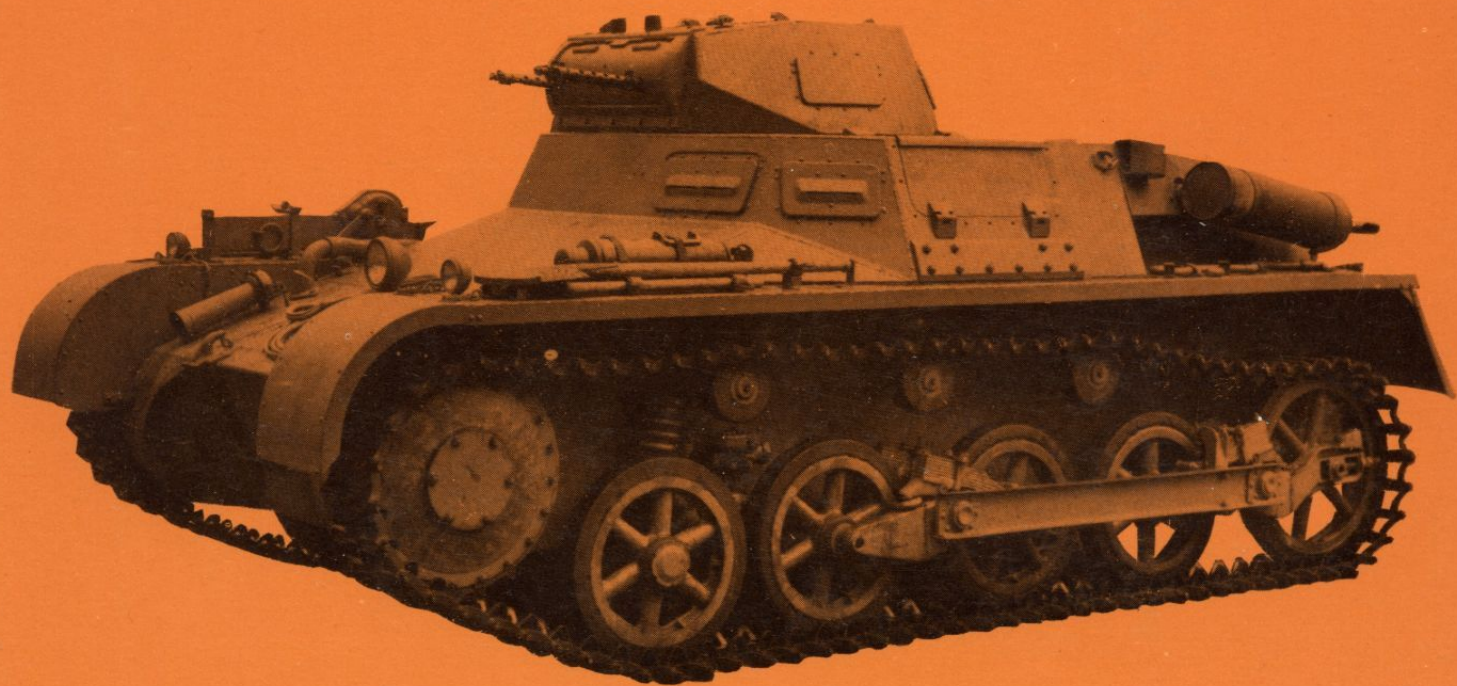


Panzerkampfwagen I & II

German light tanks

1935-45



Eric Grove

Panzerkampfwagen 1811

German light tanks
1935-45

Eric Grove

Almark Publishing Co. Ltd., London

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Line Illustrations by Kenneth M. Jones

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INTRODUCTION

This book seeks to distil and bring together the best available information on the lightest of the German World War II tank models, the *PzKpfw I* and *II*. Although the least spectacular of German tanks, these types formed the larger part of the German armoured force's strength when it scored its most crushing victories, in Poland in 1939 and in France and the Low Countries in 1940. Given the plethora of books on German armour it is surprising how badly documented is the story of the *PzKpfw I* and *II*. A study of the sources, both original and secondary, seemed to raise as many problems as it settled. The new and excellent 'Encyclopedia of German Tanks of World War II' by Chamberlain, Doyle and Jentz, which appeared shortly before the book went to press was helpful on several points but I do not entirely agree with its authors in all cases and it does not solve all puzzles. In the following I try to offer the most detailed exposition of the development and service of the *PzKpfw II* yet available in English. It is hoped that it will be followed in due course by similar studies of other German models of tank, assault gun and S.P. equipment.

As with all authors I must acknowledge my debts to

various people who have given vital assistance:— to Walter J. Spielberger who kindly answered various questions and whose monumental book: *'Die Panzerkampfwagen I und II und Ihre Abarten'* provided a vital foundation and guide; to Colonels Horden and Hill of the R.A.C. Tank Museum at Bovington for their unstinting help with research and photographs; to Mr Willis of the Photographic Library, Imperial War Museum for his assistance in pictorial research; to Martin Hart of the Modern Languages Department of this College for his help with German translation; to George Bradford, Axel Duckert, Richard Bennett and others for help with research; to Ken Jones for his patient advice and excellent drawings; to my mother who is the only typist who can cope with my extraordinary manuscripts and who has had the patience to deal with far too many drafts and finally to my wife for her encouragement over what has been, for a number of reasons, a very trying time.

ERIC J. GROVE
B.R.N.C. Dartmouth.
January, 1979.

THE PzKpfw I

In 1931 Major General Lutz was appointed 'Inspector of Motor Transport' in the German Army with Guderian as his dynamic Chief of Staff. This marked the beginning of serious planning for the creation of a German Armoured force and a light tank that could be quickly produced in some numbers seemed the first priority in order to train personnel of the projected Panzer Divisions. A specification for a 5 tonne tank was drawn up in 1932 and issued to four manufacturers; MAN, Rheinmetall-Borsig, Daimler-Benz and Krupp.

The last named firm had already developed a vehicle designated L.K.A. in answer to earlier 'Heereswaffenamt (Army Weapons Office) requirement for a 'Kleintraktor' – literally 'small tractor' – the cover name for the smallest of the Reichswehr's secret tank projects. Design work was begun in the autumn of 1931 with two engineers, Hagelloch and Woelfert, in charge of the project. The designers were able to use experience gained by the German associated Landsverk Company in Sweden and the first prototype was ready in July 1932. The little two man tank was given the cover name 'Landwirtschaftlicher Schlepper' ('Agricultural Tractor'), usually abbreviated to LaS. It had a rear mounted Krupp air cooled petrol engine which drove through the front sprockets and there were four large coil sprung road-wheels each side with a slightly smaller track idler trailing at ground level. There were two track return rollers. A small turret, set to the right of the tank, mounted two MG13 machine guns.

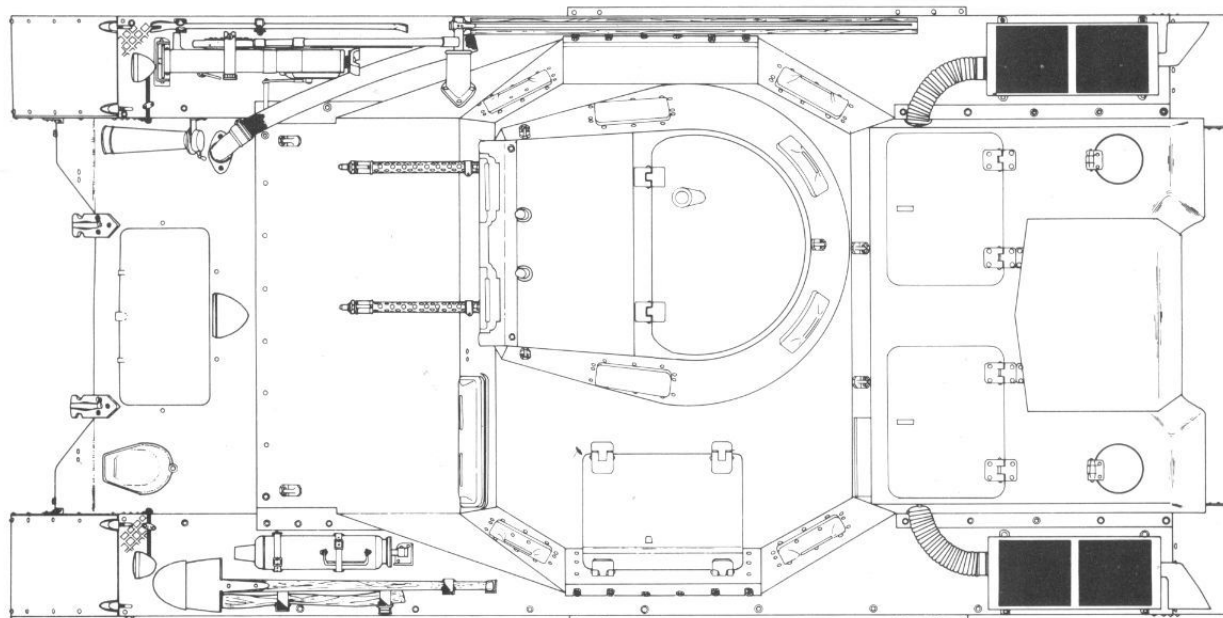
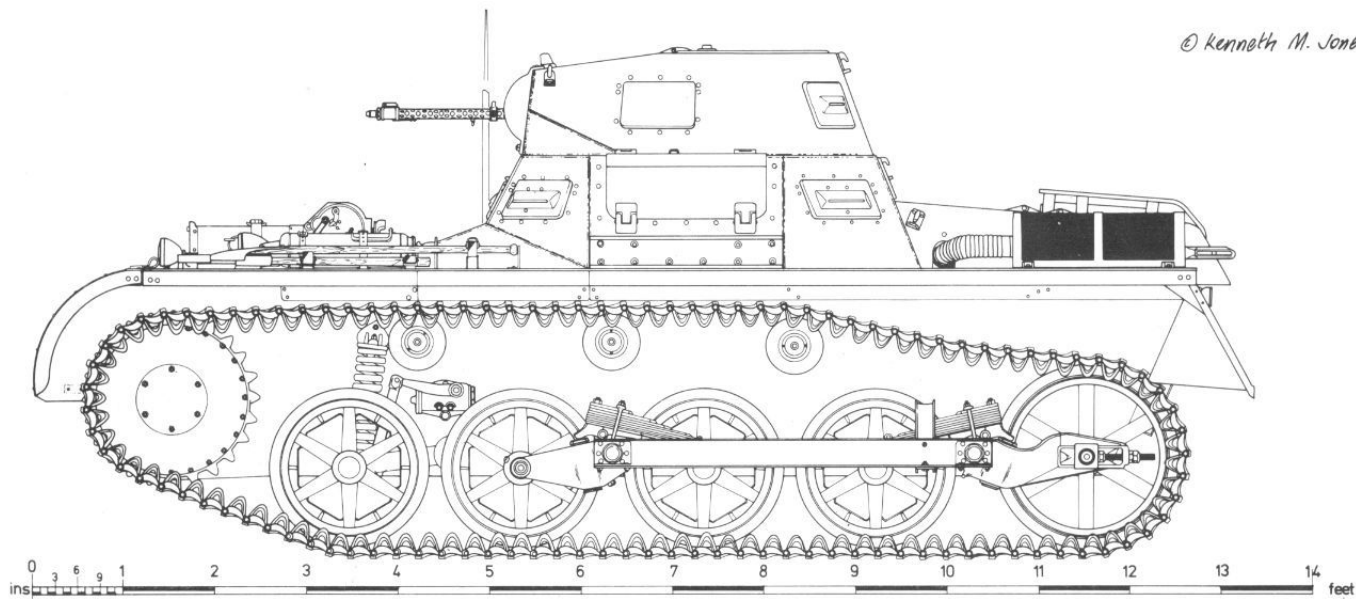


The LaS provided a ready made model for the new light tank specification and Krupp's chassis design was chosen, now however modified in accordance with the fruits of experiments with two British Carden Loyd tankette chassis. These had been purchased, thanks to the good offices of the Russians, for testing at the joint tank school at Kama, near Kazan in the U.S.S.R. Five improved Krupp LaS chassis were built and put through their paces at Kummersdorf in 1933; these seem to have been used to test the modifications to the original suspension that were eventually put into production. In the definitive suspension the rubber-tyred roadwheels were reduced in size and only the front ones each side retained coil spring suspension; the second wheel was carried on a rocker arm connected to a forward pivot coming out from the hull. This arm also supported the third wheel through leaf springs. A second pivot point was connected via another rocker to the large trailing idler and this rocker also supported the fourth road wheel by another double leaf spring. A prominent external girder connected the two pivots. There were now three return rollers.

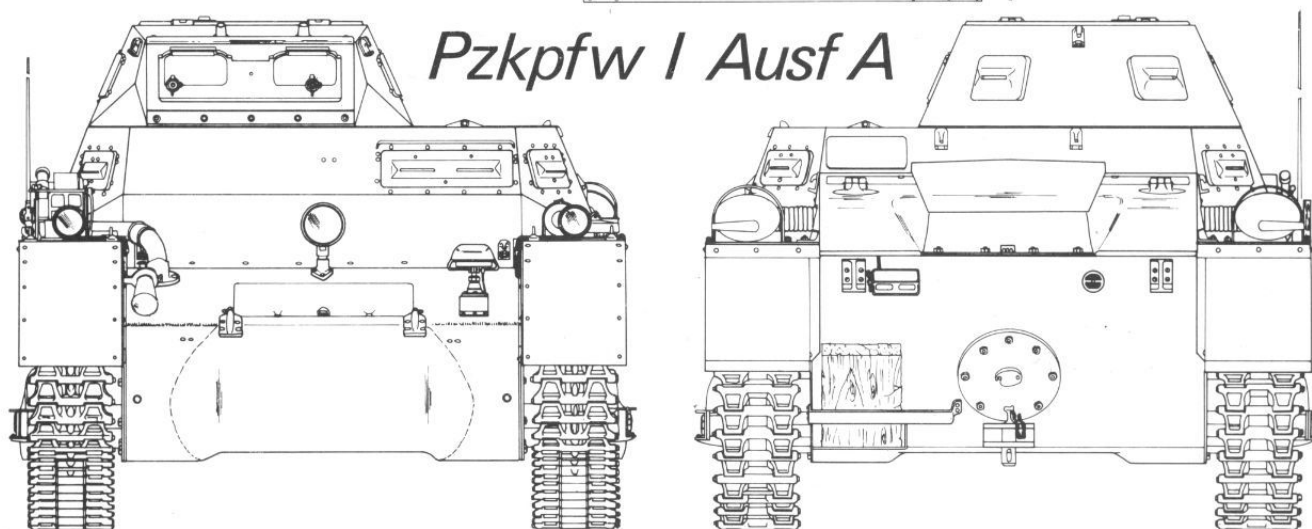
Also adopted for production was a new superstructure design offered by Daimler-Benz. This retained the basic layout of the original L.K.A. prototype but was rather better shaped. It was built out of rolled homogenous steel armour plates as face hardened armour was not yet available. Welding was used throughout except for the front glacis which was bolted to facilitate removal and for the turret mantlet which was also bolted. There were four opening vision ports on the octagonal hull superstructure, one at each corner, although many tanks lacked the rear port on the right hand side. Only the left hand ports had slits and glasses. A flat cover without glass was provided for another port on the left rear of the superstructure while driver's observation was provided by a double slitted visor with two glasses. The turret was provided with four vision ports, one on each side with a flat cover without glass and two at the rear with slits and glasses. Further vision from the turret was obtained by two flaps on the gun mantlets. There were two hatches, a semi-circular flap on the top of the turret opening towards the front and a double flap hatch on the left superstructure top and side.

In accordance with the policy of spreading weapons manufacturing expertise around as many concerns as possible three prototypes of the improved chassis were ordered from each of the following: Krupp-Gruson, Henschel, M.A.N., Rheinmetall-Borsig and Daimler-Benz. The Krupp-Gruson vehicles had emerged from the Magdeburg plant by the end of 1933 as had the first Henschel chassis which ran its first trials in February 1934. By the end of April all 15 vehicles had been completed and full production was underway soon after. Most vehicles were built by Krupp-Gruson and Henschel but Krupp of Essen, Daimler-Benz and M.A.N. had a hand in the programme also.

Parade of early production PzKpfw I Ausf. A in Berlin, pre-war. Note the rear decks have no oil cooler or air outlet armoured cover.



PzKpfw I Ausf A





The L.K.A. I 'kleintraktor' prototype built in 1932. This photographic sequence illustrates the many differences between this vehicle and subsequent production models. The larger diameter wheels of the coil spring suspension with two return rollers in its initial form is clearly shown; compare this feature with the picture on the opposite page. The turret and basic superstructure only were employed on production vehicles, although the rear was very different. This vehicle appears to be under test and on closer examination various fittings that were standardised (i.e. jacking pads, hooks, hinges and vision ports) on production vehicles in the *ausführung A* and *B*. The suspension however proved unsatisfactory and had to be replaced.

OPPOSITE PAGE: A standard production Ausf. A which despite its improved suspension was never an entirely satisfactory cross country vehicle; perhaps due to its inadequate power to weight ratio later improved with the Ausf. B. This vehicle is a very early model lacking bolted armour strips under the entry door and rear deck protection on oil cooler and air outlets.

In its production version the *1A LaS* Krupp was 4.02 metres (13 feet 2 inches) long, 2.06 metres (6 feet 10 inches) wide and 1.72 metres (5 feet 8 inches) high. Its 3460cc Krupp M305 air-cooled, four cylinder, horizontally opposed petrol engine with twin carburettors produced 57 horse power (German rating) and could drive the tank on roads at 37 kph (23 mph). Road radius of action was 145 km (90 miles) reduced to 100 km (62 miles) across country. The little tank could cross a trench 1.4 metres (4 feet 6 inches) wide, it could wade up to 60 cm (2 feet) and climb up a gradient of 30° over an obstacle 37 cm (14½ inches) high.

The gearbox was of the ZF Aphon FG35 crash type with five forward speeds and one reverse; a gear lever was mounted on top of the gearbox housing. Steering was by clutch and brake operated by two levers. Each lever had two grips, one for normal use and the other with a thumb operated catch to hold the lever back and provide a parking brake. No normal hand brake was fitted. The driver sat on the left hand side of the vehicle and had three pedals (left to right) clutch, footbrake and accelerator. The commander occupied the turret on the right and had a seat that traversed with it. Internal communication was by speaking tube and touch signals. The turret was hand traversed and mounted two 7.92mm Dreyse MG13 air cooled machine guns; these were fired separately, the left weapon by a trigger on the elevating hand wheel on the commander's left and the right by a trigger on the turret traversing hand wheel on the commander's right. A telescopic sight was mounted between the guns. Maximum gun elevation was 18° and depression 12°. Ammunition capacity was 1525 rounds in 61 box magazines, of 25 rounds capacity, eight of which were stowed in the turret and the remainder in the hull. Armour protection was as follows:— nose plate, driver's plate, turret front and sides, hull and superstructure sides, lower tail – 13mm; front glacis and turret top – 8mm; belly and top tail – 6mm. Extra 13mm strips might be added to the superstructure sides to protect the ammunition stowage spaces.



Some 818 examples of the original model were produced until 1936 before it was finally replaced on the production lines by the improved '*1B LaS May*'. Early service experience had shown that the power of the original engine was inadequate for movement in difficult country and in 1935 Krupp and Daimler-Benz were given the job of producing a better vehicle. The noisy Krupp engine was replaced by a quieter six cylinder water cooled in-line Maybach NL38TR of 3791cc which produced 100 hp almost double the rating of the original unit; an improved FG31 crash gearbox was also fitted. The new engine lengthened the tank by 40cm (16 inches) and the suspension was modified with an extra road wheel substituted for the idler on the rear rocker arm. A new raised idler was fitted and an extra return roller was also added on each side. The modified superstructure lacked the two vision ports on the rear and the right rear. Weight was up to 6 tonnes. The new engine slightly increased the maximum road speed of the tank to 40 kph (25mph) and, although the range on roads was slightly reduced to 140km (87 miles), cross country range was improved to 115 km (71 miles), an index of the tank's generally improved performance over rough ground. Maximum obstacle crossing capacity, however, remained the same.

Production of the IB by Krupp-Gruson and Henschel began in 1935 and by M.A.N. the following year. By the time these concerns had ceased *LaS* production in 1937 the two Krupp concerns had turned out around 750 IAs and IBs, Henschel 349 and M.A.N. 203. Daimler-Benz also continued to contribute its share, however, and a new *PzKpfw I* manufacturer, Wegmann, was brought into the programme in 1936 to build IBs. Production of the complete *PzKpfw I* tank ceased in the middle of 1937 but Wegmann kept the chassis in production until the beginning of 1939. With the acquisition that year of the CKD/Praga factory in Prague and its transformation into the *Böhmisch-Mährische Maschinenfabrik* another plant became concerned with the *PzKpfw I* programme, carrying out general overhauls at least until 1941.

It took time for production of armoured superstructures to catch up with that of the hulls. *Deutsche Edelstahlwerke* of Hannover-Linden, the manufacturer for all assembly plants produced 368 lower *LaS* hulls in 1933-34 against only 54 armoured superstructures and turrets. The first vehicles to reach the troops were, indeed, delivered as open chassis, known as '*Krupp Traktors*' or '*Krupp-Wannen*' (literally '*Krupp Tubs*'). There was a surplus of superstructures and turrets in 1935, 851 against 811 chassis and there may have been some retro fitting of these to open hulls. Again, however, in 1936 hull production outstripped that of upper works, 574 hulls against 565 superstructures and 557 turrets. Only 31 turrets were produced in 1937 against 114 hulls and 255 superstructures and 22 superstructures only were manufactured in 1938. These figures would point to the completion of some 1867 *LaS* chassis of both models, 1493 as complete tanks. Taking into account command vehicle construction on 190 chassis this leaves 184 chassis remaining as '*Tubs*' throughout their lives although some of these seem to have been fitted with superstructures if not turrets.

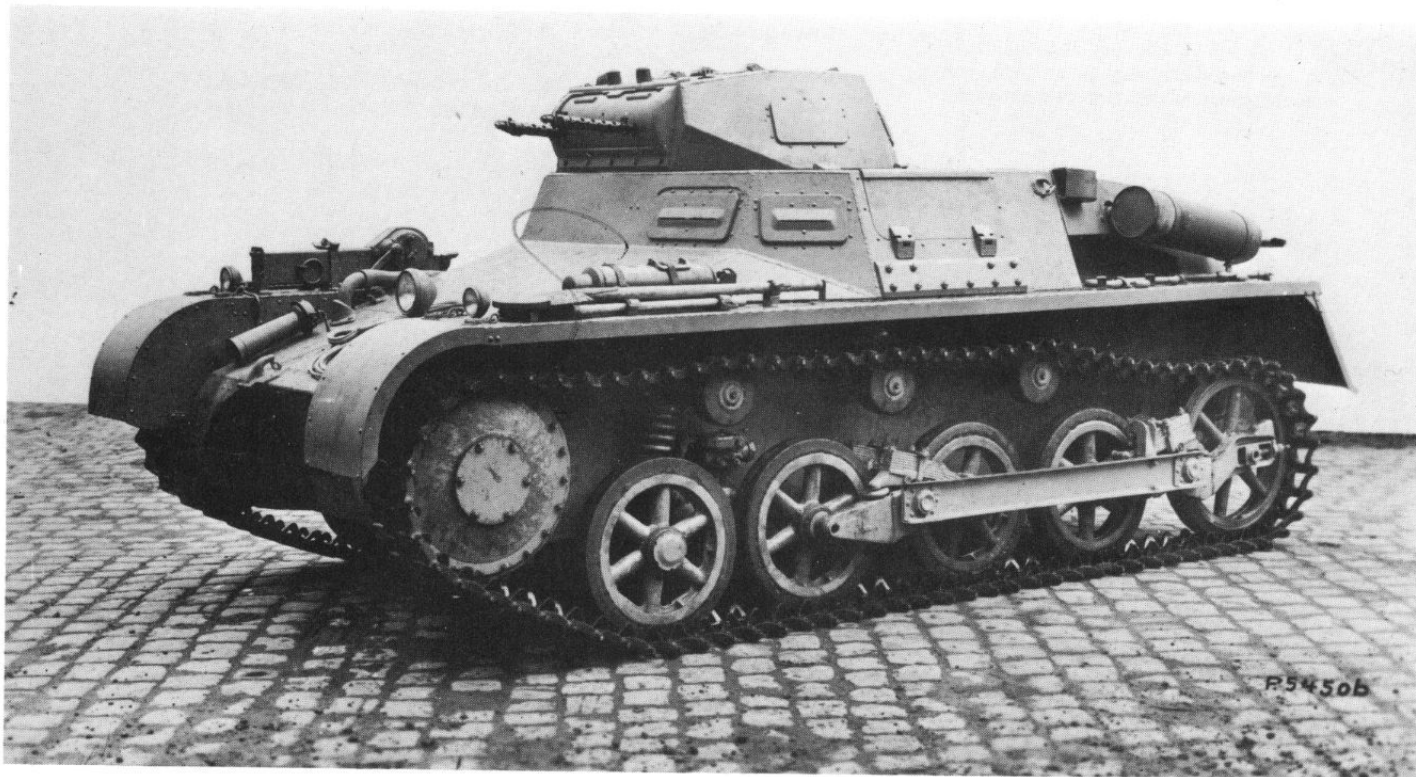
The first 'Krupp Wannen' to be delivered went to the three companies ('Lehrtrupps') of 'Kraftlehrkommando Zossen' ('Motor Instruction Command Zossen'), Germany's first new tank formation. By the summer of 1934 there were three of the first prototype 'Krupp Traktors' to supplement the previous tracked equipment of the *Kraftlehrkommando* which comprised *Rubezahl* commercial tractors and one of the Carden Loyd chassis. This heterogeneous selection gave the new *Panzer* recruits their first experience of handling tracked vehicles. A trickle of turreted vehicles began in September 1934 which allowed firing training to begin. The fully armed vehicles were known as 'MG Panzerwagen' ('Machine Gun Armoured Vehicles'). In the autumn the *Kraftlehrkommando* was enlarged to two *Abteilungen* (Battalions), each with an establishment of four tank companies with an H.Q. tank platoon. In October it was secretly designated 1. *Panzer Regiment*. The advent of more 'MG Panzerwagen' allowed these companies to be given real meaning and to begin proper training. By the Spring of 1935 each company had 21 *LaS* vehicles, three platoons of 7 each; the fourth platoon still had to make do with dummies based on motor cars.

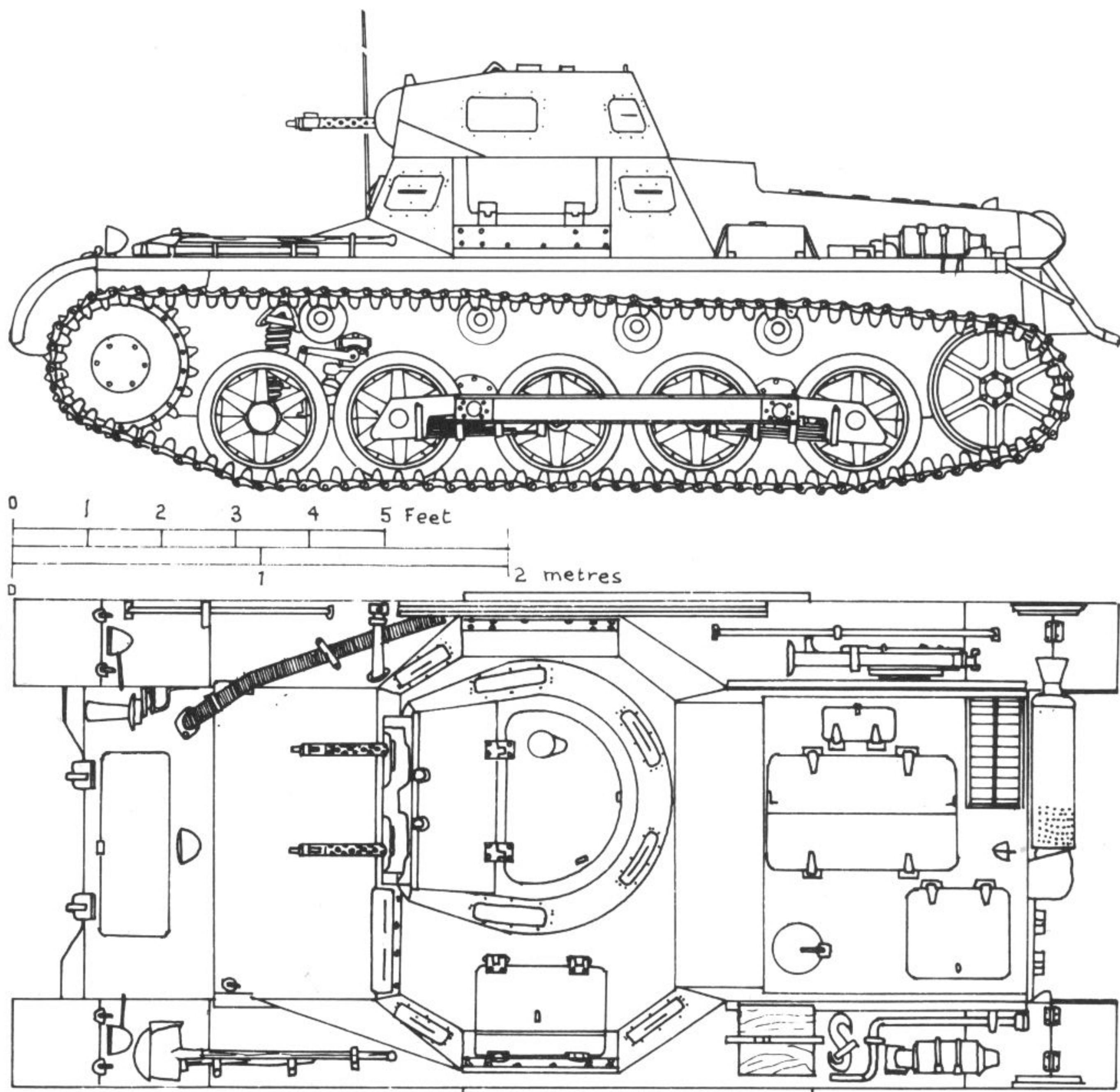
The summer of 1934 had seen another Instruction Command set up, *Kraftlehrkommando Ohrdruf*. This secretly became 2. *Panzer Regiment* in October and by then also comprised two battalions of four companies each. Again suitable vehicles were at first in very short supply and by the beginning of 1935 each company only had a single *Krupp-Wanne*; older commercial type tractors had to be used for driver training. The first turreted *LaS* tanks arrived in February and by June 1935 each company had 9; by July the number had risen to 16.

