

GERMAN ANTI-TANK GUNS

37mm - 50mm - 75mm - 88mm PAK
1935-1945

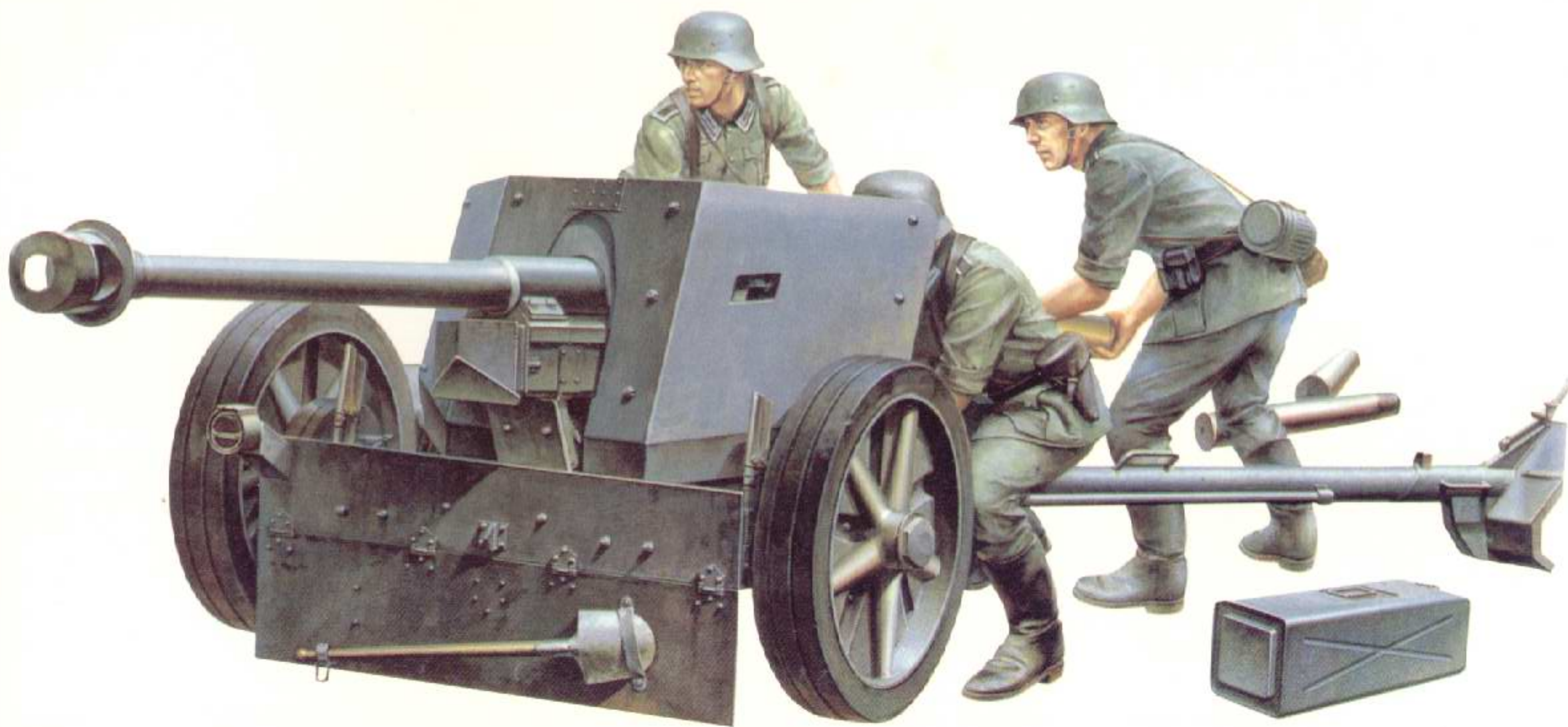
WITHOUT SELF-PROPELLED MOUNTINGS

**WERNER
HAUPT**

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Left: Only the 75mm Pak proved to be capable of dealing with all tanks in the east and west at great distances. It united mobility with penetrating power. While the 88mm Pak was difficult to control, the 50mm Pak proved not as effective after 1943.



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PHOTO CREDITS

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Horst Scheibert: *Panzerjäger und Sturmgeschütze*

Translated from the German by Dr. Edward Force,
Central Connecticut State University.

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This photo of an 88mm Pak 43/41 L/71 with a Pak 35/36 clearly shows the jump in development within four years. The white rings on the barrel of the 88mm Pak show its score of tanks destroyed.

The Origins of a New Weapon—PAK

The German military leadership—just like all foreign military staffs—promoted anti-tank guns for the infantry on the basis of World War I experience. These new guns, which could be called cannons, were to achieve good results at medium ranges. To do this, certain technical problems had to be surmounted: high penetrating power of the shell (depending on initial velocity) and rapid rate of fire, low construction of the gun, great mobility and high traverse field of the barrel.

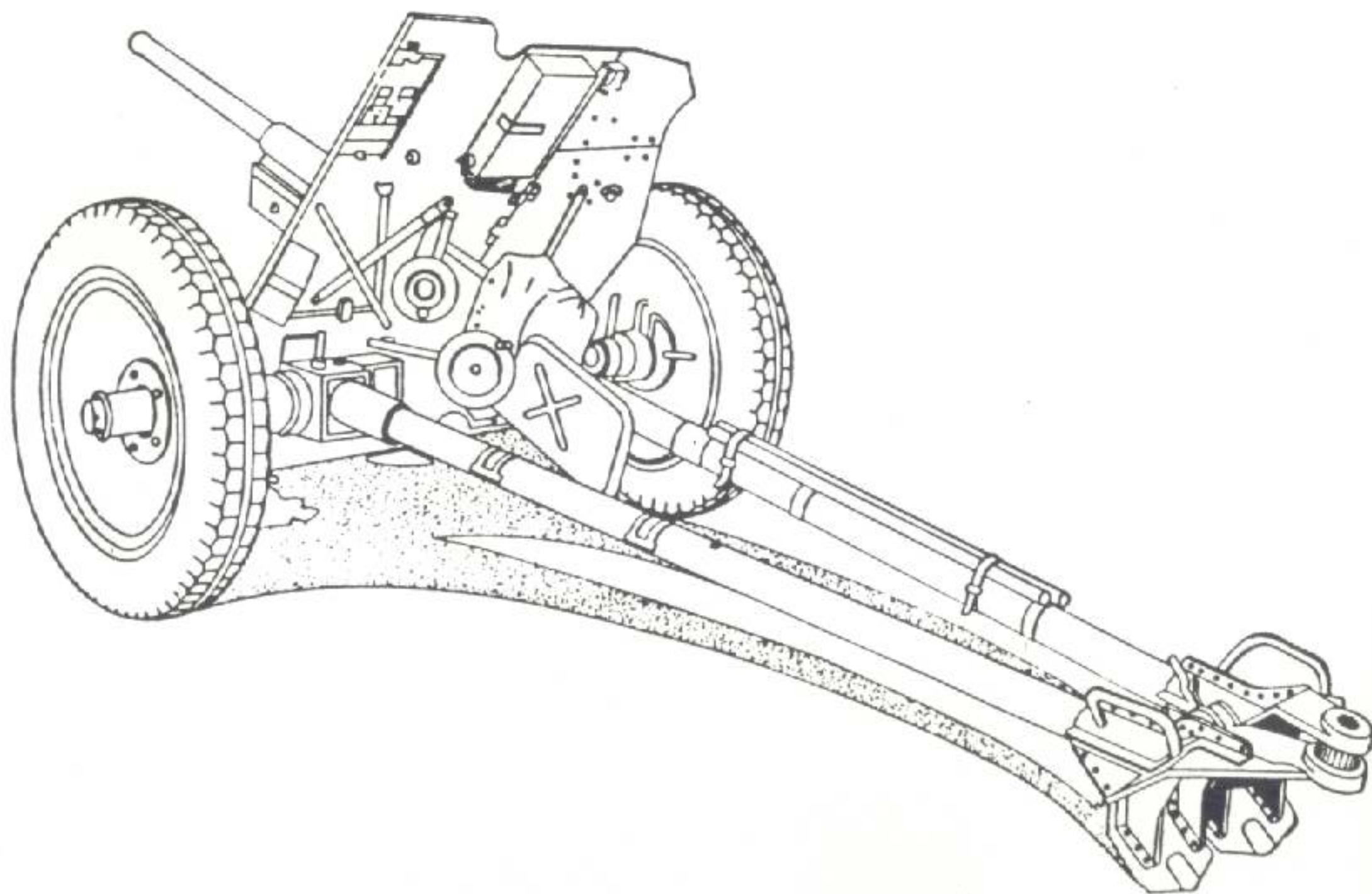
The Treaty of Versailles did not allow the German Reich to produce such a weapon. Only the Rheinmetall-Borsig AG firm was allowed to produce guns up to a caliber of 170mm. Only after the French troops evacuated the occupied Rheinland in 1925 and the Allied Control Commission began to dissolve did the production of new weapons begin in the course of general rearmament.

The Rheinmetall-Borsig AG began that same year to design, develop and produce a 37mm gun that was intended for antitank use. Production began in 1928. Individual parts of the guns were made in various smaller shops and assembled in the assembly halls of Rheinmetall-Borsig AG. Between 1928 and 1933 some 200 37mm caliber guns could be produced. They were originally designated TAK (Tankabwehrkanone).

In several branches of the Reichswehr there were already companies armed with this gun at the beginning of the Thirties. From them there developed as of 1934 the first antitank

units. The service-arm color of these new units was rose pink (as was that of the armored troops). Their shoulder flaps held a large letter P to differentiate them from other

troops with rose piping. The 14th (Antitank) Company of the Infantry regiments, established later, retained the white service-arm color of the infantry.



The 37mm Pak

The gun introduced to the troops in 1934-35 was, in its low and easily maintained form, a quickly mobile gun easily moved by a four-man crew. It was even possible—unlike previous light guns—to pull the 37mm Tak over ditches or up slopes by manpower.

The gun had the following weights and measures:

Weight ready to fire: 330 kg

Overall length: 3.40 meters

Including barrel length (max.): 1.66 meters

Aiming field of the barrel

in elevation: -8 to +25 degrees

in traverse: 60 degrees

Ammunition: antitank shells

Weight: 0.65 kg

Muzzle velocity: 760 meters per second

Armor penetration: 36 mm at 500 meters

It had a spreading mount and shield, and could be towed by a motor vehicle, horses or manpower. The gun's wheels were made of wood and bore rubber tires.

The first trials in the field (maneuvers, etc.) showed that the 37mm Tak was good but could still be improved. Thus an improved gun was built by the Rheinmetall-Borsig AG with help and support from the Army Weapons Office. This was officially designated "37mm Pak 35/36." In the process, the new abbreviation was introduced: Pak (Panzerabwehrkanone).

The 37mm Pak 35/36 had a gross weight of 450 kilograms. The barrel had an overall length of 1.66 meters, of which 1.31 meters were rifled. The combustion chamber

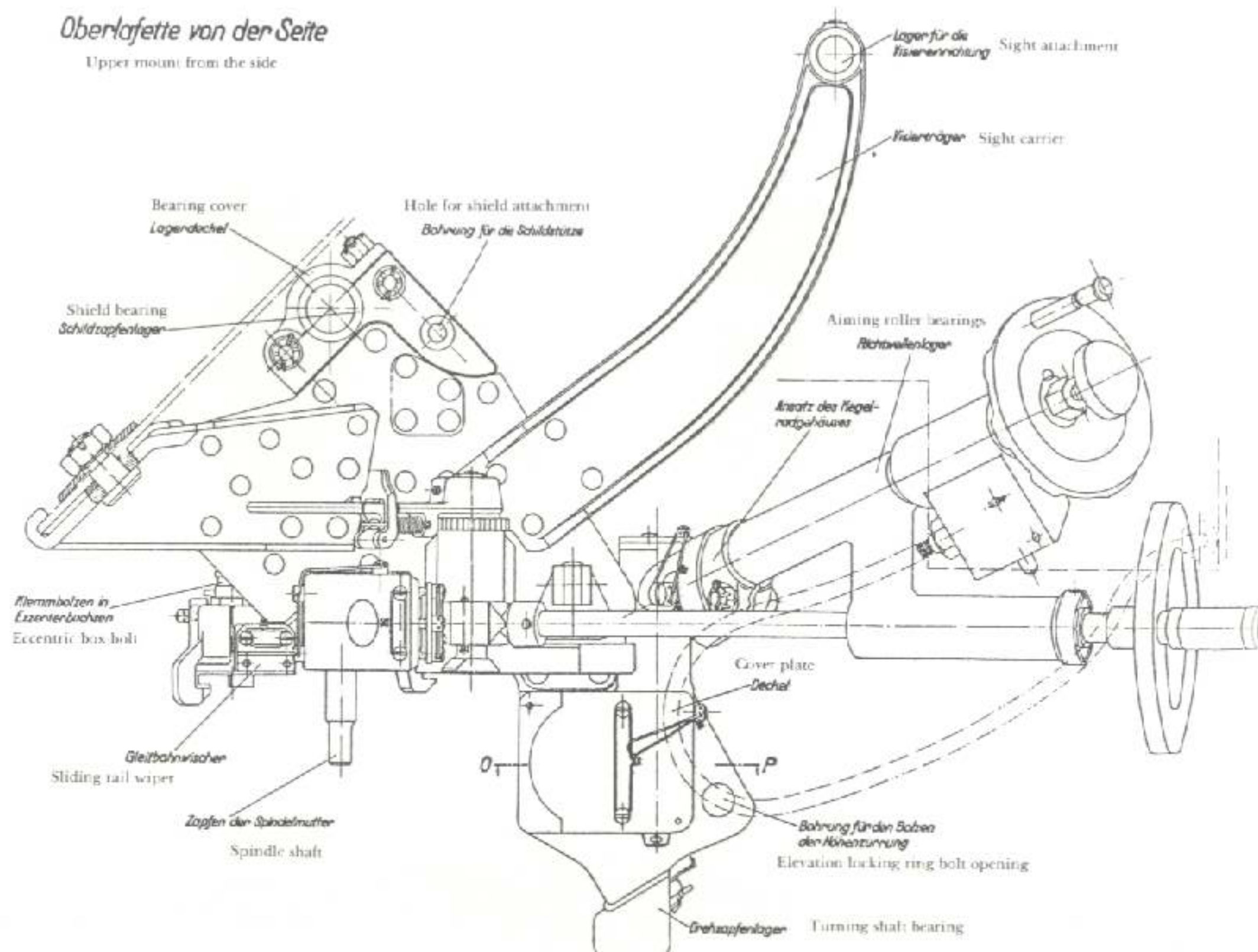
measured 380 cm. The barrel had sixteen riflings turning slightly to the right. The recoil of the barrel after firing amounted to 56 centimeters.

