

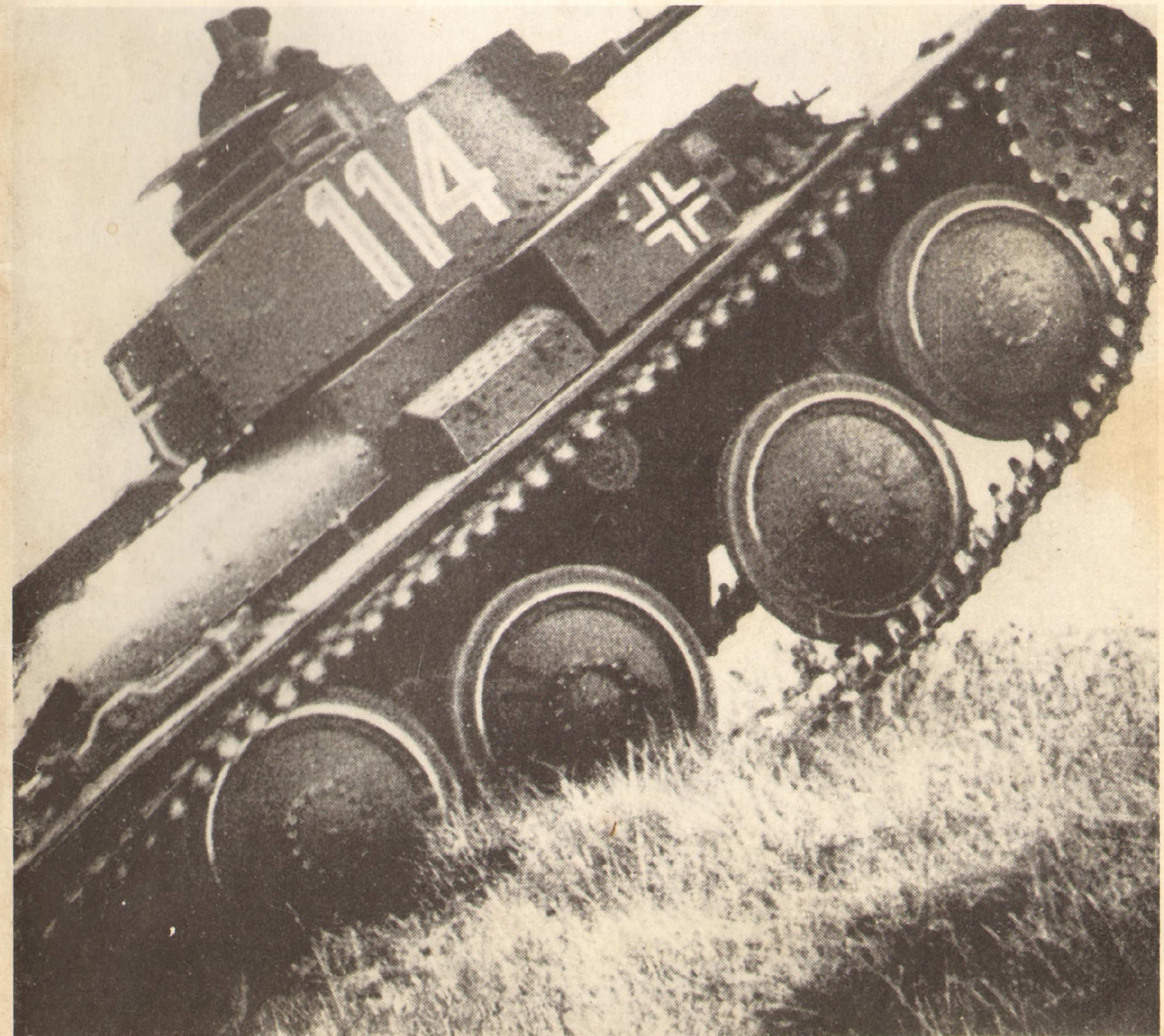
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22

45p
Profile

PanzerKampfwagen 38(t) and 35(t)

by John Milsom



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Skoda LT-35 in German service as PzKpfw 35(t).

Panzerkampfwagen 38(t) & 35(t)

By John Milsom

INTRODUCTION

SEVERAL armaments firms in Czechoslovakia, prior to the occupation by Germany, were concerned with the design, development and production of tanks and other armoured fighting vehicles—both for use by the Czech Army and many foreign armies. Many of these foreign armies still employ these same Czech tanks or modifications of them. In these pages, however, we are concerned only with the influence of Czech tank development on the German Army, and are therefore concerned primarily with two basic tank models; the Skoda LT-35 and the CKD (Ceskomoravska Kolben Danek) TNHP, which the Germans took into service as the PzKpfw 35(t) and the PzKpfw 38(t) respectively, the (t) being an abbreviation of (tscheche), the German for Czech.

DEVELOPMENT OF THE TNHP

In 1933 the CKD firm in Prague began the design of a new light tank series for export. This series received the factory designation LT (Light Tank) L. The first completed model was called the LTL-H and, when tested by the MOD (Ministry of Defence), the TNHB. For export purposes it was often referred to as the LT-34.

During October 1937 the Czech MOD formed a tank evaluation committee to conduct thorough testing of all available Czech tank designs. A new tank evaluation centre was established outside the factory during January 1938. Several factories submitted vehicles for tests apart from CKD; among these being the famous Skoda firm and the lesser known Adamov firm. By

this time the CKD LTL-H series had resulted in the LTL-P (TNHS) model with improved armament, armour and inboard facilities. Results of the trials showed the TNHS to be the most exceptional model of those submitted and after a gruelling 3,000 mile test, some 1,000 miles of which was across country, the tank showed virtually no mechanical defects. Throughout its life this tank chassis earned great respect for its reliability and durability. The maintenance and servicing of the tank was found to be minimal and could be carried out in the field.

Following a report on these tests the Czech MOD specified that the TNHS should enter production and become the standard tank of the Army. Orders were issued for 150 vehicles. After alteration the new tank received the designation TNHP.

Prior to, and during the course of, the tests by the Czech Army, CKD had received orders for most of the developed models for foreign governments. These included Sweden, Switzerland, Peru, Latvia, Yugoslavia and Afghanistan. A total of 196 tanks of this series were exported. One vehicle was purchased by the War Mechanisation Board (WMB) in Great Britain, who tested it extensively.

TECHNICAL DESCRIPTION OF THE ORIGINAL TNHP

This originally 8-ton tank mounted a 37.2 mm. tank gun (Model Skoda A7) L/47.8 and a coaxial 7.92 mm. Besa machine-gun in a turret with all-round traverse. The bulge at the rear of the turret was fitted for ammunition stowage. A further 7.92 mm. Besa



The LTL-H Light Tank (otherwise known as the TNHB or LT-34).

(Chamberlain Collection)

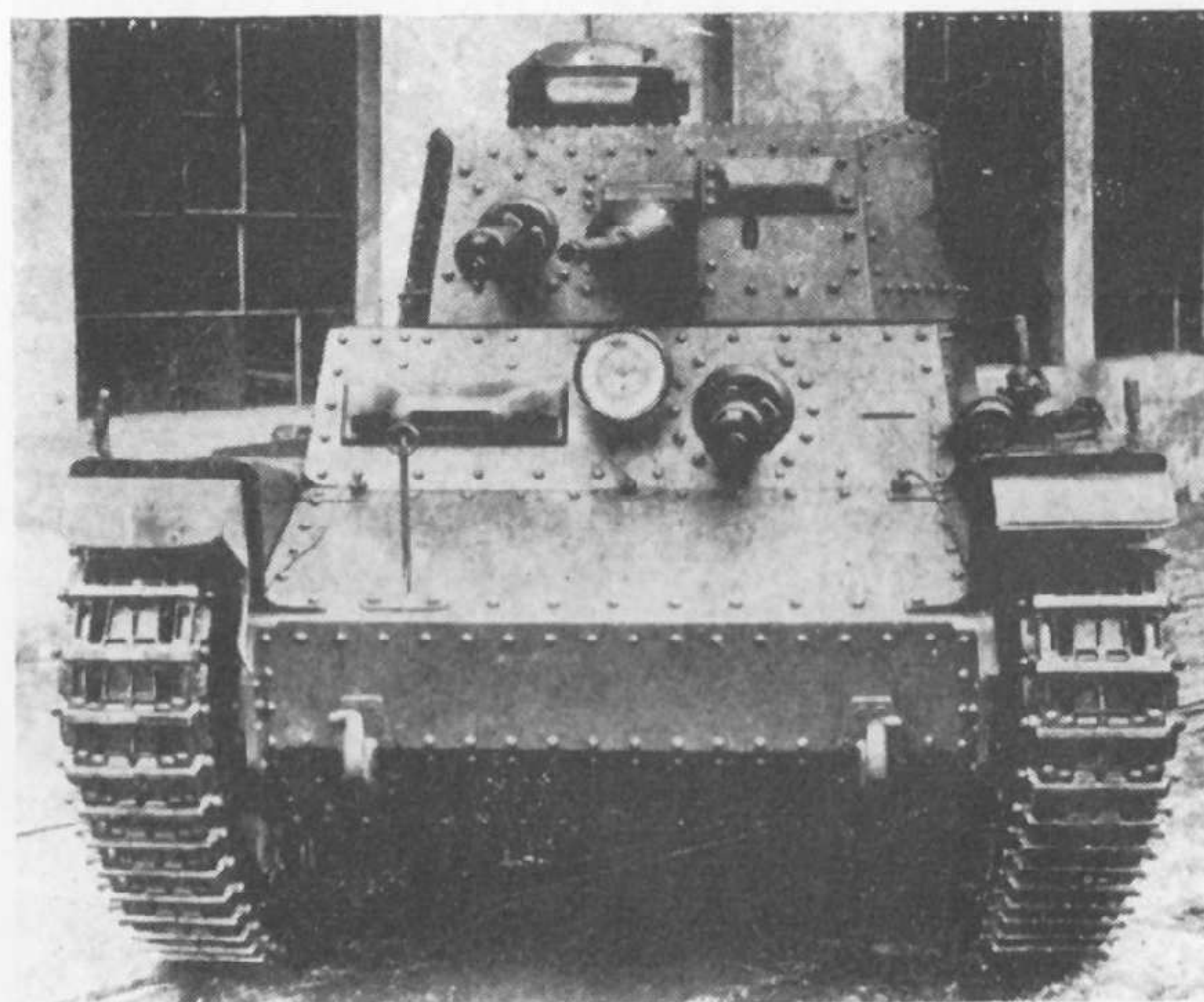
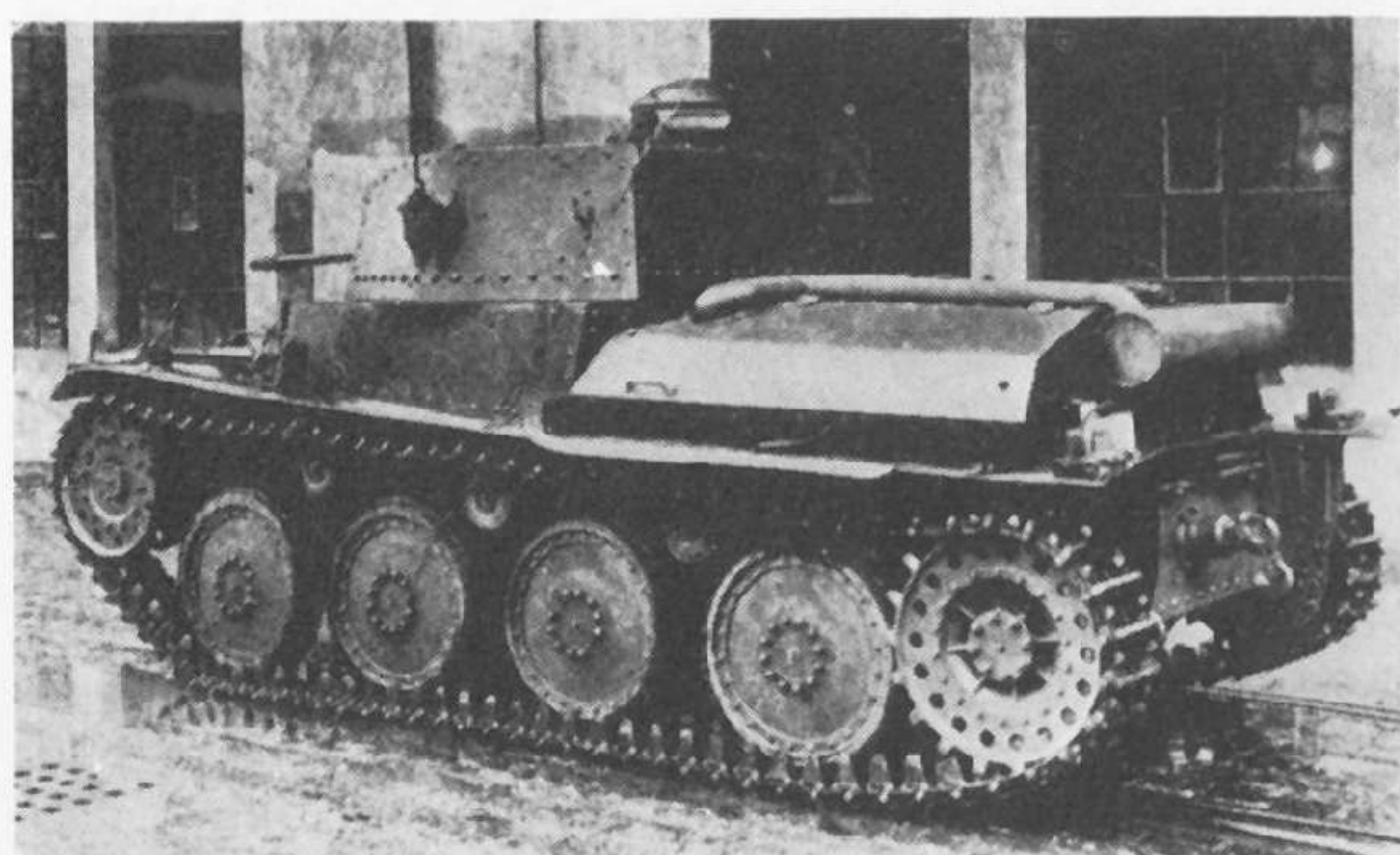
machine-gun was stationed in a spherical mounting at the front of the hull. The elevation gear of the 37 mm. gun could be locked for firing and it was intended to fire only when the vehicle was stationary. The coaxial 7.92 mm. machine-gun was provided with independent action when required, by means of its spherical mounting. The traversing gear, which was fast and light in action, was operated by a wheel on the left-hand side of the gunner. It could be thrown out of action and the turret could then be pushed round by the gunner. The turret ring was 47.5 inches internal diameter and there was no turntable. The cupola, which was fixed, was replaceable with 4 periscopes—each having replaceable mirrors and protective glasses. The forward machine-gun could be operated if necessary by the driver, via a

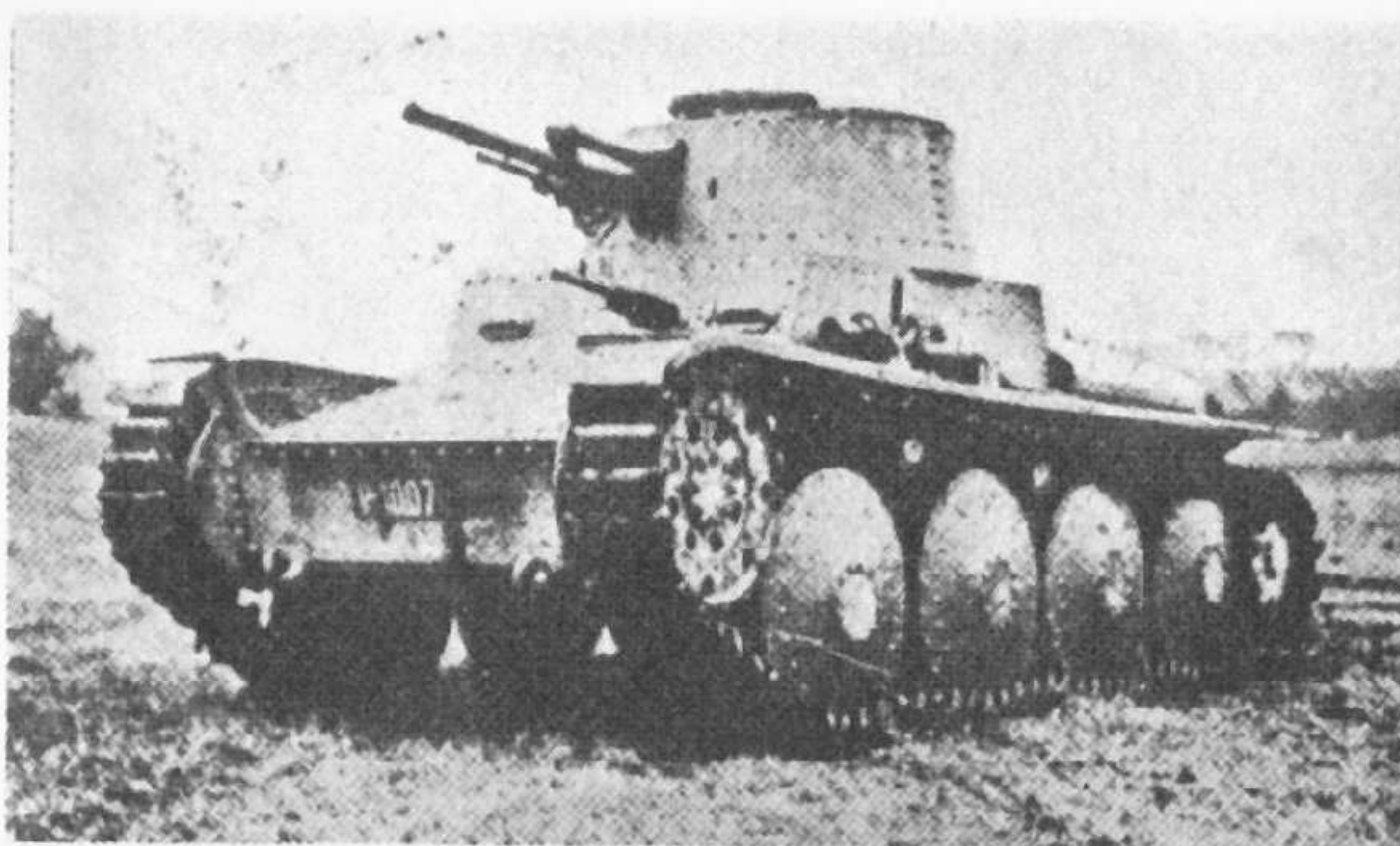
Bowden cable attached to one of the steering levers.

All main construction was rivetted with the exception of the top of the superstructure which was bolted. Protection was 25 mm. basis at the front, 19 mm. on the sides, and 15 mm. on the rear.

Four rubber-tyred single wheels 31 inches diameter were provided on each side, each wheel being mounted on a cranked stub-axle and each pair of wheels being controlled by a semi-elliptic spring freely pivoted. There were two return rollers on each side, mounted well forward. Front sprocket drive was employed, the sprocket being mounted high off the ground and 22.25 inches in diameter. The tracks were engaged by twin sprockets with 19 teeth, and each sprocket was driven through an internally toothed gear by a pinion

Below and right: The LTL-P Light Tank (otherwise known as the TNHS).
(Chamberlain Collection)





First prototype of the TNHP; note the new dish-shaped wheels, reduction in return rollers to two, and replacement of the two water-cooled machine-guns by air-cooled types. The tank also had an experimental gun arresting gear. (Milsom Collection)

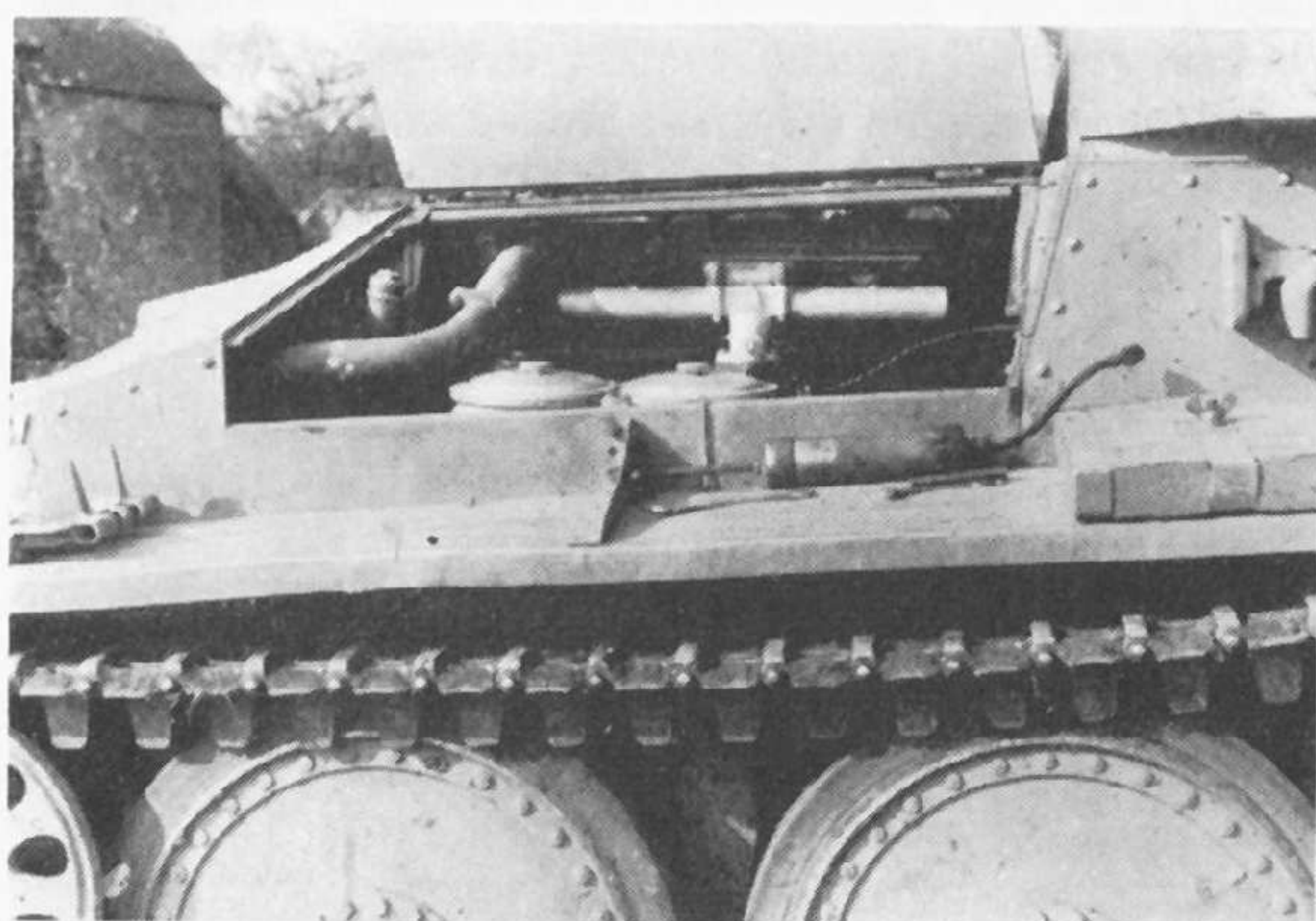


One of the first production TNHP vehicles (chassis Nos. 0001-0150) which was tested by the War Mechanization Board. This is the vehicle described in the text. (Model A). (Chamberlain Collection)

attached to the cross-shaft. The cross-shaft carried two steering units comprising epicyclic and clutch elements giving two steering ratios and driven by a bevel gear from an epicyclic Praga-Wilson pre-selector 5-speed gearbox situated between the driver on the right and the machine-gunner on the left. The forward end of the vehicle was in consequence extremely congested.