A late *PzKpfw I Ausf. A* experimentally fitted with a *Krupp M601 Diesel engine*.

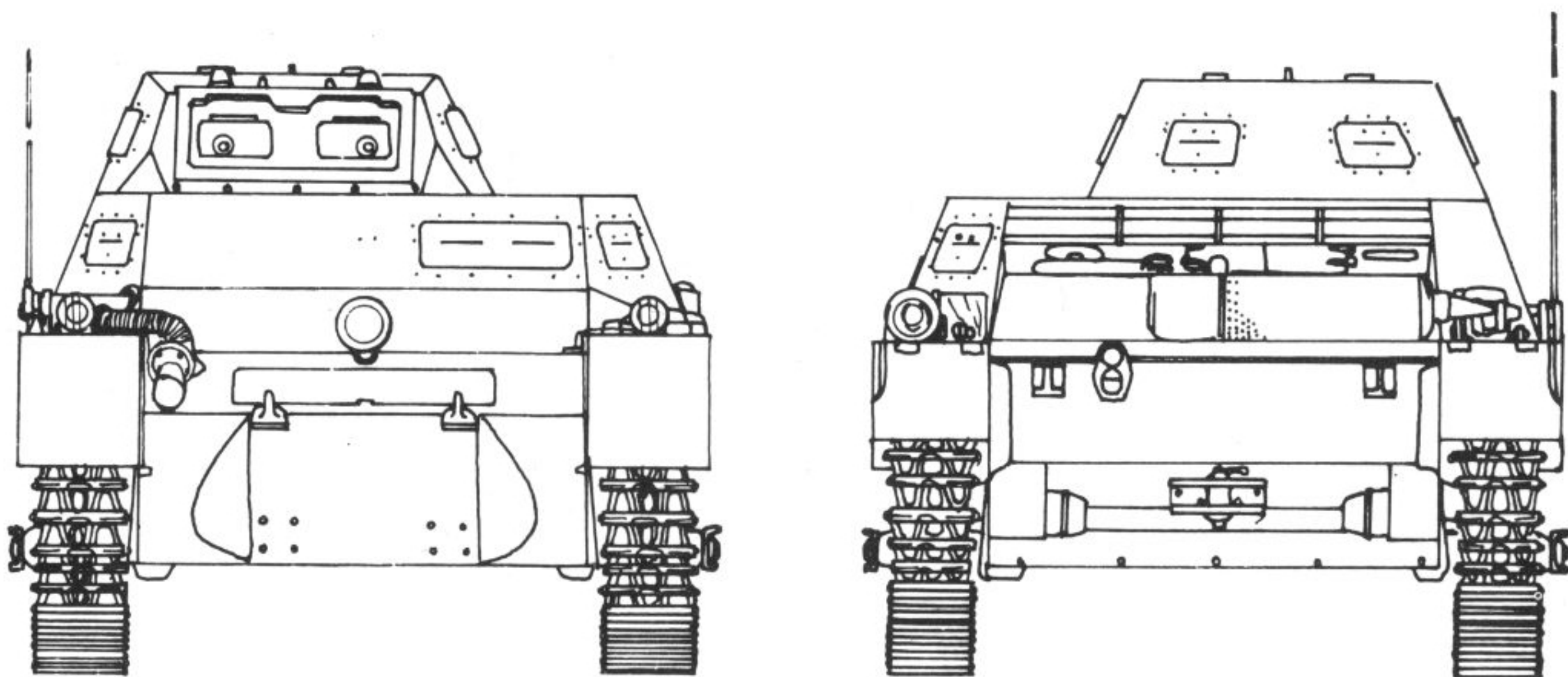
In early 1934 Guderian had displayed to Chancellor Hitler his first handful of *LaS* prototypes together with a platoon each of armoured cars, motor cyclists and anti-tank troops. The *Nazi* leader is supposed to have remarked, "That's what I need! That's what I want to have!" The future *Fuhrer* undoubtedly saw the usefulness of armoured forces in his plans for German hegemony in Europe, at least in terms of their publicity value as an apparent demonstration of the new Germany's modern military muscle. Nevertheless Guderian's troops were given no particular priority and the importance of this first display of their potential may well have been over-rated.

For the Summer 1935 manoeuvres at Munster Lager two battalions of 'MG Panzerwagen' were assembled from the best crews of both 'Kraftlehrkommandos' and these operated together with Germany's first motorised infantry regiment, other motorised units and a ground attack air squadron in an experiment in combined arms mobile operations based around tanks. The ideas of Guderian and other progressives were proved and the way was cleared for the setting up of the first three full scale *Panzer Divisions*. Each was to have a complete *Panzer Brigade* of two regiments, each of two battalions each in turn of four companies. In 1936 the company establishment was set at 22 tanks, four platoons of five with two tanks at company H.Q. Virtually all tanks at this stage were *PzKpfw I*. This was the new designation now adopted for the *LaS* as, with open rearmament, subterfuge was no longer necessary. The 1A *LaS* *Krupp* became the *Panzerkampfwagen I (MG) Ausf A* and the new 1B *LaS* May the *Ausf B*. Both were given the same official ordnance 'special motor vehicle' ('*Sonderkraftfahrzeug*') number, *SdKfz* 101. The previous 'experimental motor vehicle' ('*Versuchskraftfahrzeug*') number had been *VsKfz* 617.





PzKpfw I (MG) Ausf. B (Sdkfz. 101)

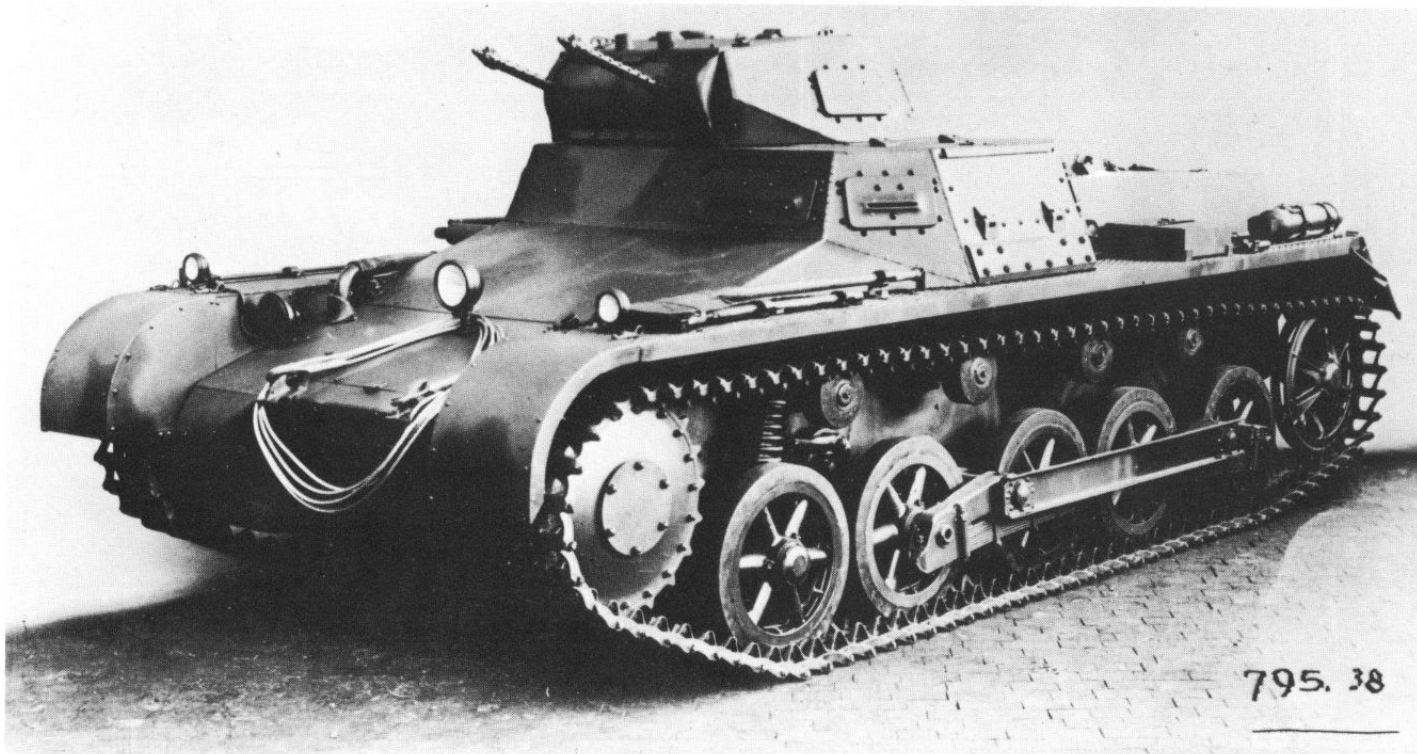


As the German armoured force expanded from its original cadres to some 34 battalions by the outbreak of war in 1939 so the increasing numbers of *PzKpfw I* played a crucial role in equipping and training new tank units. They also played an important part in the spectacular public displays that were held to demonstrate the power of the new *Wehrmacht*. *PzKpfw I* provided the backbone of the armoured units involved in the occupations of Austria, the Sudetenland and Bohemia Moravia in 1938-39. These latter operations provided crucial lessons in logistics as well as showing up the unreliability of early German armour; around a third of the tanks engaged in the Austrian 'Anschluss' broke down, and most of these were *PzKpfw I*.

The *PzKpfw I*'s combat debut had not been too successful either. At least 100 were sent to Spain to support Franco's rebellion. The first batch of 50 or so *PzKpfw I* arrived in September 1936 and more came the next year. The tanks were used to equip the three 'Lehrkompanien' (Training Companies) of the German Condor Legion's *Panzerabteilung 88* but they were later used also by Spanish crews for which the Germans acted as a training cadre. The vulnerability of the little German vehicles was soon shown. Their 13mm protection was only of use against small arms fire. In tank versus tank combat with the Soviet T-26 and BT-5 tanks of the Republicans the *PzKpfw I* was totally outclassed, being both vulnerable to the Russian 45mm guns and unable to inflict any damage with its own machine gun armament. *PzKpfw I* fell into the hands of the Republicans who sometimes gave them increased capability by fitting a French 25mm gun in a heightened turret. The *PzKpfw I* ended up serving with the Spanish Army after the Civil War but, back home, its poor operational performance had created problems for the proponents of the German armoured forces in their struggle with more conservative opponents.

The *PzKpfw I* was, indeed, never intended for combat and it was hoped that by the time Germany went to war it would have been replaced by more battleworthy vehicles. Nevertheless the continued expansion of the panzer arm and slow production of the later German tank models meant that it was still in widespread service as a main battle tank when Germany invaded Poland. 1445 *PzKpfw I* were available for use, almost half the total German tank force of 3195. All the German armoured formations used in the invasion, five full Panzer Divisions, four light Divisions, a semi-formed Panzer Division and the *ad hoc* *Panzerverband Kempf* had *PzKpfw I* on strength. The official 'ideal' Panzer Battalion establishment figures seem to have included four *PzKpfw I* out of the five combat tanks in the battalion H.Q. support platoon and nine *PzKpfw I* out of 21 combat tanks in each of the battalion's two mobilised 'light' companies (one company per battalion was kept in reserve in Germany to provide replacements). There were, however, wide variations from this in actual practice. At one extreme was *Panzerverband Kempf's Panzer Regiment 7* which had three of the four platoons in each of its four 'light' companies and two of the four platoons in each of its two 'medium' companies equipped with *PzKpfw I* (see diagram). All light tanks in its regimental, battalion and company H.Q. units were also of this type making a grand total of 101 *PzKpfw I* out of a total regimental combat strength of 133. On the other hand, a comparatively well equipped Panzer Division, like 1st Panzer, only had around 16 *PzKpfw I* per tank battalion.

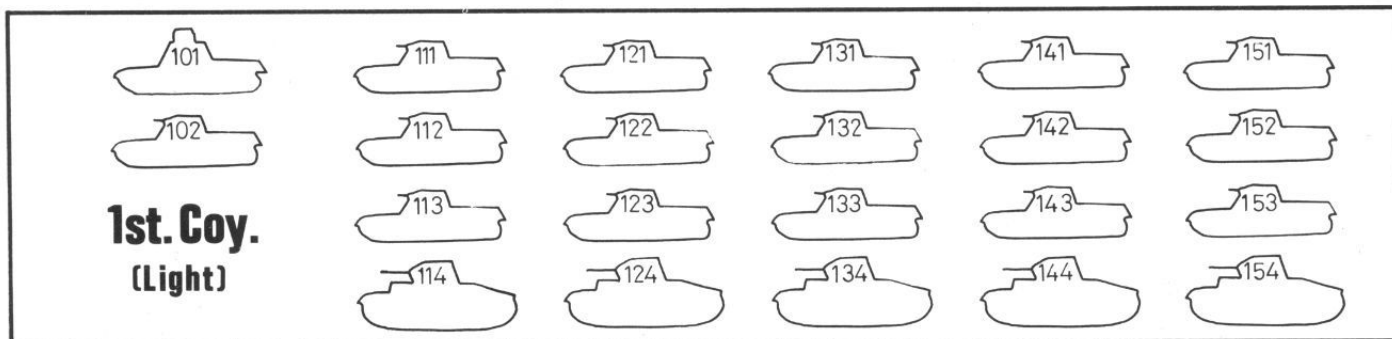
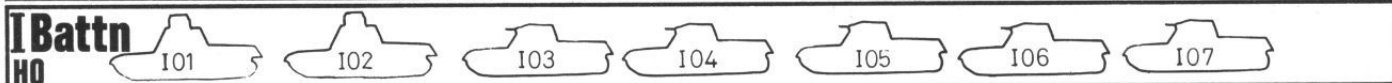
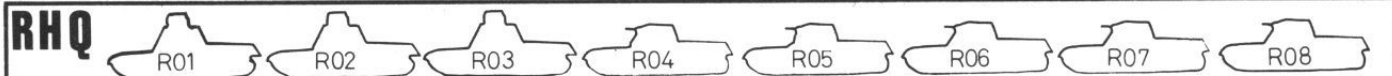
Manufacturer's photograph of a new PzKpfw I Ausf. B. Compare this illustration with preceding pictures of the Ausf. A. The new pattern lengthened suspension is evident.



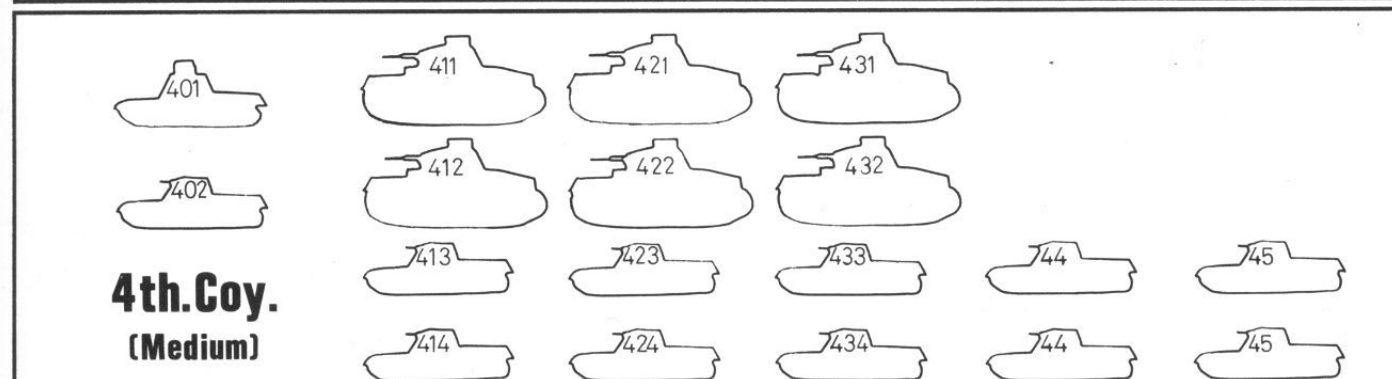
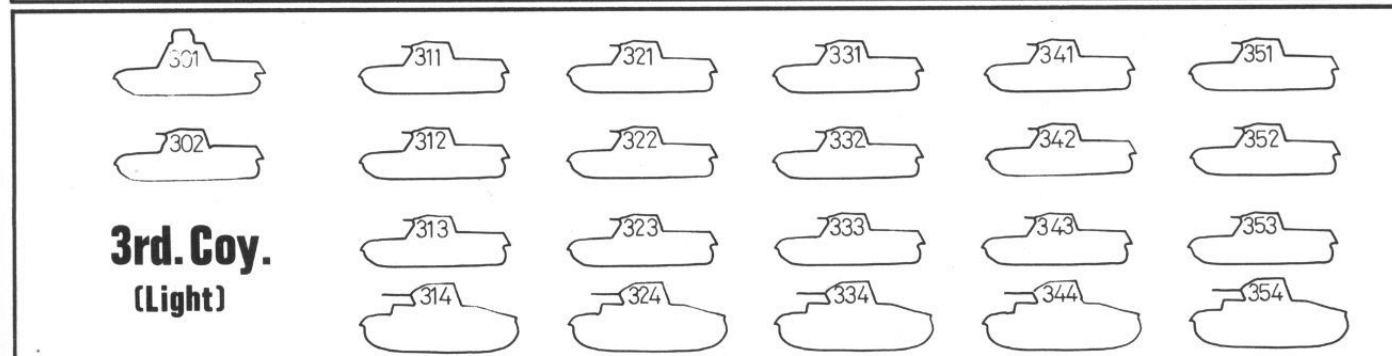
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Panzer Regiment 7 (1.9.39)

This chart shows how the PzKpfw I, PzBfwg I and PzKpfw II were deployed for combat in one of the less well-equipped Panzer Regiments at the outbreak of war. The use of PzKpfw III instead of PzKpfw IV in the medium companies is also noteworthy. (Adapted, with permission, from 'Panzer Division Kempf' by Axel Duckert, 'AFV News' in November 1968).



2nd. Coy. in reserve



II Battalion as above with 7 Coy. in reserve



In action the *PzKpfw I Ausf A* once more had proved prone to bogging down in soft going and both it and the *Ausf B* were extremely vulnerable to Polish anti-tank weapons; of the 217 German tanks knocked out by them in the campaign about 150 were *PzKpfw I*. Nevertheless, once heavy enemy defences had been penetrated or by-passed the *PzKpfw I*'s machine guns could deal with the infantry and cavalry that formed the main forces of the Polish Army and they also had some effect against the Polish artillery crews. The little tank gave enough of a degree of armoured mobility for the Germans to exploit their sophisticated tactics of armoured concentration and manoeuvre and to make their '*Blitzkrieg*' strategy work.

The next action for the *PzKpfw I* came in Norway when *Ausf A* and *B* tanks provided the largest proportion of the 40-50 tanks of *Panzer Abteilung 40* sent north to reinforce the German occupation of Denmark and the attack on Norway in April 1940. The tanks were used in an infantry support role for which they were hardly suitable but, given the lack of anti-tank weapons on the other side, they proved successful enough in sharpening the edge of the German advance.

By the time the Germans lined up their armoured forces for the assault on France there were still large numbers of

PzKpfw I in front line service; 523 out of a total of 2439 combat tanks deployed for the offensive and a German *PzKpfw I* stockpile of 1077. Of the ten full Panzer Divisions the Germans now had available, some only had a handful of *PzKpfw I* on establishment, either 10 (6th-8th Panzer) or 30 (1st, 2nd, and 10th Panzer). The main *PzKpfw I* strength was with 3rd, 4th, 5th, and 9th Panzer Divisions. The first three of these were supposed to have 140 *PzKpfw I* out of a total tank strength of 324 and the last 100 out of 229. The actual numbers varied 'on the ground', 3rd Panzer had 109 *PzKpfw I* out of 280 tanks and 4th 160 out of 343. With their greater proportion of light armour these divisions were deployed on the right of the German advance to protect the flank of the main '*Schwerpunkt*' and to hold the attention of the main allied armies while the more heavily equipped Panzer Divisions sliced across their rear. In Holland 9th Panzer's *PzKpfw I* were able to sweep ahead against a demoralised foe while further south the machine gun armed vehicles could at least identify opposition for the heavier tanks to deal with. Losses in the campaign in the west caused the total number of the German Army's available *PzKpfw I* to fall by over 150 by the beginning of July 1940, to 919.

A fully equipped PzKpfw I Ausf. A on pre-war manoeuvres.



A major pre-war role of the PzKpfw I was to promote to foreign observers perceptions of Germany's military might.



RIGHT: An experimental PzKpfw I Ausf. B chassis mounting a Krupp M601 Diesel engine. This is probably a test bed for this motor with an added weight to compensate for the absence of turret and superstructure armour plate.

BELOW RIGHT: This view of a knocked out PzKpfw I Ausf. A shows up well the layout of the front suspension bogie. The picture was taken following the 'Crusader' fighting at the end of 1941.

BELOW: PzKpfw I Ausf. B of 3rd Company, Panzer Regiment 7 in Wegrov, Poland on 13th September, 1939. Note the unusual variants of the 'Polish Crosses'.



After the French campaign's crushing vindication of *Blitzkrieg* the German armoured forces continued to expand – the number of Panzer Divisions was doubled and the number of Panzer Battalions increased from 35 to 57. This, coupled with the disappointing performance of the German tank industry, meant that PzKpfw I were still required to help flesh out the German armoured units. Worn out or damaged tanks were refurbished to increase stocks of the type to 1079 by the beginning of 1941. 25 PzKpfw I Ausf A and B were with 5th Panzer Regiment when it was sent to Africa to form the armoured core of the 5th Light Division in March 1941. These provided headquarters vehicles at regimental and battalion level and filled out the strength of the medium tank companies which seem to have been short of PzKpfw IV. In such roles as close reconnaissance and screening the PzKpfw I was still of some limited use. More of this type came with 15th Panzer's 8th Panzer Regiment in April. PzKpfw I in North Africa had improved ventilation and larger filters for tropical service. They were known as PzKpfw I Ausf A or B (Tp) (Tp = *Tropisch*).

PzKpfw I went back into action in Europe in April 1941 during the invasion of Yugoslavia and Greece and when the *Wehrmacht* massed for Barbarossa there were still around 180 in front line service for the invasion on the 22nd June, although less than half were with the Panzer Regiments. The others were mainly serving with armoured engineer companies and a few as command vehicles for self

propelled tank destroyer units. The monthly loss rate for the tank – on all fronts – shot up from 34 in June 1941 to 109 in July and 141 in August. After that the PzKpfw I bore less of the brunt of the fighting with only 7 lost in September, 15 in October, 25 in November and 14 in December. There were fewer PzKpfw I tanks to knock out as attrition took its toll and the totally outclassed vehicles were withdrawn from service.

In 1942 the PzKpfw I saw its last major front line service for the *Wehrmacht* on all fronts in Russia and North Africa. Increasingly the remaining vehicles, around 700 in number, were used for garrison, training and internal security duties in France, Norway, the Balkans and Germany itself. Together with captured tanks they helped free more battle-worthy vehicles for service in the front line. 60 PzKpfw I were lost during 1942 and by the middle of the next year only a few *Panzerjäger* commanders were struggling to make viable on a highly dangerous battlefield a tank that had never been intended for combat at all.

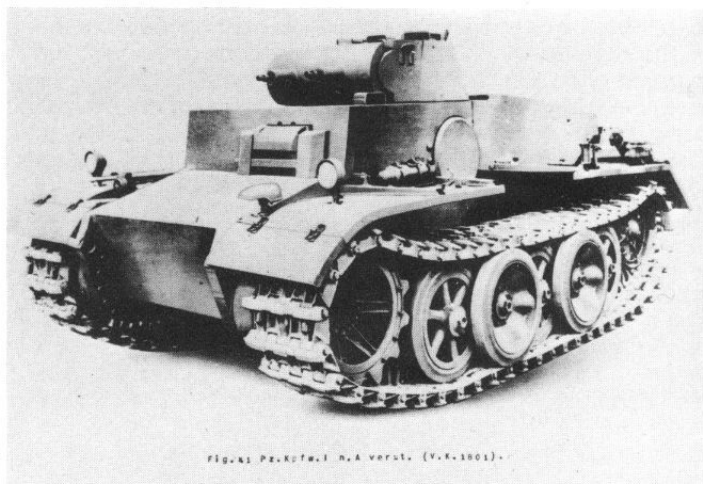
Before the war Krupp had experimented with fitting their M601 horizontally opposed air cooled diesel engine to the PzKpfw I. Both Ausf A and Ausf B tanks were used in the experiments which necessitated considerable redesign of the rear of the superstructure. The M601 had a disappointing power output of only 45 H.P. and the Germans continued to concentrate on petrol engines for their tanks.

A more considerable redesign had begun in 1939 when in September of that year the *Heereswaffenamt* issued a requirement for a new light tank that would be useful for reconnaissance and also for airborne forces. Krauss Maffei of Munich were given the job of developing the chassis and Daimler-Benz the superstructure and turret. The *PzKpfw I* was used as a model for this project, designated *PzKpfw n.A. VK601* (*n.A.* = *neuer Art* = new model; *VK* – *Vollkettenkraftfahrzeug* = Fully Tracked Motor Vehicle; 6 = the weight of the vehicle; and 01 = the prototype number). As it turned out the vehicle weighed 8 tonnes with armour protection of 10-30mm. A 4678cc (150 hp) Maybach HL45P twin carburettor engine gave a maximum speed of 79 kph. (49 mph); range was 300 km (186 miles), ideal for reconnaissance purposes. A new Maybach VG15319 pre-selector gearbox was fitted with eight forward gears and two reverse and a regenerative steering system was used. The tank looked very different from the normal *PzKpfw I Ausf B* being shorter, higher and narrower; the dimensions were: length 4.2 metres (13 feet 9 inches), breadth 1.92 metres (6 feet 3½ inches) and height 2.01 metres (6 feet 7 inches). Herr Kniepkamp of the *Heereswaffenamt* had designed the totally new suspension of five interleaved torsion bar suspended road wheels each side. This gave better weight distribution and enhanced movement across soft ground. This greater mobility was reinforced by wider tracks; 39cm (15 inches) against 28 cm. (11 inches). The tank's obstacle crossing ability was actually less than the standard *PzKpfw I* at only 30 cm. (1 foot) and the trench crossing capacity was reduced to 1.2 metres (3 feet 11 inches) but wading ability was increased to 78.5cm. (2 feet 7 inches). A centrally mounted turret carried a 20mm *Einheitswaffe (EW)* 141 automatic gun and a 7.92mm machine gun. In addition to the prototype Krauss Maffei seem to have built a development series of 40 vehicles by the end of 1943 and they were designated *PzKpfw I Ausf C* (VK601). A couple were sent that year for combat

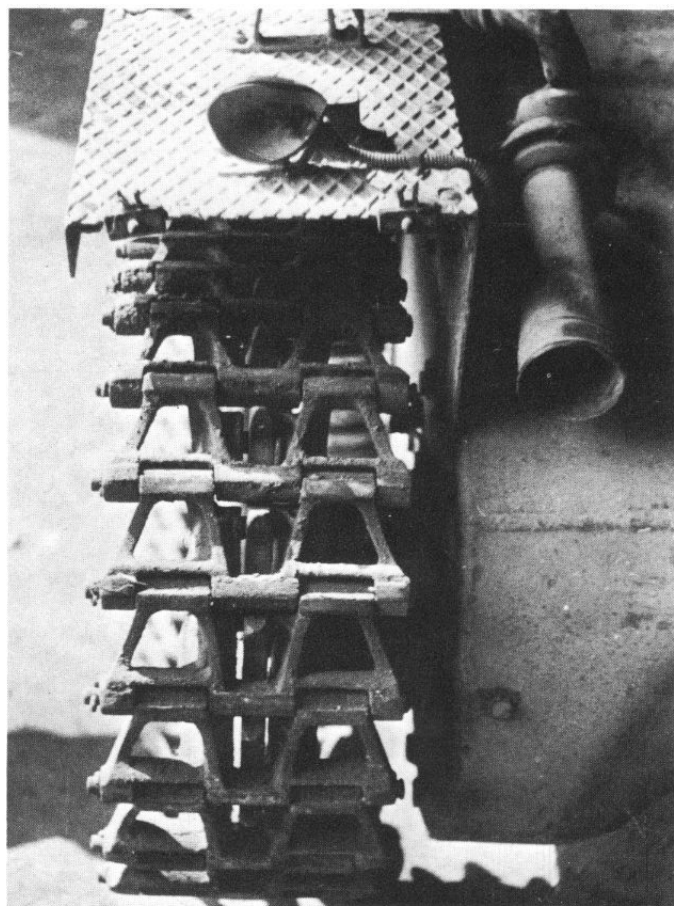
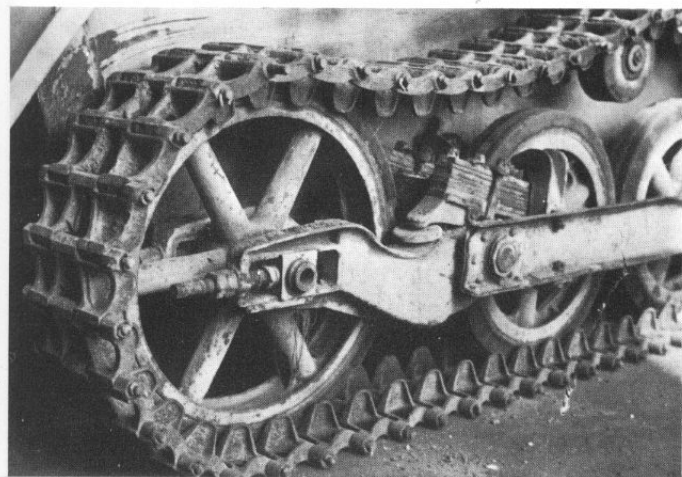
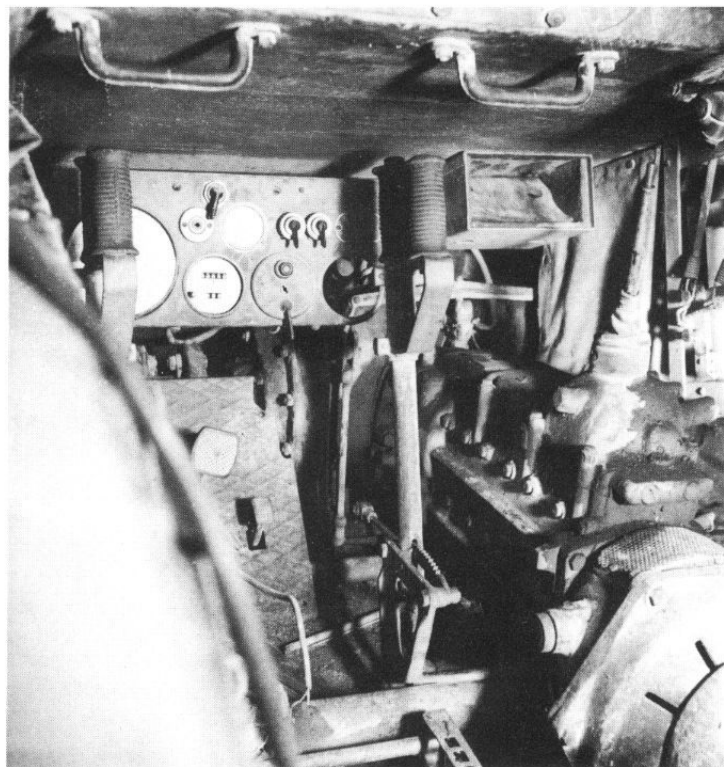
evaluation on the Eastern Front with 1st Panzer Division and the rest were used for training with the reserve army in Germany. One vehicle seems to have been tested with the more powerful HL61 engine as the VK602.