The spreading mount was retained, as was the length of the chassis, 3.40 meters. The

width of the gun with spread spars was 1.65 meters, the height to the upper rim of the shield was 1.17 meters. The special features of this easily and comfortably mobile gun were the spreading spars and the shield, composed of a front, bottom and two side panels.

Oberlafette von der Seite

Upper mount from the side



The crew of a Pak—equal to a group in an infantry company—consisted of a non-commissioned officer as group leader, one gunner (also called Gunner 1), Gunner 2 (the loader), Gunners 3 and 4 (ammunition movers) and two drivers. One of them was the driver of the towing vehicle of the gun, while the other drove the so-called limber vehicle that towed the ammunition trailer.

The new gun fired three different shells: antitank, explosive antipersonnel and hard-core shells. Their weights and measures were: (top next page)



Left: Even the lightest enemy tank was not afraid to roll over this little gun.

Gun drill on the grounds of a training field in peacetime. At the far right is the unit or group leader, and at the guns are the crews, awaiting further commands.



Shell	Weight	Muzzle velocity	Penetration (Vo)
Antitank	0.69 kg	745 meters/sec.	36mm at 500m
Antipersonnel	0.65 kg	745 meters/sec.	for infantry targets only
Hard-core	0.35	1030 meters/sec.	50 mm at 500 m

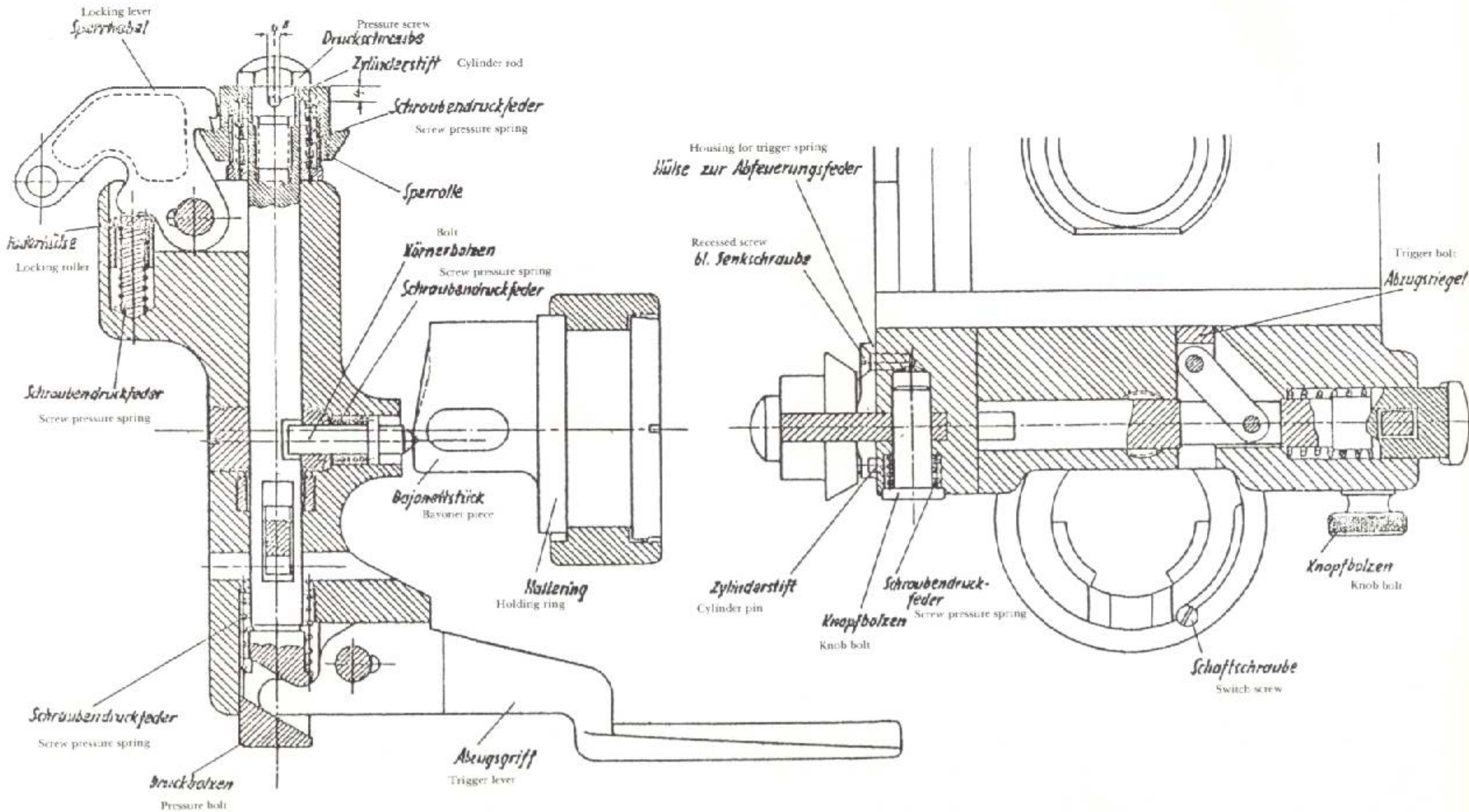
The hard-core shells were introduced only in 1940, as were the gradually improved antitank shells 39 and 40. The last type could penetrate 65 millimeters of armor at a distance of 200 meters.



Another peacetime photo—this one taken on a firing range. At left is the group leader, next to him the gunner. The other two gunners are holding down the right spar.

Cutaway drawings of the firing apparatus on the barrel

Schnitte durch die Abzugsvorrichtung am Rohr





Two more pictures of training. Members of an antitank company on the drill field. This is the 14th Company of the Guard Regiment. (Achilles)



The 37mm Pak in the War

In the last peacetime year, the German Army had 51 antitank units, which were, except for the one antitank training unit stationed in Wünsdorf near Berlin, divided among the divisions. Their numbers of 37mm Pak guns were as follows:

Infantry division	75 guns
Armored division	48 guns
Mountain division	48 guns
Infantry division (mot.)	72 guns
Light infantry division	54 guns
Cavalry Brigade 1	21 guns

An antitank unit normally consisted of a staff, three companies and a replacement company with 22 officers, three officials, 132 non-commissioned officers and 551 enlisted men. Their motor vehicles were: 45 personnel vehicles, 91 trucks, 78 motorcycles, 46 with sidecars.

When World War II began and new divisions were established, the field army, as of September 1, 1939, numbered 23,029 officers, non-commissioned officers and enlisted men in the antitank units, and the replacement army numbered 16,353 men. In the winter of 1939-40 the personnel was increased:

	Feldheer	Ersatzheer
Officers	2,250	333
Officials	363	66
Non-com. officers	13,713	2,284
Enlisted men	56,783	13,670

The supply of 37mm Pak increased from 11,200 on September 1, 1939 to 12,830 on April 1, 1940 and 14,459 on June 1, 1941. Losses of guns to enemy action were enormous; just in the period from May 10 to June 20, 1940 (western campaign) 636 were lost; from December 1, 1941 to February 28, 1942 (Russian winter fighting) 1502, to cite only two statistics.

The Army High Command issued an order on March 16, 1940 that, effective immediately, the antitank units were to be renamed Panzer-

jäger units—and the former Panzerabwehrkanone (antitank gun) became the Panzerjägerkanone, but the short form of Pak was retained.

German troops move into Liege on May 16, 1940. An infantry gun pulled by a Krupp truck (Special Kfz.No. 69)—the ideal towing vehicle for the 37mm Pak.





The most frequently used towing vehicles were the 1-ton tractor, as seen here in Greece in 1941, and the Krupp truck. . .



. . . but it could also be towed by a team of horses.

Even when towed by manpower, there were no problems.



Ukraine, 1941: Unpaved "roads" often required the crew's help.

Dringl.-St.: —

Technische Daten:

Schußweite	6800 m
Rohrweite	3,7 cm
Rohrlänge in Kalibern L/45	= 1,665 m
Geschoßgewicht	0,685 kg (3,7cm Pzgr.) 0,368 " (3,7cm Pzgr.40)
Größte V ₀	745 m/sek (3,7cm Pzgr.)
Mündungswicht 21,65 mt (Zahl der Ladungen) Patr.-Mun.	1020 " (3,7cm Pzgr.40)
Gewicht in Feuerstellung	450 kg
Gewicht in Fahrstellung	440 "
Richtfeld	Seite 60° Höhe -8 +25°
Schuß/min	12-45
Geschätzte Lebensdauer eines Rohres	4000-5000 Schuß
Durchschl.-Lstg.:	
auf 100m = 34 mm; auf 600m = 27 mm (3,7cm Pzgr.)	
" " = 64 " " = 22,5 " (3,7cm Pzgr.40)	

Geschütz-Verwertung (Mündungswicht mt) $\frac{48,1 \text{ mt}}{\text{Geschütz-Gewicht t}}$ [bei Geschützen i. gepanz. Fahrzeugen ohne Bedeutung]

Rohstoffbedarf		Fe	Mo	Cr	W	Mg	Sn	Cu
f.	1 Stck. i. kg	760	0,28	2,16			0,03	2,4
		Al	Pb	Zn	Ni	Kautschuk		
f.	1 Stck. i. kg	21,3	0,11	0,9	2,16	66,3		
Preis RM 5730,-		Durchschn. Fertigungszeit 6 Monate				Arbeitsstunden 900		

Fertigungsfirmen:

Wird nicht mehr gefertigt

Patronen:

3,7 cm Pzgr. Patr.
3,7 cm Pzgr. Patr. 40
3,7 cm Sprgr. Patr. 18 umg.
3,7 cm Sprgr. Patr. 40
3,7 cm Stiel-Gr. 41
3,7 cm Pzgr. Patr. (Üb.)



The low height, shortness of the spars and narrow spread of them allowed the gun to take up a small position. The upper part of the front shield could also be folded down—and the gun became even smaller. The guns are seen here on the steep bank of a big Russian river in 1943 (above) and before Tobruk, North Africa, in 1942 (below).



