

~~NR-2228-E~~ ~~X-R-2017~~

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ENEMY ORDNANCE MATERIAL  
(GERMAN)

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# UNCLASSIFIED CATALOG OF ENEMY ORDNANCE MATERIÉL ERRATA

A number of changes, largely in nomenclature and specifications, have been made in the Catalog from time to time, but many sets are in circulation without these changes. The following errata should be marked on the pages indicated if not already made in your Catalog.

## Volume I—German Section

- Page 16—Heading should read **S.P. Heavy Field Howitzer (On French Lorraine Chassis)**.
- Page 17—Heading should read **Ammunition Carrier (On French Lorraine Chassis)**.
- Page 21—Sub-head should read **Pz. Jäg. 38 für 7.62 cm Pak 36 (r) (Sd. Kfz. 139)**.
- Page 28—Under "Specifications" the weight should be 26.5 tons instead of 22 tons.
- Page 29—In sub-head, instead of figure "142," read 142/2.  
In the first and second paragraphs, instead of "Pz. Kw.," read **Pz. Kpfw.**  
Under "Specifications" the weight should be 27 tons instead of 22 tons.
- Page 32—Under "Specifications" the weight should be 26 tons instead of 24 tons.
- Page 33—Sub-head should read **Stu. G. IV ("Brumm-bür) für 15 cm Stu. H. 43 (Sd. Kfz. 166)**.  
Under "Specifications" the Armament should read **Stu. H. 43 (15 cm s.I.G. 33)**.
- Page 34—Heading should read **S.P. Antitank Gun "Rhinoceros" (formerly "Hornet")**.  
Sub-head should read **Pz. Jäg. III/IV ("Nashorn") für 8.8 cm Pak 43/1 (Sf) (Sd. Kfz. 164)**.  
End of first paragraph should read **Comparative figures for weight and maximum road speed of "Hornet" and "Ferdinand" are: 25 tons and 22 m.p.h., 72 tons and 12½ m.p.h., respectively.**  
Under "Specifications" the weight should be 25 tons instead of 28 tons.
- Page 37—Sub-head should read **Pz. Kpfw. "Panther" (7.5 cm Kw. K. 42-L/70) (Sd. Kfz. 171)**.  
Second line of first paragraph should read 47 tons instead of 50 tons.  
Under "Specifications" the weight should be 47 tons instead of 50 tons. The armament should read **7.5 cm Kw. K. 42—1 M. G. 34**.
- Page 38—Sub-head should read **Pz. Kpfw. "Tiger" (8.8 cm Kw. K. 36-L/56) (Sd. Kfz. 181)**.  
Under "Specifications" the weight should be 63 tons instead of 60 tons.
- Page 39—Heading should read **S.P. Antitank Gun—"Elephant" (formerly "Ferdinand")**.  
Sub-head should read **Pz. Jäg. "Tiger" (P) "Elefant" für 8.8 cm Pak 43/2 (Sd. Kfz. 184)**.  
In first line read 72 tons instead of 80 tons.  
In line eight of first paragraph read 2 2/5 inches instead of 6½ inches.  
Under "Specifications" the weight should be 72 tons instead of 80 tons. Side armor should read 60 mm instead of 160 mm. Armament should read **8.8 cm Pak 43/2—M. G. 34**.
- Page 40—Sub-head should read **Pz. Jäg. "Tiger" für 12.8 cm Pak 44 (Sd. Kfz. 186)**.  
Under "Specifications" armament should read 12.8 cm Pak 44.

- Page 46—Sub-head should read **l. gp. Mun. Trsp. Kw. (Sd. Kfz. 252)**.
- Page 74.43—Sub-head of first vehicle should read **Fernschr. Kw. (Kfz. 72/1)**.
- Page 74.84—German nomenclature of first vehicle should read **mittlerer Anhänger mit Betriebsstoffkesselanlage (o)**.
- Page 101—Sub-head should read **21 cm Mrs. mit Mrs. Laf. 18**.  
In last paragraph instead of "17 cm Mrs." read **17 cm K. mit Mrs. Laf. 18**.
- Page 105—Sub-head should read **15 cm s. F. H. 18**.
- Page 107—Sub-head should read **10 cm K. 18**.  
First line of first paragraph should read **The 10 cm Field Gun K. 18. . . .**  
Under "Specifications" muzzle velocity should be **2,660 f/s**.
- Page 109—Under "Specifications" weight of projectile should read **H.E. 33.2 lb**.
- Page 111—Under "Specifications" weight of projectile should read **(H.E.) 20.35 lb.; (A.P.) 20.75 lb**.
- Page 113—Sub-head should read **8.8 cm Pak 43/41**.  
First paragraph should read **The Pak 43/41 instead of Pak 43**.  
In line three of the last paragraph read **Pak 43/41 instead of Pak 43**.
- Page 117—Under "Specifications" delete **Weight (firing position) . . . 3,040 lb**.
- Page 123—First line in first paragraph should read **The 7.5 cm Pak 41, Germany's latest . . .**
- Page 125—Picture shown does not pertain to this item.
- Page 134—Sub-head should read **2 cm s PzB (Solothurn s/8-1100)**.
- Page 136—Under "Specifications" rate of fire should read **220 rounds (practical), 450 (theoretical)**.
- Page 207—Sub-head should read **7.92 mm Karabine 98K (Mauser-Kar. 98K)**.
- Page 210—Sub-head should read **7.92 mm PzB 35 (p)**.
- Page 214—Sub-head should read **7.92 mm M. G. 34/41**.
- Page 217—Sub-head should read **8.8 cm Raketenpanzerbüchse 43 (8.8 cm R PzB 43)—8.8 cm Raketenpanzerbüchse 54 (8.8 cm R PzB 54)**.  
Last word in first line should be spelled **Raketenpanzerbüchse**.  
Add to the end of first paragraph: **An improved model with a face shield is known as 8.8 cm R PzB 54**.
- Page 218—Sub-head should read **Panzerfaust**.  
The first paragraph should read **The German rocket grenade, "Panzerfaust" (literally "armor fist"). . . .**  
Add the following as a fourth paragraph: **Three models of the Panzerfaust exist with the following German nomenclature:**  
**Panzerfaust 30**  
**Panzerfaust Klein 30**  
**Panzerfaust 60**
- Page 306—Sub-head should read **3.7 cm Stielgranate 41**.
- Volume II—Japanese Section
- Page 114 (Page 113 in later editions). Under "Specifications" Traverse should read **46°**. (This page refers to the 75 mm Field Gun, Model 95 (1935).)

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# UNCLASSIFIED CATALOG OF ENEMY MATERIEL INDEX TO VOLUME I

## GERMAN

Air Compressor..... 74.79

### AIRCRAFT ARMAMENT

7.92 mm M. G. 15 ..... 219  
 7.92 mm M. G. 17 ..... 220  
 7.92 mm M. G. 81 ..... 221  
 13 mm M. G. 131 ..... 222  
 20 mm M. G. F. F. M. (Oerlikon) ... 251  
 20 mm M. G. 151/20 (Mauser) ..... 252  
 30 mm Mk. 101 (Rheinmetall) ..... 253  
 30 mm Mk. 108 A-3 ..... 255

Airplane Fuel Tank Trailer ..... 74.85

Ambulance ..... 74.20, 74.21

### AMMUNITION

#### Artillery Ammunition

5 cm Pzgr. Patr. 40 Pak ..... 307  
 7.5/5.5 cm Pzgr. Patr. 41 (W) ..... 306.2  
 8 cm Wurfgranate 39 ..... 309  
 8.8 cm Pzgr. Patr. .... 308  
 10.5 cm Gr. 39 Rot HL/C ..... 310  
 10.5 cm "Sabot" Type H. E. Shell .... 311  
 10.5 cm Steel Cartridge Case for  
 Recoilless Gun ..... 313  
 17 cm Steel Cartridge Case,  
 Spiral Design ..... 314  
 28 cm Rifled Projectile ..... 312

#### Bombs

H. s. 293 ..... 315  
 PC 1000 Rs ..... 316

#### Grenades

Panzerwurfmine (L) ..... 304.4  
 3.7 cm Stielgranate 41 ..... 306  
 15 cm Stielgranate ..... 306.1  
 Gewehr Sprenggranate ..... 317  
 Gewehr Panzergranate ..... 317  
 Gross Gewehr Panzergranate ..... 318  
 Gewehr Propaganda Granate ..... 318  
 Schuss Gr. P-40 ..... 319  
 Gross Panzergranaten 61 u. 46 ..... 319  
 Stielhandgranaten 24 u. 39 ..... 321  
 Eierhandgranate 39 ..... 321  
 Shaving Stick Grenade ..... 322  
 Nebelhandgranate 39 ..... 322  
 Nebelhandgranate 41 ..... 323  
 Blendkörper 1H u. 2H ..... 323  
 26 mm Wurfgranate Patrone 326  
 Leuchtpistole ..... 324

Wurfkörper Leuchtpistole ..... 324  
 27 mm Multi-Star Signal Cartridge ..... 325  
 Sprengpatrone für Kampfpistole ..... 325  
 Nebelpatrone für Kampfpistole ..... 326  
 Deutpatrone für Kampfpistole ..... 326  
 Fallschirm Leuchtpatrone für  
 Kampfpistole ..... 326

#### Mines

Behelfs-Schützenmine S. 150 ..... 304.7  
 Glasmine 43 (f) ..... 304.6  
 Holzmine 42 ..... 304.3  
 Magnetic Hollow Charge Antitank Mine.. 304.5  
 Panzerwurfmine (L) ..... 304.4  
 Riegel Mine 43 (R. Mi. 43)  
 Sprengriegel 43 (Spr. R. 43) ..... 304.2  
 Sprengmine 35 ..... 305  
 Sprengmine 44 mit S. Mi. Z. 44 ..... 304.8  
 Tellermine (T. Mi. 29) ..... 304.1  
 Tellermine (T. Mi. 35) ..... 301  
 Tellermine (T. Mi. 35—Stahl) ..... 303  
 Tellermine (T. Mi. 42) ..... 302  
 Tellermine (T. Mi. Pilz 43) ..... 304

#### Rocket Ammunition

8.8 cm R. Pz. B. Gr. .... 357  
 15 cm Wurfgranate 41 ..... 356  
 21 cm Wgr. 42 Spr. mit Hbgr. Z 35 K. .... 355  
 28 cm Wurfkörper Spr. .... 354  
 30 cm Wurfkörper Spr. .... 354.1  
 32 cm Wurfkörper M. Fl. 50 ..... 353  
 Rocket-Propelled Bomb ..... 316

Ammunition, A. P., 7.5 cm for 7.5 cm Pak 41 . 306.2  
 Ammunition, A. P. C. B. C., H. E., 8.8 cm .... 308  
 Ammunition, Arrowhead, 5 cm ..... 307  
 Ammunition, Hollow Charge, 10.5 cm ..... 310  
 Amphibious Truck ..... 58.2  
 Anhänger ..... 62, 74.67 to 74.100 inc.  
 Anhänger für Erdkabel ..... 74.74  
 Anhänger für Fährseil ..... 74.72  
 Anhänger für Fernsprechbau ..... 74.73  
 Anhänger für Langmaterial ..... 74.73  
 Anhänger für Motorboot ..... 74.72  
 Anhänger für Munition ..... 74.68, 74.69  
 Anhänger für Sammlerladegerät ..... 74.78  
 Anhänger für Schlauchtender ..... 74.78  
 Anhänger für Sturmboot ..... 74.94  
 Anhänger für Tankspritze ..... 74.77  
 Anhänger für Tragflächen ..... 74.91



Anhänger für Tragkraftspritze .....	74.77	4.2/2.8 cm Pak 41 .....	128
Anhänger mit Betriebsstoffkesselanlage 74.84, 74.85		4.7 cm Pak (t) (Skoda) .....	127
Anhänger (offen) .....	74.82, 74.83	5 cm Pak 38 .....	126
Antiaircraft Protection Truck .....	74.6	7.5 cm Pak 40 .....	117
Antiaircraft Survey Section Truck .....	74.40	7.5 cm Pak 97/38 .....	121
Antiaircraft Unit Car .....	74.24	7.5/5.5 cm Pak 41 .....	123
Armor, Tank (Chart) .....	67, 68, 69, 70	7.62 cm Pak 36 (r) .....	116
<b>ARMORED CARS</b>		7.62 cm F. K. 39 (r) .....	115
Pz. Sp. Wg. II Luchs (Sd. Kfz. 123) "Lynx" .....	8.1	8.8 cm Pak 43 .....	112.1
1. Pz. Sp. Wg. (Sd. Kfz. 221, 222, 223) .....	41	8.8 cm Pak 43/41 .....	113
s. Pz. Sp. Wg. (Sd. Kfz. 231, 232, 263)		8.8 cm Flak 18, 36, 37 .....	111
(6 Rad) .....	42	<b>Field Artillery</b>	
s. Pz. Sp. Wg. (Sd. Kfz. 231, 232, 263)		7.5 cm L. G. 40 .....	119
(8 Rad) .....	43	7.5 cm l. F. K. 18 .....	120
M. G. Kw. (Kfz. 13) .....	74.59	7.5 cm l. I. G. 18 .....	122
Fu. Kw. (Kfz. 14) .....	74.60	7.62 cm Feldkanone 36 (r) .....	116.1
s. gl. gp. Pkw. (Sd. Kfz. 247) .....	74.60	10 cm K. 18 .....	107
s. gl. gp. Pkw. (Sd. Kfz. 247) .....	74.61	10.5 cm L. G. 40 .....	110
1. Pz. Sp. Wg. (Sd. Kfz. 221) .....	74.61	10.5 cm l. F. H. 18 .....	108
1. Pz. Sp. Wg. (Sd. Kfz. 222) .....	74.62	10.5 cm l. F. H. 18 (M) .....	108.1
1. Pz. Sp. Wg. (Fu.) (Sd. Kfz. 223) .....	74.62	15 cm K. 16 .....	104.1
s. Pz. Sp. Wg. (Sd. Kfz. 231) .....	74.63	15 cm s. F. H. 18 .....	105
s. Pz. Sp. Wg. (Sd. Kfz. 231) (8 Rad) .....	74.63	15 cm s. I. G. 33 .....	104
s. Pz. Sp. Wg. (Fu.) (Sd. Kfz. 232) .....	74.64	17 cm K. mit Mrs. Laf. 18 .....	103
s. Pz. Sp. Wg. (Fu.) (Sd. Kfz. 232)		21 cm Mrs. mit Mrs. Laf. 18 .....	101
(8 Rad) .....	74.64	<b>Mortars</b>	
kl. Pz. Fu. Wg. (Sd. Kfz. 260) .....	74.65	5 cm l. Gr. W. 36 .....	124
kl. Pz. Fu. Wg. (Sd. Kfz. 261) .....	74.65	8 cm s. Gr. W. 34 .....	114
Pz. Fu. Wg. (Sd. Kfz. 263) .....	74.66	10 cm Nebelwerfer 35 .....	110.1
Pz. Fu. Wg. (Sd. Kfz. 263) (8 Rad) .....	74.66	10 cm Nebelwerfer 40 .....	110.2
Arrowhead Ammunition, 5 cm .....	307	12 cm s. Gr. W. 42 .....	106
Artillery, Large Caliber (Chart) .....	100.1	20 cm Leichte Ladungswerfer .....	102
<b>ARTILLERY</b>		<b>Mountain Artillery</b>	
<b>Antiaircraft Artillery</b>		2 cm Flak 38 Geb. ....	137
2 cm Flak (Madsen) .....	132	7.5 cm Geb. G. 36 .....	118
2 cm Flak (30) .....	135	10.5 cm Geb. H. 40 .....	108.2
2 cm Flak 38 .....	136	<b>Recoilless Guns</b>	
2 cm Flak 38 Geb. ....	137	7.5 cm L. G. 40 .....	119
2 cm Flakvierling 38 .....	133	10.5 cm L. G. 40 .....	110
3.7 cm Flak 18 u. 36 .....	130.1	<b>Self-Propelled Artillery</b>	
4 cm Flak 28 (Bofors) .....	129	Pz. Jäg. I für 4.7 cm Pak (t) .....	4
5 cm Flak 41 .....	125	Gw. I für 15 cm s. I. G. 33 .....	5
8.8 cm Flak 18, 36, 37 .....	111	Pz. Jäg. II Aus. A-E u. F für 7.5 cm Pak	
8.8 cm Flak 41 .....	112	40 (Sd. Kfz. 131) .....	11
10.5 cm Flak 38, 39 .....	109	Pz. Jäg. II Aus. D, E für 7.62 cm Pak 36	
<b>Antitank Artillery</b>		(Sd. Kfz. 131) .....	12
2 cm Flak (Madsen) .....	132	Gw. II für 15 cm s. I. G. 33 .....	13
2 cm Flak 38 .....	136	Gw. II (Wespe) für 10.5 cm le. F. H. 18/2	
2 cm Flak 38 Geb. ....	137	(Sd. Kfz. 124) .....	14
2 cm Flakvierling 38 .....	133	Pz. Jäg. Lr. S. für 7.5 cm Pak 40/1 (Sd.	
2 cm s Pz. B. (Solothurn s/8-1100) .....	134	Kfz. 135) .....	15
2.8/2.0 cm Pz. B. 41 .....	131	Gw. Lr. S. für 15 cm s. F. H. 13 .....	16
3.7 cm Pak .....	130	Pz. Jäg. 38 für 7.5 cm Pak 40/3 (Sd. Kfz.	
		138) .....	19

# INDEX TO VOLUME I

**UNCLASSIFIED**

GERMAN



Gw. für 15 cm s. I. G. 33/1 (Sd. Kfz. 138/1) .....	20	Bomb, Glider, Radio-Controlled .....	315
Pz. Jäg. 38 für 7.62 cm Pak 36 (r) (Sd. Kfz. 139) .....	21	Bomb, Rocket-Propelled .....	316
Sturmgeschütz 7.5 cm K. (Sd. Kfz. 142) ..	26	"Bouncing Betty" .....	309
Sturmgeschütz 7.5 cm K. (Sd. Kfz. 142) ..	26	Box Car Trailer .....	74.95, 74.96
Sturmgeschütz lg. 7.5 cm Stu. K. (Sd. Kfz. 142) .....	27	Brno 7.92 mm M. G. 37 (t) .....	216
Sturmgeschütz 7.5 cm Stu. K. 40 (Sd. Kfz. 142) .....	28	"Brummbär" .....	33
Sturmgeschütz 10.5 cm Stu. H. 42 (Sd. Kfz. 142/2) .....	29	"Bumblebee" .....	35
Stu. G. IV ("Brummbär") für 15 cm Stu. H. 43 (Sd. Kfz. 166) .....	33	Bus, Motor, Heavy .....	74.48
Pz. Jäg. III/IV ("Nashorn") für 8.8 cm Pak 43/1 (Sf) (Sd. Kfz. 164) .....	34	Bus, Motor, Light .....	74.47
Gw. III/IV ("Hummel") für 15 cm s. F. H. 18/1 (Sd. Kfz. 165) .....	35	Bus, Motor, Medium .....	74.47
Pz. Jäg. ("Panther") für 8.8 cm Pak 43/3 (Sd. Kfz. 173) .....	38.1	Cable Surveying Truck .....	74.31
Pz. Jäg. ("Tiger") (P) "Elefant" für 8.8 cm Pak 43/2 (Sd. Kfz. 184) .....	39	Car, Antiaircraft Unit, Light .....	74.24
Pz. Jäg. ("Tiger") für 12.8 cm Pak 44 (Sd. Kfz. 186) .....	40	Car, Armored, Full-Track ("Lynx") .....	8.1
		Car, Armored, 4-Wheeled .....	41
		Car, Armored, 6-Wheeled .....	42
		Car, Armored, 8-Wheeled .....	43
		Car, Cable Surveying .....	74.15
		Car, Communications .....	74.3
		Car, Cross-Country, Medium .....	74.10
		Car, Emergency Repair .....	74.15
		Car, Flash and Sound Ranging, Medium .....	74.12
		Car, Machine Gun .....	74.59
		Car, Passenger, Light .....	74.1
		Car, Personnel, Heavy .....	74.16
		Car, Personnel, Cross-Country, Heavy .....	74.17
		Car, Personnel, Armored, Cross-Country, Heavy .....	74.60, 74.61
		Car, Personnel, Medium .....	74.8
		Car, Personnel, Cross-Country, Medium .....	74.9
		Car, Radio .....	74.4, 74.5, 74.11, 74.13, 74.14, 74.60
		Car, Radio, Armored, Small .....	74.65
		Car, Radio, Armored .....	74.66
		Car, Radio, Armored, 8-Wheeled .....	74.66
		Car, Reconnaissance .....	74.23
		Car, Reconnaissance, Armored, Light .....	47
		Car, Command, Reconnaissance .....	60
		Car, Scout, Armored, Heavy .....	74.63, 74.64
		Car, Scout, Armored, Heavy, 8-Wheeled .....	74.63, 74.64
		Car, Scout, Armored, Light .....	74.61, 74.62
		Car, Signal Communications .....	74.10
		Car, Signal Communications .....	74.11
		Car, Survey Section, Light .....	74.5, 74.6
		Car, Telephone Exchange .....	74.13
		Carbine, 7.92 mm, Gewehr 33/40 .....	206.2
		Carriage, Field Gun .....	103
		Carriage, Gun Motor .....	(See S. P. Artillery)
		Carrier, Ammunition (On French-Lorraine Chassis) .....	17
		Carrier, Ammunition, Armored, Light .....	46
		Carrier, Personnel .....	74.22
		Carrier, Personnel, Cross-Country, Light .....	74.1, 74.2
		Carrier, Personnel, Armored, Light .....	44
		Carrier, Personnel, Armored, Medium .....	45
<b>Tank Guns</b>			
2 cm Kw. K. 30... 6, 7, 8, 10, 41, 42, 43, 65			
2 cm Kw. K. 38..... 8.1, 41, 65			
3.7 cm Kw. K. .... 22, 36, 65			
3.7 cm Kw. K. (t) .....	18		
5 cm Kw. K. (short) .....	23, 65		
5 cm Kw. K. 39 .....	24, 25, 65		
7.5 cm Kw. K. (short).... 25, 26, 31, 36, 65			
7.5 cm lg. Kw. K. .... 27			
7.5 cm Kw. K. 40 .....	31, 32, 65		
7.5 cm Kw. K. 42 .....	37, 65		
7.5 cm Kw. K. 43 .....	37, 65		
7.5/5.5 cm Taper Bore Kw. K. 41..... 65			
8.8 cm Kw. K. 36 .....	38, 65		
8.8 cm Kw. K. 43 .....	38.2, 65		
<b>Automotive Equipment (see Cars, Trucks, etc.)</b>			
Backanhänger .....	74.85, 74.86		
"Bazooka" (German) .....	217, 357		
Beacon Trailer .....	74.87, 74.89		
Befehlspanzerkraftwagen .....	3		
Behelfs-Schützenmine .....	304.7		
Beiwagen .....	74.67		
Beleuchtungsanhänger .....	74.86		
Beobachtungskraftwagen .....	47, 48, 74.27		
Bergman 9 mm Submachine Gun .....	204, 205		
Betriebs-Funkempfangsanhänger .....	74.89		
Betriebsstoffkesselkraftwagen .....	74.50, 74.51		
Bildkraftwagen .....	74.41		
Blendkörper .....	323		
Bockwagen .....	74.95, 74.96		
Bofors Antiaircraft Gun .....	129		

**UNCLASSIFIED**



Carrier, Pontoon ..... 74.97  
 Carrier, Pontoon, Light ..... 74.96  
 Cartridges, Propelling, Rifle Grenade (Chart) 320  
 Cartridge H. E., for 27 mm Grenade Pistol... 325  
 Cartridge, Signal, Multi-Star, 27 mm ..... 325  
 Cartridge Case, Steel, for 10.5 cm Recoilless Gun ..... 313  
 Cartridge Case, Steel, Spiral Design, 17 cm... 314  
 Charging Truck ..... 74.38  
 Compressor, Air ..... 74.79  
 Chemical Warfare Vehicles ..... 63  
 Commercial Truck ..... 74.24  
 Crane, Gantry, Portable ..... 62.1  
 Cross-Country Truck ..... 74.25, 74.26, 74.39  
 Deutpatrone für Kampfpistole ..... 326  
 Dieseleisbereiter als Anhänger ..... 74.81  
 Direction & Range Finder Trailer ..... 74.80, 74.90  
 Director, Antiaircraft ..... 175, 176  
 Dischargers, Rifle, Spigot & Cup Types ..... 320  
 Doughkneading Trailer ..... 74.79  
 Druckereikraftwagen ..... 74.33  
 Druckluftherzeuger als Anhänger ..... 74.79  
 Egg Hand Grenade ..... 321  
 Eierhandgranate ..... 321  
 Electrical Repair Truck ..... 61  
 "Elephant" ..... 39  
 Engines, Armored Force Vehicles (Chart) 73, 74  
 Fallschirmjäger Gewehr ..... 209  
 Fallschirm Leuchtpatrone für Kampfpistole.. 326  
 Faustpatrone ..... 218  
 Feldhaubitze ..... 105, 108, 108.1  
 Feldkanone ..... 115, 116.1, 120  
 Feldfernkelkraftwagen ..... 74.26, 74.40  
 "Ferdinand" ..... 39  
 Fernsprechbaukraftwagen ..... 74.38  
 Fernsprech-Betriebskraftwagen .. 74.13, 74.28, 74.42  
 Fernsprechkraftwagen ..... 74.17, 74.27, 74.39  
 Fernsprech-Vermittlungsanhänger ..... 74.88  
 Fernschreibkraftwagen ..... 74.28, 74.42, 74.43  
 Field Telephone Cable Truck ..... 74.26, 74.40

FIRE CONTROL

Antiaircraft Directors  
 Kommando-Gerät 36 ..... 175  
 Kommando-Gerät 40 ..... 176  
 Sight Mount for 7.5 cm Howitzer (le. F. K. 18) ..... 177  
 Sight Mount for 10.5 cm Howitzer (le. F. H. 18) ..... 177  
 Sight Mount for 15 cm Howitzer (s. I. G. 33) 177  
 Sight Mount for 7.5/5.5 cm A. T. Gun (Pak 41) ..... 178  
 Sight Mount for 8.8 cm A. T. Gun (Pak 43/41) ..... 178

Sight Mount for 7.5 cm (Stu. K. 40) on Pz. Kpfw. III Chassis F8, w/o rotary cupola.. 179  
 Sight Mount for 7.5 cm (Stu. K. 40) S. P. on Pz. Kpfw. III Chassis ..... 179  
 Sight Mount for 7.5 cm Pak 40 mounted on 38 (t) Czech Chassis ..... 180  
 Sight Mount for 7.62 cm Pak 36 (r) mounted on 38 (t) Czech Chassis ..... 180  
 Sight Mount for 10.5 cm (Stu. H. 42) on Pz. Kpfw. III Chassis ..... 181  
 Sight Mount for 15 cm s. F. H. 13 on Lorraine Chassis ..... 181  
 Sights, Tank and Armored Car (Chart).... 66  
 Fire Engine ..... 74.52, 74.53  
 Fire Extinguisher Truck ..... 74.52  
 Fire Pump, Motor, Transportable ..... 74.76  
 Flak (Flugzeugabwehrkanone) .... 109, 111, 112, 125, 129, 130.1, 132, 133, 135, 136, 137  
 Flakkraftwagen ..... 74.23, 74.24, 74.41  
 Flakmesstruppkraftwagen ..... 74.40  
 Flakvierling ..... 133  
 Flame-thrower (on Light Tank) ..... 9  
 Flame-thrower (on Medium Tank) ..... 30  
 Flammenwerfer ..... 9, 30  
 Flash Ranging Station Truck ..... 74.35  
 Flash Ranging Truck ..... 74.33, 74.39  
 Flugbetriebsstoffkesselkraftwagen ..... 74.51  
 Flugbetriebsstoff-Kesselwagen als Anhänger.. 74.85  
 Fuel Servicing Truck ..... 74.50, 74.51  
 Fuel Tank Trailer ..... 74.84, 74.85  
 Funkanhänger ..... 74.88  
 Funkbetriebskraftwagen ..... 74.43  
 Funkhorchkraftwagen ..... 74.44  
 Funkkraftwagen ..... 74.4, 74.5, 74.11, 74.13, 74.14, 74.29, 74.44, 74.60  
 Funkmastkraftwagen ..... 74.30, 74.46  
 Gantry Crane, Portable ..... 62.1  
 Gebirgsgeschütz ..... 118  
 Gebirgshaubitze ..... 108.2  
 Gefechtskraftwagen ..... 74.15  
 Generator Trailer ..... 74.86  
 Generator, Transportable ..... 74.74, 74.75, 74.76  
 Geschütz ..... 100.1, 104, 110, 119, 122  
 Gewehr ..... 208, 208.1  
 Gewehr, Fallschirmjäger ..... 209  
 Gewehr Panzergranate ..... 317, 318, 319  
 Gewehr Propaganda Granate ..... 318  
 Gewehr-Sprenggranate ..... 317  
 Glasmine ..... 304.6  
 Glider Bomb, Radio-Controlled ..... 315  
 Granatbüchse ..... 212  
 Granatwerfer ..... 106, 114, 124  
 Grenade, Hand or Rifle, Antipersonnel ..... 317  
 Grenade, Hand, Antitank, Hollow Charge... 304.4  
 Grenade, Hand, Egg-Type ..... 321  
 Grenade, Hand, Stick ..... 321  
 Grenade, Hand, Smoke ..... 322, 323  
 Grenade, Hollow Charge ..... 319  
 Grenade, Pistol ..... 324

# INDEX TO VOLUME I

# UNCLASSIFIED

GERMAN



Grenade, Pistol, Illuminating Star on Parachute .....	326	Kanone .....	100.1, 100.2, 103, 104.1, 107, 115, 116.1, 120
Grenade, Pistol, Indicator .....	326	Karabiner .....	207, 208.2
Grenade, Pistol, Smoke .....	326	Kettenschlepper .....	74.57, 74.58
Grenade, Rifle, Antitank .....	317, 318	"King Tiger" Tank .....	38.2
Grenade, Rifle, Hollow Charge, H.E.A.T. ....	319	Kommando-Gerät .....	175, 176
Grenade, Rifle, Propaganda .....	318	Krad .....	50, 58
Grenade, Rocket, Antitank .....	357	Kraftfahrdrehleiter .....	74.55
Grenade, Shaving Stick .....	322	Kraftfahrsirene .....	74.4
Grenade, Smoke .....	323	Kraftfahrspitze .....	74.52, 74.53
Grenade, Stick .....	306, 306.1	Kraftomnibus .....	74.47, 74.48
Grenade Dischargers, Rifle .....	320	Krankenkraftwagen .....	74.20, 74.21
"Grizzly Bear" .....	33	Ladder, Fire-Fighting, Motorized .....	74.55
Grosskühlbehälteranhänger .....	74.82	Ladungswerfer .....	102
Gun, Airborne, Recoilless .....	119	Lastkraftwagen (offen),	74.24, 74.25, 74.26, 74.37, 74.46, 74.52
Gun, Antiaircraft .....	125, 129, 130.1, 135	Launcher, Recoilless, Antitank Bomb .....	218
Gun, Antiaircraft/Antitank (Ex-Danish),	132, 133, 136	Launchers, Rocket .....	48.1, 217, 351, 352, 352.1
Gun, Antitank .....	112.1, 113, 115, 116, 117, 121, 123, 126, 127, 128, 130, 131, 134	Leuchtfeueranhänger .....	74.87, 74.89
Gun, Field .....	103, 104.1, 107, 116.1, 120	Leuchtpistole .....	201
Gun, Machine, Aircraft,	219, 220, 221, 222, 251, 252, 253, 255	Lichtauswertekraftwagen .....	74.33
Gun, Machine, Dual-Purpose .....	213, 214, 215	Lichtmessgerätkraftwagen .....	74.39
Gun, Machine, Heavy (Ex-Czech) .....	216	Lichtmesstellenkraftwagen .....	74.35
Gun, Mountain .....	118	Luger 9 mm Pistol .....	202
Gun, Mountain, Antiaircraft/Antitank .....	137	"Lynx" .....	8.1
Gun, Multi-Purpose .....	109, 111, 112	Machine Guns .....	213, 214, 215, 216, 219, 220, 221, 222, 251, 252, 253, 255
Gun, Railway .....	100.2	Machine Shop Truck .....	61
Gun, Recoilless .....	110, 119	Madsen Antiaircraft Gun .....	132
Guns, Self-Propelled (Chart) .....	71, 72	Maintenance Truck .....	74.18, 74.21, 74.32
Gun, Self-Propelled .....	4, 11, 12, 15, 19, 21, 26, 27, 28, 28.1, 29, 33, 34, 39, 40	Mannschaftskraftwagen .....	44.45, 60, 74.22, 74.23
Gun, Submachine .....	204, 205, 206, 206.1	Maschinengewehr .....	213, 214, 215, 216, 219, 220, 221, 222, 251, 252, 253, 255
Guns, Tank (Chart) .....	65	Maschinengewehrkraftwagen .....	74.59
Guns, Tapered Bore .....	123, 128, 131	Maschinenpistole .....	204, 205, 206, 206.1
Gun-Howitzer .....	108	Maschinensatz als Anhänger .....	74.74, 74.75, 74.76
Haubitze .....	100.1, 105, 108, 108.1, 108.2, 122	Mauser 20 mm Machine Gun .....	252
"Hummel" .....	35	Mauser 7.92 mm Rifle .....	207, 208.1
Holzmine .....	304.3	Measurement Range and Equipment Truck ...	74.36
Horchfunkpeil-Kraftwagen .....	74.45	Messtellen-und-Gerätkraftwagen .....	74.36
"Hornet" .....	34	Messtruppkraftwagen .....	74.5, 74.6, 74.12, 74.40
Hose Truck .....	74.54	Meteorological Truck .....	74.35, 74.45
Howitzer, Heavy .....	101	Mine, Antipersonnel .....	304.6, 304.7, 304.8, 305
Howitzer, Medium .....	105	Mine, Antitank,	301, 302, 303, 304, 304.1, 304.2, 304.3, 304.5
Howitzer, Mountain .....	108.2	Mine, Antitank, Hollow Charge, Magnetic. ...	304.5
Howitzer, Field, Light .....	108.1	Mine, Glass .....	304.6
Howitzer, Infantry .....	104, 122	Mobile Siren .....	74.4
Howitzer, Self-Propelled .....	5, 13, 14, 16, 20, 35	Mörser .....	100.1, 101
"Hunting Panther" .....	38.1	Mörserlafette .....	100.1, 101, 103
Ice Maker, Diesel Engine .....	74.81	Mortar .....	102, 106, 110.1, 110.2, 114, 124
Indicator Grenade .....	326	Mortar Shell—"Bouncing Betty" .....	309
Instandsetzungskraftwagen .....	74.7	Mortar, Spigot .....	102
Interceptor Truck .....	74.25	Motorcycle, Heavy (With Sidecar) .....	58
Jeep (Volkswagen) .....	59	Motorcycle Tractor .....	50
Jeep, Amphibious .....	58.1		
Kabelmesskraftwagen .....	74.15, 74.31		
Kampfpistole .....	201		

UNCLASSIFIED



Motor-Karrete .....	49	Radio Trailer .....	74.88
Motorspritze als Anhänger .....	74.76	Radio Truck .....	74.29, 74.44
Mountain Weapons .....	108.2, 118	Radschlepper .....	74.56, 74.57
Munitionstransport .....	17, 46	Railway Guns .....	100.1, 100.2
Nachrichtenkraftwagen ....	74.2, 74.3, 74.10, 74.11	Raketenpanzerbüchse .....	217
Nachrichtenwerkstattkraftwagen .....	74.48	Raketenpanzerbüchse Granate .....	357
"Nashorn" .....	34	Raketenwerfer .....	352.1
Navigations-Funkpeilanhänger .....	74.80, 74.90	Rampenwagen .....	74.98
Nebelhandgranate .....	322, 323	Range Finder Truck .....	74.36
Nebelpatrone für Kampfpistole .....	326	Raupenschlepper .....	57, 74.58, 74.59
Nebelwerfer .....	110.1, 110.2, 351, 352	Recoilless Guns .....	110, 119
Oerlikon 20 mm Machine Gun .....	251	Recoilless Gun Ammunition .....	313
Oven, Field .....	74.85, 74.86	Reconnaissance Cars .....	47, 60, 74.23
Oxygen Tank Truck .....	74.55	Reconnaissance Truck .....	74.27
Pak (Panzerabwehrkanone), 112.1, 113, 116, 117, 121, 123, 126, 127, 128,	130	Refrigeration Trailer .....	74.82
"Panther," Tank, Heavy .....	37	Rheinmetall 30 mm Aircraft Cannon .....	253
"Panther," S-P Antitank or Assault Gun....	38.1	"Rhinoceros" .....	34
"Panther," Hunting .....	38.1	Riegel Mine .....	304.2
Panzerbüchse .....	131, 134, 210, 211	Rifle .....	207
Panzerfaust .....	218	Rifle, Antitank .....	210, 211
Panzerfunkwagen .....	74.65, 74.66	Rifle, Automatic, Paratroop .....	209
Panzergranate Patrone .....	306.2, 307, 308	Rifle, Grenade-Launching .....	212
Panzerjäger ..	4, 11, 12, 15, 19, 21, 34, 38.1, 39, 40	Rifle, Semi-Automatic .....	208, 208.1, 208.2
Panzerkampfwagen .....	1, 2, 3, 6, 7, 8, 9, 10, 18, 22, 23, 24, 25, 30, 31, 32, 36, 37, 38, 38.2	Rifled Projectile .....	312
Panzerkampfwagen-Nachbildung .....	74.8	Rockets .....	(see Ammunition)
Panzerspähwagen, 8.1, 41, 42, 43, 74.61, 74.62, 74.63, 74.64		ROCKET LAUNCHERS	
Panzerwerfer .....	48.1	8.8 cm Raketenwerfer 42—"Püppchen" ..	352.1
Panzerwurfmine .....	304.4	8.8 cm Raketenpanzerbüchse 43 (8.8 cm R. PzB 43)—8.8 cm Raketenpanzer- büchse 54 (8.8 cm R. PzB 54) .....	217
Peilkraftwagen .....	74.31	15 cm Nebelwerfer 41 .....	352
Personenkraftwagen .....	59, 74.1, 74.2, 74.8, 74.9, 74.10, 74.16, 74.17, 74.60, 74.61	15 cm Panzerwerfer 42 (Sd. Kfz. N. W. 41)	48.1
Personenkraftwagen (Gepanzerte), 44, 45, 46, 74.60, 74.61		21 cm Nebelwerfer 42 .....	351
Photographic Truck .....	74.41	Rocket-Propelled Bomb .....	316
Pionierkraftwagen .....	74.37, 74.39	"Royal Tiger" Tank .....	38.2
Pistol, Signal and Grenade .....	201	Sabot Shell, H. E., 10.5 cm .....	311
Pistol, Automatic .....	202, 203	Sammlerkraftwagen .....	74.38
Pistole .....	202, 203	Sauerstoff-Kesselkraftwagen .....	74.55
Plow, Snow .....	74.101, 74.102, 74.103	Schallausnahme-Kraftwagen .....	74.34
Pontonwagen .....	74.96, 74.97	Schallauswerte-Kraftwagen .....	74.34
Pontoon Carrier .....	74.96, 74.97	Scheibenzuganhänger .....	74.100
Prime Movers ..	51, 52, 53, 54, 55, 56, 57, 74.58, 74.59	Scheinwerferkraftwagen ..	74.18, 74.19, 74.20, 74.39
Printing Press, Mobile .....	74.33	Schlauchkraftwagen .....	74.54
Projectile, Rifled, 28 cm .....	312	Schlauchtender .....	74.54
Projectile, Rocket .....	353, 354, 354.1, 355, 356	Schmeisser 9 mm Submachine Gun .....	206
Projector, Rocket .....	351, 352	Schneepflug .....	74.101, 74.102, 74.103
Projector, Rocket, Self-Propelled .....	48.1	Schuss Granate .....	319
Propaganda Grenade .....	318	Schwimmkraftwagen .....	58.1, 58.2
Protzkraftwagen .....	74.21, 74.22	Searchlight Truck .....	74.18, 74.19, 74.20
"Püppchen" .....	352.1	Self-Propelled Artillery .....	See Artillery
Radio Antenna Truck .....	74.30, 74.46	Shaving Stick Grenade .....	322
Radio Beacon Truck .....	74.31	Shell, H. E., 10.5 cm (Sabot Type) .....	311
Radio-Controlled Glider Bomb .....	315	Shell, Mortar, 8 cm "Bouncing Betty" .....	309
Radio Exchange Office Trailer .....	74.89	Sidecar for Motorcycle .....	74.67
Radio Interception Truck .....	74.44	Sights for Tanks and Armored Cars (Chart) ..	66
Radio Teletype Truck .....	74.43	SIGHTING EQUIPMENT	
		for 7.5 cm Howitzer, I. F. K. 18 .....	177
		for 10.5 cm Howitzer, I. F. H. 18 .....	177
		for 15 cm Howitzer, s. I. G. 33 .....	177

UNCLASSIFIED



for 7.5/5.5 cm Antitank Gun, Pak 41....	178
for 8.8 cm Antitank Gun, Pak 43/41....	178
for 7.5 cm (Stu. K. 40) S. P. on Pz. Kw. III Chassis F8, w/o rotary cupola .....	179
for 7.5 cm (Stu. K. 40) S. P. on Pz. Kw. III Chassis .....	179
for 7.5 cm Pak 40 mounted on Czech 38 (t) Tank .....	180
for 7.62 cm Pak 36 (r) S. P. on Czech 38 (t) Chassis .....	180
for 10.5 cm (Stu. H. 42) on Pz. Kw. III Chassis .....	181
for 15 cm s. F. H. 13 on Lorraine Chassis	181
Signal Cartridge .....	325
Signal Communication Truck .....	74.2, 74.3
Signal Repair Truck .....	74.48
Siren, Mobile .....	74.4
<b>SMALL ARMS</b>	
<b>Machine Guns</b>	
7.92 mm M. G. 15 .....	219
7.92 mm M. G. 17 .....	220
7.92 mm M. G. 34 .....	213
7.92 mm M. G. 34/41 .....	214
7.92 mm M. G. 37 (t) (Brno) .....	216
7.92 mm M. G. 42 .....	215
7.92 mm M. G. 81 .....	221
13 mm M. G. 131 .....	222
20 mm M. G. F. F. M. (Oerlikon).....	251
20 mm M. G. 151/20 (Mauser) .....	252
30 mm Mk. 101 (Rheinmetall) .....	253
30 mm Mk. 108 A-3 .....	255
<b>Pistols</b>	
9 mm Pistole '08 (Luger) .....	202
9 mm Pistole 38 (Walther) .....	203
27 mm Leuchtpistole (Walther) .....	201
<b>Rifles</b>	
7.92 mm Gewehr 33/40 .....	206.2
7.92 mm Karabiner 98K (Mauser-Kar. 98K) .....	207
7.92 mm Gewehr 41 (W) .....	208
7.92 mm Gewehr 41 (M) .....	208.1
7.92 mm Karabiner 43 .....	208.2
7.92 mm Fallschirmjäger Gewehr 42 (F. G. 42) .....	209
7.92 mm PzB 35 (p) .....	210
7.92 mm Panzerbuchse 39 (Pz. B. 39)...	211
7.92 mm Granatbuchse 39 (Gr. B. 39)...	212
<b>Submachine Guns</b>	
7.92 mm M. P. 43 .....	206.1
9 mm M. P. 18 <sup>1</sup> (Bergmann) .....	204
9 mm M. P. 34/1 (Bergmann) .....	205
9 mm M. P. 38 u. M. P. 40 (Schmeisser)	206
Smoke Grenade .....	322, 323, 326
Snow Plows .....	74.101, 74.102, 74.103
Solothurn 2 cm Antitank Gun .....	134
Sonderanhänger, 74.70, 74.71, 74.80, 74.81, 74.92, 74.93, 74.94	
Sound Detector Truck .....	74.34
Sound Plotting Truck .....	74.34
Sound Equipment Trailer .....	74.98

Spare Parts Truck .....	61
Spigot Mortar .....	102
Spiral Design Cartridge Case .....	314
Sprengmine .....	305, 304.8
Sprengpatrone für Kampfpistole .....	325
Sprengriegel .....	304.2
Stick Grenade .....	306, 306.1
Stielgranate .....	306, 306.1
Stielhandgranate .....	321
Sturmgeschütz .....	26, 27, 28, 29, 33
Sturmgewehr 44 .....	206.1
Submachine Guns .....	(see Small Arms)
Supporting Trailer .....	74.95
Surveying Trailer .....	74.90

**TANKS**

Pz. Kpfw. I Aus. A (Sd. Kfz. 101) ....	1
Pz. Kpfw. I Aus. B. (Sd. Kfz. 101) ....	2
Pz. Kpfw. I kl. Pz. Bef. Wg. (Sd. Kfz. 265) .....	3
Pz. Kpfw. II Aus. al, a2, a3, b, c.....	6
Pz. Kpfw. II Aus. A, B, C (Sd. Kfz. 121)	7
Pz. Kpfw. II Aus. D, E (Sd. Kfz. 121)...	8
Pz. Kpfw. II (F) (Sd. Kfz. 122) Flam- menwerfer .....	9
Pz. Kpfw. II Aus. F (Sd. Kfz. 121).....	10
Pz. Kpfw. 38 (t) .....	18
Pz. Kpfw. III Aus. A, B, C, D, E (Sd. Kfz. 141) .....	22
Pz. Kpfw. III Aus. F, G, H (Sd. Kfz. 141)	23
Pz. Kpfw. III Aus. J, K, (Sd. Kfz. 141)	24
Pz. Kpfw. III Aus. L, M, N, O (Sd. Kfz. 141) .....	25
Pz. Kpfw. III (Fl. W. 41) .....	30
Pz. Kpfw. IV Aus. A, B, C, D, E (Sd. Kfz. 161) .....	31
Pz. Kpfw. IV Aus. fl, F2, G, H, K (Sd. Kfz. 161) .....	32
Pz. Kpfw. V .....	36
Pz. Kpfw. "Panther" (7.5 cm Kw. K.— 42—L/70) (Sd. Kfz. 171) .....	37
Pz. Kpfw. "Tiger" (8.8 cm Kw. K. 36— L/56) (Sd. Kfz. 181) .....	38
Pz. Kpfw. "Tiger" (8.8 cm Kw. K. 43— L/71) (Sd. Kfz. 182) .....	38.2
Tanks (Chart) .....	64
Tank Destroyer .....	(see S. P. Artillery)
Tank, Dummy .....	74.8
Tank Guns .....	(see Artillery)
Tank, Heavy, Experimental .....	36
Tank, Heavy ("Panther") .....	37
Tank, Heavy ("Tiger") .....	38
Tank, Heavy (Redesigned "Tiger") .....	38.2
Tank, Light .....	1, 2, 3, 6, 7, 8, 9, 10, 18
Tank, Command, Light .....	3
Tank, Light, Flamethrower .....	9
Tank, Medium .....	22, 23, 24, 25, 30, 31, 32
Tank, Medium, Flamethrower .....	30
Tank Transporter .....	62, 74.99, 74.100
Tankspritze .....	74.53
Taper Bore Ammunition .....	306.2
Taper Bore Guns .....	123, 128, 131



Teigknetanhänger .....	74.79	Truck, Limber .....	74.22
Telephone Construction Truck .....	74.38	Truck, Machine Shop .....	61
Telephone Exchange Car .....	74.13	Truck, Maintenance .....	74.18, 74.21, 74.32
Telephone Exchange Trailer .....	74.88	Truck, Measurement Range and Equipment..	74.36
Telephone Exchange Truck .....	74.42	Truck, Meteorological .....	74.35, 74.45
Telephone Generator Truck .....	74.28	Truck, Motor, Heavy (Open) .....	74.46
Telephone Truck .....	74.17	Truck, Motor, Medium (Closed) .....	74.37
Teletype Connection Trailer .....	74.87	Truck, Motor, Medium (Open) .....	74.37
Teletype Truck .....	74.28, 74.42, 74.43	Truck, Oxygen Tank .....	74.55
Tellermine .....	301, 302, 303, 304, 304.1	Truck, Photographic .....	74.41
Tiefladeanhänger .....	74.99	Truck, Radio .....	74.29, 74.44
Tiefladeanhänger für Panzerkampfwagen,	62, 74.99, 74.100	Truck, Radio Antenna .....	74.30, 74.46
“Tiger” Heavy Tank .....	38	Truck, Radio Beacon .....	74.31
“Tiger” Redesigned Heavy Tank .....	38.2	Truck, Radio Interception .....	74.44
“Tiger,” King or Royal .....	38.2	Truck, Radio Teletype .....	74.43
Tractor, Heavy .....	74.57	Truck, Range Finder .....	74.36
Tractor, Light .....	74.56, 74.57	Truck, Reconnaissance .....	74.27
Tractor, Medium .....	74.56, 74.58	Truck, Searchlight, Light .....	74.18, 74.19, 74.20
Tractor, Motorcycle .....	50	Truck, Signal Communications .....	74.2, 74.3
Trailers .....	74.67 to 74.100 inc.	Truck, Signal Repair .....	74.48
Trailer for Airplane Wings .....	74.91	Truck, Sound Detector .....	74.34
Trailer for Assault Boat .....	74.94	Truck, Sound Plotting .....	74.34
Trailer, Airplane, Fuel Tank .....	74.85	Truck, Spare Parts .....	61
Trailer, Beacon .....	74.87, 74.89	Truck, Telephone .....	74.17
Trailer, Box Car .....	74.95, 74.96	Truck, Field Telephone Cable .....	74.26, 74.40
Trailer, Direction and Range Finder...	74.80, 74.90	Truck, Telephone Construction .....	74.38
Trailer, Doughkneading .....	74.79	Truck, Telephone Exchange .....	74.42
Trailer, Fuel Tank .....	74.84	Truck, Telephone Generator .....	74.28
Trailer, Generator, Light .....	74.86	Truck, Teletype .....	74.28, 74.42, 74.43
Trailer, Radio .....	74.88	Truck, Workshop .....	61, 74.49
Trailer, Radio Exchange Office .....	74.89	Truppenluftschutzkraftwagen .....	74.6
Trailer, Refrigeration, Large .....	74.82	Vehicles, Chemical Warfare .....	63
Trailer, Sound Equipment .....	74.98	Vehicle, Observation, Armored, 4-wheeled/ Tracked .....	48
Trailer, Supporting, Light .....	74.95	Vehicle, Reconnaissance, Wheeled/Tracked...	49
Trailer, Surveying, Heavy .....	74.90	Vehicle, Repair, Small .....	74.7
Trailer, Telephone Exchange .....	74.88	Vermessungsanhänger .....	74.90
Trailer, Teletype Connection .....	74.87	Vermessungsgerätkraftwagen .....	74.36
Trailer, Winch .....	74.100	Verstärkerkraftwagen .....	74.18, 74.32
Train, Workshop .....	61	Volkswagen .....	58.1, 59
Transporter, Tank .....	62, 74.99, 74.100	Vollgatter .....	74.98
Truck, Airplane Fuel Servicing .....	74.51	Waffenmeister-Gerätkraftwagen .....	74.37
Truck, ¼-ton, Amphibious .....	58.2	Waffenmeister-Werkstattkraftwagen .....	74.37
Truck, Antiaircraft Protection .....	74.6	Wagon, Bridging .....	74.98
Truck, Antiaircraft Survey Section .....	74.40	Walther 7.92 mm Rifle .....	208
Truck, Antiaircraft Unit .....	74.23, 74.41	Walther 9 mm Pistol, 38 .....	203
Truck, Cable Surveying .....	74.31	Walther 27 mm Signal Pistol .....	201
Truck, Charging .....	74.38	“Wasp” .....	14
Truck, Commercial, Light (Open) .....	74.24	Water Tank, Fire Fighting .....	74.53
Truck, Cross-Country (Open) ...	74.25, 74.26, 74.39	Werkstattzug .....	61, 74.49
Truck, Electrical Repair .....	61	Wetterkraftwagen .....	74.35, 74.45
Truck, Fire Extinguisher .....	74.52	Winch Trailer .....	74.100
Truck, Flash Ranging .....	74.33, 74.39	Workshop Train .....	61
Truck, Flash Ranging Station .....	74.35	Workshop Truck .....	61, 74.49
Truck, Fuel Servicing .....	74.50, 74.51	Wurfgranate .....	309, 356
Truck, Hose .....	74.54	Wurfgranate Patrone 326 Leuchtpistole .....	324
Truck, Interceptor .....	74.45	Wurfkörper Leuchtpistole .....	324
Truck, Light .....	74.25	Wurfkörper Spr. ....	354.1
		Zuckkraftwagen .....	51, 52, 53, 54, 55, 56

**CATALOG OF ENEMY MATERIEL**  
**UNCLASSIFIED**  
**INDEX TO WEAPONS BY CALIBER**

**GERMAN**

**7.92 mm**

Submachine Gun, M. P. 43 .....	206.1
Carbine, Gewehr 33/40 .....	206.2
Rifle, Kar. 98K .....	207
Semiautomatic Rifle, Gewehr 41 (W) .....	208
Semiautomatic Rifle, Gewehr 41 (M) .....	208.1
Semiautomatic Rifle, Kar. 43 .....	208.2
Automatic Rifle, Paratroop, F. G. 42 .....	209
Antitank Rifle, Pz. B. 35 (p) .....	210
Antitank Rifle, Pz. B. 39 .....	211
Grenade Launching Rifle, Gr. B. 39 .....	212
Dual-Purpose Machine Gun, M. G. 34 .....	213
Dual-Purpose Machine Gun, M. G. 34/41 .....	214
Dual-Purpose Machine Gun, M. G. 42 .....	215
Heavy Machine Gun, M. G. 37 (t) .....	216
Flexible Aircraft Machine Gun, M. G. 15 .....	219
Fixed Aircraft Machine Gun, M. G. 17 .....	220
Flexible Aircraft Machine Gun, M. G. 81 .....	221

**9 mm**

Automatic Pistol 08 .....	202
Automatic Pistol 38 .....	203
Submachine Gun, M. P. 18 <sup>1</sup> .....	204
Submachine Gun, M. P. 34/1 .....	205
Submachine Gun, M. P. 38 & 40 .....	206

**13 mm**

Fixed or Flexible Aircraft Machine Gun, M. G. 131 .....	222
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**20 mm**

A.A./A.T. Gun, 2 cm, Flak (Madsen) .....	132
A.A./A.T. Gun, 2 cm, Flakvierling 38 .....	133
A.T. Gun, 2 cm, s. Pz. B. (Solothurn s/8-100) .....	134
Antiaircraft Gun, 2 cm, Flak 30 .....	135
A.A./A.T. Gun, 2 cm, Flak 38 .....	136
A.A./A.T. Mountain Gun, 2 cm, Flak 38 Geb. .....	137
Aircraft Machine Gun, 20 mm, M. G. F. F. M. (Oerlikon) .....	251
Aircraft Machine Gun, 20 mm, M. G. 151/20 .....	252

**28/20 mm**

Tapered Bore Antitank Gun, Pz. B. 41 .....	131
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**27 mm**

Signal and Grenade Pistol, Leuchtpistole .....	201
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**37 mm**

Antitank Gun, 3.7 cm, Pak .....	130
Antiaircraft Gun, 3.7 cm, Flak 18 & 36 .....	130.1

**40 mm**

Antiaircraft Gun, 4 cm, Flak 28 (Bofors) .....	129
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**42/28 mm**

Tapered Bore Antitank Gun, 4.2/2.8 cm, Pak 41 .....	128
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**47 mm**

Antitank Gun, 4.7 cm, Pak (t) .....	127
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**50 mm**

Light Mortar, 5 cm, l. Gr. W. 36 .....	124
Antiaircraft Gun, 5 cm, Flak 41 .....	125
Antitank Gun, 5 cm, Pak 38 .....	126

**75/55 mm**

Tapered Bore Antitank Gun, 7.5/5.5 cm, Pak 41 .....	123
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**75 mm**

Antitank Gun, 7.5 cm, Pak 40 .....	117
Mountain Gun, 7.5 cm, Geb. G. 36 .....	118
Recoilless Airborne Gun, 7.5 cm, L. G. 40 .....	119
Light Field Gun, 7.5 cm, l. F. K. 18 .....	120
Antitank Gun, 7.5 cm, Pak 97/38 .....	121
Light Infantry Howitzer, 7.5 cm, l. I. G. 18 .....	122

**76.2 mm**

Antitank Gun, 7.62 cm, F. K. 39 (r) .....	115
Antitank Gun, 7.62 cm, Pak 36 (r) .....	116
Field Gun, 7.62 cm, F. K. 36 (r) .....	116.1

**81 mm**

Heavy Mortar, 8 cm, s. Gr. W. 34 .....	114
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**88 mm**

Multi-Purpose Gun, 8.8 cm, Flak 18, 36, 37 .....	111
Multi-Purpose Gun, 8.8 cm, Flak 41 .....	112
Antitank Gun, 8.8 cm, Pak 43 .....	112.1
Antitank Gun, 8.8 cm, Pak 43/41 .....	113

**105 mm**

Field Gun, 10 cm, K. 18 .....	107
Gun-Howitzer, 10.5 cm, l. F. H. 18 .....	108
Light Field Howitzer, 10.5 cm, l. F. H. 18 (M) .....	108.1
Mountain Howitzer, 10.5 cm, Geb. H 40 .....	108.2
Multi-Purpose Gun, 10.5 cm, Flak 38, 39 .....	109
Recoilless Gun, 10.5 cm, L. G. 40 .....	110
Smoke Mortar, 10 cm, Nebelwerfer 35 .....	110.1
Smoke Mortar, 10 cm, Nebelwerfer 40 .....	110.2

**120 mm**

Mortar, 12 cm, s. Gr. W. 42 .....	106
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**150 mm**

Heavy Infantry Howitzer, 15 cm, s. I. G. 33 .....	104
Heavy Field Gun, 15 cm, K. 16 .....	104.1
Medium Howitzer, 15 cm, s. F. H. 18 .....	105

**172.5 mm**

Field Gun on 21 cm Carriage, 17 cm K. mit Mrs. Laf. 18 .....	103
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**200 mm**

Spigot Mortar, 20 cm, leichte Ladungswerfer .....	102
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**210 mm**

Heavy Howitzer, 21 cm, Mrs. mit Mrs. Laf. 18 .....	101
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**280 mm**

Railway Gun, 28 cm, K 5 (E) .....	100.2
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# FULL-TRACKED ARMORED CAR

GERMAN 

Pz. Sp. Wg. II Luchs (Sd. Kfz. 123)—"Lynx"



This vehicle, one model of which is shown above, is called an armored car by the Germans. Production began in 1941 and continued through 1943. Models VK 1201, VK 1202, and VK 1303 were manufactured by Maschienfabrik Augsburg-Nurnberg.