Another development of the *PzKpfw I*, begun in 1939, was a small, 80mm armoured, infantry support tank in the 18-19 tonne bracket, a somewhat conservative reaction to the lessons of the Polish campaign. The order was issued in December of 1939 for a development batch of 30 vehicles with the project designation VK1801. The design was undertaken once more by Krauss Maffei and Daimler-Benz and, not surprisingly, it bore some resemblance to the VK601. The same engine and interleaved suspension were used although the latter was strengthened and the tracks were wider still, 54cm. (21 inches) to spread the increased weight of 21 tonnes. A ZF SSG47 gearbox was fitted, with four forward speeds and one reverse; one experimental vehicle, designated VK1802, had the VK601's VG15319 unit. Steering was by clutch and brake. Speed was reduced to 25 kph (15 mph); range was 150km. (93 miles). Dimensions of the VK1801 were: Length 4.38 metres (14 feet 4 inches), width 2.64 metres (8 feet 8 inches) and height 2.05 metres (6 feet 9 inches). Armament consisted of two MG34 machine guns in a more heavily protected version of the *PzKpfw I* turret. Development of the vehicles took place at a leisurely pace and the order was not completed by Krauss Maffei until the end of 1942. By then the little infantry support vehicle had no place in Germany's armoured requirements and an order for a further 100 vehicles was withdrawn. Various known as *PzKpfw I n.A. verstärkt* (Lit. 'strengthened') or *PzKpfw I (Ausf F)* (VK1801) most of the tanks were used for training but eight were sent to 1st Panzer Division for combat testing in Russia in 1943 and the *Ausf F* also appears to have seen some action on internal security duties in Yugoslavia, a task for which it was well suited.

BELOW: One of the forty *PzKpfw I Ausf. C* (VK601) being used for trials or training purposes. The 2cm turret gun is covered and this tank is fully equipped with external stowage.

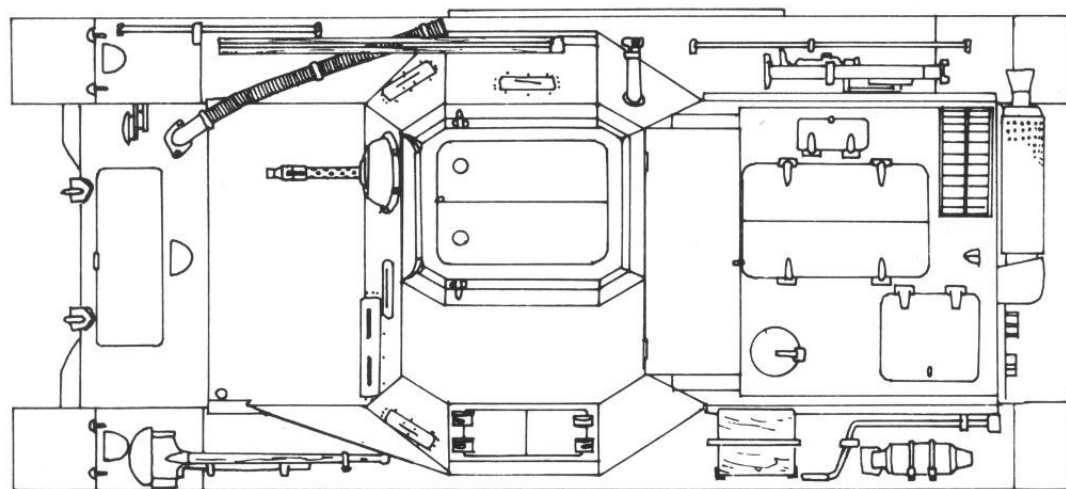
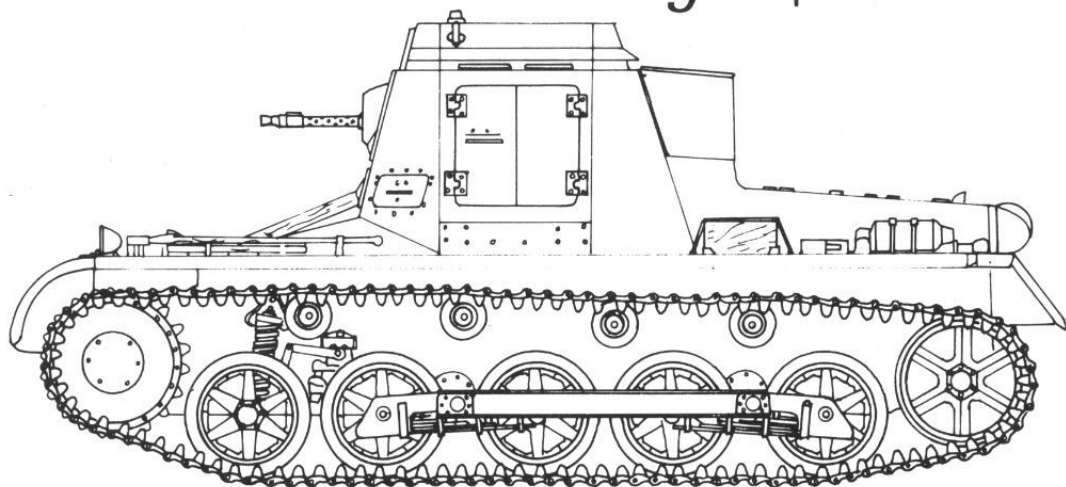


ABOVE: *PzKpfw I Ausf. F* (VK1801). These experimental vehicles possibly saw combat service in Russia and Yugoslavia. By the time they were completed these slow, heavily armoured vehicles did not fit in with current German armoured doctrine and only 30 were built.

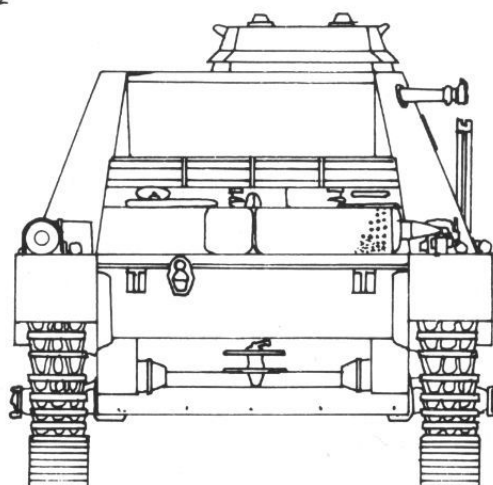
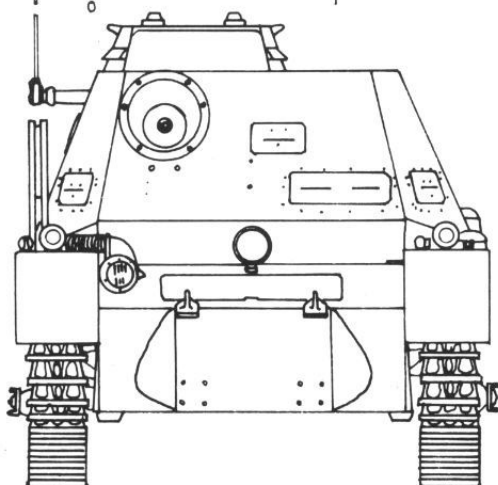


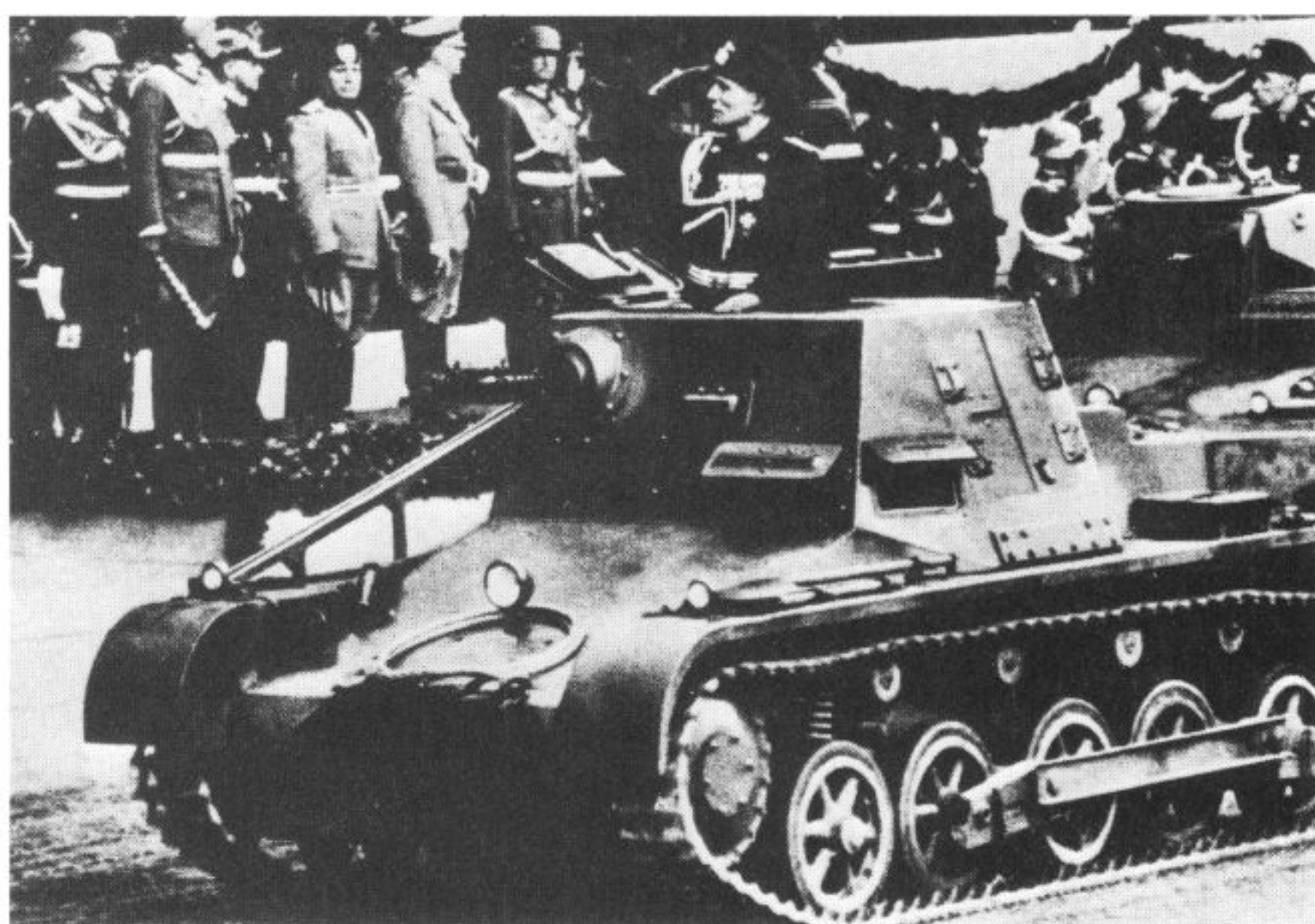
TOP: Instruction on a Krupp 'Wanne' at an NSSK driving school. The double handled steering levers and the gear shift lever – also visible on the PzKpfw I Ausf. A interior at top right – are clearly shown. The trailing idler with its track tensioning facility is clearly illustrated at above left and the single-pin, cast steel track on the right.

Kleiner Panzerbefehlswagen (Sdkfz 265)

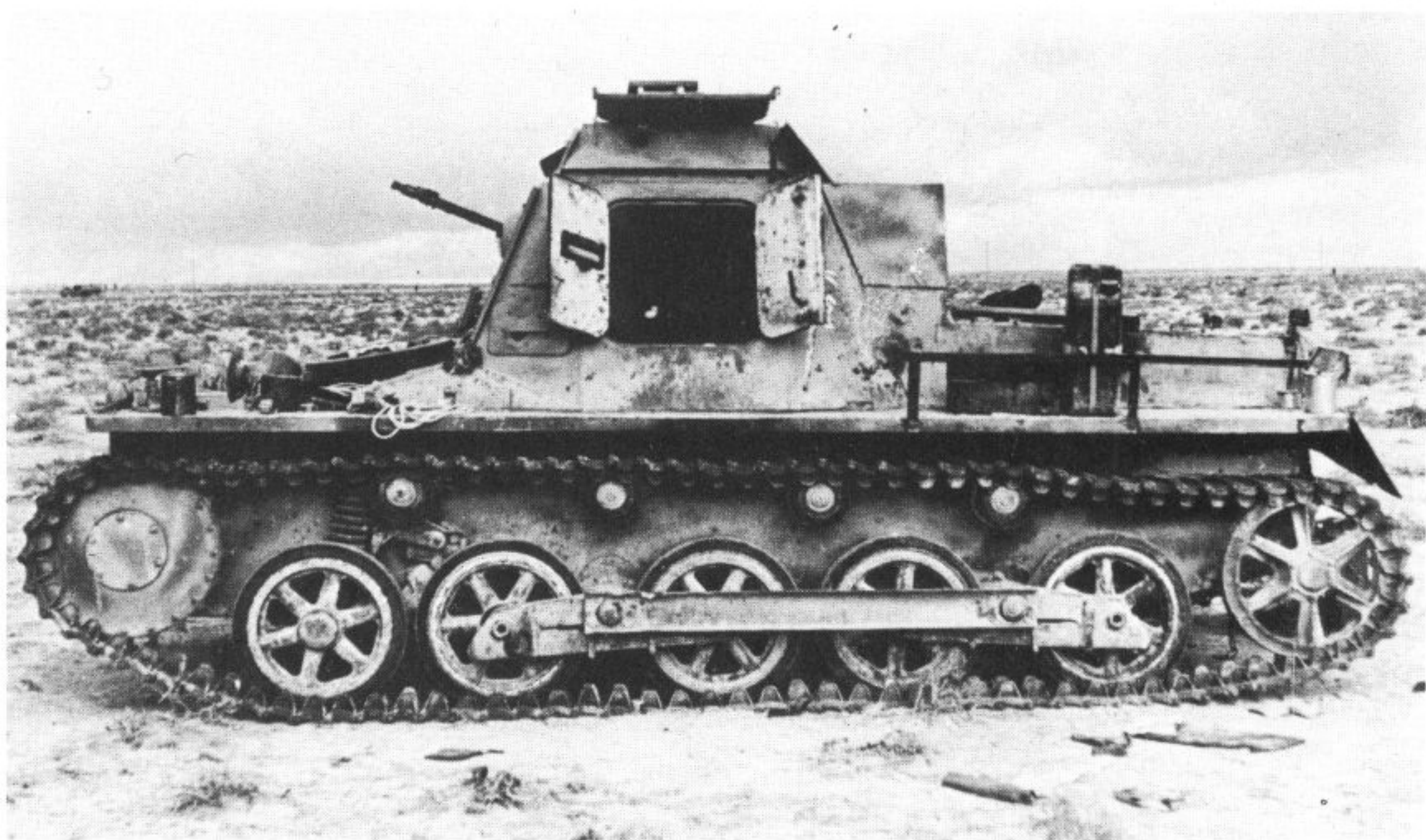


0 1 2 3 4 5 Feet
0 1 2 metres





These views illustrate the various kleiner Panzerbefehlswagen on the Ausf. B chassis. Top left shows an early higher cupola combined with the original MG mantlet which has been plated over. Note the coloured 'exercise bands' on the commander's beret band and under the MG mantlet on strings. The vehicle at the top right has no cupola but has the later type mantlet and bolted armour under the side doors which was not always fitted. Vehicles not originally fitted with cupolas were probably the 2K1B models. Above is a 3K1B (?) with standard cupola in action in Poland with Pz. Rgt. 7. Right are up-armoured vehicles captured and examined by the British in North Africa.



Radio control by commander 'leading from the front' was vital to developing German ideas of fast mobile war in which tanks would be used en masse and in close co-ordination with other arms. Not many *PzKpfw I* in their first exercises were fitted with radios and units had to co-ordinate their actions by means of flag signals. After considerable procurement problems radios eventually became standard in *PzKpfw I*, an *Fu5* transmitter/receiver or, more usually, just an *Fu2* receiver being mounted in the right front of the fighting compartment. The driver doubled as radio operator. Two over-worked crew members might just be able to fight the tank but it would be difficult to control units in such a situation. Specialised command vehicles were, therefore, designed with a larger fixed superstructure and long range radio for communication between battalion H.Q. and its subordinate companies. An extra crewman was carried as full time radio operator and there was also room for a small map table for the commander. The first half dozen *Kleiner Panzerbefehlswagen* ('Small Armoured Command Vehicles') Sd.Kfz. 265, which appeared in 1935, were based on the *Ausf A* tank chassis and were designated *1 KI A*; the superstructure was built on the right hand side of the vehicle in place of the turret and no armament was carried. Intended primarily for company commanders the vehicle was initially known as '*Kompanie Chefpanzer*'.

Most of the 190 *Kleiner Panzerbefehlswagen* produced by Daimler Benz between 1935 and 1938 were, however, of the *2 KI B* or *3 KI B* type on the *Ausf B* chassis, which may indeed have been developed primarily for the command vehicles. The superstructure was further enlarged right across the vehicle. Driver's vision was provided by a double slotted visor in the front plate. A further single slotted visor was mounted above this to the right and similarly fitted vision ports were on each forward side plate and the centre side plate on the right hand side. All these slotted plates were fitted with glass blocks. A plain flap covered a further port in the superstructure rear. Twin doors, the left hand of which was fitted with a glassed vision slit, provided access to the fighting compartment on the left side plate of the superstructure. Plain twin hinged flaps sometimes provided an escape hatch on the roof but more usually a prominent cupola was fitted with two glassed observation slits on all sides. The cupola had a twin door hatch, the right door of which had a small circular port covered by a hinged flap.

A 7.92mm machine gun was usually mounted in the right superstructure front to be fired by the commander; 900 rounds of ammunition were carried. An external 'ball' mantlet for the machine gun later replaced the earlier internal model. This seems to have coincided with the replacement of the original *MG13* by the later 8-900 r.p.m. *MG34*. A telescopic sight was provided but the machine gun could also be dismounted for use outside the vehicle. The height of the new *Kleiner Panzerbefehlswagen* was increased to 1.99 metres (6 feet 6 inches) and the vehicle weighed 5.88 tonnes. Armour protection was 14.5mm. on the superstructure front, sides and rear and 8mm. on the roof. The rest of the chassis was armoured as before. Later, *PzBfwg I* has extra 19mm armour plates bolted to the nose, superstructure and cupola front and a 12mm plate added to the front glacis (the exact arrangement might vary from vehicle to vehicle).

The radio sets carried by the *PzBfwg I* were an *Fu6* and *Fu2*. The former was a 20 watt transmitter/receiver and had almost double the range of the more normal 10 watt *Fu5*, circa 13-16km. (8-10 miles) against 6-10km, (4-6 miles). There was an extra generator to supply the increased power required from the batteries. In the first *1 KI A Kompanie Chefpanzer* a prominent frame aerial was carried on the right front of the vehicle in addition to a whip aerial on the right rear of the superstructure. In the more numerous later command vehicles this former structure was replaced by a long flexible mast which folded down into a diagonal holder. Latterly a large '2 metre' frame antenna might be fitted around the superstructure. This arrangement was probably a field modification and was particularly associated with battalion H.Q. tanks. Presumably it either allowed better long range radio reception with the original *Fu6* or denoted the fitting of the still longer range *Fu8*.

Kleiner Panzerbefehlswagen seem to have been allocated on the following basis: three to each Panzer Regiment H.Q. (for the commander himself, the adjutant and the signals officer), at least two to Battalion H.Q. and one each per tank company where, together with a normal *PzKpfw I* tank it formed Company headquarters. The vehicles were also used by Panzer Brigade H.Q.s. *PzBfwg I* were sent to Spain and went into action again in Poland. The advent of the larger tanks with more space and a larger number of crew members together with the general adoption of the *Fu5* radio made the provision of special command tanks to companies unnecessary and withdrawal of the *PzBfwg I* at this level seems to have begun by 1940. Larger *PzKpfw III* based command vehicles also began to supplement and replace the smaller vehicle at higher levels. Nevertheless shortages of heavier armour meant that it took time for this to occur and *PzBfwg I* went back into action in Norway. There were still 96 deployed in various H.Q. roles for the invasion of France and the Low Countries. A few *PzBfwg I* went to North Africa in 1941 (three were with 15th Panzer Regiment) and *PzBfwg I* were used by higher Panzer H.Q.s. in the first eighteen months or so of operations in the U.S.S.R. before being lost, withdrawn or replaced by larger command vehicles. Some *PzBfwg I* ended their days providing mobile command and/or observation facilities for armoured engineer, tank destroyer or artillery units, and some were used as armoured ambulances.

PzBfwg I with 2 metre frame antenna.



A large number of *PzKpfw I* chassis were used as ammunition carriers. Originally some 51 *Ausf A* vehicles were converted to this role, designated *PzKpfw I(A) Munitionsschlepper* (Sd.Kfz.111). The turret was removed and replaced with an armoured hatch. These may have originally been built like this in 1934-5 (they would account for most of the turretless vehicles fitted with superstructures) or they may have been converted in 1939. Their role was to give the tank unit's supply companies a means of supplying tanks in the front line. From 1942 more *PzKpfw I* chassis of both *Ausf A* and *B* were converted to the *Munitionsschlepper* role, their turrets being replaced by a large open box. These were used by tank destroyer units, among others. In 1943 it was ordered that all remaining *PzKpfw I* should lose their superstructures and become ammunition carriers, although some vehicles lost only their turrets. These *Munitionsschlepper* vehicles were also used as general supply carriers.

As discussed above similar open chassis had been utilised as driver training vehicles from the earliest days of the Panzer arm. These tended to retain the 'LaS' designation. The training hulls were passed to the *N.S.K.K.* (*Nationalsozialistisches Kraftfahrkorps* – National Socialist Motor Corps) when that body took over tank driver training during the war to release soldiers from the task.

Some of these open 'tubs' had been originally used as carriers and recovery vehicles for the vital vehicle field maintenance groups who had to keep up with the mechanised units to recover and to put back into the field damaged and broken down vehicles. Rails were placed around the open crew compartment to help contain stores and equipment. The designation was *Instandsetzungskraftwagen I*: each Panzer Company was allocated one vehicle to its *Instandsetzungstrupp (I-Trupp)*. *PzKpfw I* with superstructures but no turrets were used for this purpose also. As tanks got bigger the little vehicles proved inadequate for the task and by the end of 1941 they had been transferred to supply carrying or training roles. Such open '*Wannen*' lent themselves to a wide variety of purposes, some were even used as transport for the military bands of Panzer Regiments!



ABOVE: 9 Panzer Division's *Instandsetzungskraftwagen* in the Balkans. Note its glass windshield. BELOW: The *PzKpfw I* was totally outclassed in the Western Desert and suffered accordingly.



An important latter use for the *PzKpfw I* was to provide tanks for the engineer battalions (*Panzer Pionier Bataillonen*) of Panzer Divisions. In March of 1940 the order was issued that a third company of each engineer battalion should be equipped with armoured vehicles. Each armoured company was allocated a tank platoon of ten *PzKpfw I* and two *PzKpfw II*. These would provide support for combat engineering operations.

In order to provide even more punch for the engineers their tanks were equipped with '*Ladungsleger*' (i.e. explosive charge layer) equipment. Vehicles so fitted were known alternatively as '*Zerstörerpanzer*' (literally 'Destroyer Tank'); the whole engineer tank platoon was indeed sometimes known as the '*Zestorerzug*'. In one '*Zerstörerpanzer*' version an inclined ramp was placed over the rear of the *PzKpfw I*. The vehicle was reversed up to the target and a large box-like delayed action explosive charge slid down to the rear. This seems to have been used by *Pionier Bataillon 58* of 7th Panzer Division. Another, more common, development mounted two long swivelling arms on the rear superstructure. These arms carried a 75kg (165lb) explosive charge which could be swung over the top of the tank and dropped in front of it. Such *Ladungsleger* vehicles seem to have been used by the *Pionier Bataillonen* of all ten of the original Panzer Divisions; sometimes all their *PzKpfw I* were so equipped. *Ladungsleger PzKpfw I* seem to have seen combat service both in the western offensive in 1940 and in the Balkans in 1941. *Ladungsleger* equipment was also used in Russia but was not very successful. To lay the charge required uncomfortably close proximity to the enemy for a tank of *PzKpfw I*'s level of armour protection. Soviet opposition showed up these deficiencies in rather greater relief and the equipment soon went out of use.

Another modification sometimes added to the engineers *PzKpfw I* was an inclined ramp, sloping upwards towards the front. Mounted on top of this ramp was another which could be swung down to the rear to allow a vehicle to be driven up from the ground. The ramp vehicle could be driven into or up to an obstacle and tanks driven over it; two vehicles coupled head on made a complete bridge for tanks. This modification may well have seen service on two *PzKpfw I* of *Pionier Bataillon 58* in France in 1940.