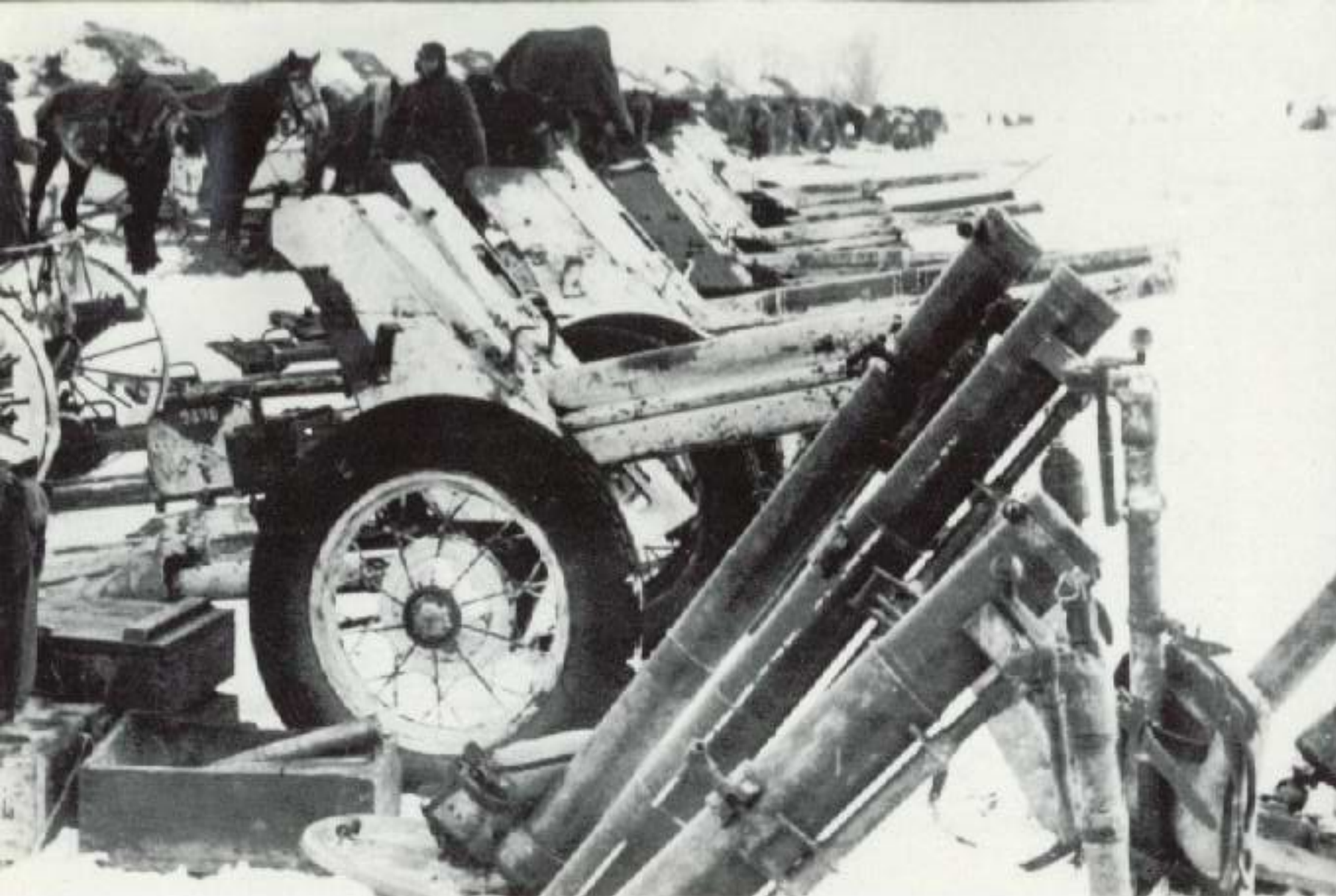


Along with coldness and slippery ice, the winter provided additional difficulties. Often only a sled was of use for position changes.

At the upper right, members of the *Grossdeutschland* Infantry Regiment are seen on the drill field.

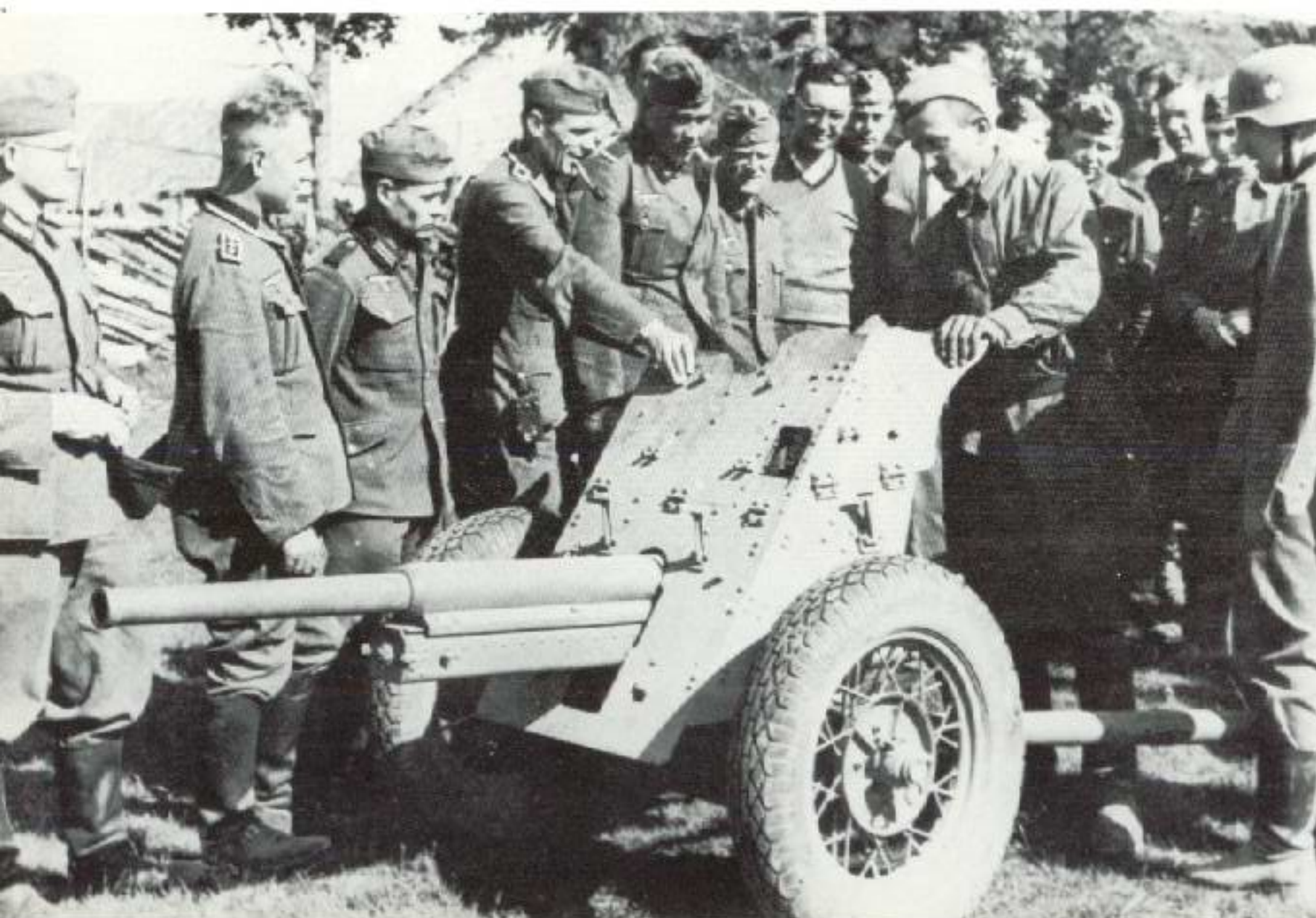
Right: The winter of 1941-42 in southern Russia. The sinking of the spars in the frozen ground obviously causes difficulties.





THE 37mm PAK AS AN EXPORT ARTICLE

The 37mm Pak manufactured by the Rheinmetall-Borsig AG was built in Russia under license according to the cooperation between the Reichswehr and the Red Army agreed on in a treaty. Four years later a license was obtained by the Japanese firm of Kyuyon Shiki Sanjunanana Miro Ho. After that guns were delivered directly from the German Reich to Estonia, Finland, Greece, Spain, Czechoslovakia and Turkey. The Pak built in Russia were often captured and usually put into German service immediately. German 37mm shells could be fired from them. The Russian licensed Pak can be recognized by their spoked wheels (better suited to the Russian mud).



The German experiences in the western campaign in 1940 showed clearly that the Pak was scarcely effective against newer types of tanks. The appearance of the Russian T-34, KW I and KW II ended its career. The light gun failed completely and was nicknamed the "gun for knocking on tanks." The introduction of the so-called stick grenade 41—an oversize shell weighing 8.5 kg and stuck onto the barrel (right)—could penetrate thick tank walls at short ranges up to 180mm, but resulted in much scattering at even 200 meters.



The end came quickly for the 37mm Pak. Larger calibers and self-propelled mounts were requested and supplied to the Panzerjäger units quickly and in great numbers as of 1942. Here an armored howitzer "Wespe" (wasp) rolls past a destroyed 37mm Pak of the last type (long barrel)—Russia, 1943.



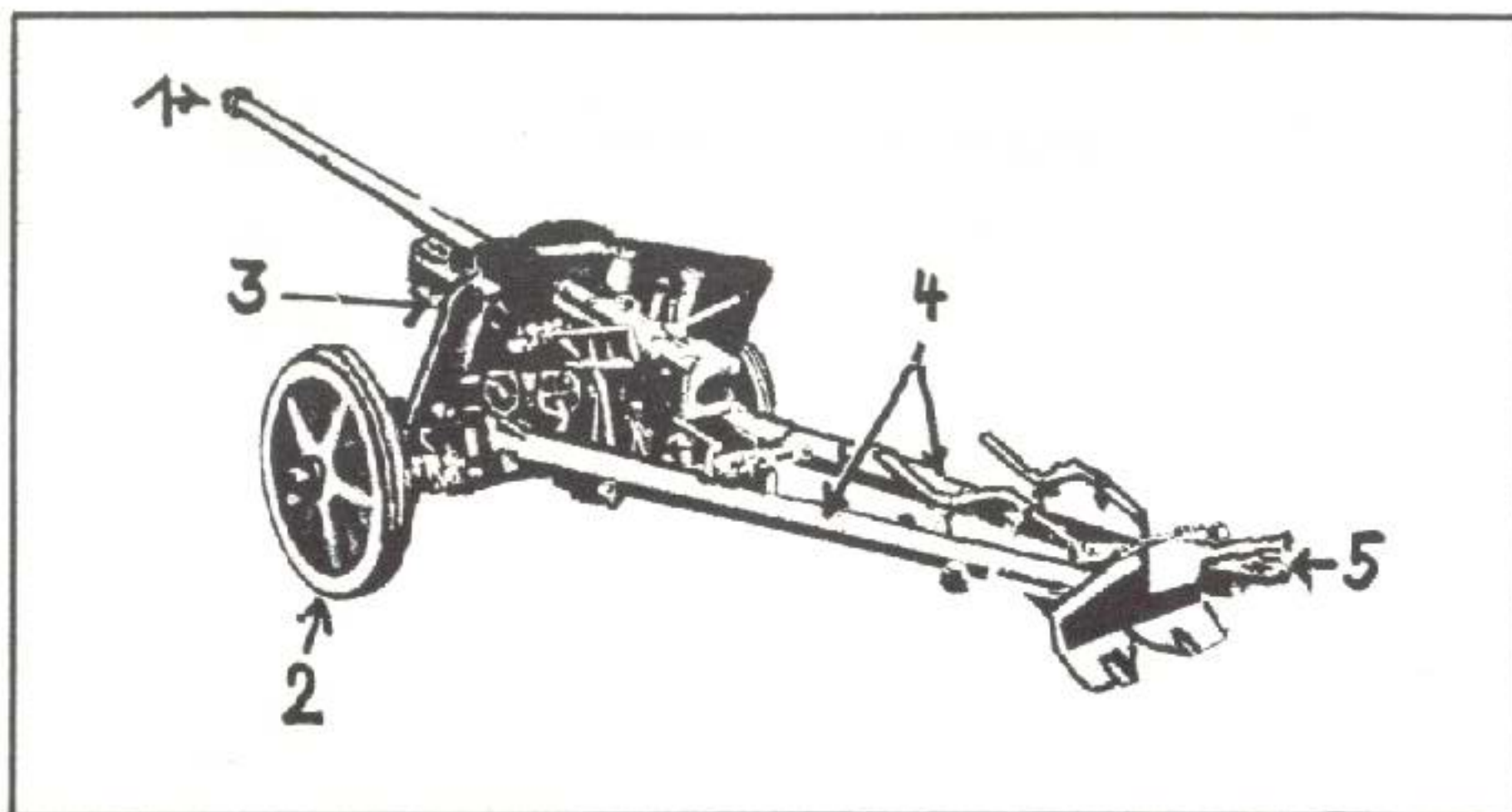
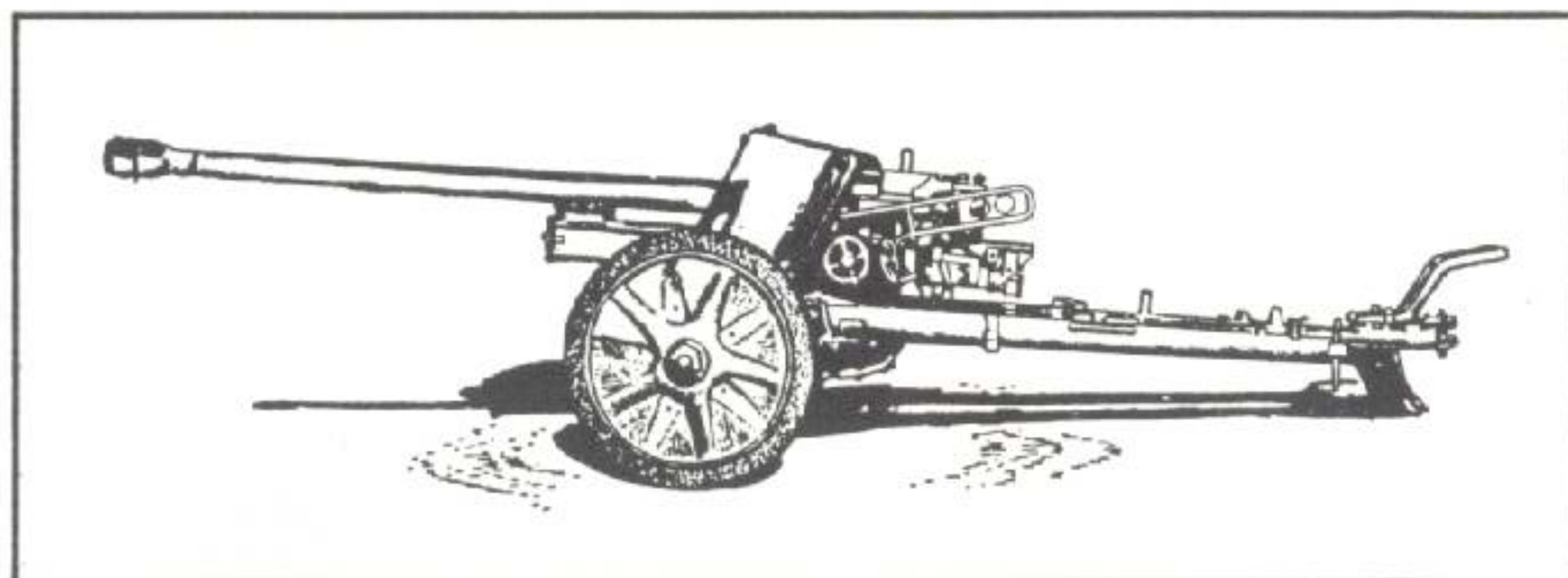
The Developmental History of a New PAK

The 50mm Pak

Experience in the last months of the Spanish Civil War showed that the 37mm Pak was not capable of fighting off heavy battle tanks. In 1938 the Army Weapons Office contracted with the Rheinmetall-Borsig AG to design and build a weapon with a larger caliber but as little weight as possible. Just two years later the first new guns rolled off the assembly line.