The propeller shaft passed through the centre of the fighting compartment, and a 6-cylinder, water-cooled, Praga TNHP OHV lorry petrol engine—developing about 125 h.p. at 2,200 r.p.m.—was mounted vertically on the centre-line of the vehicle in the rear compartment. A single dry-plate clutch was installed. The engine had a dry sump and was cooled by a finned cylinder incorporating an Auto-Klean filter. Bosch

magneto ignition was employed and all the sparking plugs were screened. A 12 volt Scintilla dynamo was belt-driven from the crankshaft and charged a 9-cell NIFE battery of 190 amp. hours capacity. Cooling was effected by a centrifugal fan driven through a Rzeppa universal joint from the crankshaft. The air was drawn partly through the bulkhead, but mainly through a mushroom type louvre over the engine compartment and thence through a radiator of the continuous fin and tube type. The air was ejected through an opening in the rear top plate protected by armour-steel slats covered by expanded metal. The fuel tanks of tern plate were situated on either side of the engine compartment and the total capacity was 49 gallons (Imperial). The floor plates immediately below the

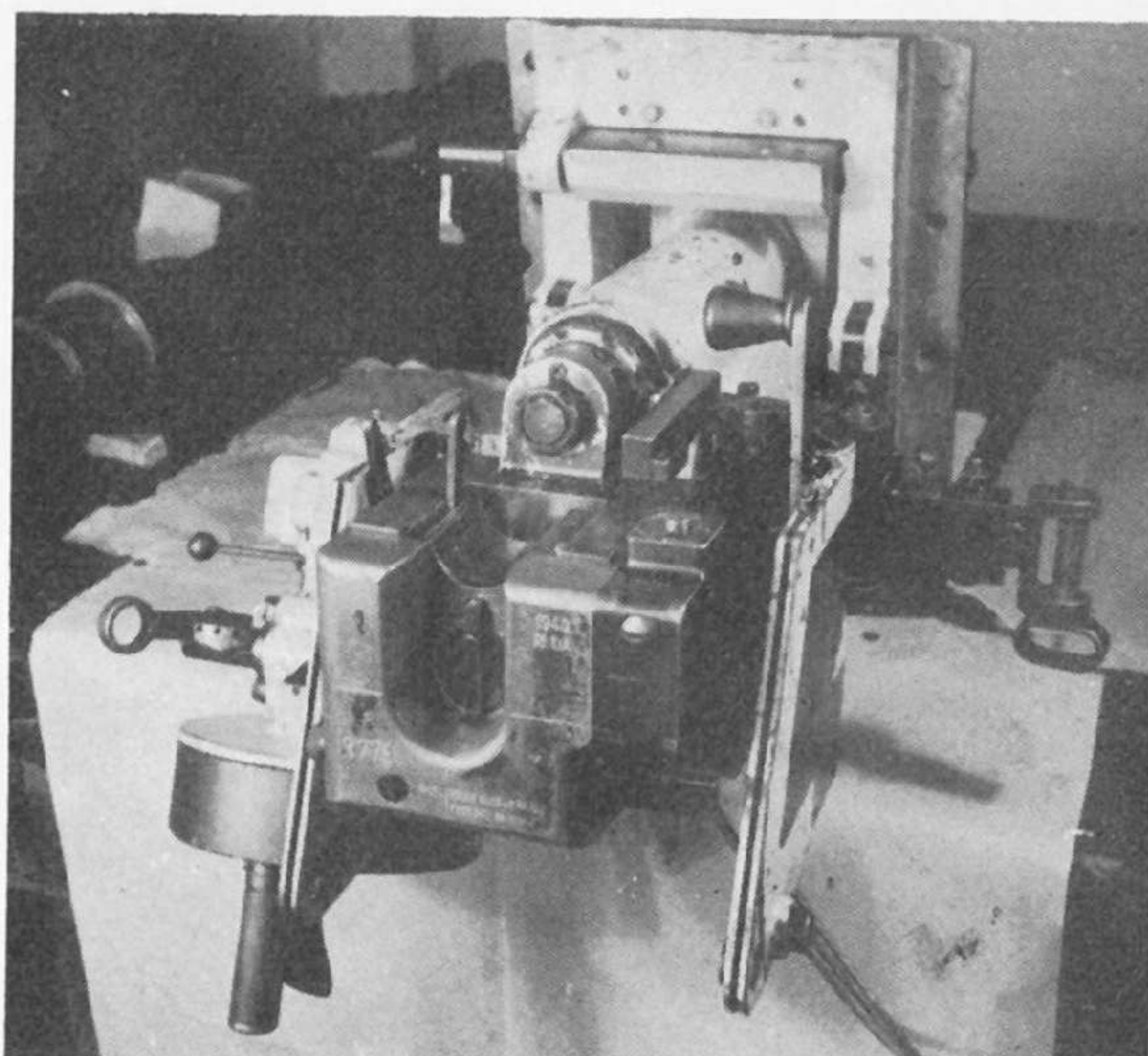


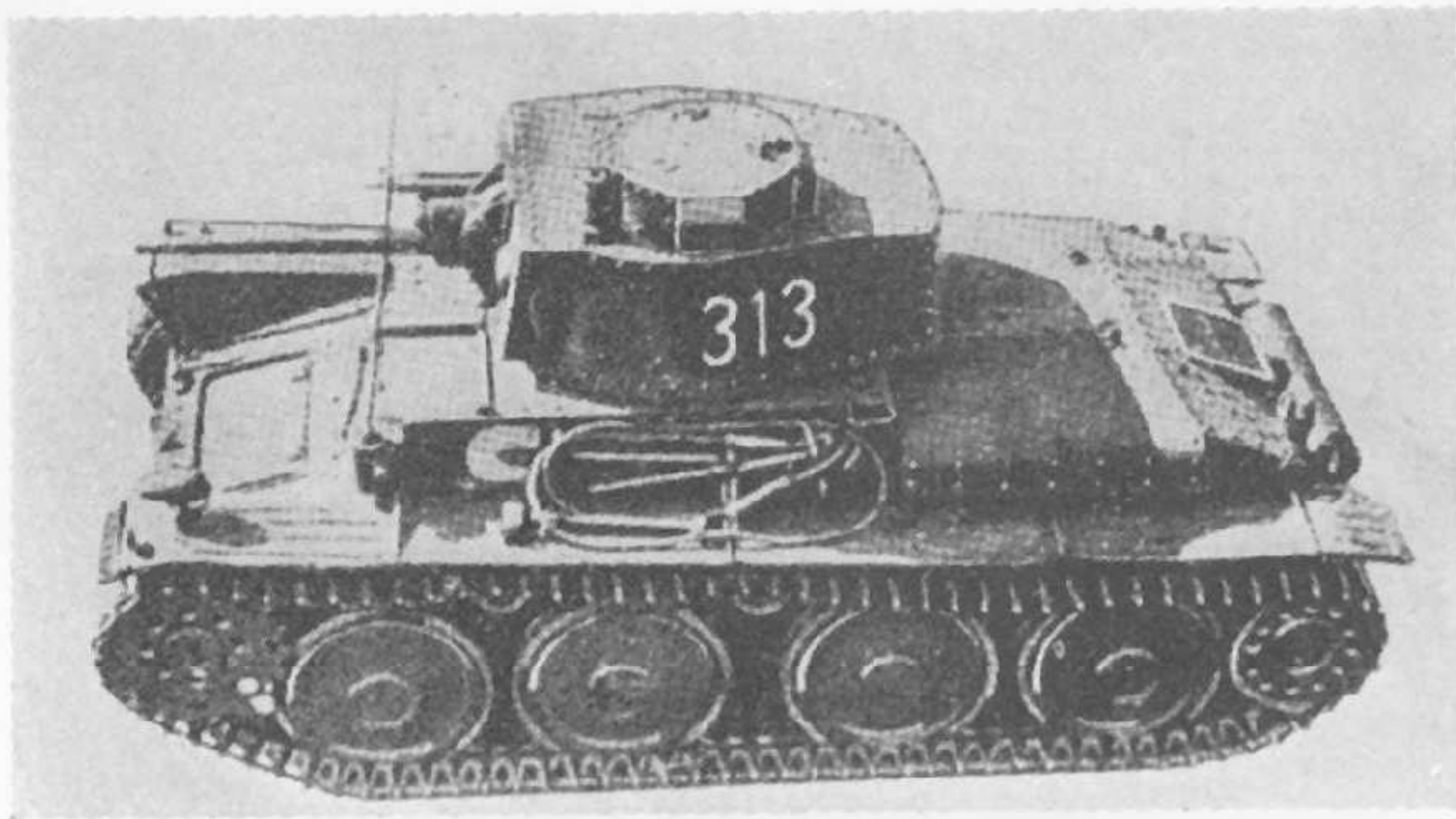
Close-up of the engine installation in a first production model TNHP (Model A). (Chamberlain Collection)

Third production model TNHP (Model C) was identical to the Model B but had an inverted recuperator (i.e. the recuperator was moved to the top of the gun). This feature was retained in all further production models.

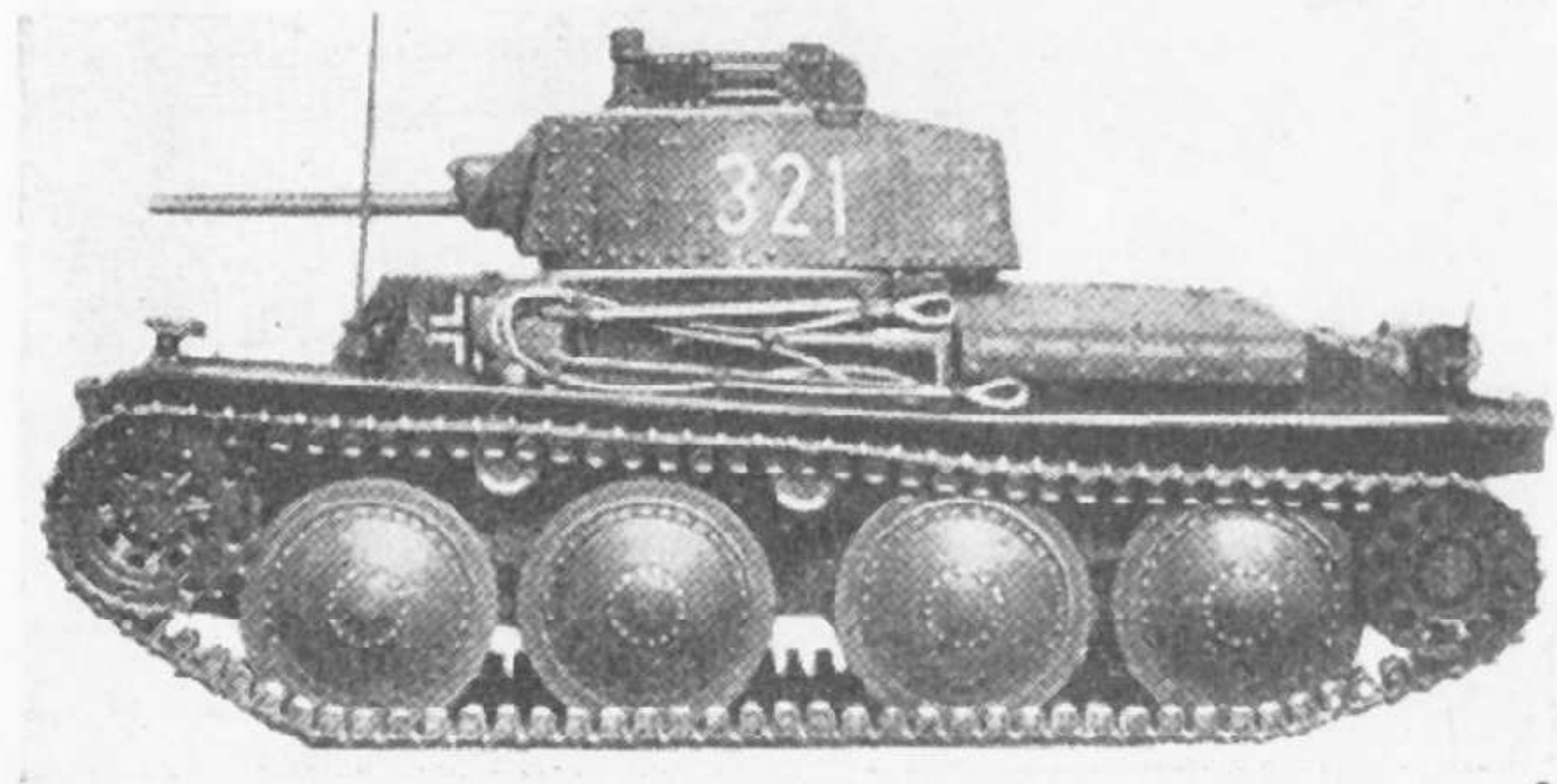
Photo showing the armament installation of a production TNHP-S tank. (Chamberlain Collection)

Second production model TNHP (Model B) in use with the Czech Army prior to the Nazi occupation. (Milsom Collection)

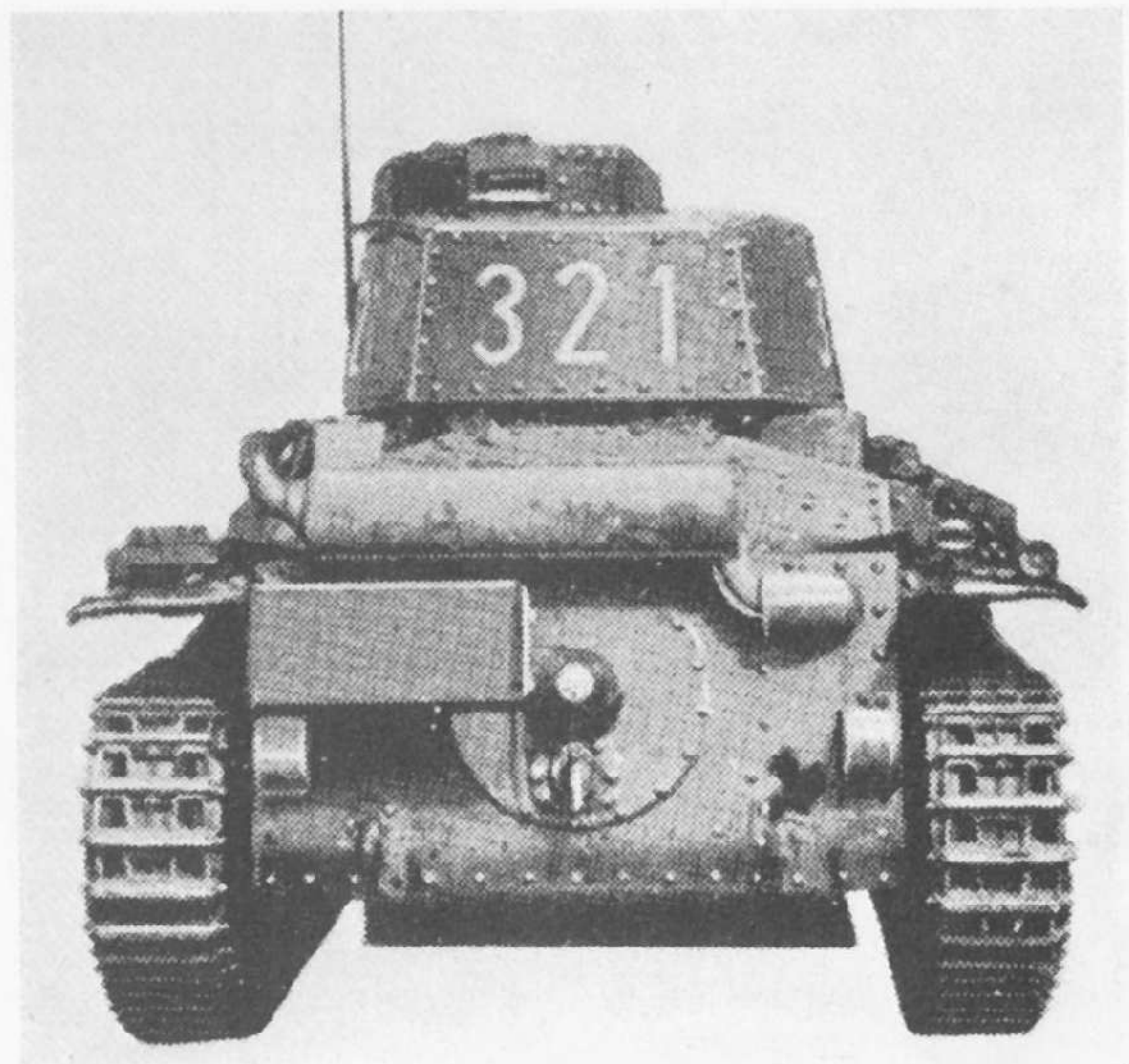




1



3



2

Above and below: Fourth production model TNHP (Model D) with new aerial installation. Note the variation in armament in these photos 1-3 have the German 3.7-cm. KwK L/40 or 45. (Chamberlain Collection)

fuel tanks were secured by a few small-diameter bolts, the idea being that in the event of an explosion resulting from damage to the fuel tanks the floor plates immediately would be blown out and so reduce the possibility of damage within the vehicle.

The track was made up of cast steel shoes 4.09 inches pitch and 11.55 inches wide, and the pins were each secured by a circlip. Detachable spuds were provided to increase track grip in snow and ice. These were located on the extremities of the pins, which projected beyond the faces of the lugs.

After testing one of these vehicles during 1939, the War Mechanisation Board passed the following comments:—

“.....It is extremely difficult for the tank commander to load the turret machine-gun or to get at it to clear stoppages; on the other hand if the third man is used for this purpose his position is remarkably cramped. A convenient action position is provided for a case of 8 rounds of ammunition for the 37-mm. gun The belt of the turret machine-gun obstructs the driver when the turret is trained forward or to the left front. The workmanship and detail design appear to be generally good, but not extravagant, and the cost/ton should be less than British tanks. Comfort of the crew and ease of evacuation of wounded are inferior

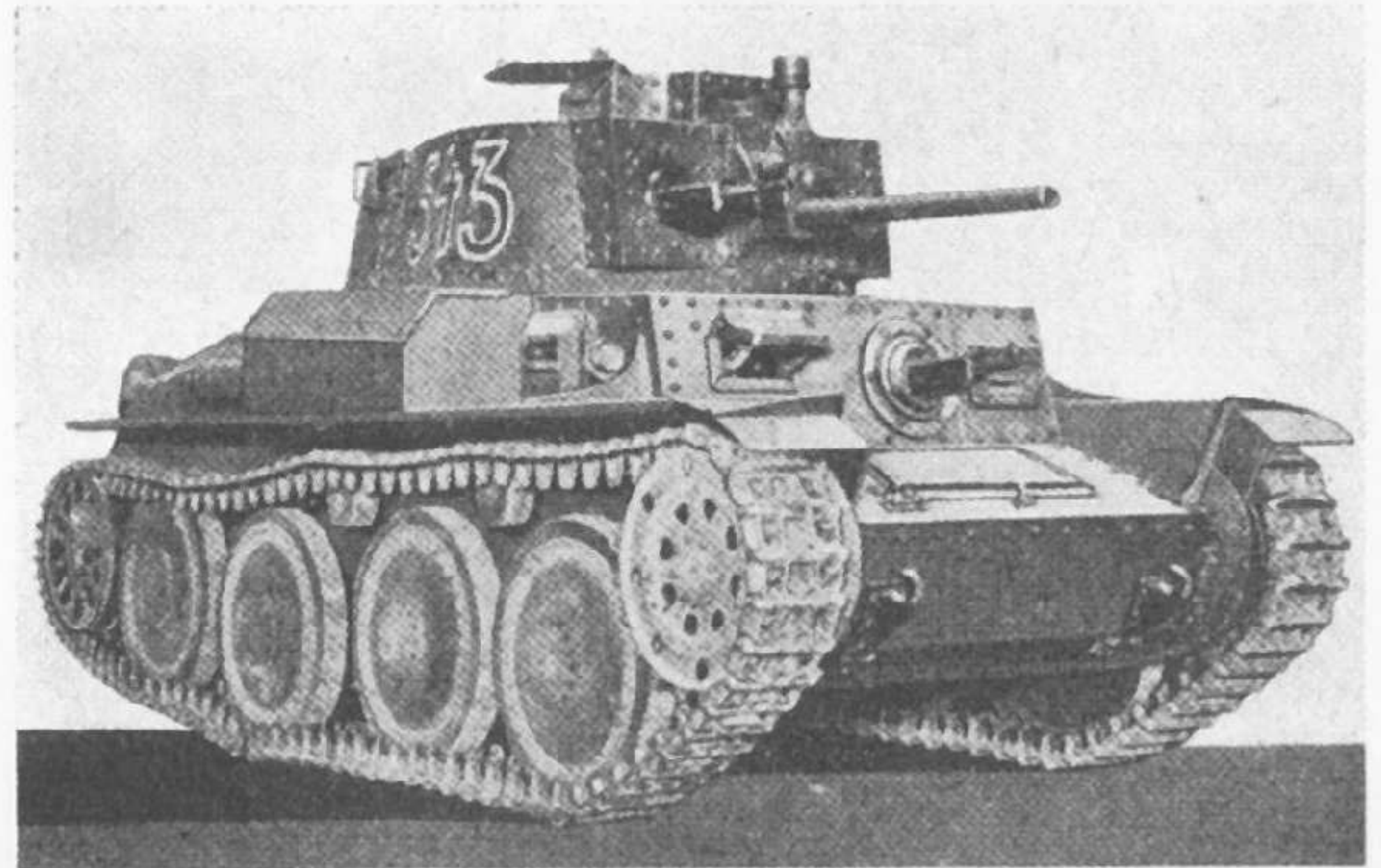


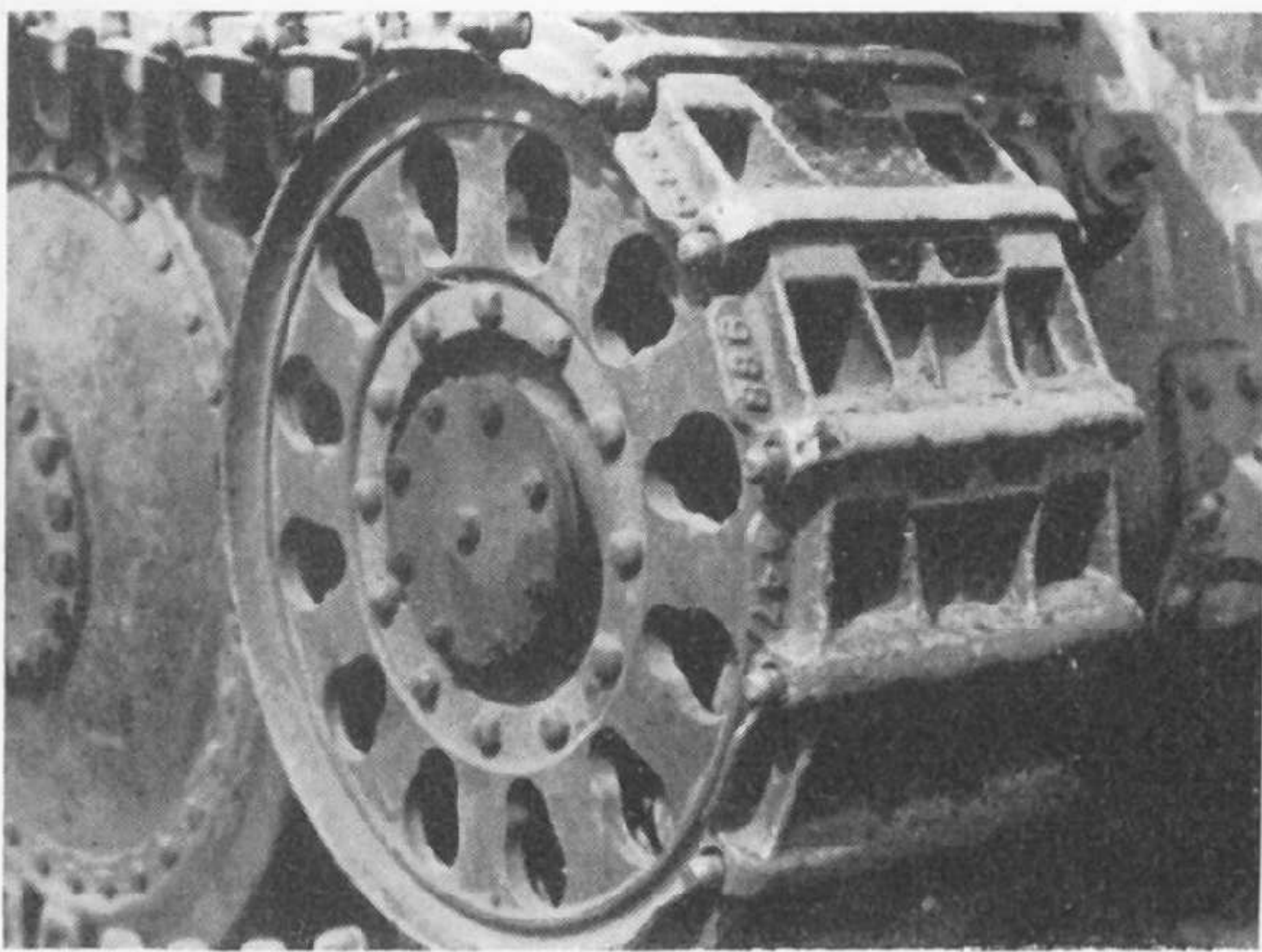


Above and below: Fifth production model TNHP (Model E) with new stowage arrangements (note the long stowage boxes placed along the sides) and internal modifications. (Milsom Collection)

GERMAN INFLUENCE ON DEVELOPMENT

Following the German occupation of Czechoslovakia, from March 15, 1939, all tanks in service with the Czech Army—as well as those in production under export contracts—were taken over by the Wehrmacht. The Germans designated the TNHP the PzKpfw 38(t) (3.7 cm.) and continued its production until early 1942, when Czech tank production was suspended. Production of the vehicle under German guidance was also carried out by the Skoda firm. In 1940 the CKD firm became redesignated BMM (Böhmisch Mährische Maschinenfabrik AG.) The Germans initially requested a monthly production figure of 40 vehicles, although this fluctuated greatly according to the availability of





Close-up of the rear idler and track on the Model E.
(Chamberlain Collection)



Rear view of the Model E; compare the exhaust pipe arrangement with the Model F.
(Chamberlain Collection)



Rear view of the sixth production model TNHP (Model F).
Note the straight exhaust pipe and modified stowage boxes.
(Chamberlain Collection)

Below: Model C in German service.



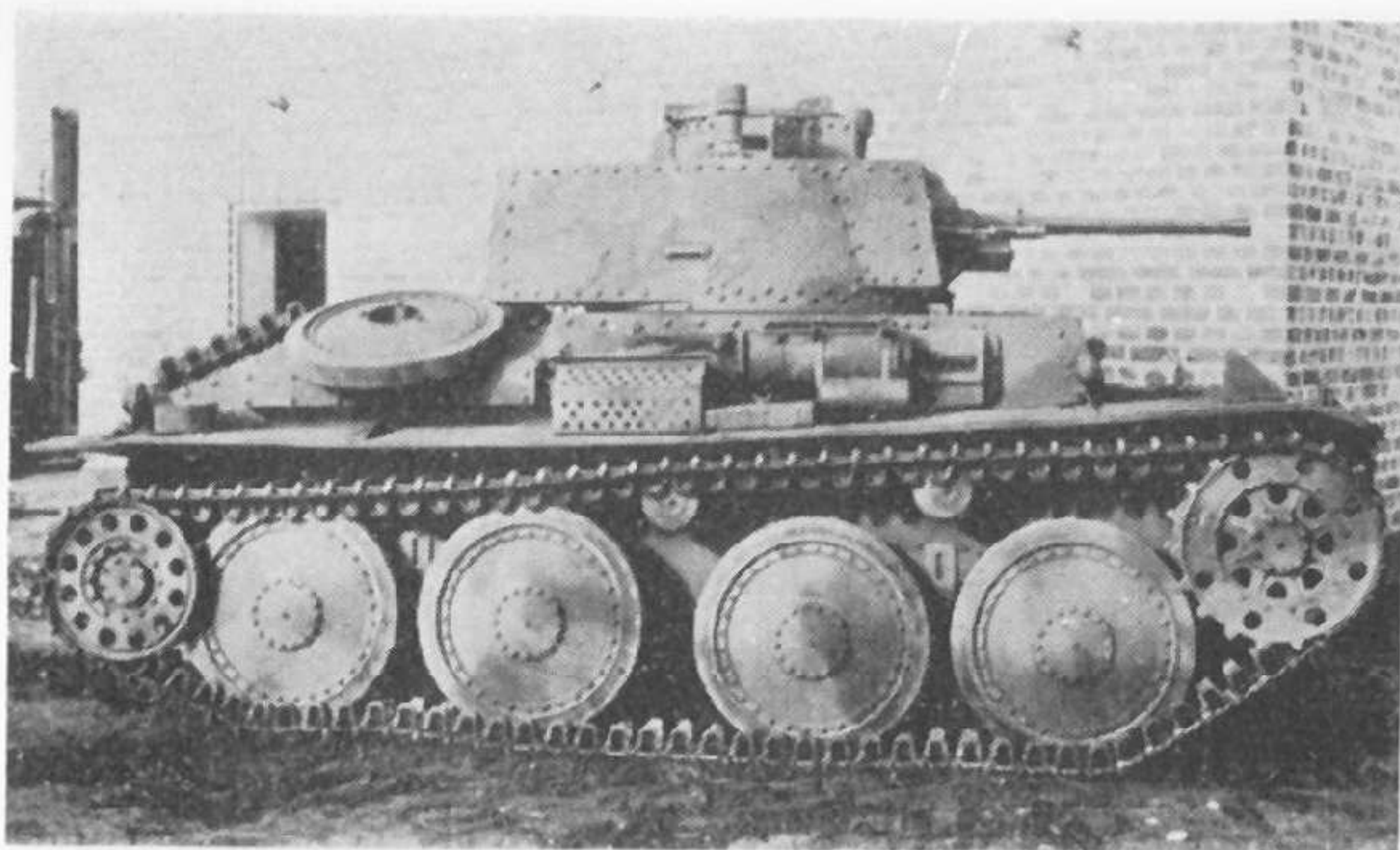
materials and man-power. A total of 1,168 tanks of this type were built for the Wehrmacht: 275 in 1940, 698 in 1941 and 195 in 1942. In 1940 228 were in service with the 7th and 8th Panzer Divisions. By July 1, 1941 there were 763, but this figure dropped to 522 by April 1, 1942.