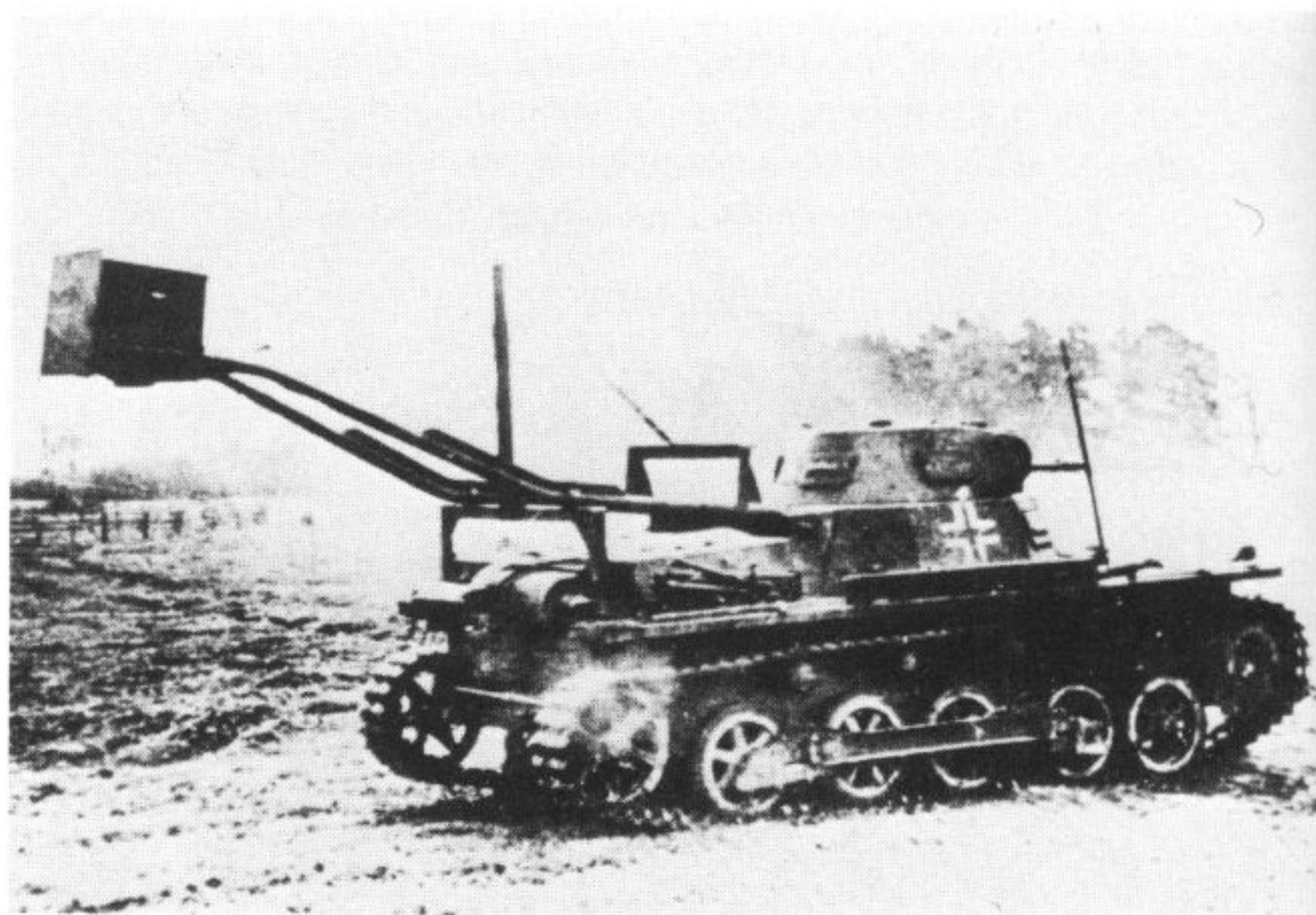
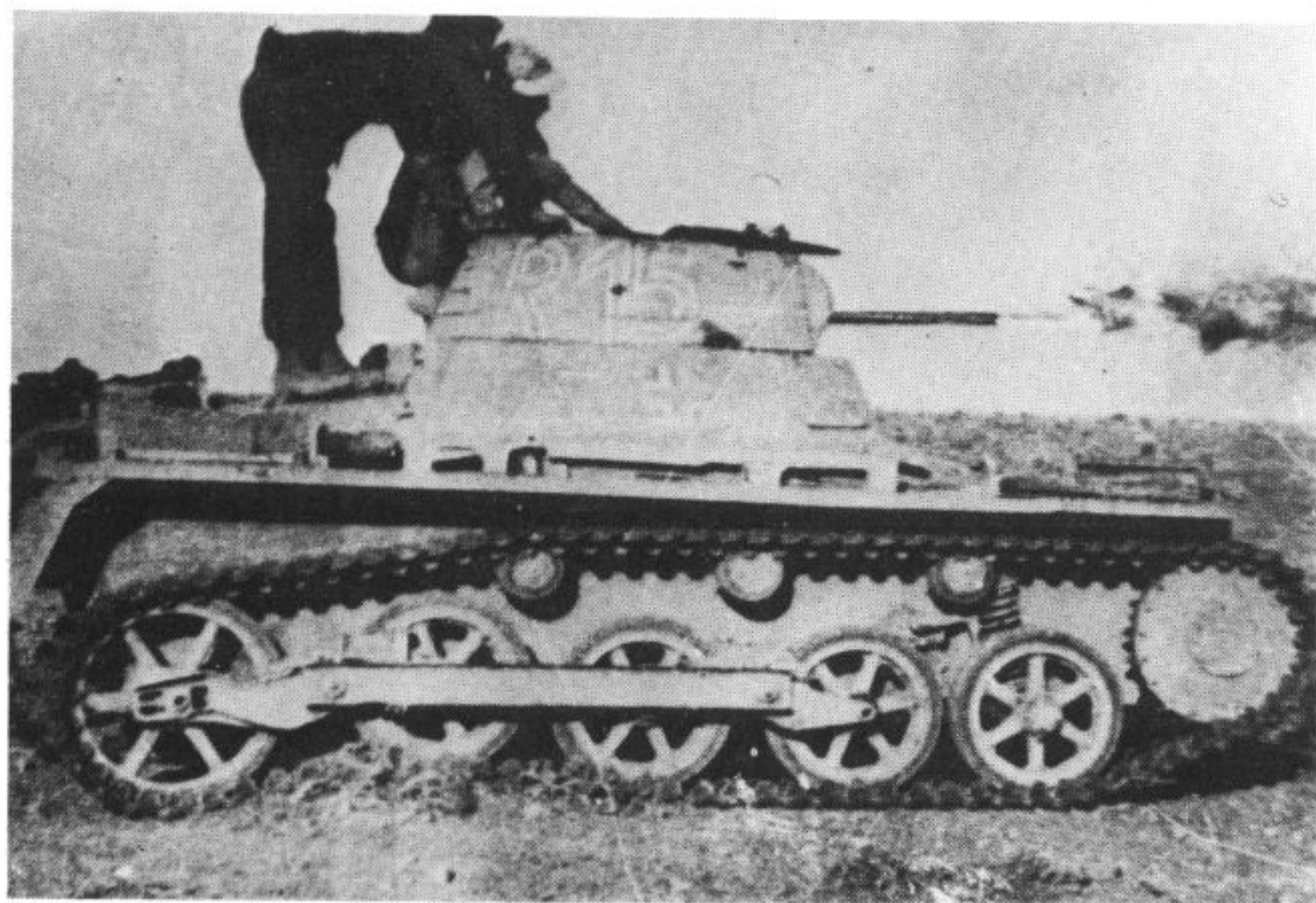
Plain *PzKpfw I* tanks seemed to have remained in service until at least the beginning of 1943 when the order was issued to remove the turrets of all remaining *PzKpfw I*. The engineers still found the turretless vehicles useful and in this role the vehicle was known as the *Pionier Kampfwagen I*, although this designation may well have been used loosely for all the engineers' *PzKpfw I*.

During the fighting in North Africa, the 5th Panzer Regiment converted at least one *PzKpfw I Ausf A* tank into a flame thrower vehicle. The conversion was quite simple; the right hand machine gun was removed and a standard infantry *Flammenwerfer 40* fitted in its place. The fuel and nitrogen tanks were carried inside the turret. Enough fuel was carried for about ten one second bursts; maximum range was about 30 yards. The vehicle was part of the Regiment's H.Q. unit and was used to some effect during the attack on the Tobruk defences at the beginning of May, 1941.

The *PzKpfw I* does not seem to have been exported in any great numbers despite being given the export designation *L.K.B.* in 1938. Its use by the Spanish Army is noted above and it was also supplied to the Finns and Hungarians, the latter also receiving the *PzBfWg I*.

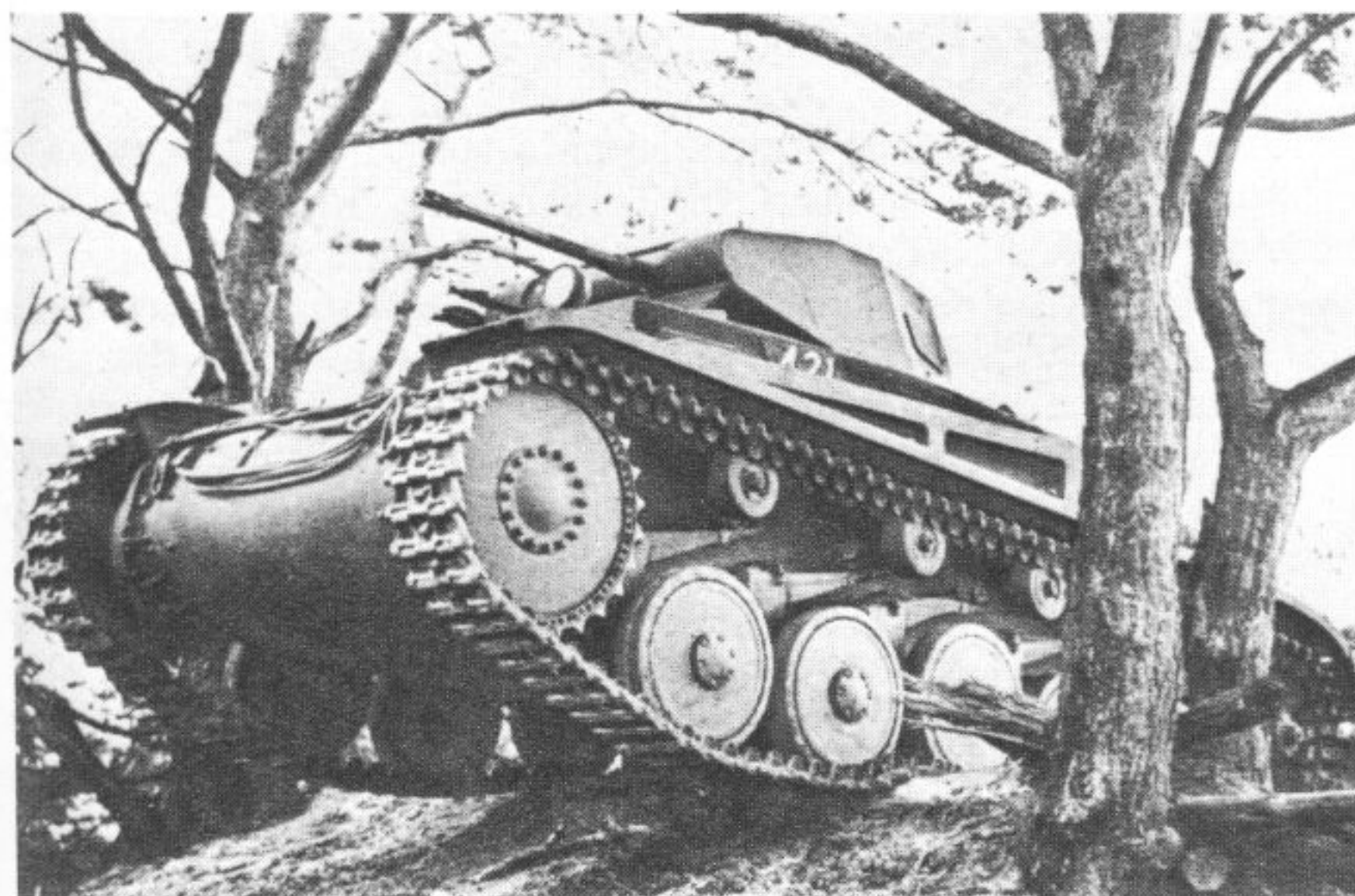
The only *PzKpfw I* not mentioned above are the self-propelled guns which used the chassis. Both the 4.7cm *PaK 36(t)* anti tank gun and the 15cm *sIG 33* heavy infantry gun were mounted on the *AusfB* chassis but these will be dealt with in a future volume.

BELOW: A re-touched photograph of Panzer Regiment 5's *PzKpfw I Ausf. A* flamethrower tank, reported used against the Tobruk defences. Markings show it to be a regimental headquarters vehicle.



ABOVE: A standard '*zestörerpanzer*' used by the *Panzer Pionier Bataillonen* of the 10 original panzer divisions, 1940-41.

THE PzKpfw II



A comparison of – at left – the original production PzKpfw II Ausf A-B and, at right, and up-armoured Ausf. A-C as used in France in 1940. Note the rounded full nose of the original model pictured left and the squared-off appearance caused by adding the extra 20mm nose and 14.5mm glacis plated. The turret and superstructure front have also been strengthened by the addition of extra 20mm plates.

In 1934 with re-armament suddenly speeding up and the definitive German battle tanks still in the early stages of development General Lutz and his staff decided that a rather more powerful light battle tank was required to supplement the little *LaS* vehicles. In July, therefore, Weapon Department 6, The *Heereswaffenamt* Office responsible for tanks, issued a specification for a vehicle in the 10 *tonne* class armed with a 20mm cannon. The project, code named *LaS 100*, was given to three firms; Krupp, Henschel and M.A.N. All produced prototypes that were presented to 'In 6' in the Spring of 1935. Krupp had built a new *L.K.A. 2* tank by the simple expedient of placing a 20mm armed turret on their old *L.K.A.* chassis which was fitted with a modified superstructure. The other two firms produced chassis which utilised new suspensions. The Henschel vehicle had six roadwheels suspended in pairs from three hull mounted pivots by means of externally mounted rocker arms and leaf-springs. The M.A.N. design showed the influence of the Carden Loyd experiments by utilising a rather similar suspension but with the addition of a long external girder connecting the three pivots. This last design was the one chosen for the new tank with M.A.N. in charge of the chassis development and Daimler-Benz the superstructure design. Other manufacturers joined M.A.N. and Daimler-Benz to produce the vehicle; FAMO of Breslau, Wegmann of Kassel and, from 1936, MIAG of Brunswick.

By the end of 1935 the first ten 1/*LaS 100* tanks had emerged from M.A.N.'s Nuremberg plant, their initial service designation being '2cm MG Panzerwagen (VsKfz 622). The 7.6 *tonne* vehicles were powered by a 6 cylinder 5698cc Maybach HL57TR engine of 130 h.p. This drove through a ZF SSG 45 gearbox with six forward speeds and

one reverse; the gear lever was on the right of the driver. Steering was by an M.A.N. epicyclic clutch and brake system operated by two levers. Maximum speed was 40 kph (25 mph) and maximum range on roads 210 km. (130 miles). Across country the range was reduced to 160km. (100 miles). The tank could cross a 1.8 metre (5 feet 11 inches) trench, climb a 42 cm (1 foot 4½ inches) obstacle and wade to a depth of 92 cm. (3 feet).

The Daimler-Benz design superstructure and turret were again made from homogenous rolled armour plate. Welding was again used to join the plates together but the homogenous armour allowed plate bending to be resorted to in order to minimise welding time and to speed production. Bent plates were used for the superstructure sides and for the nose plate. Observation for the tank's occupants was provided by vision ports covered by slitted visors on each side of the superstructure just to the rear of the front plate; usually, however, on the pre-production vehicles the right hand vision port was plain without the visor. Another port and slitted visor was in the left rear wall. The driver's vision port was covered by a plain flap but above this was a binocular type episcopes for use when 'closed down'. Four rectangular vision ports were provided on the hexagonal turret, on the two right hand faces, on the rear left face and on the rear plate itself. Normally the right rear and back visors had slits and the other two plain flaps. Each slitted visor had a 12mm glass block. A periscope was provided for the commander in the turret roof just in front of the twin door hatch and there were two opening flaps in the turret mantlet. A driver's escape hatch was provided in the top left of the curved glacis and a third escape hatch, for the radio operator, was at the rear alongside the engine.

Protection was 14.5mm. all round except on the rear decking and lower tail which was 10mm. thick and the belly which was 5mm. Armament comprised a turret mounted 2cm KwK 30 with 180 rounds and a 7.92mm MG34 with 1425 rounds (19 × 75 round drums): the 97.16 calibre KwK 30, which was fed by a ten round box magazine was an automatic weapon firing both armour piercing and H.E. ammunition at a rate of 120 r.p.m. With A.P. tracer rounds fired at a muzzle velocity of around 801 m/s (2625 f.p.s.) it could penetrate 25 mm. of armour angled 30° from the vertical at 400 yards, enough to deal with most contemporary light tanks. A telescopic sight was provided in the centre of the mantlet for both guns with a range scale graduated to 1200 metres; there was also an open sight for use when necessary graduated to 800 metres. The commander occupied the turret and doubled as gunner, operating the KwK 30 by a trigger on the elevating handwheel on his left and the MG34 by a trigger on the traversing handwheel on his right. It took ninety turns to traverse the turret fully but, if necessary, the wheel could be disengaged and the turret just pushed round directly. Maximum gun elevation was 20° and depression 9½°. A full radio fit was intended with provision for both Fu5 and Fu2. The radio operator sat in the left rear of the fighting compartment with the driver at the front on the left. All three crew members were connected to the radio for both speech and listening and there was voice tube communication between driver and commander. Overall length of the tank was 4.38 metres (14 feet 4½ inches), width 2.14 metres (7 feet) and height 1.95 metres (6 feet 5 inches).

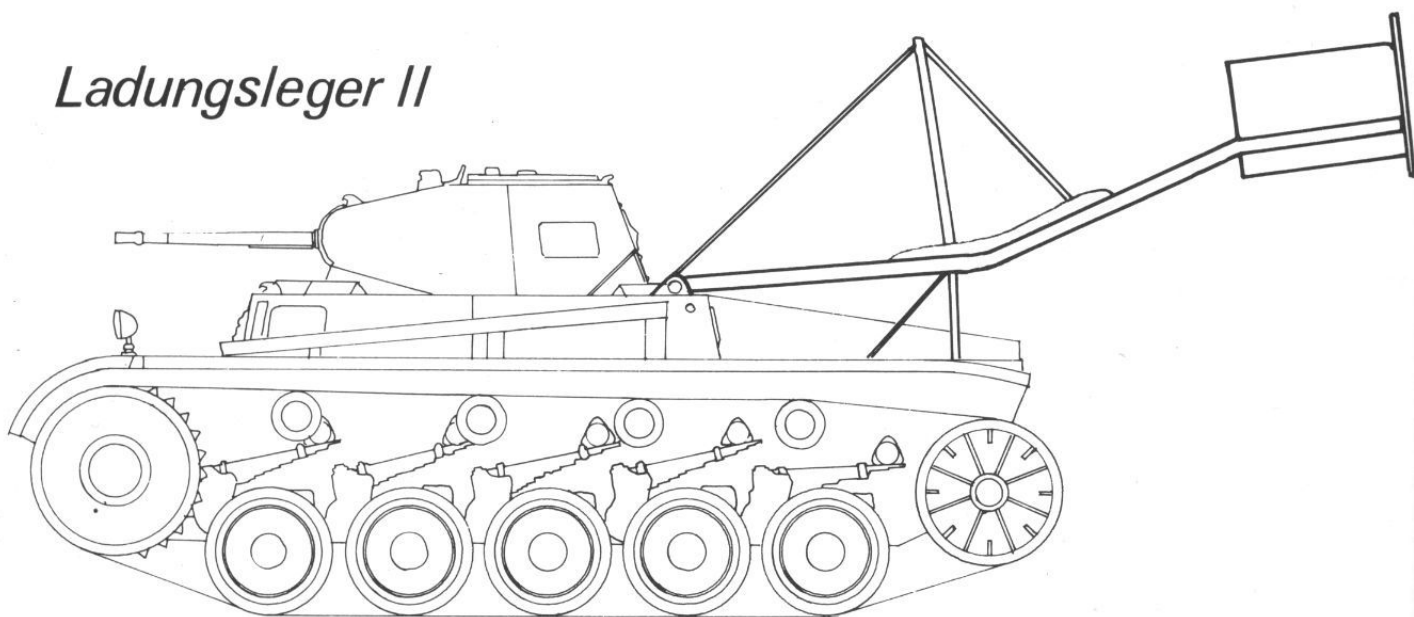
The next fifteen 1/Las 100s were built to a slightly modified design. A rear hand-hole was added to gain better access to the fan system, the dynamo was given a better cooling system and a new welded rear idler without a rubber tyre was fitted. A third group introduced a removable partition between the fighting compartment and

the engine and a large belly hatch to give access to the fuel pump and oil filters. After 25 vehicles of this batch a larger radiator was fitted to the engine and better springs were used in the suspension. The original group of ten 1/Las 100s were eventually given the service designation PzKpfw II (2cm.) Ausf a1, the next fifteen were Ausf a2 and the final 50, of both batches, Ausf a3.

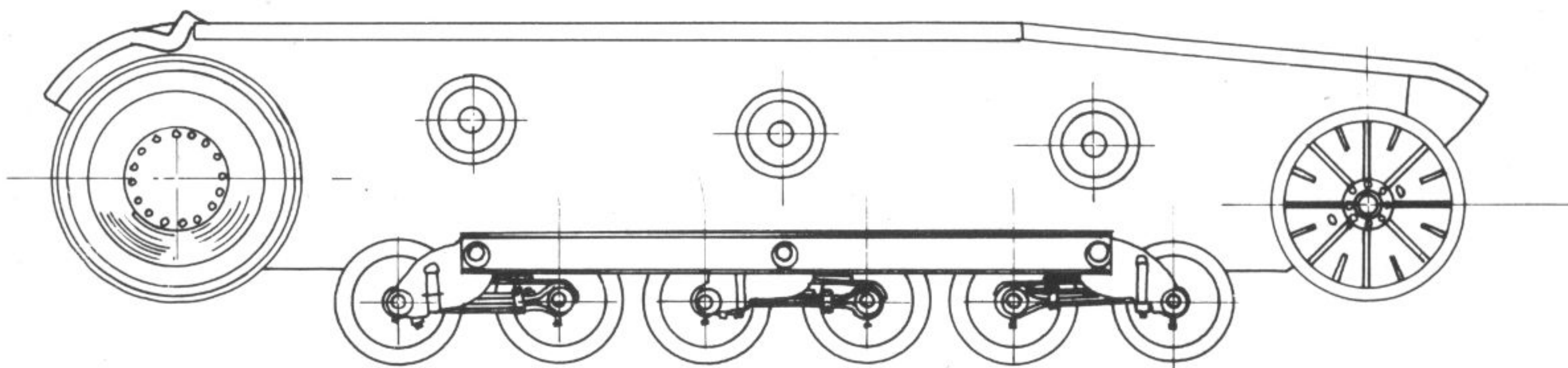
In 1936-37 further improvements took place to produce the 2/Las 100 or Ausf b. This had a new engine, the Maybach HL62TR of 6191cc with an output of 140 hp. The gearbox was as before but the steering system was modified with reduction gearing and the nose of the tank sprouted a new rectangular external housing. The tracks were widened, necessitating a new driving sprocket, wider road wheels and new wider return rollers which were now of smaller diameter. The springing was also further strengthened. The length of the Ausf b was slightly increased to 4.76 metres (15 feet 7½ inches) and the weight was now up to 7.9 tonnes. Range was slightly reduced to 190 km (120 miles) on roads and 125 km (78 miles) across country but the tank could now climb a 62 cm (2 feet) obstacle. Some 25 Ausf b seem to have been built.

In 1937 a major change occurred with the adoption of a totally new suspension of five rubber tyred medium size light alloy road wheels each side. The wheels were mounted on suspension arms each sprung against a 'roller' by a quarter elliptic spring. The arms and springs were mounted between the wheels and the hull: the external girder disappeared. The number of track return rollers was increased to four and larger drive sprockets and idlers were fitted. The new suspension gave a slightly higher ground clearance and was adopted for further production, although it was never entirely reliable and remained a weak feature of the type. The dimensions of the new 3/Las 100 or Ausf c were: Length 4.81 metres (15 feet 9½ inches), width 2.22 metres (7 feet 4 inches) and height 1.99 metres (6 feet 6 inches). The Ausf c weighed 8.9 tonnes.

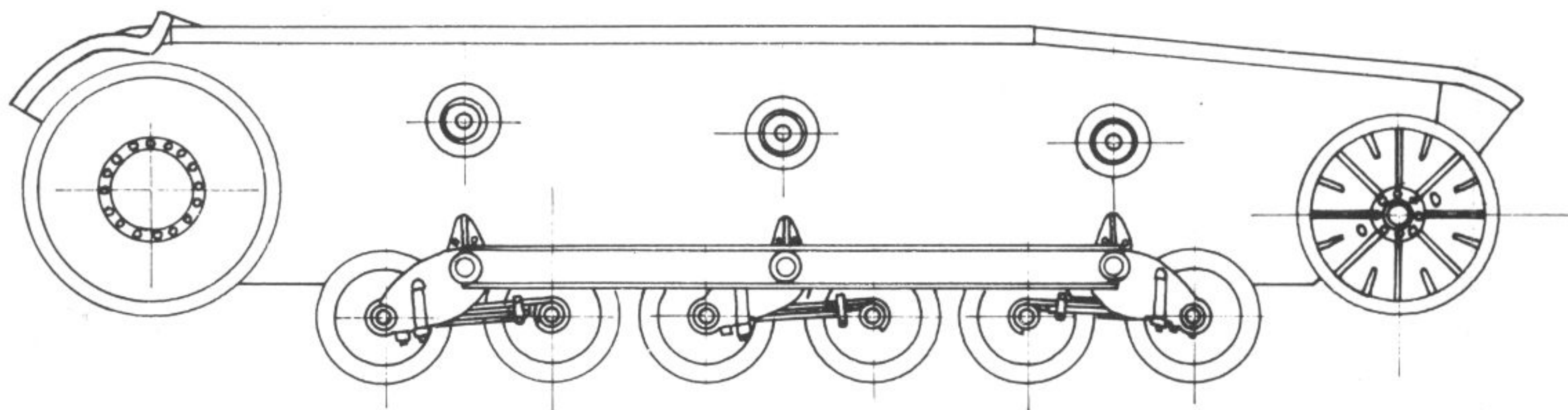
Ladungsleger II



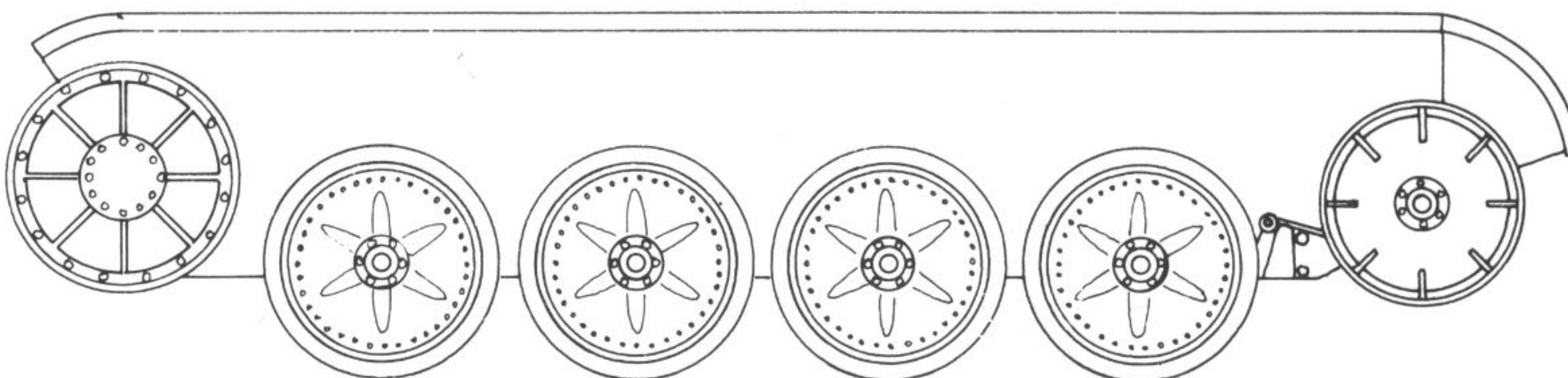
PzKpfw II suspension types.



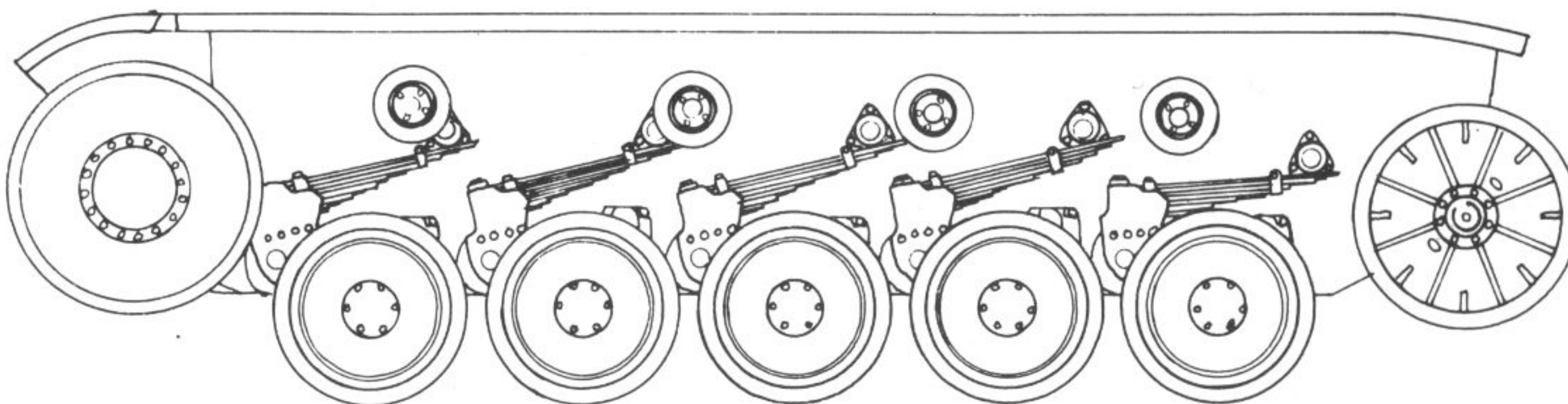
Ausf. a1, a2, a3.



Ausf. b.



Ausf. D, E & (F)

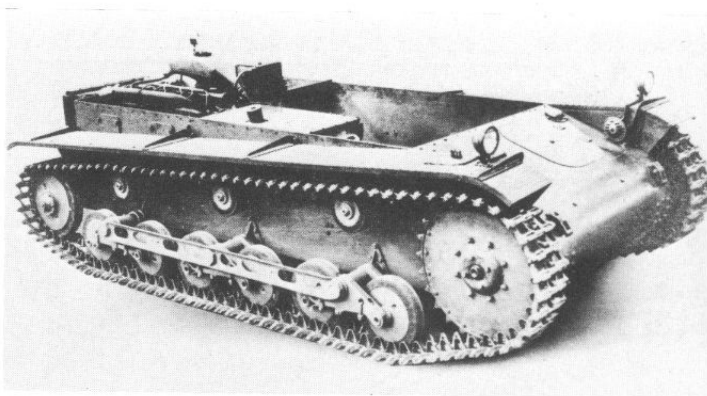
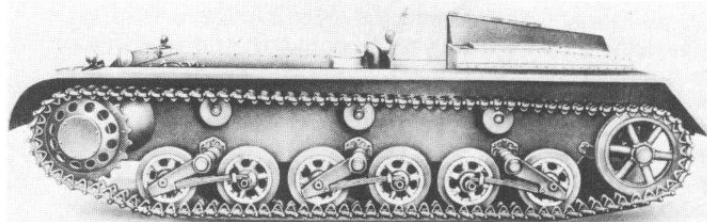
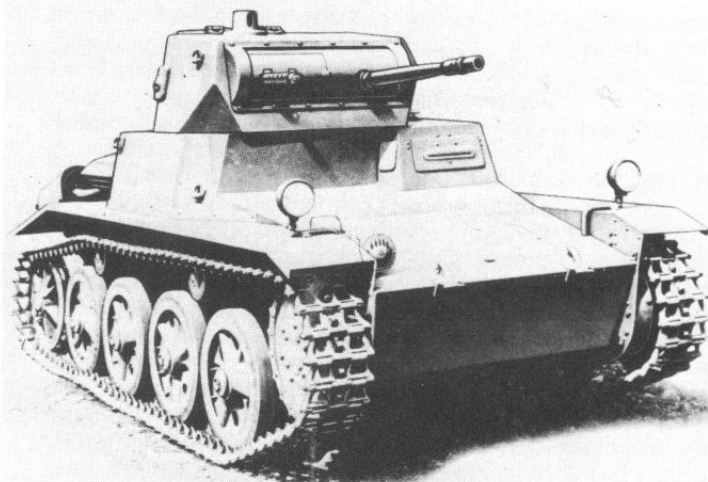


Ausf. c, A, B, C & F.