The 50mm Pak 38 L/60 was in existence. The new gun was almost identical to the 37mm Pak in design. A new feature was the muzzle brake which decreased the recoil power on the mount, which could thus be built lighter in weight. Torsion-bar springs greatly reduced the power needed to transport the gun. The double shield was new and consisted of two 4-mm shields, one behind the other, at a distance of 25mm.

At the end of 1940 the first 50mm Pak could be delivered to the troops, with army and Panzerjäger units supplied first. Most armored and a few infantry units received the new guns shortly before the eastern campaign. When that campaign began on June 22, 1941 the army had 1064 of the 50mm Pak. It was very useful against light tanks, but powerless against the T-34. The first test shots at these tanks on June 30, 1941 were the basis of the development of an even heavier gun.



1. Muzzle brake, 2. Steel disc wheel with full rubber tire, 3. Double shield, 4. Spreading mount, 5. Eye for the steerable rear wheel.



Above: Firing drill with the 50mm Pak at the Panzerjäger Training Unit's training facility. The features of the new Pak are clear to see: longer barrel, double shield, wheels, etc. The gunner is sighting the target, the loader takes the shell from the ammunition carrier, while the group leader, off to the left, observes his crew.

Right: From the "Notebooks" of the Army Weapons Office.

Stoff-
gliederung
5

Gehelme Kommandosache I

Pak 38

Blatt
650

Dringl.-St.:

Technische Daten:

Schußweite (größte wirksamste) $\left. \begin{array}{l} \text{bei Pz.Gr. = 1500} \\ \text{Stk.Gr. = 2400} \end{array} \right\}$ m
Rohrweite 5,0 cm
Rohrlänge in Kalibern L/60 o. Mdgsbr. = 3,00 m
Geschoßgewicht $\left. \begin{array}{l} \text{Pzgr. 39} \\ \text{Pzgr. 40} \\ \text{Sprgr. 38} \end{array} \right\} \begin{array}{l} 2,06 \\ 0,925 \\ 1,82 \end{array} \text{ kg}$
Größte V₀ 835 m/sek (Pzgr. 39)
Mündungswucht 75 mt
(Zahl der Ladungen) Patr.-Mun. 1180 " (" 40)
Gewicht in Feuerstellung 1000 kg
Gewicht in Fahrstellung 1062 "
Richtfeld Seite 65° Höhe -8 +27°
Schuß/min 12-15
Geschätzte Lebensdauer eines Rohres 4000-5000 Schuß
Durchschl.-Lstg.: auf 100 m = 69 mm; auf 1000 m = 48 mm (Pzgr. 39)
" " = 130 " " = 38 " (Pzgr. 40)
" " = 180 " (Stiel-Gr. 42)

Geschütz-Verwertung (Mündungswucht mt) 75 $\frac{\text{mt}}{\text{t}}$ [bei Geschützen i. gepanz. Fahrzeugen ohne Bedeutung]

Rohstoffbedarf	Fe	Mo	Cr	W	Mg	Sn	Cu
f. 1 Stk. i. kg	26,77		3,8			0,30	3,35
	Al	Pb	Zn	Ni	Kautschuk		
f. 1 Stk. i. kg	80,8		0,47	5,-	35,1 + 0,07		
Preis RM 10 600,-	Durchschn. Fertigungszeit 6 Monate				Arbeitsstunden 1800		

Fertigungsfirmen:

Wird nicht mehr gefertigt

Patronen

5 cm Pzgr. Patr. Pak.
5 cm Pzgr. Patr. 39 Pak.
5 cm Pzgr. Patr. 40 Pak.
5 cm Sprgr. Patr. 38 Pak.
5 cm Pzgr. Patr. (Üb) Pak.
5 cm Sprgr. Patr. 38 (Üb) Pak.
5 cm Stiel-Gr. 42

50mm PAK



Designed as early as 1938—thus the designation of 50mm Pak 38 L/60—this gun reached the Panzerjäger troops only at the end of 1940, often mixed with 37mm guns in the units. This picture was taken in Tunis in 1943.(BA)

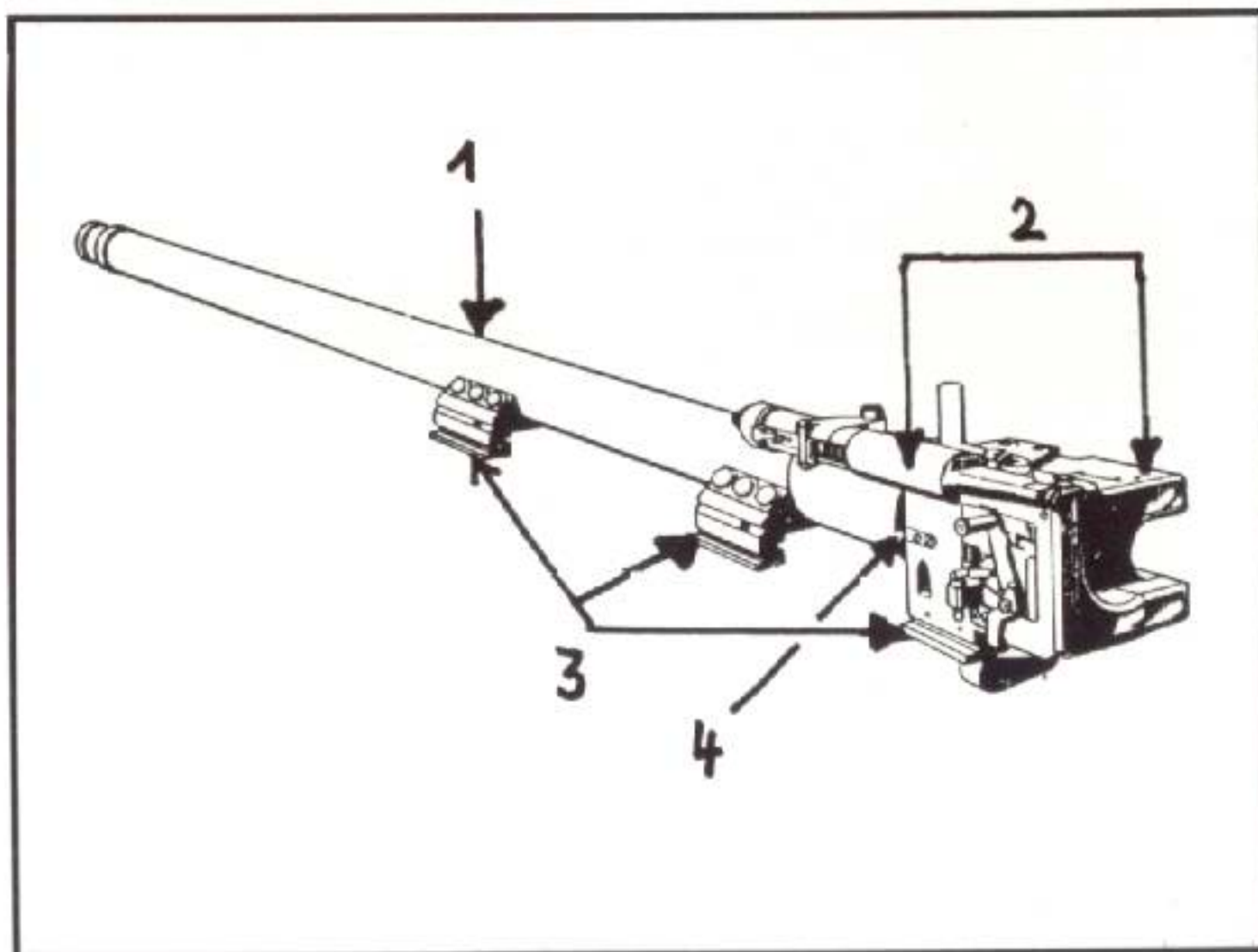
Data on the 50mm Pak 38 L/60

The weight of the new Pak was 1062 kg. Its advantages over the earlier 37mm Pak were based on a new spreading mount with double shield, a semi-automatic flat-wedge vertical breech mechanism, a push-button trigger and an auxiliary Pak aiming telescope. The barrel length was not—as the official L/60 designation would suggest—60 caliber, but exactly 63.5 caliber. The total barrel length

remained at two meters. The field of aim encompassed -8 to +27 degrees in elevation and 65 degrees to each side.

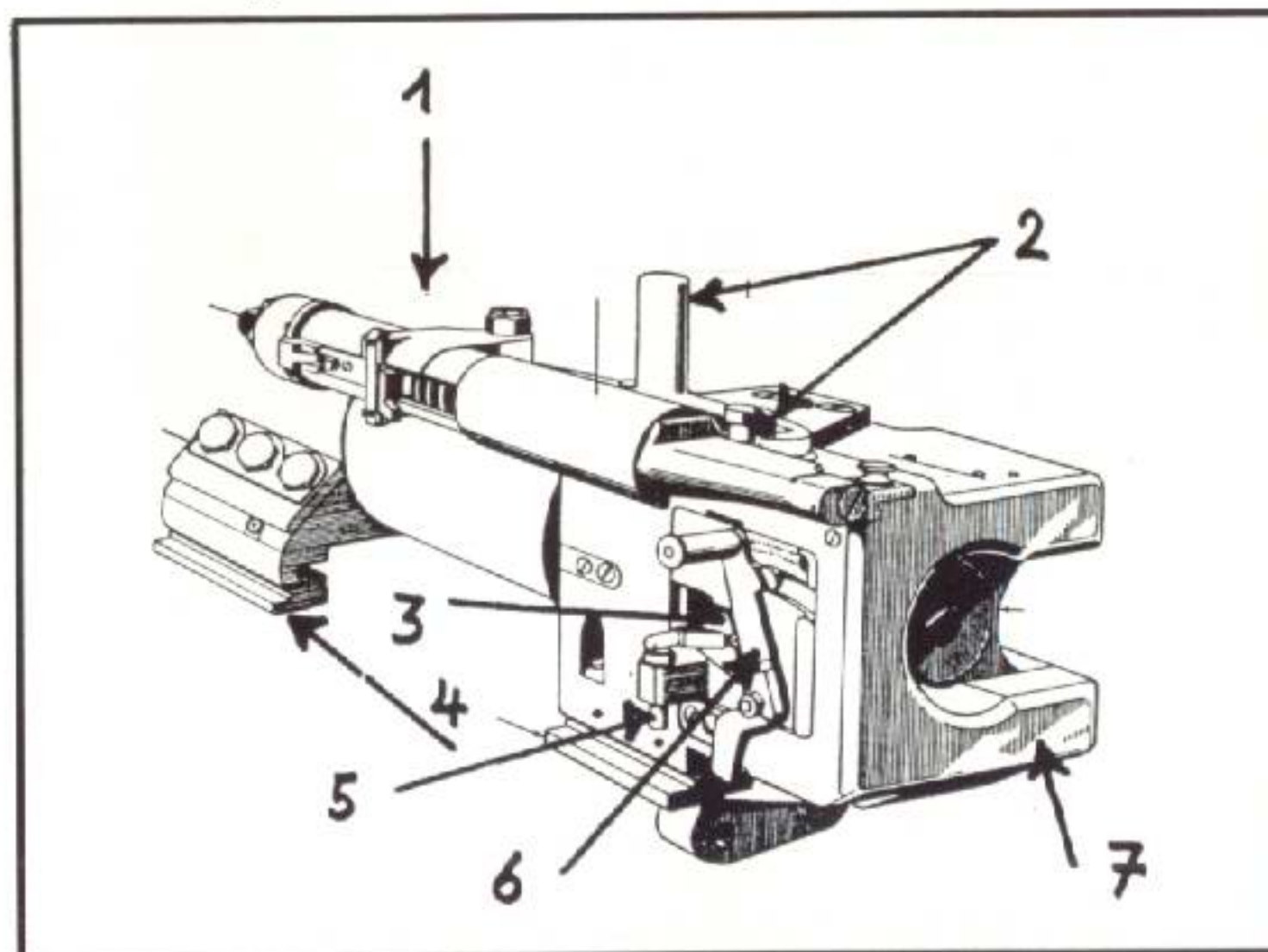
The gun fired three shell types, as did its predecessor: Antitank shells 39 and 40, high explosive shells and hard-core shells. Their differences:

Shell	Weight	Muzzle Velocity Penetrating Power
Antitank	2.18 kg	823 meters/sec. 75 mm at 500 m
Hard-core	0.98 kg	1180 meters/sec. 115 mm at 500 m
High explosive	1.96 kg	550 meters/sec. only against infantry



Gun barrel and breech:

1. Barrel with muzzle brake, 2. Breechblock, 3. Barrel mounts, set in the cradle as attachments, 4. Securing box.



The breech:

1. Recoil spring, 2. Breech lever, 3. Striking bolt spring, 4. Attachment for the gun cradle, 5. Firing piston, 6. Securing and firing lever, 7. Rear of breechblock with shell entrance.