The box-shaped superstructure is built in with the hull chassis. The thickness of armor of the Lynx is 30 mm on the front of the turret and hull and 20 mm on the turret and hull sides. One gasoline tank located inside on the right holds 83 gallons.

Track guards are provided well over the sprockets and idlers only. The turret roof slopes down towards the front and terminates in a cylindrical shape. The engine compartment is at the rear. Old models had smoke projectors, three on each side which were electrically operated. New model 1303 has no such provision.

Throat microphones were used for intra tank communication. Periscopes and an optical sighting device are provided in the turret.

The suspension consists of torsion bar straddle-mounted Christie type bogie wheels with center guide steel track, front drive sprocket and rear idler.

The first two models were equipped with *Dreislufenlenkung*, three-step clutch type steering, while Model VK 1303 has the same system as the Panther—*Einradien-Lenkgetriebe*, one radius steering. Evolution of this vehicle stems from development of the Pz. Kpfw. II, Models D and E. It is believed that this vehicle served its main purpose in perfecting one radius steering.

The transmission is synchromesh selective and adapts itself to the steering mechanism. There are seven speeds forward and one reverse; synchromesh cones are provided for all gear ratios except low and reverse.

## SPECIFICATIONS

Weight .....	12.9 tons
Length (overall) .....	15 ft., 2 ins.
Width (overall) .....	8 ft., 1½ ins.
Height (overall) .....	7 ft., 3 ins.
Ground clearance .....	16 ins.
Tread centers .....	6 ft., 10 ins.
Ground contact .....	7 ft., 3 ins.
Width of track .....	14 ins.
Pitch of track .....	
Track links .....	67
Fording depth .....	4 ft., 7 ins.
Theoretical radius of action	
Roads .....	155 miles
Cross-country .....	93 miles
Speed	
Roads .....	50 m.p.h.
Cross-Country .....	25-30 m.p.h.
Armor	
Front .....	30 mm
Sides .....	20 mm
Armament.....	One 2 cm Kw. K. 38 and one 7.92 mm M. G. 34
Ammunition (Rds.)....	400 (2 cm); 1,200 (M. G. 34)
Engine .....	178 British B.H.P.
Transmission.....	Synchromesh, 7 speeds forward; 1 reverse
Steering.....	One radius double drive epicyclic
Crew .....	4

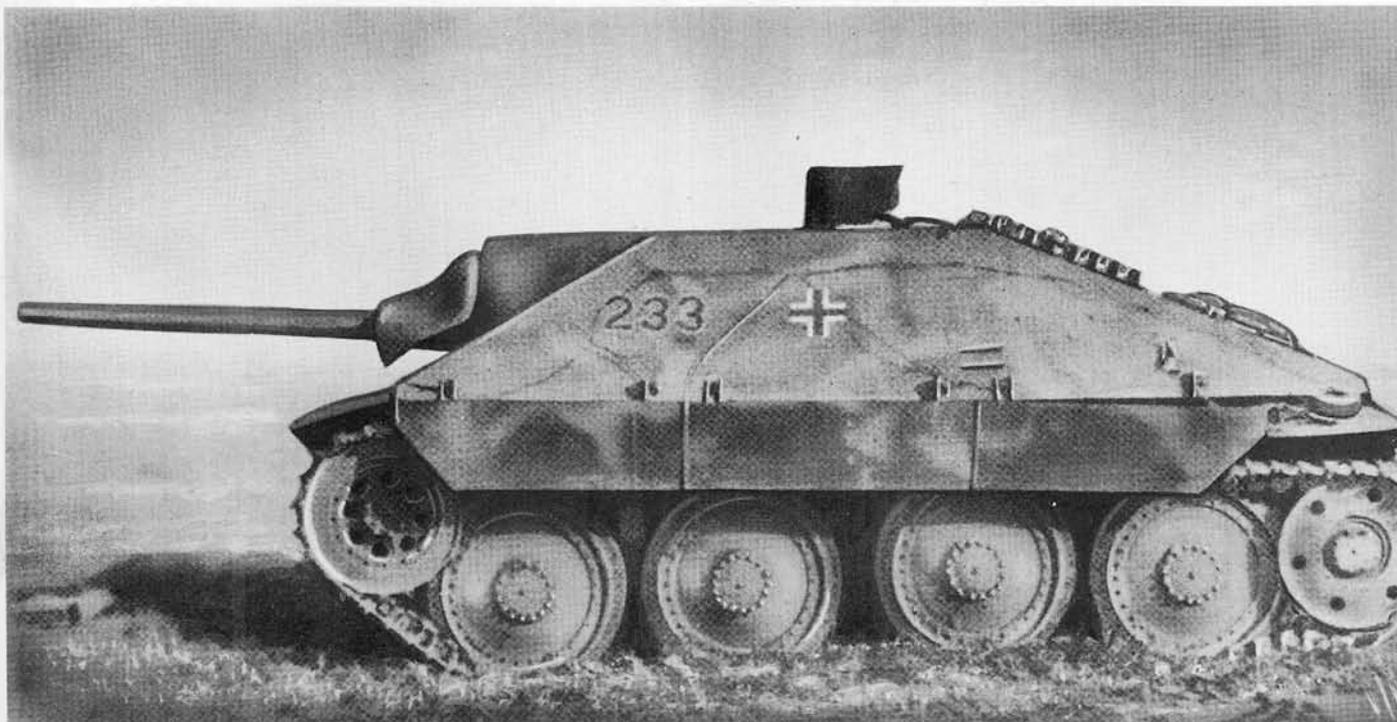
# SELF PROPELLED ANTITANK GUN

GERMAN



Pz. Jäg. 38 für 7.5 cm Pak 39 (L/48)

# UNCLASSIFIED



The chassis of this self-propelled antitank gun is a modified version of the chassis for the Czech Model 38 tank. (See page 18.) The lower nose of the hull is 60 mm thick set at 40° and interlocked with the sides and upper nose plate. The upper nose plate is 60 mm thick. It is positioned at an angle of 60° and extends to the top of the superstructure. Brinell hardness is approximately 240. All-welded construction is employed except in attaching roof and superstructure rear plates which are bolted on for reasons of accessibility. The two latter plates are 8 mm horizontal and 8 mm at 70° respectively. The side superstructure plates are 20 mm set at 40° with a brinell hardness of approximately 195. The hull floor plate is 10 mm. Side apron plates of 5 mm give added protection against high explosive shell fire.

The 7.5 cm Pak 39 (L/48), mounted 15 inches to the right of the hull center line, has an improved type of recoil mechanism. This allows the muzzle brake to be discarded. Elevation is from -6° to +10°. Traverse overall is 16° (-11° right -5° left). A new type machine gun mount is built in the roof. The machine gun is fitted with a periscopic sight and extended trigger, and may be traversed in any direction and fired from within. A Sfl ZF la sight and an episcopes is provided for the main gunner. The sight projects through the roof. The loader has an episcopes fitted in the rear portion of his hatch fixed at 6 o'clock.

The steering mechanism is the usual controlled differential type which allows curves of 29½ foot radius without "steering losses." Curves of smaller radius are obtained by using the track brakes of the additional clutch brake system also provided.

There are two fuel tanks with a total capacity of 85 gallons. Ground pressure is 11.9 pounds per square inch. The power to weight ratio is approximately 9 HP per ton. The Fu 5 radio is fitted. Commanders equipments carry an additional Fu 8.

## SPECIFICATIONS

Weight in action .....	17.6 tons
Length (overall excluding gun)....	15 ft., 11 ins.
Width (overall) .....	8 ft., 7½ ins.
Height (overall) .....	6 ft., 10½ ins.
Ground clearance .....	1 ft., 4¾ ins.
Tread centers .....	6 ft., 10½ ins.
Ground contact .....	8 ft., 11½ ins.
Width of track .....	1 ft., 1¾ ins.
Pitch of track .....	4.1 ins.
Track links .....	96
Fording depth .....	2 ft., 11 ins.
Theoretical radius of action	
Roads .....	100 miles
Cross-country .....	50 miles
Speed	
Roads .....	16 m.p.h.
Cross-country .....	9 m.p.h.
Armor	
Hull nose plate (lower) .....	60 mm at 40°
Hull side plate .....	20 mm undercut 15°
Hull tail plate .....	20 mm at 15°
Glacis plate (upper nose) .....	60 mm at 60°
Superstructure side plates.....	20 mm at 40°
Superstructure rear plate.....	8 mm at 70°
Gun mantlet .....	30 mm rounded
Armament.....	7.5 cm Pak 39 (L/48); one M. G. 34; one M. G. 44.
Ammunition (Rds.).....	7.5 cm gun, 41 rds.; M. G. 34, 600 rds.;* M. G. 44, 180 rds.
Engine.....	Czech EPA (Type TZJ), 6-cyl., inline, 158 hp. at 2,600 r.p.m.
Transmission.....	5 speeds forward, 1 reverse
Steering .....	Epicyclic, clutch brake type
Crew .....	4

\*In addition to the ammunition mentioned above, 12 rounds of signal ammunition, 20 egg hand grenades, 24 grenades, and 6 smoke candles are carried.

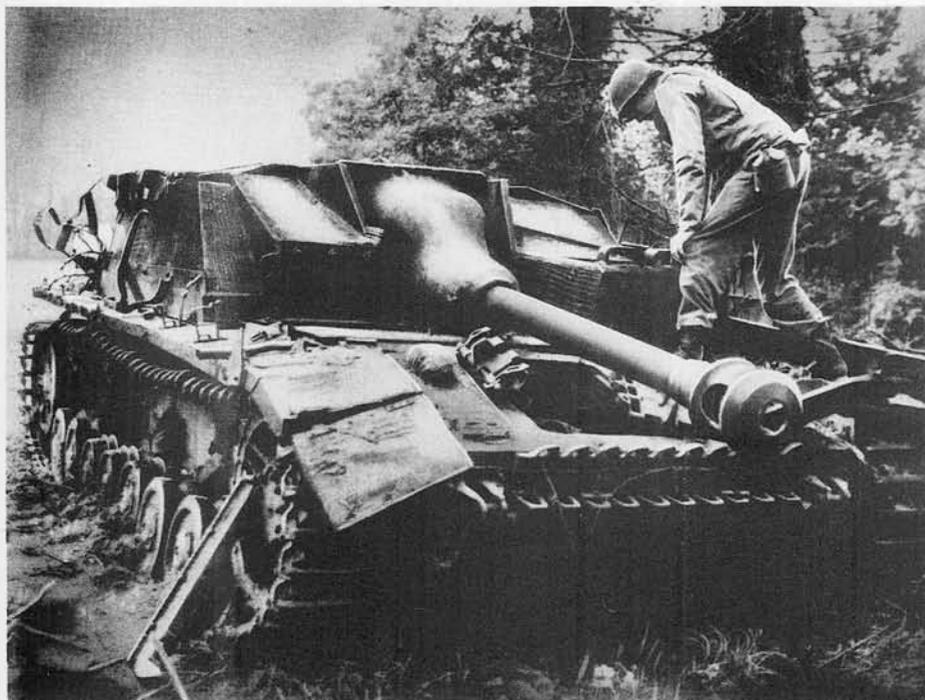
# SELF-PROPELLED ASSAULT GUN

# UNCLASSIFIED

GERMAN



## Stu. G. IV für 7.5 cm Stu. K. 40 (L/48)



This equipment, consisting of the 7.5 cm Stu. K. 40 (L/48) mounted on the Pz. Kpfw. IV chassis, represents a further development in German assault guns. The design follows that of its predecessor, the Stu. G. 40, mounted on the Pz. Kpfw. III chassis, with the exception that in the later equipment the usual keystone gun mantlet has been replaced by a cast steel mantlet with curved surfaces to offer the maximum projectile deflection. The mantlet, 130 mm thick, houses the buffer and recuperator.

Armor protection has been increased by the addition of slabs of concrete six inches thick attached to the front plate and the roof over the driver's compartment by means of wire. The rest of the armor is the same as that provided for the Pz. Kpfw. IV.

The division of chassis space follows the usual design for this type of vehicle, with the driver's compartment in the front, the fighting compartment in the center, and the engine compartment in the rear.

The gun, the Stu. K. 40 (L/48), with muzzle brake, is a lengthened version of the Stu. K. 40 (L/43) and is similar in design and performance to the Kw. K. 40 (L/48).

In the inset above is shown the 7.5 cm Stu. K. 40 (L/48) mounted on the Pz. Kpfw. III chassis which also has the improved type of rounded gun mantlet.

## SPECIFICATIONS

Weight .....	
Length .....	19 ft., 4 ins.
Width .....	9 ft., 7 ins.
Height .....	
Ground clearance .....	15 ins.
Tread centers .....	7 ft., 11 ins.
Ground contact .....	11 ft., 6 ins.
Width of track .....	15 ins.
Pitch of track .....	4¾ ins.
Track links .....	98
Fording depth .....	3 ft.
Theoretical radius of action	
Roads .....	130 miles
Cross-country .....	80 miles
Speed .....	
Roads .....	28 m.p.h.
Cross-country .....	15 m.p.h.
Armor	
Front nose plate .....	75 mm
Sides .....	30 mm
Armament .....	7.5 cm Stu. K. 40 (L/48)
Ammunitions (Rds.) .....	
Engine .....	Maybach HL 120 TRM, 320 hp.
Transmission.....	Synchromesh—6 speeds forward, 1 reverse.
Steering .....	Epicyclic, clutch brake
Crew .....	5

# UNCLASSIFIED

OFFICE CHIEF OF ORDNANCE

RESTRICTED

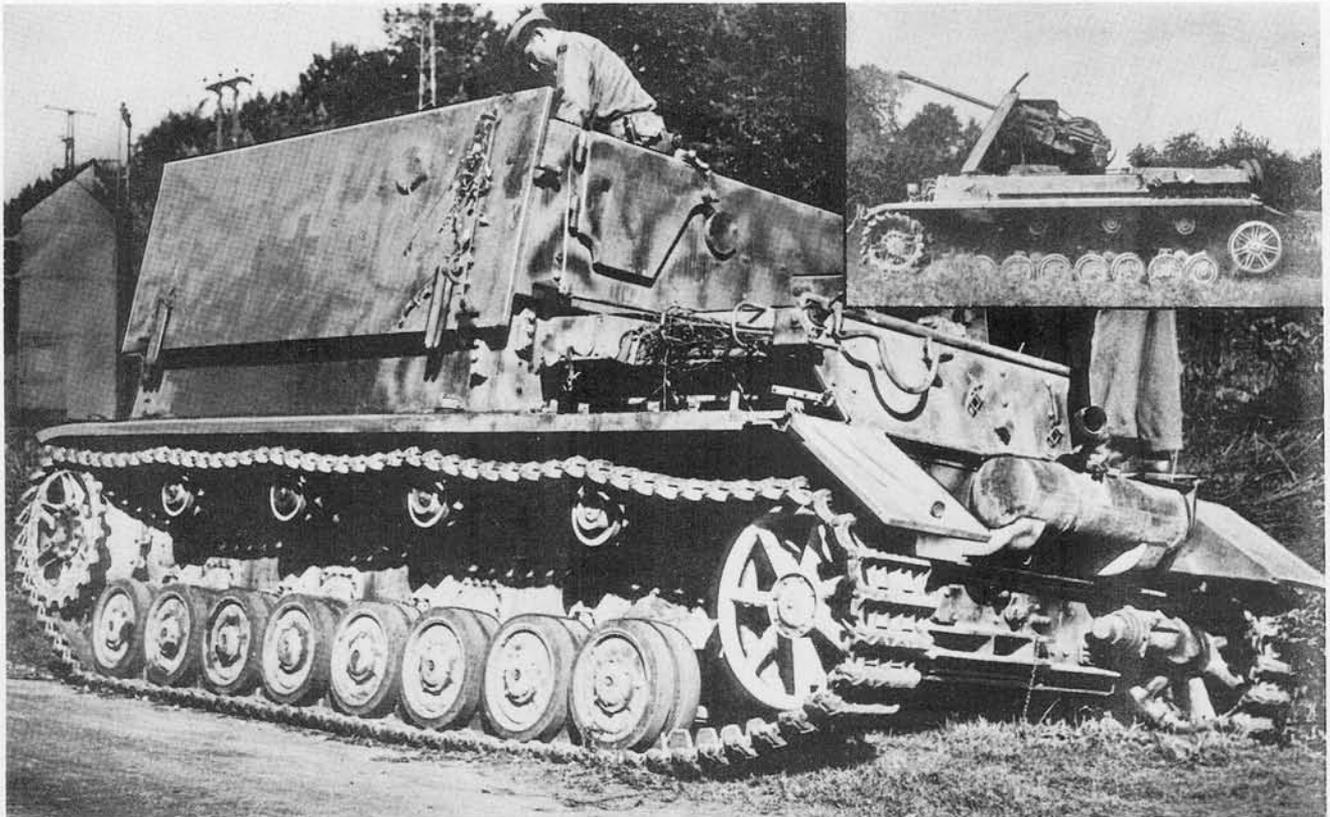
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3201

# SELF-PROPELLED ANTI-AIRCRAFT GUN

Pz. Kpfw. IV (3.7 cm Flak 43)

GERMAN 



This equipment consists of the standard Pz. Kpfw. IV chassis adapted to mount the 3.7 cm Flak 43. It is essentially an anti-aircraft weapon, although the gun may be depressed for use against ground targets.

The superstructure is especially designed for the second purpose. The side and rear walls of the structure are two spaced 15 mm armor plates nine feet long, eight feet, eight inches wide, and four feet high. The sides can be pushed outwards and downwards to a horizontal position to permit fire against ground targets or to extend the area of the loading platform.

The 3.7 cm Flak 43, which has a 360° traverse and 90° elevation, is centrally mounted on a pedestal. It is hung from a single trunnion on the right through which passes the feed and ejection aperture. The monobloc barrel is fitted with a combination muzzle brake and flash hider. Both elevating and traversing handwheels are located to the right of the gun. A hydromatic-spring buffer with variable recoil is situated below the barrel, and two return springs lie side by side above the barrel. A tri-sectional gun shield sloped at 30° to the vertical is provided. The center section is 9 mm thick and two side sections each 6 mm thick. The height of the shield, measured up the slope, is four feet, 3½ inches. The gun is fed horizontally from the left by clips of eight rounds each which are placed on a fixed loading tray.

The muzzle velocity of the 3.7 cm Flak 43 is reported as 2,750 f/s, and its theoretical rate of fire 250 rounds per minute. The ammunition issue laid down per equipment is reported as 1,600 rounds, 1,280 high explosive and 320 armor piercing.

An official German document states that the standard sight for this gun will be the Schwebedorvisor.

## SPECIFICATIONS

Weight .....	26 tons (est.)
Length .....	19 ft., 4 ins.
Width .....	9 ft., 7 ins.
Height .....	
Ground clearance .....	15 ins.
Tread centers .....	7 ft., 11 ins.
Ground contact .....	11 ft., 6 ins.
Width of track .....	15 ins.
Pitch of track .....	4¼ ins.
Track links .....	98
Fording depth .....	3 ft.
Theoretical radius of action	
Roads .....	130 miles
Cross-country .....	80 miles
Speed	
Roads .....	25 m.p.h.
Cross-country .....	15 m.p.h.
Armor	
Front plate .....	50 mm
Sides .....	30 mm
Armament .....	3.7 cm Flak 43
Ammunition (Rds.) .....	1,600
Engine.....	Maybach HL 120 TRM, 320 hp.
Transmission.....	Synchromesh—6 speeds forward, 1 reverse.
Steering .....	Epicyclic, clutch brake
Crew .....	7

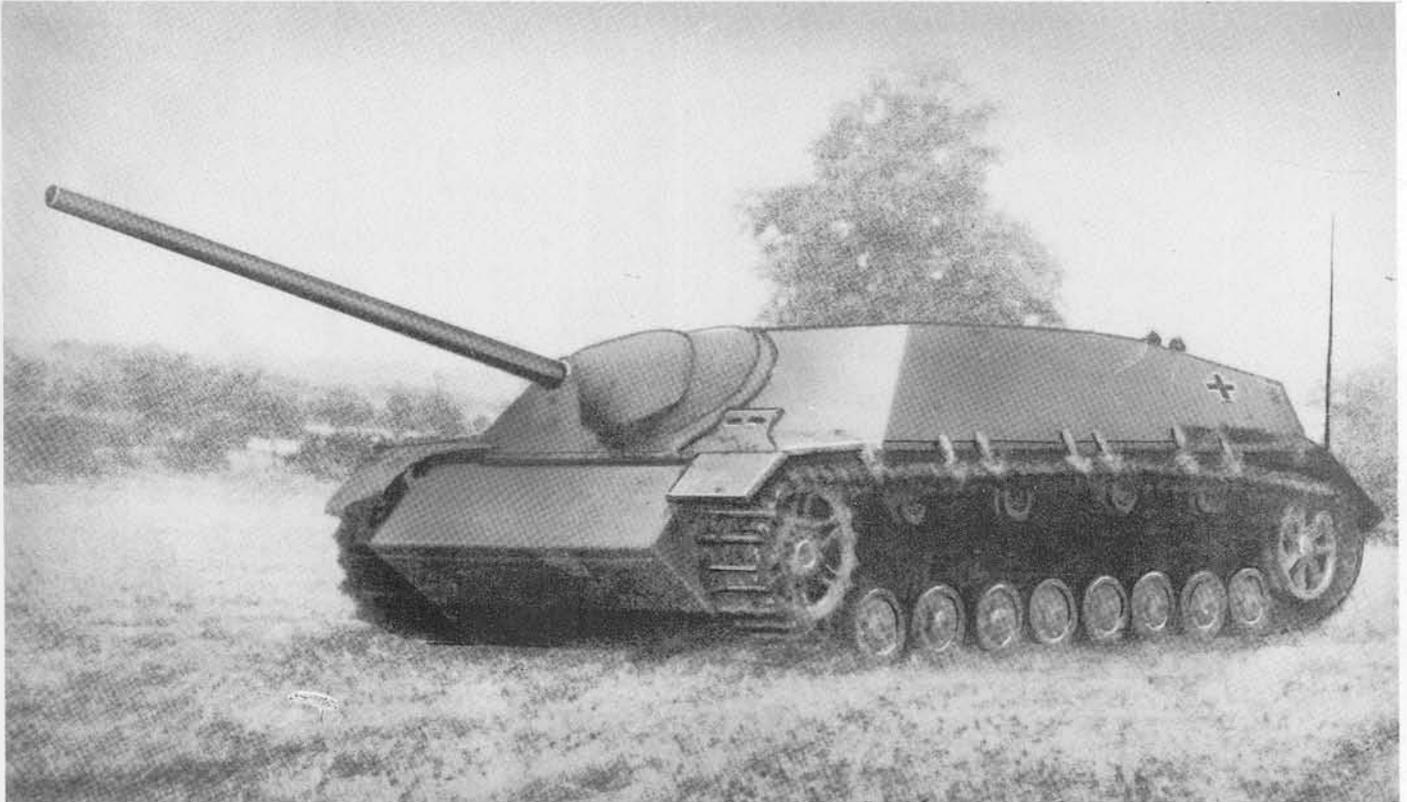
# SELF PROPELLED ANTITANK GUN

UNCLASSIFIED

GERMAN



Pz. Jäg. IV für 7.5 cm Stu. K. 42 (L/70) Sd. Kfz. 162



This self-propelled antitank gun consists of the 7.5 cm Stu. K. 42 (L/70) mounted on a modified Pz. Kpfw. IV chassis.

The vehicle is of all-welded construction except that the fighting compartment roof is bolted. The upper and lower nose plates are interlocked with each other and with the hull sides. The upper nose plate, set at an angle of 45° to the vertical, has a thickness of 80 mm. The lower nose plate, set at an angle of 55° to the vertical, has a thickness of 45 mm. The superstructure front plate is interlocked with the superstructure side plates and additional strength is provided by two brackets which are welded into recesses in the hull sides and bolted to plates welded to the superstructure front.

The crew compartment occupies the front three-quarters of the vehicle and accommodates a crew of five. The remaining quarter houses the engine which is the standard Maybach HL 120 as fitted in the Pz. Kpfw. IV.

The gun, which has no muzzle brake, is ballistically similar to the 7.5 cm Kw. K. 42 as mounted on the Pz. Kpfw. Panther. It is located eight inches to the right of the hull center line. The hydraulic buffer and hydropneumatic recuperator are mounted above the piece, the buffer being on the left. The recoil gear is protected by a cast mantlet with curved outer surfaces. Stowage is provided for 55 rounds of ammunition, all except four being stowed horizontally.

A port is provided in the superstructure front plate to the right of the 7.5 cm gun, behind which is a small machine gun ball mounting, five inches in diameter.

## SPECIFICATIONS

Weight (approx.) .....	28 tons
Length .....	19 ft., 9½ ins.
Width .....	10 ft., 4¾ ins.
Height .....	6 ft., 5 ins.
Ground clearance .....	15 ins.
Tread centers .....	8 ft., 1¼ ins.
Ground contact .....	11 ft., 6 ins.
Width of track .....	15 ins.
Pitch of track .....	4¾ ins.
Track links .....	98
Fording depth .....	3 ft.
Theoretical radius of action	
Roads .....	130 miles
Cross-country .....	80 miles
Speed	
Roads .....	28 m.p.h.
Cross-country .....	15 m.p.h.
Armor	
Superstructure, front....	80 mm at 50° to vertical
Superstructure, sides (fighting compartment) .....	40 mm at 30°
Gun Mantlet .....	150 mm (rounded)
Upper nose plate .....	80 mm at 45°
Lower Nose plate .....	45 mm at 55°
Hull sides .....	30 mm (vertical)
Armament.....	7.5 cm Stu. K. 42 (L/70); one M. G.
Ammunition (Rds.) .....	55
Engine .....	Maybach HL 120 TRM, 320 hp.
Transmission.....	Synchromesh—6 speeds forward, 1 reverse
Steering .....	Epicyclic, clutch brake
Crew .....	5

# ANTIAIRCRAFT GUN ON MEDIUM TANK CHASSIS

GERMAN



Pz. Kpfw. IV für 2 cm Flakvierling 38

# UNCLASSIFIED



This equipment consists of the four-barrelled 2 cm (.79 in.) anti-aircraft gun mounted on the Pz. Kpfw. IV chassis. The gun has been mounted in an open topped, nine-sided turret. Elevation is from 10° to 90° and traverse is 360°.

The gun is the normal 2 cm Flakvierling 38 with the triangular base removed. Two guns are mounted on either side of the cradle. The guns are fired by a set of foot pedals; each pedal operates the trigger mechanism of the two diametrically opposite guns. The weapon is traversed and elevated manually by the gunner who also aims and fires it.

The 2 cm Flakvierling 38 is supported by two four-inch I-beams which are located 15 inches below the normal tank turret ring. The I-beams are in the center below the turret opening and extend across the width of the tank chassis.

There is no traversing rack on the turret ring. A rod from the gun upper carriage supports the gunner's seat and is fastened by a U-bolt to the turret to form a connection between the gun mount and the turret armor. At the front of each side of the upper carriage is a collapsible rod which also can be fastened to the turret armor. In this manner, the gun mount and turret traverse together.

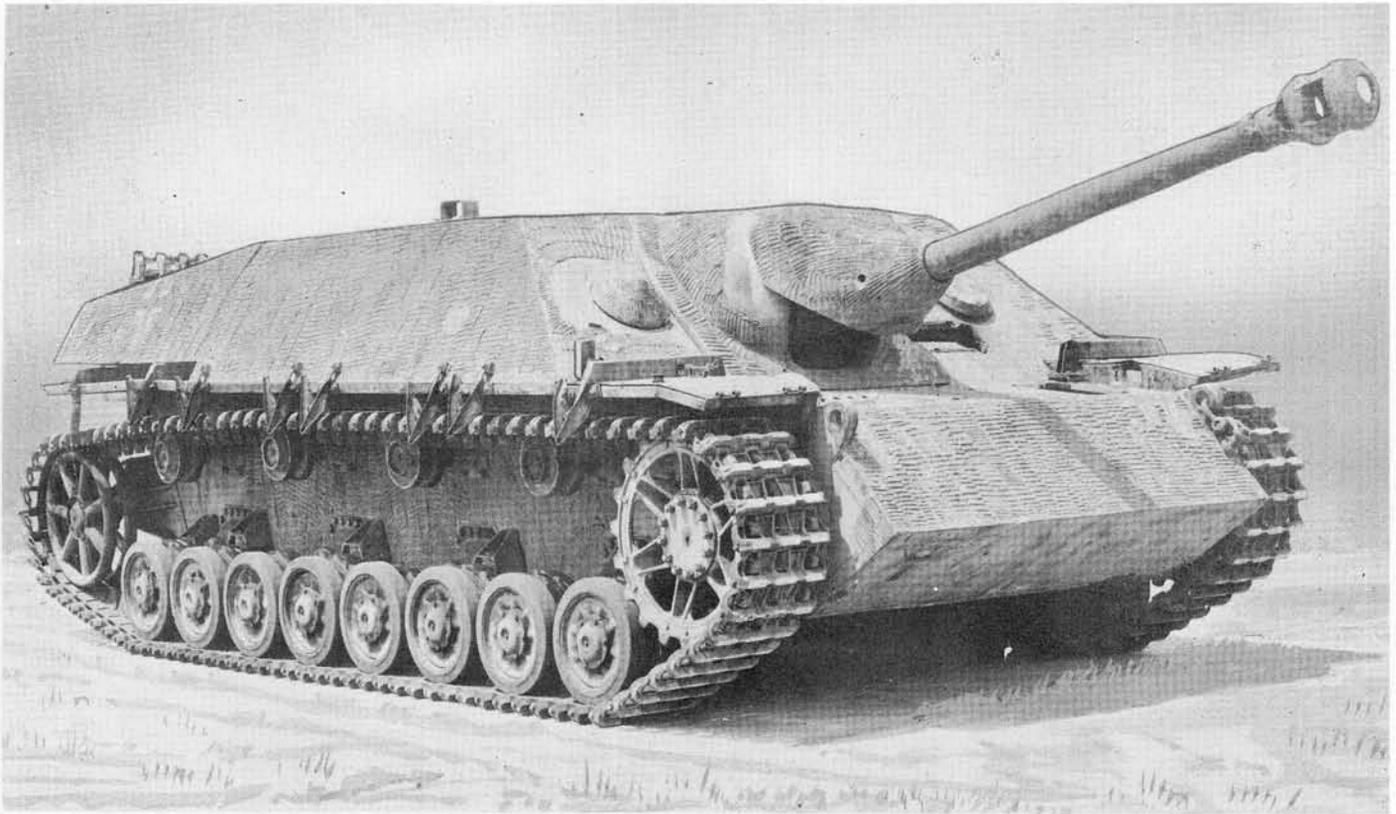
The turret is 43 inches high, 6 feet, 6 inches wide, and 8 feet long. The armor plate is 15 mm thick. Each side of the turret is composed of two plates of equal dimensions welded together. The top plates are sloped at an angle of approximately 30 degrees and the bottom plates are undercut at the same angle.

## SPECIFICATIONS

Weight .....	26 tons (estimated)
Length .....	19 ft., 4 ins.
Width .....	9 ft., 8 ins.
Height .....	9 ft.
Ground clearance .....	15 ins.
Tread centers .....	7 ft., 10 <sup>7</sup> / <sub>8</sub> ins.
Ground contact .....	11 ft., 6 ins.
Width of track .....	15 ins.
Pitch of track .....	4 <sup>3</sup> / <sub>4</sub> ins.
Track links .....	98
Fording depth .....	3 ft.
Theoretical radius of action:	
Roads .....	130 miles
Cross country .....	80 miles
Speed:	
Roads .....	25 m.p.h.
Cross country .....	15 m.p.h.
Armor:	
Front plate of superstructure—	85 mm at 10° to vertical
Sides of superstructure—	30 mm
Armanent .....	2 cm Flakvierling 38
Ammunition H.E. Shell, tracer; H.E.—Incendiary; A.P. shell, tracer.	
Rounds .....	16 clips in turret (20 rds in each) 15 boxes in tank.
Engine .....	Maybach HL 120 TRM, 320 hp.
Transmission—	
Synchronesh—	5 speeds forward, 1 reverse
Steering .....	Epicyclic, clutch brake
Crew .....	5

# SELF-PROPELLED ANTITANK GUN

Pz. Jäg. IV für 7.5 cm Pak 39 (L/48)



This equipment consists of a Pz. Jäg. IV chassis upon which is mounted a 7.5 cm Pak 39 (L/48). The chassis is a modified Pz. Kpfw. IV, designed to mount either the 7.5 cm Pak 39 (L/48) or the 7.5 cm Stu. K. 42 (L/70).

The chassis has upper and lower nose plates sloped at 45° and 57° respectively. The all-welded construction of the hull is retained, and this structure is strengthened by limited interlocking of the front plates. The main armament is mounted in the sloping front plate of a squat all-welded superstructure, and is offset 8 inches to the off-side of the center line. The mounting is of gimbal type, and is protected externally by a heavy casting. The superstructure is bolted through angle sections to the lower hull. The sloping sides of the superstructure are extended beyond the vertical hull sides over the width of the tracks, and the rear edges of the floor of the sponsons so formed are locked upon the hull angle section. The rear superstructure and engine cover plates are similar to those of the Pz. Kpfw. IV. Spaced plates of 5 mm armor are bolted to brackets welded to the basic side plates of the rear superstructure sides. The armor is treated with Zimmerit. Mechanically, the vehicle is similar to the Pz. Kpfw. IV, but with small modifications. The final spur gear carries 41 teeth instead of the 40 on the tank. The final drive sprockets are of cast steel with webs of flat section instead of the rounded spokes of the tank sprockets.

## SPECIFICATIONS

Weight .....	
Length .....	19 ft., 4 ins.
Width .....	9 ft., 7 ins.
Height .....	
Ground clearance .....	15 ins.
Tread centers .....	7 ft., 11 ins.
Ground contact .....	11 ft., 6 ins.
Width of track .....	15 ins.
Pitch of track .....	4¾ ins.
Track links .....	98
Fording depth .....	3 ft.
Theoretical radius of action:	
Roads .....	130 miles
Cross country .....	80 miles
Speed:	
Roads .....	28 m.p.h.
Cross country .....	15 m.p.h.
Armor:	
Front plate of superstructure—	
60 mm at 50° angle	
Sides of superstructure—	
30 mm at 30° angle	
Armament .....	7.5 cm Pak 39 (L/48)
Ammunition (Rds.)	
Engine .....	Maybach HL 120 TRM, 320 hp.
Transmission	
Synchronesh—6 speeds forward, 1 reverse	
Steering .....	Epicyclic, clutch brake
Crew .....	5

# S. P. ANTITANK OR ASSAULT GUN (Gun Motor Carriage)

GERMAN



Pz. Jäg. "Panther" für 8.8 cm Pak 43/3 (Sd. Kfz. 173)



The standard Model A Panther chassis is used for building this vehicle. The vehicle embodies all of the engineering principles and methods of design accumulated by the Germans up to the time of its production, and is quite effective as an antitank or assault weapon.

The hull and fighting compartment are of all welded construction. The fighting compartment is 45 inches in height at the front and 57 inches at the rear. The length of the roof is 93 inches and the width 72 inches.

The steering mechanism, "one radius steering," is new. It is unnecessary to engage the transmission in order to turn or traverse the tank through 360 degrees. The use of either steering lever will traverse the tank in a small radius or on the spot. The annulus gear of each of the two epicyclics is driven by the transmission output shaft and is subject to seven speeds forward and one reverse. The sun gears are held stationary on the straightaway by steering brakes. In making a turn, the inside sun gear is released to rotate backward for a sharper turn, the inside sun gear is driven by engagement through a steering clutch with the engine.

The vehicle is armed with the 8.8 cm Pak 43/3 gun in a massive cast steel mantlet which is flexibly mounted in a cast steel ring welded to the front plate. Traverse is 11 degrees. Stowage is provided for 29 rounds of each of two types of ammunition. One M. G. 34 is ball mounted in the front plate to the right. Driver's vision is by periscope. Fuel capacity is 193 gallons, of which 34 gallons are held in auxiliary.

## SPECIFICATIONS

Weight .....	45 tons
Length (overall) Including gun .....	28 ft., 4 ins.
Excluding gun .....	22 ft., 8 ins.
Width (overall) .....	10 ft., 10 ins.
Height (overall) .....	9 ft., 10 ins.
Ground clearance .....	21 ins.
Tread centers .....	8 ft., 7½ ins.
Ground contact .....	12 ft., 9½ ins.
Width of track .....	26 ins.
Pitch of track .....	6 ins.
Track links .....	67
Fording depth .....	67 ins.
Theoretical radius of action	
Roads .....	124 miles
Cross-country .....	62 miles
Speed	
Roads .....	34 m.p.h.
Cross-country .....	15-18 m.p.h.
Armor	
Front plate .....	80 mm at 55° to the vertical
Sides .....	45 mm at 30° to the vertical
Rear .....	40 mm at 30° to the vertical
Top .....	17 mm at 85° to the vertical
Armament.....	8.8 cm Pak 43/3 (MV 3,280 i/s. A.P.C.B.C.), M. G. 34
Ammunition (Rds.) .....	58 (8.8 cm)
Engine.....	Maybach HL 230 P 30 V12 gasoline
Transmission.....	Synchromesh 7 speeds forward, 1 reverse
Steering.....	One radius double drive epicyclic
Crew .....	5

# HEAVY TANK ("KING TIGER" or "ROYAL TIGER")

GERMAN 

Pz. Kpfw. VI (B) "Tiger" für 88 cm Kw. K. 43 L/71 (Sd. Kfz. 182)



This heavy tank designed for defensive warfare or for penetrating strong lines of defense made its combat appearance in 1944. It is distinguished by heavy frontal armor and by the employment of the heaviest German gun to be used in a turret with 360° traverse—the 8.8 cm Kw. K. 43 (L/71). This gun has a muzzle velocity of 3,280 f/s, and firing an A.P.C.B.C. projectile weighing 22.4 pounds against 30° homogenous plate has a reported penetration of 6.3 inches at 1,000 yards.

The hull and superstructure are of single-skin welded construction with interlocked joints. The hull front is formed of a single sloping plate 150 mm thick, and a lower nose plate 100 mm thick. Each of these plates is set at an angle of 50° from the vertical, resembling in design the Panther rather than the earlier Tiger. The pannier side plates, 80 mm thick, are set at a 25° angle and also resemble those of the Panther. The turret is located sufficiently back of the angle of deflection to be clear of direct hits on the front plate. The rounded front is 180 mm thick.

At the rear of the vehicle is a Maybach 60°, V-12, gasoline engine of 600 horsepower. The transmission, steering, and final drive are similar to those of the Tiger E. The suspension is made up of nine torsion bars on each side to carry the tank on steel tired road wheels. Five of these overlap the four internal ones. Every alternate track link has two ground contact bars.

This tank mounts the 8.8 cm Kw. K. 43 (L/71), two M. G. 34's, an anti-aircraft machine gun, and a smoke projector. A commander's version of this tank was also manufactured.

The transport trailer for this tank is described on page 62.2.

## SPECIFICATIONS

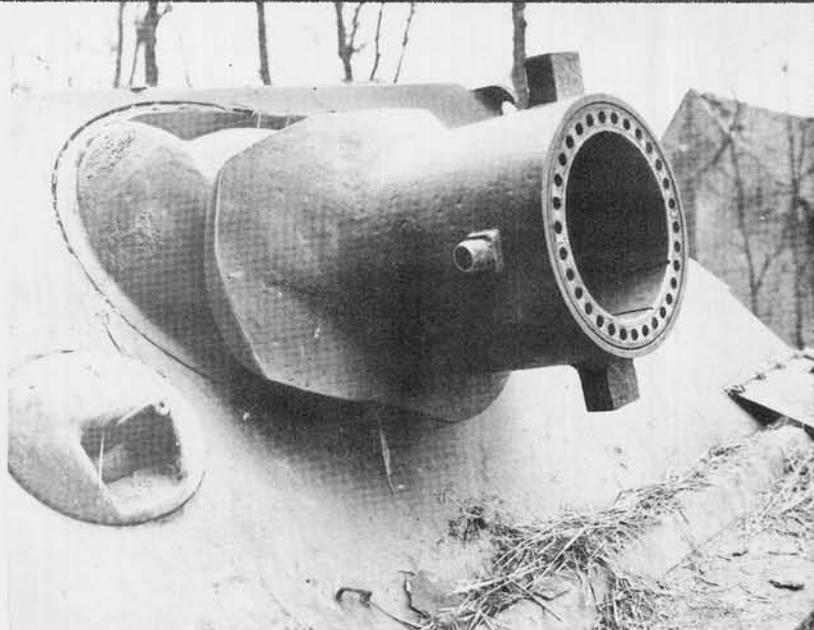
Weight .....	75 tons
Length .....	23 ft., 10 ins.
Width (overall) .....	12 ft., 7 ins.
Height .....	10 ft., 2 ins.
Ground clearance .....	1 ft., 5 ins.
Tread centers .....	9 ft., 4 ins.
Ground contact .....	
Width of track .....	32.5 ins.
Pitch of track .....	5.9 ins.
Track links .....	90
Fording depth .....	69 ins.
Theoretical radius of action	
Roads .....	106
Cross-country .....	
Speed	
Roads .....	23.6 m.p.h.
Cross-country .....	10 m.p.h.
Armor	
Front glacis plate .....	150 mm
Sides .....	80 mm
Armament.....	(1) 8.8 cm Kw. K. 43; (2) 7.92 mm M.G.'s; (1) A.A. M.G.; (1) smoke projector
Ammunition (Rds.)—88 mm .....	80
Engine .....	Maybach HL 230
Transmission .....	8 forward speeds; 4 reverse
Steering.....	Controlled differential, hydraulically operated
Crew .....	5

# 38 cm ROCKET PROJECTOR ON TIGER E CHASSIS

GERMAN



Sturmmörser



Top: General view of Sturmmörser. Above: The Raketenwerfer 61 as mounted on vehicle. Right: The projector, showing method of rifling.

**A DESCRIPTION OF THIS EQUIPMENT APPEARS ON THE FOLLOWING PAGE.**

# 38 cm ROCKET PROJECTOR ON TIGER E CHASSIS

GERMAN



## Sturmmörser

This equipment consists of a 38 cm rocket projector (Raketen Werfer 61) mounted on a modified Model E Tiger I chassis (see p. 38). A heavy rectangular superstructure of the type used on the German self-propelled guns replaces the normal superstructure and turret of the Model E. The rocket projector is mounted in the front plate of the superstructure, offset to the right of center. The superstructure is made of rolled armor plates and is of welded construction with the side plates interlocked with the front and rear plates. A heavy strip of armor is used to reinforce the joint between the front plate and glacis plate on the outside. Armor thickness varies from 40 mm to 150 mm.

The main armament, which fires a splined projectile 58.6 inches long (see page 354.2), differs radically in design and construction from any weapon previously examined. The barrel consists of a cast outer jacket, and a spaced liner of 1/2-inch steel. The latter, which is 74 1/4 inches long, is rifled, having nine grooves with right hand twist, one turn in 17.6 calibers. At the extreme rear, the grooves widen to aid in positioning splines near the base of the projectile. The liner is held in place by four steel blocks at the rear, and a perforated ring at the muzzle end. This ring has 31 equally spaced holes around its face. The breech mechanism is a horizontal sliding plate 2-5/16 inches thick opening from left to right.

The propellant gases are deflected between the tube and liner by an unusual obturator, and escape through a perforated ring at the muzzle. The metal obturator comprising a thin "L" shaped outer ring, a heavier "L" shaped perforated inner ring, and a spacer ring, fits into a circular recess in the front face of the breech plate. When the projectile is fired, the propellant gases pass through the ports to the chamber between the inner and outer rings. The face of the outer ring is forced against the rear face of the tube, and the sides against the recess in the breech plate, thereby obtaining the gas seal.

## SPECIFICATIONS

### (VEHICLE)

Weight (in action) (estimated).....	68 tons
Length (overall) .....	20 ft., 8 1/2 ins.
Width (overall) .....	12 ft., 3 ins.
Height (overall including stowage crane) .....	11 ft., 4 ins.
Height (overall less stowage crane) .....	9 ft., 3 ins.
Ground clearance .....	17 ins.
Tread centers .....	9 ft., 3 1/2 ins.
Ground contact .....	12 ft., 6 ins.
Width of track .....	28 1/2 ins.—20 1/2 ins.
Pitch of track .....	5 1/8 ins.
Track links .....	96
Fording depth .....	70 ins.
Theoretical radius of action	
Roads .....	87 miles
Cross-country .....	53 miles
Speed	
Roads .....	25 miles
Cross-country .....	15 miles
Superstructure Armor	
Front plate .....	150 mm at 45° to vertical
Projector mantlet (average).....	69 mm rounded
Projector shield (average).....	150 mm rounded
Side plates .....	84 mm at 20° to vertical
Rear plate .....	84 mm at 10° to vertical
Top plate .....	40 mm
Spherical cradle .....	100 mm rounded
Ammunition (Rds.) .....	12
Engine .....	Maybach HL 210, V-12, 630 hp.
Transmission.....	Preselector, hydraulic—8 speeds forward, 4 reverse
Steering.....	Controlled differential, hydraulic
Crew (unconfirmed) .....	7

### (PROJECTOR)

Caliber .....	380 mm (14.96 ins.)
Length of tube .....	81 1/8 ins.
Length of liner .....	74 1/4 ins.
Thickness of liner .....	1/2"
No. of grooves .....	9
Width of grooves .....	0.4 in.
Width of grooves at rear .....	1.06 in.
Depth of grooves .....	0.2 in.
Twist of grooves.....	Right hand, one turn in 17.6 caliber
Max. range (horizontal) .....	6,179 yds.
Firing mechanism .....	Continuous-pull
Traverse .....	20°
Elevation (approx.) .....	85°
Depression (approx.) .....	0°
Ammunition.....	H.E. (R. Sprenggranate 4581) HEAT (R. Hollandungsgranat 4592)
Wt. of projectile* .....	761 lbs.
*Weight zones are marked to the nearest 5 kg. (12 lbs.)	

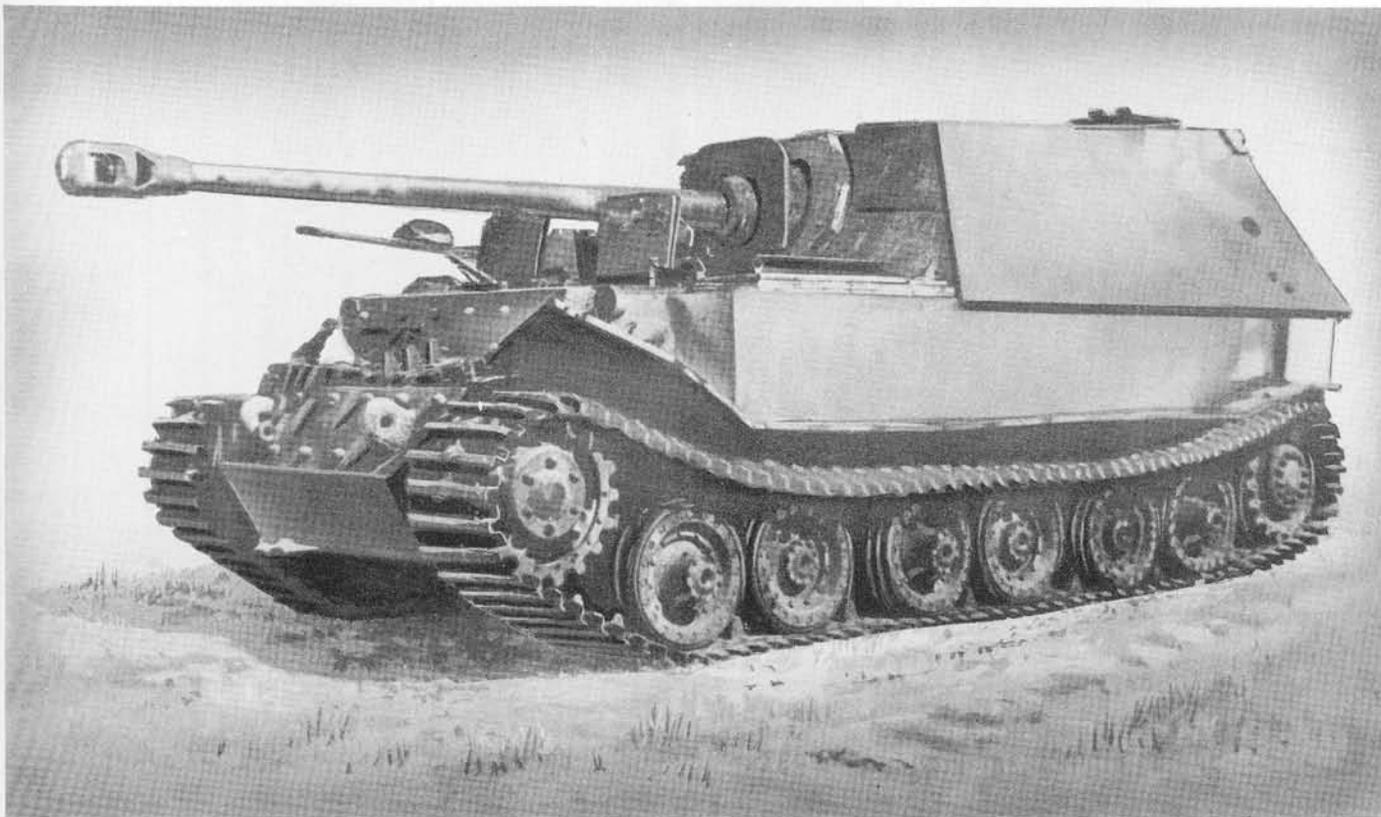
PHOTOGRAPHS OF THIS EQUIPMENT APPEAR ON THE PRECEDING PAGE. THE ROCKET IS DESCRIBED ON PAGE 354.2.

# S.P. ANTITANK GUN—"Elephant"

GERMAN



Pz. Jäg. "Tiger" (P) "Elefant" für 8.8 cm Pak 43/2 (Sd. Kfz. 184)



The "Elephant," weighing 72 tons, was the first of German heavy self-propelled antitank guns to be manufactured. It was designed and built under the supervision of Dr. Ferdinand Porsche and was first introduced under the name of "Ferdinand" in the Summer of 1943. The vehicle is actually improvised to utilize an unsuccessful tank produced by Dr. Porsche. Ninety of these vehicles were so converted. The armor is approximately 8 inches thick in the front of the hull and the sloping fighting compartment. The sides of the hull are 2½ inches, the fighting compartment 3¾ inches thick; while the rear plates of the hull are 4 1/3 inches, and the fighting compartment 3 1/3 inches. The roof of the fighting compartment and belly plates are approximately 1½ inches thick.

The "Elephant" is powered by two 12-cylinder Maybach H.L. 120 T.R.M. engines mounted centrally in the hull. From the engine the drive is taken forward directly to generators and thence to electric driving motors having a capacity of 230 Kw. at 1,300 r.p.m. which are mounted across the rear of the vehicle, under the floor of the fighting cab.

The suspension consists of six dual bogie wheels 26¾ inches in diameter on each side, mounted in pairs on stub axles which are bolted and welded to the hull; rear drive sprocket, and front idler. There are no return rollers.

The armament consists of a long-barreled 8.8 cm gun, with muzzle brake. It has an overall length of 22 feet, 11.63 inches, of which 13 feet, 1½ inches projects beyond the mantlet. The gun is mounted on trunnions 8.8 cm in diameter which are located inside the ball joint in the front armor plate of the fighting compartment. The maximum elevation of the piece is 25°; traverse is 12° left and right.

## SPECIFICATIONS

Weight .....	72 tons
Length .....	22 ft., 11 ins.
Width .....	11 ft., 5¼ ins.
Height .....	9 ft., 10 ins.
Ground clearance .....	19½ ins.
Tread centers .....	
Ground contact .....	
Width of track .....	25½ ins.
Pitch of track .....	5 ins.
Track links .....	
Fording depth .....	
Theoretical radius of action	
Roads .....	65 miles
Cross-country .....	35 miles
Speed	
Road .....	12.5 m.p.h.
Cross-country .....	6.9 m.p.h.
Armor	
Front plate .....	200 mm
Sides (hull) .....	60 mm
Armament.....	8.8 cm Pak 43/2 MG 34
Ammunition .....	8.8 cm gun—70-90 rds. MG—2,000 rds.
Engine.....	2 Maybach HL 120 TRM, 320 hp. each
Transmission.....	Gas-electric, D.C. current, 650 amps. @ 385 volts.
Steering .....	Field control
Crew .....	6

# SELF-PROPELLED GUN

GERMAN



Pz. Jäg. Tiger für 12.8 cm PJK 44 (Sd. Kfz. 186)



The Jägdtiger was the most formidable self-propelled anti-tank gun used by the Germans. It consists of a 12.8 cm PJK 44 (L/55) (less muzzle brake), mounted on a Tiger B chassis.

The hull consists of the normal Tiger B with a built-up superstructure to form a fixed turret. The front plate of the superstructure is 250 mm thick and slopes back at 15° to the vertical. It is made of one solid piece of cast steel armor. The sides of the superstructure are made in one piece with the sloped sides of the fixed turret and, like the Tiger B, are 80 mm thick sloped at 25 degrees. The rear plate of the superstructure is also 80 mm thick with a 10° slope.

The main armament consists of a 12.8 cm PJK 44 set in the center of the front plate of the built-up superstructure. It has a cast, bell-shaped gun shield similar in design to that of the 8.8 cm Kw. K. 43 on the Tiger B. The spherical housing of the gun cradle mounting pivots on a steel ball. The gun is electrically fired and has a vertical sliding breechblock. Separate loading ammunition is used, and the same cartridge case is utilized for armor piercing and high explosive rounds.

With A.P.C. ammunition, penetration of approximately 6 inches of armor at 1,000 yards at 30° is effected; with A.P.C.B.C. ammunition, the penetration is approximately 8 inches.

