Company of Accompanying Weapons	4m, 3s	4m, 43s	11m	18m	26m, 24s	36m, 30s	48m, 36s.
Battalion of Infantry [1]	12m	14m, 23s	43m, 34s	1h, 11m, 6s	1h, 40m, 54s	2h, 18m, 15s	3h, 1m, 15s.
Company of Body of the Regiment	5m, 4s	5m, 38s	7m, 6s	11m, 45s	17m, 12s	24m	32m.
Accompanying Battery	4m, 11s	4m, 32s	7m, 10s	11m, 25s	16m, 30s	22m, 30s	30m, 18s.
Company of Mortars (81's)	2m, 57s	3m, 20s	5m, 50s	9m, 36s	14m	20m	25m, 48s.
Regiment of Infantry [2]	50m	58m, 20s	2h, 10m	3h, 21m, 36s	4h, 55m	6h, 45m	9h, 5m.

[1] These figures allow for space between companies a distance of 10.9 yards on carriage road and 109.4 yards on mountain track or mule track.

[2] These figures allow for the following spaces between battalion and battalion, company of mortars (81-mm) and accompanying batteries: 32.8 yards on carriage road and 547 yards on mountain track or mule track.

b. Mechanized forces.—

Unit	*On carriage roads of a grade of less than 10 percent*	
	In daytime	
	Ordinary march	*Fast march*
Column of heavy tanks	11.2 mph	15.5 mph.

■ 125. TROOP MOVEMENT BY RAIL.—*a.* The typical military railway train in Italy comprises 40 cars and carries 1 battalion; 1 car for officers; 19 cars for troops; 12 open cars for wagons; 8 open cars for animals.

b. The operating crew ranges from four to eight men.

c. Thirty trains are required to move one division with 120 more trains for hauling artillery, ammunition, and matériel of the division. Italy has a capacity of 25½ divisional trains. Equipment is therefore adequate for troop movement.

d. On a single-track mountain line with grades from 10/1000 to 25/1000 with steam locomotive, not more than 30 trains each way may circulate in 24 hours. If there are double tracks the traffic can be doubled.

■ 126. TROOP MOVEMENT BY AIR.—

1	*2*	*3*	*4*	*5*
Number of airplanes	*Type unit*	*Time required to procure airplanes, bases, and load*	*When type of move used*	*Time required to move troops*
140 (model 582)	Inf Regt, 3,278 men and equipment			1,000 miles in 5 hours.

CHAPTER 3

SUPPLY

SECTION I

GENERAL DATA

■ 127. SUPPLY SYSTEM.—*a.* Little information is available as to Italian supply methods. However, with their activities so closely related to German operations, it may be that their methods are greatly influenced by German domination in field action.

b. Days of fire for infantry weapons are as prescribed below:

	Rounds
Pistol	10
Grenade	4
Rifle	60
Machine rifle	1, 300
MG Fiat 35	2, 000
MG Breda 37	2, 000

c. The following table shows the ammunition supply carried within the field artillery battalion:

Weapon (mm)	*With the battery (rds. per gun)*	*With the Bn Combat Tn (rds. per gun)*	*Total in Bn (rds. per gun)*
65/17 Alpine	260	250	510
65/17 Pack	160	250	410
75/15 Alpine	156	159	315
75/18 Pack	96	159	255
100/17 M1916	72	180	252
100/17 (Light)	75	114	189
100/17 M1914	72	189	261
75/27 Horse	177	----	250
75/27 M1911	128	144	272
75/27 (Light)	108	207	315
75/27	204	203	407
105/28	124	100	224
149/13	48	100	148
149/35	----	70	70
152/13	----	70	70
152/37	50	----	----
210/8 Mod. DS	27	----	27
260/9 M1916	26	----	26
305/10	15	----	15
305/17	15	----	15

d. Gas and oil supply is handled from central depots to Army auto parks and from there to division fuel sections. These fuel sections maintain a supply of a variable number of units. These units are sufficient to run a vehicle for 50 kilometers (31 miles).

SECTION II

SUPPLY UNITS

■ 128. ANIMAL TRANSPORTATION AND TRANSPORTATION UNITS.