The 50mm Pak could be moved by its own crew on roads and firm ground. This is why the third wheel at the end of the spars was added (see above) and made so the gun could be steered. (Photo taken in the Ukraine, July 11, 1942).



The 50mm Pak on all the fronts:

Above: In the 5th Light Division near Tripoli, North Africa, March 21, 1941.

Upper right: On the west bank of the Donets (picture taken August 27, 1943). The gun cradle with breech and recoil brake can be seen very clearly here, likewise the wide rubber tires on the wheels and the rather compact mount. Since the gun is still very low, cornfields offer sufficient cover.

Right: A gun emplacement near Newel in the northern sector of the eastern front (March 27, 1944). The covered breechblock can be seen clearly. The gun barrel (camouflaged) points downward.



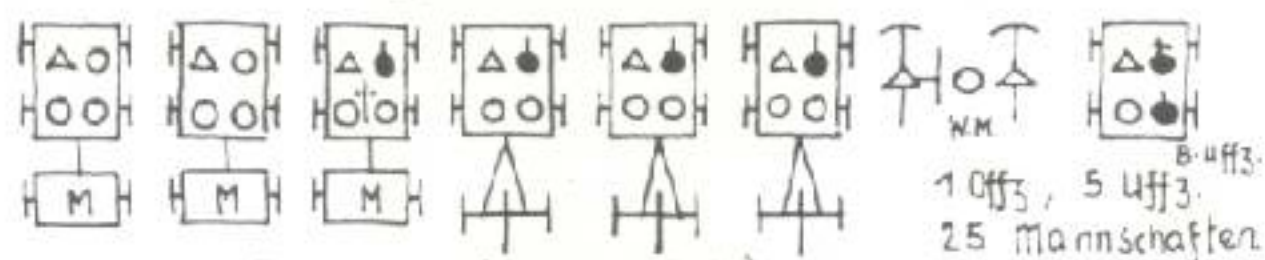
Infanterie-Panzerjäger-Komp 1941 K.S.L.N 184 C v. 1. 11. 1941

Komp. Fhr. mit Komp. Trupp

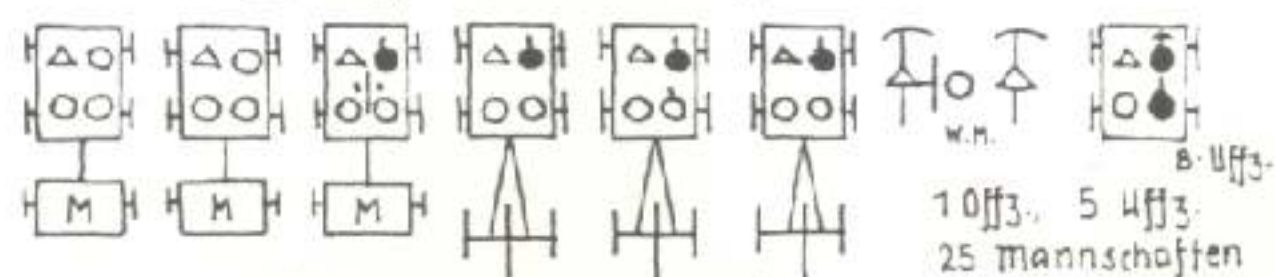
1 Offz. 3 Uffz.
7 Mannschaften

San.-Uffz. B.-Uffz.

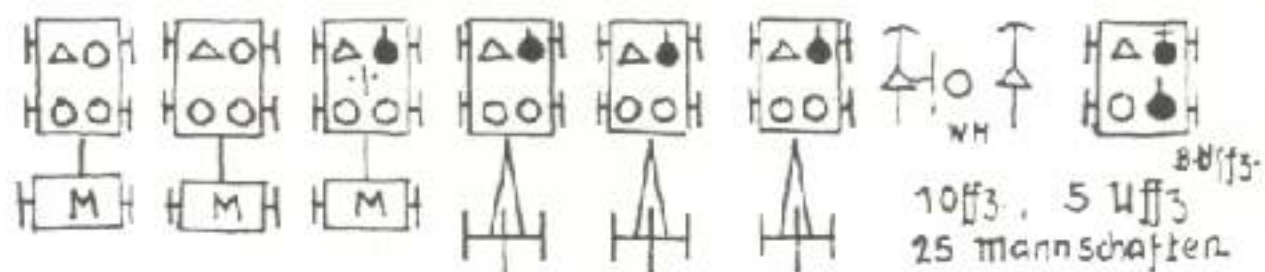
I. Zug (3.7 cm Pak)



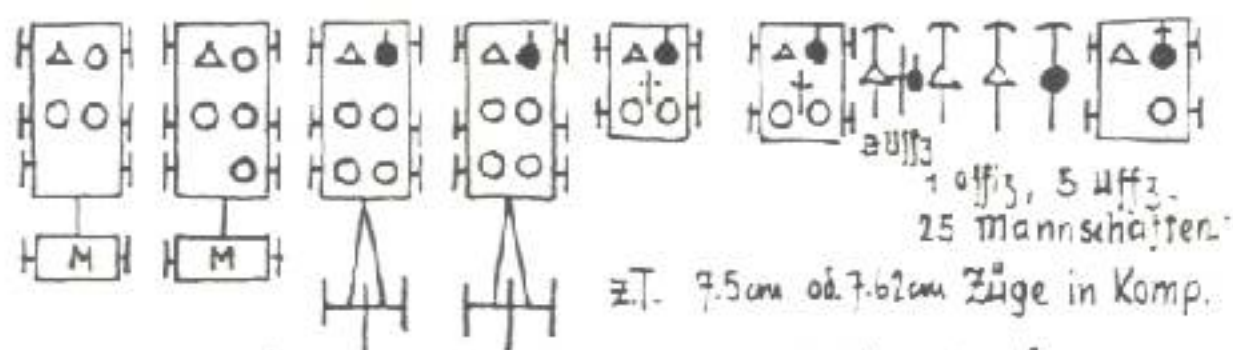
II. Zug (3.7 cm Pak)



III. Zug (3.7 cm Pak)



IV. Zug (5 cm Pak)



Gep. Troß

Kfz.-Trupp

Befehls-Troß

5 Offz., 31 Uffz., 123 Mannsch. 27 PKW, 7 LKW, 9 Solo - 8 Beikräder
85 Gew., 45 Pist., 14 M.Pist., 5 le.MG, 9-3.7cm Pak, 2-5 cm Pak.



Here is a formation diagram of a mixed Panzerjäger company. While the 37mm unit has three guns, the 50mm unit has only two.

Formations changed quickly during the war—with every change in armament. Thus this formation can be regarded as only one of many.

Right page: In service here with paratroopers in Italy. Notice the large traverse.







Sharpshooting in the autumn of 1944—presumably on a firing range, since the group leader in charge wears a Schiffchen cap.

The maximum range of the antitank shell was 9.4 km. The high explosive shell carried a load of 680 grams, which caused a splintering effect to 13 meters on each side and 8 meters forward.

As the war continued, a stick grenade was also introduced for this gun; it could penetrate 180mm of armor but was rarely used because of its short range.

The Army High Command issued an order on November 19, 1940 according to which the 1-ton towing tractor (Sonder-Kfz. 10) was to be used to tow the 50mm Pak. Every Panzerjäger unit received 45 such vehicles. Since the available capacity was not sufficient, a further order followed on January 16, 1941, according to which the Panzerjäger units of the infantry divisions were to be equipped with 1.5-ton Type A (all-wheel drive) trucks.

LOSSES AND REPLACEMENT

The Panzerjäger units, equipped with the 50mm Pak which was used at focal points against enemy tank attacks, lost a total of 269 guns in winter fighting between December 1, 1941 and February 2, 1942. Replacements of 37mm and 50mm Pak for the whole army from June 22, 1941 to March 28, 1942 numbered 2715 guns. The 50mm Pak remained in use until the war's end.



A 50mm Pak of the 6th Panzer Division with a folded-down lower shield.



If need be, it could naturally be towed as seen here too. A picture that could only be taken in the time between "hot" and "mot."



50mm Pak of the 13th Panzer Division and a T-34 tank.



DUEL— PAK VERSUS PANZER

Two typical combat pictures:

Left: Well camouflaged, they let the enemy tanks come as near as possible, so as to achieve the "penetrating" effect of the 50mm antitank shells all the more surely.

Above: It is different in open country. Here the firefight has to begin at greater ranges. But the 50mm Pak had no effect on the T-34, KW-1 tanks at 600 meters. A better gun was urgently needed.

The pictures above were taken by men of the 17th Panzer Division at the Orscha bridgehead on the Dniepr.



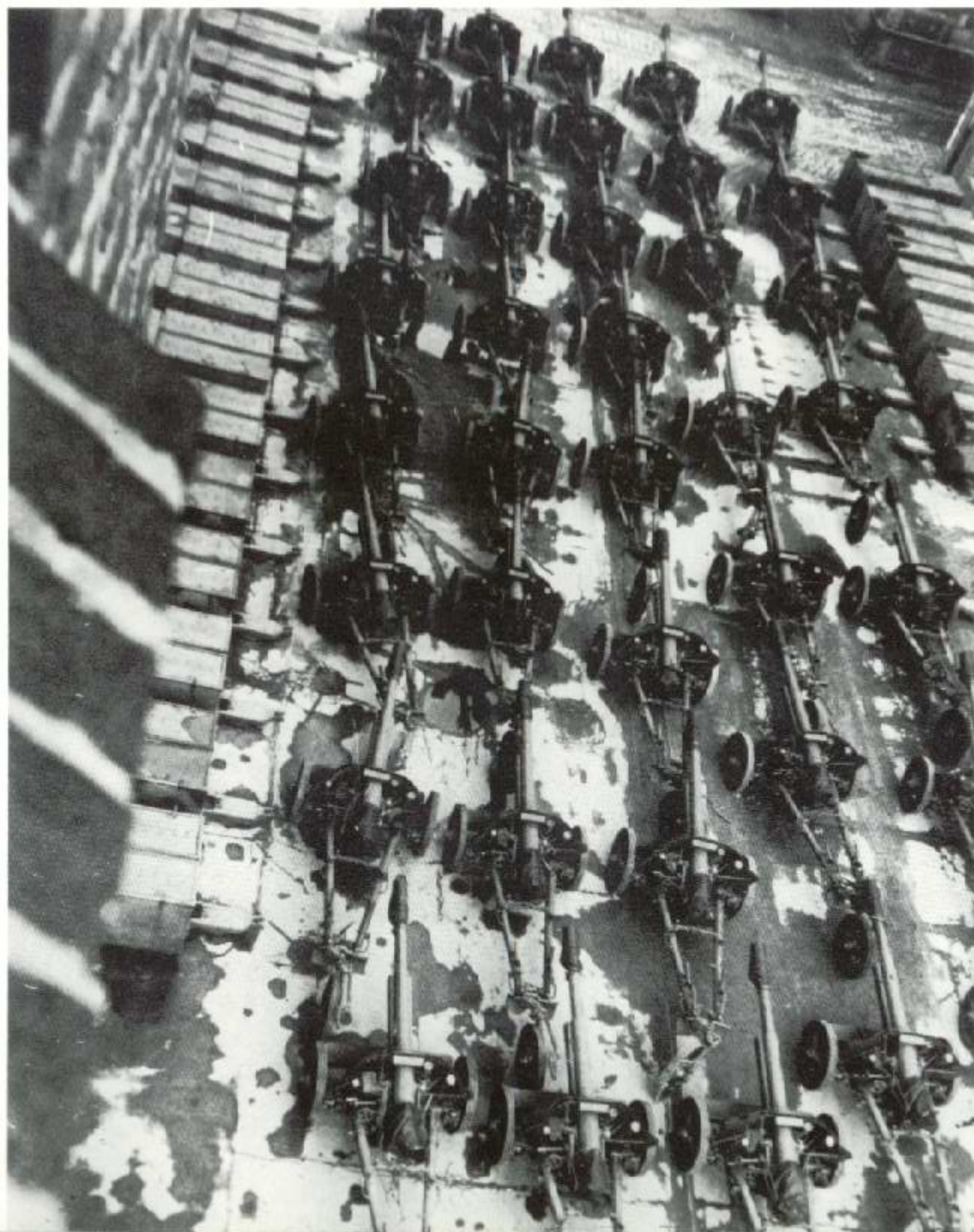
The Various 75mm Pak

THE EARLY HISTORY OF A NEW PAK

In 1939—shortly before World War II broke out—the Army Weapons Office gave the two armament firms of Krupp and Rheinmetall-Borsig AG contracts to build a 75mm antitank weapon. The lightning-fast campaigns of the first two war years, to be sure, needed no heavier antitank guns, and so the production of this type was delayed. But with the renaming of the former Panzerabwehr units as Panzerjäger units, the Army High Command confirmed in an order of April 21, 1941 that the new gun was being produced. This document included a designation for the weapon, according to which a 75mm gun—which did not yet exist—was referred to as ‘heavy Panzerjäger gun’, or s.Pak for short.