This was the end of a rather extended development programme and in 1937 the definitive production variant of the *Ausf A* (4/LaS 100) began to come off the production lines. Henschel were now brought into the programme for about a year until their place was taken by Alkett (*Altmärkische Kettenfabrik*). The *Ausf A* was fitted with an improved HL62TRM engine and SSG46 gearbox as well as a new driver's visor with vision slit. Deflector strips were also added round the base of the turret at front and rear to protect the turret ring. The unprotected ring had been a serious weakness in both *PzKpfw I* and earlier *PzKpfw II* models. The rest of the layout remained as the *Ausf c*. There were only minor detail differences between the *Ausf A* and its successor in production, the *Ausf B* (5/LaS 100) which would appear to have been the most numerous production variant with the widest range of chassis numbers. The still further modified *Ausf C* (6/LaS 100) of 1938-39 had modified engine cooling and, perhaps improved armour protection, although the exact circumstances of the up-armouring of the *PzKpfw II* at this time are far from clear.

Somewhere during the *Ausf A-C* production run the decision seems to have been taken to increase the *PzKpfw II*'s protection to improve its survivability. Extra homogenous plates, 20mm. on the nose and 14.5mm. on the glacis, were added over the existing rounded nose to produce a new 'squared off' appearance while 20mm. plates were welded and rivetted to the superstructure and turret fronts. The weight of the up-armoured versions was 9.5 tonnes but performance was virtually unchanged. Up-armouring probably began with the introduction of the *Ausf C* which is known to have introduced thicker, 50mm. glass vision blocks. A few modified tanks appear in photographs of the 1939 Polish campaign. It would appear that the lessons of these weeks confirmed the requirement for heavier protection and that the *Ausf A* and *B* vehicles were bought up to the improved standards as quickly as possible afterwards. Up-armouring was also extended to some earlier vehicles as time went on.

PzKpfw II Ausf. A-B of Panzer Regiment 7 follow a *PzKpfw I* in Poland on the 11th of September 1939. The tanks are passing the vehicles of one of Panzerverband Kempf's supporting units, the SS Signals Battalion. Note the lack of extra armour.



ABOVE: The M.A.N. offering which won the competition for the *PzKpfw II*.

TOP: Krupp's offering for the *PzKpfw II* specification was a simple conversion of their earlier LKA chassis, shown here as a heavily re-touched photograph to illustrate the conversion.

MIDDLE: Henschel prototype chassis for *PzKpfw II*.

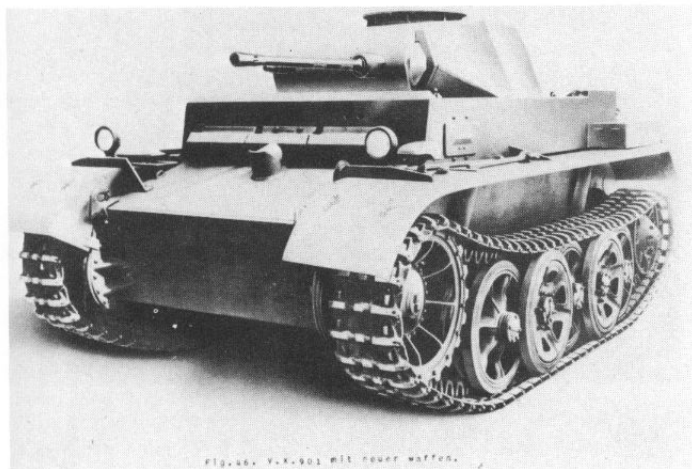
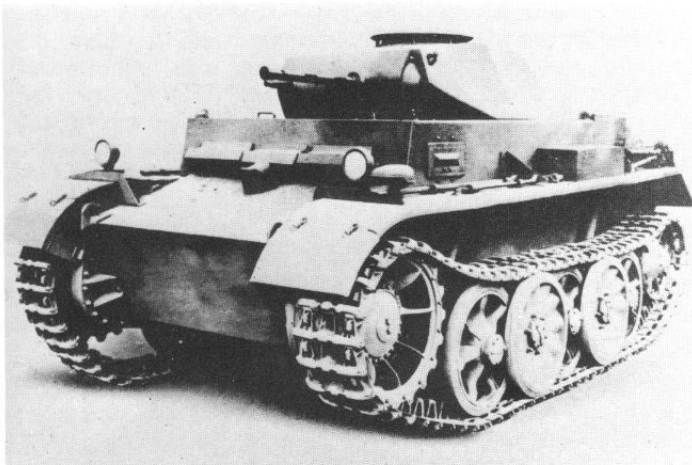


Fig. 86. V.K. 901 mit neuer Waffon.

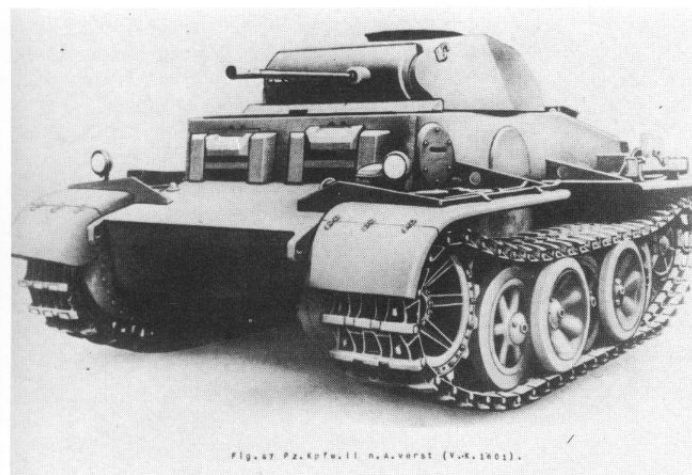


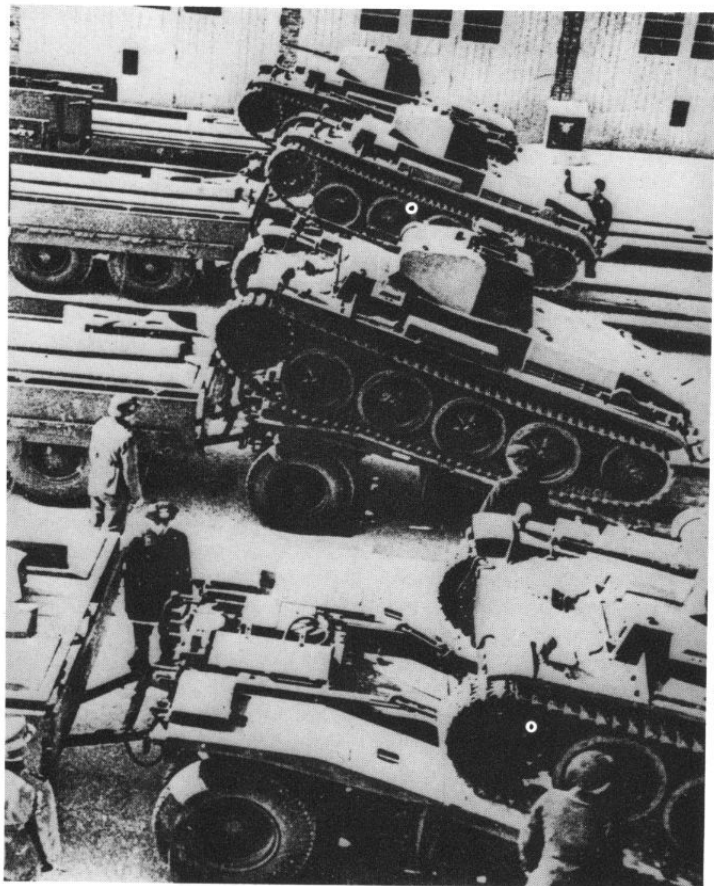
Fig. 87. PzKpfw. II n. d. vorst. (V.K. 1002).

The 3 PzKpfw II neue Art prototypes. At the top the VK1301, middle the VK901, and bottom the VK1601. There has been much confusion over the identity of these prototypes. All the pictures are heavily re-touched, for example the VK901 has had a KwK 38 drawn in over the original KwK30.

PzKpfw II had begun to appear in the Panzer Divisions by 1937 going first to the company and platoon commanders. In the same year perhaps as many as fifty were sent to Spain to get combat experience with the type. As the numbers available increased so PzKpfw II began to become a vital part of the strength of the Panzer Battalions with at least one five vehicle platoon in each PzKpfw I company in order to give anti-tank support. PzKpfw II were used in the unopposed occupation operations of 1938-39 and in the invasion of Poland, by which time 1,223 were available for service. Each tank battalion was supposed to have 22 PzKpfw II in September 1939 but this ideal was rarely, if ever, achieved. Non-availability of the PzKpfw III meant that the most powerful vehicles in some 'light' companies of Panzer Battalions remained the little 20mm armed PzKpfw II; Panzer Regiment 7 still had only the one platoon of five PzKpfw II in each of its four light companies to stiffen the PzKpfw I. The establishment for most Panzer Divisions was 69 PzKpfw II per tank regiment, 33 per battalion with three in the Regiment's H.Q. support company's tank platoon along with two PzKpfw I. 1st Panzer had more PzKpfw III than average and, therefore, only had an establishment of 39 PzKpfw II per regiment. As stated above 14.5mm. protection proved inadequate against Polish anti-tank weapons, although the 20mm gun was fully able to cope with Polish armour. Losses were significant and not many new PzKpfw II were coming off the production lines as the factories were primarily concerned with up-armouring existing vehicles. Only a handful of new PzKpfw II were produced each month, five in September 1939, eight in October and two in November before production finally petered out; by that date just over 1200 Ausf a-c and A-C PzKpfw II had been constructed. By the time the Germans struck in the west there were only 1092 PzKpfw II available for service of which 995 were deployed for the attack. Some of the balance were in Norway with Panzer Abteilung 40.

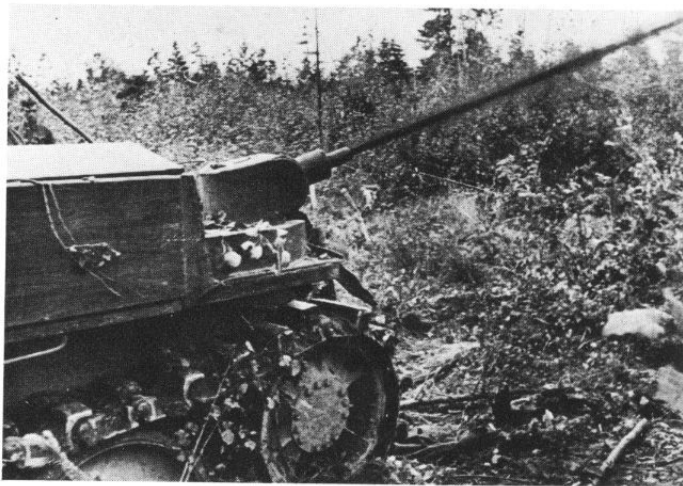
The numbers of PzKpfw II per division establishment in May 1940 were as follows: 1st 100; 2nd 100; 3rd 110; 4th 110; 5th 110; 6th 40; 7th 40; 8th 40; 9th 75; and 10th 100. More were standing in for still unavailable PzKpfw III; 3rd Panzer had 122 PzKpfw II actually in the field. Other divisions were under strength even in these light tanks; 4th Panzer only had 107 PzKpfw II and had to rely on PzKpfw I to help make up the difference. The PzKpfw II was now by far the largest individual tank type in the attacking force, making up almost 40% of combat tank strength. Although by now most PzKpfw I had the added armour they had to rely on every tactical tool in the German repertoire in their battles with the Allied armies. Nevertheless, against a confused and out-maneuvred foe, PzKpfw II proved adequate 'fillers in' behind the cutting edge of the heavier German armour.

Combat experience proved the need for a better view for the commander when 'closed down' and a cupola with eight episcopes was designed to replace the original double hatch with periscope arrangement. These cupolas were added when PzKpfw II were returned to the factory for overhaul and re-fit. By the Spring of 1941 cupolas were becoming standard fittings on up-armoured tanks. Possibly simultaneously with the fitting of cupolas extra 14.5mm. armour was added to the mantlets of some PzKpfw II. The extra plates were extended at top and bottom to protect the gaps between mantlet and turret front.



LEFT: The unsuccessful PzKpfw II Ausf. D's with re-designed superstructure and torsion bar suspension.

BELOW: A PzKpfw II (flamm) 'Flamingo' captured by the Russians. Note the lubricated type tracks and revised pattern sprocket of the Ausf. E chassis.



Despite the shortcomings it was felt that the *PzKpfw II* still had a place in the German Panzer Division. Development of a new model with thicker basic armour had begun in 1939. This *Ausf F* (7/LaS100) had a redesigned superstructure with the driver's plate carried all the way across the tank. A false aluminium visor was fitted to the right of this plate. It covered no aperture and its role was presumably to decoy fire away from the real driver's visor to the left which was itself heavily protected and of a new sliding shutter design similar to that of the contemporary *PzKpfw III*. There was also a vision slit on the offside of the superstructure but the position of the gearbox made it unusable – again a possible decoy measure. The opening flaps on the mantlet were now of equal size and of modified design. The hull nose section was of single skin construction with flat plates 35mm thick on the nose itself, 20 mm. on the glacis and 15 mm. on the lower nose. Protection elsewhere was; 30 mm. on the driver's plate, turret front and gun mantlet and 20 mm. on the superstructure sides. Armour on the hull rear and the sides and back of the turret was 15 mm., superstructure decking armour was 10 mm and belly protection 5 mm. Although overall length was unchanged the length of the hull was reduced from 4.37 metres (14 feet 4 inches) to 4.24 metres (13 feet 11 inches). Armament was as before but the small arms ammunition stowage was 2550 rounds and some later vehicles had the improved 112.3 calibre *KwK 38* 20mm gun with the slightly higher muzzle velocity of 830 m/s (2720 f.p.s.) and a rate of fire up to 220 r.p.m. The *Ausf F*'s turret carried a slightly modified cupola and there were other small modifications. The access plate on the right of the glacis became circular rather than rectangular and the escape hatch at the rear was secured by set screws rather than being hinged.

The programme to refit existing holdings of *PzKpfw II*, together with shortages of components held up production of the new *Ausf F*. Only nine *PzKpfw II* seem to have been produced in 1940, three in April, two in August and four in November-December. All these were probably *Ausf F* development vehicles, although the April batch may have been the last *Ausf C*. Continuous delivery of the *Ausf F* only got under way in 1941 with seven tanks in March and fifteen in April. By August production had risen to twenty five per month and by November to forty. A total of 233 *Ausf F* were built in 1941.



PzKpfw II of earlier models, including the oldest, remained in front line service in 1941 although some were now deployed with armoured engineer companies rather than tank units. *PzKpfw I* took part in the invasions of Yugoslavia and Greece and 1072 were available for use in June 1941 against Russia. Of these 746 were deployed for action on 22nd June. By then each Panzer Battalion was supposed to deploy 20-25 *PzKpfw II* tanks (one five tank platoon per company plus the H.Q. support platoon), with five more in Regimental H.Q.'s tank platoon. Their functions were '*Gefechtsaufklärung*' ('battle' or 'close' reconnaissance) and H.Q. protection. Additional *PzKpfw II* continued to be used to provide H.Q. officers with combat mounts and some were fitted with extra radio equipment to improve their utility as *Panzerbefehlswagen*. The *PzKpfw II* platoons would usually be found screening in front and to the flanks of the heavier armour identifying opposition to be dealt with by concentrations of *PzKpfw III* and *IV*. The light tanks could deal with some of the earlier Soviet armour themselves but stood no chance against the T34 or KV. Armour piercing capability was improved by the use of *PzGr 40* APCR rounds which had the higher muzzle velocity of 997 m/s (3270 f.p.s.). This improved penetration by 50% or more at ranges up to 400 yards. This was hardly enough, however, and there seem to have been some experiments with up-gunning *PzKpfw II* with captured French 37mm *Sa38* weapons. The *KwK 38* was also retro-fitted to some earlier *PzKpfw II* and, as routine re-fitting proceeded so the new conical idlers began to appear on the older tanks.

1941 saw the *PzKpfw II*'s appearance in North Africa. 5th Panzer Regiment deployed 45 when it arrived in March, of models A, B, and C. 15th Panzer Division brought more *PzKpfw II* and by 1942 the later *Ausf F* was in service in the desert. *Ausf F* were also brought to Tunisia by 10th Panzer Division in November 1942. Tanks sent to North Africa were modified with better ventilation and sealing to keep out sand. They had '*Tp*' for '*Tropisch*' added to their designation.

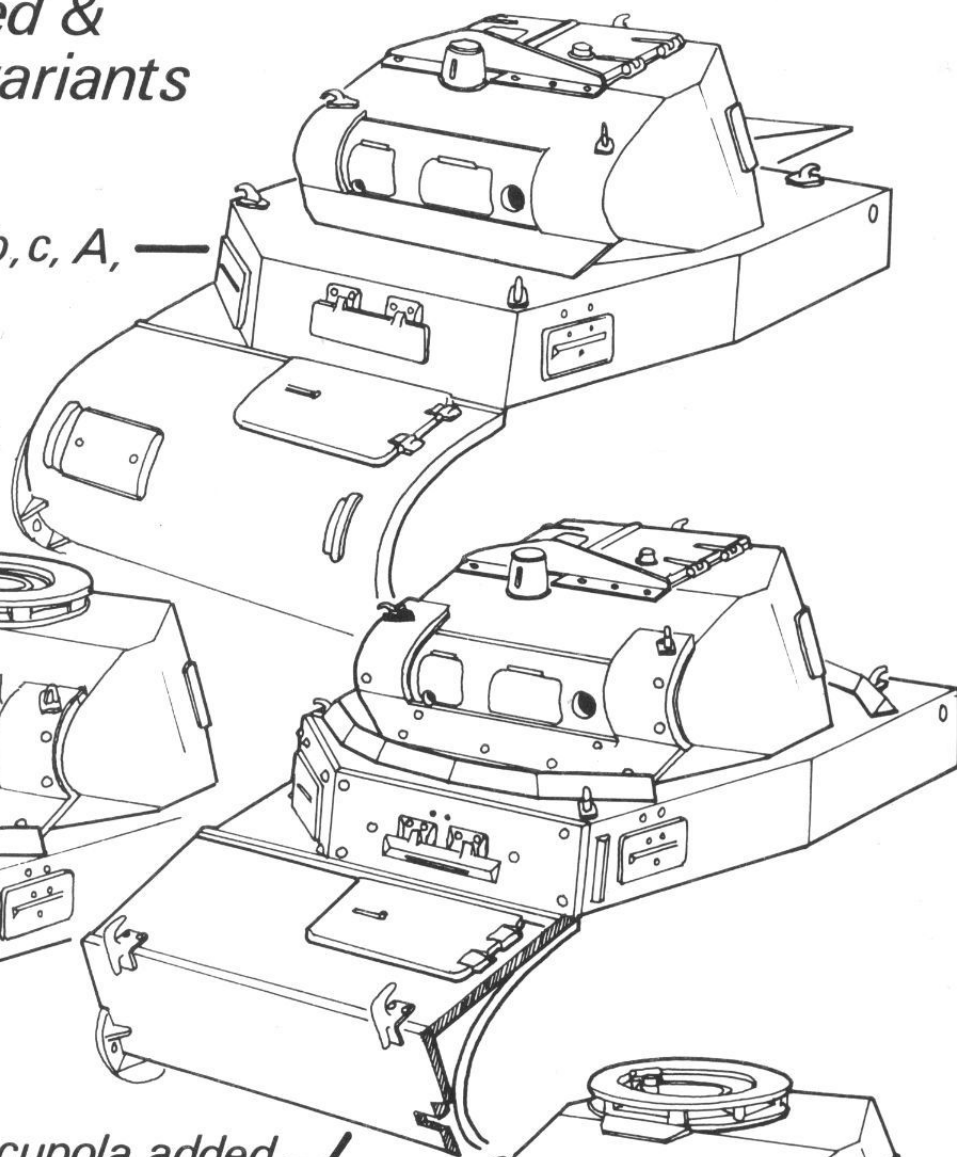
A still from a German newsreel showing a *PzKpfw II Ausf A* in service with 20th Panzer Division during the opening phase of the Russian campaign in 1941. The quality of the photograph makes positive identification difficult but the vehicle seems to have the earlier drive sprocket and to lack the small bolted-on rectangular plate on the right nose armour. The pre-production drivers flap and early type suspension however are clearly visible.

Up-armoured & reworked variants

*Ausf. a1, a2, a3, b, c, A, —
B & C as built*

extra armour & cupola added

redesigned Ausf. F —



PzKpfw II losses were quite heavy in 1941, some 393 on all fronts between June and December 1941, and 159 in the first half of 1942. The model's growing inadequacy against ever more formidable opposition led to the production programme being curtailed. Plans to expand the Panzer arm, drawn up in Summer 1941 called for thousands of new *PzKpfw II* and work was in hand on improved models (see below) but the increasing obsolescence of the whole light tank concept caused these ideas to be largely abandoned. Production of the *Ausf F* tank ceased at the end of 1942 although production of the chassis as an S.P. artillery carriage continued. Some 291 *Ausf F* tanks were built that year by M.A.N., Daimler-Benz and FAMO, who had also produced a model at their subsidiary, *Vereinigten Maschinenwerken*, Warsaw since 1940 (MIAG had ceased *PzKpfw II* production in 1940 and Wegmann in 1941). Total *Ausf F* production was around 530. The *PzKpfw II* was officially a second line type from the beginning of 1942 but, although it was withdrawn from the tank companies, it still remained in first line service in the H.Q. support and reconnaissance tank platoons of Panzer Regiments and Battalions. These H.Q. platoons were indeed enlarged to 7-8 *PzKpfw II* in 1942-43. Numbers of the type reached a new peak in September 1942 with 1039 *PzKpfw II* available for service. 1943, however, saw the H.Q. tank platoons begin re-equipment with heavier battle tanks and numbers of *PzKpfw II* in stock had declined to 209 by September of that year. Many had been converted to tank destroyers of 'Panzerjägers' but between the beginning of July 1942 and the end of August 1943 some 524 *PzKpfw II* were reported lost, 207 in February 1943 alone with the Stalingrad debacle. The building of the modified *Ausf L 'Lynx'*, as detailed below, helped boost *PzKpfw II* holdings back to the 400s by the end of the year and 385 *PzKpfw II* tanks were still available for service in September 1944. Few, if any, *Ausf A-F* were with first line tank units, however.

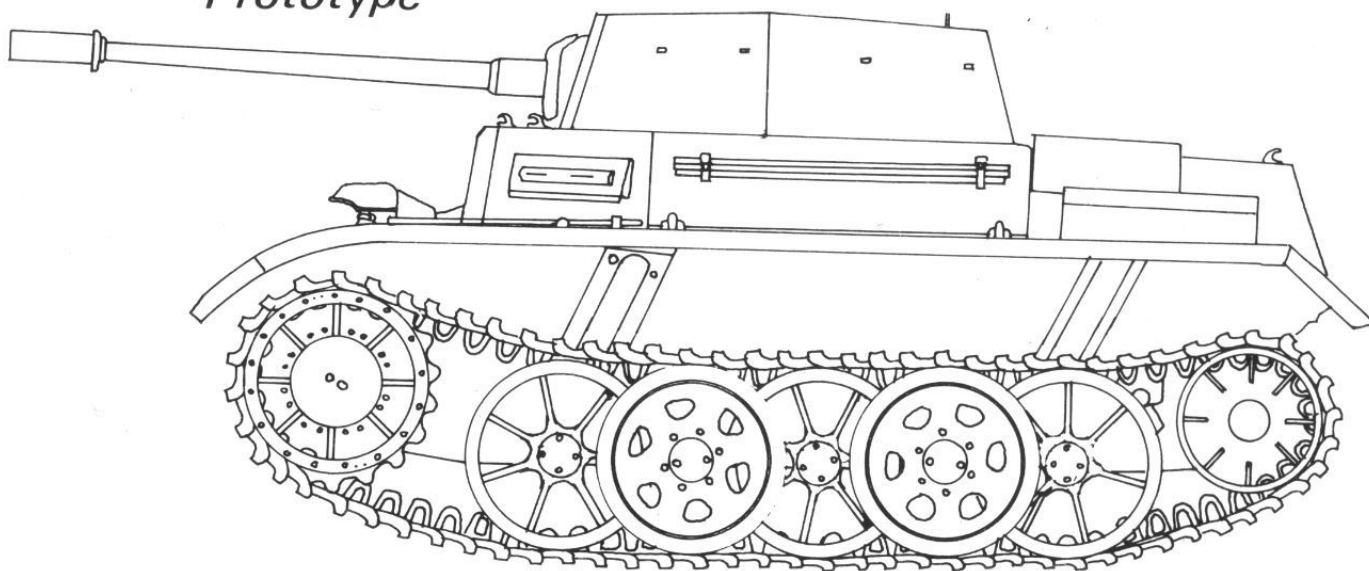


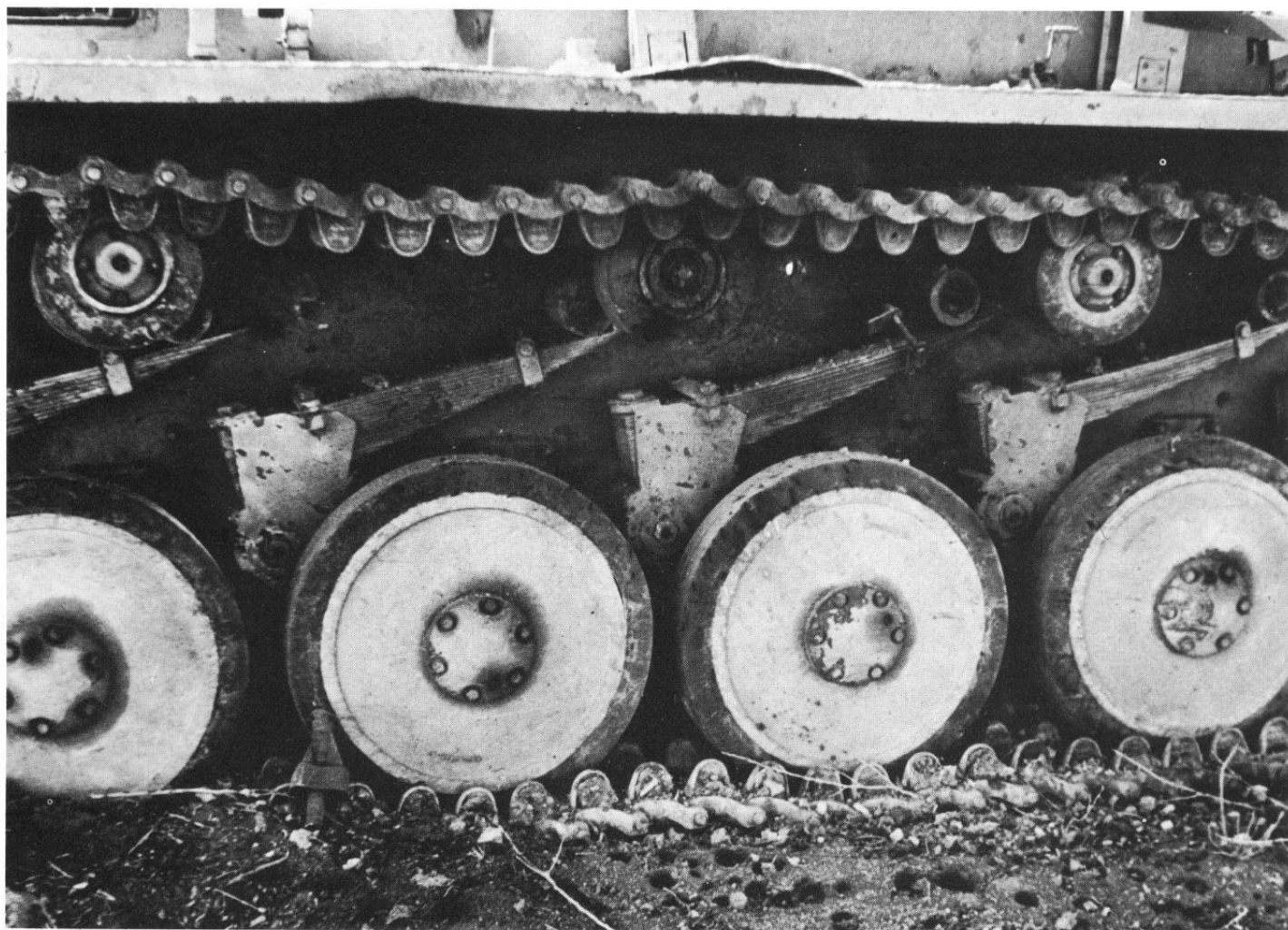
An old PzKpfw II Ausf. a being towed by Jews rounded up to work for the Wehrmacht in Kaunas Lithuania on 27th June, 1941. The men towing the tank are guarded by the local militia. Note the distinctive nose of the Ausf a, without the rectangular plates of later models.



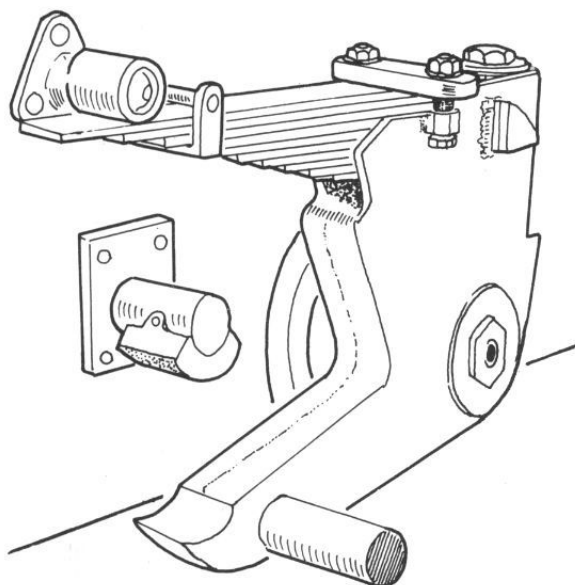
Another view of Jewish prisoners towing the broken down PzKpfw II Ausf. a. This shows the distinctive suspension, return rollers, driving sprocket and rear cooling air outlet of the old tank.

VK 903 OP Prototype





A clear view of the suspension layout of the standard production version of PzKpfw II, shows the bell cranks carrying the road wheels and their attachment points to the hull. Also visible are the laminated cantilever springs bearing against roller stops bolted to the hull. Behind the wheels were bumper stops which allowed a maximum suspension displacement of 10 cm (4 ins). Their bolted mountings are just visible.