The original gun-tank saw service with the Wehrmacht in Poland, France, Yugoslavia, Greece and Russia. Among others, the PzKpfw 38(t) formed a major part of the tank strength of Rommel's 7th Panzer Division during its rapid drive across Northern France in the 1940 campaign. During 1940-41 the PzKpfw 38(t) formed 25% of the total German tank force. As late as 1944 the vehicle was still being used as an artillery observation vehicle.

Shortly after gaining control of the Czech facilities, the Germans ordered the manufacturers to increase the frontal armour to 50 mm. and that on the sides to 30 mm. As the result, the turret front had a basic thickness of 25 mm. with an additional 25 mm. plate. The front vertical hull plate was similarly armoured; the side superstructure armour was 30 mm. thick. (In some vehicles the Germans substituted the 37 mm. KwK L/45 for the original Czech gun). The tank's weight correspondingly increased to 11 tons. This new model became the TNHP-S (S meaning "Schwer", or heavy). The Germans had 9 models of this tank in service (Models A to H and S). The chassis numbers of the models were as follows:—

Model	Chassis No.	No. Produced
A	0001-0150	150
B	0151-0260	110
C	0261-0370	110
D	0371-0475	105
E	0476-0750	275
F	0751-1000	250
S	1001-1090	90
G	1101-1600	500
H	1601 (onwards)	

All models up to chassis No. 1600 (Model G) were powered by a 125 h.p. (at 2,200 r.p.m.) 6-cylinder engine (single carburettor) EPA Models I-III. The model H was powered by a 150 h.p. (at 2,600 r.p.m.) 6-



The seventh production model TNHP (Model S), originally built for Sweden. Note the cylindrical device (function unknown) on the RHS behind the driver's episcopes. Photos are of the Swedish vehicle (Strv m/41).

(1 Milsom Collection. 2 Chamberlain Collection)

cylinder engine (double carburettor) Model epa/AC Model IV. The final engine model, the AC/1800, which was mounted in the Hetzer, was 160 h.p.

During 1940/41 90 PzKpfw 38(t)s which had been built for Sweden were impounded by the Wehrmacht and were designated the Model S by German armoured units. With additional radio equipment a commander's model was adopted, designated the Panzerbefehlswagen 38(t).

THE T-15 AND T-25 TANKS

When Skoda was instructed to participate in the PzKpfw 38(t) programme, the OKH requested them to undertake the design and development of two new tanks utilising its basic automotive components. In 1942/43 the Heereswaffenamt (Wa.Prüf.6) laid down specifications for a 10.5 ton light reconnaissance tank (T-15) and a 22-ton medium tank (T-25). Both

vehicles were to employ lengthened, widened and automotively modified chassis of the TNHP-S tank. Their maximum speeds were to be up to 38 m.p.h.—facilitated through the development of a new Skoda steering system.

The T-15 was a fast, fully-tracked reconnaissance tank with a 220 h.p. air-cooled diesel engine. It had a rear drive sprocket and a mechanical-shift transmission. The mock-up mounted a simulated 37 mm. gun in a turret very similar to that of the PzKpfw 38(t), although intentions were made clear to mount a 50 mm. tank gun. The armour was to be 50 mm. on the front, 20 mm. on the sides and 15 mm. on the rear. Modification to the hull design resulted in the mounting of the glacis plate at an angle of considerably more inclination. In both the T-15 and T-25 tanks the protection was increased through appropriate shaping of the

The eighth production model TNHP (Model G). Very similar to the Model F in appearance but note the smaller stowage boxes on the track guards. (Chamberlain Collection)





Above and right: *The final production model of the TNHP (Model H). This vehicle has the increased armour thickness and other minor alterations.* (Milsom Collection)

armour walls (believed to have been inspired by the Soviet T-34 design). This was normally accomplished by inclining the plates towards the direction of fire. Skoda laid much stress on the proper covering of the cooling air inlets and outlets. In both vehicles Skoda utilised welded armour. The T-25 existed only in the blue-print form and the construction of a prototype was never authorised. The main armament was to be a 75 mm. tank gun having a muzzle-velocity of 2,920 ft./second. This gun had automatic ammunition feed from a revolving drum magazine located beneath the floor plate. It was semi-automatic operation. Smoke was to be removed from the barrel by compressed-air. Removal of empty cartridge cases was to be achieved



via openings in the floor plate. The turret was to be traversed hydro-electrically.

A project was under consideration to arm the T-25 with the le.F.H.43 (sfl) Skoda 10.5 cm. L/30 gun with coaxial machine-gun. This vehicle, which was designated the Heuschrecke (Grasshopper) 10 was only completed in mock-up form. The gun was to be mounted in a fully rotating turret and to be removable for field use. This vehicle was estimated to weigh 24 tons and carry 60 rounds of ammunition for the main armament. The armour was to be 30 mm. on the front, 20 mm. on the sides and 10 mm. on the rear. That on the turret was to range from 10 to 30 mm. The crew was to consist of 5 men.

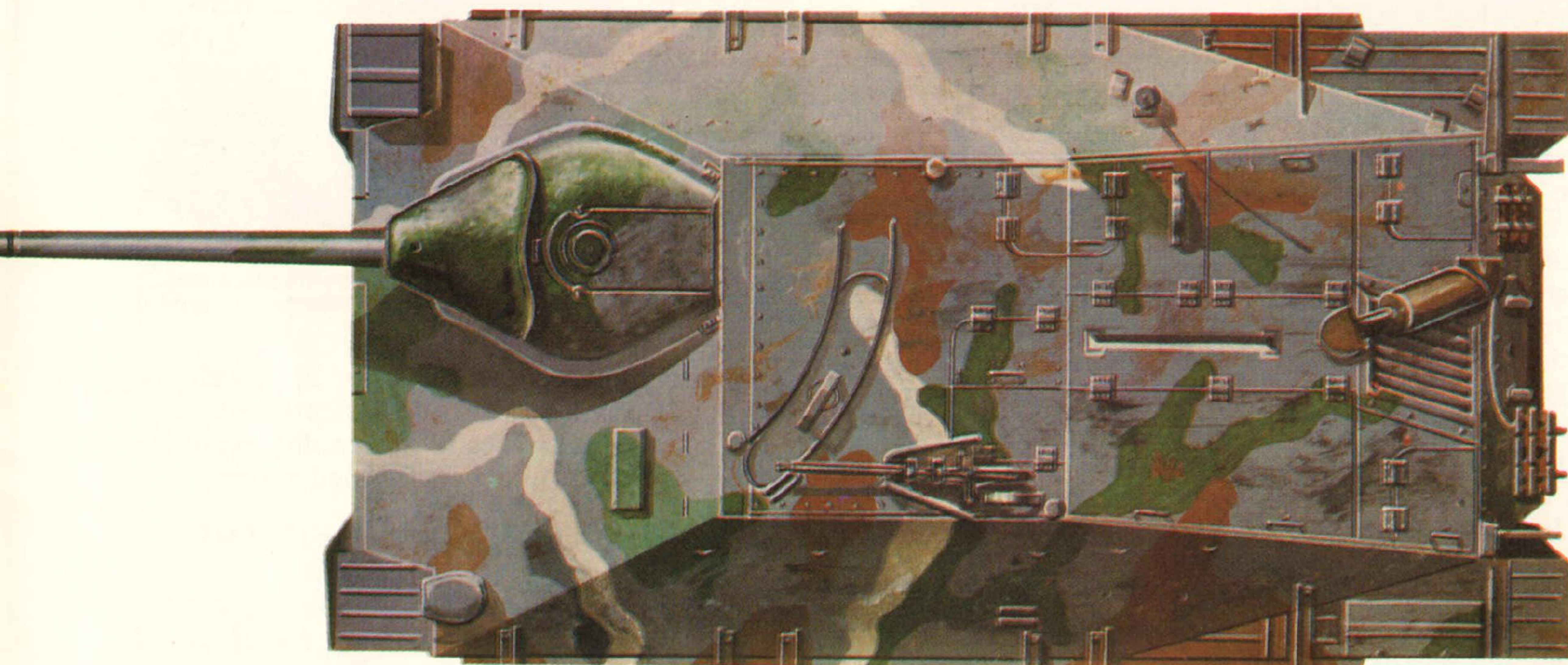
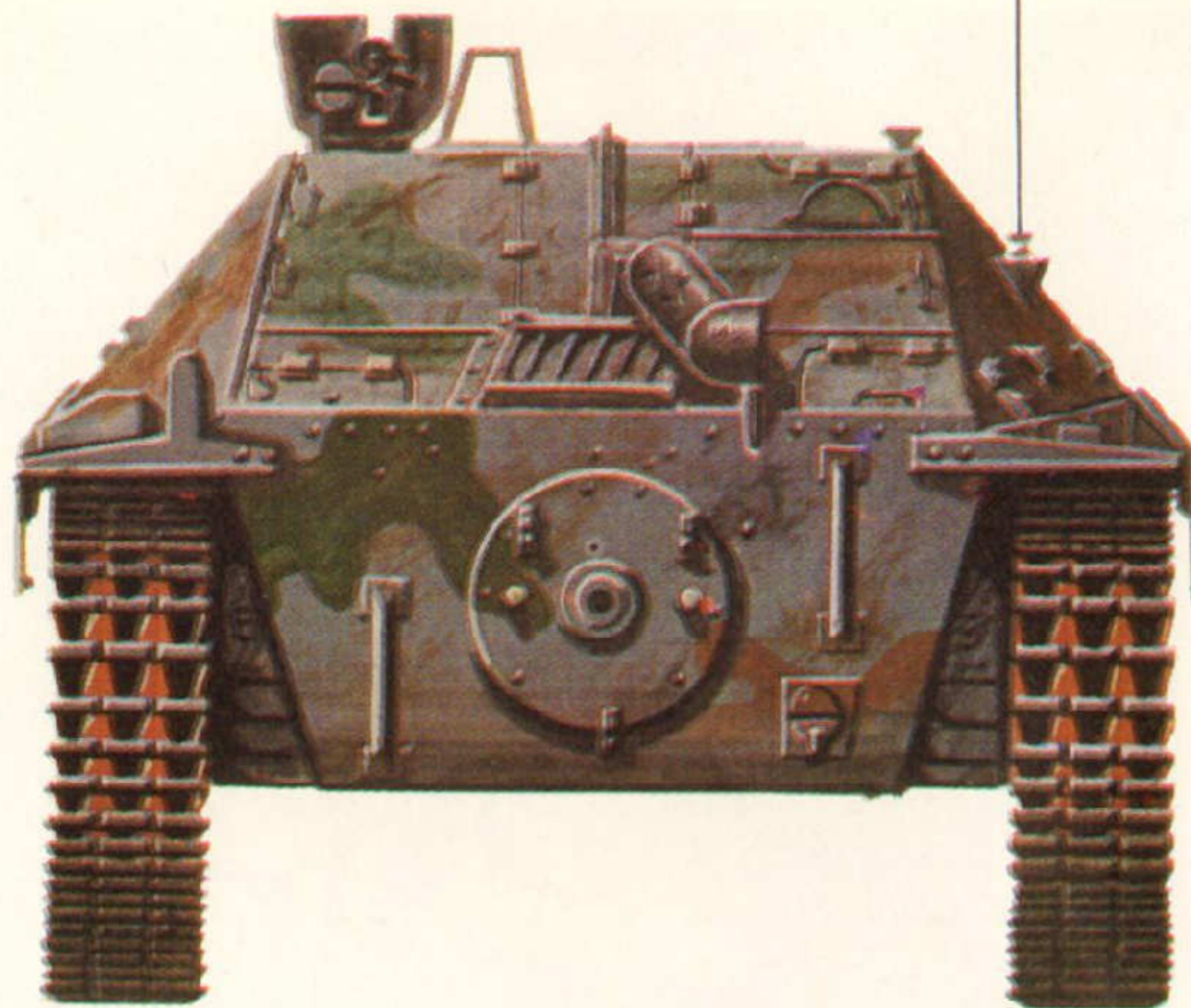
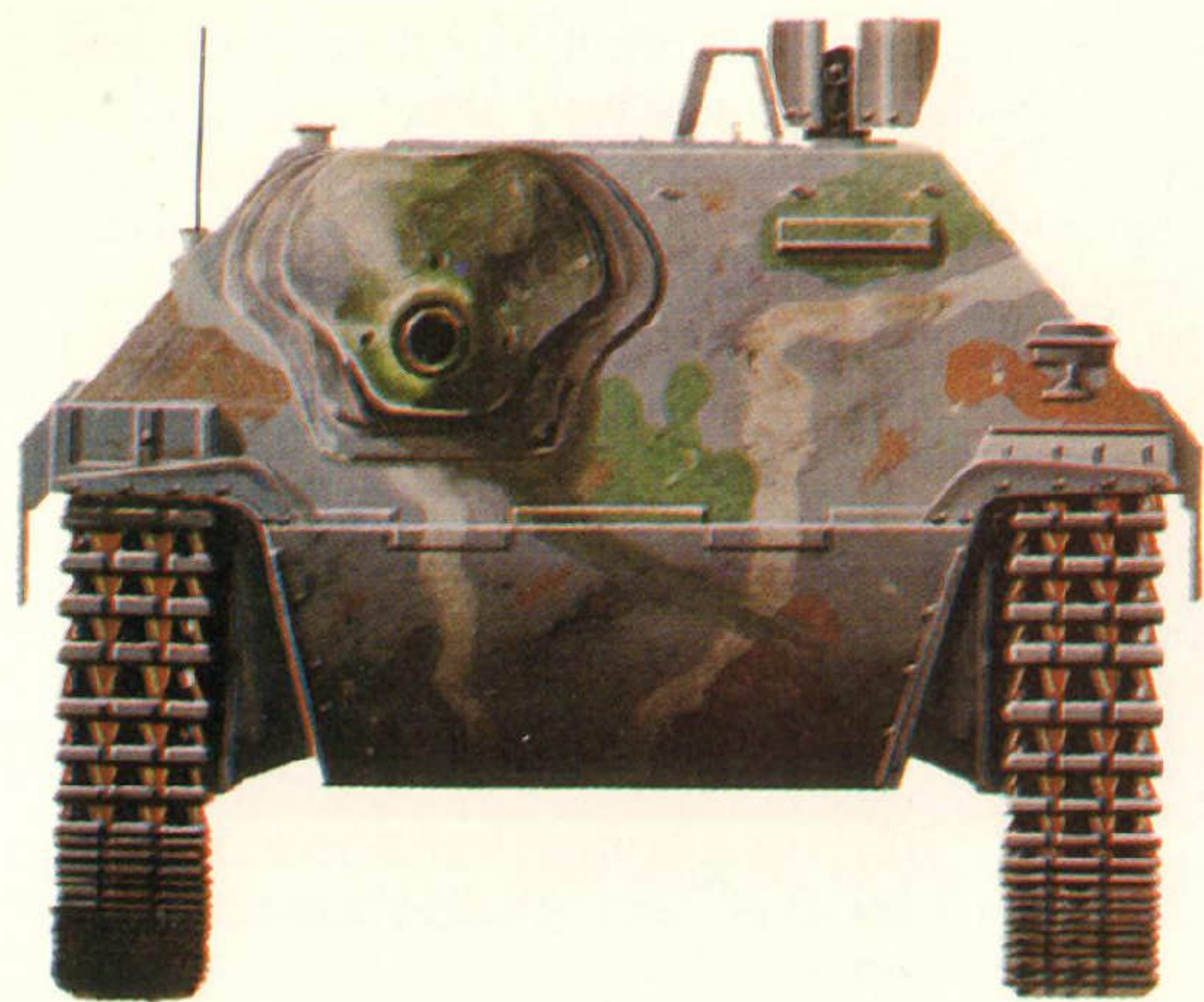
THE PANZER JÄGER 38(D) (PzJg 38(d).) SERIES

This series—which was to enter service with the Wehrmacht after 1945 as a short-term stop-gap prior to the introduction of the E-10 light tank—was intended to provide the light standard chassis for a whole new armoured vehicle family. The original drawings were dated February 1945. With a few modifications it was to be used as an air-defence weapon (with two 7.62 mm. MGs and two 2 cm. cannons in a closed revolving turret, similar to that of the Kugelblitz), a reconnaissance tank, a full-tracked

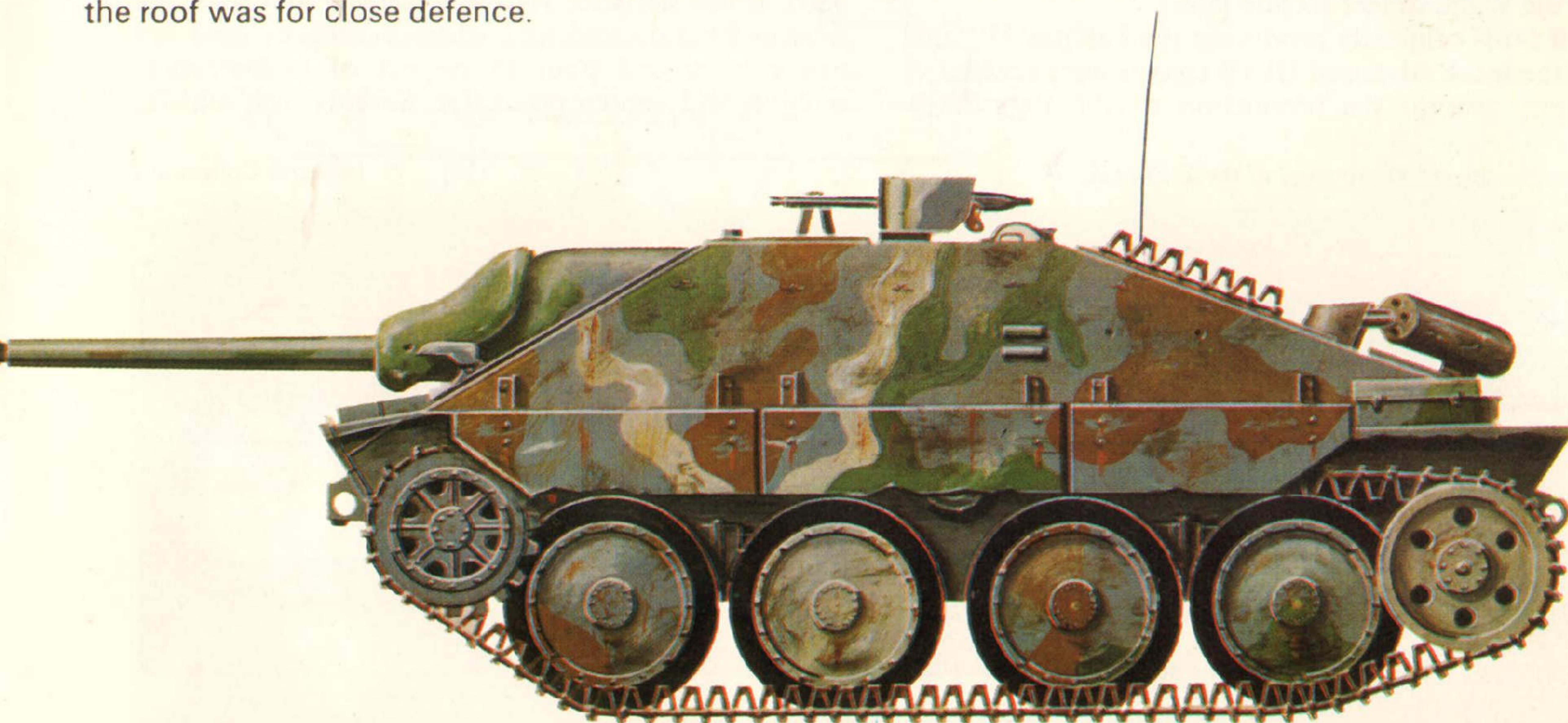


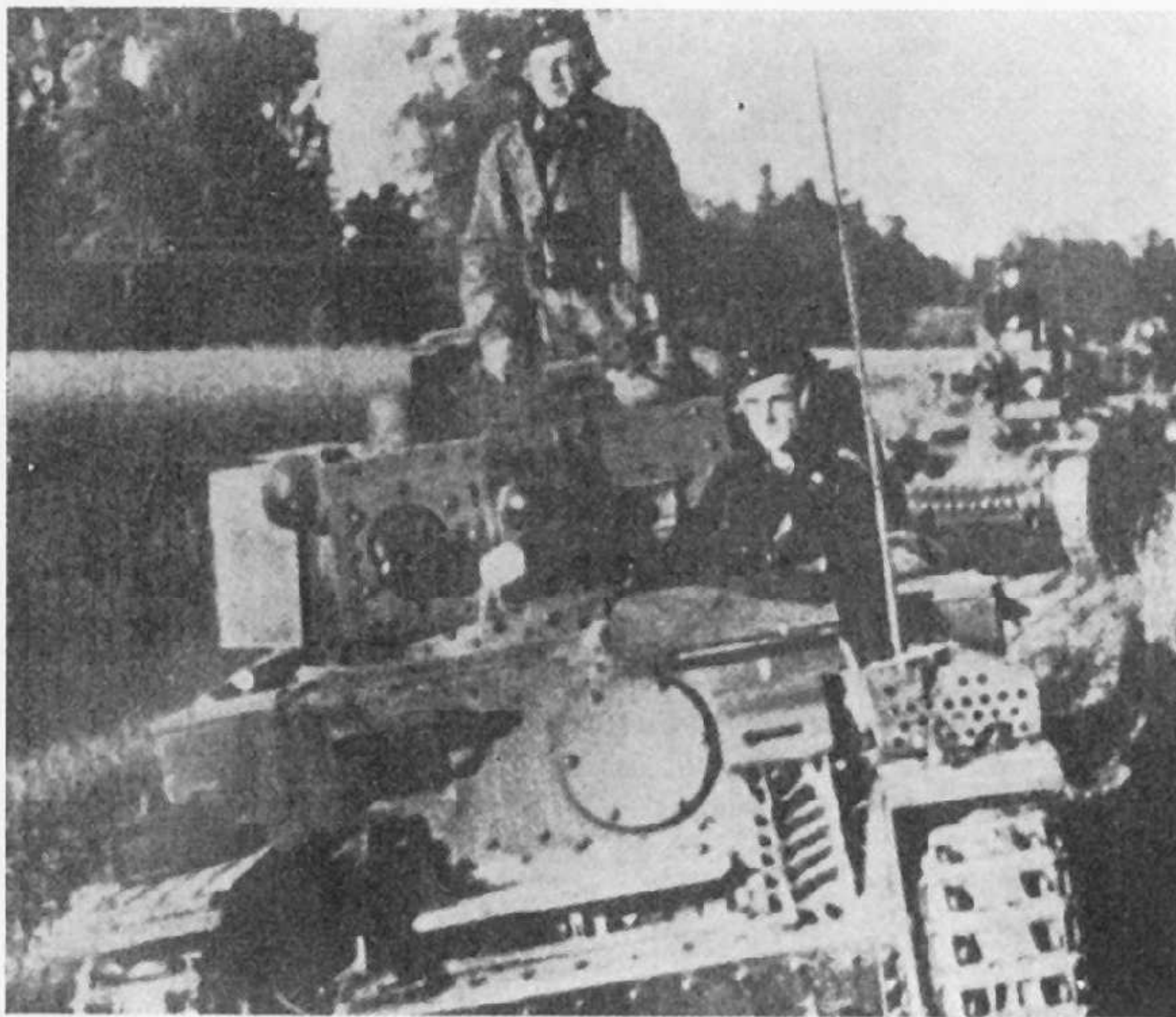
Three pictures show various views of PzKpfw 38(t) commanders' tanks. (Panzerbefehlswagen 38(t)). (Chamberlain Collection)





Jagdpanzer 38(t) Hetzer was developed during 1943 on the widened chassis of the TNHP-S. Compact, simple and reliable, "Hetzers" were used on the Russian front and then in the West, especially during the Ardennes offensive. Post-1945 Hetzers served with the Czechoslovak army and in the Swiss army. The Swiss designated them Pz Jg G13. Remotely controlled machine-gun on the roof was for close defence.