## SPECIFICATIONS

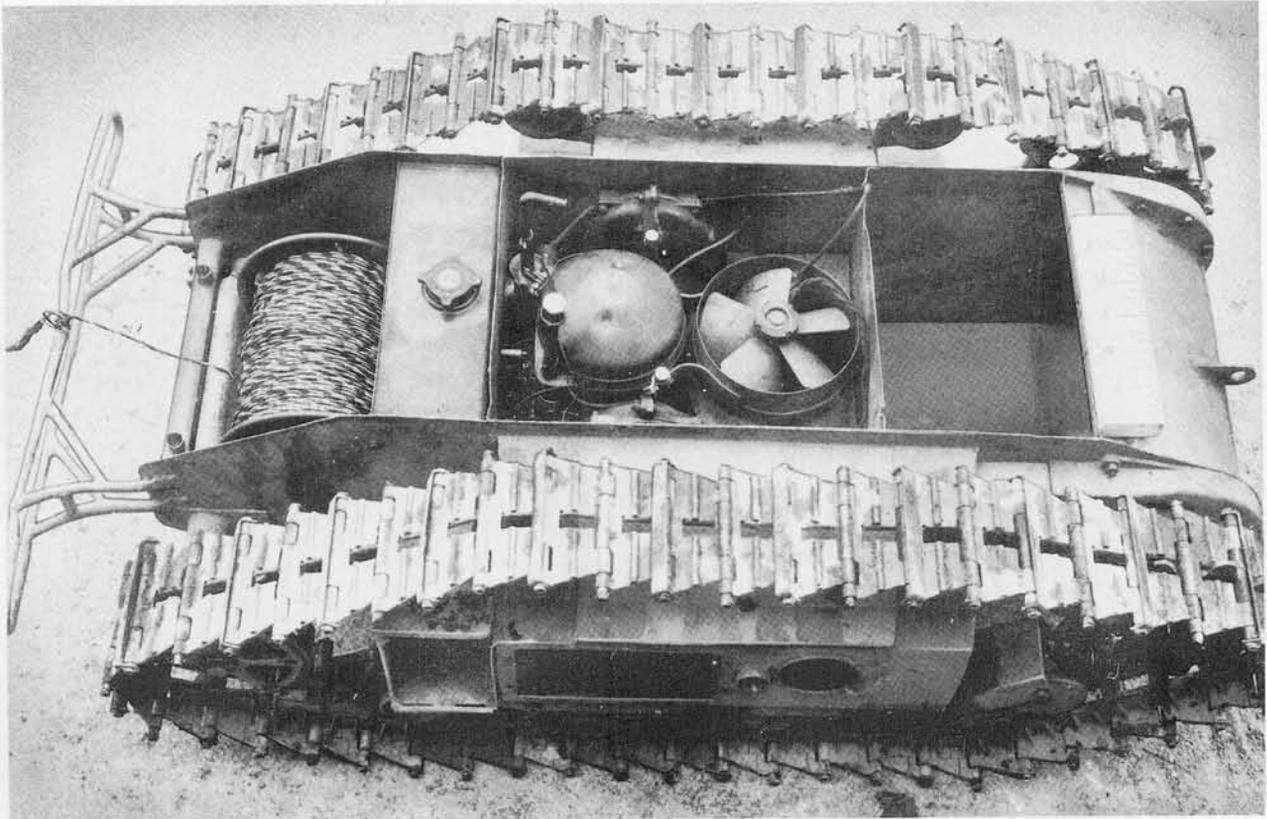
Weight .....	77 tons
Length (overall) .....	23 ft., 11 ins.
Width (overall) .....	12 ft., 7 ins.
Height (overall) .....	9 ft., 3 ins.
Ground clearance .....	19 ins.
Tread centers .....	103/110 ins.
Ground contact .....	13 ft., 4 ins.
Width of track .....	26/31½ ins.
Pitch of track .....	5.9 ins.
Track links .....	92 (46 double shoes)
Fording depth .....	69 ins.
Theoretical radius of action:	
Roads .....	106 miles
Cross country .....	75 miles
Speed:	
Roads .....	23.6 m.p.h.
Cross country .....	10 m.p.h.
Armor:	
Front plate of superstructure—	
250 mm at 15° to vertical	
Sides of superstructure—	
80 mm at 25° to vertical	
Armament .....	12.8 cm PJK 44
Ammunition .....	A.P.C.; A.P.C.B.C.
Engine .....	Maybach HL 230
Transmission .....	8 speeds forward; 4 reverse
Steering .....	Two radius system
Crew .....	6

# CABLE-CONTROLLED DEMOLITION VEHICLE

GERMAN



"Goliath—B I"



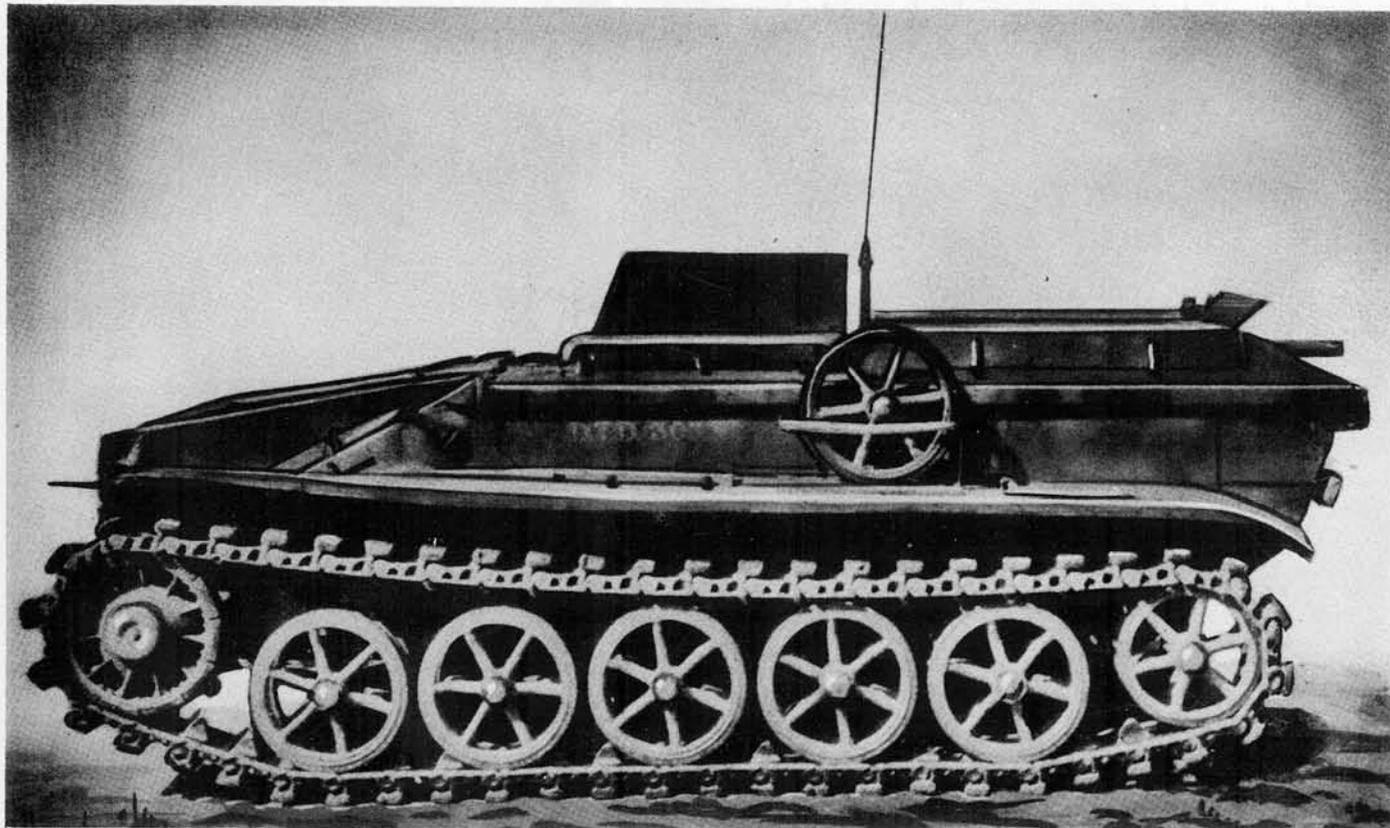
This miniature tank, weighing less than 700 pounds, is controlled by a 2000-foot electric cable from a hand control box carried in the rear. It is used to send a demolition charge to a point at which detonation destroys the tank as well as the target. The hull is fabricated from a mild 16 gauge steel with front upper and lower sloping plates 9 mm thick. These are set at 48 degrees and 50 degrees to the vertical. The hull contains three compartments. The rear compartment houses the cable and drum; the central compartment houses the power unit and control mechanism; and the front compartment contains the high explosive charge.

The power plant consists of a 2-cylinder, 2-cycle air-cooled engine. Ignition is by coil and 6 volt battery. The power is transferred through chain drives to each track by means of electromagnetic clutches. The total reduction from the clutches to the sprocket is 9.33:1. Steering is accomplished by breaking the circuit to the side to which the turn is to be made. This releases the magnetic clutch, cutting the power from the engine for that side of the vehicle. The suspension consists of five small bogie wheels on the bottom with two return rollers on top, and an idler wheel at the rear. Each bogie is independently sprung by coil springs. The chain driven sprocket is at the front of the vehicle. The track is 6 5/16 inches wide, with a simple grouser placed on every other track pin.

This vehicle carries an estimated 100-125 pounds of explosive, and has sufficient power to operate on practically all types of terrain. The control cable consists of three strands, in pairs, two for steering, and the third for setting off the detonator. In operation, the engines are started by a hand crank, the clutches engaged, and the tank then handled from the control box through the cable. Another version of this tank is powered by two electric motors.

## SPECIFICATIONS

Weight .....	650 lbs.
Length .....	5 ft., 3 ins.
Width .....	2 ft., 10 ins.
Height .....	2 ft.
Ground clearance .....	5 1/4 ins.
Tread centers .....	2 ft., 3 ins.
Ground contact .....	2 ft., 6 1/2 ins.
Width of track .....	6 5/16 ins.
Pitch of track .....	2 13/16 ins.
Track links .....	47
Theoretical radius of action .....	770 yds.
Speed .....	4 to 6 m.p.h.
Armor	
Front plate (upper and lower nose).....	9 mm
Hull .....	16 gauge steel
Armament.....(100-125 est.) pound explosive charge	
Engine .....	Inline, 2 cylinder, 2 cycle
Transmission.....	Chain drive, through electric magnetic clutch.
Steering.....	Controlled by two electric clutches



This vehicle is designed to convey a heavy demolition charge to a selected tactical objective, at which point the load may be dropped, the vehicle retracted, and the charge detonated. While it may be driven near the target, its special feature is the remote radio-control with which it may be operated after the driver leaves. Its chief use is to demolish pillboxes and strongpoints.

The hull, which is of one piece welded construction, is divided into three compartments. The engine, radio equipment, and hydraulic mechanism are contained in the rear compartment, the transmission units in one of the forward compartments, and the driver's controls and instruments in the other. Three overlapping flaps of 8 mm armor protect the top of the driver's compartment.

The vehicle is powered by a 6-cylinder, inline, water-cooled, gasoline engine, similar to commercial types. It develops approximately 80 horsepower and is supplied by two fuel tanks with a combined capacity of 28.6 gallons.

From the engine, the drive is taken forward through a fluid coupling to the gear box. Two speeds forward and two speeds reverse are provided by high and low range gears. Power is transmitted to the forward sprockets through a train of four spur gears. Suspension is on torsion bars. There are five double rubber-tired bogie wheels on each side. The cast steel center guide tracks have detachable rubber pads and are 7¾ inches wide.

An 800-pound explosive charge is carried in a container on the sloping front. Drop arms hinged to the sides of the front permit the warhead to be lowered to the ground, jettisoned, and the vehicle withdrawn from the destructive arc before the charge is detonated by means of a time fuze or electric detonator.

Radio control of the vehicle is effected by transmitting a carrier of frequency between 24 Mc/s and 25 Mc/s which is amplitude modulated by audio frequency tones. The transmitter power is approximately 4 watts.

## SPECIFICATIONS

Weight .....	4 tons
Length .....	12 ft.
Width .....	6 ft.
Height (including driver's shield).....	4 ft., 7 ins.
Ground clearance .....	12 ins.
Tread centers .....	5 ft., 2 ins.
Ground contact .....	5 ft., 10.5 ins.
Width of track .....	7.75 ins.
Track links .....	50
Pitch of track .....	5.5 ins.
<b>Armor</b>	
Front plate .....	10 mm
Sides .....	13 mm (5 mm + 8 mm)
Armament .....	800-lb. explosive charge
Engine.....	6-cylinder, O. H. V. gasoline, 80 horsepower.
Transmission.....	1 fwd, 1 reverse with high and low range—hydraulic clutch.
Steering.....	Epicyclic steering brakes either man- ually or hydraulically controlled.
Crew .....	1
<b>RADIO EQUIPMENT</b>	
Type receiver .....	Superheterodyne
Frequency .....	24,600 kilocycles
Local oscillator .....	Crystal controlled
Intermediate frequency .....	464 kilocycles
<b>Tubes</b>	
Receiver.....	1 ECH 11 Mixer-Oscillator
	1 EF 13 Fixed i-f amplifier
	1 EBF 11 second i-f AVC, Second detector
	2 EF 12 Audio amplifiers
Filter unit.....	5 EF 12 Relay control
	1 EF 13 Relay control
Power supply.....	12 v. storage battery with dynamotor
Voltage .....	Plate—200 v. Filament—6 v.

# 8-WHEELED ARMORED CAR

GERMAN 

s. Pz. Sp. Wg. (5 cm) Sd. Kfz. 234/2



This armored car is basically the 8-wheeled Model Sd. Kfz. 234 equipped with a 12-cylinder, 75°, air-cooled diesel engine. The armor plate on the front of the turret, superstructure, and hull is heavier than that of earlier models. The vehicle, itself, is also about three tons heavier.

The main armament consists of the 5 cm tank gun, Kw. K. 39/1, fitted with a muzzle brake. This gun has a muzzle velocity of 2,700 f/s, with A. P. ammunition. Its penetration performance with A. P. C. ammunition is estimated at 2.2 inches at 30° from 1,000 yards.

The mantlet is cast in one piece somewhat similar in appearance to that on the latest assault guns, but the casting also includes the coaxial machine gun. This design gives greater protection than the older types. The gun has a vertical sliding block and is of the semi-automatic type. A spring type equilibrator is mounted on the right hand side between the cradle and the turret top plate. The hydropneumatic recoil mechanism is mounted in the mantlet on top of the piece. Elevation is from  $-7^\circ$  to  $+25^\circ$ . Six smoke projectors are mounted, three on each side of the turret.

The front of the turret is protected by 30 mm armor set at an angle of  $20^\circ$  from the vertical. The sides and rear have 10 mm armor set at  $25^\circ$ , and the top plate is of the same thickness. The gun mantlet is rounded, and is 40 to 100 mm thick. The front of the superstructure has 30 mm armor set at a  $35^\circ$  angle, and the sides 10 mm at  $30^\circ$ . The nose plates of the hull are 30 mm thick, the upper plate being set at a  $55^\circ$  angle and the lower at  $30^\circ$ . The glacis plate is 17 mm at  $70^\circ$  and the sides of the hull 9 mm at  $30^\circ$ .

## SPECIFICATIONS

Weight .....	11.5 tons
Length (overall with gun at 12 o'clock)..	22 ft., 4 ins.
Length (overall with gun at 6 o'clock)..	19 ft., 8 ins.
Width .....	7 ft., 10 ins.
Height .....	7 ft., 6 ins.
Ground clearance .....	1 ft., 2 ins.
Tread centers .....	6 ft., 4 $\frac{3}{4}$ ins.
Wheelbase .....	13 ft., 5 $\frac{1}{2}$ ins.
Tire size .....	8.27 x 16
Fuel tank .....	89 gal. capacity
Fording depth .....	4 ft., 7 ins.
Speed (maximum) .....	50 m.p.h.
Engine.....	12-cylinder, 75°, air-cooled diesel 217 BHP at 2250 engine r.p.m.
Bore and stroke .....	110 mm/130 mm
Ignition .....	Diesel
Battery .....	
Transmission.....	6 speeds forward; 6 reverse
Steering .....	(Dual control) worm and nut
Crew .....	4

# HALFTRACKED ARMORED CAR

GERMAN



leichtes Schützenpanzerwagen (2 cm) (Sd. Kfz. 250/9)



This vehicle, adapted from the light armored personnel carrier, mounts the 2 cm tank gun, Kw. K. 38, and is effective for reconnaissance, action against lightly armored ground targets, protection of troop and supply trains, and as a personnel and supply carrier.

It differs from the basic vehicle principally in the addition of an armored turret which has been found in three forms: 10, 8, and 6-sided. The turret is of truncated cone shape and is similar to that used in the German 4-wheeled armored cars. The turret has no roof, but instead is provided with a wire mesh grill as anti-grenade protection.

The gun is mounted in the center with a 7.92 mm M. G. 34 on the left, and a telescopic sight on the right. The armament is controlled by one man who sits in a seat suspended from the right rear of the turret. A single handwheel controls traverse and elevation, or, by use of a small lever, the gun may be locked in a horizontal position. Counterbalance is maintained by two spring equilibrators, one mounted on each side. The turret is mounted on a ring permitting traverse through 360 degrees. Access to the turret is through a large entrance door in the left rear of the superstructure. The vehicle is provided with a transmitter-receiver, Fu. Spr. f, with intercommunicating facilities.

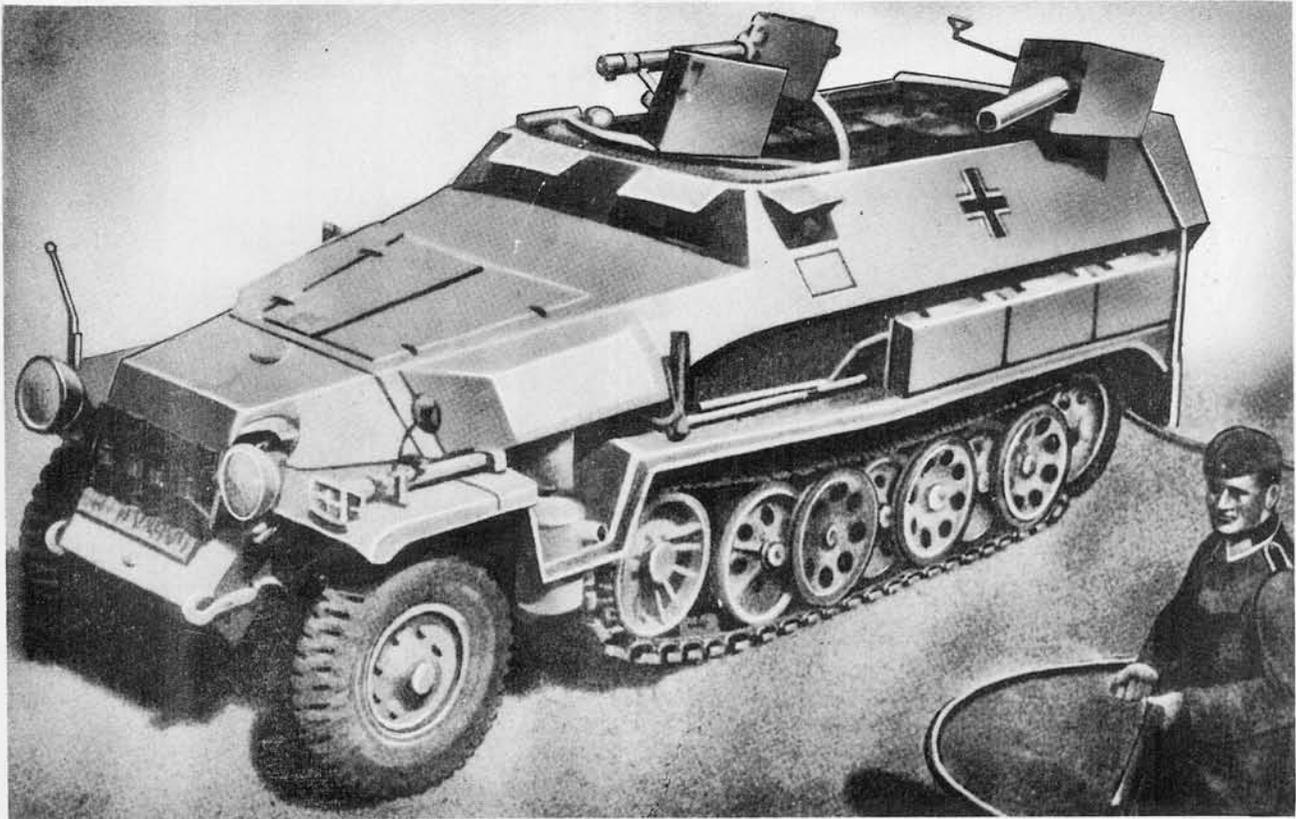
## SPECIFICATIONS

Weight (approx.) .....	6 tons
Trailer load capacity .....	
Length .....	15 ft.
Width .....	6 ft., 5 ins.
Height .....	6 ft., 10 $\frac{1}{4}$ ins.
Ground clearance .....	11 ins.
Tread centers .....	5 ft., 5 ins.
Ground contact .....	3 ft., 11 ins.
Track width .....	10 $\frac{1}{4}$ ins.
Track links .....	38
Fuel tank .....	20-25 gals.
Fuel consumption .....	
Fording depth .....	27 ins.
Speed .....	35 m.p.h.
Engine.....	6 cylinder Maybach; Water-cooled, 100 hp.
Bore and stroke .....	90 x 110 mm
Ignition .....	Bosch magneto
Battery .....	12 volt
Transmission.....	Semi-automatic, preselective type. 7 speeds forward, 3 reverse.
Steering .....	Front wheel—track epicyclic
Crew .....	3
Armament.....	1 20 mm tank gun (Kw. K. 38) 1 7.92 mm machine gun (M. G. 34)
Armor	
Front plate (approx.) .....	15 mm
Side plate (approx.) .....	6 mm
Rear plate (approx.) .....	8 mm

# ARMORED FLAMETHROWER VEHICLE

GERMAN 

m. Flammpanzerwagen (Sd. Kfz. 251/16)



This flame-throwing vehicle is employed in association with more heavily armored panzer units. It is an adaptation of the medium armored personnel carrier on which have been mounted the various items of equipment required.

There are two large projectors mounted well back on either side of the vehicle in V-shaped shields. Each of these has a nozzle .55 inch in diameter, and a traverse of 160 degrees. The third flamethrower takes the form of the cartridge ignition projector used in the small portable flamethrower Model 42, on the end of 33 feet of hose, connecting it to the propulsion unit and fuel tank through the back of the vehicle. The nozzle of this projector is .28 inch in diameter.

Fuel propulsion is by a pump driven by a small gasoline engine supplied by a 5½-gallon tank which will run the engine for two hours. One hundred and fifty-four gallons of fuel for the flamethrowers is carried. This allows about eighty bursts of one or two seconds' duration each.

The effective range of the large flamethrowers is about 40 yards; that of the portable unit about 30 yards.

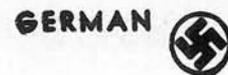
1,850 gallons of fuel are carried in the three 3-ton lorries of platoon transport. This is sufficient for two refuels for all six flamethrower vehicles of the flamethrower platoon.

The crew of the vehicle consists of one vehicle loader who also acts as wireless operator and machine gunner, two flamethrower operators, and a driver.

## SPECIFICATIONS

Weight (approx.) .....	8 tons
Trailer load capacity .....	3.3 tons
Length .....	19 ft.
Width .....	7 ft.
Height .....	7 ft.
Ground clearance .....	12 ins.
Tread centers .....	5 ft., 3 ins.
Ground contact .....	5 ft., 11 ins.
Track width .....	11 ins.
Track links .....	55
Fuel tank .....	42.5 gals.
Fuel consumption .....	5 miles per gal.
Fording depth .....	20 ins.
Speed .....	30 m.p.h.
Engine.....	Maybach, NL 42 TUKRR, 100 hp.
Bore and stroke .....	90 x 110 mm
Ignition .....	Magneto
Battery .....	12 volt
Transmission.....	4 speeds forward, 1 reverse. High and low range.
Steering.....	Front wheel and track epicyclic
Crew .....	4
Armor	
Radiator cover .....	7.5 mm at 81 degrees
Sides .....	8.5 mm at 55-60 degrees
Front plate .....	15 mm at 55 degrees
Armament.....	2 large flamethrowers 1 portable flamethrower 2 7.92 mm M. G. 34's

# TRIPLE MACHINE GUN ON SEMITRACKED VEHICLE



M. G. 151/15 und M. G. 151/20 Drilling auf m. S. P. W. (Sd Kfz. 251/21)



This is the 3-ton, armored semitrack mounting triple 15 mm or 20 mm heavy machine guns of the Model 151 aircraft type. The equipment is an assault weapon intended for ground combat, and engagement of low flying aircraft is a secondary role.

The three guns, which are cocked manually and percussion fired, are set coaxially and in the same plane. Each gun is held in a standard MG 151 aircraft cradle, less the body extension. The cradles are bolted to a common block on the top bracket of the pedestal, pivoting on trunnions for elevation and depression. The top bracket is bolted to a bottom conical skirt and the whole rotates freely on a cone pedestal fixed to the floor of the vehicle. Elevation ( $-5^{\circ}$  to  $49^{\circ}$ ) and traverse ( $360^{\circ}$ ) are shoulder controlled by the firer. A brake locking device is provided for traverse.

The guns, capable of firing 700 r.p.m. each, are belt fed, the belts being contained in steel boxes, one for each gun. A total of 3,000 rounds of ammunition in belts is carried in the vehicle. Penetration of A. P. projectiles fired from the 15 mm MG 151 is reported as 18 mm from 100 meters at 30 degrees.

Sighting apparatus consists of a telescopic sight with a magnification of 3 and a field of view of 8 degrees; a cartwheel type antiaircraft sight, and a hand periscope with a magnification of 8 and a field of view of 7.5 degrees.

A further description of the components of this equipment is available on pages 45 and 252.

## SPECIFICATIONS

Weight .....	8 tons
Trailer load capacity .....	3.3 tons
Length .....	19 ft.
Width .....	7 ft.
Height .....	
Ground clearance .....	12 ins.
Tread centers .....	5 ft., 3 ins.
Ground contact .....	5 ft., 11 ins.
Track width .....	11 ins.
Track links .....	55
Radius of action .....	186 miles
Fuel tank .....	42.5 gals.
Fuel consumption (roads) .....	5 miles per gal.
Fording depth .....	20 ins.
Speed .....	30 m.p.h.
Engine .....	Maybach, NL 42 TUKRR
Bore and stroke .....	90 x 110 mm
Horsepower .....	100
Ignition .....	Bosch magneto
Battery .....	12 volt
Transmission.....	4 speeds forward, 1 reverse. High and low range.
Steering.....	Front wheel and track epicyclic
Crew .....	4

# SELF-PROPELLED ROCKET PROJECTOR

GERMAN



15 cm Panzerwerfer 42 (Sd. Kfz. N. W. 41)



The chassis of this self-propelled rocket projector follows the half-track design but differs materially from the standard German half-track series of prime movers.

A standard commercial chassis manufactured by Opel (Chevrolet) has been modified to carry a spacious armored body of welded plates. The hull thus formed provides a firm and stable firing platform, and permits of easy mass production. The armor is intended only for protection against small arms fire of .30 caliber. The rear wheels and springs of the original truck chassis have been displaced by a track assembly, prefabricated and then bolted to the original frame. The original rear end differential has been retained but the drive shaft has been shortened and the assembly moved forward to mount the drive sprockets. The hydraulic brake system is retained only for the front wheels. A separate cable for each sprocket brake is connected to two hand levers mounted to the right of the driver's seat. Normal steering is assisted by the sprocket brake when necessary.

The rocket projector consists of ten tubes mounted in two layers of five each. Provision is made for a simple optical sight, and for hand wheels for a maximum of 80° elevation and a maximum traverse of 290°. The projectiles are the same as those fired from the 15 cm Nebelwerfer 41 and can be electrically fired, singly or ripple, by means of a squib placed in each round. They are loaded with high explosive, smoke, and chemical warfare ammunition.

Auxiliary weapons include one 7.92 mm machine gun, M. G. 34, and three 9 mm submachine guns. Ammunition stowage is provided for ten extra rockets, 2,000 rounds for the M. G. 34, and 2,000 rounds for the submachine guns.

## SPECIFICATIONS

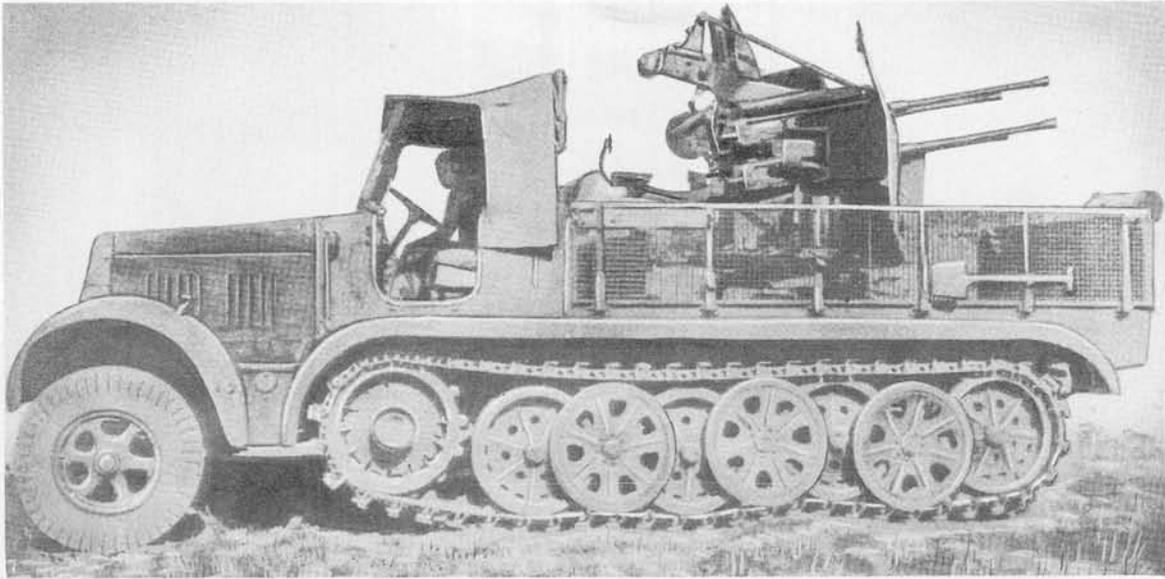
Weight (net) .....	13,558 lb.
Trailer load capacity .....	2,425 lb.
Length (overall) .....	19 ft. 5 ins.
Width (overall) .....	7 ft., 2 ins.
Wheel base (approx.) .....	130 ins.
Height (overall) .....	8 ft., 6 ins.
Armor .....	5/32 ins. to 5/16 ins.
Ground clearance (minimum) .....	10 ins.
Tread centers .....	5 ft. 2 ins./5 ft. 11½ ins.
Ground contact (tracks) .....	78 ins.
Track width .....	10¼ ins.
Track links .....	82
Fuel tank .....	22.4 gals.
Fuel consumption .....	Unknown
Fording depth .....	32 ins.
Speed .....	25 m.p.h.
Engine .....	Open (Chevrolet) 6 cyl. O.H.V.
Displacement .....	220 cu. ins.
Horsepower .....	67 U.S.A.
Ignition .....	Bosch 12 Volt (Coil)
Battery .....	12 Volt with special heater
Transmission .....	5 speeds forward, 1 reverse
Steering .....	Normal assisted by differential brake
Crew .....	3

## A.A./A.T. GUN ON SEMITRACK CHASSIS

GERMAN



m. Zgkw. 8 t Sd. Kfz. 7 (2 cm Flakvierling 38)



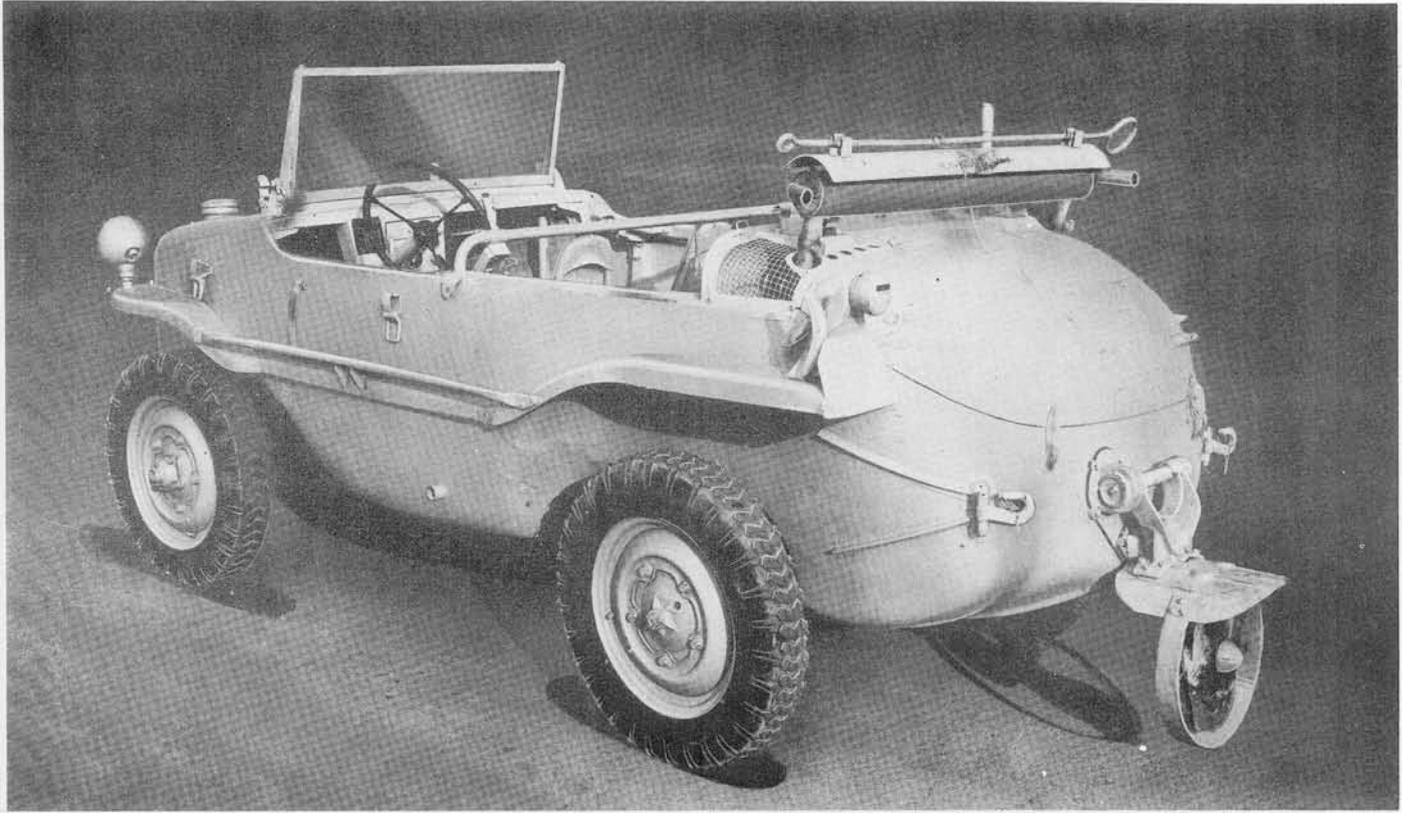
The 2 cm Flakvierling 38 has been mounted, as illustrated above, on the chassis of the 8-ton medium semitrack prime mover described on page 54. Details of the weapon and its performance may be found on page 133.

## ANTI-AIRCRAFT GUN ON SEMITRACK CHASSIS

m. Zgkw. 8 t Sd. Kfz. 7 (3.7 cm Flak 36)



The 3.7 cm Flak 36 has also been mounted on the chassis of the 8-ton medium prime mover described on page 54. Data on the weapon may be found on page 130.1.



The basic construction of this vehicle is identical with that of the standard type 82 Volkswagen. Front wheel drive has been added to the ingenious positive lock differential rear drive already employed and removes all objections to its poor cross-country performance.

The steering assembly and the front wheel suspension are placed outside a watertight bulkhead.

A rubber sealed stuffing box is used for the front wheel drive shaft. In the rear the suspension is mounted outside the watertight hull. The only openings are for each drive shaft. These are entirely hooded by two bellows type rubber boots that sheath the axle allowing movement in all directions.

Shock absorbers are provided for each wheel. In the front they are mounted outside the hull. In the rear, a watertight shaft extends through the hull from shock absorber to wheel.

Normal grease seals on the rear axle keep water from seeping into the differential and transmission assemblies.

The transmission, transfer case and the positive locking differential comprise a unit assembly secured to the floor at its extreme rear end. A power takeoff has been added to the normal transmission to provide front wheel drive. A cross-country gear position is also provided. It is an extra low gear necessitating the normal transmission be kept in neutral position when used.

The clutch is a dry single disc foot operated type. The propeller assembly is mounted on a spring-loaded hinge that is positioned in the rear directly in line with the hand crank pulley. It incorporates a slip clutch to eliminate damage to the propeller blades by underwater obstructions. Engagement direct with the engine is made through a dog clutch sealed by a rubber bushing on the engine side.

## SPECIFICATIONS

Weight .....	2,040 lbs.
Loading capacity .....	960 lbs.
Length (overall—propeller down) .....	150 ins.
(overall—propeller up) .....	140 ins.
Width (overall) .....	55 ins.
Height (overall to top of windshield).....	57 ins.
(overall less windshield) .....	38 ins.
Ground clearance .....	11.5 ins.
Tread centers .....	47 ins.
Wheelbase .....	78 ins.
Tire size .....	5.25 x16—one spare
Fuel tank .....	13 gallons, 70 octane
Fuel consumption (land) .....	20 m.p.g.
(water) .....	Unknown
Fording depth .....	Unlimited
Speed (land) .....	46.5 m.p.h.
(water) .....	7.5 m.p.h.
Engine.....	4 cyl. horizontally opposed, air-cooled
Horsepower .....	24.5 at 3,300 r.p.m.
Ignition .....	Bosch, 6 volt coil
Battery .....	6 volt
Transmission .....	4 speeds forward, 1 reverse
Steering .....	Normal—front wheels

# AMPHIBIOUS 1/4-TON TRUCK. MODEL 1942

GERMAN 

Trippel S. G. 6 Schwimmkraftwagen



Development of this vehicle began prior to 1939 at the Trippelwerke Hamburg Saar. According to German press reports, in 1941 Mr. Hans Trippel, the inventor, made improvements over his earlier models as a result of experiments and his plant prepared to go into mass production. The above vehicle was manufactured in 1942. Field examination shows that the application of its design to combined land and water transportation is successful. Simplicity of design throughout makes it possible to produce the vehicle in large quantities very easily.

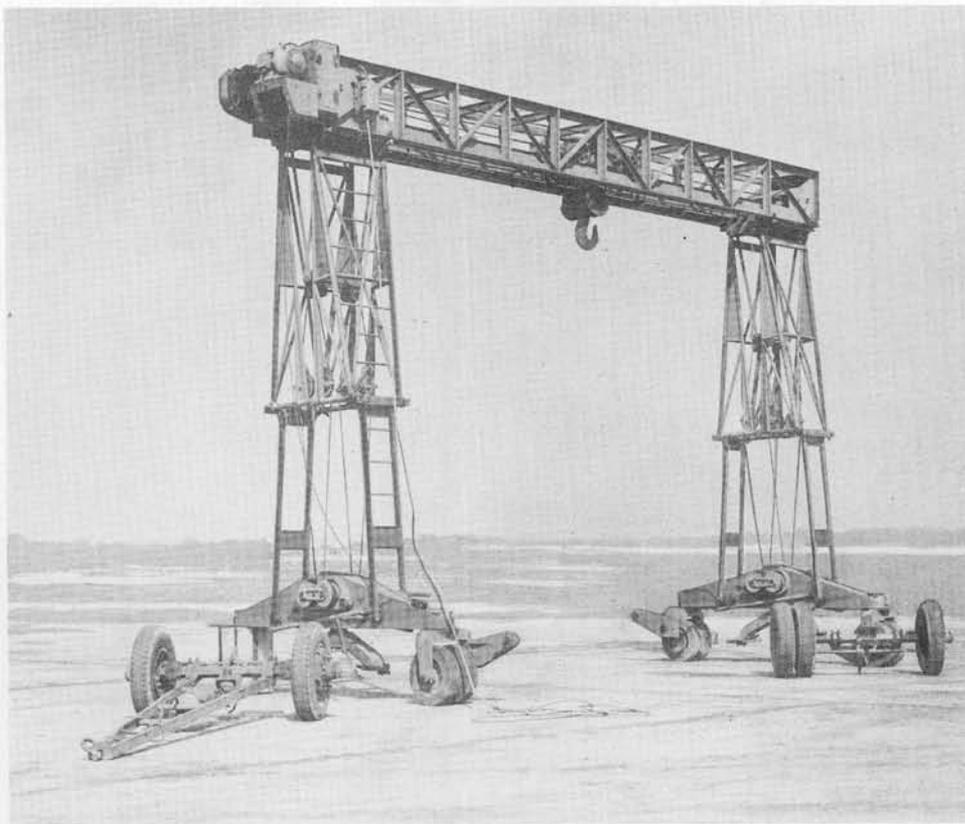
The body is arranged with a front engine compartment, a center crew compartment, and a rear stowage compartment. Water sealing is accomplished by means of rubber seals throughout. The only openings in the rear of the body are for the wheel and propeller drive and for the shafts of the shock absorbers. In the front of the body there are three openings on each side as follows: one for the shock absorber rod, the radius rod, and for the wheel drive.

Four-wheel drive with independent double coil spring suspension contributes to the cross-country mobility which is said to be remarkable. The shock absorbers are mounted inside the hull and connect with the suspension through an auxiliary shaft that is stuffing box sealed.

A special transmission is provided with three speeds forward and one reverse for highways plus three speeds forward and one reverse for cross-country and a forward and reverse gear for operation in the water. The three-bladed propeller is lowered to position when in the water and is protected inside the body work when on land. Steering is accomplished by front wheels. A one-shot lubrication system is operated from the dash.

## SPECIFICATIONS

Weight (net) .....	3,860 lb.
Cargo capacity (land) .....	2,400 lb.
Cargo capacity (water) .....	2,100 lb.
Length (overall) .....	190 ins.
Width (overall) .....	71 ins.
Height (overall—top of windshield).....	74 ins.
Ground clearance .....	15 ins.
Tread center to center .....	58½ ins.
Tire (Continental, cross-country type) .....	6.00 x 18 ins.
Wheel base .....	98 ins.
Freeboard .....	12 ins.
Speed (highway) .....	44 m.p.h.
Speed (water) .....	6–10 m.p.h.
Radius of action (land) .....	130 miles
Radius of action (water) .....	46 miles
Fuel tank .....	15½ gal.
Fuel consumption (land) .....	9.7 m.p.g.
Fuel consumption (water) .....	4.35 m.p.g.
Engine.....	Double radiator, water-cooled, details unknown.
Brakes .....	4-wheel hydraulic
Crew .....	5
Ignition and Electrical System.....	12-volt Bosch



The portable Gantry Crane was manufactured in 1942 by J. S. Fries & Son, Frankfurt, Germany. It has a capacity of 33,000 pounds, and is used by field tank maintenance units in removing turrets and engines from heavy German tanks.

With a crew of eight men, the crane can be erected from traveling position to the operating position in an estimated time of twenty minutes. When the crane is in the operating position, it can be moved on its bogies on hard surface ground, or it can be run on rails that engage the flanges on the inside of the bogie wheels.

The equipment has a tendency to be top heavy in the traveling position. It is easily erected to the operating position because of its jack-knife tubular legs which are equipped with wire cable tackle blocks and manual winch.

The bridge is fabricated from welded "I" beams and angle iron shapes. The hoisting winch and motor assembly are permanently mounted at one end of the bridge. The motor, a ten-horsepower, three-phase, fifty-cycle 220/380-volt squirrel cage induction type, is equipped with magnetic friction brake and a two-station start-and-stop starter.

The hoisting block, a twin sheave type using a six-37-strand three-quarter-inch galvanized cable, can be raised or lowered manually when power is off.

The trolley is supported by four ball bearing flanged wheels and has ball bearing equipped sheaves. The trolley is traversed manually by a chain.

## SPECIFICATIONS

Weight .....	17,250 lb.
Weight on front wheels .....	9,170 lb.
Weight on rear wheels .....	8,180 lb.
Length (overall) .....	48 ft.
Length of bridge .....	30 ft., 5 ins.
Length of bridge track .....	23 ft., 9 ins.
Length of drawbar .....	11 ft.
Width (overall) .....	7 ft., 4½ ins.
Width of bridge .....	3 ft., 3 ins.
Height (overall) .....	22 ft., 8 ins.
Height in traveling position .....	8 ft., 2 ins.
Height of bridge .....	2 ft., 7½ ins.
Center to center of bridge track.....	2 ft., 3 ins.
Tread centers (front) .....	5 ft.
Tread centers (rear) .....	6 ft., 8 ins.
Ground clearance at axles .....	1 ft.
Ground clearance at bogie wheels.....	5½ ins.
Tire size .....	34 x 7 (8.00 x 20)
Bogie wheel size.....	150 x 410 mm - 5.9 in. x 16.1 in.
Capacity .....	15 tons.

# LARGE CALIBER ARTILLERY\*



Gun	Type of Car. and Traverse	Weight of Equipment (lb.)	Length of Barrel in Calibers	PROJECTILE			Weight (lbs.)	Remarks
				Max. Range (yds.)	Muzzle Vel. (ft./sec.)	Type**		
15 cm K. in Mrs. Laf.			45	26,000	2,730	H.E. (15 cm K. gr. 18)	94.6	Probably used on platform for coast defense
15 cm K. 18 (149 mm)	Mod. Box Trail 12°	28,459	55	27,040	2,840	H.E. (15 cm K. gr. 18)	94.6	
15 cm K. 39 (149 mm)	Split Trail 60°	27,280	55.4	27,040	2,840	H.E. (15 cm K. gr. 18)	94.6	Probably mfd. by Krupp
17 cm K. in Mrs. Laf. 18	Mod. Box Trail 16°	38,500	50	32,370	3,035	H.E.B.C. (17 cm K. gr. 38 Hb.)	138	Krupp, Essen
21 cm Mrs. 18	Mod. Box Trail 16°	36,700	31	18,300	1,854	H.E. (21 cm gr. 18)	249	Krupp, Essen
21 cm K. 38	Field 360°	78,000	50	37,200	2,870	H.E. (21 cm K. gr. 38)	265	360° on platform. Krupp, Essen
21 cm K. 39	Field 360°	74,800	45	32,800	2,620	H.E. (21 cm gr. 40)	278	Skoda design
21 cm K. 39/40								Both reported to be very similar to 21 cm K. 39
21 cm K. 39/41								Muzzle brake fitted
21 cm K. 42				37,000	2,820			Skoda design similar to 21 cm K. 39
24 cm H. 39	Field 360°	59,400	28	19,700	1,970	H.E. (24 cm gr. 39)	365	Later version of 24 cm H. 39
24 cm H. 39/40								
24 cm K. 3 (238 mm)	6°	119,000	46 (55?)	41,000	3,248	H.E. (24 cm gr. 35)	331	
24 cm K. 18 (238 mm)	Field 6°	118,800	55	40,500	3,180		332	Fires splined projectile, Rheinmetal Borsig
28 cm H.L./12	Static 360°	111,000	12	11,400	1,150	H.E. (28 cm Sprgr. L./3.5 m. Bdz.)	770	Uses DeBange Type obturator. Obsolete except for coastal defense
28 cm Kst. H.	Static 360°	81,500	12	12,500	1,243	H.E. (28 cm Sprgr. L./3.5 m. Bdz.)	770	Similar to 28 cm. H.L./12. Fires same projectile
35.5 cm M. 1	Field	165,000		21,900	1,870	Anticoncrete (35.5 cm gr. Be.)	825	
42 cm Gamma Mrs.	Static 45°	308,000	16	15,500	1,485	Anticoncrete (s. Gr. Be.)	2,249 2,253	Similar to last war equipment
61.5 cm Mrs.		264,000	8	15,300	1,380	Anticoncrete (gaschosse L./4.1 für Karl gerät)	4,400	Reported to have an auxiliary 54 cm barrel
15 cm K. (E)	Rly. 360°	167,000	40	25,200	2,800	H.E. (15 cm K. gr. 18)	94.6	Naval design. Krupp. Same projectile as 15 cm K. 18
17 cm K. (E)	Rly. 360°	176,000	40	29,200	2,870	H.E.B.C. (17 cm Sprgr. L./4.7 Kz. m. Hb.)	138	Naval design. Krupp
20 cm K. (E) (203 mm)	Rly. Turntable 360°	189,500	55	40,000	3,030	H.E.B.C. (20.3 cm Sprgr. L./4.7 m. Hb.)	247	Naval design. Also known as 20 cm S. K. C./34
21 cm K. 12 (E)	Rly.	744,000	196	131,000	5,330	H.E.B.C. (21 cm gr. 35 m. Hb.)	236	Splined projectile. Differences are not known
21 cm K. 12V (E)	Rly.							Believed to involve an alteration of the rifling
21 cm K. 12N (E)	Rly.							
24 cm Th. Br. K (E) (238 mm)	Rly. 1°	207,000	35	22,200	2,210	H.E.B.C. (24 cm Sprgr. L./4.5 Bdz. u Kz. m. Hb. ung)	328	Sister piece to "Theodor Kanone"
24 cm Th. K. (E) (238 mm)	Rly.	209,000	40 (48?)	29,000	2,660	H.E.B.C. (24 cm Sprgr. L./4.2 m. Bdz. u Kz. m. Hb.)	330	"Theodor Kanone" Naval design
28 cm Ks. Br. K. (E)	Rly.	262,000	40	32,300	2,690	H.E.B.C. (28 cm Sprgr. L./4.1 Kz. m. Hb.)	529	Naval design
28 cm lg. Br. K. (E)	Rly.	271,000	45	40,500	2,820	H.E.B.C. (28 cm Sprgr. L./4.4 m. Bdz. u Kz. m. Hb.)	626	Naval design
28 cm s. Br. K. (E)	Rly.	286,000	50	40,500	2,880	H.E.B.C. (28 cm Sprgr. L./4.4 m. Bdz. u Kz. m. Hb.)	626	Naval design
28 cm Br. N. K. (E)	Rly.	330,000		50,200	3,260	H.E.B.C. (28 cm Gr. 39 m. Hb.)	496	Probably splined projectile
28 cm K. 5 (E)	Rly. 1° Turntable 360°	480,000	76	63,000	3,670	H.E.B.C. (28 cm Gr. 35)	550	Weight does not include turntable. Fires splined projectile. Also reported to fire a rocket assisted shell (28 cm R. Gr. L/4.7) with range of 53 miles.
28 cm K. 5/1 (E)						H.E.B.C. (28 cm Gr. 42)		Differences from 28 cm
28 cm K. 5/2 (E)						H.E.B.C. (28 cm Gr. 42)		K5 are unknown
38 cm Siegfried K. (E)	Rly. Turntable 360°		55 (52?)	61,000	3,450	H.E.B.C. (38 cm Sprgr. L./4.5) (Si)	1,096	Naval design. Also fires a 1,764 lb. shell with maximum range of 46,000 yds.
40 cm K. (E) (406 mm)	Rly.	710,000	50	49,000	3,450	H.E. (40 cm gr. 40)	1,320 2,100	Naval design—Adolf. K.
80 cm Gustav Geschütz		2,750,000	35	51,500	2,790		16,700	Also known as 80 cm

\*Almost all the data given have not been verified by tests performed by any Allied government and information from sources available varies considerably in reliability and degree of confirmation.

\*\*Of the several types of projectiles fired by each weapon, only one believed to give maximum range is listed.

# RAILWAY GUN

28 cm K5 (E)



The German 28 cm K5 (E) has an unconfirmed range of 31 miles and fires a pre-engraved projectile weighing approximately 550 pounds. It is fired from a turntable affording a 360° traverse.

The gun has a 70-foot 8-inch barrel held in a sleeve-type cradle. The barrel recoil mechanism, fitted between two arms projecting downward from the cradle, consists of two hydropneumatic cylinders and a single hydraulic buffer cylinder. The cradle is supported by trunnions which rest in bearings on top of a box-like frame, of girder construction, which in turn is supported on two pintles resting in bearings in the center of two 12-wheel trucks. The front pintle bearing rides in a rail on the front truck and can be positioned six inches either side of center, thereby allowing a car traverse of approximately 1°.

The equipment in effect has a double recoil action. Besides the barrel recoil which is approximately 32 inches, the gun car recoils. It is coupled to the front of the turntable platform by a hydraulic buffer and a hydropneumatic counterrecoil mechanism which returns the car to battery position.

A turntable platform is transported as part of the equipment and in transport forms a flat car with a 103-foot bed resting on two 8-wheel trucks.

A central jack helps support the tremendous weight of the gun and carriage which amounts to around 230 tons and also serves as a central pivot for the turntable.

The powder chamber is approximately 10 feet 5 inches long. Obturation is obtained by means of a short brass cartridge case and the breech is closed with a horizontal sliding type of breech-block. Firing is of the percussion type.

## SPECIFICATIONS

Caliber .....	280 mm (11 ins.)
Length of barrel .....	70 ft., 8 ins.
Length of tube .....	67 ft., 5 ins.
Length of rifling .....	57 ft.
Rifling .....	Right Hand uniform twist
Weight of barrel (Leopold)* .....	187,880 lb.
Length of car .....	95 ft., 7 ins.
Length of carriage .....	69 ft., 8 ins.
Width of carriage (overall) .....	8 ft., 8½ ins.
Number of grooves .....	12
Width of grooves .....	⅝ in.
Depth of grooves .....	17/64 in.
Max. range .....	54,680 yds.**
Traverse on turntable .....	360°
Carriage traverse (approx.) .....	½° R; ½° L
Elevation (estimated) .....	50°
Ammunition.....	Separate loading—steel spined projectile
Weight of projectile (approx.).....	550 lb.

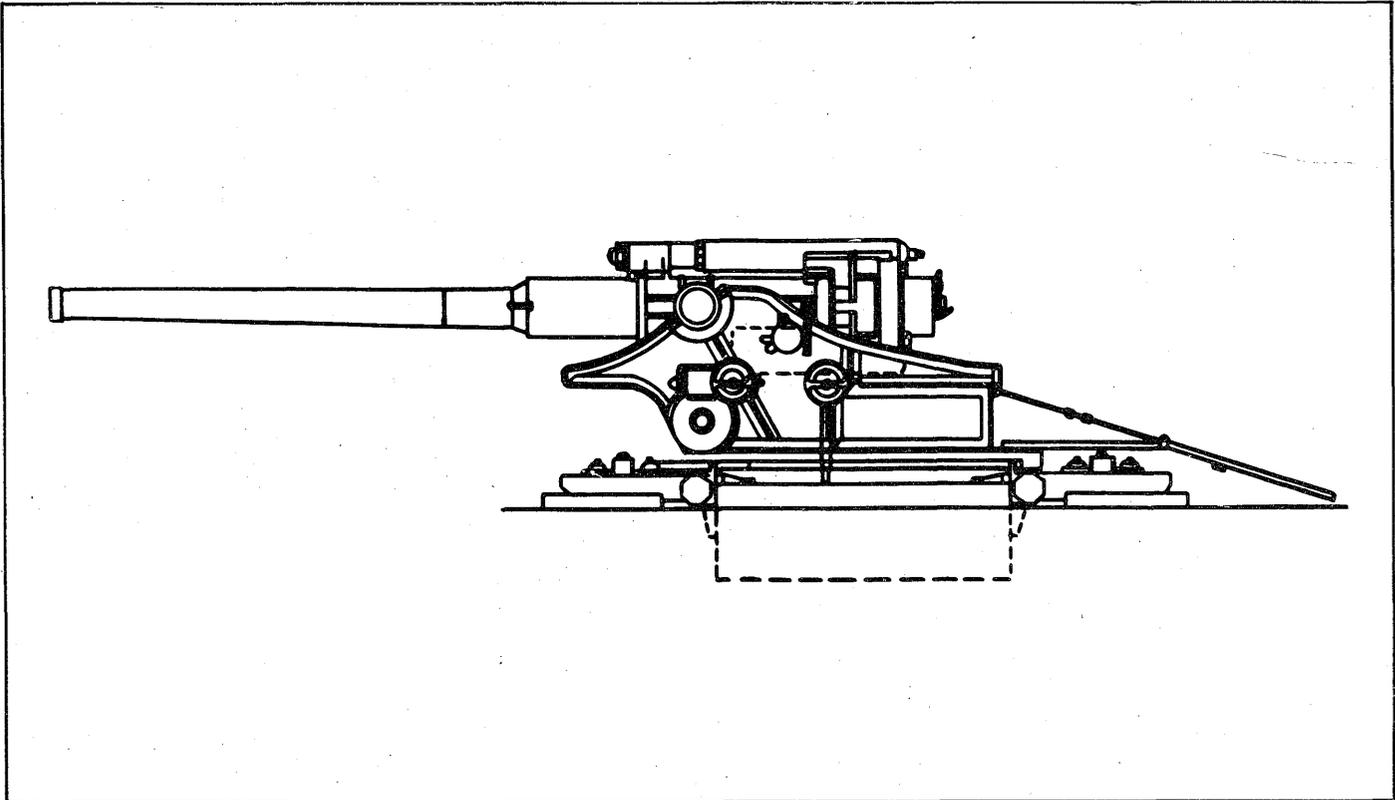
\*Two of these guns were found in Italy; one was called "Leopold," and the other "Robert." The weight of the barrel on the latter model is 187,165 pounds.

\*\*Not verified.

# HEAVY FIELD GUN

GERMAN 

21 cm K. 39



The 21 cm heavy field gun (K. 39), an original Skoda design, was taken over by the German Army shortly after the invasion of Czechoslovakia. For transport, the equipment may be broken down into three loads, each of which is mounted on two 2-wheeled, pneumatic-tired bogies.

The piece consists of an autofrettaged monobloc barrel and loose liner, and a breech ring. The breechblock is of the interrupted screw threaded type, incorporating an obturator pad, obturator spindle and percussion firing lock. On recoil, the piece slides in a cylindrical sleeve in the cradle.

The upper carriage is fitted to a turntable which revolves on a ball race mounted in the platform. The platform consists of a rectangular sheet steel box which is dug into the ground. Four removable arms located at the corners of the platform support it by bearing on the ground by means of special feet. During transport, the arms are lowered and serve to support the platform on its bogies.

The traversing and elevating mechanisms, each with two-speed gearing, are operated from handwheels on the left of the carriage.

Four types of ammunition are used in the gun: the original Czech high explosive shell; a German version of the same shell with the base fuze omitted; an anti-concrete shell with ballistic cap and base fuze; and an armor-piercing shell with base fuze. It is loaded at 8° elevation with the help of a special 2-wheeled shell trolley.