OPPOSITE PAGE: Another comparison of the original – bottom photograph – and the up-armoured production PzKpfw II Ausf. A-C.

In 1938 Daimler-Benz had developed a much modified 'Schnellkampfwagen' ('Fast Fighting Vehicle') for the tank battalions of the four Light Divisions. Although the tank mounted the same turret as the standard *PzKpfw II* the hull and superstructure were completely altered. A new torsion bar suspension with four large roadwheels each side was adopted and the hull and superstructure design owed a lot in general layout to Daimler-Benz's contemporary *PzKpfw III*. The driver and radio operator sat side by side at the front and each had a sliding shutter visor in the front superstructure plate. A pre-selector Maybach Variorex gearbox was fitted, this one the VG 102128H type with seven forward gears and three reverse; steering was by mechanical clutch and brake. The engine was the Maybach HL62TRM and this could drive the tank at 55 kph (34 mph); the vehicle could cross a 1.75 metre (5 feet 9 inches) trench, climb a step of 42 cm. (16½ inches) and wade up to 85 cm. (2 feet 9½ inches). The tanks length was 4.64 metres (15 feet 3 inches), width 2.3 metres (7 feet 6½ inches) and height 2.02 metres (6 feet 7½ inches). Armour protection was 30 mm on the front and 14.5 mm on the sides. Only some 43 of these 8/LaS 138 vehicles were built to the original design in 1938-39 and they were designated *PzKpfw I Ausf D* and *E*. The latter model had a strengthened suspension, different tracks (lubricated as opposed to dry pin) and revised drive sprockets and idler wheels. These *Ausf D/E PzKpfw II* weighed 10 tonnes and were a disappointment, especially in terms of cross country performance. They do not seem to have seen much service with the Light Divisions, which received normal *PzKpfw I* and *II* for their tank battalions, but instead were apparently issued to *Panzer Regiment 8*, part of the independent 4th Panzer Brigade before it was allocated to the new 10th Panzer Division. *Ausf D/E* may have seen some combat service with this still only partially formed Division in Poland.

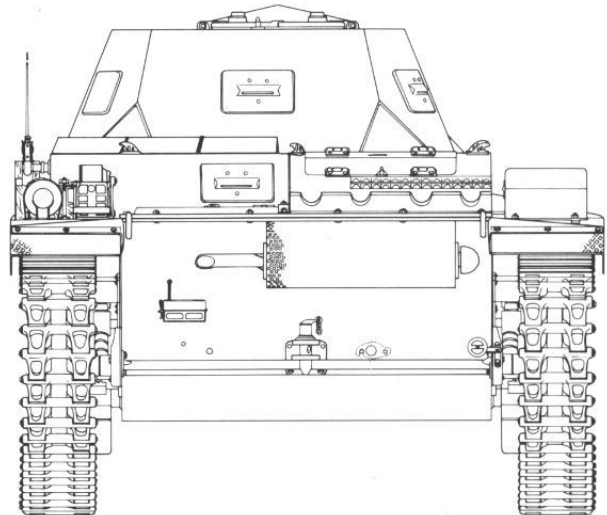
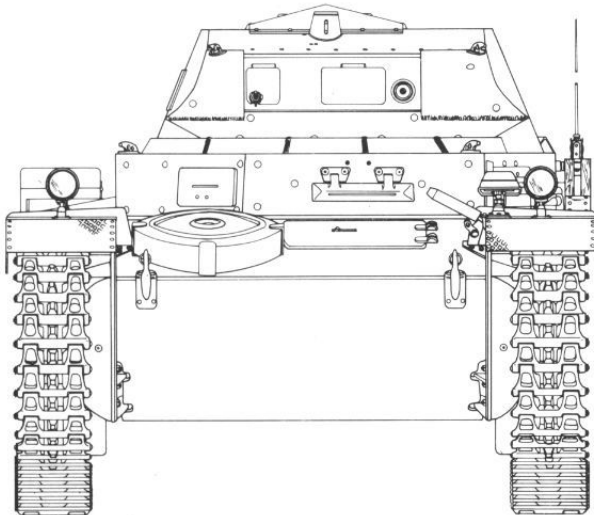
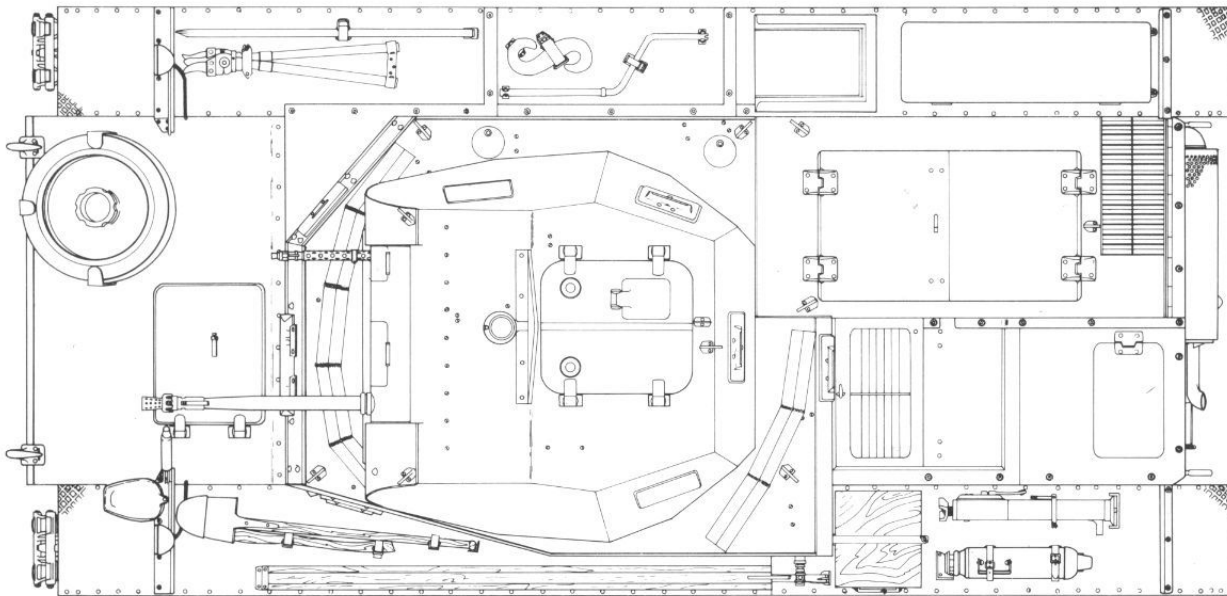
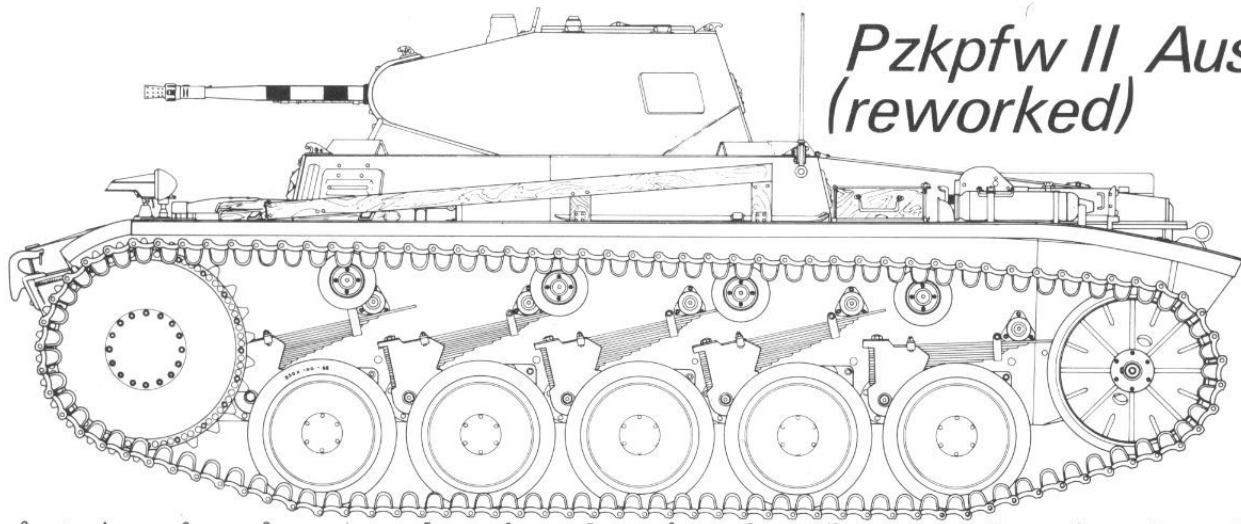
As with the *PzKpfw I*, development contracts were issued in 1938-39 for 'neue Art' light tanks based on the *PzKpfw II*, one designed to be fast and the other to carry heavy armour. The former project, designated VK901, was given to M.A.N. and Daimler-Benz in 1938 and the next year the first vehicle appeared. The improved, Kniepkampf designed, torsion bar suspension with five large interleaved roadwheels was adopted for the 9.2 tonne vehicle. Its 150 hp twin carburettor Maybach HL 45 motor gave a maximum speed of 50 kph (31 mph). Armour was 30mm on the front and 14.5mm on the sides and the armament one 20 mm *KwK 38* with co-axial *MG34* in fully stabilised mounting. Only a dozen of the original order for a development series of 75 of these tanks were built in 1941-42 and they seem to have been allocated the designation *PzKpfw II Ausf G*.

After combat experience in Poland development of a heavily armoured version of the *PzKpfw II* began in December 1939. Designated *PzKpfw II n.A. verstärkt (VK 1601)* the first prototype appeared in mid 1940. Like the similarly inspired *PzKpfw* based *VK1801*, armour was very heavy, 80mm on the front and 50mm on the sides. A Maybach HL 45 engine drove the 17 tonne tank at 31 kph (19 mph). The interleaved suspension of five large roadwheels was again adopted with wide tracks to spread the weight. The armament comprised a 20mm *KwK38* with co-axial *MG34*. A development series of 30 were ordered, of which 22 were built in 1942, given the designation *PzKpfw II Ausf J*. A further order for 100 was abandoned.



Development of the VK 901 as an improved *PzKpfw II* to replace the *Ausf F* in production continued and M.A.N. produced an improved VK 903 design with a 6745cc twin carburettor 200 hp HL 66P engine and a maximum speed of 60 kph (37 mph). An improved gear change and steering system was to be adopted. It was further decided to modify this chassis with a large fixed open turret with observation, range finding and communication equipment for the artillery observation post task. The abortive 'Panzerprogramm 41' of 30th April 1941 called for 3,500 VK 903s for *Gefechtsaufklärung*, 10,950 for general reconnaissance (i.e. for use as scout cars) and 2,003 OPs. The VK 903 seems to have been the 10.5 tonne HL 66P engined *Ausf H* and *M PzKpfw II* planned to begin production in mid 1942. One *Ausf H/M* development chassis was built by M.A.N. and delivered on 1st September 1941. Its armour is reported to have been 30mm on the front, 10mm. on the sides and rear, 10 mm. on the decking and 5 mm. on the belly. This was probably used to produce the single VK 903 OP prototype completed by September 1942 but by then the whole plan had been finally abandoned.

Pzkwpfw II Ausf C (reworked)



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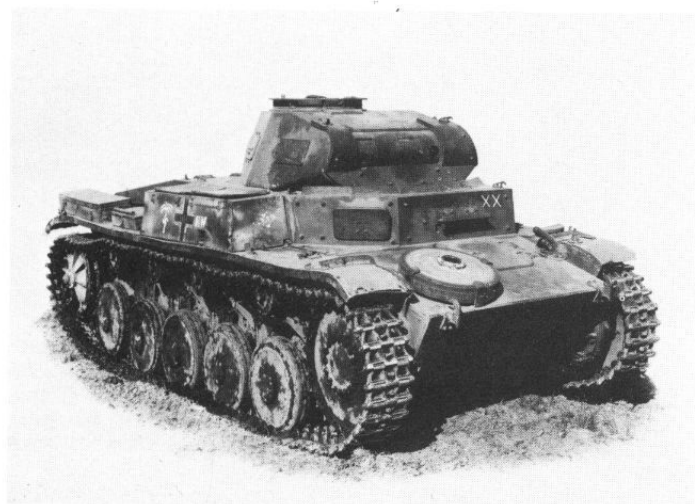
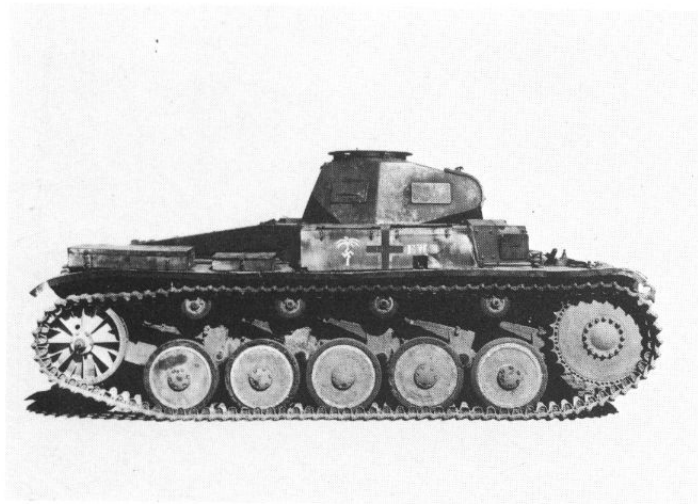
OPPOSITE PAGE TOP: This view of a standard production PzKpfw II Ausf A-C knocked out in the Western Desert shows up the way the new nose armour was added over the old curved nose plates. This vehicle lacks the extra mantlet armour.

OPPOSITE PAGE BOTTOM: A full up-armoured PzKpfw II Ausf. A-C of 21st Panzer Division abandoned after the Crusader fighting at the end of 1941. Note the mantlet armour.

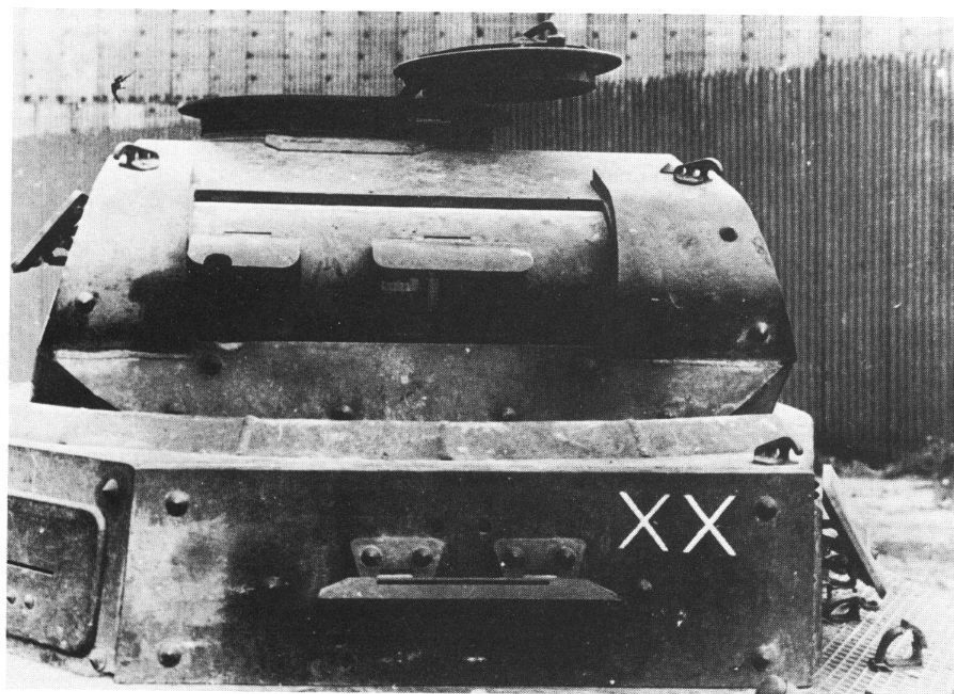
Surrendered British soldiers rest on a PzKpfw II of the 7th Panzer Division at St. Valery in June 1940. The tank is that of the commander of the 4th Platoon of the 1st Company of Panzer Regiment 25. The conquest of France was the PzKpfw II's finest hour; the type made up almost 40% of the German combat tanks engaged.

The only PzKpfw II n.A. project to go into production, and that only in a limited way, was a result of a requirement issued on September 15th 1939 for a specialised, fully tracked reconnaissance vehicle to supplement wheeled scout cars in reconnaissance units. Such vehicles were considered necessary for the more difficult terrain to be expected in Eastern Europe. Eight hundred were ordered with M.A.N. and Daimler-Benz in charge of design. None of the new vehicles were ready by June 1941 though there is evidence that by then some standard PzKpfw II had been allocated to the reconnaissance battalions of Panzer Divisions. Their radio fits were, however, rather inadequate for the purpose and extra equipment was specified for the specialised reconnaissance tanks. This in turn necessitated a four man crew: commander, gunner, driver and radio operator. Hardly surprisingly, the designers produced a vehicle along the same general lines as the VK 901/1601 and the first VK 1301 prototype appeared in April 1942. At 12.9 tonnes it was considered too heavy but three more prototypes were built and development continued, the actual conditions of the Russian Front seeming to confirm the original requirement. An 11.8 tonnes VK 1303 was eventually evolved and chosen for production as the

PzKpfw II Ausf L 'Luchs' ('Lynx') Sd Kfz 123. The four VK 1301 prototypes were rebuilt to the modified configuration and the first new tanks seem not to have been delivered until September 1943. 'Luchs' retained the torsion bar interleaved suspension of the earlier 'neue Art' development tanks but now with all 'solid' as opposed to 'spoked' wheels. The Maybach HL 66P engine gave a maximum speed of 60 kph (37 mph) on roads and 30 kph (18.5 mph) across country. A ZF Aphon SSG 48 gearbox was used with six forward speeds and one reverse; a subsidiary box gave a high and low ratio in each gear. Steering was by epicyclic clutch and brake, generally similar to the arrangement in the PzKpfw IV. Range was 290 km (180 miles) on roads and 175 km (109 miles) across country. The 'Luchs' could cross a 1.6 metre (5 feet 3 inches) trench, climb a 60 cm. (2 feet) obstacle and wade up to 1.4 metres (4 feet 7 inches). There was no cupola but two periscopes were fitted in the turret roof to give 360° vision for both commander and gunner. An Fu12 80 watt long range medium wave radio transmitter/receiver was carried with a maximum range of 25 km. (15 miles) for speech and 80 km. (50 miles) for morse. There was also an F. Spr.f short wave transmitter/receiver.



Enemy Weapon 2220 was a PzKpfw II Ausf A-C captured by the Russians from 6th Panzer Division and supplied to Britain for exhaustive evaluation in 1942. Hitherto this well photographed vehicle caused some confusion to present day armour enthusiasts because of the Afrika Korps palm appearing with 6th Panzer's marking. The right stowage bin was replaced from another tank that had served in North Africa when EW2220's bin became damaged. The original bin is evident in the photograph at the bottom of the opposite page, where the vehicle is shown minus its right track.





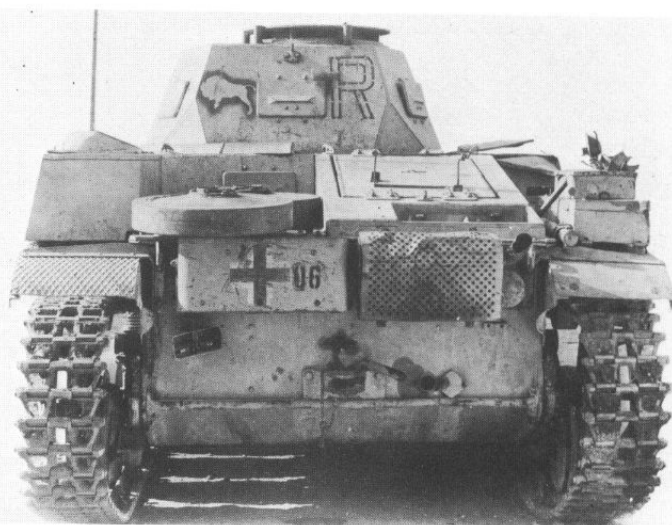
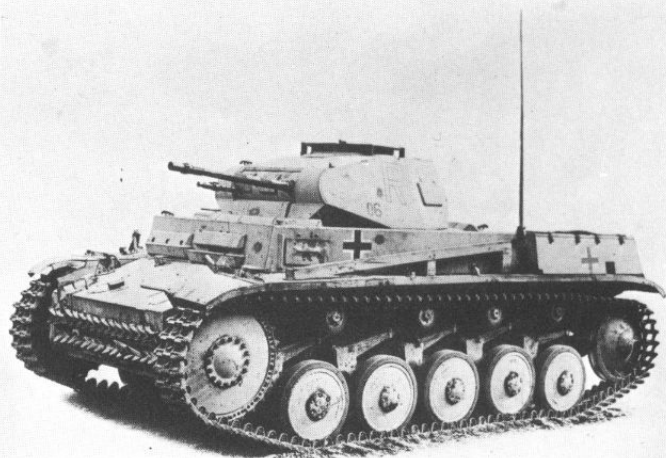
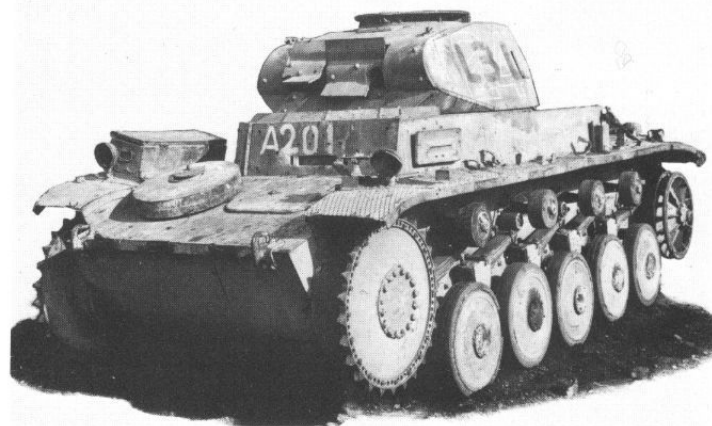
Armour was 30mm on the hull nose, the driver's plate and turret front; 20mm. on the front glacis, lower nose, superstructure sides and rear and turret sides and rear; 12mm. on the decking and 10 mm. on the belly. Sometimes frontal protection might be increased by adding extra plates. Armament comprised a 20mm KwK38 with 320 rounds and an MG34 with 2280 rounds. It was originally intended that after the first hundred vehicles the 20mm gun would be replaced by a 50mm KwK39 L/60 which would greatly enhance the little tank's firepower and improve its chances of survival against enemy armour. A larger open turret (probably fixed) was to house the new weapon in order to keep weight within acceptable limits. (This open 'VK1303b' turret had been used in the VK 903 project possibly with a dummy gun.) It seems that, despite reports to the contrary, none of these up-gunned vehicles were built and 'Luchs' production stopped in January 1944 after the first 100 20mm armed tanks. The comparatively few 'Luchs' that were built saw some action against both the Russian and Western Allies in the later war years, serving with the scout car companies of reconnaissance battalions. Use by these units led the designation to be changed to *Panzerspähwagen* (Armoured Scout Car) 2cm KwK 38 (Sd Kfz 123) 'Luchs'. M.A.N. produced the entire production run although Henschel had been intended to join the programme if it had not been cut short.

In 1941 MIAG and Daimler-Benz were told to produce a VK 1602 tank based on the old VK 1601. This would provide a more capable 'Gefechtsaufklärung' vehicle for H.Q. tank platoons in armoured units. Armour was to be 50-80 mm. on the turret and 20-60mm. on the hull. A 550 hp Maybach HL157 twelve cylinder engine would give a maximum speed of 50 kph (30 mph). Wide tracks of almost 35 cm (14 inches) would enhance cross country mobility. This tank, to be given the name 'Leopard' was to be quite a large vehicle, 6.45 metres (21 feet 2 inches) long, 3.27 metres (10 feet 9 inches) wide and 2.8 metres (9 feet 2 inches) high. The 'Leopard' was to have a four man crew, interleaved suspension and well sloped frontal armour. A 50mm gun would be carried in a fully traversing turret. Design work was completed in 1942 and a mock up built, even though the 1941 programme had called for 339 of these vehicles, production did not begin in April 1943 as originally intended. The 'Leopard' was considered by the Ministry of Armaments to be too heavy for fast reconnaissance work avoiding combat and too light to fight enemy armour. The project was abandoned in January 1943 but the well protected turret with its 60 calibre 50 mm KwK 39/1 gun was adopted for the Sd Kfz 234/2 'Puma' eight wheeled armoured car.

The PzKpfw II based development vehicles that were actually constructed were largely used for experimental work and training but at least one of the original VK 1601 chassis was converted into an armoured recovery vehicle with a large crane replacing its turret. It was issued to the *Panzer Werkstatt Kompanie* (Tank Repair Company) of 116th Panzer Division in 1944-45. How many other conversions were made is not known.

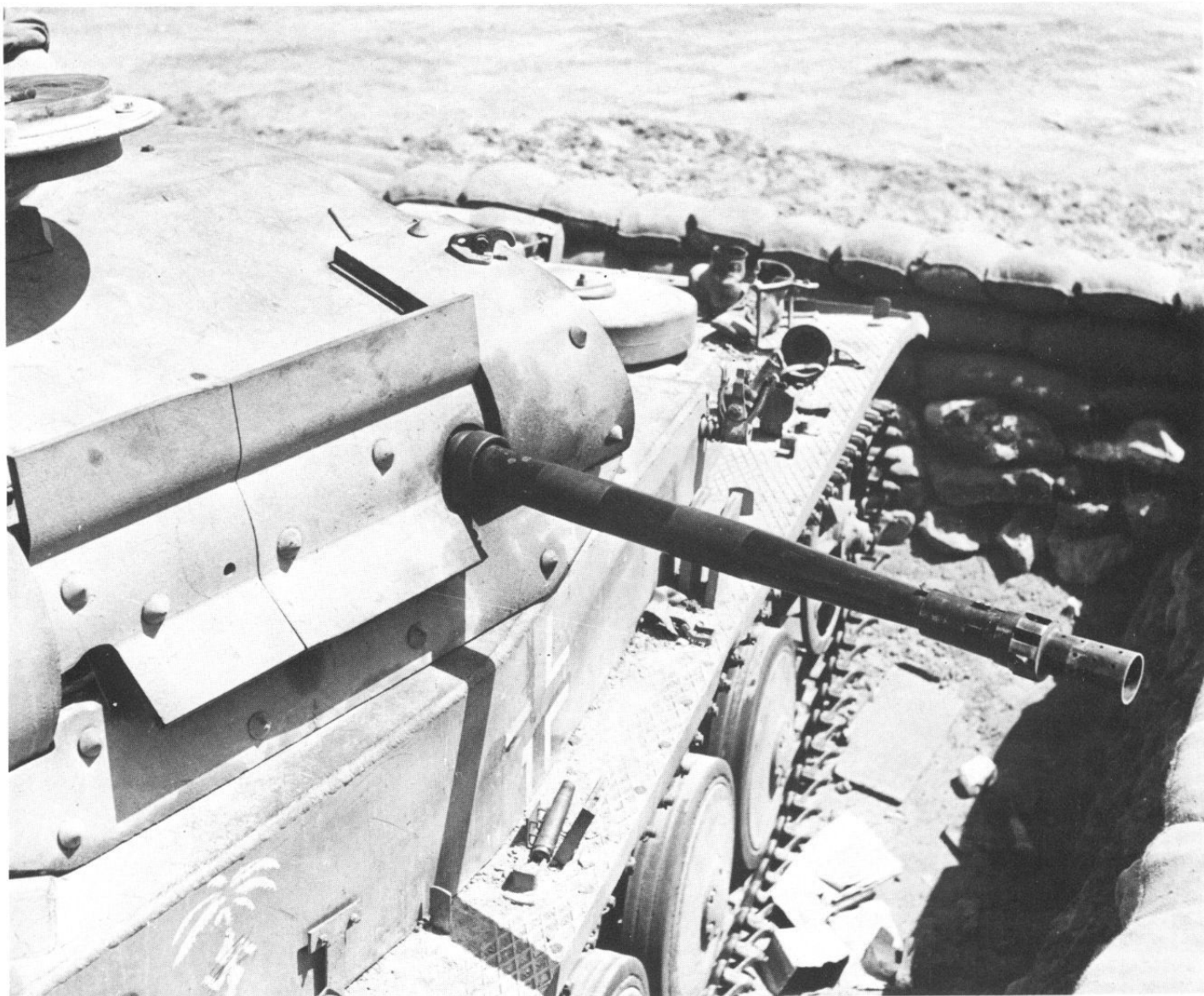
In 1939 M.A.N. and Wegmann were given the task of developing a flame-thrower tank. M.A.N. decided to use the chassis of the unsuccessful *Ausf D/E* series *PzKpfw II*. A small hexagonal turret carrying an *MG34* machine gun with 200 rounds replaced the original and a moveable flame gun was placed in a small turret on the front of each trackguard. Forward firing smoke projectors were fitted on each side to the rear in addition to the normal stern mounted smoke generator rack. Such cover was required as the range of the flame guns was only 35 metres (27 yards). The fuel was in tanks mounted on each track guard and protected by armoured shields; around 70 gallons were carried, enough for $80 \times 2\text{--}3$ second bursts. The flame guns were powered by nitrogen gas carried in four cylinders located inside the vehicle. Fuel ignition was by acetylene flame, the gas being carried in a small cylinder behind each flame gun turret. The flame guns were controlled electrically from panels in the turret. The crew was reduced to two but weight was increased to 11 tonnes. An *Fu2* radio receiver was fitted. The vehicles were designated *PzKpfw II (F) Sd. Kfz.122* and were sometimes given the unofficial name 'Flamingo'.