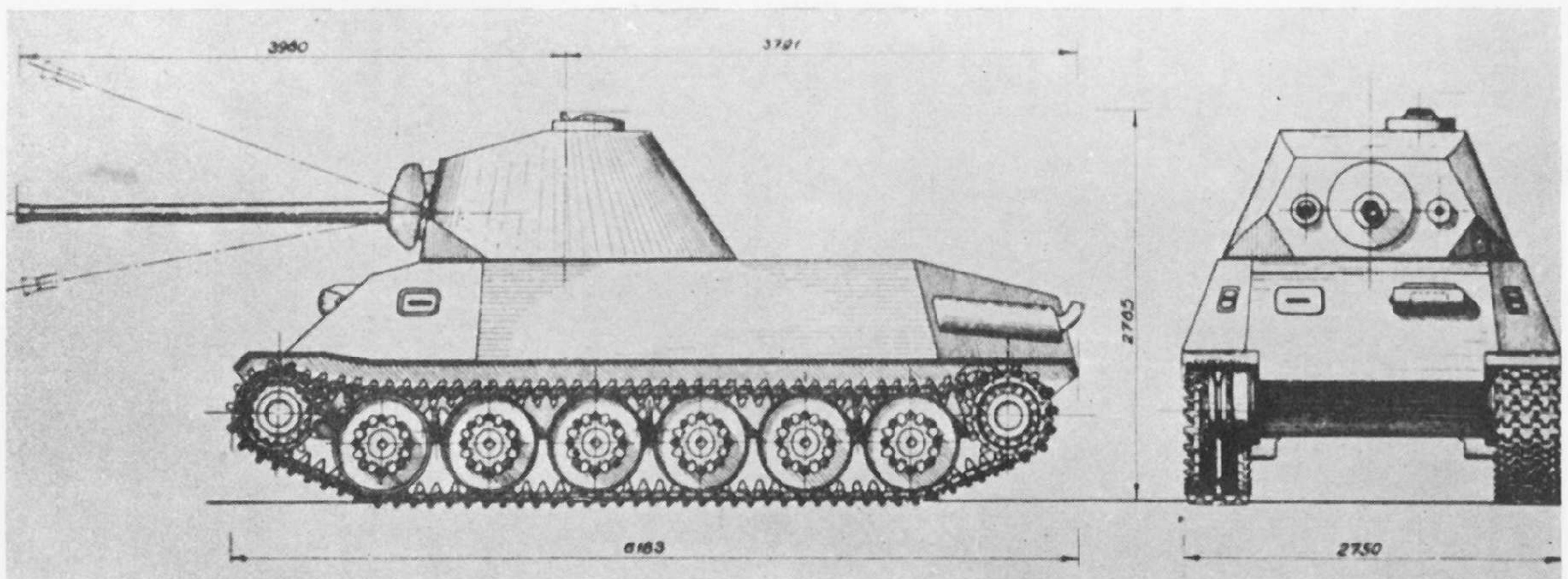


A unit modified PzKpfw 38(t) commander's model with the hull machine-gun removed and the aperture covered by armour plate. (Chamberlain Collection)

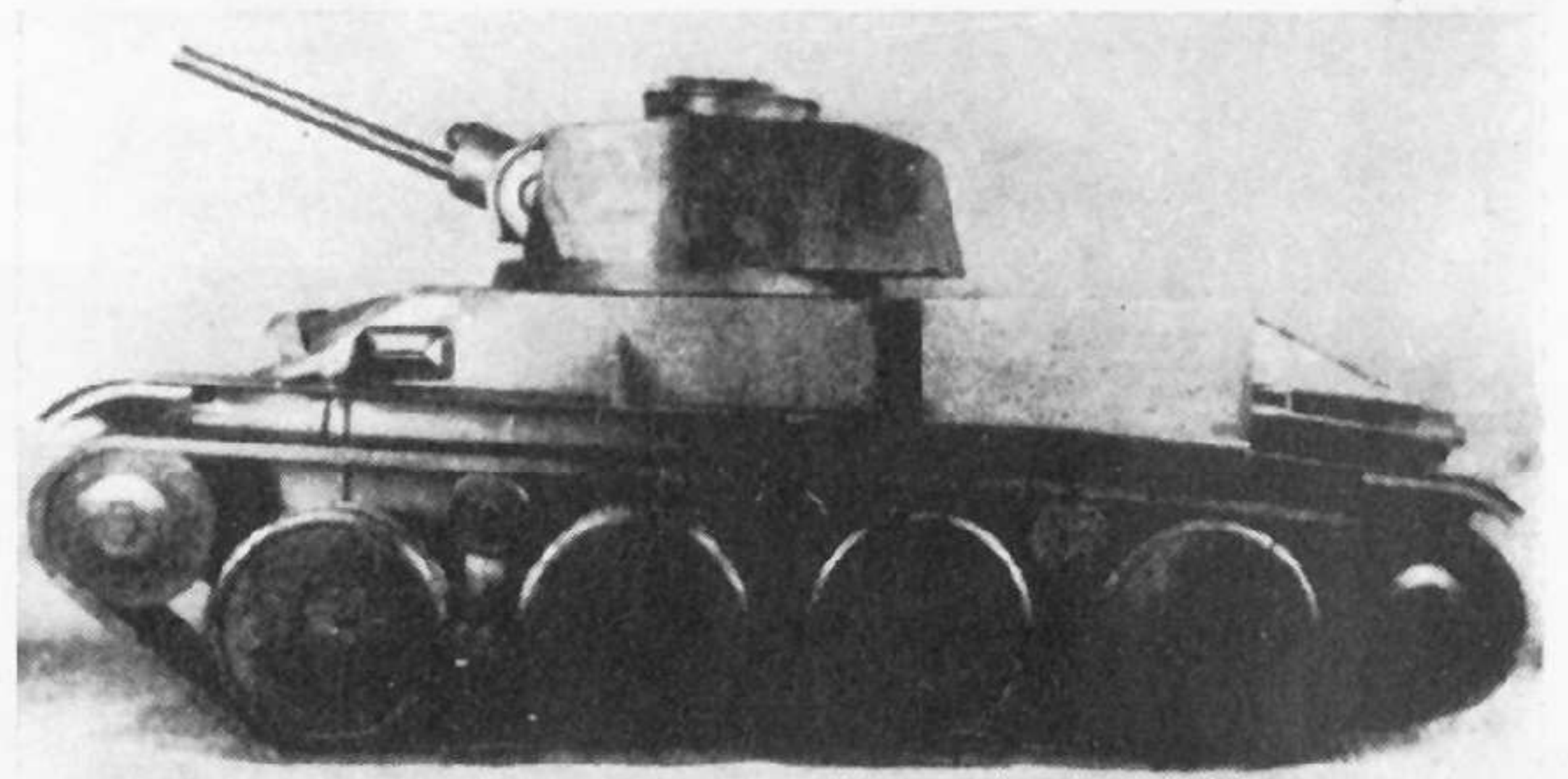
armoured personnel carrier and an armoured weapons carrier for the artillery arm. The basis chassis differed from that of the PzKpfw 38(t) mainly in the installation of an air-cooled Tatra III 12-cylinder diesel engine developing 210 h.p. at 1,800 r.p.m. and was to weigh 16 tons. Two hull configurations were to be built; Model W.1807 with the engine at the rear, and Model W.1806 with the engine mounted centrally. Both vehicles were to have armour ranging from 6-30 mm., and the smaller vehicle was to have 4 wheels per side, as against 6 on the larger model. One version was to have the 75 mm. KwK 42 or Pak L/70 in a rigid mounting, but the Germans considered replacing the 75 mm. gun by an 88 mm. in the tank-destroyer version. Development of the 75 mm. SP received top priority during 1944/45. It was to be a limited traverse mount and was to weigh about 14 tons. Some studies were carried out on the feasibility of providing all-round traverse and high-angle elevation. German engineers were also working on a 150 mm. recoilless gun, 105 mm. howitzer and a 128 mm. rifle mounting. (see the Waffenträger section later).

All firms originally producing the PzKpfw IV tank and the more advanced III/IV chassis were scheduled to turn over to the production of the PzJg 38(d)

General arrangement drawings of the T-25 tank.



A similar vehicle used by the Rumanians. (Chamberlain Collection)



Wooden model of the Skoda T-15 light reconnaissance tank. (Milsom Collection)

series. Production was planned to be 2,000 vehicles per month, including 300-350 Waffenträger, and reconnaissance vehicles. Due to the termination of the war, however, production was never undertaken.

GERMAN CONVERSIONS OF THE PzKpfw 38(t) CHASSIS

These fall into two main categories; firstly, normal supporting vehicles, and secondly, self-propelled weapons.

Aufklärungspanzer 38(t) Sd.Kfz.140/1

In October 1943 a new light reconnaissance tank was developed using the chassis and components of the 38(t). It was designed for the Russian Front since the normal semi-tracked and wheeled vehicles used for this rôle proved poor in respect of maintenance, mobility and armour protection. Seventy such vehicles

(Milsom Collection)

were built by BMM during 1943 and entered service during early 1944. The chassis and hull of the basic tank were practically unaltered, rather resembling those of the SP Flak 30 or 38 version, but the turret was removed and the turret ring altered to accept the turret of the Sd.Kfz.222 light armoured car with its organic 2 cm. KwK 38 and MG-34 armament.

Panzerkampfwagen 38(t) mit Nebel Ausrüstung

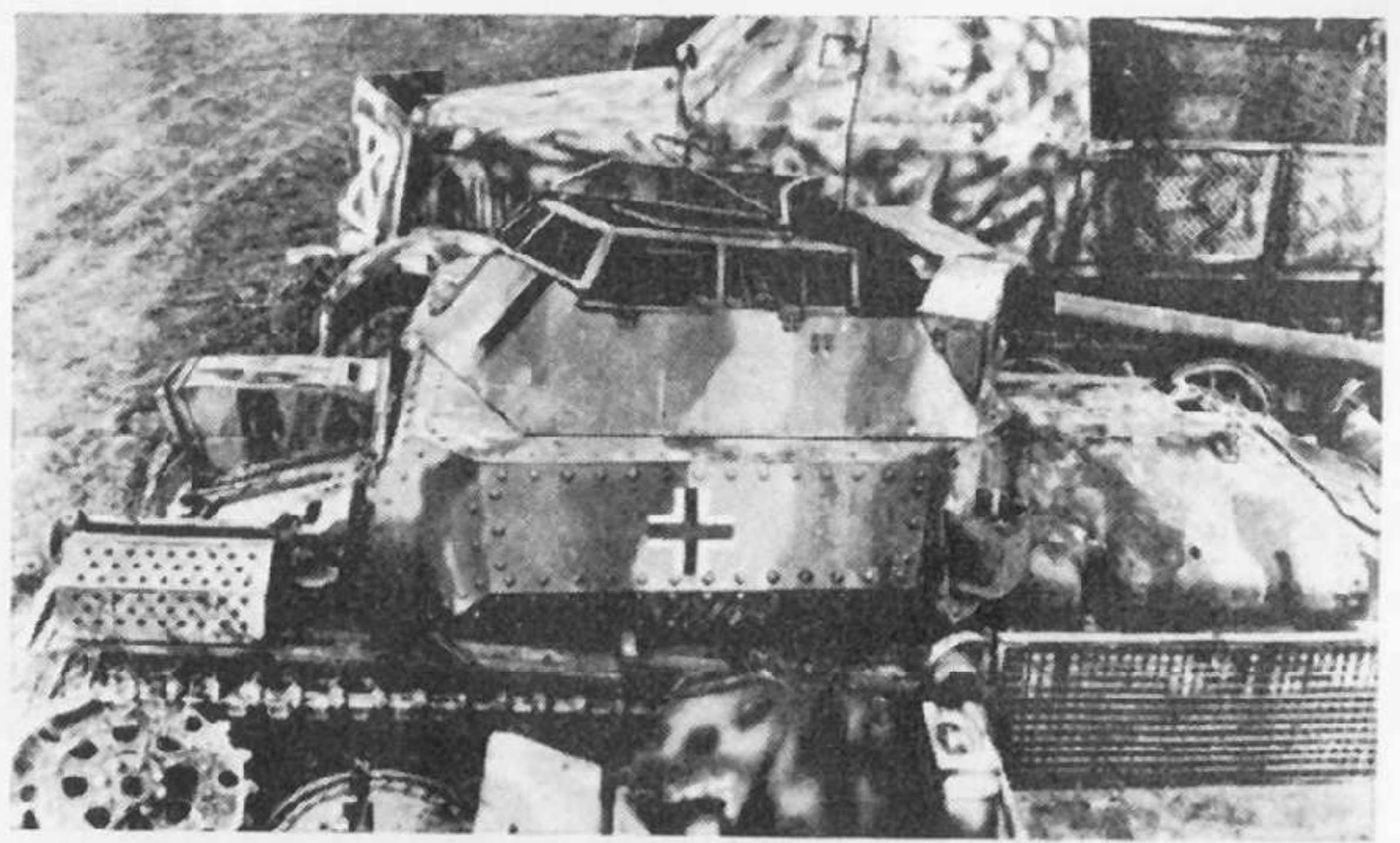
In 1943 a number of vehicles were converted as smoke dispenser vehicles. These had the turret removed and smoke dispensers built on behind the engine.

Schützenpanzerwagen auf 38(t)

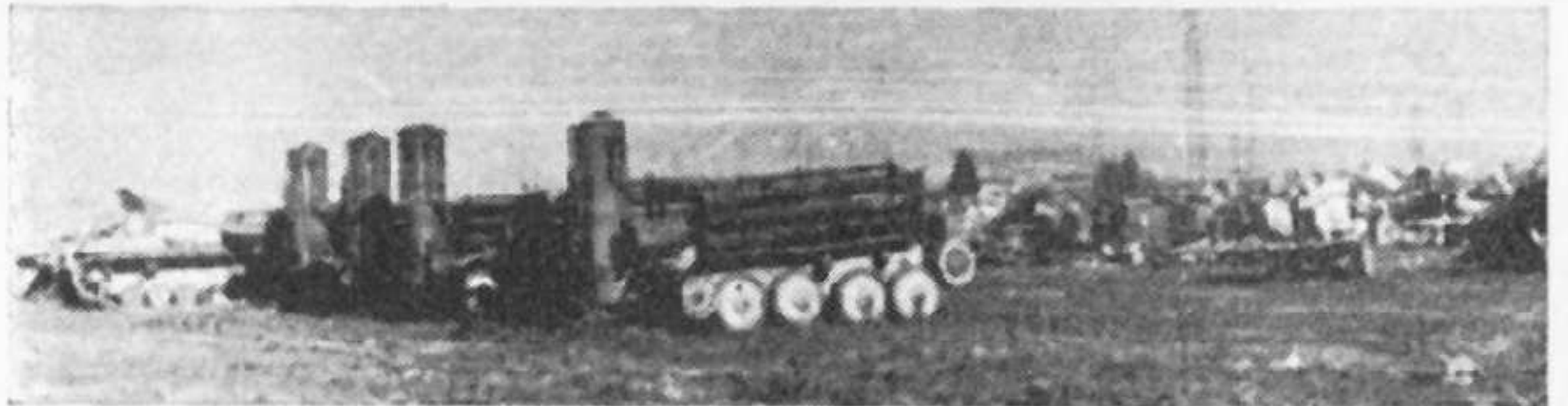
During late 1944/early 1945 plans were laid for a fully-tracked troop carrier based on an elongated PzKpfw 38(t) chassis. This vehicle was never completed.

Munitionspanzer 38(t) Sd.Kfz.138/1 (Munitionspanzer auf Geschützwagen 38(t))

Ammunition carrier converted from PzKpfw 38(t). 102 built during 1943 to accompany armoured



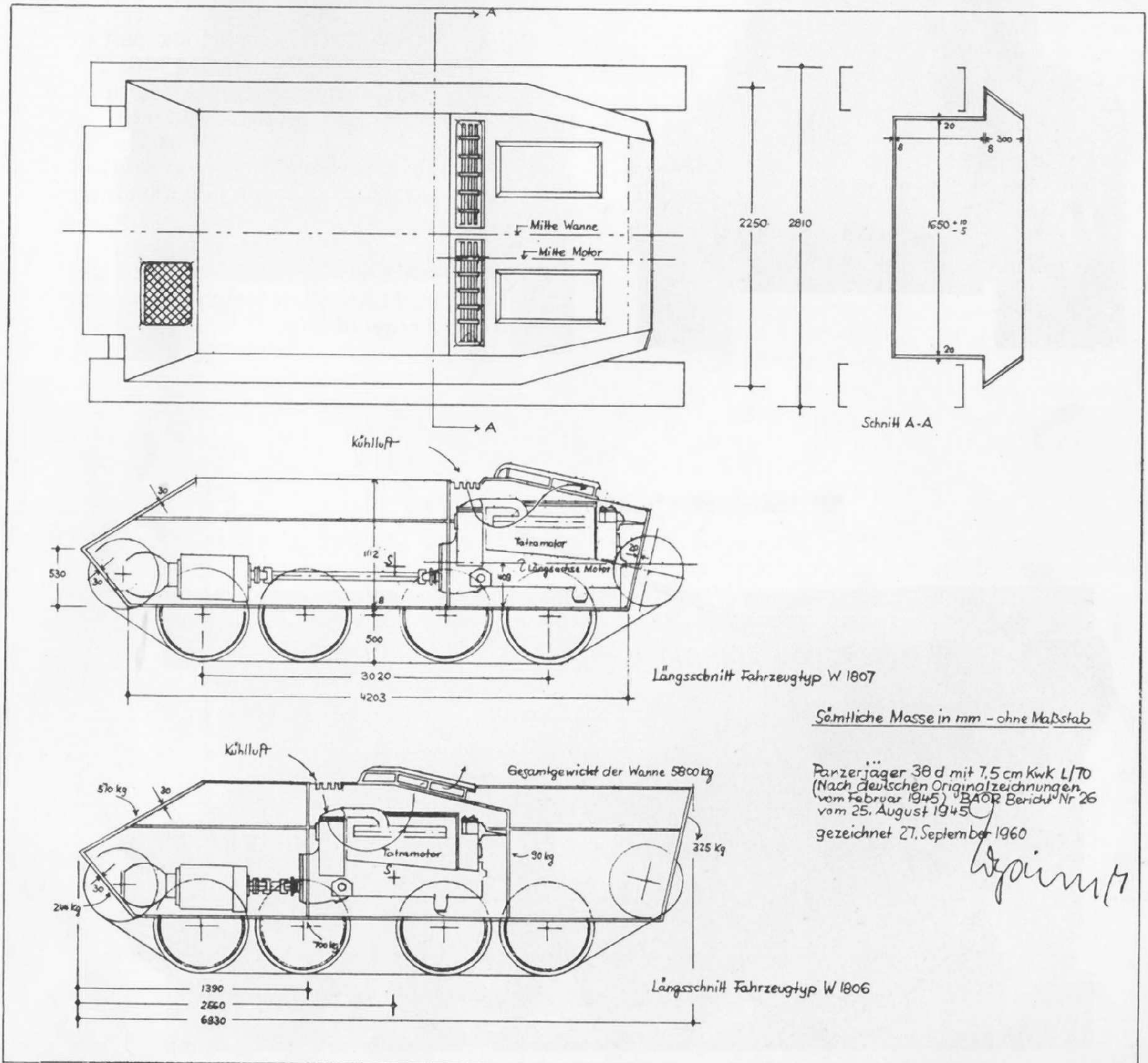
Aufklärungspanzer 38(t) Sd.Kfz.140/1. (Chamberlain Collection)

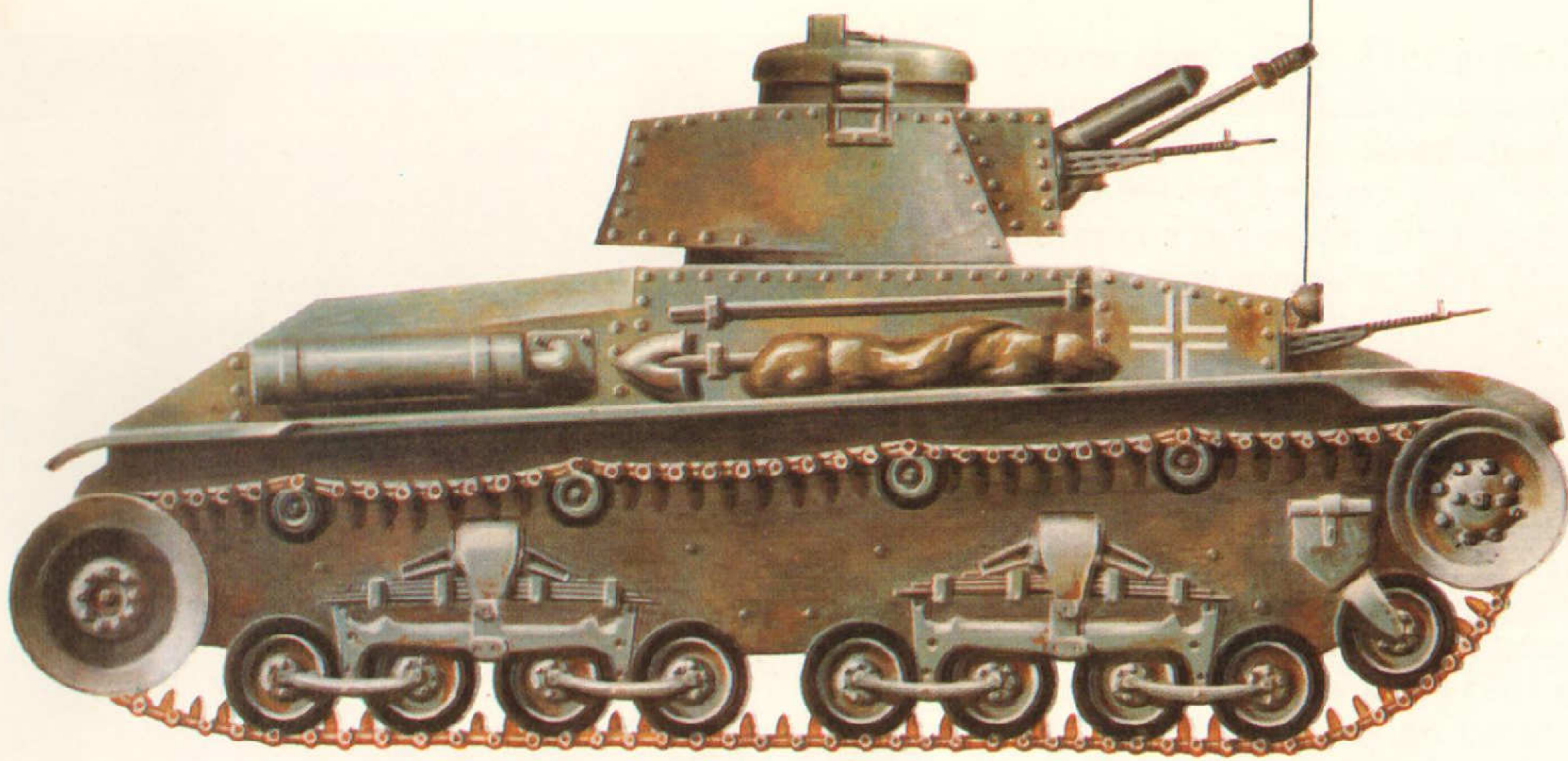


Panzerkampfwagen 38(t) mit Nebel Ausrüstung. (Chamberlain Collection)

General arrangement drawings of the two Panzerjäger 38(d) variants.

(Milsom Collection)