There are two other versions of the weapon, the K. 39/40 and the 39/41. Although the two later models are modifications of the original Skoda design, they do not differ in main performance details.

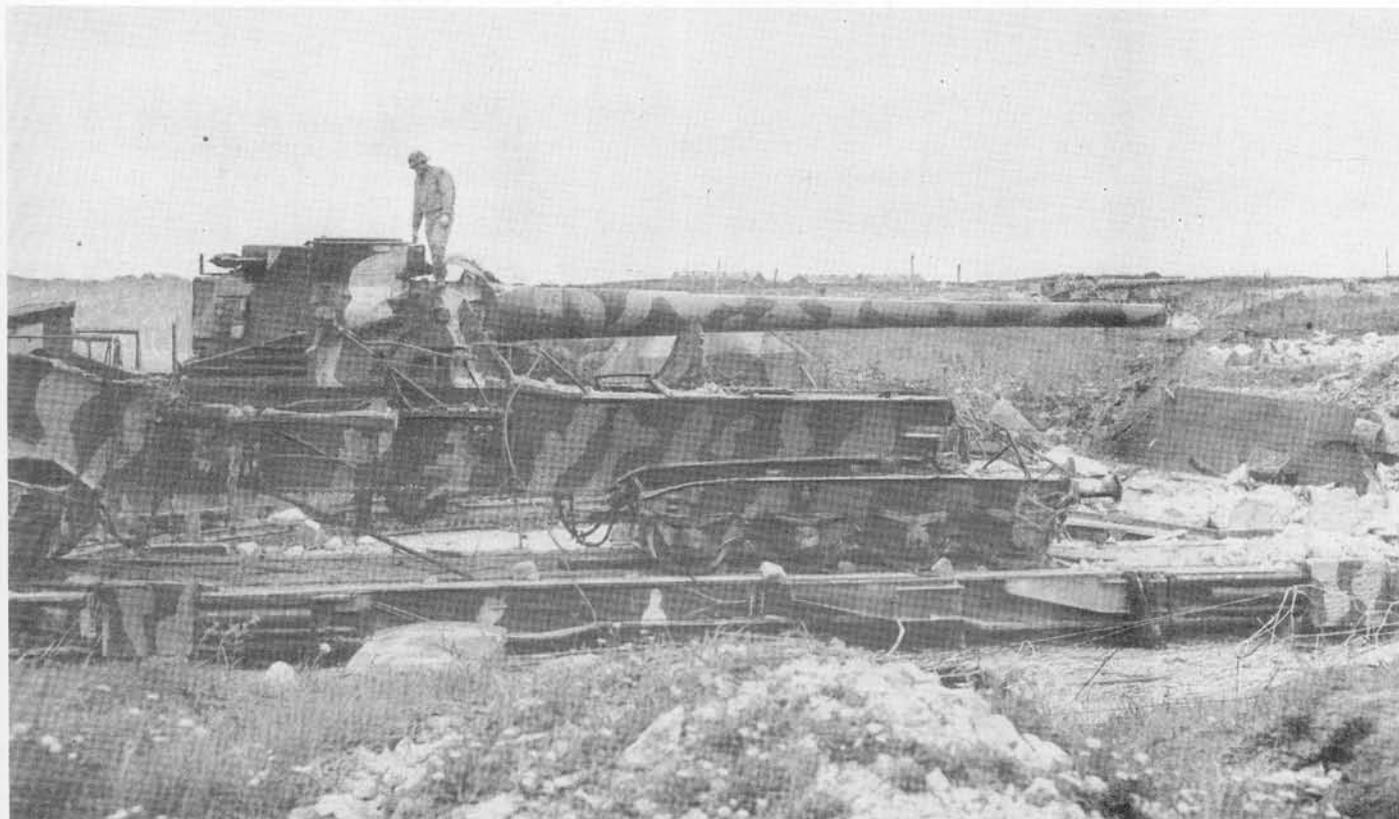
## SPECIFICATIONS

Caliber .....	210 mm (8.27 ins.)
Weight (traveling position) Three loads approx. 16½ tons each	
Weight (firing position) .....	37.2 tons
Length of barrel including breech ring....	31.3 ft.
Muzzle velocity (max.) .....	2,625 f/s
Max. range (horizontal) .....	32,800 yds.
Traverse .....	360°
Wt. of max. charge .....	82.8 lbs.
Elevation .....	45°
Depression .....	—4°
Ammunition .....	H.E.; Anti-concrete; A.P.
Wt. of projectile .....	All 298 lbs.

# RAILWAY GUN

20 cm K. (E)

GERMAN



Batteries of these railway guns in concrete emplacements were found on both the Cherbourg and Brest Peninsulas in France. Equipment consisted of the gun, carriage, turntable, power plant and electrical operating unit, and ammunition car.

The piece is of the built-up type, consisting of a tube and two jackets. It is screwed into the breech ring. The breechblock is of the horizontal sliding wedge type. The hydropneumatic recoil system has two cylinders located under the carriage; the pistons are fastened to the lower end of the breech ring.

The carriage, when mounted on a turntable, has a traverse of 360 degrees; it is estimated that elevation is from 0 to 840 mils. The turntable, consisting of two sections bolted together, rotates on a central pivot and a portable circular track. Four wheels at each end of the turntable support it on the track. Electric motors are geared through these wheels to rotate the piece in azimuth. It is very similar to the 28 cm K. 5 (E) reported on page 100.2.

A small ammunition car, equipped with a removable roof, is mounted on trucks and runs on a two-rail track which is built in as a part of the turntable track.

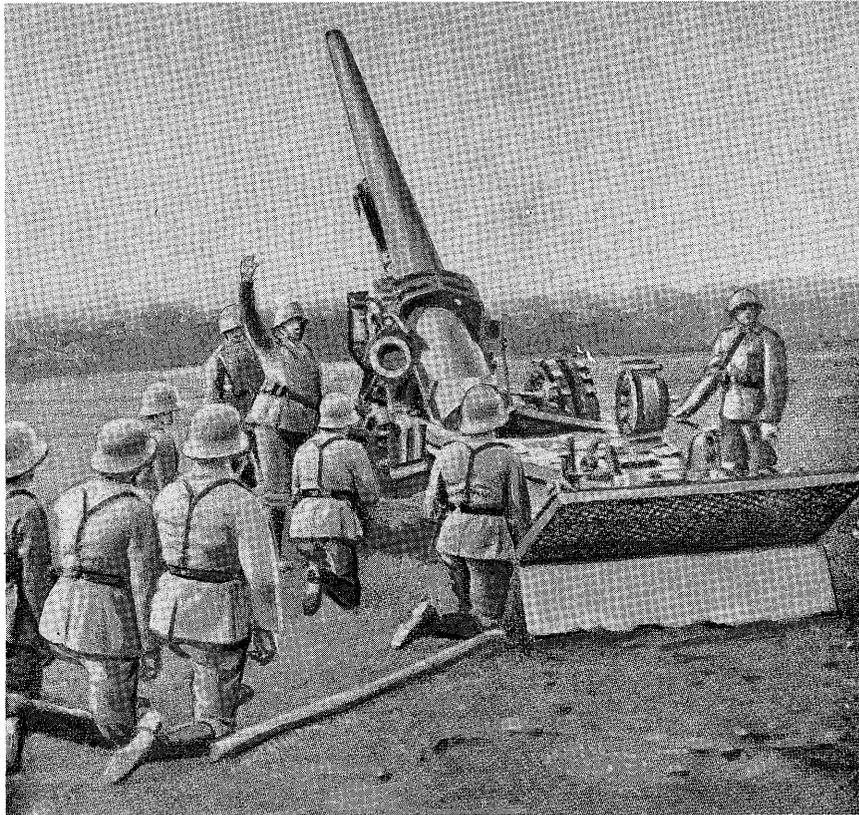
## SPECIFICATIONS

Weight of gun .....	45,500 lbs.
Weight of carriage w/ gun .....	189,000 lbs.
Caliber .....	203 mm (7.982 ins.)
Weight (firing position) .....	92.5 tons
Length (traveling position) .....	63 ft. (approx.)
Height (traveling position) .....	13 ft.
Height (firing position) .....	.....
Width (overall) .....	13 ft. (approx.)
Track .....	Std. railway gage 56½ ins.
Length of tube .....	30 ft., 7 ins.
Length of tube and breech .....	32 ft., 8½ ins.
Length of rifling .....	22 ft.
Rifling .....	Uniform R.H. twist
No. of grooves .....	64
Width of grooves .....	0.188 in. (approx.)
Depth of grooves .....	.125 in. (approx.)
Width of lands .....	.....
Muzzle velocity (shell) .....	2,800 f/s
Range (est.) .....	36,000 yds.
Traverse (on turntable) .....	360°
Elevation (estimated) .....	47°
Depression .....	0°
Length of recoil (from recoil index slide) .....	25½ ins.
Ammunition.....	APCBC, APBC, HE, Practice, Illuminating with parachute
Wt. of projectile .....	259 lbs.
Wt. of propellant (max. charge) .....	96.5 lbs.

# HEAVY FIELD GUN

15 cm K. 16

GERMAN 



The 15 cm K. 16 differs from other German 15 cm guns by reason of its appreciably heavier projectile. The ammunition employed in the K. 16 is not interchangeable with other guns of the caliber.

This weapon is generally regarded as obsolete, although it may be employed as a coast defense weapon or in some other static role. The piece may be used on the 21 cm Howitzer carriage and then may be known as 15 cm K in Mrs. Laf.

Features of the 15 cm K. 16 are: the location of the buffer and recuperator below the piece; a large three-ribbed collar which surrounds the piece just forward of the breech ring; a cylindrical breech ring; and a box-type trail terminating in a spade of massive dimensions.

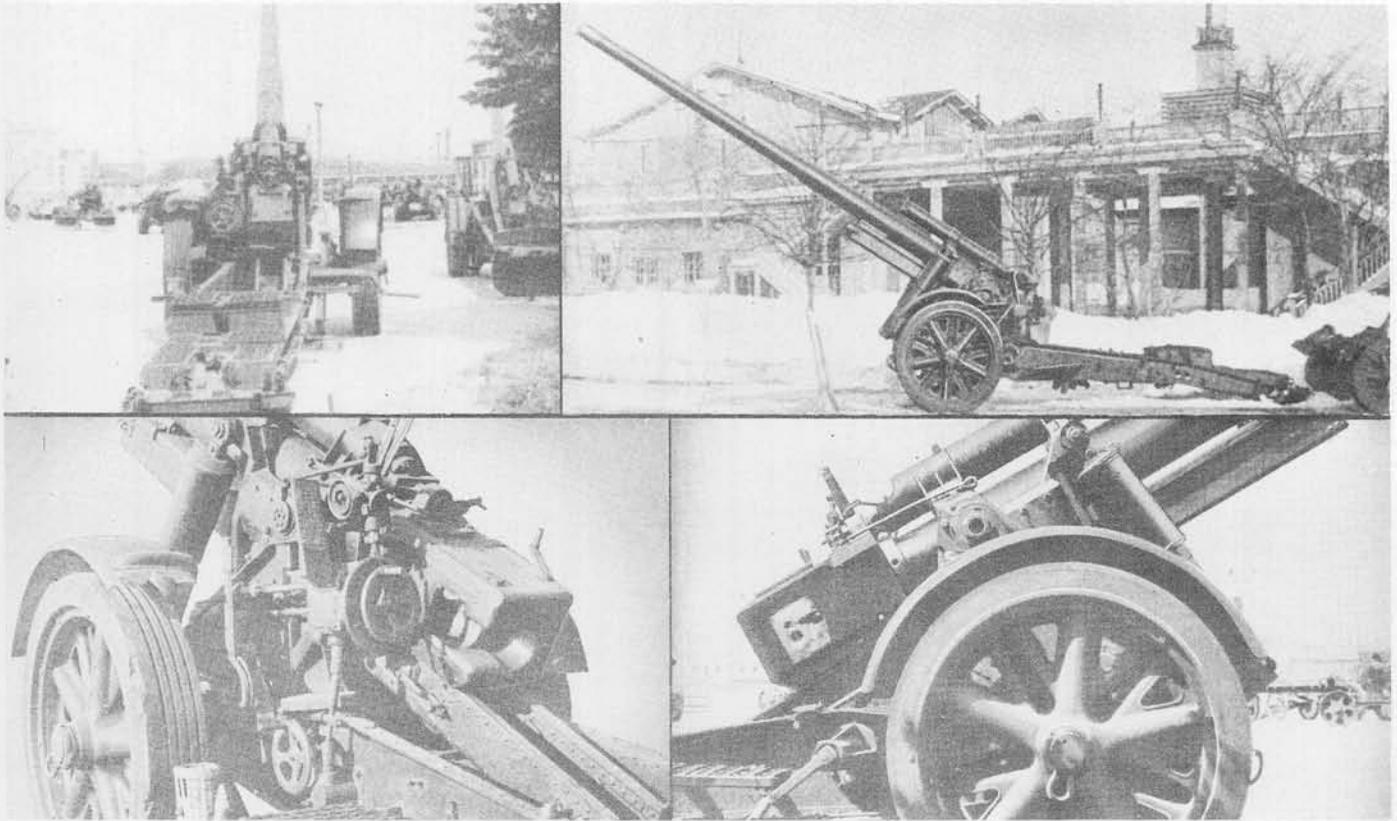
## SPECIFICATIONS

Caliber .....	150 mm (5.9 ins.)
Weight in action .....	24,000 lbs.
Length of piece .....	248 ins.
Elevation .....	42°
Depression .....	—3°
Traverse .....	8°
Maximum range .....	21,370 yds.*
Maximum muzzle velocity .....	2,480 f/s*
Ammunition .....	H. E. Capped
Weight of projectile .....	113 lb.
Propellant	
	16 lb. Ngl R.P. plus 3 oz. igniter powder
	26 lb. Ngl R.P. plus 3 oz. igniter powder
	29 lb. Ngl R.P. plus 3 oz. igniter powder

\*Not verified.

# MEDIUM FIELD GUN

15 cm K. 18



This weapon was being replaced by the 15 cm K. 39 during the closing months of the European war. For transport, the K. 18 may be broken down into two loads and drawn by either horse or truck.

The built-up tube consists of a main tube, breech jacket, and breech ring. Rifling is a 6° constant twist. Hydraulic recoil and hydropneumatic counterrecoil cylinders are of standard German design. The buffer is located below, and the recuperator above the piece.

A rectangular breech ring has a crank-operated horizontal sliding type breechblock opening to the right. Two pneumatic, push-type equilibrators are incorporated in the design.

Elevation and depression are accomplished by means of an off-center elevating arc which is operated by a handwheel on the left side of the piece. The traversing handwheel is also located on the left.

The carriage is mounted on two rubber-tired wheels and has a hollow, box-type trail allowing a total traverse of 12 degrees.

The ammunition is semi-fixed; there are three charges.

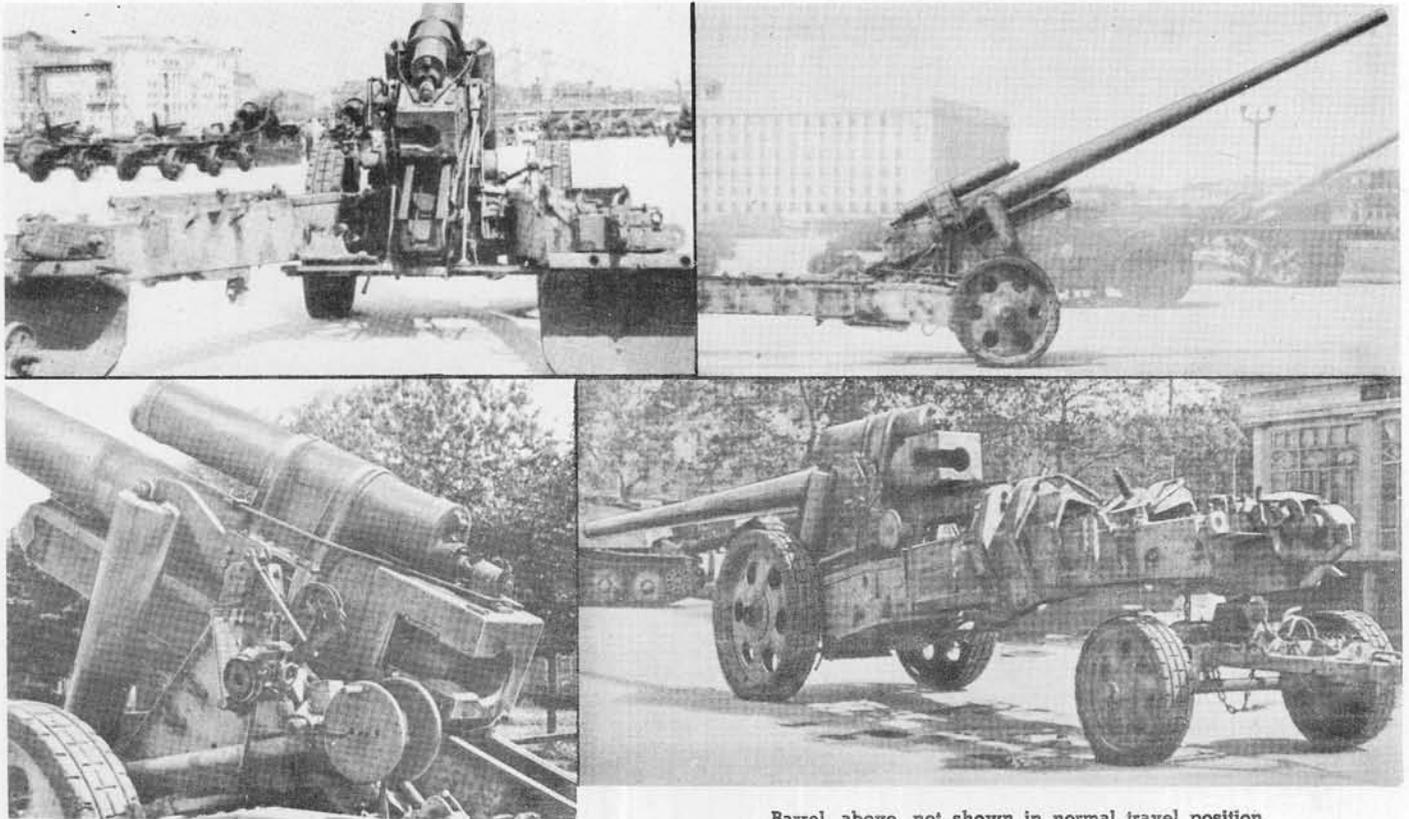
## SPECIFICATIONS

Caliber .....	149 mm
Weight (firing position) .....	28,400 lbs.
Maximum chamber pressure....	41,200 lbs./sq. in.
Length of barrel .....	323 ins.
Twist of rifling, constant .....	6°
Length of rifling .....	253 ins.
Volume of chamber .....	1,770 cu. in.
Muzzle velocity .....	2,840 f/s
Max. range (horizontal) .....	27,000 yds.
Traverse .....	12°
Elevation .....	43°
Depression .....	2°
Length of recoil .....	1,450 mm
Ammunition types—HE; anticoncrete	
Weight of max. charge .....	42.5 lbs.
Weight of projectile (HE) .....	94.6 lbs.

# MEDIUM FIELD GUN

GERMAN 

15 cm K. 39



Barrel, above, not shown in normal travel position

The K. 39 was gradually replacing the K. 18 as Germany's standard medium mobile artillery weapon. It is basically the same design as the earlier model, and has an identical range, muzzle velocity, and chamber pressure. Modifications to the piece, while extensive, were confined largely to the carriage, which resembles the 15 cm s. F. H. 18, page 105.

The tube is approximately two inches longer than that of the K. 18, and the rifling was changed from a 6° constant twist to a variable one, increasing from 4° 17' to 5° 59'. The breech mechanism is of the horizontal sliding block type. The hydraulic recoil cylinder is apparently the same as that on the K. 18, but the hydro-pneumatic counterrecoil cylinder is shorter and larger in diameter than that of the earlier model. Length of recoil varies from 1250 mm to 1500 mm (49.2 inches to 59.2 inches). The equilibrators of both the K. 18 and the K. 39 are of the push type, but those on the K. 39 are spring activated. Elevation and traverse are accomplished in much the same manner, changes being principally in the location of the handwheels. A rigid gunners' platform constructed of a non-skid open steel lattice work is bolted to the upper carriage. Although awkward in appearance, it performs the function for which it was intended without hampering the movements of the crew about the gun.

Traverse has been increased from 12° to 60° by the use of a split trail with detachable spades instead of the box-type trail used on the K. 18.

## SPECIFICATIONS

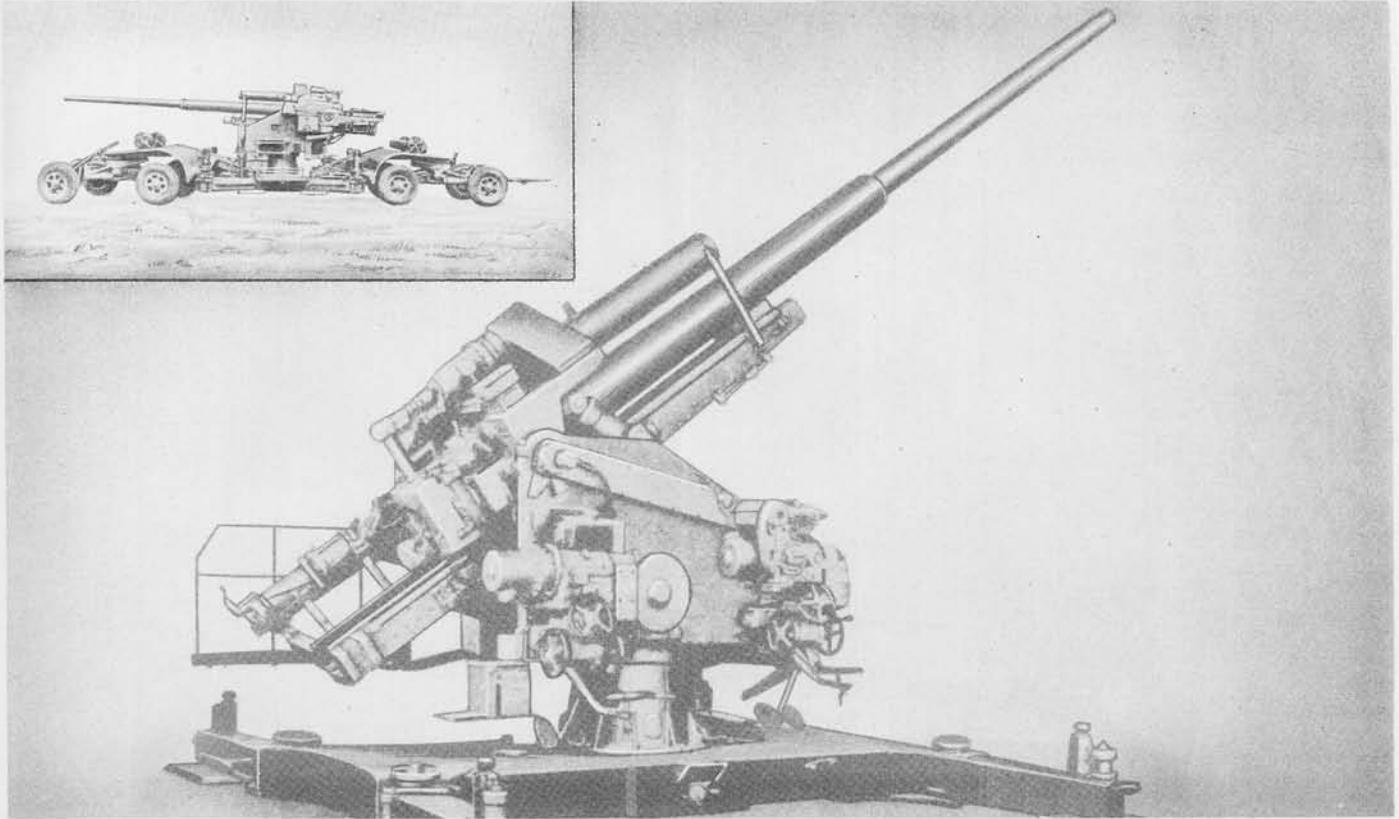
Caliber .....	149 mm
Weight (traveling position) .....	
Weight (firing position) .....	27,300 lbs.
Length (traveling position) .....	
Length (firing position) .....	
Height (traveling position) .....	
Height (firing position) .....	
Width (overall) .....	
Width of trail spread .....	
Twist of rifling—increasing .....	4° 17' to 5°
Length of barrel .....	325 ins.
Length of rifling .....	256.6 ins.
Volume of chamber .....	1,829 cu. ins.
Muzzle velocity .....	2,840 f/s
Max. range (horizontal) .....	24.7 km
Rate of fire .....	
Traverse .....	60°
Elevation .....	45°
Depression .....	4°
Length of recoil (max.) .....	1,500 mm
Ammunition types—H.E.; anticoncrete, APHE	
Weight of max. charge .....	41.2 lbs.
Weight of projectile (HE) .....	94.6 lbs.

# HEAVY ANTI-AIRCRAFT GUN

GERMAN



12.8 cm Flak 40



This weapon, together with the 8.8 cm Flak 41, is Germany's standard heavy anti-aircraft gun. There are four different type mounts used with the gun: mobile, static, railway, and a twin mounting. When used with the latter, the equipment is known as the 12.8 cm Flakzwilling.

In construction and appearance this weapon resembles the 10.5 cm anti-aircraft gun described on page 109. The barrel consists of a three-piece tube with jacket and sleeve. The breech mechanism is of the horizontal sliding block type, and an electric firing device is used. A hydropneumatic recuperator is located above the barrel, and a hydraulic buffer below.

Elevating and traversing may be operated either by power or by handwheels; are located on the right side of the equipment with the layers seated facing the gun. A machine fuze setting gear and loading and ramming gear identical with those of the 10.5 cm Flak are used.

The static mounting is a pedestal type secured to a concrete base. The cradle pivots in trunnions mounted at the extreme rear of the upper carriage, and almost in line with the breechblock. A large box-like construction, located underneath the buffer and forward of the elevating arc, contains the oil motors. The equilibrators extend from an anchoring just forward of the trunnions to the forward edge of the casing containing the oil motors.

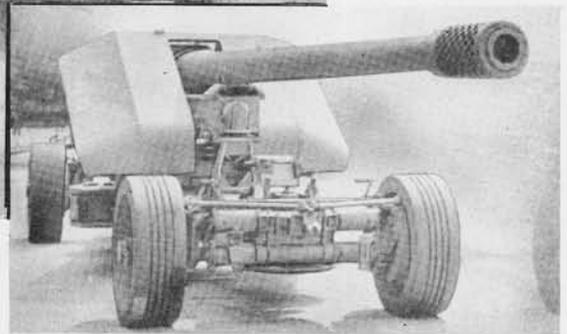
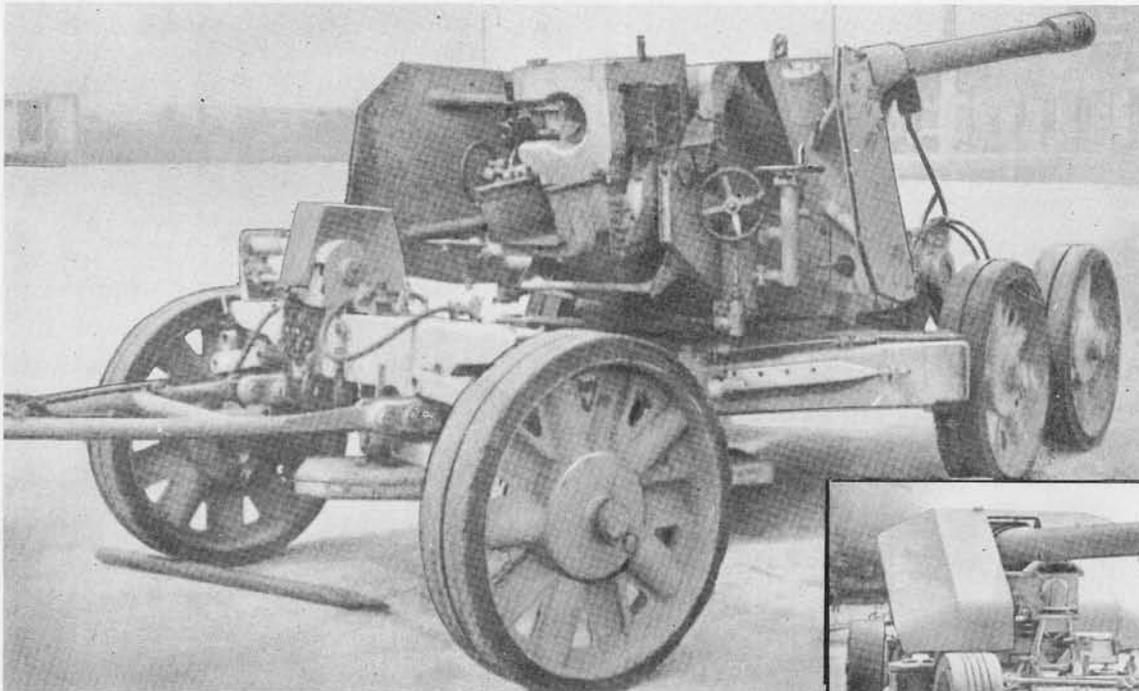
The gun being extremely high off the ground, platforms for the gun crew are provided. The gun is fitted to receive firing data by remote control transmission. A normal panoramic sight is provided as well as an antitank sight.

## SPECIFICATIONS

Caliber	12.8 cm (5.04 ins.)
Weight (static mount)	28,600 lbs.
Weight (traveling position)	59,400 lbs.
Mobile mount	
Weight (firing position)	37,400 lbs.
Mobile mount	
Length (traveling position)	49 ft.
overall	
Length (firing position)	29 ft.
overall	
Height (traveling position)	
Height (firing position)	
Height of trunnions (firing position)	7 $\frac{5}{8}$ ft.
Width (overall)	
Length of piece	308.5 ins. (61 calibers)
Length of rifling	255.13 ins.
Twist of rifling (increasing)	3° 20' to 5° 30'
No. of grooves	40
Width of grooves (forward section)	0.26 in.
(center section)	0.25 in.
Depth of grooves	0.06 in.
Width of lands (forward section)	0.13 in.
(center section)	0.14 in.
Muzzle velocity (H.E. shell)	2,886 f/s
Max. range (horizontal)	20,950 meters (22,910 yds.)
Max. ceiling at 85°	14,800 meters (48,555 ft.)
Rate of fire	12 r.p.m.
Traverse	360°
Elevation	88°
Depression	-3°
Length of recoil	from 36 to 51 ins.
Ammunition	A.P.C., H.E.
Wt. of complete round (approx.)	106 lbs.
Wt. of H.E. projectile (12.8 cm Sprgr. Patr. I. 4.5)	57 lbs.
Wt. of A.P.H.E. projectile (12.8 cm Pzgr. Patr.)	58.13 lbs.

# MEDIUM FIELD GUN

12.8 cm K. 44



Left: Rheinmetall Model; Right: Krupp Model.

There are two versions of the 12.8 cm dual purpose, anti-tank/field gun, one manufactured by Rheinmetall and the other by Krupp. The Rheinmetall model has a slightly longer breech ring; the carriage has one rear axle and two front axles, whereas the Krupp model has one rear and one front axle. Reports indicate that there may be a third version designated 12.8 cm K. 81.

The tube, of monobloc construction, is equipped with a cylindrical muzzle brake having perforations on both sides. The muzzle brake of the Krupp model is shorter and has the greater number of perforations. The manually operated breechblock is of the horizontal sliding type.

A variable hydropneumatic recoil mechanism is provided, the recoil and recuperator cylinder being carried within the cradle. Two hydropneumatic equilibrators, one on either side of the tube, compensate for muzzle preponderance.

The piece is mounted on a cruciform platform. The carriage, which incorporates torsion bar suspension, is jacked off the wheels in firing and, with the outriggers extended, a 360° traverse may be obtained. Elevating and traversing handwheels are fitted to both sides of the carriage, and a seat for the gunner is provided on the left.

A single shield is used with the Krupp gun, while the Rheinmetall version is equipped with a spaced shield. Both types, however, are angular in appearance and the sides are swept back towards the rear.

## SPECIFICATIONS

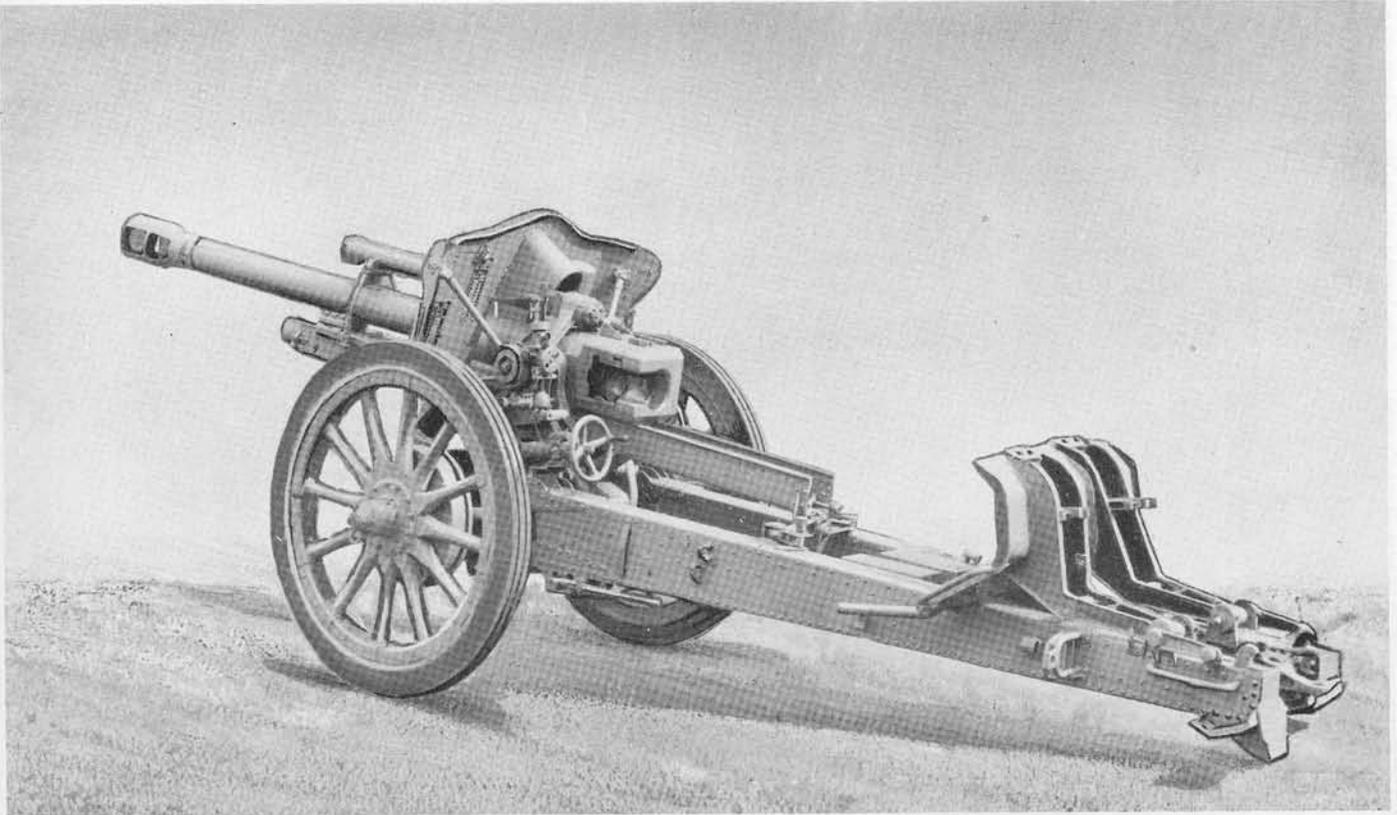
	Rheinmetall	Krupp
Length of gun (including muzzle brake and breech ring) .....	312½ ins.	299 ins.
Length of gun (including breech ring).....	277½ ins.	277½ ins.
Length of chamber (from rifling) .....	41¾ ins.	41¾ ins.
Length of rifling.....	219½ ins.	219½ ins.
Overall length (traveling position) .....	not determined	433 ins.
Overall width (traveling position) .....	108¼ ins.	98 ins.
Overall height (traveling position) .....	81 ins.	90 ins.

# LIGHT FIELD HOWITZER

GERMAN



10.5 cm l. F. H. 18 (M)



In order to obtain longer range, the 105 mm German Howitzer l. F. H. 18 was modified so that the muzzle velocity of the weapon could be increased. The Germans accomplished this by preparing a new propellant charge (Fern ladung—long range charge) which increases the muzzle velocity from approximately 1,542 feet per second to 1,772 feet per second, and the range from approximately 11,670 yards to 13,500 yards. To compensate for the increased velocity and the resulting recoil, the Germans found it necessary to add a muzzle brake. It was also necessary to slightly modify the recoil mechanism and to increase the nitrogen pressure in the counterrecoil cylinders from 730 pounds per square inch to 854 pounds per square inch. To differentiate between the two models, the letter "M" (Mündungsbremse—Muzzle Brake) was added to the old nomenclature, hence the later model is known as the l. F. H. 18 (M).

The tube is of monobloc construction. The weapon has a continuous pull firing mechanism and a breech mechanism of the horizontal sliding type. The carriage, of riveted and welded steel, is equipped with split trails, folding spades, wooden wheels with rubber tires, and a protective armor shield 4 mm thick. It also has hand operated friction brakes.

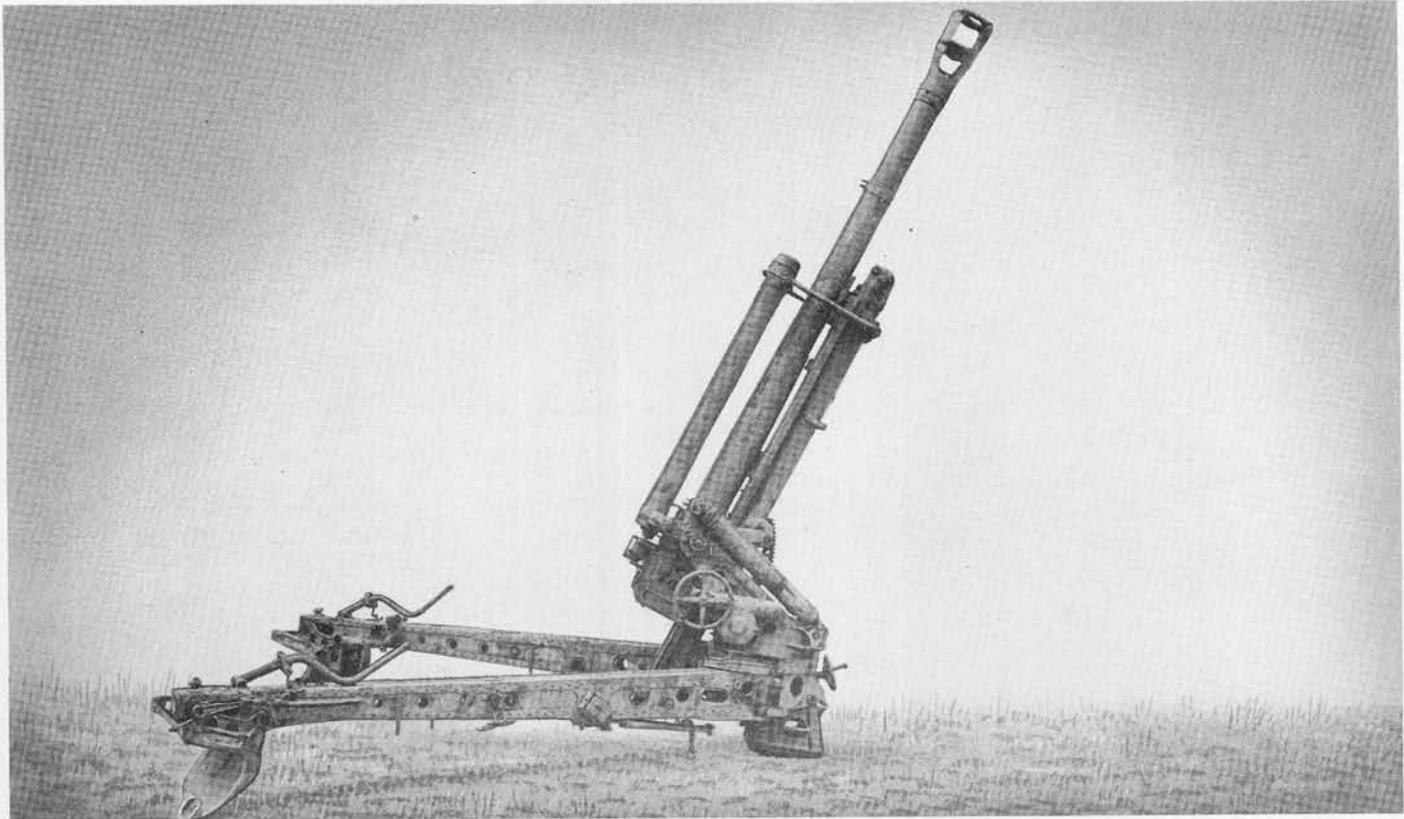
## SPECIFICATIONS

Caliber .....	105 mm (4.13 ins.)
Weight (traveling position) .....	4,255 lbs.
Weight (firing position) .....	
Length (traveling position) .....	19 ft., 6 ins.
Length (firing position).....	20 ft., 5 ins. (at 0° elev.)
Height (traveling position) .....	5 ft., 9 ins.
Height (firing position) .....	5 ft., 9 ins.
Width (overall) .....	6 ft., 6½ ins.
Width of trail spread .....	15 ft., 10 ins.
Length of bore .....	25.7 cal.
No. of grooves .....	32—R.H. Progressive Twist
Width of grooves .....	
Depth of grooves .....	
Width of lands .....	
Muzzle velocity (maximum) .....	1,772 f/s*
Max. range (horizontal) (Reported).....	13,500 yds.
Traverse .....	56°
Elevation .....	40°
Depression .....	7°
Length of recoil .....	39.3 ins.—46.8 ins.
Ammunition.....	H.E. w/P.D. Fuze; Hollow Charge; Smoke; A.P.; Incendiary
Wt. of projectile..	32¾ lb. (Long Range H.E. Shell)

\*Reports indicate that a special long range H.E. shell weighing approximately 32¾ lb. is used with the super charge to obtain this muzzle velocity.

# MOUNTAIN HOWITZER

10.5 cm Geb. H. 40



The 10.5 cm Geb. H. 40, introduced into the German Army in 1942, is the companion piece to the 7.5 cm Geb. G. 36 described on page 118. Its design is basically the same as that of the 10.5 cm le. F. H. 18 (M). The weapon can be split into nine loads for transport.

The barrel, of monobloc construction, is fitted with a double baffle muzzle brake with wide side flanges; the breech mechanism is of the horizontal sliding block type. A hydraulic buffer is built into the cradle on which the barrel slides in recoil, and a hydro-pneumatic recuperator is mounted above the barrel.

The split trail carriage has trails of riveted box construction which are fitted with large detachable spades. It is mounted on wheels of cast light alloy with detachable rims and solid rubber tires. The wheels are mounted on stub axles fitted to the trail legs and remain parallel to the legs when they are opened. Internal expanding brakes, adjusted by a handwheel from the front, are fitted to both wheels. The traversing and elevating handwheels are located on the left and right sides of the carriage respectively.

There are two range drum scales: one in mils ranging from 0 to 1,250; the other in meters ranging from 0 to 1,500 for hollow charge ammunition and from 1,500 to 9,675 for high explosive shells, both with charge 6 in the lower register.

## SPECIFICATIONS

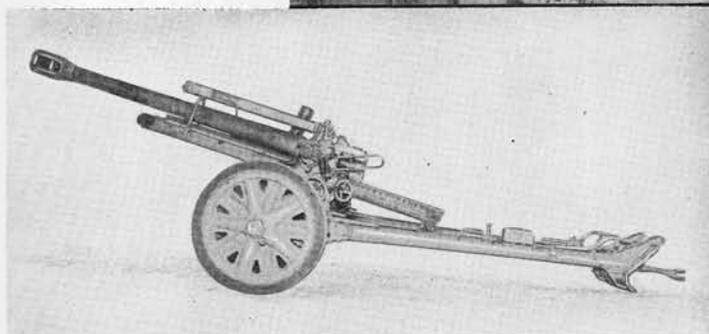
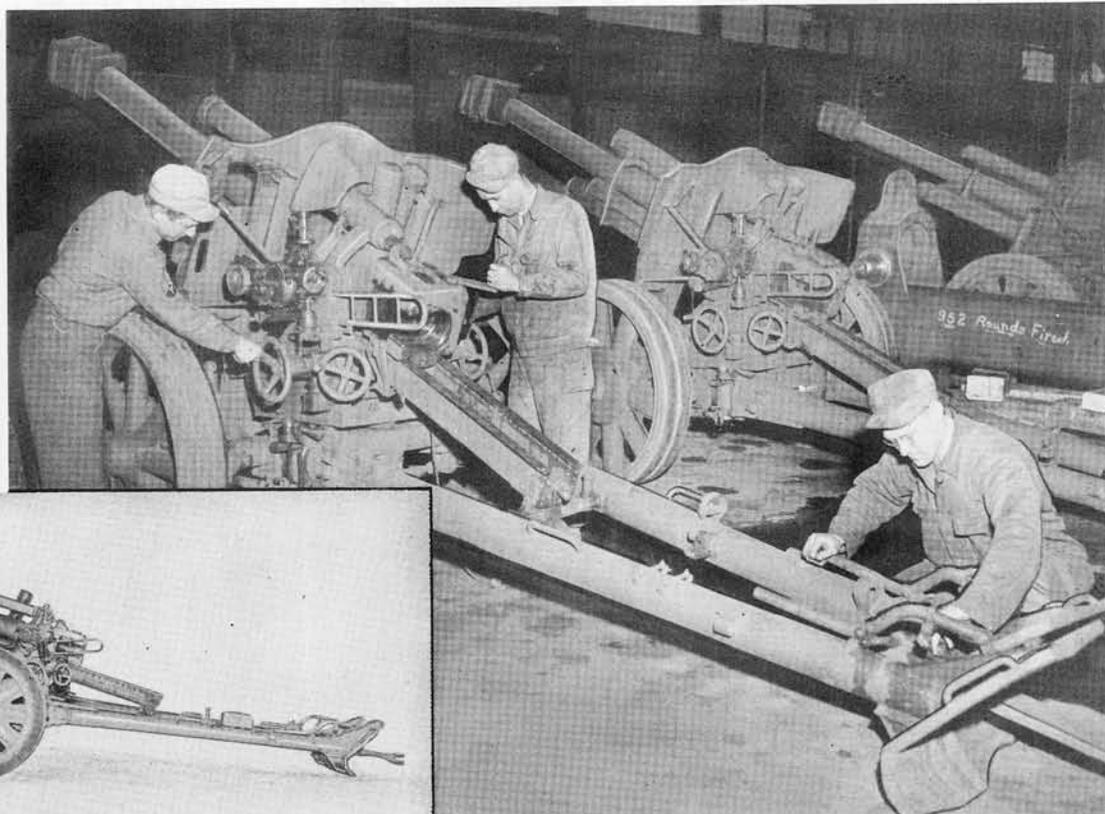
Caliber .....	105 mm (4.14 ins.)
Weight (traveling position) .....	
Weight (firing position) .....	3,660 lb.
Length of piece .....	10 ft., 4 ins.
Length (firing position) .....	18 ft., 6 ins.
Height (traveling position) .....	
Height (firing position) .....	4 ft., 11 ins.
Width (overall) .....	4 ft., 6 ins.
Width of trail spread.....	
Length of bore .....	9 ft., 5 ins.
No. of grooves .....	32
Width of grooves .....	
Depth of grooves .....	
Width of lands .....	
Muzzle velocity .....	1,870 f/s
Max. range (horizontal) .....	13,807 yds. (Chg. 7)
Max. range (vertical) .....	
Rate of fire .....	
Traverse .....	25°, 20' left and right
Elevation .....	70°
Depression .....	-4°, 47'
Length of recoil (variable)....	19.7 ins. to 49.2 ins.
Ammunition....	10.5 cm F.H. Gr. Al. (32 lb.)*
	10.5 cm F.H. Gr. 38 Al.
	10.5 cm F.H. Gr. Buntrauch (32 lb.)
	10.5 cm 39 rot HL/A and HL/B
	(25.8 lb.)—Chg. 6 only.
	10.5 cm 39 rot AL/C

\*A star shell is also reported to be fired with Charge 6.

# LIGHT FIELD HOWITZER



10.5 cm le. F. H. 18/40



Feeling the need of a weapon having the performance characteristics of the le. F. H. 18 (M) but lighter in weight, the Germans brought out, early in 1944, a modified version mounted on the carriage of the 7.5 cm Pak 40. This carriage was used because at that time it was in large scale production and required a minimum amount of modification to adapt it for use with the howitzer.

The piece, of monobloc construction with a removable breech ring, is fitted with a double baffle muzzle brake having projecting wings welded on to give it the increased efficiency necessary for the lightened carriage.

The breech mechanism is a manually operated horizontal sliding block type. The firing mechanism is of the percussion type with the lever on the left side of the cradle.

The cradle is a rectangular box design. A single hydro-pneumatic equilibrator is attached to the right side of the cradle. The recoil is a hydropneumatic type, independent system.

The elevating handwheel and firing mechanism are now so located on the left hand side of the carriage that the layer can carry out the three operations of traversing, elevating, and firing, making the weapon suitable for direct fire.

The suspension consists of two torsion bars each extending the full width of the carriage body. As the two pieces are ballistically identical, the le. F. H. 18 (M) and the le. F. H. 18/40 use the same range tables.

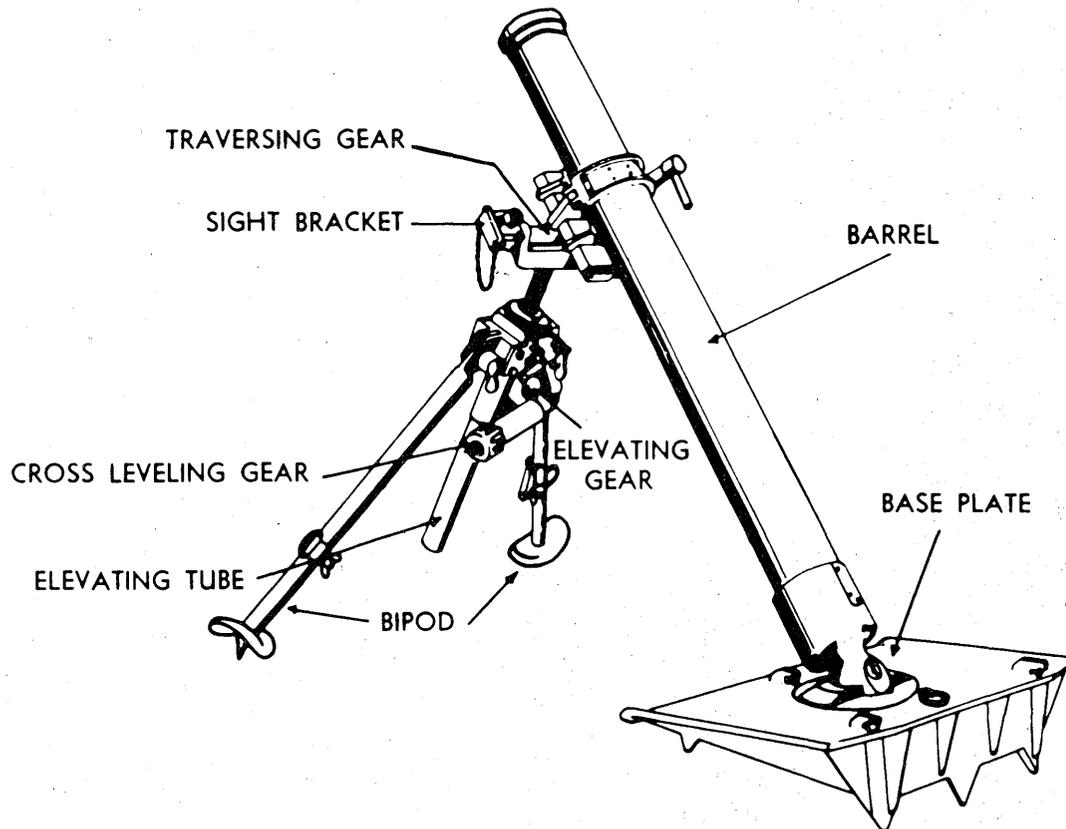
A normal type of German artillery field sight is used for laying.

## SPECIFICATIONS

Caliber .....	105 mm (4.13 ins.)
Weight (firing position) .....	4,322 lbs.
Length (overall) .....	20 ft., 2 ins.
Height (overall) .....	6 ft.
Height (firing position) .....	
Width (overall) .....	6 ft., 11 ins.
Length of barrel excluding muzzle brake .....	115.75 ins.
Length of tube .....	106.66 ins.
Length of rifling .....	93.06 ins.
Rifling .....	Increasing twist; 1 in. 23 to 1 in. 17 $\frac{3}{4}$
No. of grooves .....	32
Width of grooves .....	0.220 in.
Depth of grooves .....	0.04 in.
Muzzle velocity (H.E. long range shell) ..	1,772 f/s
Wt. of projectile .....	32 lbs., 11 ozs.
Max. range (horizontal) .....	13,479 yds.
Max. range (vertical) .....	
Max. pressure .....	34,000 lbs./sq. in.
Rate of fire .....	
Traverse .....	56°
Elevation .....	40°
Depression .....	6°
Length of recoil .....	
Ammunition .....	H.E.; H.E./I; Incendiary; Smoke; Star Shell; Prop. Leaflet Shell; Hollow Charge; Indicator Shell.

# SMOKE MORTAR

10 cm Nebelwerfer 35



The 10 cm Nebelwerfer, standard smoke and chemical mortar in use by the German Army, has also been used, to some extent, by airborne troops. It is serviced by five men and transported on a two-wheeled handcart.

Although the standard ammunition for the weapon is a 16-pound smoke shell designated Wurfgranate 35, a 19-lb. high explosive shell, Wurfgranate 40 is also used.

The mortar, which is merely a heavier and larger model of the German 8 cm mortar, consists of a barrel, bipod, and baseplate constructed on the usual mortar lines. The traversing gear, however, is unusual in that the traversing screw is housed in a sleeve which is supported by the two ends of a box-shaped yoke secured to the top of the elevating screw.

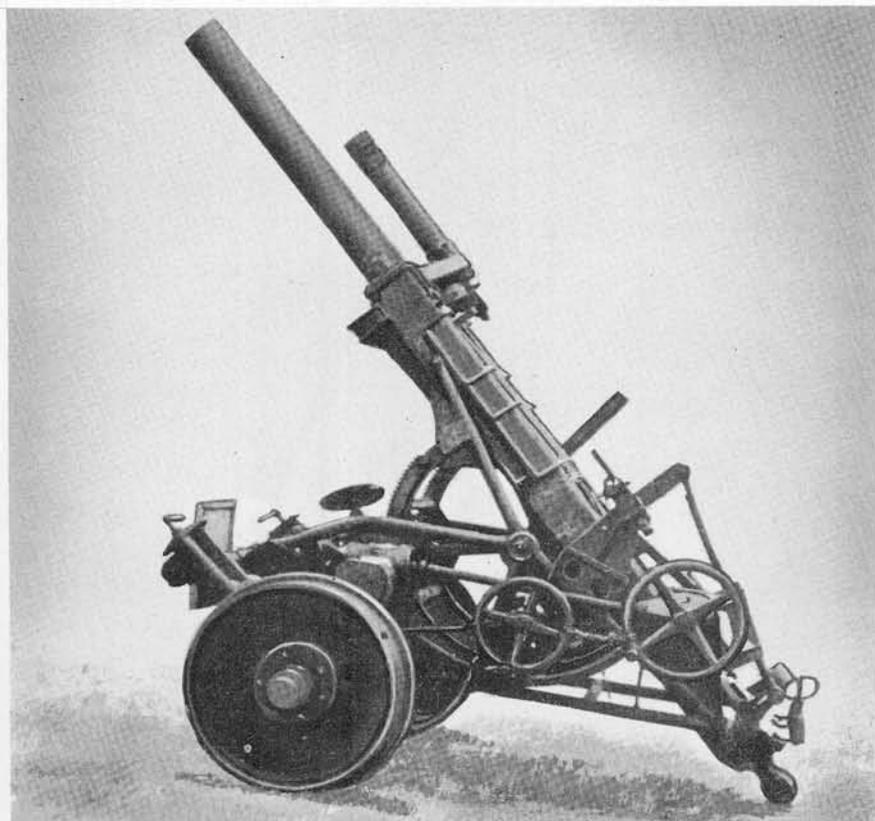
## SPECIFICATIONS

Caliber .....	105 mm (4.1 ins.)
Weight in action .....	228 lb.
Weight of barrel .....	72 lb.
Weight of bipod .....	73 lb.
Weight of baseplate .....	83 lb.
Method of operation.....	Muzzle loaded; percussion fired
Maximum range .....	3,300 yds.*
Rate of fire .....	12-15 rds./min.
Ammunition.....	H.E. and Smoke
Weight of shell .....	16 lb. (Wurfgranate 35) Smoke 19 lb. (Wurfgranate 40) H.E.
Transport .....	2-wheeled handcart

\*Not verified.