1 *Unit*	2 *O*	3 *EM*	4 *Remarks*
Pack Transportation Sec	1	120	100 pack animals. Mtn pack transportation sec is the same.
Wag Sec	1	140	120 draft animals, 60 wags, 1 bcl and 9 mtr tricls.
Mtn Pack Transportation Co (3 secs.)	6	410	312 pack animals, 4 wags.
Wag and Pack Unit in Army Corps	3	295	Wag sec and pack sec. 100 pack animals and 62 wags.
Wag and Pack Units in Army Corps (3 Cos).	12	925	As many units as there are divs in the army corps. 300 pack animals and 192 wags.
Wag and Pack Units in Div	16	840	As many units as there are regts in the div. 624 pack animals and 10 wags.
Wag and Pack Unit	4	435	2 wag secs—122 wags. 1 pack sec—100 animals.
Army Wag Squadron	12	985	As many cos, 2 secs each, as there are army corps in the Army. 372 wags.

PART FOUR—MISCELLANEOUS DATA

CHAPTER 1

UNIFORMS, EQUIPMENT, AND INSIGNIA

SECTION I

GERMAN

■ 129. UNIFORMS.—

Enlisted men | *Officers*

Headgear:

Helmet painted gray. Lugs for face shield. Scuttle shape.

Greenish-gray oversea cap, can be worn under helmet. | Oversea cap of greenish-gray, black leather visor, dark gray-green band.

Blouse:

Greenish-gray, darker shade collar.

Collar may be folded back and left open at the neck. | Choker collar.

Black soft-leather belt, dull white metal buckle.

Trousers and breeches:

Gray trousers tucked into half-length boots.

Gray breeches with leather "facings" and riding boots.

Overcoat:

Gray, doublebreasted, dark green collar.

■ 130. PERSONAL EQUIPMENT.—

a. On the man.—Pack (haversack for mounted troops); shelter half, complete with ropes, etc.; canteen and cup, mess kit and utensils; gas mask and cape; entrenching tool and sidearms; iron ration; nap case and message book; whistle and field glasses.

b. On the transport.—Overcoat, shoes, shirt, towel, socks, housewife, shaving and cleaning kit, iron ration, canvas clothing, drawers and scarf.

NOTE.—Chief consideration is to have uniform light, comfortable, weatherproof, and inconspicuous. Officers' uniforms in the field must conform to cloth and quality of the ranks.

c. Special uniforms.—

Armored troops—Loose-fitting black uniform with a black beret.

Mountain troops and rifle battalions.—Oversea cap with visor, ankle puttees and ankle boots. Rucksack and large canteen.

Other special uniforms to meet the needs of the situation.

■ 131. INSIGNIA.—*a. Branch of service.*—Colored piping of shoulder strap and colored center of collar patch. Concealed or removed usually for combat.

White and green	Infantry and rifle troops.
Rose	Tank and antitank units.
Grass green	Motorcycle units.
Gold yellow	Cavalry and bicycle units.
Copper brown	Reconnaissance units.
Bright red	Artillery.
Black	Engineers.
Lemon	Signal.
Bright blue	Transport troops.
Dark red	Chemical warfare.

b. Rank insignias on shoulder straps.—

General officers	Two heavy silver-lace strands twisted with one gold-lace strand.
Major General	No gilt star superimposed.
Lieutenant general	One gilt star superimposed.
General	Two gilt stars superimposed.
Colonel general	Three gilt stars superimposed.
Field officers	Heavy silver lace twisted in two strands.
Major	No gilt star superimposed.
Lieutenant colonel	One gilt star superimposed.
Colonel	Two gilt stars superimposed.
Company officers	Flat solid silver lace on foundation coloring of arm of service.
2d lieutenant	No gilt star superimposed.
1st lieutenant	One gilt star superimposed.
Captain	Two gilt stars superimposed.

Enlisted men:

Privates first class wear diamond-shaped design in a circular sleeve patch.

Junior noncommissioned officers wear chevrons.

Noncommissioned officers (sergeant or higher) wear stripes of silver braid on shoulder patch.

c. Unit designation.—Numerals on shoulder straps indicate regiment or similar unit. Shoulder-strap button carries number of company or similar unit.

SECTION II

ITALIAN

■ 132. UNIFORMS.—The field uniform as prescribed is worn by officers and enlisted men alike.

a. Field uniform (wool).—

Headgear	Gray-green field cap or steel helmet.
Blouse	Gray-green with open collar. No piping or embroidery.
Shirt	Gray-green, worn with collar and tie.
Breeches	Gray-green without stripes.
Puttees	Gray-green wrap leggings. Mounted and motor-transport troops may wear black leggings.
Boots	Black ammunition.

b. Field uniform (tropical).—

Headgear..... Khaki topee of cork with tinted goggles. Helmets painted a whitish color.