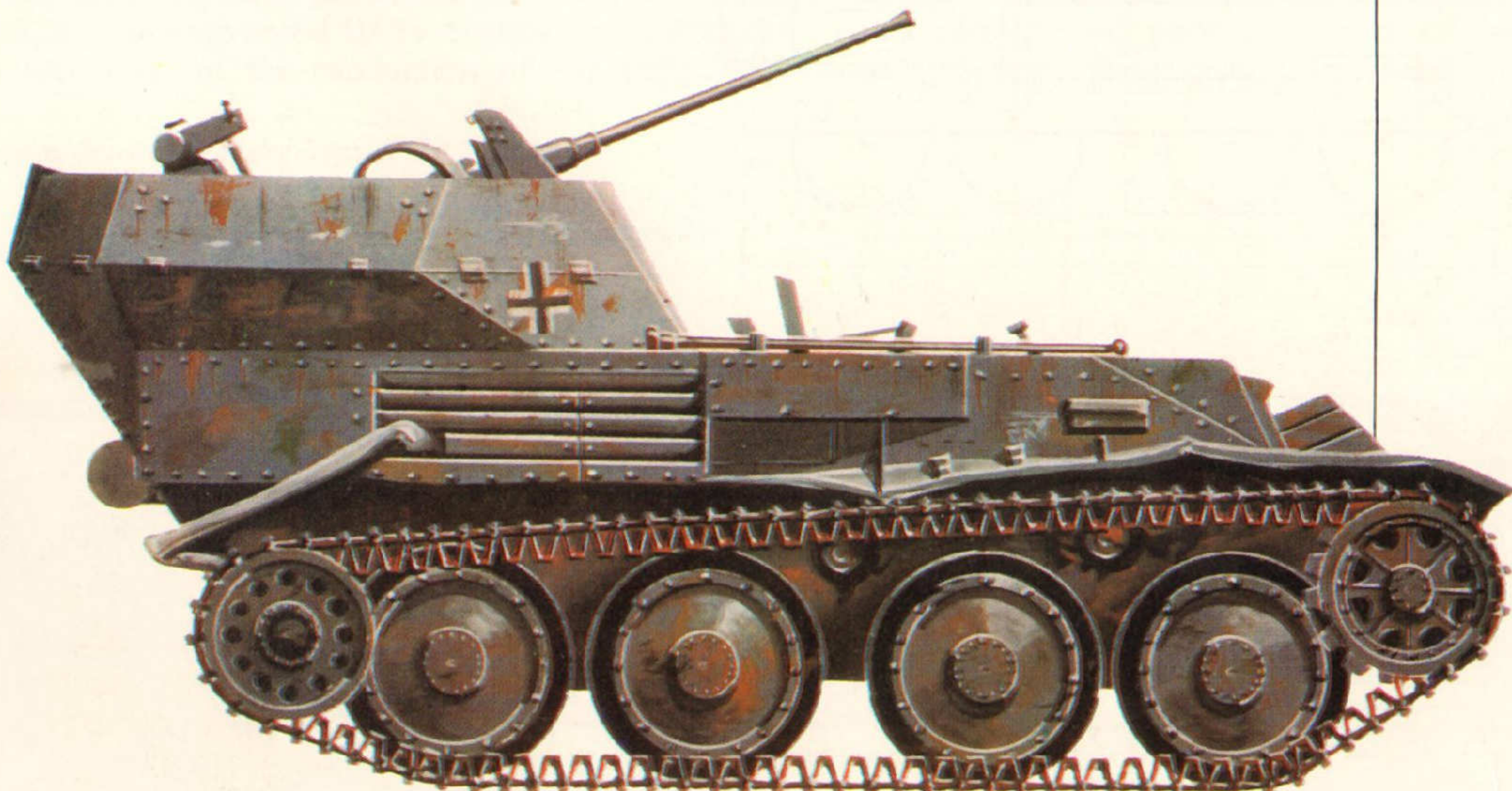


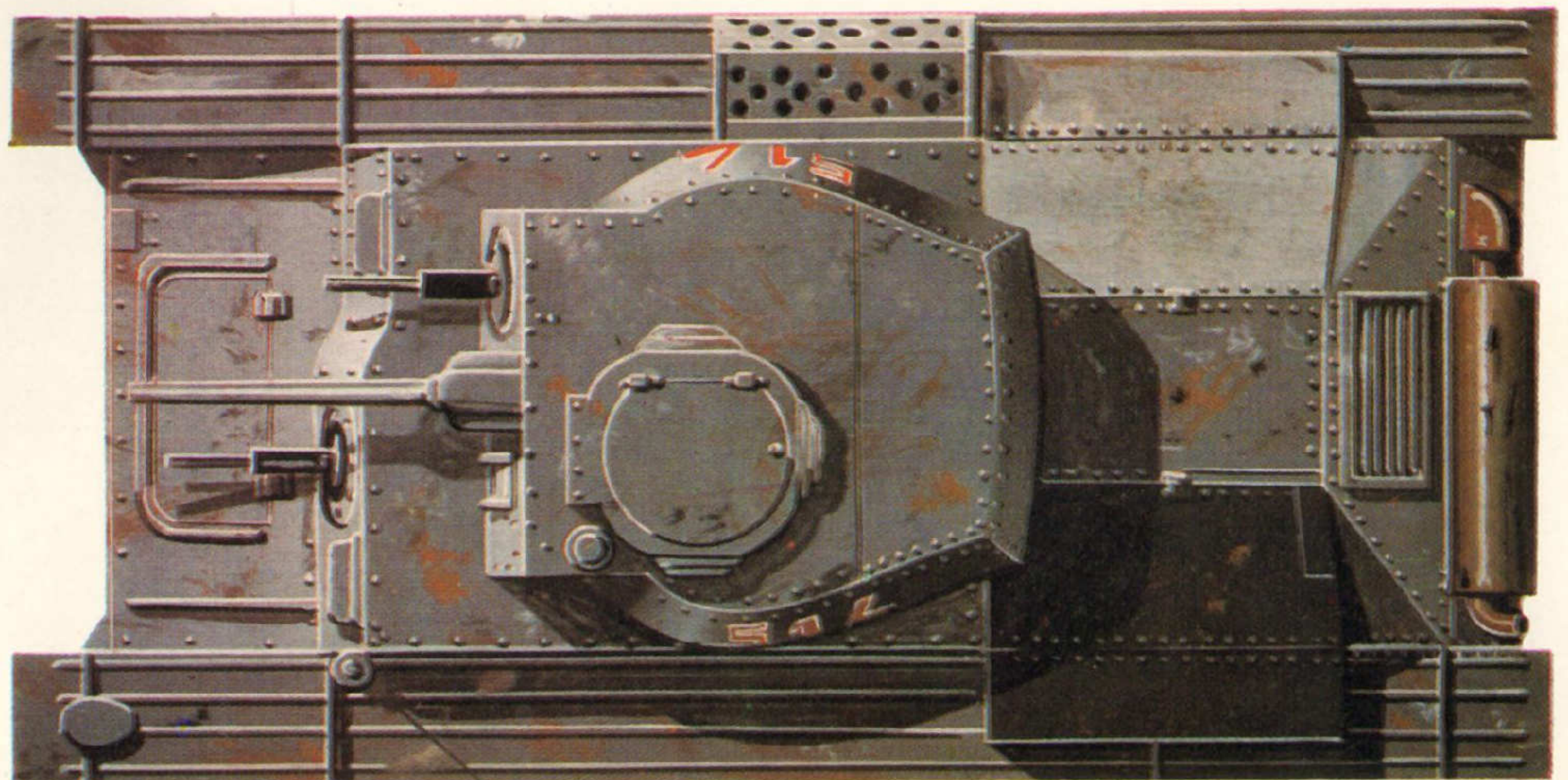
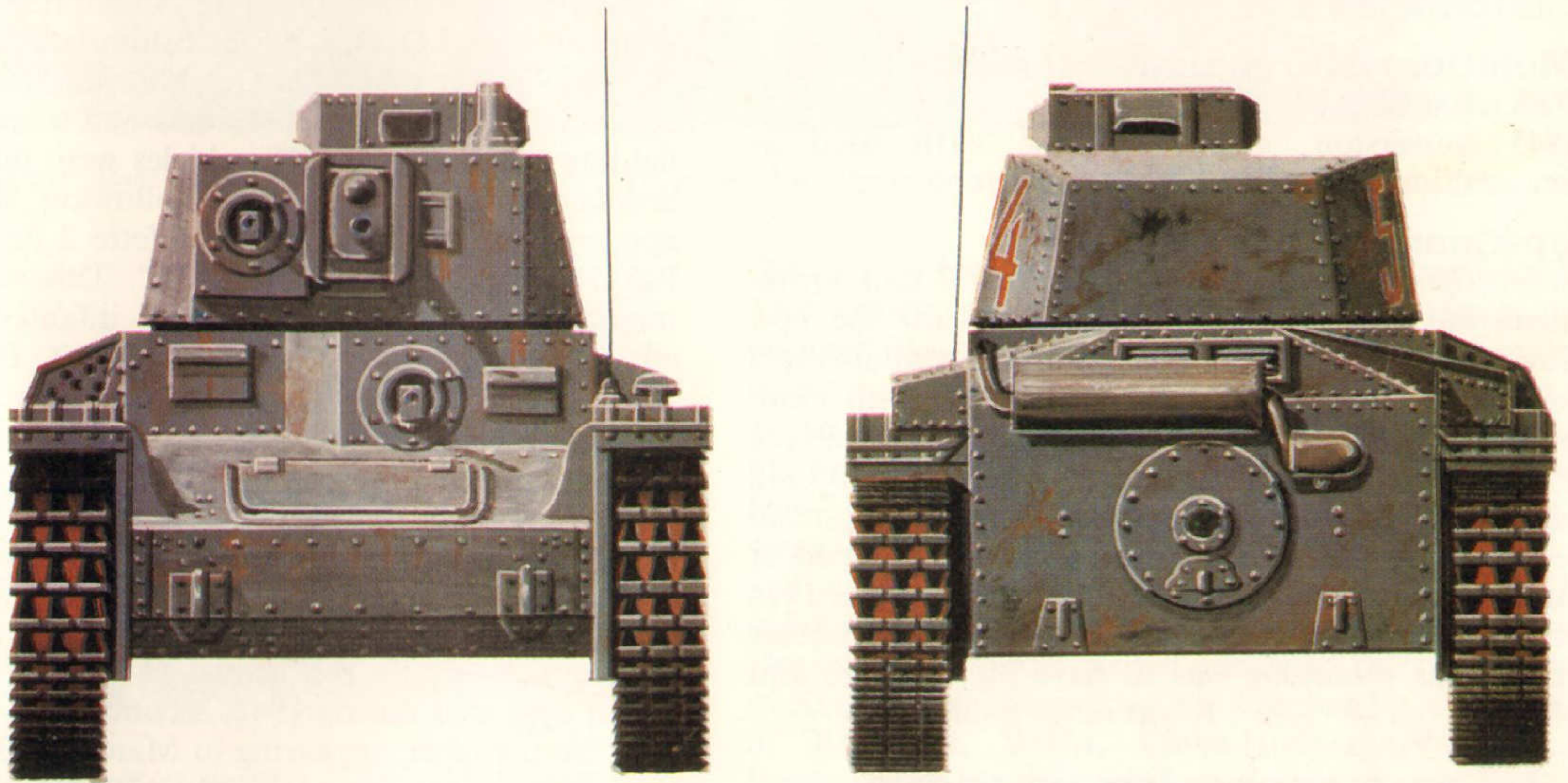
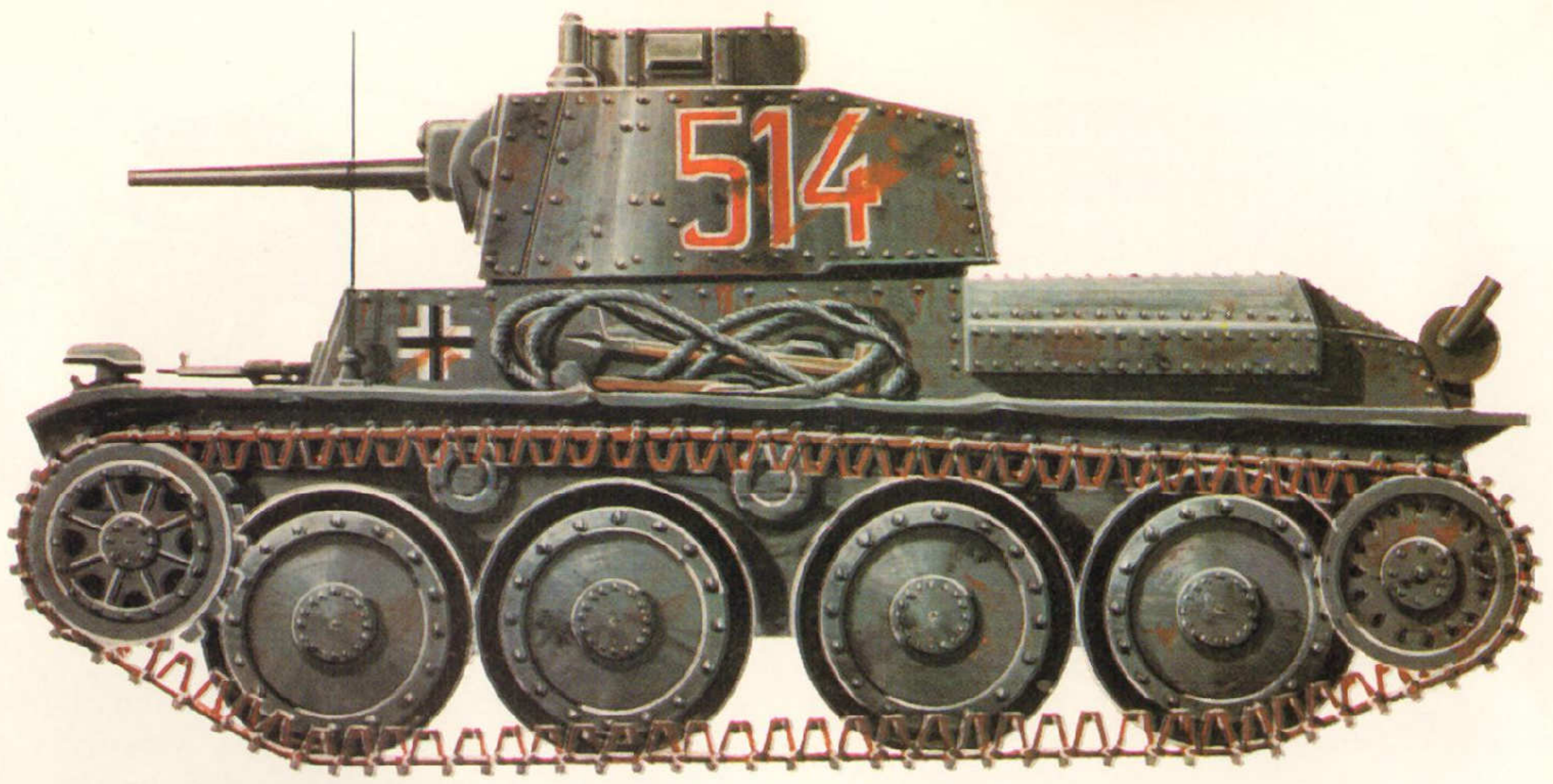


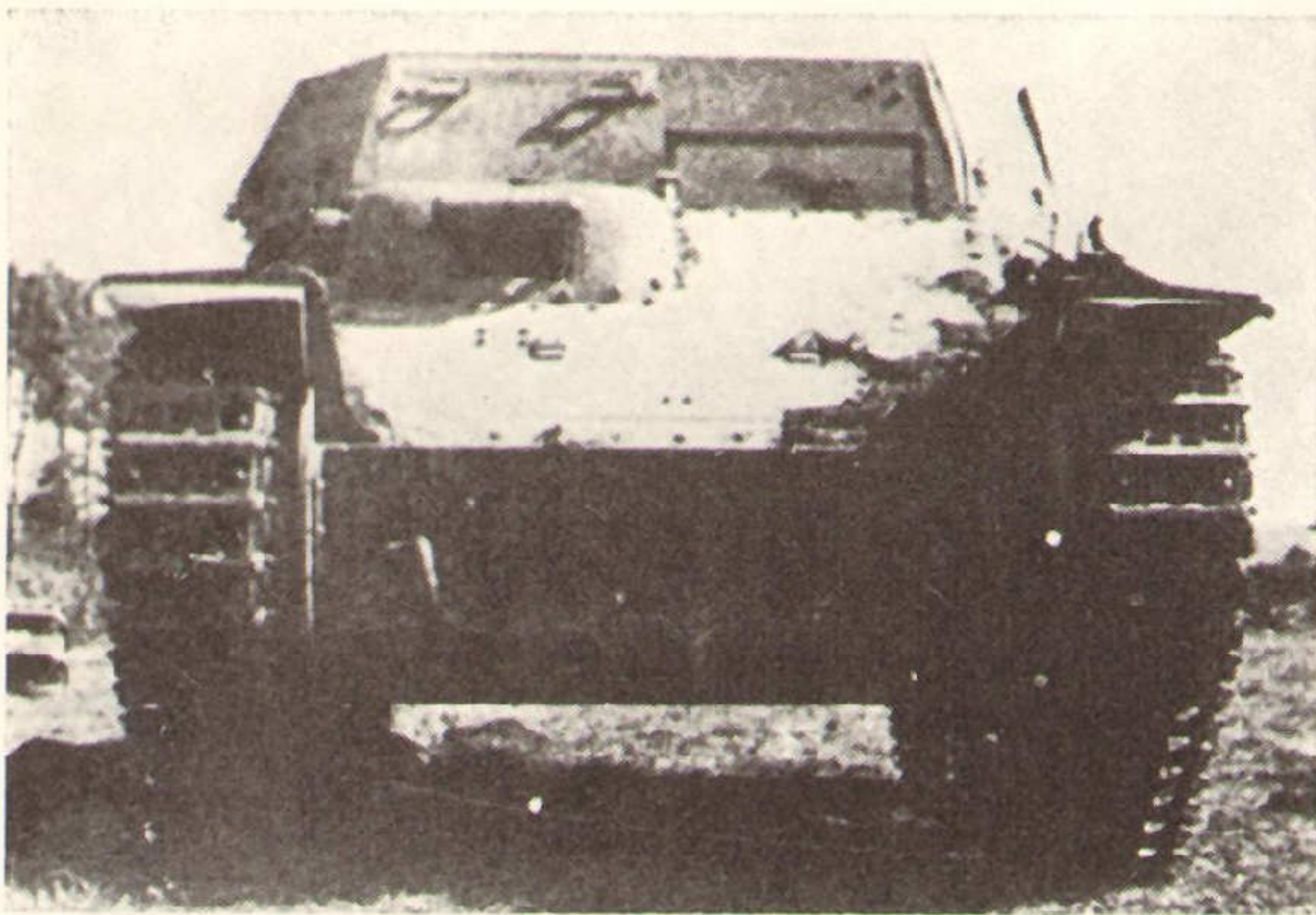
Right: PzKpfw 38(t) which took part in the invasion of France, May 1940. 7th and 8th Panzer Divisions were equipped with these former Czech TNHP tanks.

Left above and centre: PzKpfw 35(t)—Czech LTM-35—of 6th Panzer Division May 1940.

Below: Flakpanzer 38(t) (2 cm.) equipped with 2-cm. FLAK 38. It weighed 9.8 tons and had a crew of four.







Munitionspanzer 38(t) Sd.Kfz.138/1 (Munitionspanzer auf Geschützwagen 38 (t)). (Milsom Collection)

artillery units on the Russian Front. Each vehicle could carry 40 rounds.

Munitionsfahrzeug auf Fahrgestell PzKpfw 38(t)

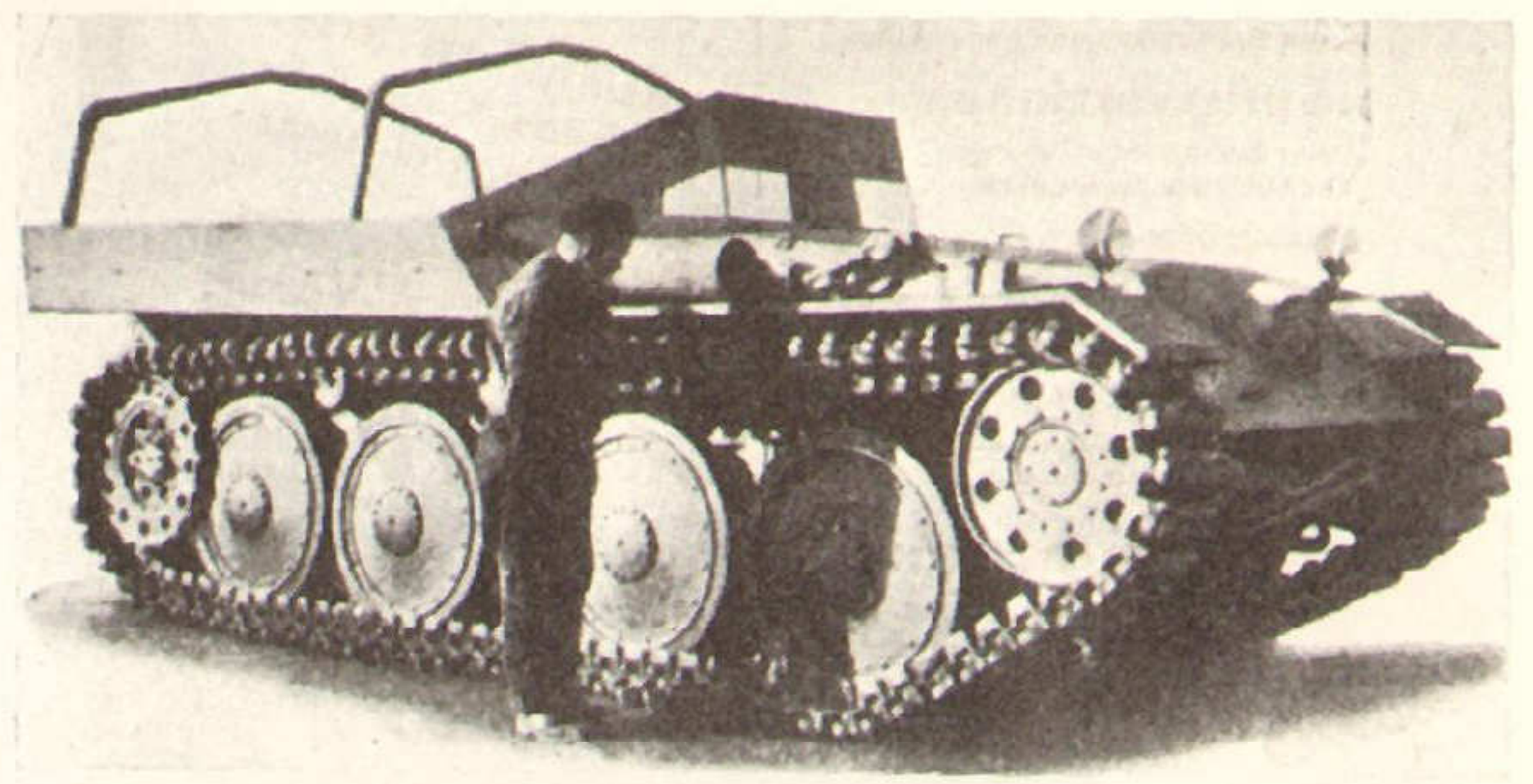
1943 conversion; gutted PzKpfw 38(t)s used as ammunition carriers and artillery tractors.

Up-Gunned Versions

When operations began in Russia the 37 mm. armament was found to be ineffective against the new Soviet tank models. For this reason several attempts were made to provide the PzKpfw 38(t) with more powerful armament. Krupp endeavoured to install the PzKpfwIV turret mounting the 75 mm. KwK 40 L/48 gun on this chassis during 1944. The project proved technically impossible and the project was dropped. A similar project was undertaken during November 1944 to mount the 75 mm. L/70 KwK 42 gun of the Panther tank. This mounting was to have 30° traverse and elevate from -8°+15°. It was never built.

SELF-PROPELLED WEAPONS

All of the early SP mountings on the PzKpfw 38(t) chassis—prior to the introduction of the Hetzer—were makeshift or improvised conversions.



Hybrid conversion of the PzKpfw 38(t) for use as a tractor in both military and civil capacities. (Chamberlain Collection)

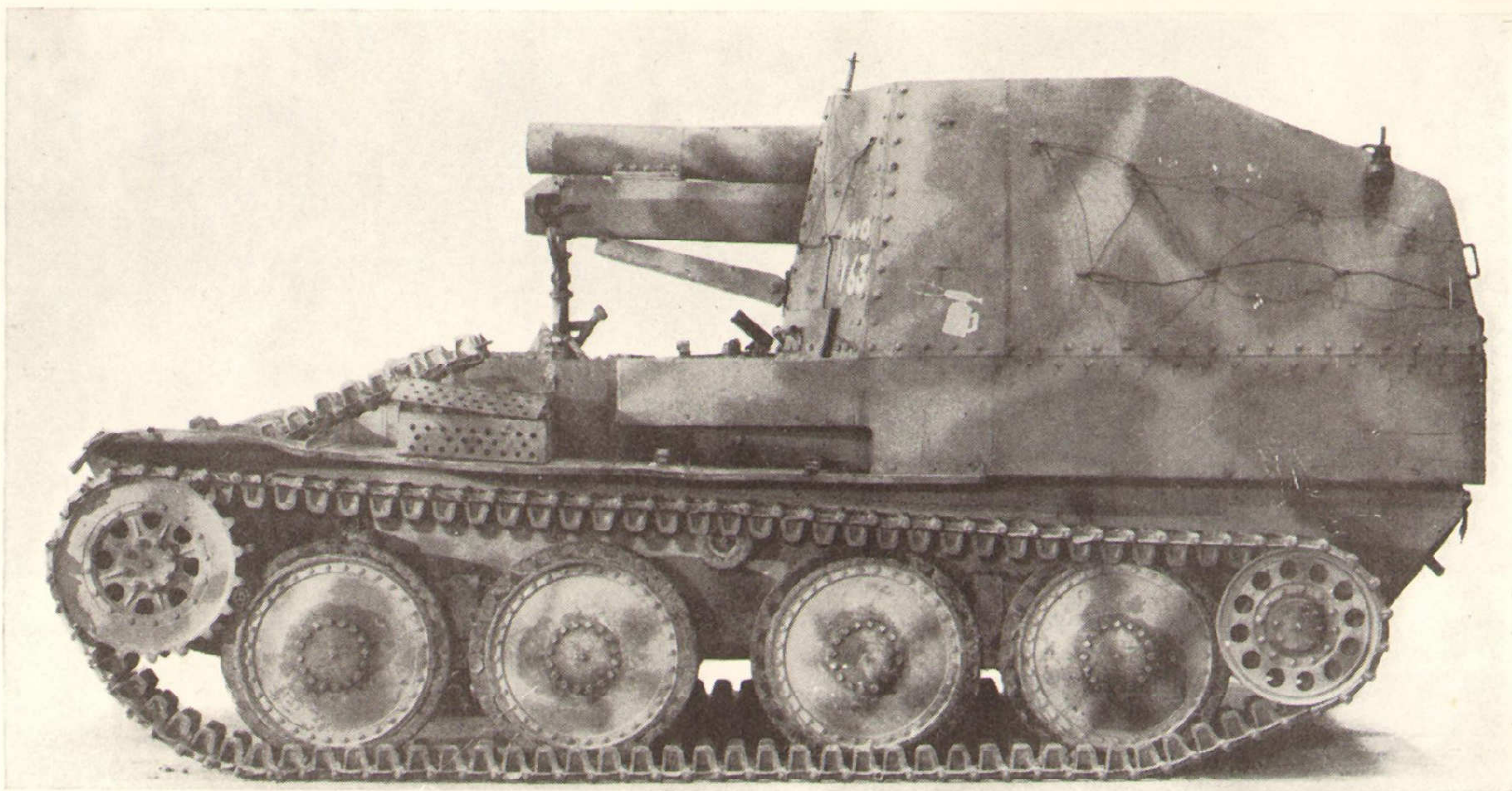
(1) Early Conversions

The first SP development on the PzKpfw 38(t) was the "s.I.G.33 on PzKw 38(t) Model H, Sd.Kfz.138/1, Bison". This vehicle was designed by Alkett and built by BMM. The armament, a 15 cm. s.I.G. 33 L/11, was designed by Rheinmetall-Borsig. An improved version, designated "s.I.G.33/1 on Selbstfahrlafette 38(t) sf Ausf M, Sd.Kfz.138/1", or Geschützwagen 38 (Bison), appeared in September 1942 and had a rear-located fighting compartment. 370 vehicles were built before production ceased in 1944. Following this, there appeared the "Panzer selbstfahrlafette 2 für 7.62 cm. Pak 36r (Sd.Kfz.139) Marder III". This vehicle was intended to provide the German infantry with an effective vehicle for the Russian Front. Production began on March 24, 1942 at BMM at 17 vehicles per month. The original OKH order had been for 30 vehicles per month. A total of 344 were built. The gun was rechambered to take the German Pak 40 cartridge case and was fitted with a muzzle brake. Another early conversion was the "7.5 cm. Pak 40/3 (L/46) auf Pz.Jag 38(t), Marder 38(t), Sd.Kfz.138. There were two models: firstly the Model H with rear engine, which appeared during 1942, secondly the Model M with front engine, appearing in March 1943. Production orders were issued in May 1942 and the first vehicle appeared in June. 418 of the first type and 381 of the second were built by BMM before production ceased in May 1944.

s.I.G.33 on PzKpfw 38(t) Model H, Sd.Kfz.138/1 "Bison". Side view is centre picture on next page.

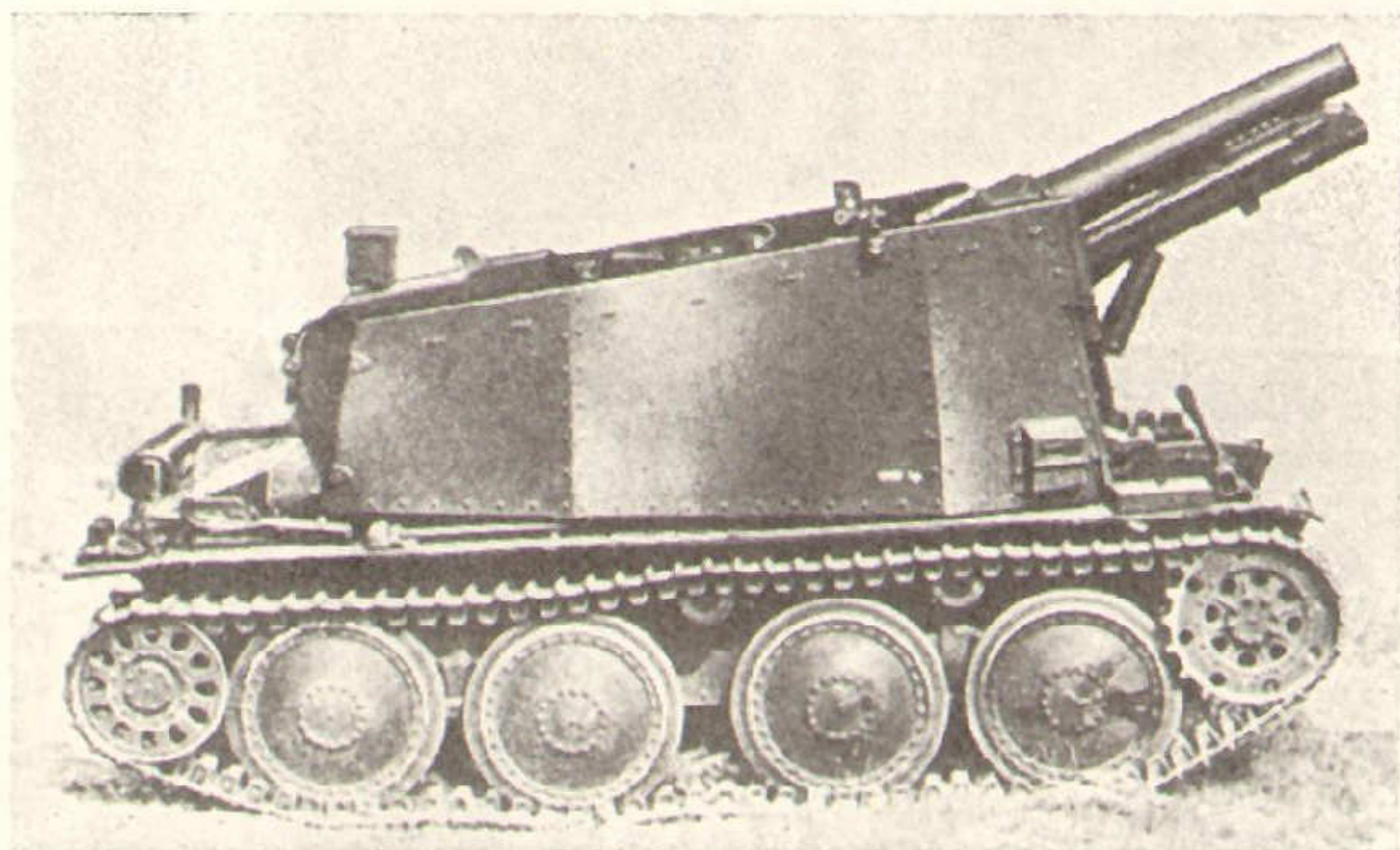
(Chamberlain Collection)





s.I.G.33/1 on Selbstfahrlafette 38(t) sf Ausf M, Sd.Kfz.138/1, or Geschützwagen 38 "Bison".

(Chamberlain Collection)



s.I.G.33 on PzKpfw 38(t) Ausf H, Sd.Kfz.138/1 "Bison".