# SMOKE MORTAR

10 cm Nebelwerfer 40



This weapon is designed for either smoke, chemical, or high explosive ammunition.

The smooth-bored tube of monobloc construction is independent of the breech and breech block. When the piece is loaded, both breech and breech block remain stationary, and the back end of the tube moves outward in a vertical direction in grooves cut into the inside of the legs of the breech block. During this operation, the tube pivots about its trunnions located midway between the muzzle and breech ends. There is no spring tension in the breech mechanism so that its movement is entirely manual. The piece is fired by percussion, a spring-driven firing pin being located in the breech block. The firing lever is located just below the breech operating lever.

There are two recoil cylinders, one located on either side of the tube. The cylinders are anchored to the ends of the frame, and the pistons attached to the sides of the breech. The counterrecoil system is located above the tube. Its cylinder is attached to the frame, and the piston to the yoke. Apparently both the recoil and the counterrecoil system is hydropneumatic.

The weapon is fired from the base plate (missing in photo) and wheels. In order to traverse the piece, it is pivoted about a ball and socket joint in the base plate by means of an axle traversing mechanism of ordinary design. Elevation is controlled by two parallel arcs which travel on pinions geared to and rotated by the elevating handwheel. Both traversing and elevating handwheels are located on the left side, as is also the sight bracket.

## SPECIFICATIONS

Caliber .....	105 mm (4.1 in.)
Weight (traveling position) .....	
Weight (firing position) .....	1,730 lb.
Length (traveling position) .....	
Length (firing position) .....	
Length of barrel .....	(16 calcs.) 66 ins.
Height (traveling position) .....	
Height (firing position) .....	
Width (overall) .....	
Width of trail spread .....	
Length of bore	} ..... Smooth bore
No. of grooves	
Width of grooves	
Depth of grooves	
Width of lands	
Muzzle velocity .....	426-1,380 f/s**
Max. range (horizontal) .....	6,810 yds.**
Min. range (horizontal) .....	1,668 yds.
Max. range (vertical) .....	
Rate of fire .....	8-10 rds./min.
Traverse .....	14°
Elevation .....	45°-85°
Depression .....	
Length of recoil .....	
Ammunition .....	H.E.; Smoke; Chemical*
Wt. of projectile .....	H.E.—(20.6 lbs.) Smoke—21.9 lbs.)

\*No chemical ammunition has ever been captured, although it is believed that the gun is designed for that type of shell.

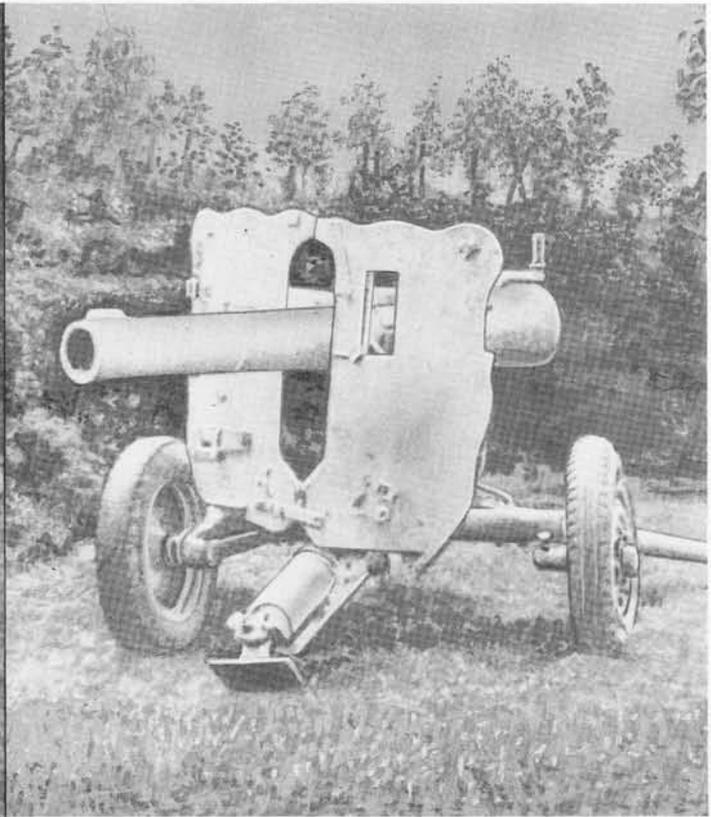
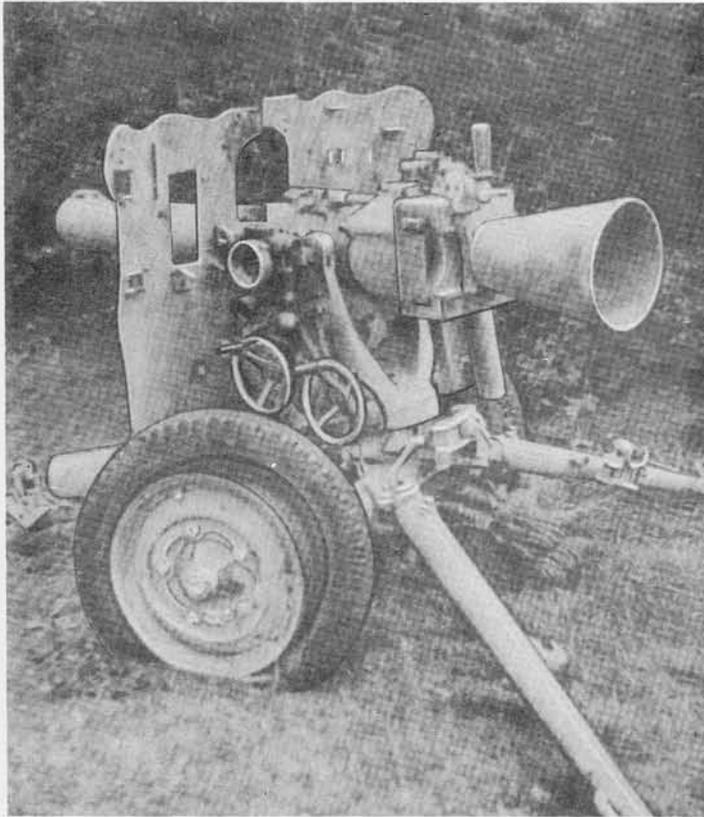
\*\*Not verified.

# RECOILLESS GUN

GERMAN



10.5 cm L. G. 42 and 42/1



This weapon represents modifications of the 10.5 cm L. G. 40 described on page 110. It is a product of Rheinmetall, and was introduced into the German Army in 1943.

The principal changes are as follows: the venturi tube has three steel strips spirally welded to the inner lip presumably to offset torque; elevation of the equipment examined was limited to approximately 30° by a fixed stop; the carriage has been completely changed—it now consists of a single tubular axle to which wheel spindles and three folding trail legs are fitted; a horizontal sliding type breechblock (resembling that of the 7.5 cm L. G. 40) has been installed; the weight has been increased by approximately one-third; the design of the shield differs from the earlier model; the percussion firing mechanism has been retained on top of the breechring necessitating the use of a cartridge case with a side primer.

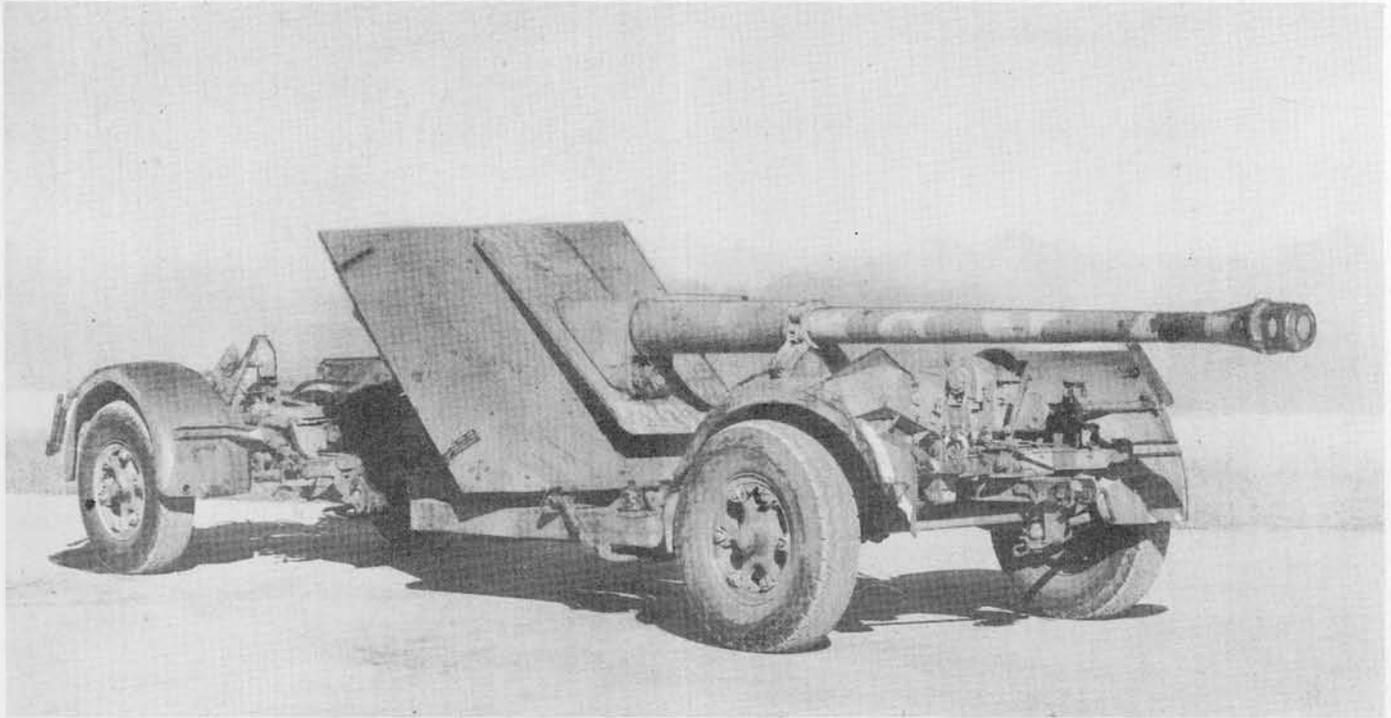
Maximum range is approximately the same as the 10.5 cm L. G. 40 and both models use the same range table. The equipment has been designed to break down into five loads for use as pack or airborne artillery. The two models, 10.5 cm L. G. 42 and L. G. 42/1, differ principally in weight.

As in the case of the 7.5 cm L. G. 40 and 10.5 cm L. G. 40, the characteristic feature of this weapon is the lack of recoil attained by allowing part of the propellant gases to escape to the rear through a venturi tube. The resulting blast creates a danger zone approximately 20 yards wide and 50 yards long to the sides and rear of the gun. The sharp sound of the discharge through the venturi tube makes it necessary for the gun crew to use ear plugs.

## SPECIFICATIONS

Length of piece (including breech ring and venturi) .....	72.28 ins.
Length of rifling .....	31.41 ins.
Twist of rifling .....	10°
No. of grooves .....	32
Length of venturi tube .....	18.18 ins.
Length of chamber .....	18.93 ins.
Capacity of chamber .....	9.5 pints
Weight in action (L. G. 42) .....	1,217 lbs.
(L. G. 42/1) .....	1,191 lbs.
Elevation .....	15° to 42°
Traverse	
at elevations up to 12° .....	360°
at elevations over 12° .....	71°
Ammunition.....	H.E., H. E. I., Hollow Charge, Smoke.
Muzzle velocity (H.E. Shell) .....	1,099 f/s
Maximum range .....	8,694

## 8.8 cm Pak 43



The 8.8 cm Pak 43 is an electrically fired, semiautomatic gun, mounted on a cruciform platform (Kreuzlafette) and transported on two single axle limbers similar to those used on the 8.8 cm Flak 18. It has a very low silhouette, on wheels the height to the top of the shield is 5 feet, 6 inches, and to the trunnions, 4 feet. When emplaced it is 12 inches lower.

The gun can be fired from its wheels without extending the side legs, if the direction of fire does not exceed 30° either side of the longitudinal girders. If the direction of fire is greater than 30°, the side legs must be extended and the pads brought firmly in contact with the ground. There is an automatic electric cut-out to the firing gear which restricts elevation to 12° on early equipments and 16° on later equipments when firing over the mounting legs.

There are several other versions of the Pak 43. The Pak 43/41 (page 113) has a two-wheeled carriage with split trails. The Pak 43/1 (page 34) is a self-propelled gun called the "Rhinoceros." Its chassis is a combination of a Pz. Kw. III and Pz. Kw. IV. The Pak 43/2 (page 39) is a self-propelled gun called the "Elephant"; it is also mounted on the chassis of the Panther (Pz. Kw. V). All of these guns use the same ammunition and have the same ballistic characteristics.

## SPECIFICATIONS

Caliber .....	88 mm (3.46 ins.)
Weight (traveling position) .....	13,000 lb.
Weight (firing position) .....	7,900 lb.
Length (traveling position) .....	
Length (firing position) .....	
Height (traveling position) .....	5 ft., 6 ins.
Height (firing position) .....	4 ft., 6 ins.
Width (overall) .....	
Length of barrel (w/o muzzle brake).....	247.5 ins.
Length of bore .....	236.9 ins.
No. of grooves .....	32
Width of grooves .....	.202 in.
Depth of grooves .....	.048 in.
Width of lands .....	.134 in.
Muzzle Velocity (A.P.C.B.C. shell) .....	3,280 f/s
(H.E. shell) .....	2,460 f/s
Max. range (horizontal).....	17,500 yds. (H.E. shell)*
Max. range (vertical) .....	
Rate of fire .....	
Traverse .....	360°
Elevation .....	40°
Depression .....	-8°
Length of recoil (normal) .....	47.5 ins.
Ammunition .....	A.P.C.B.C.—H. E.
Wt. of projectile .....	(H.E.) 20.68 lbs.**
	(A.P.C.B.C.) 22 lbs.

\*Unconfirmed

\*\*AP 40 round (tungsten carbide core)

Pzgr. Patr. 40/43 .....

16 lb.

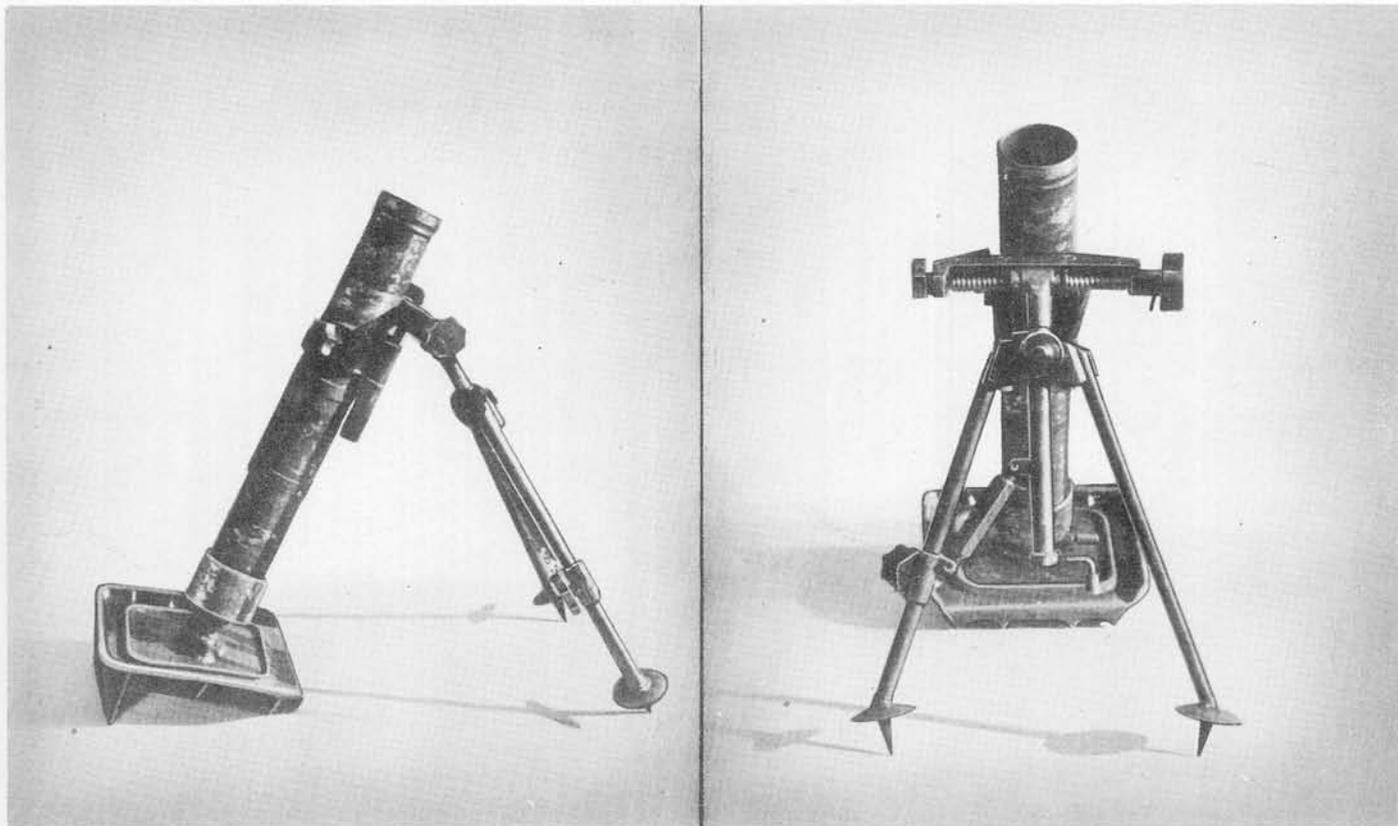
Gr. Patr. 39 HL/A and B .....

16.8 lb.

# SHORT MORTAR

Kz. 8 cm. Gr. W. 42

GERMAN 



This weapon is of the same general design as the standard 8 cm mortar (s. Gr. W. 34) described on page 114. It is, however, shorter and lighter. It differs from the original weapon in the following respects:

The Model 42 has a shorter barrel with no striker control bolt at the base. It has a smaller baseplate, square in shape, with no carrying handle. The barrel is fastened to the baseplate by a spring catch. It also has a smaller bipod.

The elevating handle is situated at the base of the elevating column between the bipod legs. The cross levelling screw is halfway down the elevating column, and is connected to the left bipod leg by a sliding screw clamp.

The sight is situated on the left side of the traversing screw. Ammunition fired is the same as for the 8 cm s. Gr. W. 34.

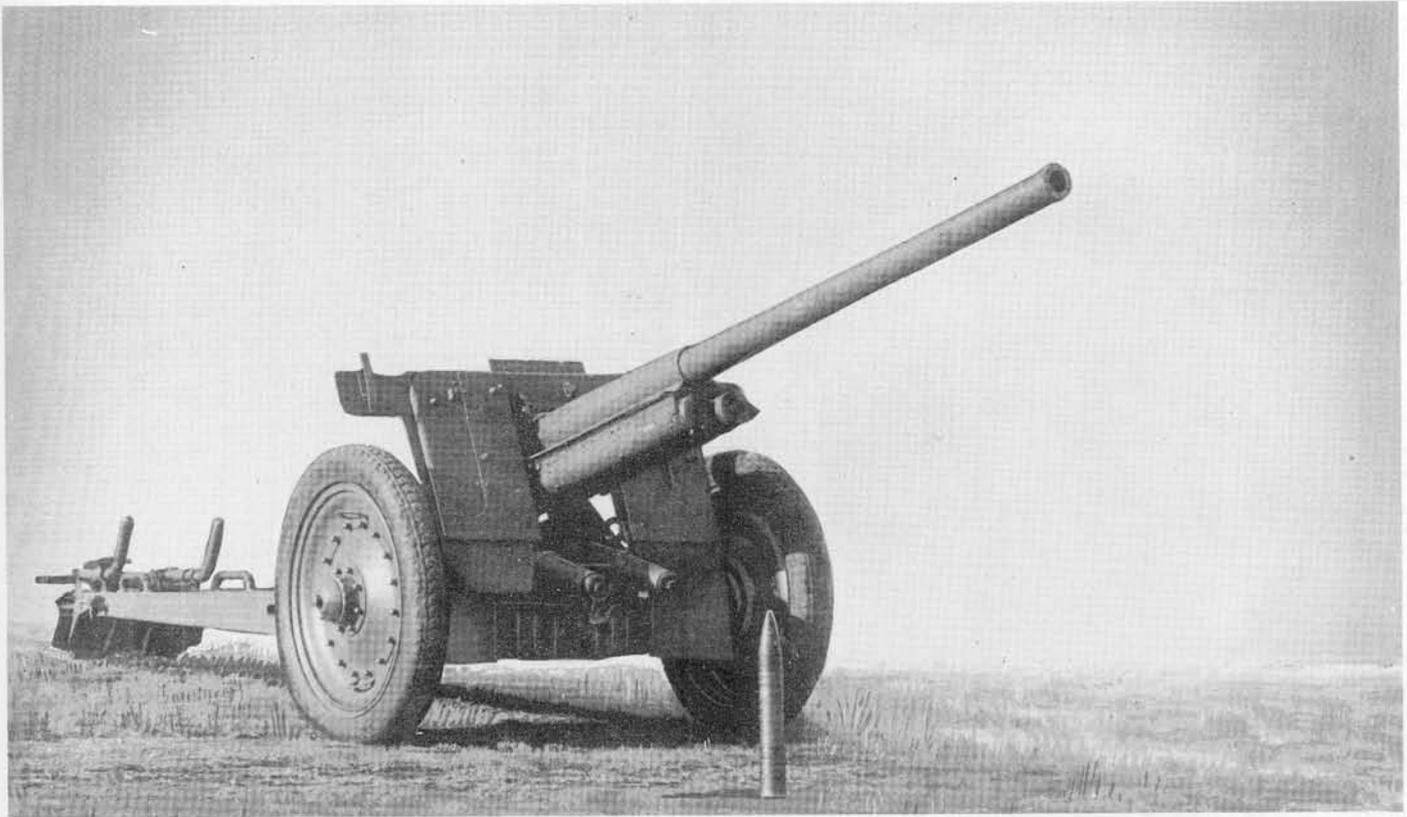
A firing table printed on a steel plate is clamped to the tube.

## SPECIFICATIONS

Caliber .....	81 mm (3.2 ins.)
Weight in firing position .....	62 lbs.
Length of barrel, overall .....	29.5 ins.
Length of bore .....	25.5 ins.
Size of baseplate .....	12 ins. x 12½ ins.
Principle of operation.....	Muzzle loaded; percussion fired (only)
Elevation .....	47° to 88°
Maximum range .....	1,200 yds.
Ammunition.....	Same as for 8 cm s. Gr. W. 34

# FIELD GUN (Ex-Russian)

7.62 cm Feldkanone 36 (r)



The 7.62 cm F. K. 36 (r) is a gun of Russian design and manufacture. The Germans captured so many pieces during the early months of the invasion of Russia that they were adopted by the German Army both in the original form for standard divisional field guns and as antitank guns known as the 7.62 cm Pak 36 (r) described on page 116.

Both weapons have the same general characteristics: built-up tubes fitted in reinforcing jackets, vertical sliding breech blocks, hydropneumatic recoil mechanisms, and split trail carriages. In addition to a number of minor changes, the principal difference is in the much greater chamber length of the Pak 36 (r)—28.25 inches compared with 15.20 inches, and the addition of a muzzle brake to the Pak 36 (r).

The breech mechanism may be operated either by hand or semi-automatically. Extractors housed in the breech ring are operated by cams when the block opens. A hand control on the left side of the breech ring is provided in case the cartridge fails to eject. The firing mechanism is a continuous pull type.

## SPECIFICATIONS

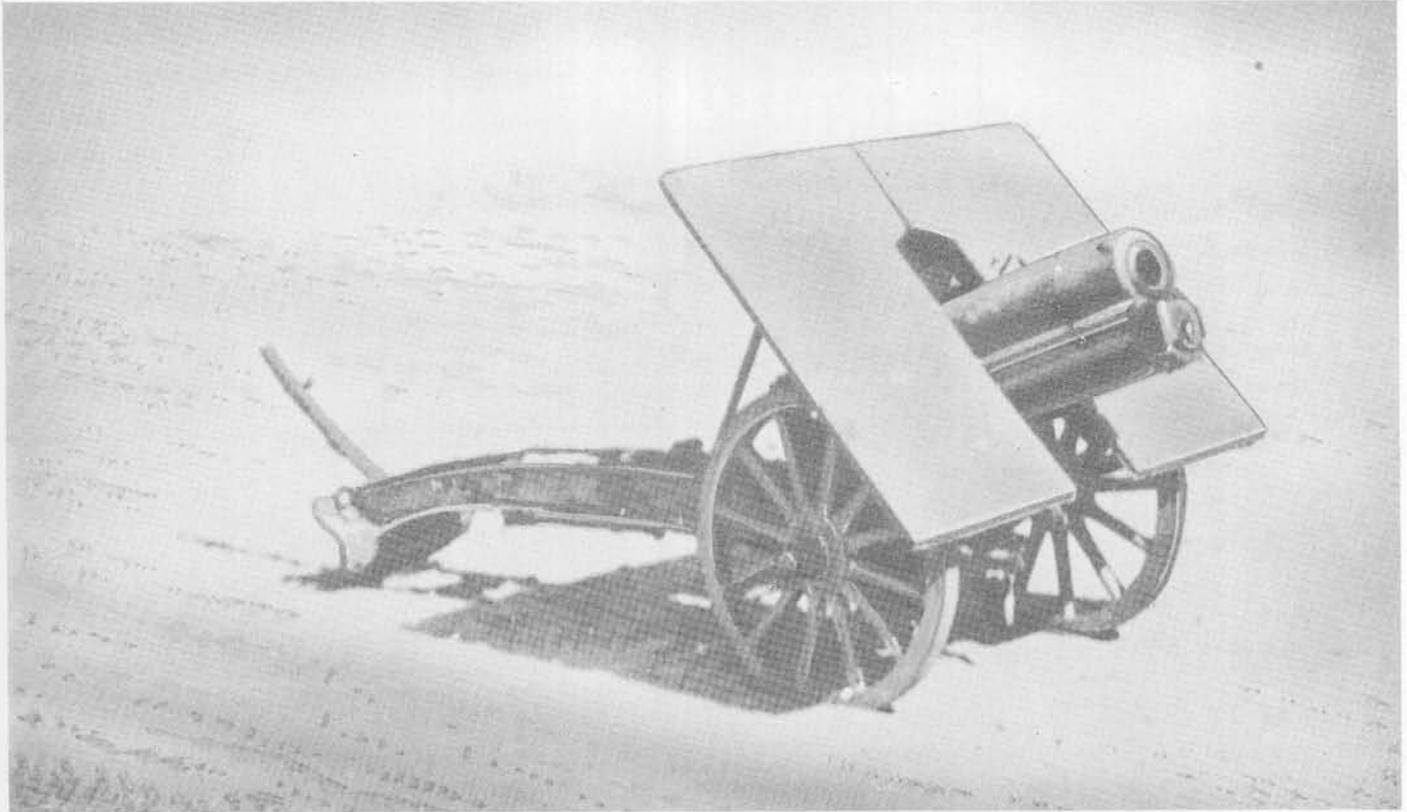
Caliber .....	76.2 mm (3 ins.)
Weight (complete) .....	3,619 lb.
Weight (firing position) .....	3,564 lb.
Length (overall) .....	22 ft. 6¼ ins.
Length of gun .....	153 ins.
Height (traveling position) .....	
Height (firing position) .....	
Width (overall) .....	
Width of trail spread .....	
Length of rifling .....	120 ins.
Length of tube .....	12 ft. 2 ins.
No. of grooves .....	32 R.H. Polygroove form; Twist-1 in 25 Uniform
Width of grooves .....	0.196 in. (5 mm)
Depth of grooves .....	0.033 in. (0.84 mm)
Width of lands .....	0.078 in. (2 mm)
Muzzle velocity (A.P.H.E. shell) .....	2,249 f/s (H.E. -2,335 f/s)
Max. range (horizontal) (A.P.H.E.).....	14,000 yds.
Rate of fire .....	
Traverse .....	60°
Elevation .....	72°
Depression .....	4°
Length of recoil (average).....	H.E.-A.P.H.E.—31.1 ins.
Ammunition .....	H.E.-A.P.H.E.-A.P. 40
Wt. of Projectile .....	H.E.—13.45 lbs. A.P.H.E.—14.2 lbs. A.P. 40—9.2 lbs.

# MOUNTAIN HOWITZER

GERMAN



7.5 cm Gebirgs Kanone 15 (Geb. K. 15)



This 7.5 cm light mountain howitzer used extensively by the German Army is an original Skoda design. The same weapon, designated 75/13, was also used by the Italians. Both armies provided their own ammunition in addition to some Czech and Austrian rounds also utilized. Types of ammunition include high explosive, hollow charge, shrapnel, and armor piercing.

The piece is wholly enclosed within a slipper which moves on a cradle extending the whole length of the piece. Breech mechanism is of the horizontal sliding block type. The recoil mechanism, contained within the cradle, consists of a hydraulic buffer and spring recuperator. A 50/50 mixture of water and glycerine is used in the buffer; quantity is approximately one-half gallon.

The carriage has wooden wheels and modified box-type trails which curve downward towards the rear. A fixed spade is attached at the rear of the trail. The shield is in two parts: a fixed upper section and a hinged lower one. It is frequently removed altogether when the howitzer is in firing position.

For mountain transport, the equipment may be broken down into seven animal loads as follows: upper carriage, slides, cradle, piece, trail and wheels, upper shield, and lower shield. The various sections are carried by mules.

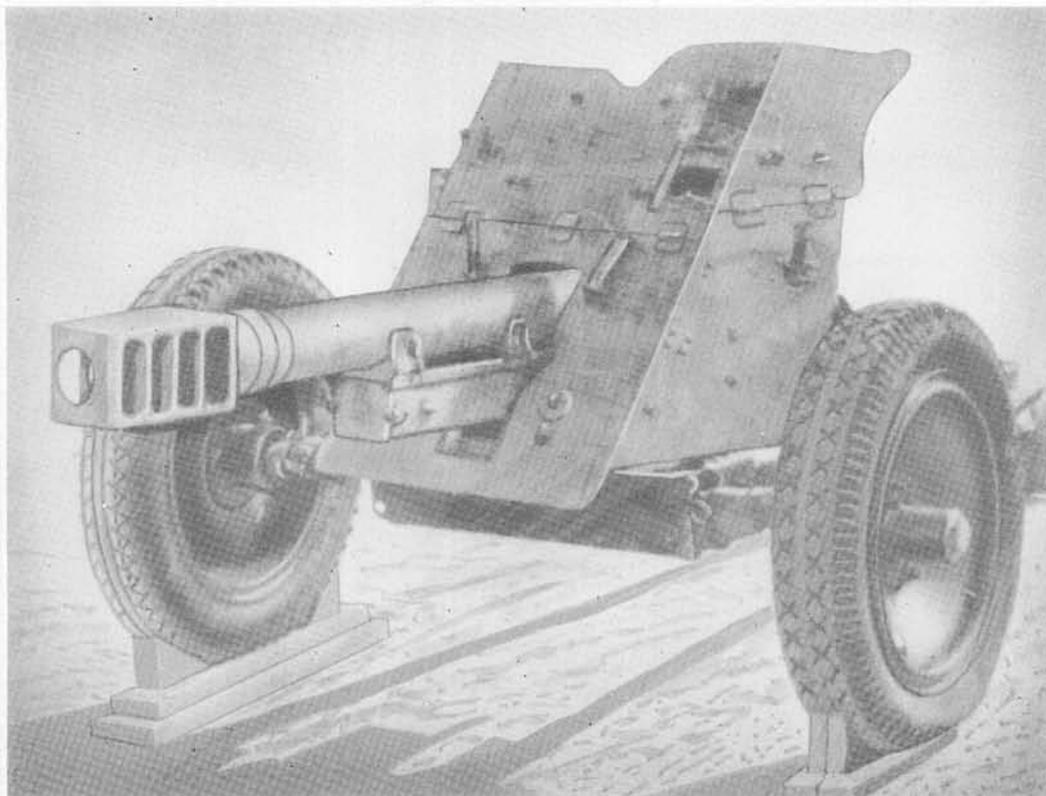
## SPECIFICATIONS

Caliber .....	75 mm (2.95 ins.)
Weight (traveling position) .....	2,449 lbs.
Weight (firing position) .....	1,351 lbs.
Length (traveling position) .....	
Length (firing position) .....	
Height (firing position) .....	
Height of trunnions .....	27.7 ins.
Width of carriage .....	37.4 ins.
Length of bore.....	13 cal.
Length of barrel and breech ring.....	43.8 ins.
Rifling .....	R.H. polygroove plain section
Length of rifling .....	31.2 ins.
No. of grooves .....	28
Width of grooves .....	5 mm
Depth of grooves .....	.68 mm
Width of lands .....	3.5 mm
Muzzle velocity (H.E. shell) .....	1,270 f/s
Wt. of projectile .....	12 lbs.
Max. range (horizontal) .....	7,270 yds.
Max. range (vertical) .....	
Rate of fire .....	
Traverse .....	7°
Elevation .....	50°
Depression .....	-10°
Length of recoil (max.) .....	35.4 ins.
Ammunition .....	H. E. & Hollow Charge

# LIGHT INFANTRY HOWITZER

GERMAN 

7.5 cm I. G. 37



The 7.5 cm I. G. 37, formerly known as the 7.5 cm Pak 37, consists of a short barreled piece fitted with a muzzle brake, and mounted on the carriage of the obsolete 3.7 cm antitank gun. The equipment has been utilized as a close support infantry weapon.

The barrel of monobloc construction is  $20\frac{1}{2}$  calibers long. The muzzle brake is in the shape of a rectangular box with four baffles, each at approximately a  $45^\circ$  angle deflecting to the rear. There is a hydrospring recoil mechanism and a breech mechanism of the vertical sliding wedge type. The latter has no provision for semi-automatic operation. A percussion type firing mechanism is cocked automatically when the breech is closed, and the gun is fired by pressing a plunger on the elevating handwheel. There is an auxiliary firing lever on the left side of the breech ring.

The carriage, which is mounted on two rubber-tired wheels, has split tubular trails. The shield is in two main parts, the upper shield and the lower shield. The lower part hinges upward when travelling, and is swung downward when the weapon is in the firing position. The upper shield is in two sections, the upper half being hinged. This section can be folded forward in order to give a lower silhouette.

Traversing, elevating, and sighting are accomplished by one man. Direct sighting is obtained by means of a telescope. A quadrant plane is located on top of the breech ring, and there is also a range drum graduated for firing semi-fixed high explosive and fixed hollow charge ammunition. With the present fire control equipment, the maximum effective range is 2,900 yards.

## SPECIFICATIONS

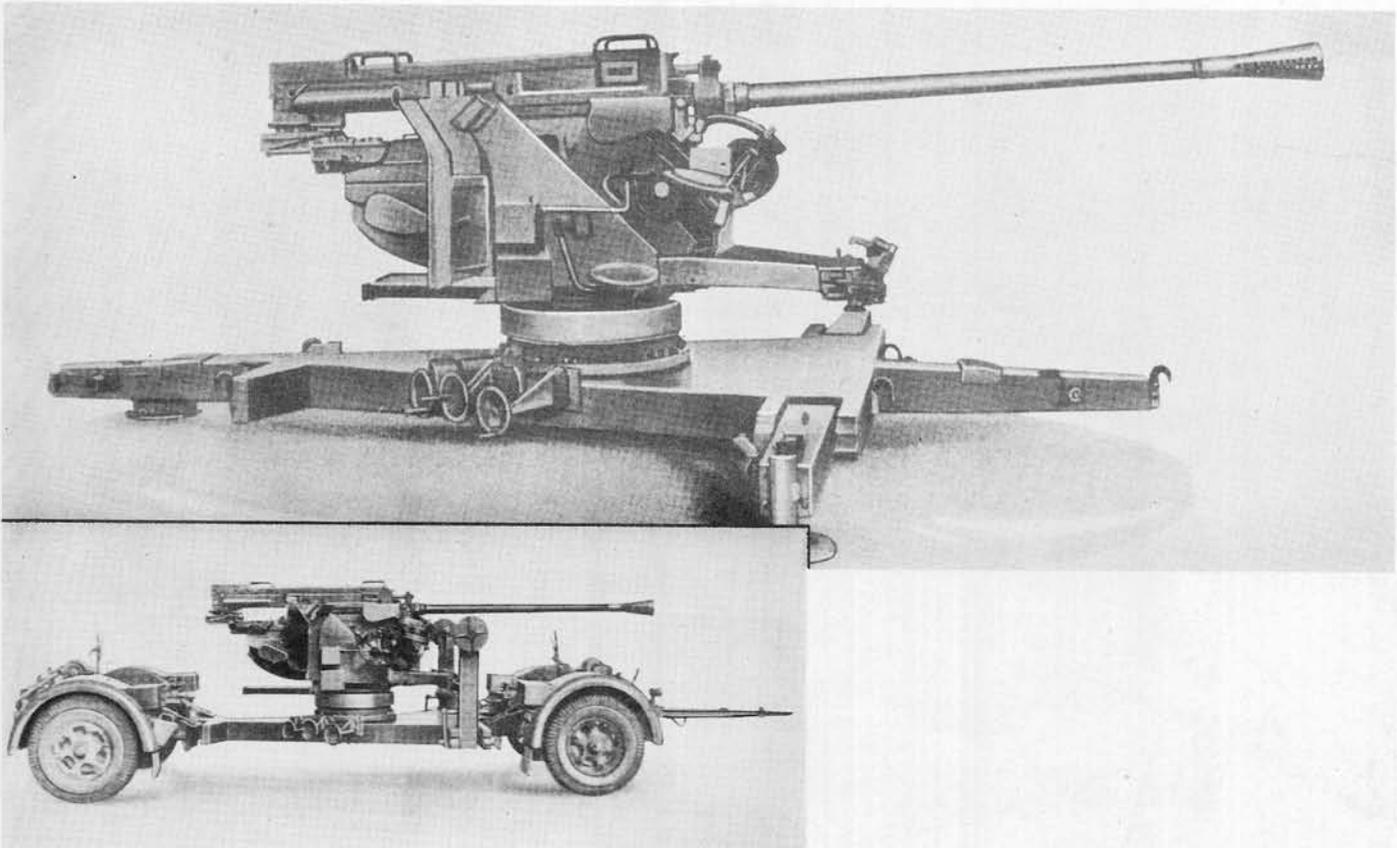
Caliber .....	75 mm (2.95 ins.)
Weight (traveling position) .....	
Weight (firing position) .....	1,124 lbs.
Length (traveling position) .....	11 ft., 7 ins.
Length (firing position) .....	11 ft., 1 in.
Height (shield lowered) .....	38 ins.
Height (shield raised) .....	$46\frac{1}{4}$ ins.
Width (overall) .....	5 ft., $3\frac{1}{2}$ ins.
Width of trail spread .....	9 ft., 1 in.
Length of rifling .....	$42\frac{3}{4}$ ins.
Rifling .....	R. H. twist
No. of grooves .....	24
Muzzle velocity (H.E. shell) .....	920 f/s*
Max. range .....	5,630 yds.
Max. range (present fire control).....	2,900 yds.
Traverse .....	$60^\circ$
Elevation .....	$22\frac{1}{2}^\circ$
Depression .....	$5^\circ$
Tires .....	Pneumatic—6.00 x 20
Length of recoil (max.) .....	17 ins.
Ammunition .....	H. E., Hollow Charge
Wt. of projectile...H. E., I. Gr. 18—13.2 lbs.	
HE-AT, I. Gr. 38HI/A—6.6 lbs.	
*Muzzle velocity with hollow charge ammunition is 1,165 f/s. Range, 5,410 yds.	

# ANTIAIRCRAFT GUN

GERMAN



5 cm Flak 41



This gas-operated, automatic, anti-aircraft gun is transported on two-wheeled transporters. To put the gun into action, the platform is lowered from the transporters by means of winding gear. The two transverse legs are lowered and the platform is roughly leveled with jacks. The final leveling is done with leveling screws in the base ring of the mounting. The barrel is removable for easy replacement in the field. The right hand twist of the rifling increases from one in 36½ to one in 30 calibers.

The breech mechanism is similar to that of the 3.7 cm Flak 43. It differs in that the breech block drops into the closed position from the open position. The dropping of the block allows buttress guides on the block to engage with similar guides on the jacket. This locks the block in the firing position and prevents any rearward movement. The feed mechanism is operated by the recoil of the breech casing. The recuperator consists of two spiral springs which are mounted side by side in the cradle. The buffer is mounted centrally in the cradle.

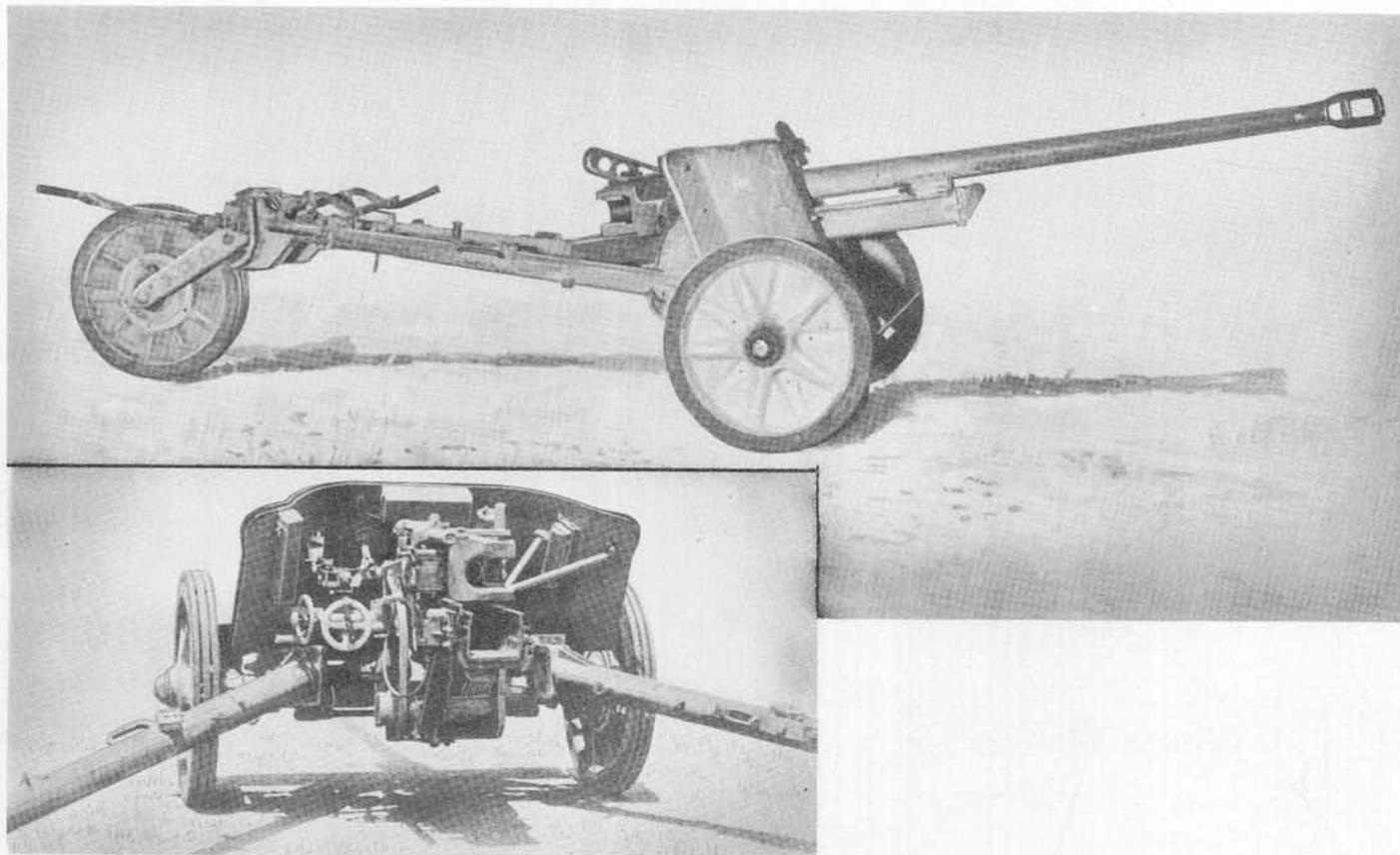
The traversing gear and the sight are on the right hand side of the mounting. The sight bracket is connected by means of a parallel motion link to a cross shaft. Here it is keyed to a pointer on the elevation scale. The gun elevating gear is on the left side of the mounting. This is also connected to a pointer on the elevation scale. The layer keeps the two pointers in line and the gun is laid at the same angle of elevation as the sight.

## SPECIFICATIONS

Caliber .....	5 cm (1.97 ins.)
Weight (traveling position) .....	7.18 tons
Weight (firing position) .....	4.30 tons
Length (traveling position) .....	27 ft., 5.5 ins.
Length (firing position) .....	19 ft., 10 ins.
Height (traveling position) .....	7 ft., 1 in.
Height (firing position) .....	7 ft., 4 ins.
Width (overall—traveling) .....	7 ft., 10 ins.
Width of trail spread .....	
Length of gun (incl. muzzle brake).....	184.5 ins.
Length of gun (excl. muzzle brake).....	170.8 ins.
Length of rifling .....	117.28 ins.
No. of grooves .....	20
Width of grooves .....	0.160 in.
Depth of grooves .....	0.020 in.
Width of lands .....	
Muzzle velocity (H.E. shell) .....	2,756 f/s
Firing mechanism protrusion .....	0.1 in.
Max. range (horizontal), APCBC .....	11,300 yds.
Max. range (vertical), APCBC .....	8,600 yds.
Effective ceiling .....	10,000 ft.
Rate of fire .....	130 r.p.m.
Traverse .....	360°
Elevation .....	90°
Depression .....	—10°
Length of recoil .....	7 ins. (approx.)
Ammunition.....	H.E. 41/tracer; Incendiary/H.E. 41/tracer; A.P.C.B.C. 42
Wt. of projectile.....	H.E.—4.8 lbs. A.P.—4.87 lbs.
Tracer burn out point	
Short (8 sec.)	2,740-3,750 yds.
Long (18 sec.)	5,400-6,120 yds.

# ANTITANK GUN

5 cm Pak 38



The 5 cm Pak 38, introduced during the 1941 campaigns in Greece and Egypt, was developed to combat the more heavily armored vehicles of the Allies.

The gun has a barrel of monobloc construction, threaded at the muzzle for attaching a two-baffled muzzle brake. Because of the position of the breech-operating cam, a minimum length of recoil of approximately 18½ inches is needed to operate the semi-automatic breech mechanism which is of the sliding horizontal block type. The recoil recuperator system is hydropneumatic.

The carriage, constructed of welded steel, is mounted on metal disk wheels with solid rubber tires. Torsion bar suspension is automatically locked when the tubular trails are spread. A 5 mm spaced armor shield and single apron protect the gun crew. The left side of the shield has a sighting port.

There are five types of ammunition fired from the Pak 38: an armor-piercing capped, high-explosive projectile; a high-explosive shell; an A.P.-H.E. (uncapped) shell; a tungsten carbide core arrowhead type projectile (A.P. 40), and a stick grenade similar to the 3.7 cm grenade described on page 306.

## SPECIFICATIONS

Caliber .....	50 mm (1.97 ins.)
Weight (complete) .....	2,015 lbs. (approx.)
Length of gun (overall) .....	15 ft., 3 ins.
Length of barrel (overall) .....	9 ft., 3 ins.
Width C-C .....	5 ft., 1 in.
Carriage.....	Welded steel w/solid rubber tires and tubular trails
Breech mechanism.....	Horizontal sliding block
Recoil mechanism .....	Hydropneumatic
Rifling .....	20 lands & grooves; right-hand twist
Muzzle velocity	
A.P.C.—H.E. ....	4.5 lb.—2600 f/s
H.E. ....	4.0 lb.—1800 f/s
Elevation .....	22°
Depression .....	—4°
Traverse .....	80°
Sights .....	Straight tube telescope
Ammunition.....	A.P.; A.P.C.; H.E.; A.P. 40
Penetration	

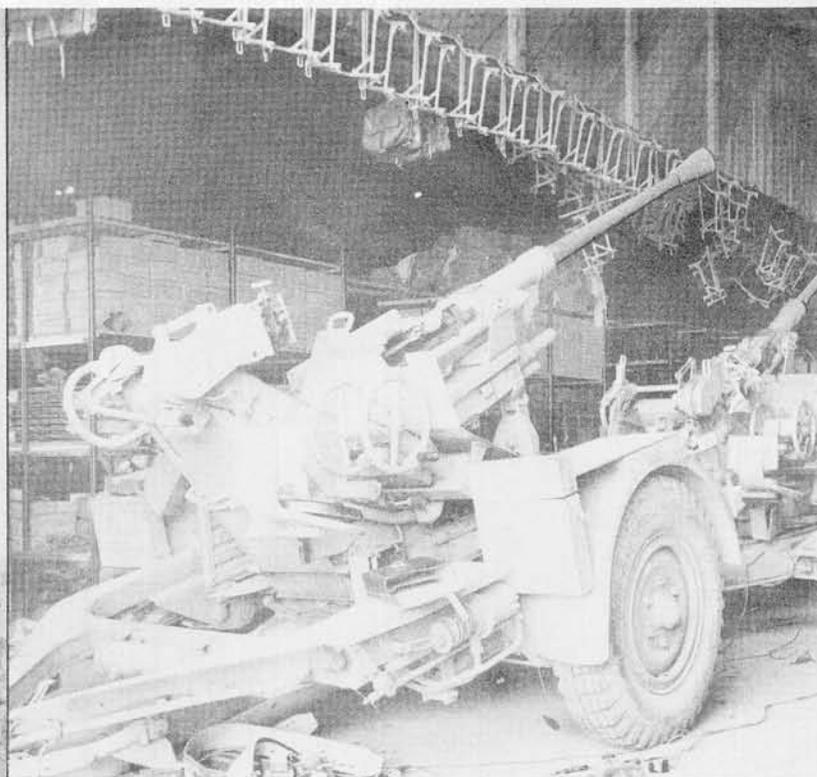
Range Yards	Thickness of armor in mm	
	30°	Normal
500 .....	2.6	3.1
700 .....	2.4	2.9
1000 .....	2.2	2.6
1200 .....	2.0	2.5

# ANTI-AIRCRAFT GUN

## 3.7 cm Flak 18 and 36



THE 3.7 cm FLAK 18



THE 3.7 cm FLAK 36

The performance of both the Flak 18 and the Flak 36 are approximately the same, the latter being the lighter and the more mobile version. The weapon is transported on a trailer; the chassis consisting of a "U" shaped steel frame mounted on two pneumatic tires. The weapon and its firing mount may be detached from the chassis by the aid of two winches. In firing position the mount rests on three adjustable firing pads. There are three seats provided; two for the gun pointers and one for the ammunition loader.

The gun has a monobloc tube. The firing mechanism is operated by recoil and residual pressure of gas in a manner similar to the 2 cm Flak 38.

The recoil mechanism is located inside the trough-shaped cradle with the buffer above and the recuperator below. Traversing and elevating mechanisms are operated by handwheels; the former providing a 360° traverse with 35½ turns, and the latter giving a rate of about 4° for each turn. The gun is fired by means for a foot pedal connected to the trigger by a system of levers.

Armor-piercing ammunition is provided in addition to the regular high explosive ammunition, permitting the guns to be employed as antitank weapons.

## SPECIFICATIONS

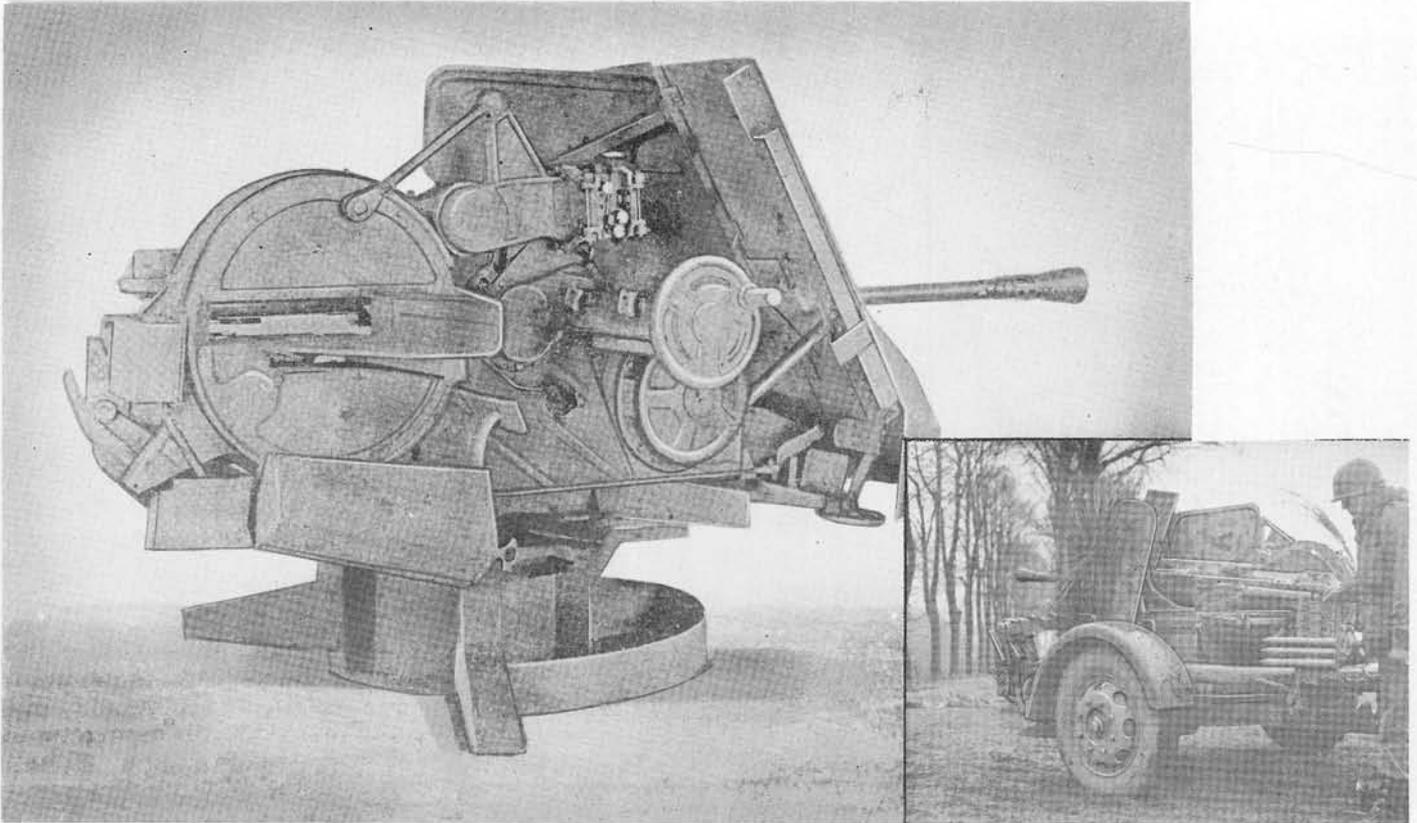
Caliber .....	37 mm (1.45 ins.)
Weight (traveling position) ....	Flak 36—5,290 lbs.
Weight (firing position) .....	Flak 36—3,430 lbs.
Length of piece (including flash hider)....	129 ins.
Length of rifling .....	71 ins.
Height of trunnions .....	44 ins.
Width (overall) .....	
Length of bore .....	
No. of grooves.....	20—R.H. plain section, Twist, increasing (1 in 50 to 1 in 40)
Width of grooves .....	0.197 in.
Depth of grooves .....	0.02 in.
Width of lands .....	0.08 in.
Muzzle velocity (H.E. Shell) .....	2,610 f/s*
Max. range (vertical) .....	13,775 ft.*
Max. range (horizontal) .....	7,080 yds.*
Effective ceiling .....	5,000 ft.*
Rate of fire (practical) .....	80 r.p.m.
Traverse .....	360°
Elevation .....	85°
Depression .....	—5°
Length of recoil .....	
Ammunition .....	A.P., H.E.
Wt. of projectile.....	A.P.—1.5 lb. H.E.—1.4 lb.

\*Not verified.

# ANTI-AIRCRAFT GUN

GERMAN 

## 3.7 cm Flak 43



The 3.7 cm Flak 43, a light, fully-automatic, gas-operated anti-aircraft weapon, may be statically emplaced, transported on a mobile mounting, or mounted on a self-propelled chassis. The gun consists of a removable, monobloc barrel fitted with a muzzle brake with six elongated ports and multi-perforated flash eliminator, and a breech casing which houses the breech mechanism. The gun is fed horizontally from the left in clips of eight rounds from a fixed loading tray, and is operated by the recoil of the gun itself. A hydro-spring buffer with variable recoil is located below the barrel, and two return springs lie side by side above the barrel.

Mounting is of the pedestal type, the gun being hung from a single-ring type trunnion on the right. The feed to the gun is mounted through the ring and on the axis of the trunnion, making unnecessary any alteration in the position of the center of gravity of the gun and other elevating parts with variation in the quantity of ammunition in the clips and feed mechanism. Elevating and traversing handwheels are both on the right of the gun, the former being vertical and the latter horizontal.