The firm of Rheinmetall-Borsig AG had meanwhile finished their gun, which was numbered “75mm Pak 40.” Then the first weeks of the Russian campaign showed that the earlier 50mm Pak was no longer equal to its tasks. Thus production of the new Pak went ahead at full speed. In the spring of 1942 delivery to the troops began, and the 75mm Pak received its baptism of fire in May of 1942 at the battle of Kharkov.

The 75mm Pak assembly hall at the Rheinmetall-Borsig factory (picture taken May 5, 1944).



THE 75mm PAK 40

The new gun was an enlarged version of the earlier 50mm Pak. The muzzle brake, the doubled shield and the torsion-bar suspension were retained. The mount still had tubular spars, but now they were made of steel instead of aluminum. The ballistic performance could thus be increased.

The newly introduced Antitank Shell 40 weighed 6.8 kilograms and achieved a penetrating power of 132mm of armor at a 500-meter range with a muzzle velocity of 792 meters per second. The hard-core shell that was also introduced at that time weighed only 3.2 kg but, with a muzzle velocity of 930 meters per second, could penetrate up to 154mm. These shells had to be replaced later on account of a serious shortage of tungsten. A 2.7 kg shell with a core diameter of 60mm was not introduced, but a hollow shell only achieved a short range because of its lower muzzle velocity of 450 meters per second.

The new gun made a more imposing impression than the earlier Pak types by its appearance alone. Just the long barrel, the solidly built muzzle brake and strengthened shield and armored axle, plus the height of the gun itself showed that the 75mm Pak ranked in the heavy artillery class. The arc of aim of the barrel was somewhat less than that of the 50mm Pak, extending from -5 to +22 degrees elevation, while the 65-degree traverse to left and right remained the same.

Production of the 75mm Pak moved at full speed only as of February 1942. The average monthly production reached 175 in 1942, 730 in 1943 and 975 in 1944. Just in October of 1944, 1050 of the guns were produced—despite ongoing Allied bomb attacks on the factories. In January of 1945 some 1000 guns,

and 335 in February 1945, were still produced. In January 1945 81% of them were sent to the front, as did 67% in February.

The loss of guns was enormous, as was to be expected with the enemy's increasing superiority. The total losses of 75mm Pak 40 amounted to:

September 1944 = 669

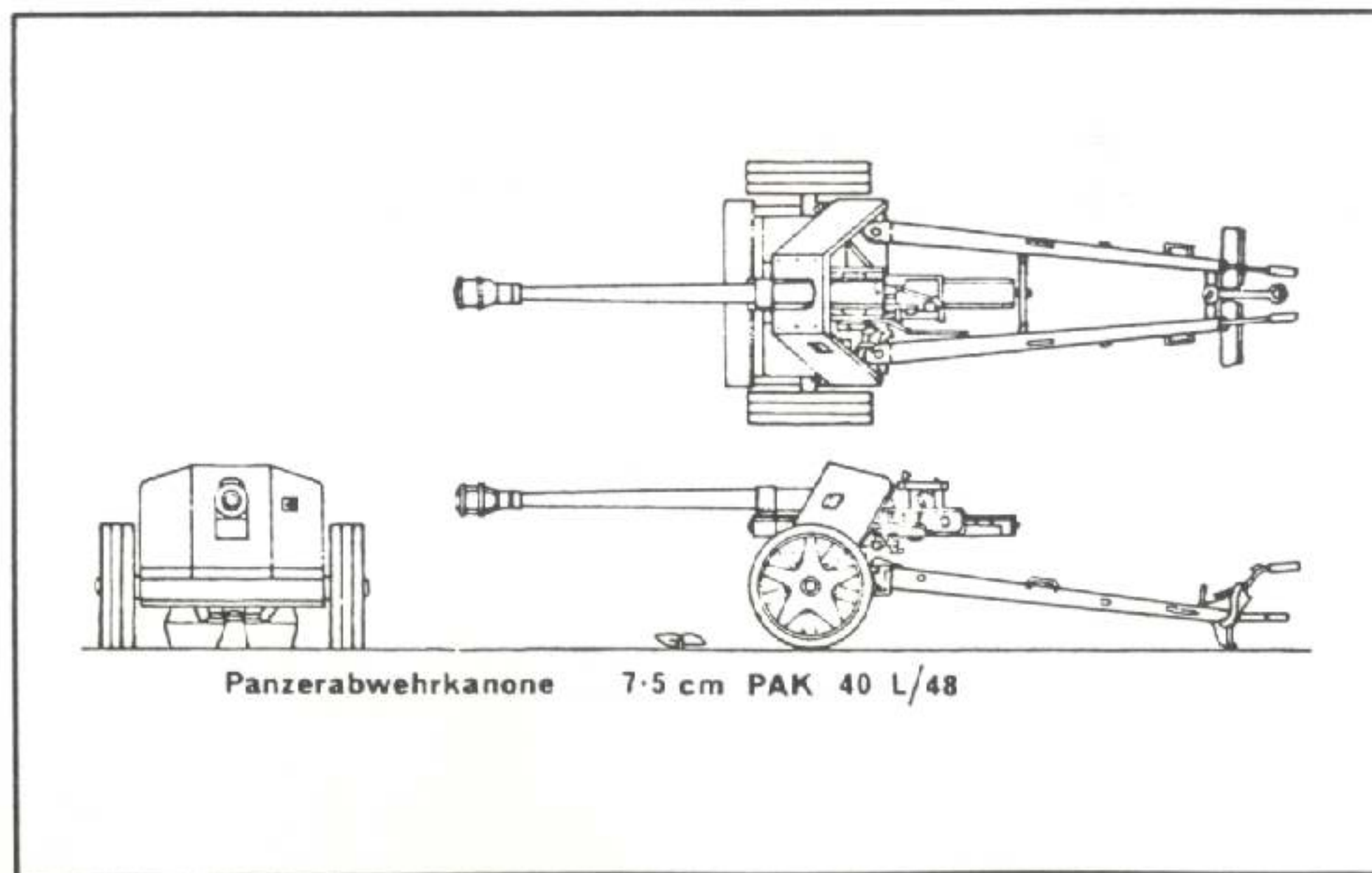
October 1944 = 1020

November 1944 = 494

December 1944 = 307

The total number of these guns with the troops at the front on October 1, 1944 was 4805, and on January 1, 1945 4817—to cite just two days.

75mm PAK 40 L/48



Stoff-
gliederung

5

Geheime Kommandosache!

7,5cm Pak 40

Blatt

G 51

Dringl.-St.: AH Pz- Progr. (Sf. S. Kfz. Bl. G 350 u. G 351)

Technische Daten:

Schußweite (wirksamste) = 1800 m — 2000 m
 m. Spregr. bei 22° Rohrerhöhung = 8100 m
 Rohrweite 7,5 cm
 Rohrlänge in Kalibern L/46 = 3,450 m (o. Mdgbv.)
 Geschößgewicht 7,5 cm Pzgr. 40 W = 4,4 kg
 7,5 cm " 40 = 4,1 kg
 7,5 cm " 39 = 3,8 kg
 7,5 cm Gr. 34 = 5,74 kg
 Größte V_0 = 930 m/sec (bei 7,5 cm Pzgr. 40); 750 m/sec (bei 7,5 cm Pzgr. 39 u. 39 AL)
 (Zahl der Ladungen) 550 (bei Spregr.)
 Gewicht in Feuerstellung 1425 kg
 Gewicht in Fahrstellung 1500 kg
 Richtfeld Seite 65° Höhe -6 + 22°
 Schuß/min 12-15
 Geschätzte Lebensdauer eines Rohres ~ 6000 Schuß
 Durchschl.-Lstg.: auf 100 m = 126 mm; auf 1000 m = 67 mm (Pzgr. 40)
 " " = 98 mm; " " = 82 mm (Pzgr. 39 u. 39 AL)
 " " = 77 mm; " " = 56 mm (Pzgr. 40 W)
 auf alle Entfernungen 60° = 90 mm (Gr. HL/C)

Geschütz-Verwertung (Mündungswucht m.f.) 145 m (bei Geschützen i. gepanz. Fahrzeugen ohne Bedeutung)

Rohstoffbedarf		Fe	Mo	Cr	W	Mg	Sn	Cu
f.	1 Stck. i. kg	6100		68,-			-5	28,8
		Al	Pb	Zn	Ni	Kautschuk		
f.	1 Stck. i. kg	131,2	-03	18,9	15,8	64,7 + 3,-		
Preis RM 12 000,-		Durchschn. Fertigungszeit ~ 6 Monate				Arbeitsstunden ~ 2200		

Fertigungsfirmen:

Ardeltwerke, Eberswalde

Gustloffwerke, Weimar

Ostlandwerke, Königsberg

Patronen:

7,5 cm Pzgr. Patr. 39 Pak 40
 7,5 cm Pzgr. Patr. 39 RI Pak 40
 7,5 cm Pzgr. Patr. 40 Pak 40
 7,5 cm Gr. Patr. 39 HL/C Pak 40
 7,5 cm Spregr. Patr. 34 Pak 40
 7,5 cm Pzgr. Patr. 40 (IV) Pak 40
 7,5 cm Spregr. Patr. 34 (IV) Pak 40
 7,5 cm Pzgr. Patr. 37 (U3) Pak 40
 7,5 cm Spregr. Patr. 37 (U3) Pak 40
 7,5 cm Gr. Patr. 39 HL/A Pak 40
 7,5 cm Gr. Patr. 39 HL/B Pak 40
 7,5 cm K Gr. Patr. rot No Pak 40



Good camouflage was vital and increased success.





Emplacement of a 75mm Pak 40 in the Carpathian foothills (May 30, 1944). The breechblock, gun cradle, mount and shield are easy to see.



Upper left: Front view of the new Pak. Wider and more sharply raked three-part shield, armored undercarriage and wide hard rubber tires on the wheels. (Picture taken February 12, 1944).

Above: Panzerjäger of a Fallschirmjäger division have just uncoupled the gun from its towing truck and are putting it in position. While the gunner and loader push on the shield, the ammunition carriers life the mount and one of them pushes the barrel down to make the gun lighter.



Left: A 75mm Pak of Panzergrenadier Division *Grossdeutschland* northeast of Bielgorod early in 1943.



Latvian volunteers in the Waffen-SS with a 75mm Pak 40. The length of the shell indicates the heavy charge of powder and thus the shell velocity of 930 meters per second (Antitank Shell 40).(BA)



A well-positioned 75mm Pak 40. The gun is dug in up to the barrel and thus hard to see—in addition to offering greater shrapnel protection.



A 75mm Pak in firing position. The group leader (a non-commissioned officer) is at the left of the gun, the gunner and (not visible) loader to the left and right close behind the shield. Gunners 3 and 4 (right) and 5 (left) push the spars down to limit the recoil.(BA)

THE 75mm PAK 41

The firm of Krupp, which also received a contract in 1939 to develop a 75mm Pak, utilized the experience of the French Army, which was already using guns with conical barrels. The design of the new gun paralleled that of the 75mm Pak built by the Rheinmetall-Borsig AG firm. But by introducing the conical—narrowing—gun barrel, the use of the 75mm Pak 41 moved in different directions. The barrel of the Krupp Pak had a rifled parallel section after the breech, followed by a conical section that gave way to a smooth parallel section at the muzzle. Thus the diameter of the shell was compressed from 75- to 55mm. The 2.5 kilogram antitank shell, its tungsten carbide core weighing 0.9 kg, thus attained a muzzle velocity of 1260 meters per second, which penetrated 205mm of armor at a range of 500 meters.

A further difference from the 75mm Pak 40 was the shield, which was a load-carrying member of the construction. The barrel with the cradle was mounted in it as a ball mount. The spars of the spreading mount and the axles suspended by torsion bars were attached directly to the shield. Thus the gun was very low, and it weighed only 1390 kg. The ban on the use of tungsten for ammunition production meant the end of 75mm Pak 41 production, of which only 150 were made. Moving the 75mm Pak 41 by manpower was no longer possible on account of its weight. An order from the Army High Command included, among others, the line: "Heavy Pak will be towed or pushed into position by motor vehicles."

The most important towing vehicles for this Pak were the 3-ton halftrack, the Ost caterpillar made by Steyr (RSO for short), and in exceptional cases the Steyr 1500 A truck.