A Flak version of the PzKpfw 38(t) was built during 1943 by BMM and 162 were in service by October 1943. The vehicle was designated "2 cm. Flak 30 or 38 L/55 on PzKpfw 38(t), Sd.Kfz.140".

(2) Later Conversions

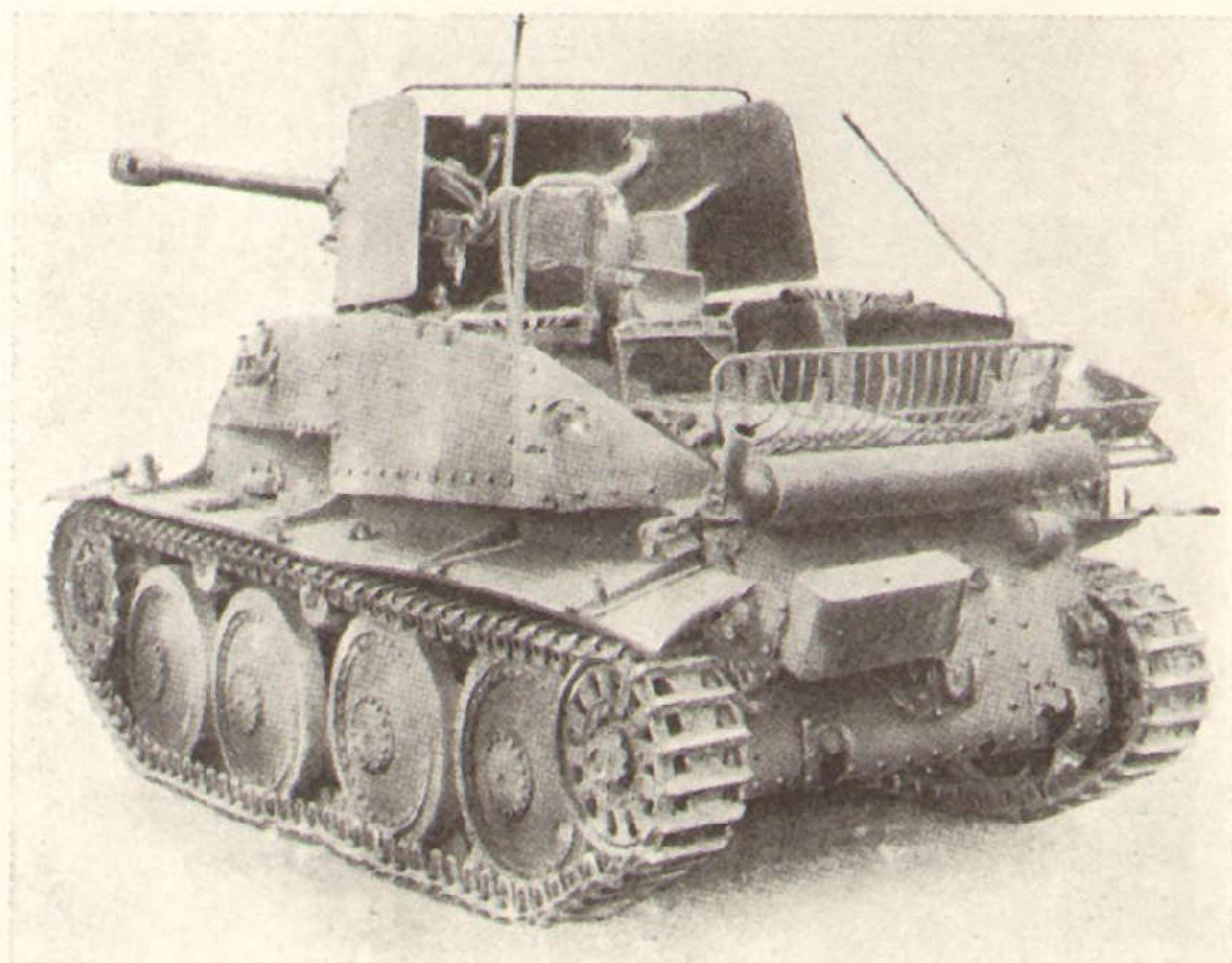
The first of the more successful SPs based on the PzKpfw 38(t) was the Hetzer. "7.5 cm. A/Tk. gun 39(L/48) on redesigned Czech LTH light tank chassis

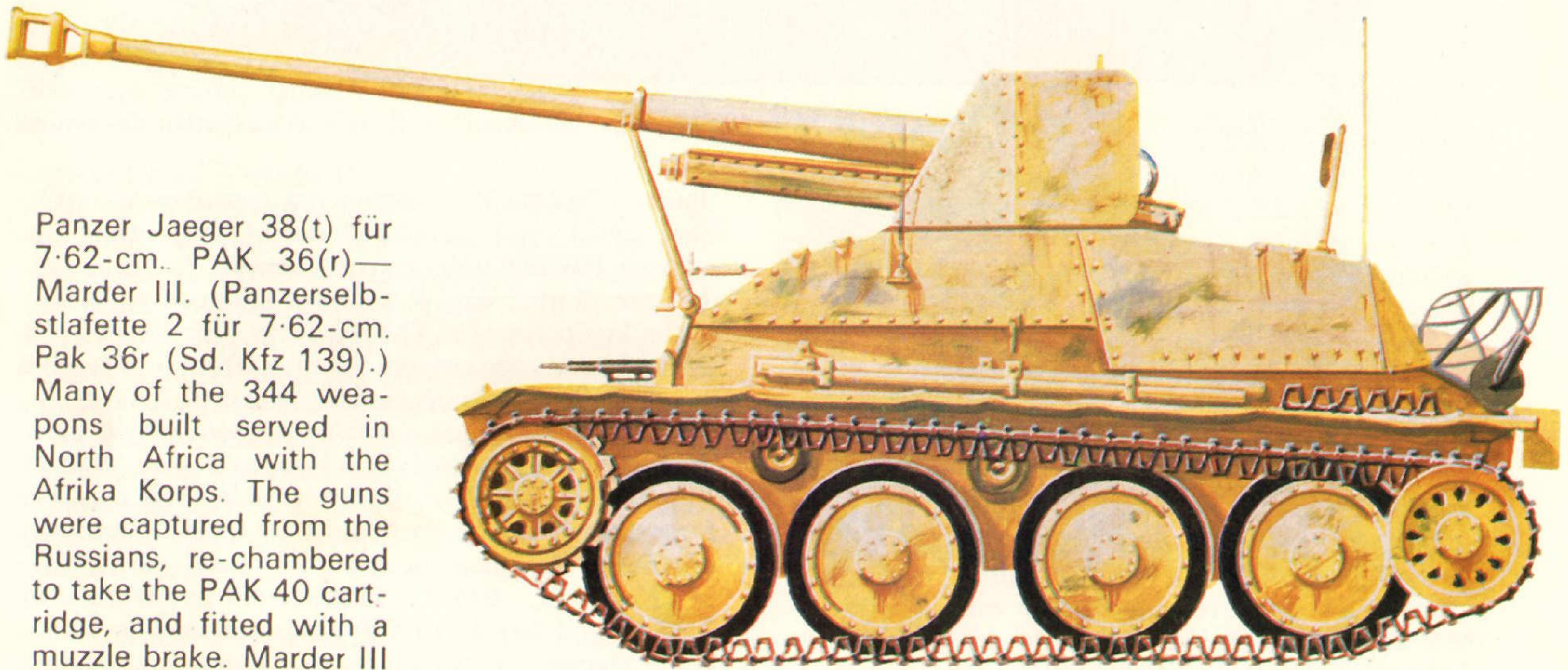
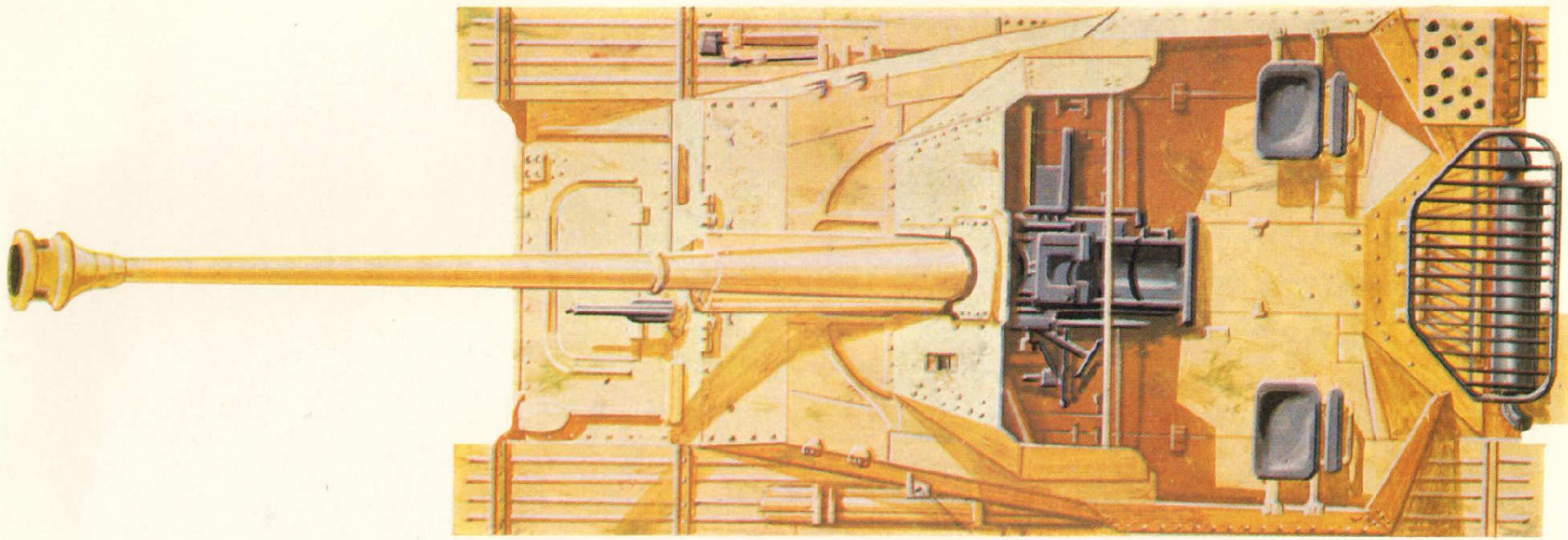
Below and right: *Panzerselbstfahrlafette 2 für 7.62-cm. Pak 36r Sd.Kfz.139, Marder III.* (Milsom Collection)



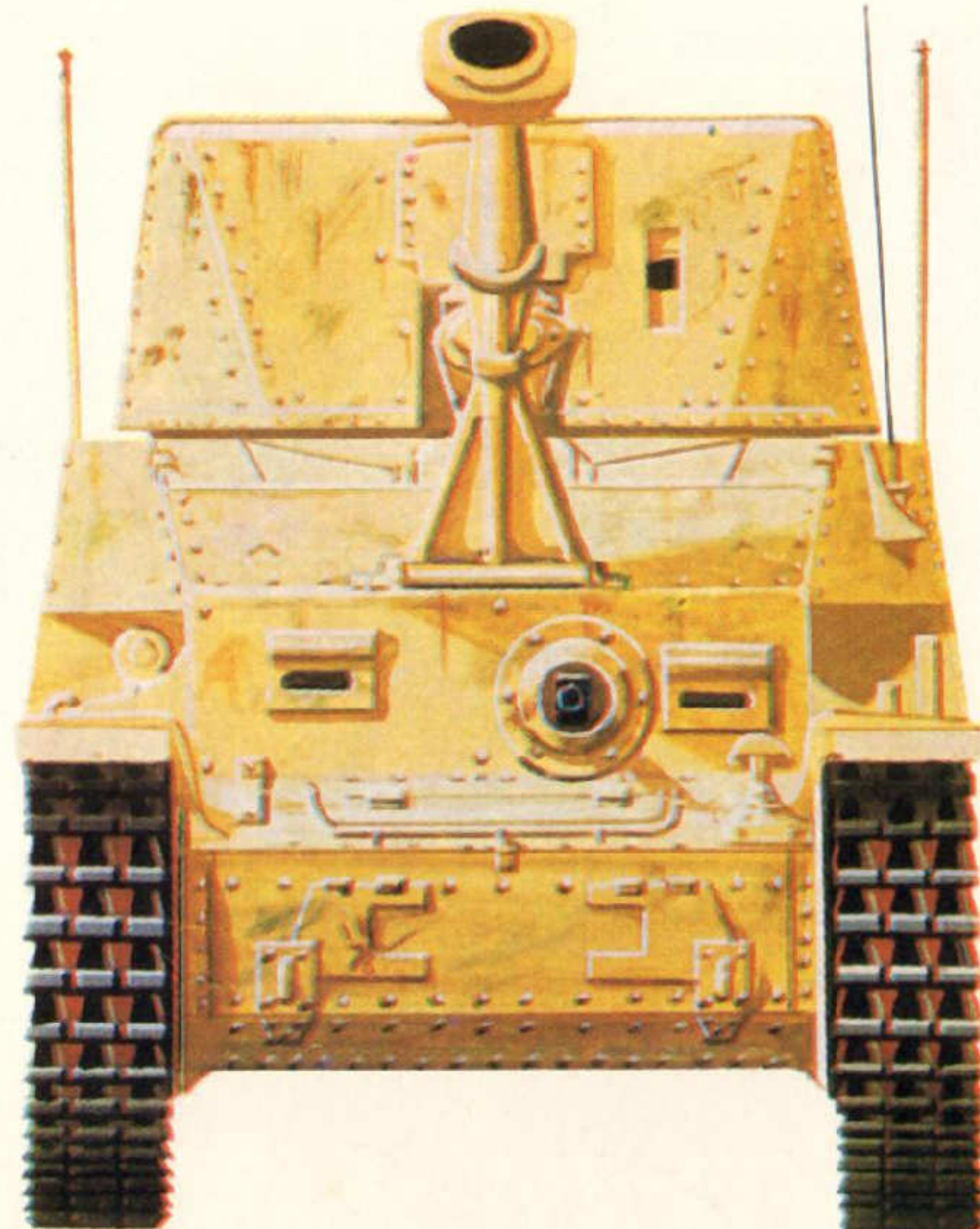
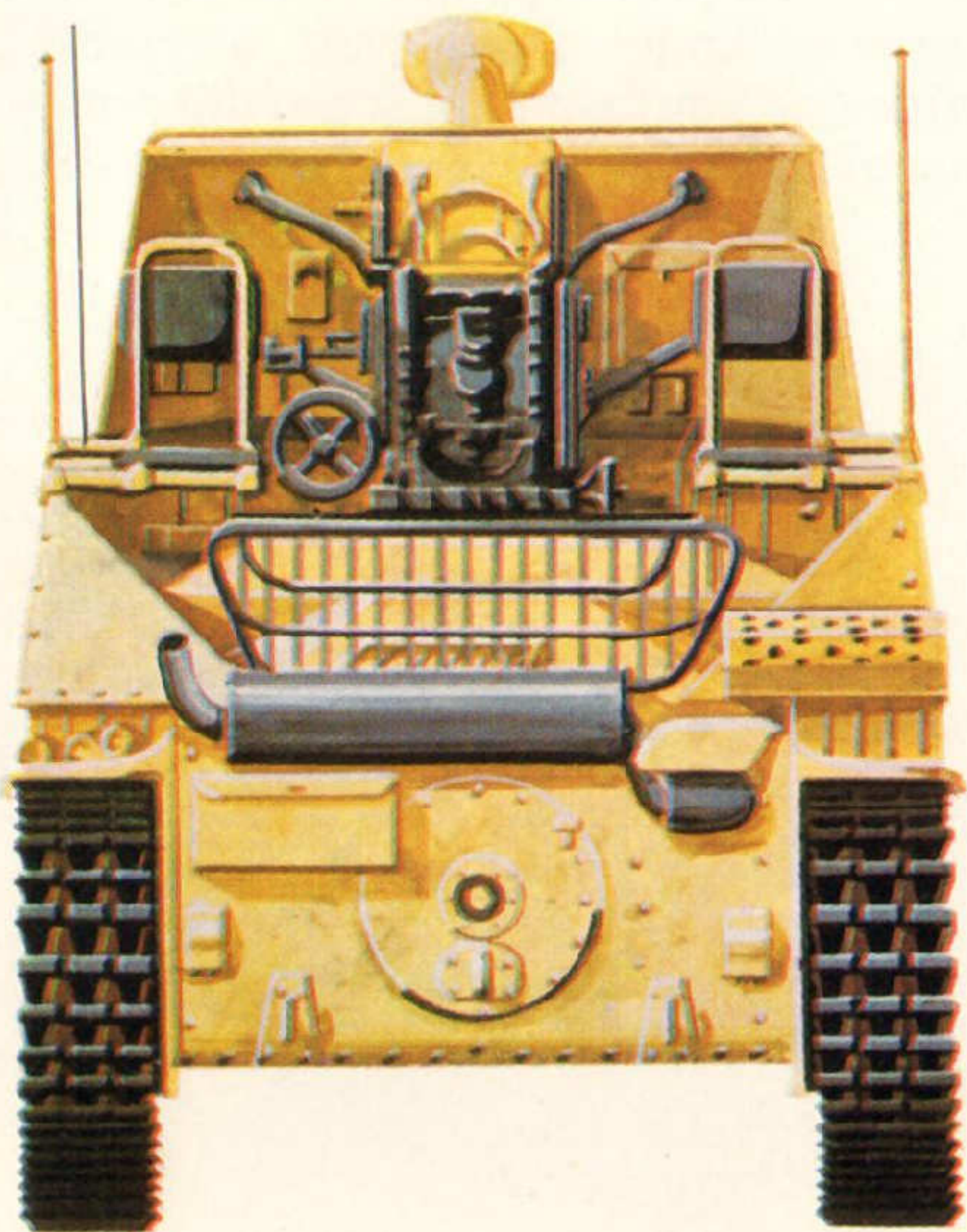
'Baiter'. Pz.Jag. 38(t) Hetzer, or Jagd Panzer 38(t)". This vehicle was developed during 1943 using the original PzKpfw 38(t) chassis widened to accommodate the 75 mm. gun. It mounted the same armament as the Jagdpanzer IV. The track was strengthened and the width between centres increased from 6.16 to 6.98 feet. The engine was uprated to 160 h.p. at 2,800 r.p.m. which gave the vehicle a maximum speed of 25 m.p.h.

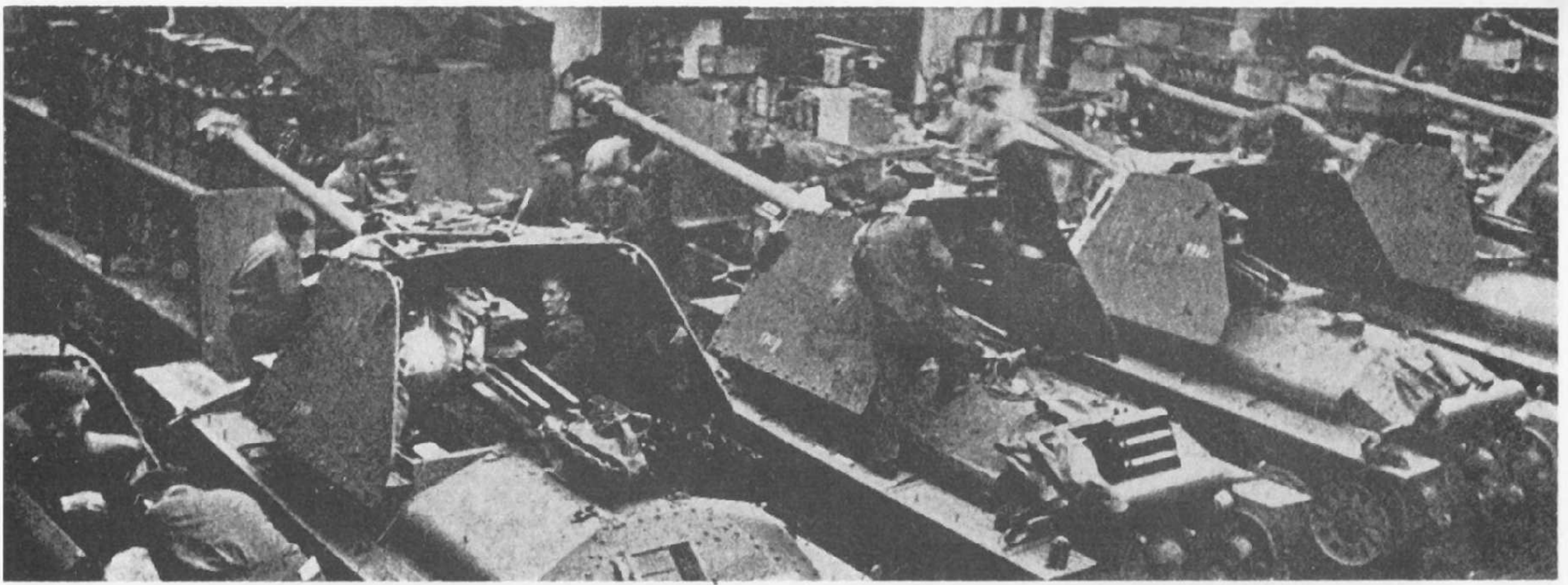
The fuel tank capacity was increased from 48 to 73 gallons. Manufacture of the vehicle, beginning in December 1943, was carried out by BMM and Skoda of Königgrätz. The armour was supplied by Poldihütte of Komotau, BMM, Linke-Hoffmann-Werke of Breslau and Skoda of Pilsen. Later models had a better shaped mantlet and later pattern road wheels. A total of 1,577 vehicles were built up to May 1945. (Production continued after the war by Skoda of Königgrätz for the Czech and Swiss armies). Plans were drawn up for a projected 15 cm. s.I.G. mounting on the Hetzer, but no prototype was built. The Hetzer was also experimentally fitted with a recoilless "Panzerwurfkanone" or light gun. It too did not pass the experimental stage. During late 1944 a number of





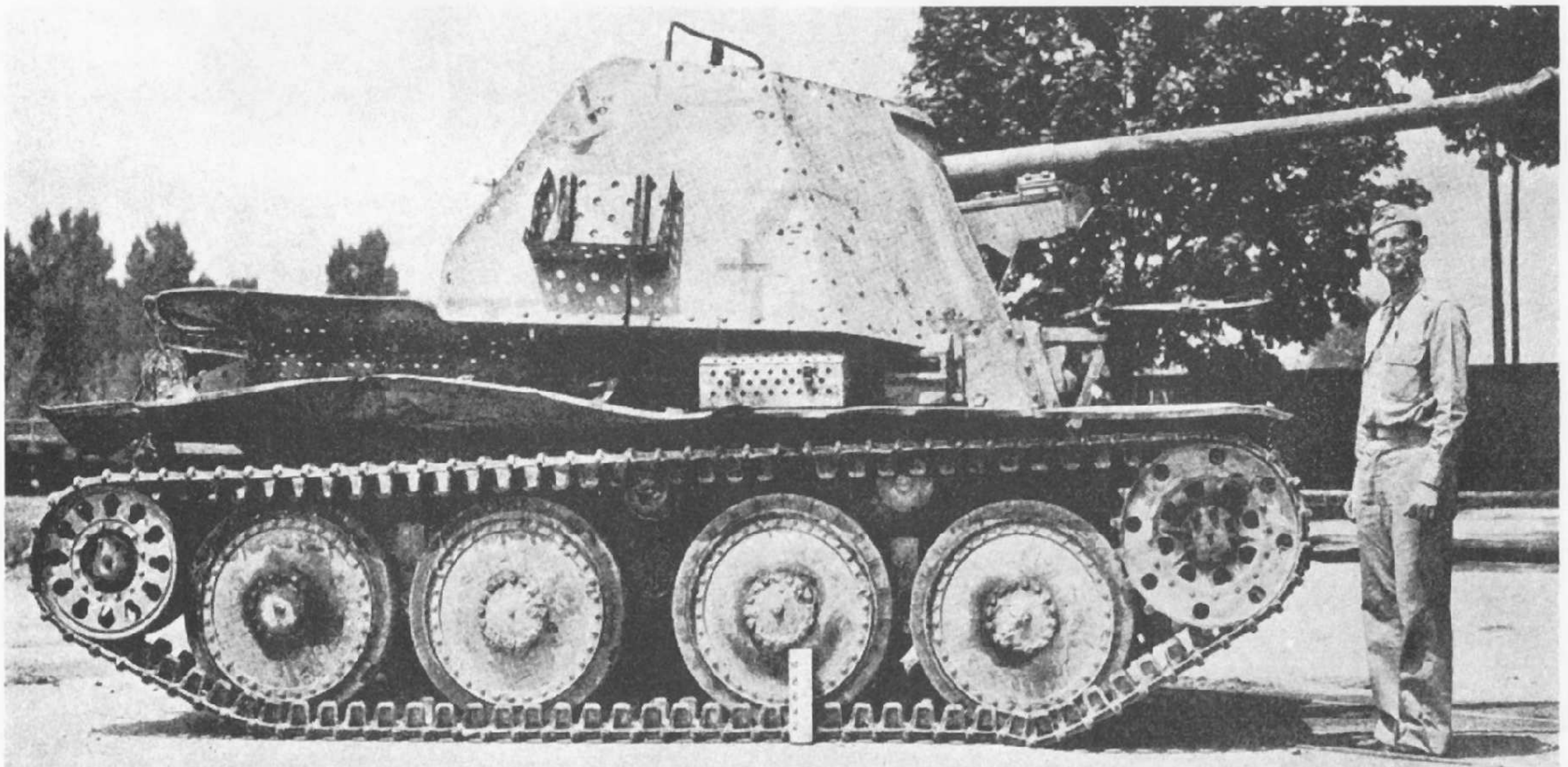
Panzer Jaeger 38(t) für 7.62-cm. PAK 36(r)—Marder III. (Panzerselbstlafette 2 für 7.62-cm. Pak 36r (Sd. Kfz 139).) Many of the 344 weapons built served in North Africa with the Afrika Korps. The guns were captured from the Russians, re-chambered to take the PAK 40 cartridge, and fitted with a muzzle brake. Marder III had a four-man crew.