The equipment, which is of low build, is fitted with a shield varying in thickness from 9 mm at the center to 6 mm at the outer edges. The shield slopes backward at a 30° angle and is 4.2 feet high. In the middle is a space through which the mantlet elevates and depresses. A twin version of the 3.7 cm Flak 43 also exists. It is known as the 3.7 cm Flakzwilling 43.

The weapon fires only the single rotating band projectiles.

## SPECIFICATIONS

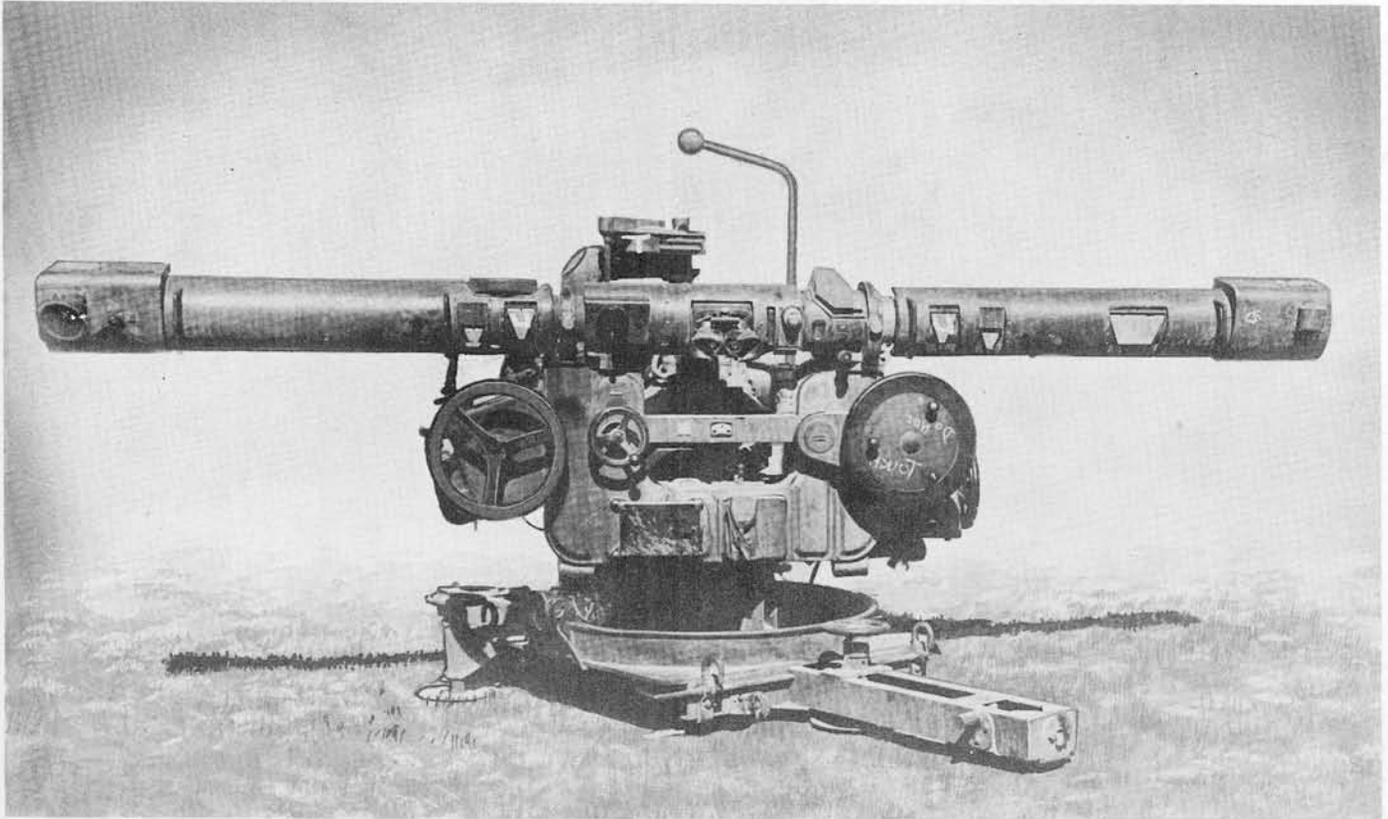
Caliber .....	37 mm (1.45 ins.)
Weight (traveling position) .....	4,180 lbs.
Weight (firing position) .....	2,750 lbs.
Length (traveling position) .....	
Length (firing position) .....	
Height (traveling position) .....	
Height of trunnion .....	29.9 ins.
Length of piece (excluding muzzle brake) ..	9.68 ft.
Length of muzzle brake .....	14.96 ins.
Length of bore .....	7 ft.
No. of grooves .....	20
Width of grooves .....	
Depth of grooves .....	
Width of lands .....	
Muzzle velocity (HE shell) .....	2,750 f/s
Max. range (horizontal) .....	7,200 yds. (approx.)
Effective range (vertical) .....	9,000 ft. (approx.)
Rate of fire (theoretical) .....	250 rds./min.
(practical) .....	150 rds./min.
Traverse .....	360°
Elevation .....	90°
Depression .....	-6°
Type of recoil .....	Variable
Ammunition .....	AP/HE; H.E.; HE/T-HE/I/T; HE/I and HE/I/short T

# ANTIAIRCRAFT DIRECTOR

GERMAN



## Kommando-Gerät 36



The Kommando-Gerät 36 is a goniographic director, thus differing from directors which operate on plan prediction or angular travel methods. The present instrument measures target course and speed and solves the problem by setting up to scale in ground plan the various distances involved. Ballistic data are obtained from graphical drums; varying heights are accepted, and corrections can be applied for wind, drift, displacement, dead time, and variations in muzzle velocity.

The instrument which has a built-in range finder is large and heavy and has a 4-wheeled traveling carriage for mobile use. A crew of thirteen men is required to operate it.

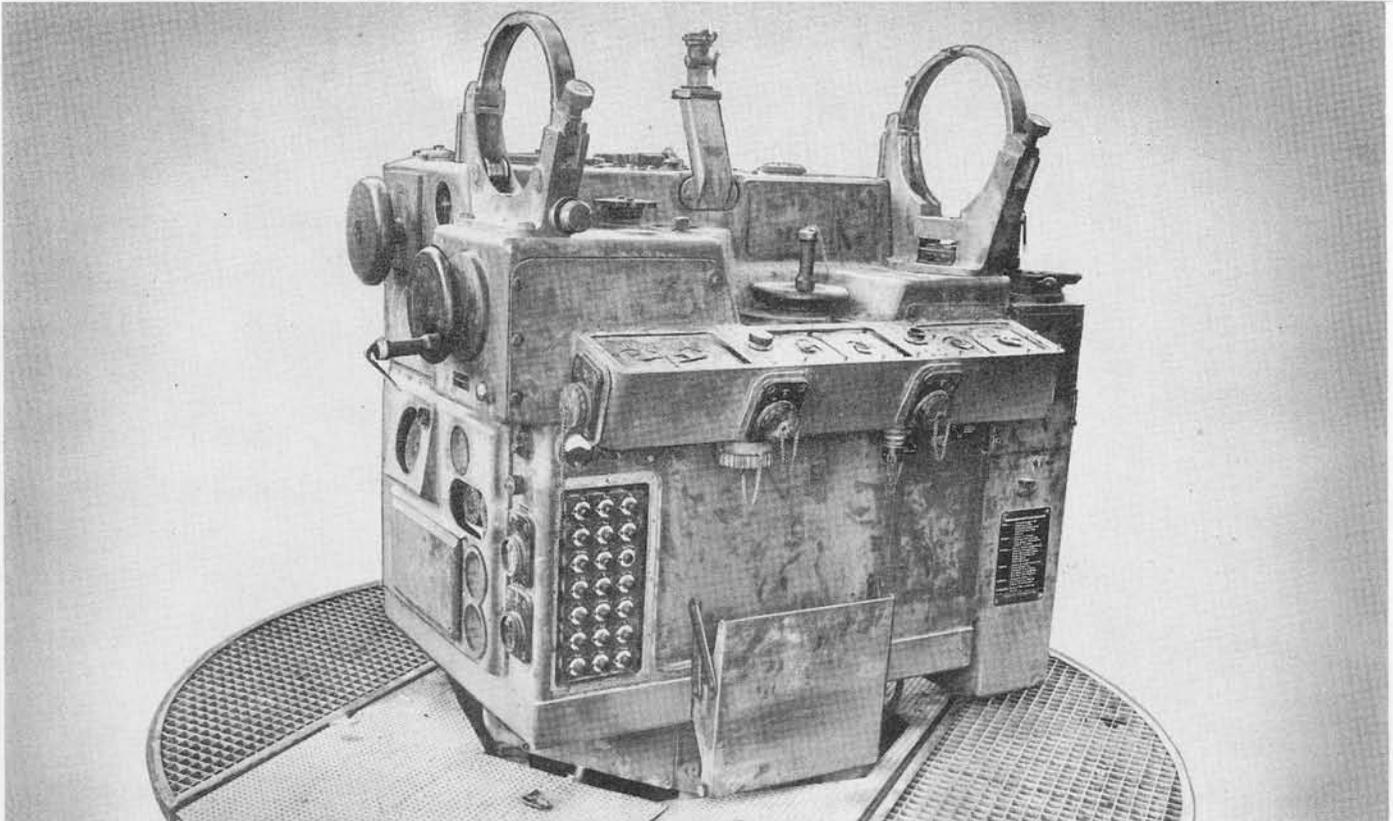
Readings must be called out to the appropriate operator on the director. Information is passed from one operator to another by voice and via a telephone system.

The instrument is manufactured by Zeiss and displays excellent workmanship. This director, however, has been criticized by fire control experts for poor coordination of basic design and for the excessive number of men needed to operate it.

# ANTIAIRCRAFT DIRECTOR

GERMAN 

Kommando-Gerät 40



The Kommando-Gerät 40 is a director used principally for major caliber weapons such as the 8.8 cm and 10.5 cm antiaircraft guns. However, by installing the proper ballistic cams, it may be used with any type of gun.

The director is operated by five men. Two are required to track in azimuth and elevation; a third sets in slant range by means of a 4-meter base stereo range finder mounted on the director; the fourth man sets in horizontal angle of approach; and the fifth man operates various switches. Data are transmitted to the guns for reception by a signal-light manual follow-up system. A trailer equipped with devices for lifting the director is used for transport.

The Kommando-Gerät 40 computes continuously Case III data (for invisible targets) by a target speed and angle of approach method, and can handle diving and curving target courses. The time from initial pickup to first round is estimated to be 20 or 30 seconds. When shifting to a new target in the vicinity of the target previously tracked and flying an approximately parallel course, as little as 10 seconds may be required.

A change in course which requires a change in operating procedure upsets firing data for only a few seconds. In principle, the director will predict correctly for a target flying at constant speed with a constant rate of change of altitude and constant curvature. The stability is not affected by gradual changes in course.

After an abrupt change in speed, altitude rate, or course azimuth, about 10 to 15 seconds are required to evaluate the new course.

## SPECIFICATIONS

Azimuth .....	No limit
Elevation .....	-1.5° to 90.5°
Slant range .....	1,200 to 18,000 m
Present horizontal range .....	570 to 14,500 m
Future horizontal range .....	570 to 14,500 m
Future altitude .....	-500 to 12,000 m
Present altitude .....	0 to 12,000 m
Ground speed of target .....	0 to 300 m/s
Vertical speed of target .....	0 to 200 m/s
Horizontal travel during time of flight .....	0 to 6,000 m
Lateral deflection .....	±1,065 mils
Course azimuth correction .....	±1,600 mils
Altitude prediction .....	±3,000 m
Maximum tracking rates	
Azimuth .....	±130 mils/sec.,
Slewing .....	±700 mils/sec.
Elevation .....	±105 mils/sec.
Time of flight .....	0 to 30 sec.
Horizontal parallax .....	500 m
Vertical parallax .....	±210 m
Fuze dead time .....	0 to 10 sec.
Wind velocity .....	0 to 28 m/s
Muzzle velocity....	24 numbers (Gebrauchsstufe)
d $\sigma$ .....	±60/16°
dA, .....	±70 mils
dF due to dead time .....	±5 secs.
dF due to MV and wind .....	±5 secs.

## Sight Mounts for Howitzers

**MOUNTS:** The telescope mounts of all three howitzers are of the same basic design. All are of the azimuth compensating type and automatically compensate for trunnion cant when cross-levelled. The angle of site mechanism has a scale graduated from 100 to 500 mils with 300 mils representing normal.

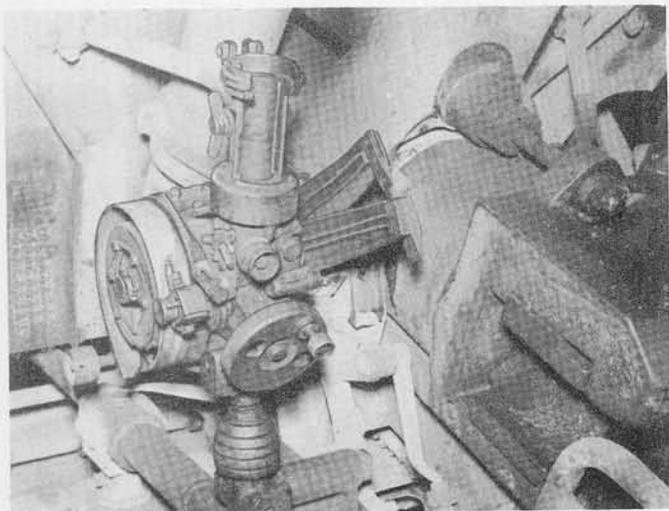
**OPERATION:** Range or super-elevation is introduced by turning the large handwheel below the bracket for the panoramic telescope. Operation of this knob causes the range drum to be rotated past the index and the index arm to be moved through an angle equal to super-elevation.

Angle of site is introduced by two operations. The first operation is to offset the angle of site level vial an amount equal and opposite to the angle of site. This is done by turning the small knob between the super-elevation handwheel and panoramic telescope bracket. The second operation is to rotate the telescope mount by means of the knurled knob beneath the super-elevation handwheel until the angle of site level is again on a horizontal plane. This second step moves the index arm an additional amount and positions it in an angle equal to quadrant elevation.

The second index arm which is actuated by the gun is brought into agreement with the first index arm by elevating the gun. The gun is then laid for quadrant elevation.

It is necessary to operate the angle of site mechanism on the panoramic telescope to bring the line of sight back on its original plane.

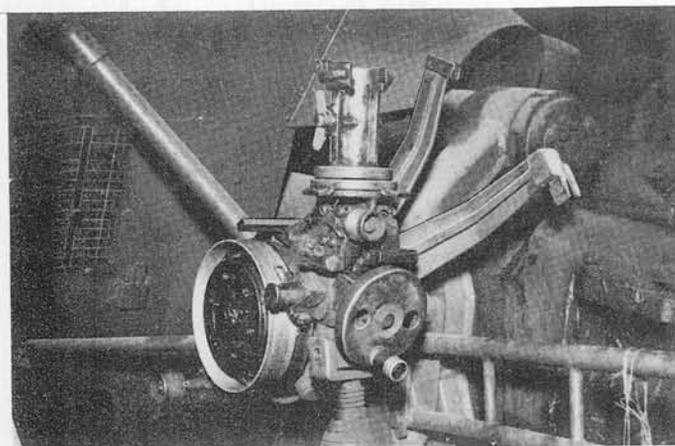
### 7.5 cm le. F. K. 18



Sight Mount for 7.5 cm Howitzer

**RANGE DRUM GRADUATION:** The range drum above has two scales: an elevation mil scale numbered from 0 to 800, divided into two mil units, and a range scale graduated in hectometers and numbered from 1 to 15.

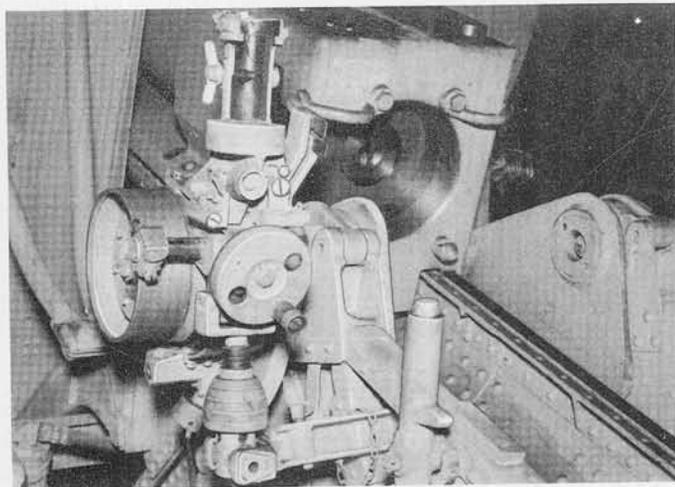
### 10.5 cm le. F. H. 18



Sight Mount for 10.5 cm Howitzer

**RANGE DRUM GRADUATION:** The mil scale on the range drum for the above instrument is graduated in the same manner as for the 7.5 cm howitzer. The range scale is graduated for zone 5; the scale is divided into 50 meter units from 100 to 9150 meters.

### 15 cm s. I. G. 33

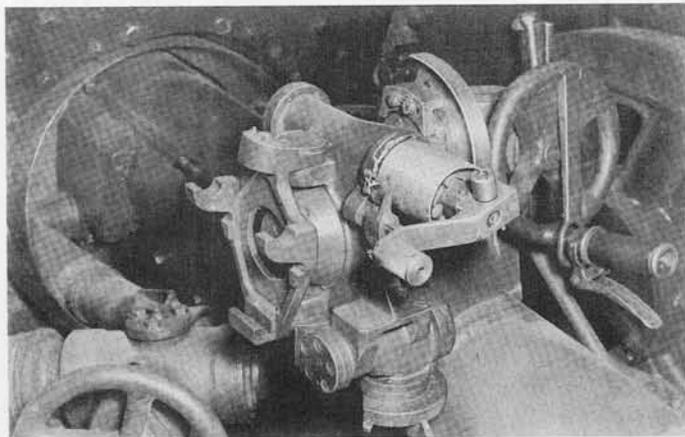


Sight Mount for 15 cm Howitzer

**RANGE DRUM GRADUATION:** In addition to the 0 to 800 mil scale on the above instrument there is a second mil scale, filled with red, placed to the right of the 0-800 scale. This second scale is graduated in 2 mil steps from 800 to 1330 mils. The range scale is preceded by the Roman Numeral I and is divided in increments of 25 meters from 25 to 1475 meters.

## Sight Mounts for Antitank Guns

### 7.5 cm Pak 41

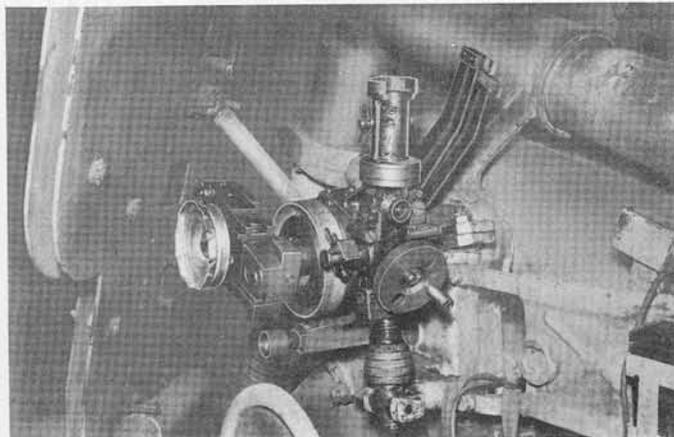


#### Sight Mount for 7.5/5.5 cm A. T. Gun

**RANGE SCALES:** There are five scales engraved about the periphery of the range drum. The first is an elevation scale graduated from 0 to 80 mils. The other four are range scales, numbered from 0 to III and graduated from 0 to 4200, 3800, 3400, and 3200 meters respectively. The range scale on the sector is graduated for ranges from 0 to 1500 meters.

**TELESCOPE MOUNT:** The telescope mount for the 7.5/5.5 is of simple construction. There is a range drum with its axis parallel to the axis of the telescope and a range scale inscribed on an arc that is located on the right side of the telescope mount. A deflection mechanism is located below the range setting handle.

### 8.8 cm Pak 43/41

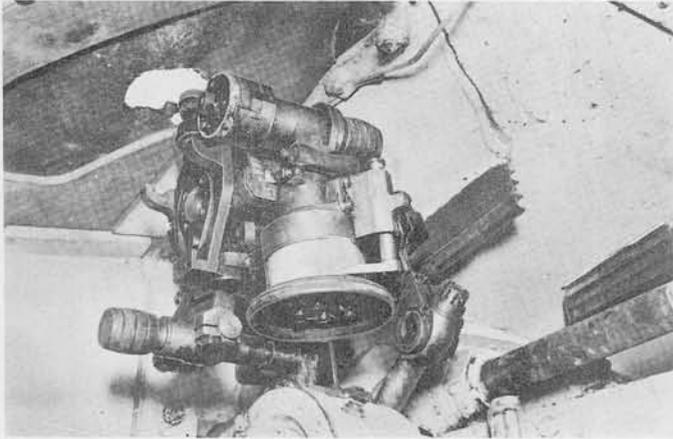


#### Sight Mount for 8.8 cm A. T. Gun

**RANGE DRUM GRADUATION:** The range drum has three scales engraved about its periphery. These scales, from left to right are: an elevation scale in steps of 2 mils from 0 to 800; a range scale marked for 8.8 cm Sp. Gr. L/4.7 with limits of 0 to 5500 meters; and a range scale marked 8.8 cm Sp. Gr. 39H1 with limits of 0 to 3000 meters.

**TELESCOPE MOUNTS:** There are two telescope mounts mounted side by side on the left side of the weapon. The first telescope mount is of the rocking bar type and is designed primarily for anti-tank use. There is no deflection mechanism apparent on the available model. The range drum is graduated from 0 to 4000 meters. The second telescope mount is of the same general design as that used with the 7.5 cm, 10.5 cm and 15 cm howitzers. Both its use and operation are also the same.

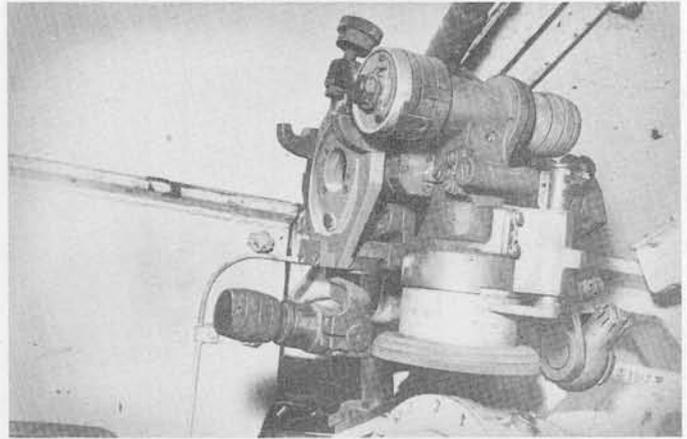
## Sight Mounts for Self-Propelled Artillery



Sight Mount for 7.5 cm (Stu. K. 40) S. P. on Pz. Kpfw. III chassis F8, w/o rotary cupola

**RANGE SCALES:** In the above sight mounts there are four scales engraved about the periphery of a vertical range drum. The first scale, used for the Pzgr. 40, is graduated from 300 to 1400 meters; the second for the Spr. is graduated from 100 to 3300 meters, and the third for the Pzgr. 39, is graduated from 200 to 2400 meters. The fourth scale on the drum is a micrometer for the elevation scale located immediately to the right and above the telescope bracket. The elevation scale is graduated in units of 100 mils from 0 to 500.

**MOUNTS:** The telescope mount for the 7.5 cm Stu. K. 40 is attached to a bracket to the left of the weapon and is connected by a linkage bar so that elevation of the weapon is relayed to the telescope mount. The mount does not automatically compensate for trunnion

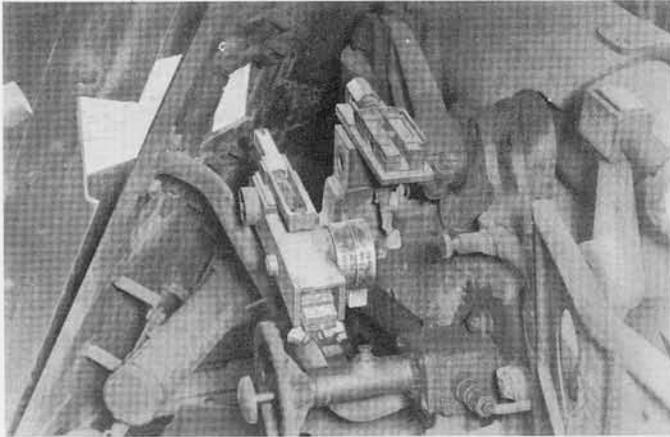


Sight Mount for 7.5 cm (Stu. K. 40) S. P. on Pz. Kpfw. III chassis

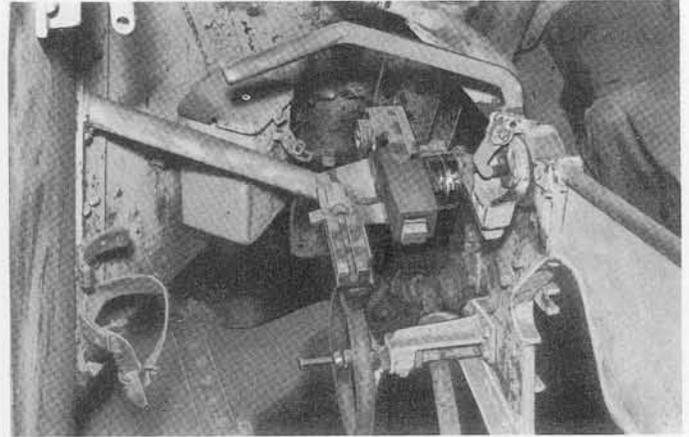
cant. The telescope used with mounts of this type is of periscopic design and has a removable head. Quadrant elevation is obtained by placing the range drum index in agreement with the proper scale and depressing the telescope mount through the super-elevation angle necessary for the range and then elevating the gun until the apex of the triangle on the telescope reticle is superimposed on the target. There is no angle of site mechanism on the telescope mount, nor is there a longitudinal level vial or index arm to indicate when the gun has been moved through an angle equal to the original movement of the telescope mount. Deflection is introduced by operating the knurled knob at the top-right of the instrument. The deflection scale is graduated in increments of one mil from 0 to 20 on each side of zero.

# ON-CARRIAGE FIRE CONTROL

## Sight Mounts for Self-Propelled Artillery



Sight Mount for 7.5 cm Pak 40 mounted on 38 (t) Czech chassis

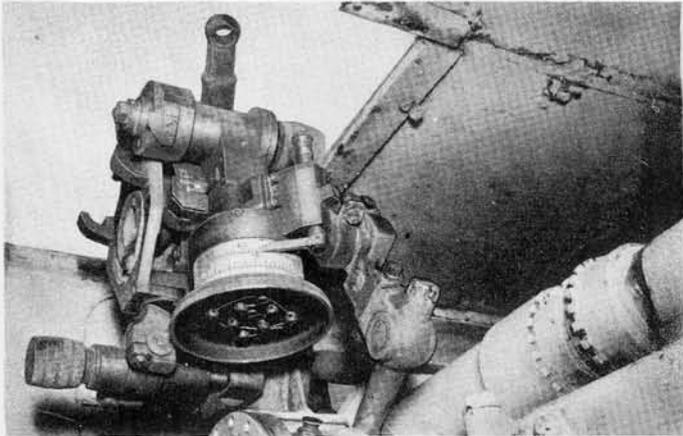


Sight Mount for 7.62 cm Pak 36 (r) mounted on 38 (t) Czech chassis

**MOUNTS:** The telescope mounts for these two guns are of the same general design, the only differences being in the ballistic cam and markings on the range drum. They are of the rocking bar type and have a range drum graduated for the various types of ammuni-

tion used in the weapons. A three power, straight tube telescope is used as the sighting component. For indirect fire, a panoramic telescope, the Aushilfsrichmittel 38 can be fitted.

## Sight Mounts for Self-Propelled Artillery

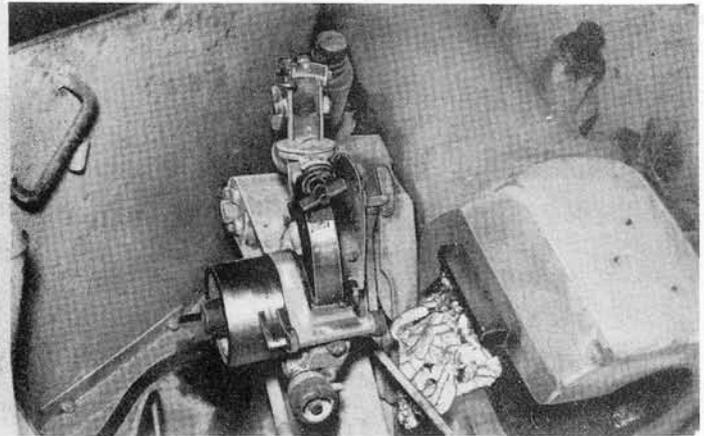


Sight Mount for 10.5 cm (Stu. H. 42) on Pz. Kpfw. III chassis

Sight Mount for 10.5 cm (Stu. H. 42) on Pz. Kpfw. III chassis. **RANGE SCALES:** There are three scales engraved above the range drum: the top scale is the elevation micrometer for the elevation scale which is graduated from 0 to 300 mils; the next, a range scale, used with the Spr. F. H. Gr., is graduated from 100 to 3300 meters; and the third scale, for the 10.5 cm Gr. 39 HL/A. HL 18, is graduated from 400 to 1500 meters.

**MOUNT:** The telescope mount for the 10.5 cm Stu. H. 42 is basically the same as the telescope mount for the 7.5 cm Stu. K. 40. The principles of operation are identical.

Sight Mount for 15 cm s. F. H. 13 on Lorraine chassis. **RANGE DRUM:** The range drum is quite broad, but there are only two scales on it. The first is a range scale graduated from 100 to 8150 meters. The inner scale is engraved from 0 to 800 mils in 2 mil steps. An elevation scale graduated in units of 100 mils is engraved on a plate fastened to the left trunnion bearing.



Sight Mount for 15 cm s. F. H. 13 on Lorraine chassis

This scale in conjunction with a pointer actuated by the gun trunnion indicates the angle of elevation imparted to the gun.

**MOUNT:** The telescope mount for the 15 cm s. F. H. is not an azimuth compensating type. A panoramic telescope bracket is attached to a rack gear and is moved through vertical angles by operation of the knurled knob in the center of the range drum. Angle of site is introduced by turning a wing nut immediately below the telescope bracket. The angle of site scale is engraved about a spiral groove cut into a plate; the index is fitted with a lug that fits in the groove and raises up or down as the scale is turned. Operation of the angle of site mechanism when the range mechanism is locked causes the panoramic telescope to be tilted through an angle equal and opposite to the angle of site. The mount is cross-leveled by turning the wing nut below and forward of the range drum. There is no level vial to indicate a horizontal plane.

# PANORAMIC TELESCOPES 16 AND 16/18

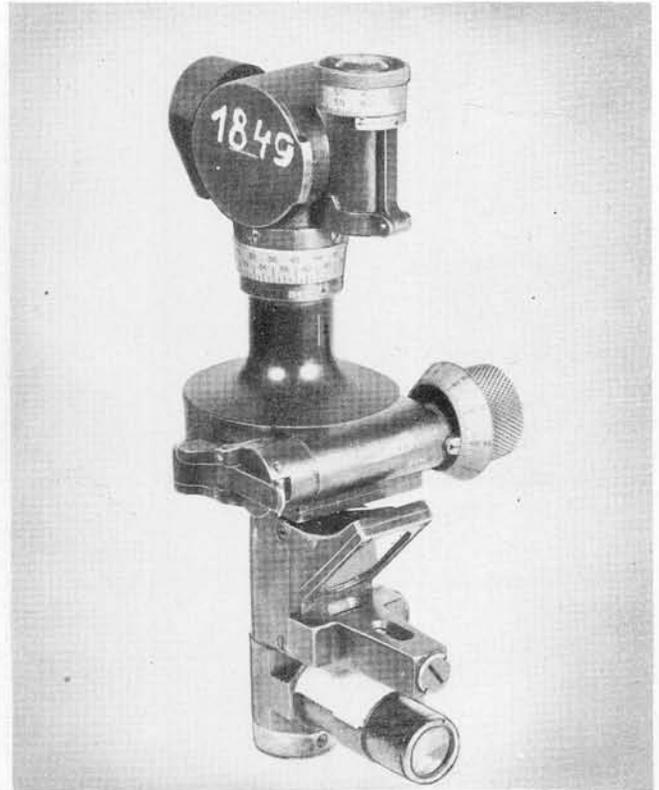
GERMAN 

Rundblickfernrohr 16 (Rbl. F. 16)

Rundblickfernrohr 16/18 (Rbl. F. 16/18)

The Panoramic Telescope Rbl. F. 16, which has been replaced by the Rbl. F. 32 and 36, is still used on the 7.5 cm l. I. G. 18. It is a 4-power, fixed-focus type with a cross level and longitudinal level for checking the alignment when the telescope and bracket are secure to the mount. Since the levels are not readily visible in this position, a mirror is provided on the telescope. The elevation scale and micrometer of the head resembles those of the standard telescope, Rbl. F. 32. The azimuth scale is graduated in 100-mil intervals and numbered from 0 to 64. The azimuth micrometer scale is graduated in units of one mil. The throwout and locking mechanism is the same as that of the usual type of panoramic telescope.

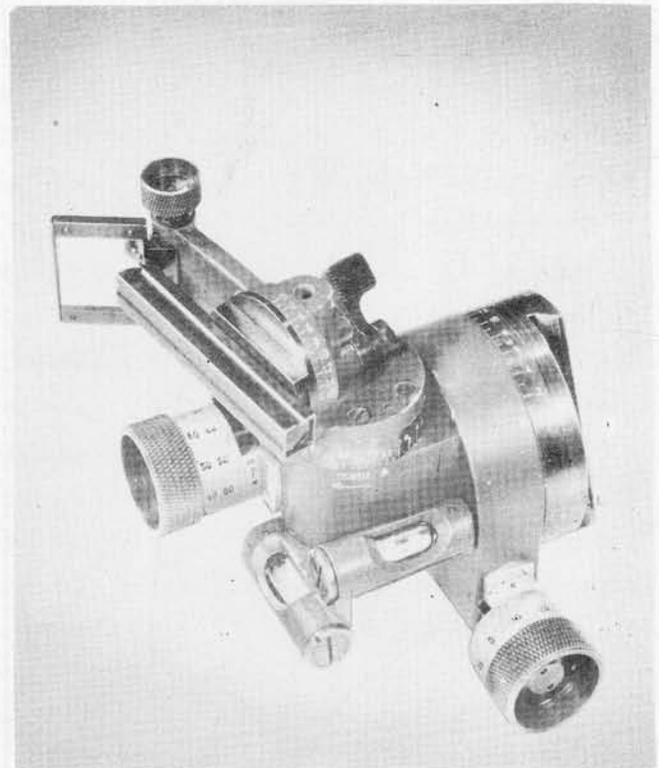
The Model 16/18, shown herewith, is very similar to the 16.



## MORTAR SIGHT

This instrument is designed to be used for laying the German 81 mm Mortar in azimuth and elevation. It embodies means for obtaining right or left lateral deflection, elevation or depression, and a collimator sight for sighting on an aiming point.

The elevation scale is graduated from 0 to 16, representing 0 to 1600 mils. The lateral deflection scale is graduated from 0 to 64. The collimator sight consists of a reticle having horizontal and vertical translucent slits located at the focal length of a single eye lens. The grooves on the top and side of the collimator are used as an open sight.

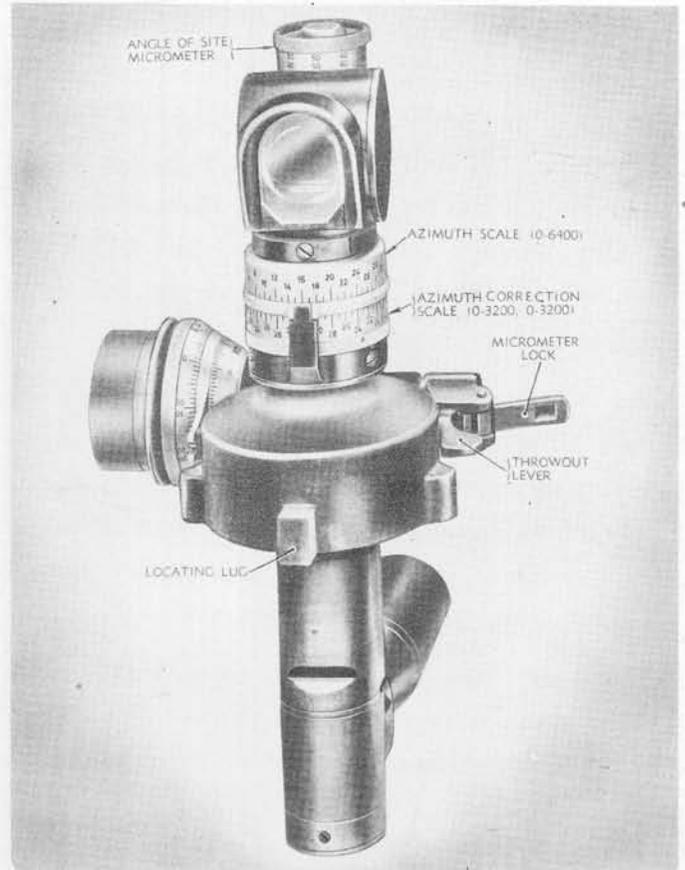
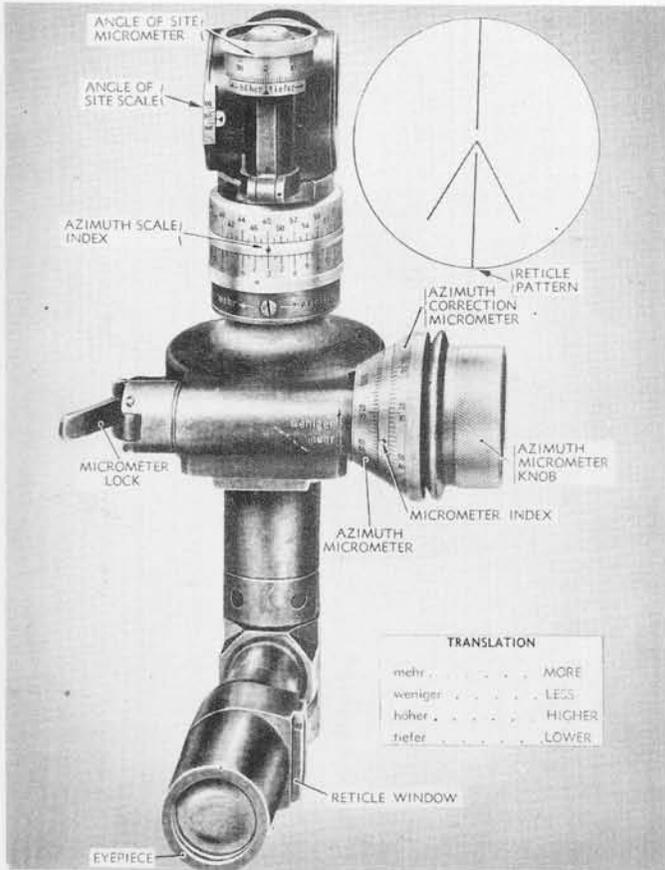


# PANORAMIC TELESCOPE 32

GERMAN



Rundblickfernrohr 32 (Rbl. F. 32)



This panoramic telescope is used on all standard field equipment. It is a 4-power, fixed-focus type with a field of view of 10 degrees. The line of sight may be raised or lowered by rotation of the angle of site knob. The angle of site scale is graduated from 100 mils to 500 mils (300 mils in normal). The angle of site micrometer is graduated in mils from 0 to 100 mils. The azimuth scales on the vertical barrel of the telescope are graduated in 100-mil intervals; the upper scale, 0 to 64, is fixed in relation to the rotating head. The lower has two semi-circular scales numbered 0 to 32 and can be rotated independently of the rotating head. A knurled portion permits adjustment. The azimuth micrometer includes two scales graduated in mils from 0 to 100 mils. The outer scale can be rotated independently of the azimuth worm. Evidently the fixed azimuth scale and micrometer are used for initial laying of the piece and the second scale and micrometer are then zeroed and used to measure base deflection. A throw-out lever is provided for rapid setting in azimuth. A locking lever locks the azimuth micrometer in any setting. The reticle pattern is shown above.

The existence of Panoramic Telescopes 36 and 37 has been confirmed. They are believed to be very similar to the Rbl. F. 32.

## SPECIFICATIONS

Power .....	4X
Field of view .....	10°
Weight .....	5 lbs.



# AUXILIARY QUADRANT SIGHT 38

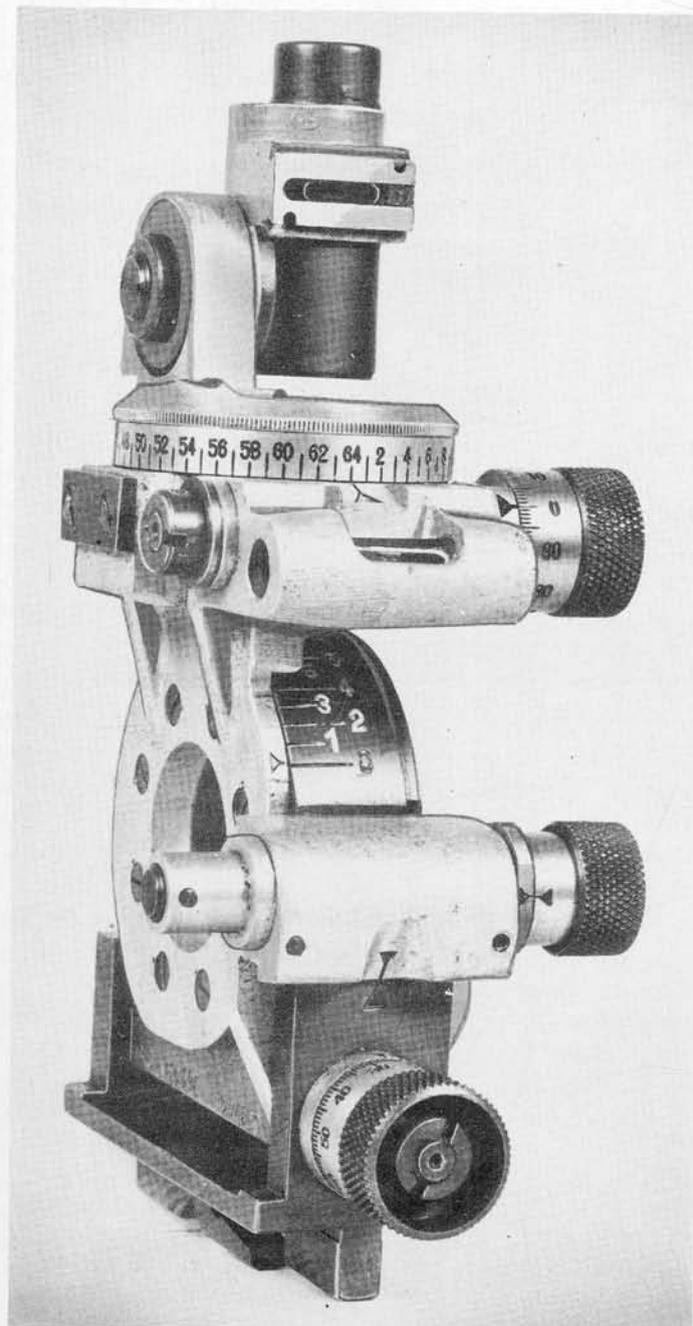
## Aushilfsrichtmittel 38

This quadrant sight is called a "substitute aiming device" by the Germans. It will fit into the sight mount found on the 7.62 cm Pak 36 (r), the 5 cm Pak 38, and the 7.5 cm Pak 40. The device has apparently been designed as a cheap instrument for indirect laying and may be used with any weapon having a suitable adapter.

The elevating worm wheel housing fits into the adapter bracket and is retained by the elevation worm wheel. The telescope bracket, which is made of cast aluminum, is fastened to the elevation worm wheel by holding screws. The cross-level vial and longitudinal level vial are part of the telescope bracket assembly.

The cross leveling mechanism consists of a worm meshed with a worm wheel segment cut on the adapter bracket. Turning the cross leveling knob causes the telescope bracket and elevation worm wheel assembly to be tilted in relation to the adapter bracket. The azimuth mechanism consists of a worm and worm wheel provided with a rather unique anti-back-lash arrangement.

Both the elevation and azimuth scales are divided into increments of 100 mils, and each is supplemented with a micrometer for 1 mil settings. The elevation scale is graduated from 0 to 1300 mils. There is a simple elbow telescope with a reticle design consisting of a large inverted "V" and two vertical lines such as is found in the German panoramic telescopes.



## SPECIFICATIONS

Power of telescope .....	3 diameters
Field of view of telescope .....	8°
Overall height of instrument .....	8 1/8 ins.
Overall width of instrument .....	3 1/4 ins.
Complete weight of instrument .....	3 lbs., 12 ozs.

## Rbl. F. 40



The Rundblickfernrohr 40 is believed to have been designed for use with the 7.5 cm L. G. 40 or the 10.5 cm L. G. 42. A carrying case and two night lighting devices employed with the instrument were also recovered.

This is a panoramic artillery sight, consisting of an upright section approximately five inches long, supporting an objective head which has a full 360° traverse, and an eye piece approximately four inches long set at an angle to the base. The eye piece traverses approximately 200°, permitting the operator to use the sight from different positions. A knob graduated in mils

and numbered on each ten mils is located near the center of the upright section and traverses the objective head. The lower section of the objective head is graduated in hundred mils, the even hundreds being numbered. By pressing a small lever near the adjusting knob, free traverse of the head for quick spotting is possible.

An adjustment for elevation is controlled by a knob on top of the objective head which is graduated in hundredths and numbered on each tenth mil graduation.

An unusual feature in this sight is that the adjusting knobs are click mounted to enable adjustments to be made at night without light.

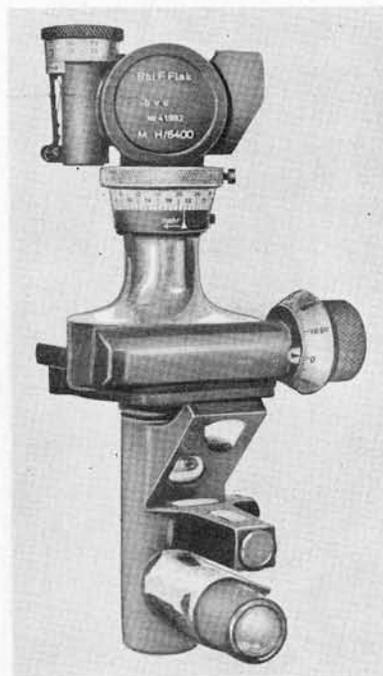
Two night lighting devices are provided with the sight. One mounts on the left side of the eye piece and illuminates the reticle with a red light which is regulated by an aperture in the attachment. The other is worn by the operator for reading graduations on the sight and has an aperture selection for either clear or red light. It is held in place on the forehead of the operator by an elastic strap.

Weight of the sight is approximately 2½ pounds.

## Rbl. F. Flak

The Rbl. Flak is used with heavy antiaircraft guns for indirect fire against ground targets and for reciprocal laying. A modified type is designed for use with the predictor.

When mounted in their respective sockets with the azimuth scales set to zero, the line of sight of the panoramic telescope on the predictor is 180° from that of the predictor telescope. The reason for the eyepiece of the gun sight being 90° from the axis of the gun is for convenience as the operator can stand at the right side of the gun and look into the sight at right angles to the axis of the gun. This sight is 9.3 inches in height.



# 27 mm DOUBLE BARREL SIGNAL PISTOL

GERMAN 

27 mm Doppel Schuss



The 27 mm double barrel signal pistol is unique in that the basic parts such as the trigger, trigger-guard, lever release, hammer assembly and switch lever, as well as all pins, are made of steel; the remaining parts, with the exception of the wooden fore-stock and hand grips, are made of an aluminum alloy.

The firing mechanism is of the continuous pull type incorporating concealed hammers. A switch lever is located on the top rear of the pistol frame to control the firing mechanism. By use of this lever, either one of the two barrels, or both, can be fired by action of the trigger. Turning the lever to the left allows only the left barrel to be fired; turning it to the right allows only the right barrel to be fired. With the lever in the center position, both barrels fire simultaneously. Breaking of the piece is accomplished by pushing forward the release lever which is located just forward of the trigger guard. Indicator pins located in the breech plate show whether the respective barrels are loaded. A safety lever is located on the left side of the receiver. The words "Feuer" and "Sicher" indicate the two positions of Fire and Safe.

Another model, a double barrel air force signal pistol of somewhat similar design, is pictured in the inset above.

## SPECIFICATIONS

Weight .....	3½ lbs.
Length .....	13¾ ins.
Ammunition types .....	
Weight of barrel .....	
Length of barrel .....	9½ ins.
Rifling .....	(smooth bore)
Muzzle energy .....	
Maximum range .....	

\*Signal cartridge with single star—max. vertical range 260 ft.

# SUBMACHINE GUN

GERMAN



7.92 mm M. P. 43, M. P. 43/1, M. P. 44 (Sturmgewehr 44)



7.92 Submachine Gun: Top, M. P. 43; Center, M. P. 43/1; Bottom, M. P. 44

The German M. P. 43 is an automatic, air-cooled, gas-operated, magazine-fed shoulder weapon, firing from a closed bolt and a locked breech. Provision is made for both full-automatic and semi-automatic fire. For full-automatic fire, the trigger must be held back until all rounds in the magazine have been fired; for semi-automatic fire, the trigger must be released after each round. However, German official sources say that full automatic fire will be used only in emergency.

Despite the fact that it is of cheap construction, made chiefly of steel stampings, the M. P. 43 is a very serviceable weapon. It is believed that the gun was developed from the 7.92 mm M. Kb. 42 (machine carbine 42) inasmuch as the general design is quite similar, and the same type of ammunition is used. However, the M. P. 43 has a shorter barrel and gas cylinder, and has no bayonet as does the M. Kb. 42.

The receiver, frame, gas cylinder, jacket, and front sight hood are made from steel stampings. As all pins in the trigger mechanism are riveted in, it cannot be disassembled, although a complete trigger assembly may be very quickly inserted. The gas piston assembly, bolt, hammer, barrel and gas cylinder are machined parts.

The gas piston assembly consists of a piston, piston rod, and slide which appear to be machined from one piece with a stamped handle inserted. The stock and pistol grips are of low grade wood. The curved magazine is inserted from the bottom, and the fired cartridge cases are ejected on the right.

The various models of this weapon, including the M. P. 43, M. P. 43/1, and M. P. 44, have been officially designated M. P. 44. A recent official German order changed the nomenclature to Sturmgewehr 44.

## SPECIFICATIONS

Caliber .....	7.92 mm (.312 in.)
Weight (with empty magazine).....	10 lb., 1 oz.
Length (overall) .....	3 ft., 1 in.
Length of barrel .....	16.2 ins.
Sight radius .....	
Principle of operation .....	gas
Feeding device .....	Curved magazine
Capacity of feeding device .....	30 rounds
Cooling system .....	air
Ammunition types .....	7.92 mm Postolen Patronen Semi AP., M.P. 43
Effective rate of fire	
(automatic) .....	100 to 120 rds./min.
(semi-automatic) .....	40 to 50 rds./min.
Type of sight.....	Leaf sight graduated from 100 to 800 meters
Rifling	
Twist .....	R. H.
No. of grooves .....	
Chamber pressure .....	
Muzzle velocity (approx.) .....	2250 f/s
Muzzle energy .....	
Maximum range .....	
Effective range .....	400 yds.

# CARBINE

7.92 mm Gewehr 33/40

GERMAN 



This carbine, a typical Mauser, is very similar to the latest model of the Kar 98K. It is a manually operated, air-cooled, clip-fed shoulder weapon, having a laminated wood stock, a large metal butt plate to protect the stock when grenades are launched, and a sling mounted on the left-hand side.

The Gewehr 33/40 and the Kar 98K have interchangeable bolts. The most obvious differences are found in the length, weight, hand guards, and bolt handles.

The present weapon has an overall length of 39½ inches as compared to the 43½ inches of the Kar 98K. The barrel length is 19¾ inches instead of 23½ inches. The carbine weighs 7 pounds 11 ounces; the rifle 9 pounds. The hand guard on the Gewehr 33/40 extends behind the rear sight and covers a greater percentage of the barrel than the one on the Kar 98K. The bolt handle on the carbine is turned down uniformly forming a semi-circle, and the knob on the end of the handle has been hollowed out and milled flat on the underside to reduce weight. On the Kar 98K, the bolt handle slopes down abruptly at right angles and the knob is solid.

## SPECIFICATIONS

Caliber .....	7.92 mm (.312 in.)
Weight .....	7 lbs., 11 ozs.
Length (overall) .....	39½ ins.
Principle of operation.....	Manually operated, bolt action
Feeding device.....	Clip-fed, hand-loaded magazine
Capacity of feeding device.....	5 rounds
Cooling system .....	Air
Ammunition .....	All 7.92 mm Mauser Types
Type of sight.....	Inverted "V" or barleycorn front sight with hood protector and tangent leaf rear sight graduated from 100 to 1,000 meters.
Length of barrel .....	19¾ ins.
Length of rifling .....	
Rifling .....	
Twist .....	Uniform R. H.
No. of grooves .....	4
Muzzle velocity .....	2,509 f/s

# SEMIAUTOMATIC RIFLE

GERMAN



7.92 mm Gewehr 41 (M)



The Gewehr 41 (M) is a self-loading, gas-operated, clip-fed, air-cooled shoulder weapon. It is basically the same as the Gewehr 41 (W) except for several changes that have been made in the manufacture and appearance.

Most of the parts of the Gewehr 41 (M) are machined pieces with the exception of the magazine well, follower, piston rod and butt plate. The majority of the machined pieces have had no further finishing, but are of a very high quality. The upper band, lower band, magazine well, magazine follower, trigger guard, piston rod, dust cover and butt plate of the Gewehr 41 (M) are stamped pieces.

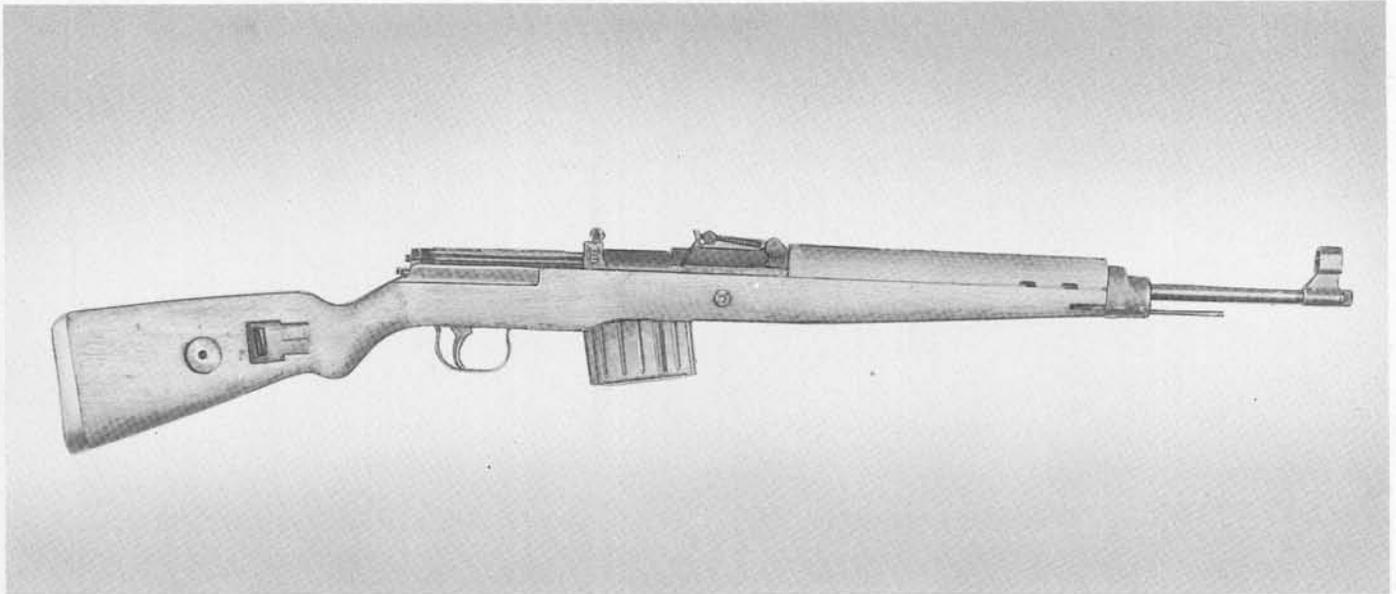
The differences between the Gewehr 41 (M) and the Gewehr 41 (W) are as follows: the piston rod of the G. 41 (M) terminates in a yoke, the two arms of which extend rearward and contact the bolt head. The piston rod of the G. 41 (W) is one piece and is in direct contact with the bolt retractor slide. The handguard of the G. 41 (M) is made of wood unlike that of the G. 41 (W) which is plastic.