The first three vehicles had been constructed by the outbreak of war and proper production began in 1940, the *Ausf D/E* tanks also being recalled for conversion. There were 17 *PzKpfw II (Flamm)* available in May of that year and 85 by October. The whole first series of 90 was complete by February 1941. They were used, together with standard *PzKpfw II Ausf A-C* also fitted with smoke projectors, to equip four special independent *Panzer Abteilungen (F)* numbered 100 to 103. Three of these were deployed for the invasion of the U.S.S.R., one with Army Group South and two with Army Group Centre. The flame throwers were used to reduce strongpoints, e.g. during street fighting in Smolensk, but the short range of the flame guns made the vehicle's operation dangerous. Protection seems to have remained only 30mm. maximum. A new order for 150 was begun in August 1941 but combat experience led to this being cut short in early 1942 after only 65 vehicles had been built. 155 'Flamingos' seem to have been built in all, 112 built new and 43 conversions. Their service life was short and the vehicles were soon withdrawn for conversion into more useful *Panzerjäger*s mounting captured Russian 76.2mm guns. There were two flame thrower models, *Ausf A* and *B*, presumably based on the *D* and *E* chassis, respectively. The 'Panzer Programm 41' included plans for 259 *VK 1601* based flame thrower tanks but this idea was also abandoned.



TOP: *PzKpfw II Ausf. C*, chassis number 26332 which was brought back to Britain from the Western Desert for examination in March 1943. The damaged tank has lost the extra armour on the drivers plate but has the extra 14.5mm plates added to the mantlet. They are extended at top and bottom to protect the space between the mantlet and the turret front.

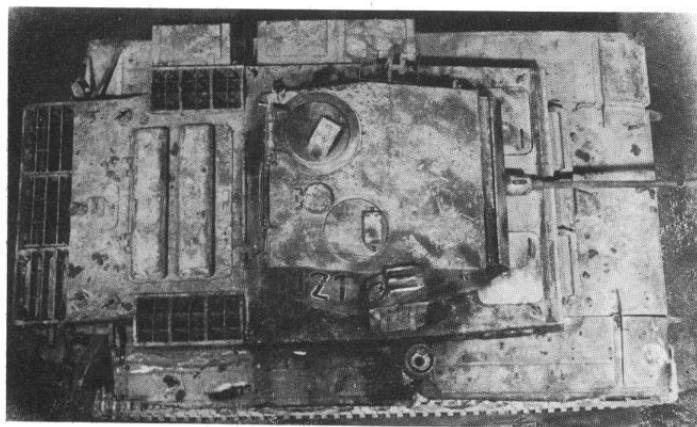
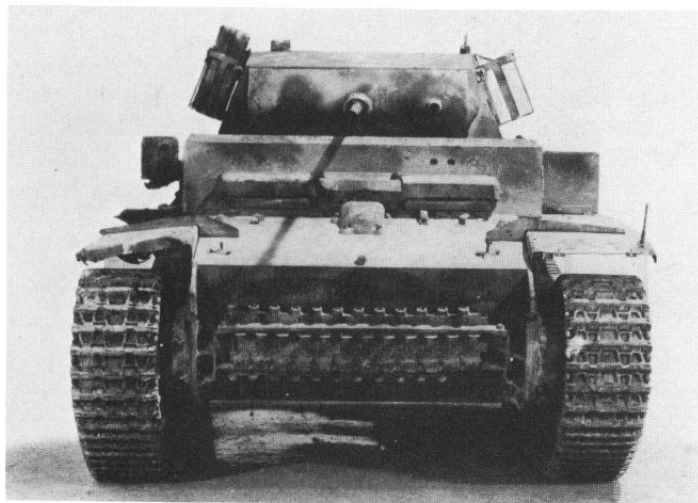
PzKpfw II Ausf. F captured in Tunisia from the Regimental HQ Company of Panzer Regiment 7. The vehicle chassis number was 28434 and is now displayed in the R.A.C. Tank Museum Bovington. Note *Pz. Rgt. 7*'s Bison insignia and the various distinguishing features of this redesigned model.



A good close up of the 2 cm KwK 30 and the extra turret armour of a fully re-worked standard production PzKpfw II ausf A-C. The extra mantlet plates are extended at the top and bottom to protect the vulnerable spots (which could even be damaged by sustained small arms fire) where the mantlet joins the turret front.

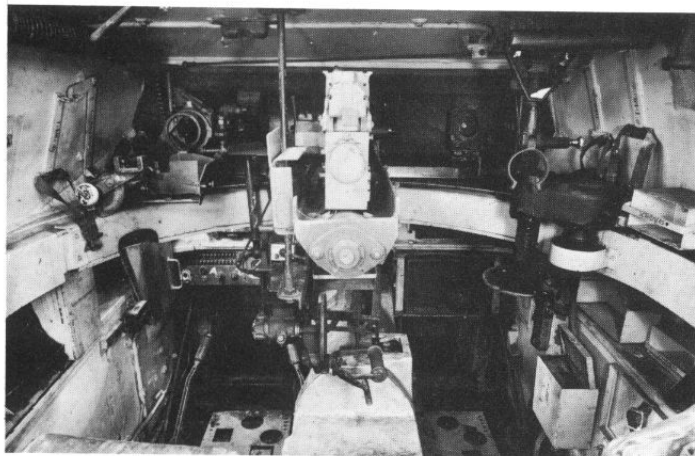
Another view of the fully-reworked PzKpfw II Ausf. A-C dug in on the Egyptian Frontier. Formerly belonging to the Regimental Medical Officer (probably Rgt 8, Panzer Division 15) this vehicle was emplaced as a static 'gun' possibly because of mechanical breakdown. Note the faint 'G' on the drivers plate; presumably the vehicle served with Guderian's Panzergruppe the previous year, during the conquest of France. This photograph was taken in May 1941.

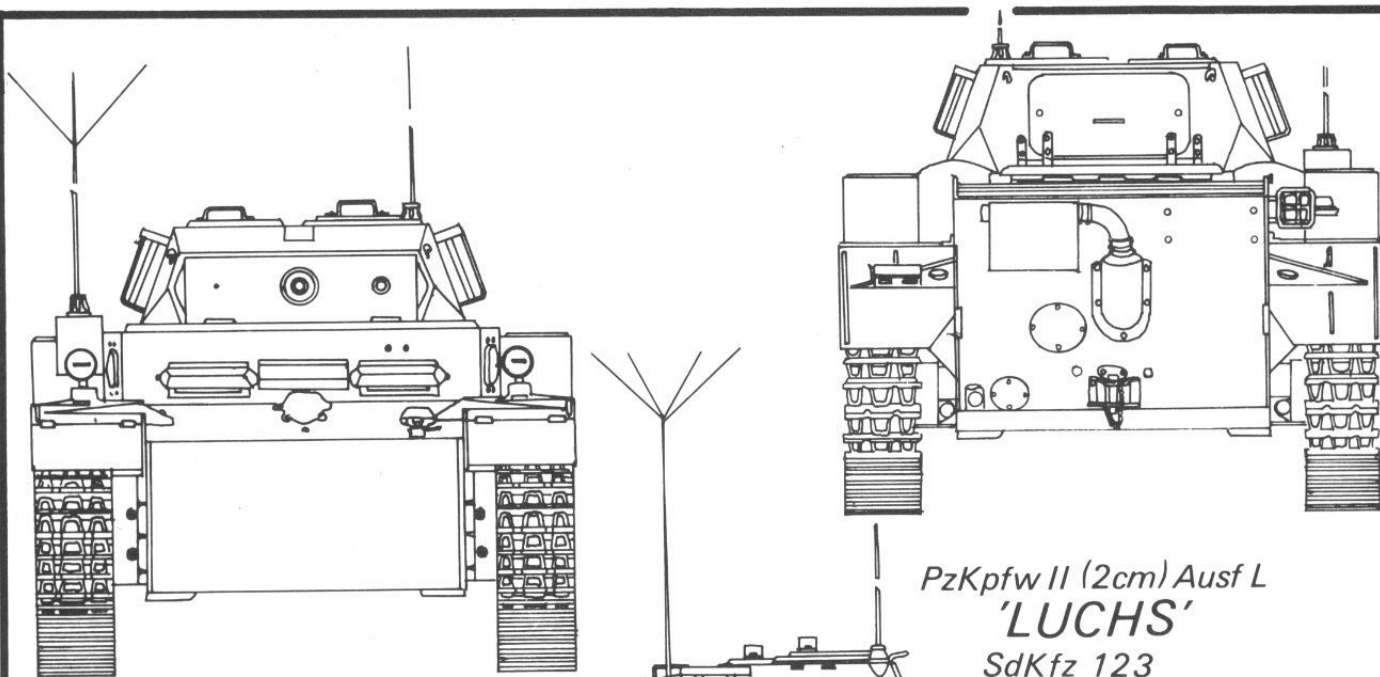




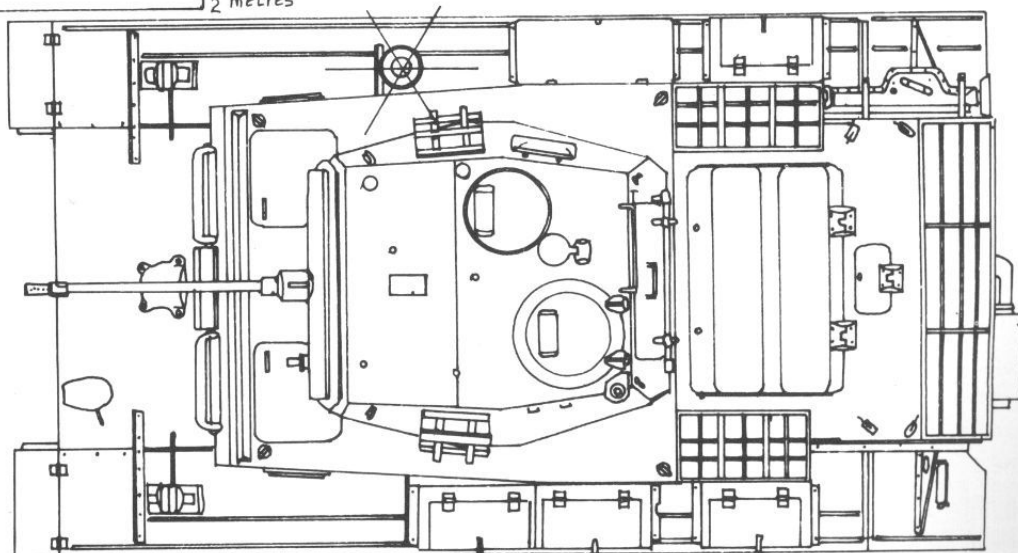
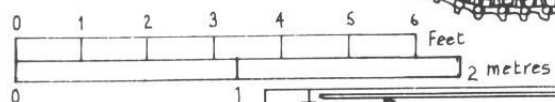
Various views of PzKpfw II Ausf. L, 'Luchs' as used in North West Europe against the Western Allies. Some vehicles used on the Eastern front had extra nose armour.

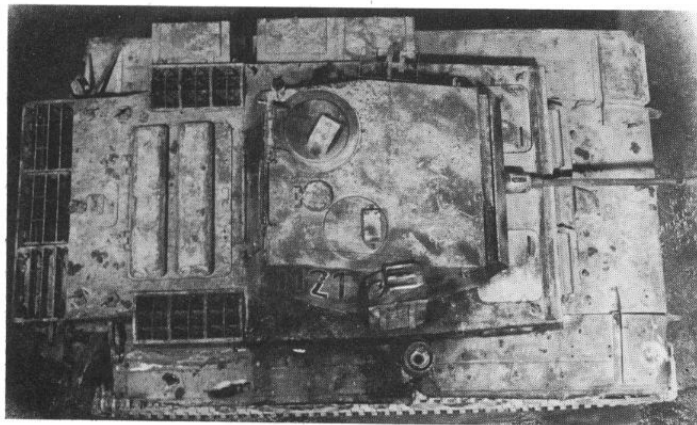
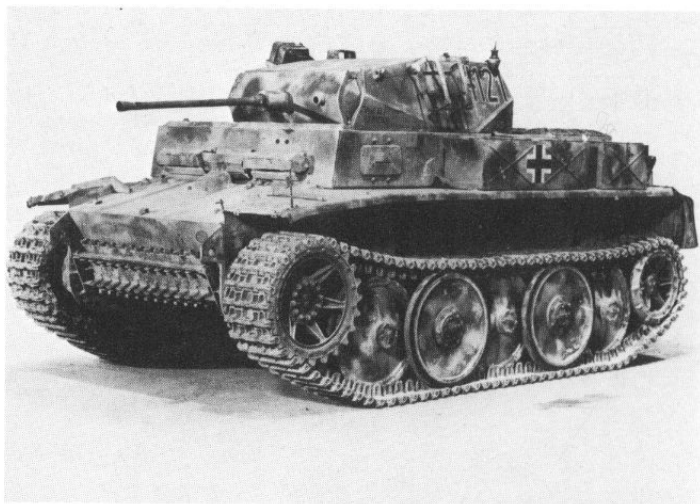
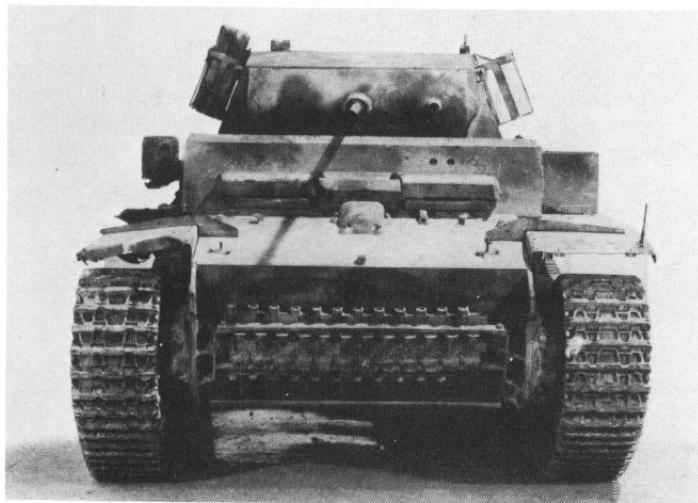
BELOW: An interior view of a captured 'Lynx'. Note the driver's steering levers at lower left. The 2cm KwK 38 is in the centre of the turret with its 'T' shaped trigger on the elevating handwheel. The tank mounting for the missing MG34 is on the left with its trigger on the 'pistol grip' type traversing handwheel located to the right under the gearbox on the turret ring. The mounting for the telescopic gunsight is to the right of the 2cm main armament.





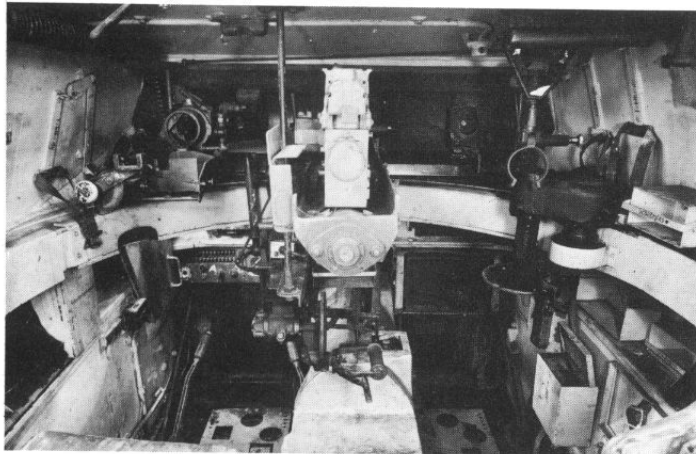
*PzKpfw II (2cm) Ausf L
'LUCHS'
SdKfz 123*

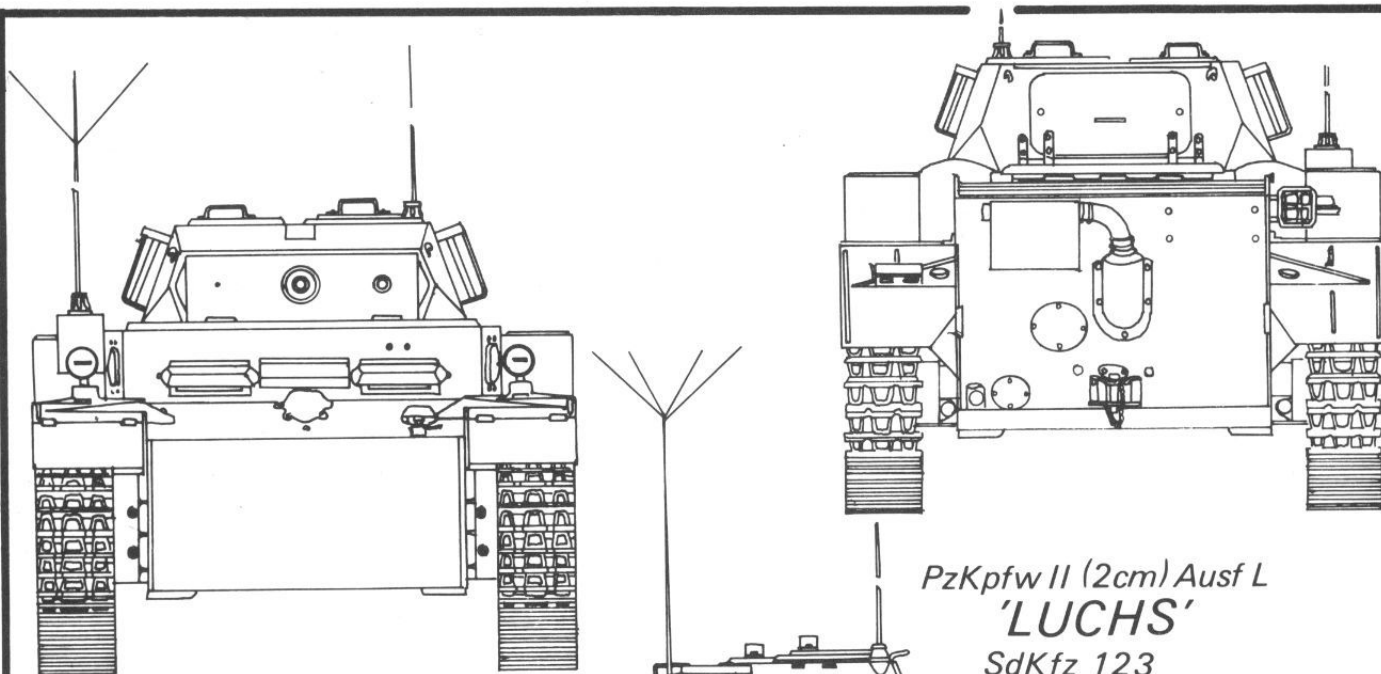




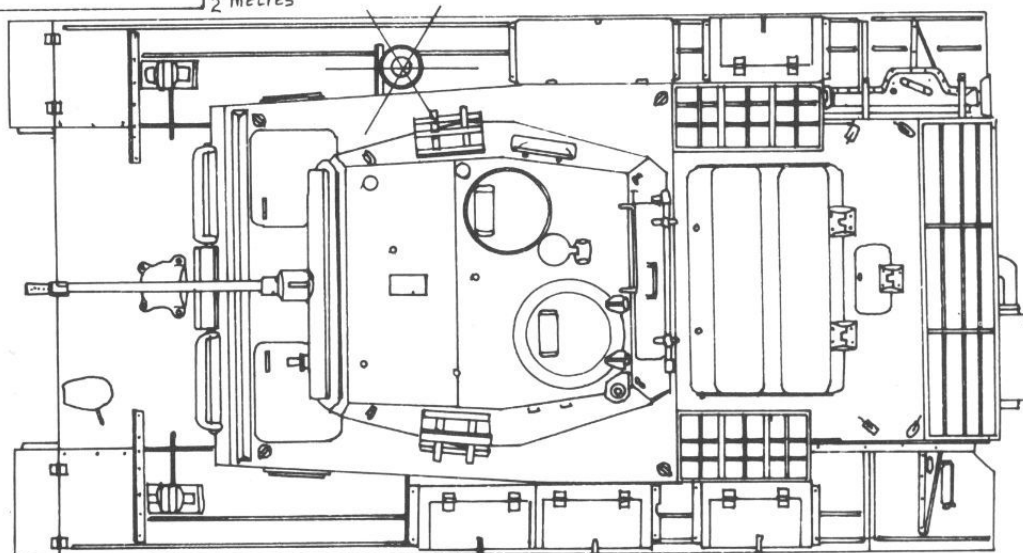
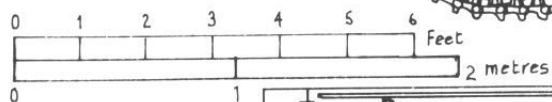
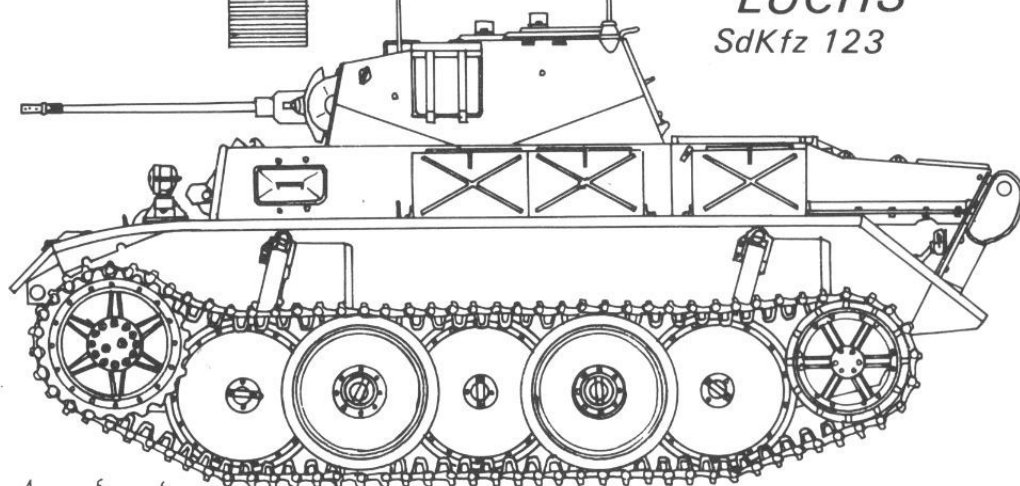
Various views of PzKpfw II Ausf. L, 'Luchs' as used in North West Europe against the Western Allies. Some vehicles used on the Eastern front had extra nose armour.

BELOW: An interior view of a captured 'Lynx'. Note the driver's steering levers at lower left. The 2cm KwK 38 is in the centre of the turret with its 'T' shaped trigger on the elevating handwheel. The tank mounting for the missing MG34 is on the left with its trigger on the 'pistol grip' type traversing handwheel located to the right under the gearbox on the turret ring. The mounting for the telescopic gunsight is to the right of the 2cm main armament.





*PzKpfw II (2cm) Ausf L
'LUCHS'
SdKfz 123*

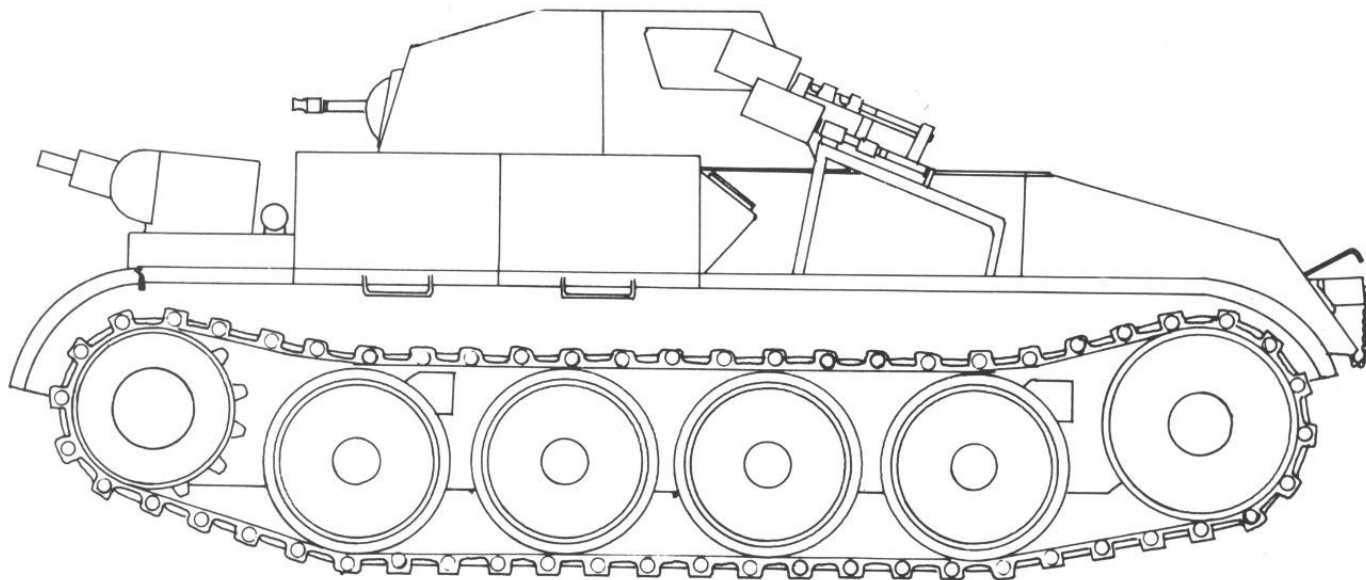


The *PzKpfw II* was one of the German's most important self-propelled gun carriages. The 1941 programme had intended to utilise the VK 903 chassis for this purpose but instead the older *PzKpfw II* chassis was adopted as its production facilities already existed. FAMO produced *PzKpfw II* based self-propelled artillery until 1944. Both the chassis of old battle tanks and newly produced units were used. Two of Germany's most important S.P.s. were *PzKpfw II* based; the 75mm armed '*Marder II*' *Panzerjäger* and the '*Wespe*' self propelled 105mm field howitzer.

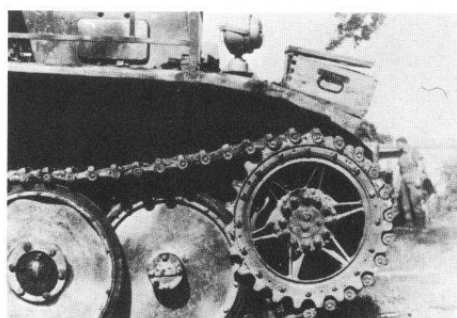
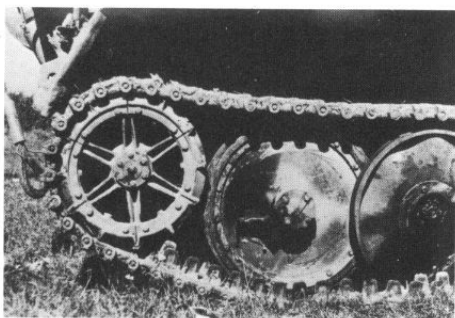
One of the most interesting other conversions of the *PzKpfw II* was into an amphibious tank. When the *Wehrmacht* was planning the invasion of Britain tanks were prepared for amphibious operation to get armoured support ashore as soon as possible. *PzKpfw III* and *IV* were fitted to submerge but the *PzKpfw II* were light enough to be modified to float. Three manufacturers were asked to prepare equipment, Alkett (Berlin), Sachsenberg (Roslau) and Buchmann (Ribnitz). Sachsenberg produced a full scale 'boat' design which was lowered over the tank but in the end a double pontoon arrangement was adopted with one

attached to each side of the tank. The tank was waterproofed and fitted with a small propellor to drive itself through the water at around 10 kph (3 mph). The first two amphibious tank battalions, 'A' and 'B', formed in the late summer of 1940 from volunteers from the 2nd Panzer Division, tested the equipment at Putlos. A total of 52 sets of equipment was purchased and the *PzKpfw II* of a complete Panzer Brigade converted to take them. With the redeployment to Russia most of this 18th Panzer Brigade went to form the 18th Panzer Regiment of 18th Panzer Division which used its submersible *PzKpfw III* and *IV* in the crossing of the Bug on the opening day of *Barbarossa*. It is possible that the *PzKpfw II* – which were still fitted to take the floatation equipment – also demonstrated their amphibious capabilities that day.

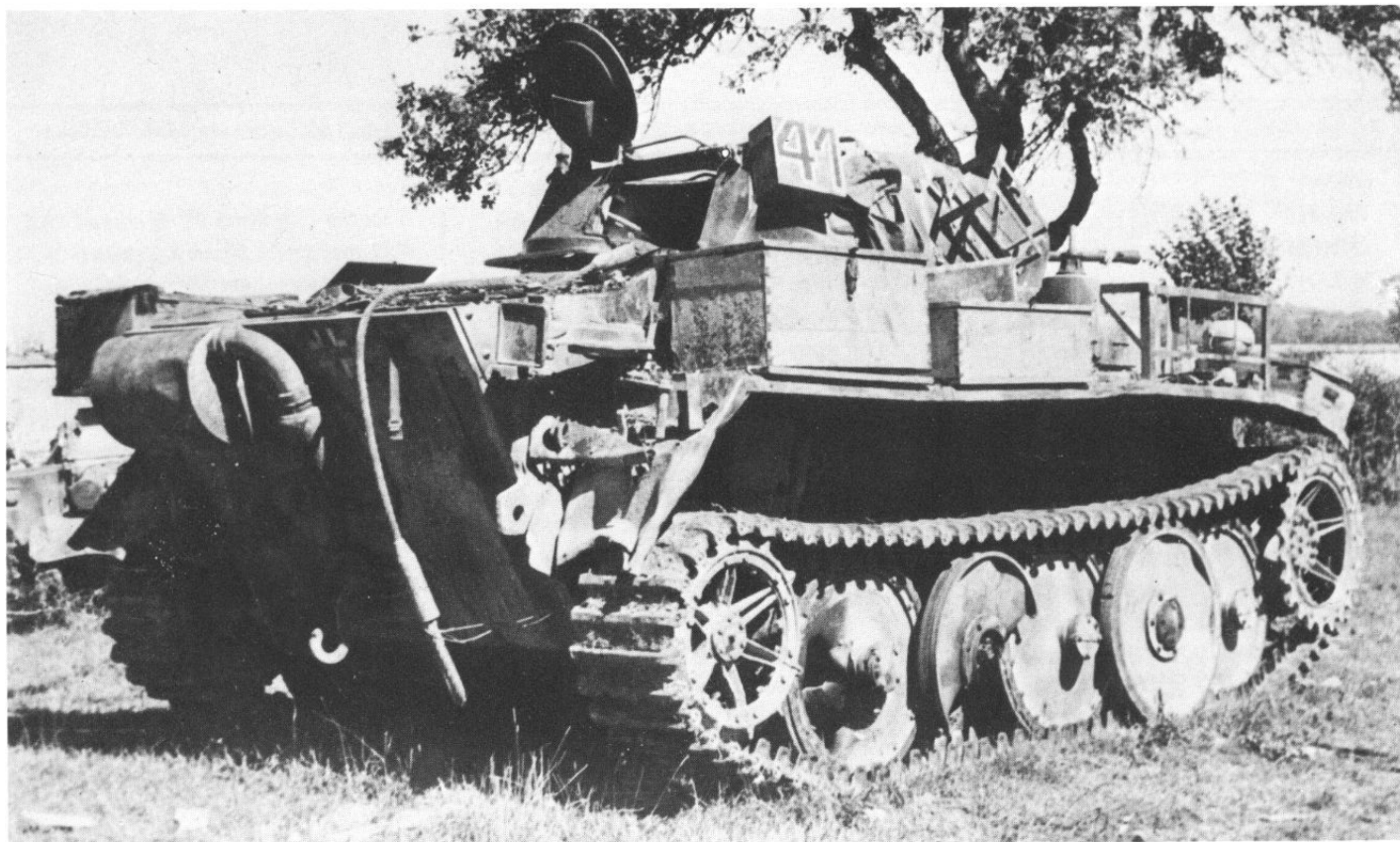
When made obsolete as battle tanks *PzKpfw II* were used, often with extra radio equipment, as command, observation and fire control vehicles for S.P. artillery and *Panzerjäger* units. A large frame antenna was sometimes carried on the rear decking and the main armament might be removed or replaced by a dummy gun.