Blouse..... Khaki cotton, with turn-down collar buttoning up to the neck.

Trousers and breeches..... Trousers with tight fit just above the ankles, cotton. Cotton breeches with puttees, leggings or stockings. Shorts are also worn.

Boots..... Black ammunition. Also heavy tan hobnails.

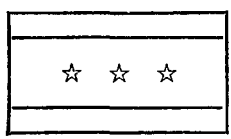
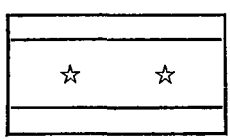
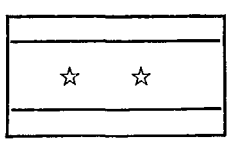
Black Shirt militia wear the same uniform except for a black shirt and tie.

■ 133. INSIGNIA.—*a. Insignia of arm.*—Worn on the front of all headdress. Stenciled on helmets. Metal insignia on caps and shoulder straps of officers in tropical uniforms.

Regimental number shown in boss or center circle of arm insignia.

NOTE.—Some of the old distinctive uniforms of the various units may still appear in some cases. There are innumerable special unit insignia which may be encountered. They follow a colored gorget sytem too extensive to enumerate.

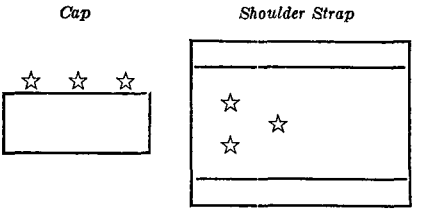
b. Insignia of rank.—

	Cap	*Shoulder Strap*
Maresciallo d'Italia	☆ ☆ ☆ ☆	
Generale d'armata	☆ ☆ ☆	
Generale di Corpo d'armata	☆ ☆	
Generale di divisione *or* tenente generale	☆ ☆	

Generale di brigata or maggiore generale is same as above except that he has only one star.

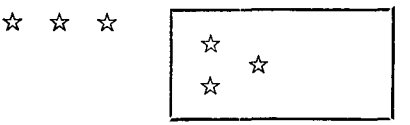
b. Insignia of rank.—Continued.

Colonnello



Tenente colonnello and maggiore differ only in the number of stars; lieutenant colonel has two, and major has one.

Capitano



Tenente has two stars arranged as capitano, and sottotenente has only one Warrant officers have shoulder straps with 1, 2, or 3 bands of yellow silk streaked with black, depending on their relative rank, and one band on their caps. Other ranks wear chevrons. Sergeant major's and sergeant's are yellow, the others red.

SECTION III

JAPANESE

■ 134. UNIFORMS.—

	Enlisted men	*Officers*
Coat:	Olive-drab, cotton, or wool.	
	Single-breasted, sack coat. Turned-down collar.	Higher collar, shorter length. Cuff stripe of dark brown braid.

Insignia of rank and organization on front edge of collar.

Colored chevrons, denoting service, above flap of right pocket.
Red—Infantry, including tanks.
Yellow—Artillery.
Green—Cavalry.
Maroon—Engineers.
Sky Blue—Aviation.
Blue-Black—Transport.
Dark Green—Medical.
Black—Military Police.

Trousers and breeches:

Breeches and woolen olive-drab spiral puttees.	Trousers with high waist and no cuff. Breeches and boots. May wear spiral puttees with either.

Shoes:

Heavy russet shoes. German type russet boot.	Black shoes or boots.

Cap:

Field: Olive-drab cloth, head-shaped, narrow visor and leather chin strap. Ventilation holes, adjustable slit in rear for size. Star on vertical front seam.

Dress: Olive-drab color, similar to U. S. except smaller crown and shorter visor, red piping and headband. Star on headband in front, silver for officers and gold for enlisted men. Leather is black.

Overcoat:

Olive-drab wool, double-breasted, turndown collar, detachable hood.

	One, two, or three bands of brown braid to indicate company, field, or general officer.

Cape:

	Olive-drab wool, conventional type. Throat piece has bars of braid for rank as overcoat.

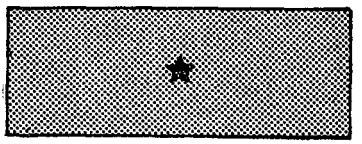
■ 135. INSIGNIA.—*a. Unit insignia.*—Arabic numerals are worn on collar flaps to indicate regiment.