## SPECIFICATIONS

Caliber .....	7.92 mm (.312 in.)
Weight .....	10 lb., 13 oz.
Length without bayonet .....	46½ ins.
Principle of operation .....	Gas
Feeding device .....	Vertical box-type magazine
Capacity of feeding device .....	10 rounds
Cooling system .....	Air
Ammunition used .....	All 7.92 mm Mauser types
Type of sight.....	Inverted V blade type front sight; tangent leaf rear sight; graduated 200 to 1,200 meters.
Length of barrel .....	21½ ins.
Rifling	
Twist .....	Uniform R. H. twist
Form .....	
No. of grooves .....	4
Depth of grooves .....	
Width of grooves .....	
Chamber pressure .....	
Muzzle velocity .....	
Muzzle energy .....	
Maximum range .....	
Effective range .....	

# SEMI-AUTOMATIC RIFLE

## 7.92 mm Karabiner 43 (Kar. 43)



The Karabiner 43, a gas-operated, semi-automatic, magazine-fed, air-cooled shoulder weapon, is basically the same in design as the Gewehr 41 (W) described on page 208. Two notable changes found in the later weapon are a modified gas operation and a change in manufacturing policy.

This weapon utilizes a gas vent and gas piston, a method used for the first time in German small arms weapons in the Fallschirmjäger Gewehr 42. The improved gas operation insures more positive operation, and malfunctions due to carbonization are less likely to occur.

A great deal of effort was put into an attempt to reduce the time and expense in the manufacture of this weapon. In order to accomplish this, forgings and stampings were used in as many parts as was practical. Machined or ground surfaces are found only where necessary to insure proper operation. The bolt, bolt channel, and contacting surfaces of the trigger group are included in these. Such surfaces as the outside of the receiver, the top of the retractor slide, and the non-contacting surfaces of the trigger group are left untouched.

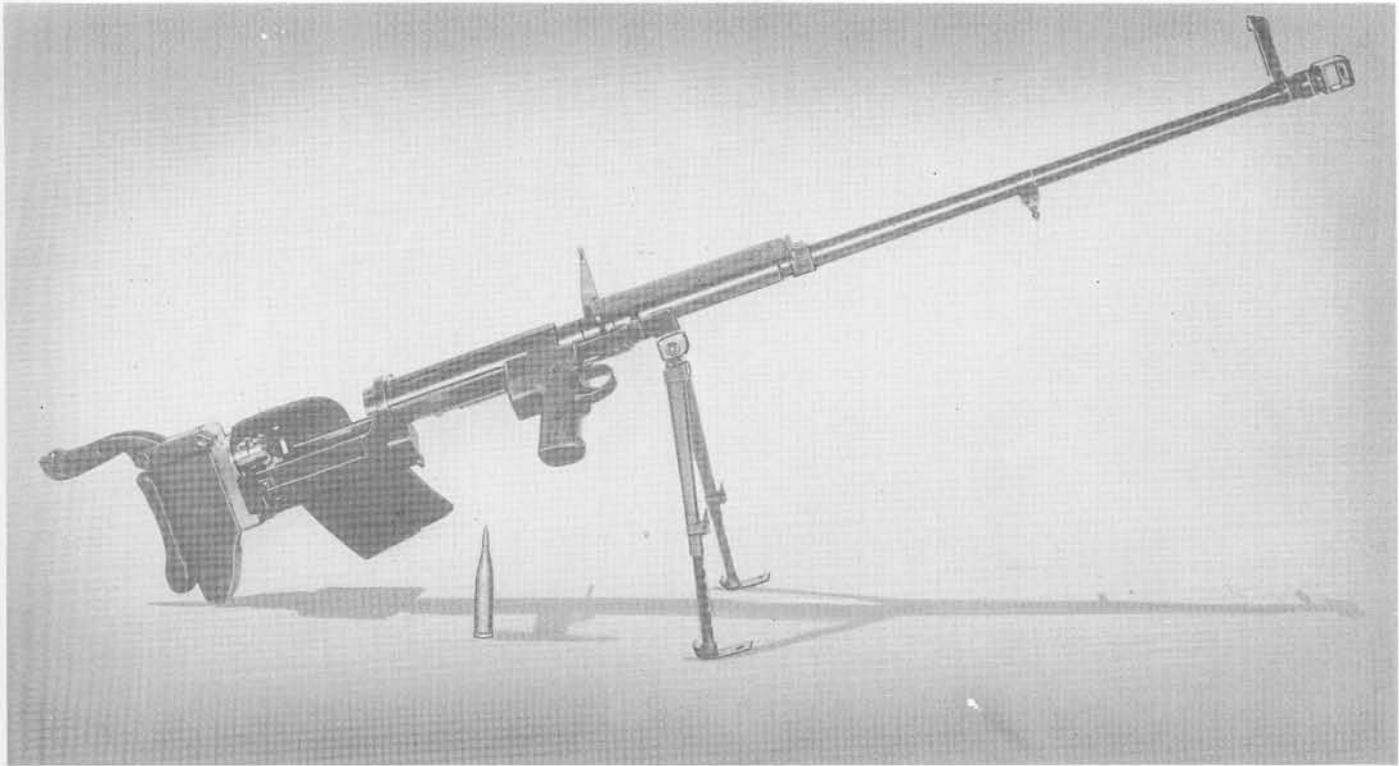
Several other slight changes were made, the most notable being the use of a ten-round, detachable box-type magazine; the addition of a threaded section on the muzzle making it possible to attach a flash hider or an adapter which is used with blank ammunition; the omission of the bayonet stud; and the addition of a telescopic sight base indicating that the Kar. 43 is intended for use as a special weapon. The weapon is lighter and better balanced than the Gewehr 41 (W) due to the elimination of the gas trap assembly at the muzzle and the long piston rod.

## SPECIFICATIONS

Caliber .....	7.92 mm (.312 in.)
Weight .....	8 lb., 9 oz.
Length .....	44 1/4 ins.
Principle of operation .....	Gas
Feeding device.....	Detachable box-type magazine
Capacity of feeding device.....	10 rounds
Cooling system .....	Air
Ammunition used .....	All 7.92 mm Mauser types
Type of sight.....	Parallel sided, flat top blade type front sight. Tangent leaf rear sight graduated from 100 to 1,200 meters. Telescopic sight base at rear of right side of receiver.
Length of barrel .....	22 ins.
Rifling	
Twist .....	Uniform R. H.
Form .....	
No. of grooves .....	4
Depth of grooves .....	
Width of grooves .....	
Chamber pressure .....	
Muzzle velocity .....	
Muzzle energy .....	
Maximum range .....	
Effective range .....	

# ANTITANK RIFLE

7.92 mm M SS 41



This antitank weapon, a manually operated, magazine-fed, air-cooled, high-velocity rifle which was standardized for production in 1941, fires the same necked-down cartridge as the Panzerbüchse 39. Although classified as an antitank rifle, the use of heavier armor on modern tanks has rendered the weapon effective against lightly-armored vehicles only.

A hinged bipod similar to that of the MG 34 is attached to the front of the receiver jacket. It folds forward for convenience in carrying. The gun is also equipped with carrying handle and sling; the former is fitted to the top of the barrel group, and the latter is attached on the right side at the bipod and back plate assembly.

A "U" type rear sight and an adjustable front sight of the square block type fold to the rear when not in use.

The gun is put in a "Safe" position by pulling the barrel housing lock extension  $\frac{1}{4}$ -inch to the rear so that its rear alignment mark is aligned with the mark "S" on the barrel housing lock. When in this position, the trigger cannot be pulled, nor can the action be opened. If the trigger is pulled while the action is not entirely closed, the gun will not fire. It is necessary to release the trigger and pull it again in order to release the sear. When the magazine is empty, the action is kept open by the protrusion of the magazine follower which stops the rearward movement of the barrel housing.

## SPECIFICATIONS

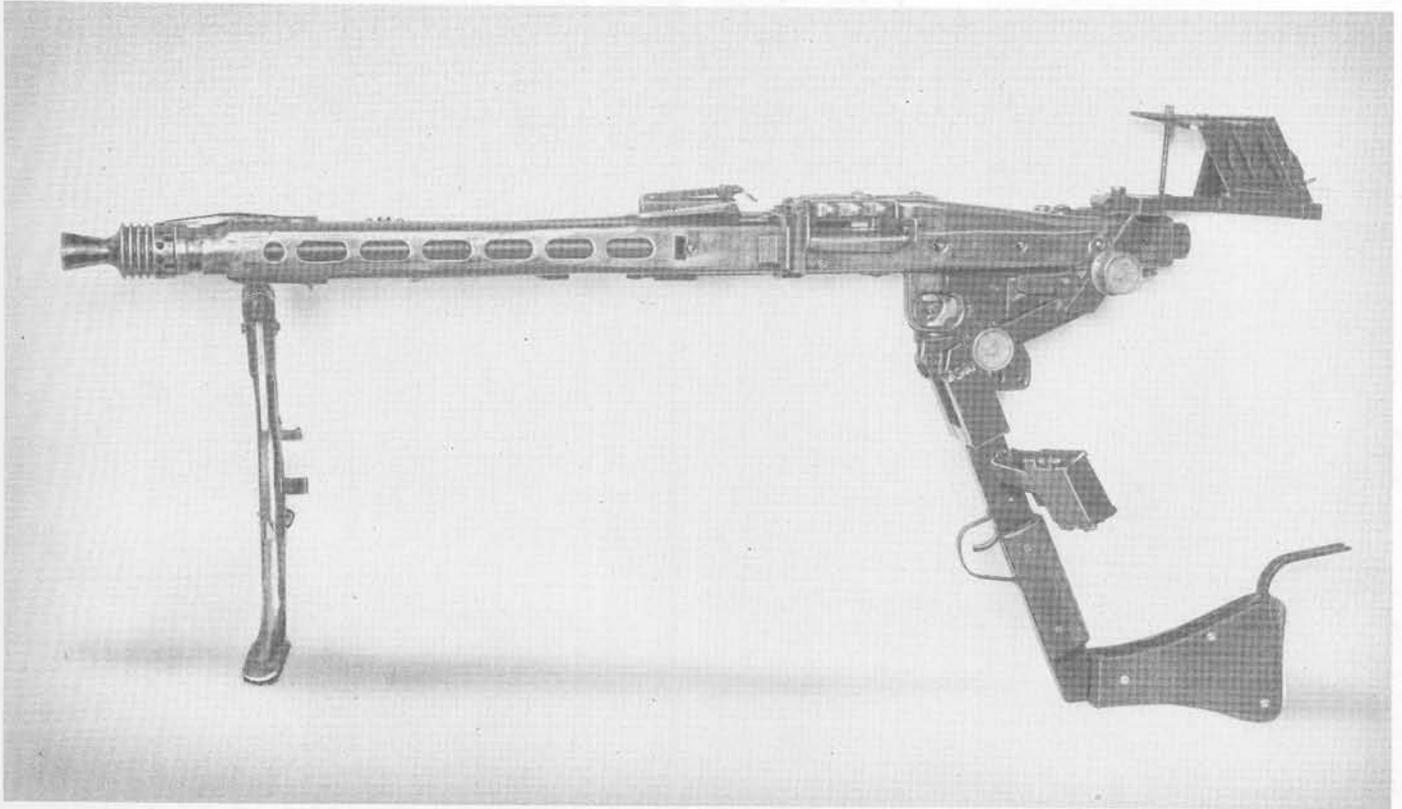
Caliber .....	7.92 mm (.312 in.)
Weight (with empty magazine) .....	29 $\frac{1}{4}$ lbs.
Length (overall) .....	59 $\frac{1}{4}$ ins.
Sight radius .....	30 $\frac{15}{16}$ ins.
Principle of operation .....	Manually operated
Feeding device .....	Magazine
Capacity of feeding device .....	6 rounds
Cooling system .....	Air
Ammunition types.....	13 mm case necked down to 7.92 mm. Same as used in the PZ B39. See Page 211.)
Rate of fire.....	.....
Type of sight.....	"U" type rear sight; square block type front sight.
Weight of barrel (w/fittings).....	13 $\frac{1}{4}$ lbs.
Length of barrel .....	43 $\frac{3}{8}$ ins.
Length of rifling .....	.....
Rifling	
Twist .....	R. H.
Form .....	.....
No. of grooves .....	4
Depth of grooves .....	.....
Width of grooves .....	.....
Muzzle velocity (estimated) .....	3,540 f/s
Type of mount .....	Bipod

# UNDERCOVER AIMING AND FIRING APPARATUS

GERMAN



Deckungszielgerät für le. 34 u. 42 Dezetgerät



The apparatus shown attached to the 7.92 mm M G 42.

This device is an undercover aiming apparatus for firing the standard machine guns from foxholes, trenches, or depressions in the ground. It permits the user to aim the weapon without exposing himself to enemy fire.

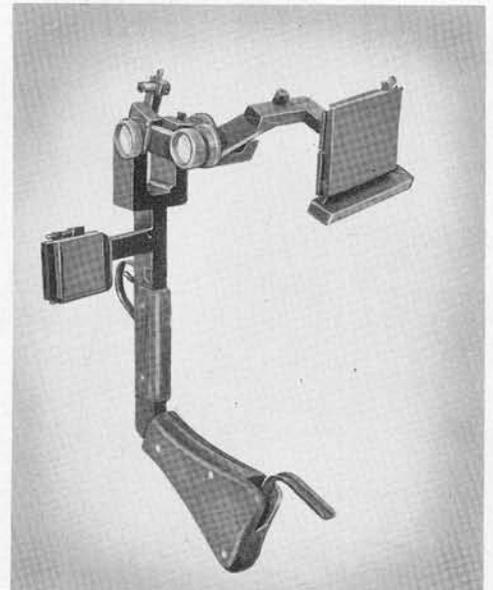
Construction is of welded steel boxwork, and consists of a shaft with a shoulder stock at the lower end and a securing arm which extends from the upper part of the shaft to the receiver of the weapon. Three milled edge clamping screws secure the device to the weapon. Two mirrors through which the weapon is aimed are lined up so as to utilize the standard sights. One mirror is mounted on the shaft and the other on an extension of the securing arm above and to the rear of the buffer group.

The firing mechanism is a simple linkage that enables the machine gun to be fired from a trigger on the instrument. It is necessary to have a different linkage for the MG 34 than with the MG 42. These are obtained by positioning the connecting bar in the trigger linkage. A window on the connecting bar shows when the desired linkage is obtained. The trigger linkage may also be positioned to make use of the semiautomatic arrangement on the MG 34, if desired.

The field of vision at 1,000 meters (1,093 yards) is about 200 meters (218 yards) broad. This can be increased by 100 meters (109 yards) by moving the head to the left or right. In the same manner, vertical vision which is 100 meters at 1,000 meters can be increased.

## SPECIFICATIONS

Height .....	24 ins.
Maximum width .....	9 ins.
Weight .....	7½ lbs.

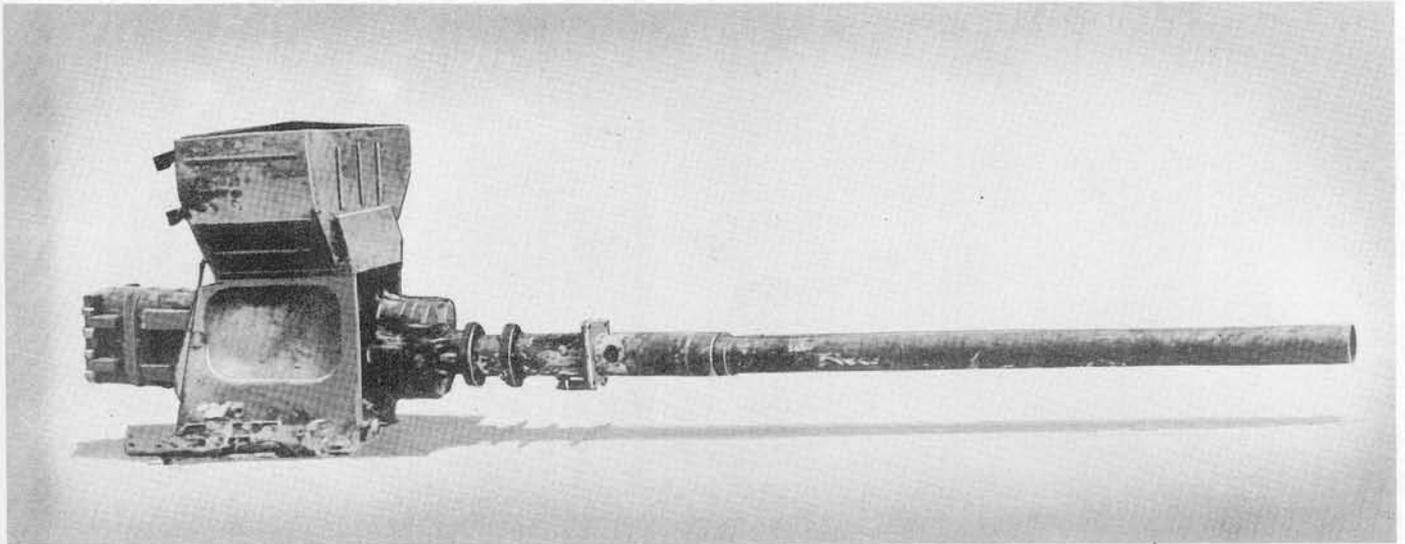


The undercover aiming and firing apparatus not attached to gun.

# AIRCRAFT MACHINE GUN

GERMAN 

30 mm Mk. 108 A-3



The Mk. 108 A-3 is an automatic, air cooled, belt-fed weapon operated by blowback and firing electrically from an open bolt. Initial cocking and initial depression of the sear to release the bolt are accomplished by compressed air. The gun is mounted on its side, and fires through the propeller hub in ME 109 G fighters. It is attached at the forward end of the receiver to a blast tube which extends through the engine. This gun is unusual in being a blowback operated, low muzzle velocity weapon.

Sixty rounds of ammunition are fed by means of a disintegrating belt from an ammunition can mounted above the gun. On release of the sear, the bolt travels forward under the action of two driving springs. A projection on top of the bolt passes through the ring extracting a round and forcing it into the chamber. After firing the empty cartridge case reseats itself in its link. The ejection is accomplished by pawls actuated by camming grooves cut in the top of the bolt. Position of a new round takes place by the same action. A feature of the gun is the fact that the barrel and receiver do not move in recoil, the entire force of which is taken up by the rearward motion of the bolt against driving springs which act as buffers on recoil. There is no locking action between the barrel and bolt at any time.

All ammunition found to date has been high explosive, high explosive-tracer, incendiary and incendiary tracer. It is doubtful if the muzzle velocity is high enough for the effective use of armor piercing ammunition.

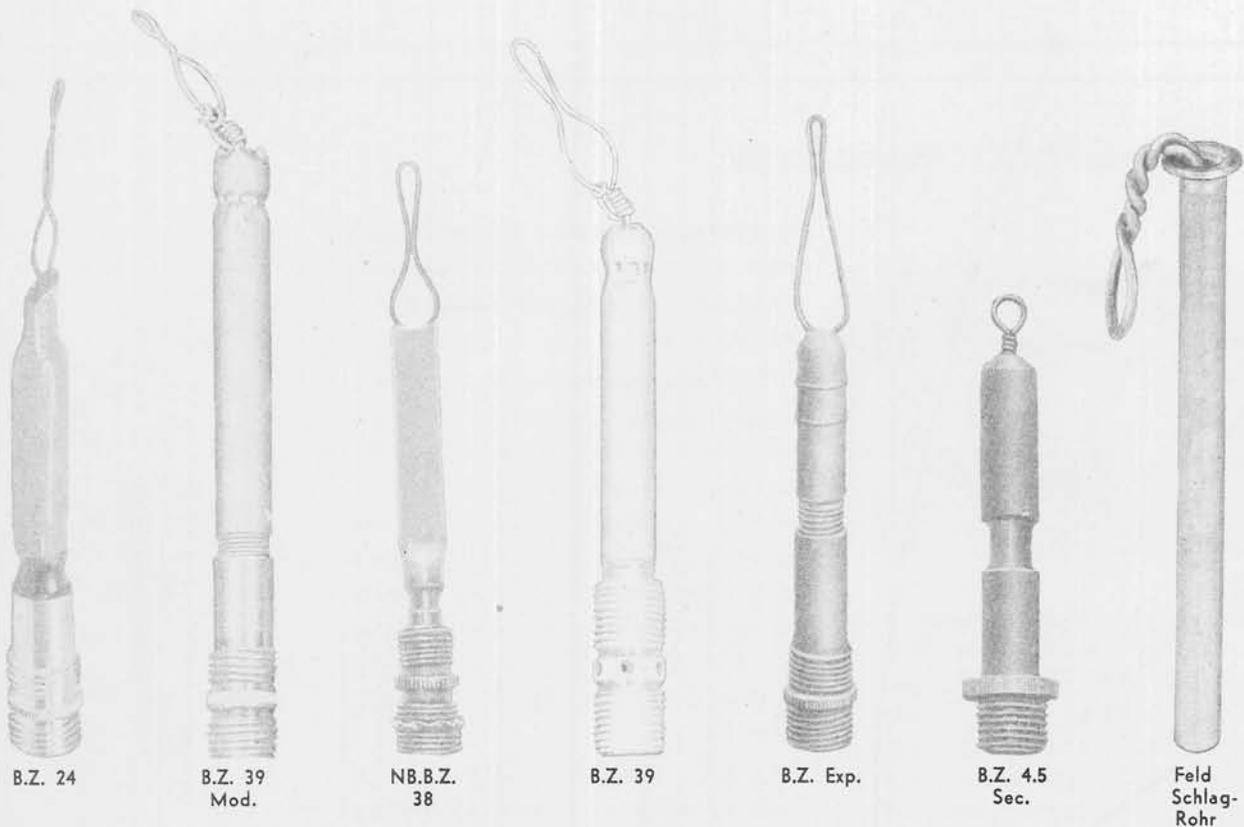
## SPECIFICATIONS

Caliber .....	29.6 mm (1.17 in.)
Weight (total) .....	265 lb.
Weight of gun .....	136 lb.
Weight of mount .....	28 lb.
Weight of ammunition can .....	36 lb.
Weight of ammunition (60 rounds) .....	65 lb.
Weight of recoiling parts .....	24½ lb.
Length of gun with blast tube .....	7 ft. 6¾ ins.
Length of gun .....	3 ft. 5¼ ins.
Length of barrel .....	21½ ins.
Number of lands and grooves .....	16
Maximum length of recoil of bolt .....	11½ ins.
Rate of fire .....	500 rds./min.
Muzzle velocity (approx.).....	H.E.—1,650 f/s.*

\*Not verified

Practically all German mines, including antitank and antipersonnel mines and booby traps, are fired by one or more of several standard igniters. Mines and prepared charges have one or more holes drilled and threaded to receive these igniters. Hand Grenades also employ igniters of the friction, pull, and pressure types. These specialized firing devices are divided by structure and function into friction, pull, and pressure igniters, and a miscellaneous group including such special devices as the tilt, rupture, chemical, and time delay types. A number of the styles most commonly employed by the German army are pictured on the following pages; a few examples are described as representative of each group.

## Friction Igniters



B.Z. 24

B.Z. 39  
Mod.

NB.B.Z.  
38

B.Z. 39

B.Z. Exp.

B.Z. 4.5  
Sec.

Feld  
Schlag-  
Rohr

## Friction Igniters



Zdschn. Anz.  
29



Zdschn. Anz.  
39



Reiss-  
zünder



Reibzünder  
West

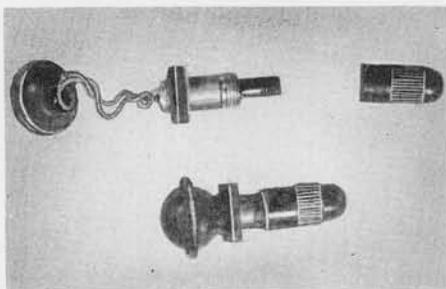


N.B.Z. 29



French  
Friction  
Igniter

## Friction Igniter B.Z.E. (Brenzünder Ei)

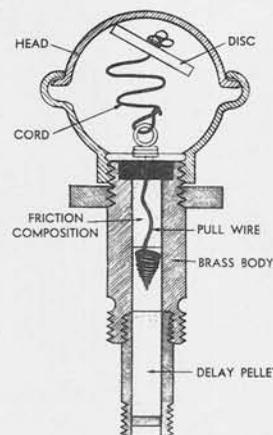


This igniter, which is used in the German egg grenades, resembles the Zdschn. Anz. 39. The B.Z.E. type has different colored caps indicating various lengths of delay in the delay pellets. Red indicates 1 second delay, blue, 4.5 seconds; yellow, 7 seconds; and white, 10 seconds. The blue-capped igniters are used in the

egg grenades, and the yellow-capped with prepared or hollow charges. Red and white-capped igniters are seldom used.

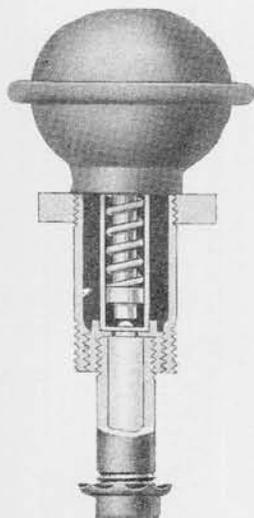
The Germans have at times booby-trapped these igniters by removing the delay pellet, which is usually screwed into the base of the igniter, and by replacing the igniter in the grenade. The igniters normally fitted with delays have right-hand threads on the caps which differentiate them at night from the left-hand threaded, grey-capped fuze igniter, Zdschn. Anz. 39.

In order to operate the device, the cap is unscrewed and the string given a sharp jerk, pulling the wire through the friction composition.

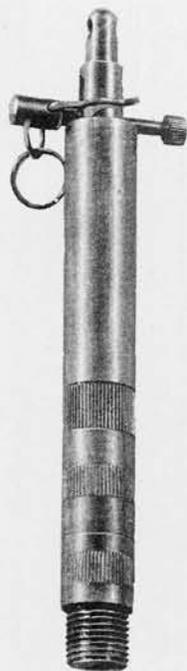




## Pull Igniters



Spring-loaded  
B.Z.E.



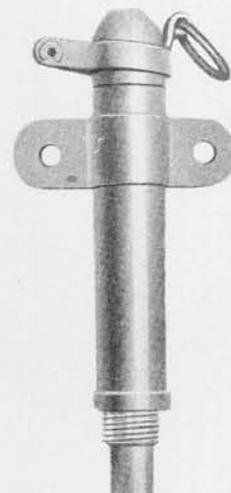
Zu.Z.Z. 35  
(Pull and  
tension release)



Zu.Z.Z. 35  
Mod.  
(Pull only)



Z.Z. 42



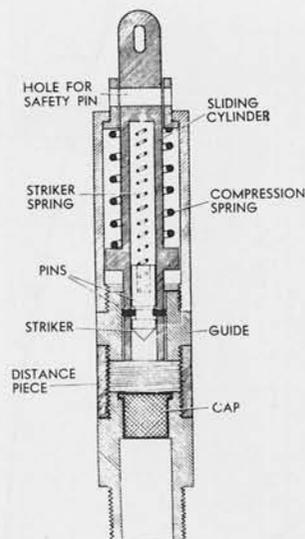
French  
Pull  
Igniter  
1939

## Pull Igniter Z.Z. 35 (Zugzünder 35)



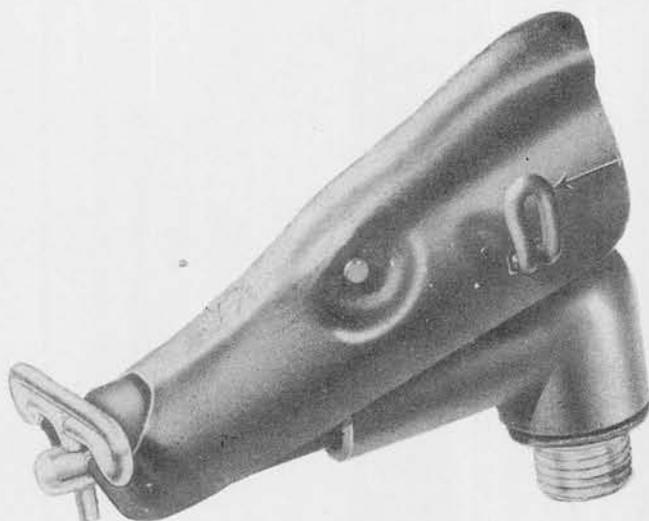
This brass igniter is used with the stock mine and occasionally with the "S" mine. It is also commonly used with booby traps.

The igniter is provided with a safety pin which is inserted through the inner of the two holes in the end of the spring-loaded striker. A trip wire is attached to the outer hole at the end of the striker. In normal use, it is screwed into one of the anti-lifting wells of a mine, a trip wire is attached, and the safety pin is withdrawn.

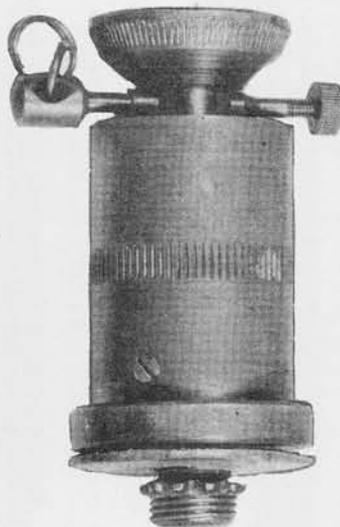




## Pressure Igniters



Hebelzünder 44  
(Used with Glasmine 43)

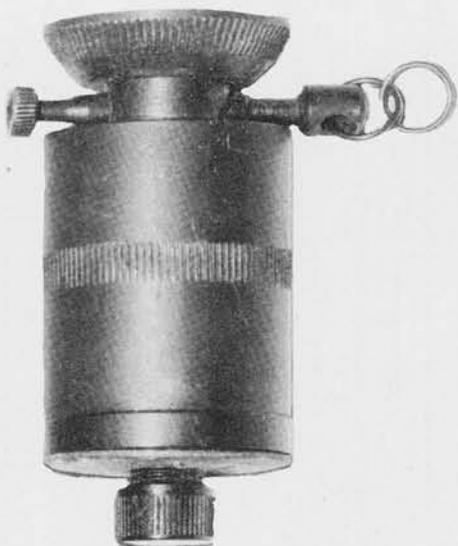


D.Z. 35 (B)



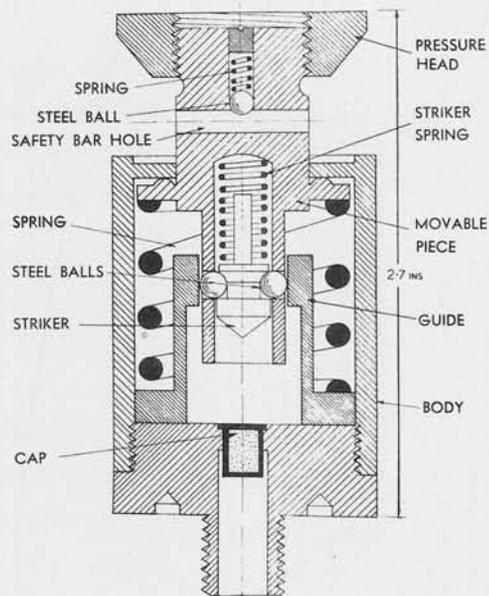
French A.T.

## Pressure Igniter D. Z. 35 "A"



This igniter is designed for use with improvised mines and booby traps. The igniter consists of a white metal body housing the ball-release, spring-loaded striker assembly. The igniter is provided with a safety pin through the head of the plunger.

To operate, after withdrawal of the safety pin, the igniter is fired by pressure on the pressure piece which depresses the plunger until the steel balls are free to escape into the recess in the guide. The spring-loaded striker is released against the percussion cap. A pressure of 130-160 pounds is necessary to fire the igniter.

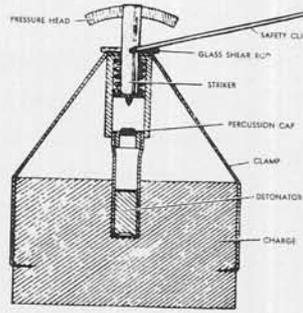




## Pressure Igniters



530 (e)



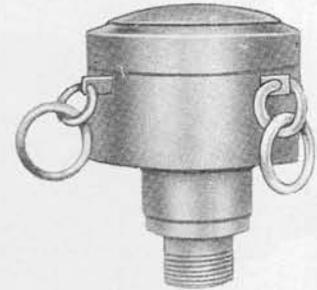
Weissmann



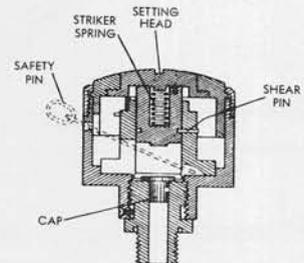
P.X. 38



S.Mi.Z. 44



Z. D. Z. 29  
(Push or Pull Type used with T. Mi. 29.)



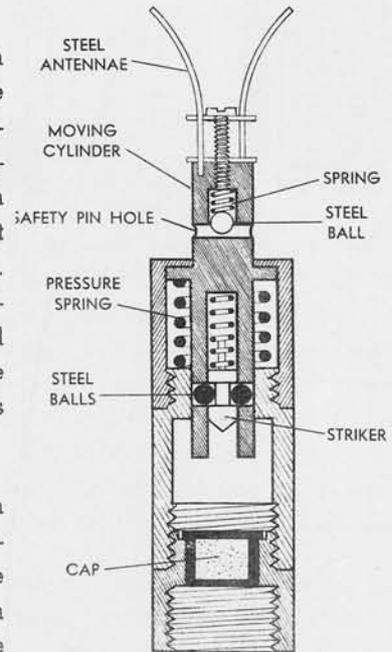
Z. D. Z. 29

## Pressure Igniter S. Mi. Z. 35



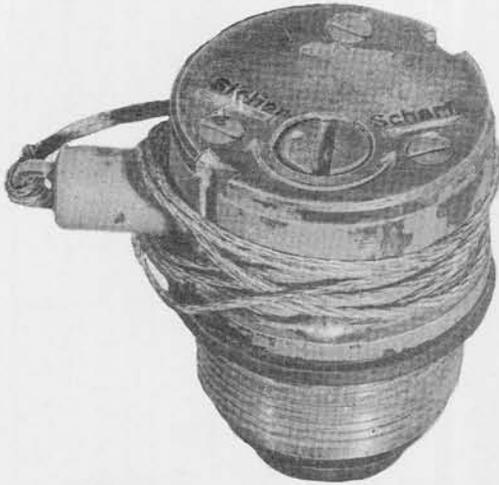
This is the standard igniter used in the "S" mine. It consists of a white metal body, housing the spring-loaded, ball-release type striker assembly. The igniter is provided with a safety pin through the plunger just above the top of the igniter body. There are three pressure prongs attached to the top of the plunger and held in place by a screw. The mine is usually buried with just the prongs of the igniter above the ground.

When the safety pin is removed, a pressure of 15 or 20 pounds is necessary to depress the plunger until the striker retaining balls are freed in the lower recess, releasing the striker.



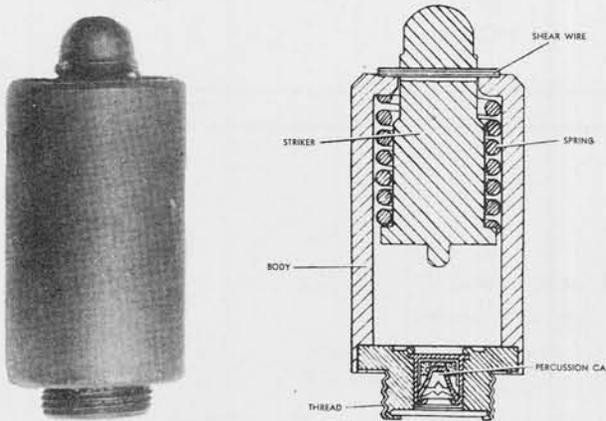


*Pressure Igniter T. Mi. Z. 35*



This metal igniter is used with the Tellermine 35 and 35 (steel). On the top of the igniter is a setting screw with a red dot which may be turned to coincide with a white groove marked "sicher" (safe), or to a red groove marked "scharf" (armed). This screw is connected to an arming spindle inside the igniter. When set at "scharf," a flange is turned out of the striker recess putting all the strain of the spring-loaded striker on the small shear wire holding the striker to the striker guide. There is a safety bolt which, in the safe position, passes through a hole in the top of the striker.

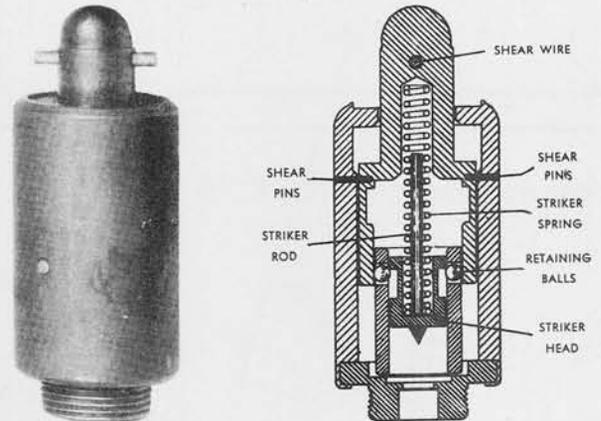
*Pressure Igniter T. Mi. Z. 42*



This igniter, used in the Tellermine 35 (steel), 42, and 43, consists of a cylindrical, steel-shelled body housing a simple steel striker retained against the pressure of a steel spring by a thick shear wire which passes through a hole in the top of the striker, the ends resting on the top of the igniter body. There is no safety pin. This igniter is sometimes manufactured with the detonator attached.

In operation, pressure on the mine cover presses against the striker head, shearing the wire and releasing the striker.

*Pressure Igniter T. Mi. Z. 43*

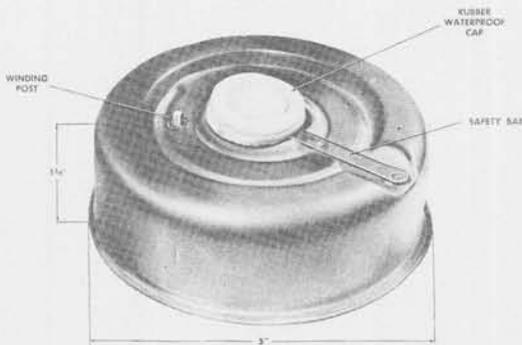
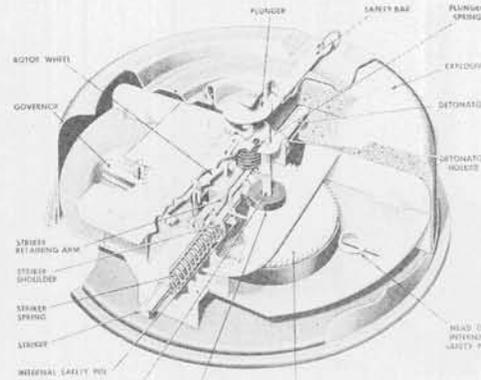


Externally this igniter resembles the T. Mi. Z. 42, but the head (actually a sleeve) is a little longer, and the shear wire is located a quarter inch above the igniter body. Once installed, this igniter cannot be disarmed. When the cover of the Tellermine is screwed down, the sleeve shears the two brass pins holding it to the body. Further pressure forces the sleeve down until the two steel balls escape into the upper recess and release the striker. If an attempt is made to unscrew the mine cover, the sleeve rises, letting the balls escape into the lower recess, releasing the striker.

## Pressure Release Device E.Z. 44

This device consists of a thin-shelled, round steel body, 5 inches in diameter and 1.75 inches high, housing a simple clockwork mechanism and a one-half pound charge. It is designed to be laid under mines, but may also be used as a booby trap.

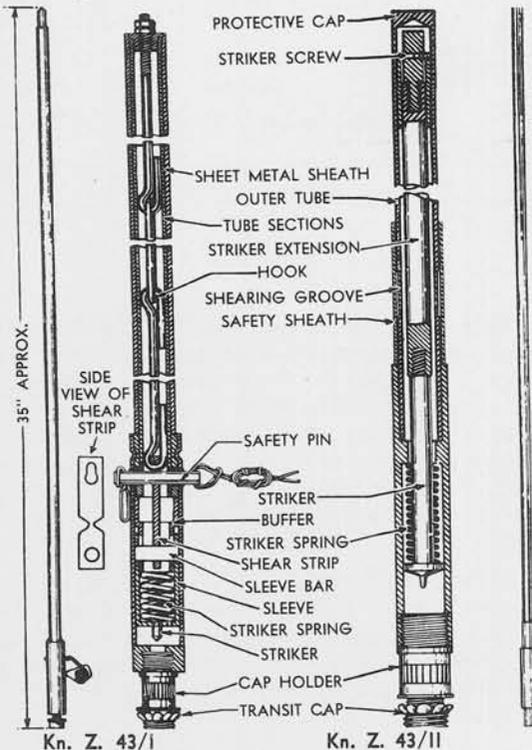
On the top is a small pressure plate connected to a hinged arm holding the spring-loaded striker back. A safety bar runs through the pressure piece into one of the clockwork wheels, preventing the wheel from turning. The mechanism is wound up with a special key and a weight of at least 10 pounds placed on



the pressure piece; then the safety bar is pulled out starting the clockwork. As the mainspring unwinds, it pushes the safety pin from the hole in the striker. The mine is then armed and the only thing holding the striker back is the hinged arm held down by the pressure piece against a compressed spring. When the weight is lifted from the pressure piece, the hinged arm moves up, freeing the striker.

Once this device is armed under an object, it cannot be disarmed or neutralized.

## Rupture Igniters 43/I and 43/II

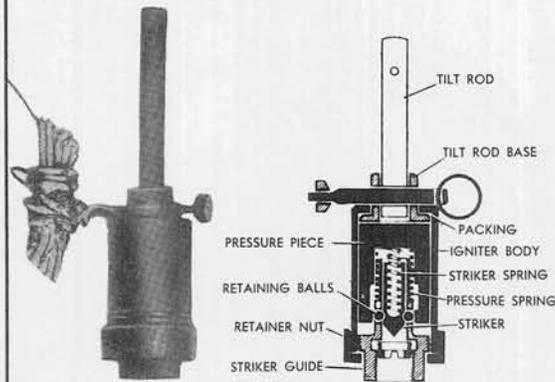


Each of these igniters is approximately 35 inches in length including the elongated staff. Either type is screwed vertically into any standard igniter socket and is designed to initiate the mine when tilted.

Kn. Z. 43/I has a staff made up of 5 sections containing a chain of hooks, the bottom one engaging the shear strip in the igniter. Sideways pressure on the staff causes the hooks to pull the shear strip upwards, raising the sleeve bar, sleeve, and spring, rupturing the shear strip and releasing the spring-loaded striker.

Kn. Z. 43/II is featured by a striker extension made of brittle plastic enclosed in an outer tube with a shear groove towards its lower end. Sideways pressure breaks the outer tube at the shearing groove and breaks the striker extension, releasing the spring-loaded striker.

## Tilt Igniters 43A and 43B

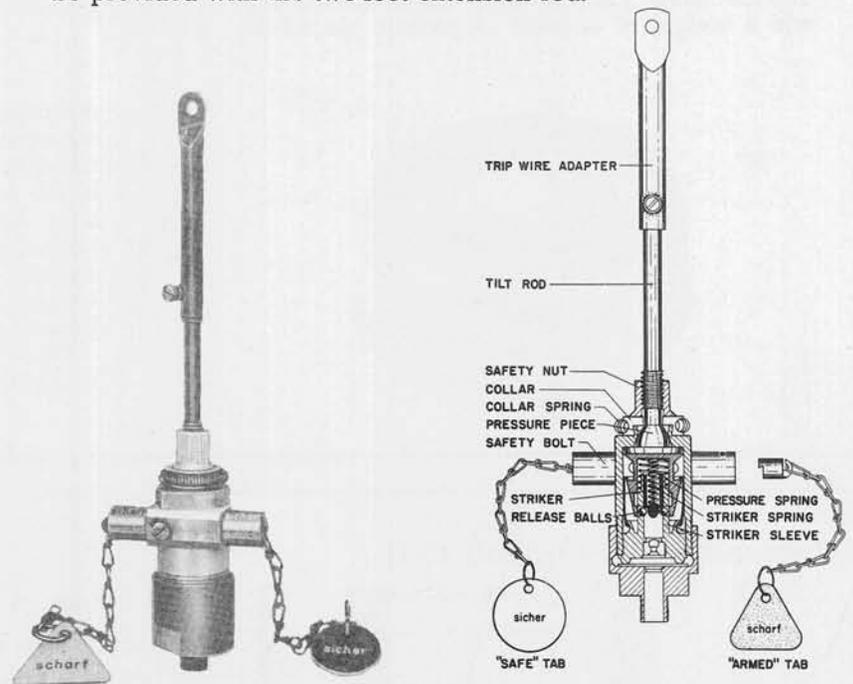


Kippzunder 43 (A)

This igniter, designed to fire when the tilt rod is pushed or tilted in any direction, has standard German threads, permitting its use in any igniter well. It has been found screwed into the bottom well of Tellermines laid upside-down and buried in the ground, the tilt rod extension extending into the air about two feet.

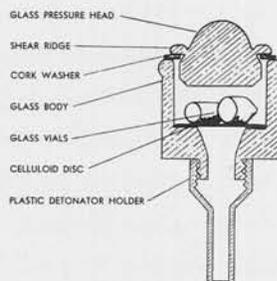
The igniter is armed by removing the safety pin. When the tilt rod is moved, the base rod tilts inside the igniter body, depressing the pressure piece and pressure spring, allowing the retaining balls to escape into the recess which releases the spring-loaded striker. A pressure of 15 or 20 pounds will set off the igniter.

Igniter 43B is similar to the preceding except for the method of arming and the safety device. A safety bolt runs horizontally through the igniter body. At each end of the bolt is a detachable chain with a metal tag on the end. One tag is round, marked "sicher" (safe); the other is triangular, marked "scharf" (armed). When the igniter is armed, the "scharf" chain is pulled out. This positions the bolt in such a manner that the pressure piece will be depressed when the rod is tilted. The igniter may have a trip wire attached to the tilt rod or it may be provided with the two-foot extension rod.



Kippzunder 43 (B)

## Topf Mine Chemical Igniter

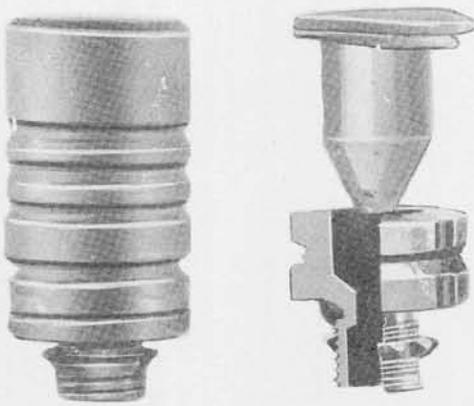


This chemical igniter, used in the Topfmine, is an entirely non-metallic pressure type without a safety device. It consists of a hemispherical pressure head fitted into a hollow glass body. The body screws into a plastic detonator holder. Two glass vials, one containing sodium and potassium as a liquid alloy and the other ethyl nitrate, are fastened within the body to a celluloid disc by adhesive tape.

When the pressure plate of the mine is sheared under a load of about 330 pounds, the head of the igniter shears along its ridge and crushes the glass vials. The resulting chemical reaction causes a flash which sets off the detonator.



## Buck Chemical Igniter



The Buck Chemical Igniter consists of a soft metal shell containing a glass vial of sulphuric acid surrounded by a white, sugar-like powder containing potassium chlorate. The base of the

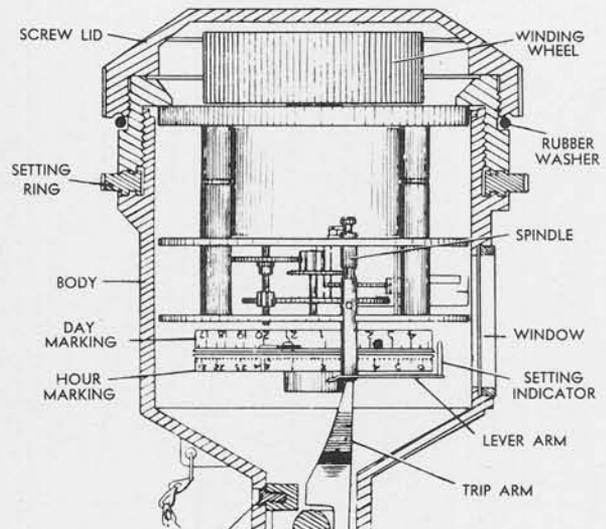
igniter is threaded to fit in the activating well of any German mine with a standard thread. In operation, when the soft metal shell is crushed, the glass vial breaks, and the acid coming in contact with the powder produces a chemical reaction which ignites the mixture, sending a flame down to the detonator. There is no safety.

A newer version of this igniter differs from the old type in that it is shorter and contains a glass vial of purple chemical instead of sulphuric acid.

## 21-Day Clockwork Igniter J. Feder 504



This igniter, which can be set to go off at any time up to 21 days, is accurate to within 5 minutes in the maximum time limit. It is housed in a white metal case, threaded to take a lid. The mechanism is set by means of a wheel under the lid. Two metal rings are visible through a glass window in the side of the igniter. One wheel, numbered in red, indicates the number of days desired to elapse before the striker is released; the other, numbered in black, is for the hours. The setting ring, marked "Steht" (stop) and "Geht" (go) is located just above the window. A combined safety and arming hole is in the striker "neck" just below the clockwork housing. The arming screw, marked "scharf" is attached to a chain; the safety screw marked "blind" is carried in the hole.

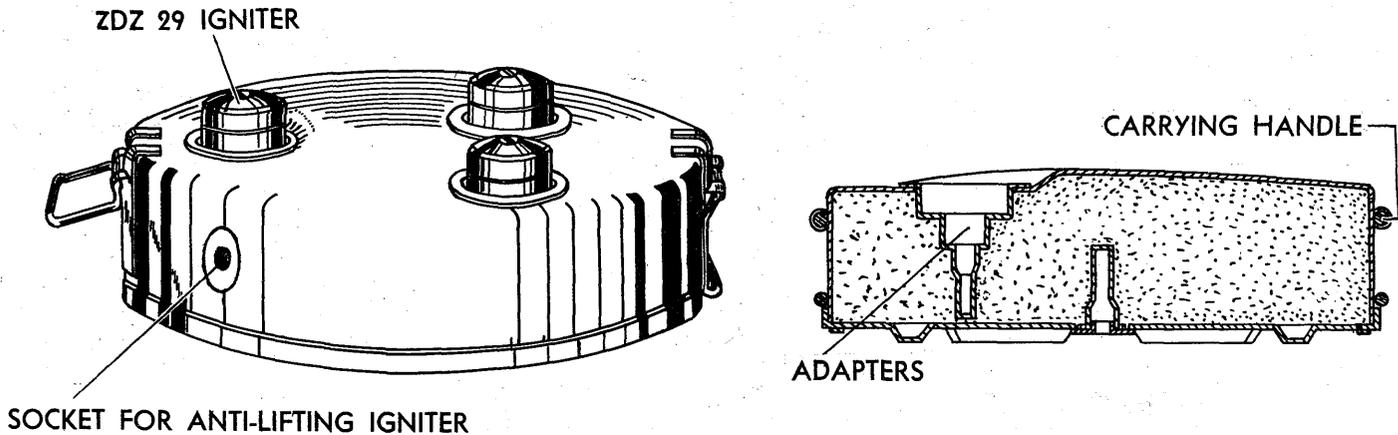


# ANTITANK MINE

GERMAN



T. Mi. 29



The German Mine, T. Mi. 29, is a light antitank mine having a total weight of 13¼ pounds. It is 10 inches in diameter, 2¾ inches high, and contains a 10 pound charge of cast T.N.T. Outside, the mine is painted olive green; all internal surfaces are shellacked.

The zinc casing comprises two sections: the top, 3/64-inch thick, slides into the base which is 1/32-inch thick, and is secured by eight tabs which pass through slots in the base and are then bent over and soft soldered. Two steel carrying handles shaped to fit close to the case when folded are held by brass strips.

The top is slightly domed and has three adapters sweated into shallow recesses. The adapters have sockets to take the standard German igniters, ZDZ 29. There are three additional sockets provided for fitting anti-lifting igniters: two are in the side of the casing, diametrically opposite one another and four inches to the right of the center of each handle; the other is in the center of the base. In addition to being sweated into the casing, each socket is secured by two brass pins which fit into slots on either side of the hole in the mine casing.

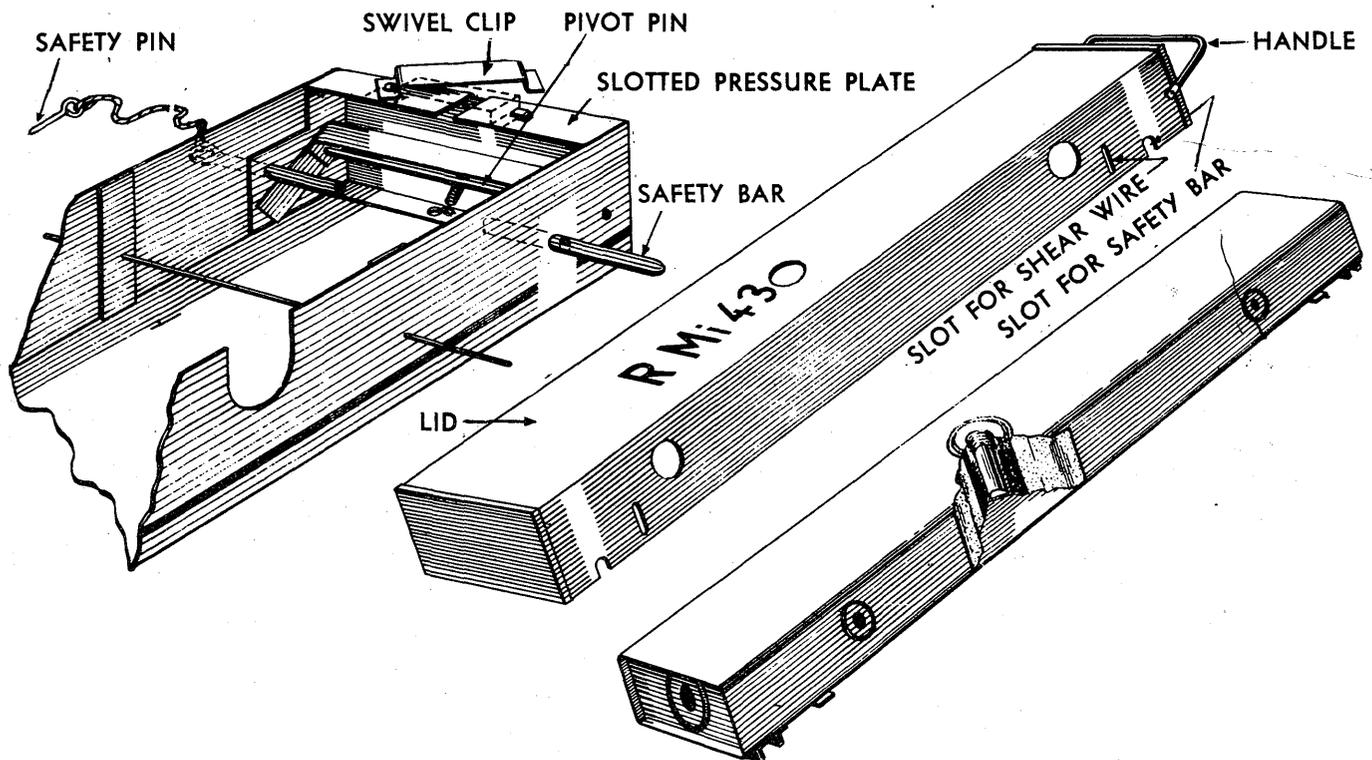
The ZDZ 29 can function as either a push or pull igniter. When it is used as a pressure igniter, there is a choice of two settings allowing the mine to fire under medium or heavy loads. The operation depends respectively on the shear of one or two pins acting as detents to a spring-loaded striker pellet. When in use as a pull igniter, the operation depends upon the withdrawal of one detent pin from the spring-loaded striker pellet.

The igniter is held in a "safe" position by the insertion of a safety key into a slot in the main body. The key slides under the striker pellet, preventing the striker from moving until the key is withdrawn.

# ANTITANK MINE

Riegel Mine 43 (R.-Mi. 43)  
Sprengriegel 43 (Spr. R. 43)

GERMAN



The Sprengriegel 43 or "high-explosive bar mine" is used in open country, on roads, and in minefields. It consists of three main parts: a metal encased charge of TNT, a sheet steel tray, and a lid which acts as a pressure plate on the charge.

The charge is provided with five igniter sockets: two for the main igniters (Type Z. Z. 42) are located in the ends of the charge and are recessed so that only the ends of the igniters show when they are fitted and laid; the other three are for the new tilt igniter 43 (Ki. Z. 43) or other antilifting or trip-wire igniters. One of the latter three sockets is located in the top center of the charge; the other two are in one side five inches from the ends. By reversing one of the main igniters with its wings below the end pressure plate, it will function as an antilifting device. The mine may also be fired electrically by remote control.