Secret Command Material

Stoff- gliederung	Gehelme Kommandosache!	Blatt
5	7,5cm Pak 41	G 52

Dringl.-St.:

Technische Daten:

Schußweite	(wirksamste) m. Sprgr. bei 18° Rohrerhöhung	2400 m
Rohrweite		7,5/5,5 cm (konisch)
Rohrlänge in Kalibern	L/57,6 bezogen auf Endkaliber	4,32 m o. Mdgr.
Geschoßgewicht	Pzgr. 41 HK 2,6 kg	Pzgr. 41 W 2,5 kg
		Sprgr. 2,65 kg
Größte V ₀	1220 m/sec	1230 m/sec
Mündungsgewicht	198 ml	900 m/sec
Patr.-Munition		
Gewicht in Feuerstellung		1390 kg
Gewicht in Fahrstellung		1880 "
Richtfeld	Seite 60°	Höhe -10 + 18°
Schuß/min	12 - 14	
Geschätzte Lebensdauer eines Rohres		~ 1000 Schuß
Durchschl.-Lstg.:	auf 100m = 65 mm; auf 1000m = 67 mm (Pzgr. 41 W)	
	" " = 193 " ; " " = 136 " (Pzgr. 41 HK)	

Geschütz-Verwertung (Mündungsgewicht mt) 142 $\frac{mt}{t}$ [bei Geschützen i. gepanz. Fahrzeugen ohne Bedeutung]

Rohstoffbedarf	Fe	Mo	Cr	W	Mg	Sn	Cu
f. 1 Stck. i. kg	5900					~5	31,6
	Al	Pb	Zn	Ni	Kautschuk		
f. 1 Stck. i. kg	150		16,6	27,3			
Preis RM 15 000.-	Durchschn. Fertigungszeit ~ 6 Monate				Arbeitsstunden ~ 2800		

Fertigungsfirmen:

Wird nicht mehr gefertigt

Patronen:

7,5cm Pzgr. Patr. 41 (H.K.) Pak 41
7,5cm Pzgr. Patr. 41 (W.) Pak 41
7,5cm Sprgr. Patr. 41 Pak 41



Here a caterpillar Ost (RSO) pulls a 75mm Pak and carries its crew.(BA)



The RSO was sent to the eastern front in great numbers in 1943. It had a 70 HP 3.5 liter Steyr carburetor motor, weighed 5200 kg, and had a range of 300 road or 150 cross-country kilometers with a full 180-liter tank.

THE 75mm PAK 97/38

Even before the two 75mm Pak went into service, the 75mm Pak 97/38 had already had its baptism of fire. This gun was basically the French 1897 field gun, great numbers of which had been captured in the western campaign. The barrel of this gun was simply removed and installed in the frame of the 50mm Pak. To decrease the heavy recoil, a muzzle brake was screwed onto the barrel. What with the short barrel length, the muzzle velocity of the shell was 570 meters per second.

Thus at 500 meters only armor of 75mm could be penetrated.

In addition, the screw block, which had to be operated by hand, proved to be a problem, since it sharply lowered the rate of fire. When damage to the spars resulted from the weight of the barrel and muzzle brake on the mount, the gun was gradually withdrawn from use on the front and turned over the Panzerjäger units in occupied territories.

Weighing 1190 kg, this gun could also be moved by manpower, for which four towlines and a large steerable wheel on the spar ends were provided.

Placing a 75mm Pak 97/38 in France, in the summer of 1944.

The gun was characterized by a rather short barrel with a muzzle brake. Although it was easy to move, it was not popular among the Panzerjäger because of its low rate of fire.



Stoff- gliederung	Geheime Kommandosache!	Blatt
5	7.5cm Pak 97/38	G 53

Dringl.-St.:

Technische Daten:

Schußweite	m.d. 7.5cm Sprgr. 233/4CF	11 000 m
Rohrweite	m Sprgr bei 25° Rohrverhöhung	9 400
Rohrlänge in Kalibern L/36 o. Mdgbr.		= 2,720 m
Geschößgewicht	1) 6,8 kg f. 7.5 cm K Gr 72 (P) 2) 4,8 kg f. 7.5 cm Gr 38/97 H/C (F)	
Größte V ₀	1) 570 m/sek 2) 450 m/sek	
Mündungswicht	113 mt	
(Zahl der Ladungen) Patr.-Mun.		
Gewicht in Feuerstellung	1190 kg	
Gewicht in Fahrstellung	1270 "	
Richtfeld	Seite 60°	Höhe -8° +25°
Schuß/min	12-14	
Geschätzte Lebensdauer eines Rohres	Schuß	
Durchschl.-Lstg.: auf 100m = 61mm; auf 1000m = 58mm (K Gr 72 (P))		
	90 mm Plattenstärke (1 7.5 cm Gr. 38/97 H/C (F))	

Geschütz-Verwertung (Mündungswicht mt) $95 \frac{mt}{t}$ (bei Geschützen i gepanz. Fahrzeugen ohne Bedeutung)
(Geschütz-Gewicht t)

Rohstoffbedarf	Fe	Mn	Cr	W	Mg	Sn	Cu
f. Stck. i. kg							
	Al	Pb	Zn	Ni	Kautschuk		
f. Stck. i. kg							
Preis RM 8 000.-	Durchschn. Fertigungszeit 4 Monate		Arbeitsstunden 1500				

Fertigungsfirmen:

Wird nicht mehr gefertigt

Patronen:

7.5 cm Gr. 33/97 H/C (F)
7.5 cm Gr. 33/97 H/C (F)
7.5 cm Gr. 33/97 H/C (F)
7.5 cm Sprgr. Patr. 233/4 (F)
7.5 cm " " 233/4 (F)
7.5 cm " " 233/4 (F)
7.5 cm " " 233/4 (F)
7.5 cm H Gr. Patr. Pz (P)
7.5 cm Gr. 38/97 H/C (F)

ADDITIONAL 75mm PAK

The 75mm Pak 44, made by Rheinmetall-Borsig AG, had a different type of conical barrel. It was very short and had a conical section first, followed by a rifled parallel section. The life of such a barrel was ended after only 200 rounds. The construction of the mount was also interesting, since the spars, when closed, turned and raised the axle. This allowed the gun to be handled

easily. But as the end of the war was near, it did not see action.

Finally, the 75mm Pak 50 was a makeshift solution. It was developed in 1944 and a few examples reached the front. It had a shortened barrel from the 75mm Pak 40 mounted on the 50mm Pak chassis. The weight of the gun, 1100 kg, was not high, but neither was its penetrating power.



The 75mm Pak was in service until the last day of the war. The picture shows a Panzerjäger unit driving through a Silesian town on February 26, 1945. The crew is riding on the 3-ton towing tractor with all their gear.

The 88mm PAK

After the Krupp firm received a contract to produce an 88mm anti-aircraft gun, it developed an 88mm antitank gun shortly before World War II began. This gun, which went into production in 1943, became the best antitank gun in the war.

The modifications from the previously customary guns of this type included a semi-automatic vertical breech mechanism. Opening the breech and ejecting the cartridge were done by two springs which were compressed when the gun recoiled. This greatly shortened the recoil. The traverse aiming gear could be turned 260 degrees. The cross mount was like that of the 88mm Flak. Firing shells was also possible when the gun was on its wheels, with firing done electrically. Since the elevation was limited to 40 degrees, the upper edge of the shield, at only 1.73 meters, could be kept very low. The weight of 3630 kg in firing position was also low.

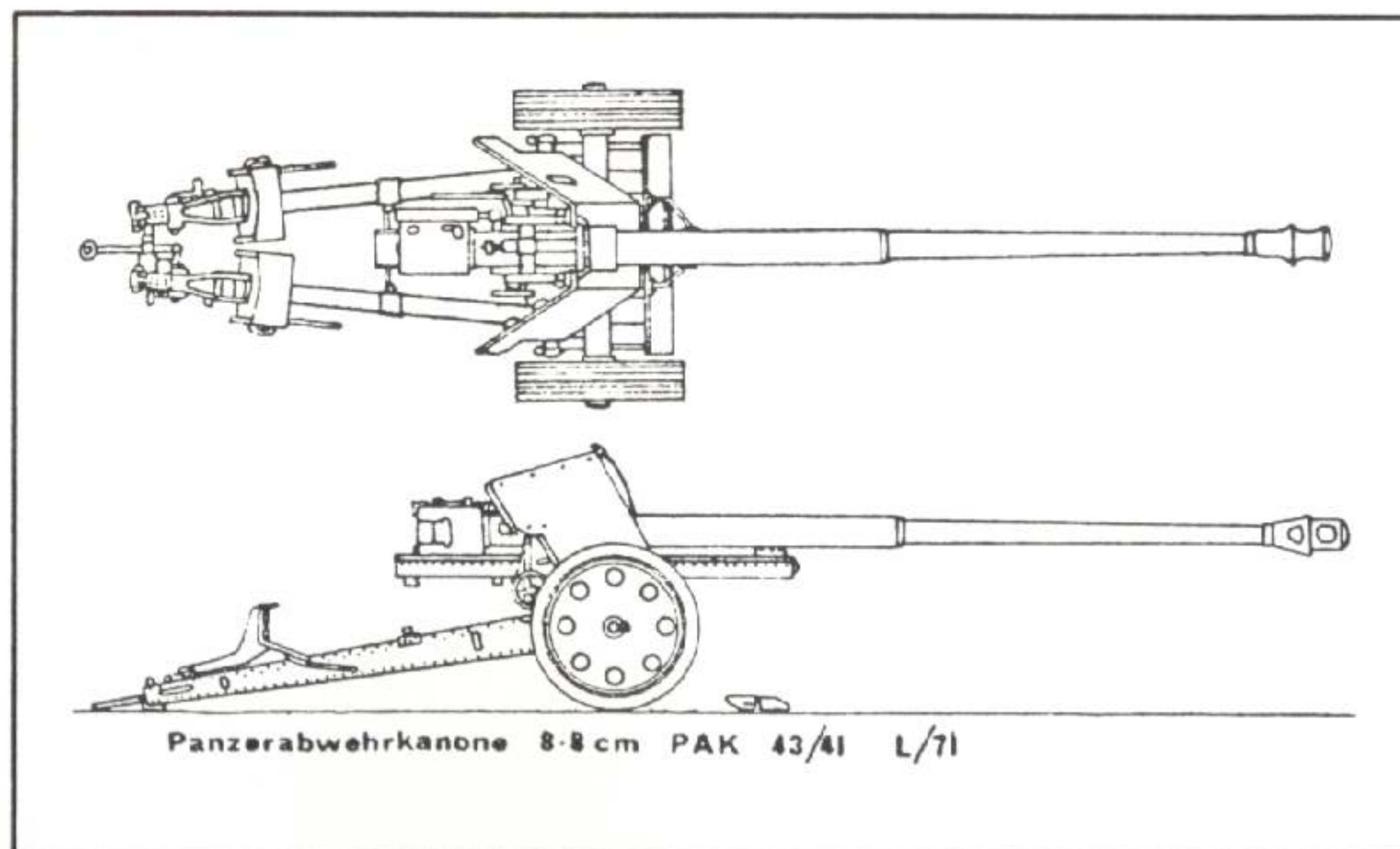
Of this gun there were two types:
the 88mm Pak 43: caliber length 6.35 meters, cross mount, great range and penetration, limited mobility off the road.
the 88mm Pak 43/41: caliber length 6.36 meters, spread mount, great range and penetration, high elevation, great weight, traverse only 56 degrees.

Both fired antitank shells, hard-core shells and explosive shells. The rate of fire for both guns was 6 to 10 rounds per minute, penetration of up to 190mm armor at a range of 1000 meters. The guns were used by the army Panzerjäger units.

The supply of 88mm Pak in the German Army as of October 1, 1944 numbered 578, on January 1, 1945 829. The 7.5 and 88mm Pak were divided as follows in the last quarter of 1944:

	Oct.	Nov.	Dec.
Supplied to the front	200	400	756
Supplied to Ersatzheer	900	480	150
Turned over to allies	16	40	50

Anti-tank gun 88mm PAK 41/43 L/71



Stoff-
gliederung

5

Geheime Kommandosache!

8,8 cm Pak 43

Blatt

G 61

Dringl.-St.: AH Pz-Progr.