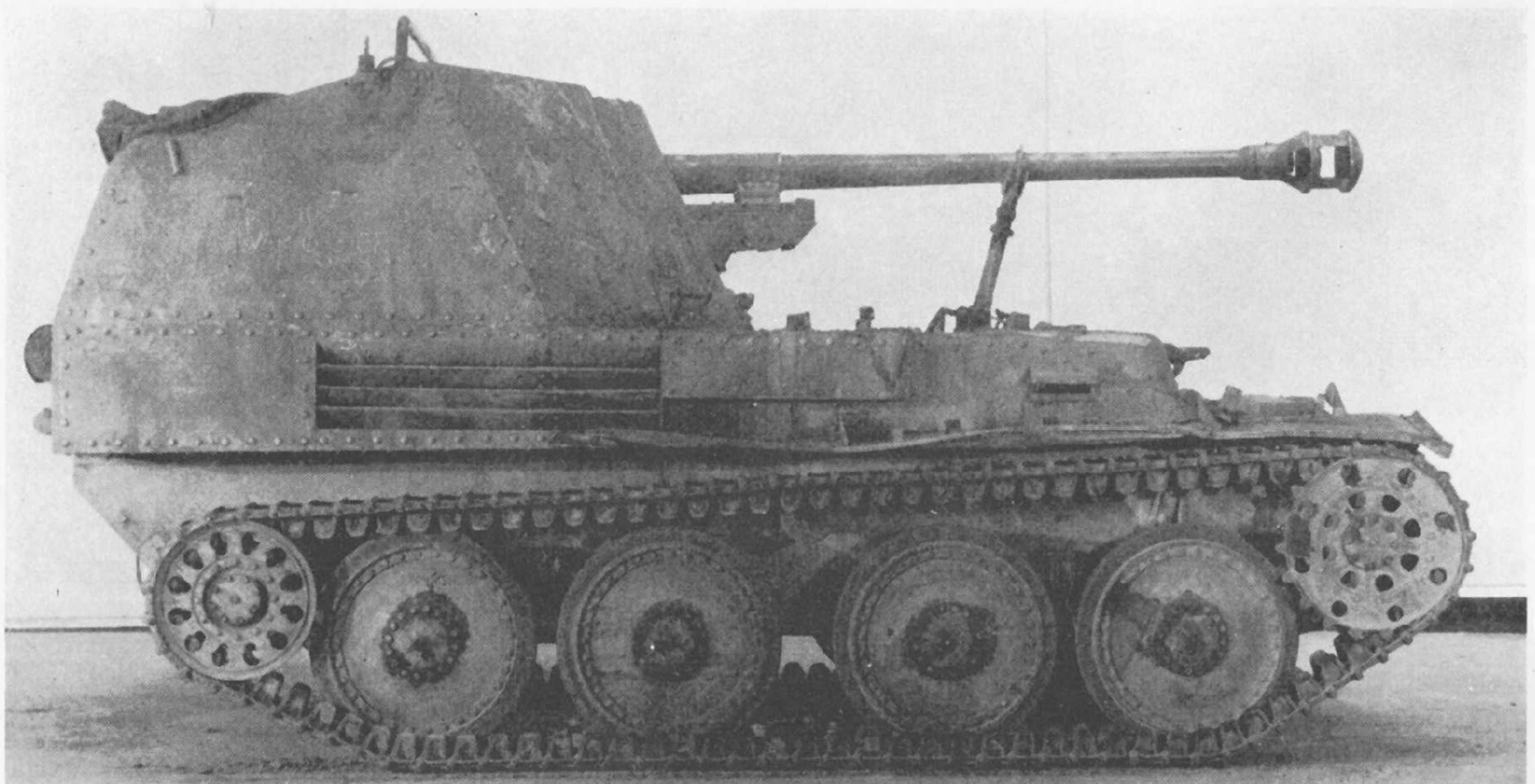
Above and below: 7.5-cm. Pak 40/3 (L/46) auf Pz.Jag. 38(t) Marder 38(t), Sd.Kfz.138, Model H.

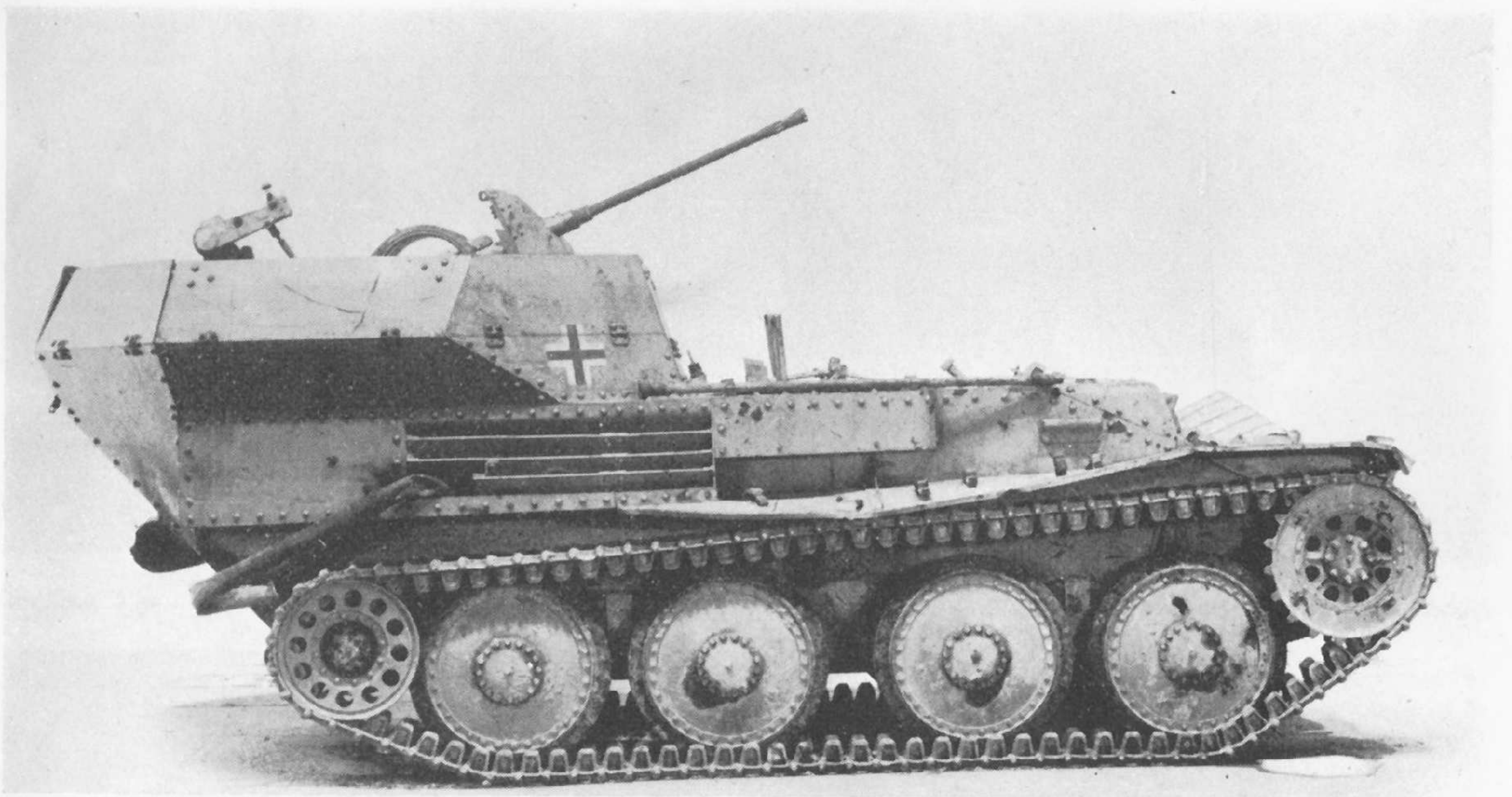
(Milsom Collection)



7.5-cm. Pak 40/3 (L/46) auf Pz.Jag. 38(t) Marder 38(t), Sd.Kfz.138, Model M.

(Chamberlain Collection)



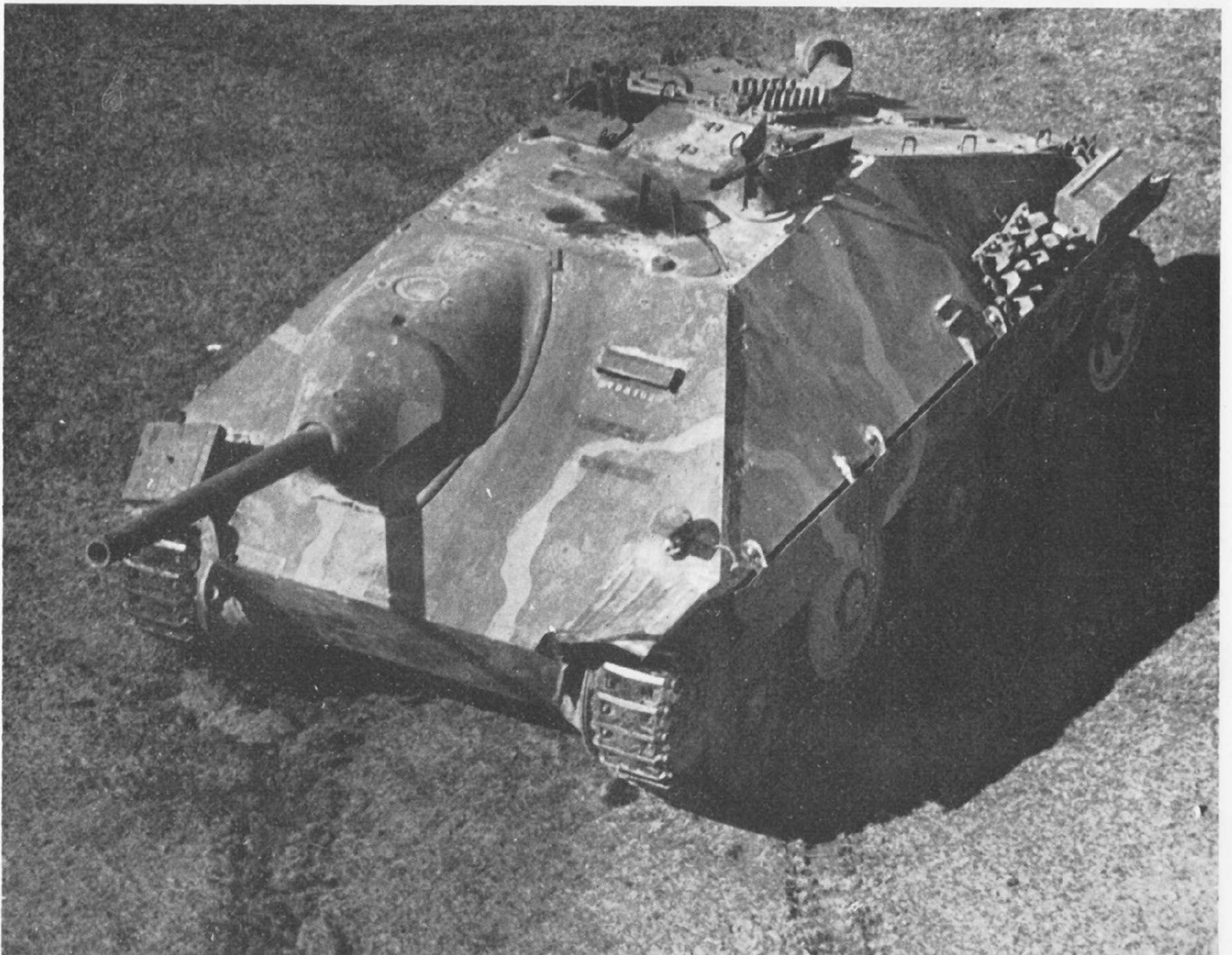


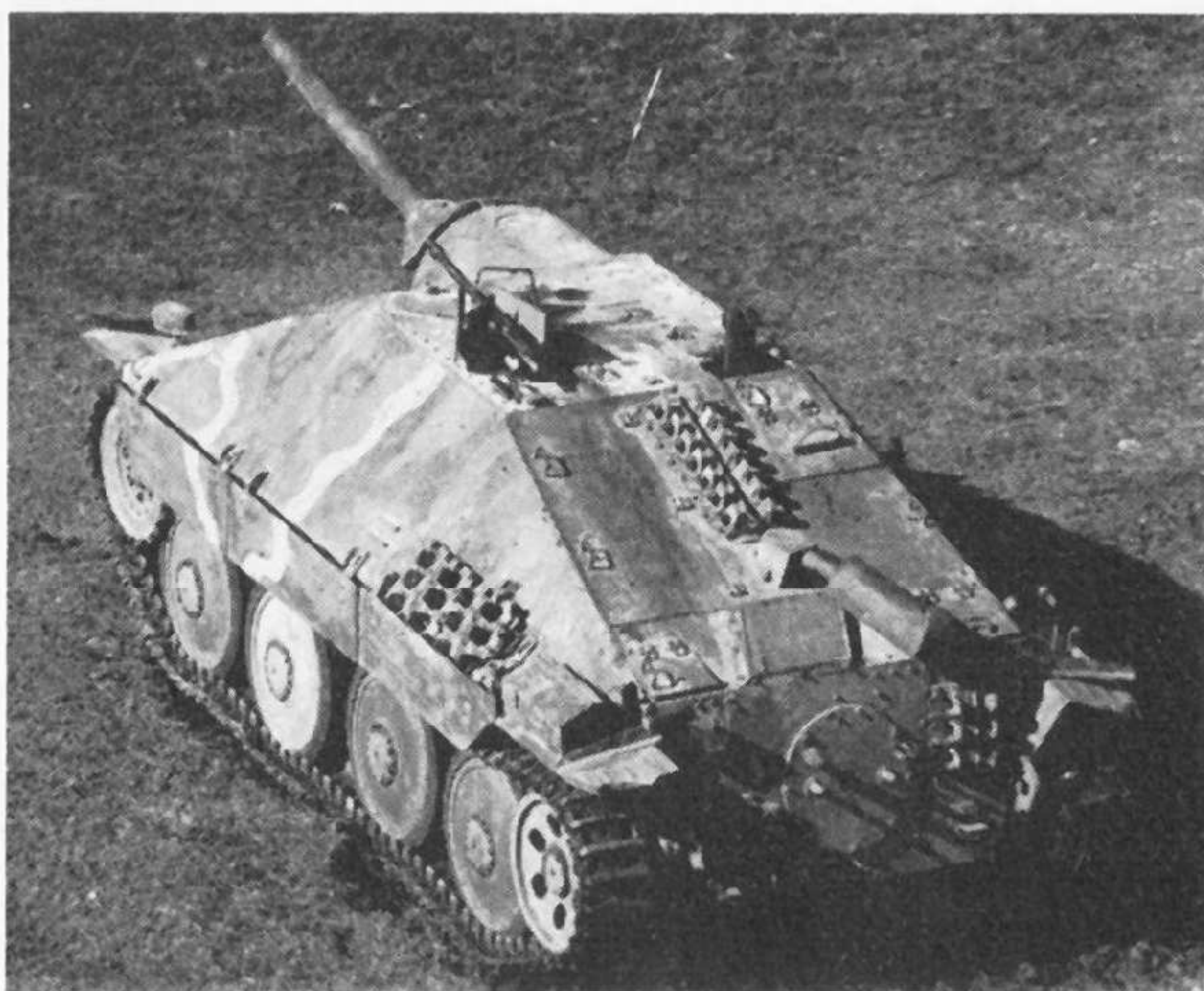
2-cm. Flak 30 or 38 L/55 on PzKpfw 38(t), Sd.Kfz.140.

(Chamberlain Collection)

Below and top left opposite: 7.5-cm. A/Tk. gun 39 (L/48) on redesigned Czech LTH light tank chassis "Baiter", Pz.Jag. 38(t) Hetzer, or Jagd Panzer 38(t).

(Chamberlain Collection)





flame-throwing tanks were built using the Hetzer chassis and hull; these was designated Pz.Jag. 38(t) Flammenwerferpanzer 38(t). There was also an armoured recovery version designated the Bergepanzer 38(t) Hetzer.

Other SP mountings under consideration for the 38(t) and 38(d) programmes were as follows:—

- (a) 8·8 cm. Pak 43/3 auf Panzer-Jäger 38(t)—original prototype for series of Panzer-jägers, with new Tatra III 12-cylinder air-cooled engine of 210 h.p. (1945).
- (b) 8·8 cm. Panzerjägerkanone 43 auf Sfl. 38(d)—Rheinmetall-Borsig/Ardelt prototype for 38(d) Waffenträger series (1945).
- (c) 8·8 cm. Panzerjägerkanone 43/3 auf Krupp/Steyr Sfl. 38(d)—based on redesigned PzKpfw 38(t) chassis (1945).

THE WAFFENTRÄGER PROGRAMME

During 1943 it was decided to begin the development of a gun carriage to specifications laid down by the artillery branch. The limited traverse fairly-heavily armoured gun mountings then in use were evidently considered unsuitable.

The requirements laid down at the time were as follows:—



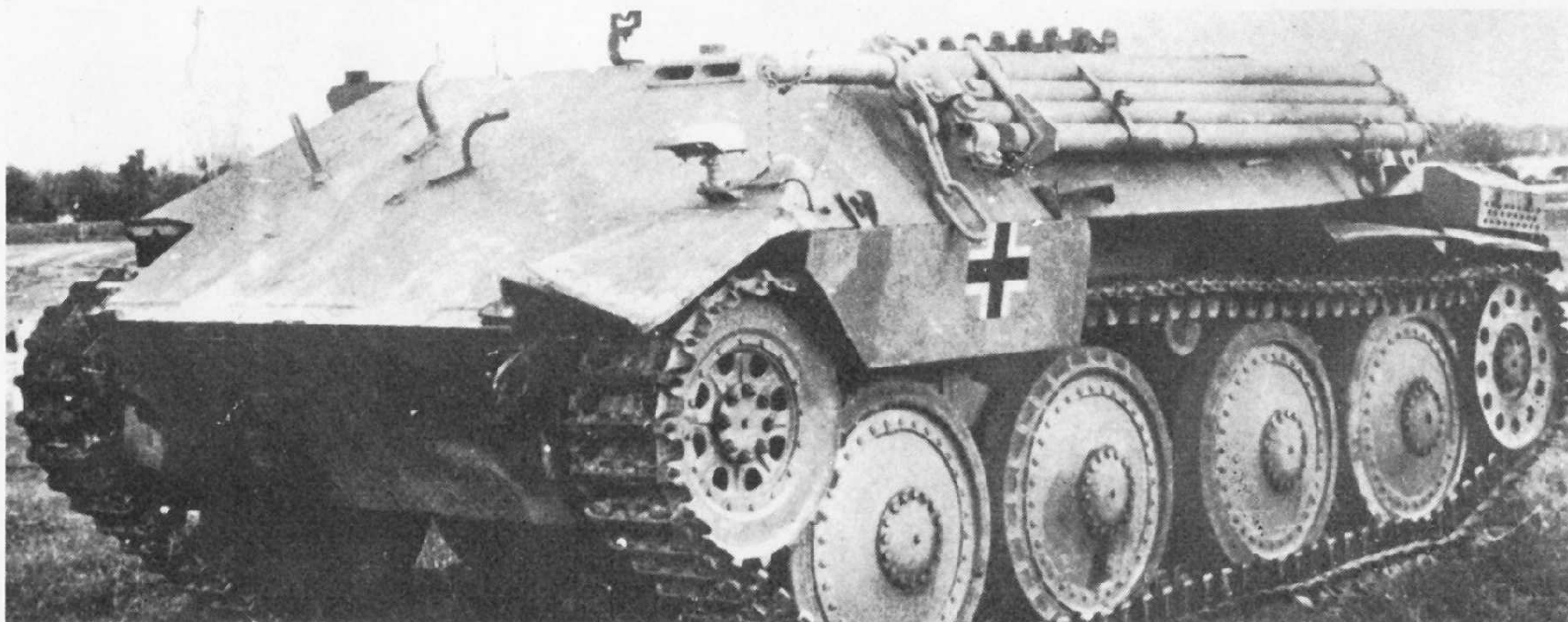
8·8-cm. Pak 43/3 auf Panzerjäger 38(t). (Milsom Collection)

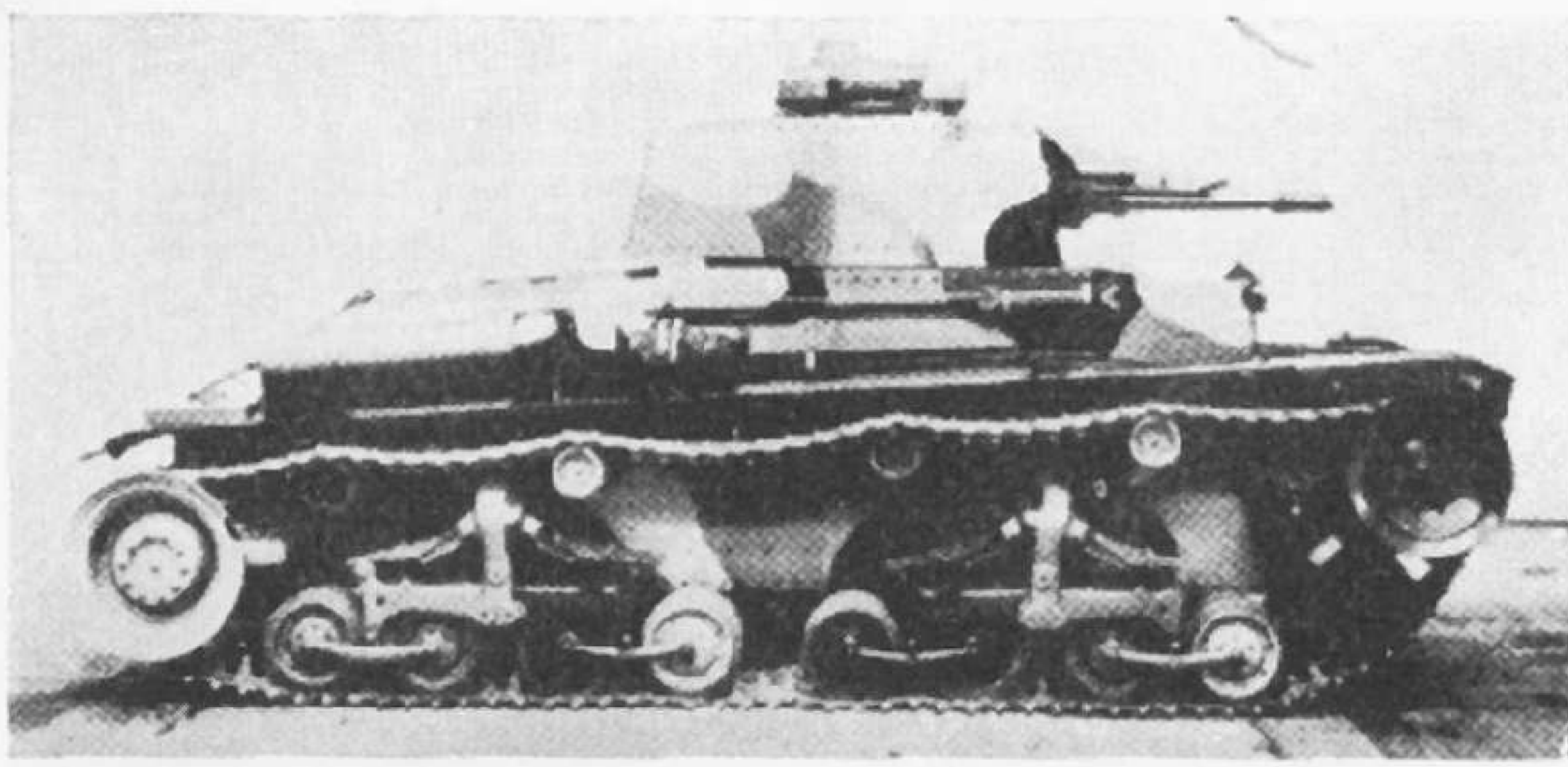
- (a) Fully tracked running gear.
- (b) Gun must be quickly removable from vehicle, power-driven mechanism for that purpose to be an integral part of the vehicle.
- (c) Provision to be made that the gun can be mounted on the ground and fired separately from the vehicle. Parts required for their operation to be carried on the vehicle.
- (d) The gun must have 360 degrees traverse, both on the vehicle and on the ground mount.
- (e) The gun should be mobile when separated from the vehicle and set on its own field carriage.
- (f) Armour protection for the crew need only be light splinter protection, approximately 8–10 mm. plates but all round protection for the gun crew is desirable.

On this basis a number of designs were laid down and several samples built by the firms of Krupp, Steyr, and Rheinmetall-Borsig. Some of these were on the PzKpfw 38(t) chassis. This initial series were found unsatisfactory. Another series of designs were begun by the same firms with the addition of Ardelt in Eberswalde. All these proposals were based on the use of the 38(t) components. After sample vehicles had been demonstrated to the army, the one by Ardelt was accepted for production. Krupp was charged with

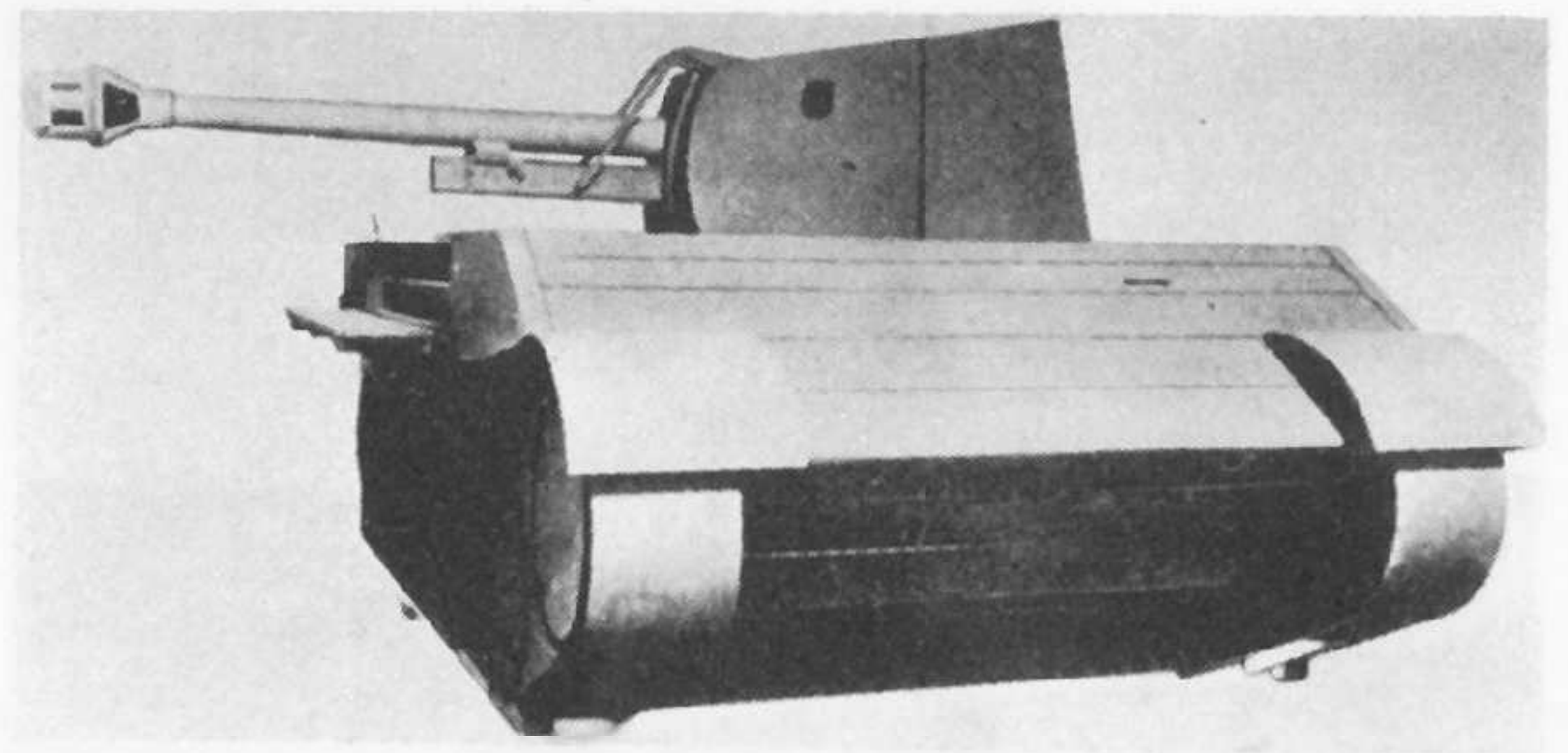
Bergepanzer 38(t)—Hetzer.