The tray is equipped with shear wires which are threaded through reinforcing strips welded to the inner sides of the tray. The ends of the tray are folded over on top to form slotted pressure plates to actuate the Z. Z. 42 igniters fitted to each end of the charge. Near each end are holes through which safety bars are threaded to keep the charge clear of the shear wires in the unarmed position. A thin red line painted along the sides of the tray one-half inch from the bottom indicates the correct position of the lid when the mine is armed.

The lid of spot welded sheet steel construction is equipped with a handle at one end. It, too, is fitted with holes to correspond with the sockets, shear wires, and safety bars.

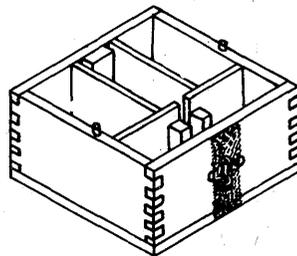
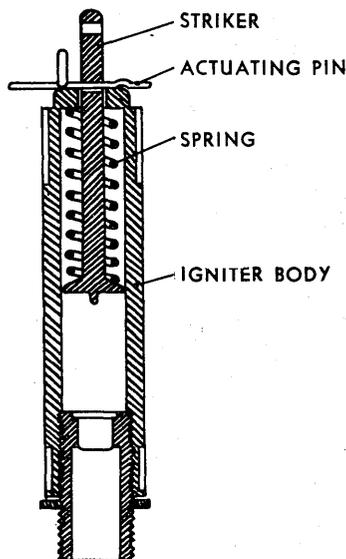
A pressure of about 440 pounds at either end, or 880 pounds in the center of the mine forces the lid and charge down, shearing the wires and actuating the igniters which set off the main charge.

## SPECIFICATIONS

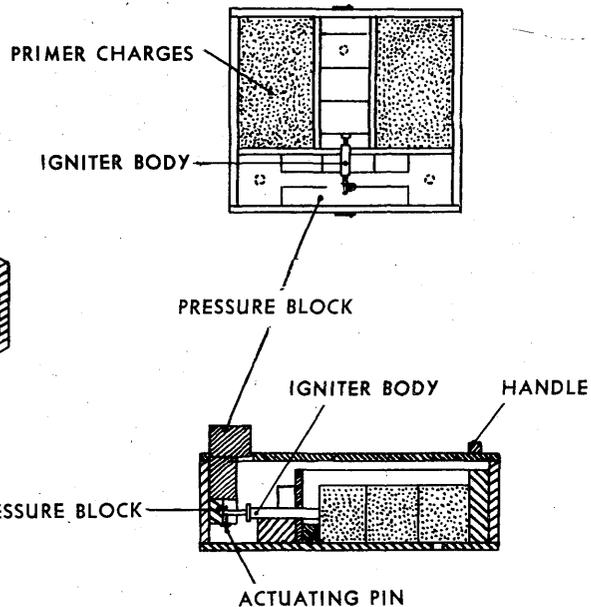
Overall length .....	31½ ins.
Overall width .....	3¼ ins.
Height (laid) .....	3½ ins.
Total weight (approx.) .....	20.5 lb.
Color .....	Light khaki
Thickness of casing (approx.) .....	.04 in.
Weight of charge .....	8.8 lb.
Main igniters .....	Type Z. Z. 42
Firing pressure (ends) .....	440 lb.
Firing pressure (center) .....	880 lb.

# WOODEN BOX MINE

Holzmine 42



Z. Z. 42  
FUZE



The body of the German Holzmine 42 consists of a wooden box of 3/4-inch lumber divided into four compartments by removable partitions. The two side compartments contain the main explosive filling; the central compartment the 7-ounce primer charges; and the end compartment the operating mechanism.

The main filling consists of two charges of 50/50 Amatol covered with a bitumastic substance as a protection against water. While it is believed that several different types of primer charges are used, three Sprengkorper 28 charges are presumed to be standard for the mine.

The end compartment contains a shearing flange secured to the outside wall by two 3/8-inch wooden dowels. It is provided with a central slot to receive the end of the striker. The igniter rest consists of a small block of wood with a U-shaped piece cut out at the top, and screwed to the base from the underside.

When the mine is armed, the feet of the pressure block rest on the shear flange, in which position the head of the pressure block projects about two inches above the lid. During transit, the pressure block is reversed so that the feet rest on blocks in the bottom of the box.

A pressure of approximately 200 pounds on the pressure block shears the dowels securing the shear flange to the outer wall of the mine and forces the flange down onto the igniter pin which is withdrawn freeing the spring-loaded striker. The fuze used is the standard German Z. Z. 42.

The Holzmine 42 has also been used as a booby trap by employing an anti-lifting device. This device which is fitted into a hole underneath the central compartment is believed to consist of a Z. Z. 35 fuze screwed into a 7-ounce charge.

## SPECIFICATIONS

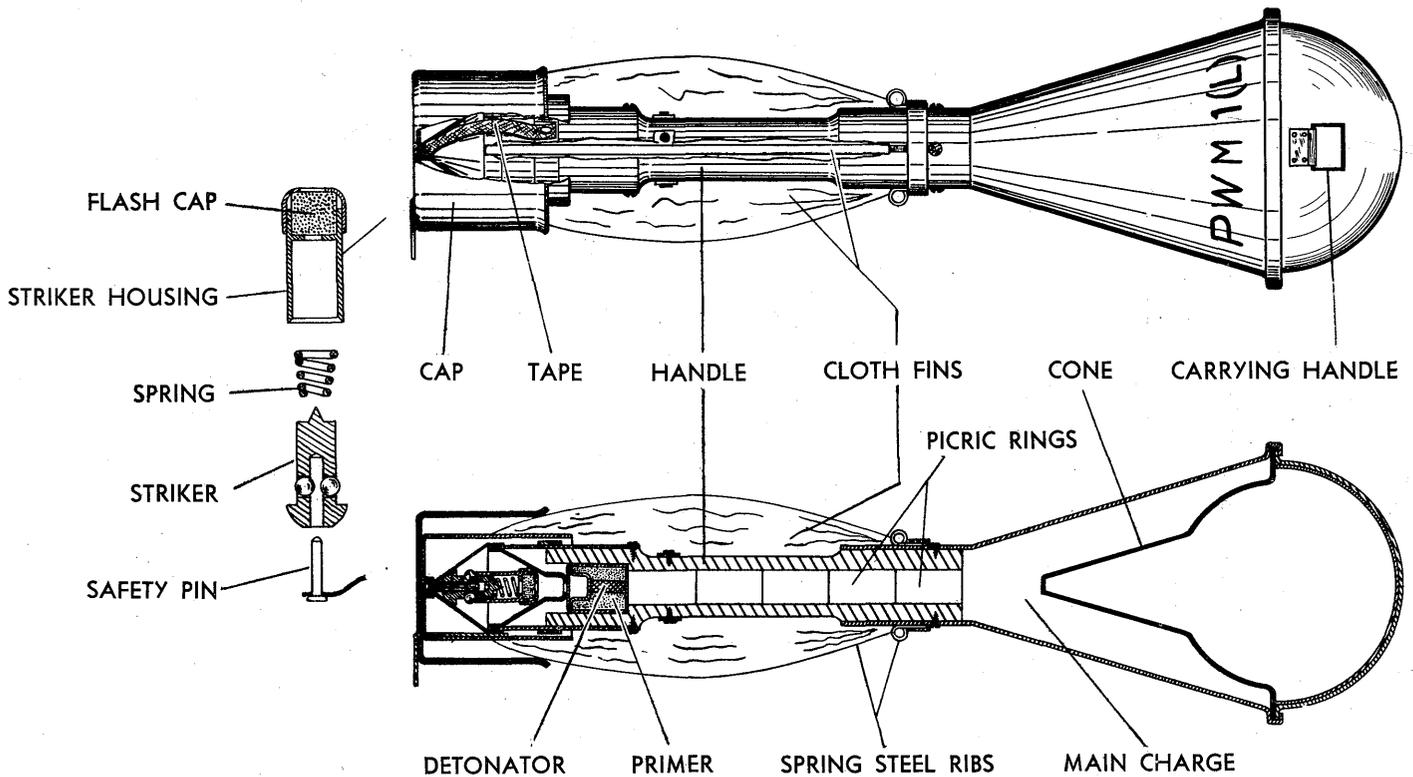
Internal dimensions .....	11.4 x 10.7 x 3.2 ins.
Size of lid .....	13 x 12 x 3/4 ins.
Size of aperture in lid .....	6.4 x 2.5 ins.
Pressure block (without feet)....	6 x 2.4 x 2.4 ins.
Size of compartments:	
Main charges .....	4.5 x 7.7 ins.
Priming charges .....	1.7 x 6.8 ins.
Thickness of partitions .....	.19 in.
Size of shearing flange .....	7.6 x 1.25 x .5 ins.
Size of slot in shearing flange .....	.27 x .67 in.
Size of wooden blocks..	3.1 x .78 x .86 ins. deep
Main explosive .....	Amatol 50/50
Total weight of explosive .....	11.9 lb.
Total weight of mine .....	18 lb.

# HOLLOW CHARGE ANTITANK HAND GRENADE

GERMAN



Panzerwurfmine (L)



The Panzerwurfmine (L) consists of a metal body and a wooden handle to which four canvas fins are attached. The grenade is intended to be thrown by hand, and is armed by the removal of a metal cap at the base of the handle. This cap not only acts as a fuze cover, but also serves to hold the fins close against the handle of the grenade before throwing.

The body is made in two pieces crimped together and attached to the handle by a metal band. It contains an 18½ oz. filling of 50/50 R.D.X./T.N.T. cast around a hollow charge liner made of pressed steel.

A sensitive impact fuze consisting of a striker, a creep spring, and two steel balls is located in the base of the handle. The two balls fit into a recess in the striker and are held outward by a safety pin fitting between them, causing them to bear against the top of the striker housing and preventing the striker from moving down onto the primer. Beneath the primer in the base of the handle is a detonator and a picric acid booster. A small length of tape is attached to the safety pin at one end, and is held in at the other end by the metal cap and a semicircular clip attached to one fin and fitting around the handle.

When the grenade is thrown, the fins which are attached to the handle by steel ribs open out umbrella fashion, and the clip attached to one fin is pulled away from the housing. This action releases the tape which unwinds and pulls the safety pin out of the striker. During flight, the two steel balls move in, freeing the striker which compresses the creep spring on impact, setting off the primer, detonator, booster, and main filling.

## SPECIFICATIONS

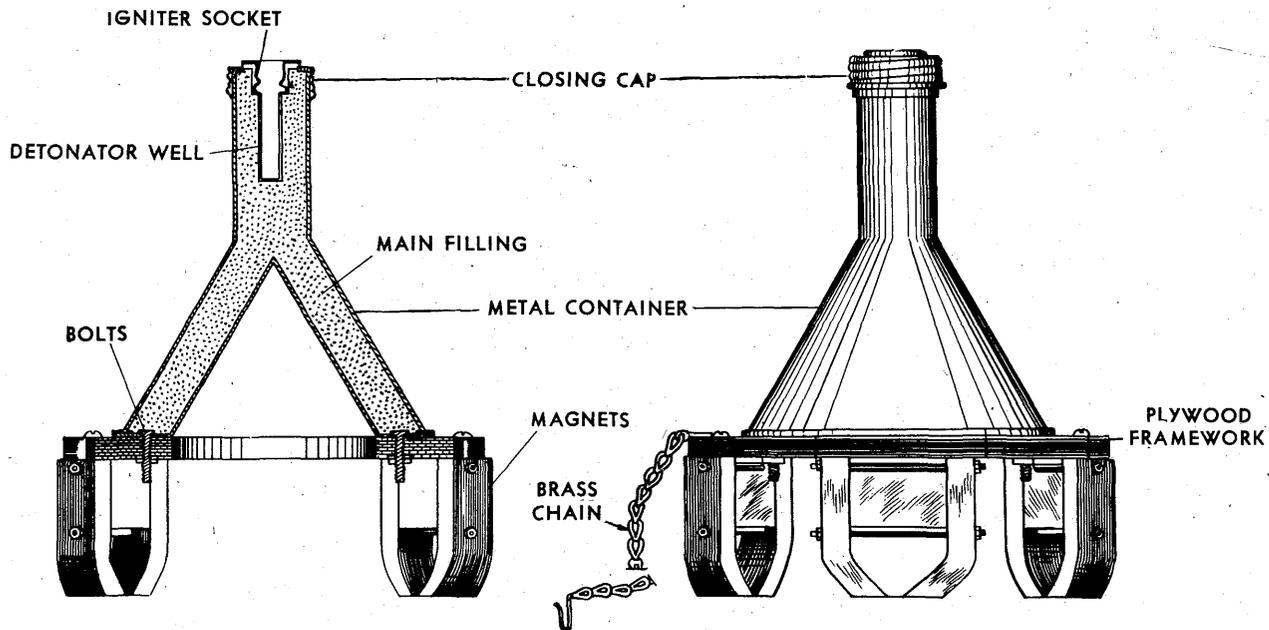
Overall length .....	21 ins.
Length of body .....	9 ins.
Length of fins .....	11 ins.
Diameter of body .....	4½ ins.
Weight (approx.) .....	3 lb.
Filling .....	Cast R.D.X./T.N.T.
Color of body .....	Grey

# MAGNETIC HOLLOW CHARGE ANTITANK MINE

GERMAN



Haft-Hohlladung 3 Kg.



The German magnetic, hollow-charge, antitank mine, designed for use by tank-hunting squads, consists of a main filling of TNT in a pressed metal container of conical shape. The conical container has an elongated apex threaded externally at its upper end to receive a closing cap. The closing cap is fitted with a detonator well, and threaded internally to receive a standard (B. Z. E.) friction igniter which has a 4.5 second delay.

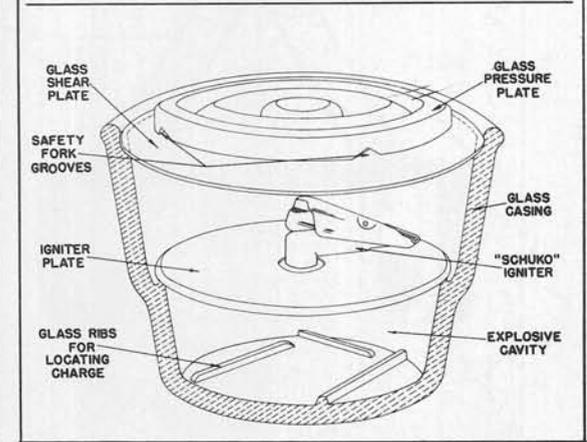
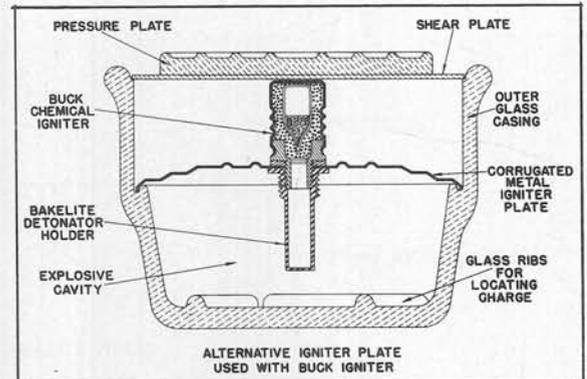
The base of the cone is attached to a plywood framework. Three horseshoe type magnets, sufficiently powerful to cause the mine to adhere to a vertical surface, are fixed to the bottom of the frame. During transit, the magnets are fitted with a keeper. A brass chain terminating in a hook is also attached to the frame.

## SPECIFICATIONS

Weight of live charge .....	7 lbs., 12½ oz.
Weight of explosive (TNT) .....	1 lb., 15½ oz.
Weight of booster (Pentrite) .....	3 oz.
Height of charge .....	10¾ ins.
Height of bursting charge container.....	7¾ ins.
Height of magnets .....	2¾ ins.
Height of apex of hollow cone .....	6 7/16 ins.
Diameter of base of hollow cone .....	4 3/16 ins.

# GLASS MINE (ANTIPERSONNEL)

Glasmine 43 (f)



The mine consists of an outer glass casing, the upper portion of which is  $\frac{1}{4}$ -inch thick and the lower portion  $\frac{2}{5}$ -inch thick. The external diameter at the base is  $4\frac{1}{2}$  inches and at the top, 6 inches at the widest part.

A grooved shoulder on the inside of the case, about 2 inches from the bottom, supports the igniter plate. The mine may employ either a Buck chemical igniter or a new mechanized igniter, the Schuko. When the latter is used, the igniter plate consists of a thin sheet metal plate, which has a central hole for the igniter. When the Buck igniter is used, however, an igniter plate having the same diameter and igniter hole but of stronger design is employed. Around the top of the case is a grooved ledge which supports a thin glass shear plate approximately  $\frac{1}{32}$ -inch thick.

A moulded glass pressure plate of  $\frac{3}{4}$ -inch extreme thickness and  $4\frac{1}{2}$  inches in diameter rests on the shear plate. There are two parallel grooves on the underside of the pressure plate which are designed to accept a metal safety fork that will bridge the outer edge of the mine and support the pressure plate until such time as the mine is laid. The two prongs are then withdrawn through the two grooves arming the mine. This fork is not supplied with the mine but is improvised by units.

Four raised strips moulded in the bottom of the mine are spaced so as to take a standard 200 gm. charge (Sprengkorper 28). When sufficient pressure (40 lbs.) is applied to the glass pressure plate, the shear plate is broken and crushes the top of the Buck igniter or trips the actuating lever of the Schuko igniter, depending on which is employed.

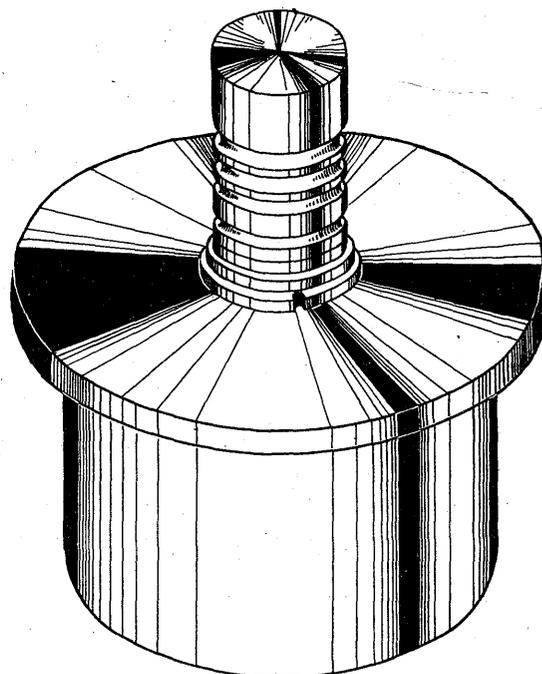
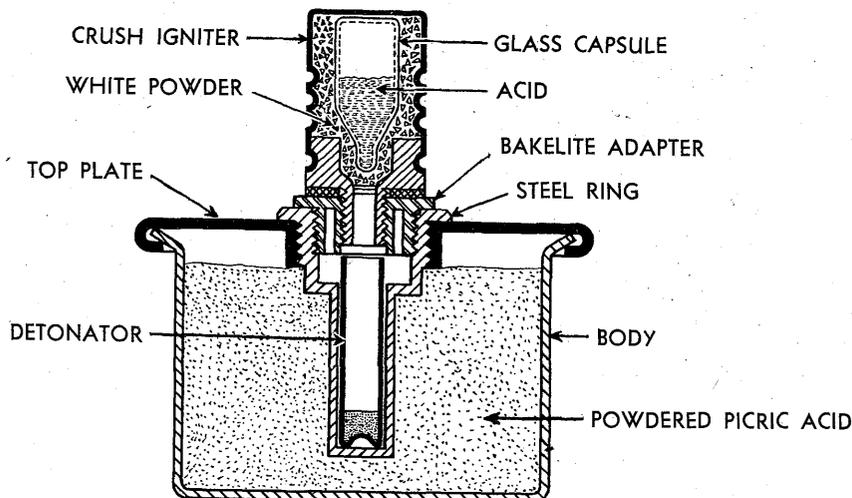
## SPECIFICATIONS

Weight of standard charge .....	200 gm
External diameter at top .....	6 ins.
External diameter at base .....	4.5 ins.
Height to lip of container .....	4.2 ins.
Thickness of casing (upper) .....	.25 in.
Thickness of casing (lower) .....	.4 in.

# ANTIPERSONNEL MINE

GERMAN 

Behelfs-Schützenmine S. 150



The German Behelfs-Schützenmine S. 150, known to allied troops in the field as the "Pot Mine," "Picric Pot," "Mustard Pot," or "Jerry Mine," consists of a cylindrical body, a top plate, and a crush igniter.

The body, which is made of pressed steel, contains a 5¼ oz. explosive charge of powdered picric acid. A chemical crush-actuated igniter is screwed into the mine by means of a brass or plastic adapter which fits into the top of the body. A synthetic rubber washer is provided between igniter and adapter for waterproofing the mine. The igniter, known as the German Buck Igniter (Chemischer Zünder Buck) consists of a thin metal drum with circumferential grooves to reduce its resistance against vertical pressure. It contains a glass ampule half filled with acid and surrounded by a white powdered flash composition. A small brass detonator (German Nr. 8) is inserted into the detonator pocket.

A moderate pressure on the top of the igniter crushes the metal drum and the glass inside it. The acid pours into the white powder, and a flash resulting from their chemical interaction sets off the detonator which in turn sets off the mine.

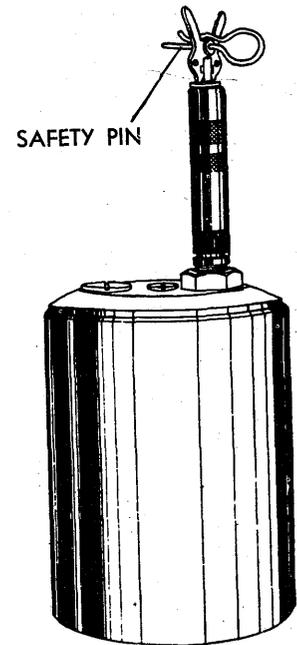
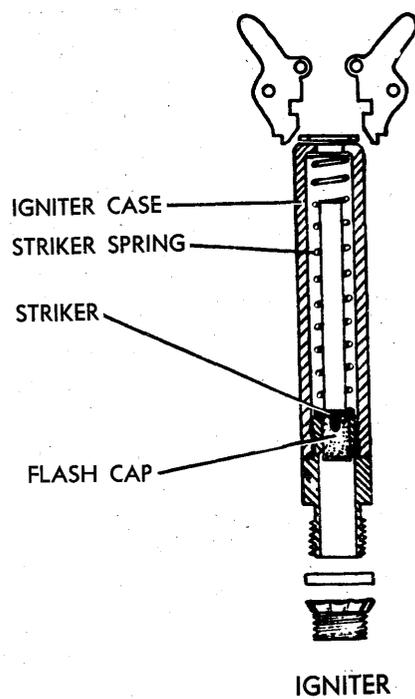
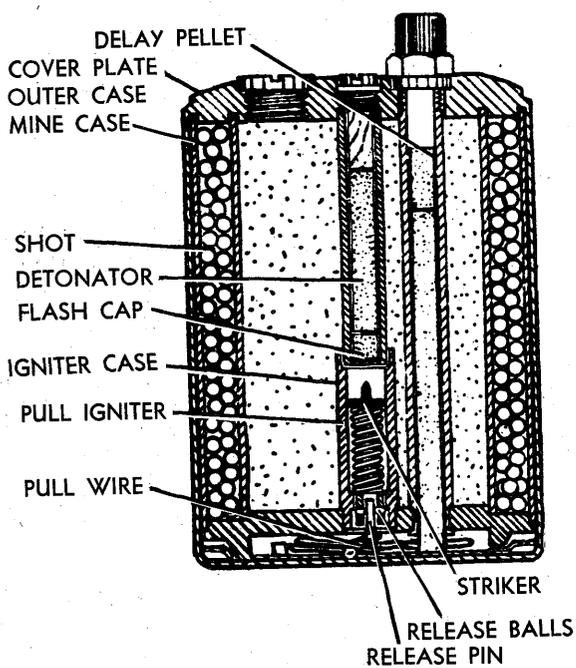
## SPECIFICATIONS

Height of body .....	2 ins.
Diameter of body .....	2½ ins.
Diameter of top plate .....	3 ins.
Height of igniter .....	1½ ins.
Diameter of igniter .....	¾ in.
Depth of detonator pocket .....	1½ ins.
Total weight .....	12½ ozs.
Weight of igniter with adapter .....	1 oz.
Explosive charge .....	Powered picric acid (5¼ oz. approx.)
Color .....	Mustard brown

# ANTIPERSONNEL MINE

GERMAN 

S. Mi. 44 mit S. Mi. Z. 44



This anti-personnel mine is basically the same, both in construction and operation, as the S. Mi. 35 described on page 305. It consists of an outer casing and an inner cylinder which contains a T.N.T. charge surrounded by small shot. There are three threaded openings in the cover plate: one is used for pouring the charge into the mine; the second, which takes a S. Mi. Z. 44 igniter, opens into a tube containing a 4.5 second delay pellet and a propellant consisting of three grams of fast burning gun powder; the third which is closed by a wooden plug leads into a tube containing a detonator, a flash cap, and a pull igniter. The pull igniter, located at the base of the tube, contains a spring-loaded striker held in place by two steel balls which are prevented from moving by a pin in the base of the igniter. The pin is attached to the base of the outer case by approximately three feet of coiled wire.

The S. Mi. Z. 44 is a percussion igniter differing from the usual percussion type in that it has two small wings which, when forced outward by pressure from above or tension through trip wires from the side, release the spring-loaded striker to fire the cap. A pressure of 21 pounds or a tension of 14 pounds will actuate the igniter.

Operation of the igniter initiates the 4.5-second delay pellet which fires the propellant throwing the mine upwards. When the coiled wire is fully extended (about 2½ feet above ground level) it pulls the pin from the igniter, enabling the retaining balls to move inward and release the striker to fire the flash cap, detonator, and bursting charge.

## SPECIFICATIONS

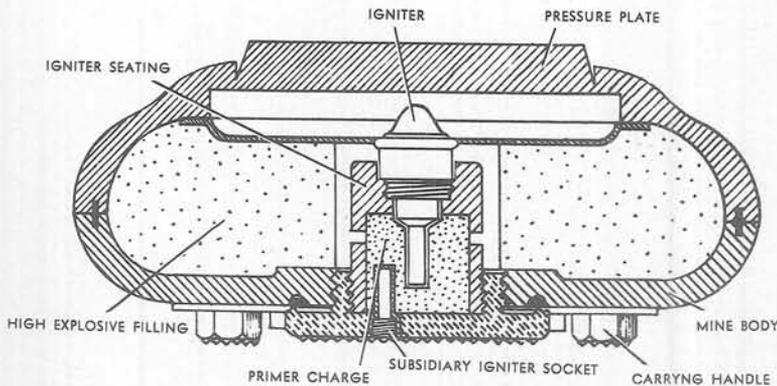
Height .....	5½ ins.
Height with igniter .....	8¾ ins.
Diameter .....	4 ins.
Weight .....	8.8 lb.
Color .....	Camouflage yellow

# ANTITANK MINE

GERMAN



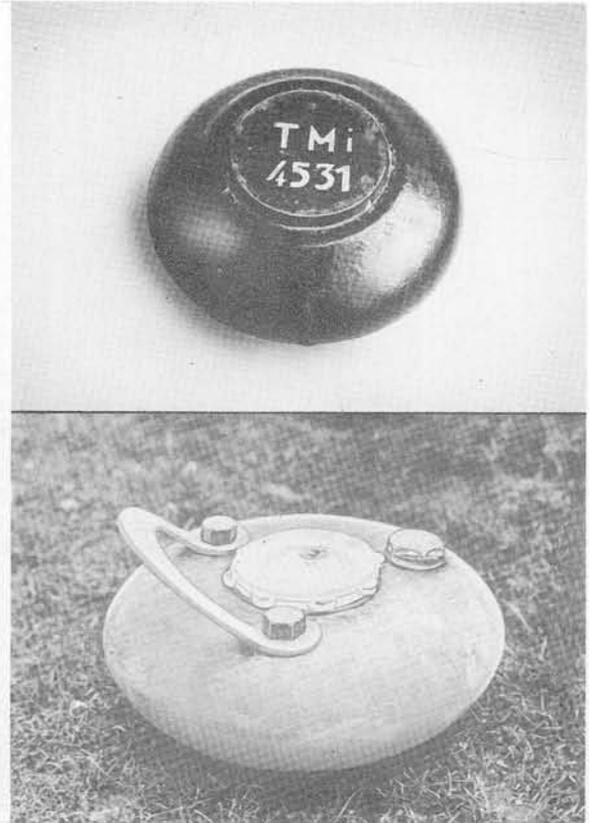
## Topf Mine



Above: A cross-section of the antitank topf mine showing principal parts.

Upper right: Top view.

Lower right: Bottom view showing carrying handle.



The Topf Mine, a completely non-metallic, waterproof, anti-tank mine, consists of a circular body filled with a 12½-pound charge of TNT, a primer plug assembly, and an igniter. The top of the mine is flat, with a fixed pressure plate in the center slightly higher than the surface; a 4½-inch circular recess located in the bottom takes the primer plug and igniter assembly. The outer casing is made of a hard pulp-like material covered with pitch. The mine rests on three glass studs; two of the studs secure a pasteboard carrying handle, while the third, which is sometimes larger than the two others, is used as a filler plug.

The primer plug assembly consists of a glass screw cap and a cylindrical wooden booster holder, the top of which has a deep threaded recess to take the Topf Mine Igniter. A subsidiary igniter socket in the glass cap leads to the booster charge, and is threaded to take a standard igniter.

The Topf Mine Igniter, which is made of glass, has no safety device. It comprises a cylindrical glass body 3 mm thick; a solid glass pressure head, hemispherical in shape and two small glass ampules, one of which contains sodium and potassium as a liquid alloy and the other ethyl nitrate. The ampules are held in position by a black celluloid disc. A thin bakelite detonator well is provided.

The mine is activated by a pressure of at least 330 pounds, which forces the pressure plate down onto the igniter head and thereby breaking the two glass ampules. A flash results, setting off the detonator, booster, and main charge. If a standard igniter is used, the mine must be laid upside down.

## SPECIFICATIONS

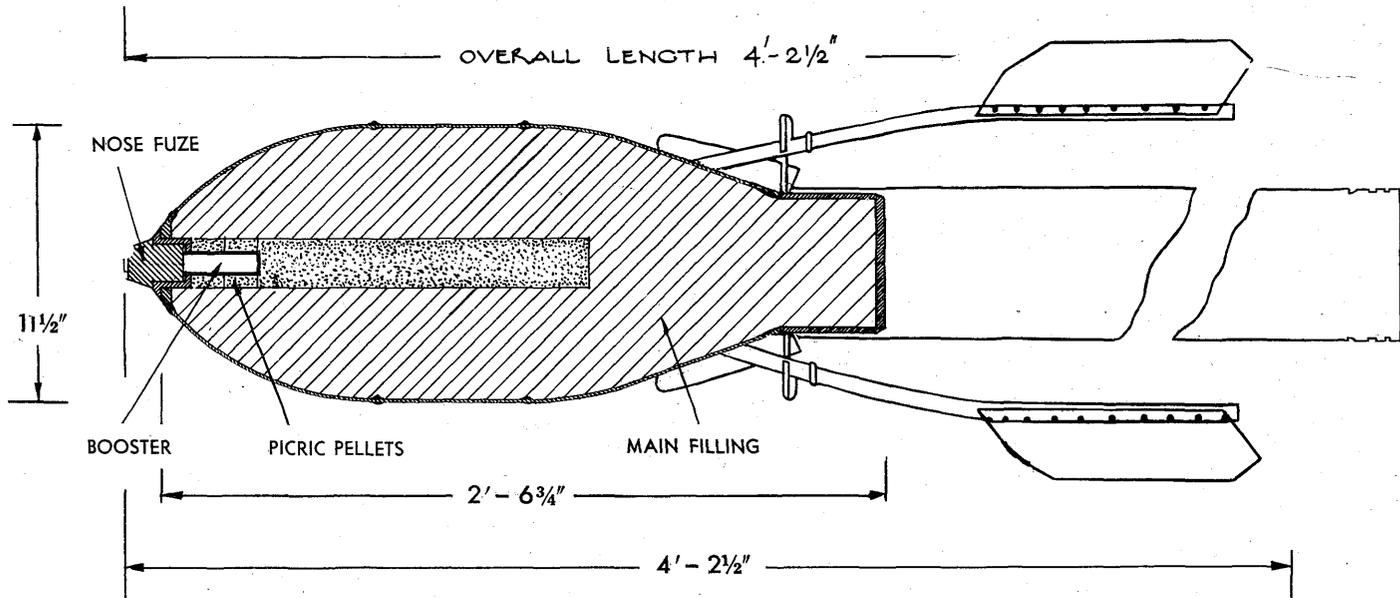
Diameter of mine .....	12½ ins.
Height of mine .....	5½ ins.
Weight (complete) .....	20 lbs.
Weight in crate .....	29 lbs.
Filling .....	TNT
Weight of filling .....	12½ lbs.
Firing pressure .....	330 lbs.
Height of igniter (including cap) .....	3½ ins.
Diameter of igniter body .....	1½ ins.
Shear pressure of igniter .....	132 lbs.
Overall height of primer plug assembly....	3.1 ins.
Diameter of primer holder .....	2½ ins.
Diameter of glass cap .....	4.6 ins.

# 15 cm STICK GRENADE

GERMAN



15 cm Stielgranate



The German 15 cm high explosive Stick Grenade is reported to be used with the 15 cm heavy infantry gun, s. I. G. 33. Its prime purpose is for demolition, and for clearing minefields and wire obstacles. Of welded steel construction, the bomb has a 1/8-inch case consisting of three main parts: the nose, a cylindrical center piece, and a tapered rear piece. Both the nose and the base are reinforced with steel rings welded to the casing. The ring in the nose is tapped to receive the fuze adaptor; that in the base to accommodate a steel cup. This cup, which has machined surfaces, is 3/8-inch thick at the base and 3/16-inch at the sides. A stick unit which leaves the bomb approximately 150 yards from the muzzle of the gun fits over the cup. According to reports, the unit weighs 22.2 kg. (49 lb.) and the propelling charge 5.5 (12 1/8 lb.).

The main filling consists of approximately 60 pounds of poured 50/50 Amatol. A 2-inch cylindrical booster charge made up of compressed T.N.T. pellets is located in the center of the main filling about 15 inches from the booster; two normal annular picric pellets surround the booster. The bomb is fitted with a percussion type nose fuze, Wgr. Z.36, which is also reported as being used in the German 20 cm Spigot Mortar Bomb. The tail, of unusual construction, has three tubular steel sockets equally spaced around the bomb and projecting from the rear portion of the casing at an angle of 20° to the main axis. These sockets receive tubular bars to which the sheet steel tubular fins are attached. The bars are bent in order to bring the fins parallel to the main axis and also to provide clearance of the muzzle of the gun. In addition there are six 5/32-inch steel plate fins welded to the casing and spaced in pairs between the tubular sockets.

## SPECIFICATIONS

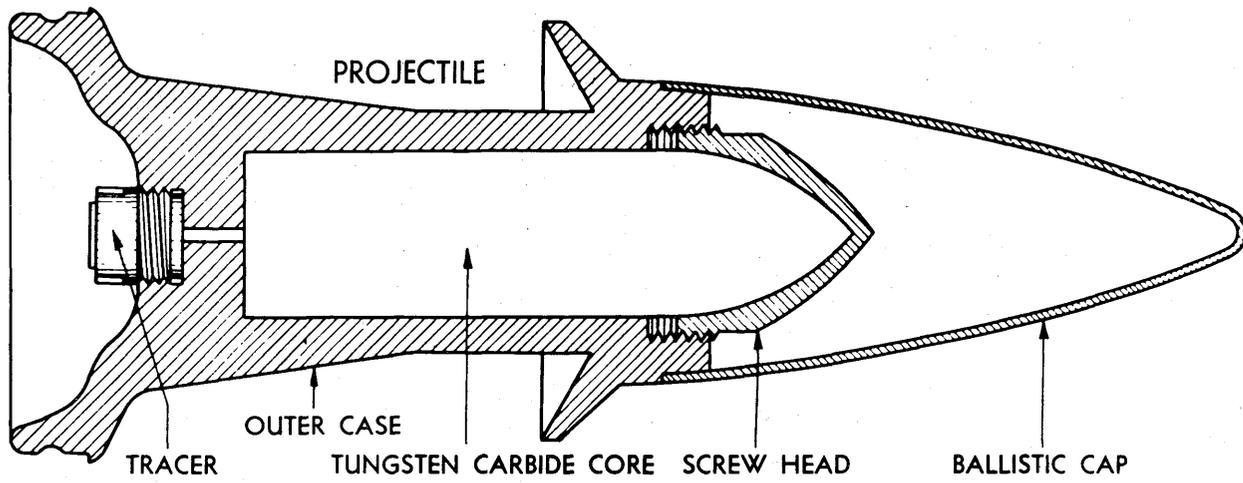
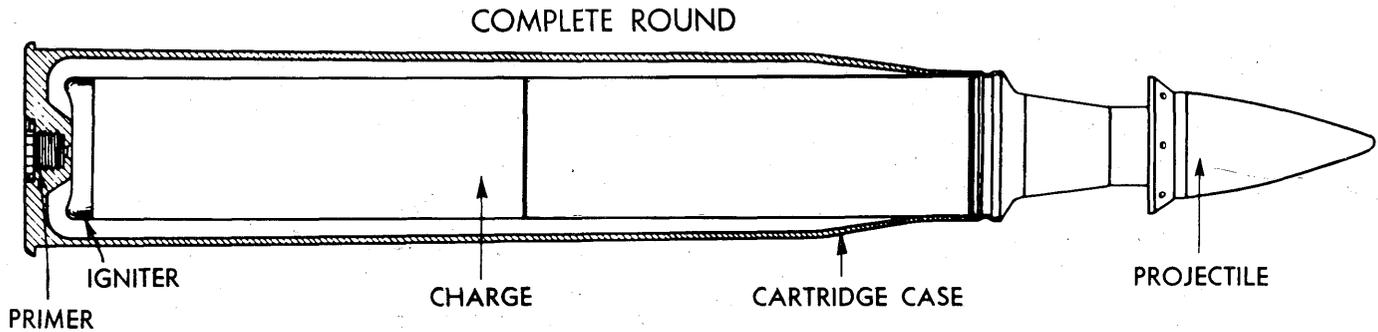
Overall length .....	50 1/2 ins.
Overall length (excluding tail fins & fuze) .....	30 3/4 ins.
Diameter (maximum) .....	1 1/2 ins.
Thickness of casing .....	1/8 in.
Total weight (approx.) .....	105 lb.
Weight of filling (approx.) .....	60 lb.
Color .....	Field grey

# 7.5 cm PAK 41 ARMOR-PIERCING AMMUNITION

GERMAN



7.5/5.5 cm Pzgr. Patr. 41 (W)



This round is designed for use in the 7.5/5.5 cm Pak 41 tapered bore antitank gun described on page 123 of this volume. It is an armor piercing tracer projectile of Gerlich design with the nomenclature 7.5 cm Pzgr. Patr. 41 (w).

The projectile consists of an outer case, a tungsten carbide core 1.16 inch in diameter, a screw head, a ballistic cap, and a tracer. It is fired from a regular cartridge consisting of cartridge case 6344, primer C/12n. A. St., an igniter of pyroxylin porous powder, and the propelling charge of diglycol tubular powder.

## SPECIFICATIONS

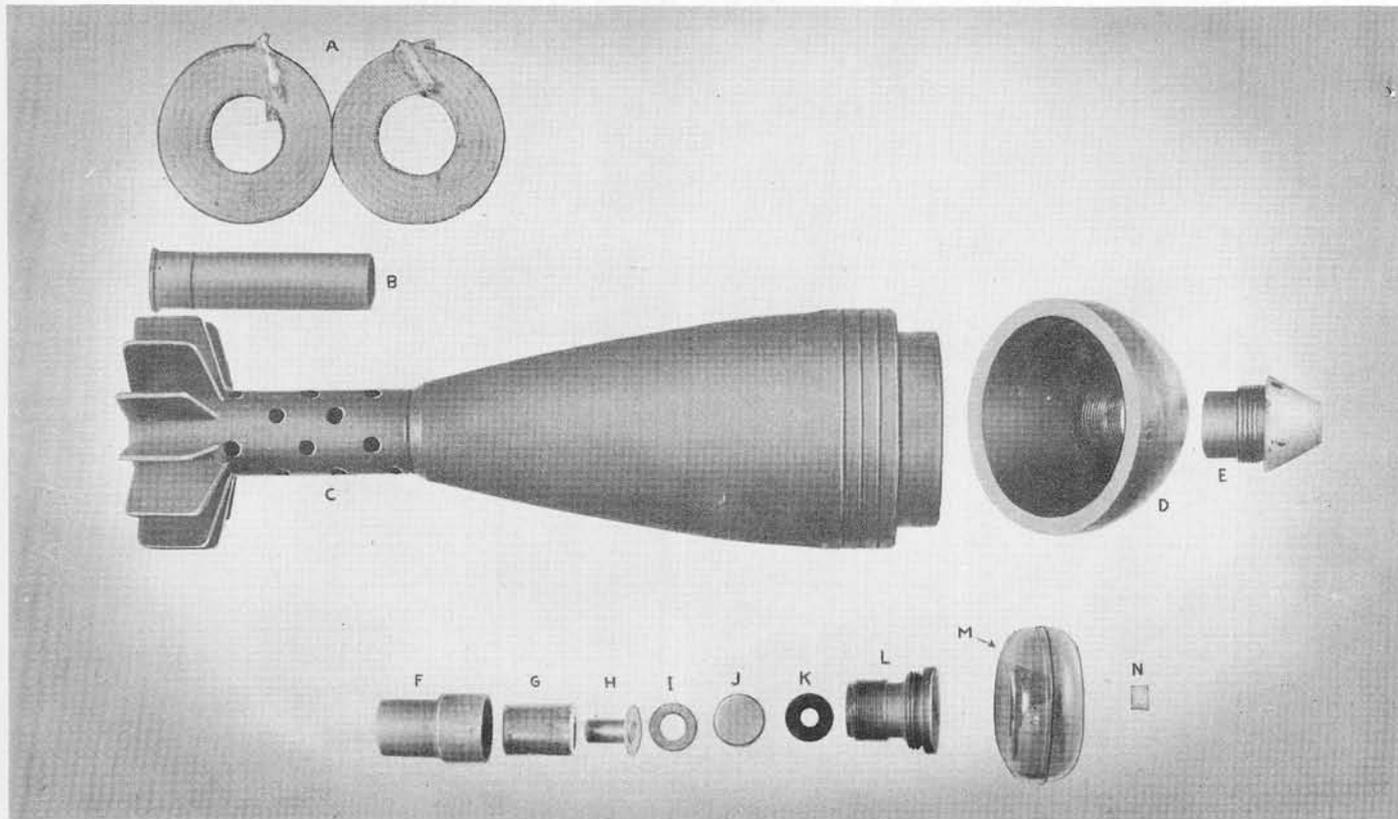
Total weight of round .....	16.65 lb.
Total length of round .....	29.8 ins.
Weight of projectile .....	5.68 lb.
Weight of tungsten carbide core .....	2.01 lb.
Diameter of core .....	1.16 ins.
Weight of propellant charge .....	5.4 lb.

# 8 cm MORTAR SHELL—"Bouncing Betty"

GERMAN



8 cm Wurfgranate 39



The 8 cm Wgr. 39 consists of a nose fuze, front cap, rear body, and tail assembly. The body, which is separated from the cap at the ogive, has a standard shape and TNT filling. The cast nose cap fits over a cylindrical boss, concentric with the longitudinal axis of the projectile. This cap is secured to the boss by four shear pins that extend through the cap and the boss. The seam where the two parts are joined is then shellacked to form a watertight seal.

An impact type, nondelay fuze is screwed into the cap; inside the cap is a plastic container of about 1½ ounces of smokeless powder. Under the charge, screwed into the projectile body, is an iron plug with a small axial hole through it. This plug separates the smokeless powder charge from the combination delay pellet and booster which is in an aluminum container.

The tail assembly is a standard type, having the usual base charge, ring increments, and fin assembly.

Upon impact, the nondelay fuze ignites the smokeless powder charge, sending a flash through the hole in the separating plug, setting off the delay pellet. The explosion from the first charge shears the pins holding the nose cap to the projectile body, and throws the shell from 5 to 10 feet into the air. In the meantime, the booster detonates the main TNT bursting charge at approximately the moment when the projectile is at the height of its bounce. This gives the effect of an air burst without the use of a precision time fuze. Height of the burst is governed by the angle of the shell axis with the ground at the time of impact.

## KEY TO PARTS

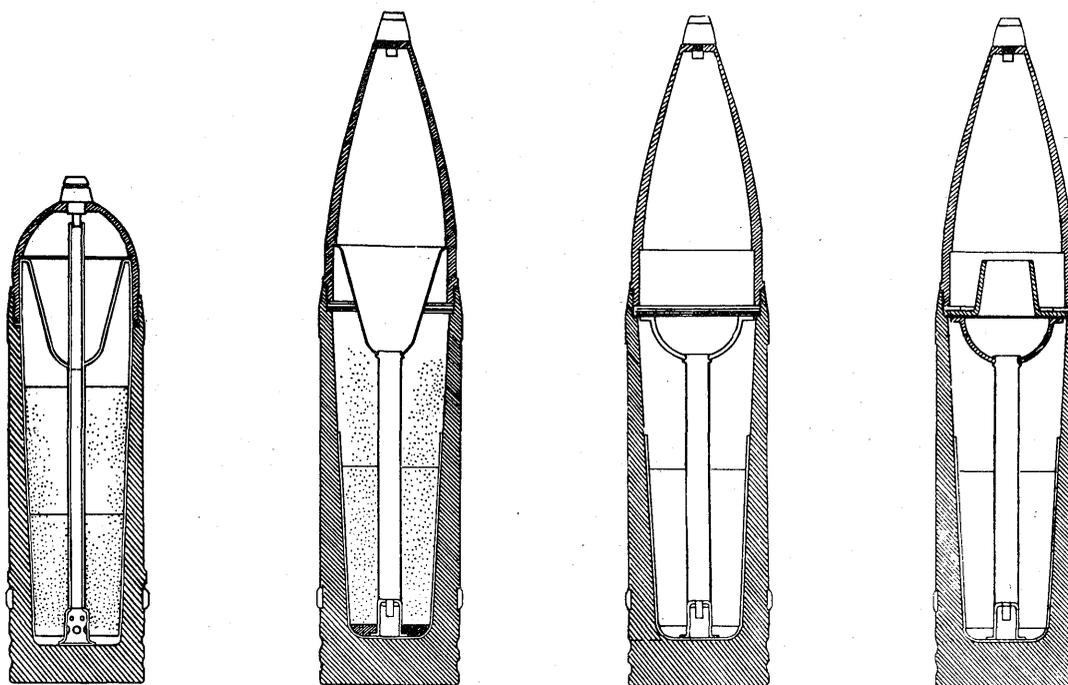
- (A) Propellant increments
- (B) Propellant cartridge
- (C) Projectile body
- (D) False ogive
- (E) Point ignition fuze—Wgr. Z 38 st
- (F) Booster well
- (G) Booster capsule
- (H) Delay type detonator
- (I) Paper washer
- (J) Paper diaphragm
- (K) Plastic washer
- (L) Booster well adapter
- (M) Ejector capsule
- (N) Ejector capsule igniter

# HOLLOW CHARGE AMMUNITION

GERMAN



10.5 cm HL, HL/A, HL/B, HL/C



Type HL

Type HL/A

Type HL/B

Type HL/C

There are four known variations of the 10.5 cm (105 mm) Hollow charge ammunition fired from the German 10.5 cm le. F. H. 18 series:

Type HL has a deep conical cavity, a short ogive, and flash tube extending through the shaped cavity to the fuze booster. All types have an additional detonator booster combination at the base of the flash tube.

Type HL/A has the same shaped cavity but has a larger diameter flash tube that is attached to the apex of cavity liner by a pressed collar, and does not extend into the cavity. This type has a long ogive.

The principal difference between types HL/A and HL/B is in a shallower, hemispherical-shaped cavity. The principal difference between types HL/B and HL/C is the addition of a funnel-like steel washer inverted over the cavity. This funnel is supposed to counteract the effects of centrifugal force on the hollow charge jet.

The explosive filler is pressed into two pellets in types HL/A, HL/B, and type HL/C. Explosive fillers in all rounds are inclosed in waxed paper cartons. The metal ogive screws into the projectile, holding all components of the filler in place.

The aluminum fuze (AZ 38) carries the primer detonator. It is armed by centrifugal force and contains no other safety features. It functions by a "spit" from the booster, which travels down the central tube and initiates the base booster, and hence the main bursting charge.

## ESSENTIAL MODIFICATIONS

Type HL/A: (a) Lengthened nose-piece (ogive), giving greater standoff. (b) Elimination of flash tube between fuze and apex of cavity and larger diameter of flash tube.

Type HL/B: (a) Further increase of standoff obtained by shortening the HE filler. Nose piece is identical with that of Type HL/A. (b) Hemispherical cavity instead of rounded cone. (c) HE filling RDX/WAX, instead of RDX/WAX/TNT.

Type HL/C: Introduction of a washer, shaped like an inverted funnel in front of the cavity. Otherwise, types B and C are essentially identical.

## SPECIFICATIONS

	HL	HL/A	HL/B	HL/C
Weight of projectile as fired:	25.8 lb.	27.1 lb.	26.6 lb.	27.2 lb.
H.E. filling, carton, wax:	4.6875 lb.	3.5 lb.	3.255 lb.	
Empty shell:	22.55 lb.	22.937 lb.	22.315 lb.	
Collar ("funnel")				.5195 lb.
Muzzle velocity <i>t/s</i> *	1375	1360	1360	1360

Estimated performance at normal against Homogeneous armor.

Type HL/A—170 mm (static) 105 mm (dynamic)

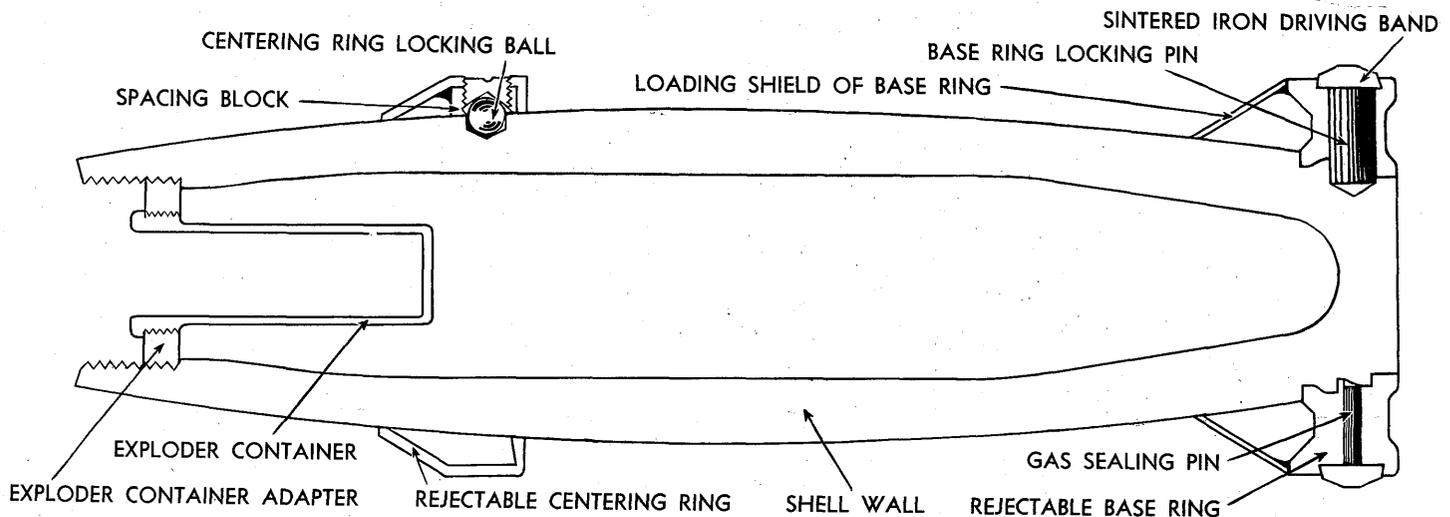
Type HL/B—155 mm (static) 100 mm (dynamic)

Type HL/C—155 mm (static) 100 mm (dynamic)  
(From German claims)

\*Firing with charge five which is normally used.

# 10.5 cm "SABOT" TYPE H. E. SHELL

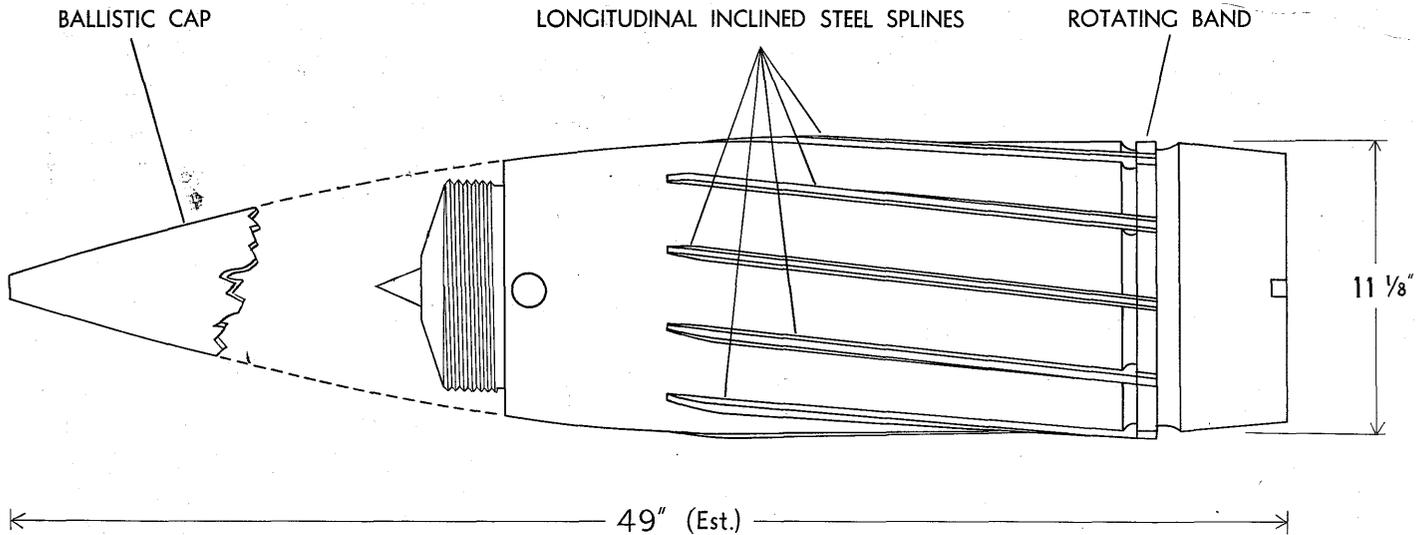
GERMAN 



This new type projectile consists of an 8.8 cm streamlined shell body fitted with centering and rotating band rings which permit it to be fired from a 10.5 cm weapon. Both the centering ring and rotating band ring are so designed that they become detached from the shell body under the influence of centrifugal force on leaving the muzzle of the gun. The advantage of such a design, provided it functions properly, is that a lighter weight projectile of smaller diameter is fired from a 10.5 cm weapon instead of the normal 10.5 cm projectile. The effect is to give a higher muzzle velocity and longer range for the 8.8 cm streamlined shell body than would be obtained with the standard 10.5 cm high explosive projectile. However, the effectiveness is reduced due to lower weight of projectile.

One disadvantage of this type of shell lies in the possibility of injury to friendly troops when the centering rings and rotating band are cast from the projectile. The centrifugal force would make these pieces into dangerous missiles.

The complete weight of the projectile is 23 pounds. Projectiles examined have been filled with a high explosive charge, and fitted with a percussion type nose fuze (AZ 23v.). The 15 cm shell of similar design employs the same fuze. The explosive trains of these projectiles are similar to those for the usual type of German high explosive shell.



This pre-engraved projectile recovered in Italy is used for long range bombardment. It has longitudinal inclined steel splines and a single one-inch-wide copper band that acts as a gas seal. The splines are set at a slight angle to the axis of the projectile and are 19.2 inches in length. In loading the projectile, the splines are lined up with the rifling of the gun tube. The shell is 33 inches in length, exclusive of the windshield. Fragments indicate that the windshield would add an extra two feet to the length.

A nose percussion fuze (AZ 35 K) and a base fuze (BD Z 35K) are fitted. The Germans are reputed to have four types of 28 cm railway guns able to employ this type of projectile. They are: 28 cm Br. N. Kan E.; 28 cm K. 5 (E); 28 cm K. 5/1 (E); and 28 cm K. 5/2 (E).

## SPECIFICATIONS

Caliber .....	280 mm (11.023 ins.)
Weight (approx.) .....	550 lbs.
Length (excluding windshield) .....	33 ins.