Technische Daten:

Schußweite bei 40° Erhöhung 15 150 m
 Rohrweite 8,8 cm
 Rohrlänge in Kalibern L/71 a.Mündgsbr. = 6,280 m
 Geschößgewicht 10,2 kg Pzgr. 39/4, 39/43 u. 39/43 AL
 7,3 " 40/43 W
 9,4 " sprgr. 43
 GröÙte V₀ 950 m/sek sprgr. 43
 Mündungswucht 520 ml
 Zahl der Ladungen 1000 " Pzgr. 39/4, 39/43 u. 39/43 AL
 1130 " 40/43 W
 Gewicht in Feuerstellung 3650 kg
 Gewicht in Fahrstellung 4750 "
 Richtfeld Seite 360° Höhe -8 +40°
 Schuß/min 6-10
 Geschätzte Lebensdauer eines Rohres ~2000 Schuß
 ~1200 " (Pzgr. 39/4)
 Durchschl.-Lstg.: auf 100m = 203 mm; auf 1000 = 165 mm (Pzgr. 39/4, 39/43 u. 39/43 AL)
 (s. Vorbm. I)

Geschütz-Verwertung (Mündungswucht mt) 142 $\frac{mt}{t}$ [bei Geschützen i. gepanz. Fahrzeugen ohne Bedeutung]
 Geschütz-Gewicht t

Rohstoffbedarf		Fe	Mo	Cr	Si	Mg	Sn	Cu
f.	1 Stck. i. kg	7765	48,0	46,8	17,1			3,0
		Al	Pb	Zn	Ni	Kautschuk		Ag
f.	1 Stck. i. kg			2,4	24,9			1,6 g
Preis RM		Durchschn. Fertigungszeit Monate				Arbeitsstunden		

Fertigungsfirmen:

Henschel, Kassel

Weserhütte, Bad Oeynhausen

Geschöß: s. Bl. G 61 I

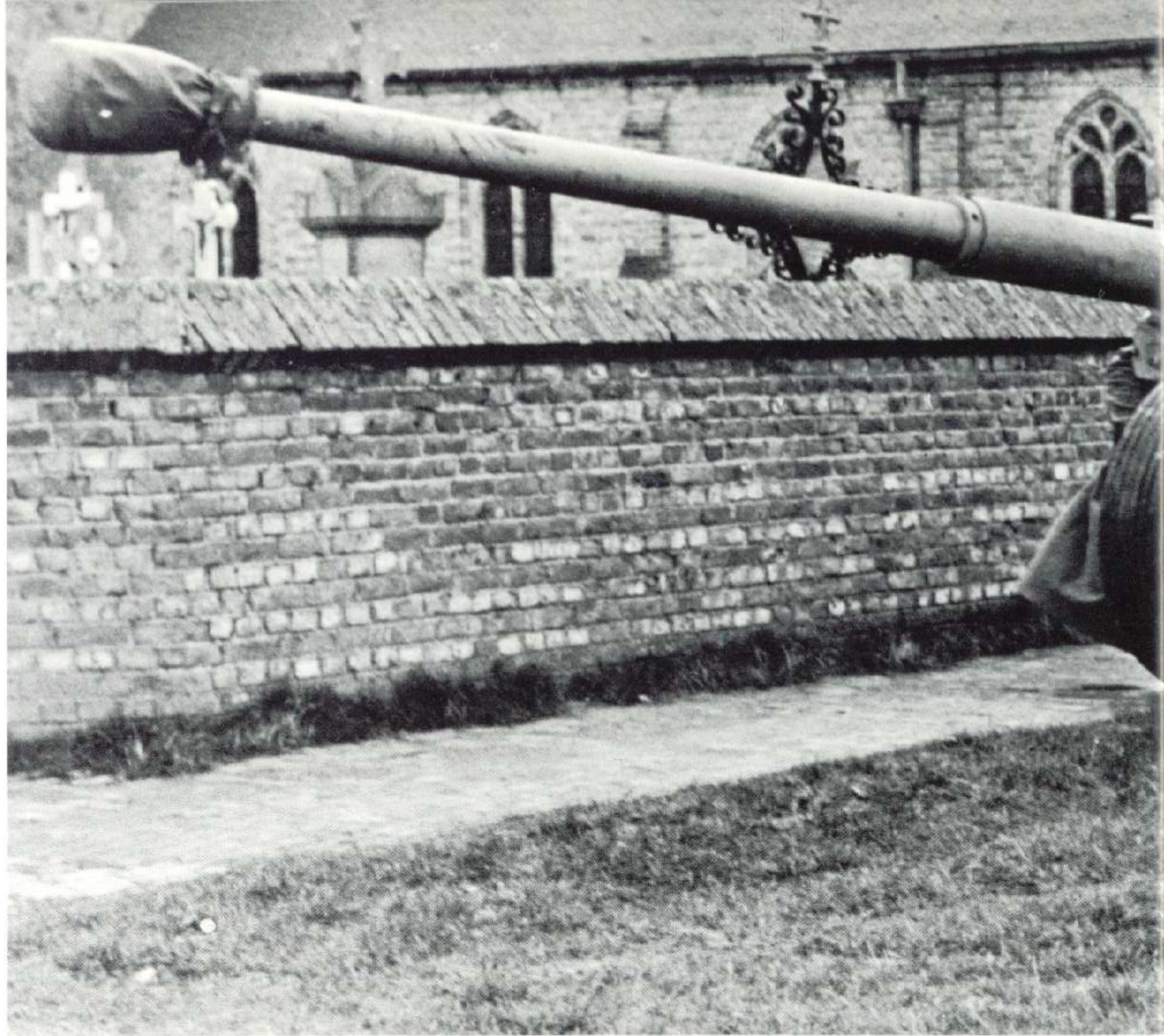
Right:

The mighty 88mm Pak from the front. The gun's wheels were those of the heavy field howitzer. What with the short supply of materials, there were two versions of the running gear; one with pneumatic tires and one with pressed steel spoked wheels with hard rubber tires.





It was almost impossible for a crew to put a gun into position because of its great weight. The 88mm Pak was modified because of increasing shortages of materials. Instead of the earlier 88mm Pak 43, there were modified models 43/1, 43/2 and 43/3. The weight rose to 4380 kg and the height of the shield was two meters.



It was a parallel piece to the 88mm Flak and had the same effect on a target.



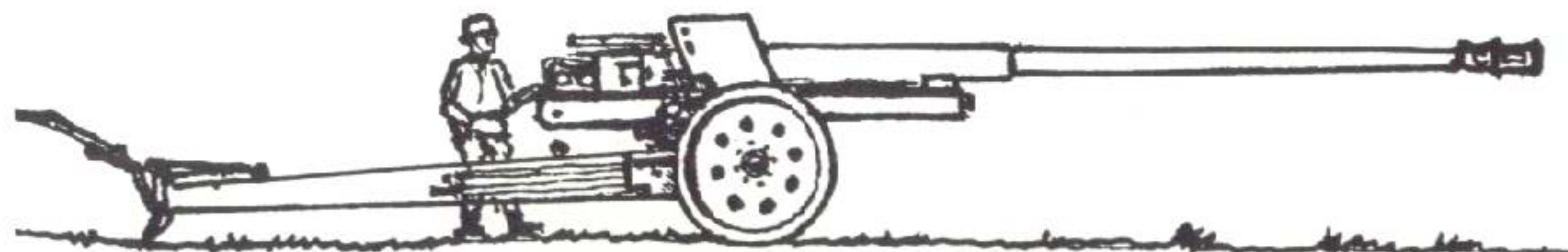
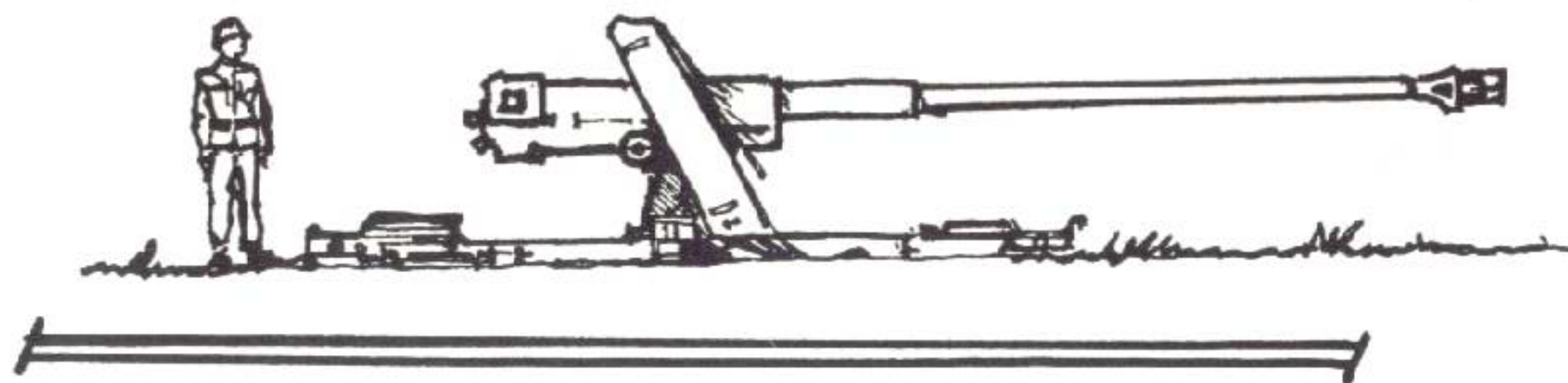
But operating it was exhausting.

DIFFERENCES BETWEEN THE TWO 88mm PAK

	Pak 43/L 71	Pak 43/41/L71
Caliber in mm	88	88
Barrel length in mm	6350	6360
Barrel length in caliber	71	71
Elevation range in degrees	-8 +40	-5 +38
Traverse range in degrees	360	56
Weight in kg (ready to fire)	3600	4350
Type of mount	Cross	Spread
Length in mm	9200	9144
Width in mm	-	2527
Height in mm	1700	1981
Antitank shell weight in kg	10.2	10.2
Muzzle velocity in m/sec	1000	1000
Hard-core shell weight in kg	7.3	7.3
Muzzle velocity in m/sec	1125	1125
Explosive shell weight in kg	9.4	9.4
Muzzle velocity in m/sec	750	750
Armor penetration mm at meters	163/1000	163/1000

Right page:

An 88mm Pak 43 with spread mount in a securing position by a river in western Germany, spring 1945.(BA)



Left:

The appearance of both guns, above the 88mm Pak 43 L/71, below the 88mm Pak 41/43 L/71.





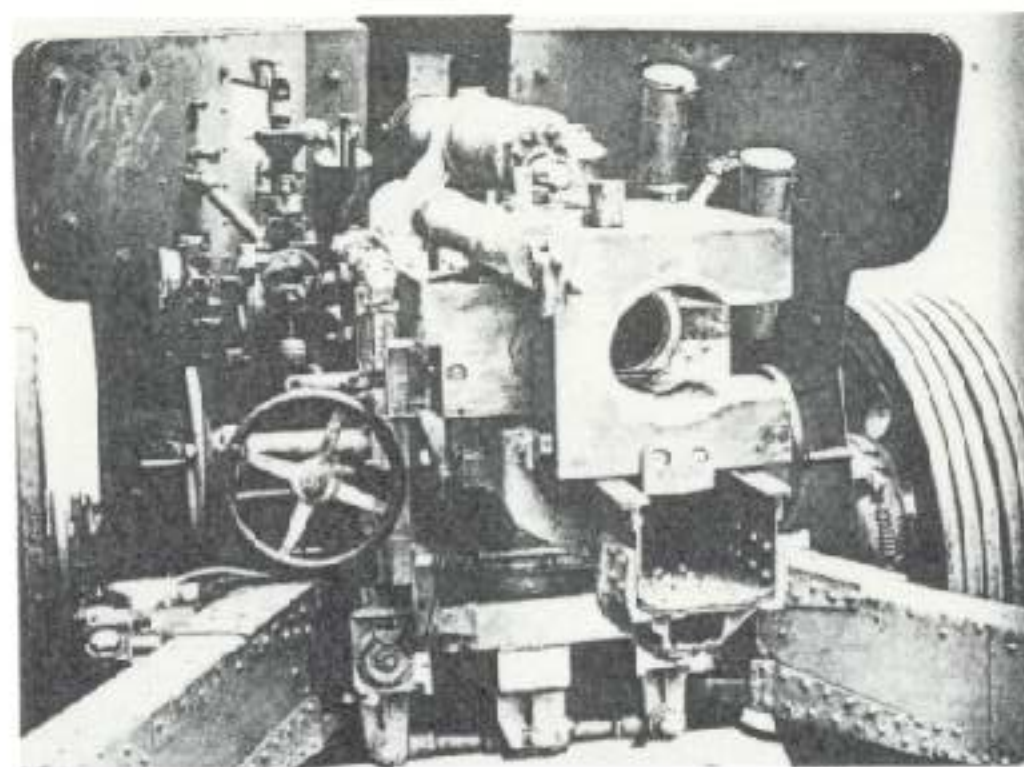
The normal towing vehicle for the 88mm Pak was the 3-ton towing tractor (Sd.Kfz. 10). Above: A picture from western Germany in the winter of 1944-45.

Below: a picture from Hungary (January 12, 1945).





Above: This 88mm Pak was displayed at a weapons show in the northern sector of the eastern front in 1944.(BA)



Left: Breechblock with aiming crank and targeting telescope, lower gun cradle, spars, axle and wheels.

HISTORY OF THE PANZERJÄGER

The German antitank troops went to war at the beginning of World War II with 50 antitank and one antitank training units, plus the antitank companies of various regiments. During the war the number of units, now called Panzerjäger, within the divisions increased to 407, including eight that had no number but bore the division's name (for example, GROSSDEUTSCHLAND, BRANDENBURG, NORWEGEN,

etc.). There were also independent army Panzerjäger units with numbers above 500. The highest number of a unit was 2113. The units that assault gun companies gained as of 1943-44 were given numbers over 1000.

The following Panzerjäger units consisted of foreign soldiers, not counting the Waffen-SS:

Pz.Jäg.Abt.	136	(Eastern peoples Caucasian, Turkmen)
"	250	(Spaniards)
"	369	(Croats)
"	392	(Croats)
"	1599, 1600, 1650	(Russians)

Near the end of the war there were also Panzerjäger regiments as well as units and brigades. They were usually armed with assault guns or assault tanks.



France, 1940—
a 37mm Pak. (Achilles)

Shooting a 37mm Pak on the drill field. Front (kneeling): the group leader. The observing officer wears the white armband of a scorekeeper. (Achilles)



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