Special units wear regimental number on left and special ornament on right.

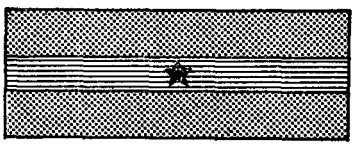
Numerals and branch of service insignia removed for field service.

NOTE.—Enlisted men's uniforms are generally ill-fitting but serviceable. In the field, officers conform to enlisted uniforms. Special types of uniforms are issued for special occasions, winter for Manchuria and China, tropical (shorts) for southern operations, etc. Predominant color is olive drab. Extensive use is made of conforming coloration in uniforms and camouflage nets for the individual.

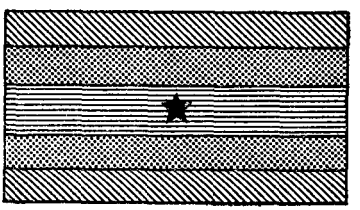
b. Insignia of grade.—Cloth patch on both collar flaps of the coat, overcoat, and cape.



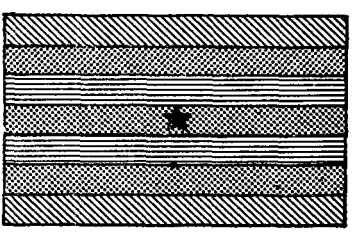
Privates—Plain red patch.
☆ (yellow star)—2d Cl Pvt.
☆☆ (yellow star)—1st Cl Pvt.
☆☆☆ (yellow star)—Superior Pvt.
(Stars are cloth).



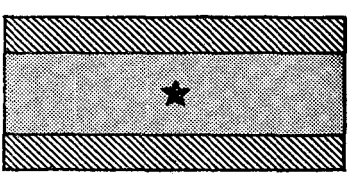
Noncommissioned officers—Plain red, one gold band.
☆ (yellow)—Corporal.
☆☆ (yellow)—Sgt.
☆☆☆ (yellow)—Sgt Maj or 1st Sgt.
(Stars are cloth.)



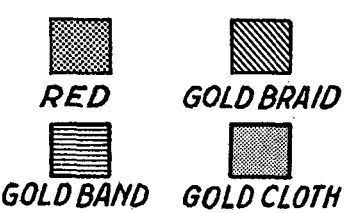
Company officers—Red cloth, gold braid border, gold band center.
☆ (yellow metal)—2d lt.
☆☆ (yellow metal)—1st lt.
☆☆☆ (yellow metal)—Captain.



Field officers—Red cloth, gold braid border, 2 gold bands.
☆ (yellow metal)—Maj.
☆☆ (yellow metal)—Lt col.
☆☆☆ (yellow metal)—Col.



General officers—Gold cloth, gold braid border.
☆ (yellow metal)—Maj gen.
☆☆ (yellow metal)—Lt gen.
☆☆☆ (yellow metal)—Gen.



CHAPTER 2

COMPARATIVE ARMY RANKS

■ 136. TABLE.—

United States	*Japanese*	*Italian*	*German*
	Gensui	Maresciallo d'Italia	Generalfeldmarschall.
General	Taishō	Generale d'armata	Generaloberst.
Lieutenant general		Generale di corpo d'armata	General der Flieger.
Major general	Chūjō	Generale di divisione	Generalleutnant.
Brigadier general	Shōshō	General di brigata	Generalmajor.
Colonel	Taisa	Colonnello	Oberst.
Lieutenant colonel	Chūsa	Tenente colonnello	Oberstleutnant.
Major	Shōsa	Maggiore	Major.
Captain	Tai	Primo capitano	Hauptmann (all arms except cavalry and horse artillery).
		Capitano	Rittmeister (cavalry and horse artillery).
		Primo tenente	
1st lieutenant	Chūi	Tenente	Oberleutnant.
2d lieutenant	Shōi	Sottotenente	Leutnant.
Cadet officer		Maresciallo ufficiale	
Warrant officer (1)	Junshikan	Maresciallo maggiore	
Warrant officer (2)		Maresciallo capro	
Warrant officer (3)		Maresciallo	
Master sergeant	Tokumu-Sōchō	Sergente maggiore	Oberfeldwebel.
1st sergeant	Sōchō		Feldwebel.
			Fahnrich.
Staff sergeant			Unterfeldwebel.
Sergeant	Gunsō	Sergente	Unteroffizier.
			Stabsgefreiter.
			Hauptgefreiter.
Corporal	Gochō	Caporal maggiore	Obergefreiter.
(Lance corporal)	Jōtōhei		Gefreiter.
Private 1st class	Ittōhei	Caporal	Oberschütze.
Private	Nitōhei	Soldato	Mannschaften.