PzKpfw II (F) Sdkfz 122

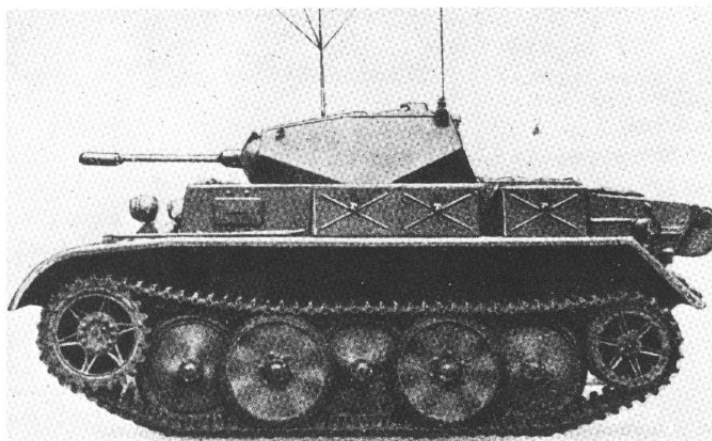


The sprocket and idler wheels of the PzKpfw II Ausf. L 'Luchs'.



ABOVE: Captured Luchs (Lynx) with damaged suspension.

A Lynx reconnaissance tank displays the aerials for both its short and medium wave radio sets.



Older *PzKpfw II* tanks were used from 1940 to supplement *PzKpfw I* in the tank platoons of armoured engineer battalions. Two *PzKpfw II* seem usually to have been allocated to each platoon and they were sometimes fitted with 'arm' like '*Ladungsleger*' equipment. Engineer *PzKpfw II* might also be equipped with two-piece inclined ramps for bridgelaying; 7th Panzer Division's *Pionier Bataillon 58* used this equipment in the French campaign. From 1942 the engineers' *PzKpfw II* were cut down into turretless carriers. These were known as '*Pionier-Kampfwagen II*' but this designation may well have been given to all the engineers' *PzKpfw II*. Other cut down *PzKpfw II* chassis were used as general supply carriers and as driver trainers.

There were other more experimental conversions of the *PzKpfw II*. Magirus built a '*schnellbrücke*' (literally 'fast bridge') bridgelayer on an *Ausf a* chassis. This utilised a one piece bridge section which was carried on top of the vehicle and which could be turned through 180° to be laid in front of the carrier. Only one seems to have been built and it disappeared from German records in the Spring of 1941. Wegmann also carried out experiments in 1939-40 with hammer mine clearance equipment utilising three *PzKpfw II* chassis but nothing again seems to have come of the work.

In its many variants and forms the versatile *PzKpfw II* chassis remained in German service until the end of the war. *PzKpfw II* tanks also saw service with Germany's allies; Slovakia, Bulgaria, Romania and Hungary. After the war a few *PzKpfw II* even found their way into the hands of the Lebanese Army.

APPENDIX I

Data Tables

		PzKpfw I (MG) Ausführung A (Sd Kfz 101)	PzKpfw I (MG) Ausführung B (Sd Kfz 101)
CREW WEIGHT LENGTH OVERALL WIDTH OVERALL HEIGHT OVERALL TRACK LENGTH ON GROUND TRACK WIDTH LINKS PER TRACK ENGINE TYPE & RATING FUEL CAPACITY GEARBOX TYPE STEERING TURNING CIRCLE MAXIMUM ROAD SPEED RANGE: ROAD CROSS COUNTRY GROUND CLEARANCE VERTICAL STEP WADING DEPTH TRENCH CROSSING ARMAMENT		Two 5.4 tonnes (5.3 tons) 4.02 metres (13 feet 2 inches) 2.06 metres (6 feet 10 inches) 1.72 metres (5 feet 8 inches) 2.47 metres (8 feet 1 inch) 0.28 metres (11 inches) 89 Krupp M305 4 cylinder horizontally opposed, air cooled, petrol: bore 92mm, stroke 130mm; 3,460cc, 57hp at 2500rpm 144 litres (31.7 imp. gallons) ZF Aphon FG31 5F × 1R Mechanical Clutch & Brake 2.1 metres (6 feet 11 inches) 37kph (23mph) 145km (90 miles) 100km (62 miles) 0.3 metres (1 foot) 0.37 metres (1 foot 2½ inches) 0.6 metres (2 feet) 1.4 metres (4 feet 6 inches) 2 × 7.92mm MG13 with 1,525 rounds	Two 6 tonnes (5.9 tons) 4.42 metres (14 feet 6 inches) 2.06 metres (6 feet 10 inches) 1.72 metres (5 feet 8 inches) 2.47 metres (8 feet 1 inch) 0.28 metres (11 inches) 100 Maybach NL38TR 6 cylinder, in line, water cooled petrol: bore 90mm, stroke 100mm; 3,791cc, 100 hp at 3000rpm 146 litres (32.1 imp. gallons) ZF Aphon FG31 5F × 1R Mechanical Clutch & Brake 2.1 metres (6 feet 11 inches) 40kph (25mph) 140km (87 miles) 115km (71 miles) 0.3 metres (1 foot) 0.37 metres (1 foot 2½ inches) 0.6 metres (2 feet) 1.4 metres (4 feet 6 inches) 2 × 7.92 MG13 with 2250 rounds
ARMOUR	CUPOLA TOP FRONT TURRET/ SUPERSTRUCTURE MANTLET SIDES REAR	8mm at 18°front and 0°rear 13mm at 80° 13mm rounded 13mm at 68° 13mm at 68°	8mm at 18°front and 0°rear 13mm at 80° 13mm rounded 13mm at 68° 13mm at 68°
HULL	DRIVERS PLATE GLACIS NOSE UPPER SIDES LOWER SIDES REAR DECKING BELLY TAIL TOP BOTTOM	13mm at 68° 8mm at 18° upper and 22°lower 13mm at 63° 13mm + 13mm strip at 70° centre 13mm at 73° front and 82° rear 13mm at 90° 6mm at 58° 6mm at 0° 13mm at 71° 13mm at 34°	13mm at 68° 8mm at 17° upper and 20° lower 13mm at 63° 13mm + 13mm strip at 68° 13mm at 90° 6mm at 3° (central decking 8mm at 0°) 6mm at 0° 13mm at 71° 13mm at 34°
NOTE: Angles are given German Style 0° – horizontal 90° – vertical			

Data Tables

Kleiner Panzerbefehlswagen (Sd Kfz 265)	Pzkw II (2cm) Ausf. A-C (Sd Kfz 121)	Pzkw II (2cm KwK 38) Ausf. L (Luchs) Sd Kfz 123
<p>Two</p> <p>5.88 tonnes (5.78 tons)</p> <p>4.42 metres (14 feet 6 inches)</p> <p>2.06 metres (6 feet 10 inches)</p> <p>1.99 metres (6 feet 6½ inches)</p> <p>2.47 metres (8 feet 1 inch)</p> <p>0.28 metres (11 inches)</p> <p>100</p> <p>Maybach NL38TR 6 cylinder, in line, water cooled petrol: bore 90mm stroke 100mm; 3,791cc, 100hp at 3,000rpm</p> <p>146 litres (32.1 imp. gallons)</p> <p>ZF Aphon FG31 5F × 1R</p> <p>Mechanical Clutch & Brake</p> <p>2.1 metres (6 feet 11 inches)</p> <p>40kph (25mph)</p> <p>140km (87 miles)</p> <p>115km (71 miles)</p> <p>0.295 metres (11½ inches)</p> <p>0.37 metres (1 foot 2½ inches)</p> <p>0.6 metres (2 feet)</p> <p>1.4 metres (4 feet 6 inches)</p> <p>17.92mm MG34 with 900 rounds</p>	<p>Three</p> <p>9.5 tonnes (9.35 tons)</p> <p>4.81 metres (15 feet 9½ inches)</p> <p>2.28 metres (7 feet 6 inches)</p> <p>2.02 metres (6 feet 7½ inches)</p> <p>2.4 metres (7 feet 10½ inches)</p> <p>0.3 metres (12 inches)</p> <p>105</p> <p>Maybach HL62TRM 6 cylinder, in line water cooled petrol: bore 105mm stroke 120mm; 6,191cc, 140hp at 2,600rpm</p> <p>170 litres (37.4 imp. gallons)</p> <p>ZF Aphon SSG46 6F × 1R</p> <p>Epicyclic Clutch & Brake</p> <p>4.8 metres (15 feet 9 inches)</p> <p>40kph (25mph)</p> <p>190km (118 miles)</p> <p>125km (78 miles)</p> <p>0.345 metres (1 foot 1½ inches)</p> <p>0.42 metres (1 foot 4½ inches)</p> <p>0.925 metres (3 feet)</p> <p>1.8 metres (5 feet 11 inches)</p> <p>1 × 20mm KwK30 or 38 with 180 rounds</p> <p>1 × 7.92mm MG34 with 1425 rounds (drums) 2100 (belts)</p>	<p>Four</p> <p>11.8 tonnes (11.7 tons)</p> <p>4.63 metres (15 feet 2½ inches)</p> <p>2.48 metres (8 feet 2 inches)</p> <p>2.21 metres (7 feet 3 inches)</p> <p>2.2 metres (7 feet 2½ inches)</p> <p>0.36 metres (14 inches)</p> <p>96</p> <p>Maybach HL66P, 6 cylinder in line water cooled petrol: bore 105mm stroke 130mm; 6,754cc, 180hp at 3,200rpm</p> <p>235 litres (51.7 imp. gallons)</p> <p>ZF Aphon SSG48 6F × 1R</p> <p>Epicyclic Clutch & Brake</p> <p>Able to turn on the spot</p> <p>60kph (37mph)</p> <p>290km (180 miles)</p> <p>175km (109 miles)</p> <p>0.4 metres (1 foot 4 inches)</p> <p>0.6 metres (¾ feet)</p> <p>1.4 metres (4 feet 7 inches)</p> <p>1.6 metres (5 feet 3 inches)</p> <p>1 × 20mm KwK38 with 320 rounds</p> <p>1 × 7.92mm MG34 with 2280 rounds</p>
<p>10mm at 0° top 14mm + 17mm at 67° front</p> <p>8mm at 0°</p> <p>14.5mm + 17mm at 67°</p> <p>12mm hemispherical</p> <p>14.5mm at 70° front, 67° centre, 72° rear</p> <p>14.5mm at 70°</p>	<p>10mm at 0° top</p> <p>10mm at 13° front 10mm at 0° rear</p> <p>14.5mm + 20mm rounded (30mm rounded*)</p> <p>14.5mm + 14.5mm rounded (30mm rounded*)</p> <p>14.5mm at 68°</p> <p>14.5mm at 68°</p>	<p>12mm at 10° front, 12mm at 0° rear</p> <p>30mm at 90°</p> <p>30mm rounded</p> <p>20mm at 70° upper, 20mm at 75° lower</p> <p>20mm at 70°</p>
<p>8mm + 12mm at 16° upper and 8mm at 19° lower</p> <p>14.5mm + 17mm at 65°</p> <p>14.5mm at 90°</p> <p>7mm at 5°</p> <p>6mm at 0°</p> <p>14.5mm at 70°</p> <p>14.5mm at 35°</p>	<p>14.5mm + 20mm at 87° (30mm at 80°*)</p> <p>14.5mm rounded + 14.5mm at 15° (20mm at 18°*)</p> <p>14.5mm rounded + 20mm at 59° upper</p> <p>14.5mm at 16° lower (35mm at 77° upper*)</p> <p>14.5mm at 90°</p> <p>14.5mm at 90° (20mm at 90°*)</p> <p>10mm at 8°</p> <p>5mm at 0°</p> <p>14.5mm at 83°</p> <p>10mm at 28°</p>	<p>30mm at 85°</p> <p>20mm at 20°</p> <p>30mm at 65° upper and 20mm at 20° lower</p> <p>20mm at 90°</p> <p>20mm at 90°</p> <p>10mm at 4° (12mm at 0° centre)</p> <p>10mm at 0°</p> <p>20mm at 60°</p> <p>20mm at 20°</p>
NOTE: Above data is for a later up-armoured model.	NOTE: Data above for tanks in reworked condition * Data for Ausf. F.	

APPENDIX II

Steering Systems.

(Reproduced, with slight amendment from a contemporary document held in the R.A.C. Tank Museum, Bovington, by whose kind permission it appears here.)

The first German tanks, *PzKpfw I* and *II*, were provided with discontinuous steering mechanisms operating on the clutch and brake principle. These mechanisms may be divided into two types, namely the simple clutch and brake (*PzKpfw I* and *PzKpfw II*, models D and E) and the epicyclic clutch and brake (*PzKpfw II*, all models except D and E). Steering mechanisms of this class have the advantage of comparative simplicity and there is much to be said for their use in light tanks.

Figure 1 illustrates diagrammatically the arrangement used in *PzKpfw I* Model A, an arrangement which is, incidentally, very similar to that employed in British light tanks Marks IV to VI.

The drive is transmitted via a bevel gear to a cross shaft which is connected through steering clutches to the reduction gears and driving sprockets. Each steering clutch has its driven portion constructed in the form of a brake drum for the corresponding track brake.

The tank is steered by two levers connected by suitable linkages to spindles controlling the left and right clutch brake units respectively. The spindle of each unit carries a cam at one end, which acts against the upper end of the clutch withdrawal fork, and a radius arm at its other end, which is connected to the brake operating mechanism.

When travelling straight ahead with the steering levers in the forward rest position, both steering clutches are engaged and both track brakes are off. To turn in either direction, the appropriate steering lever is pulled back causing the corresponding spindle to rotate. The first part of this movement disengages the steering clutch. Thus, while the track on one side continues to be driven, the other track is allowed to run free. Subsequent movement of the steering lever applies the track brake on the same side and the turn is completed with one track driven and the other stationary.

The steering layout used in the *PzKpfw I* Model B is similar to that described above. *PzKpfw II* Models D and E have the same type of steering mechanism but have separate track brakes arranged on the steering clutch output shafts.

Figure 2 illustrates the transmission layout used in very early prototype models of *PzKpfw II* and **Figure 3** that standardised in all later models, except Models D and E, up to and including Model F. The same epicyclic clutch and brake system is embodied in both these transmissions and the only essential difference between them is the type of final reduction gear employed. In **Figure 2**, this reduction is obtained between the sunwheel and planet carrier of an epicyclic train, the reaction being taken by the annulus bolted to the hull side. In **Figure 3**, however, the epicyclic train is replaced by a small pinion meshing with an internally toothed gear ring which drives the track sprocket.

In both layouts, the main drive from the gearbox is transmitted through bevel gears and a cross shaft to the sunwheels of a pair of steering epicyclics. When travelling straight ahead, the annuli of both steering epicyclics are held stationary by the steering brakes and the drive is transmitted via the planet carriers to the reduction gears which drive the sprockets.

When one of the steering levers is operated to make a turn, its first movement releases the annulus of the corresponding epicyclic. The annulus is then free to rotate and no drive is therefore transmitted to the planet carrier. In other words, releasing the annulus, which constitutes the reaction member of an epicyclic train, produces the same effect as releasing the steering clutch in a simple clutch and brake system: it interrupts the drive to the track. Subsequent movement of the steering lever applies the track brake to the same side.

The *PzKpfw II* (Lynx) has epicyclic clutch and brake systems which are generally similar to those of the *PzKpfw IV*. The operation is similar, the sunwheels being held by the steering brakes and the torque transmitted by the planet carriers to the final drive gears. Track brakes of the external contracting type are fitted to each half-shaft.



Fig 1.

PzKpfw I Ausf. A.

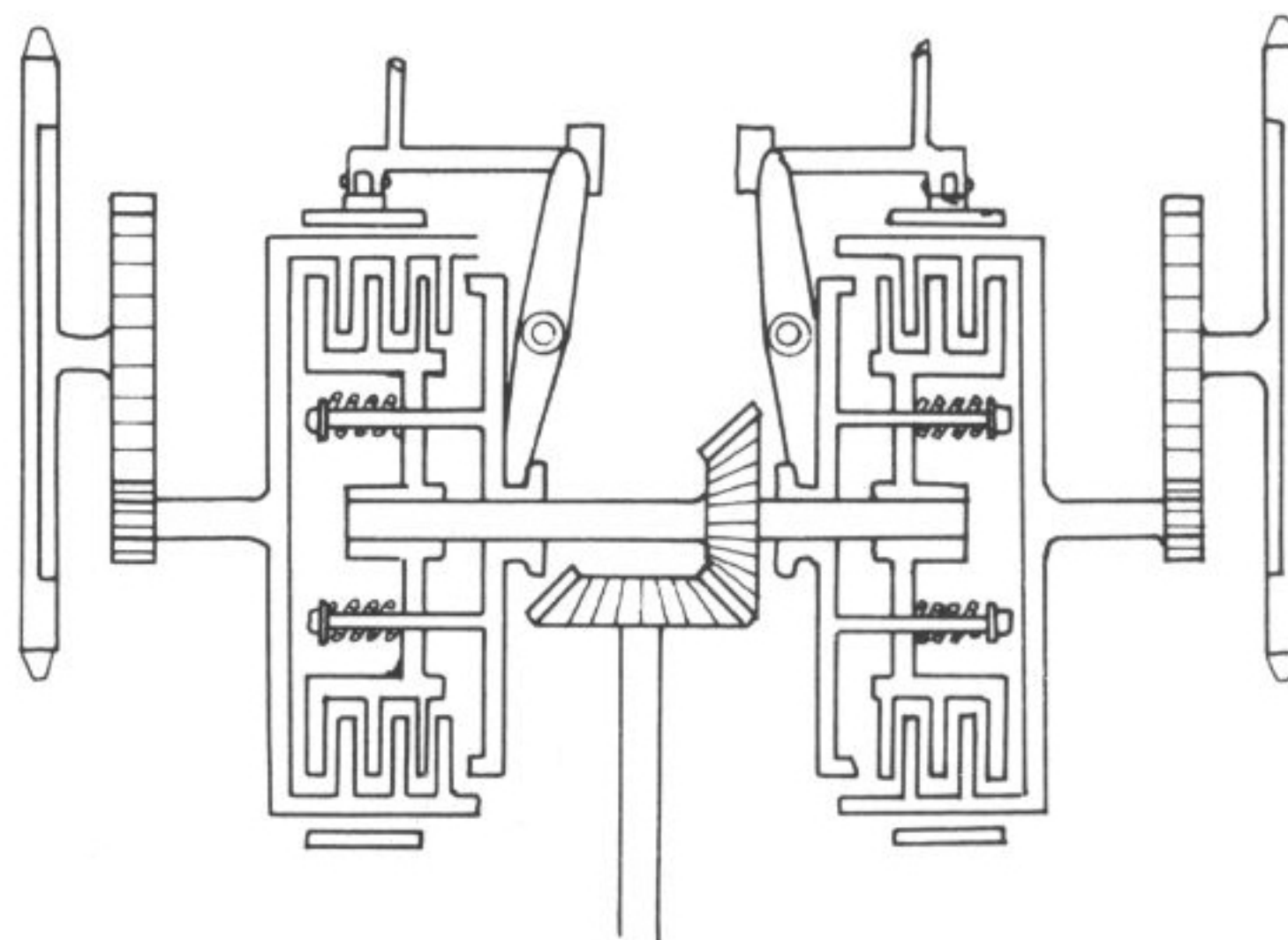


Fig 2.

PzKpfw II Ausf. a1, a2 & a3.

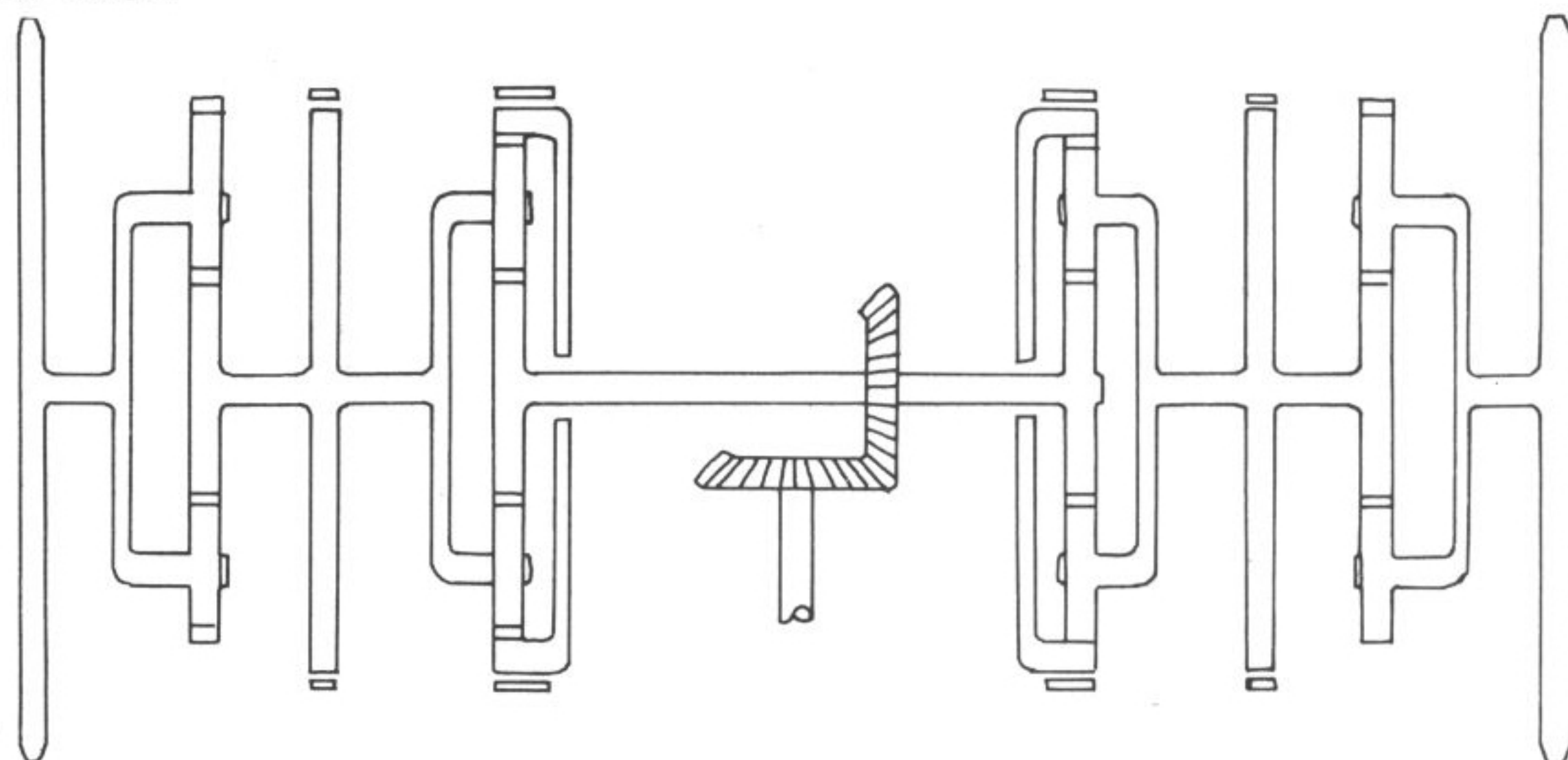
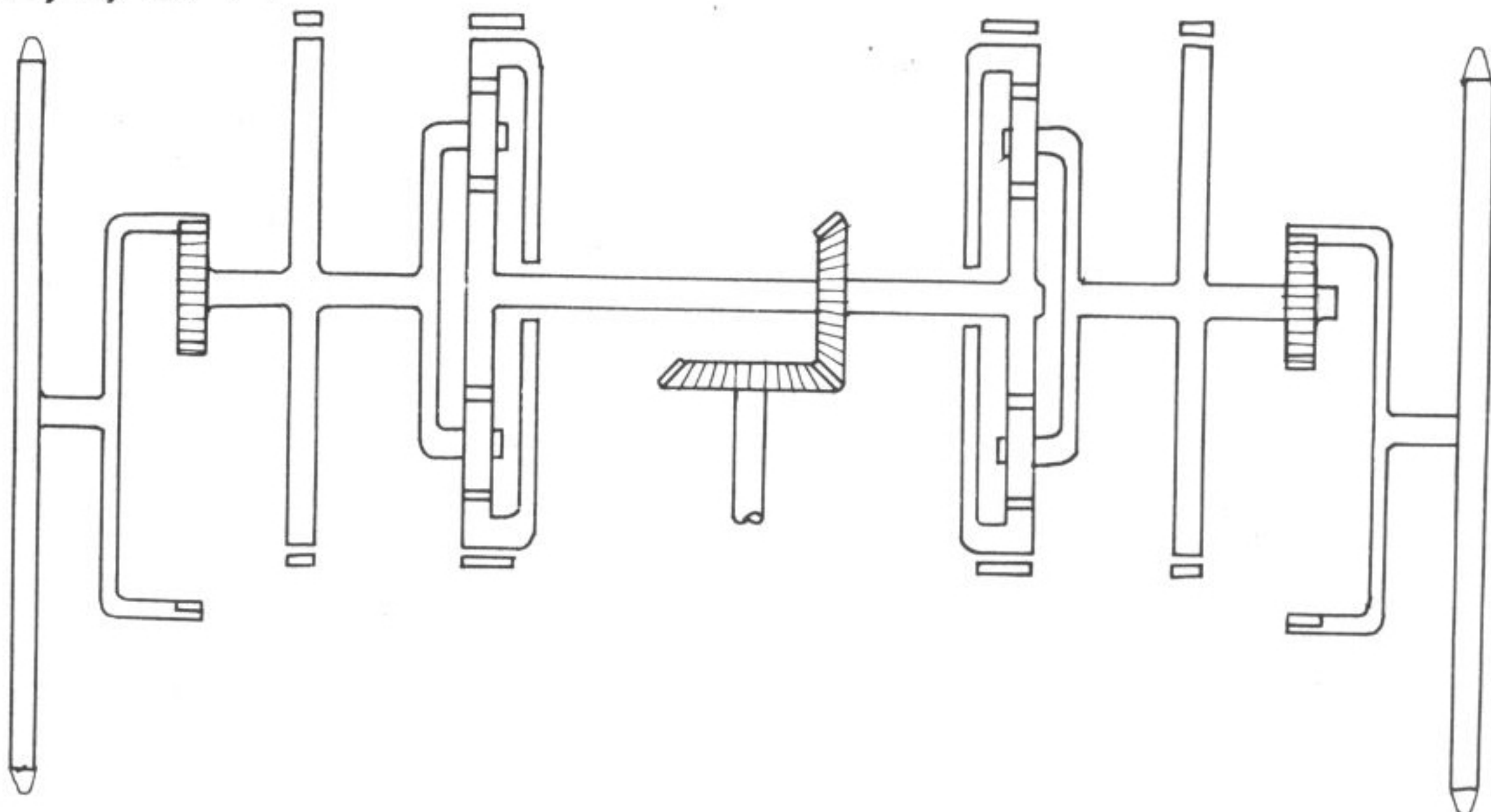


Fig 3.

PzKpfw II Ausf. b,c,A,B,C, & F.





A burnt out PzKpfw II Ausf A-C photographed after the fighting around Sollum at the end of April 1941 shows up well the profile view of the type after it had been fitted with a turret cupola. Note the MG34 co-axial gun lying on the ground under the rear idler, and its barrel near the centre roadwheel.

APPENDIX III

Chassis Number Allocation Series.

<i>PzKpfw I Ausf A</i>	9 001 – 10 477	Also includes Kleiner Panzerbefehlswagen.
<i>PzKpfw I Ausf B</i>	10 478 – 16 500	
<i>PzKpfw I Ausf C</i>	150 101 – 150 140	
<i>PzKpfw I Ausf F</i>	150 301 – 150 330	
<i>PzKpfw II Ausf a1</i>	20 001 – 20 010	
<i>PzKpfw II Ausf a2</i>	20 011 – 20 025	
<i>PzKpfw II Ausf a3</i>	20 026 – 20 075	
<i>PzKpfw II Ausf b</i>	21 001 – 21 025	
<i>PzKpfw II Ausf c</i>	21 101 – 23 000	
<i>PzKpfw II Ausf A</i>	23 001 – 24 000	
<i>PzKpfw II Ausf B</i>	24 001 – 26 000	
<i>PzKpfw II Ausf C</i>	26 001 – 27 000	
<i>PzKpfw II Ausf D</i>	27 001 – 27 800	
<i>PzKpfw II Ausf E</i>	27 801 – 28 000	
<i>PzKpfw II Ausf F</i>	28 001 – 29 400	
<i>PzKpfw II Ausf G</i>	150 001 – 150 075	
<i>PzKpfw II Ausf J</i>	150 201 – 150 222	
<i>PzKpfw II Ausf L</i>	200 001-4 and 200 101-200	

Another view of the burnt out vehicle. Note the spare tracks added to the nose to enhance protection. This photograph was taken on the 2nd of May, 1941.



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