(Chamberlain Collection)





Above and below: *LTM-35 (S IIa) light tank in original Czech camouflage before German internment.*
(Milsom Collection)



Mock-up of Waffenträger based on PzKpfw 38(t) components.
(Milsom Collection)

the responsibility for final design and co-ordination of the various manufacturers concerned in the production programme. It was decided at this stage to build two sizes of weapon carrier—one for smaller, the other for larger calibre guns. Detailed drawings for both units had been furnished in March 1945 and preparations for production were underway. The lighter vehicle was to have 4 wheels/side and be powered by a Tatra 6-cylinder 100 h.p. engine. The heavier to have 6 wheels/side and be powered by a Tatra 12-cylinder 100 h.p. air-cooled engine. The lighter vehicle was to mount either a 88 mm. K-43 or 10.5 cm. light howitzer or 37 mm. flak or a Kugelblitz turret. It was to weigh approximately 14 tons (metric). The heavier vehicle was to mount the 12.8 cm. K-44 or a 15 cm. howitzer.

It was intended that these vehicles no longer have a removable gun and that the gun cover protection extend for less than 180 degrees. The only ones of the original requirements retained were fully tracked running gear and 360 degree traverse on the lighter model. The elevation on the guns was to be very high (42° for the 88 mm. gun).

Ammunition stowage was under the floor of the gun platform. Separate ammunition carriers on the same chassis were also requested by the army. Production was to start in the spring of 1945 and was to reach 300-350 vehicles per month. Components were to be taken out of the 38(t) and 38(d) programmes, and manufacture to be handled by some of the firms

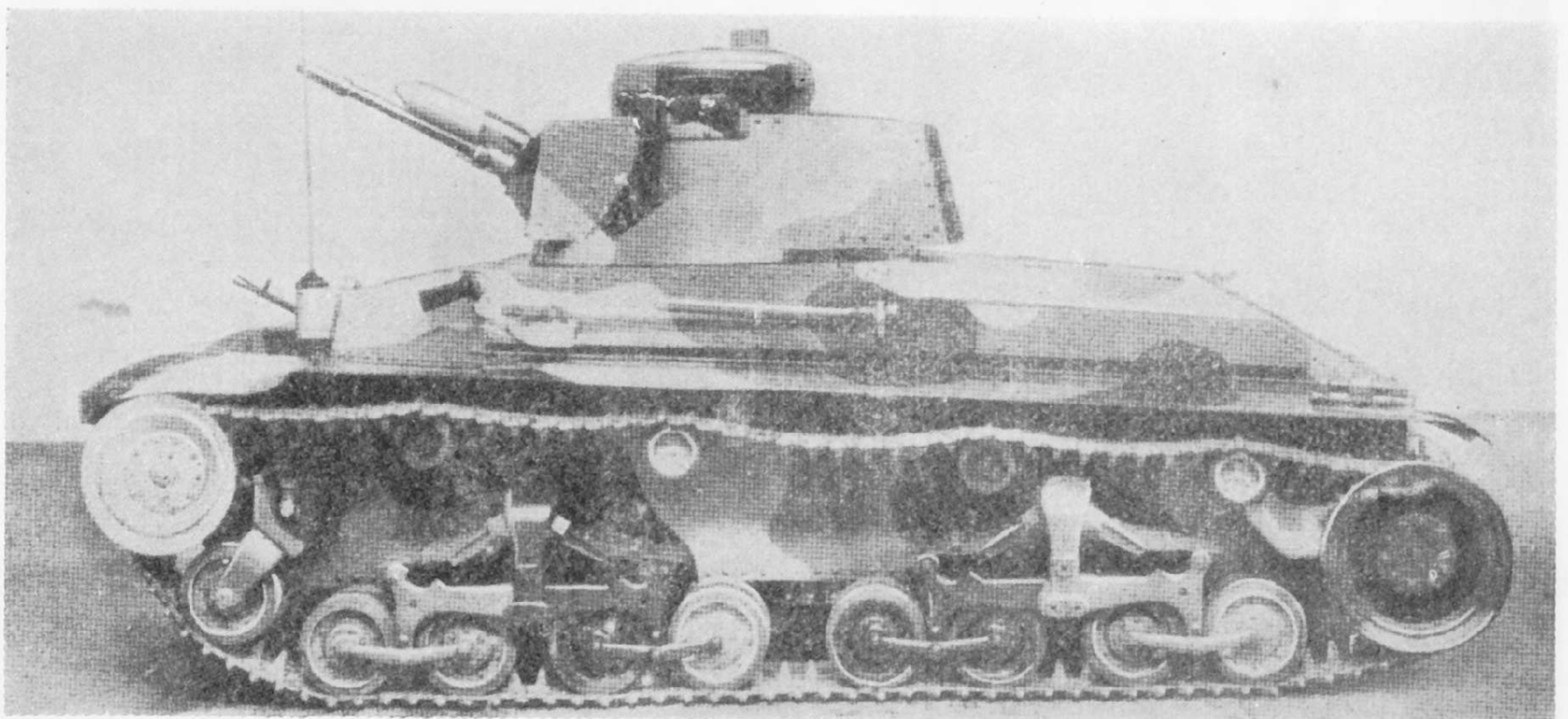
which had previously built gun carriages on the Pz.IV chassis.

DEVELOPMENT OF THE LT-35

During 1934, based on the experiences gained by the Skoda firm with a prototype tank, the MU4/T1, a larger machine was considered. This was designated the Skoda 10.5 ton tank, Model T-11 and has often been referred to as the LTM-35 (S II a).

Particular care was taken in the design of this vehicle to enable it to travel long distances under its own power. In addition to achieving a high degree of manoeuvrability great care was taken in securing suitable crew comfort and durability of power train. The general design requirements of this vehicle were as follows:—

- (1) A rear sprocket drive so as to have the fighting compartment as free as possible from all power train elements.
- (2) The engine design was as short as possible so as to have a large fighting compartment.
- (3) A 6-stage transmission with an air-shift was to be used.
- (4) Power steering through the use of compressed air was to be used so as to permit long driving hours without excessive driver fatigue.
- (5) The suspension was of such a design as to obtain equal pressures on all bogie wheels.





Above and below: *PzKpfw 35(t)* in German unit service.
(Chamberlain Collection)



8.8-cm. *Panzerjägerkanone 43/3 auf Krupp/Steyr Sfl. 38(d)*.
(Milsom Collection)

(6) The main accessories were to have double installations so as to ensure a high degree of reliability and performance.

Satisfactory results were achieved with the prototype and hence the vehicle was set up for production during 1935.

TECHNICAL DESCRIPTION OF THE LTM-35

The vehicle, which weighed 10.5 tons, was armoured with plate up to 35 mm. thick. Its armament consisted of a 37 mm. gun in a rotating turret (in 1934 this was the first Skoda tank to be fitted with a rotating turret). The gun had a monobloc barrel, was semi-automatic and used a dial sight. The elevation range of the installation was from -10 to $+25$ degrees. Horizontal movement of the piece was secured through traverse of the entire turret. Rough adjustment of the piece



was obtained through traverse of the whole turret while fine sighting adjustment was secured by traverse through a handwheel. This arrangement proved successful with light tanks in as much as a counterweight at the rear of the turret balanced the gun's weight. Elevation of the piece would be secured not only through direction action of the gunner's shoulder, but also through an elevating mechanism. At the moment of firing, however, the gun was arrested by an hydraulic installation.

A coaxial machine-gun was used as a secondary weapon. Both weapons could be fired simultaneously or individually. For this purpose the dial sight of the gun was fitted with reticule scales having two different scales. In addition each machine-gun had its own sighting telescope. A further machine-gun was mounted in the hull, and fired, in a similar fashion to that on the TNHP tank. The A3 gun was further modified to adapt itself to the narrow turret by shortening the recoil and modifying the elevation wheel so that it was unnecessary for the gunner to release it for firing. The gun was improved by increasing the muzzle velocity to 2,620 fps. The general internal layout was similar to that of the PzKpfw 38(t).

The particular advantage in the design of this tank was the operating efficiency which reduced driver fatigue. The vehicle was very fast and easy to steer thanks to its 12-speed gearbox and pneumatic-servo-mechanical steering unit. Trips of 125 miles per day at average speeds of 12-16 m.p.h. could be achieved,

Transmission lay-out of PzKpfw 38(t).

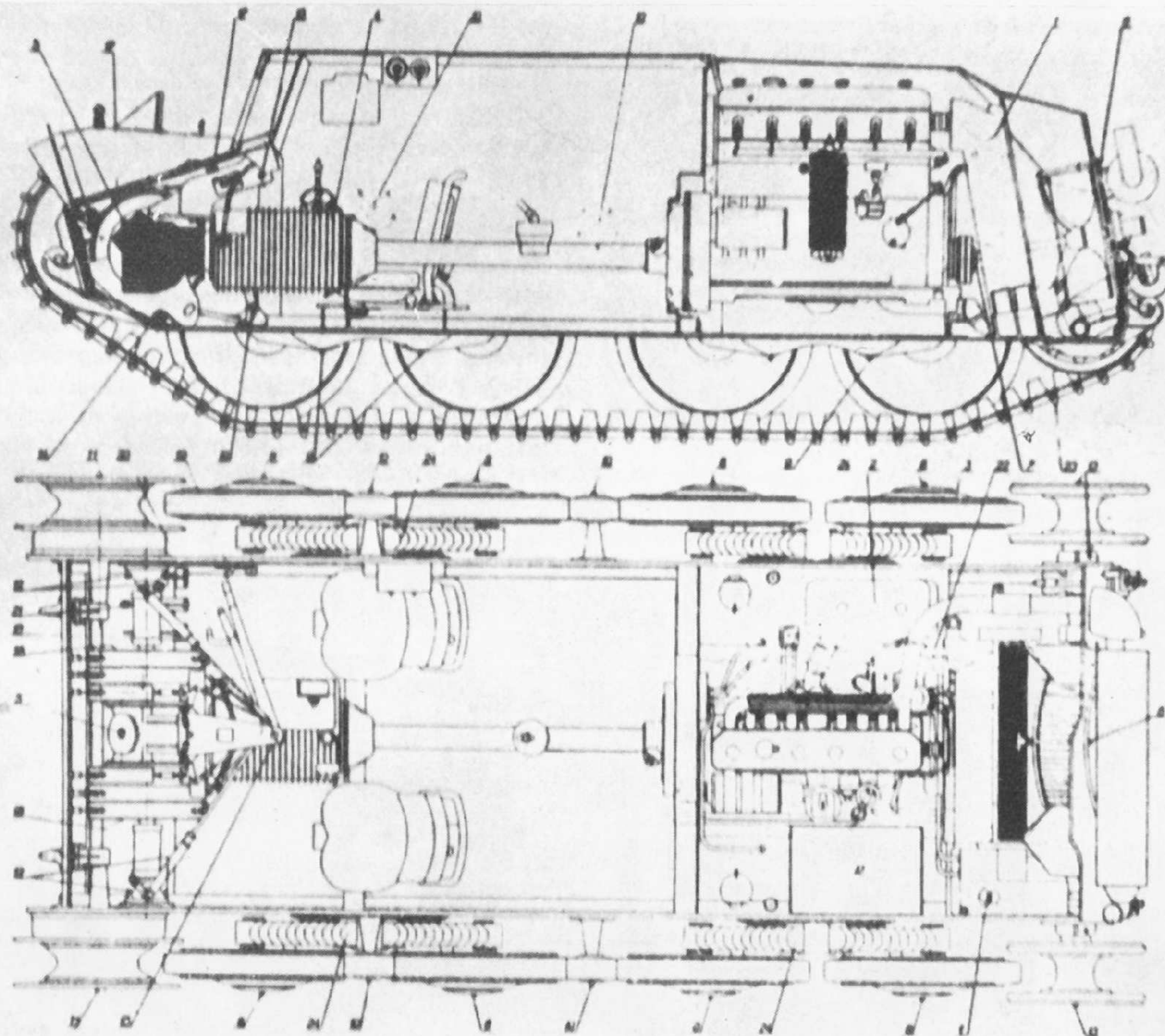
although the maximum speed of the vehicle was only 25 m.p.h. The suspension durability of the design was also remarkable in that track and bogie-wheel life ranged from 4,000-8,000 kilometres.

GERMAN EMPLOYMENT OF THE LTM-35

This tank was adopted by the Wehrmacht as the PzKpfw 35(t) during 1939, and was issued to the 6th Panzer Division. Originally the Germans had 106 of these tanks but by June 1, 1942 there was a total of 167 in service (total production unknown). During experiences in Russia it was found that the steering system froze, and consequently a heater was installed.

When these vehicles were phased out of service they were used for towing purposes—e.g. the Mörserzugmittel 35(t), mortar tractor 35(t), and the Zugkraftwagen 35(t), tractor 35(t), with a towing capacity of 12 tons. They were sometimes employed for tank recovery purposes. Such vehicles had crews of 2 men each. No self-propelled mountings are known to have been produced by the Germans on this chassis, although one such vehicle was produced by the Hungarians. (The latter produced an extensively modified version of this tank, designated the Turan II, as well as the Turan III based on a similar vehicle (the T-21) produced by CKD. Hungarian units equipped with these vehicles fought alongside the Wehrmacht during operations in Russia.)

AFV Series Editor: DUNCAN CROW





PzKpfw 35(t) of 6th Panzer Division in Champagne, June 1940.

SPECIFICATIONS

	<i>Panzerkampfwagen 38(t) (3·7 cm) TNHP-S</i>	<i>Panzerkampfwagen 35(t) LTM-35</i>
General:		
Crew:	4—commander, gunner, loader/radio-operator, driver.	4—commander, gunner, loader/radio-operator, driver.
Battle weight (tons):	8·5*/9·7	10·5
Dry weight (tons):	7·7*/8·9	9·9
Ground pressure (p.s.i.):	7·8*/10·2	7·55
Dimensions:		
Length overall (ft.):	14·91	14·88
Height overall (ft.):	7·76	7·21
Width overall (ft.):	6·62*/6·74	7·03
Track centres (ft.):	6·16	5·41
Ground clearance (ft.):	1·32	1·15
Ground contact length (ft.):	9·56	10·7
Armament:		
Main:	Skoda A7, 37·2 mm. L/47·8**	Skoda A3, 37·2 mm. L/40
Coaxial:	7·92 mm. 7165 CZ Type 37 machine-gun.	7·92 mm. 7165 CZ Type 37 machine-gun
Hull:	7·92 mm. 7165 CZ Type 37 machine-gun.	7·92 mm. 7165 CZ Type 37 machine-gun
Fire Control:		
Turret traverse:	360° (by hand-wheel or free-wheeling)	360° (by hand-wheel or free-wheeling)
Elevation:	—6° +12° (by hand)	—10° +25° (by hand)
Sighting equipment:	Various German sighting telescopes fitted.	Dial sight (some German modifications)
Special features:	Hull MG fired by driver via Bowden cable attached to steering lever. Fixed cupola with 4 episcopes.	Gun hydraulically arrested during firing, shoulder controlled in elevation.
Ammunition:		
Main Armament:	37 mm. gun: 90 rounds (HE and AP)	37 mm. gun: 90 rounds (HE and AP)
Secondary Armament:	7·92 mm. MG: 2,550 rounds.	7·92 mm. MG: 2,550 rounds.
Communications:		
External:	W/T set (various German models)	W/T set (various German models) and flag.
Internal:	Internal system of coloured lights	Internal system of coloured lights
Armour:		
Type:	Machinable quality armour plate, rivetted and bolted.	Machinable quality armour plate, rivetted and bolted.
Hull—Nose (mm.):	25*/25 + 25	35
Vertical front plate (mm.):	25*/25 + 25	23
Glacis plate (mm.):	25	28
Lower sides (mm.):	15*/30	16
Upper sides (mm.):	19*/30	24
Roof (mm.):	10 (Some variations in armour according to model)	20
Floor (mm.):	8	12
Rear (mm.):	12	20
Turret—Mantlet (mm.):	25	35
Front (mm.):	25*/25 + 25	23
Sides (mm.):	15*/30	16
Rear (mm.):	15*/22	16
Roof (mm.):	10*/15	16

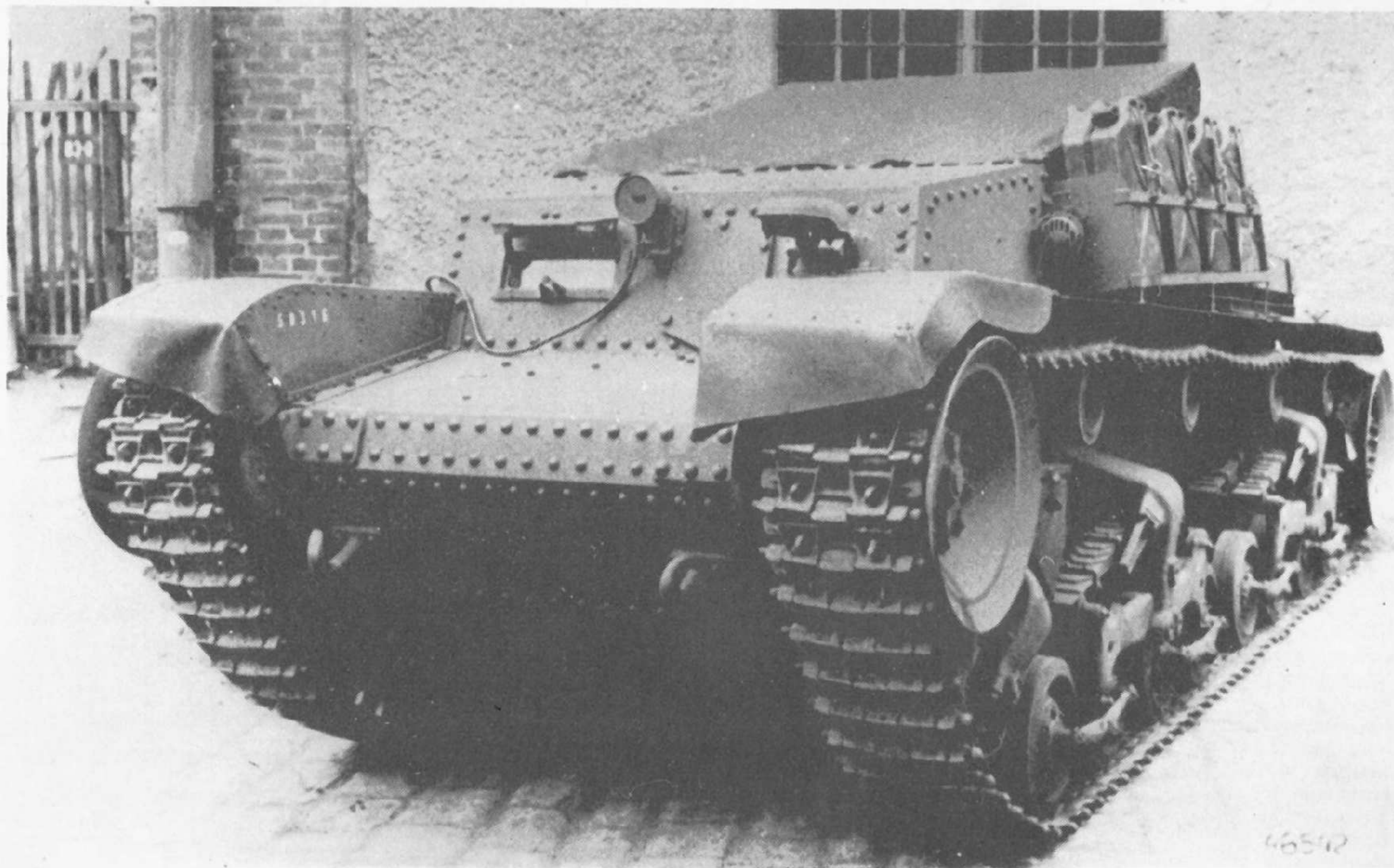
Engine:		
Type:	6-cylinder, water-cooled in-line O.H.V. Models A-G: 125 H.P. at 2,200 r.p.m. (single Solex 48 FNVP I carburettor) EPA Models I-III. Model H: 150 H.P. at 2,600 r.p.m. (twin Solex 46 FNVP carburettors) epa/AC Model IV.	6-cylinder, water-cooled in-line O.H.V. Skoda model T-11, 8.5L developing 120 H.P. at 1,800 r.p.m. (Twin Zenith UDD carburettors)
Fuel capacity (galls.):	49	34
Transmission:		
Make and Type:	Praga-Wilson TN-100 epicyclic pre-selector (2-stage).	Praga-Wilson-Skoda pneumatic-servo assisted.
Gears:	5 forward, 1 reverse (with transfer).	6 forward, 6 reverse (provided by mechanical servo).
Steering:	Praga-Wilson epicyclic clutch and brake.	Clutch and brake (servo-pneumatic assisted).
Suspension:		
Type:	4 rubber-tyred wheels per side, each mounted on a cranked stub-axle and each pair of wheels being controlled by a semi-elliptic spring freely pivoted. (Wheel diameter: 2.58 ft.). 2 return rollers per side.	8 small bogie wheels per side, coupled in pairs and mounted on hull in fours on rocker arm with inverted semi-elliptic leaf springs. Small guide wheel between front idler and first bogie wheel. 4 return rollers/side.
Tracks:		
Type:	Cast manganese steel, skeleton type.	Cast manganese steel, dry pin.
Width (ins.):	11.5	10.5
Pitch (ins.):	4.09/4.17***	4.15
No. links per track:	87-90*/93	105
Electrical system:		
	9-cell NIFE battery, 100Ah, charged by 12V Scintilla dynamo, Bosch magneto ignition.	9-cell NIFE battery, 100Ah, charged by 12V Scintilla dynamo, Twin Vertex-Scintilla magneto ignition.
Performance:		
Maximum speed (m.p.h.):	35*/26	25
Maximum gradient (degrees):	30*/26	28.6
Trench crossing (feet):	6.1	6.6
Wading depth (feet):	3.0	2.6
Vertical step (feet):	2.6	2.6
Range—road (miles):	125*/94	120
c.c. (miles):	89*/64	72
Fuel consumption (m.p.g.):	2.6*/1.92 (road)	3.5
Turning circle diameter (feet.):	14.9	16

NOTES:

- *Before/after chassis No. 1601.
- **Some vehicles had 37 mm. KwK L/45 or L/40
- ***w/o or with detachable spuds.

Mörser Zugmittel 35(t).

(Chamberlain Collection)



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Edited by DUNCAN CROW

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45 Vickers Main Battle Tank
(publication delayed).

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**French Infantry Tanks: Part II
(including R 35 and FCM 36)**

by Major James Bingham

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Major Bingham concludes this Profile with a critical examination of the French use of tanks, not only in direct support of infantry but in armoured formations, whose development, limitations and demise in action he recounts ("Within a period of three weeks the entire armoured force had been presented for destruction or neutralisation, successively and in detail").

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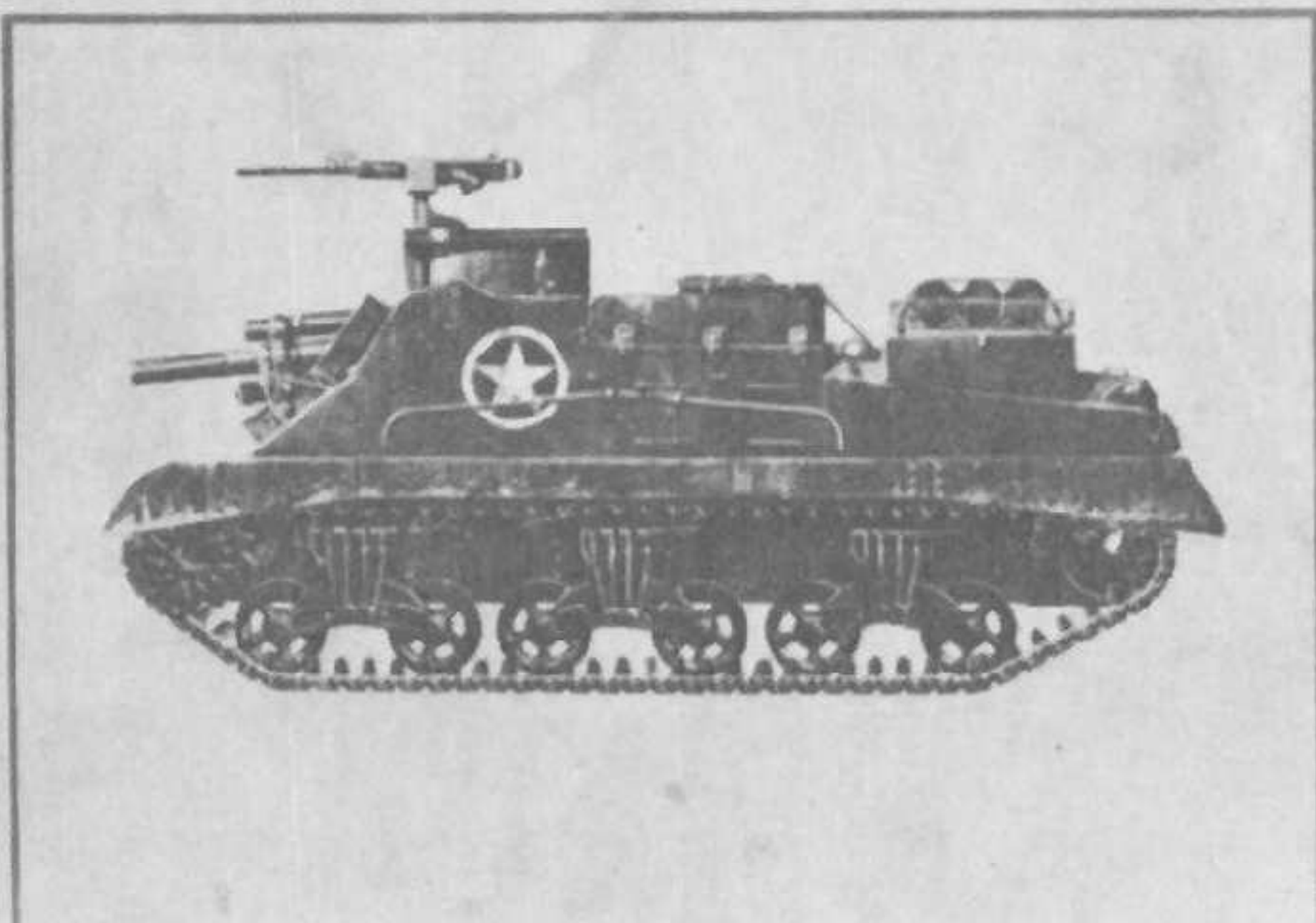
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