CHAPTER 3
COMPARATIVE MEASUREMENTS

SECTION I
COMPARATIVE MONETARY UNITS

■ 137. TABLE.—

Japanese	*Italian*	*German*
10 rin=1 sen	5 centesimi=1 soldo	100 pfennigs=1 mark.
100 sen=1 yen	20 centesimi=1 quatto soldi	(1 mark=$.24 U. S. at par).
(1 yen=$.84459 U. S.)	50 centesimi=1 mezzolira	
	100 centesimi=1 lira (L.)	
	(1 lira=$.0526 U. S.)	

SECTION II
WEIGHTS AND MEASURES

■ 138. GERMAN AND ITALIAN.—Both the Germans and the Italians use the metric system. In the table below the slight variations in spelling are shown, so that by combining the proper prefix with the proper unit the entire table of weights and measures can be obtained.

English	*Italian*	*German*	*English*	*Italian*	*German*
milli-	milli-	milli-	meter	metro	meter
centi-	centi-	zenti-	gram	gramma	gramm
deci-	deci-	dezi-	liter	litro	liter
deka-	deca-	deka-			
hecto-	etto-	hekto-			
kilo-	chilo-	kilo-			

■ 139. JAPANESE.—*a. Distance and length.*—

Ri=36 cho 2,160 ken ..... =2.4403 miles ..... =3.92727 kilometers.
Ri=(marine) ..... =1 knot ..... =1.85318 kilometers.
Ken=6 shaku=60 sun ..... =5.965163 feet ..... =1.81818 meters.
Shaku=10 sun=100 bu ..... =0.994194 foot ..... =0.30303 meter.

b. Quantity, capacity, and cubic measures.—

Koku=10 to=100 sho={4.96005 bushels / 47.95389 gallons (liquid) U. S. A. / 5.11902 bushels (dry) U. S. A.}=1.80391 hectoliters.

Go ..... =10th of a sho.
Koku (capacity of vessels) ..... =10th of a ton.

c. Weights.—

Kwan (kan) = 1,000 momme	8.26733 pounds avoirdupois 10.04711 pounds troy	= 3.7500 kilograms.
Kin = 160 momme	1.32277 pounds avoirdupois 1.60754 pounds troy	= 0.60000 kilogram.
Momme = 10 fun	0.13228 ounce avoirdupois 0.12057 ounce troy	= 3.75000 grams.

CHAPTER 4

COMPARATIVE MAP SYMBOLS FOR PRINCIPAL FIELD UNITS

■ 140. TABLE OF MAP SYMBOLS.—

	Japanese	Italian	German
Army	A		
Army headquarters		QG	
Army corps	C		
Corps headquarters		QG	
Division	D		
Division headquarters		QG	
Motorized division headquarters		QG	
Armored division headquarters		QG	PZ
Alpine division headquarters		QG	
Motor-transportable division headquarters		QG	
Celere (fast) division headquarters		QG	
Infantry:	i		
Brigade	B		
Brigade headquarters			
Regiment	R		
Regimental headquarters			
Battalion	or		
Battalion headquarters			
Company	or III		

	Japanese	*Italian*	*German*
Company headquarters			
Bicycle company			
Motorcycle company			
Machine-gun company			
Antitank company			
Cavalry:	K		
Brigade	KB		
Brigade headquarters			
Regiment			
Regimental headquarters			
Troop or squadron			
Field Artillery:	A		
Regimental headquarters (horse)			
Regimental headquarters (motorized)			
Battery (horse)			
Battery (motorized)			
Mountain artillery:	BA		
Regimental headquarters			t 
Battery			

	Japanese	*Italian*	*German*
Heavy field artillery	SA		
Battery of howitzers			
Battery of guns			
Antiaircraft artillery battery			
Observation post			
Tank	 or T.K.		
Brigade headquarters			
Heavy tank battalion			
Heavy tank company			
Medium tank battalion			
Light tank company			
Aviation unit